TCT-281
The Association Between Cholesterol Crystal And Features Of Plaque Vulnerability On Optical Coherence Tomography
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Background: Cholesterol crystals are often seen abundantly within atheromatous plaques and at sites of plaque disruption. Recent studies have demonstrated that crystallization of cholesterol promotes volume expansion potentially, triggering plaque rupture. However, the relationship between cholesterol crystals and other features of plaque vulnerability has not been characterized. As optical coherence tomography (OCT) enables the visualization of cholesterol crystals in vivo, we investigated the impact of cholesterol crystals on plaque vulnerability by using OCT.

Methods: 102 patients with atherosclerotic coronary disease undergoing OCT imaging of non-culprit lipid plaque. Cholesterol crystals were identified as a thin, linear region with high signal intensity and backscattering. Patients with and without cholesterol crystals were compared with regard to clinical characteristics and OCT-derived features of plaque vulnerability.

Results: 43% of study population demonstrated cholesterol crystals in non-culprit atherosclerotic plaque. Patients with cholesterol crystals were more likely to have a history of myocardial infarction (41% vs. 22%, p=0.04) and demonstrated higher leukocyte counts (9362 ± 7911/µl, p=0.05). These patients more frequently received ACE-I (64% vs. 38%, p=0.009) and were less likely to be treated with a statin (52% vs. 32%, p=0.04). OCT demonstrated that patients with cholesterol crystals had a thinner fibrous cap thickness and were more likely to contain plaque microchannels and lipid pools (Table).

Conclusions: The presence of cholesterol crystals is associated with features of plaque vulnerability on OCT. These patients require more intensive risk factor modification for the prevention of future ischemic events.

Table.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Cholesterol crystal (+) (n=88)</th>
<th>Cholesterol crystal (-) (n=44)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial Infarction</td>
<td>41%</td>
<td>22%</td>
<td>0.04</td>
</tr>
<tr>
<td>Statin</td>
<td>38%</td>
<td>64%</td>
<td>0.01</td>
</tr>
<tr>
<td>Leukocyte /µl</td>
<td>7911 ± 2565</td>
<td>9362 ± 4309</td>
<td>0.03</td>
</tr>
<tr>
<td>FCT</td>
<td>98.6 ± 62.0 µm</td>
<td>71.9 ± 25.8 µm</td>
<td>0.03</td>
</tr>
<tr>
<td>Microchannel</td>
<td>39%</td>
<td>73%</td>
<td>0.001</td>
</tr>
<tr>
<td>Lipid-rich plaque (quadrant ≥ 2)</td>
<td>52%</td>
<td>86%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>TCFa</td>
<td>41%</td>
<td>58%</td>
<td>0.10</td>
</tr>
</tbody>
</table>

FCT = fibrous cap thickness, TCFa = thin-cap fibroatheroma.

TCT-282
The REMEDEE OCT study: A prospective randomized study of the early vascular healing of a novel Dual Therapy Stent in comparison with an everolimus eluting stent
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Background: little is known about atherosclerotic plaque composition and morphological differences between carotid and coronary artery disease. The aim of the study was to determine correlation between intravascular ultrasound virtual histology (IVUS-VH) defined atherosclerotic plaque components in coronary and carotid artery atherosclerotic lesions.

Methods: In a single-center prospective study 100 consecutive patients (60 men and 40 women) with mean age 69.6±8.4 years were enrolled. All patients were scheduled for carotid and/or coronary artery stenting and underwent IVUS-VH examination of coronary and carotid plaque before intervention. Statistical comparison between coronary and carotid artery plaque composition according to IVUS-VH was done with Pearson correlation.

Results: High percentage of necrotic core was found both in coronary (22.5±5.7) and carotid (19.4±5.3) artery plaques, r=0.459, p<0.001. Percentage of dense calcium (13.58±8.15 vs. 7.67±5.64, r=0.557, p<0.001), fibrofatty (12.54±9.08 vs. 19.55±9.06, r=0.379, p<0.001) and fibrofatty tissue (51.72±10.33 vs. 53.42±7.95, r=0.422, p<0.001) showed moderate, statistically significant correlation between coronary and carotid arteries, respectively (Figure 1).
**Conclusion:** We found significant correlations of IVUS-VH determined atherosclerotic plaque components between coronary and carotid arteries in patients with atherosclerosis involving both arterial beds.

**TCT-285**

**Frequency and Type of Neoatherosclerosis Five Years After Drug-Eluting Stent Implantation: An Optical Coherence Tomography Study**

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**Background:** The frequency, type and extent of neoatherosclerosis within drug-eluting stents (DES) has not been described during very long-term follow-up. Moreover, it is unknown whether DES eluting sirolimus differ from those eluting paclitaxel in the definitions according to the Consensus Statement of the International Working Group of OCT.

**Methods:** The SIRTAX LATE OCT population was analyzed for evidence of neoatherosclerosis within stented segments five years after DES implantation. Using OCT definitions according to the Consensus Statement of the International Working Group of OCT, we assessed the presence of fibrocalcific plaques, fibroatheromas, macrophage accumulations, microvessels, as well as surface erosions and ruptures in each single frame. Plaques were considered to be present in case of a longitudinal extension of at least 1mm, and all other findings had to be visualized in at least three consecutive frames.

