EACD and EPNS Joint Satellite Symposia

Barcelona, 18-19 October 2006

SATELLITE SYMPOSIUM I: DISORDERS OF THE BASAL GANGLIA

1.

FUNCTIONAL ORGANIZATION OF THE BASAL GANGLIA

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The basal ganglia provide a major integrative system of the forebrain implicated in adaptative control of behavior. Receiving inputs from the entire cerebral cortex and limbic system, the basal ganglia contribute to the selection of appropriate actions in response to relevant environmental cues and reward expectancy. Early observations relating basal ganglia dysfunction to the so called extrapyramidal motor disorders and the tight connections of the basal ganglia with premotor thalamic and brain stem nuclei led to consider the basal ganglia as an integral part of the motor system. However it is now well documented that via its relationships with prefrontal cortical areas and components of the limbic system, the basal ganglia also contribute to cognitive and motivational aspects of action selection. Accordingly, increasing evidence support the implication of basal ganglia circuits in neuropsychiatric disorders such as obsessive and compulsive disorders, Tourette syndrome, drug addiction and schizophrenia.

The present communication will provide an overview of current knowledge of the functional organization of the basal ganglia. After describing classical concepts on the basic architecture and functional properties of the basal ganglia circuits, the way these circuits dynamically interact to shape basal ganglia outflow and perform action selection will be examined. Based on this knowledge and in the context of the classically proposed pathophysiological model of Parkinson's disease, the mechanisms leading to alteration in basal ganglia outflow and its restoration by deep brain stimulation will be discussed. Emphasis will be given to the concept that changes in the spatio-temporal patterns of activity rather than the firing rate of individual neurons is a main determinant of the normal and pathological functions of the basal ganglia.

2.

CLINICAL EXPRESSION OF MOVEMENT DISORDERS IN CHILDREN

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Movement disorders can be defined as neurological syndromes characterized by excess of movements or slowness or poverty of movements unrelated to weakness or spasticity. Most movement disorders are associated with pathologic alterations in the basal ganglia or their connections. Classification of movement disorder is primarily based upon the clinical description of the phenomenology observed. Movement disorders can be divided into two main groups: hyperkinesias and hypokinesias. The most important hyperkinesias are represented by chorea, dystonia, tremor, myoclonus and tics; hypokinesias are mainly represented by parkinsonism (hypokinetic-rigid syndrome). The diagnostic approach to movement disorders is a multistep process: (i) identify the most pertinent category in which the phenomenology observed can be included; (ii) distinguish between primary (without recognizable cause) and secondary (due to an established disease) movement disorders, this distinction is supported by an accurate investigation both on family and personal history and on general and neurological valuation of the patient, and (iii) plan of the diagnostic investigations depending on information derived from the above mentioned steps.

3.

BILATERAL LESIONS OF BASAL GANGLIA IN CHILDHOOD

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Developmental lesions of the basal ganglia (BG) present with dramatic clinical signs that result from impaired control of motor, oculomotor and/or cognitive behaviour. An attempt to classify this group of disorders takes into account the clinical presentation and the topography of the lesions as depicted in brain MRI.

Dysfunction of the primary afferent structure of the BG, the striatum, is the signature of several infectious, metabolic and toxic disorders. Clinical signs may have an acute or chronic/progressive onset. Bilateral striatal lesions, may have a sudden clinical presentation, featuring a combination of fever, seizures, mutism, painful crying and various extrapyramidal signs, comprising rigidity, dystonia, chorea, ballismus or tremor. Infectious etiologies include *Mycoplasma pneumoniae*, measles, HHV-6, rotavirus, and group A beta haemolytic *Streptococcus*, but evidence for a specific infection is often lacking. Some of these patients undergo a remarkable clinical and radiological recovery while other are left with permanent, severe disabilities. Other etiologies to be considered are profound hypoxia-ischemia, hemolytic-uremic syndrome or wasp sting. Regarding chronic cases, many causes of progressive neurodegeneration, such as Huntington or Wilson's disease may target the BG. However, selective impairment of the striatum, particularly when bilateral, must prompt the investigation of specific metabolic disorders. The neostriatum, particularly the putamen, is classically involved in mitochondrial disorders, Leigh syndrome being the prototypic mitochondrial syndrome of central gray matter degeneration. In addition, some cases of infantile bilateral striatal necrosis (IBSN) are found to harbour mutations in genes of different mtDNA-encoded subunits of the mitochondrial respiratory chain. Recently, mutations in *nup62*, a gene encoding a nucleoporin, have been described in familial IBSN. In these various syndromes, movement disorders, particularly dystonia, are often the prevailing sign. Of note, some progressive diseases, such as glutaric aciduria type I and some mitochondrial encephalopathies, may in fact present as acute pseudo-parainfectious disorders. This may occur less frequently with Wilson's disease, 3-methyl glutaconic and alpha keto-glutaric aciduria. Predominantly pallidal lesions may underlie acute neurological dysfunction in bilirubin encephalopathy, carbon monoxide intoxication and methyl malonic aciduria, or may present more

insidiously in again carbon monoxide intoxication, mitochondrial disorders, and neurodegeneration with brain iron accumulation. Bilateral involvement of the subthalamic nucleus has been described in bilirubin encephalopathy and in cytochrome-C oxidase deficient Leigh syndrome. Finally, while the thalamus does not belong into the BG proper, the clinical presentation of bilateral thalamic lesions, at least those involving pallidal target regions, is akin to that of striatal lesions, with dystonia being a leading sign. Acute thalamic involvement characterizes severe neonatal asphyxia, Japanese acute necrotizing encephalopathy, and several post-infectious variants, including a benign, reversible form. Bilateral thalamic lesions may also punctuate some chronic, progressive encephalopathies such as Krabbé leukodystrophy and GM1 or GM2 gangliosidosis.

4.

STREPTOCOCCAL INFECTIONS AND BASAL GANGLIA DISORDERS

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Sydenham's chorea (SC) has been established as a post-infectious autoimmune disorder induced by streptococcal infection and represents a major criterion for the diagnosis of rheumatic fever. Recent reports have suggested that, in addition to SC, there exists a spectrum of post-streptococcal central nervous system (CNS) disorders with basal ganglia involvement. Patients present with an array of behavioral disturbances and/or movement disorders. The latter comprises hyperkinetic movement disorders including dystonia, myoclonus, paroxysmal dyskinesias, tremor and stereotypies. More recently, acute parkinsonism has also been reported. Although these conditions are by definition preceded by a streptococcal infection, it is a matter of debate if they are indeed caused by a streptococcal infection. There is also debate regarding the significance of identified anti-neuronal antibodies in SC and post-streptococcal CNS disorders, which would support the hypothesis of a common autoimmune pathophysiologic mechanism induced by streptococcus. This controversy is important due to potential therapeutic implications. Children with SC require antibiotic prophylaxis to reduce the risk of rheumatic heart disease and although treatment of chorea is generally symptomatic, immunomodulatory therapy may be used in severe cases. Management of the other post-streptococcal CNS disorders remains to be established.

SATELLITE SYMPOSIUM IV: DIAGNÓSTICOS EN ATENCIÓN TEMPRANA

1.

DIAGNÓSTICOS EN ATENCIÓN TEMPRANA

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Se plantean los principales logros en cuanto al diagnóstico y la detección precoz de los trastornos en el desarrollo en los últimos años así como algunos de los retos actuales.
Situación actual, logros. a) Diagnóstico y tratamiento precoz de trastornos motores; b) Seguimiento de lactantes de alto riesgo de etiología orgánica conocida (prematuros, bajo peso, anoxia neonatal, presencia de marcadores biológicos...); c) Progreso en la identificación , antes de la edad escolar, del déficit cognitivo, trastornos en la comunicación, en el lenguaje y dificultades en la conducta.
Algunas dificultades. La edad temprana de los niños y niñas, las variaciones en la normalidad y el continuo existente desde la normalidad a la patología, especialmente en lo referido a alteraciones en los ámbitos de la conducta, la comunicación y las emociones, plantea dificultades en el diagnóstico, con el riesgo de demorar la atención y de no intervenir en la etapa de mayor plasticidad del sistema nervioso. Se confía en la normalización –demorando así el inicio de atención hasta la aparición de la constelación completa de signos– en base a categorías diagnósticas que a menudo se han elaborado con criterios correspondientes a poblaciones de mayor edad, de difícil aplicación a menores de 2 años.
Retos actuales en el diagnóstico. a) Avanzar el diagnóstico de déficit cognitivo, déficit de atención/hiperactividad, y dificultades en la comunicación y la relación social; b) Mejorar nuestros pronósticos, identificando factores/asociación de factores de buen pronóstico (protectores/resiliencia) y de mal pronóstico (factores de riesgo). Para conseguir los objetivos anteriores será fundamental: a) Disponer de cada niño o niña de información completa de antecedentes, condiciones del entorno y desarrollo en todos los ámbitos; b) Utilizar códigos diagnósticos comunes adecuados a estas edades; c) Estudios prospectivos en base a los dos puntos anteriores.

2.

ORGANIZACIÓN DIAGNÓSTICA PARA LA ATENCIÓN TEMPRANA (ODAT)

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La Federación Estatal de Profesionales de Atención Temprana (GAT) viene trabajando en proyectos con los que contribuir a la mejora de la atención temprana en nuestro país. Dado que el diagnóstico es uno de los temas que suscita mayor interés técnico, esta federación ha llevado a cabo la elaboración de la Organización Diagnóstica para la Atención Temprana (ODAT).
El principal objetivo de la ODAT es establecer un lenguaje común entre los distintos profesionales que intervienen en la atención temprana en relación con los criterios y los procedimientos diagnósticos específicos. La ODAT contempla las diferentes trastornos en el desarrollo infantil, los factores de riesgo, las deficiencias en las funciones y el entorno, a fin de que pueda aplicarse a toda la población infantil (0-6 años) susceptible de recibir atención temprana.
Se ha diseñado como una herramienta que puede facilitar el trabajo diario de los profesionales, con la cual se puede sistematizar el proceso diagnóstico, confiriendo a éste un carácter científico cada vez

más depurado y facilitando una atención más eficaz al niño. Con esta organización diagnóstica se posibilitarán mejoras sustanciales en la calidad de la intervención y de los resultados de la atención temprana.
Este instrumento permite unificar los criterios diagnósticos, aportando una clasificación específica para los trastornos del desarrollo infantil. Viene a cubrir la carencia existente en cuanto a una organización diagnóstica específica con la que abordar el diagnóstico de los trastornos del desarrollo en todas sus vertientes, pero también puede ser útil para disponer de información epidemiológica, realizar estudios e investigaciones, y obtener datos sobre la población atendida con los que planificar mejor los recursos.

3.

DIAGNÓSTICO PRECOZ DEL DÉFICIT COGNITIVO

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El diagnóstico precoz del déficit cognitivo forma parte de un proceso diagnóstico interdisciplinario, en el que la evaluación psicológica determina el perfil funcional y orienta el diagnóstico sindrómico y etiológico.
La decisión compleja de si un niño necesita atención terapéutica y de qué tipo debe basarse siempre en el diagnóstico, del cual forma parte la evaluación completa del desarrollo. El psicólogo clínico utiliza para ello: a) Historia clínica; b) Observación de la conducta espontánea del niño en situación de juego y de exploración normalizada; c) Características y respuesta del entorno; d) Información de otros profesionales (escuela, pediatra...); e) Tests cognitivos/escalas de desarrollo global y/o funciones específicas.
Los tests/escalas de desarrollo son especialmente útiles para el clínico como forma de evaluación y observación, sistematizada y normalizada, de un amplio espectro de funciones cognitivas. Dan la oportunidad al niño de mostrar aptitudes y limitaciones, nivel y forma de procesamiento cognitivo, tanto global como en habilidades cognitivas específicas.
Cada escala tiene unas cualidades únicas que la hacen especialmente útil como herramienta diagnóstica, pero también otros puntos que pueden generar desconfianza y que es necesario conocer.
La presencia de los padres durante el proceso diagnóstico favorece la confianza y bienestar del niño a lo largo de la exploración y, al mismo tiempo, la comprensión por parte de la familia de las posibilidades y límites del niño, situándolos en un plano en que los objetivos de la atención terapéutica se hacen más claros.
En la exposición oral se ampliará la información sobre el proceso diagnóstico. Se comentarán las escalas utilizadas en esta etapa, su significación clínica y su valor pronóstico en el diagnóstico precoz del déficit cognitivo.

4.

GENERAL MOVEMENTS: A WINDOW OF OPPORTUNITY FOR THE EARLY IDENTIFICATION OF CHILDREN AT HIGH RISK FOR DEVELOPMENTAL MOTOR DISORDERS

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During the last decade it has become clear that the assessment of the quality of general movements (GMs) in the young infant is a sensitive tool to evaluate the integrity of the young nervous system. GMs are movements in which all parts of the body participate and they are the most frequent movements till 4 months post-term.
Normal GMs are characterized by fluency, variation and complexity. These characteristics disappear when movements become abnormal. Movement complexity and variation are the major characteristics of GM-quality. Four classes of GM-quality can be distinguished: two forms of normal GMs (normal-optimal and normal-suboptimal GMs) and two forms of abnormal GMs (mildly and definitely abnormal GMs). Normal-optimal GMs are abundantly variable and complex. In addition they are also fluent. Normal-optimal movements are relatively rare: only 10-20% of 3 months old term infants show GMs of such a beautiful quality. The majority of infants shows normal-suboptimal movements, which are sufficiently variable and complex but not fluent. Mildly abnormal GMs are insufficiently variable and complex and not fluent, and definitely abnormal GMs are virtually devoid of complexity, variation and fluency.
Multiple studies in populations at risk for developmental disorders have shown that in particular movement quality during the last phase of GMs, i.e. the fidgety phase at 2-4 months post-term, has predictive power for developmental outcome. Definitely abnormal GMs at fidgety age are associated with the development of cerebral palsy or the complex form of minor neurological dysfunction. Studies on high risk infants also showed that abnormal movements at fidgety age in children without cerebral palsy are related to the development of coordination problems and fine manipulative disability.
In conclusion, the quality of GMs at 2-4 months post-term is a valuable, additional diagnostic tool for the prediction of neurodevelopmental outcome.

5.

TRASTORNO DE ESPECTRO AUTISTA: CUESTIONES SOBRE EL DIAGNÓSTICO PRECOZ Y EL PRONÓSTICO

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En la práctica clínica cotidiana en el CDIAP atendemos a niños pequeños que presentan síntomas que podrían incluirse dentro de lo que actualmente se entiende como espectro autista. Una gran parte de estos niños tienen menos de tres años.
En estos casos vemos diferencias significativas de evolución a partir de sintomatología similar. Desde evoluciones que situarían a algunos niños dentro del cuadro de autismo de Kanner hasta otras que los acercarían a la 'normalidad'. Entre estos polos extremos encontramos evoluciones hacia estructuras mentales de tipo autístico (rasgos autistas) y en bastantes ocasiones constatamos que desaparecen (o casi desaparecen) las características autísticas, pero persiste deficiencia mental. En esta situación nos encontramos con dificultades para reconocer signos diagnósticos tempranos que permitan prever la evolución.
Nos llama la atención tanto las mejoras (en ocasiones sorprendentes) en niños que presentaban sintomatología autista, como la confirmación de la gravedad del cuadro autista en otros niños con características parecidas a los primeros. Por lo tanto, constatamos la diferencia de respuesta a la ayuda en estos niños y nos preguntamos de qué dependen las posibilidades de mejora.
Desde esta experiencia de atención temprana y de la experiencia con niños mayores con autismo, parece importante poder intervenir cuando vemos signos de alarma y no esperar a que se confirme o no la patología, ya que en niños pequeños con esta sintomatología las posibilidades de mejora en algunos casos son muy altas y, sin embargo, el riesgo de mala evolución, si no se ayuda, también puede ser elevado.
Resulta básico colaborar y ayudar a las personas que conviven con el niño y lo fundamental en el tratamiento es el 'trato' que recibe en sus relaciones y entornos cotidianos: la familia y, también, la guardería.

6.

VALORACIÓN PRECOZ DE LA VISIÓN FUNCIONAL

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La visión nos ofrece el 80% de la información que nos llega del entorno y nos permite estructurar y organizar la realidad para entenderla de forma global. Cuando la vía visual del bebé está alterada, nos encontramos ante una situación de alto riesgo de trastorno cognitivo y/o emocional-mental.

En el Servicio de Atención Precoz del CRE Joan Amades atendemos a más de 300 niños con dificultades visuales. Un 70% son niños con discapacidad visual neurológica y otros trastornos, y el 30% restante, con ceguera o baja visión. Para cada grupo de población se establece un protocolo de intervención específico.

El objetivo del trabajo con niños con discapacidad visual neurológica es ayudarles a organizar el entorno visual para poder conectar mejor con él. Presentamos estímulos de forma pautada y gradual para evitar saturación. Tenemos en cuenta variables que mejoran la respuesta funcional visual, como iluminación tenue, tiempo prolongado de presentación del estímulo, con tamaño adecuado, contrastes en blanco-negro o amarillo-negro, movimientos oscilatorios y presentación de la cara humana en períodos prolongados y frecuentes.

La intervención en el niño con baja visión tiene como objetivo potenciar las funciones visuales. En la evaluación de la visión funcional nos basamos tanto en la observación, como en pruebas objetivas. Entrenamos a través del juego adecuado a la edad cronológica y con materiales atractivos y sugerentes apropiados al tipo de déficit visual, con luces, colores, formas, movimientos y material audiovisual, y siempre teniendo en cuenta un adecuado contraste, iluminación, tamaño, distancia y brillo.

El trabajo en las unidades de neonatología se basa en detectar posibles alteraciones visuales del neonato.

Dado que el período crítico del proceso madurativo visual es de los 0 a los 4 meses y el período sensible es de los 4 meses a los 2 años, resulta básico iniciar precozmente y de forma paralela un abordaje tanto médico como terapéutico y clínico para restablecer y dar significado a la comunicación alterada entre los padres y su hijo, la cual es determinante para la potenciación de su red neurológica.

7.

LA FORMACIÓN EN LA ATENCIÓN TEMPRANA: PERSPECTIVAS EUROPEAS

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En la presente discusión sobre la evaluación, la cualidad y la eficacia de la atención temprana, también surge el tema de la formación profesional. Desde hace 10 años, diversos grupos de expertos en la Unión Europea exigen una base profesional común en el trabajo operativo en la atención temprana. La situación de formación en sí es muy heterogénea en Europa. España y Austria son excepciones, al observarse formaciones formalizadas. En los otros países, la formación en cuanto a atención temprana se basa primordialmente en la formación básica (médico, psicólogo...) sin especialización, aunque en muchos países europeos se observan esfuerzos para definir una base común (Alemania, Gran Bretaña). El proyecto Leonardo da Vinci EBIFF trata de definir un cuadro común, proponiendo cursos básicos obligatorios (diagnóstico, escuchar a los padres, trabajar en un tema, hacer un plan interdisciplinario de intervención, reflejar el propio trabajo) y cursos complementarios, según el perfil individual de los profesionales en atención temprana.

18TH ANNUAL MEETING OF THE EUROPEAN ACADEMY OF CHILDHOOD DISABILITY (EACD)

Barcelona, 19-21 October 2006

COMMUNICATIONS *(in alphabetical order)*

1.

NEW TESTS FOR ASSESSMENT OF VISUAL, VISUO-SPATIAL AND VISUOCOGNITIVE DEVELOPMENT

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The team of the Visual Development Unit uses a neurobiological approach to understand and assess development of the eye-brain system in infants and children with neurodevelopmental disorders. Our current model of early visual development delineates the cortical modules with populations of neurones specifically sensitive to different visual attributes (colour, orientation, motion and binocular disparity) becoming functional in an orderly sequence in the first few months of life, when the visual cortex takes over executive control from subcortical systems. We have extended this model (a) to chart the complex sequence of development in the two main cortical streams, the 'ventral' stream for perceptual recognition of shapes, objects and faces and 'dorsal' stream for spatial relations, relative movement and planning actions; (b) to chart development in other parts of the dorsal stream in the development of specific visuo-motor skills e.g. reaching and grasping, navigation, stair ascent and descent.

Based on this approach, we have developed age-appropriate and child-friendly techniques to assess visual and visuo-spatial functions over the entire range of abilities from severe problems such as 'cortical blindness', to milder problems such as amblyopia, dyslexia, perceptual and attentional disorders (ADHD). For infants, we gauge the onset of cortical function using an electrophysiological measure, the orientation-reversal visual evoked potential/visual event related potential (OR-VERP) for basic pattern processing and a measure of attention – the fixation shifts (FS) paradigm, which gauges the ability of the child to switch attention with head and saccadic eye movements between competing targets. These two tests can be used not only to assess visual status in infancy (or in children with communication and speech difficulties) but also as 'early surrogate outcome measures' to predict neurological and cognitive outcome in later childhood where it is important to measure the effectiveness of early intervention and treatment in clinical trials. We have also developed a portable battery of tests –Atkinson Battery of Child Development to Examine Functional Vision (ABCDEFV)– to assess sensory, perceptual, motor, cognitive and spatial aspects of functional vision between birth and 5 years of age (or mental/ developmental age equivalence). This battery provides a means to relate functional vision to analysis of neonatal brain imaging, and to development in other domains, e.g. language and communication.

For dorsal and ventral stream tests we use measures of global visual form (ventral) and motion (dorsal) global coherence processing with both behavioural and VERP techniques. For normally developing children, between 4 and 12 years, or older children and adults in the same mental age range, we have developed computer games, where the child has to touch the side of the screen on the left or right to 'find the ball in the grass' or 'find the road in the snowstorm'. For example the child has to detect a shape ('the ball') made of either moving (dorsal) or static (ventral) small line segments embedded in a random array of these elements. In a short test of around ten minutes we can measure global coherence thresholds as a way of comparing dorsal with ventral stream functioning.

From use of all these techniques we have found that:

(a) Many term infants, with indications of perinatal brain damage on neonatal MRI, show remarkable recovery of cortical function, even with extensive damage to classical visual occipital areas. However, some parts of the cortical and subcortical visual systems show markedly less developmental plasticity than others. Damage seen on MRI in basal ganglia is a marker for poor recovery and impairs cortical vision even when occipital cortex is intact.

(b) Infants with early hemispherectomy show (i) lack of the FS attentional response under competition on their 'bad' side of space (opposite side of space to removed hemisphere); (ii) evidence for subcortical control in early life of the visual optokinetic responses for both directions of movement (OKN for pattern movement to left and right. However, after about 5 months of age the direction which would normally involve control from the damaged hemisphere becomes non-functional despite the intact subcortical system.

(c) Using the tests of form and motion coherence we find that in a range of developmental disorders, including hemiplegia, Williams syndrome, and autism, there is greater impairment of motion coherence than form coherence when compared to the normal developmental trajectory. We have proposed the hypothesis of 'dorsal stream vulnerability' –the dorsal system showing relatively less plasticity and being more vulnerable in development than the ventral system. Our tests and similar tests by other teams have shown failures on motion processing relative to form in children with fragile X syndrome, dyslexia and in children with congenital cataracts removed early in life.

(d) We already know that significant prematurity is associated with poor visual and cognitive outcome, with visual problems being due to development in either eyes, brain, or both. In our own studies we have found that healthy very premature infants (less than 32 weeks gestation), who are normal on ultrasound and neurological examination, show normal timing of onset of visual cortical function, as indicated by a significant OR-VEP at the appropriate post-term age. However, in very premature infants with abnormalities on ultrasound this cortical response is delayed or absent. In two large scale studies in progress, in collaboration with the neonatal teams at the Hammersmith Hospital, the OR-VERP and FS measures are providing sensitive indicators for early visual brain recovery and in predicting later neurological outcome. Infants in these cohorts have had neonatal MRI at term which indicates white matter changes of varying severity (DEHSI: diffuse excessive high signal intensity). DEHSI severity correlates with all our early visual measures. However, the preschool attentional tests (including tests of executive function, involving frontal and parietal lobe networks) show a high rate of failure right across the group, even in those with relatively minor abnormalities on brain imaging. In this talk we will present a model of brain development in children who have been born very prematurely. This is derived from factor analysis across all these different tests carried out on the premature cohort at 6-7 years of age. Across the group deficits are concentrated in tasks with underpinning in parietal and parietofrontal networks i.e. dorsal stream

tasks such as visuomotor actions, spatial attention, accompanied by relatively normal development in areas thought to depend on ventral stream and temporal lobe development (e.g. early language). However many in this premature group show deficits on both form and motion coherence tests, with some worse on form and some on motion. This suggests that very early development in infancy of extrastriate cortex is tied to general white matter damage (common across the whole group at birth) and this leads to a cascade of later difficulties –some relatively minor and some severe. This emphasizes the necessity for developing reliable early tests in infancy to gauge the effectiveness of early intervention and treatment, so that we can improve cognitive outcomes in these children in the future.

2.

THE ROLE OF THE PARENTS ASSOCIATIONS IN THE TREATMENT OF SPECIFIC LANGUAGE IMPAIRMENT

A Blasco

Asociación Valenciana de Padres de Niños con Trastorno Específico de Lenguaje (AVATEL). Federación Española de Asociaciones de Padres de Niños con Trastorno Específico de Lenguaje (FEATEL). Valencia, Spain.

Parents have a key role in the treatment of the specific language impairment (SLI). They spend much more time with their children than the language therapists or the school teachers, and they also have to take decisions about how to deal with the serious problem that their children have. Some programs like the well known 'Hanen' can help the parents to better relate with their children, but in Spain and in other countries these programs are not generally available. Parents can decide to bring their children to Language Units but these units are not generally established. Secondary education, professional education, adaptation to the adult life are problems that the parents have and the Administration may not necessarily provide help or solutions for children with SLI. When the National Health Service or the educational system do not provide appropriate solutions for children with SLI, the parents associations can act both as a lobby and as counsellors for the Administration. They can press asking for solutions, but they can also contact with the adequate professionals to prepare reports, propose actions and sign contracts with the Administration to take in their hands some of the many interventions that children with SLI need. The Administration can act positively attending the Associations proposals, after evaluating them appropriately, because they receive at the same time the problem and its solution. As an example of the role of associations, the Administration in the Valencia area has attended the reports provided by AVATEL asking for Language Units, and now it is being discussed the creation of a Centre managed by AVATEL for detecting and determining specific educational needs of SLI children. Besides, parents have orientation about SLI through Hanen programs, courses and workshops organised by the association.

3.

GOALS FOR REHABILITATION

E Bower [a], E. Brogren Carlberg [b], M Frontera [c]

[a] *UK.* [b] *Sweden.* [c] *Spain.*

Level. All levels.

Target audience. Clinicians, therapists, researchers and policy makers interested in the outcome of intervention in children with neurodisabilities.

Objectives. (i) To explain what a goal is, how to set goals and how goals can be used to evaluate individual outcomes in individual children with neurodisability; (ii) To describe two or three children with CP and discuss relevant goals and the process of collaborative goal setting. Videos will be used.

Summary. This interactive session will explore the theory and practice of setting goals with children with neurodisability, their families and carers. For those attending handouts will be available in Spanish or English of: (i) Bower E. Goal setting and the measurement of change. In Scrutton D, Damiano D, Mayston M, eds- Management of the motor disorders of children with cerebral palsy. 2 ed. London: MacKeith Press; 2004. p. 32-52; (ii) Gross Motor Function Classification System (Palisano et al, 1997); (iii) A clinical physical therapy form which can be used when goal setting.

4.

INTERVENTION FOR RECEPTIVE LANGUAGE DISORDER

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Studies indicate that specific language impairment (SLI), which cannot be accounted for by factors such as below-average non-verbal ability, hearing impairment, behaviour or emotional problems or neurological impairments, affects some 6% of children of school age. SLI with a receptive language component in particular appears to be more resistant to intervention than specific expressive or phonological delays, and carries a greater risk of co-morbid behavioural difficulties as well as adverse outcomes for language development and academic progress. This paper considers underlying mechanisms which may account for receptive language disorder and reviews evidence for the effectiveness of intervention.

5.

VIDEOFLUOROSCOPIC DIAGNOSIS OF OROPHARYNGEAL DYSPHAGIA

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Oropharyngeal dysphagia is a major complaint among many young patients with neurological diseases. Potential complications of dysphagia as malnutrition, dehydration, aspiration and pneumonia can lead to death. Videofluoroscopy (VFS) is the gold standard method to study the mechanisms of dysphagia. VFS is a dynamic exploration that characterizes the alterations of deglutition in terms of videofluoroscopic signs, and helps to select and assess specific therapeutic strategies. Main observations during VFS are done while swallowing 3-20 mL boluses of three consistencies: liquid, nectar and pudding. Oral VFS signs measuring efficacy of deglutition are apraxia of swallow, weak tongue propulsion, pharyngeal residue and impaired UES opening. VFS signs on the safety of swallowing are delayed pharyngeal swallow and laryngeal penetration (bolus reaches the laryngeal vestibule) or aspiration (bolus enters the airway). Fifty percent of our patients with neurological diseases showed aspirations during VFS, one-third without cough (silent aspirations). VFS allows us classifying and treat patients in a multidisciplinary approach involving doctors, nurses, swallowing-therapists, dieticians, caregivers, and patient's families. Patients with mild symptoms need strategies mainly based on reduction of volume and increase in bolus consistency. Patients with severe VFS symptoms also need changes in head posture, heightened sensory input, and active swallow maneuvers. Finally, patients with severe aspirations or severe non-efficient swallowing need a percutaneous endoscopic gastrostomy in order to avoid respiratory complications or malnutrition; we keep to maintain a minimal safe oral intake in these patients with a rehabilitation aim. Nutritional and respiratory status should be monitored in all patients.

6.

PATHOPHYSIOLOGICAL PROFILE OF GAIT. A POTENTIAL SUPPORT TO TREATMENT PLANNING IN CHILDREN WITH CEREBRAL PALSY

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Gait disturbances substantially contribute to the functional impairment experienced by children with cerebral palsy (CP). First level descriptions of abnormal locomotor patterns obtained by clinical observation and standard, instrumental gait analysis have shown consistent inter-subject variability of kinematic profiles. Such a wide spectrum of functional phenotypes might reflect heterogeneous interactions of pathophysiological mechanisms, which in turn are expected to require specific planning of therapeutical interventions. Within this framework, we sought to test the feasibility of an ad hoc-devised, second level approach to gait analysis in children with neuromotor deficits, specifically aimed at objective detection of individual pathophysiological profiles. The method relies on a set of processing lines applied to kinematic (optoelectronic system), dynamic (force plates) and surface EMG data (telemetric system) simultaneously collected during walking, and provides quantitative estimation of the actual interference of the following pathophysiological mechanisms: deficient/inefficient muscle activation (paretic component), enhanced motor output during muscle lengthening (spastic component), non-selective contraction of antagonist muscles (co-contraction component) and increased passive muscle-tendon stiffness (passive, non-neural component). The procedure will eventually produce an individual 'pathophysiological profile of gait', summarizing (i) the relative incidence of the different factors, (ii) their scaled gravity levels, and (iii) their topographical distribution among representative lower limb muscles. Results indicate that subject-specific gait profiles, marked by different incidence of paresis, spasticity, co-contraction and passive component, with different levels of severity of individual factors and different topographical distribution thereof, can be obtained not only in children belonging to the same clinical form (e.g. unilateral or bilateral spastic CP), but also in subjects exhibiting the same type of kinematic gait pattern (e.g. crouch, equinus or mild knee walking). Providing information on central and peripheral mechanisms underlying abnormal gait by second level strategies was found to improve treatment planning, with particular reference to focal chemodervation.
The pathophysiological profile of gait was eventually applied to 50 children with spastic diplegia, hemiplegia and sporadic or familial spastic paraparesis, whose locomotor pattern was instrumentally characterized according to the international kinematic classification. The main result of this pilot study was the evidence that
This notion was further supported in a follow up study of a group of children assessed by pathophysiologcal profile, but treated with botulinum toxin, on the sole basis of clinical examination and instrumental kinematic description of the walking pattern. Indeed, subjects within this group revealing poor or no locomotor improvement after treatment were those whose pathophysiological gait profiles were dominated by paretic components or characterized by very low incidence of spastic components. Exploiting first and second level approach to gait analysis is expected to improve rationale planning of treatment strategies.
In fact, escape to observational testing and cannot be directly captured by biomechanical movement descriptions produced by standard (*first level)* gait analysis protocols.
The whole protocol was tested in a new, ad hoc conceived, Laboratory for Movement Analysis in Children, after a preparation stage involving development of a child-adapted instrumental set-up, production of optimized software and protocols, and execution of a multifactorial analysis of unperturbed walking in normal children for creation of a normative database.
We conclude that clinical and instrumental descriptions of abnormal gait in children with CP might be conveniently integrated by pathophysiologically-oriented approaches, in order to gain additional information on the underlying central and peripheral mechanisms, to be used for rational therapeutic interventions.

7.

MOLECULAR BASES OF MENTAL RETARDATION AND AUTISM

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Chromosomal abnormalities visible on a standard G-banding karyotype classically account for the etiology of less than 5% of cases of mental retardation (MR). Multitelomeric studies increased the diagnostic yield with another 5-10% of causal rearrangements. The recent finding that our genome is enriched in segmental duplications that behave as hotspots for frequent submicroscopic rearrangements, leading to either disease or polymorphic copy-number variants (CNVs), suggests that these variants could be implicated in the cause of a larger proportion of cases with syndromic mental retardation (MR) and autistic spectrum disorders (ASD).
In an attempt to identify the etiology of these disorders, our group is studying a large sample of undiagnosed cases of MR as well as a sample of 115 adults and 88 children with a diagnosis of ASD (based on DSM IV criteria, ADIR positive). Diagnostic studies in all cases include detailed clinical and dysmorphological evaluation, standard karyotype, fragile-X testing, and a rapid detection of genomic rearrangements in the 15q12, 17p11.2 and 22q11.2 regions by a multiplex qPCR. Metabolic screening, subtelomeric MLPA assays and/or additional tests are also performed when appropriate.
We performed array-based comparative genomic hybridization (a-CGH) with a custom made BAC array (5222 BAC clones covering 23% of the genome, 0.6 Mb average spacing, with high a density in putative mutational hotspots, those flanked by segmental duplications and those located in the subtelomeres) in a large proportion of these cases.
This multistep diagnostic approach to patients with MR and ASD was able to identify a substantial number of causal diagnoses. Specifically, the evaluation of genomic imbalances with qPCR and a-CGH identified several novel putative causes of syndromic MR and ASD.

8.

TRAUMATIC BRAIN INJURY. INCIDENCE AND OUTCOME –CURRENT FACTS AND 'CONTROVERSIES'

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International data on occurrence of traumatic brain injury (TBI) in children all severity grades report figures ranging from 98-139/100,000. Mild TBI is most common constituting approximately 85% of all TBI. Incidence rates for mild TBI are ranging from 250-500/100,000 and for moderate and severe TBI 12-18/100,000.
The highest incidence rates are found among the youngest (0-4 years of age) children.
The diagnostic definitions especially in mild TBI are still confusing and a large variation in inclusion criteria are seen. During the last five years many studies use the definitions formed by the American Congress of Rehabilitation Medicine. Still there is an ongoing dis-

cussion regarding the development of long lasting sequelae after mild TBI. Studies from 1998 to 2006 report postconcussion symptoms in 20-30% of all children 3 months to one year after injury. In a majority of cases the symptoms will vanish after one year. Weather or not some children will have remaining problems years after a mild TBI remain to be answered. In the more severe cases definitions are clearer and international studies report remaining problems in 60-80%. Outcome studies in moderate and severe TBI are being frequent in the literature and a strong association exists between injury severity and cognitive outcome, although these children show considerable improvement during the first years post injury. The improvement slows markedly by the time and persistent deficits are visible 3 years after injury. The risk is also significantly greater to exhibit long-term neurobehavioural impairment. Health related quality of life is impaired as long as 10 years post injury and recent research reveal that there is a larger decline in verbal learning capacity and verbal memory compared to non verbal functions.

9.

THERAPEUTIC INTERVENTION IN PRETERM INFANTS

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Advances in the understanding of fetal physiology have resulted in markedly increased survival rates of premature infants. However, severe neurologic impairments affect a considerable proportion of extremely low-birthweight infants and often an obvious cause of injury is missing. The immature human brain undergoes a period of rapid growth which expands from the third gestational trimester to the second year of life. In recent years we learned that during this period the developing brain is extremely susceptible to silent triggers of cell death. It has been reported that sedatives, anesthetics, anticonvulsants and also oxygen, which is widely used in neonatal intensive care units, cause massive apoptotic neurodegeneration in infant rodents. This information suggests that also human infants may be susceptible to and actually sustain iatrogenic brain damage from treatments that are considered safe in older patients. Such mechanisms could potentially cause diffuse brain injury in early infancy and result in later cognitive and motor impairment in infants born preterm. Although this evidence calls for caution with the use of pharmacologic agents and oxygen in neonatal medicine, avoiding them is nearly impossible. Thus, the search for adjunctive neuroprotective measures that will ameliorate toxicity for the developing human brain is highly warranted.

In various experimental models of newborn rodents (hypoxia-ischemia, hyperoxia, drugs) histological evidence of programmed cell death in concert with upregulation of pro-apoptotic genes (i.e. Fas/CD95, Caspase-3, -8) have been observed. A reduction of neurotrophic factors (i.e. BDNF, NGF, NT-3) and impaired cross-talking with intracellular signaling pathways activated by neurotrophins (ERK1/2- and PI3-AKT-pathways) contribute to this injury in the immature brain. Furthermore, neurotoxic insults such as hypoxia-ischemia and hyperoxia provoke inflammatory responses with production of pro-inflammatory cytokines –i.e. caspase-1, interleukin (IL)-1, IL-18– which potentially perpetuate neurodegeneration.

Attempts to identify measures that will counteract neurotoxicity target apoptotic, inflammatory and growth factor cascades, which include experimental therapies and also application of hormones (i.e. 17-β estradiol) and clinically used growth factors (i.e. erythropoietin).

10.

CENTRAL VISUAL PATHWAYS: TWO VISUAL SYSTEMS, ONE BRAIN

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Why do we need vision? As it turns out, there are two answers to this question. On the one hand, we need vision to give us detailed knowledge of the world beyond ourselves –knowledge that allows us to recognize things from minute to minute and day to day. On the other hand, we also need vision to guide our actions in that world at the very moment they occur. These are two quite different job descriptions, and nature seems to have given us two different visual systems to carry them out. One system, 'vision-for-perception', allows us to recognize objects and events, and to build up a 'database' about the world. This is the system we are more familiar with, the one that gives us our conscious visual experience –and allows us to incorporate new vision-based knowledge, and make decisions based on visual information. The other, much less studied and understood system, 'vision-for-action', provides the visual control we need to move about and interact with objects in the world. This system does not have to be conscious, but does have to be quick and accurate. Converging lines of evidence suggest that these dual functions of vision –perception and action– are mediated by two separate visual pathways in the human cerebral cortex that arise from primary visual cortex: a ventral stream projecting to the temporal lobe that mediates conscious visual perception, and a dorsal stream projecting to the posterior parietal cortex that mediates the visual control of action. Nevertheless, there is a complex but seamless interaction between the two systems in the production of adaptive behaviour. Childhood developmental disorders and disease can affect either or both of these two systems in different ways, leading to different patterns of deficits and spared visual abilities.

11.

UPPER LIMB FUNCTION IN CHILDREN WITH CEREBRAL PALSY –A MATTER OF PROBLEMS IN VARIATION AND SELECTION

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According to the Neuronal Group Selection Theory (NGST), typical motor development is characterized by two phases of variability. The variation is not random, but determined by criteria set by genetic information. Development starts with the phase of primary variability, during which variation in motor behaviour is not geared to external conditions. Next, the phase of secondary variability takes over, during which motor performance can be adapted to specific situations. The transition from primary to secondary variability occurs at function-specific ages. In both forms of variability, selection on the basis of afferent information resulting from self generated motor activity plays a significant role.

According to NGST, children with cerebral palsy have a limited repertoire of movement strategies, which in the domain of reaching and grasping results in relatively stereotyped reaching and grasping. In addition, children with cerebral palsy have problems in selecting the most efficient movement strategy in a specific situation due to deficits in the processing of sensory information.

Therefore, NGST suggests that therapeutic intervention in these children at early age should aim at trying to enlarge the primary neuronal networks and thus increase primary variability. With increasing age, the emphasis of intervention could shift to provision of ample opportunities for active and variable practice, as this might

compensate for the impaired selection from a non-optimal repertoire of motor solutions.

12.

TRANSDISCIPLINARY ASSESSMENT OF VISION FOR EARLY INTERVENTION AND SPECIAL EDUCATION

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Assessment for early intervention means observations and testing immediately after a suspicion of vision loss at any age. It starts at birth or soon after if the eye contact is delayed or abnormal or the infant's early motor development shows hypotonia. The possibility of central scotoma and hypotonia of the intraocular muscles with poor accommodation should be considered. The ophthalmologists' task is to examine ocular structures and refraction and correct for the basic refractive errors and poor accommodation and measure grating acuity, contrast sensitivity and oculomotor functions. Therapists and parents repeat testing with near correction, if there is not a clear response during the clinical assessment.
Eye-hand-coordination and recognition of family members by face are the developmental milestones that may reveal visual processing problems in infants with otherwise normal development.
Problems in communication with other toddlers/children, fear for small dogs (poor motion perception), clumsiness, orientation problems, hypersensitivity to noise or any of the common symptoms of visual processing problems should lead to examination of the quality of visual information transferred from the eyes and changes in processing visual information. This requires neurologists, therapists, early intervention specialists/ teachers and families. Common signs like increased crowding and poor contrast sensitivity or colour vision and perception of the length and orientation of lines can be assessed in a doctor's office but most other signs need to be observed by the rest of the team. The work goes on until the school age and requires well formulated questionnaires and detailed reports from and to the medical services so that the information gathered is understood by the families and therapists and teachers in planning their work.
In later loses of visual processing, assessment of visual functioning is an integral part of treatment and leads to early intervention without delay.

13.

ASSESSMENT OF VISION AS A TRANSDISCIPLINARY TEAM TESTS AND OBSERVATIONS

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Assessment of visual functioning as a transdisciplinary team means good teamwork between medicine and education in the work with the families. The amount of information needed for assessment of visual functioning is much greater than that used for follow-up of diseases.
The normal developmental milestones need to be known as well as vision disorders in different syndromes, birth injuries and diseases. As an example, Down syndrome (DS) often causes general hypotonia and also hypotonia of intraocular muscles. Thus babies with DS and other infants with hypotonia need to be assessed for refractive errors and accommodation and need to get their spectacles at the age of a few weeks. At that time also grating acuity, contrast sensitivity and oculomotor functions are examined. If there is delay in the development of any visual function, it should lead to thorough assessment of the quality of image and it's processing.
Image quality is assessed for form, colour and motion perception measuring visual acuity (WHO/PBL/03.91) with several tests, contrast sensitivity, colour vision, visual field and visual adaptation. For motion perception there is only the Pepi-test available. It depicts perception of low speed visual information.
Visual processing disorders have few clinical tests: tests for perception of length and orientation of lines. These and image quality are reported to paediatric neurologists and neuropsychologists.
Most of the specific losses of visual processing need to be observed during play and daily activities. Thus therapists and teachers, even parents, need to know the basic observations and learn to train children for further testing. Each of the more than 30 specific functions in processing of visual information should be discussed with each child as early as we can communicate with children about their different world.

14.

RECOVERY OF MOTOR FUNCTIONS AFTER TRAUMATIC BRAIN INJURY IN CHILDREN AND ADOLESCENTS

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Quantitative instrumented measures and clinical assessments were used to examine the recovery of gait, gross motor proficiency, and hand functions in 23 children (13 males, 10 females) with traumatic brain injury (TBI) over five months of inpatient rehabilitation. Brain injury had been severe (initial Glasgow Coma Scale < 8) in 17 of the children and moderate (GCS 8-10) in six children. The age of the children ranged from 4 years 7 months to 15 years 10 months. The first examination took place about 3 months after TBI; follow up examinations were scheduled one, two, and five months later. Data were compared with healthy control children of the same age and sex.
Repeated gait analyses in ambulatory children showed significant reductions of walking velocity, stride length and cadence after TBI, and impaired balance. Spatiotemporal gait variables were correlated with Gross Motor Function Measure (GMFM) scores. Hand function, as assessed with the Purdue Pegboard and Developmental Hand Function Test, was characterised by deficits in fine motor skills, speed, and coordination. Analysis of the isometric fingertip forces of a precision grip-lift task showed exaggerated and highly variable grip forces as well as negative load forces, indicating that the object was pressed on the table before lift-off. Despite considerable improvements during rehabilitation, differences in gait velocity, stride length, and hand function of children with TBI and controls were still present about eight months after injury. Gait improved more than hand motor skills. The degree of impairment increased with trauma severity. There was no significant correlation between the age at injury and the rate of sensorimotor recovery; young age at injury was not associated with better outcome.

15.

INCLUSIVE EDUCATION AND FUNCTIONAL ACTIVATION: ANTITHESIS OR SYNTHESIS

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According to UNESCO (2002), inclusive education is 'a system of education in which all the pupils with special educational needs are enrolled in ordinary classes in their district schools, and are provided with support services and an education based on their forces and needs. Inclusive schools are based on the basic principle that all schoolchildren in a given community should learn together, so far as is practicable, regardless of their handicaps or difficulties'. Inclusive education has become a world-wide movement grounded in a human rights discourse, promoted by United Nations declarations, parents' organizations and official policy by many govern-

ments. It fits into the modern WHO social definition of disability, whereby functioning and degree of disability are seen as a function of the degree of participation in mainstream society, including school education. Inclusive education claims to be better for general cognitive development, academic skills achievement and development of social skills. There are widespread differences in understanding and in practices of inclusive education throughout Europe. While some countries like Italy and Norway have implemented total inclusive education for every child, others like Sweden and the UK promote it but leave a choice, in many countries it is still in an embryonic phase, meeting opposition from teachers in special as well as mainstream education, parents' pressure groups, financial and legal obstacles. Even for those who are, there are many practical and theoretical difficulties: do we limit inclusive education objectives to shared social activities or do we make efforts to make curricula more accessible? Is a class with special needs children within a mainstream school a step towards inclusive education, or is it a barrier? What are the conditions to organize good inclusive education? Are special schools still needed or can one do without? For children with cerebral palsy, particularly those with moderate to severe degrees and with multiple disabilities, inclusive education represents quite a challenge. There is a genuine concern that total inclusion will be at the expense of development of functional improvement and autonomy, of academic skills learning and of social relationships and well-being. However, this does not need to be necessarily so. In fact, this has less to do with the place where a child is educated than with the vision and methodology of the education and rehabilitation team. The risk is very real however, when inclusive education is not well understood, not well organized or accompanied. Analysis of 'examples of good practice' –which will be illustrated in this presentation– shows that a synthesis can be found between the need to develop functional communication, mobility, cognition and academic learning and the need to participate and develop social feeling of belonging. This requires a new orientation of mainstream and special needs teachers, therapists, assessment psychologists, parents and medical consultants. Static tests of intelligence which used to be a main criterion whether to mainstream or not, will not be of use anymore, because they assume that educational achievement is mainly determined by the child's intelligence, supposedly a constant child's characteristic. However, the success of inclusive education does not depend on the child's characteristics, but is a function of the child's ecology: curriculum adaptation, teacher's and peers attitudes, therapeutic and educational support team, parents. etc. Also, social construction theories of intelligence as well as evidence of environmental brain plasticity see a child's cognitive functioning as dynamically contingent upon environmental input, particularly on the mediation to the child of the world around. Therefore dynamic and functional forms of assessment of learning potential are more suitable to plan educational intervention.

16.

NEUROPSYCHOLOGICAL PROFILE OF DYSLEXIA

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Dyslexia is characterized by an unexpected difficulty in reading in children who otherwise possess the intelligence, classroom instruction and motivation considered necessary for accurate and fluent reading. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities. It is perhaps the most common neurobehavioral disorder affecting children, with prevalence rates rating from 5 to 17.5%. It is a persistent, chronic condition and in most of the cases it is familial and heritable. The neurological disorder underlying dyslexia is the same across the cultures reported by cross-language studies.

Functional neuroimaging studies disclose a different activation pattern in dyslexic's brains when reading. A posterior dysfunction in the dominant hemisphere in and around the angular gyrus is postulated. According to Coltheart (1993), the access to a word's meaning can be accomplished via a direct orthographic to lexical route or through a phonologically mediated route. Neuroimaging studies show the different anatomical networks for each route, which lead to different subtypes of dyslexia: angular gyrus for the phonological route and the word form area for the lexical route. Differences in subtype's prevalence between languages may differ depending on the shallowness of the orthography.
We analyze the profile of 175 dyslexic children. We postulate that the extension of the brain dysfunction may produce different clinical symptoms. Besides the main mechanical reading problem and the deficits on orthography, dyslexic persons may have problems memorizing multiplication tables and automatic verbal sequences, organizing written essays, reading comprehension, handwriting, attention difficulties, naming retrieval and phonetic fluency.

17.

INDIRECT AND MULTI-DISCIPLINARY DELIVERY OF LANGUAGE INTERVENTIONS FOR SCHOOL-AGED CHILDREN

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Public service policies in the UK are committed to children, including children with disabilities, attending their local mainstream schools wherever possible, and to schools collaborating with health and other services in meeting children's needs. Speech and language therapists (SLTs) therefore base their services for children with language impairment in schools, and plan interventions along with education staff. This provides good opportunities for language generalisation. Delivery of language intervention is usually carried out by non-SLTs; either by school teachers and their assistants, with the SLT acting as consultant, or by SLT assistants with the SLT acting as supervisor. Such indirect approaches (from the SLTs point of view) require to be carefully managed. There is a need to systematically review the literature to seek effective language interventions; to collate these into an intervention manual; to monitor delivery of language learning activities and ensure compliance with the manual, and to evaluate the effectiveness of intervention. Two intervention studies for children with language impairment attending mainstream schools which went through these stages will be outlined, one that delivered intervention on a pre-determined regime via SLT assistants, and the other on a more flexible basis via teachers and classroom assistants, which is the delivery mode most commonly used in the UK. The first study produced better outcomes than the second, apparently related to achieving more systematic delivery of language learning activities. The implications for SLT service delivery in schools will be discussed, and a further research project that aimed to build an intervention package tailored to schools will be described.

18

DYSCALCULIA AND RELATED DISORDERS

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Developmental dyscalculia is a specific learning difficulty manifested by failure to achieve adequate proficiency in arithmetic despite normal intelligence, scholastic opportunities, emotional stability, and sufficient motivation. These difficulties do not result from a sensorial deficit and interfere significantly with daily life and/or school success.

In our presentation, we will rapidly report the results of studies that have assessed the prevalence of this learning disorder as well as the data indicating a possible genetic contribution to this trouble. But the main part of our presentation will deal with the cognitive bases of developmental dyscalculia. Firstly, we will examine different hypotheses assuming that developmental dyscalculia is the result of a deficit lying in more general cognitive factors. In particular, we will examine the evidence related to a deficit in working memory, a default in inhibition capacities, a problem in retrieving information from long-term memory and a problem stemming from finger agnosia. Then, we will discuss the hypotheses assuming that developmental dyscalculia results from a deficit specific to the number domain. In particular, we will present the data related to the hypotheses of a deficit in the number sense itself or to the access to the number sense from symbolic representations. In agreement with this number-related basic deficit hypothesis, we will present some neuro-anatomical findings of peculiarities in the intrapariatal sulcus in the brain of individuals suffering from dyscalculia.

19.

PROSODY, LANGUAGE AND AUTISM

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Background. Prosody plays an important role in a range of communicative functions; affective, pragmatic and syntactic which alter the meaning of what is said. Although children with autism frequently have disordered expressive prosody and prosody is important in the development of normal language skills, the relationship between disordered receptive and expressive prosody and receptive language has not been studied in autism due to methodological difficulties.
Objective. To investigate whether difficulties of receptive and expressive prosody in children with autism have a significant relationship to their receptive language and non-verbal ability.
Methods. Prosodic skills were measured using a computerised methodology: Profiling Elements of Prosodic Systems in Children (PEPS-C) which measures receptive and expressive prosody in a group of 31 children with autism between the ages of 6-13 years and compared to the performance of a group of 72 typically developing children matched by gender, socio-economic status and verbal mental age.
Results. Children with autism had significant difficulties understanding and expressing prosody ($p > 0.0001$) and there was a high correlation with receptive vocabulary ($r = 0.559$, $p = 0.001$) and receptive grammar ($r = 0.604$, $p > 0.0001$) but no correlation with non-verbal ability. Prosodic impairment was particularly marked for the children with autism in their understanding and use of affect or emotion.
Conclusions. These findings confirm that prosodic ability for children with autism is even more impaired than one might predict from their language development and is amenable to measurement and that it may be beneficial to assess prosody and target clinical intervention.

20.

EVERYDAY ACTIVITIES IN YOUNG CHILDREN WITH CEREBRAL PALSY, AND THE INFLUENCE OF MOTOR IMPAIRMENTS, GROSS MOTOR FUNCTION AND ENVIRONMENTAL MODIFICATIONS

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Everyday activities provide the context for children's learning and development. Assessment of everyday activities in young children depends to a considerable extent on the framework used to conceptualise functioning. The International Classification of Functioning, Disability and Health (ICF) provides a standard vocabulary to describe the individual's capacity and performance of activities, the integrity of body functions and structures, and environmental factors that could have an influence on functioning. Based on the ICF it is now possible to uncover the conceptual basis and the concepts included in different assessment tools. Understanding of what a tool measures is essential when planning interventions and monitoring change. I will present how we examined the measurement constructs and the content of the Pediatric Evaluation of Disability Inventory (PEDI), a frequently used tool to describe everyday functioning in young children with disabilities.
According to the ICF, everyday functioning is considered to be a result of and influenced by the characteristics of the child as well as characteristics of the environment. In a study of 95 children with cerebral palsy, aged 2 to 7.5 years, we applied the PEDI to describe achievement of activities, activity performance and use of environmental modifications for mobility, self-care and social function. The influence of motor impairments and gross motor functioning on the child's achievement of activities was investigated using the Gross Motor Function Classification System, the Ashworth Scale, the Selective Motor Control Scale and ROM measurements. The role of assistive devices and other environmental modifications for activity performance was explored from the parents' perspective. I will draw on results from the study to suggest use of multidimensional assessments and outcome-driven models for intervention. Within an outcome-driven approach, environmental modifications are given equal priority in planning of interventions, and the strategies for intervention are determined within the context of the demanded activity.

21.

NEW TECHNIQUES TO TREAT SPASTICITY

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Management of spasticity include several options as physiotherapy, occupational therapy, orthotics, pharmacological treatment and surgery, either orthopedic and neurosurgical. The treatment is multilateral because the initial spastic disorders develops muscular contractures, dynamic and static joint deformities, and abnormal motor control as time goes on and the child grows. This is due to the fact that spastic muscles grow less than normal ones and bone. Growth makes this process turns permanent and any treatment during infancy and childhood must be permanent. The best treatment for spasticity is pharmacologic (oral drugs, intratecal baclofen or botulinum toxin), but the prevention or treatment of its consequences as is joint deformity (by mean of orthosis or orthopedic surgery) and the learning of normal motion patterns or correction of abnormal one (physiotherapy, occupational therapy are always needed.
This workshop is divided in two parts:
(a) Treatment of spasticity on early childhood, when oral drugs and botulinum toxin, besides physiotherapy, are the keystone. In the case of botulinum toxin treatment, the best results are obtaining when adequate assessment of gait, of muscles involved and optimal doses and periodicity of injections are provided.
(b) The treatment of spasticity in second childhood, where intratecal baclofen and orthopedic surgery are needed for treating in severe spasticity and its consequences.
The presentation will be interactive, illustrated with a lot of cases and videos of their evolution with and without treatment, showing the successes, pitfalls and failures of the management of this complex disorder.

22.

TRAUMATIC BRAIN INJURY: ACUTE MANAGEMENT – CURRENT ISSUES

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Traumatic brain injury (TBI) remains the leading cause of death and disability in children and adults aged less than 45 years. In these patients, primary lesions (mainly diffuse axonal injury, cerebral contusions and haematomas) cause unconsciousness and neurologic deficits. Intracranial hypertension and other secondary lesions such as ischemia or brain swelling/oedema increase morbidity and mortality. Although no new therapeutic manoeuvres have been added in the management of head-injured patients, in the last few years a substantial reduction in mortality and better outcomes have been achieved. Key elements in obtaining these results have been integrated care by multidisciplinary teams, the creation of neurointensive care units, and the application of guidelines and structured management protocols.

Other essential issues in the management of head-injured patients are early resuscitation and rapid transfer to a trauma centre. In patients with severe or moderate TBI, the primary aims are the early detection and evacuation of mass lesions and treatment of raised intracranial pressure (ICP) to avoid secondary cerebral ischemia. Multimodality monitoring and structured therapeutic protocols include sequential CT scans and the application of several general manoeuvres to avoid increases in ICP (analgesics, sedation, muscular paralysis, correct position of patients in bed, aggressive treatment of fever...). When ICP increases despite these manoeuvres, the guidelines of the Brain Trauma Foundation recommend sequential addition of CSF drainage, hypertonic solutions, and moderate hyperventilation (first tier therapies). In patients with refractory high ICP, barbiturates, decompressive surgery, moderate hypothermia and/or other second tier therapies can be added. The therapeutic measures and recommendations proposed in this approach are based on the best available evidence according to the principles of evidence-based medicine.

