

An architectural rendering of a large, modern hospital complex. The main building is a tall, multi-story structure with a glass facade and a distinctive curved top. In the foreground, there are several smaller, modern buildings with large windows and glass facades. The hospital is surrounded by a landscaped area with many trees and a paved walkway. The sky is overcast with grey clouds.

# Integrated Use of Coronary Physiology and Imaging

**NAM, Chang-Wook MD PhD**

Keimyung University Dongsan Hospital



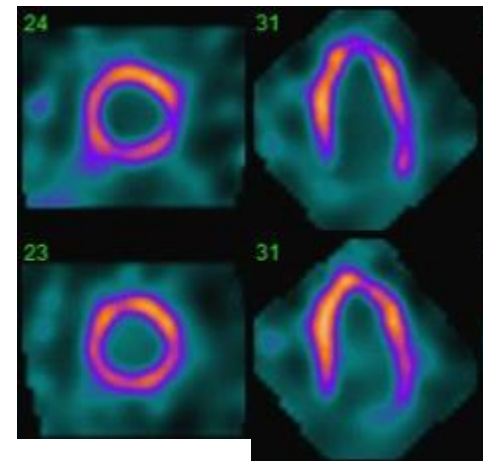
# Disclosure

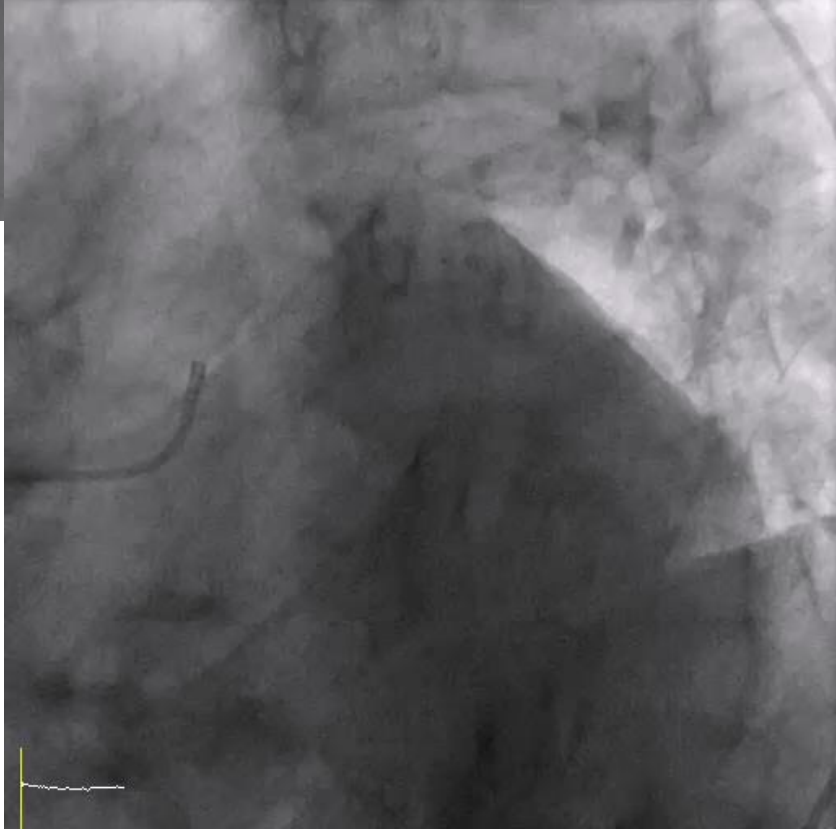
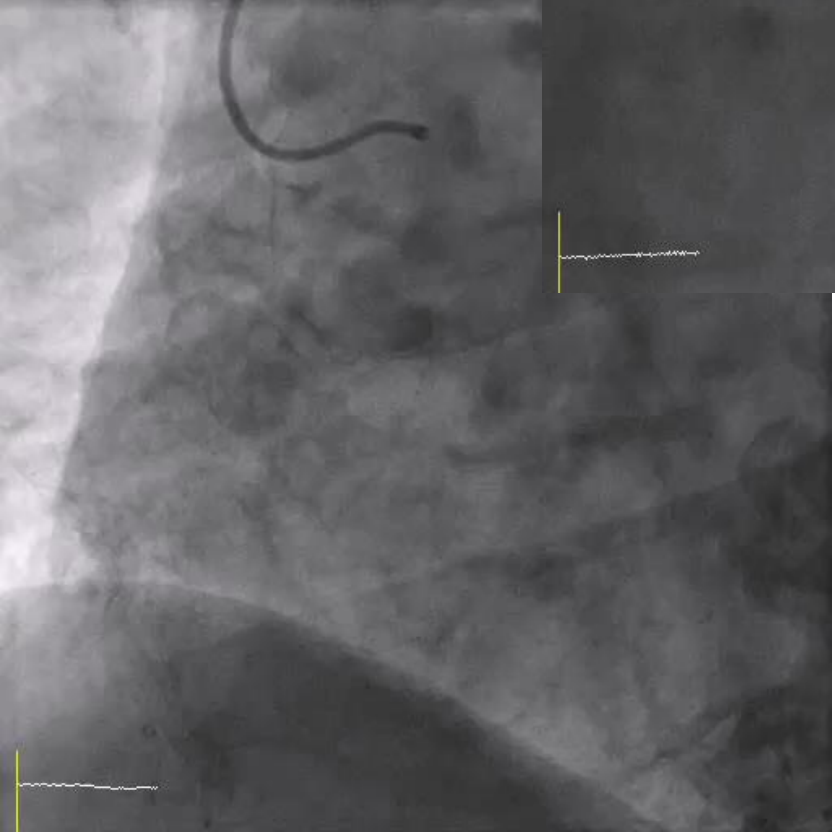
✓ None for this presentation



# Patient Profile

- ✓ 62 / Male
- ✓ C/C : recently redeveloped effort angina  
SA (2007.07.04): DES 4.0x15mm for mid RCA  
medical Tx for distal LCX CTO
- ✓ P/Hx : HTN, 30 yrs  
CGN CKD, 1yr
- ✓ SPECT: reversible at lateral wall







# How to integrate Physiology and Imaging

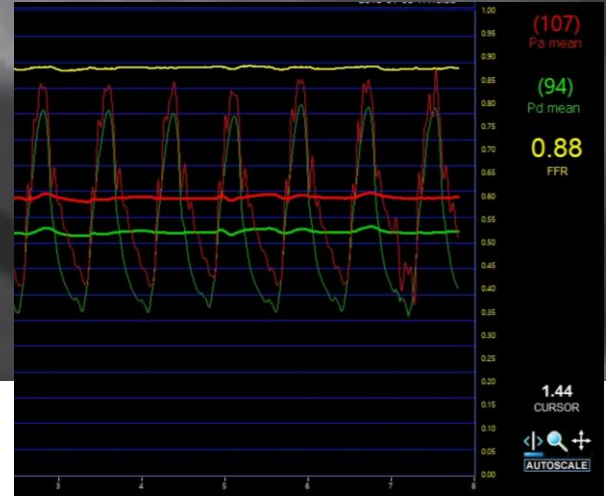
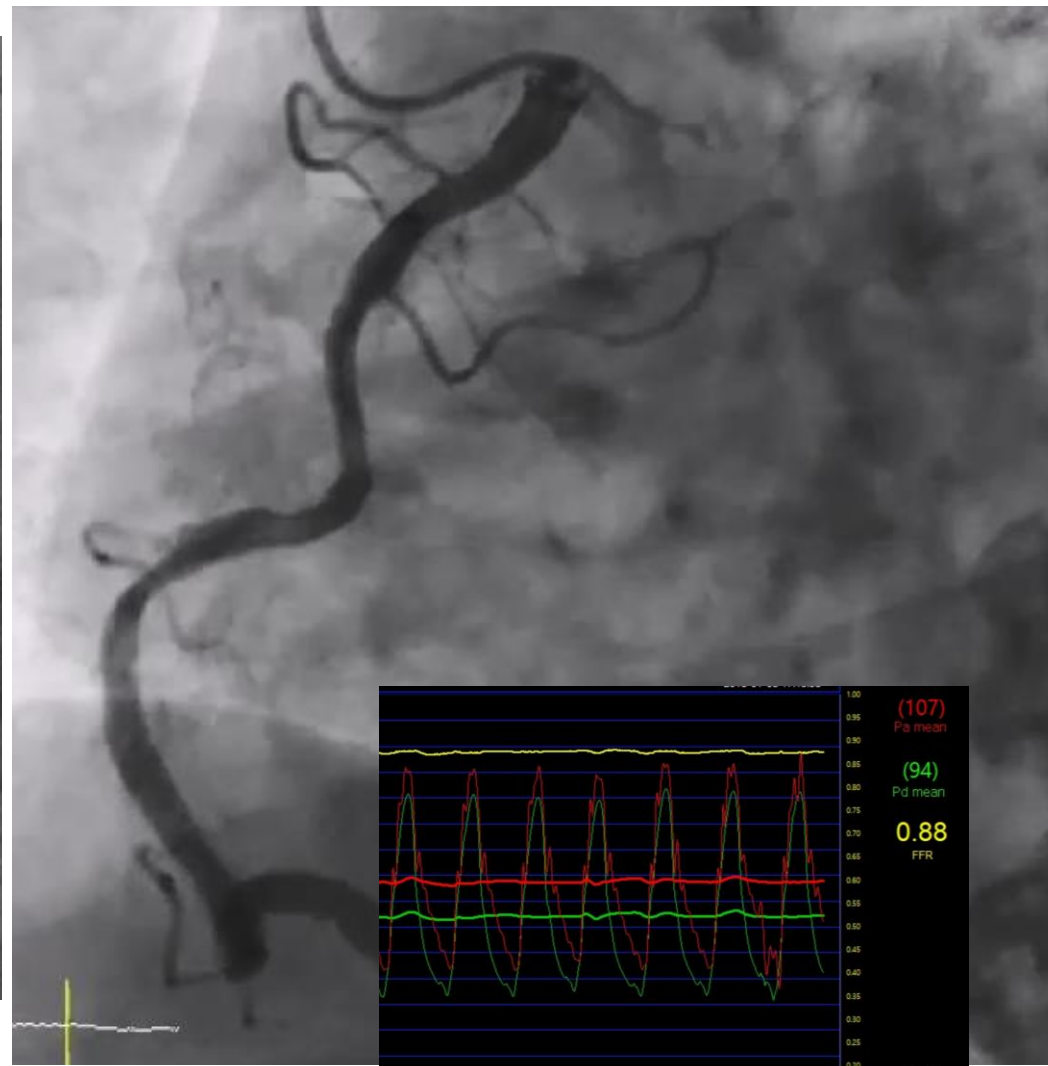
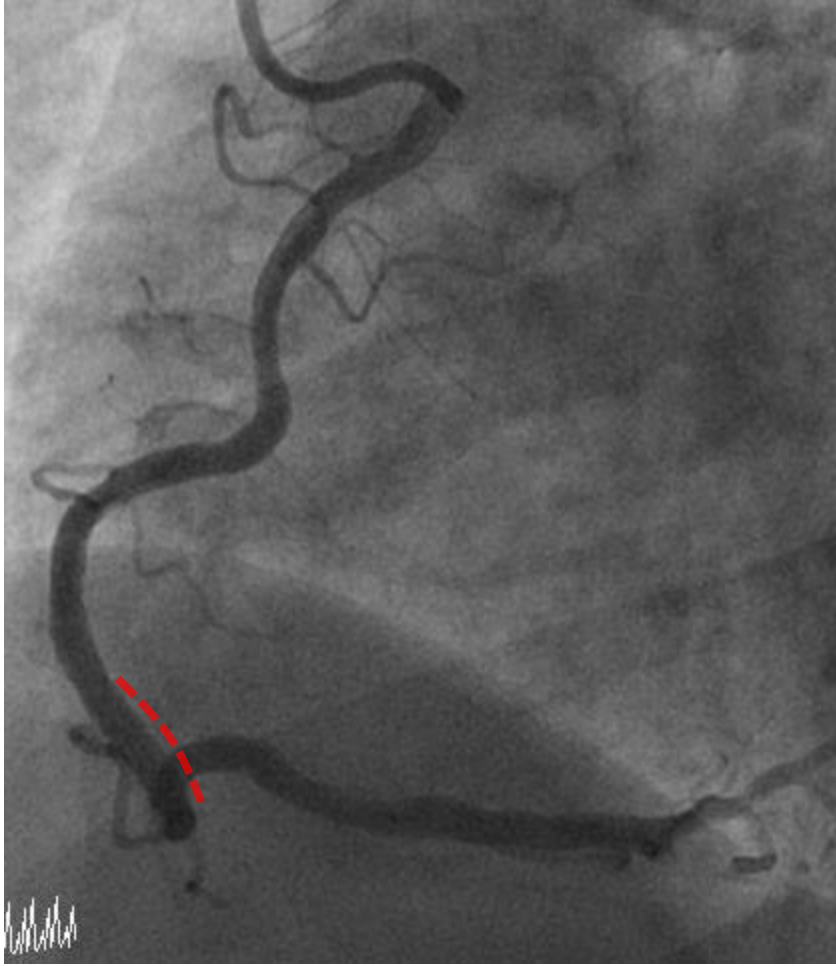
01

