Debate: IVUS is Better

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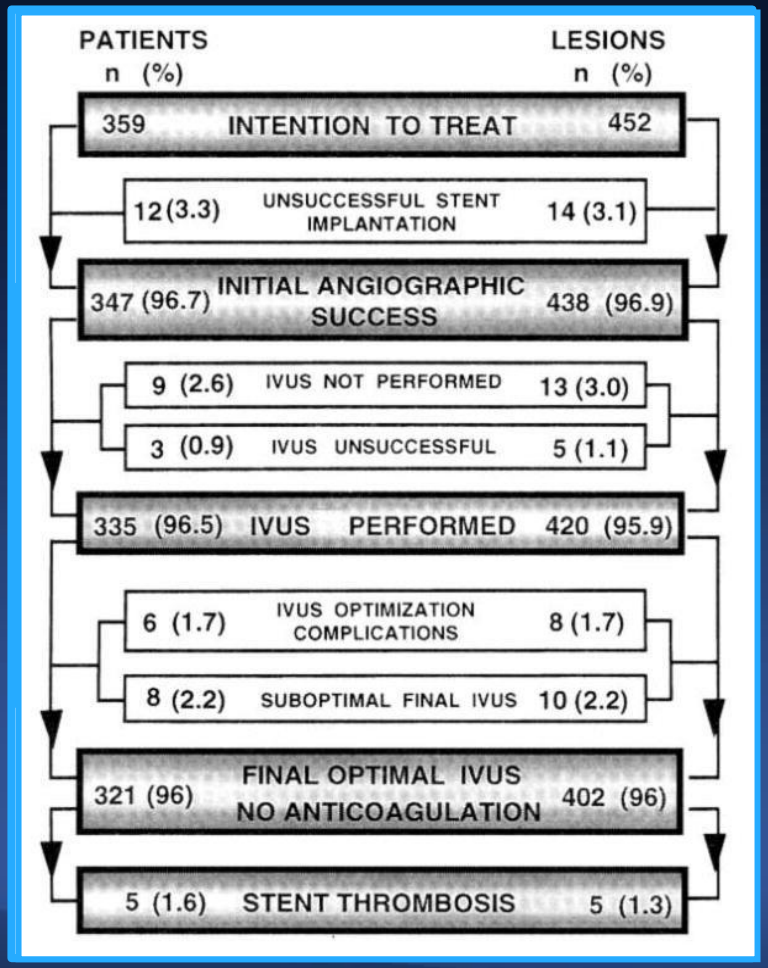
My Disclosure

- I am an ***IVUS*-Holic**
- I am an ***OCT-User, Too***

Intracoronary stenting without anticoagulation accomplished with *IVUS* guidance

Antonio Colombo et al. Circulation. ***1995 (24 years ago)***;91:1676–1688



Stent Thrombosis

3-4%

1.6% at 6 months

Greater Number of Scientific Evidence

IVUS

OCT

IVUS

OCT

IVUS

OCT

Randomized Trials

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Cardiovascular Research Foundation

Columbia University Medical Center

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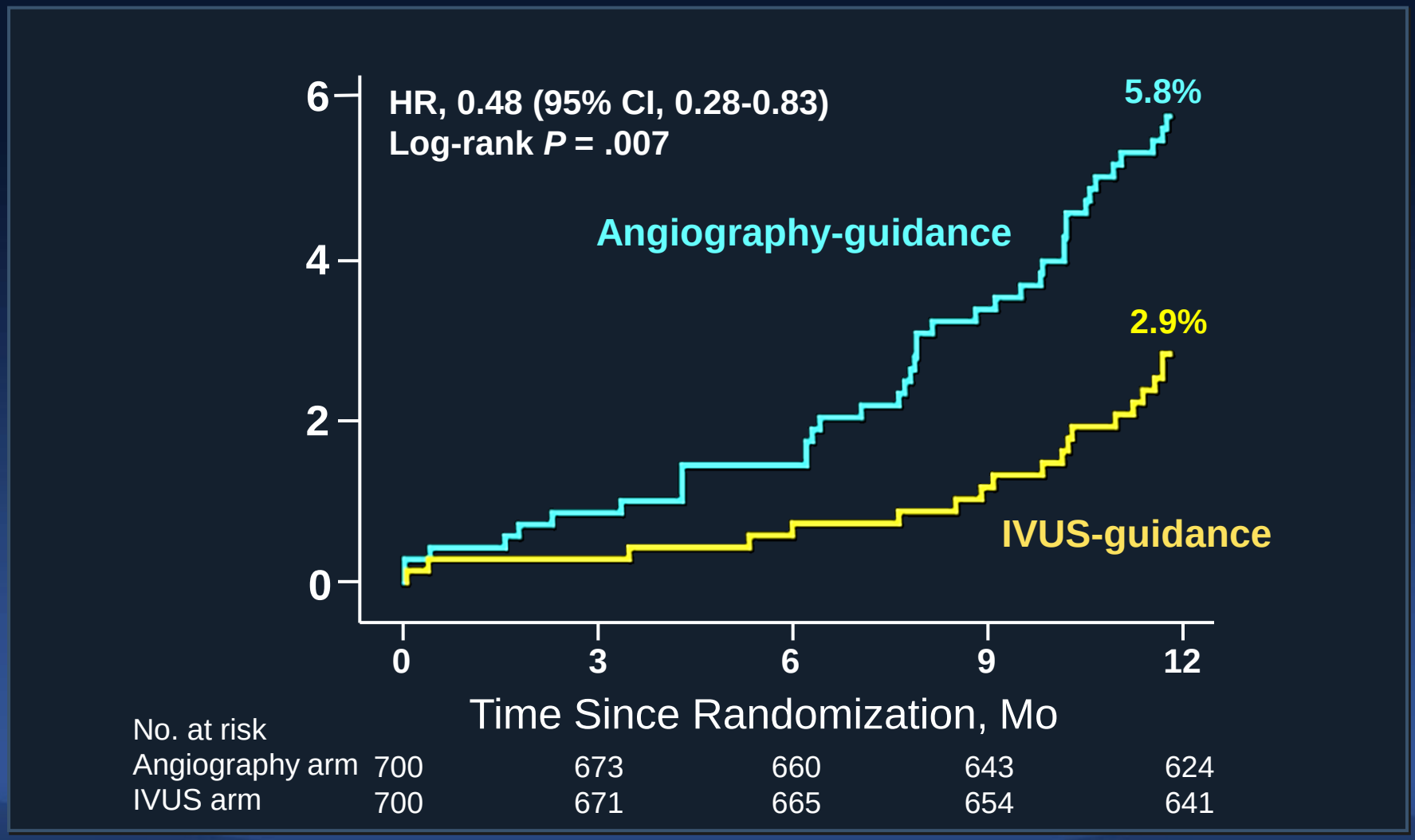
Courtesy of Mintz GS

IVUS-XPL RCT

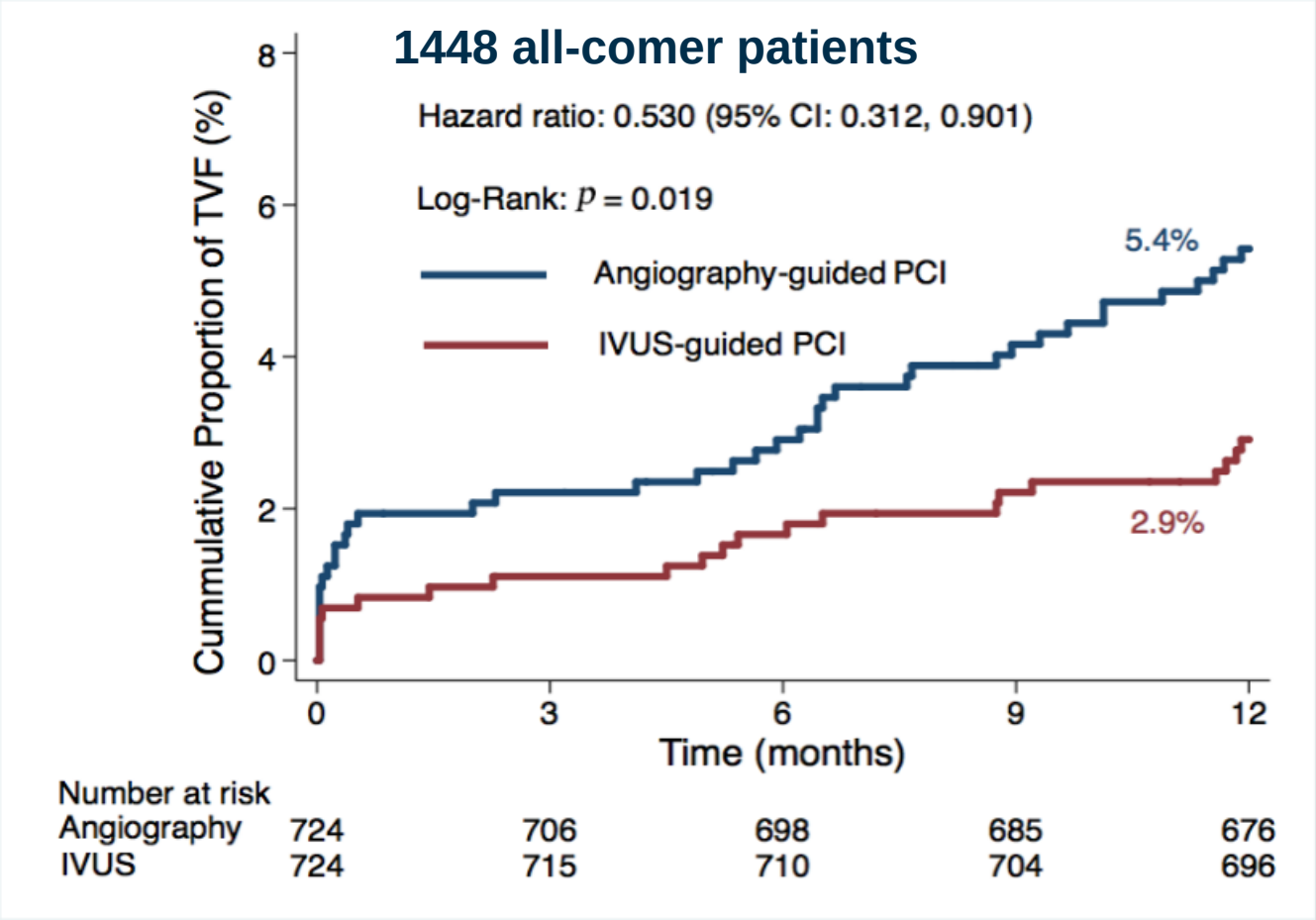
IVUS use decreased MACE after Long-lesion PCI



Hong SJ et al, *JAMA 2015*;314:2155-63

ULTIMATE RCT

IVUS use decreased MACE in all comer setting



JACC. 2018 Sep 17. pii: S0735-1097(18)38433-X.

