



# IVUS-based evaluation of vessel functional restoration after bioadaptive coronary stent implantation

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Thu Duc General Hospital

# Case report

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## Patient Information:

- Nữ, 75 tuổi
- Vào viện vì đau ngực

## Past Medical History

- Đái tháo đường type 2
- Tăng HA

## Blood Test:

- TroponinT hs: 173 pg/mL
- NTproBNP: 188 pg/mL
- Creatinin: 0.61 mg/dl
- LDLC 102 mg/dl. HbA1C: 6.9 %

## Echocardiography

- EF 55%.
- Giảm động thành dưới, vách, đáy

# Case report

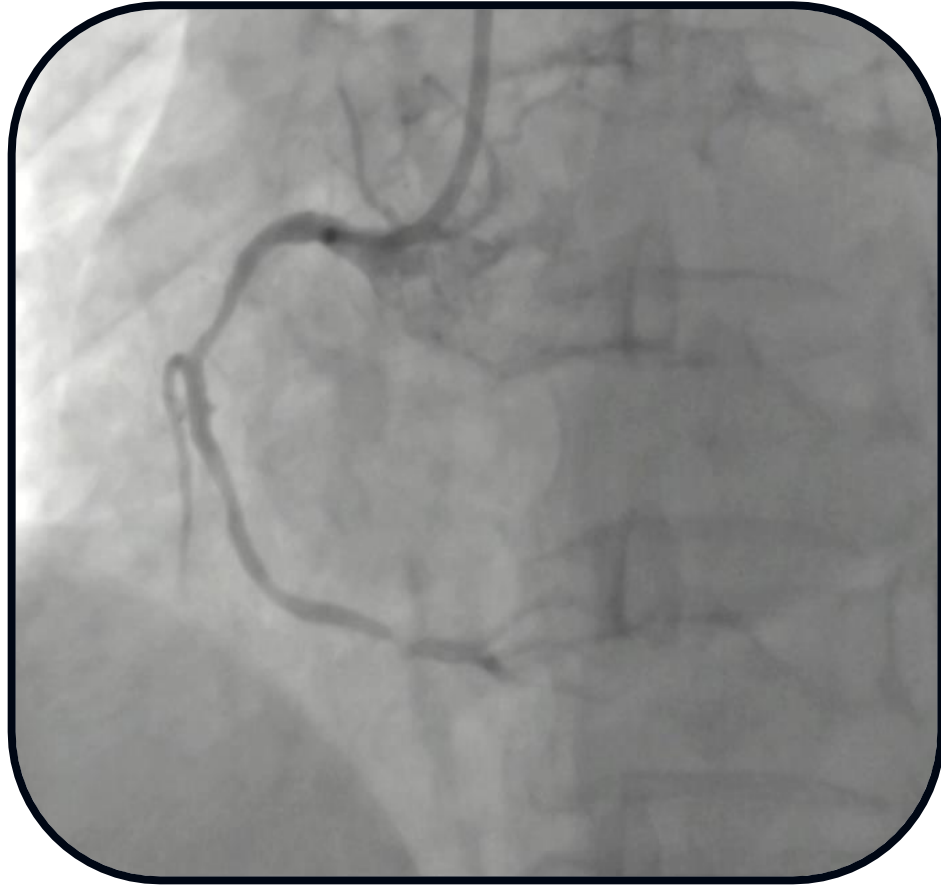


**Chẩn đoán: NSTEMI ngày 1 nguy cơ cao, non ARC HBR – THA – Đái tháo đường type 2**

**Điều trị: Aspirin, Brilinta, Crestor, Jardiance, Ramipril, PPI**

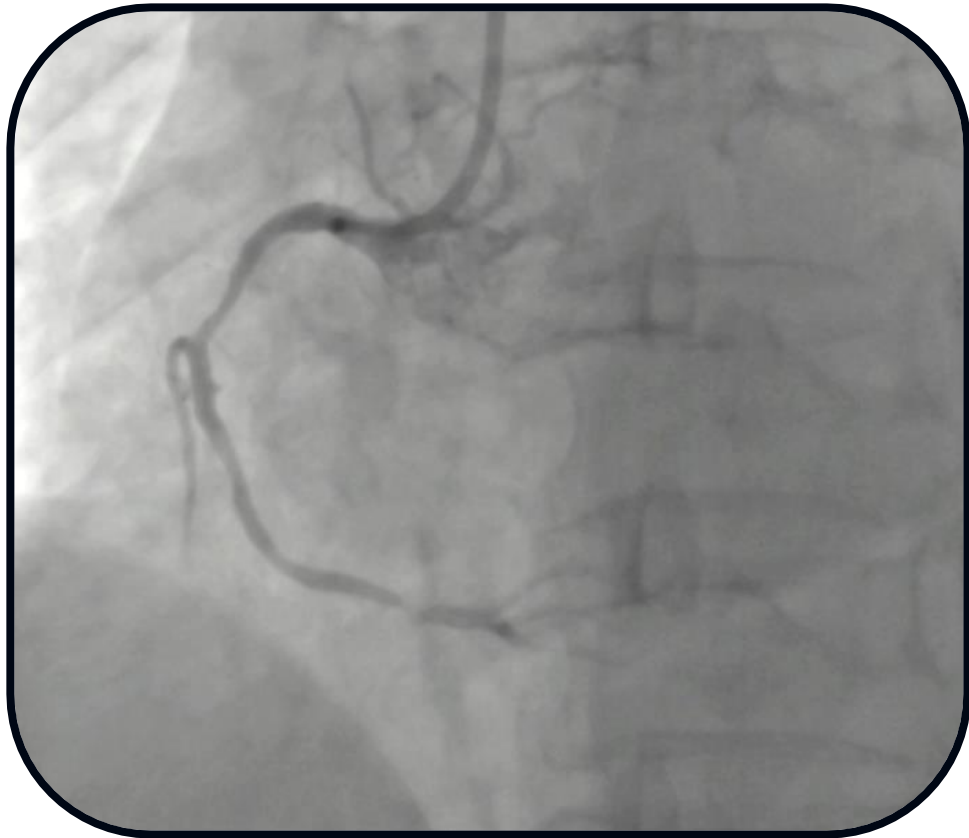
# Coronary angiography

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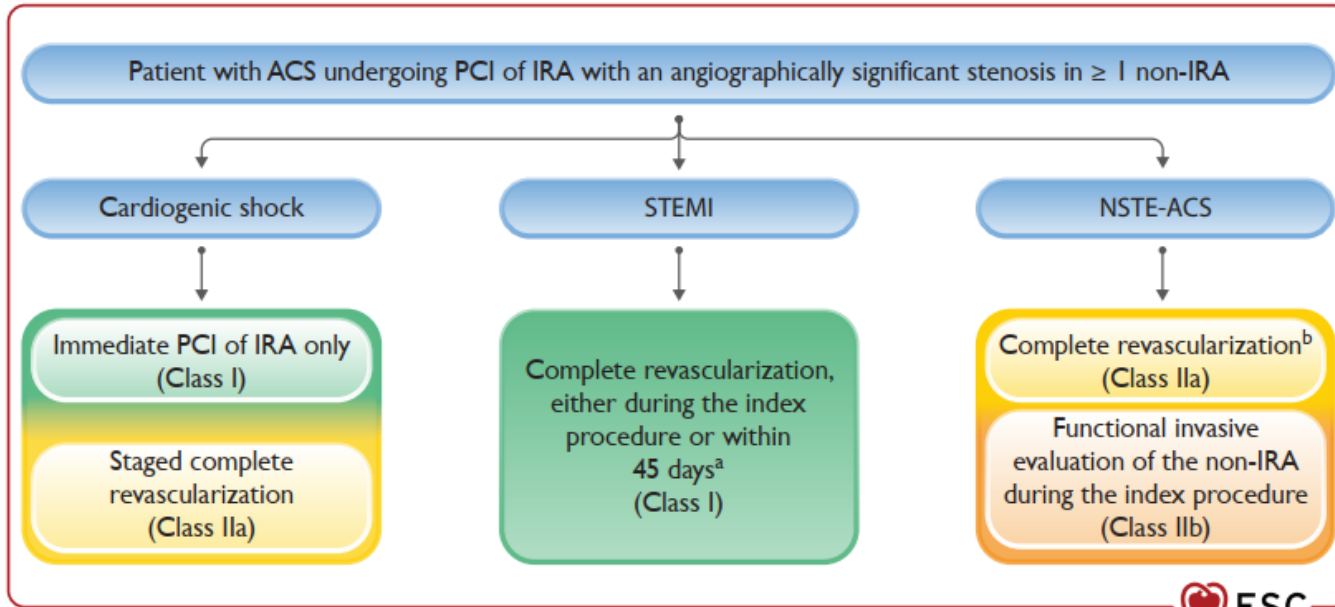
## 02 DES RCA: YUKON CHROME PC 3.0 x 40mm và DYNAMIX 3.5 x 38mm

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# 2023 ESC Guidelines for the management of acute coronary syndromes

## Complete revascularization



### Multivessel disease in haemodynamically stable STEMI patients undergoing PPCI

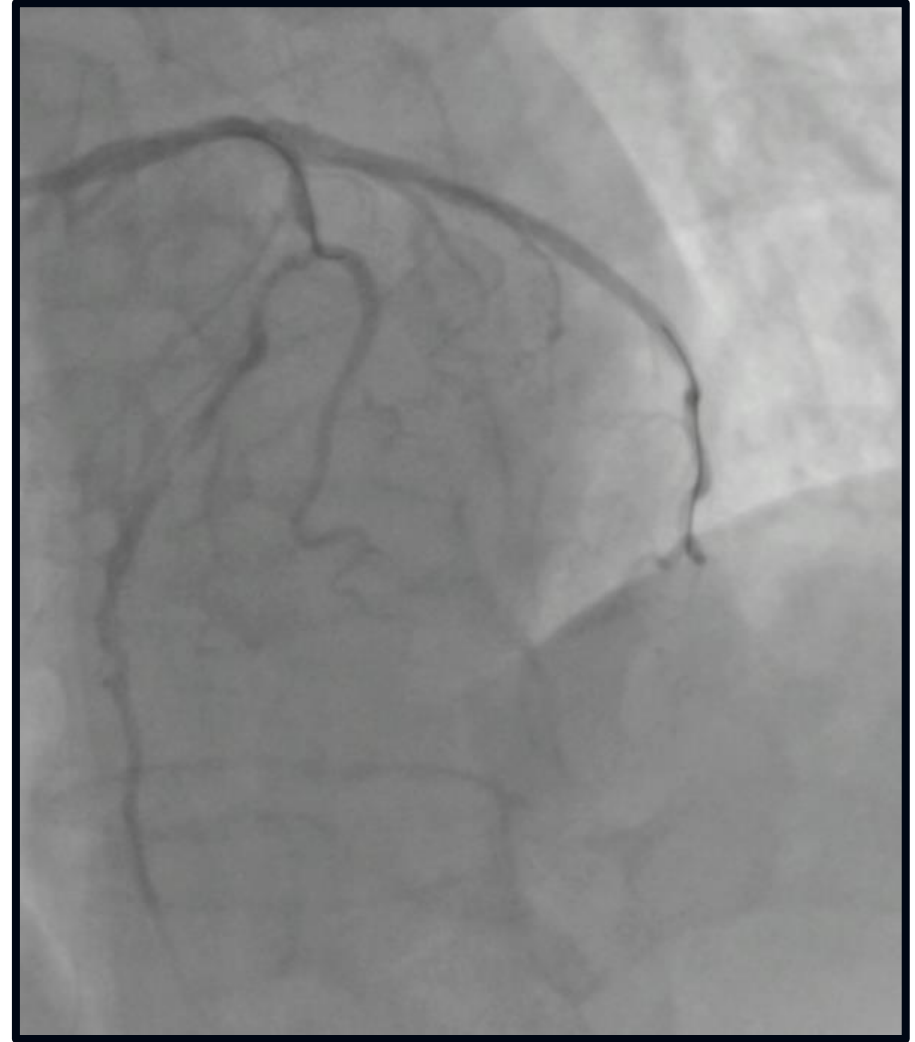
Complete revascularization is recommended either during the index PCI procedure or within 45 days. <sup>508–511,531</sup>	<b>I</b>	<b>A</b>
It is recommended that PCI of the non-IRA is based on angiographic severity. <sup>511,524</sup>	<b>I</b>	<b>B</b>
Invasive epicardial functional assessment of non-culprit segments of the IRA is not recommended during the index procedure.	<b>III</b>	<b>C</b>