**Physiology-guided decision making for whether treat or not, and where to treat**



# RCA

# FFR

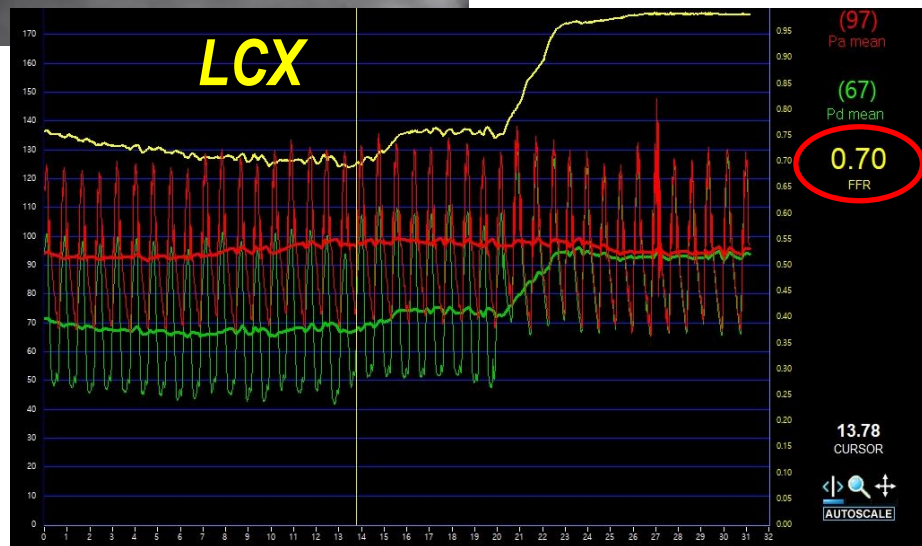
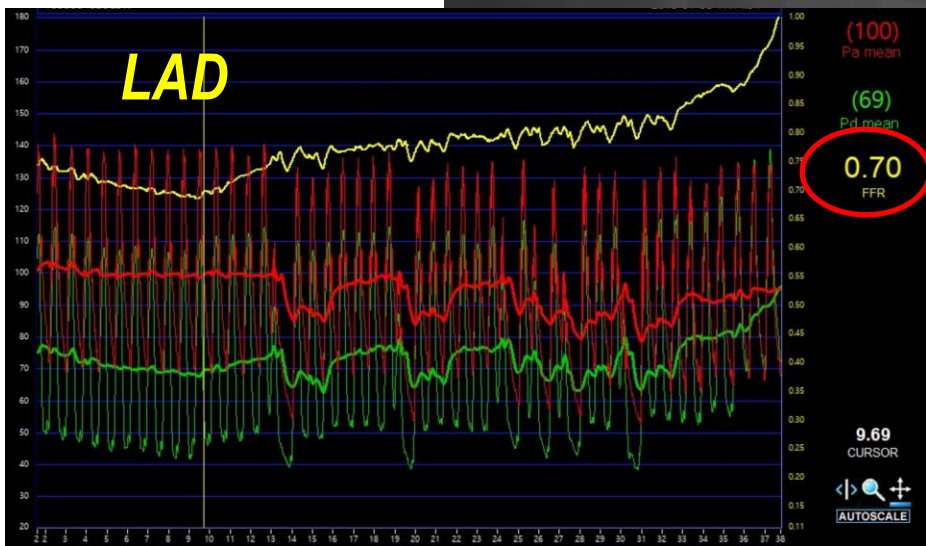
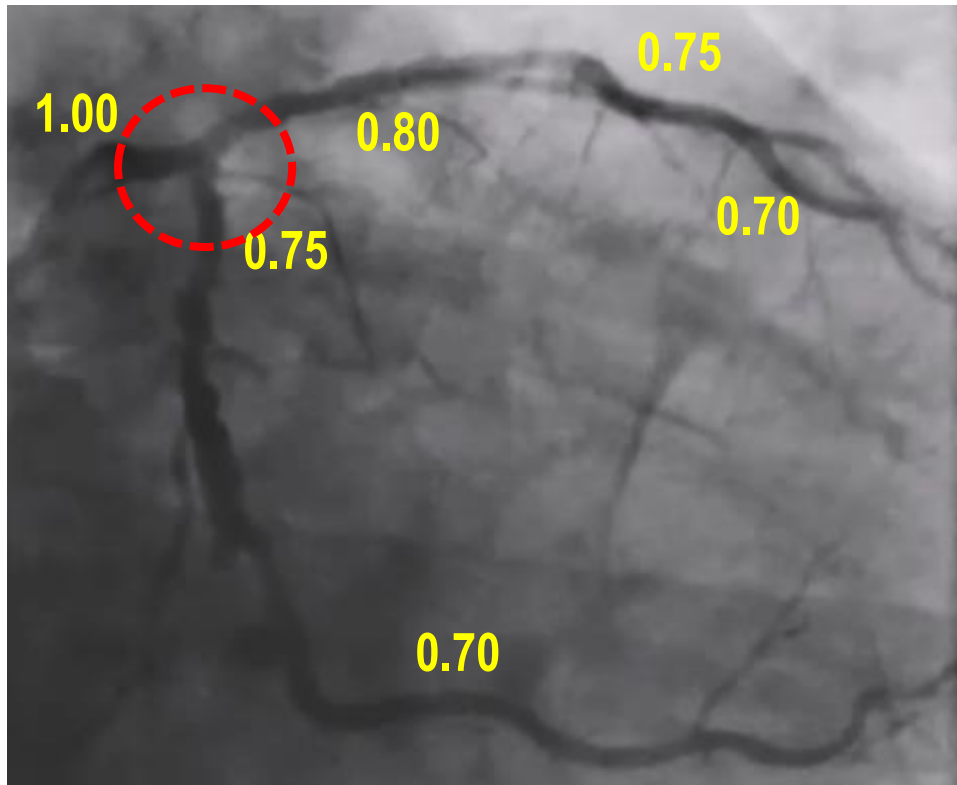


2007. 7. 4.





# LCA





# How to integrate Physiology and Imaging

01

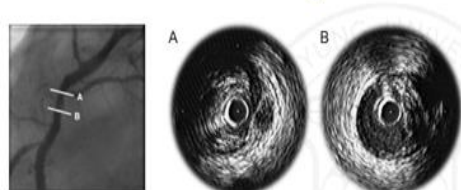
Physiology-guided decision making for whether treat or not, and where to treat

02

Imaging-guided decision making for how to treat

➔ Target lesion / device / procedure selection...