2014 ESC Guideline for IVUS/OCT

- IVUS in selected patients to optimize stent implantation.
- IVUS to assess severity and optimize treatment of ***unprotected left main lesions.***
- OCT in selected patients to optimize stent implantation.

	COR	LOE
	IIa	B
	IIa	B
	IIb	C

Elective stenting of unprotected left main coronary artery stenosis: effect of debulking before stenting and *IVUS* guidance

Park SJ et al. JACC. 2001 Oct;38(4):1054-60

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Elective Stenting of Unprotected Left Main Coronary Artery Stenosis

Effect of Debulking Before Stenting and Intravascular Ultrasound Guidance

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OBJECTIVES We sought to evaluate: 1) the long-term outcomes of 127 selected patients receiving unprotected left main coronary artery (LMCA) stenting; and 2) the impact of the debulking procedure before stenting and intravascular ultrasound (IVUS) guidance on their clinical outcomes.

BACKGROUND The long-term safety of stenting of unprotected LMCA stenoses has not been established yet.

METHODS A total of 127 consecutive patients with unprotected LMCA stenosis and normal left ventricular function were treated by elective stenting. The long-term outcomes were evaluated between two groups: IVUS guidance (n = 77) vs. angiographic guidance (n = 50); and debulking plus stenting (debulking/stenting; n = 40) vs. stenting only (n = 87).

RESULTS Angiographic restenosis was documented in 19 (19%) of 100 patients. The lumen diameter after stenting was significantly larger in IVUS-guided group (p = 0.003). The angiographic restenosis rate was significantly lower in the debulking/stenting group (8.3% vs. 25%, p = 0.034). The reference artery size was the only independent predictor of angiographic restenosis. During follow-up (25.5 ± 16.7 months), there were four deaths, but no nonfatal myocardial infarctions occurred. The survival rate was 97.0 ± 1.7% at two years.

CONCLUSIONS These data suggest that stenting of unprotected LMCA stenosis might be associated with a favorable long-term outcome in selected patients. Guidance with IVUS may optimize the immediate results, and debulking before stenting seems to be effective in reducing the restenosis rate. However, we need a large-scale, randomized study. (J Am Coll Cardiol 2001; 38:1054–60) © 2001 by the American College of Cardiology

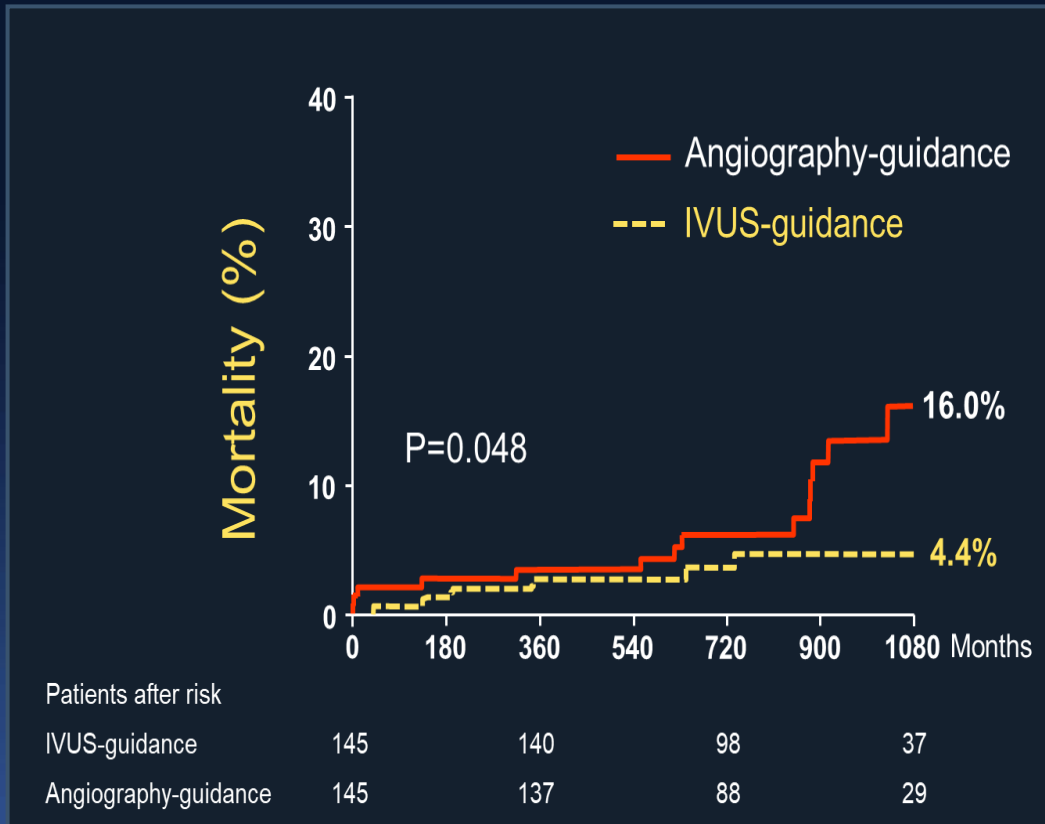
Since the first report of balloon angioplasty, percutaneous intervention has been investigated for the treatment of unprotected left main coronary artery (LMCA) stenosis (1–12). Unfortunately, the initial experiences of patients undergoing unprotected LMCA interventions were discouraging because of high procedural complications and early mortality (2,9). However, recent progress in technique and equipment, including development of newly designed stents and use of intravascular ultrasound (IVUS) imaging, a debulking procedure and effective antiplatelet agents, has brought unprotected LMCA stenosis to the forefront of interventional cardiology, making it an inviting target for percutaneous intervention. The purposes of this study were: 1) to evaluate the long-term results of the first 127 patients with normal left ventricular function who received unprotected LMCA stenting; and 2) to evaluate the impact of the debulking procedure before stenting and IVUS guidance on their clinical outcomes.

METHODS

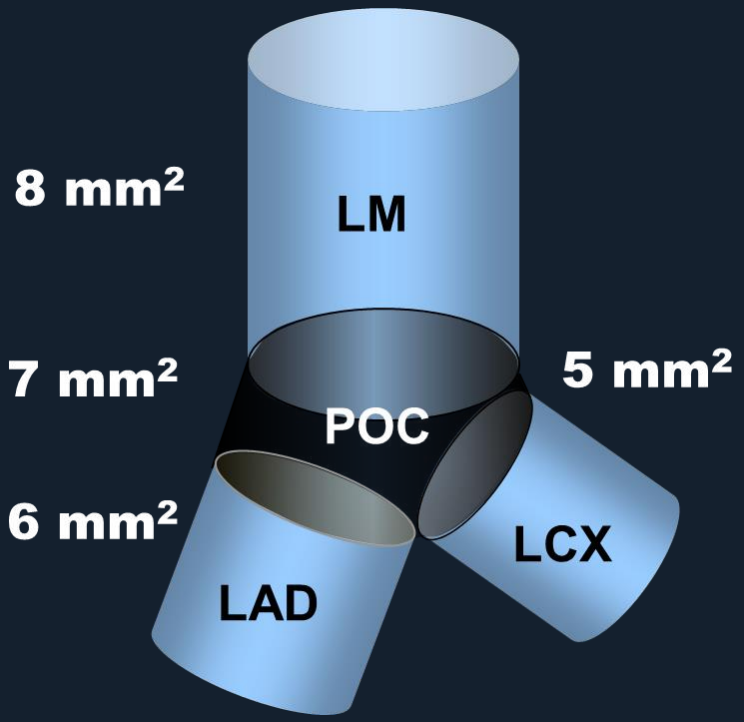
Study patients. From November 1995 to April 2000, 127 consecutive patients with unprotected LMCA stenosis and normal left ventricular function were treated with elective stenting at our institution. The inclusion criteria were symptomatic LMCA disease or documented myocardial ischemia and angiographic evidence of ≥50% diameter stenosis of the LMCA. The exclusion criteria included a contraindication to antiplatelet or anticoagulation therapy and left ventricular dysfunction (ejection fraction <40%). The patients' informed, written consent was obtained, in accordance with the rules of the Institutional Ethics Committee, which approved the study.

Stenting procedure. The stenting procedures were described previously and briefly as follows (11). Several stents were used, depending on the length and location of the lesion: 1) slotted-tube stents were primarily used for ostial or body lesions of the LMCA; and 2) slotted-tube stents or coil stents, or their combination, were used for distal

IVUS Guided LM PCI

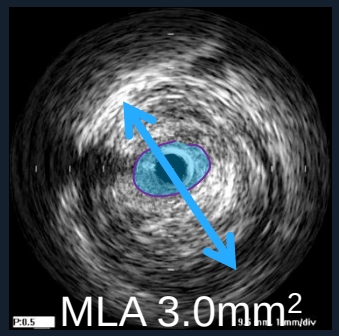


Patients after risk				
IVUS-guidance	145	140	98	37
Angiography-guidance	145	137	88	29



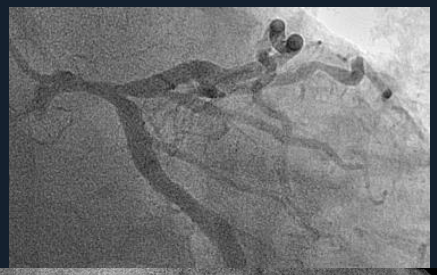
Park SJ et al, Circ Cardiovasc Interv. 2009;2(3):167-77.
Kang et al. Circ Cardiovasc Interv 2011;4:1168-74

