TCT 2010: Clinical Trials Focus on Device-Based Therapies for Cardiovascular Disease

Highlights From the 22nd Annual Transcatheter Cardiovascular Therapeutics Scientific Symposium, September 21-25, 2010, Washington, DC

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Key words: Transcatheter aortic valve implantation • Stent thrombosis • Next-generation drug-eluting stent • Bare metal stent • In-stent restenosis

The annual Transcatheter Cardiovascular Therapeutics (TCT) symposium is the world's foremost meeting emphasizing late-breaking trials, peer-reviewed clinical science, and live cases focusing on lesser invasive therapies for coronary artery disease, peripheral vascular disease, and structural heart disease. The conference enables interventional cardiologists, cardiac surgeons, and vascular medicine specialists to incorporate the most recent advances in minimally invasive techniques for treating cardiovascular (CV) disease into their everyday practices. Here we review many of the important, late-breaking trials presented at TCT 2010. These findings span a wide range of clinical indications, from percutaneous valve placement for patients with inoperable aortic stenosis to current and future drug-eluting stents (DES) for coronary artery disease.

Reviewed by Jason Kahn, MA, Gregg W. Stone, MD, Gary S. Mintz, MD, Caitlin E. Cox, MA, Kim Dalton, MA, Laura A. McKeown, BA, Martin B. Leon, MD, Columbia University Medical Center, and the Cardiovascular Research Foundation, New York, NY.

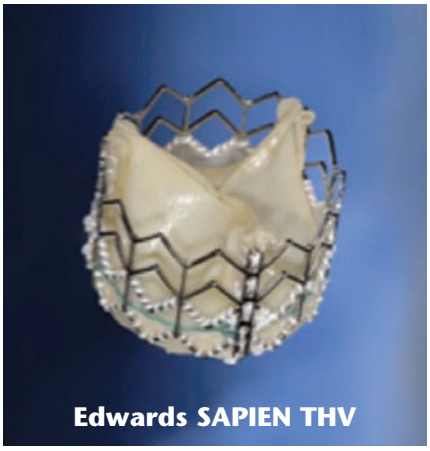
Transcatheter Valve Therapy

PARTNER

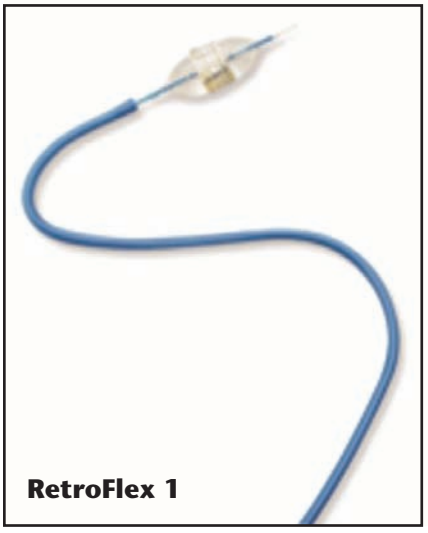
Setting a new standard of care for patients with inoperable aortic stenosis, results from the PARTNER (Placement of Aortic Transcatheter Valves) trial demonstrated statistically significant reductions in all-cause and CV mortality with transcatheter aortic valve implantation (TAVI) using the SAPIEN heart valve system (Edwards Lifesciences, Irvine, CA) compared with standard therapy in patients who are not candidates for surgical therapy (Figure 1).

Martin B. Leon, MD, of Columbia University Medical Center (New York, NY), presented the results of PARTNER, which randomized 358 patients with severe aortic stenosis and cardiac symptoms who were unable to undergo surgery to TAVI (n = 179) or standard therapy (n = 179). The latter consisted of medical therapy, conservative care, and/or balloon aortic valvuloplasty.

Inclusion criteria for the trial were 1) severe calcific aortic stenosis defined as echocardiography-derived valve area of < 0.8 cm^2 (effective orifice area index < 0.5 cm^2), and mean gradient > 40 mm Hg or jet velocity



23 mm and 26 mm valve sizes



22F and 24F sheath sizes

Figure 1. *Study devices used in the PARTNER (Placement of Aortic Transcatheter Valves) trial. THV, transcatheter heart valve. The Edwards SAPIEN THV and RetroFlex 1 are manufactured by Edwards Lifesciences (Irvine, CA).*

> 4.0 m/s; 2) New York Heart Association [NYHA] functional class II or greater; and 3) risk of death or serious irreversible morbidity > 50% as assessed by a cardiologist and 2 surgeons.