## Evaluation of Plaque Composition 'Attenuated Plaque'

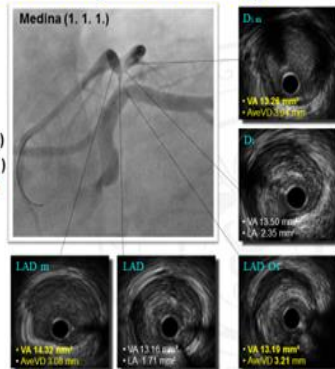


- 68Y.O. / Female
- Hypertension (4Y)
- Obesity (BMI 25.1)
- *Unstable Angina*

- defined as *hypochoic plaque* with *deep ultrasound attenuation* without calcification or very dense fibrous plaque
- associated with a higher C-reactive protein level, more severe and complex lesion morphology, *no-reflow* after PCI

Lee SY. JACC Intv 2009;2:65-72 Keimyung University, Korea

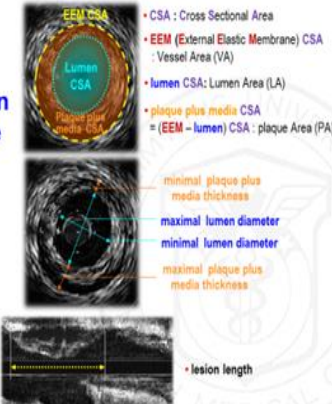
## Decision of Optimal Strategy



## Determination of Stent Size and Length



Keimyung University, Korea

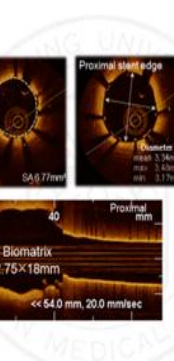
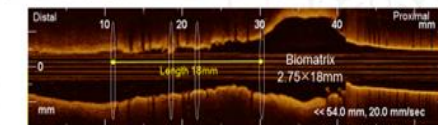
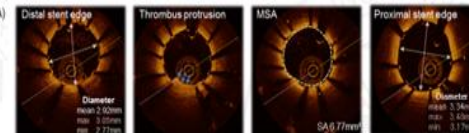


- CSA : Cross Sectional Area
- EEM (External Elastic Membrane) CSA : Vessel Area (VA)
- lumen CSA: Lumen Area (LA)
- plaque plus media CSA = (EEM - lumen) CSA : plaque Area (PA)
- minimal plaque plus media thickness
- maximal lumen diameter
- minimal lumen diameter
- maximal plaque plus media thickness
- lesion length

