Disclosures

- Consultant
  - Medtronic, Boston Scientific, Volcano, St Jude Medical, Mitralign
A Friendly Debate Amongst Friends

IVUS

OCT

UCDAVIS
Tried and True Technology
New Technology
IVUS
Mechanical (single rotating transducer) and Solid State (multiple fixed transducers).
IVUS Integration
Intravascular Ultrasound
Lumen vs. Vessel Wall
Lumen vs. Vessel Wall
Target Stent Segment IVUS

Incomplete Apposition
Incomplete Expansion
Edge Tear
Case

- 48 year old woman with tobacco use, acute chest pain, elevated cardiac markers and deep anterior T wave inversions
Interventional Sizing Using IVUS Diameter Determination

1. Measure lumen at reference point (within the image slice with the largest lumen and smallest plaque burden)

2. Size Interventional device accordingly

3.5 x 10 mm Cutting Balloon

3.5 x 18 mm DES

4.0 x 15 mm Quantum Maverick
Final: Well Apposed Stent
Well-deployed Stent
**IVUS**

- **Resolution**: 100 - 150 µm
- **Scan Area**: 10 - 15 mm
- **Penetration**: 4 - 8 mm
- **Contrast Flush**: Not required
- **Imaging Length**: 150+ mm

**OCT**

- **Resolution**: 10 µm
- **Scan Area**: 6-7 mm
- **Penetration**: 1.5 – 2 mm
- **Contrast Flush**: Required
- **Imaging Length**: 54 mm
The C7 Dragonfly™ Imaging Catheter is intended for use in vessels 2.0 to 3.5 mm in diameter. The C7 Dragonfly Imaging Catheter is not intended for use in the left main coronary artery or in a target vessel which has undergone a previous bypass procedure.
C7 Dragonfly™
Imaging Catheter

Instructions For Use

Set the Injection Pump to deliver:
4 mL/sec flush rate.
14 mL total flush volume.

Incomplete blood displacement results in light attenuation
How would you choose which segment to image with OCT?

- Proximal lesion?
- Mid lesion?
- PDA Bifurcation?
- Proximal landing zone?
- Distal landing zone?

What would IVUS show you?

- Single full vessel scan
- Plaque burden
- Vessel sizing
- Plaque Composition
- Normal-to-normal vessel imaging
IVUS as a Diagnostic Tool

- Ambiguous Angiogram
- Intermediate lesions (40-70% Angio Stenosis)
- Aorto-ostial lesions
- Discrepancy between the clinical scenario, the angiogram, and/or non-invasive testing
IVUS During Intervention

• Guide choice of therapy

• Precise vessel sizing (BMS + DES)

• Evaluate stent expansion and stent apposition, and lesion coverage

• Investigate mechanisms of stent failure (restenosis, thrombosis)
APPROPRIATENESS CRITERIA

ACCF/SCAI/STS/AATS/AHA/ASNC 2009 Appropriateness Criteria for Coronary Revascularization


Endorsed by the American Society of Echocardiography, the Heart Failure Society of America, and the Society of Cardiovascular Computed Tomography

APPROPRIATE USE CRITERIA

ACCF/SCAI/STS/AATS/AHA/ASNC/HFSA/SCCT 2012 Appropriate Use Criteria for Coronary Revascularization Focused Update


Endorsed by the American Society of Echocardiography and the Heart Rhythm Society
## Intermediate Risk Findings on Noninvasive Study

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<th>Med. Rx</th>
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<th>1 vz. disease of Prox. LAD</th>
<th>2 vz. disease with Prox. LAD</th>
<th>3 vz. disease; no Left Main</th>
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2012 Appropriateness Guidelines

IVUS Can Be Used to Assess Lesion Significance

No Mention of OCT!
IVUS Lesion Significance

• Proximal Epicardial Coronary Artery
  - MLD < 2.0 mm
  - MLA < 4.0 mm²

• Left Main
  - MLD < 3.0 mm
  - MLA < 6.0 mm²

2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention: Executive Summary

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions
**IVUS**

4.4.2. Intravascular Ultrasound

**CLASS IIA**

1. IVUS is reasonable for the assessment of angiographically indeterminate left main CAD (248–250). *(Level of Evidence: B)*

2. IVUS and coronary angiography are reasonable 4 to 6 weeks and 1 year after cardiac transplantation to exclude donor CAD, detect rapidly progressive cardiac allograft vasculopathy, and provide prognostic information (251–253). *(Level of Evidence: B)*

3. IVUS is reasonable to determine the mechanism of stent restenosis (254). *(Level of Evidence: C)*

**CLASS IIb**

1. IVUS may be reasonable for the assessment of non-left main coronary arteries with angiographically intermediate coronary stenoses (50% to 70% diameter stenosis) (248,255,256). *(Level of Evidence: B)*

2. IVUS may be considered for guidance of coronary stent implantation, particularly in cases of left main coronary artery stenting (249,254,257). *(Level of Evidence: B)*

3. IVUS may be reasonable to determine the mechanism of stent thrombosis (254). *(Level of Evidence: C)*

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No Mention of OCT!
Prospective Application of Pre-Defined Intravascular Ultrasound Criteria for Assessment of Intermediate Left Main Coronary Artery Lesions

Results From the Multicenter LITRO Study

Jose M. de la Torre Hernandez, MD, PhD,* Felipe Hernández Hernandez, MD,† Fernando Alfonso, MD, PhD,‡ Jose R. Rumoroso, MD, PhD,§ Ramon Lopez-Palop, MD, PhD,|| Mario Sadaba, MD,‡ Pilar Carrillo, MD, PhD,§ Juan Rondan, MD, PhD,¶ Iñigo Lozano, MD, PhD,¶ Juan M. Ruiz Nodar, MD, PhD,# Jose A. Baz, MD,** Eduard Fernandez Nofreiras, MD,†† Fernando Pajín, MD,‡‡ Tamara Garcia Camarero, MD,* Hipolito Gutierrez, MD, §§ on behalf of the LITRO Study Group (Spanish Working Group on Interventional Cardiology)

Santander, Madrid, Bilbao, Alicante, Oviedo, Vigo, Badalona, Toledo, and Valladolid, Spain

JACC. 2011
Kaplan–Meier Curves

Figure 4: Survival Free of Cardiac Death in Both Groups

Figure 5: Survival Free of Cardiac Death, Myocardial Infarction, and Any Revascularization in Both Groups
IVUS

4.7.4. Aorto-Ostial Stenoses

**CLASS IIa**
1. **IVUS** is reasonable for the assessment of angiographically indeterminant left main CAD (391,392). *(Level of Evidence: B)*
2. Use of DES is reasonable when PCI is indicated in patients with an aorto-ostial stenosis (393,394). *(Level of Evidence: B)*

**CLASS IIa**
1. **IVUS** is reasonable to determine the mechanism of stent restenosis (254). *(Level of Evidence: C)*

No Mention of OCT!
Malapposition in Stent Thrombosis
LAD Stent With Malapposition ChromaFlo
Underexpansion in Stent Thrombosis
Calcium Easily Seen by IVUS

- Bright echos (brighter than adventitia)
- Can measure the arc it encompasses
- Acoustic shadowing
IVUS Can See Thrombus
IVUS During Peripheral Vascular Interventions

- Renal and Mesenteric Artery Interventions
- Aortic Dissection and Aortic Trauma
- Abdominal and Thoracic Endovascular Aneurysm Repair
- Carotid Interventions
- IVC Filter
Summary

• IVUS is here to stay
  ▪ Proven technology with outcome data

• The Promise of OCT
  ▪ More information is not necessarily a good thing
Too Much Information
Thank You