Supported by Grant FIS-03/0153.

23.

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN ADULTS

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The aim of the presentation is to update the existing scientific knowledge about attention-deficit/hyperactivity disorder (ADHD) in adults. Approximately, 4% of adults of general population have an ADHD. This rate increase dramatically up to 25% in subjects with substance use disorders. Follow-up longitudinal studies of ADHD children show 70% persistence rate of ADHD into adulthood. Symptoms with highest persistence are inattention and impulsivity, because hyperactive symptoms decrease and it shows a clinical change. Combined ADHD is the subtype more frequent in adults as in childhood. Adult ADHD produce the same academic failure, social and familiar problem than childhood ADHD, besides, occupational problems. ADHD in adulthood has an high rate of comorbidity, as in childhood. The most frequent comorbid disorders are substance use disorders, affective disorders, anxiety disorders and personality disorders. It is available several psychometrics instruments to evaluate adult ADHD. Structure interview and a systematic evaluation of comorbid disorders are useful in the differential diagnosis. Pharmacological treatment in adult ADHD is the same as than used with children but weight-adjusted. Clinical trials have been carried out with psychostimulants and results show methylphenidate are the most effective and safest. Atomoxetine is the non-psychostimulant drug that has been most widely studied in adults. Cognitive-behavioral therapy has shown in clinical trials that it is an effective psychological therapy in adults.

24.

ORO-MOTOR DISORDERS CAUSES AND CLINICAL MANIFESTATIONS

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The term 'oro-motor disorders' (OMD) refers to a group of diseases that predominantly affect sensory inputs, motor systems and movement organisation involved in sucking, chewing, swallowing, speech articulation and facial non-verbal communication. Widespread congenital or acquired central nervous system lesions, neurodegenerative diseases or advanced neuromuscular disorders, in which oro-motor involvement is a relatively minor part of the patient's illness, are not generally considered under the heading of OMD.

Children with OMD are not numerous. However, as a group, they merit special consideration since management of diseases leading to OMD is complex, owing to their protracted and varying course, the diverse areas of health care involved and the significant amount of resources their treatment requires. Many aspects of OMD have been reviewed in the literature under different headings: dysphagia, feeding or swallowing disorders, congenital suprabulbar and pseudobulbar paresis, or congenital flaccid bulbar paresis. Establishing the origin, nervous system location and pathophysiology of diseases leading to OMD is not a minor issue since it provides clues to natural history and permits anticipation in terms of treatment and care provision. Delayed functional maturation, anatomical defects, either isolated or as part of polymalformative syndromes, cortical dysgenesis involving specific areas of cerebral hemispheres, brainstem lesions or neuromuscular diseases are the most commonly found causes of OMD.

Congenital lesions with selective bilateral involvement of the perisylvian cortex or the cortico-bulbar tracts are associated with paresis of the tongue, soft palate, pharynx and facial muscles. Patients with these anomalies, besides their oro-motor dysfunction, are likely to present minor signs of pyramidal tract involvement, varying degrees of mental retardation and seizures.

Recently, we proposed the term 'brainstem dysgenesis' (BSD) to describe infants with congenital dysfunction of multiple cranial nerves and muscle tone due to prenatal lesions or anomalies of the brainstem. In some patients with BSD is genetically determined and may be either isolated or part of a more extensive polymalformative syndrome. In the majority of cases, however, prenatal destructive or disruptive lesions of vascular origin are the cause of this disorder. The clinical manifestations in these patients, similar to what occurs with vascular accidents involving cerebral hemispheres, will depend on the vascular territory affected and the extent of the brain tissue damaged. In most patients described under Möbius, Pierre Robin and Cogan syndromes, brainstem maldevelopment has been postulated and, consequently, the nosology of these syndromes may be better approached if they are viewed as forms of BSD.

Congenital myopathies, particularly those manifesting at birth and the congenital form of myotonic dystrophy, are the most common neuromuscular disorders known to cause OMD. Severe hypotonia, muscle weakness and breathing difficulties initially play an important role in OMD. Velopalatine insufficiency and anatomical changes in oral cavity later contribute to articulatory speech problems. Early recognition of these diseases is important, not only from the management point of view but also for family genetic counselling.

25.

INTERNATIONAL POLICIES AND ACTION LINES REGARDING CHILDREN WITH DISABILITIES

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The concept of disability has experienced in the last years a shift from a model focused in the rehabilitation process, to a social model, stressing the interaction between the person and the environment, to ensure his or her full integration and participation.
This model is the base of the actions carried out by the international organisms, with the holistic purpose to guarantee to persons with disabilities the enjoyment of their inherent rights as members of the society.
The topics related with children with disabilities have a twin-track approach in these actions, combining references in mainstreaming policies about childhood or in general activities in the domain of disability, with specific projects on children with disabilities, up to now oriented to areas such as education, des-institutionalization or non discrimination.
The general framework for the future has been set up in two important documents: the United Nations 'Convention on the Protection and Promotion of the Rights and Dignity of Persons with Disabilities', and the Council of Europe 'Action Plan to promote the rights and full participation of people with disabilities in society'. Specific requirements of children with disabilities are underlined in both documents.
The policy of the European Union in this sector, further to various pieces of legislation, has been developed through activities in specific areas, such as the creation of The European Agency for Development in Special Needs Education, and the implementation of mechanisms to support research and development, open to issues related with the disability in childhood, for example the 'Dafne Programme to combat violence against children, young people and women'.
Nowadays, there is a request to revise relevant policies and legal documents with the intention to incorporate the perspective of children with disabilities.

26.

EXECUTIVE FUNCTIONS IN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

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This presentation challenges the popular/main stream idea that attention-deficit/hyperactivity disorder (ADHD, DSM-IV) is associated with impaired executive functions per se. Laboratory findings will be discussed, suggesting that children and adults with ADHD do not mobilize sufficient energy to meet task demands, that is to say, individuals with ADHD suffer from a (biological) state regulation deficit. The assumed state regulation deficit will be explained in terms of performance and psychophysiological indices, derived during the execution of cognitive tests. Links with maternal anxiety during pregnancy, genetic factors, and treatment (methylphenidate) will be made.

27.

NEUROPSYCHOLOGICAL REHABILITATION IN CHILDREN WITH ACQUIRED BRAIN INJURIES

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The goals of neuropsychological rehabilitation in children with acquired brain injuries are to understand and treat these children's cognitive and behavioural impairments, to recognize the role of these impairments in functional disabilities and to monitor the impact on the role of the family and other socio-emotional factors.
Within the framework of neuropsychological rehabilitation cognitive remediation refers to systematic therapeutic efforts designed to improve specifically the cognitive functions. There is a great need for evidence based cognitive rehabilitation programmes especially designed for children in order to evaluate the consequences, that may influence these children's recovery and prevent secondary effects after an acquired brain injury.
A randomized controlled study and follow up after systematic cognitive rehabilitation training with a holistic cognitive training program in children with acquired brain injuries will be presented. The results demonstrate direct and maintained positive influence on complex attention and memory tasks, as well as transfer to school behaviour, attention and executive functions.

Morning Instructional Courses

28.

MEDICIÓN DE LA FUERZA MUSCULAR CON EL DINAMÓMETRO PORTÁTIL EN LAS ENFERMEDADES NEUROMUSCULARES

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Las enfermedades neuromusculares presentan una debilidad muscular de carácter progresivo, en general más acentuada en los grupos proximales. Se cree que la fuerza muscular tiene relación con la función, aunque determinadas actividades se realizan con una fuerza muy al límite, estableciendo compensaciones con otros grupos musculares. Ello explicaría que, en un momento dado, se perdiera la capacidad de realizar una determinada función, sin que apenas se detecten cambios concretos en el grupo muscular implicado.
La medición objetiva de la fuerza muscular es difícil debido a distintos factores. Por un lado, la progresividad varía según el tipo de enfermedad o fase evolutiva, pero además hay una gran variabilidad individual. Se puede medir de forma manual mediante el *Medical Research Council* (MRC) o test manual, basado en la fuerza del examinador o con el dinamómetro portátil, un método más preciso y objetivo. Éste mide la fuerza en newtons o kilos y es capaz de detectar pequeños cambios. Los grupos musculares que con más frecuencia suelen explorarse (aunque dependen del tipo de enfermedad) son los flexores y abductores de cadera, flexores y extensores de rodilla, abductores de hombro, flexores y extensores de codo, flexores y extensores de muñeca, y la prensión de la mano. Para ello debe seguirse una metodología en cuanto a la postura y condiciones del paciente.
La finalidad de este *International Course* es la valoración de la fuerza muscular en las enfermedades neuromusculares mediante el dinamómetro portátil, desarrollando un método de trabajo objetivo que nos ayude a conseguir una mejor correlación entre fuerza y

función y, a la vez, que facilite la comparación entre grupos de estudio, ya sea en un mismo país o entre distintos países.

29.

ABORDAJE NEUROPSICOLÓGICO EN LOS TRASTORNOS DE APRENDIZAJE

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Los niños con un trastorno de aprendizaje tienen un espectro de síntomas cognitivos que deben detectarse y valorarse para enfocar el tratamiento. El uso de medidas estandarizadas como los tests ayudan a entender el funcionamiento cognitivo del niño respecto a su grupo de edad. El proceso de desarrollo cerebral del niño es una variable que interviene en la decisión de las pruebas a aplicar.

Los resultados de los tests deben tomarse en consideración juntamente con una buena historia clínica, la observación del niño, el nivel sociocultural y la información que pueden proporcionar la escuela y el entorno del niño.

Este taller pretende, a través de casos prácticos, ofrecer una visión de la valoración cognitiva y su utilidad.

Las principales áreas a evaluar para entender los trastornos de aprendizaje y sus procesos comórbidos son: inteligencia general; aspectos conductuales/personalidad; atención; memoria; lenguaje y funciones instrumentales; funciones visuoperceptivas, visuoespaciales y visuoconstructivas; y funciones ejecutivas.

18TH ANNUAL MEETING OF THE EUROPEAN ACADEMY OF CHILDHOOD DISABILITY (EACD)

Barcelona, 19-21 October 2006

FREE PAPER SESSIONS

Thursday, October 19
Free Paper Session I: Perinatal Brain Injury

O1.

IMPACT OF CHORIONICITY ON THE NATURAL HISTORY AND PERINATAL OUTCOMES OF TWIN PREGNANCIES AND TWIN-TWIN TRANSFUSION SYNDROME AND SELECTIVE INTRAUTERINE GROWTH RESTRICTION INCIDENCE

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Objective. To evaluate the impact of chorionicity on the natural history and perinatal outcomes of twin pregnancies and twin-twin transfusion syndrome (TTS) and selective intrauterine growth restriction (sIUGR) incidence.
Methods. Prospective longitudinal study. Setting: a network of public and private hospitals Catalonia and Balears, Spain. Population: two consecutively cohorts of 127 monochorionic (MC) and 109 dichorionic (DC) twin pregnancies. Main outcome measures: pregnancy outcome, neonatal morbidity, mortality, TTS and sIUGR incidence.
Results. Intrauterine fetal death (IUFD) incidence was significant higher in MC vs DC, 6.5% (8/123) vs 1% (1/106), in cases complicated with sIUGR or TTS it was 22% (2/9) and 50% (5/10), respectively. The incidence of sIUGR was similar in MC and DC, 7% (95% CI: 1.94-12.1) vs. 5% (95% CI: 0.8-9.5), respectively. The incidence of TTS in MC was 8% (95% CI: 3.2-12.8). There was a higher incidence in the rate of neurological –3% (7/220) vs. 0.5% (1/205)–, respiratory –14% (31/220) vs. 8% (16/205)–, morbidity and persistent ductus arteriosus –3% (6/220) vs. 0%– among the MC group. The excess of neonatal complications in MC occurred in cases complicated with TTS or sIUGR. Uncomplicated MC twin pregnancies had perinatal outcome similar to DC twins.
Conclusions. Neonatal complications were higher in MC pregnancies complicated with TTS and sIUGR. Although the incidence of sIUGR was similar in MC and DC twins, there was a trend towards worse outcome in MC affected with sIUGR.

O2

INFLUENCE OF GESTATIONAL AGE ON TYPE OF BRAIN INJURY AND NEUROMOTOR OUTCOME

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Objective. We investigated a possible correlation between gestational age (GA) and type of brain injury, defined by echography and between gestational age and type, location and severity of cerebral palsy (CP). Further more, we studied a possible correlation between grade and severity of brain injury and neuromotor outcome.
Methods. Children with a birth weight ≥ 1,250 g and a GA ≥ 30 weeks with a complicated neonatal period and/or brain injury were selected from a larger group of children who were followed in the Center of Developmental Disorder (University Hospital Ghent). The children were divided into two groups: a preterm group (276 children) with a GA between 30 and 37 weeks and a term group (185 children) with a GA ≥ 37 weeks. In both group (term and preterm) were 38 children with cerebral palsy. The type of brain injuries diagnosed by echography were classified into 7 categories: periventricular leukomalacia, flares, intraventricular hemorraghe, hypoxic-ischemic injury to basal ganglia, parasagittal cerebral injury, focal ischemia, hemorraghe. Also the type (spastic, dystonia, athetoses, dystonia and spasticity, athetoses and spasticity, ataxia) and location (diparesis, triparesis, quadriparesis, hemiparesis) of cerebral palsy was registered.
Results. The type of brain injury that mostly occurs in the term group with cerebral palsy were hypoxic-ischemic injury to basal ganglia (39%), focal ischemia (18%), hemorraghe (13%) and parasigital cerebral injury (10%). In the preterm group 39% of the children with cerebral palsy had periventricular leukomalacia, 24% intraventricular hemorraghe and 18% flares. There is a significant correlation between GA and type of brain injury ($p < 0.001$; Cramer's $V = 0.759$) and between GA and type ($p = 0.004$; Cramer's $V = 0.474$) and location ($p < 0.001$; Cramer's $V = 0.552$) of CP. There is also a significant correlation between grade of IVH and neuromotor outcome ($p = 0.018$; Cramer's $V = 0.436$), severity of basal ganglia injury and neuromotor outcome ($p = 0.043$; Cramer's $V = 0.399$).
Conclusions. The presence of the different types of brain injury and the different types of CP depends on GA. The neonatal brain echography is predictive for later neuromotor outcome.

O3.

THE OUTCOME OF TRANSIENT PERIVENTRICULAR ECHODENSITIES IN THE PRETERM NEWBORN

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Objective. The significance of transient periventricular echodensities (TPE) –or flares– appearing in the ultrasonograms of immature

newborns is not completely understood. This study aims at identifying the outcome of TPE in a cohort of prospectively followed preterm infants.
Methods. From 1997 to 2003, 20 preterm newborns developed TPE on neonatal cranial ultrasonograms, in the absence of other significant brain injury. All were followed for 3-7 years. Neuromotor outcome was assessed with standard neurological examination and GFMCS. Cognitive capacities were evaluated with NEPSY, a test able to detect subtle disabilities interfering with learning. Patients were subdivided into group I (TPE lasting < 7 days) and group II (TPE lasting ≥ 7 days).
Results. There were 8 patients in group I and 12 in group 2. Gestational age was lower in group II (28 ± 2) as compared to group I (33 ± 3) ($p < 0.05$). In group I, no patient developed a motor disorder that could be assigned into any level of the GFMCS, while in group II 3 out of 12 were classified as GFMCS level I. In addition, three patients in group II displayed visuomotor difficulties. Preliminary results of the neuropsychological assessment also indicate a lower performance in patients in group II, particularly in the attention-executive and visuospatial domains.
Conclusions. TPE, an often neglected finding in neonatal cranial ultrasound, confer a modest increase in the risk for both mild developmental motor disorder and cognitive difficulties, potentially leading to impairment in learning and adaptive behaviour. Ongoing studies in control individuals matched for gestational age should confirm the relevance of these findings.

O5.

REORGANISATION OF THE SOMATOSENSORY SYSTEM AFTER EARLY BRAIN DAMAGE: AN FMRI AND SEP STUDY

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Objective. The reorganisation of the motor system after early brain damage has been extensively investigated both by means of electrophysiological and neuroimaging techniques. Conversely, very little is known about the reorganisation of the somatosensory system. Consistent evidence supports the idea that the brain adaptive responses to damage may be different for motor and sensory function, leading in some cases to an inter-hemispheric dissociation. The aim of this study was to investigate the reorganisation of the somatosensory system following early brain damage by means of a combined use of clinical, neurophysiological and fMRI methods.
Methods. Thirteen children with congenital or early acquired hemiplegia (5 females; age range: 10-28 years; mean age: 16.4 years) were selected for this study. In all cases fMRI of sensory stimulation, median nerve SEPs, TMS, Melbourne assessment of motor function and assessment of sensibility were performed.
Results. Six subjects showed a perilesional representation of both sensory and motor function of the paretic hand. They all showed very good motor function and no or mild sensory deficits. fMRI of sensory stimulation of the paretic hand always elicited large activations in the contralateral hemisphere. Five subjects showed a perilesional representation of the sensory function and a contralesional representation of motor function (interhemispheric sensory-motor dissociation). They all showed moderate or severe impairment of motor and sensory function. fMRI of sensory stimulation of the paretic hand always elicited large activations in the contralateral hemisphere. In the remaining two subjects the representation of the motor function of the paretic hand was contralesional, but no short latency SEPs could be elicited either in the affected or the unaffected hemisphere. These subjects showed a moderate impairment of motor function and a severe impairment of sensory function. fMRI of sensory stimulation of the paretic hand elicited small bilateral activations.
Conclusions. Our results suggest that the intra-hemispheric reorganisation is the only possible compensatory mechanism for the somatosensory function, even in presence of very early lesions. In some cases the sensory function can be heavily impaired and the SEPs very abnormal. In such cases, the fMRI of sensory stimulation shows abnormal small and bilateral symmetrical activations. The representation of motor function ipsilaterally to the affected hand gives rise to a dissociated reorganisation. In this case, the motor function, and to a lesser extent, the sensory function are significantly worse. The actual role of the dissociation itself in relation to this specific functional profile cannot be clearly determined.

Free Paper Session II: Oromotor Disorders

O6.

NUTRITIONAL STATUS IN CHILDREN WITH CEREBRAL PALSY IN A TOTAL POPULATION

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Objective. To estimate the prevalence of malnutrition in a total population of children with cerebral palsy (CP).
Methods. All children with CP 5-11 years of age living in the Swedish southernmost counties Jan 1st 2002 were included (n = 316). Their weight and height measurements were previously reported every 6th month for children below 7 years and once a year thereafter as a part of a preventive health care programme (CPUP). These data and all measurements in their medical records were plotted into growth charts and body mass indices (BMI) were calculated. A categorical scale to classify nutritional status was used, based on clinical estimation of the individual longitudinal growth, BMI and knowledge about weight, length and gestational age at birth, etiological diagnosis including syndromes, gastrointestinal, endocrine and other somatic disorders. The nutritional status on Jan 1st 2002 was operationally defined as 'normal', 'ongoing catch-up', 'stunting' of other causes than nutritional, 'overweight', 'obesity', 'malnourishment' or 'starvation'. Anthropometric data were reported for 270 children (85%). The distribution of Gross Motor Function Classification System (GMFCS) levels and CP sub-types in the drop-out group was similar to the group with available anthropometric data.
Results. Every fourth child with CP had signs of nutritional problems; 23% were categorized as malnourished or starved and 3% obese. Malnutrition and starvation progressed with gross motor dysfunction classified through GMFCS ($p < 0.05$). More than 10% of children in GMFCS level I and 70% of children in GMFCS level V had either actual malnutrition/ starvation or growth catch-up after previous interventions. Half of the gastrostomy-fed children in GMFCS level V showed good catch-up growth. They all lived in districts with an available dietician in contrast to the children with gastrostomy without sufficient weight gain. BMI was a useful measurement to detect overweight and obesity but less so in detecting malnutrition and starvation in children with CP.
Conclusions. Repeated weight and height measurements plotted into growth charts should be included into the preventive follow-up of children with CP to detect children with dysphagia and other problems causing malnutrition. At least one in four children with CP need intervention to normalize their weight gain including monitoring and adjusting of nutrient intake throughout the period of growth.

O7.

PREVALENCE OF DROOLING IN CHILDREN ATTENDING COMPLEX NEEDS SCHOOLS IN GLASGOW

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Introduction. Persistent drooling in children with neurodisability is common. Previous studies have variously estimated the prevalence between 10 and 60%. Although drooling may appear trivial, it has a disproportionately large impact on the child, carers and family. There are a number of treatments available, but awareness of these is low among parents and professionals. We believe that there may be a large unmet need in the community.
Objective. To estimate the prevalence of drooling in children with neurodisability in Glasgow, to inform decisions about service provision.
Methods. A cross-sectional study was performed involving all 358 children and adolescents (aged 2-18 years) in the 7 complex needs nurseries and schools in Glasgow. Ethical approval was obtained. Data were collected with the aid of the school nurses who supplied information from their records, their own observations and interviews with education staff. The severity of drooling was quantified using Blasco's scale and the Teachers' Drooling Score (TDS). Other data recorded included age, sex, underlying diagnosis, whether ambulant (independently mobile without wheelchair), whether verbal (children with only a handful of recognisable single words were classified as non-verbal for our purposes), how fed (oral or gastrostomy tube), and whether any treatment had been received to date for the drooling.
Results. 94 children (26%) were reported to drool. According to Blasco's scale, the drooling was rated as being mild in 21 (22%), moderate in 35 (37%) and severe in 38 (40%). According to the TDS, 22 (23%) had a score of 2 (mild drooling), 21 (22%) a score of 3, 23 (25%) a score of 4 and 28 (30%) a score of 5 (severe). Only 20 (21%) had received treatment for drooling in the past. TDS and Blasco scores were highly correlated with each other. Neither TDS nor Blasco scores were associated with age, sex or underlying diagnosis. Both TDS and Blasco scores were associated with markers of the severity of disability such as being gastrostomy-fed, non-ambulant and non-verbal. Those with worse TDS and Blasco scores were more likely to have received treatment for drooling in the past.
Conclusion. Drooling represents a common and often untreated problem amongst children with disability, having a severity in proportion with that of the underlying disability.

O8.

NEUROPHYSIOLOGICAL EVALUATION OF 13 PATIENTS WITH BRAINSTEM DYSGENESIS

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Objective. The term brainstem dysgenesis (BSD) designates all those patients with congenital dysfunction of cranial nerves and muscle tone due to prenatal lesions or anomalies of the brainstem. In some patients, the origin of the dysgenesis is genetically determined and it as been reported as isolated clinical manifestation or as part of a more extensive polimalformative syndrome. In the majority of patients with BSD, however, prenatal destructive or disruptive lesions of vascular origin are the cause of the disorder. Depending on the vessels involved and the magnitude of the lesion, clinical manifestations may range from intrauterine death to mild involvement of several cranial nerves. Neuroradiological studies in this group of patients are normal at large and final diagnosis relies on clinical and neurophysiological findings. Our aim was to evaluate neurophysiologically brainstem function in a group of 13 patients with BSD syndrome.
Patients and methods. Thirteen patients with ages between 2 months and 16 years and with different forms of BSD syndrome have been evaluated. Tests were selected depending on the clinical abnormalities: conventional electromyography and nerve conduction velocities at the extremities were performed to exclude other causes peripheral nervous system (PNS) involvement. Facial nerve motor evoked potentials, EMG at different cranial muscles (orbicularis oris, masseter, lingual and trapezius), blink reflexes and brainstem auditory evoked responses (BAERs) were carried on looking for abnormalities at the brainstem level.
Results. All patients showed abnormalities in more than one neurophysiological test depending on the degree of clinical disability: seven showed abnormal EMG at the orbicularis oris and five had decreased amplitude of facial motor evoked potential. Eight patients showed abnormal blink reflex responses and five patients had abnormal BAERs. Neurogenic EMG patterns were obtained in five patients at the masseter muscle and in two patients at the lingual muscle.
Conclusions. In BSD patients the combination of different neurophysiological tests allows the exclusion of other PNS diseases, it is crucial to localize the lesion at the brainstem level and are can help to define its extension.

O9.

PSEUDOMONAS AERUGINOSA COLONISATION IN CHILDREN WITH SPECIAL NEEDS: ITS EFFECT, EVALUATION OF PREDISPOSING RISK FACTORS AND TREATMENT

F Enright

Background. Pseudomonas aeruginosa is known to cause a range of potentially serious infections including pneumonia. The source *P. aeruginosa* is often unclear however colonisation is recognised to precede infections.
Aims. To look at the aetiological or risk factors of colonisation in a group of children with special needs.
Methods. The records of 49 children were studied. The inclusion criteria were children up to eighteen years of age who had *P. aeruginosa* isolated on a sputum sample. Fourteen children were identified. The main analysis was a nested case control study of these children versus 14 age-matched controls that were not colonised. Risk factors analysed were: age, underlying diagnosis, sex distribution, mobility, feeding method, presence of aspiration or gastro-oesophageal reflux, history of a fundoplication and scoliosis. The number of hospital admissions and infections were compared in the two groups.
Results. SPSS (version 12) calculated odd ratio results. The children fed via a gastrostomy tube were 15 times more likely to become colonised. The children who had evidence of gastro-oesophageal reflux were 17 times more likely, and children aspirating were 5.6 times more likely to become colonised. There was no association between having spastic quadriplegia, scoliosis or a fundoplication and becoming colonised. The colonised group were 5 times more likely to acquire infections and 8 times more likely to be admitted than controls. Their stay in hospital was also 16 times longer than the control group. There were limitations in evaluating the effectiveness of treatment due to the small number involved.
Conclusions. Children who were fed via a gastrostomy tube, had evidence of gastro-oesophageal reflux or aspiration were more likely to become colonised with *P. aeruginosa*. The colonised group were more likely to develop infections or become hospitalised and because of this further research is needed in the treatment of this condition.

Free Paper Session III: Miscelanea (Cerebral Palsy)

O10.

SONOGRAPHY-GUIDED INJECTIONS OF BOTULINUM TOXIN IN SPASTIC MUSCLES IN CHILDHOOD

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Objective. The intramuscular application of botulinum toxin type A has emerged to be an established treatment option to reduce muscular hyperactivity due to spasticity in children with cerebral palsy. Accurate injection is a prerequisite for efficient and safe treatment with botulinum toxin type A. So far, treatment procedures have not been standardised.
Methods. This presentation will show the injection technique guided with ultrasound. Sonography is performed with the iU22 ultrasound system (Philips) using the 17 MHz linear transducer. The transverse viewing mode was arranged such that the medial part of the muscle is seen on the left side of the monitor, in the longitudinal viewing mode, the cranial part appears to the left. All our children receive a general anaesthesia for several reasons. We treat multilevel, which means, that often many muscles need to be injected. The patients we treat from about 18 month on rest quiet then, so we can proof the muscle movements without any activity of the child before we start the injection. The muscles of the upper extremities are very small, so the toddler shouldn't move for accurate injection into the center of the targeted muscle belly. The following muscles were injected: biceps brachii, brachialis, pronator teres, flexor digitorum superficialis and profundus, carpi radialis and ulnaris, flexor pollicis longus, adductor and opponens pollicis, gastrocnemius medial and lateral, soleus, tibialis posterior, adductor longus and magnus, gracilis, medial harmstrings and psoas.
Results. Best orientation is possible in the transverse view. The correct placing of the needle is easy with good knowledge of anatomy and sonography. The pattern of dispersion of the injected botulinum toxin in saline solution varies from a compact hypoechogenic area to an echogenic cloud in the muscle. We visualize the vessels by colour doppler and we can correct initially wrong needle placement immediately. We are able to inject even small muscles with a diameter of only 4 mm in very young children. Besides print photographs we also document cineloops.
Conclusions. Visual identification of muscles and depth control of the needle placement are the key features of sonography-guided injection that lead to improved targeting and safety of botulinum toxin injections. Careful comparison of sonographic images and anatomic knowledge are necessary. It can be expected that precise guidance of injections into the targeted muscle may improve local efficacy.

O11.

FIRST STEPS WITH THE PEDIATRIC LOKOMAT ® –FEASIBILITY OF ROBOTIC ASSISTED LOCOMOTOR TRAINING IN CHILDREN WITH CENTRAL GAIT IMPAIRMENT

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Background. Promising evidence exists that robotic-guided locomotor training may enhance functional ambulation in adults with central gait impairment. Body weight supported treadmill training in children with central gait impairment is proven to be effective. Intensive, task specific training enabled by a driven gait orthosis (DGO) could improve walking performance in children lastingly and cost-effectively. A pediatric module for the DGO Lokomat ® has just been developed, which allows training of children starting from approximately 4 years.
Methods. The new DGO device has been tested in the clinical setting of our rehabilitation centre in 6 children and 6 adolescents with acquired or congenital central gait impairment. Locomotor training in the DGO was the main component of the rehabilitation program consisting of 3-5 sessions of 45 min/week. Other therapeutic sessions were individually scheduled concerning the special needs of the child. We strived for a total of 20 sessions on the DGO. The effective training time of each session was logged. The Gross Motor Function Measure (GMFM-66) standing and walking section, 6 min walking test and gait speed measured with the timed 10 m walking test were assessed in a pre/post design.
Results. Preliminary results and clinical experience of this series of children and adolescents are promising: Gait speed, the GMFM score as well as the distance in the 6 min walking test improved in all children. Results of the walking section in the GMFM were superior to findings of the standing section, which underlines the task-oriented specificity of the DGO training. A positive relation was found between increasing numbers of trainings and walking distance during training sessions. Due to limitations of the study design (small sample size, mixed pathologies, influence of other therapies), data was analysed descriptively.
Conclusions. This first pediatric trial aims to determine the feasibility of an intensive training on a robotic-assisted gait orthosis in children and adolescents with central gait disorders. DGO, as the main component of multi-modal locomotor training, was successfully integrated in the clinical rehabilitation program of children. Preliminary findings in the outcome measurements suggest an improvement of locomotor performance. A vast majority of children participated highly motivated in the DGO training. Further research with larger number of subjects, defined diagnostic groups and appropriate designs is needed to prove the efficacy of this new therapy. In order to enhance motor learning and motivation, a child-friendly biofeedback needs to be developed.

O12.

PRAXIC ORGANIZATION DISORDERS IN DIPLEGIA

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Introduction. Motor impairment is the most evident sign of cerebral palsy but often motor impairment does not provide sufficient explanations for the serious difficulties in daily life activities (dressing, handling objects and tools, writing and drawing). There can be an incongruence between a good motor repertoire of upper limbs and the poor performance in manipulative tasks. In spite of the available motor repertoire the child seems unable to use it in successful actions. Dyspraxia is a motor learning disorder involving action planning hidden under impairment and making the disability worse.
Objective. We want to investigate the nature and possible profile of dispraxia in children with diplegia.
Methods. Participants: 21 children with diplegia (17 boys, 4 girls), cerebral palsy documented by neuroimaging, age from 6 to 14 years, good motor repertoire of the upper limbs (precision grip, fine selective finger movements, complete wrist and elbow joint ROM) but an evident clumsiness in praxic tasks, verbal IQ > 80, no major sensorial deficits, no epilepsy.
Assessment. Anamnesis for motor development; cognitive assessment (WISC-R): motor domain: a standardized battery of manipulative tasks (one-hand and bimanual, with and without the use of objects, on verbal request and by imitation), block-building test, VMI (Visual Motor Integration); perceptual domain: visual-spatial

perception (TPV, subtest 2), visual gnosis (Gollin), stereognosis, proprioception (sense of position).
Results. All of them had more then 10 degrees of discrepancy between verbal-IQ and performance-IQ. In manipulative tasks the best performance was with concrete objects and by imitation (18 successful), the level progressively deteriorated without object and on verbal request. Block-building (4 successful with model, 13 after demonstration). VMI (only 1 scores at the 34th percentile,13 at the first percentile). TPV (17 average or higher). Gollin (18). Stereognosis of familiar objects (18). Proprioception, position sense (15).
Conclusions. Dispraxia in diplegic children seems to manifest mainly with the constructional apraxia characteristic, all the participants had some difficulties in specific constructional tasks, particularly in graphics. The performance in block-building test becomes significantly better after demonstration, this data could be consistent with the hypothesis of dispraxia as a motor planning disorder. Surprisingly visual-spatial disturbances rarely emerged, perceptual and gnosis disorders were not constant. Although in some cases different perception deficits can be detected, we could not identify a recurrent specific one. An information processing disturbance in motor planning must be considered.

O13.

THE IMPACT OF MOBILITY TRANSITION AND DEVELOPING FUNCTIONAL LIMITATION AMONG OLDER ADULTS WITH CEREBRAL PALSY

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Objective. To describe lifelong changes in functional limitation and impacts of mobility transition among older adults with cerebral palsy (CP).
Methods. Participants were recruited through support organizations for people living with disabilities. Subjects were included in the study if they were adults living with CP aged 36 or older, and independently in the general community. Interviewers with CP gathered life history information regarding health and functional status from consented subjects using peer interview. Standardized interview, including Craig Handicap Assessment and Reporting Technique (CHART) were all performed while visiting subject homes. In addition, the Barthel index, the Gross Motor Function Classification System (GMFCS), was used to evaluate subjects motor skills status comparing the base line at the age of 18. Reliability of self reported GMFCS in adult population was recently proved by Jahnsen.
Results. A total of 66 adults (29 female) were included in this study. Mean age was 50.5 years, and 50 individuals had had partner (24% single). Types of CP were 19 individuals had spastic tetraplegia, 28 individuals had dyskinetic type, 16 individuals with spastic diplegia, and three (3) individuals had spastic hemiplegia. 14 individuals kept walking with or without assistance (ambulatory group) as GMFCS above 3, 25 individuals decline to GMFCS 4 or 5 (transition group), and 27 individuals had GMFCS 4 or 5 from the age of 12 (wheelchair group). Average age of the decline to GMFCS 4 among transition group was 35.2. Average score of Barthel index (specifically incontinence and transfer items) of individuals of transition group made the most decline amongst all ($p < 0.05$). Transition group had lower average score of total CHART than ambulatory group ($p < 0.05$). 13 individuals including 8 of transition group got orthopedic surgery for secondary cervical problem. Individuals who had GMFCS 1 at the age of 18 were more likely to get surgery ($p = 0.007$).
Conclusions. These finding suggest that individuals living with CP are facing considerable possibility developing functional limitation until their middle age regardless of their baseline GMFCS. Individuals who made transition from walking to use wheelchair need additional physical assistance in daily activities. These developing functional limitations can make negative impact on social participation. The limitations of this study are selective bias and recall bias. Due to the lack of long term treatment of individuals with CP in the past, understanding and prevention of the developing functional limitations are very critical issue, especially at present.

O14.

THE INFANT MOTOR PROFILE: A STANDARDIZED AND QUALITATIVE METHOD TO ASSESS MOTOR BEHAVIOUR IN INFANCY

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Objective. Assessment of motor dysfunction in young children is still in its infancy. This is regrettable as a sensitive, reliable and valid instrument is a prerequisite for early detection of infants with developmental motor disorders, such as cerebral palsy and developmental co-ordination disorder. Early detection is needed to warrant the provision of intervention at young ages, i.e. at ages when brain development is characterized by high degrees of plasticity. Adequate assessment techniques are also indispensable for the evaluation of the effectiveness of intervention strategies. The Infant Motor Profile (IMP) is a recently developed video-based assessment of spontaneous motor behaviour of infants aged 3 to 18 months. Motor behaviour is evaluated in the following conditions: supine, prone, sitting, standing and walking and reaching, grasping and manipulation of objects. The IMP consists of 82 items which are divided into five subscales. The first two subscales address movement variability: the size of the movement repertoire and the child's ability to select adaptive motor strategies out of its movement repertoire. The other subscales of the IMP are movement symmetry, fluency, and performance. The present pilot study aims at testing intra- and interobserver agreement and determine concurrent validity with the Alberta Infant Motor Scale (AIMS) and neurological examination.
Methods. Forty-two infants with corrected ages from 4 to 18 months were evaluated by means of the IMP, the AIMS and the neurological examination according to Touwen. The study group consisted of a mix of low-risk, at term born and high-risk, preterm born infants.
Results. For the majority of IMP-items intra- and interobserver reliability were good to excellent (Spearman's rho > 0.6). Total IMP-score and scores on the subscales variability-size of repertoire, fluency and symmetry differed significantly between full-term and preterm infants. Total IMP score and the subscores on performance, variability-size of repertoire, variability-ability to select and symmetry correlated well with the AIMS score. The IMP total score and the subscores on all five subscales were able to differentiate between infants with an abnormal neurological condition, infants with simple or complex minor neurological dysfunction and those with a neurologically normal condition.
Conclusions. The pilot study suggest that the IMP might be a promising tool to evaluate neurological integrity during infancy.

O15.

DOES THE PEDIATRIC EVALUATION OF DISABILITY INVENTORY NORMS FIT IN THE NORWEGIAN CULTURE?

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Objective. The purpose of this study was to evaluate the applicability of Pediatric Evaluation of Disability Inventory (PEDI) American normative data for a general Norwegian population.
Methods. A total of 174 Norwegian typically developed children between 1.0 and 5.9 years were investigated with the Norwegian translation of PEDI. Random selection was made from a general population and the American normative values were used to compare the capability and performance of the Norwegian children.
Results. The results of capability and care-giver assistance in the domains of self-care, mobility and social function ranged from mean 38.0-46.8, versus expected 50. Our results showed that the Norwegian sample scored significantly lower than the American reference values for functional skills and care-giver assistance especially in self-care. For the mobility and social function domains the results were less deviant. Independence in certain items was regarded as non relevant by Norwegian parents and thus not strived for.
Conclusion. Specific items deviated from the American normative data, which suggests necessary adjustments for the applicability of PEDI use in the Norwegian culture. Cultural differences and parent's perceptions influence children's performance and need to be investigated and accounted for in assessments of functioning related to activity and participation.

O38.

HEMIPLEGIC CEREBRAL PALSY AND EPILEPTIC STATUS IN SLEEP

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Introduction. Up to 60% of children with cerebral palsy develop epilepsy during childhood. The presence of epilepsy as a co-morbidity does affect quality of life and children perform less well in school. This may be a manifestation of the extent of the brain lesion. However, children with hemiplegic cerebral palsy may present with a deterioration in learning ability or communication skills and be found to be in electrical status in sleep (ESIS). Their motor deficit may deteriorate but there may not be a significant change in frequency of day-time seizures.
Methods. This paper uses electroencephalography, magnetic resonance imaging and video images to describe five children with hemiplegic cerebral palsy and ESIS, highlighting the difficulties in diagnosing and managing this condition.
Conclusions. ESIS is rarely seen in adults, and is encountered in a number of epilepsy syndromes in children. If clinicians are to avoid adding to the difficulties of the child with hemiplegic cerebral palsy, it is important to be aware of this co-morbidity.

Friday, October 20
Free Paper Session IV: Early Intervention

O17.

DOES EARLY INTERVENTION IN INFANTS WITH HIGH RISK FOR A MOTOR DEVELOPMENTAL DISORDER AFFECT MOTOR DEVELOPMENT?

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Background. Infants with high risk for developmental disorders are often referred to paediatric physiotherapy at early age. However, evidence for the effects of paediatric physiotherapy is still lacking. Recently we reviewed the literature and concluded that 1) no evidence was found for a beneficial effect of traditional forms of paediatric physiotherapy (TPP) like neurodevelopmental treatment and Vojta, 2) infants who have reached at least term age seem to benefit most from developmental programmes in which parents learn how to promote infant development.
Objective. To determine whether a recently developed physiotherapeutic intervention programme, COPCA (Coping with and Caring for infants with neurological dysfunction –a family centred programme), is more beneficial for developmental outcome at 18 months corrected age (CA) than TPP. COPCA is based on new insights in developmental neurology and family education.
Methods. Twenty infants who had definitely abnormal general movements at 10 weeks CA were randomly assigned to the experimental group who received COPCA or the control group who received TPP. The randomised intervention period lasted from 3 to 6 months CA. Thereafter intervention followed the suggestions of the paediatrician. The infants were examined at 3, 4, 5, 6, and 18 months CA with a battery of assessments including a standardized neurological examination and the Alberta Infant Motor Scale (AIMS). At 6 and 18 months the mental scale of the Bayley Scales of Infant Development (BSID) was administered. Assessors were blind according to group allocation.
Results. Nine infants had been assigned to COPCA intervention and 11 to TPP. Both groups did not differ in gender, gestational age at birth, birth weight or family characteristics. Neurological condition at 18 months was similar in both groups. In each group two infants were diagnosed with cerebral palsy; the other infants had a complex form of minor neurological dysfunction. Both groups had similar results on the total score on the AIMS. However, infants who had received COPCA intervention performed better on the AIMS sitting subscale than the TPP-group ($p = 0.02$). At 18 months infants of the COPCA-group tended to perform better on the BSID and moreover, their cognitive abilities remained stable over time. In contrast, BSID-scores of the TPP-group decreased significantly between 6 and 18 months CA ($p = 0.03$).
Conclusions. Our findings suggest that COPCA intervention might be able to promote the development of sitting behaviour and cognitive abilities more than traditional paediatric physiotherapy. Further research is needed to confirm these promising results.

O18.

EFFECT OF EARLY INTERVENTION IN INFANTS WITH HIGH RISK FOR A MOTOR DEVELOPMENTAL DISORDER ON POSTURAL DEVELOPMENT

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Background. Most infants with developmental motor disorders show deficits in postural control. Different therapies are therefore directed towards improving the child's ability to control posture. However, evidence that traditional paediatric physiotherapy (TPP), like neurodevelopmental treatment, promotes development, is lacking. Postural control is organized into two functional levels. The first level is involved in the generation of direction-specific adjustments, for instance, perturbations inducing a forward sway of the body induce dorsal postural activity. The second level is involved in fine-tuning of the basic postural pattern, for instance by selecting which direction-specific muscles are recruited. According to the Neuronal Group Selection Theory (NGST) motor development is characterized by variability. Two phases of variability are distinguished: primary and secondary variability. During the former behaviour is not adapted to the environment during the latter it is, for instance a certain strategy is selected out of the repertoire.
Objective. To compare the effect on postural development of an NGST based intervention (COPCA) with that of TPP.
Methods. 20 high risk infants were randomly assigned to receive COPCA (n = 9) or TPP (n = 11) between 3 and 6 months. Postural function was assessed during reaching at 4 and 6 months in two positions: lying supine and sitting with support. Surface EMG-activity was recorded from arm- and postural muscles. Significant phasic activity in neck and trunk muscles (postural activity) was related to onset of the prime mover (the arm muscle activated first). Similar postural information was available of 12 typically developing (TD) infants.
Results. All high risk infants showed direction-specific adjustments at 4 months, but less than TD infants ($p < 0.01$; median: TD 60%, COPCA 30%, TPP 25%). In COPCA-infants –but not in TPP-infants– direction-specificity during sitting at 6 months increased to 50% ($p < 0.05$). At 4 months all groups showed variation in which muscles were recruited. COPCA-infants –like TD-infants– developed at 6 months a preference for recruitment of the pattern in which the neck-, thoracic- and lumbar extensor muscles were activated in concert –a development which was absent in TPP-infants. At 4 months high risk infants showed more often synchronous recruitment of postural muscles than TD infants (55-80%, vs. 0-15%; $p < 0.01$). At 6 months COPCA-infants –but not TPP-infants– showed less synchronous activity (20-35%; $p < 0.01$).
Conclusions. COPCA intervention between 3 and 6 months improved the ability to generate direction-specific adjustments with less synchronized activity and facilitated the selection of a preference pattern.

Free Paper Session V: Functioning in Cerebral Palsy

O19.

HOW DOES FUNCTIONAL ABILITY IMPACT ON PARTICIPATION AND HEALTH IN CHILDREN WITH AMBULANT CEREBRAL PALSY?

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Objective. The preliminary findings of a five year follow up study involving ambulant children with cerebral palsy using a population-based register as the sampling frame are presented. The analysis aimed to detect differences in function, participation and child health in relation to functional status as assessed by the Gross Motor Function Classification System (GMFCS).
Methods. A representative series of 184 participants (aged 4-17 years) with ambulatory CP were assessed from an eligible population of 487. Inclusion criteria were the ability to walk 10 steps without the assistance of another person and the absence of lower limb surgery in the previous 12 months or botulinum toxin A injection in the previous 6 months. All participants were classified using the GMFCS. Each participant's physical function was assessed using the Gross Motor Function Measure (GMFM), the Pediatric Evaluation of Disability Inventory (PEDI) and by measuring the distance covered during a one-minute walk at the child's maximum walking speed. Participation restriction was assessed using the Lifestyle Assessment Questionnaire–Cerebral Palsy (LAQ-CP) and child health (physical and psychosocial) was evaluated using the Child Health Questionnaire (CHQ). A one-way analysis of variance was used to determine differences between GMFCS levels on each of the measurement tools. Duncan's post-hoc test was applied as necessary.
Results. 112 boys and 72 girls (mean age 10.8 years) were assessed. Mean scores for each of the measurement tools by GMFCS level are presented in the table. Significant differences ($p < 0.001$) were identified between adjacent GMFCS levels on all of the functional measurement scales. For participation, significant differences were identified between GMFCS levels I and II, and II and III, but not between III and IV ($p < 0.001$). Significant differences were detected between levels I and II for the physical component of child

Tabla O19. Mean scores ± standard deviations for studied measurement tools.

	All data (n = 184)	GMFCS I (n = 57)	GMFCS II (n = 91)	GMFCS III (n = 22)	GMFCS IV (n = 14)
Function					
GMFM (%)	76.8 ± 14.7 (n = 158)	89.6 ± 8.5 (n = 54)	76.0 ± 8.9 (n = 75)	57.7 ± 6.8 (n = 19)	49.6 ± 4.9 (n = 10)
PEDI mobility Fss PEDI mobility Cas (%)	77.4 ± 15.8 81.6 ± 15.9 (n = 176)	92.8 ± 9.2 94.4 ± 9.0 (n = 55)	75.5 ± 11.1 80.2 ± 11.6 (n = 85)	61.6 ± 8.5 70.0 ± 18.1 (n = 22)	54.1 ± 7.7 58.0 ± 12.0 (n = 14)
Distance walked (m)	80.0 ± 25.7 (n = 174)	98.1 ± 16.5 (n = 57)	81.7 ± 18.2 (n = 83)	53.9 ± 15.4 (n = 22)	30.3 ± 16.6 (n = 12)
Participation					
LAQ-CP (%)	33.0 ± 14.9 (n = 183)	20.7 ± 10.4 (n = 56)	34.9 ± 11.1 (n = 91)	45.4 ± 15.5 (n = 22)	50.6 ± 12.3 (n = 14)
Health					
CHQ-Phs CHQ-Pss	37.6 ± 15.3 45.1± 11.7 (n = 163)	45.2 ± 14.3 44.8 ± 12.7 (n = 54)	36.36 ± 13.8 44.14 ± 11.2 (n = 79)	29.9 ± 15.9 46.4 ± 11.7 (n = 19)	23.2 ± 10.2 50.7 ± 9.3 (n = 11)

Fss: functional scaled score; Cas: caregiver assistance score; Phs: physical summary score; Pss: psychosocial summary score.

health ($p < 0.001$), but no differences across GMFCS levels were determined for psychosocial child health.
Conclusions. Clear differences in physical function are apparent between children classified on adjacent GMFCS levels. This paper will describe those differences and discuss the implications for the management of children with cerebral palsy in relation to maximising participation and child health. This will include reference to psychosocial health. The findings also have implications for how subjective experiences like psychosocial well-being are measured in childhood populations with disability.
Acknowledgements. The support of the Northern Ireland Research and Development Office Project Grant RSG/1708/01 is gratefully acknowledged.

O20.

EXPECTATIONS AND EXPERIENCES. SEMI-STRUCTURED INTERVIEWS WITH ADULTS WITH CEREBRAL PALSY IN NORWAY

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Objective. The present study consists of qualitative individual and focus-group interviews of adults with cerebral palsy in Norway. Cerebral palsy (CP) is regarded to be non-progressive, but studies during the last decade have documented new health problems and functional problems in early adulthood. These changes are hypothesised to be a long-term effect of the original brain damage. The aim of the present study was to assess the participants' expectations about their own future as adults when they were children, and what they actually experienced as adults.
Methods. Semi-structured individual and focus-group interviews were conducted in seven women and ten men with cerebral palsy between 30 and 72 years. The participants were a strategic sample from the Norwegian Cerebral Palsy Association, representing different gender, ages, type and severity of CP, and life situations. The interviews were transcribed and analysed according to editing analysis style, and were used in the preparation of a multidimensional survey on 400 adults with CP in Norway.
Results. The interviews describe that all the participants expected to live independent lives with predictable functional ability, and with an education, a job, a home, and a family like any other adult person. All the participants had their own home, seven were married or cohabitant, and four had children. However, even the youngest participant had experienced a chocking and unexpected deterioration of function, causing an existential crisis, like having a new disability. All except the oldest participant had physiotherapy during most of their childhood. However, the participants, their families and the health professionals were not aware of the possibility of early functional deterioration, with all its consequences for participation in different contexts of the society. Six participants had university education. However, only one participant was still working full-time, three had never had a job, while the others had reduced or stopped work in early age with economic and social consequences.
Conclusions. The results of the present study show that there is a discrepancy between expectations and experiences regarding CP being a stable condition, both in persons with CP themselves and health professionals. There is a need for further research on causal pathways and prevention strategies regarding the late effects of CP. However, last but not least, there is a need for follow-up programs for persons with CP with a life span perspective, focusing on balance between personal resources and demands in the environment and empowerment strategies from early childhood.

O21.

CO-ACTIVITY IN FOUR LOWER EXTREMITY MUSCLES DURING MAXIMUM VOLUNTARY CONTRACTION IN HEALTHY CHILDREN AND CHILDREN WITH CEREBRAL PALSY

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Introduction. Increased co-contraction or co-activity is part of the motor dysfunction in cerebral palsy (CP). Analysis of selected agonist/antagonist pairs in the lower extremity muscles has shown increased co-contraction or coactivity to varying extents in children with CP compared to healthy control subjects.
Objectives. We aimed to determine whether children with spastic diplegic and spastic hemiplegic CP varied from healthy control subjects in how they activated non-prime mover muscles (muscles not primarily intended to be activated) during maximum voluntary isometric contraction (MVIC) of two proximal and two distal lower extremity muscles. This approach allowed analysis of distant, as well as antagonist muscles for co-activity.
Methods. Fourteen children with spastic diplegic CP (4-10 years of age), seven children with spastic hemiplegic CP (5-10 years of age) and 14 healthy control children (4-11 years of age) participated in the study. Gross Motor Function Classification System (GMFCS) levels for the children with diplegic CP were level I in 3 subjects, II in 5 subjects, III in 5 subjects, and IV in 1 subject. Children with hemiplegic CP had GMFCS level I in 5 subjects and II in 2 subjects. Surface electromyography (EMG) was simultaneously recorded from the vastus lateralis (VL), medial hamstrings (MH), tibialis anterior (TA), and lateral gastrocnemius (LG) muscles during MVIC of each muscle. When the muscle served as prime mover, EMG was defined as 100%. Co-activity was defined by activity in the muscle when it was not the prime mover and was normalized as a percentage of the EMG from MVIC.
Results. We found that while most pronounced in distal muscles, co-activity was apparent in all muscles tested, both proximal and distal. Overall the children with CP had the highest co-activity. On average children with diplegia had more than double, and children with hemiplegia had close to double, the co-activity seen in the healthy children. The greatest overall co-activity was observed in the TA muscle, then the MH muscle. The TA muscle co-activity was as high as 92% and 102% when VL and MH muscles were the prime movers and 67% when LG muscle was the prime mover for the children with diplegia.
Conclusions. We believe that increased co-contraction or co-activation in distant as well as antagonist muscles could be a possible cause of the weakness in CP and a result of the aberrant motor control caused by impaired function of the corticospinal, and possibly intra-spinal, pathways.

Free Paper Session VI: Learning Disorders

O22.

SCHOOLING OF 8-12 YEAR OLD CHILDREN WITH CEREBRAL PALSY IN EUROPE

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Objective. Schooling of disabled children takes place in general in mainstream schools or special schools. The European agency for

development in special needs education classifies countries according to inclusion policy from those with a 'one track approach' (including Italy and Sweden with almost all children within mainstream education) to those with a 'multi track approach' (including Denmark, France, Ireland and United Kingdom with multiplicity of approaches to inclusion). The SPARCLE study (Study of Participation of Children with Cerebral Palsy Living in Europe), which undertaken in these six countries, offers the opportunity to explore different schooling practices. The objectives are to describe the type of schooling children aged 8-12 years with cerebral palsy (CP) receive and to explore its association with centre, impairments, personal and family factors.
Methods. The data were captured in a larger cross-sectional study investigating the relationship of participation and quality of life to environment in 9 European regions, in which 818 children with CP were surveyed at home. Type of schooling was recorded on a four-point scale, dichotomized here as 'principally mainstreaming' ('mainstream school' or 'mainstream school and visits special unit') vs. 'others' ('special unit in mainstream school' or 'special school'). Impairment is described by 8 variables: CP type, IQ, gross motor function classification system, bimanual fine motor function, vision, hearing, seizures, and communication. Analyses comprise descriptive statistics and multilevel multivariate logistic regression (adjusted on impairments, with centre as a level-two random effect) to study possible determinants for mainstreaming.
Results. 729 children from 8 centres were studied. All centres together, mainstreaming represents 57.7% of children, from 33.9% in South East France to 58.0% in Sweden to 93.0% in Italy. Special units in mainstream school represent a quite important alternative in some centres (19.8% of children in Western Sweden, 17.1% in South East France, 12.2% in East Denmark). All impairment variables (except hearing) are significantly associated with mainstreaming: the most severely impaired is the child the less likely is he/she to be in a mainstream school. Adjusted on all impairment variables, results show that age is the only level-one significant effect and that centre effect (level-two random effect) is important. Note that, only 3 of the 8 impairment variables have a significant effect (IQ, communication and CP type).
Conclusions. There are some divergences between inclusion policies and practices in the countries participating to SPARCLE, especially in Sweden. Beyond child's impairment, centre influences the type of schooling, which requires further analysis in order to take into account national and local characteristics on education and care.

O23.

EARLY LINGUISTIC EXPERIENCES AND DEVELOPMENT OF THEORY OF MIND IN CHILDREN WITH SEVERE SPEECH AND PHYSICAL IMPAIRMENTS

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Objective. 'Theory of mind' (ToM) refers to our ability to attribute thoughts, beliefs and feelings to ourselves and to other people, and to our understanding that our actions are governed by these thoughts, beliefs and feelings. This ability is crucial in social interaction and communication. The question of how to explain the development of ToM is still unsettled. Early exposure to communication is one possible prerequisite. If this is the case, then one would expect development of ToM to be affected in children with different communicative impairments. In accordance with this expectation, recent studies have in fact shown that deaf children without early exposure to sign language have difficulties in solving tasks requiring a ToM. Other examples are children with developmental language delay. From this perspective, the development of theory of mind in children with severe speech and physical impairments (SSPI) is most interesting, considering the problems experienced by children with SSPI within the area of early social experience and communication.
Methods. In three studies 14, 6 and 16 participants with severe speech and physical impairments participated. Also participating was a group of children, matched to the focus group for mental and linguistic age. They were presented a range of tasks to track the development of ToM: pretend play, perceptual tasks, 1st and 2nd order false belief tasks (so called 'change of location' tasks) and an 'unexpected content' task.
Results. Findings from our research suggest that the children have difficulties solving the ToM-tasks, but that they follow a normal pattern of development with severe delay compared to children without disability.
Conclusions. There are different possible explanations to the children's early failure to solve ToM-tasks: a) Limited linguistic and conversational competence; b) Memory problems; c) Lack of experiences, e.g. pretend play; d) Lack of opportunities to take other persons' perspectives. The ability to take someone else's perspective is crucial in social interaction and communication. Interpersonal communication enhances this ability. It is therefore important not only to provide children with SSPI with appropriate and sufficient communication aids, such as Bliss for example, but also to provide experiences and the tools with which to use communication aids in an efficient manner.

O24.

SUNBEAM: A RANDOMISED, CONTROLLED, OPEN-LABEL STUDY OF THE BROADER EFFICACY OF ATOMOXETINE COMPARED WITH STANDARD CURRENT THERAPY IN A GROUP OF UK CHILDREN AND ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY

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Objective. Quality of life is often significantly impaired in children and adolescents with attention-deficit/hyperactivity disorder (ADHD). This study aims to evaluate the effect of atomoxetine compared with standard current therapy (SCT) on broader efficacy in a UK sample of paediatric patients with ADHD.
Methods. 201 children with ADHD (both treatment naïve and previously treated with medication) participated in this multicentre, randomised, controlled, open-label trial. ADHD RS was assessed to monitor core ADHD symptoms. The primary outcome measure was the total score of the Child Health and Illness Profile-Child Edition (CHIP-CE), a measure of broader efficacy and quality of life. Patients were assessed at 2 weekly intervals and the data were analysed using a mixed models repeated measure analysis of the total score of the CHIP-CE across treatment at week 10. The child-rated Harter Self Perception Profile and the parent-rated Family Burden of Illness Module were also collected.
Results. 104 patients enrolled into the atomoxetine arm, 97 into the SCT arm. The average age was 10.9 years (SD: 2.2) and 88.6% were males across both groups. 90.5% had DSM-IV combined type ADHD, 7.5% inattentive ADHD, and 2.0% hyperactive ADHD. Approximately 60% had comorbid oppositional defiant disorder. 64.7% had used stimulants previously. The CHIP-CE is presented as *t*-scores (i.e., mean of 50, SD: 10). The baseline mean total score of the CHIP-CE was 23.2 (SD: 12.2) on the atomoxetine arm and 23.9 (SD: 11.0) on the SCT arm indicating significantly compromised quality of life. The least squares means increased over time to 38.4 at 10 weeks for atomoxetine and 30.8 for SCT ($p < 0.001$) demonstrating superiority of atomoxetine over SCT. The individual five domains of the CHIP-CE (satisfaction, comfort, risk avoidance, resilience, and achievement) were all statistically significant at week 10. Baseline mean ADHD RS total scores were 45.5 (SD: 8.7) for atomoxetine and 45.6 (SD: 7.8) for standard current thera-

py indicating a severely affected group of children. The ADHD RS total least squares means decreased over the 10 weeks to 23.5 for atomoxetine and 33.7 for SCT ($p < 0.001$). The parent-rated Family Burden of Illness Module and all six domains of the child-rated Harter Self Perception Profile demonstrated clinically relevant improvement from baseline to endpoint for both atomoxetine and SCT but did not show separation.
Conclusions. In a severely affected group with ADHD, treatment demonstrated definite improvement in quality of life measures. Atomoxetine, compared with SCT, demonstrated superior improvement in the primary objective, the CHIP-CE.