Minz GS et al. JACC 2001;37:1478-92 Keimyung University, Korea

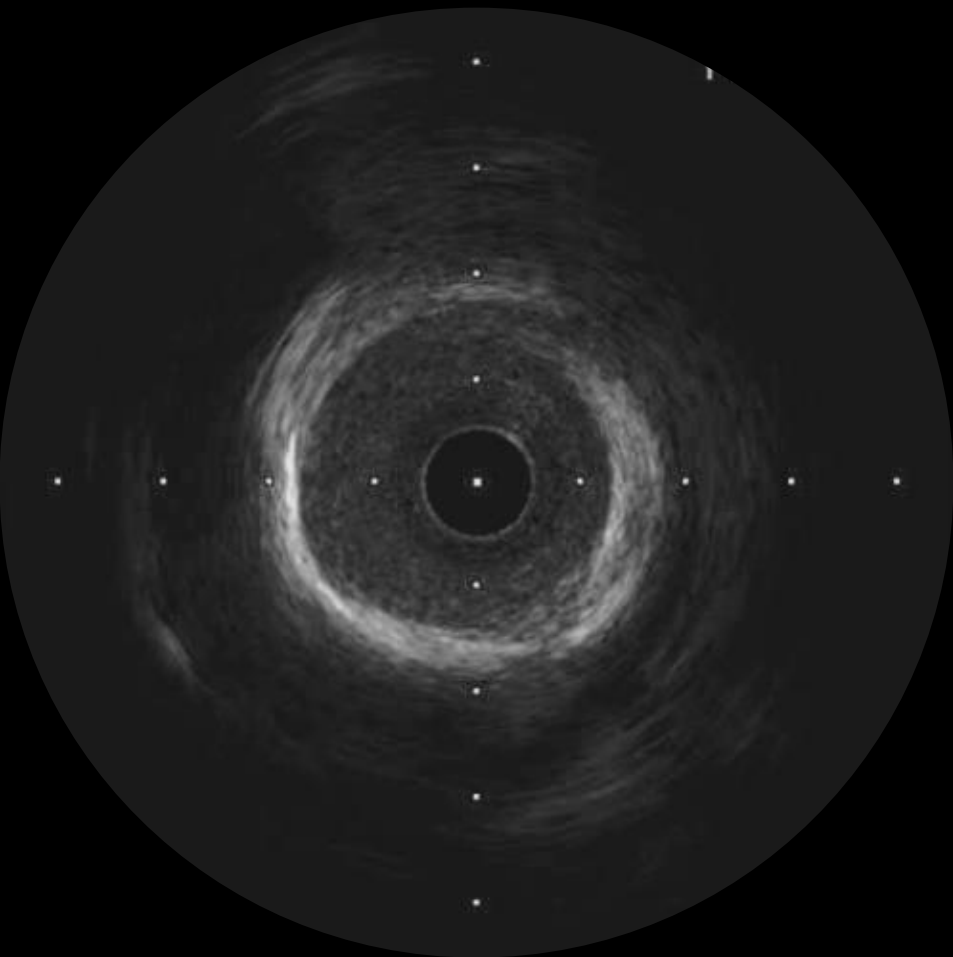
## Post-PCI Quantitative Measurement

63YO/M, NSTEMI

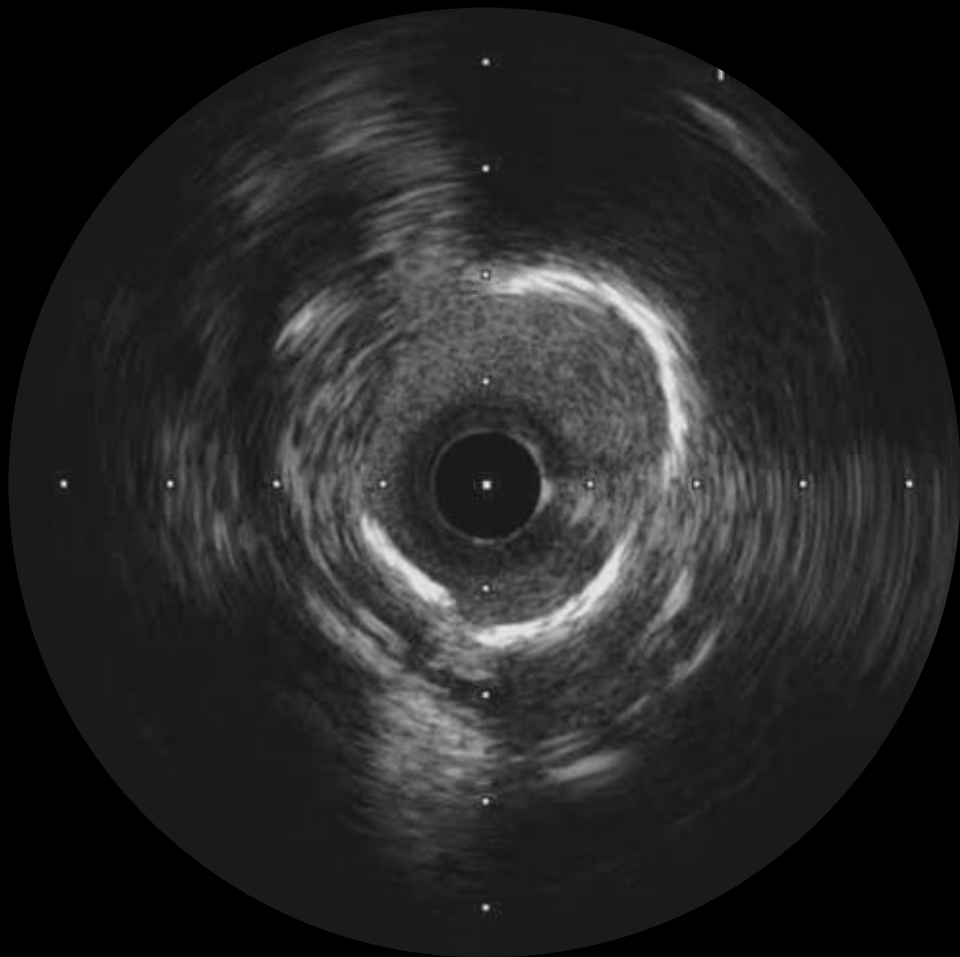




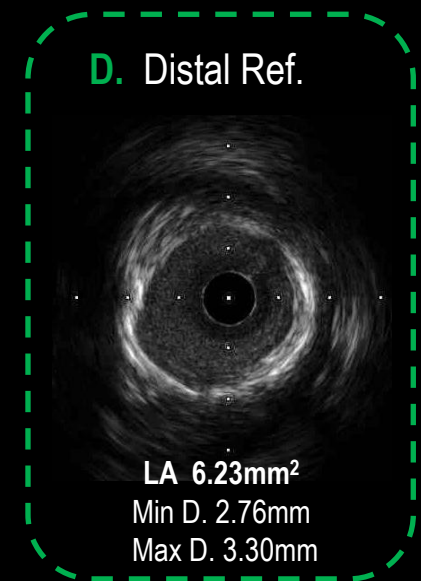
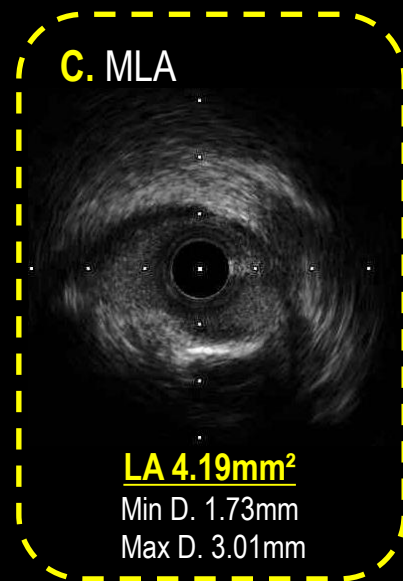
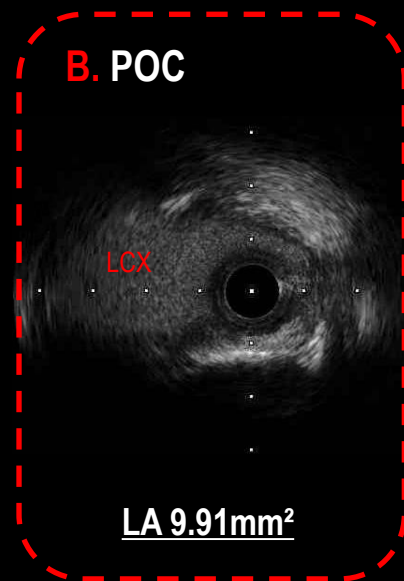
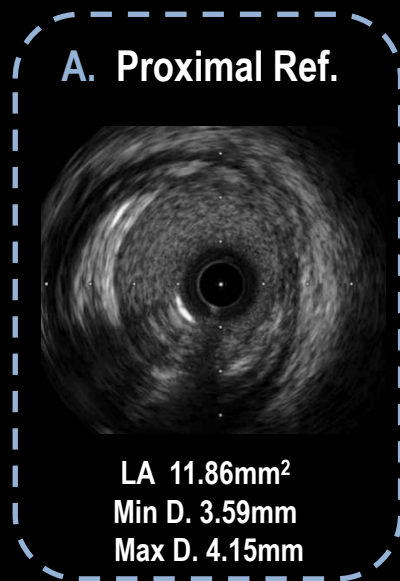
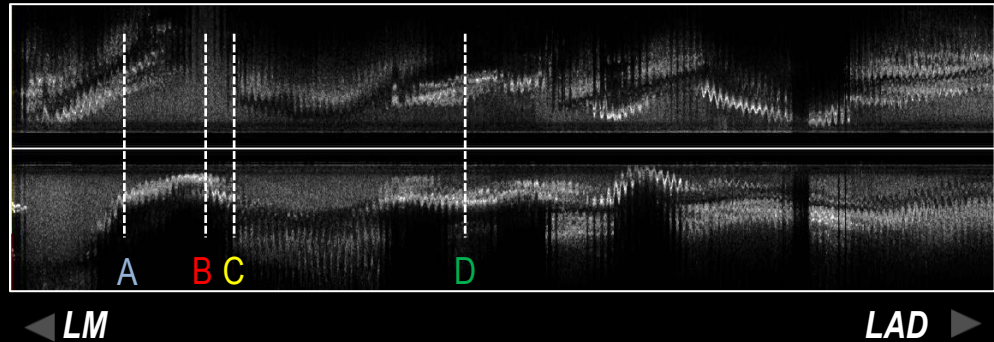
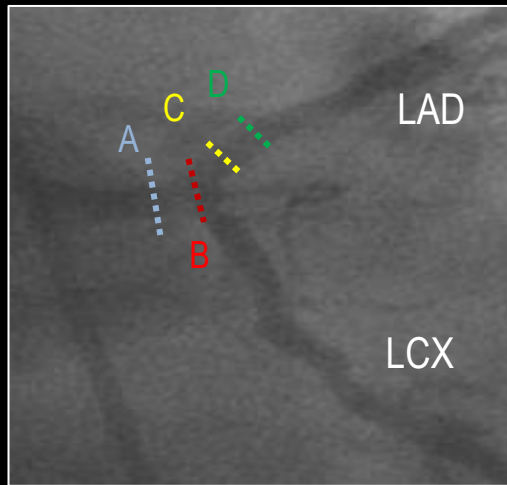
**IVUS from LAD to LM**



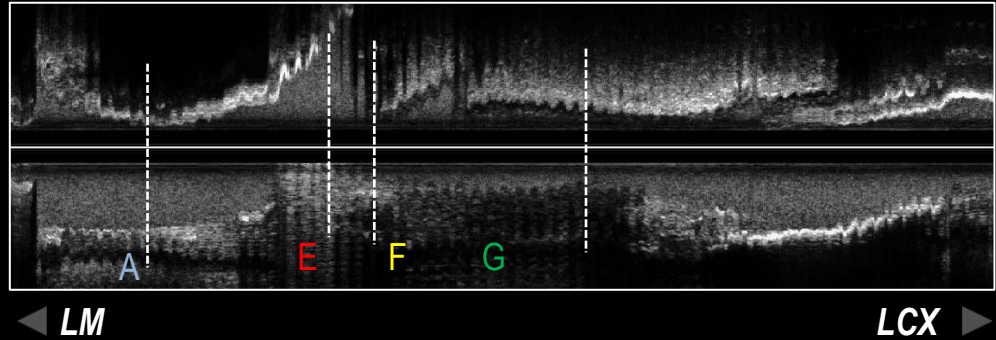
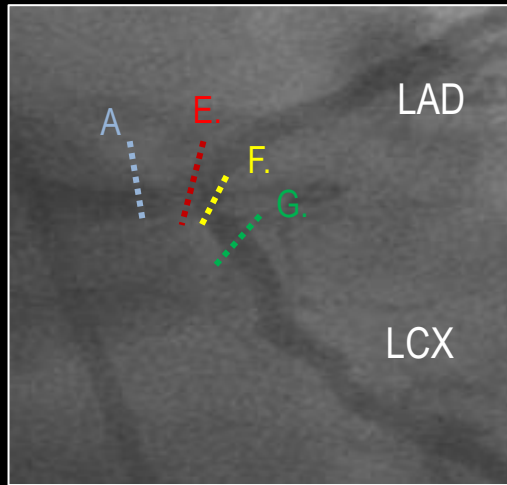
**IVUS from LCX to LM**



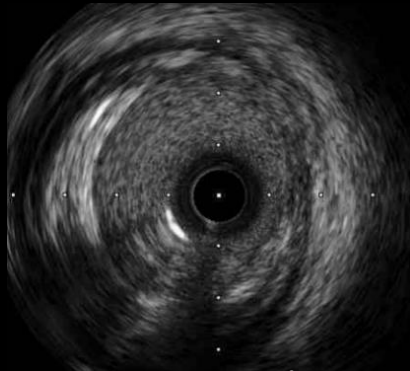
# IVUS from LAD to LM



# IVUS from LCX to LM

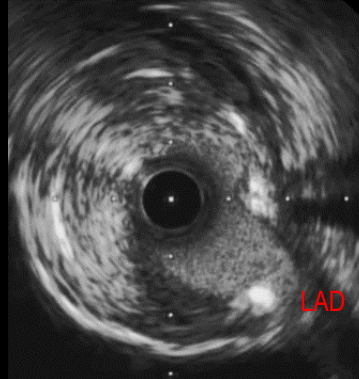


**A. Proximal Ref.**



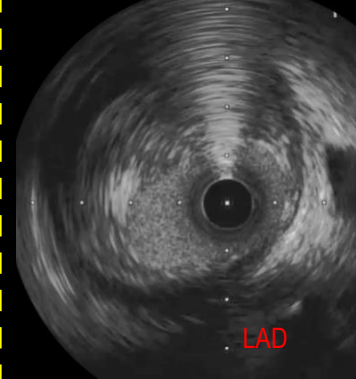
LA 11.86mm<sup>2</sup>  
Min D. 3.59mm  
Max D. 4.15mm