### Multivessel disease in haemodynamically stable NSTEMI-ACS patients undergoing PCI

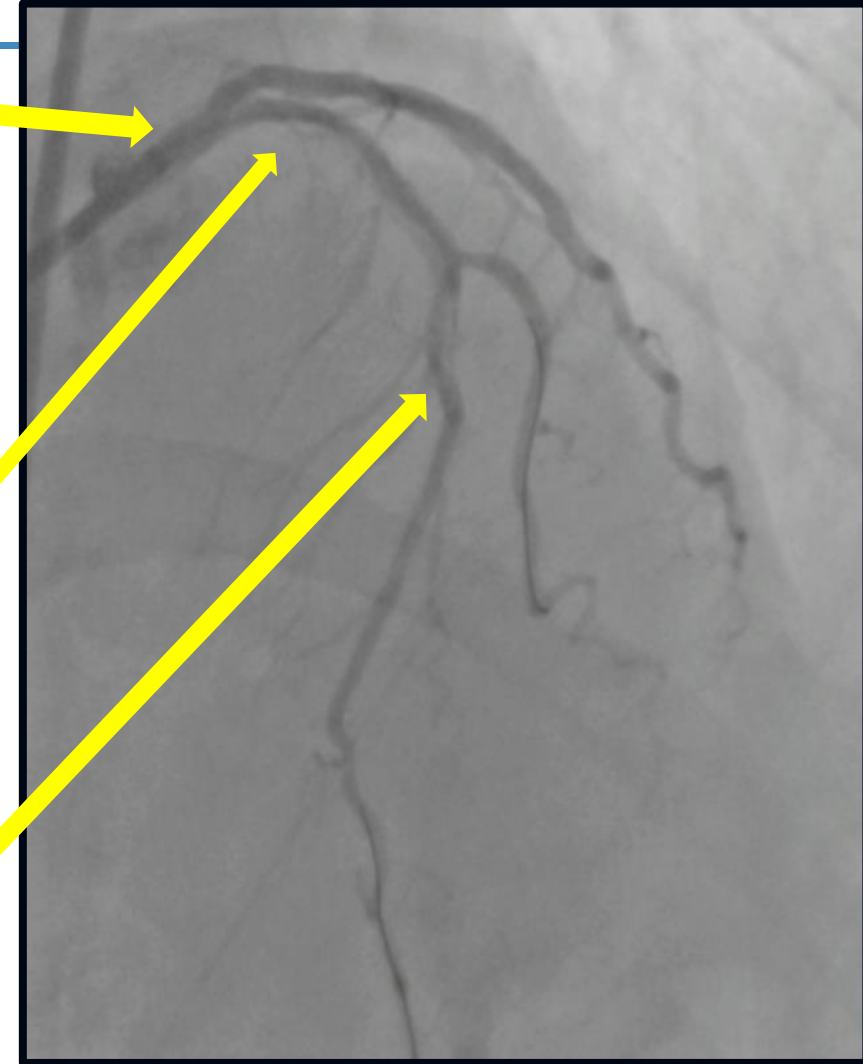
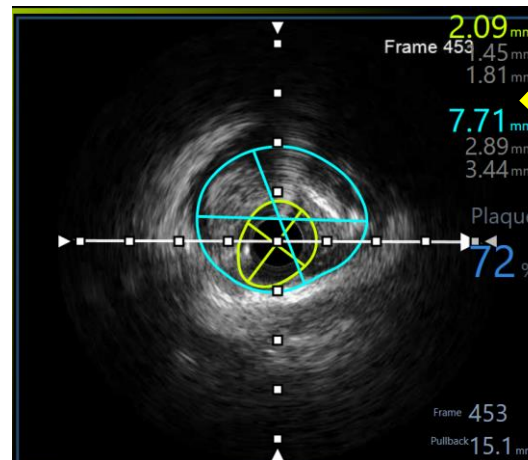
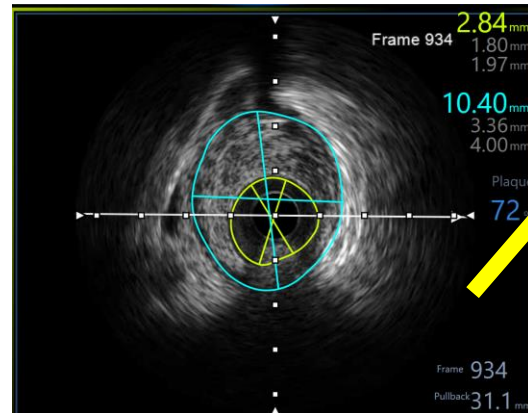
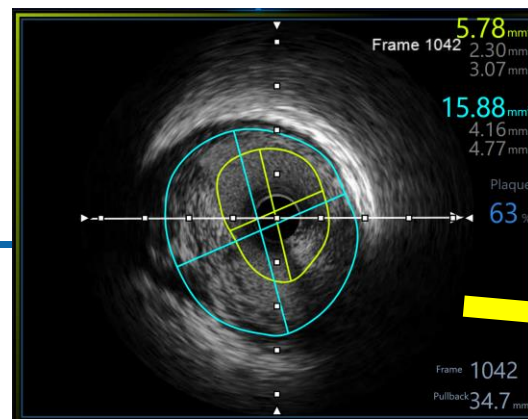
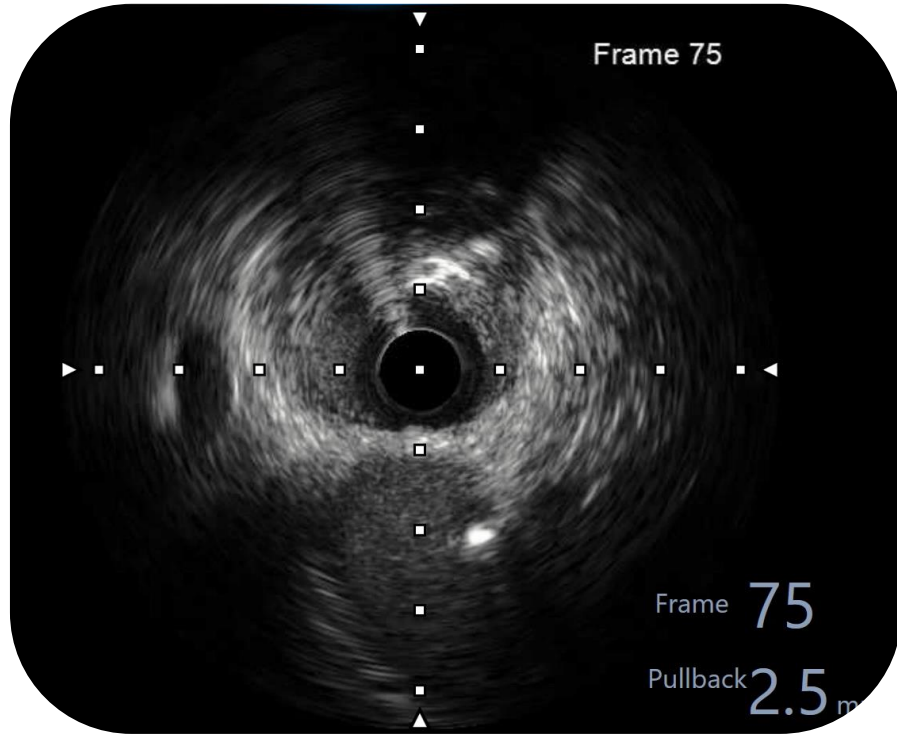
In patients presenting with NSTEMI-ACS and MVD, complete revascularization should be considered, preferably during the index procedure. <sup>513,514</sup>	<b>IIa</b>	<b>C</b>
Functional invasive evaluation of non-IRA severity during the index procedure may be considered. <sup>518,527,528,532</sup>	<b>IIb</b>	<b>B</b>

# LM LAD: Severe stenosis, calcification, long lesion, diffuse lesion

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# IVUS LM-LAD

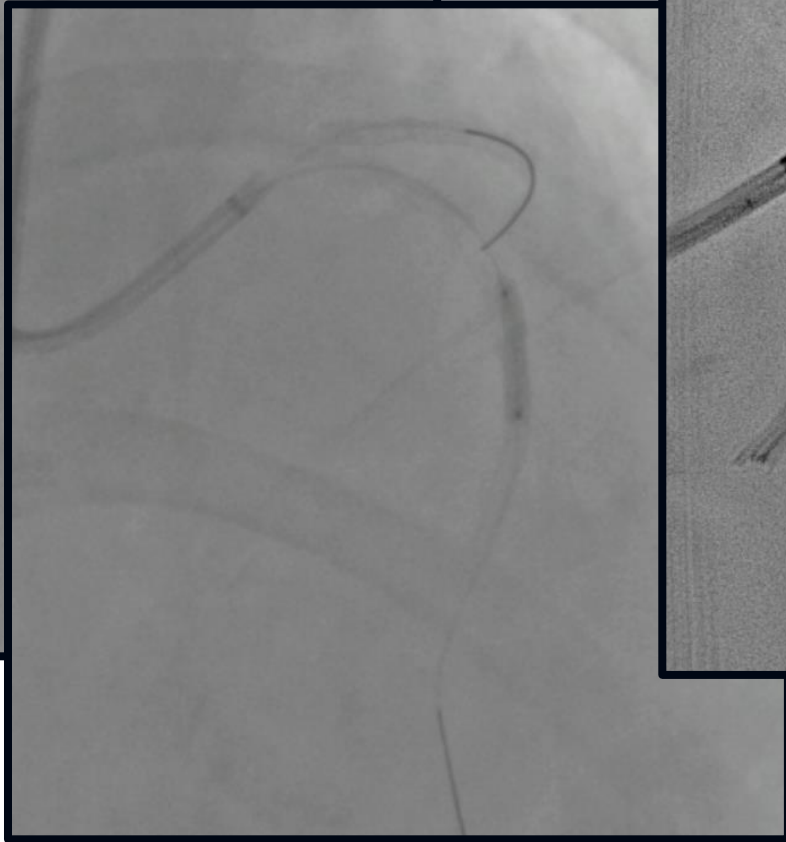
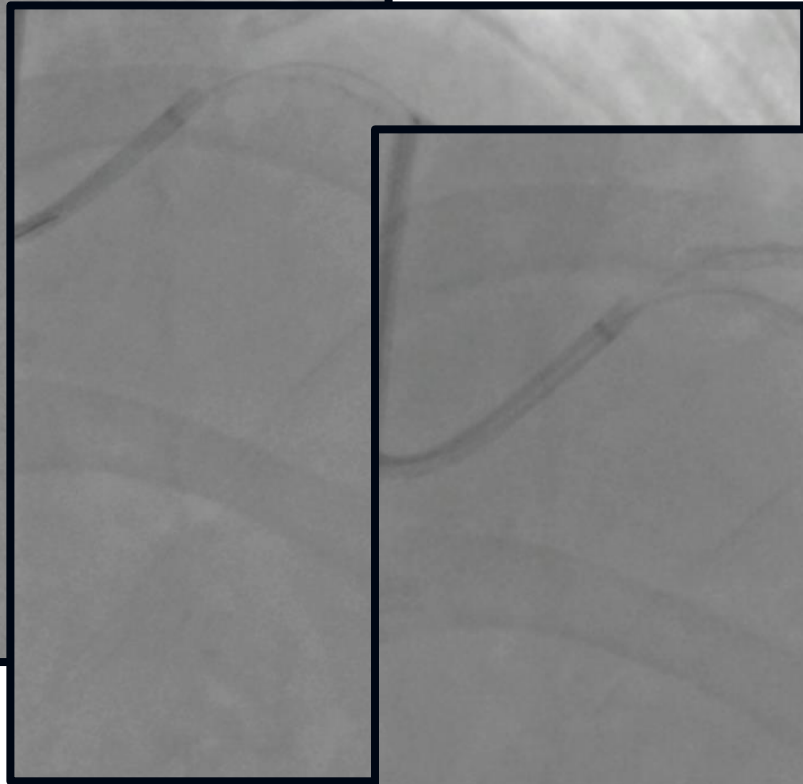
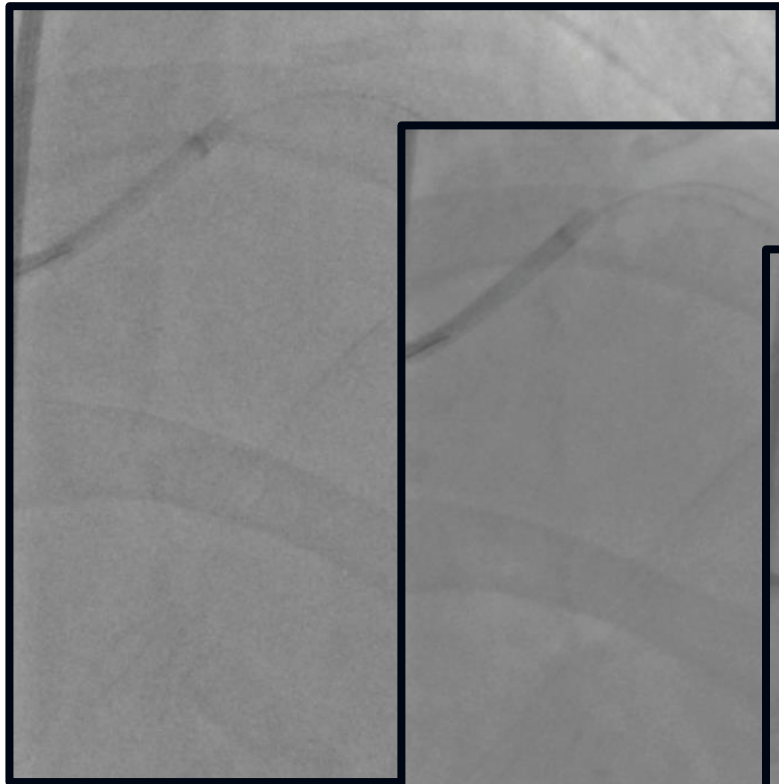