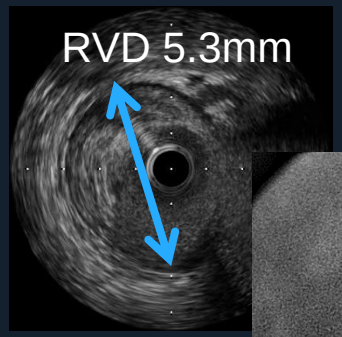
Pre-Lesion Evaluation

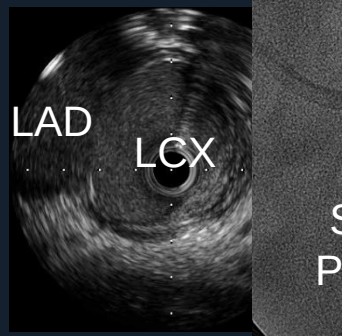


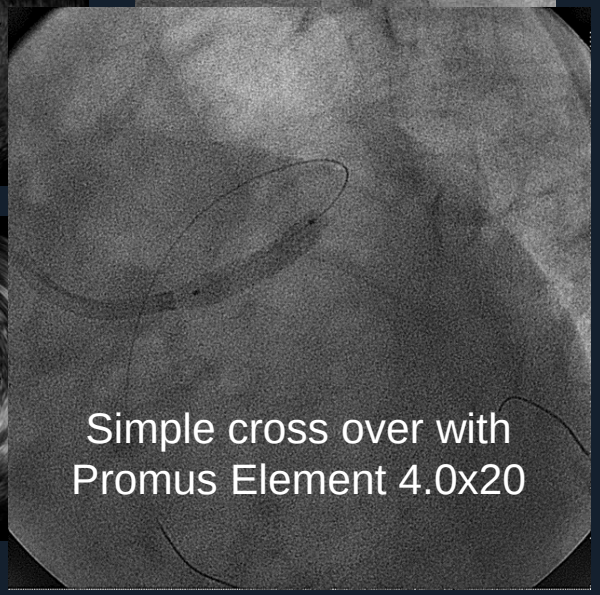
Distal LM,

RVD 6.2mm

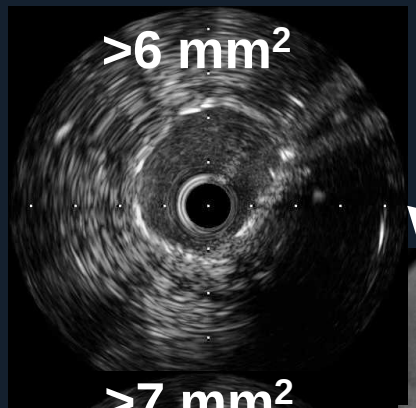


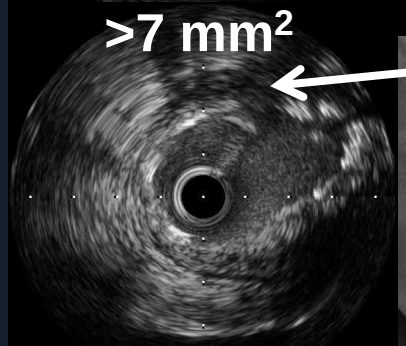


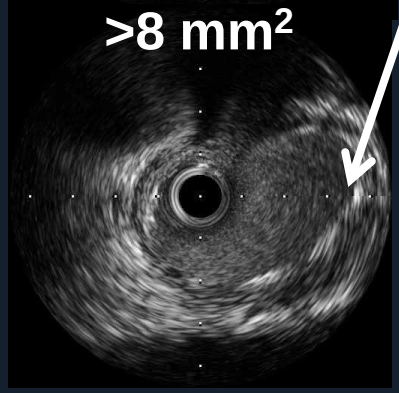


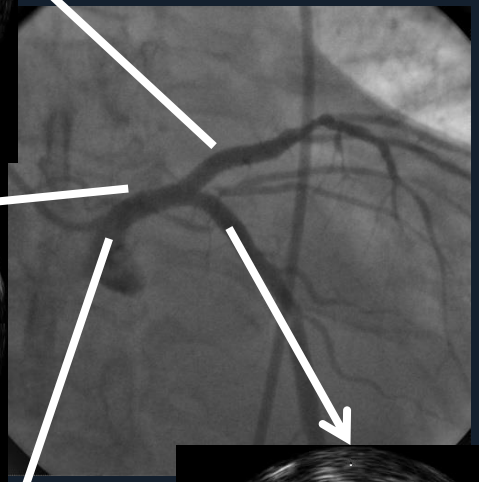


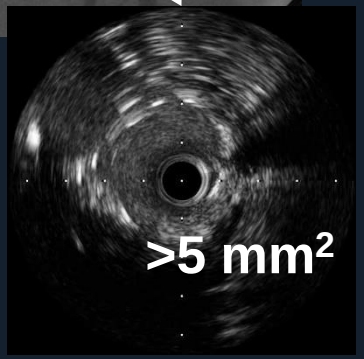
Post-Stent optimization





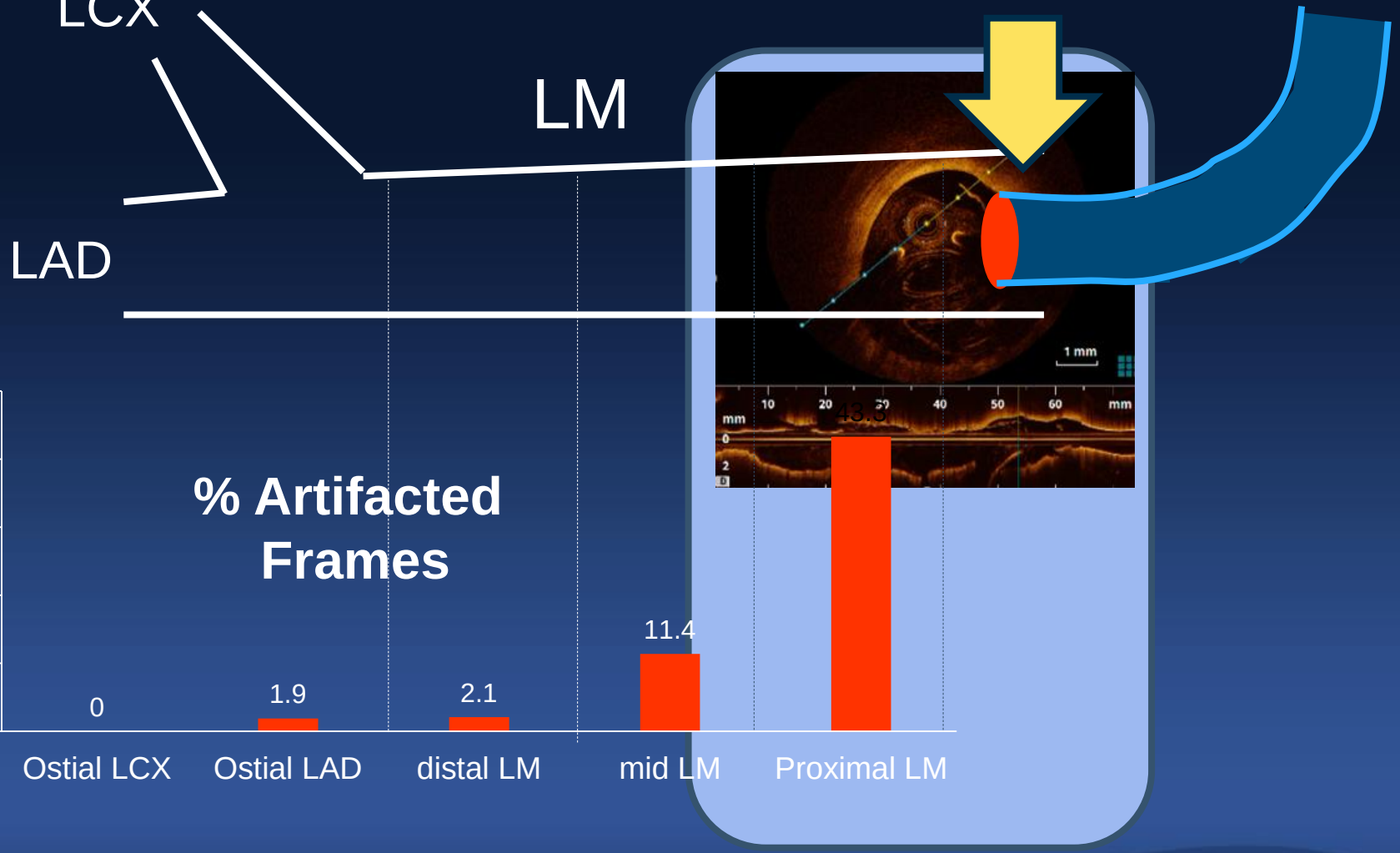






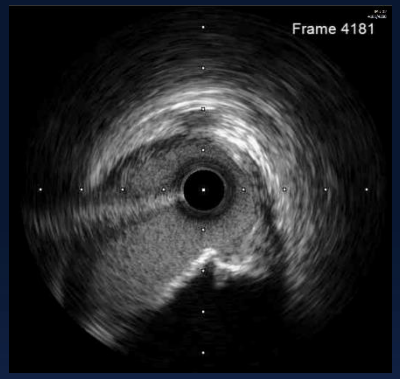
OCT for Left Main

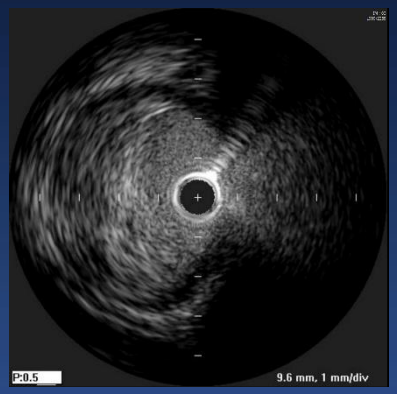
OCT systematically misses the first LM segments

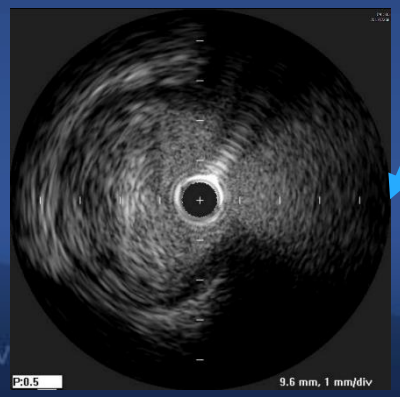


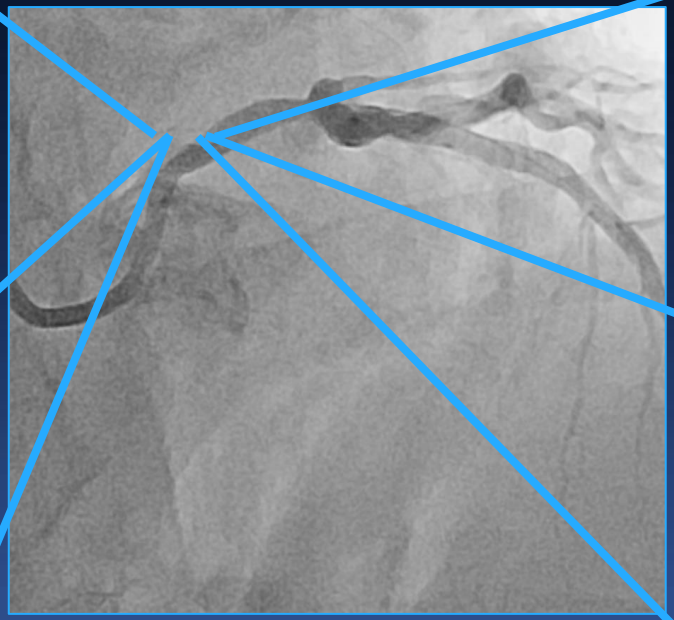
Burzotta F et al. Eurointervention 2015 Jan;10(9):e1-8

