VISUALIZATION OF THE VASCULAR EFFECTS OF THE EVEROLIMUS-ELUTING BIORESORBABLE VASCULAR SCAFFOLD WITH IN VIVO OPTICAL COHERENCE TOMOGRAPHY AND HISTOLOGY TWO YEARS AFTER IMPLANTATION IN PORCINE CORONARY ARTERIES

i2 Poster Contributions
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Background: The objectives of this study were to compare in vivo OCT and histology, for the analysis of: (I) the strut area and thickness of the everolimus-eluting bioresorbable vascular scaffold (BVS), and (II) the neointimal hyperplasia (NIH) covering the endoluminal surface of struts (NIHES) and between the struts (NIHBS) at two (n=2), three (n=8) and four (n=12) years after implantation in porcine coronary arteries.

Methods: Three and four years after implantation struts were no longer detectable by OCT due to complete bioresorption. However, OCT imaging performed at two years still provides clear delineation of the preexisting struts. All BVS implanted arteries were evaluated by histology. Sixty corresponding polymeric struts were matched using landmarks (metallic markers) and evaluated both with OCT and histology by two independent observers for strut areas and thicknesses, NIHES and NIHBS.

Results: The median [IQR] strut areas by histology and OCT were 0.04 [0.04-0.06] and 0.02 [0.02-0.03] mm², respectively. The strut area by histology was 50% larger than by OCT. The limits of agreement (upper limit; lower limit) in the Bland-Altman analysis (BA) were [0.07: -0.01]. The mean (±SD) strut thickness by histology and OCT were 220±60 and 130±30 μm respectively, and the strut thickness was 41% larger by histology than by OCT. The limits of agreement in the BA were [220; -20]. The median [IQR] NIHES by histology and OCT was 0.07 [0.06-0.09] and 0.03 [0.03-0.05] mm², and was 57% larger by histology than by OCT. The limits of agreement in the BA were [0.10; -0.02]. The mean (±SD) NIHBS by histology and OCT, was 0.13 ± 0.07 and 0.10 ± 0.06 mm², and was 23% larger by histology compared to OCT. The limits of agreement in the BA were [0.21; -0.15]. Inter-observer variabilities for most parameters were good.

Conclusions: The present study demonstrates that in vivo OCT provides microscopic measurements comparable to quantitative histology and is reproducible for the evaluation of certain vascular and device-related structures. However, histology systematically gives larger values for all the measured structures compared to OCT, two years after implantation.