# PCI LM LAD: Modifying plaque by using Cutting & NC balloon

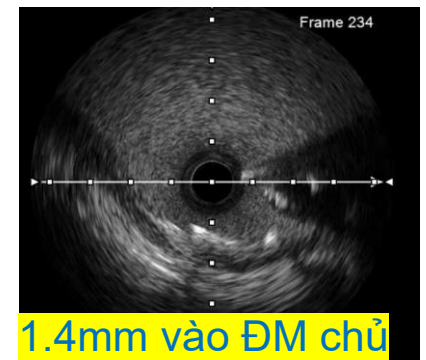
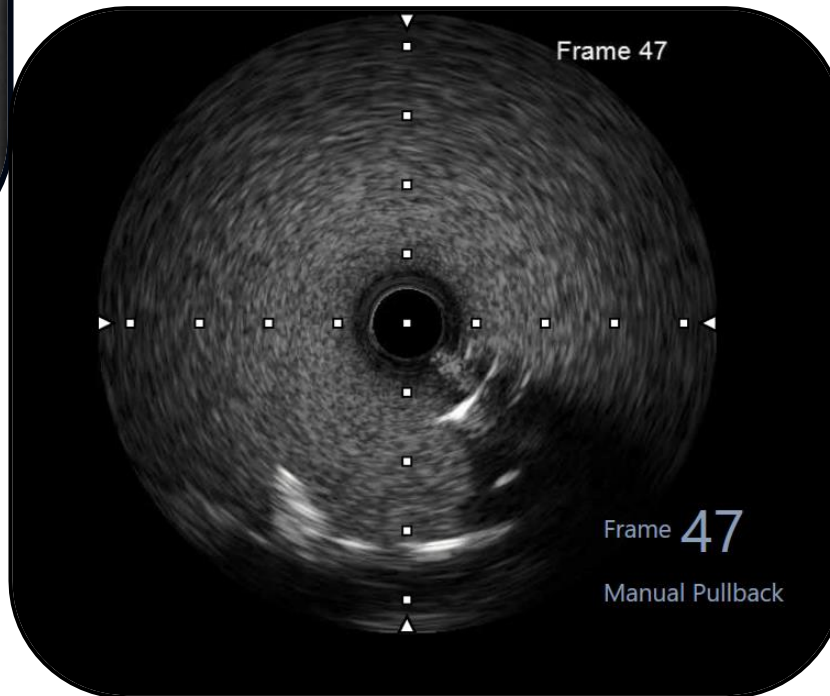
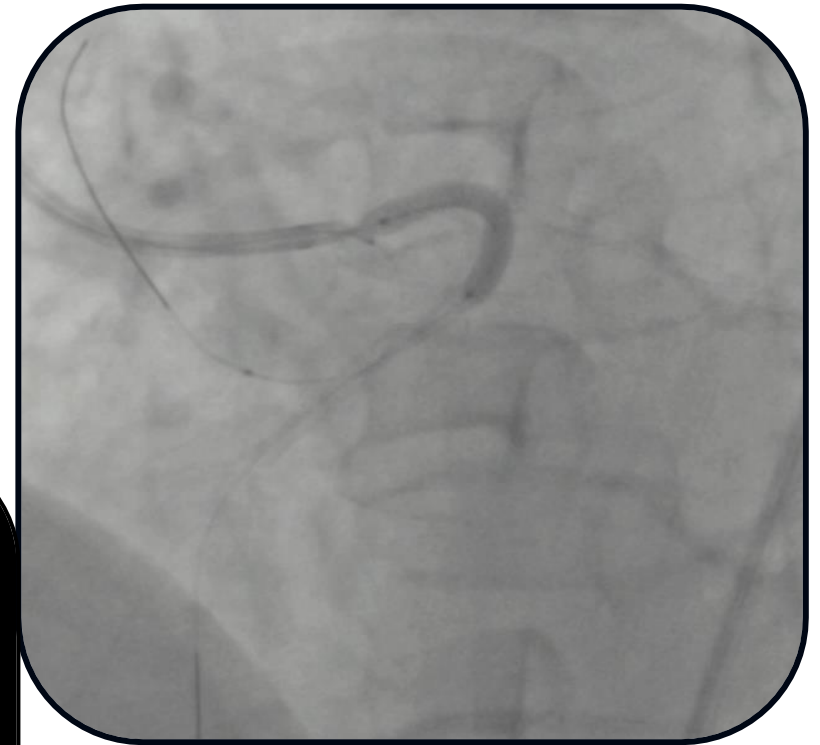
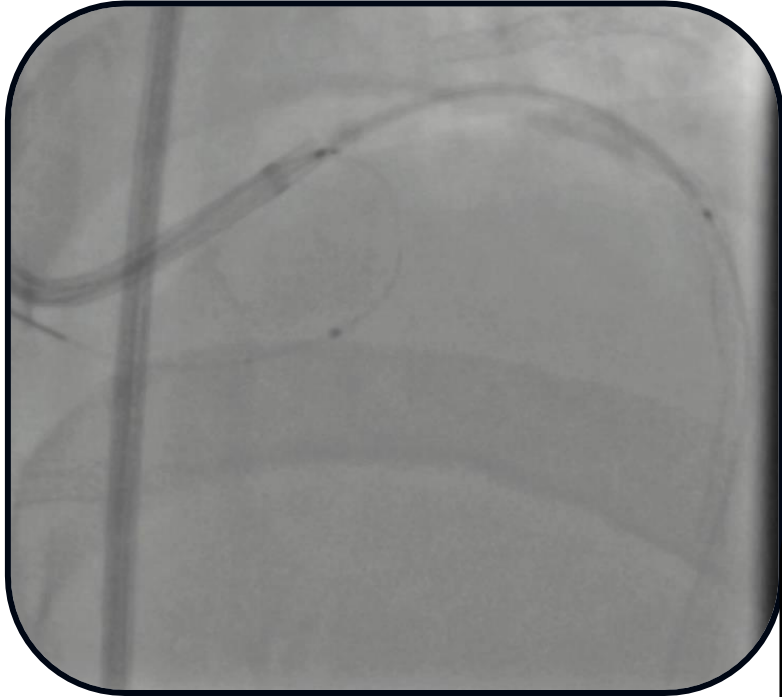
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# DYNAMIX 2.5 x 38mm and DYNAMIX 3.0 x 38mm



# Floating IVUS live Technique



1.4mm vào ĐM chủ

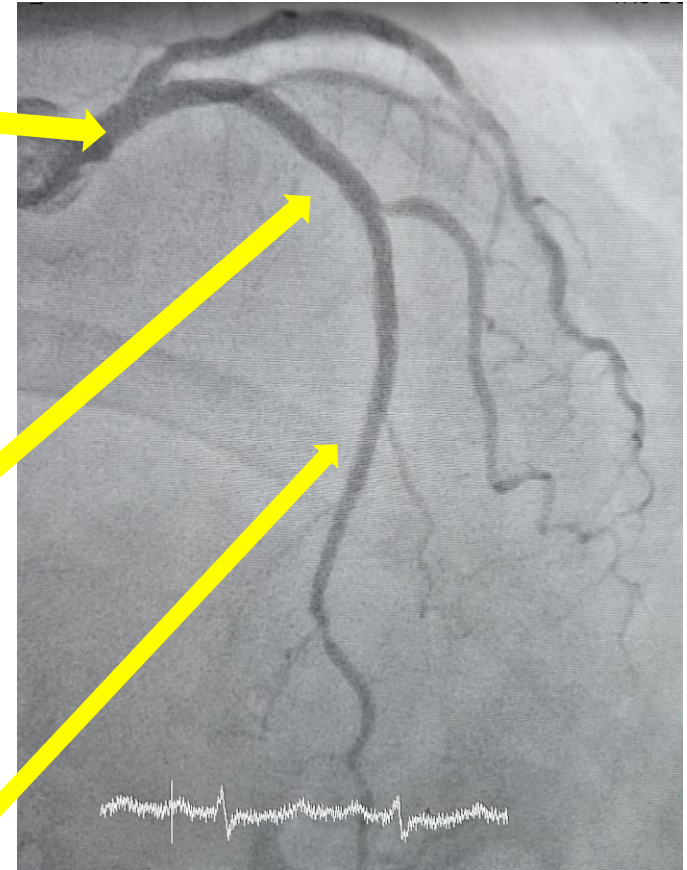
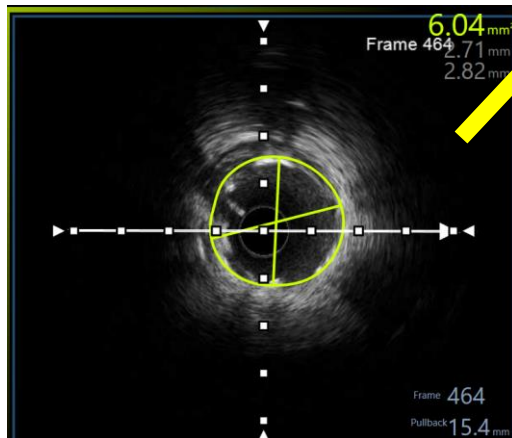
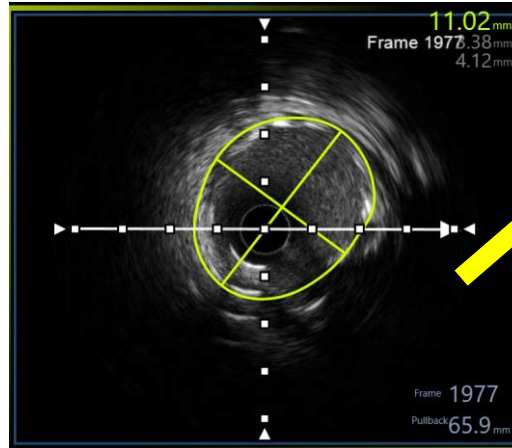
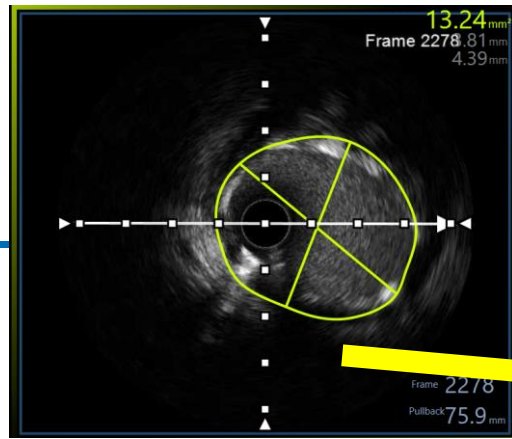
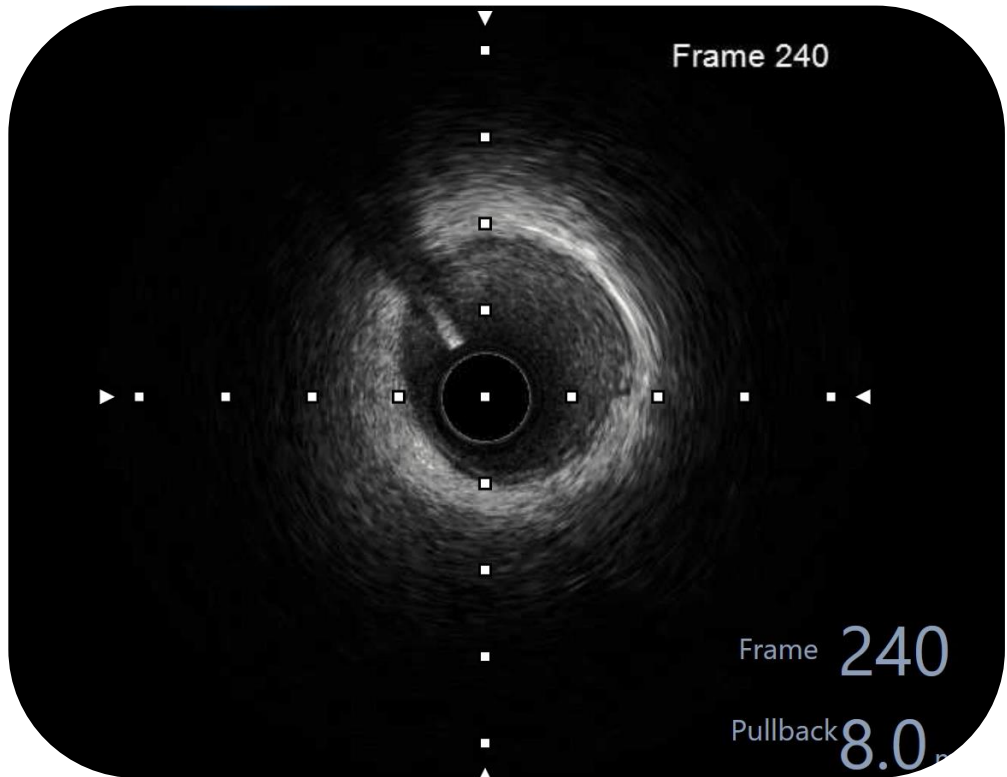
**Post-dilatation:** FORCE NC 2.75 v`a 3.0mm.

