TCT-564
Biodegradable-Polymer Biolimus Eluting Stents Show Better Anti-proliferative Efficacy And Vascular Healing Pattern Than Permanent-Polymer Paclitaxel Eluting Stents in a Preclinical Coronary Model
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Background: Second-generation drug eluting stents (DES) have shown a high efficacy in terms of restenosis prevention, like first-generation DES, with reduced rates of stent thrombosis, especially late stent thrombosis. The suggested mechanism for this superiority is a better morphological and functional healing response. The objective of this study is to compare the efficacy and safety results of 2 different, first and second-generation, DES in a swine model of normal coronary arteries.
Methods: In 9 domestic juvenile swine (25±3 kg), one stent per coronary artery was implanted with an intended stent-to-artery ratio 1.1±0.1. We used 9 bare metal stents (BMS), 9 permanent-polymer paclitaxel eluting stents (PES) and 9 biodegradable-polymer biolimus eluting stents (BES). Quantitative coronary angiography was performed after 28 days to assess the in-stent % stenosis and the endothelium-dependent vasomotor response of the distal vessel (Acetylcholine 10-6M). We performed morphometric analyses of the in-stent % area stenosis and the endothelialization rate (haematoxylin-eosin stain, extent of luminal surface coverage with endothelial cells) at 3 levels of each stent sample. The enOS+ endothelialization index measures the proportion of the whole luminal surface covered by enOS+ endothelial cells.
Results: All the stents were implanted as per-protocol, with a final stent:artery ratio 1.1±0.15. No baseline differences were observed between groups. The Table shows the restenosis and the functional healing parameters analyzed in each group.

<table>
<thead>
<tr>
<th></th>
<th>BES (%)</th>
<th>PES (%)</th>
<th>BMS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiographic diameter stenosis (%)</td>
<td>3±6</td>
<td>15±26</td>
<td>34±17</td>
</tr>
<tr>
<td>Histologic area stenosis (%)</td>
<td>23±10</td>
<td>36±21</td>
<td>37±15</td>
</tr>
<tr>
<td>Vasoconstrictor response (%)</td>
<td>+6±10</td>
<td>-7 ± 6</td>
<td>+</td>
</tr>
<tr>
<td>eNOS+ endothelialization index (%)</td>
<td>5±4</td>
<td>85±7</td>
<td>96±3</td>
</tr>
</tbody>
</table>

Conclusions: In this preclinical test, biodegradable-polymer biolimus eluting stents show a higher anti-proliferative effect than both bare metal and permanent-polymer paclitaxel eluting stents. The functional vascular healing pattern of biolimus eluting stents is similar to that observed in bare metal stents and better than that observed after paclitaxel eluting stents.

TCT-565
NOYA I: A Prospective Randomized Trial of the Biodegradable Polymer NOYA Sirolimus-Eluting Stent Compared with the Durable Polymer FIREBIRD 2 Sirolimus-Eluting Stent in Patients with Coronary Artery Disease: 9-Month Angiographic and 24-Month Clinical Results
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Background: Durable polymers potentially contribute to persistent inflammation, delayed endothelial healing, and late stent thrombosis after drug-eluting stent implantation. NOYA, a novel Cobalt-Chromium-based sirolimus-eluting stent (SES) with DL1 Polylactide biodegradable polymer (Medfavour Medical, Beijing, China). The present study aimed to evaluate the efficacy and safety of the NOYA stent in treating de novo coronary artery lesions.
Methods: NOYA I trial was designed to compare the NOYA stent with the FIREBIRD 2 stent, a durable polymer SES widely used in China (MicroPort Medical, Shanghai); the trial was a non-inferiority trial with a primary angiographic endpoint of in-stent late loss at 9 months. Subjects with maximum of two de novo native coronary lesions with DS% >= 70% by visual estimation (Age 18-75, lesion length <= 30mm, RVD 2.5-4.0mm) were enrolled. The secondary endpoints were binary restenosis rates at 9-month, major adverse cardiac events (MACE) defined as the composite of cardiac death, myocardial infarction (MI), or target lesion revascularization (TLR), and definite/probable stent thrombosis at 24-month.
Results: A total of 300 patients (n=150 in each group) were enrolled from 16 Chinese centers in the study. Baseline data and procedural results were comparable between the two groups. The 9-month angiographic follow-up rate was 84.7%. Angiographic late lumen loss at 9-month in the NOYA group was similar to the FIREBIRD 2 group (in-stent 0.11±0.20 mm vs. 0.13±0.19 mm, non-inferiority p<0.0001); in-segment binary restenosis rates were not significantly different (NOYA 4.2% vs. FIREBIRD 2 3.7% p=0.73). The rates of MACCE at 9-month, MI, TLR and stent thrombosis at 24 months were comparable (4.7% vs. 6.0%; 0 vs. 2.0%; 2.7% vs. 2.7%; 0 vs. 0.7%; respectively). Conclusions: The biodegradable polymer NOYA stent was non-inferior to the FIREBIRD 2 durable polymer stent with respect to the primary non-inferiority endpoint of in-stent late loss at 9-months. Clinical outcomes were comparable between the two stents at 24 months. (ClinicalTrials.gov Identifier: NCT01226355).