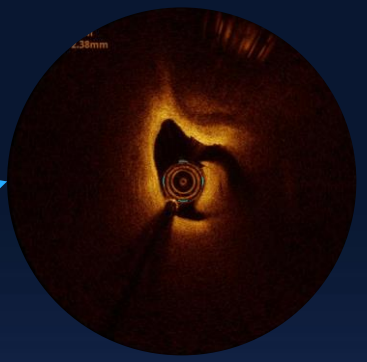
Left Main Ostium Evaluation

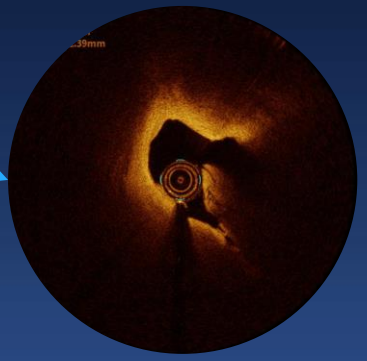


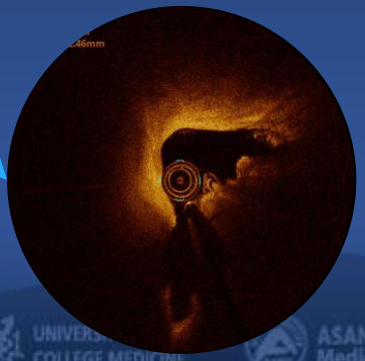




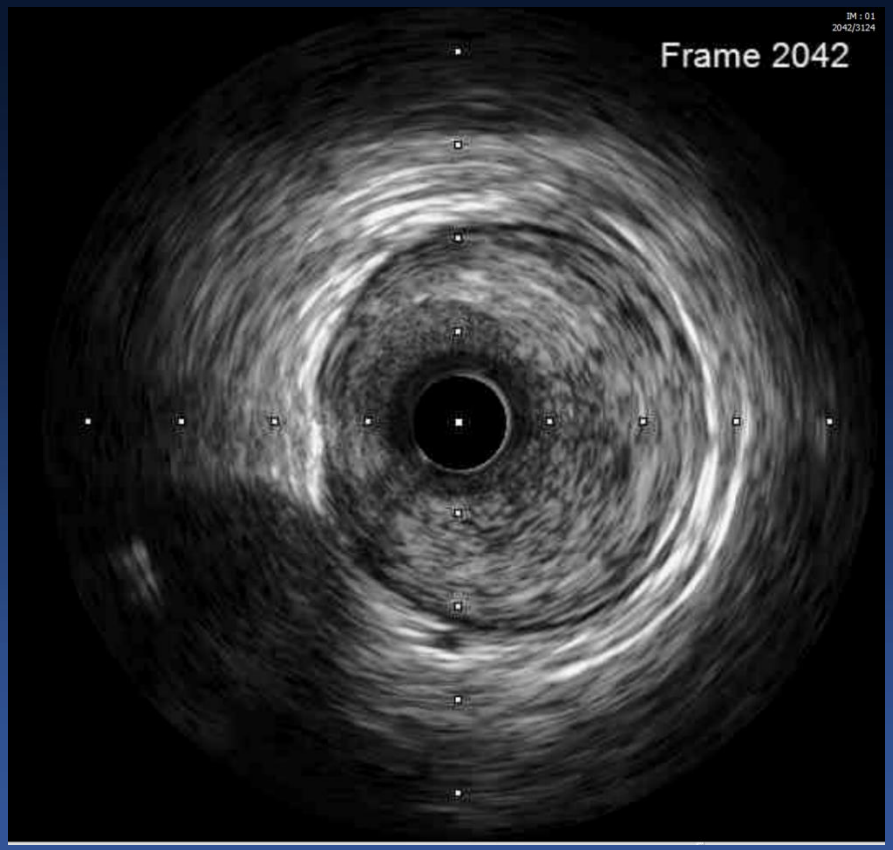


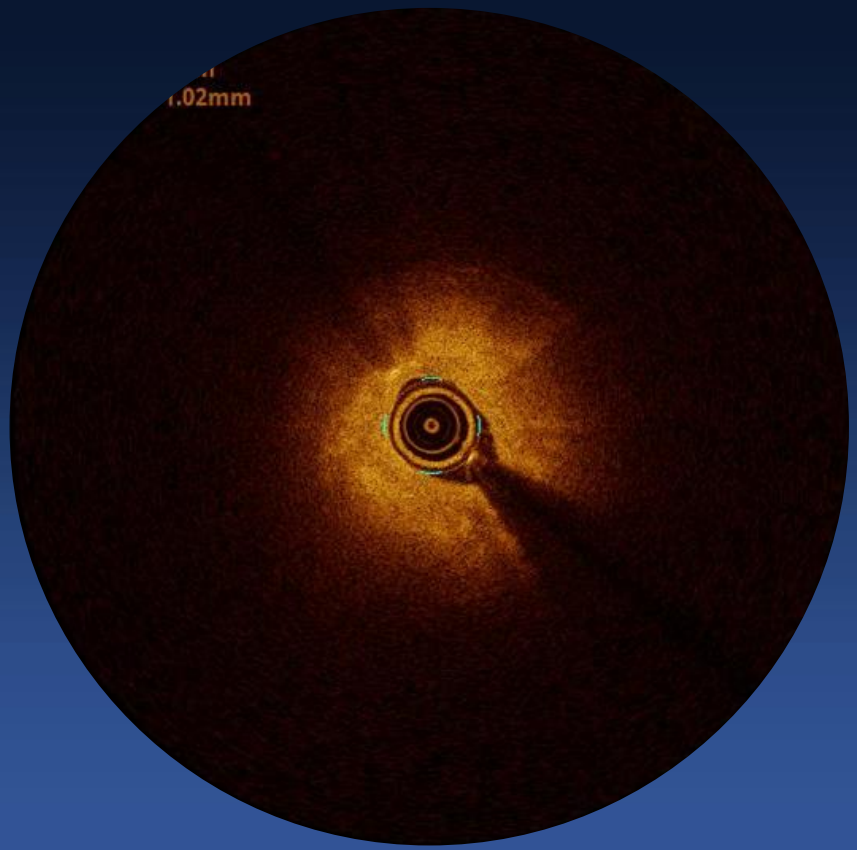






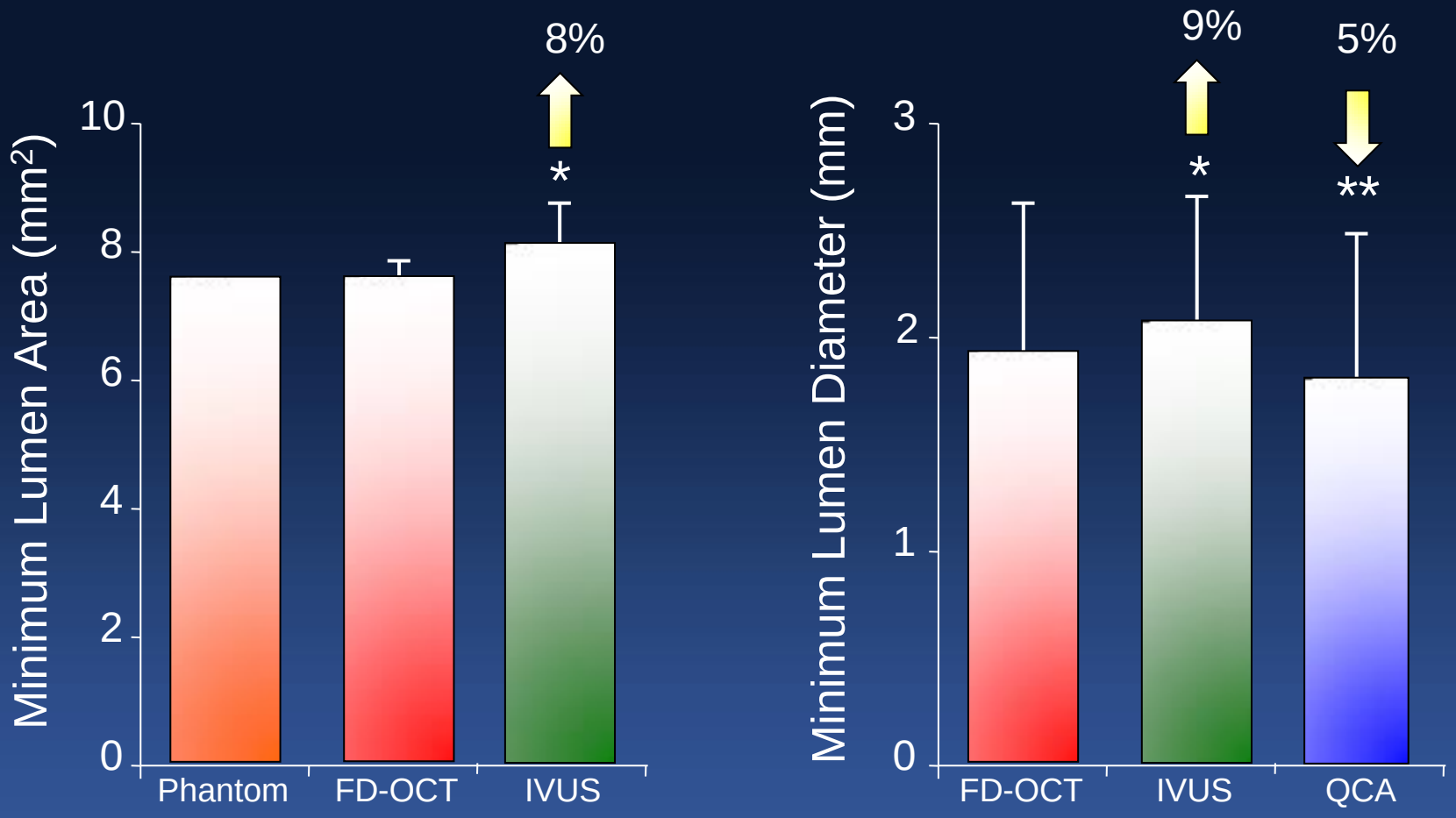
Reference Vessel Measurement





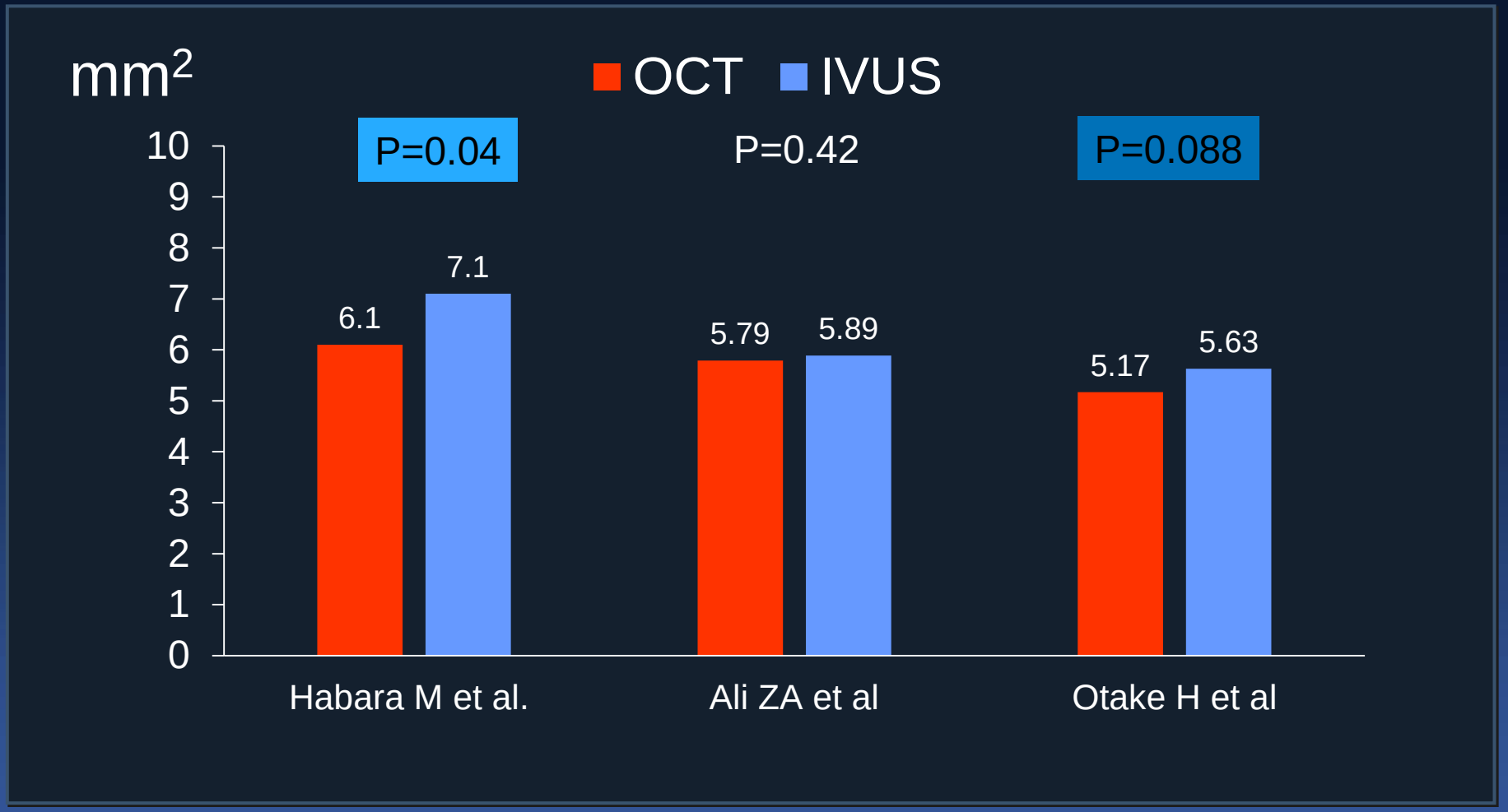