**POT** FORCE NC 4.0 x 12mm

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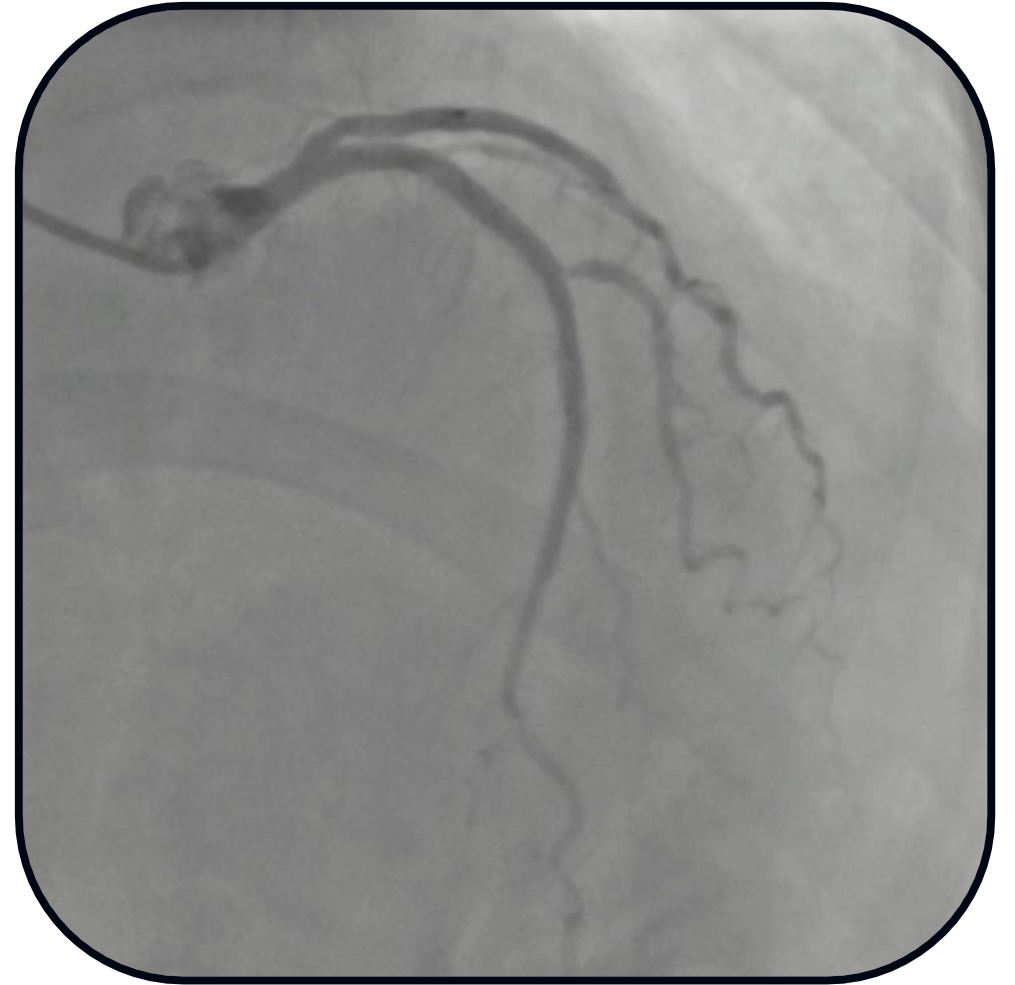


# Final IVUS after stent NC balloon/POT



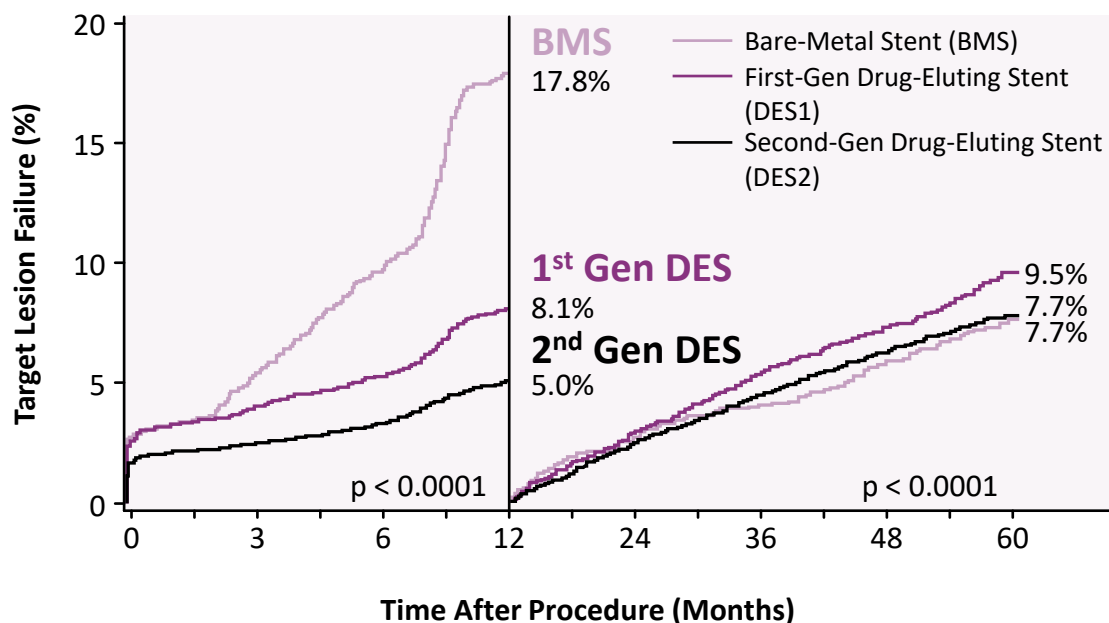
# Final angiography

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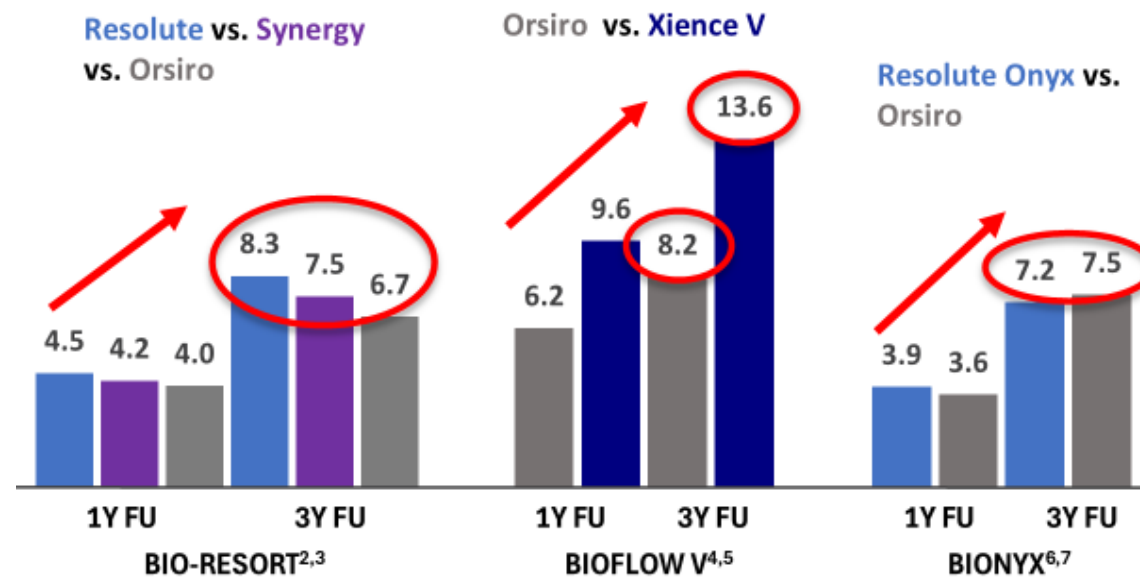


# Stent related adverse events increase 2-3% each year after PCI

## Non-Plateauing Adverse Events Post 1-Year<sup>1</sup>



## 1 and 3-year TLF Rates With Contemporary DES<sup>2-7</sup>



## Các biến cố bất lợi gia tăng do hạn chế sự giãn nở mạch và mất chức năng mạch

1. Madhavan MV et al. *J Am Coll Cardiol* 2020;75:590-604  
 2. von Birgelen C et al *The Lancet*. 2016 Nov 26;388(10060):2607-17.  
 3. Buiten A et al *JACC: Cardiovasc Interv.*, 2019. Vol. 12, No. 17.  
 4. Kandzari DE et al. *The Lancet*. 2017 Oct 21;390(10105):1843-52

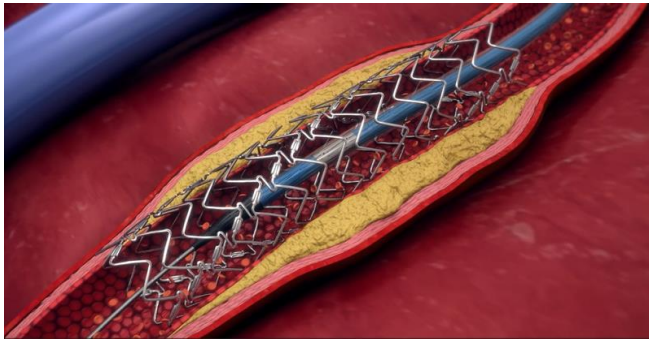
5. Kandzari DE, et al. *J Am Coll Cardiol Intv.* 2020 Jun, 13(11) 1343-1353  
 6. von Birgelen C et al. *The Lancet*. 2018 Oct 6;392(10154):1235-45.  
 7. Ploumen EH et al. *Circ J*. 2021 Oct 25; 85(11):1983-1990

# Study Device: Bioadaptor Mechanism of Action

Bioadaptor DynamX công nghệ thiết kế để phục hồi khả năng điều hòa huyết động của mạch

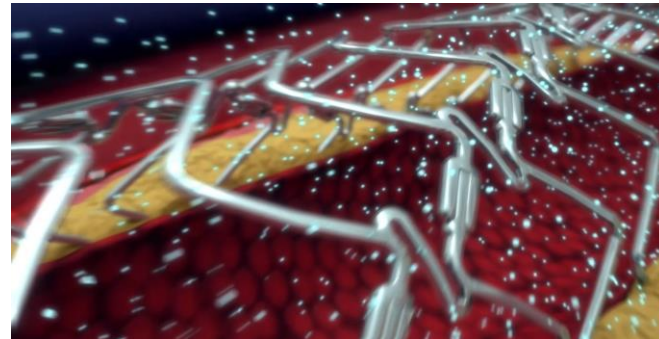
0 – 6 months

after 6 months



**1. Locked:**  
Establish Flow Lumen

6 tháng đầu: Đóng khung. Tái thông dòng chảy mạch máu



**2. Unlocked:**  
Maintain Flow Lumen

> 6 tháng: Tháo khung, phục hồi tái định dạng lòng mạch, và giảm thiểu hẹp tồn dư lòng mạch.



**3. Dynamic Support:**  
Restore Hemodynamic Modulation

Phục hồi huyết động học mạch máu, phục hồi độ đàn hồi, trả lại chức năng sinh lý mạch máu.