Free Paper Session VII: Miscelanea (Autism)

O25.

MUST MRI BE SYSTEMATICALLY PERFORMED IN AUTISTIC CHILDREN?

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Objective. To describe imaging results, i.e. systematic and standardized MRI, in a group of autistic children without comorbidity.
Methods. For this study we used data from a collaborative study still in progress. 221 autistic children aged 4 to 19 years were assessed with the ADI-R. 183 parents accepted their child to have a standardized neurological clinical exam by the child neurologist and all children had a karyotype, molecular assessment of fragile X, and FISH analysis. Results of MRI performed during this study are already available for 90 children, with the inter-observer reliability of features checked beforehand.
Results. Agreement for MRI results between observer was good. It varied from 66% to 100% for qualitative items (kappa) and 93% for the quantitative one (Kendall). Sex ratio was 4.3 (M/F) and average age at time of the study was 11.0 years (95% CI: 0.1-11.9). In this sample 17 children had an identified syndrome. Among them 8 had a chromosomal anomaly. Ten children had an unidentified syndrome and 5 had more than five minor physical anomalies. In the remaining group of autistic children without comorbidity ($n = 58$) an abnormal MRI was found in 27% of cases. More often children had anomalies localized in the posterior cerebral fossea or presented a enlargment of the Virchow-Robin spaces.
Conclusions. Standardized neurological exam, high-resolution karyotype, molecular assessment of fragile X should be done in all cases of autistic children. If after these explorations no comorbidity had been found, this study points out (i) the question about recommendation to perform or not a systematic MRI and (ii) the fact that more MRI data are needed in the general population for comparison with results observed in subgroup of autistic children.

O26.

EPILEPSY AND AUTISTIC SPECTRUM DISORDER IN CHILDREN

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Objective. Few studies have explored the influence of epilepsy on how autistic spectrum disorders (ASD) manifest in children. This study compares 60 children aged between 8-16 who have an ASD and epilepsy with 60 matched children who have an ASD only. The study investigates whether children with the combination of epilepsy and an ASD differ in their behaviour, cognitive skills, clinical presentation and/or neurologically from children who have an ASD only. We are specifically interested in whether children with dual diagnoses show different profiles of ASD features and what the familial impacts of these are.
Methods. Structured parental interview; individual neuropsychological and neurological assessment of the child; and questionnaires on sleep, behaviour and parental stress.
Results. A sub-sample will be presented based on data collected to date. All participants in the epilepsy and ASD sample have intellectual disabilities; the majority have severe-to-profound intellectual disabilities. Children with epilepsy and an ASD vary in the quality of their social interactions, the majority being 'active and odd' rather than 'aloof and withdrawn' or 'passive'. Most of the children with epilepsy and an ASD experience generalised seizures, many having both generalised and partial seizures. Based on this initial sub-sample, children with epilepsy and an ASD have more gross motor problems and more sleep wake transition disorders. Families of children who have both conditions experience greater parental and family problems.
Conclusions. Data gathering continues. Preliminary findings are consistent with epilepsy being associated with particular clinical profiles of ASD, characteristic associated developmental difficulties, challenging behaviours, high levels of family stress and other psychological problems. If confirmed, these findings will have implications for diagnosis, management and clinical support.
Acknowledgements. The research is funded by the Castang Foundation and the Little Foundation.

O27.

RETT SYNDROME IN SPAIN, GENOTHYPE-PHENOTYPE CORRELATIONS

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Introduction. Rett syndrome (RS) is a X linked dominant neurodevelopmental disorder. It has been shown to be associated with mutations in the methyl-CpG-binding protein 2 (MeCP2).
Aim. Our aim is to describe the relation between phenotype and genotype in the most common mutations found in the Spanish population of RS. Due to the wide phenotypic variability in presentation among patients with common mutations, this studies are necessary to be able to apply early interventions.
Methods. In Spain during the last years we have diagnosed 314 RS patients, two of them are boys. We have obtained 65% positive molecular studies. For the description of the phenotypes we have applied the diagnosis criteria of Baden-Baden 2001. Up-today we have completed the study of 276 that have been introduced in the IRSA database.
Results. We have defined the following phenotypes: classic RS 227 (82,2%) and variant forms 49 (17,75%), that correspond to 11 preserved speech, 8 late regression, 9 early epilepsy and 21 congenital forms. The clinical data of our series show that the median age of clinical diagnosis is from 2 to 5 years of age. With normal early development on 56% of all the RS patients. Deceleration of head growth is present on 58%. Epilepsy is related on 63%. Loose purposefulness of the hands has been registered on 29% before 2 years and 71% before 3 years of age. On the date of the register walks alone 54,6%. On 166 positive molecular studies obtained we found 72 nonsense mutations, 59 missense mutations, 31 C-terminal and 4 large deletions.
Conclusions. The genetic studies show that the most frequent mutations in Spain are *R255X*, *R168X*, *R270X* and *T158M*. Applying our

checklist the mutations with more scores have been nonsense mutations with scores higher than 15 in 38%, they show more incidence on respiratory dysfunction and loosing or never walking. Nonsense mutations, *R270X*, *R168X* and *R255X* are associated to the most severe clinical forms. 67%, 53% and 50% of the patients loose or never walk. Missense mutations are milder forms with score less than 14, even with deceleration of head growth on 89% observed in patients with *R306C* and 68% in *T158M*. We have observed less epilepsy on all RS patients especially on mutation *R168X* and *R270X*, even in the cases with no mutations, when compared to other series. In variant forms especially early epilepsy and congenital form genetic studies have been the most negative.

O28.

PROFILE OF REPETITIVE BEHAVIOURS IN CHILDREN WITH AUTISM SPECTRUM DISORDER FROM 2 TO 9 YEARS OF AGE

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Objective. Repetitive behaviours are one of the triad of impairments for a diagnosis of autism. They have been studied much less than social and communication impairments, and recent research suggests that repetitive behaviours may have a different heritability and developmental course. Therefore the objective of the study was to examine the degree, type and pattern of change in repetitive behaviours as potentially important markers for the further understanding of autism. We reported follow-up of a cohort of 104 children with autism, autism spectrum disorder (ASD) or specific language impairment (SLI), from mean age 37 months to mean age 50 months and found a decrease in all groups in ratings of repetitive behaviours using the Autism Diagnostic Interview (ADI-R). In contrast, three previous US and UK studies had suggested that children with ASD will increase repetitive behaviours during preschool years, and then decrease by 7 to 9 years.
Methods. We attempted at age 7 to 9 years to contact those children who had a best estimate diagnosis of ASD at age 3, without severe learning difficulties. Twenty four children and parents were seen for assessment (45%: 12 refused, 4 had moved away, 13 could not be contacted). Fifteen repetitive items from the ADI-R were used to explore current and past presence and impact of the behaviours. The 30 item Repetitive Behaviours Questionnaire (Turner) was also presented, to gather information on type and frequency of behaviours. Language measures and neuropsychological tests were undertaken with the children.
Results. Total ratings of ADI-R repetitive behaviour items were found to have increased in comparison with preschool years. Parents' recall of the level of severity of the behaviours ('ever' ratings) were higher than 'current' ratings. Further analyses are underway of the type and frequency of behaviours, and their association with cognitive underpinnings.
Conclusions. The findings of a different profile over time in repetitive behaviours to that found by other studies using the ADI-R highlights the importance of considering all the areas within this domain of ASD, not solely the algorithm items. Advice to parents about the likely continuation and challenge of repetitiveness needs to be founded on accurate information.

O29.

EPIDEMIOLOGY OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

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Objective. To collect information about attention-deficit/hyperactivity disorder (ADHD) diagnosis and medication rates utilizing teacher and parent information with a community based sample of children from multiple ethnic and racial groups.
Methods. A total of 11,599 children in grades pre-K through 6th grade were included in a large epidemiology study of ADHD. A two-step process was utilized which included school-based teacher assessments followed by further assessment with parent interviews. There were 37 schools involved from four school districts with various geographic settings in the state of Oklahoma: urban, suburban, exurban and rural. Children in the screened sample were identified from diverse ethnic and racial backgrounds: Hispanic 16%, African American 20%, Native American 9%, White 58%, and other race 3% (race ethnicity categories are not exclusive). Teachers completed the behavior rating scales for each student in their classroom and parents completed a brief screen about their child's ADHD diagnostic and medication status. Samples were drawn for a more extensive interview with parents in phase 2. Interviews included the C-DISC-IV and behavior rating scales which have been used previously with minority populations.
Results. According to teacher report at the screening phase, 17% of students had elevated teacher rating scores for ADHD, 4% were diagnosed with ADHD, and 3% were taking medication for ADHD. These 2,248 children plus a random sample of 993 children were recruited for parent interviews in phase 2. Interviews were completed with 468 parents; 217 children (47%) met DISC-IV criteria for diagnosis of ADHD, (28%) reported ADHD diagnosis and 112 (24%) were receiving medication for ADHD.
Conclusions. Results indicate there is a great need for ADHD assessment and treatment at the community level. There seem to be a number of children possibly with ADHD who have not been clinically diagnosed and not receiving treatment. Those diagnosed and treated varied by ethnicity and race with, fewer minority children diagnosed and treated as previous studies have shown. Both access to care and perceptions about the diagnosis and treatment may be contributing issues in this finding.
Acknowledgements. This study is funded by the Centers for Disease Control and Prevention (U50/CCU622315-03).

Saturday, October 21
Free Paper Session VIII: Miscelanea

O30.

RATER RELIABILITY OF THE ASSISTING HAND ASSESSMENT

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Introduction. The Assisting Hand Assessment (AHA) is a criterion-referenced assessment instrument developed for children with unilateral disability in their arm and hand, e.g. hemiplegic cerebral palsy or brachial plexus palsy. AHA aims to describe and measure the ability to effectively use the affected arm and hand in bimanual activities. The instrument has 22 items assessed on a 4-point rating scale from a videotaped play session where the child plays with

toys in the AHA test-kit, selected to require the use of both hands together. AHA was first developed for children aged 18 months to 5 years. Recently it was validated for the extended age range of 18 months to 12 years in a Rasch analysis involving 409 assessments. The results of this Rasch analysis correspond well with the results previously reported for children up to five years of age i.e. construct validity was confirmed and high separation values indicate good responsiveness to change and that the scale is useful for subjects within a wide range of abilities.
Objective. To report evidence of inter- and intra-rater reliability.
Methods. Inter-rater reliability was investigated in two designs, one involving 2 raters and the other 20 raters. In the 2-rater trial both raters assessed the same AHA-sessions with 18 children. In the 20-rater trial all raters assessed the same videotaped AHA-sessions with 8 children. In the 20-rater design 10 raters evaluated the English version and 10 evaluated the Swedish version of AHA. For intra-rater reliability 20 raters rated one child each twice with 3 weeks interval. The intraclass correlation coefficients as well as the standard error of measurement were calculated.
Results. The inter-rater ICC for sum score in the 2-rater design was 0.98. In the 20-rater design the ICC for sum score was 0.97. For intra-rater reliability the ICC for sum score was 0.99. The standard error of measurement was 1.5 for inter-rater and 1.2 for the intra-rater study, which gave an error interval of ± 3 raw scores for inter-rater and ± 2.4 raw scores for intra-rater.
Conclusions. This study shows excellent inter- and intra-rater reliability for sum scores for the AHA.

O31.

THE USE OF THE GROSS MOTOR FUNCTION CLASSIFICATION SYSTEM BY PROFESSIONALS IN THE NETHERLANDS; THE NEED FOR IMPLEMENTATION STRATEGIES

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Background. Since the first publication on the Gross Motor Function Classification System (GMFCS) by Palisano et al in 1997 its reliability and validity has been further confirmed. The use of the GMFCS in research is beyond discussion, but less information is available on how the GMFCS is being used in administration, clinical practice or education.
Objective. To examine the uptake of the GMFCS by physician in paediatric rehabilitation medicine and paediatric physiotherapists (PT) in the Netherlands.
Methods. Between April and November 2005 a cross-sectional survey was executed. All registered physicians (n = 82) and PT's (n = 1,095) were invited personally to fill out a questionnaire on the GMFCS. Participants were asked to answer electronically via the Internet; the PT's also had the opportunity to fill-out the questionnaire by pen. Ten statements on the GMFCS had to be answered on a 10 point Likert scale (1 = I do not agree at all with the statement, and 10 = I agree a very great deal with the statement). For this analysis we defined three subgroups: no agreement (1-3), intermediate agreement (4-6) and good agreement (7-10).
Results. In total 36 out of 82 (44%) of the physicians and 117 out of 1,095 (10.7%) PT's participated in the study. No data on reasons for non-response were obtained. Of all respondents 95 out of 153 (62%) indicated to be familiar with the GMFCS. The extent to which physicians agree with this statement is (geen verschillen tussen groepen? is op zich opvallend omdat beiden via totaal verschillende wegen hun info krijgenstatistically higher (mean 8.2; SD: 1.4) than the scores of the PT's (mean 6.0; SD: 3.2; $p < 0.0001$). Although 50% of all respondents felt confident in their ability to classify children with the GMFCS and their ability to share information with others, another 30% did not. The actual use of the GMFCS is still limited for administration and registration purposes (50%) and for discussion with parents and family members (36%).
Conclusions. To our knowledge this is the first study on the utility of the GMFCS in clinical practice. A small majority (62%) of the participating physicians and physiotherapists in paediatric rehabilitation in the Netherlands indicated to be familiar with GMFCS. There is more variability in the extent to which people feel confident in their abilities to use the GMFCS. Implementation strategies are necessary to support professionals in their ability to use the GMFCS, for sharing information with parents and families in particular.

Free Paper Session IX: Traumatic Brain Injury

O32.

VALIDATION OF THE GROSS MOTOR FUNCTION MEASURE FOR USE IN CHILDREN AND ADOLESCENTS WITH TRAUMATIC BRAIN INJURIES

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Objective. The Gross Motor Function Measure (GMFM) has demonstrated excellent psychometric properties in children with cerebral palsy and Down syndrome. It also has been found useful in assessing gross motor function in paediatric patients recovering from traumatic brain injury (TBI). As one cannot assume that the measurement properties of a test will be the same in a different clinical population, aim of the present multi-centre study was to evaluate validity and responsiveness of the GMFM in children and adolescents with TBI.
Methods. 73 patients (mean age: 11.4 years; range: 0.8-18.9 years; 32 female, 41 male) with moderate to severe TBI were recruited in 12 rehabilitation centres in Germany and Switzerland and were assessed twice with the GMFM over a period of 5 weeks 5 days (SD: ± 7 days). The mean time from date of TBI to first assessment was 0.8 years (range: 0.5-11.4 years). Since there are no accepted 'gold standards' to measure change in motor function in paediatric TBI rehabilitation which could be compared to the GMFM, we used judgements of change made independently by parents, physiotherapists and two video-assessors (VA1, VA2) not familiar to the patients as an external standard. A priori construct hypothesis' were formulated: a) GMFM-change scores should demonstrate a significant correlation with changes in motor function rated by parents, physiotherapists and VA1/VA2 ($r > 0.4$); b) The degree of correlation should be higher between GMFM-change score and video-rating ($r > 0.6$); c) Changes in the GMFM-score would be smaller as the interval between time of injury and first GMFM-assessment increased; d) The GMFM would be considered reliable in a test-retest-situation, if the ICC for the total score was observed to be ≥ 0.90.
Results. As hypothesized, correlations between GMFM and objective video-rating were best and did meet criterion (VA1: $r = 0.737$; VA2: $r = 0.657$); correlations between GMFM and parents/physiotherapists were lower (parents: $r = 0.531$; physiotherapists: $r = 0.555$). The GMFM-change-score in patients with TBI < 1 year before first GMFM-assessment was 12.8% (SD: ± 14.5) vs 1.8% (SD: ± 4.8%) in TBI > 1 year ($p < 0.001$). Test-retest-reliability could be determined ($r = 0.90$).
Conclusion. We have provided sufficient evidence of responsiveness and validity to support the use of the GMFM as an evaluative measure of gross motor function in children and adolescents with TBI.
Acknowledgements. Study support by 'ZNS–Hannelore Kohl Stiftung', grant 200 300 1). Participating centres: Rehabilitationsklinik

Brandenburg, Rehabilitationszentrum Friedehorst Bremen, Hegauer Jugendwerk Gailingen, Neurologische Rehabilitationsklinik Geesthacht, Neurochirurgische Rehabilitationsklinik Hattingen, Kinderkrankenhaus Park Schönfeld Kassel, Neurologisches Rehabilitationszentrum Kreischa, St. Mauricius Therapieklinik Meerbusch, Fachkrankenhaus Neckargemünd, Kinderklinik Schömberg, Behandlungszentrum Vogtareuth, Kinderspital Zürich-Affoltern.

O33.

COGNITIVE OUTCOME IN YOUNG ADULTS WHO SUSTAINED SERIOUS TRAUMATIC BRAIN INJURY TEN YEARS EARLIER IN CHILDHOOD

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Background. 165 survivors of traumatic brain injury (TBI) (0-17 years) during 1987-1991 were identified. The traceable individuals (149) were invited to a neurological and neuropsychological follow-up investigation in which 53 individuals took part. Of those 53, 17 had undergone neurosurgical operations. All 53 answered a quality of life questionnaire and a 21-item symptom checklist. The age at injury, Glasgow Coma Score, length of unconciousness, and posttraumatic amnesia did not differ from the original series of 165. A control group of 40 healthy individuals matched for age and gender was evaluated with neuropsychological tests.
Aims. To compare the neuropsychological test results between adults with serious TBI and an age and gender matched control group, and to compare the outcome for those who initially underwent neurosurgical operations (n = 17) and those who did not (n = 34).
Methods. Cognitive outcome assessed the following domains including intellectual functioning (attention/concentration, memory, mental processing speed, executive functioning, verbal abilities and visuo-spatial abilities) for the 53 patients and for the control group of 40 individuals. The neuropsychological tests included the Wechsler Adult Intelligence Scale (WAIS-R), Ray Auditory Verbal Learning test (RAVLT), Rey-Osterrieth Complex Figure Test, Trail Making Test A+B and the Verbal Fluency Test.
Results. The control group (n = 40) performed significantly better in all neuropsychological tests than the injured group. No significant differences were seen between the group treated with neurosurgical interventions and the non-surgically treated group except for Rey-Osterreith Complex Figure Test subtest, immediate recall and 30 min-delayed recall, were the surgically treated group were significantly impaired compared to the non treated group.
Conclusions. 10 years after injury the TBI group (n = 53) showed impaired neuropsychological test results compared to an age and gender matched control group (n = 40). The neurosurgically treated group had impaired visual memory compared to the non surgically treated group.

O34.

NON-VERBAL AND VERBAL COMMUNICATION IN SEVERE/MODERATE TRAUMATIC BRAIN INJURY CHILDREN COMPARED TO NORMAL CONTROLS AND ITS RELATIONSHIP TO COGNITIVE AND PSYCHOLOGICAL FUNCTIONING

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Objective. Evidence from retrospective studies suggests that verbal communication is compromised by paediatric traumatic brain injury (TBI). However, few studies have investigated non verbal communication following TBI in childhood and the mechanisms underlying psycholinguistic outcome.
Aims. To compare non-verbal and verbal language in severe/moderate TBI children with that in non injured controls, and to explore the relationship between linguistic outcome and cognitive and psychological functioning.
Methods. Longitudinal prospective study of TBI children and controls. Injury severity was classified by admission Glasgow Coma Score (GCS) as severe (GCS ≥ 8), moderate (GCS: 9-12) and mild (GCS: 13-15). Non-verbal communication was assessed by Diagnostic Analysis of Nonverbal Accuracy (DANVA-2). Verbal language was assessed by Wechsler Objective Language Dimensions (WOLD) and the Test for Reception of Grammar (TROG). Cognitive function was assessed by Wechsler Intelligence Scale for Children-III (WISC-III), Test of Everyday Attention in Children (TEA-Ch) and Children's Memory Scale (CMS). Psycholological function was assessed by Child Behaviour Checklist (CBCL), Birleson Depression Scale (BDS) and Impact of Events Scale (IES).
Results. 26 severe/moderate TBI children and 13 controls have been studied, mean age 12.15 years (SD: 3.30). There was a significant difference between TBI children and controls in DANVA-2 Child Paralanguage (DANVA2-CP) (p = 0.017) but not DANVA-2 Child Facial Expressions (DANVA2-CF) (p = 0.712). TBI children differed significantly from controls in the WOLD Listening Comprehension Subtest (p = 0.025) but not in the TROG (p = 0.329). In TBI subjects, DANVA2-CP correlated with performance IQ (p = 0.019), verbal immediate memory (p = 0.01), and attentional switching/control (opposite opposite worlds, p = 0.029). Listening comprehension correlated with age (p < 0.0001), verbal IQ (p = 0.001), General Memory Scale (p = 0.046) and verbal delayed memory (p = 0.002). There was a significant relationship between DANVA2-CF and DANVA2-CP (p = 0.024) and between DANVA-CF and sex (p = 0.029). No relationship was seen between communication and Internalising/externalising behaviours or depressive/anxiety symptoms.
Conclusion. Communication abilities in severe/moderate TBI children are significantly impaired compared to controls. In keeping with previous research, receptive grammar does not appear to be affected by TBI. There was no relationship between communication skills and emotional and behavioural response to injury. The relationships between cognitive function (PIQ/VIQ) and emotional prosody (DANVA2-CP) and semantics (listening comprehension) support the recent suggestion that these language functions localise to right and left cerebral hemispheres respective

O35.

ACQUIRED BRAIN INJURY IN DEVELOPMENTAL AGE: GISCAR STUDY

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Objective. Gruppo Italiano Studio Cerebrolesioni Acquisite e Riabilitazione (GISCAR) prospective study aims to collect data on children and adolescents (age < 14 years) with acquired, severe, brain injury in rehabilitation treatment. It analyses the demographic, etiologic and clinical characteristics of these patients in order to identify rehabilitation pathway and correlations between clinical features, rehabilitation programme, outcome and assistive needs.
Methods. Two schedules were set up to collect data according to age (0-6 and 7-14 years). These schedules annotated following data: personal, premorbid conditions, accident's history, its acute sequelae and treatments. Furthermore, they included hospitalisation length and number, clinical conditions on admission to the rehabilitation department. Standardised measures were used to assess patients during hospitalisation and at discharge. Outcome measures administrated for the younger group were: Levels Cognitive Functioning (LCF), Glasgow Outcome Scale (GOS) and Func-

tional Independence Measure for Children (Wee-FIM); for the older group the Disability Rating Scale (DRS) and FIM.
Results. Our study, starting from 1st of June 2004 to 30th of May 2006, up to now included 183 patients, 63 of them monitored with follow-up. 45.9% of these patients were admitted from Intensive Care Unit (ICU) as first rehabilitation hospitalisation. The majority, 66% of the cases, were males. In the older group, pedestrian accidents were the major etiology of traumatic brain injury (TBI). Among the other etiologies anoxic brain injury due to cardiac arrest or complications of heart surgery represents 20% of cases, brain injury due to encephalitis and haemorrhage represented respectively 13.7% and 8.9%. 10.3% of patients admitted from ICU bore tracheostomy tube and 5.5% of them kept it at discharge. Decubitus ulcers, especially in occipital area, were frequent on admission in rehabilitation department and represented 10.3%. Neurovegetative disorders occurred in 10.9% of cases. The average length of vegetative state was 32 days (SD: 34). 64.4% of TBI patients, versus 30% of those with other etiologies, obtained improvement by one or more assessment tools at the end of rehabilitation treatment. Only two patients did not return home for pre-existing family problems.
Conclusions. Collected data are numerous and describe in detail clinical features and evolution of patients, giving a clear idea of several problems that a rehabilitation unit has to deal and manage with.

Free Paper Session X: Central Visual Impairment

O36.

VISUAL IMPAIRMENT IN CEREBRAL PALSY

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Introduction. The spectrum of visual problems in children with cerebral palsy (CP) is extremely broad and includes both peripheral problems, such as strabismus, refraction disorders and retinopathies, and visual problems of central origin, such as amblyopia, delayed visual maturation and cerebral visual impairment (CVI). Cerebral palsy and CVI share a common origin. The most common cause of both conditions is hypoxic-ischaemic encephalopathy. The literature data show that 60 to 70% of children with CP also have CVI. Hypoxic-ischaemic encephalopathy is now the main cause of CVI. Different brain areas may be affected, depending on the gestational age of the infant: the grey matter tends to be more damaged in children born at term and the subcortical white matter in preterm infants. The manifestations of CVI may include reduction of visual acuity, visual field, or contrast sensitivity, and impairment of visual exploration (ocular motility) or processing of visual information (visuocognitive impairment).
Aims. We set out to evaluate visual function in children with CP and to verify whether different types of CP are associated with different patterns of visual involvement.
Methods. A sample of 129 children with CP classified according to Hagberg's criteria (17 with hemiplegia, 51 with diplegia and 61 with tetraplegia) underwent a complete neurophthalmological assessment. Our protocol begins with assessment of basic visual functions (visual acuity, visual field, ocular motility, stereopsis, optokinetic nystagmus, perception of colours and, when possible, depending on the age of the subject, visuocognitive assessment). Ophthalmological and orthoptic assessments and electrophysiological and neuroradialogical examinations complete the evaluation.
Results. The results suggested that the different subtypes of CP are associated with different neurovisual patterns. The most frequent symptoms were reduced visual acuity (88% of cases), and abnormalities of stereopsis and OKN (85%), followed by altered contrast sensitivity (68%). Visual field reduction and alterations of fixation shift were less frequent. Oculomotor disorders were also typical, particularly in the tetraplegic and diplegic subgroups. As regards the 'classic' ophthalmological abnormalities, refraction disorders were very frequent in the hemiplegic and diplegic children, whereas fundus oculi abnomalities were more typical of the tetraplegic children.
Conclusions. Our experience confirms that the spectrum of visual function disorders in CP is very broad, covering both central and peripheral aspects, such as visual exploration. The severity of the visual function impairment reflects the severity and the different levels of visual pathway involvement. We conclude that the clinical picture of CP can be defined not only on the basis of the motor deficit presented (hemi- di- or tetraplegia), but also on that of the peculiar visual profile associated with each of these deficits. This dual characterization of the clinical picture (based on both motor and neurophthalmological aspects) has important repercussions as regards rehabilitation.

O37.

DEVELOPMENT OF A DEVELOPMENTAL FRAMEWORK (DEVELOPMENTAL GUIDE) FOR CHILDREN WITH VISUAL IMPAIRMENT 0-36 MONTHS

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Objective. The work of our group and others has shown that infants with severe visual impairment are a particularly vulnerable group within the population of children with disability. They require a developmental framework that is specific to their developmental patterns and needs.
Aim. To provide a national developmental framework (guide) for infants and young children (0-36 months) with severe visual impairment that is underpinned by a scientific developmental framework. The framework will be used to inform and assist parents to help their child progress and to recognise and, where possible, overcome areas of vulnerability with the support of their specialist teacher for the visually impaired and other professionals.
Methods. The development of the framework draws on our specialist team's clinical experience over 30 years of research and clinical practice and is informed by focus groups and piloting a) with parents –over 50 families: three parent focus groups, four national consultation events involving teachers and parents and use of draft materials with families–, and b) with qualified teachers of children with visual impairment –three specialist teacher focus groups, four national consultation events (as above) and supporting families using the materials–. The framework is designed to allow parents to record their observations of their child's development in a systematic way, to recognise their readiness for learning the next steps in development and to have practical guidance on activities to promote the development of all skills. The framework includes a record of visual development (measurements of functional vision) and a visual promotion programme.
Results. We describe the theoretical and empirical justification of the developmental framework, the outcome of focus groups with parents and specialist teachers, the content of the final framework and plans for implementation including the strategy for a local and regional health and education service framework for early intervention.
Conclusions. This paper describes the development of this national developmental framework and guidance for parents of young children with visual impairment which will have important implications for services both nationally and internationally.

O4.

A COMPARISON STUDY OF BEHAVIOURAL AND ELECTROPHYSIOLOGICAL EVALUATION OF VISUAL ACUITY IN CHILDREN WITH PERIVENTRICULAR LEUKOMALACIA

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Objective. Periventricular leukomalacia (PVL) is considered the major cause of visual impairment in prematurely born children. The most frequent disorders consist of visual field restrictions, disorders of oculomotor behaviour and impairment of visual acuity, often associated to visual crowding. Acuity defects can be now easily diagnosed from the first weeks of life by means of preferential looking techniques such as the acuity cards (AC). However, the reliability of this technique has been recently questioned, particularly in populations at high risk for developmental disorders. The aim of the present study has been to evaluate visual acuity in a group of children with PVL by means of two different techniques: i) the Teller AC, a behavioural technique based on preferential looking, and ii) the sweep visual evoked potentials (VEP), an electrophysiological technique.
Methods. We enrolled 25 children referred to the Stella Maris Scientific Institute between 2004 to 2005 with a diagnosis of PVL on brain MRI. In all the subjects visual acuity was measured by means of Teller ACs and VEP techniques and the results were compared (Pearson's parametric test for bivariate correlation). A neurological examination, an MRI brain lesion severity score and a full visual assessment were also performed.
Results. A high correlation between the visual acuity assessed by Teller ACs and VEPs was shown. There was a tendency towards a higher estimation of vision by the Teller ACs, as opposed to the VEPs. Visual acuity was also significantly correlated to the thickness of the corpus callosum.
Conclusions. Behavioural techniques, in this study Teller ACs, have confirmed their important role in the assessment of early visual development, also in risk populations. This approach proved to be a reliable and easy to use method which should be part of any developmental follow-up of the infants at risk for visual impairment of central origin.

O16.

INFORMING PARENTS OF THEIR BABY'S DIAGNOSIS OF DOWN SYNDROME

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Aim. The aim of this study was to establish how parents in one Scottish Neonatal Unit viewed how they were informed of their baby's diagnosis of Down syndrome and to compare these responses with those found in the literature and consider ways to improve the process of breaking the news to families.
Methods. 44 babies with Down syndrome, born between 1998 and 2002 in a Scottish tertiary neonatal centre, were identified. 24 parents were contactable and agreed to participate. We interviewed consenting parents in person and completeded a questionnaire.
Results. Parents were most likely to have the initial suspicion of the diagnosis raised with them by a junior paediatrician (45.8%) or a midwife (25%). The diagnosis was usually given by a consultant paediatrician (45.8%) but also by junior paediatricians (33.3%). Parents recognised practical constraints but preferred to be told in a private location and to have present both parents (present in 87.5%), the baby (present in 90%) and a midwife known to them (present in 54.2%). They preferred to be told 'as soon as possible', especially once suspicions are aroused (59% of mothers suspected 'something was wrong' before being told). 91.4% of parents were told within 24 hours but for 50% told within 2-12 hours this was still 'too late'. Some parents can be told 'too early' (20% of those told within 2 hours of birth). Taking time to optimise conditions improves the parents' experience and allows 'bonding time'. Pointing out baby's features of Down syndrome can be helpful (occurred in 90%). Parents value positive and supportive staff. Parents found information supplied to be 'adequate' (83.3%) and 'realistic' (77.3%). Not all were offered follow-up with the person telling them.
Conclusions. Our parents' views on how they were told were more positive than reported previously, but common areas of dissatisfaction still exist. Junior doctors and midwives are likely to be involved at the outset, and additional training and support may be required. Parents would ideally prefer to be told by someone who is sure of the diagnosis, is knowledgeable about Down syndrome, is known to them and is available. Early consultant paediatric input with support of a core of trained midwives may be advisable.

O39.

LONGITUDINAL STUDY OF THE HORMONAL INFLUENCES CONTROLLING PUBERTY IN CHILDREN WITH CEREBRAL PALSY COMPARED TO A REFERENCE GROUP OF NORMALLY GROWING CHILDREN

WITHDRAWN

Free Paper Session XI: Miscelanea

O40.

CLINICAL FINDINGS FROM A MULTICENTRE EUROPEAN CEREBRAL PALSY STUDY: CAN WE DISTINGUISH QUADRIPLEGIA FROM DIPLEGIA?

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Objective. To compare and contrast the clinical and neuroradiological features in children with diplegia and quadriplegia, identified from a multicentre European study of cerebral palsy.
Methods. Children were recruited from 8 European centers. All were born over a consecutive 2 year period (1996-1999) and were suspected to have cerebral palsy. Experienced paediatricians applied a standarised proforma, comprising 160 items which detailed the distribution of the motor disorder, tonal abnormalities, comorbid features and functional abilities. From this diplegic and quadriplegic children were identified. Available MRI brain scans were reviewed in a standardized fashion by two neuroradiologists, blinded to the clinical findings. Where appropriate the severity of white matter involvement was graded.
Results. In total 431 children were recruited to the study. Of these, 148 children were described as diplegic (34.3%) and 80 as spastic quadriplegia (18.6%). In diplegic children functional severity was reported as mild in 34%, moderate in 46% and severe in 20%. In quadriplegic children functional severity was reported as mild in 9%, moderate in 35% and severe in 73%. Visual behaviour, feeding and communication abilities also differed markedly in the two groups. MRI scans were reviewed in 351 children of whom 122 were diplegic and 57 were quadriplegic. The commonest abnormalities were periventricular lesions seen in 87 of the diplegic children (71.3%) and 20 of the quadriplegic children (35.1%). The remain-

der had miscellaneous cortical or basal ganglia lesions (16 and 26 respectively), malformations (6 and 7 respectively) or were found to have normal MRI scans (13 and 14 respectively). In the quadriplegic group the periventricular changes were generally extensive, involving posterior, mid and anterior areas and described as severe in 63.2%. In the diplegic group periventricular changes mainly involved posterior areas; changes were mild in 41.9% and severe in 21.9%.
Conclusions. Colver and Sethumadhavan (2003) proposed that the term diplegia should be removed from the classification of cerebral palsy. We maintain that the terms diplegia and quadriplegia remain useful clinical descriptors. At an early age such children can be clearly distinguished on clinical, functional and radiological grounds and this can be used to inform medical care.
Acknowledgements. The Castang Foundation. Children, families and staff of contributing European centres.

O41.

CHILDREN WITH CEREBRAL PALSY: HOW ABOUT THE PARENTS?

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Background. Parents of children with cerebral palsy often have to face increased demands and challenges, which may lead to high stress levels. There is, however, considerable variation in how caregivers adapt to these stressors and demands. Little is known about the way in which parents adapt after they have been told that their child has cerebral palsy and which variables explain differences in adaptation. This information is very important because it might help service providers to tune their intervention towards the unique situation of the child and the family.
Objective. To get insight in the process of adaptation of parents with young children with cerebral palsy.
Methods. A literature search was performed using the Medline and PsychInfo databases.
Results. The studies that were found showed a large variety in research designs, instruments and populations. In general, studies were cross-sectional, focusing on the relation between one or two factors and stress or coping as a measure of parental adaptation. A large number of variables were found, which can be are arranged in three categories: child-related factors, parent-related factors and contextual factors; the latter are factors related to external support including variables related to the process of care. Literature indicates that the way in which parents are involved in the process of care might be an important predictor for parents' outcome in terms of emotional well-being.
Conclusions. It is important to realize that the way parents adapt after they have been told that their child has cerebral palsy varies among parents and also may change as a function of the child's development and changing stages of family life over time. Because the literature up to now is limited we conclude that longitudinal research looking at multiple variables together over time is needed to get insight in the processes of adaptation. The factors should include child characteristics, family characteristics and variables related to the processes of care. More insight in the role of variables related to the process of care will support the development and implementation of services that may support the adaptation process to the benefit of both the parents and the children with cerebral palsy.

O42.

PHYSICAL ACTIVITY LEVEL AND SPORTS PARTICIPATION OF ADOLESCENTS WITH CEREBRAL PALSY (12 TO 16 YEARS)

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Objective. Low levels of physical activity in persons with disabilities, such as cerebral palsy, may decrease their aerobic capacity, muscular strength and endurance, which could restrict the functional independence and increase the risk for secondary complications. However, little is known about the physical activity level of adolescents with cerebral palsy. Therefore, the purpose of this study was to describe the physical activity level and sports participation of adolescents with cerebral palsy.
Methods. The physical activity level of eighty-five adolescents with cerebral palsy (GMFCS level I, $n = 45$; II, $n = 6$; III, $n = 10$; IV, $n = 8$; V, $n = 16$), aged 12 to 16 years, was measured with questionnaires filled out by their parents. Information about sport activities and cycling outside (including handbike and tandem) was gathered. Descriptive statistics were used to describe the physical activity level of adolescents who have the ability to be physically active (GMFCS I-IV). Also sports participation of adolescents with GMFCS V was described.
Results. Preliminary results showed that 83% of the adolescents with GMFCS levels I-IV participated in sport activities. No differences between levels of disability were found (80%, 90%, 88% for GMFCS I/II, III, and IV, respectively). Approximately half of the adolescents (52%) participated two hours or more in sport activities. Apart from sport activities almost all adolescents cycled weekly (78%), showing a significantly lower frequency in GMFCS IV (82%, 90%, 38% for GMFCS I/II, III, and IV, respectively). Half of the adolescents in GMFCS V participated in sports in their electric wheelchair.
Conclusions. Most of the adolescents with cerebral palsy are physically active. Despite the small group, it is noticeable that adolescents in GMFCS IV do cycle, but less frequently than adolescents in GMFCS I to III. Although sport activities performed in an electric wheelchair probably do not contribute to physical fitness, it is noticeable that 50% of adolescents in GMFCS V do participate in sports. Further research will be necessary to investigate which factors determine physical (in-)activity. It should also be explored whether the physical activity level of adolescents with CP is sufficient to maintain their aerobic capacity, muscular strength and endurance.
Acknowledgments. This research was performed as part of the PERRIN programme (Pediatric Rehabilitation Research in the Netherlands, www.perrin.nl), which is a longitudinal study of children with cerebral palsy.

18TH ANNUAL MEETING OF THE EUROPEAN ACADEMY OF CHILDHOOD DISABILITY (EACD)

Barcelona, 19-21 October 2006

POSTER PRESENTATION

Friday, October 20
Cerebral Palsy Classification

P1.

IS ATAXIC CEREBRAL PALSY AN OUTDATED DIAGNOSIS?

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Objective. Review of the diagnosis of ataxic cerebral palsy (CP) in paediatric clinical practice in the North of England for children born between 1991-1996.
Methods. Retrospective reassessment of diagnosis of ataxic CP using: a) Children registered as ataxic CP on the North of England Collaborative Cerebral Palsy Survey (NECCPS); b) Children with diagnoses of either non progressive cerebellar ataxia (NPCA) or ataxic CP on the diagnostic database (DD) held by North of England paediatric neurologists (less fully ascertained). NECCPS registrations were reassessed clinically by either paediatric neurologist or neurodisability paediatrician.
Results. From 1991-1996 there were 218,314 live births (LB) and 549 children with CP. CP prevalence was 1.9/1000 LB. 16 cases of ataxic CP were recorded. The DD for the same period had 2 children with ataxic CP. In one the diagnosis had been revised to spastic CP with ataxia and the other was on NECCPS register. Prevalence of ataxic CP was thus 0.05/1000 LB, comparable with that reported by Hagberg et al in 1993. 14 of 16 were born at term and in 8 there was a history of neonatal seizures or encephalopathy. 2 were non ambulant but the majority had learning difficulties. Metabolic investigations in 8 were normal. Neuroimaging was available in 14 (12 MRI and 2 CT) and normal in 9. At clinical review diagnosis was revised in 13. Two of 3 with ataxic CP had cerebellar abnormalities on MRI. 7 had revised CP diagnoses (4 dyskinetic and 3 spastic). 2 with dyskinetic CP had characteristic focal basal ganglia abnormalities on MRI. In 6 CP was no longer the diagnosis. 4 had developmental co-ordination disorder (DCD). Review of clinical histories of children with NPCA on the DD, recorded revised diagnoses of DCD and spinocerebellar ataxia. All had investigations with imaging and metabolic studies.
Conclusions. Initial diagnosis of ataxic CP was revised in the majority of children. Current diagnoses included spastic or dyskinetic CP and DCD. Early diagnosis of ataxia is difficult. Progressive ataxic disorders can present with similar features. All children with ataxia should undergo investigation including MRI and metabolic studies. Results cast doubt on the validity and clinical use of the diagnosis of ataxic CP.

P2.

THE PANORAMA OF CEREBRAL PALSY IS STILL CHANGING

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Introduction. Perinatal mortality and prevalence of cerebral palsy during 4 periods from 1968 until 2002 in a defined birth cohort in a Swedish county. Perinatal mortality and rate of cerebral palsy are important to follow for each centre with neonatal intensive care. We now know that many cerebral palsy cases have prenatal origin but to avoid more damage good pre- and perinatal care is essential.
Objective. To describe perinatal mortality and prevalence of cerebral palsy from 1968 until 2002 in Örebro county, a geographical defined area in Sweden with about 1/30 of Swedish population. Has lowered mortality rate resulted in more cases of cerebral palsy? Is the panorama still changing?
Methods. Retrospective study of all cases of cerebral palsy registered at paediatric department and children referred to habilitation centre, study of statistics and records of perinatal and neonatal care. Population data was drawn from the Swedish National Board for Health and Welfare.
Results. In the period 1968-1972 perinatal mortality was 16.8 per 1000 births, prevalence of cerebral palsy was 2.0 per 1000 live births. During 1986-1990 perinatal mortality was 6.9 and prevalence of cerebral palsy was 1.9 per 1000. Period 1991-1996: perinatal mortality was 5.7 and prevalence of cerebral palsy was 2.8 per 1000, 52% were term and 48% preterm born children. Latest period 1997-2002 perinatal mortality was 5.7 per 1000 and prevalence of cerebral palsy was 1.9 per 1000, 71% were term and only 29% were preterm born children. The aetiology, type of cerebral palsy and birth weight of CP cases during the two last periods will be more analysed and discussed. There is a trend in the latest period for fewer premature children and more full term children with asphyxia.
Conclusion. Perinatal mortality has been reduced by 2/3 –16.8 to 5.7– from the 1970s until 1997-2002, but the prevalence of CP is now the same. CP prevalence has varied during time mostly due to complications in children born before 38th week. Latest period there is a trend of lower rates of CP in premature born children and proportionally higher rates in full term children with asphyxia.

P3.

CLINICAL PRESENTATION OF CEREBRAL PALSY: A SINGLE CENTRE STUDY

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Objective. The objective of this study was to describe the prevalence, the distribution, the type and the severity of cerebral palsy (CP) within a single-centre study.
Methods. In the centre for developmental disorders in Ghent 412 children were recruited between 1995 and 2002. All of these chil-

dren had a birth-weight less than 1,250 g and/or a gestational age less than 30 weeks or were part of a multiple pregnancy of which at least one child matched the previous criteria. The prevalence, type, distribution and severity of CP was evaluated. Also the age at which CP was diagnosed was recorded.
Results. Within this study group 59 children (14%) were diagnosed as CP. 75% of the children with CP were spastic, 8% dystonic, 2% dystonic with spasticity, 3% athetotic with spasticity, 5% ataxic, 5% hypotonic. In 2% of the cases the type of CP was not known. When considering the distribution thirty seven children (63%) presented a diplegia, 14 children (24%) a quadriplegia, 3 children (5%) a hemiplegia and in 5 children (8%) the distribution was not known. In 44% of the children the disorder was considered to be mild, in 34% moderate en in 22% severe. The diagnosis of CP could be made at the corrected age of 12 months in 73% of the cases. At the corrected age of 30 months 98% were diagnosed as CP.
Conclusions. 14% of the premature infants developed CP. The clinical presentation can be very divers but the majority of clinical subtype is the mild-moderate spastic diplegia. In 73% of the cases diagnosis within the first year was possible.

P4.

CEREBRAL PALSY IN NORWAY DESCRIBED ACCORDING TO THE SURVEILLANCE OF CEREBRAL PALSY IN EUROPE (SCPE) GUIDELINES

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Aims. Comparing the spectrum of cerebral palsy (CP) between regions and countries may be hampered by variability in the classification of CP subtypes. Moreover, different diagnostic criteria may obscure the identification of aetiological and risk factors. In this study we present the first results of a national CP registry applying the Surveillance of Cerebral Palsy in Europe (SCPE) classification system. We also want to compare the SCPE classification of bilateral CP with the traditional clinical classification in diplegic (DP) and quadriplegic (QP) CP.
Methods. All Norwegian neuropaediatric departments were invited to submit data according to the SCPE classification system on children with CP born between 01.01.1996 and 31.12.1998. The departments were also asked to provide the total number of children with CP born in the same period in their catchment area. Walking and sitting abilities were recorded and used to assess the severity of CP according to the Gross Motor Function Classification System (GMFCS). Hand motor function (HMF) was recorded in each hand separately.
Results. In all, 374 children were reported to have CP, corresponding to a prevalence of 2.1 per 1000 liveborn. Detailed information was recorded for 292 (78%) children, and among these 78 (31%) had the unilateral, 123 (49%) the bilateral, 17 (7%) the dyskinetic and 14 (6%) the ataxic type of CP. In 20 cases (8%) the type could not be classified. Of the 123 bilateral cases, clinicians reported 85 (69%) to be of the DP and 38 (31%) of the QP type. According to GMFCS, 76 (62%) cases with bilateral CP were less severely affected (GMFCS I–III), whereas 44 (36%) were severely affected (GMFCS IV-V). Agreement in the classification of bilateral cases as DP and GMFCS I-III and as QP and GMFCS IV-V was good (κ value: 0.77). HMF was near normal or normal in both hands in 56 (68%) of the 85 DP cases compared with 53 (70%) of 76 cases with GMFCS I-III and bilateral CP. HMF was obviously impaired or worse in both hands in 35 (92%) of the 38 QP cases compared with 37 (84%) cases with GMFCS IV-V and bilateral CP.
Conclusion. We found good agreement in the classification of the bilateral CP types between the SCPE classification system combined with GMFCS and the clinical classification in DP and QP types. However, the SCPE classification combined with GMFCS is likely to provide a more objective classification, thus being more suitable for research purposes.

P5.

CLASSIFICATION OF CEREBRAL PALSY IN A CEREBRAL PALSY REGISTER ASCERTAINMENT PROCESS

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Objective. To describe the ascertainment and classification process of cerebral palsy (CP) cases in the setting-up of a population based register.
Methods. Surveillance of Cerebral Palsy in Europe (SCPE) collaborative group agreed a set of criteria to determine eligibility that rely solely on the clinical features of a case. SCPE Decision Tree for CP and Classification Tree for sub-types of CP were used to identify eligible cases during the setting-up phase of a population based CP register.
Results. The clinical records of 280 children with motor impairment referred to the CP register from 5 different sources were abstracted by a range of professionals. In order to estimate inter-observer variability, each clinical record was extracted twice, by 2 different professionals: κ statistic ranged from 0.5 to 1, depending on training and CP subtype. The proportion of cases and the causes of exclusion at each step of the decision and classification trees were quantified.
Conclusions. The criteria and the tools developed by SCPE allow to document each step of CP classification and to improve agreement in a register ascertainment process.

P6.

INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH IN CHILDREN WITH CEREBRAL PALSY: PRELIMINARY CLINICAL EXPERIENCE FROM TURKEY

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Objectives. The aim of our study was to analyze the preliminary clinical experience of functioning and disability in the aspect of impairment, activity limitation and participation restriction in learning and applying knowledge, communication, mobility, self care domains as proposed in the ICF; their correlation with standardized evaluation instruments whether to answer if the ICF reflected functional profile efficiently in children with cerebral palsy (CP).
Methods. The study included 83 children with various types and severity of CP with mean age of 7.45 ± 2.51 years. We studied associations between impairments, activity limitations and participation restrictions, in addition their correlation with verbal IQ and WeeFim. Activity limitations were studied with the Gross Motor Function Classification System (GMFCS), Bimanual Fine Motor Function (BMFM) and participation restriction with a code, a five level ordinal qualifier. Association between ICF parameters and their correlation with WeeFim, verbal IQ was calculated by Spearman's rank correlation test. For multivariate analysis, stepwise regression was calculated.
Results. Spasticity, seen in 97.5% and mental retardation, in 51.8% of the children, were the most frequently impairments. There was a highly significant correlation of 0.82 between GMFCS and BMFM ($p < 0.001$). Mental retardation, speech deficit, activity limitations and participation restrictions were strongly correlated with each other ($p < 0.001$). There was also strong significant correlation

between areas of WeeFim and domains of participation restrictions ($p < 0.001$). Restriction in learning and applying knowledge, communication, mobility, self-care were best predicted by verbal IQ, WeeFim communication, locomotion, self-care areas respectively ($p < 0.0001$).
Conclusion. Our preliminary experience showed us that ICF is a useful classification tool as well as it reflects functionality of children with CP clinically. We think that ICF may meet the increasing need of a model in our country and may provide a common language for the rehabilitation team in children with CP if it becomes widespread around Turkey.

P7.

ANALYSIS OF CAUSES OF PRIMARY DISABILITY IN CHILDREN, LINKED TO CEREBRAL PALSY IN 2004 YEAR IN COMPARISON TO 1995, 1998 AND 2001 YEARS IN UKRAINE

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Methods. Computerized database was created on the base of analysis of registration card of a child suffering from cerebral palsy (CP). In 1995 year 661 cards were received for every firstly diagnosed case of CP, in 1998 (978 cards) and in 2001 (637 cards). In 2004 year, 702 cards were received (54% live in cities, 46% in rural territories, 57% were boys, 43% were girls). 2,978 cases in all.
Results. Spastic forms of CP predominate and compile 84.5%. Little's form: 1995: 31.1%, 1998: 30.2%, 2001: 37%, 2004: 36.6%. Double hemiplegia presented in 29.6%; hemiparetic form, 18.3%; atonic-astatic form, 7.5%; mixed form of CP, 7,4%. There is a positive tendency to decreasing of hyperkinetic form of CP (1995: 4,1%, 1998: 2,0%, 2001: 1.1%, 2004: 0.65%). 71.2% of children with CP were diagnosed at the age under 3 years (from them under 2 years in 41.8%). A tendency to increasing of a number of premature children with CP becomes noticeable. In 2004 CP in premature children compiles 50.9%. In 1995 mature newborns compiled 63.4%; in 1998, 58.4%; in 2001, 50.2%; in 2004, 47.7%. Base factors of pre- perinatal period, which defined a possibility of forming of CP in children were: a) Complications of pregnancy (1995: 75.8%, 1998: 88.4%, 2001: 88.5%, 2004: 93.4%); b) Intrauterine hypoxia of fetus (1995: 53.9%, 1998: 56.9%, 2001: 70.3%, 2004: 76.6%); c) Asphyxia of newborn (1995: 60.1%, 1998: 73.8%, 2001: 74.6%, 2004: 83.8%); d) Metabolic encephalopathy (1995: 43.3%, 1998: 41.9%, 2001: 45.5%, 2004: 48.9%); e) Trauma during delivery (1995: 24.1%, 1998: 40%, 2001: 37.7%, 2004: 46.4%). Only in 24,5% deliveries were uneventful (1995: 34.3%, 1998: 20.7%, 2001: 27%). Only 13.4% of newborns did not have symptoms of impairment of neurological system when discharged from maternity clinic. In 1995 they were 35.7%; in 1998, 24.3%; in 2001, 17.7%. In 53% of newborns (2001: 60.3%) changes in movement system were revealed (muscular hypo-atonia, hypertone, dystonia); in 15.1% seizures took place (2001: 14.95%). Instrumental investigations in newborns are expanding: neurosonography (1995: 9.7%, 1998: 43.9%, 2001: 63.7%, 2004: 72.4%). Testing for enzymopathies were carried out in 25.2% in children with CP in 2004 (2001: 22.1%), testing for intrauterine infections was performed in 37.2% (2001: 32%). In 24,1% (2001: 17.3%) of children imaging performed (CT, MRI) detected inborn defects of brain in 9% (2001: 10.8%). Although rehabilitation in children under one year was not performed in 23.1% (2001: 23.4%) of outpatient cases, in 22.8% of in patient cases (2001: 26.5%).
Conclusions. Reported results of analysis of 2,978 registration cards of children suffered from CP define main patogenic causes, which form nosologic definitions of childhood disability in children with impaired neurological system and give evidence of possibility of influence on prevalence of the CP.

Functioning in Cerebral Palsy

P8.

RELATION BETWEEN TEMPORAL AND SPATIAL PARAMETERS OF GAIT AND GMFM FOR THE CHILDREN WITH SPASTIC DIPARESIS

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Objective. Spastic diparesis is the most common type of CP in which is the majority of them were the ability to walk with or without support. GMFM quantify how much motor function the child is able to demonstrate and gait analysis can demonstrate the complex gait abnormalities often involving more than one joint. The aim of this study is to investigate a relation between GMFM and temporospatial parameters of gait analysis.
Methods. 46 spastic diparesis children (19 girls, 27 boys) between the age of 7-14 years were included in the study. 36 of them were the ability to walk alone, and 10 of them need a support for walking. GMFM was performed for each children and evaluated A, B, C, D, E sections and GMFM total. Three-dimensional movement analysis system which had six cameras and two force platforms used for motion analysis. Three time-distance parameters which were chosen randomly from at least three repetition walking of the children were evaluated and the arithmetical average of these parameters were determined. Velocity, cadence, step length, double support time measured and Pearson's correlation coefficient statistical method used to investigate the relationship with GMFM values.
Results. Time-distance parameters of gait analysis, velocity, cadence, step length were positive correlation and double support time there was negative correlation with D and E GMFM sections and GMFM total. The results show that there were statistically significant correlation between GMFM and computerized gait analysis ($p < 0.05$).
Conclusions. Time-distance parameters of gait analysis and D, E sections of GMFM were objective indicators of motor function in CP. D and E sections and total score of GMFM were correlated with gait analysis. These parameters might be useful for observing the patients ambulatory performance in clinic. It is conceivable that either assessment could be used to evaluate the functional status of children in cerebral palsy.

P9.

STABILITY OF GROSS MOTOR FUNCTION CLASSIFICATION SYSTEM IN A LONG TERM FOLLOW-UP STUDY OF CHILDREN WITH CEREBRAL PALSY

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Introduction. Children with cerebral palsy (CP) have different levels of gross motor function due to the extent of brain damage. The Gross Motor Function Classification System (GMFCS) is based on the children abilities and limitations in motor function of daily life with particular emphasis on sitting and walking. Knowledge of whether children remain in the same classification level over time has important implications for prognosis given to the family by the interdisciplinary team. The classification level is reported to be stable when the child is growing up and the gross motor function reach a plateau, different for the five classification levels.
Aim. To describe gross motor function for children with CP over time and investigate whether they remain in the classified level.
Methods. Participants were 117 children (65 males and 52 females,

mean age 5 years). The children were tested with Gross Motor Function Measure (GMFM-88) and classified with GMFCS regular, for eleven years, by physiotherapists.
Results. 97 children (83%) kept the GMFCS classification level over time and 20 changed level mainly before seven years of age. 20 children were classified at a higher level and three at a lower level. The children who changed to a higher level had hemiplegia, dyskinetic CP and spastic diplegia. Six children with spastic diplegia got a higher level after surgical interventions. The development of gross motor function measured by GMFM changed the most within the five GMFCS levels up to sixth and seven years of age. Level I, II and III had the most rapid change and level V had the lowest.
Conclusions. The GMFCS classification level was stable over time. Some children had a more rapid development of gross motor function and reached a higher level. Number of subjects were physiotherapists working in habilitation centres of the Western Region and the County of Halland in Sweden assessed children with CP regularly for eleven years. Voluntary movements are effected that limit the childs activities of daily life. The GMFCS and assessment with GMFM are today commonly used by physiotherapists to assess the activity/participation level according to ICF (International Classification of Disability and Health). The instruments have been used to describe gross motor development by creation of motor developmental curves for children with CP. The curves are useful in giving prognosis of motor development by the interdisciplinary team working with the child and it's family.

P10.