**E. Ostial LCX**



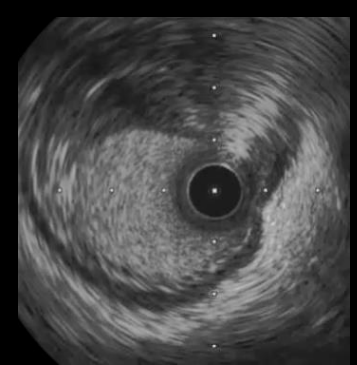
**LA 3.91mm<sup>2</sup>**

**F. Prx. LCX**



**LA 4.51mm<sup>2</sup>**  
Min D. 2.18mm  
Max D. 3.68mm

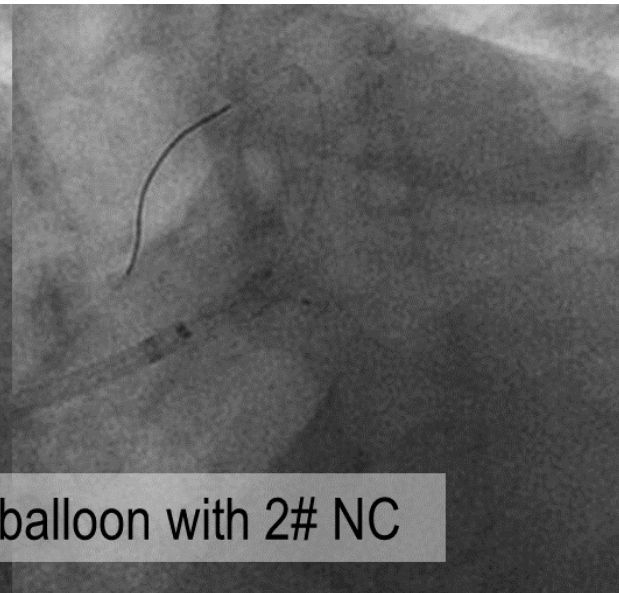
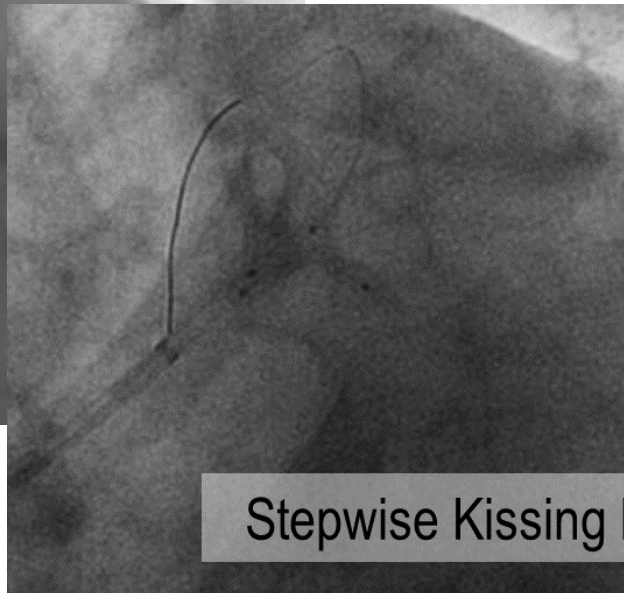
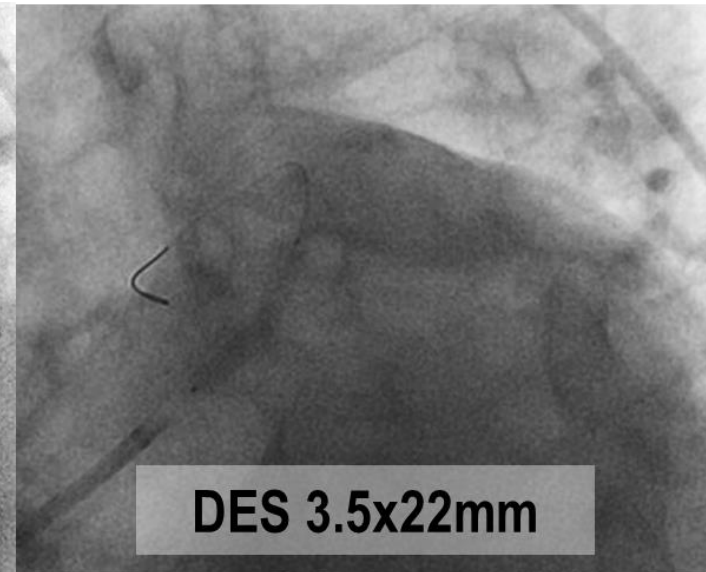
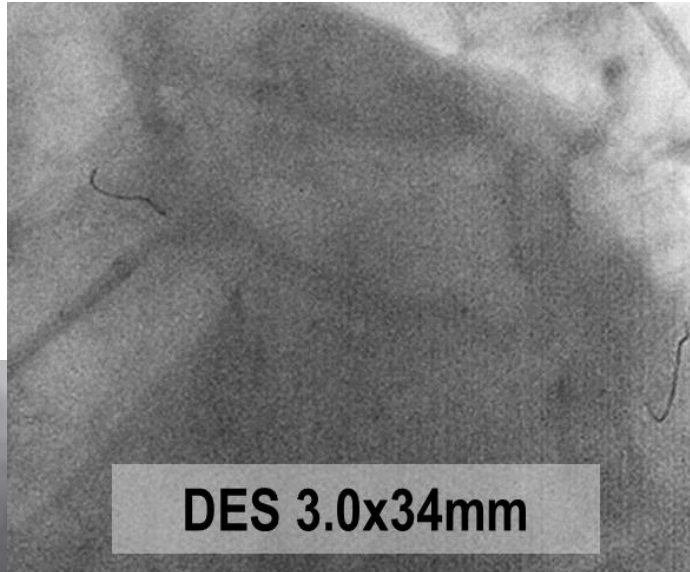
**G. Distal Ref.**



LA 5.92m<sup>2</sup>  
Min D. 2.89mm  
Max D. 3.25mm



# Culotte stenting

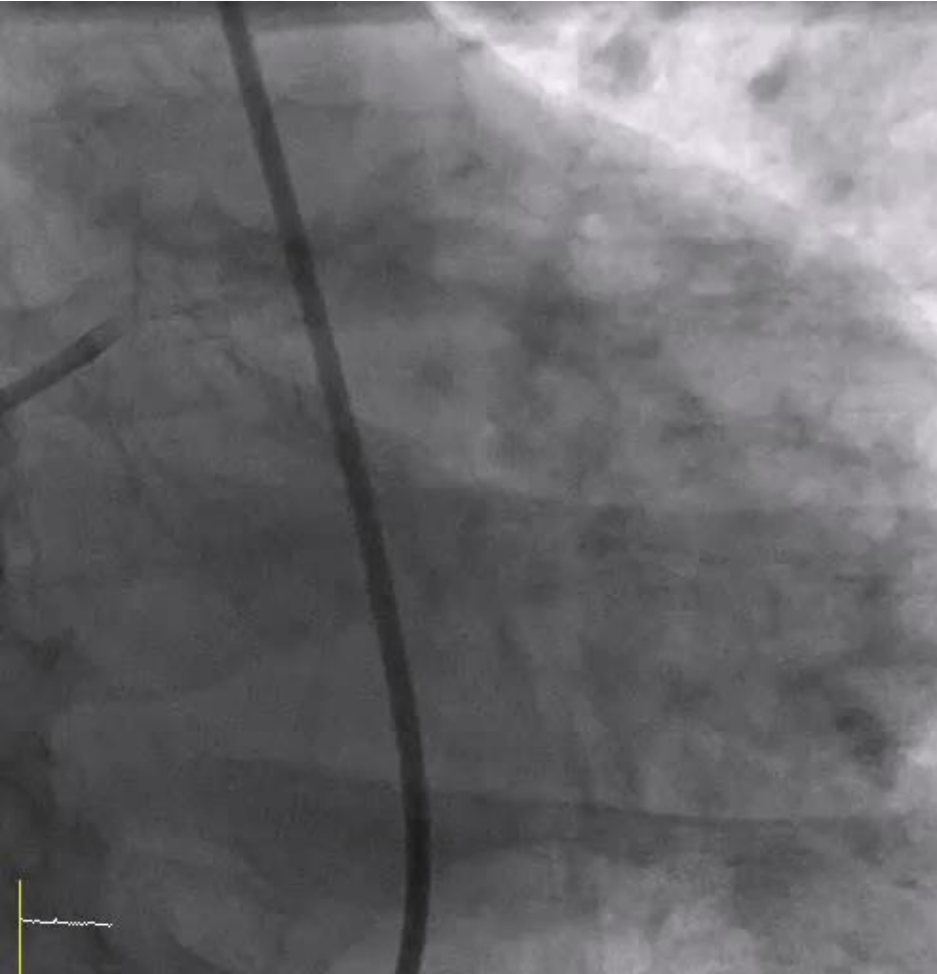


Stepwise Kissing balloon with 2# NC





# CAG after Culotte stenting







# How to integrate Physiology and Imaging

01

Physiology-guided decision making for whether treat or not, and where to treat

02

Imaging-guided decision making for how to treat



Target lesion / device / procedure selection...