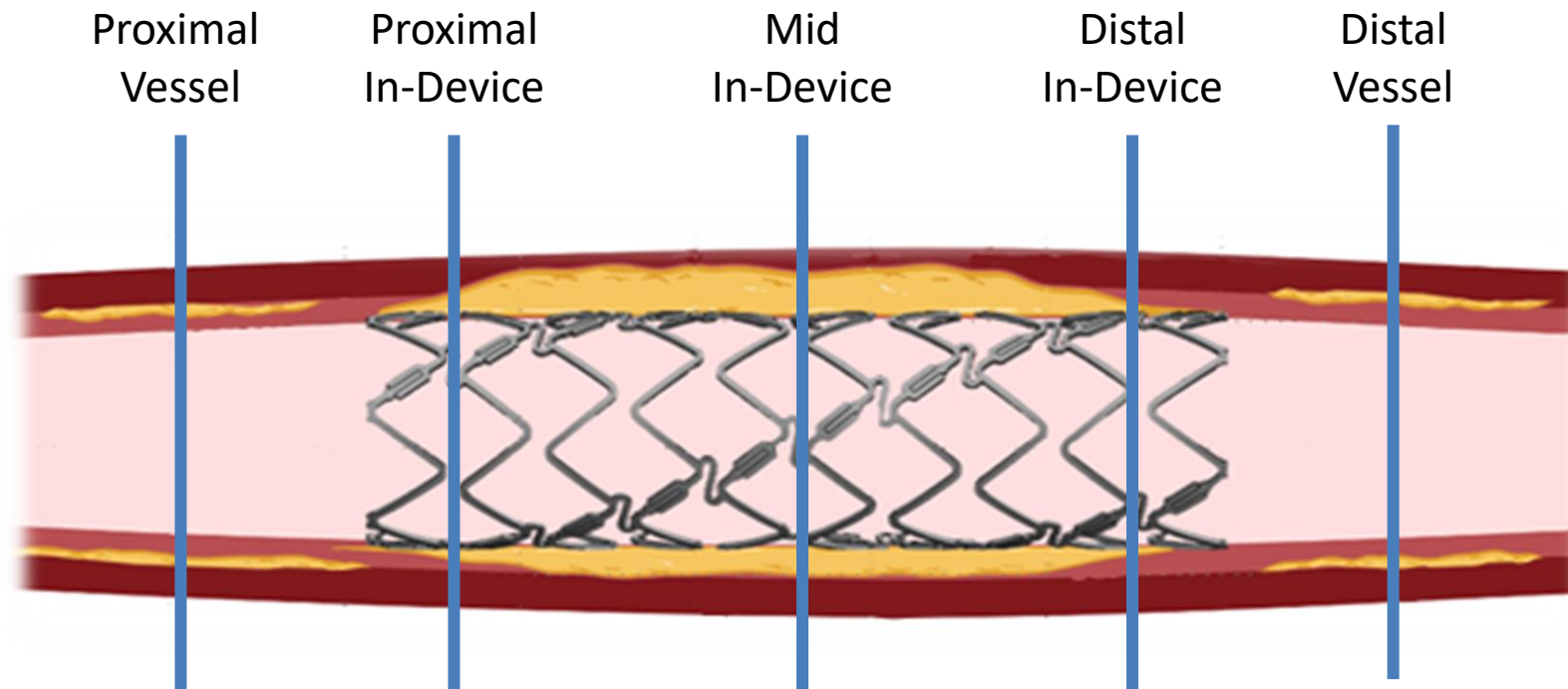
# **BIOADAPTOR RCT Outcomes**

## **Imaging at 1 year follow up**

# Secondary Endpoint: Stationary IVUS pulsatility paired analysis (N=100)

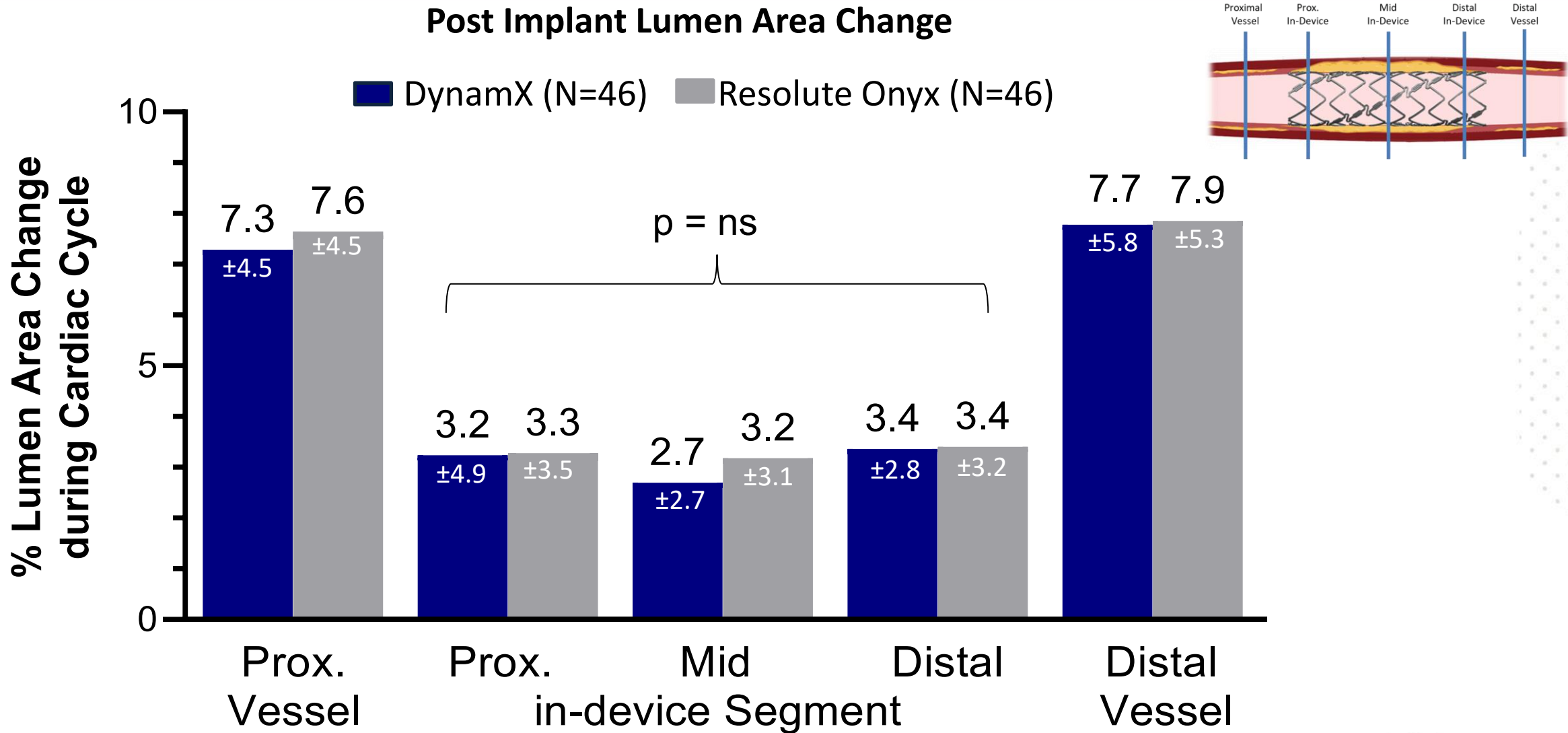
% Change in Lumen Area between systole and diastole cycles

Recorded using the same frames at Post-Implant and 12-month follow-up



**Imaging at 12 months follow up**

# Post implant pulsatility was constrained in both arms

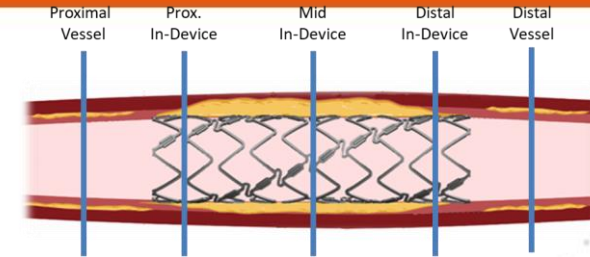
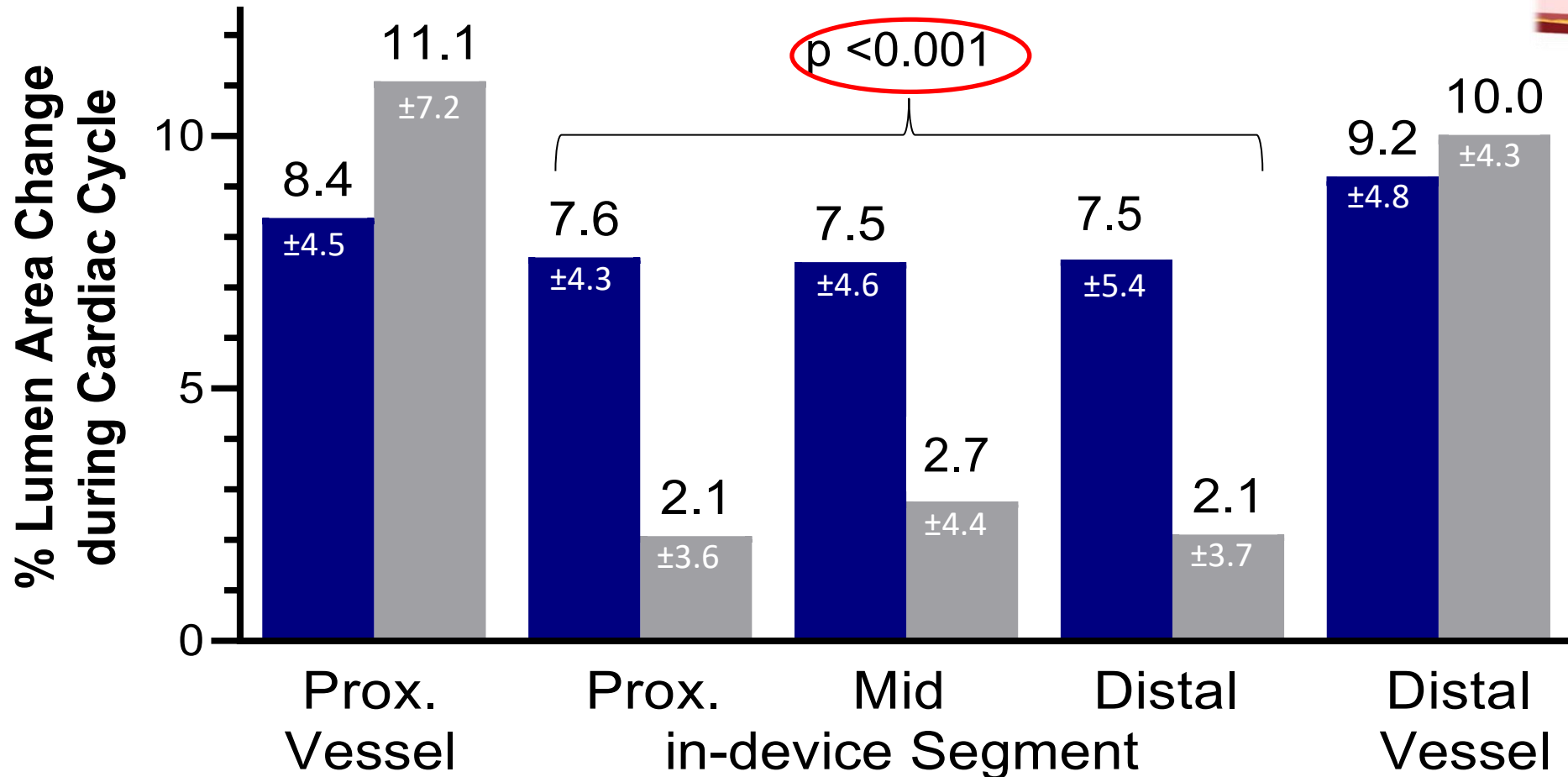


Imaging at baseline, post PCI

# Pulsatility at 12 months restored in DynamX

## 12-Month Lumen Area Change

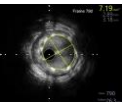
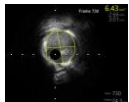
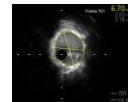
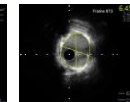
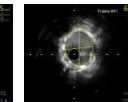
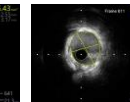
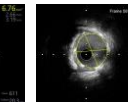
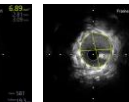
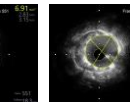
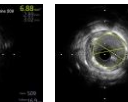
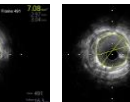
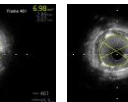
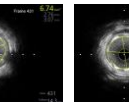
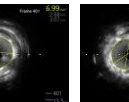
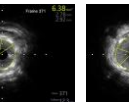
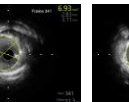
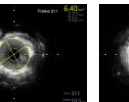
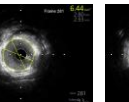
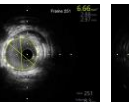
■ DynamX (N=46) ■ Resolute Onyx (N=46)



Imaging at 12 months, post PCI

# Change in Cross-sectional area of Scaffold

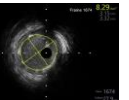
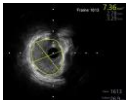
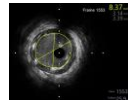
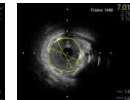
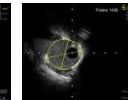
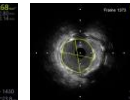
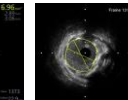
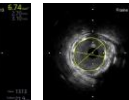
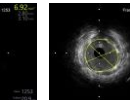
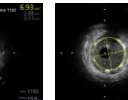
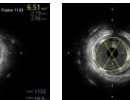
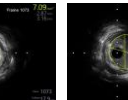
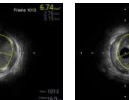
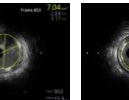
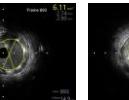
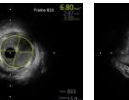
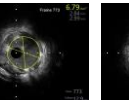
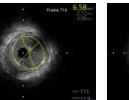
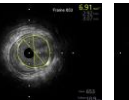
After PCI

Distace from proximal edge (mm)																		
0mm	1mm	2mm	3mm	4mm	5mm	6mm	7mm	8mm	9mm	10mm	11mm	12mm	13mm	14mm	15mm	16mm	17mm	18mm
																		
Cross-sectional Area (mm <sup>2</sup> )																		
7.19	6.43	6.7	6.45	6.43	6.76	6.89	6.91	6.88	7.08	6.98	6.74	6.99	6.38	6.93	6.4	6.44	6.66	6.73

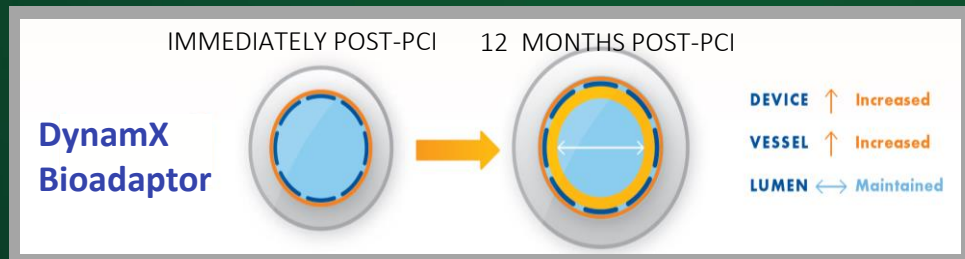
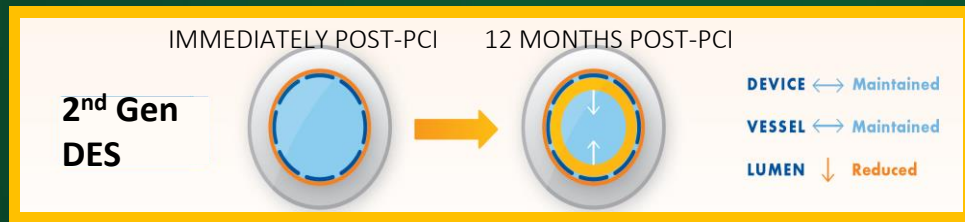
30 months later



$6.73 \pm 0.26 \text{ mm}^2$

Cross-sectional Area (mm <sup>2</sup> )																		
																		
8.29	7.36	8.37	7.01	6.68	6.96	6.74	6.92	6.93	6.51	7.09	6.74	7.04	6.11	6.8	6.79	6.58	6.91	6.99
<p><math>6.99 \pm 0.54 \text{ mm}^2</math>      <math>p=0.044</math></p>																		