COMPARISON OF GROSS MOTOR FUNCTION MEASURE FOR CHILDREN WITH SPASTIC DIPARESIS AND HEMIPARESIS

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Objective. Cerebral palsy (CP) represents a complex of postural abnormalities. It is clinically classified by its distribution as hemiparesis, diparesis, quadriparesis. The purpose of this study was to describe patterns of gross motor development for spastic diparesis and spastic hemiparesis of children with CP and to compare the severity related to the distribution of the body.
Methods. A total of 43 children with CP (23 diparesis, 13 boys and 10 girls, and 20 hemiparesis, 13 boys and 7 girls) aged between 7-14 years were selected randomly from Metin Sabanci Spastic Children Center. The 88-item GMFM was used and individuals items were selected involving left side and right side of the body. A total of 44 items were identified as 26 items involving upper limbs and 18 items involving lower limbs. For statistical analysis, Mann-Whitney *U* test was used to compare two groups.
Results. There weren't any statistically significant difference between two groups for GMFM sections A, B, C scores ($p > 0,05$). Mean score of GMFM section D, E and total the values were higher in hemiparesis group. Thus, there was a statistically significant difference for hemiparesis and diparesis children ($p < 0,05$). Mean score of GMFM items involving the upper limbs the values were higher in diparesis group and mean score of items involving lower limbs were higher in hemiparesis group. Comparing the mean score of selected items for two groups there was a statistically significant difference between the hemiparesis and diparesis groups ($p < 0,05$).
Conclusions. In CP, the main purposes of the exercise therapy are maintain normal joint mobility, postural control, muscle strength and quality of life as long as possible. In rehabilitation process, treatment with spastic diparesis children need to focus in lower extremity strengthening exercises, mobilisation, and gait activities. For hemiparesis children, rehabilitation treatment need to focus on the affected side of the body, to increase upper extremity functionality and weight shifting, balance exercises for lower extremity of the body.

P11.

THE USE OF THE GROSS MOTOR FUNCTION MEASURE IN EVALUATION OF INTENSIVE (RE)HABILITATION PROGRAM –A PILOT STUDY

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Introduction. The Gross Motor Function Measure (GMFM-88) was designed to evaluate change in gross motor function in children with cerebral palsy (CP). Five distinct motor development curves describe important and significant differences in the rates and limits of gross motor development among children with CP by severity. It is known that children in each curve proceed with development until they reach a plateau.
Aim. To see how effective the intensive (re)habilitation program is.
Methods. We included children with CP that were admitted to intensive comprehensive (re)habilitation program (5 times per week, 2-4 weeks). GMFM scoring was done at the beginning and at the end of program and again at next admittance after period of 4 weeks or more.
Results. For now we scored 12 children. Results are suggesting that younger children and those in lower GMFCS levels were developing well in the intensive program. The progress was smaller in the time they had less intensive program at home. More disabled children progressed less and maintained the achieved level in that time at home. Older children (above 4 years) were not gaining much in the intensive program. Their function was improved by the use of aids (walker) (Table).

Table P11.

Case	Age (years)	GMFCS	GMFM [a]	GMFM [b]	T (w)	T1-2 (w)	GMFM [a]	GMFM [b]	T (w)
1	1.1	1	54	83	3	16	143	172	2
2	2.9	3	115	132	3				
3	1.3	3	33	68	4	11	69	81	2
4	1.5	3	37	71	2				
5	9.5	3	172	203 [c]	2				
6	5.2	3	171	190 [c]	2				
7	5.2	3	170	195 [c]	2				
8	6.9	4	167	175 [c]	2	4	166	173 [c]	4
9	7.1	5	33	48	5				
10	6.5	5	95	103	2				
11	1.6	4	46	53	4				
12	1.4	5	18	38	4				

GMFCS: level of the Gross Motor Function Classification System; T: length of the program (in weeks); T1-2: time between 1st and 2nd admission. [a] Results at the admission. [b] Discharge. [c] With walker.

Conclusions. Preliminary results are suggesting that the intensive (re)habilitation program is efficient and enables children to progress in gross motor function. Results are also in agreement with motor development curves, so further investigation is needed to tell whether the progress is due to therapy or natural course of CP.

P12.

FUNCTIONAL GOAL-DIRECTED TRAINING FOR PRESCHOOL CHILDREN WITH CEREBRAL PALSY

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Objective. To evaluate the effect of functional, goal-directed training for preschool children with cerebral palsy (CP) on gross motor function, performance of everyday activities, and goal attainment. The intervention was carried out during a twelve-week period in daily life settings providing ample opportunities for the child's active problem solving and learning skills the family and the child considered important. Apart from daily training the children also met a multidisciplinary team once a week in a group at the local habilitation centre. The members of this team also visited the child at home and at the pre-school to give guidance on training.
Methods. Twenty-two preschool children with CP, median age 43 months, GMFCS level I-IV, participated. The children were divided into three groups for didactic reasons. They were all able to understand uncomplicated instructions. Five goals connected to everyday activities were specified for each child by the parents. Scaling of the goals into the remaining three steps of the Goal Attainment Scale (GAS) was thereafter done in close collaboration with two PTs. GAS contains five steps ranging from –2 to + 2. Gross Motor Function Measure (GMFM-66) was used to evaluate change in gross motor function and to assess performance of everyday activities in the domains of mobility, self-care and social function as well as caregiver assistance the Pediatric Evaluation of Disability Inventory (PEDI) was used.
Results. After twelve weeks 25% of the goals were fully achieved and 59% of the set goals reached the level of +1 and +2. At follow-up 12 weeks after the intervention period the children further improved and 76% of the goals reached levels higher than expected (+1 and + 2). GMFM-66 scores improved continuously during the intervention ($p < 0.001$). A stable pre- and post-training baseline was found. The children increased their performance in self-care, mobility and social function ($p < 0.001$). The need for caregiver assistance was significantly decreased within all these domains ($p < 0.001$).
Conclusions. Goal-directed training in the setting of daily life proved to be a successful method of intervention for these preschool children with cerebral palsy. Surprisingly the children reached their goals to a higher extent than expected possibly reflecting that parents underestimate the learning potential of their children or difficulties in scaling the goals.
Acknowledgement. We are grateful to all the children and the parents who participated. We also acknowledge the contribution from the colleagues in the habilitation teams in Stockholm.

P13.

GOAL-SETTING AND IMPLEMENTATION OF GOALS IN YOUNG CHILDREN WITH CEREBRAL PALSY IN A FAMILY-CENTRED PERSPECTIVE

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Introduction. The processes of goal-setting in rehabilitation are complicated, particularly in terms of incorporating the client's perspective, which in pediatric rehabilitation usually are the parents. There is some evidence supporting active participation of parents in the decision-making process for young children with disabilities; however research on how to perform goal-setting in clinical practice is needed.
Objectives. To explore the goal-setting process within a family-centred approach. To investigate the parent's experiences with goal-setting for their children with cerebral palsy and the implementation of these goals into the natural learning environment at home and in the kindergarten.
Methods. Seven children with cerebral palsy, age 3, who participated in a rehabilitation programme, were all enrolled. Six subjects had hemiparesis, classified as level I (GMFCS), and one child had diplegic type, classified as level III. The parents were interviewed with the Canadian Occupational Performance Measure (COPM) in order to let the parents evaluate the child's activity performance and their satisfaction with the performance. The parents also identified specific goals in collaboration with the professionals and five possible outcomes of the goals were identified using Goal Attainment Scaling (GAS). A focus group methodology was performed to investigate parent's experiences with goal-setting and implementation. Two rounds of interviews were conducted 5 months apart.
Results. A total of 37 goals were identified for GAS. The majority of goals were defined within four categories: mobility 43%, play 30%, self care 24 % and social function 3%, while no goals could be allocated to body function. Approximately 70% of the total goals defined in GAS were attained. The parents portrayed goals as valuable if they were related to everyday life, were meaningful for the child and its level of function. The parents stressed the importance of making the goals concrete, e.g. they should be achievable and visible for all those working with the child.
Conclusions. The parents expressed a variety of positive outcome related to this goal-setting and its implementation. They experienced an increased and active use of every day activities to attain goals. They perceived a faster progress in skill development in the child. They felt an increased self-confidence and motivation to proceed in the work with their children. And working with concrete goals promoted collaboration with service providers.

P14.

PHYSICAL THERAPY FOR INFANTS NEWLY DIAGNOSED AS HAVING CEREBRAL PALSY, DO PERIODS WITH INTENSIVE THERAPY MAKE ANY DIFFERENCES IN MOTOR FUNCTION?

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Objectives. The purpose was to evaluate changes in gross motor function after periods of intensive physical treatment, for infants who were newly diagnosed as having cerebral palsy. The parent's experiences with periods with and without intensive therapy were also collected.
Methods. Single-subject designs with multiple baselines were used to study improvement in motor function. Five infants between 6 and 9 months of corrected age participated. They were recruited from the local hospital. Each child received 2 periods of physical therapy 5 days a week, for 4 weeks. Between these periods there were 8 weeks without therapy. Functional goals for each period for every child were set. The therapy was individually tailored, built upon neurodevelopmental treatment. A blinded assessor, using Gross Motor Function Measure (GMFM), evaluated motor function every 4th week. Every test was recorded by a camcorder and 4 goal areas for each child were analysed for qualitative changes in motor performance. Assessment with PEDI (Pediatric Evaluation of Disability Inventory) was performed before and after periods

with intensive therapy. A semi-structured interview of the parents was performed one month after the end of the project.
Results. Statistical significance was established with the standard deviation band method. All children showed improvement above the 2SD line in their GMFM score after the first or second intervention period. According to GMFM, their change scores for a period of 6 months were larger than expected for children younger than 2 years of age. Compliance was high for all children. All parents were very pleased having participated in the study. They reported that seeing a therapist very frequently, gave them the possibility to really learn the handling skills and made the transfer into daily activities easier.
Conclusions. The participants were at a very young age, and were expected to show motor function development also without physical therapy. Their parents reported that periods of intensive therapy gave the children a spur in their motor development. Since some of the children had not reached a motor age of 6 months, we can question whether the tests chosen represent appropriate tools for assessing motor outcome for such young children. More studies about early physical therapy for this group of children are needed.
Acknowledgment. This work was supported by Department of Clinical Service, St. Olavs Hospital, Trondheim University Hospital and by grants from The Norwegian Fund for Postgraduate Training in Physiotherapy, and was supported by Department of Clinical Service, St. Olavs Hospital, Trondheim University Hospital.

P15.

SYNERGISTIC MUSCLE ACTIVATION DURING VOLUNTARY MAXIMUM CONTRACTIONS IN CHILDREN WITH SPASTIC DIPLEGIA, SPASTIC HEMIPLEGIA, AND HEALTHY CONTROLS

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Objective. We aimed to examine muscle recruitment patterns in children with cerebral palsy compared to healthy control children under conditions of maximum voluntary contractions.
Methods. Three groups of children participated in the study: 12 children with diplegia (8 males, 4 females; 4-10 years of age, mean age 7 years 0 months, SD 2 years 4 months); six children with hemiplegia (4 males, 2 females; 5-10 years of age, mean age 7 years 4 months, SD 2 years 0 months); and, 13 control children (7 males, 6 females; 4-11 years of age, mean age 7 years 2 months, SD 2 years 0 months). Surface electromyography was simultaneously recorded from four proximal and distal lower extremity muscles, vastus lateralis, medial hamstrings, tibialis anterior, and lateral gastrocnemius.
Results. Children with cerebral palsy showed greater variability in pattern of muscle activation and more frequently failed to activate the prime mover first compared to the control children, in particular when the prime mover was a distal muscle. This was particularly true when the prime mover was a distal muscle. For example, during ankle plantar flexion when the lateral gastrocnemius muscle was the prime mover, children with hemiplegia showed pre-activation of the tibialis anterior muscle by 94 ms and children with diplegia showed medial hamstring co-activation.
Conclusions. The children with cerebral palsy showed considerable alterations in temporal patterns of muscle activation compared to the control subjects. These findings under conditions of maximum voluntary contraction are similar to findings reported in the literature under other more automatic movement paradigms. Impaired temporal sequencing (abnormal synergy) appears to be a general phenomenon in cerebral palsy, independent of complexity or simplicity of motor task, and irrespective of the level of voluntary motor control employed. Greater understanding of muscle recruitment patterns may provide directions for motor control retraining or other forms of intervention.

P16.

EARLY POSTURAL CONTROL INTERVENTION: A CLINICAL STUDY RELATED TO THE EFFICACY OF TRAINING BALANCE IN CHILDREN FROM 8 TO 30 MONTHS-OLD WITH SPASTIC CEREBRAL PALSY

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Aim. In this paper we discuss the possibility of improving balance within early rehabilitation care of children with spastic tetraplegic, hemiplegic and diplegic cerebral palsy (CP).
Introduction. Balance is critical to the development of independence in many functional skills, including walking and manipulation skills.
Methods. We studied 10 children from 8 to 30 months-old with different types of CP through clinical baseline assessment of echological interactive disability, specific reactive and proactive balance training and clinical assessment after intervention. GMFM, PDMS, PEDI, WeeFim, Griffits DS and specific hand or walking skills tests were used in baseline and final assessments. Balance training for recovering from an unexpected external threat to stability during sitting or standing and for stabilizing posture in anticipation of a known threat to stability (voluntary movement) was performed using a moving platform bearing on a central pivo.

P17.

A LONGITUDINAL STUDY ON THE COURSE AND DETERMINANTS OF DAILY FUNCTIONING IN PRIMARY SCHOOL AGED CHILDREN WITH CEREBRAL PALSY

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Background. In the Dutch national research program Pediatric Rehabilitation Research In the Netherlands (PERRIN) development of activities and participation of children and adolescents with cerebral palsy (CP) is studied in different age groups. The projects concerning age groups of 0-5, 9-16 and 16-24 years have been started some years ago and are in the stage of data-collection. These projects focus on specific themes: early diagnosis and family; decline in functioning mobility in specific subgroups and puberty; and transition to adulthood, respectively. Until recently the age group of 5-9 years was missing in the PERRIN program. Addition of this age group brings along some new age-specific themes in children with cerebral palsy: e.g. school going, cognition and identity.
Objectives. The aims of the PERRIN CP 5-9 study are 1) to describe the course of daily functioning in terms of activities, participation and quality of life in primary school aged children with CP, 2) to study the relations between possible determinants and the level of daily functioning and quality of life and 3) to describe the use of services and health care facilities and to identify unmet needs.
Methods. A prospective observational cohort study comprising 100 children diagnosed with CP. Recruitment of 50 children aged 5 years and 50 children aged 7 years is foreseen. These children will be followed for two years. Outcome is measured yearly (T0-1-2) on the levels of activity and participation (GMFM, PEDI, VABS) and quality of life (TACQoL). Potential determinants are measured once at baseline (T0) and concern bodily (dys)functions, personal factors (child characteristics) and environmental factors (e.g. parental reaction to diagnosis). The recruitment of children and parents takes

place from collaborating centres of paediatric rehabilitation medicine in Utrecht and Amsterdam and has started in May 2006.
Conclusions. The PERRIN CP 5-9 study is characterised by a longitudinal design, by primary outcomes on the level of activities and participation, by relationships between child and parental characteristics and additionally by a focus on cognitive and school functioning. These characteristics and measures will be highlighted in the presentation.

P18.

PHYSICAL STRAIN OF WALKING IN CHILDREN WITH CEREBRAL PALSY

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Objective. The purpose of this study was to evaluate the physical strain of comfortable walking in children with mild cerebral palsy (CP). The physical strain was defined as the oxygen uptake during walking (VO_2walk) expressed as a percentage of their maximal aerobic capacity (VO_2peak).
Methods. Six children (3 girls, 3 boys) with mild spastic CP (3 hemiplegia, 3 diplegia), who were able to walk independently without restrictions (GMFCS I), were included in this preliminary study. Age ranged from 8 to 16 years (mean 10.8, SD: 2.9), and body weight ranged from 26 to 66 kg (mean: 41.3, SD: 16.8). VO_2walk was measured during 6 minutes of walking on a circular indoor track (» 50 m) at their self-selected, comfortable walking speed. VO_2peak was measured in a shuttle run test, which was especially adapted for children with CP. In this test running speed was set using two auditive signals that indicated the time to complete a 10 m track, starting at 5 km/h. Running speed was increased each minute with 0.25 km/h. VO_2walk and VO_2peak were measured using a portable system (VmaxST, Sensor Medics, Bilthoven).
Results. VO_2walk ranged from 16.6 to 21.6 mL/kg/min (mean: 18.5, SD: 1.8), VO_2peak ranged from 32.9 to 41.3 mL/kg/min (mean: 38.4, SD: 3.0). Consequently, the physical strain during walking ranged from 44 to 59% (mean 48.5%, SD: 7.0%).
Conclusions. Comparing these preliminary outcomes with other studies reveals a slightly increased oxygen uptake during walking and a decreased maximal aerobic capacity of our subjects as compared to predicted values for age and gender matched able-bodied controls. Consequently the physical strain during walking in children with CP (48.5% in this study) is higher than reported in able bodied children (< 30%). This may explain the reported problems with fatigue during daily life activities. Further study is required including more children with CP as well as able bodied children to confirm the current results. It should also be explored whether improving the aerobic capacity in children with CP may reduce early fatigue in activities of daily living.

P19.

CO-ASSESSMENT ROUTINES USED FOR IMPLEMENTING CPUP –A POPULATION-BASED PREVENTION PROGRAMME FOR CEREBRAL PALSY

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Objective. Hip dislocation in children with cerebral palsy (CP) has a well-documented history and morbidity. In 1994, a population-based prevention programme for children with CP (CPUP) was started in southern Sweden with the aim of preventing dislocation of the hips by early detection and intervention. The programme includes a standardised follow-up of the diagnosis, gross motor function, clinical findings, treatment and at least yearly standardised radiological measurements of the hips. The programme states that the children are supposed to enter the study before the age of 2 years. This programme was implemented in the southern Västra Götaland Region in year 2000. The aim of this study is to retrospectively analyse the co-assessment decisions that were made and to describe the outcome for the children.
Methods. 166 standardised records and 91 radiological follow-up records from children with cerebral palsy, living in the southern Västra Götaland Region, born in 1996 to 2003, were collected during four years and were now reviewed. Twenty-five children were followed from the age of two years. Seven of those could walk independently while two walked with assistance. Sixteen children could not walk even with assistance (GMFCS 4-5) (CPUP-group). Twelve children were older than 2 years when the programme was implemented (control-group). A special co-assessment protocol was constructed to compare clinical findings, treatment and radiological outcome and to enhance the choice of intervention.
Results. Limits for some clinical findings were defined by analysing the records when migration percentage exceeded 33%. The pace of development of changes was also considered. As a result of these comparisons the following decisions were made: eight nonambulant children from CPUP-group were treated with bilateral tenotomies of the adductors and iliopsoas at the age of 1.9-5.5 (mean: 2.9) The oldest child also needed varus osteotomy of the proximal femur unilaterally. Two children from the control group needed corrective surgery at 5 years of age. They still need further orthopaedic interventions. Recommended routines were described as a result of our experiences. Today none of the children have a dislocated hip with migration percentage > 40%. Considering that 56% of the children were nonambulant (GMFCS 4-5) this is a satisfying result.
Conclusions. The screening programme appears to be as successful here as in southern Sweden. The co-assessment protocol enhances the comparison between the clinical and radiological measurements and clarifies which critical observations are present at each check-up.

P20.

COMPARISON BETWEEN ASSESSMENT OF MOTOR FUNCTION, PERCEPTION AND SPEECH AND SEVEN POSTURAL REACTION ACCORDING TO VOJTA

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Aim. To properly assess the actual developmental state of a child one has to know exactly the differences in the development of premature baby in comparison to child born at term.
Introduction. Historically the diagnosis of premature baby was based on weight at birth lower than 2,500 g but now these children are described only as having low weight at birth. However, children with the weight at birth lower than 1,500 g are frequently premature babies. In developed countries the survival rate of children with extremely low weight at birth (lower than 1,000 g) increased to 45%.
Methods. The investigated group consisted of 57 children with weight at birth lower than 1,500 g who were rehabilitated in Children Follow-up Department. The seven postural reaction according to Vojta were compared with functional diagnosis consist of: crawling, sitting, walking, grasping, speaking and perception. All children were diagnosis in the first quarter of life (given in corrected age).
Conclusions. Children with minimal central nervous system coordination disability according to Vojta showed in all parts correct development functional diagnosis, but children with light and moderate central nervous system coordination disability according to

Vojta indicated more problems with crawling, sitting, walking and grasping then with speaking and perception.

P21.

NEUROPSYCHOLOGICAL CORRELATES OF MOTOR IMPAIRMENT IN CEREBRAL PALSY

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Background. Neuropsychological deficits are commonly related to different etiologies that have a neurological origin. These disorders may be diagnosed clinically with such terms as, for instance, disharmonic cognitive profile, learning disability, non-verbal learning disability, dyslexia, specific language impairment, or attention and executive function deficit. Knowledge about various neuropsychological deficits connected with cerebral palsy is slowly accumulating.
Methods. This paper reviews results on several neuropsychological studies in children with cerebral palsy.
Results. Results are discussed in terms of demands for more specific clinical assessment and imaging-based methods in order to tap more precisely the anatomy of neuropsychological deficits connected with cerebral palsy.

P22.

THE INFLUENCE OF EARLY INTERVENTION ON FUNCTIONAL INDEPENDENCE OF CHILDREN WITH CEREBRAL PALSY

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Objective. During the past decades several reviews of therapeutic interventions for children with or at risk for cerebral palsy have been published, nevertheless the majority of results from most of the studies did not provide sufficient evidence for the effectiveness of the interventions. The aim of the study was to determine the influence of early therapeutic intervention on severity of cerebral palsy and on the level of patient's functional independence.
Methods. We evaluated 77 patients with cerebral palsy registered in The Centre of Child Neurology and Neurorehabilitation, Tbilisi. 37 patients with cerebral palsy have been observed since being newborn (group I). II group consisted of 40 patients with cerebral palsy that did address The centre and were above age of 1 year. For functional independence evaluation, Functional Independence Measurement for Children (WeeFIM) was used. All patients received rehabilitation therapy by multidisciplinary team approach. While estimating severity, the overall criterion was a priority: mild (independent), moderate (needs assistance), severe (needs total care). The functional independence (WeeFIM) of patients in both groups was estimated at the age of 5 years.
Results. During study of syndrome distribution of patients in both investigational groups, spastic syndrome appeared to be the most frequent with: spastic diplegia to be 54.5%, hemiplegia 3.9%, quadriplegia 33.8% and 92.% of all cases made spasticity syndrome, from other syndromes, dyskinetic was 6.5%, then ataxic 1.3%. While estimating the effectiveness of early therapeutic intervention (from age of 4 months), it was evident that early therapeutic intervention doesn't decrease the number of severe cerebral palsy (I group, 32.4%; II group, 30%), but improves child's functional independence (p <0.05): mean value for I group was 4.24; for II group, 3.12.
Conclusion. Early therapeutic intervention doesn't change the severity of cerebral palsy. It increases the degree of functional independence of patients with cerebral palsy.

P23.

VALUE OF THE OSTEOPATHY IN THE HOLISTIC TREATMENT CONCEPT WITH CHILDREN AND YOUNG PEOPLE WITH CEREBRAL PALSY

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Introduction. In the treatment of cerebral palsy, the goal of the physical therapy is to exercise new achieved movements despite of the spasticity. In our centre for development and paediatric neurorehabilitation (CDN), the NDT-therapy (neuro development treatment) is, besides other therapies (like PNF, functional training and instruction of the parents), very important. In the holistic treatment concept, orthetical supplying and likewise systemic and local medicamental therapies are considered. Children with dystonic and spastic movement disturbances show through their problem asymmetrical, synergetic courses of motion, which are persistent and which have a negative influence on therapy process.
Background. The condition for successful training of such movement transitions is the intact-be of all biomechanical and organic functions and structures. In order to optimize the biomechanical conditions in the treatment of dystonia and cerebral movement disturbances, the CDN works hand in hand with the osteopathy. Osteopathy is a distinctive and complete system of health care, based on a collective attention to the human body. The therapist integrates the reason for consultation into his concept. The procedures used in diagnosis and treatment promote healthy functioning in a person by correcting mechanical imbalances within and between the structures of the body. By structures we mean the muscles, bones, ligaments, organs, and fascia. Correcting the mechanical imbalances in the structures is done by restoring, maintaining, and improving the harmonious working of the nervous and musculoskeletal systems.
Methods. Since 2004 the osteopathy is integrated in the holistic treatment concept by cp-children. In the current program of the physical therapy 1-3 initial meetings of osteopathy, in the presence of the physical therapist, were accomplished on 25 children with hemiplegia, 12 children with tetraplegia, 8 children with diplegia and on 20 children with other problems. If necessary, the treatment was repeated after 1-3 months. Success was documented by means of clinical findings and Scores (Ashworth, ROM, course analyses, etc.), as well as by parents questionings (COPM).
Results. The improvements gained by the integration of osteopathy in the concept of physical therapy are a more symmetrical and more economic gait pattern, faster and more rhythmic walking, the reduction of the synergetic courses of motion and the associated movements (especially the upper extremity), the improvement of the general symmetry, as well as a tonus reduction.
Conclusion. Inserting osteopathy into the physical therapy with the cerebral palsy child is a valuable, efficient, impressive and effective addition to the general

P24.

USE OF A DYNAMIC FOOT PRESSURE INDEX TO MONITOR THE EFFECTS OF TREATMENT FOR EQUINUS GAIT IN CHILDREN WITH CEREBRAL PALSY

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Objective. Pedobarographs are increasingly used in clinical gait labs to assess foot deformity of patients with cerebral palsy. The aim of this pilot study was to determine the preliminary validity of a newly developed index using foot pressure analysis in order to quantify the degree of equinus gait in children with cerebral palsy before and after injection with botulinum toxin.
Methods. Data was captured pre-injection and 12 weeks post-injection. Ten children aged 2.5 to 6.5 years took part (5 males and 5 females). Three of them had a diagnosis of spastic diplegia and 7 of congenital hemiplegia. In total 13 limbs were analysed. After orientation and segmentation of raw pedobarographic data we determined a dynamic foot pressure index graded 0 to 100 that quantified the relative degree of heel and forefoot contact during stance. This data was correlated (Pearson's correlation) with clinical measurements of dorsiflexion at the ankle (on a slow and fast stretch) and video observation –using the Observational Gait Scale (OGS)–.
Results. Six out of 10 subjects were pure toe-walkers with foot pressure indices of 0 on their pre-injection assessment. Following treatment only 2 subjects remained on their toes. Pedobarograph data was strongly correlated with both the observational gait scale scores ($R^2 = 0.79$; $p < 0.005$) and clinical measurements of dorsiflexion on a fast stretch which is reflective of spasticity ($R^2 = 0.70$; $p < 0.005$).
Conclusion. We demonstrated the foot pressure index's sensitivity in detecting changes in spasticity and good correlation with video observations seems to indicate this technique's potential validity. When manipulated and segmented appropriately, and with the development of a simple ordinal index, we found that foot pressure data provided a useful tool in tracking changes in patients with spastic equinus.

P25.

POSTURAL CONTROL DURING QUIET STANDING IN CHILDREN WITH SPASTIC DIPLEGIC CEREBRAL PALSY AND HEALTHY CHILDREN

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Aim. To identify the characteristics of postural control during quiet standing in children with spastic diplegic cerebral palsy (CP).
Methods. Case-control study, participating 19 children with spastic diplegic CP at the age of 4 or 6 years who were able to stand independently without any assistance and 22 typically developed healthy children at the same age were recruited as subjects. Pressure data was recorded while subjects stood on the dual force platform (AMTI OR 6-5, MA, USA) with each foot on one force platform. Data were collected in two consecutive trials in which the subjects were asked either to open or close their eyes throughout quiet standing. The coordinates of center-of-pressure (COP) signals and vertical ground reaction force were collected at a sampling frequency of 60 Hz from each force platform and the net body COP was calculated from these data. In addition, the parameters representing the ankle control, hip protraction/retraction and transverse body rotation mechanisms were calculated. As well, path length, medio-lateral (ML) and antero-posterior (AP) displacements were measured. The correlation coefficients between parameters representing postural control mechanisms were assessed. The significance level was set at $p < 0.01$.
Results. The children with CP showed significantly higher values for ML and AP displacement of COP with both eyes opened and closed than the control group. The AP displacement and path length of COP were higher for eyes-closed condition than for eyes-opened condition in the control group. However, those values in the children with CP were not significantly different between eyes opened and eyes closed conditions. The transverse body rotation was dominant for controlling ML and AP postural sway in the children with CP, whereas the ankle control for controlling ML sway was more dominant in the control group.
Conclusions. These findings identified that he relatively poor ankle control was largely compensated with increased transverse body rotation for postural stability in children with CP.

P26.

THE EFFECTS OF THE NF-WALKING ORTHOSIS ON THE WALKING ABILITY OF CHILDREN WITH SEVERE GAIT IMPAIRMENT

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Methods. 97 children (42 females, 55 males; mean age 7.5 years), 87 with various types of cerebral palsy, 4 with spina bifida and 6 with other diagnosis, Gross Motor Classification System (GMFCS) level 4, 48; level 5, 49, with limited or no trunk control were consecutively provided with a NF-walking orthosis (NFWO). Assessments were carried out at and 3 months after the provision of the NFWO (walking distance within one month, ROM, gross motor function measure GMFM, independent walking ability and mobility rating).
Results. With a NFWO 80 of 97 (82%) kids were able to walk, 55 (69%) of them for the first time in life on their own. 11 children used it first as a dynamic stander, 4 of them started to walk within 6 months. Six children gave their walker back. Seventy-five of 80 walking children walked daily distances of 99 m (2-463m). These individuals progressed from GMFCS mean level 4.51 without NFWO to 3.92 with NFWO. The increase of independence –walking ability indoors (5-10 m) and being mobile outdoors (> 10 m) with NFWO compared to no mobility aid– was highly significant ($p < 0.001$). There was a significant difference for independence in mobility indoors with the NFWO compared to former mobility aid ($p < 0.03$). No significance was reached for independent walking outdoors with the NFWO compared to former mobility aid and for crossing obstacles. There was a highly significant increase of bilateral use of hands ($p < 0.001$) when using the NFWO compared with the former or without mobility aid.
Conclusion. The results emphasize the merit of the NFWO to attain independent walking abilities in severely gait impaired children with poor trunk control. The successful outcome depends on the ability to initiate steps and being motivated to move.

P27.

OUTCOMES OF PHYSICAL THERAPY IN CHILDREN WITH CEREBRAL PALSY: A PERSPECTIVE FROM A REHABILITATION CENTER

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Objective. Cerebral palsy (CP) has a prevalence rate of 0.15-0.25% in United States and 0.2% in Europe. Although there is no epidemi-

ological research on CP in Turkey, a high prevalence rate is predicted because of insufficiency of health conditions, consanguineous marriage and social-economic difficulties. We estimate that approximately one million children with CP live in Turkey. Regarding the population of disabled children in our country, many of physiotherapists work with the disabled children in 'special rehabilitation centers'. The purpose of this study is to present outcomes of physical therapy in children with CP from a perspective of special rehabilitation center.
Methods. The study is a prospective study conducted at Cagin Rehabilitation Center, included 17 children with CP, treated in the center. Mean age of participants was 5 ± 3.43 (range: 4-16 years). Participants were taken physiotherapy program due to Bobath Neurodevelopmental Treatment during 1 year period. Gross motor function of children were assessed with GMFM, functional independence with WeeFim and level of disability with GMFCS, before and after 1 year of physiotherapy programme.
Results. Wilcoxon and *t*-test were used to compare the initial and last results. GMFM and WeeFIM scores were statistically significant when the results compared ($p < 0.01$). Correlation between GMFM-WeeFIM were significant before and after treatment ($p < 0.01$).
Conclusion. Regular physiotherapy programmes improve gross motor function and functional independence in children with CP. In addition we think that pediatric physical therapists will contribute physiotherapy by following up literature, advances in assessment and treatment of children with CP.

P28.

HORSE BACK RIDING IN TURKISH CEREBRAL PALSIED CHILDREN: EFFECTS ON GROSS MOTOR FUNCTION AND FUNCTIONAL INDEPENDENCE

WITHDRAWN

P29.

THE EFFECTS OF UPPER EXTREMITY HYPERTONUS AND SITTING CAPACITY ON FUNCTIONAL INDEPENDENCE IN CHILDREN WITH SPASTIC CEREBRAL PALSY

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Objective. This study aimed to determine the effects of upper extremity hypertonus and sitting capacity on functional independence in children with spastic cerebral palsy (CP).
Methods. The study included 22 children with CP. Sixteen of children were spastic diparetic (72.7%) and 6 were spastic hemiparetic (17.3%). Gross Motor Function Classification System (GMFCS) was determined for children. According to GMFCS, 9 (40.9%) of children were in level I, 4 (18.2%) in level II, 9 (40.9%) in level III. Children were assessed by Seated Postural Control Measure (SPCM) for sitting capacity, Manuel Ability Classification System (MACS) for children with CP for upper extremity and WeeFIM for functional independence. SCPM included alignment and function section, having each section scores and total score. Spasticity in upper extremities: shoulder extensors, adductors, internal rotators, elbow flexors, pronators, wrist flexors were assessed by Modified Ashworth Scale (MAS). A total score was calculated for MAS of both upper extremities.
Results. Spearman's correlation test was used for statistical analysis. We found significance correlation between total WeeFIM score and MACS ($p < 0.001$; $r = –0.728$). There was also correlation between total WeeFIM scores and alignment section ($p < 0.001$; $r = 0.714$) and total WeeFIM scores and function section of SCPM ($p < 0.005$; $r = 0.464$). There was statistically correlation between MACS and alignment, function sections of SCPM ($p < 0.05$).
Conclusions. Increase of hypertonus in upper extremities cause more difficulties in functional independence in children with CP. Children who can sit independently and can easily use upper extremities are more successful in their daily living activities.

P30.

EVALUATION OF GAIT FUNCTION BY THE FAMILIES OF CHILDREN WITH CEREBRAL PALSY

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Aim. To evaluate gait functions by families in children with spastic cerebral palsy (CP).
Methods. The study included 27 children with CP with mean age of 6.72 ± 3.73 years. Gross Motor Function Classification System (GMFCS) was determined for whole children. According to GMFCS, 9 (33.3%) of children were in level I, 4 (14.8%) in level II, 9 (33.3%) in level III, 5 (18.5%) in level IV. We compared two different gait assessment scale: Physician Rating Scale (PRS) was performed by pediatric physiotherapist and Gillette Functional Assessment Questionnaire (FAQ) was performed by families. Spasticity in lower extremities: hip flexors, adductors, internal rotators, hamstrings, plantar flexors were assessed by Modified Ashworth Scale (MAS). A total score was calculated for MAS of both lower extremities. The relation between the FAQ and PRS, MAS were determined.
Results. We have found significant correlation between PRS and FAQ ($p < 0.01$; $r = 0.608$). In addition correlation between MAS and PRS ($p < 0.01$; $r = –0.555$), FAQ ($p < 0.01$; $r = –0.72$) were found.
Conclusions. Lower extremities spasticity in children with spastic CP effect functional gait negatively. Regarding the families having major important role in rehabilitation of CP, sharing their ideas with health professionals are valuable. In addition, gait function should be assessed in a easy and practice way for planning rehabilitation program.

P31.

RELATION OF POSTURAL CONTROL IN SITTING WITH GAIT FUNCTION IN CHILDREN WITH SPASTIC CEREBRAL PALSY

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Objective. This study aimed to determine the relation of postural control in sitting with gait function in children with spastic cerebral palsy (CP).
Methods. The study included 27 children with CP with mean age of 6.72 ± 3.73 years. Children were assessed by Seated Postural Control Measure (SPCM) for sitting capacity, Physician Rating Scale for gait assessment. Functional Sitting Posture Assessment addressed head, trunk and foot control according to an ordinal scale between 0-4, meaning none control-good control. Seated Postural Control Measure (SCPM) included alignment and function section, having each section scores and total score. Spasticity in lower extremities: hip flexors, adductors, internal rotators, hamstrings, plantar flexors were assessed by Modified Ashworth Scale (MAS). A total score was calculated for MAS of both lower extremities. The relation between the Physician Rating Scale and MAS were determined.
Results. Spearman's correlation test was used for statistical analysis. We found significance correlation between total PRS and alignment section ($p < 0.001$; $r = 0.704$) and function section ($p < 0.001$;

$r = 0.786$) of SCPM. There was also correlation between total PRS and MAS score ($p < 0.001$; $r = –0.519$).
Conclusions. Gait function are the main milestones of motor development and children with CP feel functional independence and improve environmental perception. Both spasticity of extremities and sufficient sitting posture are important factors effecting gait function.

P32.

EFFECTS OF POSTURE CONTROL ON UPPER EXTREMITY FUNCTIONS IN CHILDREN WITH SPASTIC CEREBRAL PALSY

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Objective. Our study aimed to analyze the effects of posture control during sitting on upper extremity functions in children with spastic cerebral palsy (CP).
Methods. The study included 25 children with CP with mean age of 5.75 ± 2.86 years. Three (12%) of children were spastic quadriparetic, 6 (24%) were spastic hemiparetic, 16 (64%) were spastic diparetic. Gross Motor Function Classification System (GMFCS) was determined for whole children. According to GMFCS, 8 (32%) of children were in level I, 4 (16%) in level II, 9 (36%) in level III, 4 (16%) in level IV. Children were assessed by Seated Postural Control Measure (SCPE) including alignment and function section, having each section scores and total score. Spasticity of upper extremities; shoulder extensors, adductors, internal rotators, forearm pronators, elbow, wrist, finger flexors, were assessed by Modified Ashworth Scale (MAS). A total score was calculated for MAS of both upper extremities. In addition, upper extremity hand function was evaluated by Manuel Ability of Classification System (MACS). We addressed if the measurements of upper extremity and sitting scale correlated each other.
Results. We used Spearman's correlation test for statistical analysis. There was significant correlation between function section of SCPE and MACS ($p < 0.001$; $r = –0.648$). We found no significant correlation between MACS and alignment section of SCPE. There was significant correlation between MAS, MACS and alignment, function sections of SCPE ($p < 0.05$).
Conclusions. Spasticity in upper extremity is a considerable factor effecting upper extremity functions as well as sitting posture and trunk control are also the other factors. Thus; physiotherapy and rehabilitation will be dwelled upon the muscle tone regulation, trunk control and correct sitting posture to improve upper extremity capacity in of children with CP.

P33.

COMPARISON OF TWO DIFFERENT SITTING ASSESSMENT SCALE IN CHILDREN WITH SPASTIC CEREBRAL PALSY

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Objective. The aim of this study was to compare two different assessment scales in children with spastic cerebral palsy (CP).
Methods. The study included 27 children with CP with mean age of 6.72 ± 3.73 years. Gross Motor Function Classification System (GMFCS) was determined for whole children. According to GMFCS, 9 (33.3%) of children were in level I, 4 (14.8%) in level II, 9 (33.3%) in level III, 5 (18.5%) in level IV. We compared two different sitting assessment scale: Functional Sitting Posture Assessment and Seated Postural Control Measure (SCPE). Functional Sitting Posture Assessment addressed head, trunk and foot control according to an ordinal scale between 0-4, meaning none control-good control. SCPE included alignment and function section, having each section scores and total score. Spasticity in lower extremities: hip flexors, adductors, internal rotators, hamstrings, plantar flexors were assessed by Modified Ashworth Scale (MAS). A total score was calculated for MAS of both lower extremities. The relation between the sitting scales and GMFCS, MAS were determined.
Results. Spearman's correlation test was used for statistical analysis. There was a significant correlation between alignment section of SCPE and head ($p < 0.05$; $r = 0.446$), trunk ($p < 0.02$; $r = 0.546$), foot control ($p < 0.05$; $r = 0.476$) of Functional Sitting Posture Assessment. Function section of SCPE and trunk ($p < 0.05$, $r = 0.433$) and foot control ($p < 0.001$, $r = 0.618$). There was a highly significant correlation of 0.63 between the alignment and function section of SCPE ($p < 0.001$). There was a statistically significance between GMFCS levels and both sitting scales ($p < 0.001$); MAS and two sitting scales ($p < 0.05$) although higher correlation in SCPE.
Conclusions. Hypertonus of lower extremities effect trunk control and sitting posture negatively in children with spastic CP. Assessment of sitting have great importance in planning applications of physiotherapy. Although both sitting scales assess sitting posture effectively in children with CP, alignment and function section of SCPE enables more detailed and sensitive assessment while Functional Sitting Posture Assessment is more practice and easier test to perform.

P34.

ASSESSMENT OF SITTING POSTURE IN CHILDREN WITH SPASTIC DIPARETIC CEREBRAL PALSY

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Objective. The aim of this investigation was to assess how much the sitting posture was effected in children with spastic diparetic cerebral palsy (CP).
Methods. The study included 18 (36%) girls, 32 (64%) boys, a total number of 50 children with spastic diparetic CP. Mean age of children was 5.5 ± 3.1 years (range: 2-10 years). Gross Motor Function Classification System (GMFCS) was used to determine the level of disability in children. Five of children were in level I (10%), 8 (16%) in level II, 18 (36%) in level III, 19 (38%) in level IV according to GMFCS. Children were assessed by Functional Sitting Posture Assessment. In this assessment, head, trunk and foot control were determined according to an ordinal scale between 0-4, meaning none control-good control. In addition, spasticity in lower extremities: hip flexors, adductors, internal rotators, hamstrings, plantar flexors were assessed by Modified Ashworth Scale (MAS). A total score was calculated for MAS of both lower extremities.
Results. Sperman's rho test was used for statistical analysis. There was a significant correlation between trunk control and MAS scores ($p < 0.01$, $r = –0.358$), but no correlation between MAS scores and head, foot control. We also found correlation between level III-IV of GMFCS and trunk, foot control of Functional Sitting Posture Assessment ($p < 0.001$ $r = –0.471$).
Conclusions. Spasticity of lower extremities effect trunk control and sitting posture negatively in children with spastic diparetic CP. Regulation of muscle tone should have priority in the physiotherapy applications of spastic diparetic children for correcting the sitting posture.

P34B.

INCONTINENCE AND TOILETING PROBLEMS IN CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER

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Objective. Although rarely mentioned in the literature, incontinence and toileting problems are frequently reported as major clinical issues for many children with disabilities. This paper explores the prevalence and type of toileting difficulties in a group of children with developmental coordination disorder (DCD) and contrasts these problems with the children's movement, emotional and behavioural characteristics.
Methods. Questionnaires of historical and current (in)continence and difficulties managing toileting (eg. managing paper or clothing) were completed by parents of children from a clinical sample identified with DCD and who were participating in an intervention study (n = 41; age range: 6-12 years). Responses on this questionnaire were contrasted with standardised measures of movement difficulty, parent ratings of movement problems and ratings of emotional and behavioural problems on the Strengths and Difficulties Questionnaire along with self-report of ability to use toilet paper.
Results. Graphs and charts will illustrate the persistent wetting and soiling problems reported for 29% and 27% of children respectively. 15% were wetting ≥ twice a week and 10% were soiling ≥ once a week. Parents reported worse movement control amongst children who had had difficulties with toilet training (U = 124; p = 0.05) whilst children who had difficulties managing clothing showed poorer planning and organisation skills (U = 46.5; p < 0.05). Poor ability to perform slow controlled movements was associated with more persistent soiling problems (U = 83; p < 0.05). Emotional symptoms of the SDQ were associated with persistent bedtime wetting to an older age (r = 0.492; p = 0.002; n = 38). Peer problems were associated with difficulties with toilet training and persistent daytime wetting (r = 0.424, p < 0.01; r = 0.330, p < 0.05; n = 40). Comparison of mean scores of key variables showed significant differences for children reported to have had difficulties with toilet training for control of movement (U = 124; p = 0.05) and poor peer relations (U = 101.5; p < 0.01). Logistic regression analysis suggests that emotional and peer problems are most likely to predict problems with toileting.
Conclusions. Toileting difficulties of children with disabilities are likely to be under reported. This paper poses questions regarding the contribution of movement control and emotional and behavioural factors to the persistent difficulties some children with DCD experience in achieving independence in toileting. The significant association between emotional and behavioural factors and problems with toilet training warrants further investigation.

Botulinum Toxin

P35.

A COMPARISON OF GROSS MOTOR FUNCTION MEASUREMENTS IN CHILDREN WITH CEREBRAL PALSY TREATED WITH BOTULINUM TOXIN-A ALONE AND WITH BOTULINUM TOXIN-A COMBINED WITH INTENSIVE PHYSICAL THERAPY

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Aim. To compare the effects of treatment with Botox A and Botox A combined with an intensive physical therapy program in the treatment of a group of children with cerebral palsy. The protocol was reviewed and approved by Ethics Review Committee of the Prince Sultan Hospital and Al-Hada Armed Forces Hospital and Rehabilitation Centre in Saudi Arabia, where the experiment was conducted. The parents gave their informed written consent and they were present throughout all treatment and test sessions.
Methods. 32 children with cerebral palsy, diplegia, spasticity of the ankle planter flexors and significant gait abnormalities were tested. They were spilt into 2 groups. There was no significant difference in gender balance, age or weight between the two groups (age range: 28-132 months; weight: 11-46 kg; 9 males and 7 females in each group). All children received the same initial treatment: Botox A injections into their ankle extensor muscles, casts applied to their ankles for two weeks and fitted with corrective shoes. After the casts were removed, one group received daily physical therapy sessions lasting up to 3 hours. The time was divided between active and passive stretching exercises, hydrotherapy and treadmill walking. This was delivered daily for two weeks and then at a rate of 3 sessions/week for next 12 weeks. The GMFM scores were made before the treatment started and then at 4, 6 and 35 weeks after the casts were removed.
Results. The initial GMFM scores in the two groups were not significantly different before treatment began (Botox alone 60.9 ± 9.2, Botox and PT 58.6 ± 11.9, mean ± SD). Both groups showed improvement over the 35 weeks (Botox alone 67.3 ± 12.0, Botox and PT 68.1 ± 14.7, mean ± SD). The improvement was statistically significant in both groups (p < 0.001). However, there was no significant difference between the outcomes of the treatment at 4, 6 and 35 weeks when the scores were compared using ANOVA tests for repeated measures (p = 0.810).
Conclusions. The intensive physical therapy treatment offered no significant improvement in the GMFM scores of this group of children. Other aspects of the children's movement did improve with the additional physical therapy, for example six children improved their gait. The GMFM scores did not detect these changes.

P36.

FIVE YEARS EXPERIENCE OF A PAEDIATRIC BOTULINUM TOXIN CLINIC: A CHANGING CLINICAL PICTURE

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Objective. To describe the changes in clinical practice of a tertiary referral botulinum toxin clinic over a five year period. Alterations in the clinical characteristics of the population treated and the target muscle groups injected are examined.
Methods. Retrospective review of clinical database. Data was collated for 2 twelve month time periods for years 2000 and 2005. Comparison was made between the number and site of each injection episode and between patient numbers, age and underlying diagnosis.
Results. In 2000, 38 patients were injected with botulinum toxin A (BTA) constituting 42 injection episodes (4 patients reinjected). In 2005, 64 patients received 72 injection episodes (6 patients reinjected). Diagnosis and age are summarised in the table. Between the years 2000 and 2005 patient load increased by 66% whilst proportionately the overall number of children with a diagnosis of

Table P36.

	Total treated	Mean age (range)	CP hemiplegia		CP diplegia		CP whole body		Other	
	n	years	*n*	%	*n*	%	*n*	%	*n*	%
2000	38	6 (2-18)	9	21.5	26	62	4	9.5	3	7
2005	64	7 (1-19)	14	21	27	42	8	12.5	15	23

CP: cerebral palsy.

cerebral palsy fell from 93% to 77%. There was a rise in 'other' diagnoses. These particularly included progressive dystonias and acute brain injuries. The distribution of the muscles injected also changed over these time periods: In 2000, 37/41 (80.5%) injection episodes were to lower limb (LL), 66% being single site only. Three episodes (7%) were to upper limb (UL) and one was to neck. In 2005, 57/72 (79.5%) injection episodes were to LL but now only 21% were at single level, 39% were multilevel and 19.5% included both UL and LL. Twelve episodes (16.5%) were to UL only. 4 episodes were to other muscles (neck and face).
Conclusions. The documented changes in injection episodes, muscles injected and underlying diagnoses over a 5 year period reflect the expanding clinical usage of BTA. This is despite its limited licensed indications. In cerebral palsy management there is an increasing trend towards multilevel injections, following the concept of multilevel surgery. There is now an additional recognised role in the management of other chronic and acute neurological conditions. These changes place increasing demands on tertiary services, requiring more expert assessment and injection technique, with expansion of services to meet increasing clinical demand.

P37.

LONG TIME EFFICACY OF BOTULINUM TOXIN A USE IN CHILDREN WITH CEREBRAL PALSY: A RETROSPECTIVE CHART REVIEW

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Objectives. We aimed to investigate the long-time efficacy of repeated injections with botulinum toxin A (BTX-A) to lower extremity muscles in children with cerebral palsy (CP). A positive effect was defined as increased or maintained joint range of motion (ROM) and decreased spasticity. Additionally, we investigated whether age at the start of treatment, the level of functional involvement according to the Gross Motor Function Classification System and casting combined with the BTX-A treatment influenced the results.
Methods. The first six years of BTX-A treatment were evaluated and prospectively recorded data were analyzed as a chart review. Ninety-four patients with a diagnosis of CP were included in the study. Each patient received repeated injections with BTX-A to lower extremity muscles. The median age at the time of the first treatment was 5 years and the median follow up time was 562 days. Outcome was defined as the difference between baseline measurements and assessments of the status at ankle, knee and hip every three months. The mean and 95% confidence intervals (CI) for these differences were calculated. A CI not including zero was indicative of a statistically significant change from the baseline. The statistical significance was verified by the application of non-parametric signed-rank tests.
Results. Reduced spasticity was observed in all muscle-groups, most pronounced in the right gastrocnemius. ROM was initially increased at the ankle and knee. Older children and patients with greater functional disability were more often non-responders. The addition of a post injection cast resulted in a greater and prolonged improvement in ankle dorsal extension and reduced the number of non-responders.
Conclusion. Repeated BTX-A injections are safe and seem to induce long-term reduction in spasticity and postpone anticipated decrease in joint ROM in children with CP. The combination of BTX-A treatment and casting increases ankle joint ROM.

P38.

THE EFFECT OF MULTILEVEL BOTULINUM TOXIN-A AND COMPREHENSIVE REHABILITATION IN CEREBRAL PALSY ON MOBILITY AND GAIT ONE YEAR AFTER TREATMENT

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Objective. Many children with cerebral palsy (CP) walk with flexed knees. Without intervention, this flexion-pattern tends to increase over time, leading to a decrease in mobility and increased energy-consumption. Recently, we found that treatment with multilevel botulinum toxin A (ml-BTX-A) and comprehensive rehabilitation is effective in these children, with significant improvements on gait at 6, and on mobility at 12 and 24 weeks after treatment. Treatment can be repeated when medically indicated. In the Netherlands, this treatment is generally not re-scheduled within one year. From this perspective, the objective was to determine long-term results measured after 48 weeks.
Methods. Forty-seven children were included in this study –diagnosis of CP, walk with flexed knees (with/without a walking aid or an AFO), aged 4-12 years–. All participated in a multi-centre randomised trial to evaluate the effect of ml-BTX-A and comprehensive rehabilitation, and had been randomised to a short or long baseline group. Assessments were performed before and up to 48 weeks after treatment. Outcomes included the Gross Motor Function Measure-66 (GMFM-66), a parent self-reported Problem Score (PS), energy cost (EC) during walking (n = 21), the Edinburgh Visual Gait Analysis Interval Testing (GAIT) scale, the sagittal knee angle during midstance (KAMS), range of motion (ROM) and spasticity –joint angle of catch measured during a fast (< 1 s) passive stretch– of injected hamstrings, soleus and gastrocnemius muscles. We evaluated the long-term effect after 48 weeks in a pre-post analysis.
Results. At 48 weeks after treatment, a significant improvement was found on the majority of outcomes: GMFM-66, +2.3 points (95% CI: 1.2 to 3.22); PS, –1.4 points (95% CI: –2.0 to 0.8); EC: –1.8 J/kg/m (95% CI: –2.64 to –0.92); ROM: hamstrings, +3.3° (95% CI: 0.1 to 6.4); spasticity: soleus plantarflexion, –4.1° (95% CI: -7.2 to -1.1); gastrocnemius plantarflexion, –4.2° (95% CI: -7.7 to –0.6). No change was found on gait pattern (GAIT, –0.3 (95% CI: –1.1 to 0.4); KAMS, +1.9° (95% CI: –0.5 to 4.2).
Conclusions. Mobility and energy cost were improved one year after treatment with ml-BTX-A and comprehensive rehabilitation. Spasticity and ROM were improved in a few muscles, without a change in gait pattern. According to these results, re-scheduling of ml-BTX-A and comprehensive rehabilitation in children with CP does not seem necessary within one year treatment when the explicit aim is to improve mobility and/or prevent a deterioration in gait pattern.

P39.

THE EFFECTS OF PHYSICAL THERAPY AFTER BOTULINUM TOXIN-A INJECTION ON GAIT PATTERNS OF CEREBRAL PALSY PATIENTS

G Uku

Aim. This study was performed to examine the effects of physical therapy after botulinum toxin-A injection on gait patterns of cerebral palsy patients (7 hemiplegic, 10 diplegic, and 4 quadriplegic) by using computerized gait analysis.
Methods. The number of the subjects was 20 (7 girls and 13 boys; age range: 3-10 years; mean age: 5.14 years). Botulinum toxin-A injections were applied to the gastrocnemius muscles in 31 lower extremities with dynamic equinus deformity and/or dynamic knee flexion deformity. Basic gait parameters and kinematics assess-

ments were made before, at 6 weeks, and at 6 months after botulinum toxin-A injection, by using the EVa HIRES 4.0 hardware-software and OrthoTrak 5.0.3 software systems (Motion Analysis Corp.). The treatment protocol included daily Neurodevelopmental Therapy (NDT), stretching-strengthening exercises, and a specific therapy program based on every subject's individual requirements. Multiple analysis of variance (MANOVA) test was used to determine the benefits of the treatment.
Conclusion. Physical therapy program which was applied after botulinum toxin-A injection has beneficial effects on gait patterns of cerebral palsy patients.

P40.

BOTULINUM TOXIN-A TREATMENT FOR MANAGEMENT OF FOCAL SPASTICITY: REVIEW OF USE IN A PAEDIATRIC REHABILITATION CLINIC DURING 2004

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Objective. Botulinum toxin-A (BTX-A) is established as an effective and safe intervention in the management of focal spasticity. The aim of this paper is to review data from a large number of children attending a paediatric rehabilitation clinic receiving BTX-A injections for the management of focal muscle spasticity in both lower and upper limbs, to comment on efficacy of treatment as measured by achievement of pre determined goals, to describe adverse effects and if possible relate these to the dose of botulinum toxin given.
Methods. All patients who received BTX-A treatment at the Children's Hospital at Westmead during the year 2004 were identified from the Rehabilitation Department database. The following data was collected into a Microsoft Excel spreadsheet: (i) Name, sex, age and diagnosis; (ii) Level of motor function as defined by Gross Motor Function Classification Score; (iii) Details of BTX-A treatment: frequency of injections, site of injections and dose of injections (total and U/kg) and use of post injection plasters; (iv) Response to treatment as identified by achievement of predetermined goals; (v) Procedural and BTX-A adverse effects; (vi) Attendance at follow-up clinic and decisions made on further courses of BTX-A or adjunct treatment.
Results. During 2004, 226 children received BTX-A injections and there were 351 episodes of BTX-A injections. 93 girls and 133 boys were injected with an age range of 16 months to 18 years and 4 months. 217 children had cerebral palsy and 9 had other conditions causing spasticity including metabolic disease and spinal cord injury. Of those with cerebral palsy 80 had hemiplegia, 58 had diplegia and 59 quadriplegia. 18 children had a dystonic quadriplegia and 1 athetoid cerebral palsy. All children had goals identified prior to injection and only in 2 children were no goals met. Side effects relating to injections were recorded for 305 episodes; localised weakness was observed in 7 episodes (2.3%) and weakness distant to the injection site was not seen. Urinary incontinence was identified in 8 episodes (2.6%) and was transient. Procedural side effects were recorded for all injection episodes and were few –in 3 episodes nausea and/or vomiting occurred. No child exceeded a total dose of 400 U or 16 U/kg of BTX-A.
Conclusions. The results obtained from our study support established literature that BTX-A is a safe and effective treatment for focal spasticity in children. We identified benefits in functional skills and ease of care in children with a wide range of motor function. Side effects are few, relatively minor and transient.

P41.