At 30 days, there were no significant differences in either all-cause mortality (5.0% vs 2.8%; $P = .41$) or CV mortality (4.5% vs 1.7%; $P = .22$) with TAVI-treated subjects when compared with control subjects, respectively.[1] At 1 year, however, patients who underwent TAVI demonstrated a significant reduction in all-cause mortality compared with those who received standard therapy (30.7% vs 50.7%; $P < .0001$). The number needed to treat with TAVI to prevent 1 death was 5 patients (Figure 2). The coprimary composite endpoint of all-cause mortality and repeat hospitalization also markedly favored the TAVI arm, as did several other 1-year outcomes (Table 1).

The number needed to treat to prevent the coprimary endpoint was 3.4. For CV mortality and the composite endpoint of mortality and stroke, the numbers needed to treat were 4.1 and 5.5, respectively. Among survivors at 1 year, the rate of cardiac symptoms (NYHA class III or IV) was lower among patients who had undergone TAVI than among those who had received standard therapy (25.2% vs 58.0%; $P < .001$). Furthermore, the 6-minute walking distance improved significantly only in the TAVI arm, which was statistically significant (baseline, 73 m vs 1 year, 120 m; $P = .002$).

Major vascular complications were higher at 30 days for TAVI than for standard therapy (16.2% vs 1.1%; $P < .0001$), as was the frequency of major bleeding episodes (16.8% vs 3.9%; $P < .0001$). The frequency of major strokes also tended to be higher at 30 days in the TAVI arm compared with standard therapy (5.0% vs 1.1%; $P = .06$), and the rate of major or minor stroke was increased with TAVI at 30 days (6.7% vs 1.7%; $P = .03$).

Second- and Next-Generation Stents

SPIRIT IV, COMPARE

Two late-breaking clinical trials at TCT 2010 demonstrated that the everolimus-eluting XIENCE V® (Abbott Vascular, Abbott Park, IL) stent produces superior and lasting benefits over the standard paclitaxel-eluting TAXUS® Express™ and Liberté® stents (Boston Scientific, Natick, MA).

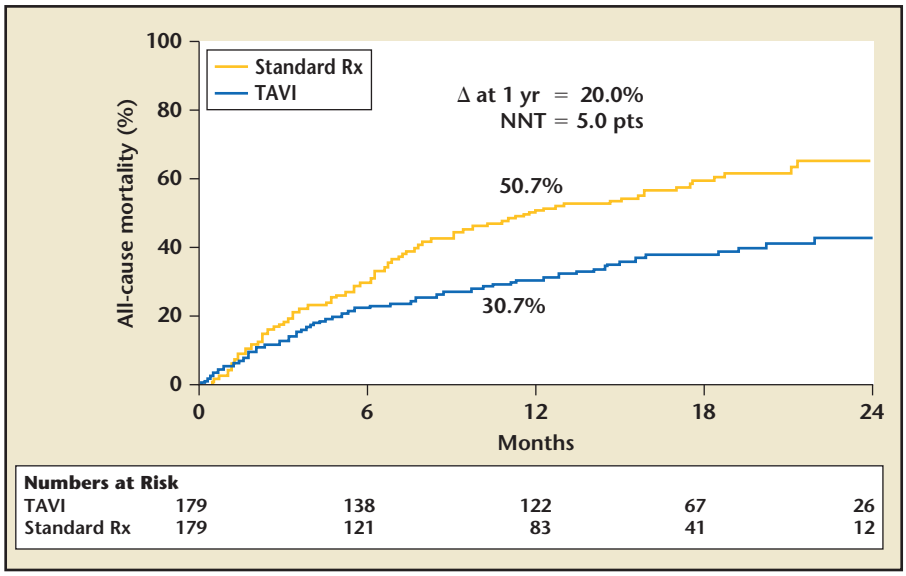


Figure 2. *All-cause mortality over 24 months in the PARTNER (Placement of Aortic Transcatheter Valves) trial. NNT, number needed to treat; Rx, therapy; TAVI, transcatheter aortic valve implantation. Data from Leon MB et al.*[1]