# 12 months follow-up OUR CASE



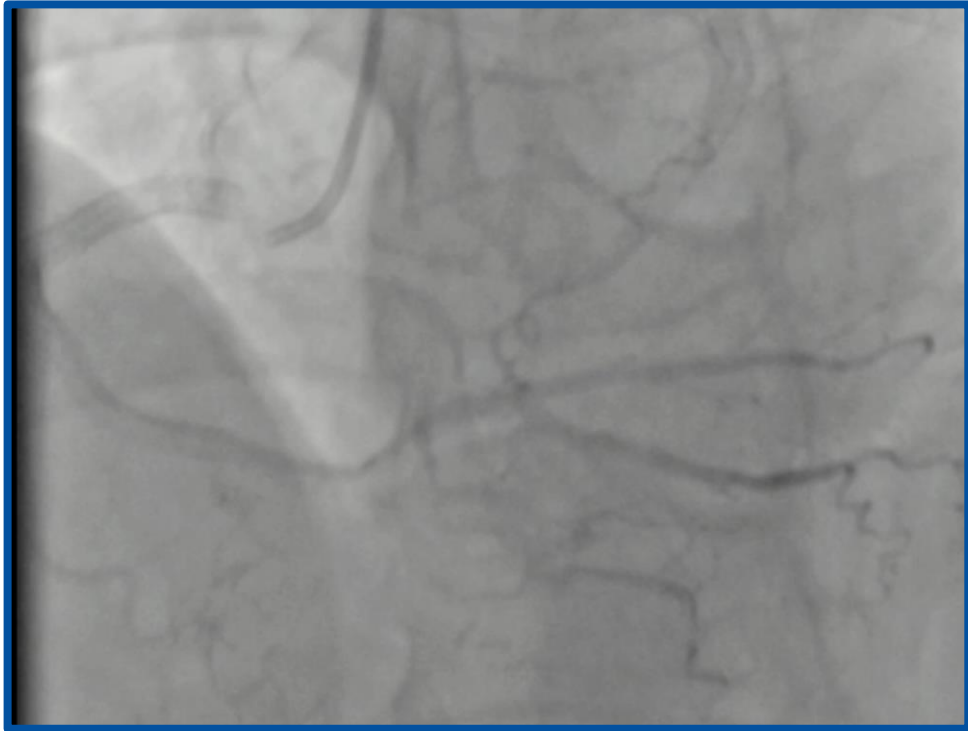
**IVUS Imaging Post-Implant – In-device Pulsatility is Constrained**

**% Lumen Area Change during Cardiac Cycle**

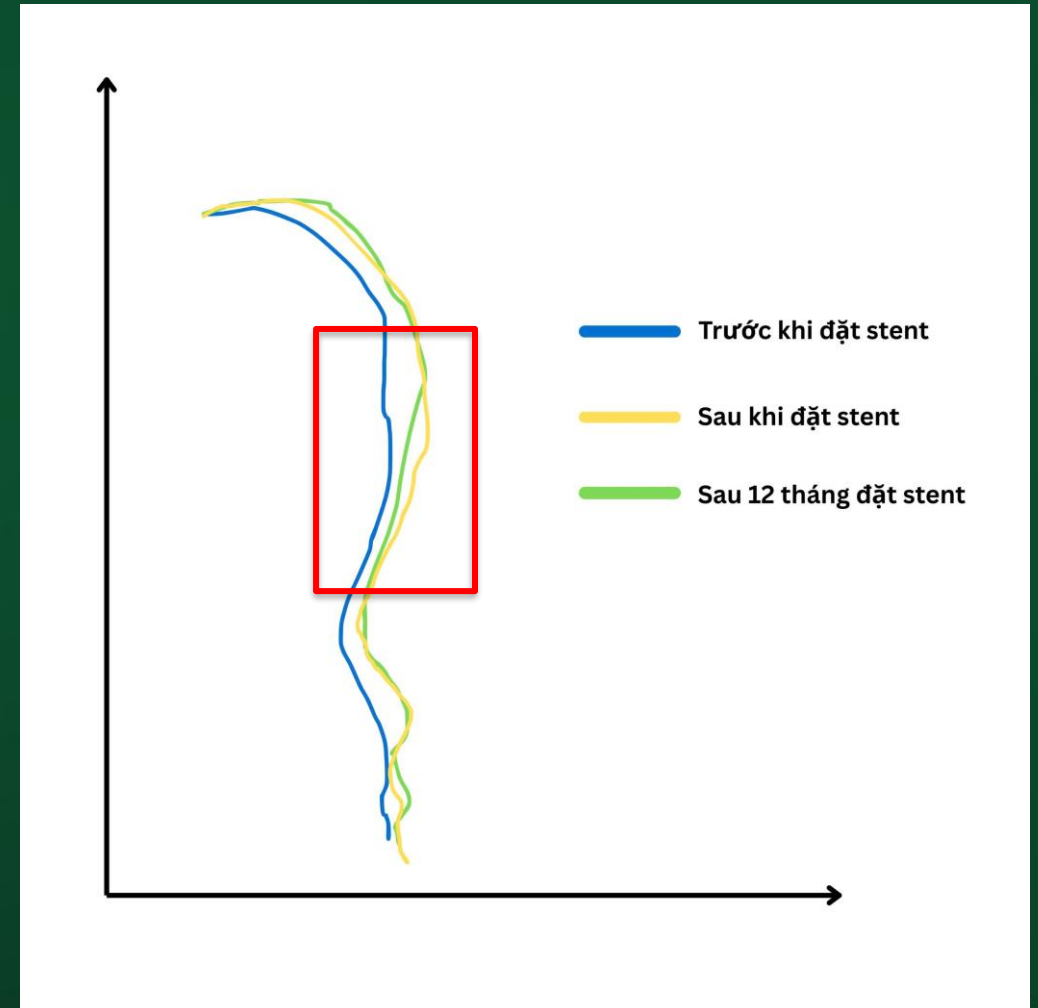
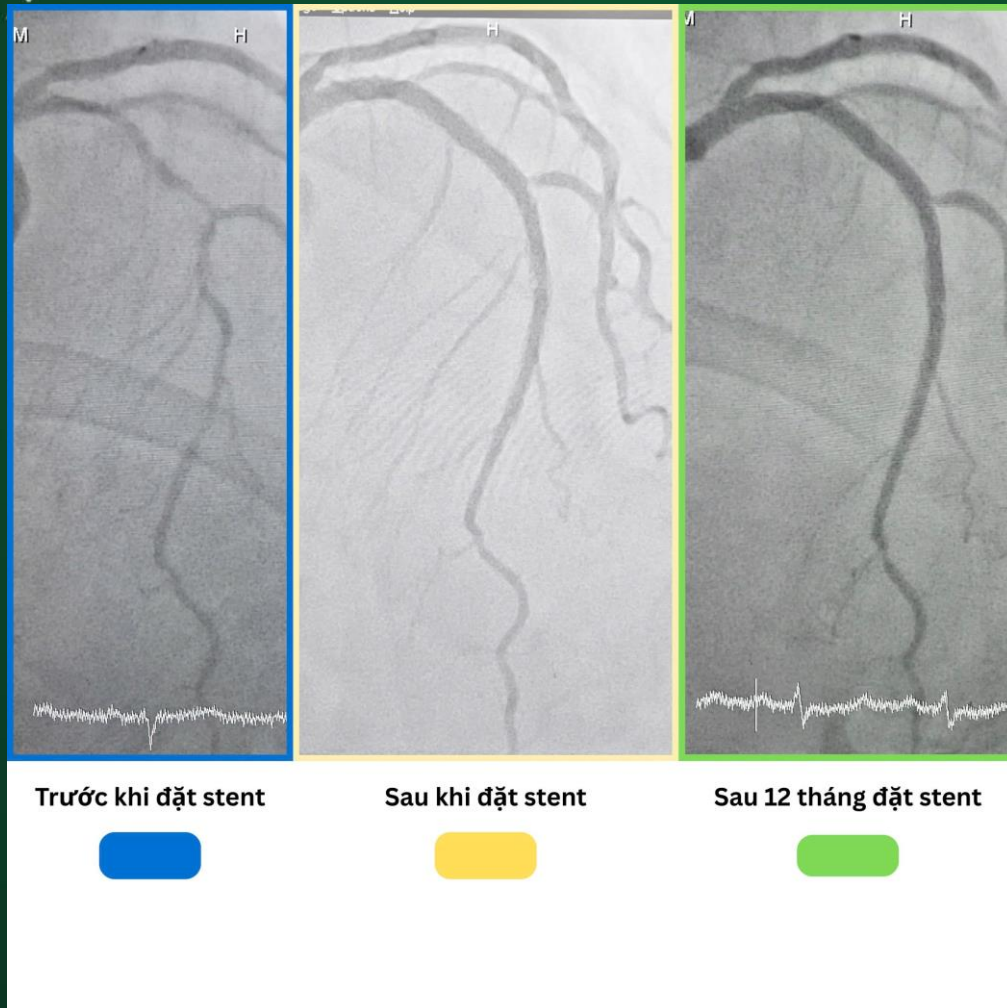
DynamX Bioadaptor, when unlocked, allows the vessel to accommodate NIH progression to maintain flow lumen area and normalize stresses

# 12 Month Follow up

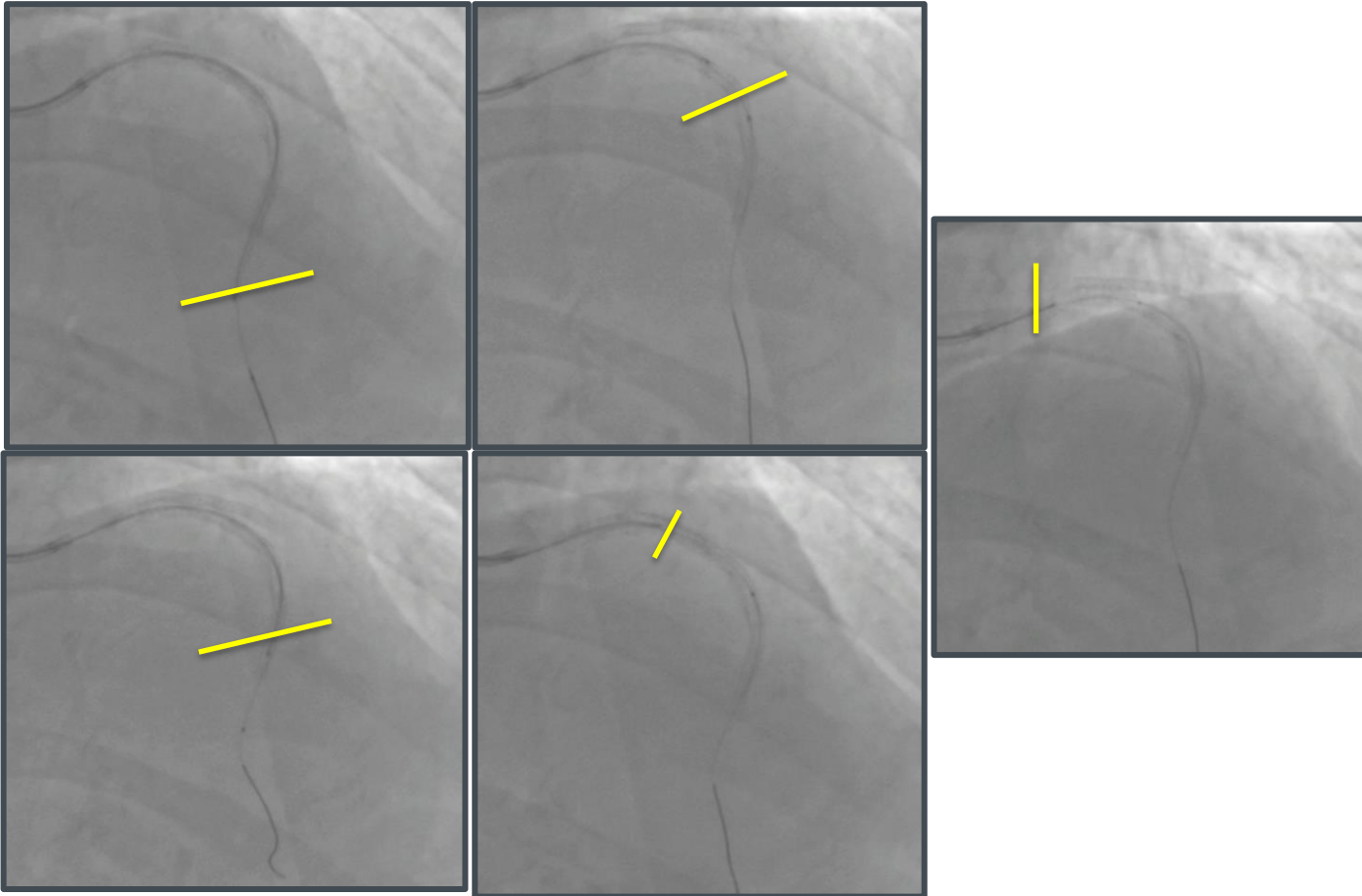
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# 12 months follow up



