



Neurophysiology

Guest Editor



Jesús Pastor

Clinical Neurophysiology, Hospital Universitario de La Princesa, Madrid, Spain

jesus.pastor@salud.madrid.org



Dra. Lorena Vega-Zelaya

Clinical Neurophysiology, Hospital Universitario de La Princesa, Madrid, Spain

lorenacarolina.vega@salud.madrid.org

Message from the Guest Editor

Dear Colleagues,

Neurophysiology is defined as a branch of physiology and neuroscience that is concerned with the study of the functioning of the nervous system. This implies a multilevel approach, covering from microscopic systems (e.g, functioning of ionic channels) to macroscopic ones (e.g, neural networks from the whole brain). Obviously, physiological knowledge is a goal in itself but, moreover, is the previous step to knowledge patho-physiological functioning in human illnesses. This is the justification that Clinical Neurophysiology, in spite of the word, will be addressed to study pathologies (not just physiology) affecting the nervous system.

In recent years, the results obtained by the diverse branches of Neurophysiology (which in broad sense obviously includes the clinical aspect) have been incremented in number and quality. As examples necessarily short, the improvement of technical and numerical methods to sorting cellular recordings have allowed recording more and more neurons simultaneously, identifying its role in emotional or cognitive functions. In a complementary way, in silico simulations from small number of neurons to extensive networks have delimited and defined better possible new experiments.

Also in clinical neuroscience, advances have been amazing. Multisite recordings during Deep Brain Stimulation (DBS) surgery have allowed knowing better the pathological functioning of basal ganglia illnesses (e.g, Parkinson or Huntington's disease, dystonias, or cognitive pathologies) or epilepsy.

Numerical methods are daily applied to conventional recordings as EEG, increasing its diagnosis power in cognitive pathologies (e.g, dementias, aphasias), or encephalopathy, among several other



diseases. The EEG monitoring in intensive care unit patients will allow to detect and treat early several pathological conditions of extremely high prevalence, as stroke, brain trauma or status epilepticus.

Related techniques that have been benefited by improvement of technology and numerical methods permit to implant close-loop devices in several patients during long lasting periods to obtain electrical information and deliver drugs or current to alleviate or avoid pathological conditions.

Meanwhile, some other fields continue a constant development as the application of echography to electromyography or electroneurography. Another relevant example is the constant refinement of sleep stages definition, the use of new numerical methods for staging or the description of new pathologies.

Application of Artificial Intelligence and big data methods can too signify a revolution on the view we have of old pathologies.

In this Special Issue, we aim to collect Original Research and Review articles focusing on novel methods related to Neurophysiology in broad sense, including better, more efficient and less patient-disturbing methods. We hope this Special Issue will contribute to new and further insight in human pathologies affecting the nervous system, much of them between those of special social-economical burden for National Health Systems systems and patient-devastating.

Dr. Jesús Pastor and Dra. Lorena Vega-Zelaya

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Contact us: Front.Biosci.Landmark@fbscience.com