Table 1
PARTNER, Outcomes at 1-Year

	TAVI (%)	Standard Therapy (%)	*P* Value
All-cause mortality and repeat hospitalization	42.5	71.6	< .001
Cardiovascular mortality	20.5	44.6	< .001
Mortality and stroke	33.0	50.3	.001

PARTNER, Placement of Aortic Transcatheter Valves; TAVI, transcatheter aortic valve implantation.
Data from Leon MB et al.[1]

For the SPIRIT IV trial, Gregg W. Stone, MD, of Columbia University Medical Center (New York, NY), and colleagues randomized 3687 patients with mostly noncomplex coronary artery disease in patients with stable ischemic heart disease in a 2:1 ratio to treatment with the everolimus-eluting XIENCE V stent or the paclitaxel-eluting TAXUS Express stent.

At 1 year, the everolimus-eluting stent reduced the composite endpoint of target lesion failure (TLF; cardiac death, target-vessel myocardial infarction [MI], or ischemia-driven target lesion revascularization).[2] The newly presented results show that the positive outcomes continue from 1 to 2 years. Academic Research Consortium-defined definite or probable stent thrombosis rates also were substantially lower with the newer stent, and mortality rates were similar between groups (Table 2). Between 1 and 2 years, adverse event rates occurred at similar frequency with the 2 stent platforms.

The COMPARE trial, which involved 1800 patients, was performed at a single hospital and was meant to reflect what happens in the real world, said investigator Peter C. Smits, MD, PhD, of Maastad Ziekenhuis (Rotterdam, The Netherlands).

With few exclusion criteria, all patients eligible for percutaneous coronary intervention (PCI) were randomized to receive the XIENCE V stent (n = 897) or TAXUS Liberté (n = 903). Similar to the 1-year follow-up, the everolimus-eluting stent reduced the primary composite endpoint of major adverse cardiovascular events (death, nonfatal MI, and ischemia-driven target vessel revascularization [TVR]) plus nonfatal MI and TVR at 2 years (Table 3).[3] As in the SPIRIT IV trial, both groups had comparable death rates.

Patients randomized to everolimus-eluting stents compared with paclitaxel-eluting stents in the COMPARE trial had lower rates of stent thrombosis and other adverse ischemic events between 1 and 2 years, in contrast to the similar rates seen in SPIRIT IV after 1 year. Whether these differences are due to the higher rate of patients with acute coronary syndromes enrolled in COMPARE, or the fact that dual antiplatelet therapy at 2 years was used in approximately 70% of SPIRIT IV patients versus approximately 15% of COMPARE patients is unknown. In both trials, patients with diabetes failed to derive any extra benefit from the everolimus-eluting stent over the paclitaxel-eluting stent.

SORT-OUT IV

Although the superiority of the second-generation everolimus-eluting stent has now clearly been demonstrated compared with the first-generation paclitaxel-eluting stent in several large trials, prior to TCT the everolimus-eluting stent had not been directly compared with the sirolimus-eluting stent, which has greater antirestenotic potency than the paclitaxel-eluting stent.

Table 2
SPIRIT IV, Outcomes at 2 Years

	XIENCE V (%)	TAXUS® Express™ (%)	HR (95% CI)	*P* Value
TLF	6.9	9.9	0.70 (0.55-0.89)	.003
TLR	4.5	6.9	0.66 (0.50-0.88)	.004
MI	2.5	3.9	0.64 (0.44-0.94)	.02
Stent thrombosis	0.42	1.23	0.36 (0.17-0.79)	.008
Death	2.0	2.7	0.79 (0.51-1.23)	.30

CI, confidence interval; HR, hazard ratio; MI, myocardial infarction; TLF, target lesion failure; TLR, target lesion revascularization.
TAXUS® Express™ is manufactured by Boston Scientific (Natick, MA). XIENCE V is manufactured by Abbott Vascular (Abbott Park, IL).
Data from Stone GW.[2]

Table 3
COMPARE, Outcomes at 2 Years

	XIENCE V (%)	TAXUS® Liberté® (%)	HR (95% CI)	*P* Value
MACE	9.0	13.7	0.66 (0.50-0.86)	.0016
MI	3.9	7.6	0.52 (0.35-0.77)	.0009
TVR	3.1	7.7	0.40 (0.25-0.61)	< .0001

CI, confidence interval; HR, hazard ratio; MACE, major adverse cardiovascular events; MI, myocardial infarction; TVR, target vessel revascularization.
TAXUS® Liberté® is manufactured by Boston Scientific (Natick, MA). XIENCE V is manufactured by Abbott Vascular (Abbott Park, IL).
Data from Smits PC.[3]

In the all-comers SORT-OUT IV (Scandinavian Organization of Randomized Trials with Clinical Outcome) trial, presented by Lisette Okkels Jensen, MD, PhD, of Odense University Hospital (Odense, Denmark), 2774 patients with coronary artery disease were randomly assigned to PCI with an everolimus-eluting stent (n = 1390; XIENCE V) or a sirolimus-eluting stent (n = 1384; CYPHER [Cordis Corp., Miami Lakes, FL]).

