TCT-647
Two Year Follow Up Data of Orbital Atherectomy System for the Treatment of De Novo Calcified Coronary Lesions - A Single Center Experience
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Background: Coronary Artery Disease continues to be a widespread and growing problem worldwide. Performing PCI on calcified lesions can lead to higher MACE rates and stent under expansion/malapposition. The Orbit I trial was conducted to evaluate the safety and performance of the Diamondback 360 Orbital Atherectomy System (OAS) (Cardiovascular Systems, Inc., St. Paul, MN, USA) for the treatment of calcified coronary lesions.

Methods: From May 2008 to July 2008, a single-center subset of 33 non-consecutive patients from the ORBIT I study were enrolled at CIMS Hospital Pvt. Ltd., India based on several criteria, including a de novo, coronary lesion with stenosis ≥50% and ≤100% and at least one quadrant of calcification via IVUS. The patients were treated with OAS prior to stent placement. The safety endpoint was MACE rates, and patients were followed to two years at this center.

Results: Of the 33 patients, 90.90% (n=30/33) were male and the average age was 54.9 years. The ACC/AHA lesion class was: Type A 6.06% (n=2/33); Type B1 33.33% (n=11/33); Type B2 60.60% (n=20/33). The % diameter stenosis was 85.75%; lesion length was 15.90 mm. The procedural success was 97% (32/33) with one case where Periprocedural MI was observed in 2 patients and transient slow flow in 1 patient following ELCA. During follow-up, MACE occurred in 1 patient (5.5%) who underwent TLR.

Conclusion: The ELLEMENT study confirms the efficacy and reproducibility of OLA with contrast injection in improving stent underexpansion in unreattachable lesions.

TCT-648
Evidence of Late Neointimal Hyperplasia Formation after Five Years of Different Generations Drug-Eluting Stents
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Background: Neointimal hyperplasia (IH) following drug-eluting stent (DES) implantation correlates with the potency of the anti-proliferative drug, its kinetic profile, and the biodegradable polymer properties. The present serial IVUS assessment represents the longest serial invasive assessment of two generations DES with durable and biodegradable polymers. The findings of this study support the occurrence of continuous IH growth following the implantation of DES, these observations seem to be particularly

Conclusion: The present serial IVUS assessment represents the longest serial invasive assessment of two generations DES with durable and biodegradable polymers. The findings of this study support the occurrence of continuous IH growth following the implantation of DES, these observations seem to be particularly

TCT-650
In Vivo Tissue Characterization of Coronary Lipid Plaques: Comparison of Optical Coherence Tomography and Near-Infrared Spectroscopy
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Background: Intravascular imaging with Fourier domain optical coherence tomography (OCT) produces high-resolution images (10-20 μm) of coronary atherosclerosis. The LipiScan IVUS Cardiovascular Imaging System combines co-registered grayscale intravascular ultrasound (IVUS) with near infrared spectroscopy (OFDI) to detect lipid-rich plaques. The concordance between these 2 imaging modalities has not been studied.

Methods: 10 vessels were interrogated with both the Dragonfly OCT (pullback speed 2 mm/sec) and the IVUS/LipiScan catheter (pullback speed 0.5 mm/sec). A fiducial branch was identified for each pullback. Offline frame by frame analysis of the images was performed to identify lipid pools. By OCT, lipid-rich plaque was defined as a signal-poor region with diffuse borders. By NIRS, lipid-rich plaque was defined as a high lipid core burden index, which has been validated against histology.

Results: There was excellent correlation between the spatial lipid pool distribution as noted on OCT and NIRS, with an average 5 mm discrepancy between the two modalities (possibly due to variations in guide catheter and wire position and imaging catheter positioning). See Figure. Small lipid pools which did not extend beyond 1-2 frames were noted on only one or the other imaging system, which might be explained by the varying distance of the light source from the small lipid pool, differences in penetration, or false positives/negatives.