Are OCT and IVUS measurements the same?

OPUS-CLASS (Phantom vs OCT vs IVUS)



Kubo et al. iJACC 2013;6(10):1095-1104

Minimal Stent Area (*Simple Lesion*)



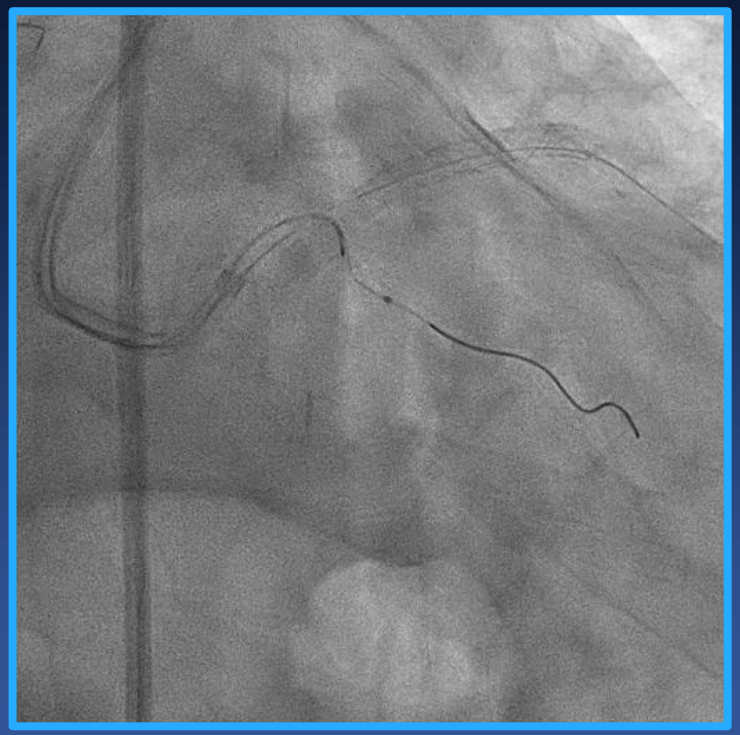
Habara M et al. Circ Cardiovasc Interv. 2012;5:193-201.

Ali ZA et al. Lancet 2016:388;2618-28

Otake H et al., 2018 Jan;11(1):111-123.