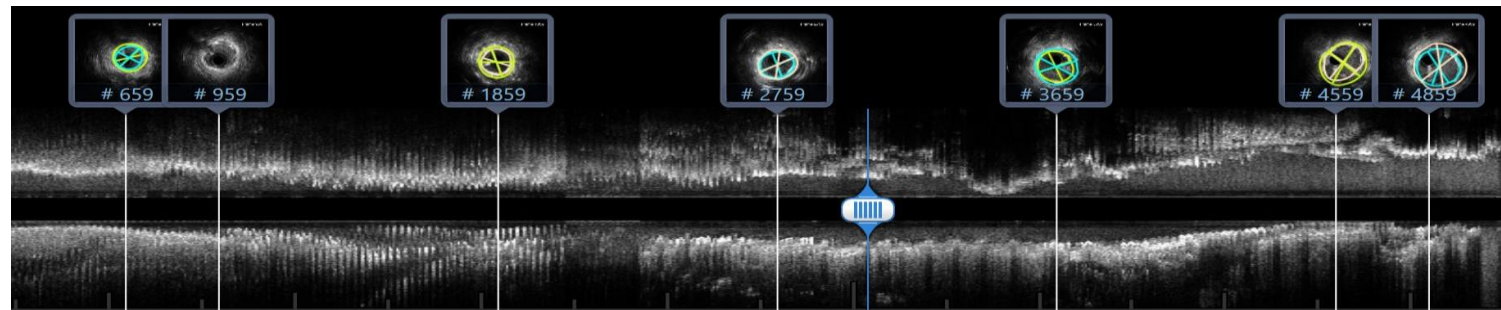
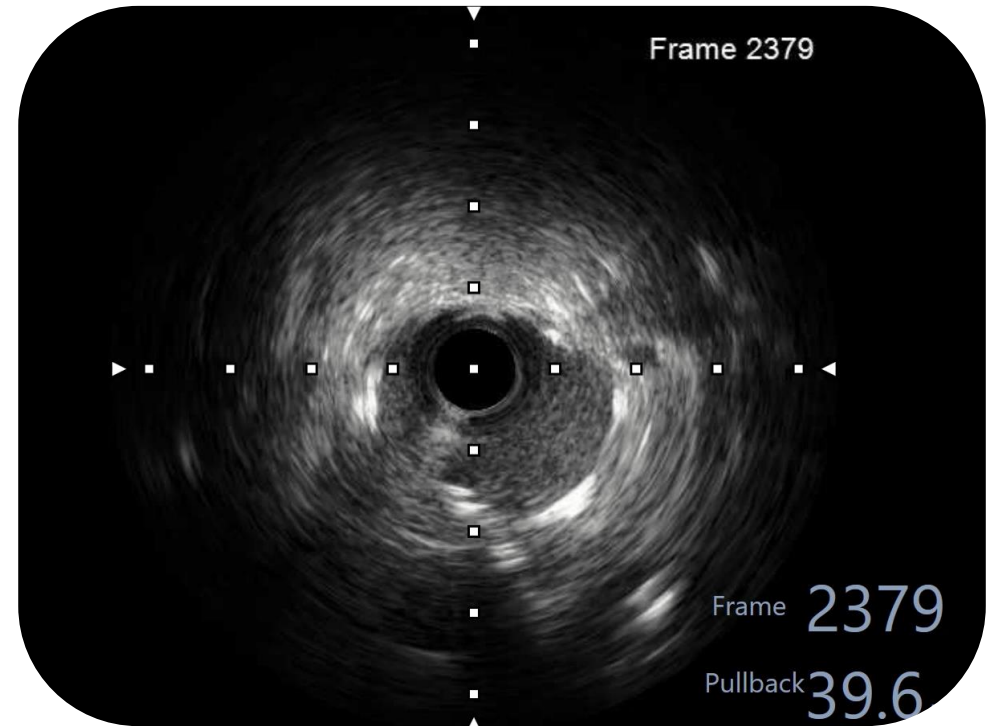
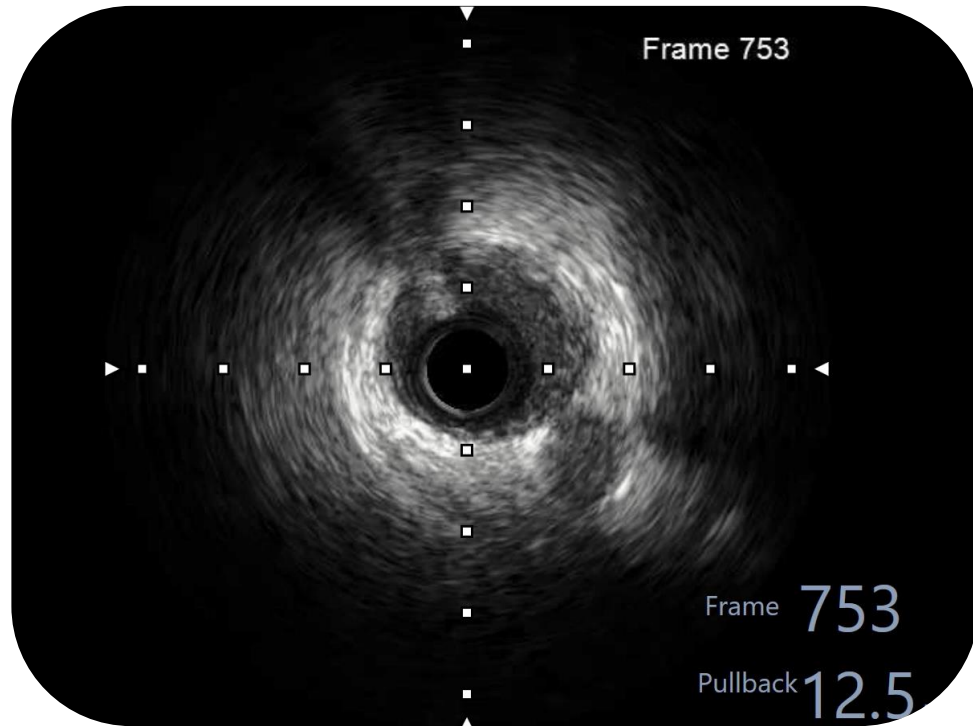
# 12 Month Follow up: Stationary IVUS



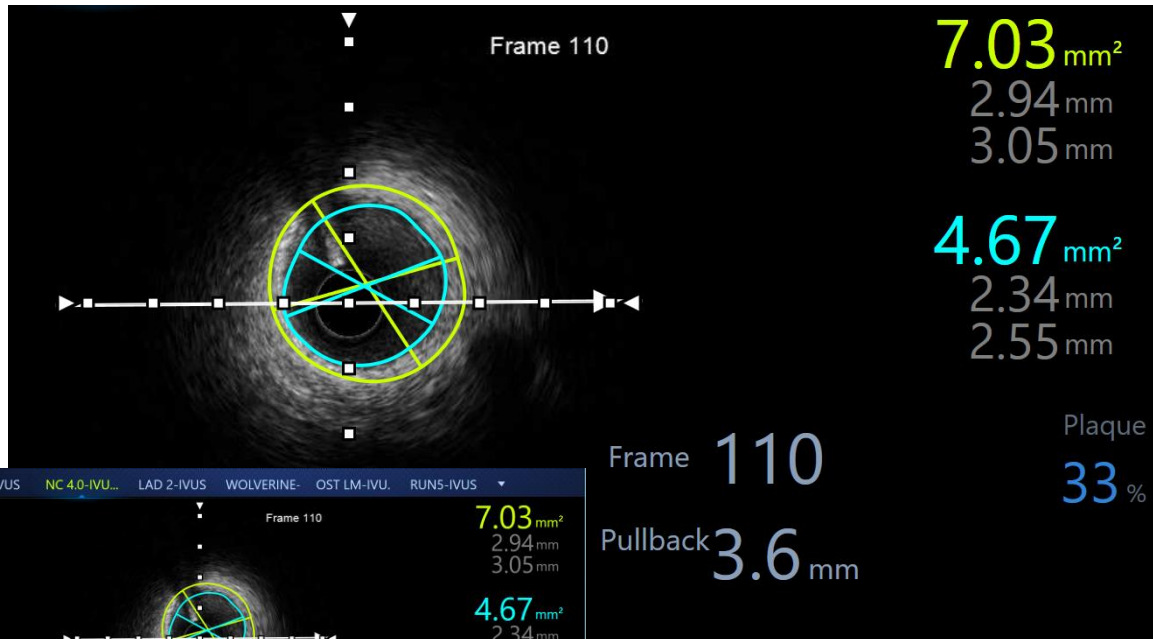
## Chạy IVUS tại 5 vị trí

- rìa gần stent
- rìa xa stent
- stent LM
- overlap 02 stent
- free stent LAD

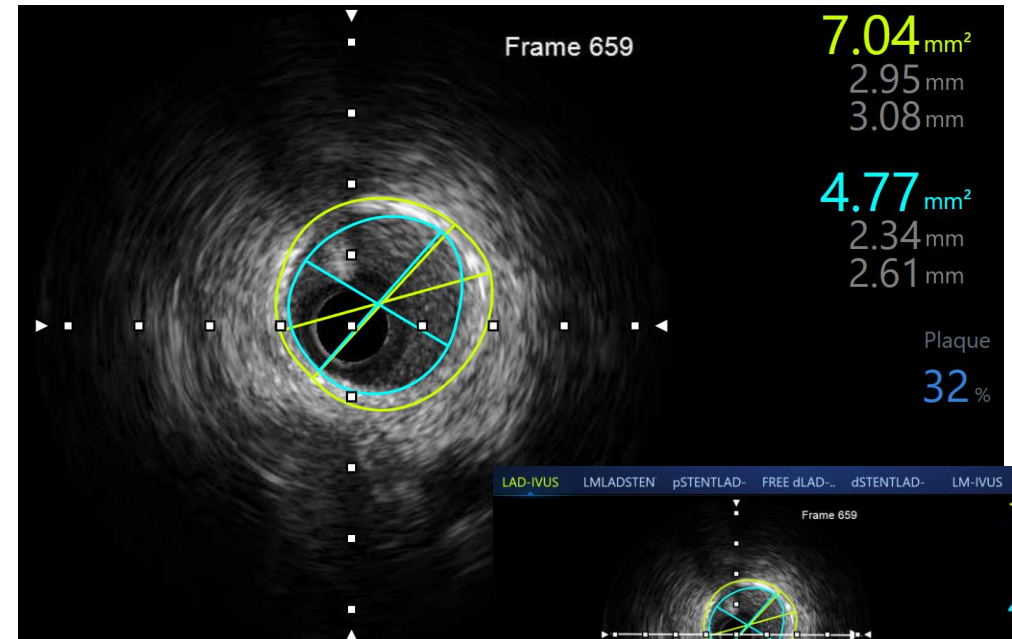
# IVUS mdLAD and LMpLAD 9.2025



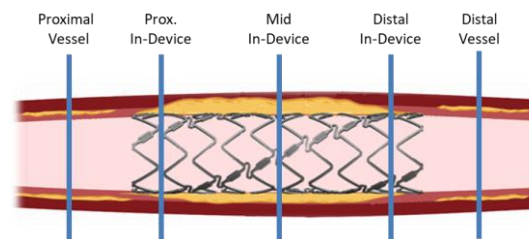
# IVUS LAD free stent edge 5mm implant and 12 month follow-up