**TCT-651**

Assessment of the bioresorption process utilising intravascular ultrasound derived echogenicity analyses and vasomotion testing of the ABSORB bioresorbable everolimus-eluting vascular scaffold. A sub-study of the ABSORB Cohort B trial

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**Background:** Reduction in the hyper-echogenicity characteristics of the ABSORB scaffold has been demonstrated to be related to the recovery of vasoreactivity of the scaffolded segment at 2 years. Subsequent changes in the platform design and manufacturing processes lead to significant prolongation in the lumen support with a new revision of the device. We sought to correlate the reduction in hyper-echogenicity of the revised ABSORB with the recovery of vaso-reactivity of the scaffolded segment during this time period.

**Methods:** All patients from the ABSORB trial, who underwent paired echogenicity analyses and vasomotion testing at 6 (ABSORB Cohort B1) or 12 (ABSORB Cohort B2) months follow-up, were included in the analysis. Vasoreactivity was calculated as relative mean lumen diameter (MLD) changes from pre to post acetylcholine administration.

**Results:** Overall, 31 patients underwent paired IVUS derived echogenicity analyses and vasomotion testing at 6 (n=14) and 12-month (n=17) follow-up respectively. The reduction in hyper-echogenicity of the scaffolded segment in the acoustic echotexture group went from 20.04±10.01 % to 18.09±10.01 % (p=0.561) and from 22.89 ± 9.99 % to 18.16 ± 8.70 % (p=0.006) at 6 and 12 months, respectively. The changes in MLD after administration of acetylsalicylic acid were % 1% of vasoconstriction (p=0.405) and 4% vasodilatation (p=0.086) at 6 and 12 months, respectively. A significant relationship between the changes in hyper-echogenicity and in MLD after acetylsalicylic acid administration was demonstrated at 12 months (P<0.05), but not at 6 months (P>0.05).

**Conclusion:** The reduction in hyper-echogenicity of the scaffolded segment is significantly correlated with the restoration of the vasomotor activities of a coronary segment scaffolded by the ABSORB scaffold at a long-term follow-up. This is consistent with the programmed loss of structural integrity of the scaffold at that time point.

**TCT-652**

In Vivo Distribution Of Lipid Core Containing Plaque According To Distance From The Ostium By Near Infrared Spectroscopy In Non-culprit Coronary Arteries

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**Background:** Anatomopathological data indicate that coronary plaques prone to rupture and erosion tend to cluster within the proximal third of each coronary vessel. Intracoronary NIRS is a novel method to detect lipid core plaques (LCP). We sought to assess the spatial distribution of lipid core plaques (LCP) by means of near infra red spectroscopy (NIRS) in coronary arteries.

**Methods:** Spectroscopy (NIRS) in coronary arteries.

**Conclusion:** There was very good correlation between the presence, absence, and spatial distribution of lipid pools as noted on OCT and NIRS imaging. Larger studies are required to determine whether NIRS and OCT provide complementary information for plaque characterization.

**TCT-653**

Quantitative and Qualitative Changes of Neointimal Tissue in Drug Eluting Stents [Serial (9 Months and 2 Years) Observation Using Intracoronary Optical Coherence Tomography]

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**Background:** Long-term serial change of stent strut coverage and neointima characteristics in DESs have not been fully investigated with OCT. This study aimed to evaluate the serial quantitative and qualitative changes of vascular response in drug eluting stents (DES) at 9 months and 2 years using optical coherence tomography (OCT).

**Methods:** The OCT was performed serially in 80 DESs of 76 patients at 9 months and 2 years after DESs implantation (sirolimus-eluting stent [SES], n=23; paclitaxel-eluting stent [PES], n=20; zotarolimus-eluting stent [ZES], n=25. everolimus-eluting stent [EES], n=12). Serial change of quantitative (neointimal thickness, stent strut coverage and apposition at each strut) and qualitative characteristics were evaluated.