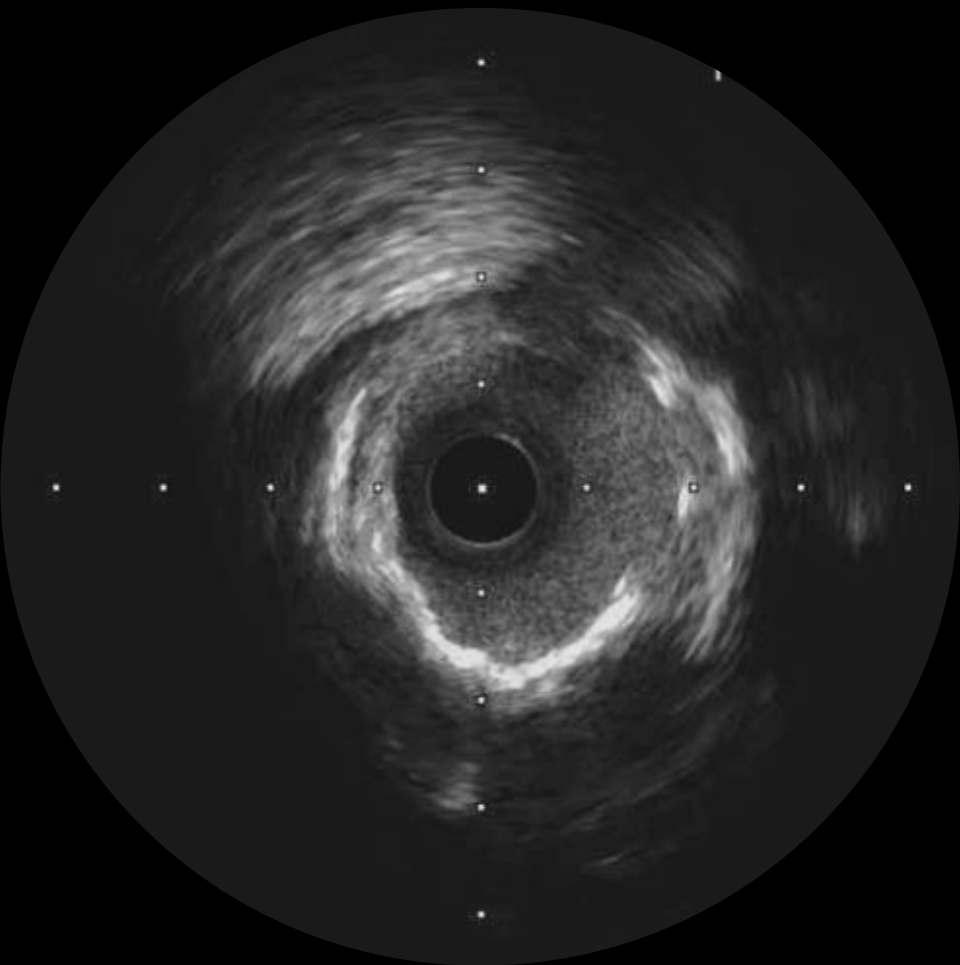
03

**Imaging (and/or Physiology)-guided post procedural evaluation**

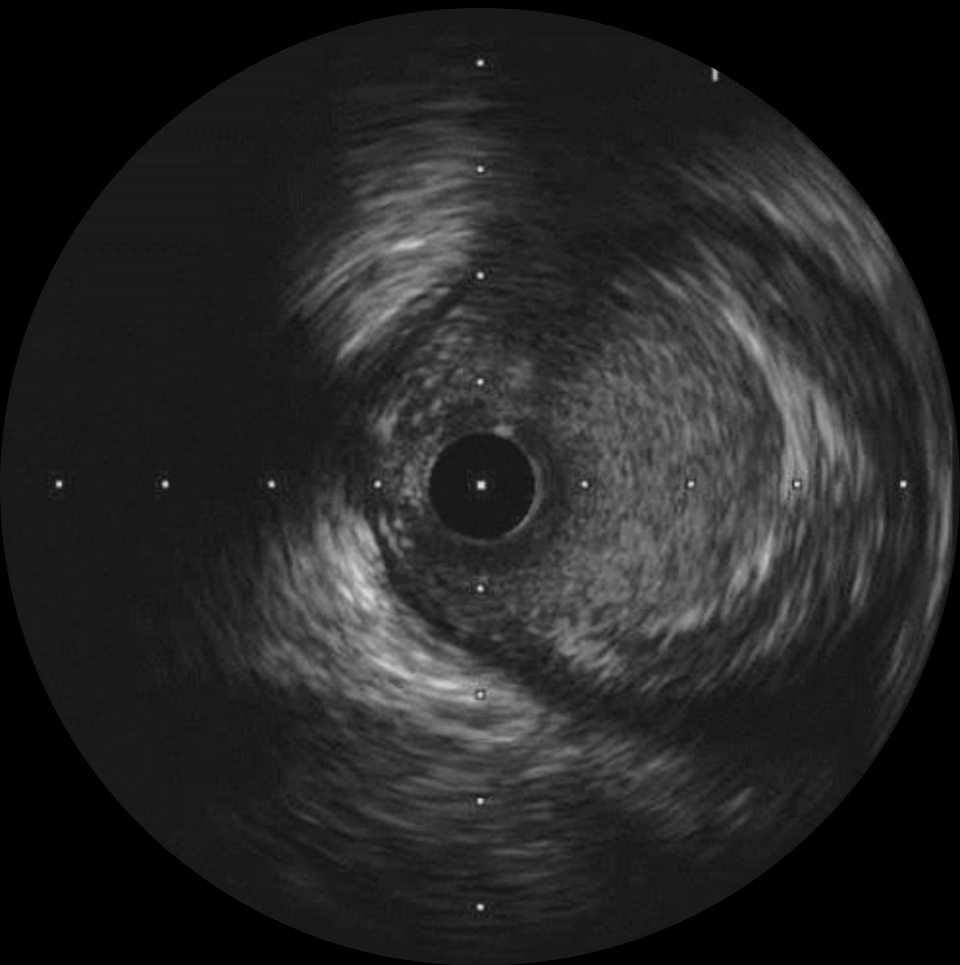


**Result assessment, additional procedure decision, prognosis expectation...**

**IVUS from LAD to LM**

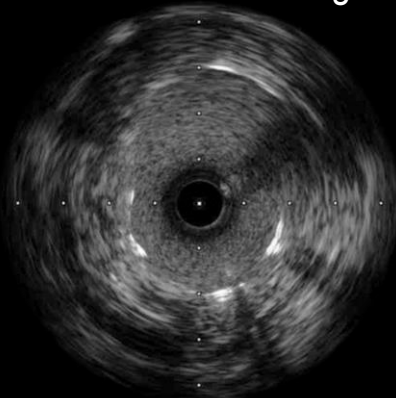


**IVUS from LCX to LM**



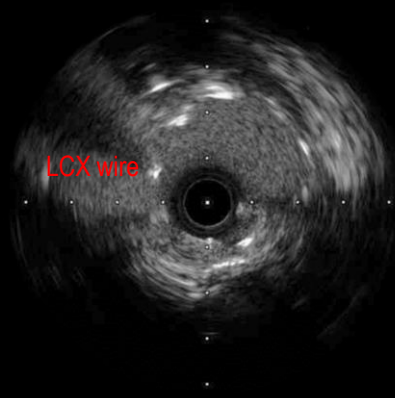
# Final IVUS Findings LAD

A. Prox. Stent edge



**SA 13.3mm<sup>2</sup>**  
LA 13.8mm<sup>2</sup>  
VA 30.8mm<sup>2</sup>

B. POC



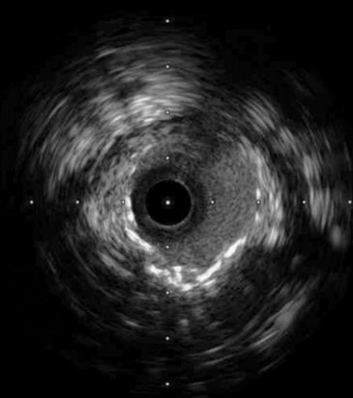
**POC LA 12.92mm<sup>2</sup>**  
LAD SA 8.25mm<sup>2</sup>

C. Proximal LAD

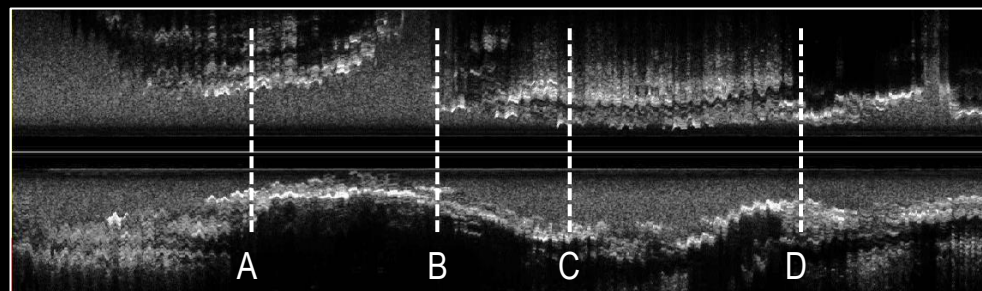


**SA 7.25mm<sup>2</sup>**  
LA 7.47mm<sup>2</sup>  
VA 20.57mm<sup>2</sup>

D. MSA



**MSA 6.31mm<sup>2</sup>**  
LA 6.64mm<sup>2</sup>  
VA 21.90mm<sup>2</sup>



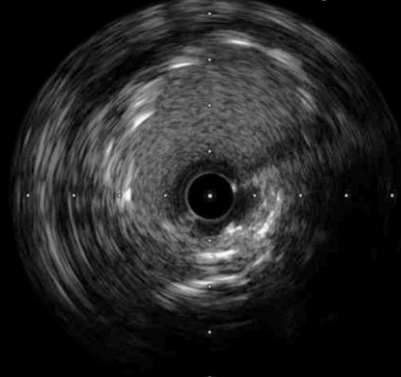
← proximal

Stent length 20.93mm ( Onyx 3.5\*22)

distal →

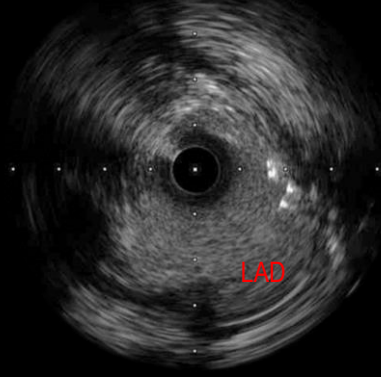
# Final IVUS Findings LCX

A. Prox. Stent edge



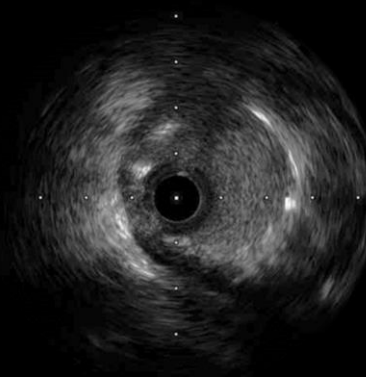
SA 13.4mm<sup>2</sup>  
LA 14.8mm<sup>2</sup>  
VA 34.5mm<sup>2</sup>