CRUCIAL POINTS OF THE OCCUPATIONAL AND PHYSICAL THERAPY IN THE MULTILEVEL BOTULINUM TOXIN TREATMENT IN AMBULATORY CHILDREN WITH CEREBRAL PALSY

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Introduction. More than 80% of children with cerebral palsy (CP) suffer a reduced mobility through generalized spasticity. The goal of physical and occupational therapy is to exercise new achieved movements despite of the spasticity. By adding multilevel botulinum toxin type A (BTX-A) injections, several effects can be observed: increase in dynamic mobility, better gait patterns, reduced risk of appearance of secondary and tertiary problems and finally preparation for a better neuroorthopedic future.
Aim. The main purpose of this study was to analyse the crucial points of the occupational and physical therapy as well as the orthopedic-technical support after introducing multilevel BTX-A.
Methods. We have evaluated retrospectively 175 infants and children with spastic CP, who were repeatedly treated with BTX-A, in the last 5 years. 91 patients were injected only in the lower limb, 38 patients only in the upper limb, 46 patients in both. Success was documented by means of clinical findings and scores (Ashworth, Range of Motion, gait analysis etc.), as well by parents questionings (COPM). We will report our crucial experiences in the long term follow up of these children.
Results. Generally, it is important that the specific therapeutic and orthopedic-technical consequences and goals are to be discussed in detail and to be clearly explained to the parents. During the further therapy-process the goals should be re-assessed by the rehabilitation team, since gaining and maintaining of them depends on the compliance, as well as on the normal mental development of the patient. The sooner the spasticity is treated the better the motor sequel will be. Storing the new-achieved movements in the cortex will be enhanced. For the lower limb, it is extraordinary important to adapt 2 weeks symmetrical plaster (also with hemiplegia) after the injection. The assignment of the physical therapist is an intensive collaboration with the orthopaedic-technicians, the treatment of the child after the NDT concept, force-co-ordination training and mobilisation of the muscular and collagenic structures. The assignment of the occupational therapist is to adapt and to control continuously custommade splints and other aids, early start and continuation of the occupational therapy considering constraint induced movement therapy.
Conclusion. Multilevel BTX-A treatment is an important and successful part of the multidisciplinary management in children with spastic CP to achieve higher motor levels. The optimal outcome can be gained by modifying and adapting the occupational and physical therapy, as well as the orthopaedic-technical support, considering the crucial therapeutic points.

P42.

BOTULINUM TOXIN IN THE TREATMENT OF FOCAL SPASTICITY IN CHILDREN WITH CEREBRAL PALSY

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Introduction. Botulinum toxin (BTA) is the most potent neurotoxin currently known. However, in small doses it can be used to treat several diseases characterized by involuntary muscle contraction. Working with the pediatric orthopedic ward of Rizzoli Orthopaedic

Institute, we treated children affected by cerebral palsy with BTA to improve their gait and evaluate the need for surgery.
Methods. The patients were admitted to day hospital to assess their form of disease and to decide which muscles to inoculate. Then, they were filmed and braces were prescribed. At the second admission BTA Botox was injected at doses of 5-6 U/kg/muscle. Total doses did not exceed 400 U and were diluted according to the size of the muscle inoculated. Rehabilitation was prescribed to enable the drug to spread and for the patient to learn new motor patterns. The patients were re-assessed at 1, 3, and 6 months, filming was repeated, and braces were checked.
Results. From June 2002 to December 2005 were performed 73 inoculations in 56 patients: 21 hemiplegic, 28 diplegic, and 7 tetraplegic. Mean age was 8.4 years, 35 were boys and 21 girls. The site of inoculation was the triceps in 87 cases: tibialis posterior in 8, adductors in 6, great toe abductor in 3, medial flexors of the knee in 2, and wrist flexors and opponens pollicis in 1 case. 11 patients no longer presented, so they were excluded from the study. At 1 and 3 months' follow-up all patients had a regional improvement: reduction of the focal spasticity, increase in ROM, and functional improvement reported by the patients' parents. At 6 months 14 patients showed improved function, 16 were re-inoculated, 8 underwent tenotomy or lengthening of the inoculated muscle tendon, and 7 patients have not yet completed follow up.
Conclusion. Using BTA gives good results in patients without perception or cognition disorders, when the deformity is correctable and locomotor function is already acquired. Compared to surgical treatment, the use of BTA has the advantage of ensuring a reversal of the effect produced. Critical evaluation of the results enables the identification of errors and therefore, optimization of the drug's use.

P43.

UPPER EXTREMITY FUNCTION AND OCCUPATIONAL PERFORMANCE IN SPASTIC CEREBRAL PALSY CHILDREN FOLLOWING LOWER EXTREMITY BOTULINUM TOXIN INJECTIONS

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Introduction. The effect of botulinum toxin type A (BTA) injections to the lower limbs of children with cerebral palsy (CP) on lower extremities function has been widely researched. Their effect on daily activities and upper limb function is sparsely documented. The existing studies dealt with BTA injections to the upper extremities.
Objective. To investigate the effect of injecting the lower extremities with BTA on the performance of daily activities and upper limb function.
Methods. Prospective follow-up clinical trial. Study participants and setting: 17 spastic CP children, aged 28 years, who were referred to a child neurology outpatient clinic for BTA injections. The protocol was for the children to be seen for study purposes four times during their routine appointments. The first assessment would be made at the first appointment, one month prior to injection, the second assessment one or two days prior to the injection procedure, and the third and fourth one month and 56 months post injection in order to evaluate short and long-term effects. Assessment tools: the Canadian Occupational Performance Measure (COPM) and the Pediatric Evaluation Disability Inventory (PEDI) document satisfaction, importance of daily activities (Occupational Performance), functional abilities and degree of dependence on outside assistance. The Quality of Upper Extremity Skills Test (QUEST) documents the quality and functional abilities of the upper extremities. All tests are to be performed at each of the four scheduled assessments.
Results. A oneway ANOVA with repeated measures was used to analyze the thus far accumulated data. Preliminary results revealed that for all measures, as expected, there was no difference between the first and second tests. Improvement was documented by the third test: it was significant ($\alpha < 0.05$) for the COPM and for QUEST but not yet for PEDI ($\alpha > 0.05$). Final results on the entire cohort are expected by June 2006.
Conclusion. Our preliminary findings indicate that BTA injections to the lower extremities improve upper limb function and occupational performance in CP children.

P44.

DELAYED VERSUS IMMEDIATE CASTING AFTER BOTULINUM TOXIN INJECTION FOR PARTIALLY REDUCIBLE SPASTIC EQUINUS

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Objective. In clinical practice serial casting is often prescribed after botulinum toxin injections to improve ranges of motion and to potentiate the decrease in hypertonia. The aim of this study was to compare the performances of delayed versus immediate serial casting as an adjunct to botulinum toxin therapy for partially reducible spastic equinus.
Methods. Randomised controlled trial. Twelve children aged 3.5 to 7.5 years took part (6 males and 6 females). Five of them had a diagnosis of spastic diplegia and 7 of congenital hemiplegia. In total 17 limbs were treated. These children presented spastic equinus associated with mild gastrosoleus contracture (not reducible beyond 0° knee extended). Each affected calf was injected with 10 U/kg of Dysport ® in 2 divided doses. Children were randomised to immediate serial casting (same day, $n = 8$) or delayed serial casting (4 weeks post-injection, $n = 9$). Casts were replaced weekly for a total of 3 weeks. Complications were recorded. Outcomes were assessed pre-injection and then 3 and 6 months after casting using the Ashworth and Tardieu scales and the observational gait scale (video-based analysis).
Results. Three children complained of pain that required re-casting in the immediate casting group versus none in the delayed casting group ($p = 0.08$). Limbs in the delayed casting group showed significantly more decrease in spasticity both at 3 and 6 months post casting. At 3 months there was a 27° improvement in the fast dorsiflexion angle (Tardieu R1) in the delayed casting group versus 17° in the immediate casting group ($p = 0.029$). At 6 months a 19° improvement persisted in the delayed group compared to 11° in the immediate group ($p = 0.010$). Improvements on the Ashworth scale were also significantly higher in the delayed casting group at both 3 and 6 months ($p = 0.004$, $p = 0.002$ respectively). No significant differences in terms of slow range of ankle dorsiflexion (Tardieu R2) or observational gait scale scores were observed.
Conclusions. This study demonstrates the clear benefit of delaying serial casting until 4 weeks after the injection of botulinum toxin in terms of recurrence of spasticity at the gastrosoleus. It also may offer an advantage regarding the incidence of painful episodes associated with casting and that lead to re-casting. However the timing of adjunctive casting did not influence either the improvement in static contracture or the overall pattern of gait. Most importantly reducing the recurrence of spasticity by delayed serial casting may offer the possibility of decreasing the frequency of botulinum toxin re-injections.

P45.

INTRATHECAL BACLOFEN POMP IN CHILDREN WITH SPINA BIFIDA

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Introduction. In accordance with Stark classification proposal, we can identify two types of spina bifida clinical forms. The first type is characterized by flaccid palsy in areas below the spinal lesion level (type 1: floppiness), the second one, less common, is characterized by spasticity in the palsied peripheral areas (type 2: spinal spasticity). For spasticity treatment, drug therapy is the most important means. There are oral medications (baclofen, tizanidina, dantrolene), distrectual (baclofen pump: ITBP), and topic ones (botulin toxin). Among all these treatment, the great advantage of the pump system is that it continuously delivers baclofen in small doses directly to the spinal fluid, increasing its therapeutic benefits and causing fewer and less severe side effects compared to the oral assumption. Distrectual medication is more suitable for chronic disease, such as spina bifida second type, because it reaches more muscle than the topic treatment.
Methods. The main cause of spasticity in spina bifida children second type is the tethered spinal cord. The recommended treatment of this complication is the untethering procedure. If this is not possible or fails, the intra-thecal baclofen pump system offers a valid solution to reduce the progression of spasticity. Only if the pump system also fails, is it necessary to resort to selective dorsal rhyzotomy (SDR). Our centre in Parma University Hospital follows 1,062 patients with spina bifida and has performed 148 untethering procedures in the last 15 years (6 of them with unsatisfactory results), 8 ITBP implant, and 2 SDR.
Results. We present the results obtained from these 6 patients plus 2 other cases that were unsuitable for untethering procedures. All of them were suffering from severe spinal spasticity type 2, progressive scoliosis and quickly worsening in lower limb deformities.
Conclusion. Our experimental data, added to a questionnaire compiled by the family, has led to the conclusion that ITBP efficiently reduces spasticity and involuntary spasms, improves care and comfort in wheelchair, prompting more active lifestyle. Patients can use braces for longer period during day and present a slower evolution of scoliosis.

P46.

ELECTROMECHANICS SYSTEMS AND BRAIN AND SPINAL CORD INJURY REHABILITATION IN CHILDREN WITH GAIT DISORDERS

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Introduction. Children having neurological diseases such as brain injury or spinal cord injury presents changes in gait patterns, among which the most common are: tone alteration (hyper- o hypotonia), instability, incoordination, ataxia. Electromechanics gait systems, especially those of weight support, were developed with the objective of improve gait capacity, accelerating the recovery process. Several systems have been developed that offer an attendance controlled and programmable based on the necessities of the patient.
Objective. To evaluate the efficacy of intensive gait rehabilitation by means of several procedures, including electromechanical systems of body weight support.
Methods. We included 19 children with spinal cord or brain injury, with ages understood among 6 and 16. We performed a personalized rehabilitation program, of 8 weeks of duration, including several techniques: strength of lower limb muscles, balance, improvement of range of motion, postural treatment, training activities of daily living, physical activities and sport, and gait –management of technical aids, gait exercise, aquatic gait, electromechanicals systems (body weight support: trolley body weight support training system; body weight support footplates, Gait Trainer ®; body weight support treadmill, Lokomat ®), mechanic vibration, posturography, electric cycloergometry, and functional electrical stimulation. The tests performed were: Tinetti test (to measure gait and balance), visual gait analysis, video recording, ten meter test (measures velocity, cadence and step length), FIM, WISCI II, posturography and technical aids assessment.
Results. We found that patients with traumatic brain injury present better gait improvement (40%) than children with cerebral palsy or spinal cord injury (< 10%) in Tinetti scale and ten meter test. All patients improved their autonomy, with better scores in visual gait analysis.
Conclusion. Changes in balance and quality of gait were appreciated in all cases, although patients with traumatic brain injury had better evolution. Most of children needed minor technical aids at the end of treatment.

P47.

UTILIZATION OF DEEP BRAIN STIMULATION AS ADJUNCT TREATMENT FOR CONTROL OF TRUNCAL DYSTONIA IN CEREBRAL PALSY (A CASE REPORT)

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Objective. To describe adjunct neurosurgical procedures for dystonia. This case report describes a fifteen year old male with severe dystonia, spastic cerebral palsy, and GMFC4. He underwent adductor releases in 1993, and hamstring releases in 1995. By the age of nine, he was unable to sit comfortably in his power chair due to his hypertonia. He was unable to utilize his augmentative communication device and unable to drive his power wheelchair independently. Multiple oral medication trials failed including oral baclofen, sinemet, tegretol, and artane, alone or in combination.
Methods. Intrathecal baclofen (ITB) was started in 1998 with doses ranging between 200-420 μg/day. His sitting improved, he could drive his power wheelchair and use his communication device more effectively. Care and comfort scores improved for positioning and dressing. During his pubertal years a lumbar scoliosis developed rapidly with increased torsion of the trunk. The curve increased from 26º to 90º within 8 months. The dosage of ITB was manipulated, however, upright sitting was compromised due to back pain. A thoraco lumbar sacral orthosis (TLSO) was ineffective and skin was compromised with wear. Spinal fusion was proposed at two centers. Given the severe truncal dystonia and torsion, the spine surgeons' concern was that a fusion would be difficult to maintain, therefore, other options to control dystonia were considered. A deep brain stimulator (DBS) was implanted under an FDA approved protocol. Using MRI guidance and microelectrode recordings, deep brain stimulating electrodes were placed in the globus pallidus bilaterally and connected to pulse generators in the subclavicular area.
Results. Following adjustments of the DBS, oral medication was decreased and the ITB infusion could be decreased by 25%. Sitting became pain free and was achieved without a TLSO. The degree of curvature of the spine had not progressed by X-ray and the ability to mobilize the trunk had improved. He went on to have a successful spinal fusion.
Conclusion. DBS provided considerable help for this child who has secondary dystonia due to cerebral palsy. DBS may be considered to augment other interventions for hypertonia.

P48.

SIGNIFICANT CLINICAL IMPROVEMENT AFTER BILATERAL PALLIDAL STIMULATION IN A 8 YEARS OLD CHILD WITH FAST PROGRESSIVE TORSION DYSTONIA

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Objective. We report a case of a seven year old girl with generalized dystonia.
Methods. After the initial complaint with walking difficulty the child developed a progressive generalized dystonia first thought of as being of psychogenic origin as a major diagnostic work up was not conclusive. The child was referred to our hospital and mutational analysis of the *DYT1* gene was done showing the typical deletion found in patients with *DYT1* positive torsion dystonia. As some attempts have been made to perform deep brain stimulation in these patients we decided to do this in our patient as pharmacological therapy had failed so far and the disease was progressive with the child losing significant motor skills such as walking and sitting.
Results. The BFMDRS before surgery was 60. Pallidal stimulators were placed bilaterally with significant success. Walking ability was restored completely after the surgery and two months of rehabilitation. The BFMDRS was below 10 after three months. As a complication, the speech of the patient got worse immediately after surgery but could be improved by accurate adjustment of the stimulator. Outcomes of three other cases with deep brain stimulation done in our hospital will be discussed.
Conclusion. We suggest that deep brain stimulation is an important therapeutic option in the treatment of children with primary dystonia and that this treatment option is still underrepresented in the pediatric population.

Orthopedics Orthesis

P49.

EVALUATION OF THE SMART WALKER WITH THE ORTHOTIC PROSTHETIC USER SURVEY (OPUS)

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Background. The Smart Walker is an ambulatory training orthosis that provides for upright posture and mobility. It has the unique feature of suspending the individual as it controls alignment of the lower extremities. It is utilized for children with cerebral palsy GMFC 4 and provides hands free play and interaction with environment. Earlier versions of ambulatory training devices include the Mulholland Walkabout that was developed by Wally Motlock in the early 1970's. The Hart Walker Orthosis, the Mark I developed in the 1980's by David Hart and in the 1990's the Mark II. The Smart Walker was developed in the 1990's and has been dispensed by Advanced Orthotic Design in the later 1990's. Reported gains include increased interaction of the child and environment and longer periods of upright standing that theoretically support bone density and improve alignment.
Methods. The Orthotic Prosthetic User Survey (OPUS) is a tool developed from a NIDRR grant that provides insight into the parent, caregiver and child satisfaction, compliance with the use of the orthosis and goal attainment. The poster will provide the description of the team, the procedure for evaluation and the follow up for delivery of the Smart Walker. OPUS results are presented to support the satisfaction of the orthosis and the family's goals.
Conclusions. There are many devices on the market to increase upright stance and walking for the more involved child, GMFC 4. By using the OPUS a measure of satisfaction and compliance can be objectified. Further research to understand the long term consequences of supported stance is necessary to continue justification for orthotics and equipment.

P50.

PROSTHETIC TIME USE AND SPORT/RECREATIONAL ACTIVITIES OF THE CHILDREN WITH PROXIMAL FOCAL FEMORAL DEFICIENCY

Ö Ülger, S Topuz, K Bayramlar, F Erbahçeci

Objectives. This study is carried out to determine the prosthetic use and sport/recreational activities of the children with proximal focal femoral deficiency (PFFD) with prostheses.
Methods. Prosthetic time use questionnaire and medicare functional level (MCFL) score are used to evaluated the functional prosthetic time use and sport/recreational activities of the 7 children whose ages varied between 8-17 years besides the prosthetic assessments. Prosthetic training and rehabilitation has done for three week all of them. Evaluations were done before the treatment (first) and 6 months after the discharge (second) with the prostheses.
Results. Due to MCFL classification 5 children showed localization at the level of 3 and 2 children showed localization at the level of 4 in the first evaluations. In the second evaluations, 7 children showed localization at the level of 4. The result showed that the children with PFFD were successful in sport/recreational activities such as table tennis and football. There were any children use their prosthesis in the first evaluation. All of them their prosthesis use at home, school, social activities, functionally all time in the six months after the discharge evaluation. It was determined that all the patients are wearing their prostheses more than 8 hours daily.
Conclusions. Consequently, it can be said that the prosthetic control is better in PFFD and active participation of the child to sport/recreational activities is a very important criteria in development of the functional level. It can be said that the prosthetic use in social environment and the increase in prosthetic use time led the children to gain experience and confidence in sport/recreational activities.

P51.

THE EFFECT OF PROSTHETIC REHABILITATION ON AMBULATORY ACTIVITIES OF THE CHILDREN WITH CONGENITAL AMPUTATIONS

Ö Ülger, S Topuz, K Bayramlar, F Erbahçeci, G Sener

Objectives. The study is planned to investigate the effects of prosthetic rehabilitation on ambulatory activities in children who had congenital amputations.
Methods. 20 children whose ages varied between 8-17 were assessed to determine the ambulatory activities such as ascending and descending stairs / inclines, crossing obstacles, getting in and off a vehicle after 3 weeks of prosthetic training (first) and 6 months after their discharge (second) from the prosthetics department. Ambulatory activities analysis were carried out to achieve data.
Results. Statistically important differences were found in ambulatory activities data when the results of the first and second assessments were compared ($p < 0.05$). It was also determined that the children were successful in ambulatory activities after 6 months of their discharge.
Conclusions. Consequently, it can be said that the children presented improved ambulatory activities after 6 months period of their discharge due to prosthetic rehabilitation program. It can be stated

that the prosthetic use in social environment and the increase in prosthetic use time led the children to gain experience and confidence in daily activities.

P52.

COMPARISON OF COMFORT, FUNCTIONAL ACTIVITY USE, DISTRIBUTION PRESSURE AND POSTURAL ALIGNMENT BETWEEN TWO TYPES OF SEAT CUSHION FOR CHILDREN WITH SEVERE MOTOR DISORDERS: DEVELOPMENT OF A MODEL AND MEASURES

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Objective. The objective of this presentation is to present a model for evaluating the response to adaptive seating cushions by children with severe motor impairment, and describe specific measures devised to objectively evaluate their responses. Children with severe motor impairment often use adaptive seating devices to (a) help improve the child's postural alignment (b) give the child postural stability (c) increase the child's function and (d) help the child to achieve comfort, but measurements to evaluate seating positions tend to be subjective and unreliable. A model for evaluation of these four areas of seated behaviour will be described, and preliminary data from a pilot study investigating the differences between two seated surfaces for children with complex motor disorders presented. The hypotheses are that seated position, comfort, pressure distribution, stability (lack of slip) and background movement will be reduced in a shaped contoured seat base than a flat seat cushion.
Methods. Previously, differences in perceptions of postural alignment, function, ease of use, comfort and stability were examined between parents and therapists of children using these devices. A model for further investigation of these seating systems is proposed, using the International Classification of Functioning, Disability and Health (ICF) –World Health Organisation 2001– as a basis for investigation of all domains of functioning. The measures developed for this project include (a) postural alignment (manual and electric goniometry), (b) measurement of pressure distribution through the whole seated surface (c) use of actigraphy to measure background movements (d) accelerometry to measure tendency to move over time in 3 planes (stability) (e) comfort in different seating positions and (f) criterion based seated functional activities specific to children with severe motor and cognitive disorders.
Results. Preliminary results have been analysed using descriptive methods, as the purpose at this stage is to ascertain how useful the measures are in objectively measuring different seated positions. There are however, marked differences between the two seated surfaces on postural alignment, pressure distribution throughout the seat and back, background movements and accelerometry. Comfort in different seats and criterion based seated functional activities however do not show obvious differences. This requires further investigation.
Conclusions. A model and outcome measurements have been developed to ascertain children's response to adaptive seating devices. We have found that some of these tools are useful in describing children's posture and stability, but have limitations when looking at comfort or functional skills. The development and refinement of both the model and rigorous, objective tools are key recommendations.
Acknowledgements. Nancie Finnie Memorial Trust have funded this research.

P53.

EFFECTS OF ORTHOSES ON THE GAIT OF SPASTIC CEREBRAL PALSY

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Objective. Orthotic treatment is important in management of spastic children with orthopaedic problems. Although orthoses may be expected to improve walking function in cerebral palsy. The aim of this study was to evaluate the effect of the ankle-foot-orthesis (AFO) on gait function in children with hemiplegic and diplegic cerebral palsy. Also our study was to compare its performance with barefoot walking with normal values using sagittal plane kinematic data.
Methods. Thirty independently ambulatory children (15 with diplegia and 15 with hemiplegia; mean age 7 years 2 months, 7 years 4 months; range 7 years 1 months to 14 years 5 months) participated in this study. Each children had their gait analysed wearing AFO's and barefoot. Gait was assesed using a three-dimensional, eight camera, 50 Hz Motion Analysis System, USA measurement system. The Motion Analysis Clinical Manager software was used for calculating and plotting temporospatial parametres and sagittal plane joint motion data.
Results. The kinematic results of the gait analysis and temporal-spatial parametres were compared with paired-samples *t* test. In the comparison of the subjects barefoot and AFO gait analysis, there were statistically significant differences between results. Also the use of AFO's increased step length, stride length significantly ($p < 0.05$). However there was no statistically significant difference in cadence and walking speed, when barefoot walking was compared with walking with AFO's ($p > 0.05$). There was a statistically significant increase in the joint motion of ankle in all phases of walking ($p < 0.05$). But there wasn't a statistically significant increase in the joint motion of knee and hip ($p > 0.05$).
Conclusions. This study supports the benefits of orthotic use in children with spastic cerebral palsy who was possible to increase the walking ability. We found that the AFO changed toe walking on the hemiparetic side into a heel-toe gait pattern in all patients. The AFO successfully controlled excessive ankle plantarflexion in swing phase that correctly pre-positioned the foot for an initial heel contact. The AFO allows more normal dorsiflexion during in stance phase than barefoot. AFO use enhances the functional abilities of children with spastic cerebral palsy.
Acknowledgements. This project was supported by the Metin Sabanci Spastic Children Center and Turkey Spastic Children Foundation. We thank Tarik Bitlis PT, Sule Yilmazturk MD, Osman Uckardes PT for their assistance with data collection and processing.

P54.

SCOLIOSIS IN SUBJECTS WITH TOTAL BODY INVOLVEMENT CEREBRAL PALSY: INTEREST OF THE SPINAL ARTHRODESIS

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Objective. There is much controversy in the literature about how to manage scoliosis in the population of subjects with total body involvement Cerebral palsy and profound mental retardation. The aim of this descriptive study is to formulate hypotheses concerning the interest of the spinal fusion.
Methods. This descriptive cross-sectional study was conducted in 61 patients aged from 4 to 48 years (mean 24 years) who present a severe scoliosis (Cobb > 40°). Those who underwent spinal arthrodesis surgery were at more than one year of the surgery. Each patient had a recent X-ray of the spine and hips, and a clinical exam. Differ-

ent data were collected concerning the orthopaedic and functional status, health level (pulmonary, digestive, nutrition, skin), pain, and subjective quality of life (sQoL). Those measures and the clinical examination were carried out by the same physician.
Results. Data were all collected for 61 patients (35 girls, 26 boys). 16 underwent spinal fusion at the mean age of 16.5 years –prevalence: 26.2% (IC = 15.19-37.27)–. No statistical difference was found between those with a spinal instrumentation and the others. Perhaps there is a difference with the functional level, but only a longitudinal study would be conclusive. Pain is well present (19.7%) and not treated enough (only 50% have treatment). It contributes to a poor sQoL ($p < 0.042$). Among the other data, nutritional level is the variable which influences the most general health status ($p < 0.05$).
Conclusions. Spinal fusion cannot be generalized in this population of total body involvement Cerebral palsy with severe scoliosis. Surgery indication has to be a multidisciplinary decision. We have to reflect on the 'medical priority' for these patients.

P55.

BILATERAL HIP RECONSTRUCTION IN SEVERE WHOLE BODY CEREBRAL PALSY –THE TEN YEARS FOLLOW-UP RESULTS

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Aim. The results of a functional, clinical and radiological study of 30 children (60 hips) with whole body cerebral palsy are presented with a mean follow-up of ten years.
Methods. Bilateral simultaneous combined soft-tissue and bony surgery was performed at a mean age of 7.7 years (3.1-12.2). Evaluation involved interviews with patient/carers and clinical examination. Plain radiographs of the pelvis assessed migration percentage and centre-edge angle. Twenty two patients were recruited. Five had died of unrelated causes and three were lost to follow-up.
Results. Pain was uncommon, present in 1 patient (4.5%). Improved handling was reported in 18 of 22 patients (82%). Carer handling problems were attributed to growth of the patients. All patients/carers considered the procedure worthwhile. The range of hip movements improved, with a mean windsweep index of 30.8 (50 pre-operatively). Radiological containment improved, with mean migration percentage of 20º (50 preoperatively) and mean centre-edge angle of 29.3º (–5 preoperatively)
Conclusion. We consider that bilateral simultaneous combined hip reconstruction in whole body cerebral palsy provides painless, mobile and anatomically competent hips in the long term.

P56.

CHANGES OF GAIT PATTERN ON TRANSVERSE PLANE AFTER FEMORAL DEROTATIONAL OSTEOTOMY AND SOFT TISSUE SURGERY IN AMBULATORY CHILDREN WITH SPASTIC DIPLEGIC CEREBRAL PALSY

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Objectives. To identify the effect of femoral derotational osteotomy (FDRO) on the movement in the transverse plane in ambulatory children with spastic diplegic cerebral palsy (CP), in comparison with the children with spastic CP who underwent soft tissue surgery.
Methods. Before-after trial. A retrospective review of 15 children with spastic diplegic CP at the age of 4 to 14 years of age who underwent multilevel soft tissue surgery including FDRO (FDRO group) and 14 children with spastic diplegic CP at the age of 5 to 18 years who underwent multilevel soft tissue surgery only (no-FDRO group) from a university hospital. Three-dimensional computerized gait analysis was undertaken using a Motion Analyzer (Vicon 370 MA with 6 infrared cameras) before and at least 1 year following corrective surgery. Kinematic data on the transverse plane such as pelvic rotation, hip rotation and foot progression angle were collected amongst the data for the gait analysis. The limbs with more external pelvic rotation were selected for the analysis. Negative values indicate external rotation and positive values indicate internal rotation. For statistical analysis, Wilcoxon signed ranks tests were used. The significance level was set at $p < 0.05$.
Results. In the FDRO group, maximal, minimal and mean angles of hip rotations were significantly changed towards normal values (–1.2 ± 7.8º to –12.5 ± 7.4º, 24.3 ± 8.8º to 15.5 ± 7.6º and 9.6 ± 7.1º to –0.1 ± 5.9º). In addition, maximal, minimal and mean angles of foot progression angles were significantly improved (–10.0 ± 12.9º to –21.8 ± 9.7º, 14.4 ± 14.9 to –7.2 ± 11.1º and 3.7 ± 13.1 to –13.2 ± 9.4º). However, there was no significant change in the pelvic rotation following operation. The soft tissue surgery group (no-FDRO) exhibited no significant changes in pelvic rotation, hip rotation and foot progression angle before and after surgery.
Conclusions. This study revealed that FDRO might be a useful treatment option for improving gait deviation on the transverse plane in children with spastic diplegic CP.

P57.

SURGICAL CORRECTION OF UNILATERAL SPASTIC CEREBRAL PALSY: IS QUALITY OF REACHING, GRASPING AND MUSCLE COORDINATION IMPROVED?

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Introduction. Impaired arm and hand function are major problems of children with cerebral palsy (CP), which contribute to disability in daily functioning. Surgery is a treatment option in children with CP with secondary contractures and joint deformities. Studies on functional outcome after surgery are very heterogeneous and reveal conflicting results. In addition, little is known on the effect of surgery on arm muscle coordination.
Objective. To get insight in the effect of surgical correction of the involved arm and hand on impairment level, i.e. on qualitative aspects of motor performance and arm and hand muscle coordination.
Methods. Subjects consisted of three adolescents with unilateral spastic cerebral palsy. For better understanding of the EMG data, six age and gender matched typically developing persons were assessed once. Surgery consisted of tenotomy, transfer, rerouting and lengthening of muscles. The postoperative protocol consisted of 5 weeks plaster immobilisation, followed by 6 weeks intensive hand therapy and application of a removable splint. Follow up consisted of a baseline assessment one week preoperative, and at 3, 6 and 12 months postoperative. Each assessment consisted of measurements on impairment level (Zancolli, Geschwind and House classifications) and evaluation of reaching and grasping during a simple task. Quality of reaching and grasping was evaluated by means of a standardized protocol assessing motion of trunk, shoulder, elbow, lower arm, wrist, fingers and thumb on a 3-point scale. Intra-and inter observer agreement on the assessment was good: $\kappa > 0.60$). Surface EMGs were recorded of biceps (BB), triceps, extensor carpi (EC), flexor carpi (FC) and pronator teres.
Results. All three subjects showed improvement on impairment level, i.e. on Zancolli, Geschwind and House classifications. Movement quality of trunk, shoulder, elbow and lower arm did not change after operation. Movement quality of wrist and fingers in general did improve. Surgical intervention affected recruitment order of the arm muscles: it induced a significant reduction of the

order EC → BB → FC, occurring in 55% of the trials pre-operatively and in 10% of the trials at 6 and 12 months postoperatively (Friedman: $p < 0.05$).
Conclusions. After surgery of the spastic hand a different position of the hand is created, which seems to be associated with a qualitative improvement of wrist and finger movements and a reduction of a deviant recruitment order of the arm muscles.

P58.

THE EPIDEMIOLOGY OF FRACTURES WITHIN A NON-AMBULANT PAEDIATRIC POPULATION, AND THE CONTRIBUTORY ROLE OF A CHILD'S NUTRITIONAL HEALTH

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Objectives. Pathological fractures are proving an increasing problem in children with chronic disabilities due to advancing life expectancies. This study aimed to determine the epidemiology of fractures within a cohort of non-ambulant children, including their mechanism and distribution. We further assessed the contribution of factors known to adversely affect child bone health, including immobility and nutrition.
Methods. Data was collected from the medical records of 165 children identified by NHS Scotland Special Needs System (SNS) as having a profound ($n = 82$), severe ($n = 46$) or non-assessable ($n = 37$) walking disability. Statistical analysis was applied using χ^2 and Fisher's exact tests.
Results. The 5 most prevalent diagnoses within the sample were cerebral palsy ($n = 96$), Duchenne muscular dystrophy ($n = 8$), spina bifida ($n = 6$), myopathy ($n = 4$) and Down's syndrome ($n = 4$). Fractures were incurred by 15.2% of subjects, of whom 40% had recurrent episodes and 28% suffered multiple fractures upon a single episode of injury. Lower limb injuries represented 72.2% cases, with the femur the most commonly affected site (40%). Low-impact injuries, those that would not cause fracture in healthy subjects, constituted 47.3% fractures. Non-accidental injury (NAI) resulted in two fractures. Children with profound walking disability were more susceptible to fracture (22.4%) than those classified as severe (15%) or non-assessable (12%). No significant correlation arose between weight centile and fracture incidence ($p = 0.81$), although subjects were found to be of a lower weight than their ambulant equivalents, with 39% falling below the 3rd centile. Gastrostomy-fed children were less likely to lie within the lowest weight category than the population mean ($p < 0.001$). Fractures were incurred by 28.8% of patients fed by gastrostomy, compared to 13.8% and 4.5% by oral and mixed routes. A higher rate of osteopenia arose amongst gastrostomy-fed patients (62.5%), despite provision of a controlled, well-balanced diet, than amongst those fed by other means (37.5%). Whilst gastrostomy-fed subjects fractured exclusively by low-impact mechanisms, patients fed orally represented all cases of high-impact fracture.
Conclusions. Non-ambulant children are more likely to sustain low-impact, multiple and recurrent fractures than their mobile equivalents. In this study we find no heightened risk of NAI compared to able-bodied children. Although gastrostomy feeding preserved weight, this intervention carried an increased risk of osteopenia and fracture, specifically by low-impact mechanisms. Further study involving blood biochemistry and DEXA scanning is required to ascertain whether the development of a nutritional deficit before gastrostomy introduction underlies this risk, and if there is hereby a role for pre-emptive gastrostomy.

P59.

DOES SELECTIVE DORSAL RHIZOTOMY COMBINED WITH PHYSIOTHERAPY TREATMENT REDUCE ORTHOPAEDIC SURGERY IN CHILDREN WITH CEREBRAL PALSY?

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Introduction. Selective dorsal rhizotomy (SDR) combined with physiotherapy treatment reduces spasticity and facilitates motor function in children with cerebral palsy. Evidence of positive benefits in range of movement, muscle tone and motor function has been shown. For musculo-skeletal effects however, the benefits are not as convincing.
Objective. To monitor rates of orthopaedic surgery, spinal deformities and hip subluxation/luxation 5 years following SDR.
Methods. The consecutive first thirty-five children with spastic diplegia to undergo SDR in Lund were included; mean age at operation was 4.5 years (2.5-6.6). To monitor development of motor function and optimising physiotherapy treatment with a focus on standing/weight bearing positions all children were regularly followed five years postoperatively. Data on post SDR orthopaedic operations and preop GMFCS levels was retrospectively collected from medical records. Hip migration percentage and Cobb's angles were measured.
Results. More than half of the group (57%) had not been undergoing any orthopaedic surgery after SDR at follow-up. Children with walking capacity (GMFCS I-III) had undergone surgery to a lager extent than the non-walkers (GMFCS IV-V), where the most common indications for surgery were to stabilize the foot and to reduce contractures or deformities. Preoperatively none of the children had scoliosis (Cobb's angle > 10°) or any other spinal deformity. At follow-up six children had scoliosis, four children had increased lumbar lordosis and one an increased kyphosis. Three children had a lumbar spondylolisthesis; however no spinal surgery was needed. Preoperatively ten hips in seven children had migration percentage (MP) > 33°, at follow-up eight of these hips had decreased and two increased MP. At follow-up eight hips in six children had MP > 33° of which one with MP 52° were referred to surgery.
Conclusions. The rates of orthopaedic surgery were lower than in other studies. Non-operative treatment methods to prevent and treat contractures were primarily chosen at early stages after SDR; serial casting, intensified physiotherapy and orthoses treatment have shown to be clinically useful. This might explain the rather low figures of surgery. Spasticity reduction in SDR seems not to increase the risk for increased hip migration. Development of spinal deformities during the first 5 years is similar to other studies. Children operated with SDR need continuous orthopaedic follow-up on a long-term basis, early intervention might prevent surgery.

P60.

OUTCOMES AND CLINICAL EXPERIENCES 5 YEARS AFTER SELECTIVE DORSAL RHIZOTOMY

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Objective. The aim of this study was to describe and evaluate side effects, safety and functional outcomes after selective dorsal rhizotomy (SDR) combined with intensified physiotherapy.
Methods. Thirty-five children with cerebral palsy spastic diplegia were operated at mean age 4.5 years (range: 2.5-6.6 years). The majority (26/35) had GMFCS-levels III-IV. The children were assessed

by the same multidisciplinary team at pre-, 6, 12, 18 months, 3 and 5 years after SDR. Demographic data, postoperative complications, amount of cut rootlets, tendon reflexes, clonus, muscle tone and range of movement were recorded. Motor function was classified according to Gross Motor Function Classification System (GMFCS) and measured with Gross Motor Function Measure (GMFM-66). The parents opinions about their child's performance of skills, activities and amount of caregiver assistance were measured with Pediatric Evaluation Disability Inventory (PEDI).
Results. The mean proportion of cut rootlets S2-L2 was 40%. No complication of importance occurred. Four of seven with severe underweight normalized; 29 of all 35 children had quite normal weight/length measurements at the five year postoperative control. Obesity present pre-operatively persisted. Muscle tone was immediately reduced with no recurrence of spasticity over the 5 years. For the total group significantly improvements were seen in range of movement for hip abduction, popliteal angle and ankle dorsal flexion capacity of gross motor function, performance of functional skills and independence in self-care and mobility. The experiences and results will be presented and discussed in relation to GMFCS-levels and time interval at postoperative follow up.
Conclusions. SDR is a safe and effective method of reducing spasticity without major negative side effects. Combined with intensified physiotherapy it provides lasting functional benefits in carefully selected and systematically followed young children with spastic diplegia.

Quality of Life

P61.

RELIABILITY AND VALIDITY OF THE CEREBRAL PALSY QUALITY OF LIFE QUESTIONNAIRE OR CHILDREN (CP QoL-CHILD)

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Objective. Increasingly clinical trials of the efficacy of treatments need to measure quality of life (QoL) in addition to body structure and function. The Cerebral Palsy Quality of Life Questionnaire for Children (CP QoL-Child) has been developed by an international team of clinicians and researchers and parents and children and is the first condition-specific QoL scale for children with cerebral palsy (CP). The CP QoL-Child is based on thematic data from parents and children. This study aimed to test the psychometric properties of the CP QoL-Child.
Methods. Instrument validation study measuring reliability and validity. A population based sample of 205 parents of children with CP aged 4-12 years were recruited from the Victorian CP register. From a total of 695 eligible families, paediatricians were able to contact 471 families (70%). Of these families, 224 families (including 54 children) consented to be involved (54%). The sample was distributed across GMFCS levels (I = 36, II = 57, III = 28, IV = 21, V = 51), age range (4-12 years, M = 8.37) A questionnaire package was mailed to each family, including the CP QoL-Child, Kidscreen (QoL), Child Health Questionnaire (CHQ) –health status and well-being– and GMFCS (functioning). Reliability (internal consistency, test re-test) was examined using Cronbach's α and interclass correlations. Validity (construct, convergent) of the instrument was examined using Pearson correlation analyses and multiple analyses of variance.
Results. There was evidence that the questionnaire is reliable and valid. Cronbach's α for each domain ranged from 0.53-0.89. Interclass correlations for each domain ranged from r = 0.58-0.81. The CP QoL-Child was moderately correlated with Kidscreen (r = 0.20-0.50) and domains of the CHQ (r = 0.002-0.60). There were differences in QoL across GMFCS levels. Children with higher functioning reported higher QoL scores for most domains including participation and physical health (level I: M = 70.87, SD = 12.80; level II: M = 61.74, SD = 15.69; level III: M = 58.92, SD = 18.08; level IV: M = 57.14, SD = 15.79; level V M = 51.30, SD = 14.92). For a few domains, children with higher functioning did not report higher QoL scores, such as emotional wellbeing (level I: M = 79.86, SD = 18.13; level II: M = 79.38, SD = 12.90, level III: M = 80.06, SD = 13.76; level IV: M = 78.77, SD = 14.24; level V: M = 73.73, SD = 14.17).
Conclusion. The CP QoL-Child has been developed to ensure that it has excellent face and content validity. Current research has confirmed that the instrument is reliable and that the relevant domains of CP QoL-Child correlate with generic QoL, health and functioning.
Acknowledgements. National Health & Medical Research Council, Telstra Foundation.

P62.

CHILD/PARENT AGREEMENT IN REPORTS OF THE QUALITY OF LIFE OF CHILDREN WITH CEREBRAL PALSY: A EUROPEAN STUDY

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Objective. Quality of Life (QoL) should be subjective and self-reported. In some children with intellectual impairment, proxy reports have to be used. In order to understand how to interpret such proxy reports, we have assessed the extent of agreement between children who can self report and their parents' reports of QoL in 8-12 year old children with cerebral palsy (CP) living in Europe and examined which factors influence levels of agreement.
Methods. Within a wider study of the relationship of participation and QoL to the environment, 818 children with CP were visited at home in 7 European countries. QoL was measured using child and parent versions of Kidscreen, an instrument developed from focus groups with children across Europe. Child/parent agreement was studied separately for each of the 10 Kidscreen domains (scored 0 to 100) using correlation and directional and absolute differences. In each domain, multilevel multivariate linear regression models were used to establish which characteristics of the children, the family and their environment influenced the extent of agreement.
Results. 63% of children were able to self-report, hence 517 child/parent dyads were available for comparison of child/parent responses. Pearson and intra-class correlations between child and parent reports were low (respectively 0.24 to 0.44 and 0.21 to 0.41 for all domains), suggesting poor agreement at the individual level. A systematic bias was observed in 8 out of 10 domains (physical and psychological well-being, autonomy, friendships, bullying, self-perception, parent relations, school life) with children reporting significantly better QoL than their parents –mean directional differences (child-parent) ranging from 3.3 (bullying) to 15.4 points

(friendships)–. The finances domain was the only one where parents reported significantly better QoL for their child than the children themselves. Mean absolute differences between child and parent scores ranged from 13.8 points (emotions) to 23.4 and 24.7 points (friendships and finances respectively). The main factors significantly and independently associated with greater levels of disagreement between child and parent reports were parental stress and disadvantaged economic status in the physical well-being domain, parental stress in the autonomy domain and child mental health problems in the friendships domain.
Conclusions. Children and parents have very different perspectives on the QoL of children with CP –children generally report significantly better QoL than their parents. Parental stress, child mental health and low socio-economic status increase disagreement in child/parent reports of the child's QoL.
Acknowledgements. SPARCLE funded by European Commission Research Framework 5 QLG5-CT-2002-00636.

P63.

HEALTH-RELATED QUALITY OF LIFE IN CHILDREN WITH CEREBRAL PALSY: DIFFERENCES IN PERCEPTION BETWEEN CHILDREN AND PARENTS

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Background. Health-related quality of life (HRQoL) is considered an important outcome measure for children with cerebral palsy (CP). In the past, assessment of HRQoL relied mainly on proxy-report (e.g., parents). However, it is generally agreed upon that self-report is important to get insight in the HRQoL of children with disabilities, including CP, especially with regard to their psychosocial and emotional functioning.
Objective. The aim of the present study is to investigate the agreement between child and parent reports on HRQoL in children with cerebral palsy (age 8-13 years old).
Method. Both children with CP (n = 43; GMFCS I, II) and their parents completed a 56 item questionnaire (TACQoL). The questionnaire consists of seven domains (each 8 items): physical complaints, motor functioning, autonomy, cognitive functioning, social functioning, positive emotions, and negative emotions.
Results. On average, the children reported a lower HRQoL than their parents on physical complaints, and positive emotions, and a higher HRQoL on cognitive functioning (paired t-test: $p < 0.05$). For negative emotions there was a trend, but not statistically significant, for children to report a higher HRQoL ($p = 0.08$). No significant differences were found for motor functioning, autonomy, and social functioning. The Pearson and intraclass correlations between the child and parent reports were significant for all domains, respectively, $0.36 < r_p < 0.66$ ($p < 0.03$), and $0.52 <$ ICC < 0.77 ($p < 0.01$), except for the domain autonomy ($r_p = 0.04$, and ICC = 0.16).
Conclusions. Children with CP and their parents showed different perceptions of the HRQoL. Use of self-report HRQoL measures for children with CP is therefore considered compulsory.

P64.

AVAILABILITY OF ITEMS NEEDED BY CHILDREN WITH CEREBRAL PALSY IN THE PHYSICAL, SOCIAL AND ATTITUDINAL DOMAINS OF THE ENVIRONMENT

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Objective. To evaluate how the environmental needs of children with cerebral palsy relate to their type and level of impairment and to assess the extent of availability of needed items.
Methods. Following preliminary qualitative studies, the European Child Environment Questionnaire (ECEQ) was developed to record which items in the physical, social and attitudinal environment of home, school and community are needed by and available to disabled children. As part of a wider interview-based survey (SPARCLE), which is investigating how environment influences participation and quality of life in disabled children, ECEQ was administered to parents of 818 children with cerebral palsy aged 8-12 years, in seven European countries. Parental reports of type and level of impairment (walking, two-handed motor function, communication, feeding, IQ, seizures, vision, hearing and type of cerebral palsy) were recorded. Responses related to the physical and social domains were analyzed using Rasch models, yielding parameters which summarise environmental need and availability of needed items for each child in each domain. These parameters were related to the child's impairment using multivariate latent regression Rasch models. Responses related to the attitudinal domain were analysed using multivariate logistic regression to compare children with one or more negative response with others and to relate any differences to the child's impairment.
Results. Qualitative work generated 24, 21 and 14 items related to the physical, social and attitudinal environments respectively. Children with poorer walking, communication and two-handed motor function and those with bilateral cerebral palsy had significantly ($p < 0.001$) more need for an adapted physical environment. About 20% of children reported availability of all but one of the items they needed. Children with poorer walking or bilateral cerebral palsy reported significantly poorer availability of needed items. Children with poorer walking, communication, two-handed motor function and lower IQ had significantly ($p < 0.001$) more need of social support. About 10% of children reported availability of all but one of the items they needed and availability was not significantly related to impairment. Parents generally reported positive attitudes to their child. Poorer communication and lower IQ were significantly ($p < 0.001$) associated with less positive attitudes at home and school respectively.
Conclusions. The environmental needs of children with cerebral palsy were closely related to their walking, communication, two-handed motor function, type of cerebral palsy and IQ. The physical and attitudinal needs of less impaired children were better met than those of more impaired children.

P65.

CORRELATION BETWEEN LIFE SATISFACTION AND GENERAL HEALTH OF CEREBRAL PALSY CHILDREN WITH DIFFERENT FUNCTIONAL LEVELS

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Objective. Children with disabilities are viewed as having difficulties in school life and lower life satisfaction. They more often have health problems and are socially isolated. Our goals are: to analyze life satisfaction of children with cerebral palsy (CP), to compare their life satisfaction with SF-36 health scales-bodily pain, role-physical functioning and physical functioning, and to analyze gen-

eral health status of CP children of different levels of functioning.
Methods. 27 children-15 boys, 12 girls, 14-18 years of age (mean age: 15.37 years) with CP who attended support/self-support groups for disabled children in Riga. Instruments: Life Satisfaction Questionnaire (Fugl-Meyer, Branholm) for evaluation of individual life satisfaction, SF-36 (Ware) short form measure of general health status in general population, and GMFCS (Palisano et al).
Results. Children were divided into 2 groups: 16 children were on 1st and 2nd functional level, 11 on 3rd and 4th functional level (GMFCS). Children of the second target group had a variety of physical (including chronic physical conditions) and emotional problems. Low numbers (< 50) in role-physical functioning of the second group correlated with low physical functioning ($p = 0.619$). Low life satisfaction correlated with low scores of general health. There was no correlation between life satisfaction and functional level of children with CP. CP children of FL III-IV (GMFCS) were more isolated and the families had heavier financial burden in comparison with other parents.
Conclusions. Life satisfaction is not related to the functional level of children with CP. Low life satisfaction of participants correlates with low scores of general health. Most children with CP of support/self-support groups are not satisfied with their financial, leisure situation and social isolation.

P66.

VISUAL FEEDBACK IN TREATMENT OF DYSARTHRIA IN CHILDREN WITH CEREBRAL PALSY

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Objectives. In a first study two boys –aged 6 and 11– with dyskinetic cerebral palsy (CP) received speech therapy with visual feedback through electropalatography (EPG). Despite receiving traditional speech therapy for years their motor speech disorders are still moderate to severe. Both boys show retracted production of alveolar phonemes –hence this being the primary target of the training. The second part of this study, taking part during 2006, another five children with CP receive speech therapy. The same design is used as in the study described above. The aim of the study is to discover whether training with EPG would improve the participants' speech, focus being on their articulation of the alveolar stops /t/ and to evaluate their intelligibility before and after EPG therapy.
Methods. EPG is a technique which records the location and timing of tongue contacts with the hard palate during speech. It has been used since the 1960s in phonetic research, and lately also as a visual feedback method in diagnosis and treatment of speech disorders. The EPG-therapy takes place over eight weeks. Three recordings of EPG-data, and audio recordings, are made before and after the EPG-training.
Results. Results show that the boys in the first study have improved their articulation of initial /t/. One of them rarely reached the alveolar place of articulation before training, while after training he reached the alveolar place in most of the words. The other boy showed a stable alveolar contact in all of the words after therapy. Further results are expected from the ongoing second part of the study with dysarthric children with CP.
Conclusions. The results show that the boys in the first study improved their articulation of initial /t/ through an objectified improvement of the oral-motor process, i.e. the ability to put the tongue at the appropriate position. Their intelligibility was evaluated by naive listeners. This evaluation showed that one of the boys considerably increased his intelligibility. Thus, EPG is considered to be a valuable instrument to treat motor speech disorders in children with cerebral palsy. However, more research is needed to obtain convincing evidence of the significance and practicability of this method. The results from the first part of this study suggest that EPG can be valuable in treating motor speech disorders due to CP.

P67.

DEVELOPMENT OF A FAMILY-CENTRED PROGRAM OF INTENSIVE TRAINING: AN INTERACTIVE PROCESS BETWEEN CLINICIANS AND RESEARCHERS

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Introduction. As a response to parents request for predictable and more intensive periods of rehabilitation throughout childhood and adolescence, an intensive training program (BIP) was initiated at the Rehabilitation Unit, Buskerud Hospital. Core issues were family-centred services and learning in natural environments. BIP was planned with five age-related blocks. Physiotherapist's piloting of the second block, including children aged three to four, raised many questions concerning goal-setting and intensive training. Children, parents and local service providers participated in this block which included three stays at the rehab unit and two home periods. Researchers were included in the further development of the program starting with exploring the second intensive block. On the background of the clinician's experience, the research project focused on exploring goal-setting, development of the activity program during the short stays at the rehabilitation unit and implementation of goal in everyday activities.
Objectives. To develop the content of the second of four blocks in the rehabilitation program (BIP) in teamwork between clinicians and researchers.
Methods. An action research methodology was used in order to associate research and practice. Five physical therapists in the rehabilitation unit and three researchers acted together on particular cycles of activities: application of assessment tools, education day for parents and the family's service providers, goal-setting and development of the activity program in collaboration with parents and local service providers.
Results. The interactive process between researcher and practitioners resulted in viewing goal-setting as a family-centred and dynamic process using different goal-setting instruments. Together the parents, service providers and researchers developed a learning environment for the child's exploration of activities. The joint observation of the children: their interests, constraints and movement strategies were perceived to be of great importance. The goal-setting process and the learning environment contributed to develop a close relationship between goals and activities in everyday life.

P68.

SUBJECTIVE QUALITY OF LIFE IN A POPULATION OF TOTAL BODY INVOLVEMENT CEREBRAL PALSY WITH PROFOUND LEVEL OF MENTAL RETARDATION

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Objective. To evaluate the subjective quality of life (sQoL) in a population of children and adults with total body involvement cerebral palsy.
Methods. As no valid scale exists to evaluate the sQoL in this population, we used a questionnaire named QUALIN, validated for infants under 1 year. A parallel was drawn between these two populations who do not have oral communication and depend on others. This scale assesses four areas: somatic/psychology, family context, capacity to stay alone and behaviour/communication. Other data were collected: global health, pain, orthopedic/digestive/pulmonary status.
Results. 89 patients aged from 2 to 48 years (mean: 16 years) were included in the study. The hetero-questionnaire QUALIN was well

received by the family and the caregivers (100% response). Only the items about the 'game' are not well appreciated. For the adult patients it is difficult to answer about the type of nurse. 65% of the population present a good sQoL whereas the health status is mediocre and the neurologic injury severe. Different data influence this sQoL ($p < 0,05$): pain, sleep, pulmonary and digestive pathology.
Conclusions. Evaluating the sQoL of total body involvement cerebral palsy with profound level of mental retardation has a point. It would be interesting to develop a tool which is more sensitive and appropriate.

P69.

A COHORT STUDY OF PARENTS' SOCIAL SITUATION AFTER THE BIRTH OF A CHILD WITH CEREBRAL PALSY

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Objective. To follow the social situation of parents before and after giving birth to a child with cerebral palsy (CP) and compare with parents to children without CP.
Methods. A longitudinal study using public registries in Denmark. Children with CP born 1965-90 were identified in the Danish Cerebral Palsy Registry and controls in the Civil Registration System matched by gender and age. Parents were identified through the Fertility Database in Statistics Denmark. A cohort of 3,593 parents to children with cerebral palsy and a cohort of 17,982 parents to controls were included. Data on employment status, annual pre-tax income, divorce (not living together) and subsequent children (siblings) were collected in registries in Statistics Denmark 1980-1999.
Results. Most parents in Denmark worked before and after having a child. Employment frequency of mothers of children with CP was 81% the year before birth of the child and 71% when the child was two years old. Mothers of control children had an unchanged employment frequency of 84% in the same period. 27% of mothers to children with CP worked part-time when the child was five years old, compared with 18% of mothers to control children. Mothers of children with CP had a lower pre-tax annual income than mothers of controls controlled for mothers age, birth year of the child and parent's cohabitation. This was mainly due to not employed mothers of children with CP having a lower income than not employed mothers of controls and not due to hours worked a week. Fathers of both CP children and controls had an unchanged employment frequency after birth of the child and pre-tax annual income of fathers to children with CP and control children did not differ. The risk of divorce was not increased among the parents of children with CP when the child was five years old, controlling for socio-economic and demographic factors. Most children with CP had siblings.
Conclusions. Most parents to a child with CP worked, lived together and had more than one child, just like parents of control children. The Danish welfare system seems to have succeeded in supporting parents to a disabled child, but we have not considered the psychological well-being and health of parents or siblings. Special attention needs to be paid to single mothers, mothers with a low educational level and mothers with severely disabled children, who are at highest risk of being outside the labour market.

P70.

THE DEVELOPMENT OF A CONDITION-SPECIFIC QUALITY OF LIFE INSTRUMENT FOR YOUNG CHILDREN WITH CEREBRAL PALSY: A FEASIBILITY STUDY

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Background. Increasingly the importance of health-related quality of life (HRQoL) as outcome variable in clinical trials has been recognized. There are a few generic HRQoL measures for young children available, but disease-specific modules for cerebral palsy are missing. A disease-specific module has more in common with clinical measures and contributes toward better treatment planning at the level of the individual patient. Most clinicians feel that some disease-specific questions are necessary.
Objective. To identify themes for HRQoL of young children (0-4 years) with cerebral palsy to guide the development of a condition-specific module, that could be added to the generic quality of life scale TAPQoL for young children.
Methods. In the development of quality of life scales four stages can be distinguished. The first three stages focus on the identification of topics. In the present study the first three stages have been completed. In these stages parents ($n = 8$) and professionals ($n = 6$) participated in semi-structured interviews. After comparison with the TAPQoL and deleting items that were already included in the TAPQoL, items were formulated and parents and professionals reviewed the formulated items on relevance, clarity and completeness.
Results. Overall, six themes (domains) were identified, operationalised in 25 items. The domains to be included are: cerebral palsy-specific health problems, specific motor problems, specific problems with personal care, specific cognitive problems, specific problems in social functioning and specific emotions.
Conclusions. Semi-structured interviews with parents and professionals made it possible to identify topics that were regarded as important in the measurement of HRQoL of young children (0-4 years) with cerebral palsy. In the next step pilot testing should be performed in which reliability and validity will be examined in more detail. Finally, reference data should be sampled.

P71.

WHAT DOES A COMMUNITY SERVICE FOR CHILDREN WITH ACQUIRED BRAIN INJURY LOOK LIKE?

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Objective. To set up and evaluate a community support service for children with an acquired brain injury
Methods. In the UK about 3,000 children a year acquire a significant neurological or cognitive disability as a result of traumatic brain injury. Many studies have been done over the last twenty years documenting the long term challenges that families face when caring for people with traumatic brain injury and brain tumours. Parents are most stressed by changes in cognition and behaviour studies also highlight the lack of social and practical support available and conclude that models of long term support and care need to be developed. The Children's Trust is a residential rehabilitation centre for children with an acquired brain injury. Over the last two years a pattern has been emerging. Some children and families feel that a residential placement is not something they would consider. This is for a variety of reasons; the age of the child, other siblings in the family needing support, the child has no physical problems and the family and child do not yet have awareness of the impact of cognitive problems in everyday life. It is clear that a gap exists in the provision of

longer term specialist provision for children with an acquired brain injury in the UK. At home and at school is the most effective setting to provide long term specialist support. The service set up in December 2005, offers an inter professional assessment model which provides an in depth assessment of a child's cognitive, communication, physical and psychological needs. This information is shared with the wider community team (with parents consent).
Conclusions. As this is a new service models of intervention are being developed. In order to evaluate the service a range of outcome measures will be used. Of the 12 children referred, 9 have attended an inter professional assessment and 6 are receiving intervention.
Acknowledgements. Thanks to The Children's Trust who have supported this new project and to The Harrison Research Centre for their support in developing the protocol for evaluating the service.