At 9 months, rates of the composite endpoint of cardiac death, MI, definite stent thrombosis, or clinically driven TVR (the primary endpoint) were low and similar: 4.9% for the everolimus group and 5.2% for the sirolimus group.[4] The second-generation everolimus-eluting stent met the criteria for noninferiority to the sirolimus-eluting stent ($P = .01$).

There was no difference between the 2 arms for most secondary outcomes. Of note, however, are the low event rates in both arms, precluding power to demonstrate clinically meaningful differences between the 2 stents. However, definite stent thrombosis was less with the everolimus-eluting stent compared with the sirolimus-eluting stent (Table 4).

ISAR-TEST 4

A secondary analysis from ISAR-TEST 4 (Intracoronary Stenting and Angiographic Results: Test Efficacy of 3 Limus-Eluting Stents) focusing on the main trial's permanent-polymer DES arm was presented by Robert A. Byrne, MB, BCh, of the Deutsches Herzzentrum (Munich, Germany). In the substudy, 1304 patients with de novo coronary artery stenosis ≥ 50 and symptoms or objective evidence of ischemia were randomly assigned to PCI with everolimus-eluting stents (n = 652) or sirolimus-eluting stents (n = 652). A unique aspect of this trial was the performance of angiography at both 6 to 8 months and 2 years in a large proportion of patients.

At 2 years, there was no difference between the groups for the primary endpoint (a composite of cardiac death, target vessel-related MI, or target lesion revascularization [TLR]).[5] In addition, rates of all-cause death, definite or probable stent thrombosis, and TLR were similar. A strong trend was present for less TLR with the everolimus-eluting stent (Table 5).

Late lumen loss was comparable at both 6 to 8 months (0.14 ± 0.41 mm for everolimus vs 0.17 ± 0.33 mm for sirolimus; $P = .15$) and at 2 years (0.29 ± 0.51 mm for everolimus vs 0.31 ± 0.58 mm for sirolimus; $P = .59$), although some late catch-up was observed in both arms. However, binary restenosis was lower in the

Table 4
SORT-OUT IV, Outcomes at 9 Months

	Everolimus-Eluting Stents (%) (n = 1390)	Sirolimus-Eluting Stents (%) (n = 1384)	HR (95% CI)	*P* Value
Cardiac death	1.9	1.4	1.35 (0.76-2.40)	.31
MI	1.1	1.4	0.79 (0.40-1.55)	.48
Definite stent thrombosis	0.1	0.7	0.22 (0.05-1.02)	.05
TVR	2.8	3.5	0.81 (0.53-1.23)	.32
TLR	1.4	1.7	0.87 (0.48-1.58)	.64

CI, confidence interval; HR, hazard ratio; SORT OUT IV, Scandinavian Organization of Randomized Trials with Clinical Outcome; MI, myocardial infarction; TVR, target vessel revascularization; TLR, target lesion revascularization.
Data from Jensen LO.[4]

Table 5
ISAR-TEST 4, Outcomes at 2 Years

	Everolimus-Eluting Stents (%) (n = 652)	Sirolimus-Eluting Stents (%) (n = 652)	RR (95% CI)	*P* Value
Cardiac death, target vessel-related MI, TLR	16.0	18.8	0.85 (0.65-1.11)	.23
All-cause death	6.4	6.7	0.93 (0.61-1.43)	.75
Definite/probable stent thrombosis	1.4	1.9	0.75 (0.32-1.78)	.52
TLR	9.9	13.5	0.73 (0.52-1.01)	.06

CI, confidence interval; ISAR-TEST 4, Intracoronary Stenting and Angiographic Results: Test Efficacy of 3 Limus-Eluting Stents; RR, relative risk; MI, myocardial infarction; TLR, target lesion revascularization.
Data from Byrne RA.[5]

everolimus group than in the sirolimus group (12.7% vs 16.9%; $P = .03$), underlying the lower rate of TLR observed with the everolimus-eluting stent.