TCT-566
SYNERGY Biodegradable Polymer Everolimus Eluting Coronary Stent: Porcine Vascular Compatibility and Polymer Safety Study
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Background: This study evaluated the porcine vascular response to the SYNERGY stent which utilizes a novel Platinum Chromium alloy Element platform with everolimus delivered abuminally from a polylactide-co-glycolide biodegradable polymer. Methods: The study total of 299 coronary arteries in 102 swine were implanted at a targeted stent-to-artery ratio of 1.1:1 with similar number of devices in each group (n= 5-9) and later explanted for pathological analysis. SYNERGY was compared to SYNERGY1xPolymerOnly, BareMetalSYNERGY and BareMetalOMEGA at 5, 28, 90, 180 and 270 days in single stent configuration. In overlap configuration, SYNERGY was compared to SYNERGY1xPolymerOnly and BareMetalOMEGA at 5 and 90 days. A 3-fold greater mass of polymer per stent safety margin design compared SYNERGY3xPolymerOnly to SYNERGY1xPolymerOnly, BareMetalSYNERGY and BareMetalOMEGA at 5, 28, 60, 90, 120, 180 and 270 days.
Results: There was no cardiac mortality, stent thrombosis or myocardial infarction, and all stented vessels were patent on angiography and histology. None of the five unscheduled deaths were device related. Vascular response was similar among SYNERGY, both bare metal stents and SYNERGY3xPolymerOnly except that parastent fibrin was significantly (p<0.0001) higher at 28 days in single stents, and at 90 days (p<0.023) in overlapping stents, for SYNERGY, although never more than mild. Complete endothelialization of SYNERGY and SYNERGY1xPolymerOnly was found by SEM at 28 days. Inflammation was predominantly mild to mild for all device types and when severe, was limited to the early time points and showed a hypersensitivity pattern characteristic of the porcine model affecting all stent types except SYNERGY3xPolymerOnly. No severe inflammation was observed in any group after 90 days. No morphological parameter (e.g., endothelial cell coverage, luminal thrombus, inflammation, parastent fibrin) or morphometric parameter (e.g., area stenosis, EKL area) was significantly different between any of the device groups at 120, 180 or 270 days.
Conclusions: In porcine coronary arteries the SYNERGY stent, and its biodegradable polymer at 3x safety margin, demonstrated vascular compatibility similar to bare metal stent controls.

TCT-567
Long term Safety and Efficacy of Biodegradable Polymer-Coated Sirolimus-Eluting Stents in “Real-World” Practice: 5 year follow-up of the CREATE (multi-Center Registry of EXCEL Biodegradable Polymer Drug Eluting Stents) Study
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Background: It has been hypothesized that persistent presence of polymer may compromise the safety of drug-eluting stents, therefore drug eluting stent with biodegradable polymer coatings might reduce very late adverse events. This study aims to evaluate the 5-year safety and efficacy of a biodegradable polymer-coated sirolimus-eluting stent (Excel, JW Medical System, Weihai, China) with 6 months dual antiplatelet therapy in “real-world” patients.
Methods: Clinical outcomes were prospectively evaluated through 5 years in the CREATE study. A total of 2,077 patients, exclusively treated with Excel stents at 59 centers from 4 countries, were enrolled in this multicenter registry. Recommended antiplatelet regimen included clopidogrel and aspirin for 6 months followed by aspirin alone for chronic aspirin therapy. This trial is registered with ClinicalTrials.gov, number NCT00343787.
Results: Clinical follow up was completed in 1982 patients at 5 years (95.4%). MACE rates at 1 year, 2 years, 3 years, 4 years and 5 years were 2.61%, 3.44%, 4.47%, 5.21% and 7.47%, respectively. In the 5 years, the cumulative rate of overall stent thrombosis without the pre-defined ARC definite, probable and possible was 2.36%. Heart failure and diabetes were independent predictors of stent thrombosis in multivariate analysis (OR=3.478, 95%CI=1.830–6.610, P<0.01; OR=1.002, 95%CI=1.000–1.003, P=0.014).