P72.

DOES THE SEVERITY OF MOTOR IMPAIRMENT AFFECT PARENTAL STRESS? RESULTS FROM A STUDY ON CHILDREN WITH CEREBRAL PALSY IN SEVEN EUROPEAN COUNTRIES (SPARCLE)

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Objective. Serious motor problems in children may have an adverse impact on their families in term of stress. We have studied the level of stress perceived by parents of children with cerebral palsy (CP) and its relation to severity of motor impairment of the child.
Methods. Cross-sectional survey as part of a larger study (SPARCLE) investigating quality of life and participation in children with CP. Parents of children sampled from population-based registers of CP in seven European countries (Denmark, France, Germany, Ireland, Italy, Sweden and UK) were visited by research associates. The Parenting Stress Index Short Form (PSI/SF) was used as measure of stress in parent-child system (higher scores indicate more stress). The GMFCS was used to record severity of motor impairment. Analysis used multivariate logistic regression.
Results. 818 families took part in the study and 785 completed the PSI/SF questionnaire. Mean age of children was 10.4 years (range: 7-13 years); 59% were male. The median of the PSI total score varied from 75 for parents of children without motor limitation to 86 for children with GMFCS 4 and 5. In the multivariate analysis we have taken into account sex, age, number of siblings and parental education. Compared to children with mild motor and cognitive impairment, the risk of PSI score above the 75th centile was slightly higher for severely motor impaired children without cognitive impairment (odds ratio = 1.9; 95% CI = 0.84-4.32) and much higher for those with both severe motor and cognitive impairment (odds ratio = 3.3; 95% CI = 1.77-6.27).
Conclusions. The stress perceived by parents of children with CP seems to be influenced by the grade of motor impairment and even more when there is additional cognitive impairment.

P73.

COMPARING THE DEPRESSION, ANXIETY AND QUALITY OF LIFE BETWEEN MOTHERS OF CHILDREN WITH CEREBRAL PALSY AND AUTISTIC CHILDREN

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Objective. The aim of this study is to examine depressive symptoms, anxiety and quality of life in two groups of mothers; those with autistic children and those with cerebral palsied children.
Methods. Mothers of 26 children with cerebral palsy and mothers of 18 autistic children from rehabilitation centres participated this study. Beck Depression Inventory was used to assess depression and State Trait Anxiety Inventory was used to assess anxiety. Nottingham Health Profile was used to assess quality of life of the mothers. Descriptive statistics and student *t*- test was used to analyse the data.
Results. Comparing the two groups of mothers, we found that mothers of autistic children had lower levels in depression ($p < 0.05$), emotional reactions ($p < 0.05$), energy level ($p < 0.01$), pain ($p < 0.05$), sleep ($p < 0.05$), physical activity ($p < 0.01$) and social isolation ($p < 0.05$) subscales of Nottingham Health Profile. State-trait anxiety levels did not differ between two groups.
Conclusion. The findings of this study indicated that mothers of children with cerebral palsy had higher level of depression and lower level of quality of life than the mothers of autistic children. Further studies are needed to determine whether physical conditions in Turkey or the characteristics of the child's disease affect the mother's mental health and quality of life.

P74.

MENTAL HEALTH IS RELATED TO FUNCTIONAL ABILITIES IN CEREBRAL PALSY

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Objectives. To report on psychiatric impairments in 8-12 year old children with cerebral palsy (CP) in Europe; and establish the relative importance of child and family characteristics in determining such impairments.
Methods. A cross-sectional survey involving questionnaires administered to parents at home as part of a larger study, SPARCLE, exploring quality of life and participation. The families were visited in 9 regions across 7 European countries. A total of 818 children took part (65% of those approached). Children were classified by function using the Gross Motor Function Classification System (GMFCS). Intellectual impairment was defined as absent (IQ ≥ 70), moderate (IQ ≥ 50 < 70) or severe (IQ < 50). The pain score was derived from the pain domain in the Child Health Questionnaire and defined as absent (score = 100), moderate (50-99) or severe (< 50). The total difficulties score in the Strengths and Difficulties Questionnaire was used as a measure of psychiatric caseness and dichotomized into normal (< 14) versus borderline/abnormal (≥ 14). The data were investigated for possible determinants of psychiatric problems using descriptive statistics and multilevel, multivariate logistic regression clustering within centre.
Results. 42% of our sample had psychiatric symptoms (≥ 14) and almost a quarter (24%) had abnormal symptoms, sufficiently severe to warrant referral to psychiatric services. Of the child and family characteristics analysed, four variables provided the 'best fit' in the multivariate analysis. Children with better motor function had increased odds of experiencing psychiatric symptoms: OR = 1.08 (95% CI = 0.69-1.69) GMFCS level II; OR = 0.60 (95% CI = 0.36-0.98) level III; OR = 0.38 (95% CI = 0.22-0.66) level IV, and OR = 0.15 (95% CI = 0.08-0.28) level V compared to children in GMFCS level I. Children with intellectual impairment had increased odds of psychiatric disorder, OR = 3.63 (95% CI = 2.34-5.51) if moderate and OR = 6.22 (95% CI = 3.84-10.01) if severe when compared to children without intellectual impairment; and those with pain had increased odds of psychiatric disorder, OR = 1.66 (95% CI = 1.16-2.38) if moderate to severe compared to children without pain. Children without siblings or with at least with one sibling with chronic illness or disability had increased odds of psychiatric disorder (OR = 1.69; 95% CI = 1.2-2.38) compared to those with non-disabled, healthy siblings. Differences between centres were also examined.

Conclusions. Of the characteristics studied, gross motor function was one of the most influential determinants of psychiatric problems in CP. Parents and professionals need to be aware that children with CP with better motor function are at increased risk for mental health problems.
Acknowledgements. SPARCLE is funded by the European Commission Research Framework 5. Grant no. QLG5-CT-2002-00636.

P75.

THE IMPACT OF CHILDHOOD EPILEPSY ON FAMILIES: DEVELOPING A DIAGNOSTIC AND THERAPEUTIC TOOL

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Objectives. Determine the impact of (having) childhood epilepsy on the child itself and its family members. Developing a diagnostic and therapeutic tool in a contextual approach. This study examined the effects of epilepsy on family structure and interaction patterns within the family and quality of parenting.
Methods. 5 families, consisting of a child with severe epilepsy, its parents and siblings, are invited to 2 assessment sessions: the first session consists of playing a board game. Parents are leaders of the game and the board game contains assignments with questions in the categories 'feeling', 'thinking' and 'doing'. The questions can be related to epilepsy. The second session consists of a clay work assignment. The family members have to make an individual fantasy sculpture of clay and after 10 minutes they are asked to combine these sculptures into one. They are allowed to use other materials like paper, scissors, glue and colour pencils. The 2 assessment sessions are videotaped and are subjected to a quantitative and qualitative analysis. The quantitative analysis exists of counting the number of interactions directed to and from each family member; and a comparison of amount of interactions per person is made. The qualitative analysis exists of reviewing the answers on the epilepsy related questions, the quality and type of parenting and the symbolic outcome of the clay work-result.
Results. Qualitative as well as quantitative analysis show that the patient has a central role within the family structure. There are significantly more interactions directed towards the child with epilepsy from the parents and siblings. The analysis of the quality of parenting shows that there is more stress on regulation of the children's behaviour in contrast with emotional support of the children. The coping with epilepsy related questions and assignments vary per family. Within families one can identify types of coping strategies. The evaluation of the results with the parents gives them insight in their family functioning and their coping with severe epilepsy.
Conclusions. Childhood epilepsy has a great impact on family-interaction patterns. A contextual approach is an effective and useful method to gain insight in the effect of epilepsy on family structure, interaction patterns within families and the quality of parenting. The assessment sessions existing of playing sessions with the whole family are a valuable diagnostic and therapeutic tool in the epilepsy health care.

P76.

THE NEED OF PSYCHOTHERAPY OF THE FEAR IN MOTHERS OF CHILDREN WITH CEREBRAL PALSY

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Introduction. Children with cerebral palsy often have other conditions such mental retardation, vision and hearing impairments, speech and language disorders, chewing and swallowing disorders. Motor dysfunctions and other health disturbances can be a reason of important stress for family members especially mothers. Families should adapt to different conditions and accept the diagnosis of the child to optimize the care and fulfillment every needs –emotional and social as well. The aim of the study was to estimate the level of fear as a state and a trait in mothers of children with cerebral palsy.
Methods. Children were aged 1-6 years. 20 women aged 22-38 years participated in the study. They fulfilled the STAI questionnaire during the normal control psychological examination of the child. The comparison groups were mothers of children with tension headaches.
Results. The results underwent statistical analysis, were important at 0,05 level, and show the higher level of fear as a trait in a group of mothers with cerebral palsy (p = 0,01). There were no differences in level as a state between groups. The results confirm the theory of chronic sadness where the emotions of sadness assist to mothers of children with chronic illness.
Conclusion. Mothers of children with cerebral palsy need emotional support or psychotherapy to improve processes of coping with the chronic stressors.

P77.

INSIGHTS: ADULTS WITH DISABILITIES REFLECT ON THEIR PEDIATRIC HEALTHCARE

B Tann

Objective. Professionals who are involved with children with disabilities are many times unaware of the child's perception of the intent of care, or the child's experience of treatment. Adults' interactions with healthcare are influenced by their past experiences as children. This educational multimedia tool was undertaken to increase healthcare providers' awareness of some of the issues recalled by adults of their perceptions of treatment and of professionals during childhood.
Methods. Adults with disabilities were recruited to talk about their experiences as children with disabilities. The individual, semi-structured interviews lasted an hour. The interviews were composed of a number of open-ended questions, and were videotaped with the interviewees' consent. The emotive nature of the first person narrative was very compelling as stories of fear, pain, embarrassment, relief and love were shared. The process of creating the video and excerpts from the video will be presented in the poster.
Results. Interviewees reported that participating in the making of the video gave them a sense of relief to have told their stories. They also noted that it offered them an opportunity to share and validate their experiences. Healthcare professionals who viewed the video reported an increased awareness that every interaction has the potential to impact a child's life.
Conclusion. Both interviewees and healthcare professionals were greatly affected by participating in the project. The video may be an excellent adjunct to the training of professional staff who work with children.

P78.

DETERMINANTS OF MATERNAL AND FAMILIAL STRESS EARLY AFTER DIAGNOSIS IN CASES OF CHILDHOOD BRAIN TUMOUR

R. Shortman

Introduction. Brain tumours are the second most common group of childhood malignancies. Childhood cancer places major stress on families, yet few data exist concerning its determinants. Such data are crucial if families are to be provided with appropriate and effective support.

Aims. To compare emotional health in mothers of children with brain tumours one month after diagnosis with that in control mothers, and to investigate the determinants of maternal and familial stress.
Methods. Longitudinal prospective study of brain tumour children and matched controls. Maternal emotional health was assessed by Beck Depression Inventory II (BDI) and Beck Anxiety Inventory (BAI); family stress by Impact on Family Scale (IFS); family functioning by Family Assessment Device (FAD); family support by Family Support Scale (FSS); family coping by Coping Health Inventory for Parents (CHIP). Cognitive outcome in the child was assessed by WISC III; emotional/behavioural status by Birleson Depression Scale (BDS), Impact of Events Scale (IES), Revised Children's Manifest Anxiety Scale (RCMAS) and Child Behaviour Checklist (CBCL); quality of life by Health Utilities Index-3 (HUI-3).
Results. 37 tumour patients and 37 controls were recruited, mean age 8.2 years (range: 0.4-16.6 years). Mothers of brain tumour subjects had significantly higher BDI ($p = 0.001$) and BAI ($p = 0.002$) scores than controls. Maternal depression/anxiety symptoms correlated with familial stress (IFS total, $p = 0.003$, $p = 0.02$); older age ($p = 0.004$); performance IQ ($p = 0.03$); family functioning (FAD general functioning $p = 0.03$, communication $p = 0.04$, problem solving $p = 0.02$, roles $p = 0.02$) and family support (FSS formal kinship, $p = 0.03$). Family stress levels correlated with child's physical dependency (HUI-3 ambulation $p = 0.02$, vision $p = 0.04$, dexterity $p = 0.04$); family functioning (FAD affective $p = 0.04$) and familial coping (CHIP social, $p = 0.03$). There was no relationship between the child's emotional/behavioural status and measures of maternal emotional health or familial stress.
Conclusion. Stress levels in mothers of brain tumour children are increased compared to controls. Maternal and familial stress levels correlate with dependency and with family functioning and family support, but not with the child's emotional/behavioural status.

P79.

RELATIONSHIP BETWEEN PARENTAL COPING STRATEGIES AND FAMILY FUNCTIONING AND BEHAVIOURAL OUTCOME AND QUALITY OF LIFE IN CHILDREN WITH SEVERE, MODERATE AND MILD TRAUMATIC BRAIN INJURY

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Introduction. Children having neurological diseases such as brain injury or spinal cord injury presents changes in gait patterns, among which the most common are: tone alteration (hyper- o hypotonia), instability, incoordination, ataxia. electromechanics gait systems, especially those of weight support, were developed with the objective of improve gait capacity, accelerating the recovery process. Several systems have been developed that offer an attendance controlled and programmable based on the necessities of the patient.
Objective. To evaluate the efficacy of intensive gait rehabilitation by means of several procedures, including electromechanical systems of body weight support.
Methods. We included 19 children with spinal cord or brain injury, with ages understood among 6 and 16. We performed a personalized rehabilitation program, of 8 weeks of duration, including several techniques: strength of lower limb muscles, balance, improvement of range of motion, postural treatment, training activities of daily living, physical activities and sport, and gait –management of technical aids, gait exercise, aquatic gait, electromechanicals systems (body weight support: trolley body weight support training system; body weight support footplates, Gait Trainer ®; body weight support treadmill, Lokomat ®), mechanic vibration, posturography, electric cycloergometry, and functional electrical stimulation. The tests performed were: Tinetti test (to measure gait and balance), visual gait analysis, video recording, ten meter test (measures velocity, cadence and step length), FIM, WISC III, posturography and technical aids assessment.
Results. We found that patients with traumatic brain injury present better gait improvement (40%) than children with cerebral palsy or spinal cord injury (< 10%) in Tinetti scale and ten meter test. All patients improved their autonomy, with better scores in visual gait analysis.
Conclusion. Changes in balance and quality of gait were appreciated in all cases, although patients with traumatic brain injury had better evolution. Most of children needed minor technical aids at the end of treatment.

Saturday, October 21
Communication Learning

P80.

IMPROVING COMMUNICATION IN THE INTEGRATED CARE SETTING OF CHILDREN WITH CEREBRAL PALSY: PRELIMINARY EVALUATION RESULTS OF A SECURED WEB-BASED COMMUNICATION SYSTEM

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Objective. Due to the broad variety in clinical manifestations of cerebral palsy (CP), multiple professionals from various institutions can be involved. Efficient and effective cross organizational communication among these professionals and CP-patients' parents is essential, though in practice often complicated by lack of acquaintance with- and accessibility of all involved professionals. To improve these gaps, we developed a secured web-based communication system, which we evaluated in three different care regions in the Netherlands. In this study some preliminary evaluation results are described.
Methods. The parents of 31 CP-patients in the age of 4-8 years participated in the evaluation study, along with 118 involved professionals of (specialized) hospitals, primary care centres and (special) schools/day care centres. Participation included 6 months access to the communication system, which was free to use next to the regular modes of communication. Parents and professionals completed two questionnaires, one before (T0) and one after (T1) the 6-months use of the system. Both parents' questionnaires evaluated parents' experiences with the communication around their child's care during the previous 6 months. The professionals' questionnaires evaluated respectively professionals' expectancies of- and experiences with the communication system. The questionnaire data were complemented with objective data extracted from the system's database.
Results. At present (end of May 2006), the 6 months evaluation period has just been completed and T1 questionnaires are being sent to the participating parents and professionals. Therefore, this results-section is focused on professionals' expectations towards the communication system. Of the 118 participating professionals, 44% ($n = 52$) were (para-)medical professionals of (specialized) hospitals, 43% ($n = 51$) were educational and paramedical professionals of (special) schools/day care centres (EDC) and 13% ($n = 15$) were primary care professionals (PCC). Of the hospital professionals, 50% ($n = 26$) expected that the use of the communication system would improve the transparency of the integrated care network

around individual patients. The EDC and PCC professionals showed a similar score (57% and 67% respectively). Within the group of hospital professionals (n_{valid} = 32), 53% expected that the use of the communication system would improve the accessibility of the hospital's rehabilitation physician. Within the group of EDC and PCC professionals (n_{valid} = 24 and n_{valid} = 7 respectively), this proportion was relatively higher (respectively 75% and 100%).
Conclusions. The professionals' actual experiences with the web-based communication system are about to be analyzed. The complete analysis of evaluation results will conclude on the system's added value in integrated care networks such as CP.

P81.

MEASURING THE SUCCESS OF THE COMMUNICATION AIDS PROJECT (CAP): RESULTS FROM LONDON CAP

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Objective. The objective of this presentation is to evaluate the experience of children receiving communication aids in one of six partner centres who took part in the Communication Aids Project (CAP). Children use Augmentative and Alternative Communication (AAC) in order to supplementing their verbal speech output. One of the biggest barriers to successful communication for people with complex communication has been shown to be funding for equipment. The Communication Aids Project (CAP) was developed to help students with across the areas of verbal communication, written communication and understanding language, to improve their access to the curriculum.
Methods. The participants were patients of Great Ormond Street Hospital for Children NHS Trust who had been given equipment by London CAP (n = 60). Before equipment was provided, the local and specialist teams were required to agree three targets. These targets were then evaluated 6 months following receipt of the equipment. Evidence and explanations of these outcomes were also requested. Data was analysed using descriptive statistics. The 'targets' were collapsed into targets achieved and not achieved. Descriptive statistics were performed. A keyword analysis was performed using the evidence/explanations of targets to categorise these into themes.
Results. The results of the descriptive analysis showed that only one third of targets were achieved within six months. Further analysis of interactive components showed that the number of targets achieved were not obviously influenced by type of school placement, age, diagnosis, referrer, target type or equipment provided, rather the individual child's needs/situation. The keyword analysis highlighted barriers to AAC success, such as the need for adequate support and training for parents, SLTs and teachers and the lack of understanding about the child's underlying impairments and their impact on communication aid use.
Conclusions. There are several implications from this project. Firstly, there is a need for ongoing objective research into the provision of AAC devices. Furthermore, the funding resources need to stretch further than just the cost of equipment to include ongoing support. A strong commitment and an ongoing support base locally are essential for the successful implementation of communication equipment. Further research is required on the outcomes of communication aid provision so that any available funding is allocated wisely. We recommend the promotion of AAC within our professions and society, but equal value should be given to all communication systems that exist to help people who have complex communication needs.

P82.

HELPING PARENTS TO FACILITATE THEIR CHILD'S COMMUNICATION DEVELOPMENT: GROUP TRAINING FOR PARENTS OF PRE-SCHOOL CHILDREN WITH MOTOR DISORDERS

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Objectives. Children with motor disorders often take a respondent role in interaction and fail to develop a full range of communication skills. Speech and language therapy often involves parents, teaching them how to facilitate their child's communication development. It Takes Two to Talk ® – the Hanen Program is a group training programme for parents that has gained popularity in the UK but has not been evaluated for parents of children with motor disorders. This is a phase II study to inform a pragmatic trial. It investigates: i) how It Takes Two To Talk is delivered to families of pre-school children with motor impairments; ii) if parents' and children's interaction patterns change following It Takes Two To Talk training; iii) how acceptable and useful the program is to families of children with motor impairments.
Methods. Parents of 40 children with motor impairment. Children: aged 18 to 42 months at recruitment; motor impairments affecting at least two limbs; correctable vision and hearing; communicating by speech or by other forms of communication including gesture, facial expression, vocalisation, AAC. Primary outcome measures: i) parents and children are videotaped playing with a set of toys previously shown to elicit a full range of communication skills. Interaction is transcribed and coded to show the percentage of communicative responses and directives made by parents and the percentage of initiating turns made by children and the range of skills used; ii) children's communication skills are elicited using the Communication Skills Assessment; iii) in-depth interviews of parents eliciting their perception of the therapy programme. Parents attend It Takes Two to Talk in their local health settings. Families are seen by the researchers at four points: four months and one month prior to training, one and four months post training.
Results. To date twenty families have been recruited to the study; 15 have completed the intervention and 12 have been interviewed. This poster will describe the design and progress of the study, which is running until 2007. The poster will describe the families who have been recruited to the study to date, and the data collected. Themes from interviews with families who have completed It Takes Two to Talk will be described.
Acknowledgements. Lindsay Pennington is supported by the Department of Health and the Health Foundation, UK. The research is funded by the Health Foundation, UK.

P83.

THE COMPUTERISED COMMUNICATION SUPPORT SYSTEM: A TOOL FOR COMMUNICATION AND SOCIALISATION

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Background. The institution caters for up to 120 children and adolescents suffering from physical disabilities often accompanied by related difficulties. 33% of these individuals have little or no access to spoken language. During transdisciplinary treatment, several communication systems are analysed. Ultimately, a system is chosen based on the severity of the individual's physical disability, their ability to interact with others and their age.
Objectives. Our aim is to detect the most adequate system, be it pictographic, gestural or alphabetical; often a combination of all systems will be considered. Our team favours the use of new technolo-

gies, in particular a computerised communication support system. Targets: outline the concept of computerised support, identify requirements for the establishment of communication through a pictographic code via computerised support, and assess advantages and disadvantages of a computerised support system
Methods. The computerised communication support system is a laptop with a reinforced case, a touch-sensitive screen. It uses communication software that relies on the principle of dynamic screens and a computerised voice. Establishing communication through a computerised support system requires the child's ability to acquire communication through pictographic codes which allow access to more abstract concepts and increase vocabulary, and make use of dynamic screens. Advantages linked to this support system: i) encourages child to be autonomous through techniques adapted to the child's physical abilities, such as touch-sensitive screen, mouse simulator, scanner; ii) child benefits from sound feedback through computerised voice. Computerised voice offers immediate reply and dialogue. Computerised voice helps the child's interlocutor when communication becomes unclear and allows group communication as child becomes understandable to everyone. It offers useful support for school-related learning through listening to sentences; iii) offers deferred communication. Child is able to encode messages, store and circulate them when needed, and print out; iv) use of other software, thus allowing other activities (pedagogic, fun...). The main disadvantages we identified concerning this support system: its price, possible technological problems, the need to learn to operate the system, ergonomic installation.
Conclusions. Computerised support systems that make use of computerised voices are useful tools allowing fast, voice-based communication. The child is an active participant in communication, independent from the interlocutor. Potentially, it is a useful tool of communication and socialisation, as well as fun and pedagogic.

P84.

VISUAL FEEDBACK IN TREATMENT OF DYSARTHRIA IN CHILDREN WITH CEREBRAL PALSY

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Objectives. In a first study two boys –aged 6 and 11– with dyskinetic cerebral palsy (CP) received speech therapy with visual feedback through electropalatography (EPG). Despite receiving traditional speech therapy for years their motor speech disorders are still moderate to severe. Both boys show retracted production of alveolar phonemes –hence this being the primary target of the training. The second part of this study, taking part during 2006, another five children with CP receive speech therapy. The same design is used as in the study described above. The aim of the study is to discover whether training with EPG would improve the participants' speech, focus being on their articulation of the alveolar stops /t/ and to evaluate their intelligibility before and after EPG therapy.
Methods. EPG is a technique which records the location and timing of tongue contacts with the hard palate during speech. It has been used since the 1960s in phonetic research, and lately also as a visual feedback method in diagnosis and treatment of speech disorders. The EPG-therapy takes place over eight weeks. Three recordings of EPG-data, and audio recordings, are made before and after the EPG-training.
Results. Results show that the boys in the first study have improved their articulation of initial /t/. One of them rarely reached the alveolar place of articulation before training, while after training he reached the alveolar place in most of the words. The other boy showed a stable alveolar contact in all of the words after therapy. Further results are expected from the ongoing second part of the study with dysarthric children with CP.
Conclusions. The results show that the boys in the first study improved their articulation of initial /t/ through an objectified improvement of the oral-motor process, i.e. the ability to put the tongue at the appropriate position. Their intelligibility was evaluated by naive listeners. This evaluation showed that one of the boys considerably increased his intelligibility. Thus, EPG is considered to be a valuable instrument to treat motor speech disorders in children with CP. However, more research is needed to obtain convincing evidence of the significance and practicability of this method. The results from the first part of this study suggest that EPG can be valuable in treating motor speech disorders due to CP.

P85.

POOR MATHEMATICAL DEVELOPMENT IN CEREBRAL PALSY MEDIATED BY WORKING MEMORY AND EARLY NUMERACY

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Objectives. Children with cerebral palsy (CP) have been reported to have difficulty with mathematics. The purpose of the current study was to gauge the contributions of working memory, early numeracy and mathematics instruction time on mathematical proficiency in first graders with CP.
Methods. In the first year of a nation-wide longitudinal study in the Netherlands, groups of first grade children with CP in both mainstream and special education and a control group of healthy first graders in mainstream education were tested in three testing sessions. They were administered working memory tasks to assess the phonological loop, visual spatial sketch pad and central executive of working memory. Also, an early numeracy test was used to assess number concept and simple counting skills. Questionnaires were sent to teachers to obtain information about the amount of mathematical instruction time each child received. Finally, children's mastery of basic math skills was assessed.
Results. Group differences were found on all aspects of working memory, early numeracy, amount of mathematics instruction time and basic math skill. Working memory, early numeracy and amount of mathematics instruction time were each individually predictive of basic math scores. A model was developed in which all observed group differences in basic math skill could be completely explained by working memory and early numeracy.
Conclusions. The mathematical difficulties in first graders with CP appear to be due to deficits of working memory and early numeracy.

P86.

HOW CAN WE MANAGE DROOLING IN CHILDREN WITH CEREBRAL PALSY?

WITHDRAWN

P87.

MUSIC THERAPY FOR CHILDREN WITH SEQUELAE AFTER CENTRAL NERVOUS SYSTEM TUMOUR. A CASE-CONTROL STUDY

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Objective. As many as 70% of children with central nervous system (CNS) tumours survive, but many develop neurological sequelae. These symptoms are not only a consequence of the tumour itself,

but also of radiation and chemotherapy. Music therapy has been extensively used as a part of rehabilitation programmes for various types of impairments. However, scientific evaluations of the effects are scanty. This case-control study was therefore undertaken to investigate the effects of individual music therapy on cognitive and psychological functions in children treated for CNS tumours.
Methods. 16 children with neurocognitive late effects after treatment of CNS tumour participated in the present study. The ages varied from 9 to 16 years. Every second child was randomly assigned to a music therapy group or to a 'non-treatment' control group. The individual music therapy sessions took place once a week for 60 minutes during eight months. The music therapy comprised expressive and receptive music therapeutic techniques. All children were evaluated with a psychological and educational test battery before and after the period of eight months.
Results. The results revealed statistically significant improvements in attention and in word comprehension for the music therapy group compared to the control group. No other parameters showed any differences between cases and controls.
Conclusion. Music therapy in the rehabilitation of children with cognitive late effects after treatment of brain tumour has never previously been studied in a controlled fashion. It is therefore interesting that this small-scale study could show subtle, limited, but still significant improvements in functions with impact for attention and verbal communication.
Acknowledgements. This work has been supported by the Swedish Children's Cancer Foundation and by Stockholm County Council's Research Programme 'Arts in Hospital and Care as Culture'.

P88.

EXECUTIVE FUNCTION, LEARNING, LANGUAGE, AND BEHAVIOR: A VIEW OF INTEGRATION

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Introduction. Executive function is unanimously accepted to be involved in learning, language, and behavior, but a coherent executive function explanation for these apparently different conditions is far from being established. Since 1994, our research has been focused on both normal children and non-normal children. So, dyslexia, but also learning problems, attention deficit hyperactive disorder, epilepsy and movement disorders have been focus of our published research. Also, gifted children, autism and other developmental disorders, Down syndrome, Klinefelter syndrome, Williams syndrome and other chromosomal anomalies, encephalic lesion due to cranial traumatism, and neurofibromatosis. Furthermore, different kind of behavioral problems.
Objectives. From a neurological point of view, at present, we count on the PASS theory of cognitive information processing (Das), and we know part of impulsive emotional-feeling processing (LeDoux, Damasio, Bechara, Goldberg). From a holistic perspective, we have integrated both concepts to explain the executive function and several normal and dysfunctional conditions.
Methods. The translated and factor analysis-validated DN:CAS (Das-Naglieri Cognitive Assessment System) battery for assessing PASS processing (Planning, Attention, Simultaneous, Successive). The functional magnetic resonance image (MRI) technique. The linguistic acoustic analysis method. The qualitative observational method of behaviors by using audio-video recording of both linguistic and body language. Statistical analysis has been properly applied.
Results. Characteristic DN:CAS profiles in normal and dysfunctional conditions have been defined. In particular, the profile of vulnerable gifted children as well as of the attention deficit hyperactive disorder has to do with dysfunctional executive-planning processing. Dyslexia and childhood benign epilepsy perform otherwise. Of particular relevance because of its applicability is the DN:CAS profile related to dysfunctional impulsive-emotional behavior that includes movement disorders like tic and stereotypy, conduct disorder like oppositional defiant disorder, asocial-aggressive behavior, bullying, teasing, and intimidation, drug abuse, but also somatization and other behavioral dysfunctions. An fMRI pattern of the impulsive circuit in normal subjects to be compared with dysfunctional conditions has been established.
Conclusions. According to our results, it can be postulated that behavior, learning, and language are different conditions that can be explained by the same executive functional mechanism. This mechanism can be diagnosed and treated with appropriate PASS-processing intervention even in the case of autistic children.

P89.

PAST AND PRESENT NEUROLOGICAL AND NEUROCOGNITIVE OUTCOMES IN IDIOPATHIC CENTRAL NERVOUS SYSTEM ISCHAEMIA IN CHILDHOOD

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Objective. Stroke in childhood is certainly less frequent than in adulthood, but it is nevertheless socially relevant because of the severity of the outcome. We evaluate the neurological and neuropsychological outcome in a cohort of children with idiopathic central nervous system (CNS) ischaemia after the injury. Since October 1998 we have diagnosed and studied 15 patients (8 females and 7 males) whose age ranges between 7 months and 13 years showing idiopathic arterious CNS ischaemia (mean: 72 months; median: 56.5 months; SD: 50.7). They were submitted to the protocol for trombophilia.
Methods. We contacted the 7 children of group B (3 females and 4 males) who had a CNS stroke in 80's (when no urgent medical treatment was done), to assess their neuropsychological outcome. At the moment of the stroke their age varied from 11 months to 11 years old (mean: 4 years); we secondary compare the results of the assessment in these two cohorts of patients.
Results. In the Neuropsychological Assessment 5 patient had a Wechsler scale evaluation, and the score were in the normal range: the verbal IQ ranged between 60 and 131 (mean: 101), the performance tasks varied from 64 and 102 (mean: 88) and the total IQ was between 59 and 115 (mean: 95).
Conclusions. Although the two groups are very little, and not statistically numerous enough to obtain sure conclusions, we can say the IQ media is normal in both the groups; even if the means are better in the present outcome than in the patients who had a cerebral idiopatic stroke in the past, there is no statistic difference among the two groups.

P90.

RELATIONSHIP BETWEEN NEURORADIOLOGICAL APPEARANCES AND MEASURES OF FUNCTIONAL, COGNITIVE AND PSYCHOLOGICAL OUTCOME AND HEALTH RELATED QUALITY OF LIFE IN CHILDREN WITH TRAUMATIC BRAIN INJURY

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Objective. Prediction of outcome in children with severe traumatic brain injury (TBI) is important in terms of acute management and counseling families. However, surprisingly few data exist relating neuroradiological findings and outcome in TBI children. The aim

of the study was to classify early CT scans following TBI and relate the results to measures of functional, cognitive and psychological outcome and to health related quality of life (HRQoL).
Methods. Longitudinal prospective study. Injury severity was assessed by admission GCS and length of hospital stay (LOS). CT scans were classified using Lobato, Traumatic Coma Data Bank (TCDB), depth of lesion (DOL) and intracranial lesions (ICL) systems. Functional outcome was assessed at hospital discharge using the Kings Outcome Score for Childhood Head Injury (KOSCHI). Cognitive outcome was assessed one month after injury by WISC-III, Test of Everyday Attention in Children and Children's Memory Scale. Psychological outcome was assessed by Child Behaviour Checklist (CBCL), Birleson Depression Scale (BDS) and Impact of Events Scale (IES). Quality of life was assessed by Pediatric Quality of Life Inventory (PedsQL).
Results. 71 children (42 severe/moderate; 29 mild) have been studied, mean age 11.9 years (SD: 3.47). There was a significant correlation between LOS and Lobato, TCDB, and DOL (all $p < 0.0001$) and ICL ($p = 0.002$) classifications. Discharge KOSCHI categories showed a significant relationship to Lobato ($p = 0.007$), TCDB ($p = 0.003$) and DOL classifications ($p = 0.026$) but not to ICL ($p = 0.058$). CBCL school score significantly correlated with all four classification systems (Lobato, $p = 0.005$; TCDB, $p = 0.001$; DOL, $p = 0.005$; ICL, $p = 0.029$); CBCL total competence score with TCDB classification ($p = 0.021$); and CBCL total problems score with ICL ($p = 0.016$). The Lobato classification correlated significantly with performance IQ ($p = 0.035$) and selective attention ($p = 0.019$); TCDB, DOL and ICL classifications correlated with selective attention ($p = 0.011$; $p = 0.023$; $p = 0.037$). No significant relationship was seen with other aspects of cognitive function or with BDS, IES or PedsQL scores.
Conclusion. Neuroradiological findings correlate with functional outcome and some aspects of cognitive and psychological outcome. The Lobato classification is the easiest to use and appears relatively sensitive. We suggest this system could be used in clinical practice on the PICU.

P91.

LONG TERM EFFECTS OF TRAUMATIC BRAIN INJURY IN CHILDREN: A RETROSPECTIVE COHORT STUDY

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Objective. The aim of this study was to investigate the physical, behavioural or cognitive problems reported by parents of children who have had a traumatic brain injury (TBI), if a follow-up took place after the TBI and if the occurrence of unconsciousness can be seen as a predictive factor for the outcome.
Methods. All children aged 0-16 years who were examined in the emergency department of the University Medical Center Groningen for TBI in 2000 were included in this retrospective study. In 2004 the parents were asked to fill in the Child Behaviour Checklist (CBCL) and a self-made questionnaire about the accident, the follow-up and problems reported. Finally 60 (56%) children could be analysed.
Results. In 24 (40%) children there was no loss of consciousness, 25 (42%) had mild TBI (period of unconsciousness less than 10 minutes, Glasgow Coma Scale 13-15 post traumatic amnesia less than 1 hour) and 9 (15%) had moderate or severe TBI (all children that did not fulfill the criteria of no LOC or mild TBI). In 2 (3%) cases, the severity of the TBI was unknown. In the self-made questionnaire more learning and behavioural problems were reported by the parents four years after the TBI compared with the situation before the TBI ($p < 0.05$). The outcome of the CBCL showed no correlation with the severity and there was no difference compared with the outcome of the norm population used by the CBCL. Forty-eight (80%) children got no follow-up after the TBI.
Conclusion. Four years after a TBI significant more behaviour and learning problems are reported, this is not seen in the outcome of the CBCL. Eighty percent of the children got no follow-up. We found no factors that can predict the reported problems. Our results are in line with some previous reports on TBI in children, whereas other studies have observed no evidence for persisting problems.

P93.

COGNITION AND BEHAVIOR IN CHILDREN WITH CEREBRAL PALSY WITH AND WITHOUT EPILEPSY

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Objectives. To describe the occurrence of behavior problems and cognitive difficulties in a group of children with cerebral palsy (CP) and CP and epilepsy
Methods. This is part of the SPARCLE project. The parents of 83 Swedish children with cerebral palsy aged 8-12 were interviewed by the first author. Parents were asked about epilepsy, seizure semiology and seizure frequency. The Strength and Difficulties Questionnaire (SDQ) was administered, which assesses behavior and gives a total difficulties score of 0-40; > 16 is considered abnormal behavior, and an impact score where > 1 indicates social impact. Gross motor function was assessed according to GMFCS level at the interview, where the child also was present. Cognitive level had previously been done by psychological testing or clinical assessment. Medical journals were reviewed for further epilepsy data.
Results. Out of 83 children 34 had active epilepsy. In children with mild mental retardation 10/23 (43%) had epilepsy, 18/29 (62%) of those with severe mental retardation, whereas only 4 out of 29 (14%) of those with normal cognitive function ($p = 0.001$). All levels of motor function were represented. Epilepsy occurred in 8/30 from GMFCS I and II, 6/10, 5/17 and 15/36 in levels III, IV and V respectively. A quarter of the parents rated their child behavior as 'abnormal' according to SDQ. In children with epilepsy 35% (12/34) of parents rated their child behavior as 'abnormal', whereas only 18% (9/49) of those without epilepsy. The mean total difficulties score was generally higher (12.6) than normative data of 6.3-7.2 for Swedish children. In children with epilepsy the mean was 14.5 (median: 15) and for those without seizures the mean was 11.2 (median: 10). The mean impact score was 2.1 in children with epilepsy and 1.2 in those without seizures.
Conclusions. Behavior problems are common in children with CP, and probably even more so when other neuroimpairments such as epilepsy are present. It is important to identify such problems and address them adequately. More studies are needed in this field.

P94.

FROM APRAXIA TO CHILD DYSPRAXIA: CONTRIBUTION OF NEUROANATOMICAL AND COGNITIVE ADULT MODELS IN COMPREHENSION OF MECHANISMS OF CONSTRUCTIONAL PRAXIS IMPAIRMENT IN BRAIN-DAMAGED AND NON-BRAIN-DAMAGED CHILDREN

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Background. Adult constructional apraxia is assessed as an acquired disability to obtain an assembly of many single pieces to build a significant whole. It means organize units together respecting their spatial relationships. Two components are involved in this activity: the ability of visuo-spatial analysis and the ability to plan the actions.

These components are referred to different localisation of lesions. In the same way, child constructional dyspraxia, as a developmental impairment, sends to different clinical descriptions: in the first, the visuo-spatial impairment is predominant, in the second, the planning impairment is and in a third group, both impairments are present. Currently, none theoretical model in child is suggested to explain these clinical observations. We report constructional praxis impairment in five children (two brain-damaged and three non brain-damaged) referred to medical unit for learning disabilities in the light of neuro-anatomical and cognitive models available for adults.
Methods. We would like to explore two hypothesizes. The first one sends to a lesion (or dysfunction) of frontal lobe in relation to a dysexecutive syndrome involving planning incapacity or deficit in attention and the second one to a lesion (or dysfunction) of the posterior area, parietal and occipital lobe in relation to a deficit in visuo-spatial perception).
Conclusion. The transposition of these models from adult to child would permit us, after adaptations, to analyse the constructional praxis impairment, taking into account their similarities and differences and finally, to propose a neuro-developmental model of this function.

P95.

INTELLECTUAL AND MEMORY FUNCTION OVER THE FIRST YEAR AFTER DIAGNOSIS IN CHILDREN TREATED FOR BRAIN TUMOURS COMPARED WITH MATCHED NORMAL CONTROLS

R. Shortman

Introduction. Brain tumours are the second most common childhood malignancy. There is evidence that cognitive function is reduced in long-term brain tumour survivors but little information exists concerning outcomes throughout the first year of treatment.
Aim. To measure the intellectual and memory function of children with brain tumours early after diagnosis, and over the first year of treatment.
Methods. Longitudinal prospective study of children with brain tumours admitted to the Regional Neuroscience Centre compared with normal matched controls. Intellectual outcome –verbal IQ (VIQ), performance IQ (PIQ)– was assessed using age appropriate forms of Wechsler Intelligence Scales. Memory was assessed using the Children's Memory Scales (CMS).
Results. 20 tumour patients and 14 matched controls have been included in this analysis of IQ and memory performance at one, six, and twelve months diagnosis and treatment for brain tumour. The mean age of the tumour patients was 10.7 years (range: 3.8-16.73 years); 10 were boys, 10 girls. Brain tumour patients' VIQ improved between T1 and T6, falling at the twelve-month interval, in contrast to the performance of controls that rose steadily across the three intervals, there is a main effect of tumour group (p = 0.029), no main effect of time and no interaction. PIQ results show a significant main effect of time (p = 0.046), and group (p = 0.016), there is no significant interaction. The general memory index of the CMS shows no main effect of time, but a main effect of group (p = 0.039), there is no significant interaction between group and time for the general memory index.
Conclusions. Children with brain tumours have significant impairments in intellectual and memory function early after diagnosis and treatment that appear to recover over the first six months of treatment. However cognitive functioning subsequently deteriorates once more between six and twelve months post surgery. Further analysis may determine the cause of this deterioration, and the role of radiotherapy.

P96.

COGNITIVE OUTCOME AT ONE AND SIX MONTHS AFTER DIAGNOSIS IN CHILDREN TREATED FOR BRAIN TUMOURS COMPARED WITH MATCHED NORMAL CONTROLS

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Introduction. Brain tumours are the second most common childhood malignancy. There is evidence that cognitive function is reduced in long term brain tumour survivors but few data exist concerning early outcome. The relative contributions of tumour, surgery and radiotherapy/chemotherapy to cognitive outcome remain to be defined.
Aims. 1) To define cognitive function in children with brain tumours one and six months after diagnosis compared to control children. 2) To investigate changes in cognitive outcome in brain tumour patients between one and six months after diagnosis.
Methods. Longitudinal prospective study of children with brain tumours admitted to the Regional Neuroscience Centre compared with normal children matched for age, sex and socio-economic status. Intellectual outcome was assessed using the Wechsler Intelligence Scale for Children (WISC-III UK), the Wechsler Primary and Preschool Scale of Intelligence Revised. Attention was assessed using the Test of Everyday Attention (TEACh). Memory was assessed using the Children's Memory Scales (CMS). Academic status was assessed using the Wechsler Quicktest.
Results. To date 31 tumour patients and 31 matched controls at one month and 19 patients and 19 controls at six months have been studied. The mean age at diagnosis was 11.7 years (range: 5.97-16.6 years). At one month after diagnosis there was a significant difference between tumour patients and controls for verbal IQ (VIQ) (p = 0.009), performance IQ (PIQ) (p = 0.003), processing speed (p < 0.0001), visual immediate memory (p = 0.001), verbal immediate memory (p = 0.003), visual delayed memory (p = 0.002), verbal delayed memory (p = 0.004), selective attention (map mission, p = 0.044) and the Wechsler Quicktest Composite score (p = 0.01). There was a significant improvement in PIQ, visual immediate memory, visual delayed memory and selective attention between one and six month assessments (paired t test, p = 0.001; p = 0.01; p = 0.001; p = 0.035) but no significant improvement over time in VIQ or processing speed (paired t test, p = 0.257; p = 0.341). Six months after diagnosis brain tumour children showed significantly poorer results than controls on measures of VIQ (p = 0.031), processing speed (p = 0.001), selective attention (Sky Search, p = 0.041) and attentional switching and control (creature counting, p = 0.048).
Conclusion. Children newly diagnosed with brain tumours have significant impairments in cognitive function that will negatively impact on their performance in the school setting and which are due to the tumour and surgery. Although there is some improvement in cognitive function over time, significant deficits persist for at least six months after diagnosis.

P97.

PREDICTIVE VALUE OF BAYLEY MENTAL SCALE (BSID-II) FINDINGS IN CHILDREN BETWEEN 18 AND 30 MONTHS. COMPARISON WITH WISC-R SCALE AT THE AGE OF 7 YEARS

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Introduction. The Bayley Scales of Infant Development (BSID-II) is a recognised tool to evaluate cognitive development in infancy. As far as we know, this is the first study comparing prospectively the results of BSID-II on children between 18-30 months with cog-

nitive evaluation using the WISC-R at a school age of 7 years. Our experience with the BSID-II has made us reconsider the importance of the parameter 'cognitive age' given the variability of language development at these ages.
Objective. To assess the predictive value of MDI and cognitive age on the Bayley Mental Scale in children between 18 and 30 months with or without a diagnosis of mental retardation.
Methods. Between 1994 and 1997, 57 children were assessed using the BSID-II in our Development Unit at the aforementioned ages. Thereafter, we asked families' permission to perform further evaluation at 5 and 7 years. We prospectively made an independent blind evaluation with K-ABC battery at five years (results already communicated) and again with WISC-R at seven years.
Results. $N = 49$. 100% of children with WISC CI < 70 had Bayley MDI < 70. All children with Bayley MDI > 70 have WISC-R CI > 70. 81% of children with WISC CI > 70 has MDI > 70. When cognitive age is taken into account, specificity increases to 88%. 76% of children with Bayley MDI < 70 have WISC CI < 70. When cognitive age is taken into account the positive predictive value increases to 84%.
Conclusions. The MDI of BIDS-II between 18 and 30 months proved to be a very sensitive instrument in the detection of mental retardation at 7 years (100% sensitivity) and also a very good instrument for reassuring normality at this age (negative predictive value 100% for MR). Specificity (81%) and positive predictive value (76%) of BISD-II MDI was quite good for CI <70; and improved when cognitive age was taken into account (88% and 84% respectively); nevertheless one must be cautious in the diagnosis of MR at these ages (> 15% of false positive).

P98.

FAST MAPPING AS A PREDICTOR OF VOCABULARY DEVELOPMENT IN BRAZILIAN CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENT

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Introduction. Children with specific language impairment (SLI) characteristically show language difficulties manifested in lexical acquisition and phonological memory deficits, among others. Fast mapping tasks assess the abilities to draft semantic, phonological, syntactic and contextual characteristics of words, providing a good prognosis of the abilities necessary to lexical acquisition. In such tasks, children with SLI require more presentations to new stimuli in order to fast map their lexical attributes, and comprehension of new words precede their production.
Objective. The aim of this study was to verify if the performance of SLI children in a fast mapping experimental procedure could predict their improvement in receptive and expressive vocabulary tests.
Methods. Eight Brazilian children with diagnosis of SLI and ages between 4 years 5 months and 5 years 7 months carried out an Expressive Vocabulary Test and a Receptive Vocabulary Test, both standardized for Brazilian Portuguese speakers, at the beginning and the end of an 8-month speech-language therapy period. In the third month of this period, all subjects were submitted to three experimental sessions of a fast mapping experimental procedure, with weekly intervals between them. The experimental procedure consisted of three tasks: presentation of new words and referents, initial (before the presentation task, in the second and third sessions) and final production, recognition. Stimuli were four novel words and referents (unfamiliar objects). There was a one-minute interaction interval between presentation and final production tasks, in order to assure that children's response was not an imitation of the stimuli.
Results. Statistically significant differences were found only in expressive measures ($p = 0.07$). A dependence relationship between Expressive Vocabulary Test and final production task of the experimental procedure was found, indicating strict relationship between these variables ($p = 0.064$). There was an important improvement in the Expressive Vocabulary performance over the period ($p = 0.012$). It was also found a significant difference between final and initial production tasks of the experimental procedure ($p = 0.046$), supporting the fast mapping paradigm. Although there was a relation between these variables alone, no correlation was found between the improvement in the Expressive Vocabulary Test and the production task of the experimental fast mapping procedure.
Conclusion. The expressive measures of the experimental fast mapping procedure were significantly associated to the performance on Expressive Vocabulary, but cannot predict the improvement in this test.

P99.

PSEUDOWORD REPETITION IN BRAZILIAN CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENTS

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Introduction. According to the working memory model, the phonological loop is the component of working memory specialized in processing and manipulating limited amounts of speech-based information. Tests of nonword repetition are usually accepted as a suitable measure of short-term memory abilities. Many children with specific language impairments (SLI) demonstrate deficits in the area of verbal working memory, which are commonly referred to be related to their language processing deficits. There is, however, a lack of Brazilian studies that explore this theme on that population.
Objective. The aim of this study was to assess short-term memory abilities in Brazilian children with SLI and to compare them to the performance of typical developing children.
Methods. Thirteen children with diagnosis of SLI, aged 6 to 10 years, participated in the present study. All subjects were submitted to the Brazilian Children's Test of Pseudoword Repetition, a validated Portuguese-language version of the Children's Nonword Repetition Test. This test consists in the repetition of 40 pseudowords, which were strictly controlled in terms of wordlikeness (high, medium and low similarity to real words). These stimuli were divided into sets of 10 pseudowords, according to number of syllables (from two to five), and the order of the sets was randomly determined for presentation to all subjects. Each attempt was scored 1 if the repetition was judged to be phonologically accurate, and 0 if it differed from the target. For cases in which the child used phonological processes (as assessed by the Phonological Test), credit was given for the consistent substitutions.
Results. Data indicated that 61.5% of the SLI children performed inadequately on this test, whereas only 38.5% reached reference levels. It was found a wordlikeness effect, since the group showed better performance in highly similar words ('high') than in the poorly similar ones ('low') ($p < 0.05$). Finally, although the word extension effect was comparable to that found in typical development, children in this study showed a significantly worse performance in words with all extensions (two, three, four and five syllables) ($p = 0.008$).
Conclusions. SLI children evidenced significantly poorer short-term memory abilities than their typically developing peers, supporting the view of a verbal working memory deficit on this population. The findings are interpreted within the framework of a limited-capacity model of language processing.

P100.

INTENSIVE SPEECH THERAPY FOR OLDER CHILDREN WITH DYSARTHRIA: A PILOT STUDY

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Objectives. Children with dysarthria associated with cerebral palsy (CP) have difficulties making themselves understood. SLT focusing on helping children maximise their motor control for louder, slower speech has been advocated but not evaluated. This pilot study investigates the effects of therapy on children's: i) single word intelligibility; ii) connected, conversational speech intelligibility; iii) speech volume. Results of the pilot study will be used in the design of a definitive trial to investigate the clinical and cost effectiveness of the treatment.
Methods. Participants: i) Fifteen children with CP and dysarthria. Exclusion criteria: bilateral hearing impairments greater than 50 dB with inability to perceive the difference between speech sounds; severe visual impairments that are not correctable with spectacles; profound cognitive impairments; inability to comprehend grammatically simple instructions; ii) 120 naive listeners who have no experience of people with cerebral palsy or disordered speech will evaluate audio recordings of participants' speech; iii) Three members of school staff who work with each child will be recruited as familiar listeners for the study (45 familiar listeners in total). Measures: i) Single word intelligibility: Children's Speech Intelligibility Measure; ii) Connected speech: recordings of children describing sequences of three pictures; iii) The loudness/sound pressure level of conversational speech measured from recordings taken for Measure 2 above (see below). Children receive three individual sessions of therapy per week for 6 weeks at school. Sessions last for 35-40 minutes in total and take place on different days. Intervention focuses on creating background effort for speech by controlling breath support for speech, slowing speech rate and increasing the loudness of speech across utterances, following the therapy described in the literature.
Results. Percentage intelligibility of single words and connected speech will be calculated for each child for each of three time points: one week before one week after and six weeks after intervention. Data from naïve and familiar listeners will be analysed separately. Listeners will be blind to the time of the recording. Data will be analysed using analysis of variance techniques. This poster will describe the therapy procedure being tested and the design of this phase II study.
Acknowledgements. Lindsay Pennington is supported by the Department of Health and the Health Foundation, UK. The research is funded by Cerebra, UK.

P101.

BEST PRACTICES IN EARLY CHILDHOOD EDUCATION AND DEVELOPMENT

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Objective. To identify potential issues/topics for further research in evidence-based practices in early childhood education and development.
Methods. Identifying the range of potential research topics that are suggested directly or indirectly through the focus of relevant legislation, policy documents, NDA research and policy publications, and public consultation.
Results. Topics identified includes children and family outcomes outlined in national documents on quality, framework, and outcomes.
Conclusion. The process in identifying and documenting evidence-based practices through empirically studies is a key factor in achieving desired outcomes in early childhood education and development.
Acknowledgements. Research and Standards Development: National Disability Authority; National Council for Special Education, Ireland; Centre for Early Childhood Development and Education, Ireland; National Children's Office, Ireland.

P102.

PREVALENCE OF VERBAL DYSPRAXIA AND APHASIA IN CHILDREN WITH CSWS AND RESPONSE TO TREATMENT

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Aim. To look for the prevalence of verbal dyspraxia and of aphasia in children with CSWS or CSWS-like syndrome .
Methods. We assessed all children presented with learning, behaviour and/or language problems to our centre between October 1999 and January 2006. All of them had at least one long term EEG/video registration including full night of natural sleep. 143 children with epilepsy were primarily presented with learning problems. 30 children had a CSWS or CSWS-like syndrome. Language assessments for comprehension and expression and speech assessment, including standardized and non-standardized tests were performed as well as psychological tests. All had intensive speech/language therapy and medical treatment.
Results. 143 children with epilepsy were primarily presented with learning, behaviour and/or language problems. The epilepsy varied in type and severity. 30 children had a CSWS or CSWS-like syndrome. At the time of referral 12 children had acquired language and/or speech problems. 4 of them had specific verbal dyspraxia and one had aphasia. One child was even diagnosed with an aphasia (Landau-Kleffner syndrome) before admission but his mutism turned out to be a result of an extreme verbal and oral dys(a)praxia with only a few symptoms of aphasia; through intensive rehabilitation he recovered to the premorbid level. No absolute relation between the epileptic foci and the clinical features could be retained neither was there an absolute correlation between clinical recovery and changes in the epileptic activity.
Conclusions. Verbal dyspraxia seems to be rather frequent in children with CSWS. Specific speech and language assessment must therefore be done in all children with CSWS. Besides medical treatment intensive speech-/language therapy is necessary. No definite correlation was found between clinical features, time of their onset or time of recovery on one side and features such as localisation, percentages, spreading of epileptic activity on the other side. Reaction to drug treatment differed strongly in different children; amazing was that in one child different CSWS foci react differently to treatment.

P103.

DIFFERENT PROFILES OF READING IN DYSLEXIA AND SPECIFIC LANGUAGE IMPAIRMENT

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Objective. Dyslexia is a specific learning disability characterized by an unexpected reading difficulty in children who have normal intellectual levels and adequate functioning in other cognitive areas. These difficulties result from a deficit in the phonological component of language. The dyslexic readers have a functional disruption in the posterior brain system that is considered pivotal in carrying out to decode phoneme-graphema. Specific language impairment (SLI) is a form of language disorder that affects both expressive (phonological, syntax, semantic and pragmatic module) and/or receptive language. This language processing difficulty con-

tributes to learning and reading disabilities in school. The cerebral dysfunction is related with language areas (anterior and posterior brain areas) around the perysilvian region. The impairment of reading and writing abilities is present in both learning disabilities. Nevertheless, depending of underlying disruption in the neural systems, the profile of reading will be different. The aim of this study is to compare the reading profile in the two learning disabilities.
Methods. The sample was composed by 60 children (30 dyslexic and 30 SLI), A extensive assessment battery was administered with a complete analysis of reading: fluent and accuracy reading, comprehension and writing skills.
Results. Differences were found between the groups on reading profile. Dyslexic group showed its essential disability on phonological decoding. SLI group performed significantly less accurately than dyslexics on all tasks (fluent, automatic processing and accuracy reading, comprehension and writing skills).
Conclusions. Reading skills was positively correlated with the magnitude of disruption in neural systems. The rigorous assessment of reading skills is necessary and offers more precise identification and diagnosis of these learning disabilities. A better understanding of both learning disabilities is critical for the rational development of therapeutic strategies to treat these disorders.

Early Intervention Development

P104.

OPENING THE BLACK BOX OF NEURODEVELOPMENTAL TREATMENT OF INFANTS WITH DEVELOPMENTAL MOTOR DISORDERS

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Introduction. Knowledge about the effect of specific elements of intervention is crucial for determining the effectiveness of intervention.
Objective. To reveal the contents of NeuroDevelopmental Treatment (NDT) in infants aged 4 and 6 months corrected age who were at high risk for developmental motor disorders by means of a standardized observation protocol. Specific questions addressed were: 1) What is the actual content of NDT sessions?, 2) Is the proportion of time spent on various treatment strategies related to developmental outcome at 18 months?
Methods. The study group consisted of 10 high risk infants, who received NDT intervention between 3 to 6 months corrected age. The infants' developmental status was assessed at 18 months. The assessment included a standardized neurological examination, the Alberta Infant Motor Scale (AIMS) and the Mental Scale of Bayley Scales of Infant Development (BSID). At 4 and 6 months a treatment session of each infant was video recorded. Video recordings were analysed with a standardized observation protocol, which classifies actions into the following categories: a) Facilitation and inhibition techniques, b) Sensory experience, c) Passive motor experience, d) Active motor behaviour, e) Family involvement and educational actions, f) Communication. The protocol allowed translation into algorithms of the computer program 'The Observer', thereby offering the possibility of multilevel quantitative analysis of actions during NDT sessions. Interrater and intrarater agreement of the protocol was satisfactory –r = 0.63-1.00 (inter); r = 0.71-0.99 (intra)–.
Results. 51% of treatment duration was spent on facilitation and inhibition techniques, sensory experience and passive motor experience; 37% on active motor behaviour, 8% on communication, 2% on parent training which was an element of the category 'family involvement and educational actions'. The relative amount of time spent on the various categories of therapeutic actions was not related to developmental outcome at 18 months. Outcome at 18 months was related to a separately evaluated parameter: the amount of time spent on actions in which the infant was offered full postural support was inversely related to the total AIMS score (p = 0.01).
Conclusion. With the use of a standardized observation protocol it is possible to open the black box of the application of NDT in infants with developmental motor disorders. The time spent on the main categories of therapeutic actions of NDT is not related to developmental outcome at 18 months.

