Bioresorbable vascular scaffolds (BRS) have been shown to allow restoration of the treated segment’s plasticity and reactivity to those resembling a non-stented artery, a desirable feature unattainable with metallic stents (BMS). We have previously reported the dynamic changes in arterial geometry in response to a novel non-drug eluting BRS as compared to BMS up to 2 years. This study provides an insight over a 3-year duration.

**METHODS** Forty-seven coronary arteries of 19 swine received BRS (Amaranth Medical, Mountain View, CA; 2 Amaranth Medical, Inc., Mountain View, CA; 3 Columbia University Medical Center, New York, NY)

**RESULTS** The lumen areas of reference segments increased over time in both BMS-caged segments (Day 0 = 6.09±1.80 mm², 2 Years = 10.55±2.95 mm² and 3 Years = 13.58±3.23 mm², p < 0.05) and the BAS-treated arteries (Day 0 = 6.63±1.21 mm², 2 Years = 11.66±2.50 mm² and 3 Years = 13.87±2.75 mm², p < 0.05). In contrast, in BRS the early lumen area loss present at 1 month inverted into lumen gain that corresponded with the scaffold expansion as it degraded, paralleling the artery growth (scaffold area, Day 0 = 6.87±1.17 mm², 2 Years = 11.66±1.51 mm², and 3 years = 13.87±2.75 mm², p < 0.05) and allowing the treated segment to remodel (lumen area, Day 0 = 6.87±1.17 mm², 2 Years = 9.67±1.56 mm², and 3 years = 11.94±2.77 mm², p < 0.05). Figure 1: Area Stenosis did not show significant difference between BMS and BRS over time.

**CONCLUSIONS** Between 3 and 5 years after implantation, BRS treated coronary artery segments continue to positively remodel, with further late lumen area gain paralleling the reference segment expansion over time. This pattern, uniquely possible due to scaffold degradation and unattainable in the BMS-caged segments, appears to be a reproducible and inherent behavior of non-drug eluting bioresorbable stents in the normal porcine coronary model.

**CATEGORIES CORONARY:** Bioresorbable Vascular Scaffolds

**KEYWORDS** Bioresorbable scaffold, Remodeling

**TCT-S37**

**Three-Year Comparison of Vessel Remodeling Between a Novel Non-Drug Eluting Bioresorbable Sternal and Bare Metal Stent in Porcine Coronary Arteries**

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**BACKGROUND** Degradation of bioresorbable stents (BRS) has been shown to allow restoration of the treated segment’s plasticity and reactivity to those resembling a non-stented artery, a desirable feature unattainable with metallic stents (BMS). We have previously reported the dynamic changes in arterial geometry in response to a novel non-drug eluting BRS as compared to BMS up to 2 years. This study provides an insight over a 3-year duration.

**METHODS** Forty-seven coronary arteries of 19 swine received BRS (Amaranth Medical, Mountain View, CA; n = 34) or BMS (Liberte® Boston Scientific, Natick, MA; n = 13). Optical coherence tomography (OCT) was done at day 0, 1 month (BRS, n = 26; BMS, n = 13), 1 year (BRS, n = 12; BMS, n = 4), 2 years (BRS, n = 13; BMS, n = 4) and 3 years post implant (BRS, n = 11; BMS, n = 3).

**RESULTS** The lumen areas of reference segments increased over time in both BMS-caged segments (Day 0 = 6.09±1.80 mm², 2 Years = 10.55±2.95 mm² and 3 Years = 13.58±3.23 mm², p < 0.05) and the BAS-treated arteries (Day 0 = 6.63±1.21 mm², 2 Years = 11.66±2.50 mm² and 3 Years = 13.87±2.75 mm², p < 0.05). In contrast, in BRS the early lumen area loss present at 1 month inverted into lumen gain that corresponded with the scaffold expansion as it degraded, paralleling the artery growth (scaffold area, Day 0 = 6.87±1.17 mm², 2 Years = 11.66±1.51 mm², and 3 years = 13.87±2.75 mm², p < 0.05) and allowing the treated segment to remodel (lumen area, Day 0 = 6.87±1.17 mm², 2 Years = 9.67±1.56 mm², and 3 years = 11.94±2.77 mm², p < 0.05). Figure 1: Area Stenosis did not show significant difference between BMS and BRS over time.