Thus, although SORT OUT IV and ISAR-TEST 4 suggest small benefits of the everolimus-eluting stent compared with the sirolimus-eluting stent, much larger trials would be required to definitively evaluate these differences.

Next-Generation DES

ISAR-TEST 5

A polymer-free, rapamycin/probucol-eluting "Dual-DES" stent is noninferior to the permanent polymer-based zotarolimus-eluting stent with regard to hard clinical endpoints and angiographic parameters out to 12 months, according to results of ISAR-TEST 5 (Intracoronary Stenting and Angiographic Results: Test Efficacy of Rapamycin/Probucol- and Zotarolimus-Eluting Stents 5).

The Translumina® (Hechingen, Germany) Dual-DES consists of a microporous, thin-strut stainless steel platform coated with a resin-based mix of rapamycin and probucol. The comparator was the zotarolimus-eluting stent (Endeavor® Resolute; Medtronic, Minneapolis, MN) with a durable polymer on a cobalt-chromium alloy platform.

For this all-comers trial, 3002 patients with symptomatic coronary artery disease and de novo lesions ≥ 50% were randomized in a 2:1 ratio to the Dual-DES (n = 2002) or the zotarolimus-eluting stent (n = 1000). Dual antiplatelet therapy was recommended for at least 6 months and aspirin indefinitely.

As reported by presenter Julinda Mehilli, MD, of the Deutsches Herzzentrum (Munich, Germany), at 1 year the Dual-DES and zotarolimus-eluting stents yielded nearly identical rates of the primary endpoint (composite of cardiac death, target vessel-related MI or TLR), meeting the criteria for noninferiority ($P = .0012$).[6] Rates of all-cause death, definite or probable stent thrombosis, cardiac death or MI, and TLR were similar between the 2 stent groups (Table 6).

On angiographic follow-up at 6 to 8 months (76% complete), the Dual-DES and zotarolimus groups showed comparable in-stent late lumen loss (0.31 mm vs 0.30 mm; $P = .62$) and in-segment binary restenosis (13.2% vs 13.5%; $P = .81$). There was no

Table 6
ISAR-TEST 5, Outcomes at 1 Year

	Dual-DES (%)	Zotarolimus-Eluting Stents (%)	RR (95% CI)	*P* Value
Cardiac death, target vessel-related MI, TLR	13.1	13.1	1.03 (0.80-1.31)	.83
All-cause death	3.6	4.4	0.82 (0.56-1.20)	.31
Definite/probable stent thrombosis	1.1	1.2	0.94 (0.45-1.84)	.91
Cardiac death or MI	4.1	4.4	0.94 (0.65-1.36)	.73
TLR	10.3	10.0	0.99 (0.80-1.23)	.94

CI, confidence interval; ISAR-TEST 5, Intracoronary Stenting and Angiographic Results: Test Efficacy of Rapamycin/Probucol- and Zotarolimus-Eluting Stents 5; MI, myocardial infarction; RR, relative risk; TLR, target lesion revascularization.
Data from Mehilli J.[6]

treatment interaction for the primary endpoint for any of the prespecified subgroups based on age, sex, presence of diabetes, and vessel size.

These data suggest promise for non–polymer-based DES. Of note, however, clinical advantages were not apparent for this device within the first year compared with the zotarolimus-eluting stent. Longer-term follow-up is necessary to determine whether the benefit of leaving behind a polymer-free bare metal stent might result in reduced rates of very late stent thrombosis.

Peripheral Stenting

Zilver PTX

In the Zilver® PTX™ (Cook Medical, Bloomington, IN) trial, patients with symptomatic disease of the femoropopliteal artery obtained improved patency and safety outcomes at 12 months after treatment with a dedicated polymer-free paclitaxel-eluting stent versus balloon angioplasty with provisional stenting, whether with the same DES or its bare-metal equivalent.

Investigators led by Michael D. Dake, MD, of the Stanford University School of Medicine (Stanford, CA), randomized 479 patients with symptomatic, above-the-knee femoropopliteal disease and Rutherford class ≥ 2 to treatment with the paclitaxel-eluting Zilver PTX stent (n = 241) or balloon angioplasty (n = 238). In the latter group, half of subjects had suboptimal angioplasty and thus underwent secondary randomization to provisional stenting with a Zilver PTX (n = 61) or BMS Zilver (n = 59). Apart from the presence or absence of paclitaxel, the 2 stents are identical.