P105.

IMPACT OF DIAGNOSIS OF A DEVELOPMENTAL DISORDER ON THE CHILD AND ITS FAMILY

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Objective. The purpose of this study is to enhance the importance and the impact of diagnosis of a developmental disorder on the life of the child and its family, as well as the level of parental satisfaction regarding the Child Development Clinic of the Paediatric Department of Hospital Santa Maria (HSM), University of Lisbon.
Methods. One hundred children followed at the Child Development Clinic, and their families, were enrolled in the study. Children were considered eligible after at least 3 visits with the developmental paediatrician at the Child Development Clinic and a formal diagnosis of a developmental disorder. Collection of data took place from May 2005 to March 2006, and was carried out by two external independent observers, through a structured interview to the child's parents, designed by the Child Development Clinic. The SPSS program, version 12.0, was used for statistical analysis. As the variables of this study were measured by means of nominal scales, the techniques were non-parametric (using a degree of reliability of 95%), with the test Coefficient of Contingency and Correspondences Analysis.
Results. Parents of 100 children were interviewed, mostly mothers (78%). The most frequent diagnosis was cognitive impairment (29%), autistic spectrum disorder (23%) and language disorder (15%). Statically significant correlation was found between the fact that developmental paediatrician gave the diagnosis (79%) and the parents' feeling of having been well prepared to receive it (62%), the clarity of information (71%) and that all the parents' questions were answered (62%). Eighty per cent of the parents interviewed s considered it very important to know the diagnosis. The impact of diagnosis on the family's life was considered positive in 51% of cases and in 43% considered that nothing had changed. The impact on the school life was considered positive in 61% of cases. As for impact on community life, 35% considered it positive and 63% considered that nothing changed. Most parental satisfaction with this Clinic was good (53%) or very good (39%).
Conclusions. The study concludes that families consider it of extreme importance to know the diagnosis of a development disorder and that this had a great positive impact on the life of the child, mainly in family and school settings. It is also evident that families were satisfied with the Child Development Clinic of the HSM, as for the way in which diagnosis was given and subsequent follow-up.

P106.

DO MEMBERS OF THE HABILITATION TEAM KNOW BY HEART THE COMPOSITION OF THE ADDITIONAL CARE NEEDS OF CHILDREN WITH NEURODEVELOPMENTAL DISABILITIES?

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Objective. Children with neurodevelopmental disabilities often need intensive additional care due to associated impairments. Comprehensive assessment by a team of professionals of the impairments that limit the child's capacities is necessary to provide the child with this care and to set realistic habilitation goals. However, information about a child is often extensive and kept in clinical records that are not always at hand during daily care. Especially in the classroom situations professional team members have to rely on their remembered knowledge concerning the impairments of the child which underlie the limited capacities and determine the additional care. This study aimed to assess the remembered knowledge or recall of information of team members concerning the composition of the additional care needs of the children whom they regularly provide with therapy.
Methods. The composition of additional care needs of 44 toddlers with neurodevelopmental disabilities visiting two different rehabilitation centres was assessed by 23 team members, unprepared and individually. We used the Capacity Profile (CAP) to assess the composition of additional care. The CAP distinguishes additional care needs in five domains: physical health; motor functions; sensory functions; mental functions; and voice and speech functions. The intensity of additional care in each domain can be classified ranging from 0 (no additional care) to 5 (needs help for each activity). The intensities of care in the various domains form the CAP of the individual child. The CAP was assessed by team members who knew the child well (teachers, physical therapists, occupational therapists, speech therapists; median: 3 members per child; range: 1 to 4). The agreement between the CAP completed by the team members and the CAP completed by the child's physiatrist based on information in the clinical record, was calculated using Cohen's weighted κ.
Results. A total of 150 CAPs were undertaken. Kappa values for physical health, motor functions, sensory functions, mental functions, and voice and speech functions on agreement between the physiatrist and a) teachers were 0.53, 0.57, 0.38, 0.37, 0.28; b) physical therapists 0.33, 0.72, 0.20, 0.40, 0.36; c) occupational therapists 0.57, 0.59, 0.19, 0.58, 0.57; and d) speech therapists 0.59, 0.65, 0.52, 0.52, 0.45, indicating a fair to moderate agreement.
Conclusions. This study showed that team members at best have a moderate knowledge of the consequences of the associated impairments in terms of additional care needs especially in those domains that cannot be easily observed (sensory functions). The CAP may provide this information in a more comprehensive way.

P107.

NEUROPSYCHOLOGICAL PROFILE IN 124 VERY PRETERM BIRTH CHILDREN AT FIVE YEARS OLD

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Introduction. Many very preterm children actually can survive with the help of intensive care treatment. Prematurity is associated with a high prevalence of neurological deficits such as developmental behavioural and learning disabilities.
Objective. To determinate the presence, frequency, and severity of cognitive and behavioural functioning in extremely preterm birth or low weight at the age of early school.
Methods. We studied 124 children born at 32 or fewer weeks of gestation, and/or weight < 1,500 g in Catalunya, Spain (1999-2002). Other 40 children refused to participate probably because some of them had severe neurological impairment. Neurological examination, cognitive, and behavioural measures were administered. The median age at the time of the study was 5 years.
Results. The rates of average intellectual functioning, borderline and mental retardation were 87%, 11%, and 2%, respectively. In general, the group exhibited poorest scores on attention, visuospatial and visuoconstructive domains. The worse score on behavioural scales was at somatic complaints item. Soft signs were present in 29% of the sample.
Conclusions. Assessment of different developmental domains shows that preterm children have some subtle disabilities. The time of very early school age doesn't provide a sensible prediction of cognitive outcome. Among extremely preterm children, cognitive impairment is common at school age. Follow-up studies during that period are necessary to identify possible academic problems.

P108.

NEONATAL ULTRASOUND ABNORMALITIES IN INFANTS WITH SEVERE INTRAUTERINE GROWTH RESTRICTION

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Background. Intrauterine growth restriction (IUGR) is one of the most important causes for premature delivery. Although these infants have special physiological, metabolic and vascular characteristics, there is not agreement whether these neonates have a higher or lower risk of neonatal presence of hypoxic-ischemic (HY-I) and hemorrhagic (HE) brain events.
Objective. To evaluate the presence of HY-I and HE events in preterm infants with severe IUGR compared with preterm infants with appropriate gestational age (AGA).
Methods. In all the consecutive infants born with obstetric diagnosis of IUGR compared to infant delivered prematurely, normally grown for GA and matched to cases by sex and GA were evaluated the presence of brain (HY-I) and hemorrhagic (HE) ultrasound events at 3rd (I), 14th day (II) and 40 weeks corrected age (III evaluation). The Clinical Risk Index for Babies score (CRIB II) was calculated at one hour after admission in neonatal intensive care unit (NICU).
Results. Higher presence of HY-I events was present in IUGR, 51.4% vs 22.9% ($p = 0.01$). It was consistent along the consecutive evaluations, II, 29.4% vs 12.9% ($p = 0.09$) and III evaluation, 27.6 % vs 9.5% ($p = 0.11$). Conversely, AGA infants showed a higher incidence of HE events. CRIB score was the same for both groups, 7 vs 8 ($p = 0.45$).
Conclusions. IUGR infants are a group with a dissimilar pattern of HE and HY-I lesions than AGA infants group. Additional factors related with chronic hypoxia in IUGR infants rather than preterm contribution could explain these differences. It is important to take in account the possibility of effective screening and early diagnosis of brain damage by using serial cranial ultrasound looking for preventative strategies.

P109.

THE EFFECT OF NEONATAL HYPOXIC ISCHEMIC ON BRAIN DAMAGE AND CLINICAL OUTCOME: THE VALUE OF NEONATAL DIFFUSION WEIGHTED IMAGING

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Introduction. Neonatal hypoxic ischemia in the term born infant is an important risk factor for morbidity and mortality. Clinical evaluation, EEG and MRI are used for early identification of the severity of injury and prediction of long-term outcome. Diffusion-weighted imaging (DWI) is a relatively new MRI technique that may have additional value in prediction of brain damage and clinical outcome.
Objective. To investigate whether neonatal DWI can be used to predict brain damage, measured as volume and myelination with MRI, and outcome at the age of 2 years.
Methods. In 16 term born neonates diagnosed with hypoxic ischemia neonatal MRI was performed. The apparent diffusion coefficient (ADC) was measured in 14 predefined regions (Siemens Vision, 1.5 T, single-shot EPI-sequence; TR = 5,100 ms; TE = 137 ms; b = 50, 500, 1,000 s/mm^2). The infants were examined for developmental outcome at 2 years using the BSID-2 motor scale (good: PDI >70; poor PDI ≤ 70). Volumes of cerebrospinal fluid (CSF), brain tissue, white matter (WM) and gray matter (GM) were measured on follow-up MRI scans (age: 14-38 months; mean: 25 months). For quantification of myelination the Magnetic Transfer Ratio (MTR) was used. The MTR was measured in 17 predefined regions and in GM, WM and basal ganglia (BG) (Siemens Vision and Siemens Sonata, 1.5 T, FLASH T_1-weighted 3-D sequences with and without off-resonance pulse of 1,500 Hz; TR = 23 ms; TE = 4 ms).
Results. Eight infants had a good and 8 a poor outcome. In the poor outcome group the CSF, as percentage of the total brain volume, was increased compared to the 'good' outcome group, 23.9% and 14.2 %, respectively (Mann-Whitney, $p < 0.01$). The WM volume, as percentage of the total brain volume, was decreased in the poor outcome group (9.5% vs 20.3%; $p < 0.01$) and the GM volume was also decreased in the poor outcome group (27.3% vs 40.2%; $p < 0.01$). There was a slight decrease of MTR in WM, GM and BG of infants in the poor outcome group. Infants with poor outcome and atrophy had decreased neonatal ADC values in the internal capsule ($p < 0.05$) and to a minor degree in the putamen.
Conclusion. Atrophy of the brain is a long-term consequence of neonatal hypoxia ischemia and correlates with poor outcome, in this small group of infants. There is also a small effect of neonatal hypoxic ischaemia on the myelination. In this group of patients the neonatal ADC in the internal capsule correlated with amount of atrophy and the clinical outcome.

P110.

EVALUATION OF THE NEURODEVELOPMENT OF INFANTS AFFECTED BY ASPHYXIA AND/OR PREMATURELY TREATED WITH NEUROHABILITATION THERAPY DURING THE FIRST YEAR

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Introduction. The neurodevelopment alterations are usually not detected in an early stage of life, but are later noticeable through the different spheres: motor (cerebral palsy), cognitive (disruption of learning), and sensory (visual and auditory absence).
Objective. In order to decrease the probabilities that such alterations may occur, it is important to introduce an arduous and extensive therapy program, such as the one suggested by Dr. Katona, during the first months of life.
Methods. In this work, we followed the trimester (initial, 6, 9, 12 moths) of 16 babies who had antecedents of neurological risks (asphyxia and/or prematurely) and have done a therapy work during first year, they were evaluated whit Katona movement patterns, Bayley Scale of Infant Development and measurement of different cerebral structures by magnetic resonance image (MRI).
Results. In the Katona evaluation, we found out that there is a progressive development in each of the evaluations, yet there are also significant changes ($p \leq 0.01$, $p \leq 0.05$, respectively) this occurred between the last evaluation and the first two (initial and 6 moths). In the mental and the motor subscale of Bayley, we also found progressive developments and significant changes as well between the first and last evaluation ($p \leq 0.048$). Furthermore, with the CC we could observe that the group of babies that were evaluated as normal thru the Katona method and the Bayley motor scale at the end of the treatment, had an average volume of 5.33 cm^3, while the ones evaluated as having a partial improvement and mildly delayed had a 3.1 cm^3 and the ones that had no improvement and significant delayed had an average of 2.2 mm^3.
Conclusions. The results indicate that there is a long term clinical recovery after implementing a suggested intensive therapy, and a interhemispheric communication that plays a major role in the recovery of the child since it is directly proportional with the CC development of the babies that have been exposed to asphyxia and/or prematurely.
Acknowledgements. Héctor Belmont, Bruno Argueta and Grecia L. Barrera for their technological support. This research was partially sponsored by Salud-2002 C01-7074; CONCYTEQ 60 2004; Fondo sectorial Qro-04-C01-16.

P111.

VISUAL CAPACITIES OF PRETERM INFANTS

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Objective. To analyze the visual behavior of a group of preterm infants. To explore the visual capacities of preterm babies linked to alert, fixation and visual attention, in order to establish prevention or stimulation programs.
Methods. A group of full-term babies enrolled, as a control group, was confronted by 14 different visual stimulus, specially designed for this study, applied in a random order. This group was composed of 39 children (41% girls and 59 % boys) with 39.05 weeks of pregnancy (SD = 1,81). Assessment was conducted in the neonatal unit during the first or second day. Once the level of visual capacity was determined, the set of 14 visual stimuli were applied to the preterm group composed of 36 children (47.2% girls and 52.8% boys), with 31.16 weeks of pregnancy (SD = 3.83); 37.5% of children weighed between 1,500 g to 2,500 g, and 59.4% weighed between 1,000 and 1,499 g. The preterm group was explored during the first months (average: 35,03 days; SD = 35,57), also in the neonatal unit. The awake state was controlled: children were explored in an alert state.
Results. To a stimulus of strong color contrast (white and black) both groups showed a similar level of alertness, fixation and attention to the patterns. For the stimulus of weak color contrast (white and grey) the preterm group showed a lower level. However exploration of preterm infants was interfered with by signs of fatigue, crying or sleeping, which prevented the complete application of the visual task.

Conclusions. To be able to identify more accurately the alert, fixation and attention of preterm babies it is necessary to apply the visual stimulus in a random order, to analyse the effect of interferent variables. A new group of preterm infants will be considered and the stimulus will be applied in a random order.
Acknowledgements. We would like to give our acknowledgement to the Doctors J. Perapoch and A. Macaya of Vall d'Hebron Hospital, X. Krauel and Ana Riverola of Sant Joan de Déu Hospital and G. Guinovart and E. Moliner of Santa Creu i Sant Pau Hospital, all of them in Barcelona, for giving us all of their support in our study.

P112.

GENERAL MOVEMENTS IN LOW BIRTH WEIGHT PRETERM BABIES AND NEUROLOGICAL OUTCOME AT TWO YEARS

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Objective. Cerebral palsy (CP) risk increases with decreasing birth weight. Therefore children with low birth weight (LBW) below 1,500 g are in need of special attention and close follow up to detect neurological abnormalities at an early age for timely intervention. The assessment of general movements (GMs) is a method which has a high predictive value for later developmental and neurological deficits and is routinely used in both our developmental centers.
Methods. The study group consisted of 64 infants with LBW born between 2001 and 2004, among them 23 children had birth weight below 1,000g. Twelve children were small for gestational age. Mean birth weight was 1,070 g, and mean gestational age 28.3 weeks. There were 38 boys and 26 girls. Head ultra sound showed PVL in 11 cases and IVH in 4. Two observers blindly assessed videotapes of writhing and fidgety movements up to 20 weeks post term age. The outcome was measured by classical neurological examination at two years.
Results. All babies had abnormal GMs in writhing period. Cramped synchronized (CS) movements were present in 22, and poor repertoire (PR) in 42 infants. Abnormal fidgety movements were found in 38 children: 28 had no fidgety (F–) and 10 abnormal fidgety (AF). At two years 18 children showed normal development without abnormalities. CP was present in 8 children, and in 38 children mild neurological abnormalities or developmental delay were found (MNA). All children with CP had persistently abnormal GMs in writhing (PR or CS) and in fidgety period (F–). Eight (29%) children with no fidgety developed CP, 18 (64%) exhibited MNA and two (7%) were normal. Seven out of 10 children with AF had MNA and 3 were normal. In the group of 26 children with fidgety (F+), MNA was present in 50 % at two years but none of them had CP. In our group of children with LBW anormal GMs at fidgety age (F– or AF) were related to CP in 21% and to MNA in 66% of cases.
Conclusions. In agreement with previous studies, our results show that the assessment of GMs, especially in the fidgety period is a good tool for identification of LBW children at risk for later developmental or neurological deficits.

P113.

DIFFERENTIAL EFFECTS OF BIOLOGICAL RISK AND ENVIRONMENTAL FACTORS ON COGNITIVE AND MOTOR DEVELOPMENT IN EARLY CHILDHOOD OF PRETERM INFANTS

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Objectives. In this study we compared patterns of cognitive and motor scores of preterm and full term children from infancy through early childhood, and investigated the influence of biological risk and the quality of the proximal environment on cognitive and motor development in early childhood.
Methods. The sample consisted of 35 preterm children with a gestational age ≤ 30 weeks and 43 full term children. Cognitive and motor development were assessed with the Bayley Scales of Infant Development at 3, 6 and 41 months of age (corrected for prematurity). The group of preterm and full term children were defined as the high biological risk group and the low biological risk group, respectively. Maternal education was used as an indicator of socioeconomic status. The quality of the proximal environment was assessed with the Home Observation for Measurement of the Environment (HOME) at 41 months.
Results. ANOVA repeated measures analysis of the Bayley scores revealed that development of preterm and full term children followed similar patterns: Significant decreases in cognitive and motor scores from infancy through early childhood were found for both groups. Furthermore, the preterm children scored lower in the cognitive domain at all ages, but not significantly so in the motor domain. Next, regression analyses including gender, socioeconomic status, HOME score, biological risk group and the interaction between HOME score and biological risk group as predictors of cognitive and motor development at 41 months were run. A significant moderator effect of HOME score and biological risk group was found for cognitive development, as well as a significant main effect of socioeconomic status. For motor development, gender, socioeconomic status and biological risk group were significant predictors.
Conclusions. The importance of using a control group when studying the development of preterm children is underscored. Cognitive development of preterm children in early childhood is protected by a high quality proximal environment. Future studies need to identify aspects of the proximal environment which are important for motor development in order to be able to guide intervention efforts.

P114.

EFFECTS OF AN ORAL STIMULATION PROGRAM IN PRETERM INFANTS

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Objective. Sucking is an important step in the feeding habits. The newborn has developed this capacity during his life in the uterus and at 34 weeks of postconceptional age, sucking is perfectly coordinated with breathing and swallowing and it can be used for nutrition. Preterm children born before 34-potconceptional-week have not this capacity still developed, so it is stimulated by several ways: nipples, sensorial stimulation, oral stimulation...
Methods. Research with 16 patients born before 32-postconceptional-week, fed by a catheter due to ineffective nutritive sucking. Two groups have been done (4 children/subgroup): one control and one experimental group, divided in 3 subgroups (children without pathology, children with a neurological pathology and children that have had mechanic ventilation). In the control group, non-nutritive sucking is stimulated with a nipple. In experimental group, feeding innate reflexes are stimulated 2 times/day, during 15 min, by a physiotherapist with exercises of global and facial relaxation and perioral and intraoral stimulation (movements of cheeks, jaw and tongue). Stimulation begins when the child has a postconceptional age of 32 weeks and lasts since the withdraw of the feeding catheter. Those children with hemodynamic or cardiac-respiratory instability, a grief systemic pathology or with mechanical ventilation are excluded. The variables evaluated are age at birth, weigh, quantity and duration of intake by catheter, time of catheter feeding and time of stay in hospital.
Results. The research is still being performed. Our hypothesis is that stimulation of feeding innate reflexes decreases the time need-

ed by the preterm infant to get a nutritive sucking. We also expect that the groups of children with neurological pathology or those that have had mechanical ventilation previously, need more time to achieve this nutritive sucking, due to central alteration or delayed maturing of the breathing-sucking coordination.
Conclusions. Several authors have shown the efficiency of non-nutritive sucking stimulation with an oral stimulation program, but little bibliography is found of the effects of this stimulation in preterm infants with a neurological or respiratory pathology. Further research is needed to check the results in a bigger sample. Some control groups with neurological and post-mechanical ventilation preterm children are also necessary. We should also consider the influence of another pathologies or situations in achieving nutritive sucking. In further research we can introduce biomechanical measures in our evaluation.

P115.

TEST-RETEST OF THE NORWEGIAN TRANSLATION OF MPOC-20

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Background. Our habilitation centre is carrying out a project one of the aims of which is to achieve a more family-centered service. In order to evaluate to what degree our aim is accomplished requires reliable test instruments. The Measure of Processes of Care-20 (MPOC-20) seems to be such a measure. We will be using a translated version of the MPOC-20 in order to measure families' perception of changes in our service delivery. The translation and retranslation were carried out according to international standards and in collaboration with Dr. Peter Rosenbaum at the CanChild Centre at McMaster University in Ontario, Canada in 2004. Before applying the MPOC-20 at our centre we have considered it essential to do a test-retest of this instrument in order to evaluate the reliability of the new Norwegian version.
Objective. The aim was to investigate the intrarater reliability of the Norwegian translation of the MPOC-20 questionnaire.
Methods. The questionnaire was mailed together with an invitation and detailed information, to 43 sets of parents, with a request that each parent answer separately. Criteria for inclusion were multiple contacts with our centre in the previous 12 months, and understanding of written Norwegian. Testing of MPOC as a measure of reliability was done using the intraclass correlation coefficients (ICCs).
Results. 35 questionnaires were returned, comprising 24 families. We have just finished the test-retest reliability analysis and the ICCs seems to be ranging from 0.62 to 0.75. We have to work more with the analysis before we can present final results.
Conclusion. The conclusion will be finished during the summer and can be introduced at the 18th Annual Meeting of the EACD.

P116.

DEVELOPMENT OF POSTURAL MUSCLE ACTIVITY DURING REACHING IN TYPICALLY DEVELOPING INFANTS: THE ABILITY TO ADAPT EMERGES AT 6 MONTHS OF AGE

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Background. Adequate postural control is a prerequisite for daily activities such as reaching. Thus, reaching movements are accompanied by postural adjustments. Most infants with developmental motor disorders show deficits in their postural control. In order to assist these infants, we need to understand the underlying mechanisms of the development of postural control. In the organization of postural control two functional levels can be distinguished. The first level of control is involved in the generation of direction-specific adjustments. Direction-specificity means for instance that perturbations inducing a forward sway of the body, such as reaching movements, are accompanied by activity in the dorsal postural muscles. Functional activity at the second level of control is involved in fine-tuning of the basic postural pattern on the basis of multi-sensorial afferent input. This modulation can be achieved in various ways, for instance, by changing the number of direction-specific muscles recruited. According to the Neuronal Group Selection Theory (NGST) motor development, including postural development is characterized by variability. Two phases of variability have been distinguished: primary and secondary variability. During the former behaviour is not adapted to the environment, during the latter it is –for instance a certain strategy is selected out of the repertoire.
Objective. To investigate typical development of postural control at 4 and 6 months.
Methods. 12 typically developing infants were assessed at 4 and 6 months. The infants were tested in two positions: lying supine and sitting with support. Reaching was elicited by presenting toys in the midline at an arm length distance while simultaneously surface EMG-activity was recorded from multiple arm-, neck-, trunk- and legmuscles. A computer-algorithm determined significant phasic muscles activity. Activity in neck and trunk muscles (postural activity) was related to onset of the prime mover, which was the arm muscle being activated first.
Results. Direction-specific activity was present in 40-70% of the trials (median: 60%) at the two ages and two situations. The direction-specific activity was characterized by variation. Within the variation a developmental pattern could be distinguished. The 6-months-olds recruited significantly more often than the 4-months-olds the muscle activation pattern in which the neck-, thoracic and lumbar extensor muscles were activated in concert (supine: $p < 0.02$; sitting: $p < 0.01$).
Conclusion. Typically developing infants show in conditions with postural support often but not always direction-specific postural activity. The ability to select a specific pattern out of a variable repertoire emerges at 6 months.

P117.

NEUROLOGICAL SIGNS AT TWO YEARS: CORRELATION WITH THE ASSESSMENT OF GENERAL MOVEMENTS

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Objective. Among different approaches to the neonatal neurological assessment, good agreement between the Amiel-Tison assessment and Prechtl's qualitative assessment of general movements was demonstrated. In the process of follow up there is consensus on the clinical definition of cerebral palsy, while milder signs have not been widely recognized. A cluster of minor neurological and cranial signs detected with systematic examination within the first 2 years of life were proposed by Amiel-Tison and Gosselin as a useful method to detect children with past neurological insult and possible future problems. The aim of the present study was to analyze the relation between the qualitative abnormalities of general movements and the Amiel-Tison and Gosselin method of neurological assessments up to the age of 2 years.
Methods. In forty-five premature infants with risk factors for brain damage, the observation of spontaneous movements was performed according to the standard Prechtl method from term to 20 weeks postterm age. The findings were classified according to the different patterns of abnormality. The neurological assessment described by

Amiel-Tison and Gosselin was performed from term age and repeated every three months up to 2 years. According to findings, five categories were identified: 1) cerebral palsy; 2) minimal cerebral palsy with independent walking before the age of 2 years; 3) Amiel-Tison triad (ATT), including imbalance of passive axial tone, phasic strech reflex in triceps surae, and cranial signs, particularly on the squamous suture; 4) intermediate with one or two of the three ATT signs; 5) absence of neurological findings.
Results. Cerebral palsy was identified in four, minimal cerebral palsy in two, and Amiel-Tison triad in four children; they all had continuously abnormal patterns of general movements. Intermediate group with two signs was found in ten children; only one was normal in writhing period, while they were all abnormal in fidgety period. The intermediate group with one sign consisted of nine children; abnormal findings in writhing period were present in eight, in fidgety period in seven. Among sixteen children without neurological signs, seven had normal general movements in writhing, and five in fidgety period.
Conclusion. Minor neurological and cranial signs were found more commonly in children who had abnormal patterns of general movements both in writhing and in fidgety period. The predictive value of these signs regarding learning disabilities should be further evaluated at school age.

P118.

ASSESSMENT OF PRESCHOOLERS REFERRED WITH MOTOR PROBLEMS: ARE WE WASTING OUR TIME?

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Objective. The literature has suggested significant over-referrals for evaluation for developmental coordination disorder (DCD): a condition with well-described comorbidity. Significant questions exist as to how broad-based initial assessments should be on children referred with motor problems. Objective was to examine motor function of preschool children referred with a complaint of motor problems in relation to intake data in order to direct efficient assessment practice.
Methods. Children aged 4-6 years referred for assessment via a physician due, but not limited, to a motor problem and without suggestion of static encephalopathy, were entered into this prospective study. Intake information obtained included reasons for referral (fine/gross motor, language, and/or behavior) and referral initiator. Parents and teachers completed questionnaires assessing motor function (DCDQ). Each child underwent a standardized assessment of motor function (Zuk) and the Visual Motor Integration (VMI) Visual Perception (VP), and Motor Control (MC) tests of the Developmental Test of Visual-Motor Integration (Beery). Children who performed below 1.5 standard deviations (SD) on any of the tests were considered to have an abnormal score.
Results. Ninety-seven children (76 male) completed the Zuk and Beery assessments (mean age: 5.2 years; SD = 0.8). Teachers were sole initiators in 67 (69%) referrals. Specific reason for referral included fine motor in 92 (95%), gross motor 24 (25%), language 19 (20%) and behavior 16 (16%) of cases. Children with abnormal scores on each of the tests included: Zuk 47.4%, VMI 7.2%. VP 4.1%, MC 34%. Furthermore, 39.2% of the children did not fail any tests compared to only 2.1% of the group who failed all tests. Significant correlations were found among: age and Zuk ($r = 0.41$, $p < 0.01$), age and MC ($r = 0.22$, $p = 0.04$), DCDQ for parents and Zuk (73 responses, $r = 0.49$, $p < 0.01$), DCDQ teachers and MC (39 responses, $r = 0.33$, $p = 0.04$). No significant correlation found for gender or referral source with Zuk/Beery tests.
Conclusions. Significant numbers of referrals with motor concerns are inappropriate, resulting in delay for evaluation and treatment. Physicians appear not to be screening referrals. Teacher referrals appear inappropriate and they may need to be provided with more accurate information regarding developmental expectations in this period. Questionnaires used were not helpful in predicting later function though parents were noted to be more accurate in identifying the need for intervention referrals. There is a dire need for short screening assessment prior to referral to a developmental center for comprehensive assessment.
Acknowledgments. C. Iluz administrative organization, physical and occupation therapist's assistance in data collection.

P119.

DEVELOPMENT OF EMG AND KINEMATICAL CHARACTERISTICS OF REACHING IN INFANTS 4-6 MONTHS OF AGE

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Background. Reaching movements are initiated by activity of the so-called prime mover, i.e. the arm muscle being activated first during reaching. Reaching movements end in successful grasping around the age of 4 months. The kinematical characteristics of reaching have been studied in infants sitting in an infant chair or while lying supine from 3 months onwards. Little is however known on the relationship between prime mover activity and the kinematics of reaching during early infancy. According to the Neuronal Group Selection Theory (NGST) motor development is characterized by variability. Two phases of variability have been distinguished: primary and secondary variability. During the former behaviour is not adapted to the environment during the latter it is, for instance a certain strategy is selected out of the repertoire of strategies.
Objective. To investigate the relationship between prime mover activity and kinematical characteristics of reaching movements in typically developing infants aged 4 and 6 months.
Methods. 12 typically developing infants were assessed at 4 and 6 months while supine and sitting with support. Reaching was elicited by presenting toys in the midline at arm length distance while surface EMG-activity was recorded from the deltoid muscle, pectoralis major and biceps brachii (BB). A computer-algorithm determined significant phasic muscle activity. The arm muscle which first showed phasic activity related to reaching was the prime-mover. In addition, kinematics of the reaching arm were recorded. Kinematical analysis focused on the number of movement units (MU), which are subunits of the reaching movement defined from the velocity profile and the transport MU, which is the first MU with the longest duration.
Results. The identity of the prime-mover showed variation in particular at 4 months. At 6 months identity of prime-mover still varied, but a dominance of BB as prime-mover emerged, in supine ($p < 0.05$) and sitting ($p < 0.01$). Also the kinematical characteristics were variable. Nevertheless in sitting developmental trends could be observed: with increasing age the number of MU decreased ($p < 0.02$) and the relative proportion of the transport MU increased ($p < 0.03$). Developmental changes in prime mover use were not related to the number of MU. But selection of BB as prime mover at 6 months during sitting was related to a larger transport MU ($p < 0.02$)
Conclusion. The ability to select a relatively efficient reaching strategy out of a repertoire of reaching strategies emerges at 6 months.

P120.

FOG'S TEST: A PILOT VIDEO STUDY OF CHILDREN ATTENDING MAIN-STREAM SCHOOL

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Objectives. Fog and Fog described associated movements in the upper limbs in young or delayed children when walking with feet inverted (1962). Over the last 40 years Fog's test has incorporated other gaits and become a standard clinical tool of paediatric neurologists and developmental paediatricians, although no formal attempt at quantitative or qualitative analysis has been attempted since the 1970s. This study therefore aims to pilot the feasibility of a video study of Fog's test in normal children; to assess inter-observer reliability; to document the sequence of development by age (using cross-sectional data at this stage); to identify any unusual sequences; to develop and assess a scoring system; to describe the phenomenology of associated movements in children and their variations.
Methods. Local primary and secondary schools were approached and parent and child information sheets and consent forms distributed by class teachers. A simple brief questionnaire was completed by parents or guardians for each child and returned with the completed consent form to the school. Two investigators arranged a suitable time to assess consented children in school, one supervising and one videoing. Children were identified by a stick on ID number and their faces were not included in shot. A standardised score sheet was developed and modified to record the results in real time and on video review. Each child was asked to walk in turn towards and away from the camera 1) on tip-toe; 2) on heels; 3) feet inverted; 4) feet everted. Upper limb postures were recorded. Data was entered into SPSS for statistical analysis: intra- and inter-rater reliability by weighted κ; score correlation with age by Spearman-rank correlation coefficients and *t*-tests.
Results. So far analyses have been finished on 112 children aged 4 -12 years. Data on another 260 are currently being processed. Inter-rater reliability was good (weighted $\kappa = 0.63$) comparing 22 blinded scores. Intra-rater reliability was very good (weighted $\kappa = 0.72$). Scores were correlated with age when children with disabilities were excluded ($p < 0.05$). 87% performed in line with the expected order of difficulty. A power calculation suggested that 112 children will be needed for each 1 year age group to create a useful normal reference age scale.
Conclusions. More work is needed to explore the age/maturity dependent phenomenology of associated upper limb movements with Fog's test, but the approach developed works and a range of associated movements can be well demonstrated on video.

P121.

TELEFYSI: UPGRADING OF BROADBAND VIDEO-CONSULTATION FOR TRANSMURAL COMMUNICATION CONCERNING CHILDREN WITH POSTURAL AND MOVEMENT DISORDERS

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Introduction. TELEFYSI is a video based teleconsultation health service for children with postural and movement disorders. It is a teleconsultation service using a secured digital environment based on video's of a child's movement disorders this additional information. This material is exchanged between different pediatric physical therapists. This transmural communication takes place in an α-synchronic way. The aims for this teleconsultation service are efficient patient referral, transparency of care and exchange of knowledge.
Objectives. To upgrade a broadband video based teleconsultation service for transmural communication in children with postural and movement disorders from 4 to 20 pediatric physical therapists in the eastern region of The Netherlands. Can this implementation be described by means of health care, health organization and technical applications issues?
Methods. To upgrade a teleconsultation service from a small 4 sides to a 20 pediatric physical therapy sides. in the eastern region of the Netherlands. This development was undertaken in three phases: introductory phase, learning phase, and production phase. Inclusion criteria: video-camera, computer/ laptop with Windows XP and broadband (minimal 512 kb) internet access, and active participation for at least 6 months. Access to the helpdesk was offered for all technical issues and teleconsultations service were reimbursed by the regional health care insurance company. Evaluation took place by questionnaires at the start of the production phase. Logging consultation activities and measuring sample sizes and download time for data, were performed.
Results. Mean sample size for a regular teleconsultation case is 10.4 Mb (SD = 5.4). Mean regular download time is 3 minutes and 22 s (SD = 45 s). Implementation from 4 to 17 sides was performed from January 2006 till June 2006. Three sides are under construction. Other results will be presented with regard to reasons for consultation, efficacy and efficiency of teleconsultation, proceedings after consultation, and parental satisfaction.
Conclusion. Video based teleconsultation for children with posture and movement disorders can be implemented in a regular, regional, health setting. Teleconsultations can be used in daily pediatric physical therapy practice.

P122.

MOTOR IMAGERY AS A TOOL TO STUDY MOVEMENT DEVELOPMENT

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Objective. Motor imagery (MI) is defined as mental rehearsal of a motor act without any overt movement execution. There is some evidence that MI is disturbed in children with developmental coordination disorder. However, whether MI is age-dependent has not been studied to date.
Methods. 113 Flemish children (6 to 16-year-old) performed a new task, the Virtual Radial Fitts Task (VRFT) which was used to measure the adequacy of MI by scrutinizing the differences in movement duration for real and imagined movements. Subjects were presented with a piece of paper on a digitizer on which 5 targets were drawn on 15 cm long radials from a centre target circle between a start and stop box. Five different sheets were used with targets of 2.5, 5, 10, 20 or 40 mm in diameter. Movement Time (MT) was defined as the time needed for the pen to move from the starting box on the left size of the paper to the stop box on the right side of the paper. The order of conditions (real or imagined) and the order of target widths within each condition were randomized across subjects. For both conditions subjects completed two trials of each target width, resulting in a total of 20 trials per subject. To investigate whether real and imagined movements obeyed Fitts' law, each subjects' mean MT was calculated and plotted against target width for each condition. A linear curve was fitted to the data and a least squares calculation was used to determine the goodness of fit of the line. The intercept, slope and correlation calculated from each of

these regression lines were used as dependent variables in 5 age groups × 2 movement condition (real and imagined) ANOVAs.
Results. The correlation between target width and MT was higher ($p < 0.001$) for real ($r = 0.93$) than for imagined movements ($r = 0.72$) and higher for older than for younger children ($p < 0.001$). Comparison of the mean intercepts indicated main effects for movement condition ($p < 0.001$; imagined movements are faster), age ($p < 0.001$) and a movement and age interaction ($p < 0.001$). Comparison of the mean slopes indicated that the difference between movement conditions changed with age ($p < 0.001$).
Conclusions. These results support the idea of a developmental trend in the ability to generate internal representations of volitional movements.

P123.

REORGANISATION OF COGNITIVE FUNCTIONS AFTER UNILATERAL STROKE IN CHILDHOOD –A COMBINATION OF TWO IMAGING METHODS

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Aims. To study functional and structural recovery after paediatric stroke by combining two complementary imaging methods, to know more about plasticity of cognitive functions in children after stroke and to increase knowledge about neural development throughout childhood and adolescence.
Methods. Children after unilateral stroke and healthy controls were examined with functional magnetic resonance imaging (fMRI) using four paradigms known to activate unilateral areas –language tasks: left hemisphere (LH), visual search tasks: right hemisphere (RH)–. Structural aspects were studied by the relatively new method of diffusion tensor imaging (DTI), allowing for the assessment of microstructural organization of the developing white matter. All children performed a neuropsychological examination.
Results. 11 children after unilateral stroke were examined (aged 0.7-15.5 years; 9 boys). The control group consisted of 20 healthy, right-handed German-speaking children (aged 6.9-20.5 years; 11 boys). Controls presented above average language functions (mean verbal-IQ: 116.6; range: 100-143), visuo-spatial short and long-term memory capacities were within the normal range (range of *z*-values: –0.216 to 0.674). Patients' sample showed average verbal functions (verbal IQ: 99.6; range: 80-127) while visuo-spatial long-term memory capacity was significantly reduced (mean *z*-value: –1.017; range: –2.4 to 0.4). Controls showed an increase of laterality of language and visual search functions throughout childhood and adolescence. Children after LH stroke ($n = 6$) showed bilateral language activation with a shift of cingular activation to the RH. Different patterns of reorganization occurred for visual search after RH stroke ($n = 5$): there was a strong shift of RH activation to the LH. DTI of patients compared to controls showed an alteration of the white matter in the anterior corpus callosum corresponding strongly with the functional interhemispheric shift detected in cingular areas.
Conclusions. In healthy children, laterality for language and visual search is increasing throughout childhood and adolescence. After stroke, children may show a contra- or ipsilateral reorganisation of LH functions (language). However, RH functions (visual search) tend to reorganise more interhemispherically than language functions. Functional reorganisation found in cingular areas corresponds clearly with structural changes in the white matter detected with DTI.

P124.

HOLISTIC PEDIATRIC REHABILITATION PROGRAMME FOR CHILDREN WITH ACQUIRED BRAIN INJURY: PRELIMINARY STUDY RESULTS

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Background. In Finland, the yearly number of new traumatic brain injuries among children is approximately 60. Many of these children acquire a permanent decrease in functioning due to the injury. After a brain injury, the requirement for regular follow-up lasts until the symptoms of the injury have either disappeared or stabilized at a certain level. The majority of brain-injured children require rehabilitation and support for the rest of their lives. In Finland, about 20 percent of the children with brain injury receive rehabilitation. Most of them are severely disabled. The Holistic Pediatric Rehabilitation Programme for Brain-Injured Children (HOPE) is a holistic rehabilitation programme for brain-injured children and their families. HOPE is the only rehabilitation programme in Finland in which the whole family participates and a follow-up and regular collaboration with school or day care are included. HOPE consists of intensive rehabilitation periods and network co-operation. The goals of the programme are to increase the functioning and quality of life of the child and his/her family and to improve collaboration with local authorities. The rehabilitation perspective is client-centered and emphasises the family's resources and strengths. A multi-professional team is responsible for rehabilitation. The study group consists of 20 families who participated in the HOPE programme in 2005-2006. The ages of the brain-injured children varied between 4 and 16 years.
Aim. Participating in everyday life is an important goal in brain injury rehabilitation. However, there are only a few studies that evaluate the effectiveness of rehabilitation from the perspective of coping in everyday activities and of participation. This study evaluates the HOPE programme's effectiveness on the functioning and well-being of children with acquired brain injury and their families. It also examines how the ICF classification is manifested in HOPE.
Methods. In choosing the methods, the ecological validity of the assessment tools and coping in everyday activities were emphasised. The background information was gathered using basic neuropsychological tests, the five to fifteen-scale, and BRIEF, HIBS, and MPOC questionnaires. Classroom performance was evaluated by the child's teacher.
Results. Preliminary data indicates increased experience by the parent of receiving equal support and advice in seeking information about the child's injury. The results also indicated the parents' increased experience of appreciation as individuals and experts on their child. Additional data will be gathered in 2006.

P125.

A LIFESPAN HABILITATION PROGRAM FOR PERSONS WITH MILD MENTAL RETARDATION

J Ottersen

Background. The needs of persons with mild mental retardation are often underestimated. Their level of functioning is very close to the normal range, and during childhood they are often overestimated by their parents and teachers. Experience of reduced coping often leads to low self-esteem, which may be the predictor of a wide variety of social problems like drug abuse, criminal activity and psychiatric disorders. In Norway different public agencies of health, social security and education at many levels are involved in services for disabled persons. It is difficult for mentally disabled persons

and their families to get a complete picture of every possible contact for present and future needs. Likewise it is a challenge for the involved agencies to cooperate in an efficient and coordinated manner. It is therefore of importance to define which agency is responsible of supporting possible needs of disabled persons. Last autumn the Habilitation Department of the county hospital of Buskerud, Norway, started a project addressing these issues.
Objective. To make a program defining our services for persons with mild mental retardation through the lifespan.
Methods. For a start we defined eight life periods: Infants, toddlers, children, adolescents, young adults, adults, elderly and old people. We then identified possible needs and ways of support for the person himself, his family and the professionals being involved, through the eight periods, a document called 'Description of life periods'. In Norway the municipalities have main responsibility for habilitation. Representatives from the municipalities therefore were invited to define the kind of assistance they find most important from the county hospital.
Results. Based on the 'Description of life periods' and the statements from the municipalities, the hospital project group defined the core habilitation supports for which we are responsible.
The main elements of the program for the county hospital are as follows: i) Defining the diagnosis, information; ii) Assessment and follow-up of persons with complex problems; iii) Age 10-12 years: the children realize their learning problems; iv) Age 14-15 years: planning for adulthood; v) Age 17-20 years: preparing for adulthood; vi) Beginning signs of aging; vii) Beginning signs of dementia.
Conclusions. The hospital program will start January 1, 2007. An evaluation program is currently being planned. The 'Description of life periods' are offered the municipalities for local service planning.

P126.

THE MODIFIED ICF-CHECKLIST FOR EARLY INTERVENTION –PRESENTATION OF THE CHECKLIST AND ITS APPLICATION IN TWO EARLY INTERVENTION CENTERS IN NORTH GERMANY

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Objective. Since 2001 German law supports an interdisciplinary approach in early intervention. The ICF (International Classification of Functioning, Disability and Health, WHO) offers a framework to describe needs and resources of handicapped children and their families from an interdisciplinary view. An ICF-version for children below age 7 is not yet available. The intention of this work is to contribute with a modified checklist for this age.
Methods. In a previous project a modified checklist for children in neurorehabilitative care had been developed. For our purposes we modified this checklist further, concerning the special demands for younger children and the usual interventions in early intervention centers. It was applied to all children in two early intervention centers in North Germany. Analysis was performed regarding practicability of the checklist and distribution of needs and resources in the domains body structures and functioning, activities and participation, and contextual factors.
Results. The modified checklist consists of 154 items with 3 qualifiers: 1: normal for age or sufficient support; 2: not normal for age or insufficient support; 3: further diagnostic and research necessary. A forth qualifier can be combined with the other three to designate a specific goal area of early intervention. The checklist was applied to a total of 239 children. It was filled out by members of the participating centers (special educators, physio-, speech- and occupational therapists, social workers). The completion of the list took about 30 minutes for each child and applicability was considered good. The preliminary analysis of 95 sets shows that the greatest part of the cases (over 60%) lacked detailed medical information. Only 1% of children receiving early intervention had a birth-weight below 1,500 g. Learning and mobility were the factors most frequently impaired (75% and 55%). Communication skills and mobility were the most common resources described (34% and 28%). The contextual factors considered more limiting to development were relationships and attitudes (26% and 24%).
Conclusions. The data from the two early intervention centers show a non-expected lack of ex-premature children. In many cases early intervention seems to be performed without detailed knowledge of medical conditions. Problems with learning and mobility were most common. The most limiting contextual factors were found in relationships and attitudes. Early intervention programs should assess and address these issues, regularly. A better integration of medical services with early intervention programs is proposed.

Attention-Deficit/Hyperactivity Disorder (ADHD)

P127.

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: USE OF FEUERSTEIN METHOD AND PSYCHOMOTOR THERAPY AS TREATMENT IN VERY YOUNG CHILDREN

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Objective. Attention-deficit/hyperactivity disorder (ADHD) is a neurobiological disorder that affects 3 to 7 percent of school-age children. However, it is now known that ADHD nearly always persists. For this reason, it is very important to diagnose this disorder as soon as possible, in order to treat it in the most effective way. In Italy nowadays it is very difficult to use chemicals for treating children affected by ADHD, and psychological therapy is the most common treatment. In our centre in the last three years we begun to treat a little group of children using the Feuerstein method.
Methods. Since January 2003 we have studied 58 patients from 4 to 12 years old: firstly we use the CBCL and a careful reconstruction of their history. If ADHD is diagnosed, children (n = 30) have a clinical assessment of the developmental level (we use the Raven Matrix, Wechsler Scale, Rey figure, and, when necessary logopedical and psychomotor evaluation) and emotional evaluation (by 3 child observations and CAT or TAT). For rating ADHD symptoms we use the Brown scale. In a very little group of patients which are attending the primary school we are trying to use the Feuerstein method PAS combined with cognitive psychomotor therapy to improve their ability.
Conclusions. We underline the importance of an earlier diagnosis of ADHD, in order to avoid the comorbidity and have the best treatment for the specific case. We also underline the improvement of mood disorder using the Feuerstein method.

P128.

TELE-ADHD (ATTENTION-DEFICIT/HYPERACTIVITY DISORDER) CLINIC –A NOVEL APPROACH TO IMPROVE SERVICE DELIVERY AND CONCORDANCE

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Objective. To present a model of service delivery that employs teleconference consultations of child and adolescent ADHD patients and their carers and/or teachers.

Methods. All newly diagnosed (March 2004-March 2006) ADHD children and their carers were offered teleconference consultations to answer queries; evaluate response to treatment and adverse effects during a dedicated clinic setting. Parents were instructed to use a semi structured questionnaire to organise their thoughts, complete standardised rating scales for core symptoms (ADHD rating scale–DuPaul 1998) and adverse effects prior to the interview.
Interviews were recorded in an auditable format and triplicate clinic sheets. The outcomes were audited and will be presented. The clinic protocol is presented in the figure.
Conclusion. A structured teleconference consultantion within a dedicated clinic setting is a useful adjunct to the changing needs of the 21st century**.**

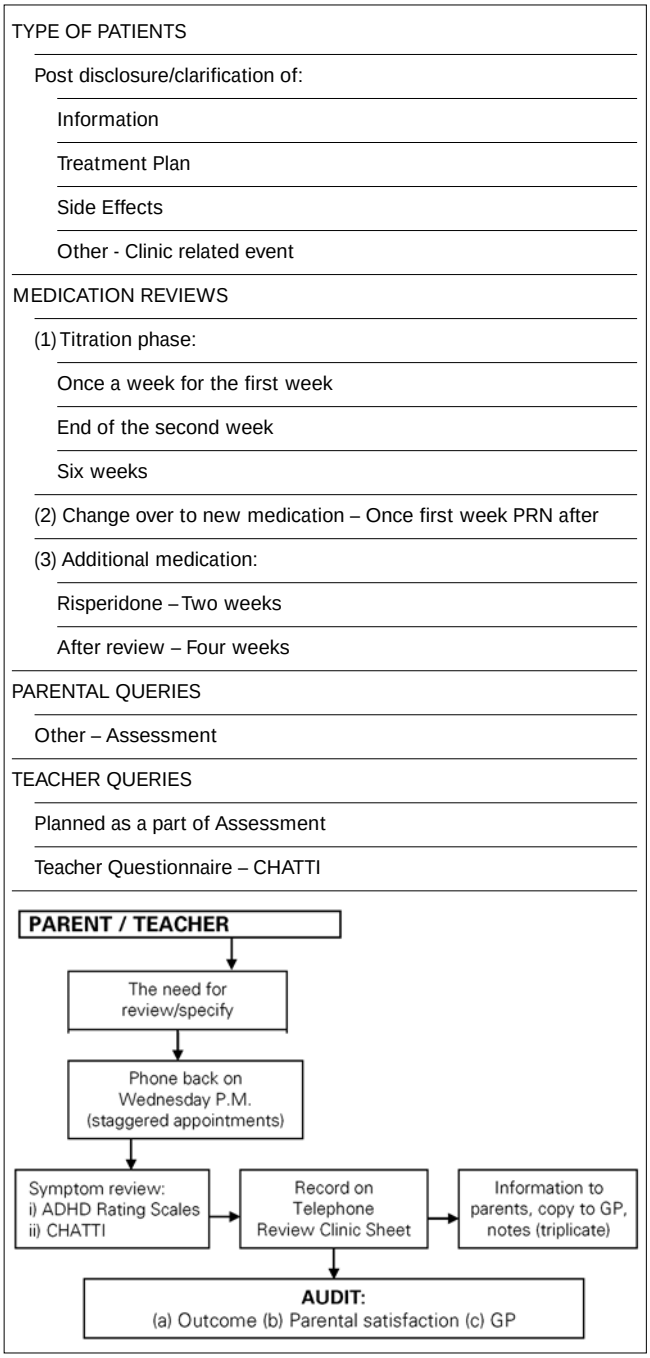

Figure P128. Telephone review clinic.

P129.

READING PROFILES IN ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER

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Objective. Attention-deficit/hyperactivity disorder (ADHD) is a neurobiological disorder. There have been described 3 sub-groups of profiles of neuropsychological function in ADHD: i) those with normal or essentially normal functions; ii) those with attention and executive dysfunctions (ED); iii) those with comorbid learning disabilities (LD) (e.g., arithmetic or reading disabilities such as dyslexia). In these three groups, difficulties in performance at school have been described. The prevalence of comorbid learning disabilities in ADHD is present in 25-30% of children and dyslexia tends to appear frequently. Our objective is to analyse the reading profile in a paediatric population who have diagnoses of ADHD and correlate that with neuropsychological functions in ADHD.
Methods. We present a review of 60 children with ADHD. Participants were divided into 3 groups of diagnoses: group 1: ADHD children with normal functions (n = 20); group 2: ADHD children with ED (n = 20), and group 3: ADHD children with comorbid dyslexia (n = 20). In all participants neuropsychological examinations were undertaken. We evaluated reading abilities. We used coping and dictation tests to assess writing skills and for reading skills we assessed the mechanical abilities (rate and accuracy as parameters) and comprehension. We also analysed the timing of reading acquisition during school in each group.
Results. Group 3 showed more deficits than groups 1 and 2. Group 1 presented some difficulties in reading rate because it was so fast. Group 2 displayed in particular impairment in reading comprehension. Group 3 exhibited difficulties in all reading areas but principally in rate and accuracy rather than reading comprehension. In writing skills there were differences too. The results indicated that group 3 had lower scores in dictation than group 2 who presented lower results in copying. There were no differences between group 1 for these aspects. Group 3 presented more problems with reading acquisition during the first periods of school.
Conclusions. ADHD children showed reading comprehension deficit due to impairment in attention and executive functions. Children diagnosed with ADHD with comorbid dyslexia exhibited more difficulties in all reading abilities as a result of the phonological dysfunction associate with ADHD. Complete neuropsychological examinations are necessary to distinguish cognitive performances in reading skills in the ADHD population to establish a correct diagnosis and treatment interventions.

P130.

USE OF METHYLPHENIDATE FOR ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER IN CHILDHOOD

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Introduction. Attention-deficit/hyperactivity disorder (ADHD) is a persistent and severe impairment of psychological development. The prevalence of ADHD of school age children is 2-5% in UK. Methylphenidate is recommended by the National Institute for Clinical Excellence (NICE) in UK, for use as part of a comprehensive treatment programme for children with a diagnosis of severe ADHD.
Aims. To determine whether we are following NICE guidance on the use of methylphenidate. To find out about the support that the

children in this study were receiving. To improve the services for children with ADHD.
Methods. Children with a diagnosis of ADHD and prescribed methylphenidate after October 2000, were included in the study. The complete audit was performed (August 2002-February 2004) at Alder Hey Children University Hospital, Liverpool. The first part was carried out August 2002-February 2003. Further recommendations were implemented in the following six months. The second part was carried out August 2003-February 2004.
Results. Total 420 cases identified, 90 cases reviewed (60 in 1st audit and 30 in 2nd), completing audit circle; 85 male, 5 female. 90% were managed by community paediatrician. All patients > 6 years old, overall 28.8% had learning difficulties, 21% had sleeping problems and 28.8% had mental health problems. Peak age of diagnosis was 9 years in the first part vs 7 years in the second. Reported overall side effect of methylphenidate (most of them were transient) was 12%. In 3 cases medication was stopped due to side effects. Behavior and concentration improved in 81.6% of cases. Family support significantly improved in the second part (6.6% vs 56.6%; $p = 0.0001$) via ADHD family project. Also there was increase of educational support for these children via educational psychology services; (5% vs 33%; $p = 0.001$). The child and adolescence mental health support increased: 18% vs 27%.
Conclusions. The guidelines were followed, but not fully. However this was improved significantly in the second part due to increased professional awareness about ADHD because we delivered many seminars about ADHD. Mental health team worked more closely than before with community paediatricians via joint ADHD clinics with child and adolescence psychiatrists. Families were getting better support via ADHD family project which was jointly funded between health, education and social services. The audits lead to a better provision of services for these children via specialist ADHD clinics.

P131.

TREATMENT OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN YOUNG PEOPLE WITH LEARNING DISABILITY AND COMPLEX EPILEPSY

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Objective. To review the response to treatment for attention-deficit/hyperactivity disorder (ADHD), and adverse effects in young people with learning disability and complex epilepsy, in the National Centre for Young People with Epilepsy (NCYPE), a residential centre providing specialist multidisciplinary care for young people with learning disability and complex epilepsy.
Methods. A case-note review identified 23 of a population of 198 young people at the centre between 1998-2005, diagnosed and treated for ADHD based on DSM-IV criteria. Scores from Conners' ratings scales and seizure counts pre-treatment and at 1,3 and 6 months following initiation of treatment were calculated and the results of structured observations included.
Results. The mean age at ADHD diagnosis was 12 years (range: 9-19 years), 19 (83%) were male. Learning disability was severe in 11 (48%), moderate in 7 (30%) and mild in 5 (22%). 21 (91%) had other psychiatric co-morbidities (including oppositional disorder, autistic spectrum, conduct disorder or a mood disorder).The first-line medication was short-acting methylphenidate (Ritalin ®) in 19 patients (82%), long-acting methylphenidate (Concerta XL ®) in 2 patients (9%), and dexamphetamine in 2 patients (9%). 12 patients (52%) required change to another medication, either due to therapeutic failure or side effects. The most frequent second-line agents were atomoxetine, risperidone, Concerta XL, and dexamphetamine. Improvement in ADHD symptoms with treatment was found in 12 cases (52%). Adverse effects and failure to control ADHD symptoms were factors in treatment drop-out occurring in 52% of the children. Drop-out rates irrespective of use as first- or second-line agent were: dexamphetamine (75%), Concerta XL (50%), short-acting methylphenidate (40%), and atomoxetine (30%). 17 (74%) of the patients had epilepsy. 7 (41%) had inactive, treated epilepsy (defined as no seizures in two or more years). 10 patients had active epilepsy. 3 patients with epilepsy (17%) had a greater than 10% increase in seizure frequency with methylphenidate. In one of these patients seizures were unchanged after stopping methylphenidate and in the other two cases treatment was continued.
Conclusion. Treatment for ADHD should be considered in young people with learning disability and complex epilepsy as it may improve ADHD symptoms without causing a clinically significant increase in seizure frequency.

P132.

A RANDOMIZED, CONTROLLED TRIAL OF OMEGA-3 AND PHOSPHOLIPIDS SUPPLEMENTATION IN CHILDREN WITH ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER

WITHDRAWN

Autism

P133.

THE RELATIONSHIP BETWEEN MOTOR ABILITIES AND DAILY LIVING ACTIVITIES IN AUTISTIC CHILDREN

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Objective. The purpose of this study was to determine the relationship motor abilities and daily living activities in autistic children.
Methods. Thirty autistic children in special rehabilitation center were included in the study. The mean age of autistic children was 9.4 with a 1.84 standard deviation. In this study, Bruininks-Oseretsky Test of Motor Proficiency was used to assess the gross and fine motor skills. The eight subtests of Bruininks-Oseretsky Test of Motor Proficiency were used to assess gross and fine motor skills. These are running speed and agility, walking forward heel to toe on walking line, jumping up and clapping hands, standing broad jump, touching nose index fingers-eyes closed, response speed, drawing a line through a crooked path with preferred hand and placing pennies in a box with preferred hand. The Pediatric Evaluation of Disability Inventory was used to assess daily living activities.
Results. There was a significant correlation between self care scores and total motor scores ($r = 0.437$; $p < 0.05$). It was found that a significant correlation between self care scores and mobility scores ($r = 0.500$; $p < 0.01$).
Conclusions. The findings of this study showed that motor abilities affect daily living activities in autistic children. The motor proficiency must be evaluated and trained to increase independence level in daily living activities in autistic children.