B. POC



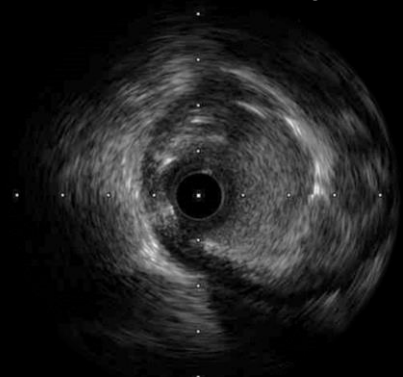
LA 11.9mm<sup>2</sup>

C. MSA

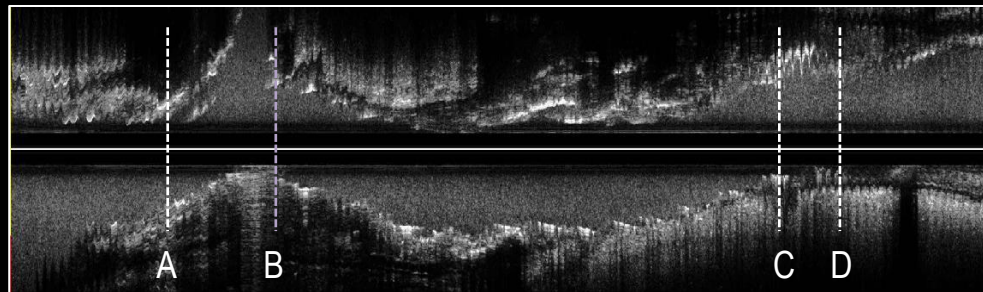


MSA 7.7mm<sup>2</sup>  
LA 8.0mm<sup>2</sup>  
VA 21.0mm<sup>2</sup>

D. Dist. Stent edge



SA 7.9mm<sup>2</sup>  
LA 8.1mm<sup>2</sup>  
VA 21.3mm<sup>2</sup>



← proximal

Stent length 35.88mm ( Onyx 3.0\*34)

distal →



# Summary of Case

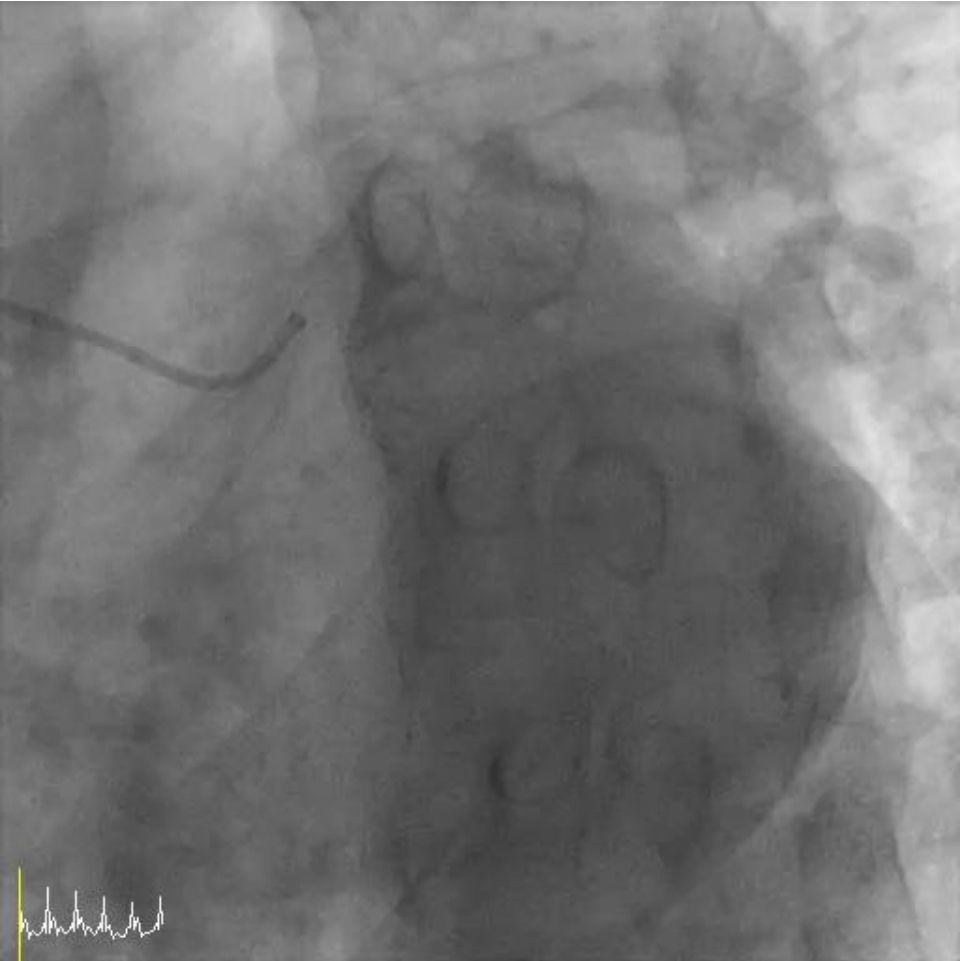
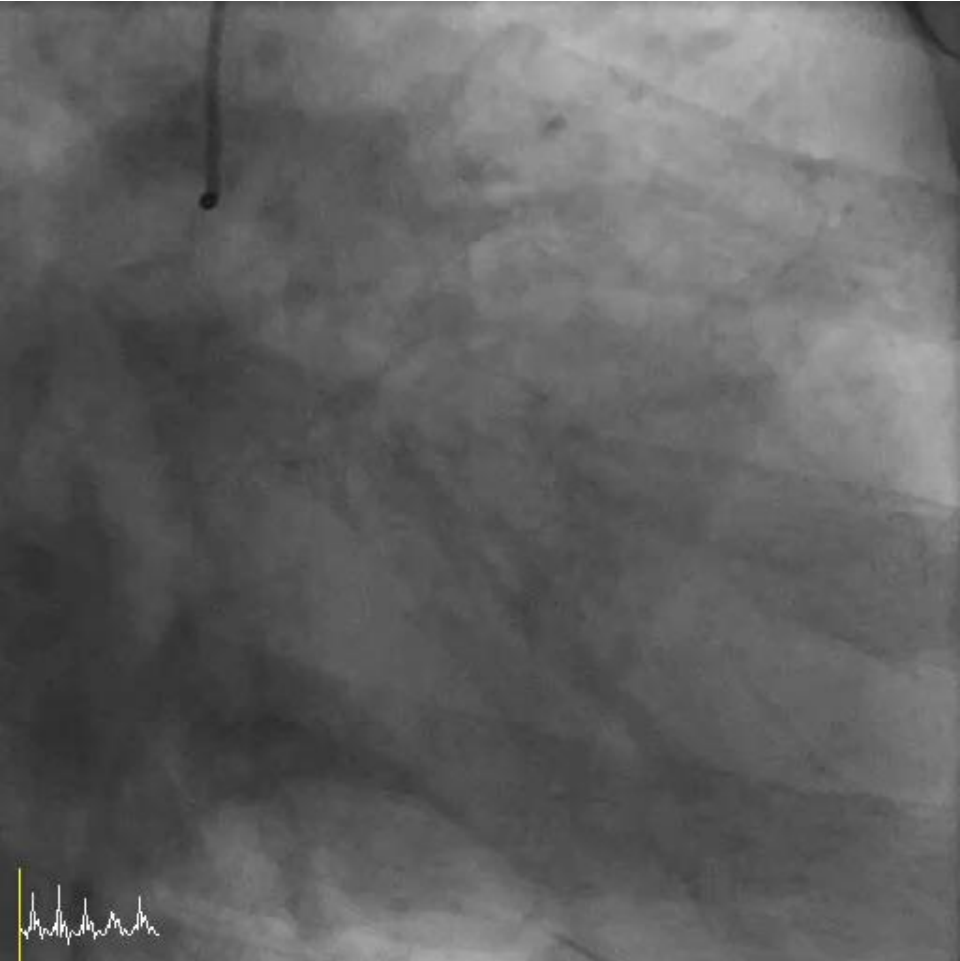
- **Recurred angina**, ambiguous result of SPECT (only lat. +)
- Angiographic **intermediate lesions** of mid **RCA & LM bifurcation**
- **FFR** : Significant decreased crossing distal LM to LAD/LCX
- **IVUS** : ostial LAD MLA 4.19mm<sup>2</sup> / ostial LCX MLA 3.91mm<sup>2</sup>
- **Technique** : Culotte technique
- **Post stent optimization** confirmed by IVUS

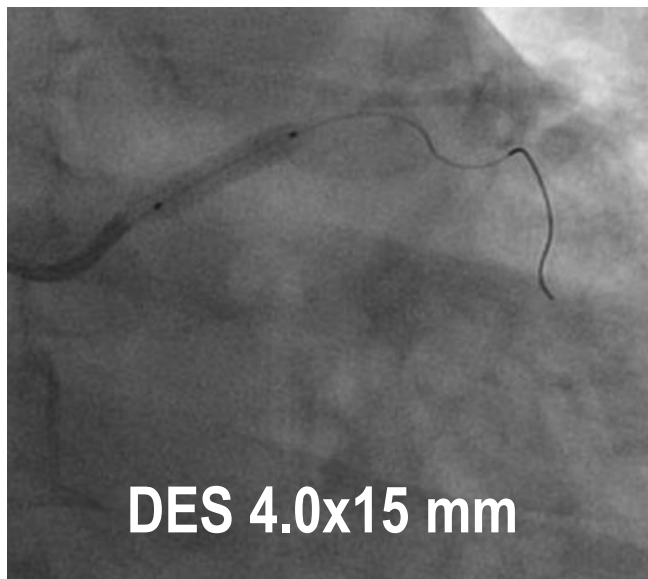




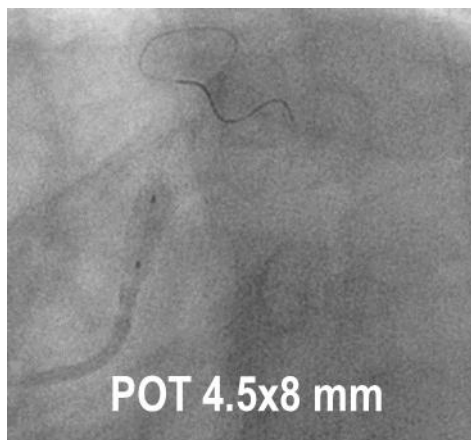
✓ 60/M, Effort angina

✓ P/Ex, Lab & TTE (-), but CCTA (+)