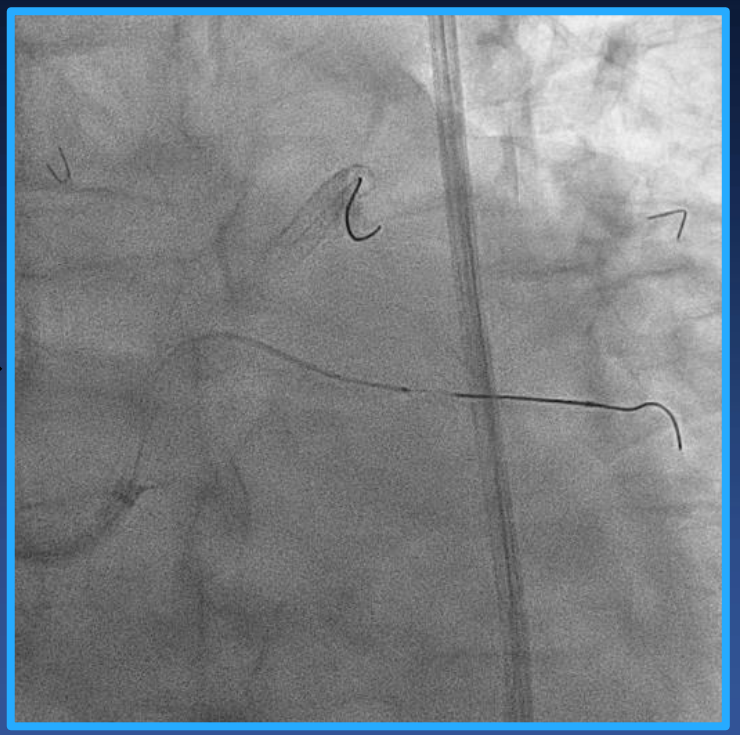
Yesterday, My LM Live Case

I want to see LCX

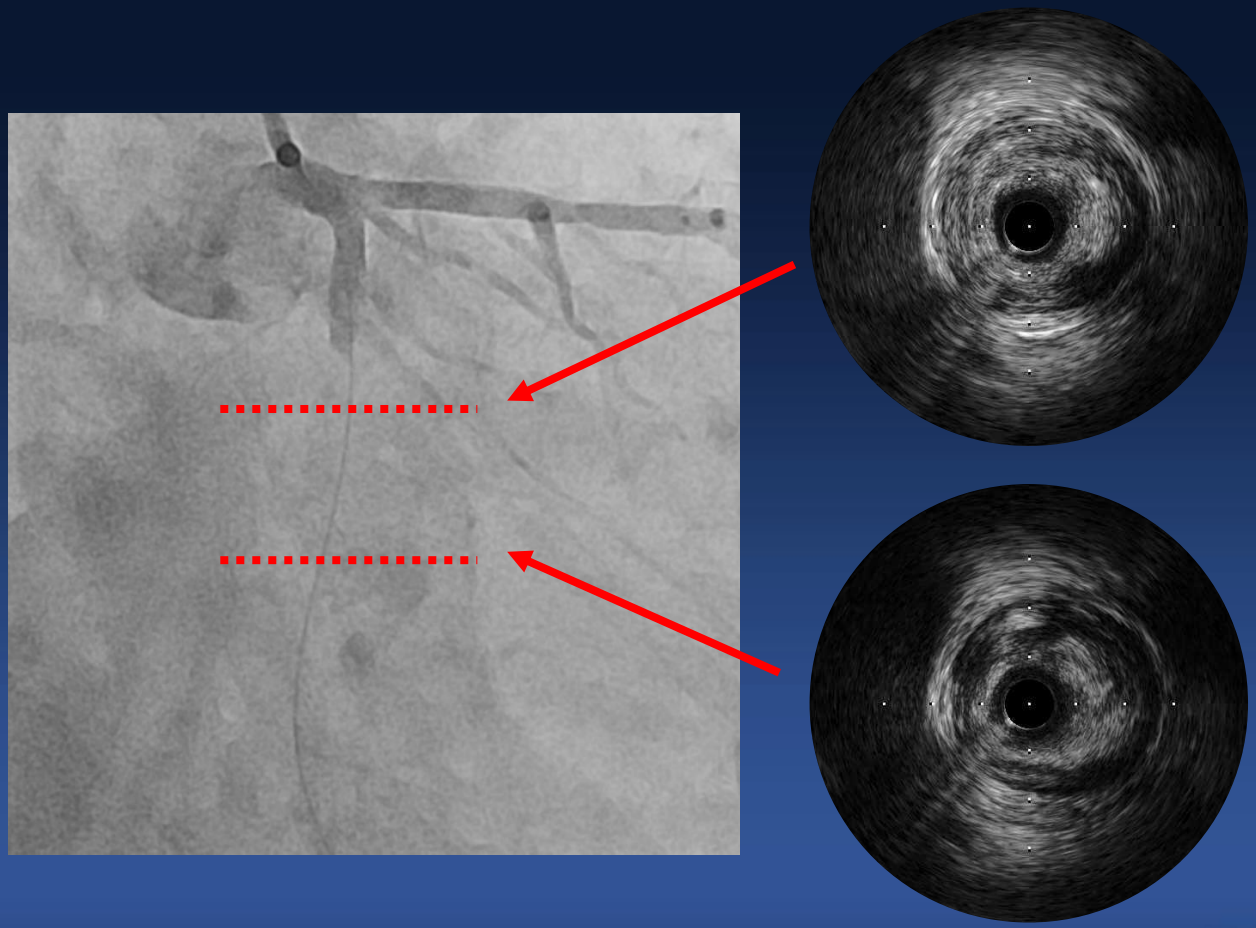


After
Repeated
Balloon

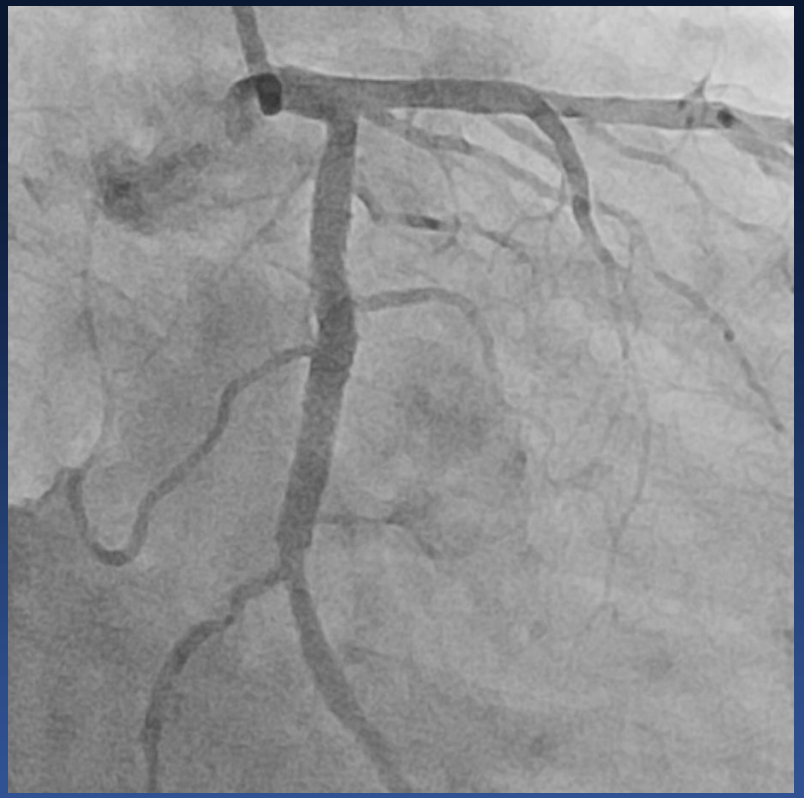
IVUS
Passed



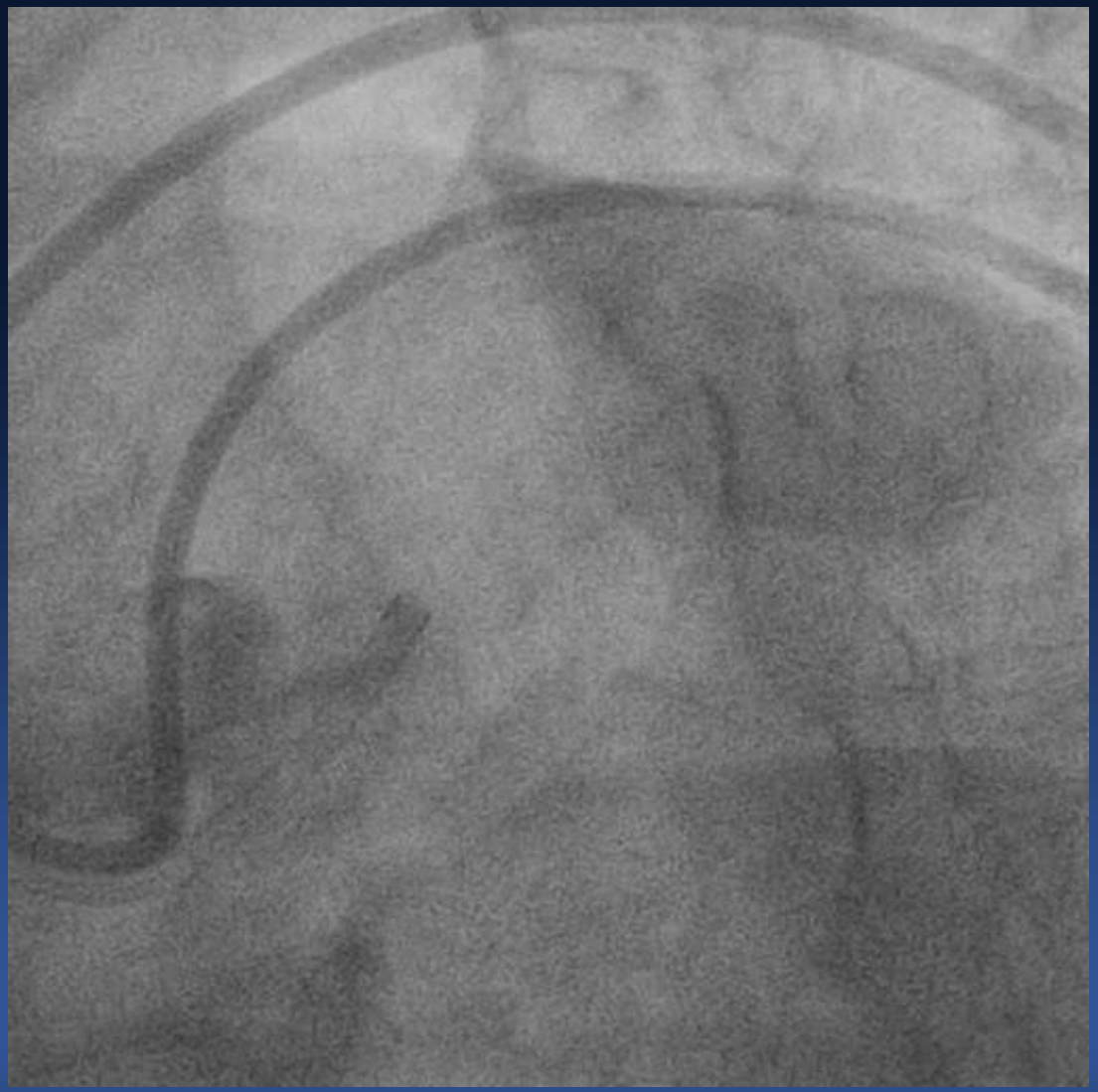
When I Can Not See Distal Even After Repeated Balloon:



When I Can Not See Distal Even After Repeated Balloon:

