Disclosure

Speaker name: Suhail Dohad, MD

I have the following potential conflicts of interest to report:

- Consulting, Avinger Inc.
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)

- I do not have any potential conflict of interest
First IVUS in 1969 –
For years a technology without a home

25 MHZ IVUS
1994

40 MHZ IVUS
2009
# Performance Comparison: OCT vs. IVUS

<table>
<thead>
<tr>
<th></th>
<th>OCT</th>
<th>IVUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial Rotation</td>
<td>10 - 15 µm</td>
<td>100 - 200 µm</td>
</tr>
<tr>
<td>Frame Rate</td>
<td>100 frames/s</td>
<td>30 frames/s</td>
</tr>
<tr>
<td>Pullback Speed</td>
<td>20 mm/s</td>
<td>0.5 - 1 mm/s</td>
</tr>
<tr>
<td>Max. Scan Dia.</td>
<td>10 mm</td>
<td>15 mm</td>
</tr>
<tr>
<td>Tissue Penetration</td>
<td>1.0 - 2.0 mm</td>
<td>10 mm</td>
</tr>
<tr>
<td>Blood Clearing</td>
<td>Required</td>
<td>Not Required</td>
</tr>
</tbody>
</table>
Plaque Characterization

**FIBROTIC**

ATTENUATION: **3.2/MM**
BACKSCATTERING: **6.7/MM**

**CALCIFIED**

ATTENUATION: **1.7/MM**
BACKSCATTERING: **5.4/MM**

**LIPID**

ATTENUATION: **7.5/MM**
BACKSCATTERING: **6.6/MM**
Tissue Characterization
Lipid-rich Plaque
Plaque Rupture and Erosion

(A) Plaque rupture. Arrow delineates a broken fibrous cap. The contents of the ruptured plaque are partially washed away by the flush, leaving behind a cavity (white arrow). (B) Plaque erosion. A white thrombus (white arrow) is present on an irregular luminal surface. There is no evidence of rupture. Scale bars represent 500 μm. IVOCT technology, image contributor and institution, and commercial IVOCT vendor for each figure is provided in the Online Supplementary Material. *Guide-wire artifact. Abbreviations as in Figure 1.
Thrombi

(A) Red thrombus. Yellow arrow points to a red thrombus protruding into the lumen with high IVOCT backscattering and attenuation. (B) White thrombus. White arrow points to white thrombus with homogeneous backscattering and low attenuation, attached to the surface of coronary artery involving stent struts. There is extensive stent strut malapposition in this image. Scale bars represent 500 μm. IVOCT technology, image contributor and institution, and commercial IVOCT vendor for each figure is provided in the Online Supplementary Material. *Guide-wire artifact. Abbreviations as in Figure 1.
Large Calcium
Stent Apposition Assessment: OCT vs. IVUS

OCT supports a detailed analysis of stent placement and review of stent edge margins.
## OCT Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Diagnostic OCT (St. Jude + Terumo)</th>
<th>Therapeutic OCT (Avinger)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>Frequency Domain</td>
<td>Frequency Domain</td>
</tr>
<tr>
<td>Light Source</td>
<td>Swept Source</td>
<td>Swept Source</td>
</tr>
<tr>
<td>Resolution (Axial)</td>
<td>&lt;20 um in tissue</td>
<td>&lt;20 um</td>
</tr>
<tr>
<td>Resolution (Lateral)</td>
<td>25-60um</td>
<td>&lt;300 um</td>
</tr>
<tr>
<td>A-lines/Frame</td>
<td>504</td>
<td>1024</td>
</tr>
<tr>
<td>Frame Rate</td>
<td>100 fps</td>
<td>1 fps with catheter rotation</td>
</tr>
<tr>
<td>Pullback Capabilities</td>
<td>Yes 10-25mm/sec</td>
<td>NA</td>
</tr>
<tr>
<td>Optical Sensitivity</td>
<td>&gt;90 dB</td>
<td>&gt;90 dB</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>&gt;50 dB</td>
<td>&gt;50 dB</td>
</tr>
<tr>
<td>Display</td>
<td>1280 x 1024</td>
<td>2560 x 1440</td>
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</tbody>
</table>
Diagnostic imaging capabilities of the Ocelot -Optical Coherence Tomography System, ex-vivo evaluation and clinical relevance

Suhail Dohad, John Shao, Ian Cawich, Manish Kankaria and Arjun Desai

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Therapeutic OCT = Diagnostic OCT = Histology
Ocelot Catheter Overview
Lumivascular Image Guided Therapy
Endovascular Approach to CTO

Lumivascular Approach to CTO
Proximal Cap

SFA Ostium
Avoiding Collateral

SFA Ostium
Lumen Environment - Calcium

Distal SFA
OCT can help identify reconstitution site Recanalization results in “starburst effect” with saline mixing with blood
- 8Fr/7Fr
- 130/110 cm working length
- .014 guidewire compatible
- Cutter rotation = 1000rpm
- OCT - frequency
Pantheris Features

- **Shaft Occlusion Balloon (Deflated)**
- **Cutter Window (In Closed Confirmation)**
- **Shaft Occlusion Balloon (Inflated)**
- **Active Mode (Cutter in Active Confirmation, Nose Cone Deflected)**
Cutting & Reviewing Troughs

**Cutting Trough Using OCT Guidance**

- Media
- EEL
- Eccentric Disease

**Reviewing Troughs**

- Media
- Post-Cut Trough
- EEL
- Post-Cut Trough
Pantheris Animation
VISION Case – 74 y/o Claudicant, Rutherford 3
Summary

• High resolution imaging with OCT is possible in non coronary vasculature

• Accurate plaque definition allows therapeutic solutions:
  • Crossing CTOs reliably maintaining a predominant true lumen crossing
  • Strategizing treatment of CTOs
  • OCT directed plaque excision to maximize luminal gain without compromise of the media-adventitial border
THE LUMIVASCULAR FUTURE

IMAGE GUIDED THERAPY
PANTHERIS & OCELOT