**Results:** The incidence of uncovered stent strut significantly decreases from 9 months to 2 years follow-up (4.9% to 2.6%, p<0.001), but there was similar for malapposition rate (1.0% to 1.1%, p=0.63) and incidence of intracoronary thrombosis (1.0% to 8.8%, p<0.05). In qualitative evaluation, lipid laden neointima (13.8% to 26.3%, p=0.03) and intimal disruption (13.8% to 33.8%, p=0.03) were more frequently detected at 2 years follow-up compared to 9 months follow-up.

**Conclusion:** This OCT study suggested that neointima coverage improved from 9 months to 2 years, but prevalence of malapposition and thrombus was not changed during extended follow-up. Additionally, the neothrombosis including transforming into lipid laden neointima might progress between 9 months and 2 year-follow period.

**TCT-654**

Quantitative multi-modality imaging analysis of a fully bioresorbable scaffold: a head-to-head comparison between QCA, IVUS and OCT

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**Background:** The bioresorbable vascular scaffold (BVS) has peculiar imaging characteristics, like total translucency and radioacuity. We analyze the agreement between QCA, IVUS and OCT in the BVS for length and minimum lumen area (MLA) measurements immediately post-implantation and at 6 months.

**Methods:** Patients enrolled in the ABSORB cohort B1 study (NCT00856856) underwent coronary angiography, IVUS and OCT immediately post BVS implantation and at 6 months. Agreement between QCA edge detection (ED), QCA videodensitometry (VD), IVUS and OCT regarding scaffold length and MLA was analyzed through intraclass correlation coefficients and Passing-Bablock non-parametric orthogonal regression.

**Results:** 45 patients were sequentially imaged. OCT estimates scaffold length accuracy compared to nominal length (95% CI of the difference: 0.34 mm and at 0.13; 0.47 mm for baseline and 6 months, respectively), whereas QCA incurs consistent underestimation of the same magnitude at both time points (Pearson correlation = 0.806). IVUS yield low accuracy (95% CI of the difference: 1.04; 3.24 and -0.56; 2.65 mm2 for baseline and 6 months, respectively), with several outliers and random variability test-retest. MLA decreases substantially between baseline and 6 months in QCA and OCT, but only minimally in IVUS (95% CI: 0.12, 0.52 mm2). ICCa and Bland-Altman show poor agreement for MLA between the different imaging modalities: worst agreement ED-IVUS (ICCa 0.253), best agreement IVUS-OCT at 6 months (ICCa 0.767). All the pairs deviated significantly from linearity (p<0.01). Passing-Bablock non-parametric orthogonal regression showed constant and proportional bias between IVUS and OCT.

**Conclusion:** OCT is the most accurate technique for measurement of scaffold length; QCA incurs systematic underestimation (foreshortening) and IVUS is the most inaccurate and unpredictable modality. This has implications for volumetric coronary artery. The region of interest (ROI) was subsequently divided into 10-mm segments from proximal to distal. The 2 mm long block chroma-test (probability of LCP ranging from 0–low probability- to 1 –high probability) was assessed per ROI and for each 10-mm segment.

**Results:** Overall, the length of the ROI was 58.0±4.3 mm, subdivided into 10-mm segments for a total of 392 analyzed segments. There was a progressive decrease of LCP from proximal to distal in the various 10-mm segments (1st 0.41±0.48 % vs. 2nd 0.35±0.42 % vs. 3rd 0.37±0.43 % vs. 4th 0.32±0.43 % vs. 5th 0.26±0.20 % vs. 6th 0.26±0.19 %, p<0.01). While in LAD and in LCx, LCP tended to cluster in the proximal segment (p<0.001 and p<0.001, respectively), in the RCA they were evenly distributed along the entire artery (p=0.155). At logistic regression analysis, distance from the ostium was the only independent predictor of LCP.

**Conclusion:** Lipid-core plaques, as detected by NIRS, cluster in the proximal segment of the coronary arteries, in distribution similar to that observed in prior autopsy studies. The distribution of LCP is similar to that of the culprit lesions of STEMI patients.