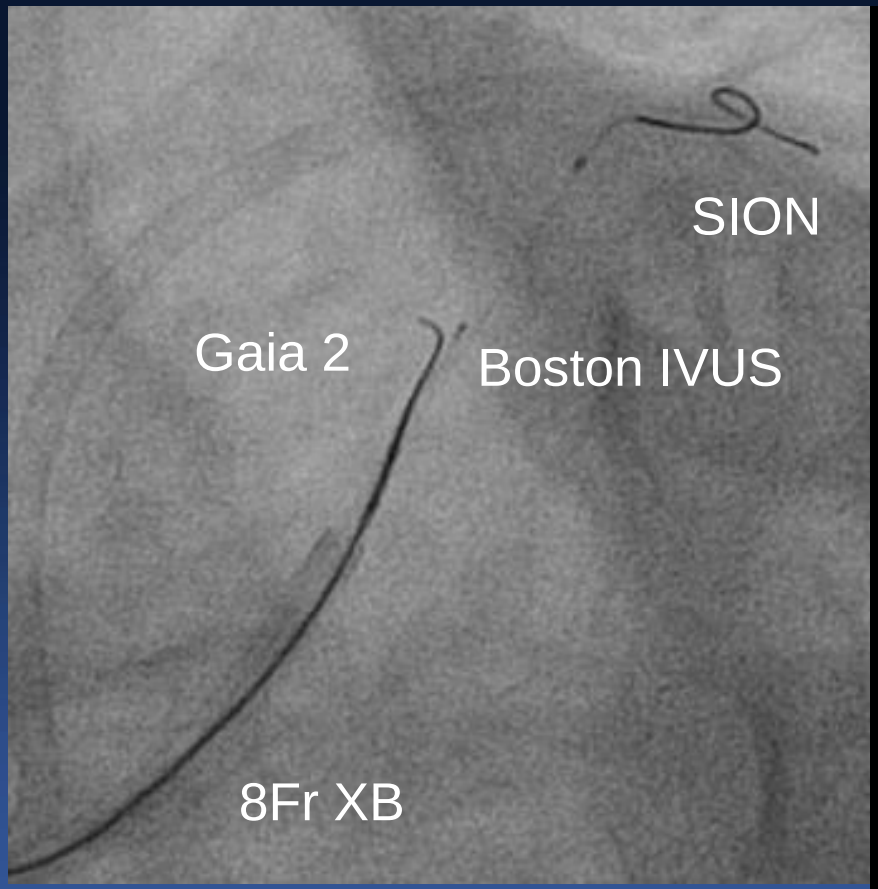


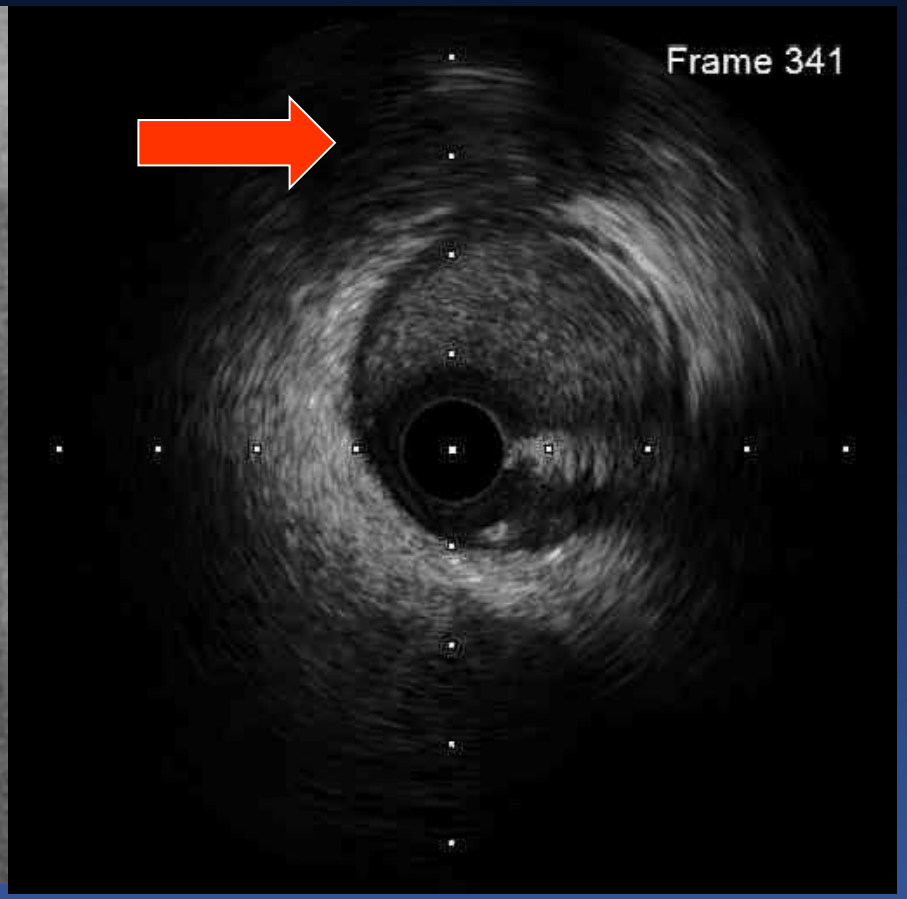
LAD CTO



Courtesy of SW Lee

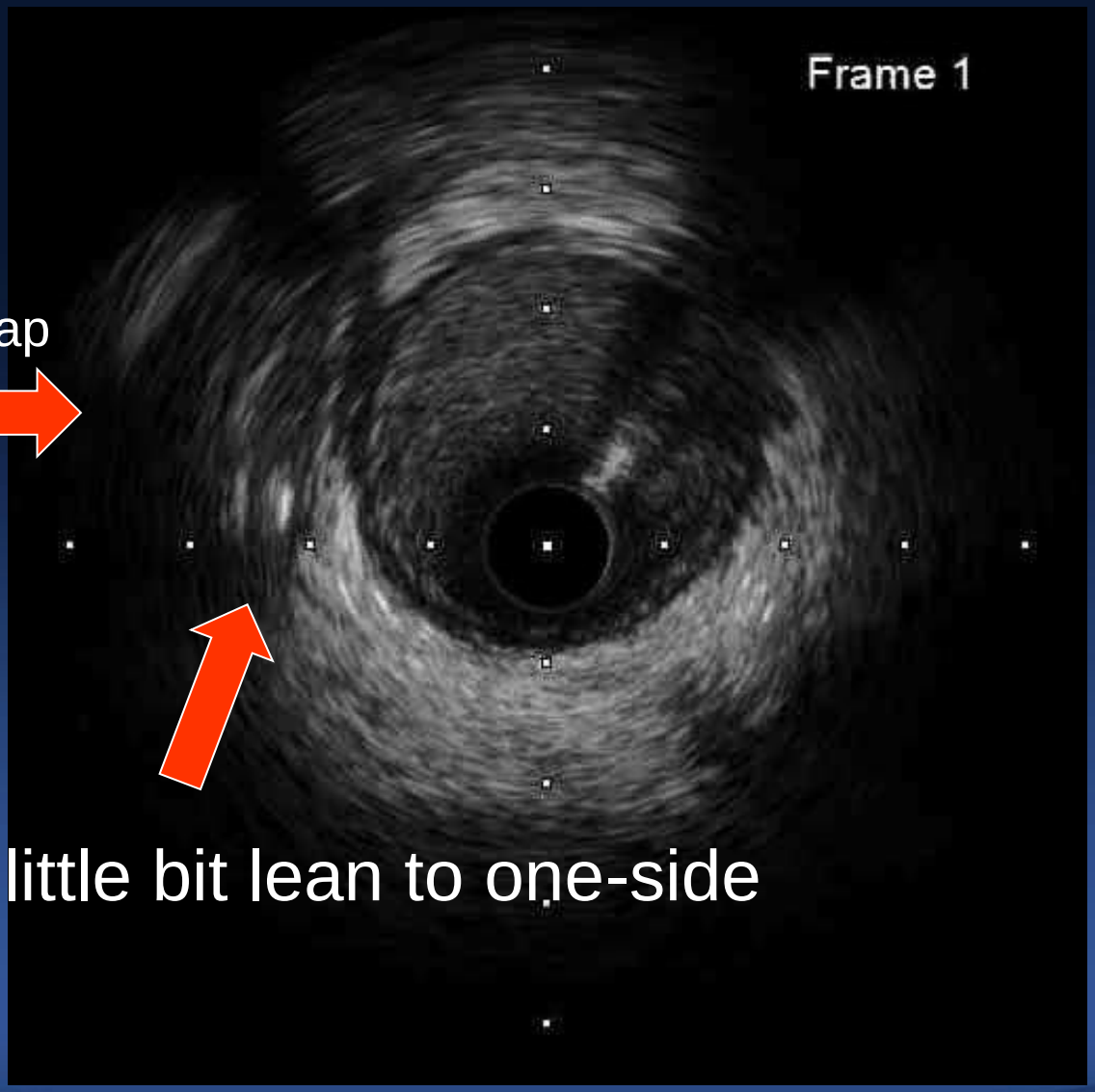
IVUS-guided puncture with real time application





Courtesy of SW Lee

IVUS pull-back from Diagonal



Gaia 2, A little bit lean to one-side

Zero Contrast Procedure with IVUS

European Heart Journal (2016) 3
doi:10.1093/eurheartj/ehw078

Imaging- and ph
coronary interv
administration i
a feasibility, safe

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Mark A. Hardy[3], David J. C
Jeffrey W. Moses[1,2], Ajay J.
and Martin B. Leon[1,2]**

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Foundation, New York, NY, USA; [3]Department of Surger
New York Presbyterian Hospital and Columbia University

Received 21 December 2015; revised 10 January 2016; accep

Aims The feasibility, safety, a
patients with advance
'zero contrast' PCI wi
(RRT) in patients with

Methods and results A total of 31 patients
erular filtration rate =
coronary angiogram w
real-time intravascular
coronary flow reserv
adverse cardiovascula
of 79 days (IQR 33–2

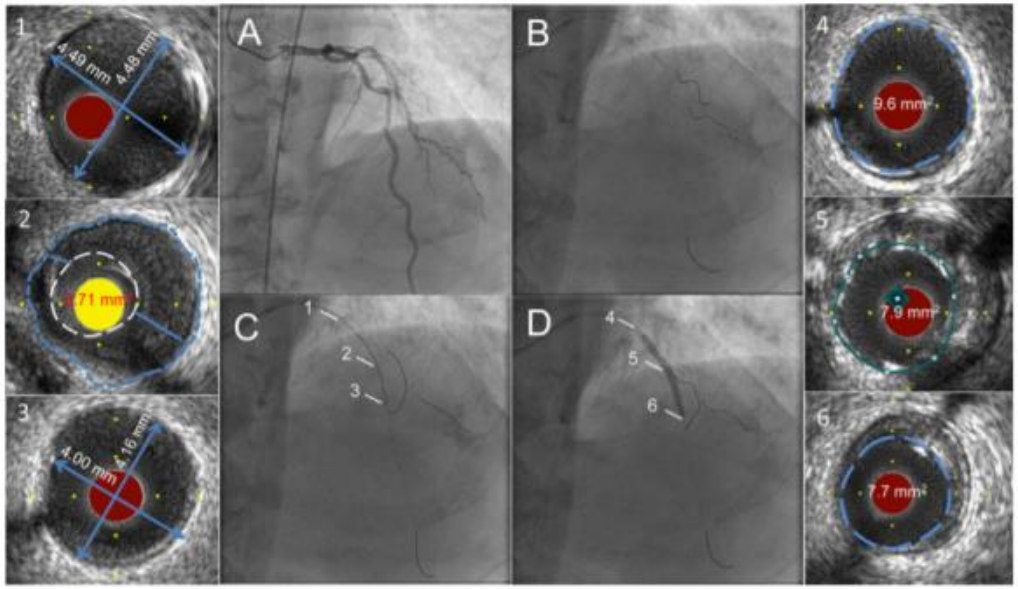
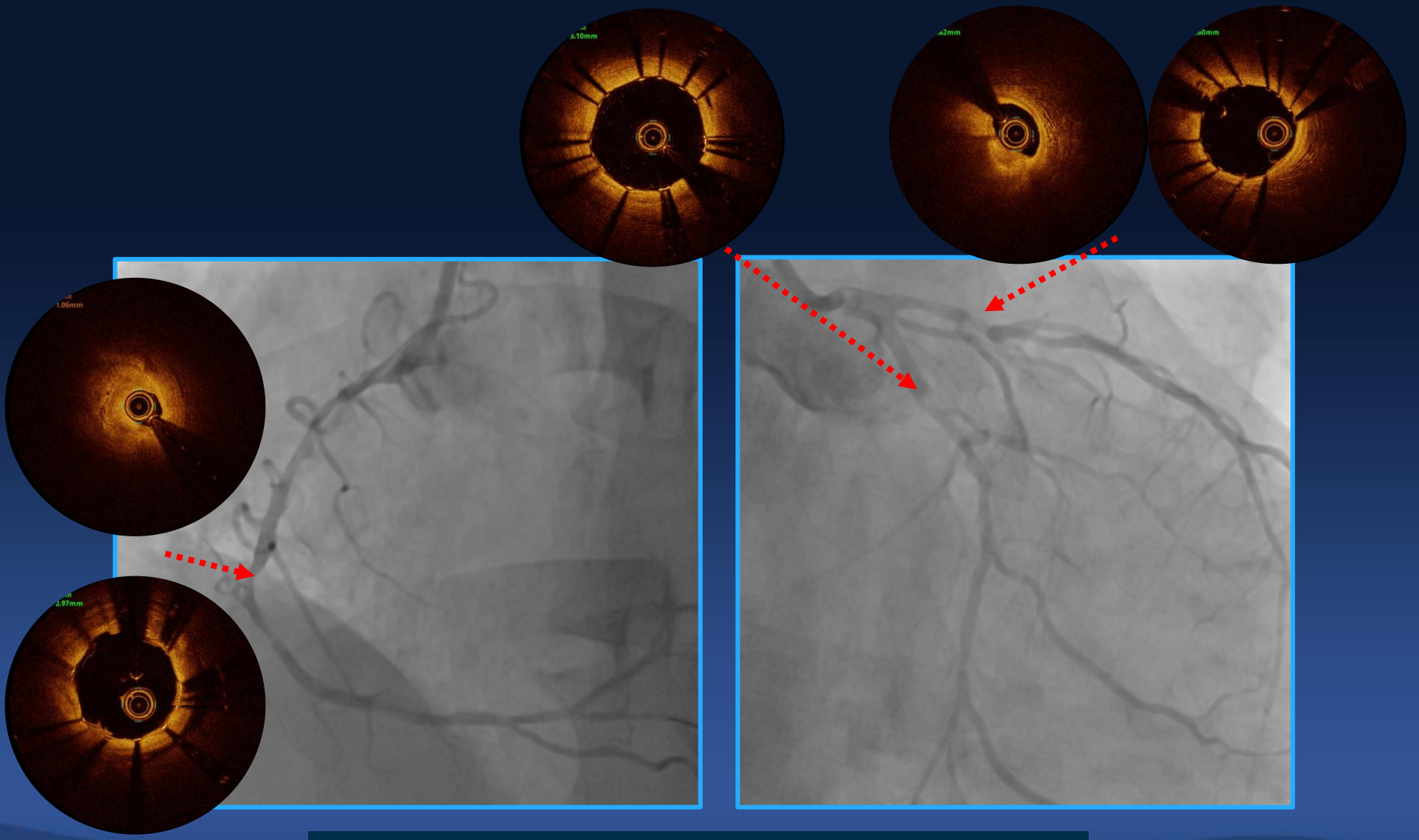