**CONCLUSIONS** Between 3 and 5 years after implantation, BRS treated coronary artery segments continue to positively remodel, with further late lumen area gain paralleling the reference segment expansion over time. This pattern, uniquely possible due to scaffold degradation and unattainable in the BMS-caged segments, appears to be a reproducible and inherent behavior of non-drug eluting bioresorbable stents in the normal porcine coronary model.

**CATEGORIES CORONARY:** Bioresorbable Vascular Scaffolds

**KEYWORDS** Bioresorbable scaffold, Remodeling

**TCT-S36**

**Neointimal Response to Everolimus-Eluting Bioresorbable Scaffolds Implanted at Bifurcation Coronary Segments: Insights from Optical Coherence Tomography**

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**BACKGROUND** Tissue formation at coronary bifurcations is related to vascular endothelial shear stress, and postmortem pathological studies have described different patterns of neointimal coverage between the outer wall and inner wall at coronary bifurcations treated with first-generation drug-eluting stents (DES). Current everolimus-eluting bioresorbable scaffolds (BRS) have thicker struts compared to their metallic counterparts, and could therefore have a stronger influence on vascular endothelial shear stress compared to DES. However, the neointimal coverage of bifurcation lesions treated with BRS has not been adequately studied. In the current study, we sought to evaluate the vascular response to BRS struts deployed at bifurcation segments using optical coherence tomography (OCT).

**METHODS** This study included 37 patients (51 bifurcation lesions) examined with coronary angiography including OCT 11.0 ± 2.1 months after BRS implantation. Cross-sectional area (CSA) of the bifurcation lesion with a side branch more than 1 mm using OCT was analyzed every 200 μm. All images were divided into 3 regions according to the shear stress; one half of the circumference of the vessel opposite to the ostium (OO), the side branch ostium (SO), and the vessel wall adjacent to the ostium (AO). All struts in OO, AO, and SO regions were classified as covered or uncovered. The thickness of coverage was measured in each CSA, and the averaged neointimal thickness (NIT) was calculated. Additionally, to evaluate the impact of the side branch size on neointimal proliferation, we classified side branches according to the ratio of the diameter of the side branch ostium (DS) to the diameter of main branch (DM).

**RESULTS** The mean age of the study population was 57 ± 11 years. Mean BRS diameter and length were 3.1 ± 0.37 and 21.0 ± 5.7 mm, respectively. The mean diameter of all side branches was 1.55 ± 0.55 mm. Overall, there was a significant difference in NIT among the 3 examined regions (OO, 119 ± 68 vs. AO, 94 ± 35 vs. SO, 80 ± 41 μm, p = 0.03). In addition, a significant difference was observed in the percentage of uncovered struts among the 3 regions (OO, 0.43 vs. AO, 1.4 vs. SO, 4.8%, p = 0.02). Lesions were divided into 2 groups based on a median value of DS/DM of 0.318 (large ratio side branch group = LRSB, n = 26; and small ratio side branch group = SRSB, n = 25). In the LRSB group, there was a significant difference in NIT (OO, 128.61 ± 61 vs. AO, 91.3 ± 40 vs. SO, 8.03 ± 6.38 μm, p = 0.01) and the percentage of uncovered struts (OO, 0.38 vs. AO, 2.0 vs. SO, 8.7%, p = 0.01) between the 3 regions, but this was not observed in the SRSB group.

**CONCLUSIONS** Different patterns of neointimal coverage are observed between the outer wall and inner wall of coronary bifurcation lesions treated with everolimus-eluting BRS. Neointimal coverage is least at and adjacent to large side branches.