Zilver PTX is a self-expanding nitinol stent specifically designed for the superficial femoral artery. It has a polymer-free paclitaxel coating (dose 3 μg/mm^2) on the abluminal side of the stent struts.

By 12 months, per-protocol analysis showed that Zilver PTX improved the primary safety endpoint of 12-month event-free survival from death, amputation, TLR, or worsening Rutherford score (by 2 classes or to class 5 or 6) compared with angioplasty (90.4% vs 82.6%; $P < .01$).[7] The difference began to emerge at approximately 6 months. Stent fractures were strikingly uncommon in both Zilver PTX and BMS patients at an overall rate of 0.9% through 12 months, and none resulted in clinical sequelae.

Based on intention to treat, the primary efficacy endpoint of 12-month primary patency on duplex ultrasonography (peak systolic velocity ratio < 2.0) or angiography if available (diameter stenosis < 50%) was higher for Zilver PTX than for angioplasty. Patency was slightly improved in the subgroup of patients who had optimal angioplasty but still worse than in Zilver PTX-treated patients. Those who underwent standard care—angioplasty with provisional BMS—also had significantly poorer patency rates consistent with a 49% relative reduction in restenosis with the Zilver PTX (Table 7).

To examine the drug effect, the researchers performed a head-to-head comparison of secondary randomization to provisional stenting with Zilver PTX or BMS and found 12-month patency rates of 89.9% and 73.0%, respectively ($P = .01$). This represents a 63% relative reduction in restenosis with the DES compared with the otherwise identical BMS.

Although longer-term follow-up and greater review of the study details are required, these data suggest that the Zilver PTX DES might play an important role in the treatment of patients with superficial femoral artery disease.

MI Patients

HORIZONS-AMI

New results from the HORIZONS-AMI (Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction) trial show that 3 years after ST-segment elevation MI (STEMI), patients who underwent angioplasty with paclitaxel-eluting stents while anticoagulated with bivalirudin have superior outcomes than patients treated with BMS and heparin plus a glycoprotein IIb/IIIa inhibitor (GPI). Gregg W. Stone, MD, presented these findings from the trial's final report.

HORIZONS-AMI compared bivalirudin to heparin plus a GPI in

Table 7
Efficacy Based on Intention-to-Treat

	12-Month Patency (%)	*P* Value Versus Zilver PTX
Zilver PTX	83.1	–
Angioplasty	32.9	< .01
Optimal angioplasty only	65.3	< .01
Optimal angioplasty or suboptimal angioplasty + BMS	67.0	< .01

BMS, bare metal stent.
Zilver® PTX™ is manufactured by Cook Medical (Bloomington, IN).
Data from Dake MD.[7]

Table 8
HORIZONS-AMI, 3-Year Outcomes for Drug Arm

	Bivalirudin (%)	Heparin + GPI (%)	*P* Value
Major bleeding	6.9	10.5	< .001
Reinfarction	6.2	8.2	.04
Cardiac mortality	2.9	5.1	.001
All-cause mortality	5.9	7.7	.03

HORIZONS-AMI, the Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction; GPI, glycoprotein IIb/IIIa inhibitor.
Data from Stone GW.[8]

3602 STEMI patients. Of these patients, 3006 were randomly assigned to either paclitaxel-eluting TAXUS stents or bare-metal Express stents.

In the trial's drug arm, bivalirudin significantly reduced the likelihood of non-coronary artery bypass graft major bleeding by 36%, reinfarction by 24%, cardiac mortality by 44%, and all-cause mortality by 25% at 3-year follow-up (Table 8).[8] The bivalirudin and heparin plus GPI arms had comparable rates of TVR and stroke. Three-year rates of Academic Research Consortium-defined definite or probable stent thrombosis were also not significantly different between the 2 groups at 4.5% and 5.1%, respectively.