**Results:** All segments were independently assessed by two experienced observers. A total of 89 event-free patients with 41 lesions treated with SES (41 patients) and 48 lesions treated with PES (48 patients) were analysed at five years of follow-up. Neoatherosclerotic plaques were observed in 15% of lesions, and fibroatheromas (12.4%) were more common than fibrocalcific plaques (5.6%). While macrophage accumulations were frequently present (32.6%), microvessels (2.2%) and surface erosions (2.2%) were rare, and no plaque rupture was observed. Neoatherosclerotic plaques were more common among lesions treated with PES (25%) than SES (5%); P < 0.01, and differences between stent types applied to both the frequency of fibrocalcific plaques (SES 0%, PES 10.5%, P = 0.041) as well as fibroatheromas (SES 4.9% vs. PES 18.8%, P = 0.046). Similarly, macrophage accumulations were more frequent among lesions treated with PES (47.9%) than SES (14.6%, P < 0.001).

**Conclusions:** Among event-free patients, neoatherosclerotic plaques were observed in 15% of lesions five years after DES implantation. The frequency, type and extent of neoatherosclerotic changes were importantly influenced by the implanted DES type.

**TCT-286**

**Characteristics of OCT findings for lesions avoiding onset of AMI**

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**Background:** Cavity aperture resulting from plaque rupture is often located in the proximal for STEMI patients and distal for NSTEMI patients. To investigate the characteristics of lesions avoiding onset of AMI through observing lesion cavities in angiography patients.

**Methods:** Target population consisted of 232 patients (250 lesions) with ischemic heart disease (excluding AMI patients) undergoing OCT prior to therapeutic treatment that presented to our facility from May, 2009 to December, 2011. Of these, OCT findings determined a cavity at stenosed location in 22 patients. A comparative investigation was performed on cavity aperture location: proximal side (Group P: 12 lesions); others (group D: 8 lesions).

**Results:** OCT findings Distal lumen area (group P: 5.97±1.88, group D: 8.68±2.51, P < 0.05), minimal lumen area (1.95±1.21, 2.68±1.31), cavity area (1.87±1.28, 3.09±1.02, P < 0.05), proximal lumen area (6.76±2.24, 10.72±3.74, P < 0.05) Location of plaque rupture site was: proximal (group P: 66%, group D: 38%); middle (25%, 12%); distal (9%, 30%, P = 0.05). There was no difference determined between groups for location of MLA or residual low intensity area. Furthermore, there was a higher tendency for group D to have spotty calcification at lesion location compared to Group P (50%, 88%, respectively).

**Conclusions:** In comparison to those patients with proximal cavity aperture, distal cavity aperture patients had larger vessel diameter, larger plaque volume and plaque disruption distal to lesion location.

**TCT-287**

**Abstract Withdrawn**

**TCT-288**

**Impact of the Prevalence of Diabetes Mellitus on Coronary Plaque Vulnerability Assessed by Integrated Backscatter Intravascular Ultrasound**

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**Background:** Diabetes mellitus (DM) is a well-established risk factor for coronary artery disease (CAD). However, little is known about relationship the prevalence of DM and coronary plaque vulnerability assessed by integrated backscatter intravascular ultrasound (IB-IVUS).

**Methods:** One hundred sixteen consecutive patients with stable CAD who underwent percutaneous coronary intervention were enrolled. Nonculprit coronary lesions with mild to moderate stenosis were measured by IB-IVUS. A total of 20 IB-IVUS images were recorded at an interval of 0.5 mm for 10 mm length in each plaque. Patients were divided into two groups: the DM group and the non-DM group. We assessed the relations among DM and coronary plaque instability using IB-IVUS.

**Results:** Plaque volume (PV) and percentage of PV (%PV, 100×PV/Vessel Volume) in the DM group were significantly higher than those in the non-DM group (66.0±27.2 mm3 vs. 56.8±21.2 mm3, P = 0.0278 and 42.5±9.7% vs. 39.0±8.8%, P = 0.0453, respectively). Lipid volume (LV) and percentage of LV (%LV, 100×LV/PV) in the DM group were significantly higher than those in the non-DM group (28.9±15.5 mm3 vs. 22.2±13.0 mm3, P = 0.0130 and 42.1±12.4% vs. 37.3±12.2%, P = 0.0400, respectively). Furthermore, multiple regression analysis revealed that the prevalence of DM was independently associated with PV (p=0.0351), LV (p=0.0164) and %LV (p=0.0304) among IVUS parameters in addition to other metabolic factors. Nonculprit coronary lesions in patients with DM are associated with more lipid-rich plaque content and a greater PV, suggesting that DM patients increased plaque vulnerability.

**TCT-289**

**Clinical Feasibility of Higher-Frequency IVUS for Quantitative Measurements of Native Coronary Lesions: First-in-Human Experience with 60MHz versus 40MHz IVUS Imaging**

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**Background:** Despite the technical advantage of improved image resolutions, higher-frequency IVUS imaging may theoretically be susceptible to impaired lumen and vessel border detection due to higher blood scattering and lower signal penetration within the tissue. This first-in-human study aimed to evaluate the feasibility of 60MHz IVUS imaging with a novel multi-frequency IVUS system in-in vivo quantitative assessment of native coronary lesions.

**Methods:** A total of 121 matched cross-sections were imaged and compared at 40MHz and 60MHz. Visibilities of lumen and vessel borders were classified into 3 grades (good: 75% visible, fair: 25% visible). Quantitative evaluation included area and minimum diameter measurements of lumen (LA; MLD) and vessel (VA; MVD).

**Results:** Good visualization of lumen border was achieved in 87.6% with 60MHz and 60MHz. Visibilities of lumen and vessel borders were classified into 3 grades (good: 75% visible, fair: 25% visible). Quantitative evaluation included area and minimum diameter measurements of lumen (LA; MLD) and vessel (VA; MVD).

**Conclusions:** Overall, the 40MHz and 60MHz IVUS imagings showed comparable visibilities of lumen and vessel borders. All quantitative measurements significantly correlated with good agreements (LA: r=0.97; MLD: r=0.95; VA: r=0.97; MVD: r=0.93, p<0.001 for all) between the 2 frequency imagings.