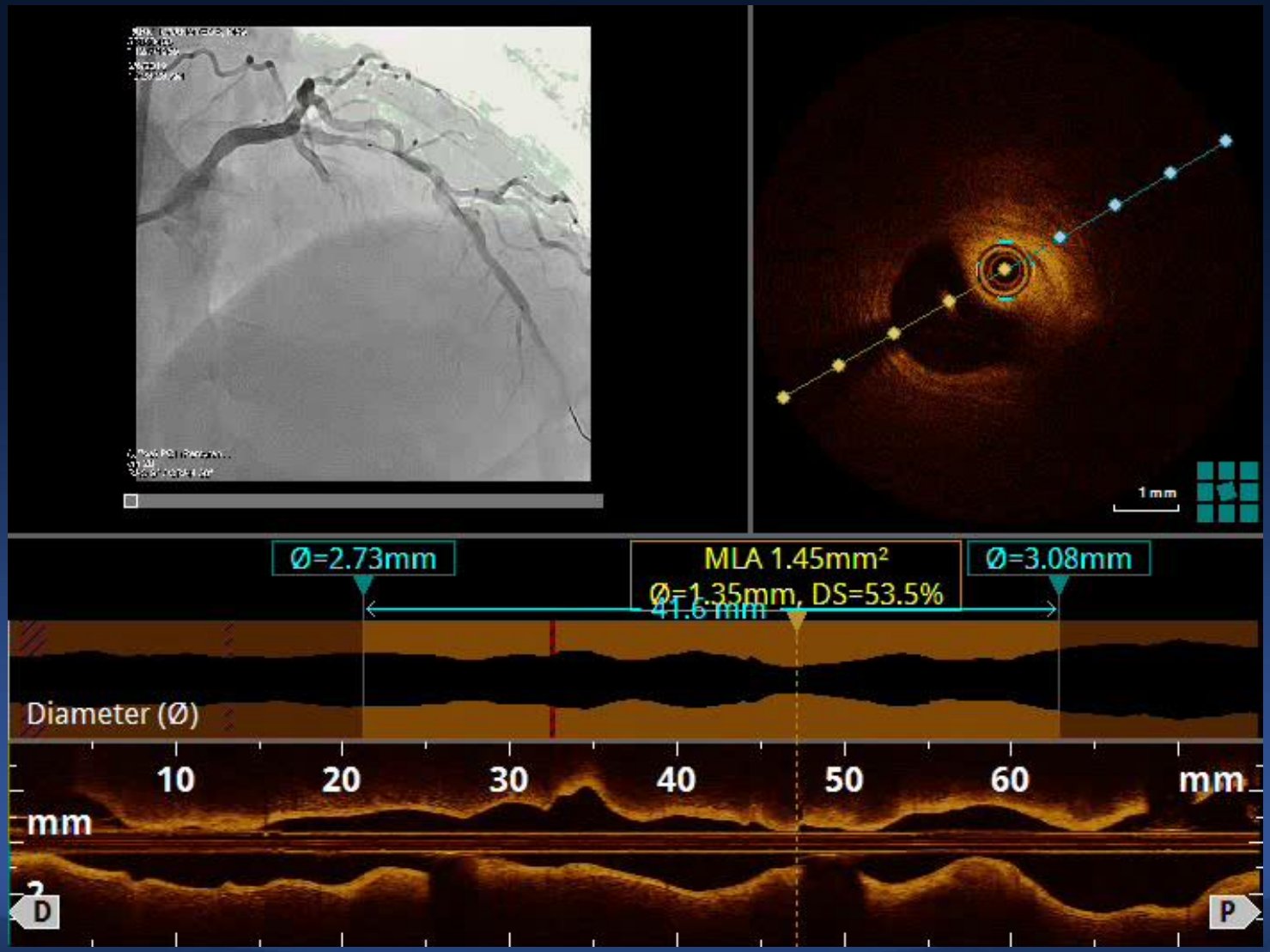
Figure 1 Ultra-low contrast coronary angiography followed by staged percutaneous coronary intervention with zero contrast. Cine images recorded at the initial angiography using ultra-low contrast volume are displayed on adjoining screen during the staged percutaneous coronary intervention (*A*) and used to guide catheter engagement, coronary guide wire placement in the left anterior descending artery, diagonal branch, and the circumflex artery, thus creating a metallic silhouette of the left coronary system (*B*). Intravascular ultrasound imaging of the left anterior descending artery is performed with proximal reference diameter (≈4.5 mm) (1), minimal luminal area (3.71 mm^2) (2), and distal reference diameter (≈4.0 mm) (3) measured for selection of the appropriate pre-dilation balloon and stent sizes. The co-registered dry cine image of intravascular ultrasound transducer placed at the distal reference (*C*) is used to guide the percutaneous coronary intervention. Following preparation of the lesion and deployment of a 3.5 × 38 mm drug-eluting stent (*D*), intravascular ultrasound is repeated to assess the result, to determine the proximal (9.6 mm^2) (4) and distal (7.7 mm^2) (6) reference areas, and to guide post-dilation of under-expanded segments to achieve the pre-determined MSA, defined as >90% of the mean of the proximal and distal reference areas, (7.9 mm^2) (5).

3 vessel PCI with OCT

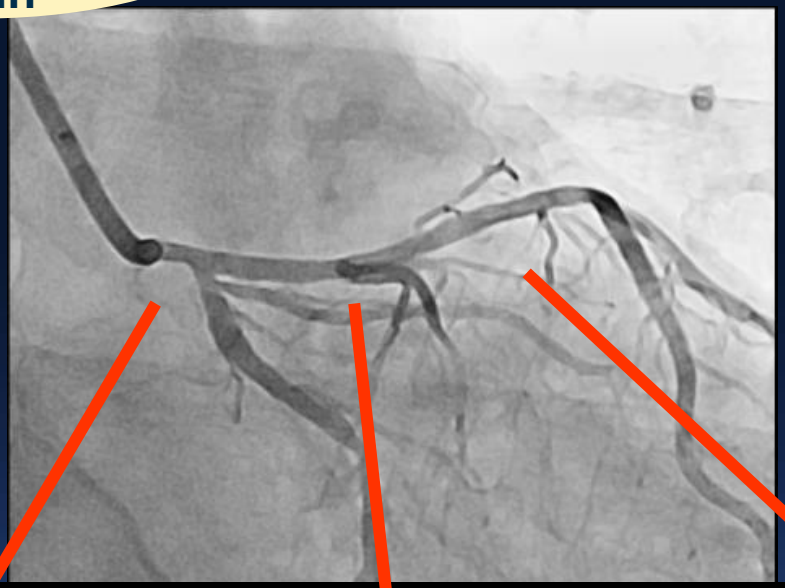


Total Contrast Volume: 500cc

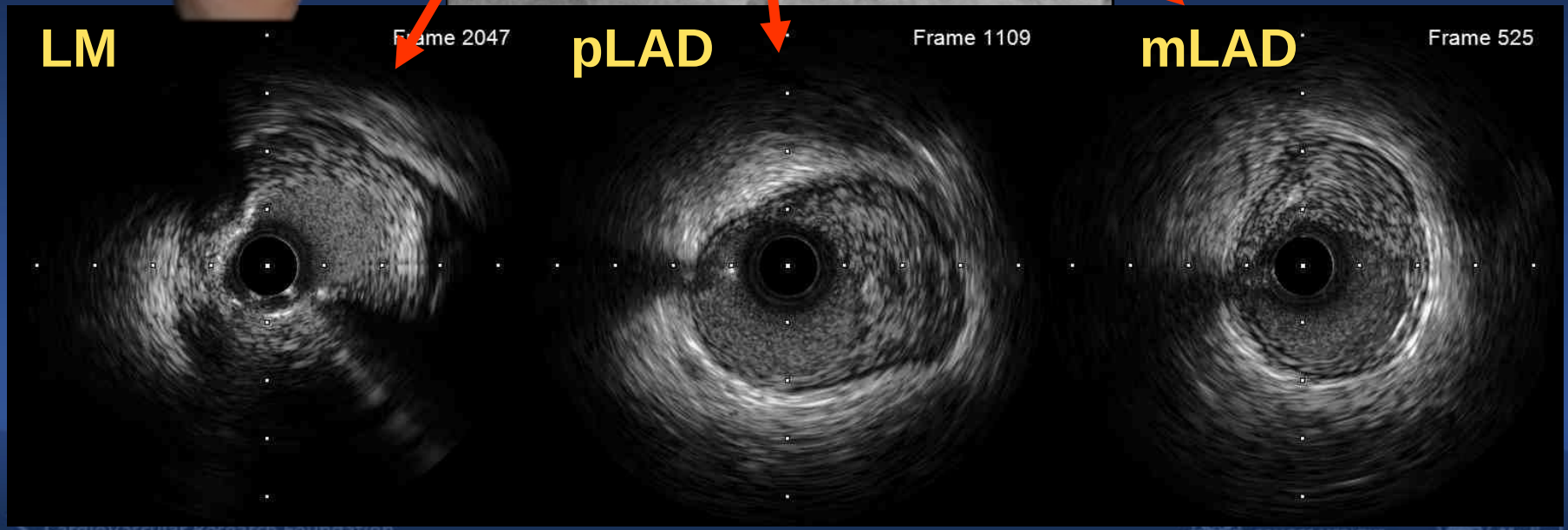
Beautiful OCT Co-registration



IVUS



We Need Training



Why IVUS,

- Scientific Evidence
- Vessel Size: bigger stent
- No-Contrast
- Real Time Guidance and Manual Pull-Back
- Complex Procedure and Complex Situation

  LM and Multivessel Disease
- IVUS is like old friend, When I am in trouble, it helps me

  A friend in need is a friend indeed…..
- For simple lesion and simple situation, you can use OCT.


서울아산병원
Thank you.