P134.

THE COMPARISON OF MOTOR PROFICIENCY BETWEEN AUTISTIC AND HEALTHY CHILDREN

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Objective. The primary objective of this study is to research the motor proficiency between autistic and healthy children.
Methods. Thirty children with autism were matched with 30 normally developing children. The mean age of autistic children was 9.4 with a 1.84 standard deviation. The mean age of healthy children was 8.9 with a 1.85 standard deviation. In this study, Bruininks-Oseretsky Test of Motor Proficiency was used to assess the gross and fine motor skills. The eight subtests of Bruininks-Oseretsky Test of Motor Proficiency were used. These are running speed and agility, walking forward heel to toe on walking line, jumping up and clapping hands, standing broad jump, touching nose index fingers-eyes closed, response speed, drawing a line through a crooked path with preferred hand and placing pennies in a box with preferred hand.
Results. Significant group differences were found in all tests assessing gross and fine motor skills ($p < 0.05$). The comparisons revealed that the normal developing children had significantly higher fine and gross motor scores than the autistic children.
Conclusion. The findings of this study indicated that autistic children's motor proficiency more effected than normal developing children. Further research is required to determine whether the motor proficiency effect daily and academic life for autistic children.

P135.

DIAGNOSTIC AND SUPPORT PROGRAMS FOR PRESCHOOL CHILDREN WITH AUTISTIC SPECTRUM DISORDERS IN ST. PETERSBURG: QUALITATIVE STUDY OF THE EXISTING SITUATION AND FAMILY NEEDS

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Objective. To understand and to describe current diagnostic and support programs for families having young children with autistic spectrum disorders (ASD) in St. Petersburg.
Methods. Semi-structured interviews with 15 parents were carried out after diagnostic sessions. These families came to St. Petersburg Early Intervention Institute first time during February-April 2005 with preschool age child (mean age: 39 months; range: 23–55 months) who met diagnostic criteria of ASD (according to DSM-IV).
Results. As a result of previous professional assessments every child in our sample had different combinations of 7-8 diagnostic labels which were given independently by several professionals. Along with autism (7 cases) or without it that were for example brain damage, birth trauma, speech delay, wrong upbringing, etc. The majority of parents were very confused and upset because of the child condition and different diagnosis. Talking about treatment parents considered educational program as main part only in one case. In other cases main component was 'medically' oriented (medications, electrotherapy, chiropractic, massage, acupuncture, homeopathy and so on). All parents didn't know about alternative communication and behavioral therapy. Only 5 children had possibility to visit preschools.
Conclusions. Different treatment programs are provided by several services and different specialists. They are vary in both quality as well as the degree of evidence-based support, and seriously influence the family situation. Concept of ASD is new for Russia. Other discourses (like for example 'neurological' approach with birth trauma, local brain damage, etc.) are still more popular in Russian professional society. Even concerning autism there are different opinion (symptoms, age and the reasons of appearance). This controversial picture makes early identification and diagnostic very difficult. Various information and methods of treatment make emotional situation in the families even more difficult. Every time facing with new interpretations of child's problems family is forced to reorganize their understanding of child's needs. At the same time family members has a real need to be heard, supported, but professional society is mostly trying to 'cure' the child. The access to the recourses for families having children with ASD is limited. Very unclear situation with diagnostics is one of the reasons for it. With 'help' from professionals parents continue to look for the medical cure, but education and social needs of the children are ignored. An adequate diagnosis could be helpful for the family to get the information about the needs of the child and to start educational program.

P136.

ON IMITATION IN AUTISM: CHILDREN WITH FRAGILE X SYNDROME WITH/WITHOUT AUTISM

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Introduction. The past twenty years have seen a renewed interest in imitation as an important clue in understanding the development of social interactions. At the same time, there has been growing evidence of imitation deficits being specifically present in individuals with autistic spectrum disorders (ASD). It remains unclear which subcomponents of this complex behavior are more specifically involved in the overall imitation deficit in ASD. The present study included two subgroups of children with fragile X syndrome (FXS) regarding the presence of ASD. While both the both groups would supposedly have many problems in term of visual attention, dyspraxia, executive functioning, sensory processing, and language, the aim of the study was to find out if there's any difference regarding imitation abilities in the form of facial, single hand, complex hand and sequenced non-meaningful gestures.
Methods. Twenty four children with FXS (mosaic or full mutation), aged 6 to 14 years, 22 boys and 2 girls, participated in the study. Based on results from ASD testing they were split in two subgroups: a non-ASD group of 9 children and ASD group of 15 children. All of the children were assessed with an intelligence test, with some also included in the assessment of visual-motor skills (VMI), sensory impairment (Short Sensory Profile) and language abilities (PPVT-R, EOWPVT). Both groups were relatively matched in terms of age (Hodges, $g = 0.16$) and IQ (Hodges, $g = 0.22$). Imitation skills were investigated using the Imitation Battery by Rogers et al (2005) and difference assessed using the Mann-Whitney *U* test.
Results. Although the groups didn't show significant differences on any form of imitation tasks, a trend was present. It showed that the ASD group performed more poorly imitating single hand ($p = 0.117$), complex hand ($p = 0.126$) and sequenced gestures ($p = 0.196$). The effects were of medium size ($0.69 < \text{Hodges } g < 0.73$).
Conclusions. In our study of imitation in children with FXS with and without autism we couldn't find any significant difference between the ASD and non-ASD groups, owing in part to the small number of participants. It is possible that the imitation deficits are due to other domains shown to be impaired in the children with FXS regardless of ASD.

P137.

DETERMINATION OF PLASMATIC AMINO ACIDS IN EPILEPTIC PATIENTS AND AUTISTICS WITH EPILEPSY

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Introduction. The biological importance of amino acids is well known. There seems to be a relationship between the dietary availability of precursors amino acids of certain neurotransmisors and their production in the brain. Alterations of some amino acids in autistic patients and epileptic patients have been found. Epilepsy is one of the diseases frequently associated with the autism.
Objective. Plasma values of amino acids in young patients with epilepsy, autistic with epilepsy, and in healthy control subjects were determined.
Methods. The microdialysated samples were analysed by capillary electrophoresis with detection by means of laser-induced fluorescence technique, from which concentrations of amino acids were obtained.
Results. The epileptic subjects exhibited an increase in the values of the amino acids tyrosine, GABA, arginine, glutamate and aspartate; in the group of autistic with epilepsy, a significant increase of the values of the same amino acids. In the group of autistic with epileptic subjects was detected and also shown increased values of phenylalanine.
Conclusions. The alteration of the amino acid phenylalanine might be related mainly to the autism. The amino acids tyrosine, GABA, arginine, glutamate and aspartate might be related to the etiopathogeny of the epilepsy and autism. Further studies with a greater number of autistic patients will elucidate the role of each amino acid either in autism or in epilepsy.

P138.

PAIN PERCEPTION IN AUTISM SPECTRUM DISORDERS

WITHDRAWN

P139.

RETT SYNDROME –MORE ABOUT THE HANDS

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Objectives. i) To review information about the nature and prevalence of hand stereotypies, with the aim of providing a clear description of hand stereotypy and demonstrate the need for a classification system of hand stereotypies, ii) To identify further areas for research into hand stereotypy in Rett syndrome for occupational therapists working in this field.
Methods. Systematic review of the literature of hand stereotypy in Rett syndrome. Medline and CINHAL internet search sites were used to aggregate the relevant literature. The search terms 'Rett syndrome and hands', 'Rett and motor' and 'Rett and stereotypy' were utilized. The terms 'Rett and motor' yielded six articles, 'Rett syndrome and hands' yielded 15 articles and 'Rett and stereotypy' (1990-2005) yielded 74 articles. An examination of the reference lists of key articles was used to supplement the literature found using the computerized searches. No randomized controlled trials were found.
Results. A total of 38 articles were assessed as appropriate to include in this review. The range of variables surrounding the hand behaviour in Rett syndrome is considered including the timing, nature, and complexity of the stereotypy as well as whether the behaviour is constant, rhythmical or cyclical. Detailed descriptions of the hand behaviours are summarized and categorized from the literature. Additional factors are highlighted that could enhance the descriptions of hand stereotypy in Rett syndrome.
Conclusions. Providing description of stereotypic hand behaviours in Rett syndrome in this review has highlighted that there is a need for a classification system that is more sensitive than currently used. There are no models sensitive enough to detect the individual differences of presentation. The unique presentation of each girl with Rett syndrome has been highlighted in this review. Appreciation of this individuality is promoted for tailoring therapeutic intervention and monitoring outcome and change. There are clinical descriptive factors which would assist in the development of a classification system including detailed evaluation, such as orientation of hands, fingers and the anatomical presentation of the hands and arms.
Acknowledgements. The author would like to acknowledge with gratitude the assistance of Dr. Angela Morgan, lecturer at The Institute of Child Heath, London and The Children's Trust, Tadworth. Additional thanks to St. Margarets School for their continued interest in Rett syndrome. This work was supported by The Children's Trust, Tadworth.

P140.

USE OF ARIPIPRAZOLE (ABILIFY ®) IN PAEDIATRIC POPULATION

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Introduction. Aripiprazole (Abilify ®) is the newest of the atypical antipsychotics. It is a partial agonist at dopamine (D_2) and serotonin receptors (5-HT_{1A}) and acts as an antagonist at 5-HT_{2A} receptors. Furthermore it exhibits moderate affinity for α_1-adnenergic and histamine (H_1) receptors. This receptor activity profile differentiates aripiprazole from other atypical antipsychotics. There is growing interest in the use of aripiprazole in children with aggressive behaviour associated with conduct disorder and autistic spectrum disorder (ASD).
Objective. To assess the efficacy, safety and tolerability of aripiprazole in children with disruptive behaviour disorder (DBD) and ASD.
Methods. Retrospective case notes analysis of children with a diagnosis of DBD and/or ASD (pervasive developmental disorder) based on DSM-IV criteria and is treated with aripiprazole.
Results. Eight case notes were identified who were prescribed aripiprazole. All 8 children were males. At the time of start of aripiprazole, the youngest child was 9 years old and the oldest child was 14 years old. 4 children had a diagnosis of ASD with comorbid ADHD and 4 children had a diagnosis of conduct disorder. All children were started on aripiprazole in a dose of 2.5 mg. Five of these children were concurrently on long-acting methylphenidate (Concerta XL ®). The duration of aripiprazole medication varied from 1 month to 11 months. Safety and tolerability was assessed based on parental reports on telephone. 5 children who were on Abilify for over six months had blood tests to monitor biochemical abnormalities. Effectiveness was assessed using Clinical Global Impression-Severity scale. One child stopped Abilify after a single dose because of side effects (decreased appetite, increased sleepiness all day and feeling unwell). In 7 children the mean baseline CGI-S was 5.3 mean CGI-S in 6 children at 3 months showed an improvement to 2.3 mean CGI-S at 6 months in 5 children continued to remain at 2.2. In 3 children dose of Abilify was increased to 5 mg daily at parental request after an initial visible effect. All 7 children who are on Abilify continue to show reduction in their aggression.
Conclusions. Aripiprazole offers a new therapy for the management of children with aggressive behaviour in conduct disorder and autism. This study shows effectiveness in paediatric age group. However

clinicians should be aware of the potential for aripiprazole to cause adverse effects in this population. Larger controlled trials are urgently warranted.

P141.

DIAGNOSING SPECIFIC LANGUAGE IMPAIRMENT

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Objective. Specific language impairment (SLI) is most visibly exhibited as deviant language development. The underlying mechanisms are still under debate. Correspondingly, in clinical practice, the developmental trends caused by the language deficits and by factors behind seem to be insufficiently recognised. This presentation has its basis on the study by Asikainen (2005), where the main objectives were to evaluate factors underlying SLI and factors related to the cognitive development of children with SLI, and to evaluate merits of the present clinical practice. Special attention was paid to relations between deviant language and discrimination, and memory functions.
Methods. The study group was drawn from clinical material. They were 78 children diagnosed with SLI. The control group were 101 children with no known delay in development. The children's linguistic, verbal and nonverbal performance and motor skills were evaluated, likewise their general histories.
Results. The clinical picture of the study group was in agreement with findings reported in the SLI literature. Discriminative ability and auditory span differed between the LI and control groups, and there was also a discrepancy between verbal and nonverbal performance. Correlation analysis of the data supported the assumption that inadequate long-term memory is on factor accounting for linguistic disturbance.
Conclusions. Our study suggests that at the core of SLI there is a general neural deficiency in discrimination and in forming representations –or sometimes a representation already formed may be lost. Despite improvement in speech development, these neural deficiencies do not necessarily disappear but may also later imply a need for substantial repeats and illustrating graphics. Unless compensated, the disorder may cause learning difficulties and poor outcome. SLI may also cause deficient development of executive functions, difficulty in expressing and comprehending verbal messages adequately in social relationships, poor social-emotional development, mental disorders, poor participation, and unemployment. However, these aspects do not seem to be adequately recognized in clinical practice.

Miscelanea

P142.

INTRACORTICAL INHIBITION AND FACILITATION BEFORE AND AFTER CONSTRAINT-INDUCED MOVEMENT THERAPY IN CONGENITAL HEMIPARESIS

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Objective. Constraint-induced movement therapy (CIMT) in children with congenital hemiparesis is leading to a fast improvement of motor function of the paretic hand. Our aim was to study, whether this gain of function is accompanied by a disinhibition of the primary motor cortex of the affected hemisphere.
Methods. Eleven patients (range: 10-30 years; median: 12 years; 6 female) with congenital hemiparesis due to infarction within the territory of the arteria cerebri media and preserved contralateral corticospinal tracts to the paretic hand, participated in a in-patient 12 days therapy. Immediately before and after the treatment, we measured intracortical inhibition (ICI) and facilitation (ICF) of both hemispheres (paired pulse transcranial magnetic stimulation with interstimulus intervals of 2 to 20 ms).
Results. The motor function of the paretic hand was significantly improved in all patients (Wolf Motor Function Test). ICI of the affected hemisphere before and after therapy was significantly reduced when compared to the contralesional hemisphere (ANOVA, $p = 0.017$). ICI and ICF of both hemispheres remained unchanged after CIMT.
Conclusions. Patients with congenital hemiparesis show intracortical disinhibition of the affected hemisphere. Despite the functional improvement of the paretic hand, ICI and ICF remained unchanged after the CIMT. It might be that the preexistent disinhibition is impeding the demonstration of neuromodulatory effects of the primary motor cortex in our patients.

P143.

CASE REPORT: A 6 YEARS-OLD FEMALE AFFECTED BY CEREBELLAR HYPOPLASIA WITH A VERY MILD MENTAL RETARDATION AND LANGUAGE DYSFUNCTION

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Objective. Cerebellar hypoplasia is a developmental disorder characterized by the incomplete or partial development of cerebellum. It may be genetic, or occur sporadically. The cerebellum plays an important role not only in motor control but also in cognitive processing, language, thought modulation, emotion, organizing of activities in a sequential manner. In infancy, symptoms may include developmental delay, hyptonia, ataxia, seizures, mental retardation, and nystagmus. Cerebellum is involved in skilled mental performance, and also in sensory acquisition, discrimination, tracking and prediction, visuo-spatial tasks, by to the loops with frontal, parietal and temporal lobes.
Case report. We describe the case of a 6 years old female, with a diagnosis done during the pregnancy of cerebellar hypoplasya, involving vermis and hemispheres, whom we are following since her birth. She lives in a very good environment, and her family accepted her disability at all. At 2 years old she underwent a surgical intervention of VCS. At the Griffith Scale, assessed once a year, she shows a mild retardation, most of all in the 'hearing and speech', and 'performance'. The last cognitive evaluation was performed using the Wechsler scale. She had a physiokinesic therapy in her first year of life because of a mild motor retardation, and nowadays, because of her language disabilities (which are her most important delay), she is following a logopedical treatment. We show her mental development, assessed by the Griffith and the Wechsler scales, and a video that shows her previous motor difficulties and her present growth.
Conclusions. In spite of her anatomic damage, involved the vermis, this patient has a good modulation of emotions. Her mental and language retardation are really mild. We underline the importance of a very early diagnosis of cerebellar malformations, of a good neuropsychiatric follow-up and how the environment can play a role in improving sequels of congenital brain damage.

P144.

CEREBRAL STROKES IN CHILDHOOD: HAEMATOLOGICAL SCREENING PROTOCOL AND THROMBOPHILIC RISK FACTORS

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Introduction. Childhood stroke survivors can have a different disabilities caused by their stroke, which can include epilepsy, hemiplegia, hemiparesis, hypotonia, speech and language difficulties, vision deficits and so on. They may require physiokinetic and speech therapy, medications, special education, orthotics and more. The earlier therapy is started, the better chance their disabilities will be less severe.
Objective. To assess the role of thrombophilia risk factors, both acquired and hereditary, in a cohort of children with idiopathic central nervous system (CNS) ischaemia followed in our institute between 1998 and 2005.
Methods. In order to diagnose an ischemic event we consider: i) careful personal and family history, haematologic disease, mental retardation; ii) physical exam including vascular skin abnormalities. In the first instance CT scan and then MRI. If the CT scan and/or MRI show an ischaemia, then we consider the following diagnostic tests: blood studies (thrombophilia screening), echocardiogram, EKG, cardiac evaluation, carotid artery exam, holter monitor. Now we consider the blood studies performed in these last 6 years. The thrombophilia screening includes: PT, PTT, fibrinogen, measurement of factors VIII: c, VIIIR: Ag, VII, XII, AT III, protein C, protein S, APCR, plasminogen, Born Test, lipoprotein A, prothrombin G20210 mutation, MTHFR mutation, LAC, ACA, homocysteinemia and lipid profile. Since October 1998 we have diagnosed and studied 14 patients (8 females and 6 males) whose age ranges between 7 months and 13 years showing idiopathic arterious CNS ischaemia (average: 72 months; median: 56.5 months; SD: 50.7). They were submitted to the protocol for trombophilia and a sample of blood has been stored for further genetic analysis.
Results. 36% were positive for anticoagulant antibodies In 12 cases (86%) we found a thrombotic risk factor: 5 –3 (21%) in heterozygosys, 2 (14%) in homozigosys– for C677T MTHFR mutation, 1 (7%) for prothrombin polymorphism, 7 (50%) had dyslipidaemia. Four patients received rehabilitation treatment for neurological outcome and 1 for motor disorder; 5 took antiepileptic drugs, and 3 are actually on AED therapy. Three children are currently receiving secondary prophylactic treatment with ASA because thrombotic risk factors were assessed, confirmed and persist in the follow-up controls.
Conclusions. We underline the importance of a complete thrombophilia screening protocol in children with CNS ischaemia, since we demonstrate a high incidence of risk factors. We underline the need of a careful neurologic diagnosis and extensive follow-up for a better knowledge of the disease and a prevention of further episodes.

P145.

UNILATERAL FACIAL PALSY: A RARE PRESENTATION OF BRAINSTEM DYSGENESIS

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Introduction. First described by Roig et al in 2003, brainstem dysgenesis encompasses a group of malformations of vascular origin arising early in embryogenesis. The usual clinical presentation occurs in the neonatal period with congenital hypotonia and dysfunction of different combinations of cranial nerves. Velo-palatine incoordination, bilateral (Möbius-like) facial diplegia, temporo-mandibular joint ankylosis, oculomotor apraxia and pyramidal signs are the most frequently encountered signs. We report the case of a newborn with congenital, unilateral, peripheral-type facial palsy where the associated findings were suggestive of brainstem dysgenesis.
Case report. This female patient had been monitored since 34 weeks of gestation because of IUGR and polyhydramnios. Delivery was at term by elective cesarean section. Birth weight was 2,390 g and Apgar scores 9-10. Patient was admitted to the newborn unit due to low weight and hypoactivity. Neurological examination on admission showed a right-sided, peripheral-type facial paralysis, severe axial hypotonia and exaggerated deep tendon reflexes. Patient went onto display swallowing difficulties, requiring tube feeding, and respiratory monitoring because of recurrent apnea. Routine exams and screen for inborn errors of metabolism were normal. Barium swallow showed an abolished gag reflex, poor suction and a severe velo-palatine incoordination. MRI revealed hypoplasia of the pons. Brainstem evoked potentials showed asymmetric interpeak latencies, slower on the left side, suggesting retrocochlear abnormalities. Blink reflex was normal. EMG showed a right facial nerve neuropathy with moderate axonal loss. On short-term follow-up, mild improvement of feeding difficulties and hypotonia was documented but facial palsy remained unchanged.
Conclusions. In the absence of birth trauma, neonatal unilateral facial palsy should raise the suspicion of congenital brainstem dysgenesis, especially if associated with hypotonia, long tract signs or oromotor disorders. MRI is mandatory in order to rule out other central nervous system malformations, mainly biopercular or perisylvian polimicrogyria. The prognosis of patients with brainstem dysgenesis due to prenatal lesions depends on the magnitude of the vascular territory involved and, in most cases, is better than the initial clinical manifestations would indicate.

P146.

LOCOMOTION RECOVERY IN TWO ACQUIRED BRAIN INJURY CHILDREN WITH UNILATERAL SPATIAL NEGLECT

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Case reports. We describe the complete recovery of locomotion function in two our inpatient children after acquired brain injury. The first one had a severe traumatic open brain injury, with an open fracture in the right parietal and occipital areas of the skull, total destruction of the right parietal lobe and partial injury of the right temporal lobe when he was a 7 months-old child; he shown a left hemiparesis with unilateral neglect (UN). The second presented a double hemiparesis with right UN as consequence of Epstein-Barr virus encephalitis when he was a 42 months-old child.
Conclusions. We focused our paper on the clinical evolution, within rehabilitative intervention during its standing and walking recovery phases, describing functional profiles and relative rehabilitative choices in agreement with the concepts of M. Jeannerod, G. Rizzolatti, M. Arbib, L.C. Robertson, G. Edelman and A.R. Damasio, in these particular cases in which disabilities were sustained by the presence of UN, a multicomponential syndrome. Our Movement Analysis Laboratory (VICON Oxford Metrics opto-electronic 3-dimensional system) carried out a gait analysis supporting the study of these cases.

P147.

ADRENOLEUKODYSTROPHY RELATED TO X CHROMOSOME: DESCRIPTION OF CLINICAL CASE AND IMPORTANCE OF THE GENETIC STUDY OF CARRIERS

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Introduction. Adrenoleukodystrophy (ADL) makes reference to a group of neurological degenerative disorder, characterized by nervous desmyelinating and a very long chain fatty acid (VLCFA) accumulation in body's tissues and flowed. It affects to one of each 20,000 boys. Of inheritance related to the X chromosome (X-ADL), it is the more frequent perixosomal disease. The biochemical defect is at level of the oxidation of VLCFA. Genetic alteration is located in the long arm of X chromosome (Xq28), described more than 200 mutations. To verify this alteration is important, since it is allowed to suggest genetic advice and the detection of the disease in presymptomatic or carrying men. At the present time the preventive therapies that are applied to presymptomatic patients are: dietetic advice, provision of gliceril trioleate and bony marrow transplant, with evolutionary clinical control in search of changes in the neuropsychological test or cerebral image's studies.
Case report. We described a masculine adolescent of 13 years, referred for neurological evaluation at 8 years, by antecedent of older brother diagnosed with ADL, at 7 years, being at the moment neurologically asymptomatic. Other familiar antecedent: several men of the maternal family with dark spots in skin, already passed away, were not studied. Cerebral magnetic resonance did not show alterations. Conclusive genetic study for the ADL-X diagnosis is asked for, with alteration in allelic of *DXS52*. Increase of the VLCFA was determined; in addition levels of adrenocorticotropine hormone are made to him which reported high values 1,441 pg/mL (normal values: 5-46 pg/mL) suggestive of primary adrenal insufficiency, reason by which is referred to endocrinology service, having indicated treatment with Hydrocortisone, flurocortisone, lovastatine and dietetic handling. The last study of cerebral image did not show alterations. Evolution: the patient has remained neurologically asymptomatic, with stabilization of the adrenocortical function.
Conclusions. The definitive confirmation of the X-ADL diagnosis, in the presented case allows to locate to this patient within the clinical form of asymptomatic presentation, with purely biochemical manifestations, which are extremely rare. For the final diagnosis in index case like this patient, the determination of VLCFA in plasma is required and when it is possible, to make genetic study. It is important to emphasize the accomplishment of a precocious diagnosis of X-ADL to optimize the effectiveness of the transplant of bony marrow.

P148.

INFANT-JUVENILE MULTIPLE SCLEROSIS: DESCRIPTION OF SIX CLINICAL CASES AND LITERATURE'S REVIEW

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Introduction. The multiple sclerosis (MS) is an inflammatory, demyelinating disease, of autoimmune nature, chronic course, in which the primary target of attack is the white substance of the central nervous system (CNS) particularly myelin. Usually it begins between the age of 20 and 40 years, nevertheless there is a world report of clinical cases (MS) in the childhood, specially in infant-juvenile group. MS has greater incidence in feminine sex, white race and more presentation occurred in tempered and cold zones. To be a chronic and potentially incapacitate disease, the MS has an important familiar, social and economic impact. To make MS diagnose in the pediatric age, it is required a meticulous clinical history that help to characterize the signs and symptoms of MS and also its evolutionary profile. In face of the presumption diagnoses , are made the complementary studies, as the cerebrospinal fluid examination (CSF), with determination of proteins electrophoresis and oligoclonal bands, also is fundamental to make image study like cerebral magnetic resonance (CMR), that allows to orient the type of injury, topographic location and the temporary presentation of the same ones, being a fundamental aspect, the presence of 2 or more injuries in the white substance, anatomically and temporarily separated. The determination of visual evoked potentials (VEP), is generally of great value. Other important aspect is the consideration of differential diagnoses with other childhoods demyelinating disease, like acute disseminated encephalomyelitis (ADEM).
Case reports. The objective of the present study is to describe the diagnostic approach and evolutionary profile of 6 patients, between the ages of 8 and 14 years, in those who suspected MS diagnosis, basing on the clinical criteria, complementary tests (CSF/CMR/VEP), immunological studies and rigorous investigation of differentials diagnoses, based on the diagnoses criteria internationally established and the raised ones by the Venezuelan Society of Neurology. Also the applied therapeutic handling with β-1b interferon is considered.
Conclusions. Although the MS diagnosis in pediatric age is more difficult than in adults, due to the greater frequency of ADEM, and to the challenge to try to exclude other differentials diagnoses, stop is due to have a suspicion index, when demonstrates the occurrence of injuries in the cerebral white substance with dissemination in time and space which cannot be explained by other mechanisms or pathological condition.

P149.

OCCLUSIVE CEREBRAL INFARCT IN PEDIATRICS HAS PARTICULAR IMPORTANCE THOUGHT TO THE RANGE OF AGES IN WHICH IT OCCURS IN THIS PATIENTS AND THE SEQUELS IT PRODUCES

J Carrillo Ibarra

Objective. To analyse the evolution and treatment of this case and to make a review of the literature about the occlusive cerebral infarct following head trauma. The study of a masculine 1 year 11 months of age patient with an occlusive acute postraumatic infarct was done; as well as the review of the literature.
Case report. Masculine 1 year 11 months patient, product of the second delivery and with normal neurologic development. He presented a fall from his own high with an apparent mild head trauma, 18 hours later he starts with neurologic deterioration and was transported to the emergency service, where he was found with 11 points of the Glasgow scale, a right central facial palsy and ipsilateral hemiparesia. A skull CT and MRI were done, which revealed an occlusive acute, left, talamic infarct. Also EKG, USG where practiced which denied cardiac pathology, as well as he had a normal EEG, and MRI angiography. All the conventional laboratory studies were normal, the coagulation C and S proteins presented normal values, and the anticardiolipin and antiphosfolipid antibodies where negative. He received treatment with clopidogrel (2 mg/kg), heparin and salicylic acid with conventional doses. The patient progress was good and left hospital 12 days later.
Conclusions. Cerebral infarct in pediatric patients may occur at any age but its higher incidence is in children below tow years, female and following severe head trauma. Cardioembolic etiologies take the first places. Incidence of cerebral infarct following atheroscle-

rosis increases with the age. Although our case is about a masculine patient, without cardiac pathology, and associated to severe head trauma. Occlusive cerebral infarct in children has a greater incidence in patients below tow years. Bibliography shows that children don't have atherosclerotic etiology, being the most common causes (18%) those ones of cardioembolic origin and occlusive disease of small vessels, secondary to diabetes mellitus (3%). The less common causes like; sickle cell anemia, moyamoya disease, central venous trombosis and antiphosfolipid antibodies syndrome; all together have more than 50% of the cases reported. Severe head trauma is associated with occlusive cerebral infarct, but there is no record of it related to mild head trauma. Early treatment with antiplatelet agents decreases the morbi-mortality of the occlusive postraumatic cerebral infarct.

P150.

A CASE OF EARLY-ONSET DYSTONIA IN A GIRLWITH MILD PERINATAL BRAIN INJURY

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Objective. Many lesions affecting the basal ganglia may cause symptomatic dystonia and should be clearly distinguished from the idiopathic disorder. Disorders of movement and posture constituting the umbrella of cerebral palsy (CP) usually show themselves as a non-progressive cerebral insult, however some may appear as progressive condition. We present a girl, now 3.5 years-old, who soon after rather uneventful birth presented with dystonia, seemingly with progressive course but later proved to be probable CP and not an idiopathic disorder.
Case report. The girl was born after uneventful pregnancy with vacuum extraction due to difficult delivery to a healthy father, while the mother has level I CP due to perinatal causes One father's cousin has epilepsy while mother sister's son is around 6 years-old and has gait problem and some communication disorder. Immediately after birth the girl had neonatal jaundice and received phototherapy, had mild hypertonus and head ultrasound revealed minor subependimal bleeding. At the age of 6 weeks abnormal body movements and opistothonic posturing were obvious. Neurodevelopmentally she showed good social contact, on tactile stimulations tremor and clonic movements of limbs could be elicited, increased tone was more in lower limbs (of spastic and dystonic type). The diagnosis of dyskinetic syndrome was put and she has started on regular neurodevelopmental treatment and multivitamins, MRI head at age of 4 months was normal as were also normal routine biochemical investigations including amino acids, organic acids, peroxysomes, lysosomes and carnitines. As her motor difficulties persisted a trial of levodopa was suggested but her parents did not consent to it. She continued to make good developmental progress but experienced dystonic posturing particularly affecting right lower limb and her gait was unstable with intoning of her feet. The condition seemed to have diurnal fluctuations, she appeared better in the mornings and became progressively stiffer in the afternoons. Therefore, at the age of 3 years supplementary investigations were done, including CSF amino acids, CSF neurotransmitter metabolites and *DYT1* gene, all proved normal as well as developmental psychological testing and again the parents declined proposed treatment with levodopa. Her condition remained unchanged, however still diurnal fluctuations were observed.
Conclusion. In our girl early clinical signs, family history and investigations pointed to a diagnosis of *DYT1* negative early onset idiopathic dystonia, however her relatively benign and non-progressive course thereafter, despite diurnal variation, is more consistent with some form of early onset dyskinetic-dystonic CP.

P151.

EXTRAORDINARY ETIOLOGY OF CEREBRAL PALSY

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Introduction. The authors is reviewing the case of a three years old cerebral paretic girl, whose spacious intracerebral haemorrhage was noticed when she was six weeks old. Leukemia was detected in the background of stroke.
Case report. She was born from IVF twin pregnancy on the 37th week, with 2,600 g, Apgar score was 9/10. Her early adaptation was tranquil. On the six week she got antibiotic treatment because of her pneumonia. Two days later her status relapsed suddenly, and she got into hospital with pathological neurologic symptoms. Spacious haemorrhage was detected with cranial ultra sonography on the right hemisphere. Extreme leucocytosis, thrombocytopenia and atypical cells was found in blood-cell formula. Beside the pathologic neurological symptoms, hepato-splenomegalia is significant. Acute lymphoid leukemia was verified with bone-marrow examination. Her haematologic treatment was done according to 'Infertant 98' protocol. Side by side this treatment neurotherapy was started according to Katona's method then it was supplemented with physicotherapy. Later, cystic laesios was detected with cranial ultra sonography beside the haemorrhage. Chemotherapy and neurotherapy was done side by side permanently. Her chemotherapic treatment was accomplished a year ago. In the attitude of haematology she is in remission. At the age of three, in her neurological status minimal left sided hemiparesis is being noticed. When she goes on foot the synkinesis of her left hand is a bit delayed, and the inflection of her left foot is less significant. She is able to climb up a wall bar on her own. She is speaking.
Conclusion. Our case is an example to the fact that the traverse of chemotherapy and neurotherapy can be applied suitably in rare and serious clinical aspects. In the case of spacious laesio, early started neurotherapy leads to great outcome.

P152.

A REVIEW OF THE MEDICAL PROBLEMS OF CHILDREN WITH CLEFT LIP AND/OR CLEFT PALATE AND THE INPUT OF PAEDIATRICIANS

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Objectives. Patients with clefts often have complex needs. The aim of this study was to identify associated medical problems in children with cleft lip and/or palate and determine the input from paediatricians in district general hospitals covered by the Cleft.NET.East network.
Methods. Questionnaires were sent to the clinical director of each hospital in the Cleft.NET.East network for information on local services offered to children with clefts. Repeat questionnaires were sent to those who did not reply followed by a telephone reminder. Children born with cleft lip and/or palate between January 2003 and December 2004 were identified from the Cleft.NET.East database and their medical records reviewed.
Results. Replies were received from all fourteen (100%) hospitals in the network. In 8, babies born with clefts were assigned to the on-call paediatrician at birth. In 10 (71%), infants were offered an initial outpatient appointment with the aim of providing multidisciplinary care. In 10 (71%), a lead clinician coordinated the local cleft service, 9 were paediatricians and 1 an orthodontic consultant. In 4 hospitals there was no local lead clinician. Paediatricians made contact with the network clinical nurse specialist in 6 (43%) hospitals. All 14 hospitals had a cleft link nurse. Specialist cleft clinics were undertaken in 10 hospitals, but only in 5 (50%) was a local

paediatrician in attendance. Of the 152 database entries, 148 children had clefts. Antenatal diagnosis was made in 47 (32%) pregnancies. The detection rate depended on the type of defect 36 (77%) cleft lip/palate; 10 (21%) isolated cleft lip and 1 (2%) isolated cleft palate. Median gestation was 40 weeks (range: 29-42 weeks), weight 3,145 g (range: 1,200-4,680 g). The initial hospital stay was 4 days (range: 1-90 days). 34 (23%) children had an identified syndrome, 10 (7%) had chromosomal anomalies and 14 (9%) had cardiac anomalies. 79 (53%) children had impaired hearing and 4 (3%) visual impairment. 34 (23%) children had feeding problems requiring nasogastric feeding, 3 (2%) required gastrostomy. 26 (17%) children had developmental delay and 4 (3%) had abnormal MRI scans. Two children required a tracheostomy. 6 (4%) children died. Only 67 (45%) children had a named paediatrician involved in their care.

Conclusions. This study has identified that children with isolated cleft palates in particular, have many additional medical problems. The antenatal diagnosis rate is lowest for these defects. Children with cleft did not undergo routine follow up in all centres. Practice varies widely across the network.

P153.

RELATIONSHIP OF UNDERNUTRITION TO HEALTH AND QUALITY OF LIFE IN CHILDREN WITH SEVERE MOTOR AND MENTAL DISABILITIES

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Objectives. The aim of this study was to estimate the prevalence of malnutrition among a sample of 59 children with severe motor and mental disabilities and to explore the relation with health and quality of life.

Methods. 59 polyhandicapped children, 37 boys and 22 girls (age: 2-15.1 years) underwent anthropometric assessment, including body weight, triceps skinfold and recumbent length. When orthopaedic contractures were present, stature was calculated from tibia and ulna length. Functional status, medical condition, oral motor function and feeding status were also recorded. Undernutrition was determined using the tricipital skinfold percentile (TSp), the weight-for-height centiles (WHC) and the observation of the child's statural curve. The quality of life of each child was evaluated with the questionnaire QUALIN adapted for polyhandicapped children and the quality of life of their parents with the Profile of Subjective Quality of Life (PSQoL). Health status was evaluated by the number of infections, doctor visits, days of hospitalization and days of ulcers during the last 12 months.

Results. All children had a severe motor disability –Gross Motor Function Classification System (GMFCS) IV or V– and 53 (90%) had a severe mental disability. Anthropometric measures could be assessed in all participants. 22 (37%) were undernourished. Of the children who were undernourished 16 presented with motor oral dysfunction and only 7 received an oral supplementation. Statistical analysis showed that the prevalence of undernutrition was significantly higher in the children who had a gastro-oesophageal reflux ($p = 0.04$), an evolutive disease ($p = 0.02$) and more severe mental ($p = 0.04$) and motor ($p < 0.01$) disabilities. Poor nutritional status was associated with pain ($p = 0.02$) and poor quality of life of the child ($p < 0.01$) and his/her parents ($p = 0.04$). We found no association between the nutritional and health status.

Conclusions. Despite the severity of motor involvement, the frequency of orthopaedic contractures and growth failure, it is relatively easy to determine the nutritional status of polyhandicapped children using simple anthropometrics data. While undernutrition is common among this population and is associated with poor quality of life, few children benefit from a nutritional management (regular follow-up, oral supplementation, gastrostomy...). There is an urgent need to increase the caregivers' awareness of the consequences of undernutrition and to train them to assess the nutritional status of polyhandicapped children.

Acknowledgements. This study was supported by the GERIMOC (Groupe d' Étude et de Recherche sur l'Infirmité Motrice d'Origine Cérébrale), France.

P154.

PSYCHO-EDUCATIONAL TOURETTE'S SYNDROME PROGRAMME FOCUSED TO AFFECTED CHILDREN AND THEIR FAMILIES

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Background. Tourette's syndrome (TS) is a neurological disorder of unknown etiologic involving the dopaminergic neurotransmission systems in the fronto-subcortical pathways. With onset between ages 2 and 15, it is more prevalent in men (3/4) and has an important genetic load (about 10% of patients have a family history of the disorder). TS is characterized mainly by the presence of motor and vocal tics, and 88% of the patients suffer from another comorbid disorder. The attention-deficit/hyperactivity disorder appears more frequently, followed by the obsessive-compulsive disorder. Behavioural and learning problems as well as other psychopathological disorders such as major depression and anxiety are commonly observed. Tics together with comorbid disorders produce an important decrease of life quality (LQ). Therefore TS treatment should focus not only on tic control but also on dealing with comobird disorders and coping with the generated psychosocial impact, in order to ensure the best possible LQ. It has been reported that the patients' relatives frequently experience feelings of overload and show high risk of developing psychiatric mobility. Recent publications suggest that initiatives oriented to confer strategies to diminish the carer's overload could be beneficial. For all these reasons it appears necessary to complement medical treatment of TS with psychological support and psycho education addressed both to the patients and their relatives. However this psychosocial attention must be in accord with the characteristics and specific needs of each group of patients and relatives, whose associations are considered an adequate frame for its diffusion.

Methods. For this reason our group developed an educational programme from the psychoeducational program for Parkinson's patients due to Consortium EduPark (Project nr. QLK6-CT-2002-02674, 'Quality of life and living resources', 'EduPark') working with the support of the European Commission. This project has involved several health professionals, neurologists, psychologists and neurophysiologists. Number of sessions: 10. Patients separated from parents. Duration of each session: 90 minutes per week. Number of participants per group: 5-12. Session 1: Introduction to the program and presentations. This session explains to the participants the structure of the programme. Presentations of the group will be done. Session 2: Information about the disease. Giving the tools about how and where they can get some specific information about their own personalized problem. Session 3: Self-monitoring. To understand what self-monitoring is why it is so important to their global health. Who the main abilities and techniques are to practice the methodology properly. Session 4: Modification of behaviour. To train to the participants in educational strategies and to teach them some behaviours' modification strategies. Session 5: Problem solving. To teach strategies in order to solving the main problems related to the TS and to cope with their problems in an adaptative way. Session 6: Efficient communication. To teach different com-

munication pathways to express our thoughts. Strategies about effective communication. How to use positive thoughts to reach an efficacy communication. Session 7: Dealing with stress. To understand what the stress is and what their components are in order to reach the welfare state in people with TS and their families. Session 8: Health care. To think about the impact of the TS in the family and how to deal with it. The importance of doing pleasant activities to maintain a healthy life. Session 9: Social support. To understand that the social support is important to the affected children and their families. Session 10: Recapitulation. Summary of all the sessions.
Conclusion. Actually the programme is summated to a research in order to prove his validity.

P155.

NEUROLOGICAL AND COGNITIVE COMPLICATIONS OF GALACTOSAEMIA

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Objective. Galactosaemia is a rare inborn metabolic disorder of galactose metabolism leading to acute toxicity and a chronic syndrome. The chronic neurological syndrome includes movement disorder (dyspraxia, ataxia) and varying degrees of cognitive disorder. Knowledge of genesis and course of neurological and cognitive complications in this condition is still limited. The Department of Metabolic Medicine of Great Ormond Street Hospital for Children, London, treats the majority of children with galactosaemia in the south east region of England. Although many have been treated continuously, a significant proportion is referred to the multidisciplinary Neurometabolic Clinic (NMC) of the hospital regarding concerns of poor school achievement, particularly problems in handwriting, numeracy and literacy, disorganised and inconsistent performance, difficulties in expressive language/speech and following verbal instructions. The objective of the study is to consider existing knowledge of neurological and cognitive complications in school aged children with galactosaemia and present new findings based on in depth clinical examination.
Methods. Systematic retrospective database analysis of neurological and cognitive outcome in a continuous series of children with galactosaemia (n = 14; mean: 8 years; range: 4-11 years) referred to the NMC in 1997-2006. The sample represents 35% of total children with galactosaemia treated in the Department of Metabolic Medicine during the same period (n = 40).
Results. Neuropsychological and neurological examination revealed a high proportion of neurological complications (7/14), in particular dyspraxia and ataxia. The majority (10/14) were in the average or mild learning difficulties range (IQ > 70). Of these, all had significant focal cognitive deficits, primarily in visual spatial/ perceptual and visuo-motor, working memory, mental arithmetic and organisational skills. Verbal dyspraxia and expressive language deficits were present in some.
Conclusions. The incidence of neurological and focal cognitive deficits appears high in children with galactosaemia. The pattern of these is discussed within the context of dyspraxia and galactosaemia. Possible causal mechanisms are suggested and also strategies for assessment and rehabilitation.

P156.

RETROSPECTIVE ASSESSMENT OF THE USE OF MELATONIN FOR CHILDREN WITH SLEEP PROBLEMS: AN AUDIT OF THE GREATER BELFAST AREA

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Introduction. Sleep disturbance in children particularly in those with neurodevelopmental disorders is common. Melatonin can be prescribed but there is limited evidence regarding its use and effectiveness.
Objectives. This audit attempts to identify the characteristics of children in our area currently prescribed/previously used melatonin; evaluate the quality of sleep history taken, dosage of melatonin prescribed and the effectiveness of the treatment.
Methods. Melatonin is presently prescribed on a named patient basis. Pharmacy records were used to identify 56 children prescribed melatonin between 2000 and 2005. Medical notes for 48 children were available. These notes were reviewed retrospectively and a proforma completed. Effectiveness was defined as successful by an improved sleep pattern when recorded and pharmacy continuing regular prescriptions for melatonin.
Results. 48 children were included (34 male, 14 female). The age range of child was 1 year 10 months to 20 years 5 months (median age: 4 years 6 months). The most common diagnoses were attention-deficit/hyperactivity disorder (ADHD) and autistic spectrum disorders (ASD). The most common age for reported onset of sleep problems was 1-5 years (39.6%). Only 29 charts included a description of sleep pattern. Of these 20 (69%) had delayed onset of sleep > 60 minutes, 33 (68.8%) woke through the night. Two children had completed a sleep diary. Fifteen parents were given sleep modification advice. Six (12.5%) had participated in a behavioural modification programme before melatonin. Prescription of melatonin increased from 1 child in 2000 to 27 children in 2004. Thirty-five (72.9%) children started on 2 mg of melatonin. The number of children still taking melatonin in September 2005 was 23 (47.9%). Children over 5 years and those with diagnoses of ASD or epilepsy ± cerebral palsy were more likely to respond. Sleep hygiene advice/behavioural modification programme/use of sleep diary did not appear to improve likelihood of success.
Conclusions. This audit suggests that melatonin can be helpful for some children. Successful use of melatonin did not appear to improve with non-pharmacological interventions however use of these interventions was limited and poorly recorded.

P157.

IDENTIFICATION OF SLEEP PROBLEMS BY QUESTIONNAIRE IN CHILDREN WITH SEVERE CEREBRAL PALSY

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Objectives. To establish if children with cerebral palsy have more sleep problems than able-bodied children and to identify causes of sleep disturbance. There is little research documenting sleep problems or their causes in cerebral palsy. There are no validated sleep questionnaires that take into account sleep problems in the context of complex disability.
Methods. We designed a sleep questionnaire with a medical section and conducted a comparative study between 14 children with cerebral palsy (aged 2-10 years) and 14 age-matched, able-bodied children. The research assistant completed the questionnaire with the family who, also, completed a sleep diary for one week. The sleep section of the questionnaire measured bedtime routine, night-time behaviour and breathing during sleep. The medical section identi-

fied clinical problems. The sleep diary was a subjective record kept by parents.
Results. The sleep section was analysed using Mann Whitney *U* tests: i) Bedtime routine: no significant difference found between the two groups; ii) Night-time behaviour: children with cerebral palsy scored significantly higher, indicating greater night-time disturbance ($U = 18.5$, two-tailed $p = 0.000$). They woke more than once during the night and stayed awake for longer periods ($U = 43$, two tailed $p = 0.006$; $U = 61$, two-tailed $p = 0.032$) and were more likely to wake up with pain/discomfort ($U = 47.5$, two-tailed $p = 0.005$); iii) Breathing quality: children with cerebral palsy scored significantly higher, indicating higher frequency of breathing problems during the night ($U = 53.5$, two-tailed $p = 0.037$). They were more likely to snore and have disturbed/ interrupted breathing; iv) Medical section: children with cerebral palsy, who had disturbed nights, experienced pain and discomfort from positioning, orthopaedic, digestive and respiratory problems and seizures; v) Sleep diary: provided supportive information for night-time events.
Conclusions. Children with cerebral palsy had a higher frequency of sleep disturbance and breathing problems but bedtime routine was similar to able-bodied peers. The questionnaire could be a tool for information on sleep disturbance in children with cerebral palsy and could direct the clinician towards specific management. The questionnaire highlights the impact of sleep problems on the family and alerts clinicians to initiate treatment and support parents. Further research is required to assess sleep improvement following specific interventions.

P158.

TRAINING OF SACCADIC EYE MOVEMENTS BY AUDIO-VISUAL STIMULATION: A STRATEGY TO COMPENSATE FOR VISUAL FIELD DEFECTS IN CHILDREN?

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Introduction. Following lesions affecting the visual field, adult patients usually show a gradual spontaneous recovery which is however typically limited to a period of a few months. A new therapeutic strategy has been recently proposed in stroke patients with stabilised visual field defects, based on the training of saccadic eye movements towards the hemianoptic field elicited by spatial and temporal coherent auditory stimulation. No data are available concerning the possible effect of this method when the lesion is acquired during development.
Objective. In this study we present the results of the application of a bimodal (visuo-acustical) training of saccadic eye movements in a 12 year old child with a right hemianopsia following an haemorragic event due to rupture of an artero-venous malformation.
Methods. The training was performed for 4 weeks, 5 days per week, 8 blocks per day. Each block consisted of a bimodal stimulation of the hemianioptic field: visual stimuli were preceded by an acoustic stimulus by a time ranging from 500 to 0 ms (100 ms units). In order to evaluate the effects of our treatment a battery of tests for visual search was administered before and after the training.
Results. No significant increase of the visual field was shown after the training. However, a significantly higher percentage of correct responses to unimodal and bimodal stimulation was shown when the subject was free to use ocular movements. These results were still observable 6 months after the training (present duration of the follow-up). An improvement in the speed and accuracy of the response in the visual search test, and in the rapidity of reading was also shown.
Conclusions. Our results confirm also in children the efficacy of a bimodal training of saccadic eye movements on visual scanning strategies. In our subject this has shown to improve essential functional abilities such as reading and visual search. Other studies are needed to evaluate the duration of the observed effect, to confirm the utility of this rehabilitation approach also with other type of brain lesions and to investigate on the underlying neurophysiological mechanisms.

P159.

IMPROVEMENT OF VISION ASSESSMENT OF CHILDREN WITH MOTOR IMPAIRMENT FOR REHABILITATION AND SPECIAL EDUCATION

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Objective. Children with motor impairment may have different visual problems. The aim of our project was to develop new assessment practices for a thorough assessment of visual functioning and to adapt the results of the assessment to the every day activities of these children.
Methods. Three State Schools for Children with Motor Impairments in Finland have partaken in an interdisciplinary project to assess vision of 53 students with motor and learning problems. A great majority of these children have cerebral palsy; other disorders are meningomyelocele, hydrocephalus, brain malformation, and mitochondrial diseases. Before this project seven of these children had been diagnosed with vision impairment and the Finnish Registry of Visual Impairment had been notified. Children were chosen for this study based on the need for further investigations as a result of difficulties in visual functioning at school. The purpose of the project is multidiscliplinary work. Information was collected from a questionnaire to parents and teachers on children's visual functioning. The level of verbal reasoning and visual cognitive functions were evaluated by neuropsychological examinations. Clinical examination of vision covered oculomotor functions, assessment of image quality, processing of visual information and compensatory strategies. Mathematic and reading skills were assessed using dynamical tests. The multidiscliplinary staff assessed and observed the functional vision of the children in activities of daily living in all school settings. We are developing a data collection form to collect observations together.
Results. The most common findings were in oculomotor functions and crowding phenomenon, inability to keep details separated from each other. Thirty children had moderate or severe visual loss and were eligible for registration. They had cerebral visual impairment (CVI) or a combination of anterior visual impairment and CVI. Most of the children had great difficulties in visual cognitive functions in the neuropsycological tests and in mathematics in dynamical math tests. Children's learning environments as well as visual ergonomy has been improved. Children have magnifying devices, and special attention has been given to spatial awareness in orientation. Modification of learning materials by using larger prints sizes, individually chosen spacing between letters and good contrast has contributed to easier learning. We are developing learning materials to offer structured pictures and texts for the children. Talking books are in use. One aim is to minimize visual and auditory noise in learning environments.
Conclusions. Visual impairment was found to be far more common than expected and problems in visual functioning more various than hitherto known in children with motor problems. This project has shown the importance and necessity of including the interdisciplinary team and parents to assess and observe the functional vision of children with motor disabilities.

P160.

EPILEPSY: IT BORDERS ME! WHAT SHALL I DO?

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Objectives. To look for the impact of the diagnosis of epilepsy in daily life, to look how children deal with the daily reality of epilepsy and to help them to live with it.
Methods. Children admitted at a third level referral epilepsy centre got several sessions observed and accompanied by a play therapist. Other children participate to a 'patient' group to talk and play about epilepsy in all its aspects.
Results. Playing is the language of children. By imagery interaction playing they tell their feelings, their frustrations about the consequences of having epilepsy. It is also a mean to help the children to regain control about their life. Painting is another way to show what epilepsy, what a seizure means for them. In the 'patient' group they can be themselves, they share their feelings before and after a seizure; they understand each other.
Conclusions. More attention should be given to the influence of a seizure on a child, to the importance of the restrictions due to the epilepsy. Children don't want to be an exception. They don't like the control of the adult. Besides the lack of independence the unexpected occurrence of a seizure is the most difficult aspect; they cannot trust their own body.

P161.

COORDINATING CARE FOR CHILDREN WITH DISABILITIES IN HOSPITAL

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Objectives. In 2004 the author was awarded a Winston Churchill Travelling Fellowship to research how care is co-ordinated for children with disabilities in hospital in Sweden, Finland and Canada. The objectives of the study were: i) To compare models of good practice in children's hospitals in Canada, Finland and Sweden; ii) To identify how care is integrated and co-ordinated in hospital, and between hospital and the community. Disabled children are frequent visitors to hospitals both as inpatients and outpatients. They can be faced with a range of different professionals, services and agencies which can be daunting to the children and their families. Children with disabilities have the same right to high quality services as their able bodied peers and services should reflect their particular needs.
Methods. Ten children's hospitals were visited, 5 in Canada, 2 in Sweden and 3 in Finland. The hospitals were chosen to represent different populations and where there was good practice. Contact was made with a lead professional or service manager in each hospital who co-ordinated the visit. Each hospital offered a different programme which enabled a range of different services to be observed and the opportunity to meet with a wide range of professionals and some families.
Results. The main themes which contributed significantly to well co-ordinated care were: i) Family Centred Care: clear vision for family centred care across both acute and community services; parents/user representation on child health planning teams; needs led clinics for families; a family journal for each child who has regular admissions to hospitals; co-ordinator or key worker as a point of contact for families; annual multi disciplinary reviews with a family plan; training for all staff on the needs of children with special needs; awareness of child centred environmental issues in wards and clinics. ii) Team working: multidisciplinary teams with a shared vision; clear roles and responsibilities for team members; team co-ordinator; commitment to team development and training. iii) Liaison between acute and community teams: agreed protocols between tertiary, secondary and primary care teams for both pre admission and discharge planning; joint training for all teams including contributions from parents; provision of special equipment needs when a child is discharged from a regional centre.
Acknowledgements. Winston Churchill Memorial Trust for funding this travel fellowship. Janeway Children's Hospital, St John's, Newfoundland, Canada IWK Children's Hospital, Halifax, Nova Scotia, Canada. Children's Hospital of Western Ontario, London, Canada. McMaster Children's Hospital, Hamilton, Ontario, Canada. The Hospital for Sick Children, Toronto, Ontario, Canada. Queen Silvia's Hospital, Göteburg, Sweden. Astrid Lindgren Children's Hospital, Stockholm, Sweden. Päijät-Häme Central Hospital, Lahti, Finland. Karelia Central Hospital, Joensuu, Finland. Department of Paediatric Neurology, Tampere University Hospital, Finland.

P162.

PERSONAL RESUSCITATION PLANS IN CHILDREN WITH LIFE LIMITING CONDITIONS

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Objective. The Association for Children with Life-Threatening or Terminal Conditions and their Families (ACT) care pathway suggests all children in the end phase of a life-limiting condition should have a personal resuscitation plan (PRP) as part of their end of life plan. A standard PRP form is used locally and copied to families and appropriate professionals. We aimed to audit the use of the recently developed PRPs in a population of children with life-limiting conditions (LLCs) and neurodisabilities.
Methods. The community children's nursing team identified all children on their case load at the end stage of a LLC/having life threatening events. This team serves children with neurodisabilites and nursing needs in a population of 600,000 (150,000 children). All PRPs were reviewed by one author.
Results. 15 children (5 female) had severe cerebral palsy (6), neurodegenerative disease (9), with median age 10 years (range: 1.3-18.5 years). 6/15 had PRPs, for the past median time 9 months (range: 1-21 months). Two plans had changed significantly following a change in each child's medical condition. The level of support agreed with families was: suction/oxygen for comfort only (2); basic life support including mouth to mouth or bag and mask ventilation (2); full cardiopulmonary resuscitation including intubation, cardiac compressions and advanced life support (2). Four children also had rescue anticonvulsant regimes. All the plans included ambulance to the local Emergency Department if symptoms were not controlled in the community. The medical advisor for the local ambulance control reproduced the PRPs on ambulance service headed note paper. The parents/guardians feelings when developing the PRPs was recorded: 'it was very upsetting, but glad it was done' (3); 'it was ok, did not mind' (3). Nurses wanted all 15 to have PRPs but the lead paediatricians had to decide when and how to raise the issue with families. In addition 2 children with PRPs died recently: 1 family choosing hospital, the other home for their child's last illness.
Conclusions. The PRPs are flexible and acceptable when offered to families. Not all eligible families are currently being offered a discussion about PRPs. Further audit of their application, usefulness and acceptability is under way.

P163.

AN AUDIT TOOL FOR CHILDREN'S PALLIATIVE CARE: A PILOT

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Objective. Death, especially of a child, is a very sensitive issue professionals have been reluctant to measure the outcomes of palliative care from the bereaved's point of view. The Royal College of Paediatrics and Child Health (RCPCH) and Association for Children with Life-Threatening or Terminal Conditions and their Families (ACT) have published a number of recommendations for children's palliative care services. We aimed to develop and pilot a questionnaire for bereaved parents and carers to assess the quality of the palliative care experienced.
Methods. This survey of parents/carers experiences of their child's palliative care was registered with the Trust's Clinical Audit Department. A literature review and discussions with colleagues led to us piloting a first draft Bereavement Questionnaire in selected bereaved families 2 to 24 months after the loss of their child. The questionnaire includes a section on how the questionnaire itself was to fill in and whether this kind of audit should be undertaken.
Results. The questionnaire was modified after the first 3 assessments, undertaken by the paediatrician known well to the bereaved. A further 4 families have been assessed. The main themes focused on preparation for the death, autonomy and empowerment of the family and child, symptom control, and what happened after the death. Although several families found the questionnaire hard or upsetting, all so far were positive about the experience and thought it was a good idea. More families are currently being surveyed.
Conclusions. It is possible to audit directly the bereaved parents/carers views of the palliative care their child received. Preliminary data from selected families suggests they can view this positively. Further families responses and views will be elicited before the questionnaire is used routinely, e.g. at bereavement counseling and follow-up visits.