In the stent analysis, TAXUS-treated patients (n = 2257) experienced a 40% reduction in ischemic TLR compared with Express BMS-treated patients (n = 749). However, routine angiographic follow-up at 13 months in a significant proportion of patients in this trial may have exaggerated the benefits of paclitaxel-eluting stents. Among the subset of 1802 patients who did not undergo routine angiographic follow-up, ischemic TLR was 33% less likely with TAXUS (Table 9), representing an absolute risk reduction of 4% (number needed to treat to prevent 1 TLR = 25). Rates of all-cause mortality, cardiac mortality, reinfarction, stroke, and stent thrombosis were comparable between the 2 groups.

Examining all 4 drug/device combinations, the lowest mortality at 3 years was observed in the bivalirudin and paclitaxel stent group, which had an all-cause death rate of 4.9%.

In-Stent Restenosis

CRISTAL

The optimal management for DES restenosis is unknown. The CRISTAL (Intra-Drug Eluting Stent [DES] Restenosis Study) trial studied treatment with sirolimus-eluting stents versus percutaneous transluminal coronary angioplasty (PTCA) in 240 patients with in-stent restenosis in a

Table 9
HORIZONS-AMI, 3-Year Outcomes for Stent Arm

	TAXUS DES (%)	Express® BMS	*P* Value
TLR	9.4	15.1	< .001
TLR: no routine angiography	8.7	12.7	.01

BMS, bare metal stent; DES, drug-eluting stent; HORIZONS-AMI, the Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction; TLR, target lesion revascularization.
TAXUS® and Express™ are manufactured by Boston Scientific (Natick, MA).
Data from Stone GW.[8]

Main Points

- The PARTNER (Placement of Aortic Transcatheter Valves) trial demonstrated statistically significant reductions in all-cause and cardiovascular mortality with transcatheter aortic valve implantation when compared with standard therapy in patients who are not candidates for surgical therapy.
- Two late-breaking clinical trials demonstrated that the everolimus-eluting stent produces superior and lasting benefits over the standard paclitaxel-eluting stent. Patients randomized to the everolimus-eluting stent had lower rates of stent thrombosis and other adverse ischemic events between 1 and 2 years when compared with patients receiving paclitaxel-eluting stents.
- Recent data hold promise for non–polymer-based drug-eluting stents; however, longer-term follow-up is necessary to determine whether leaving behind a polymer-free bare metal stent might show benefit in reducing very late stent thrombosis.

Table 10
CRISTAL, Angiographic Endpoints

mm	CYPHER (mm) (n = 136 Patients) (n = 141 Lesions)	PTCA (n = 61 Patients) (n = 61 Lesions)	*P* Value
Acute gain	1.39 ± 0.52 (92)	0.90 ± 0.57 (46)	< .0001
Follow-up MLD	2.14 ± 0.62 (104)	1.71 ± 0.55 (44)	< .0001
Late lumen loss	0.37 ± 0.57 (104)	0.41 ± 0.63 (42)	.73
Net gain	1.07 ± 0.69 (74)	0.49 ± 0.67 (35)	< .0001

CRISTAL, Intra-Drug Eluting Stent (DES) Restenosis Study; MLD, minimum lumen diameter; PTCA, percutaneous transluminal coronary angioplasty.
CYPHER® is manufactured by Cordis Corp. (Miami Lakes, FL).
Data from Chevalier BR.[9]

sirolimus-eluting CYPHER stent or paclitaxel-eluting TAXUS stent.

Researchers led by Bernard R. Chevalier, MD, of Institut Cardiovasculaire Paris Sud (Massy, France), found no difference between the repeat stent group versus the PTCA group in the primary endpoint of in-stent late lumen loss (0.37 ± 0.57 vs 0.41 ± 0.63; $P = .73$).[9] According to Dr. Chevalier, this outcome may have been the result of choosing the wrong primary endpoint and it is likely that postballoon recoil acted as a confounding factor in the primary-endpoint analysis.

In addition, although there was no difference between the groups in preprocedural minimum lumen diameter (MLD), the repeat stent group had much higher postprocedural MLD, follow-up MLD, acute gain, and net gain (Table 10).

The researchers also noted a trend toward less clinically driven TLR in the sirolimus-treated patients compared with those who received PTCA (5.9% vs 13.1%; $P = .10$). The results were comparable whether CYPHER was used to treat in-stent restenosis in CYPHER or TAXUS stents. These results suggest repeat treatment with a sirolimus-eluting stent is associated with a better angiographic outcome at 1 year than repeat PTCA. A larger trial is required to determine if this benefit results in improved clinical outcomes. ■

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