**DES 4.0x15 mm**

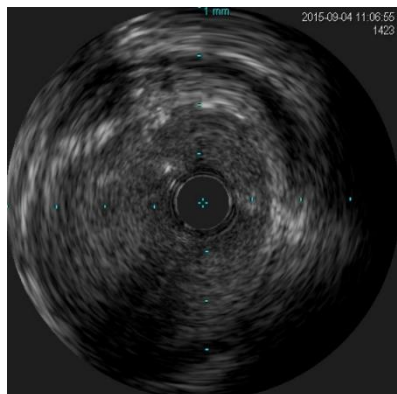


**POT 4.5x8 mm**



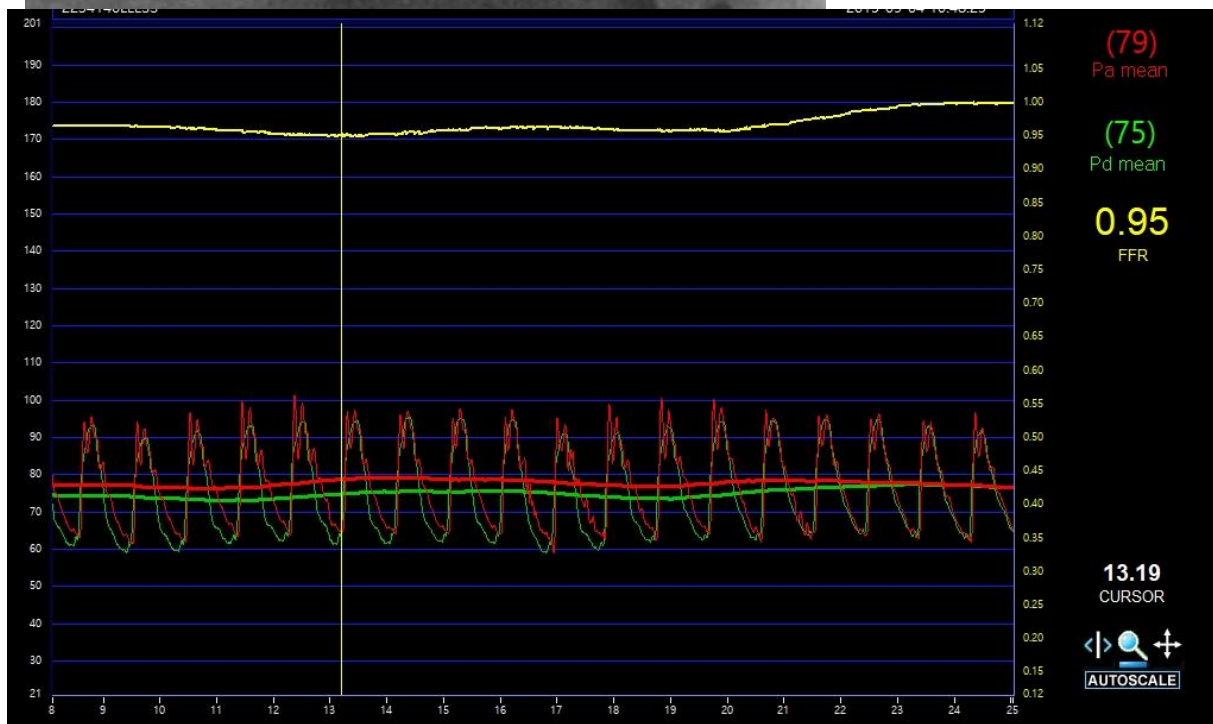
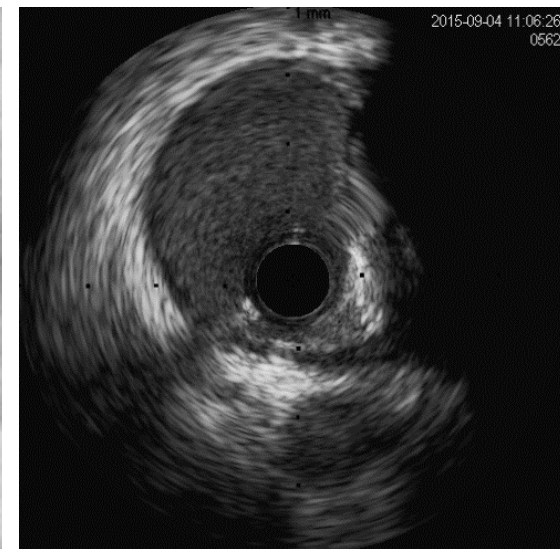
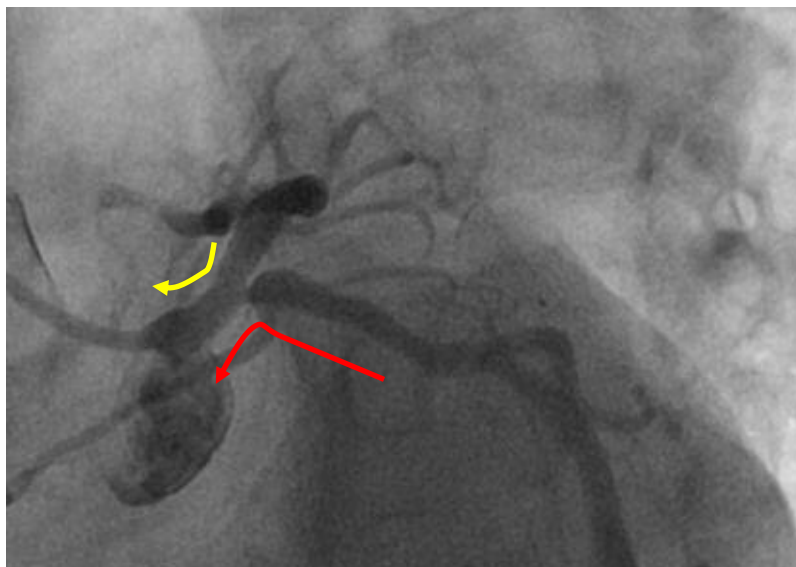
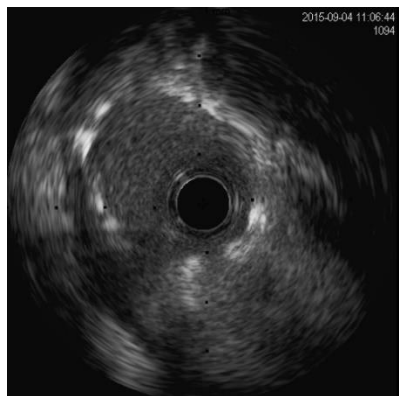


**A. Proximal reference**



VA 25.62mm<sup>2</sup>  
 LA 16.95mm<sup>2</sup>  
 %PB 33.8%

**B. POC**



**%PB 48.3%**

**%PB 48.8%**

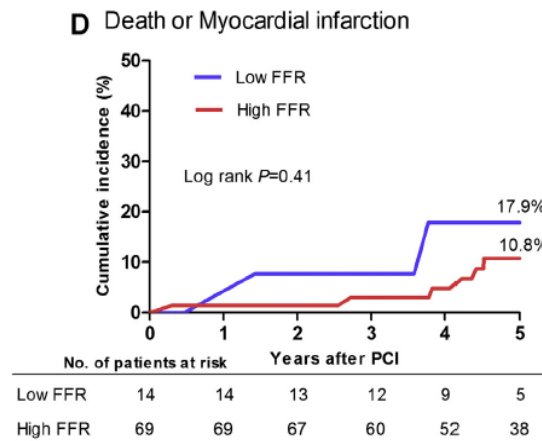
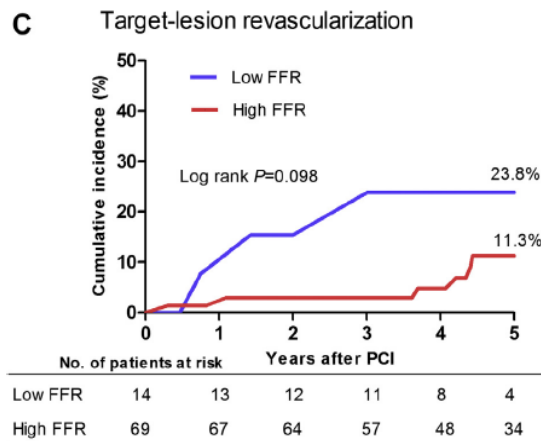
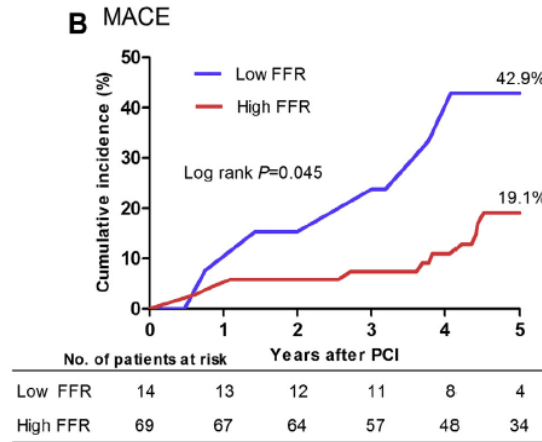
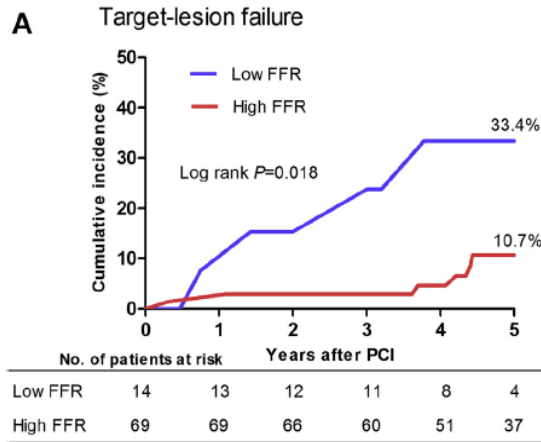
**%PB 46.7%**

**13.19**  
CURSOR



# FFR guided decision making for jailed LCX

- 83 pts who underwent FFR measurement of LCX after LM simple crossover stenting
- 5-year event rate of target lesion failure (cardiac death, target-vessel MI, or TLR)



**FFR measurement in jailed LCX can be helpful in selecting an adequate treatment strategy and may reduce unnecessary complex procedures.**





# Take Home Message

- **Intravascular imaging** modalities can be very useful for the **guidance of complex PCI**, especially in **LM bifurcation lesion**.
- Although **intracoronary image** play a **crucial role** for the treatment of **bifurcation lesion**, **functional evaluation** with **invasive coronary physiology** can help a decision making.
- **Integration of image and physiology** can guide to get the **best results** before, **during**, and **after PCI**.