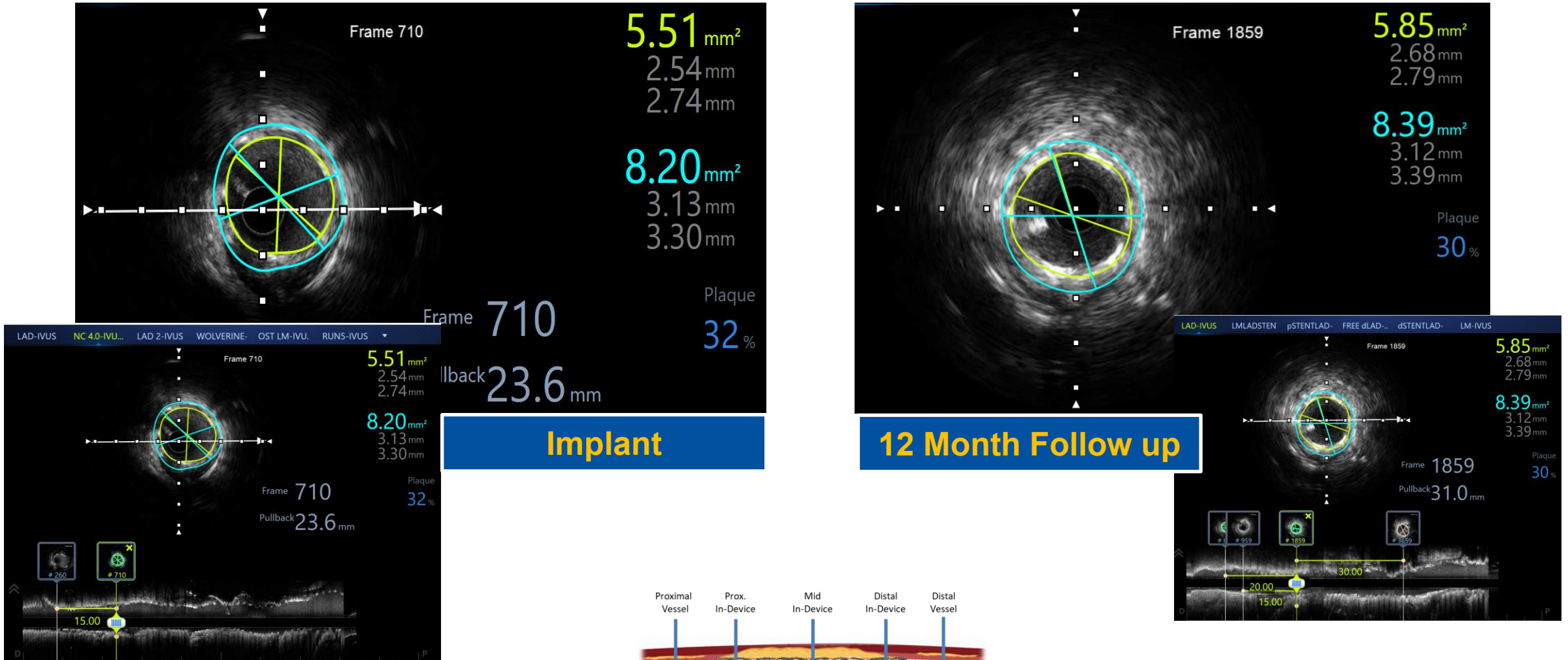
**Implant**



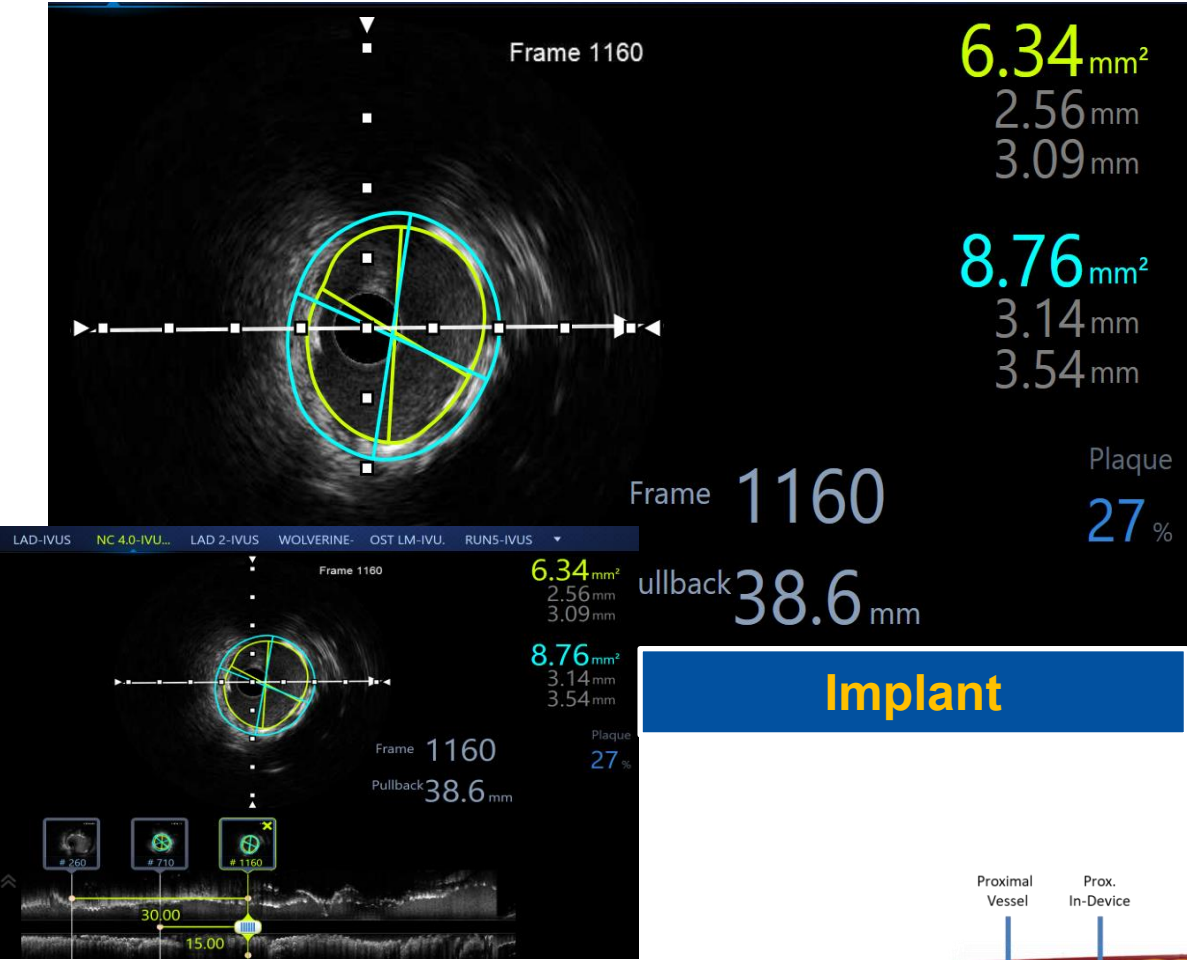
**12 Month Follow up**



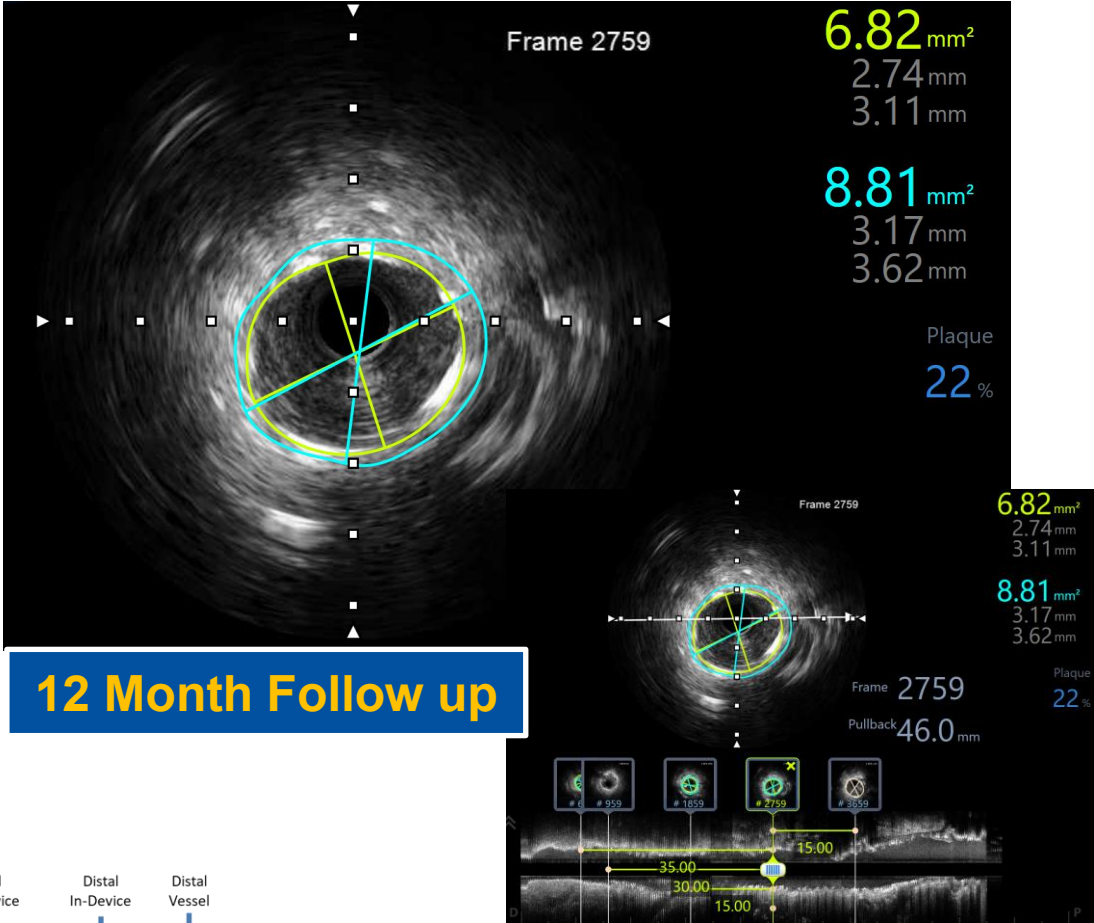
# IVUS LAD stent edge 15mm implant and 12 month follow-up



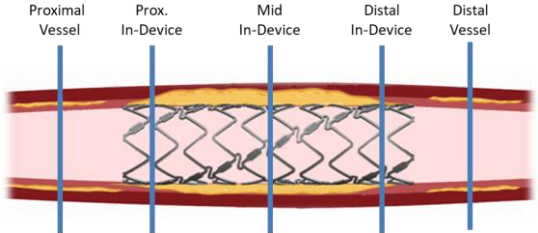
# IVUS LAD stent edge 30mm implant and 12 month follow-up



**Implant**

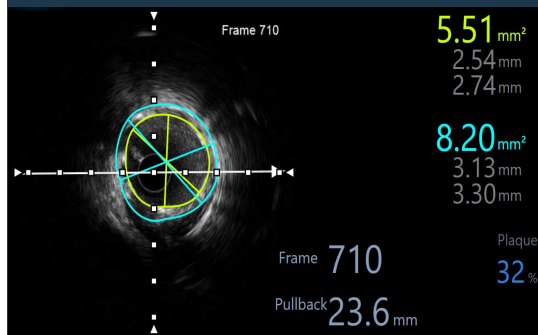


**12 Month Follow up**

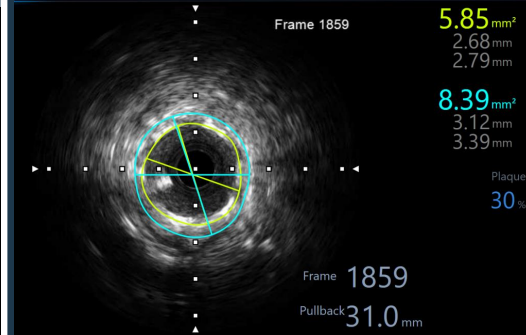


# IVUS Shows Adaptive Remodeling with Bioadaptor

## LAD stent edge 15mm (dLAD)



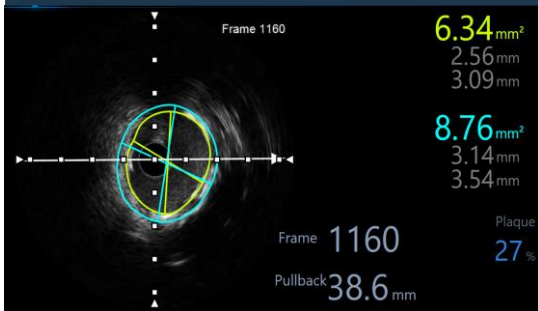
**Implant**



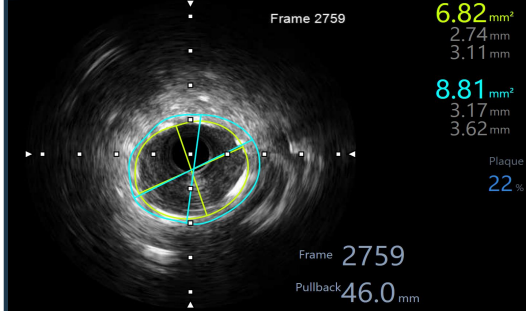
**12 Month Follow up**

**At 12 months**  
- lumen area increase **(+6%)**  
- vessel area: increase **(+2%)**

## LAD stent edge 30mm (mLAD)



**Implant**



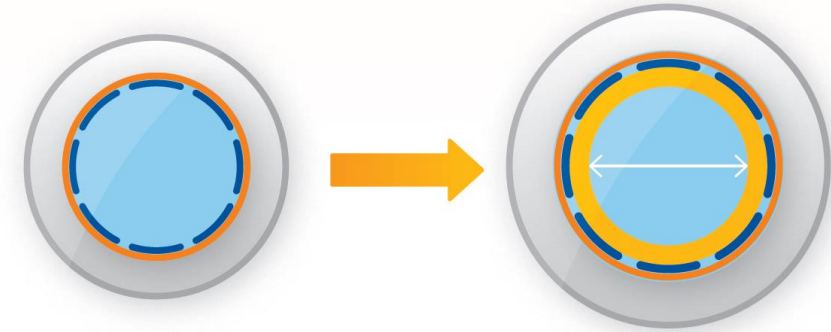
**12 Month Follow up**

**At 12 months**  
- lumen area increase **(+8%)**  
- vessel area: increase **(1%)**

Bioadaptor, when unlocked after 6 months, allows the vessel to accommodate NIH progression to maintain flow lumen area.

IMMEDIATELY POST-BIOADAPTIVE PCI

12 MONTHS POST-BIOADAPTIVE PCI

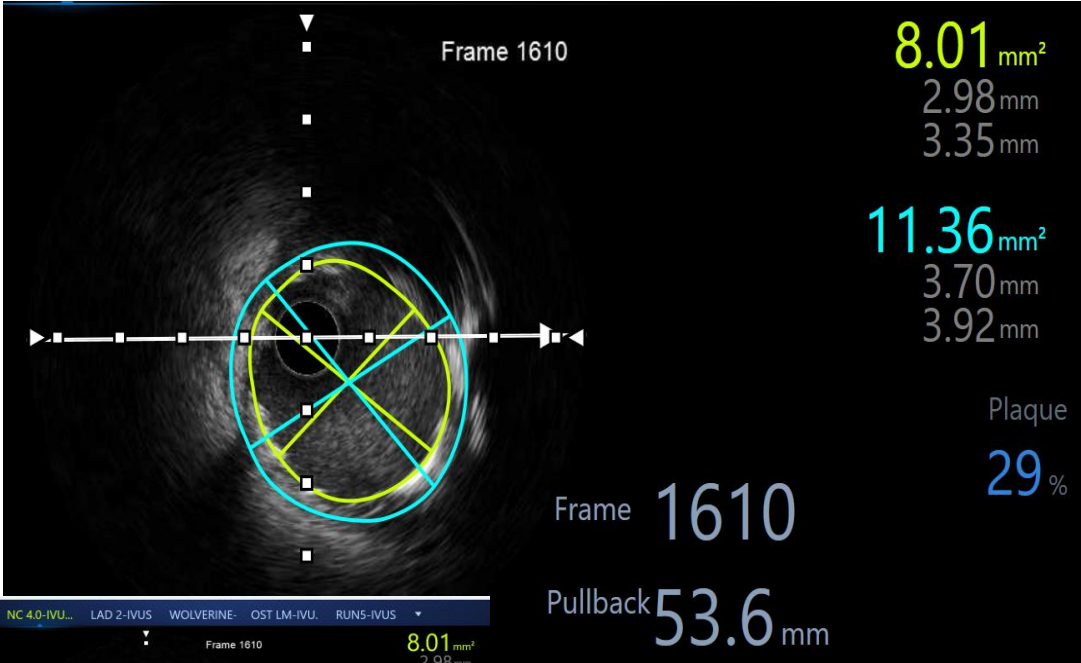


**DEVICE** ↑ **Increased**

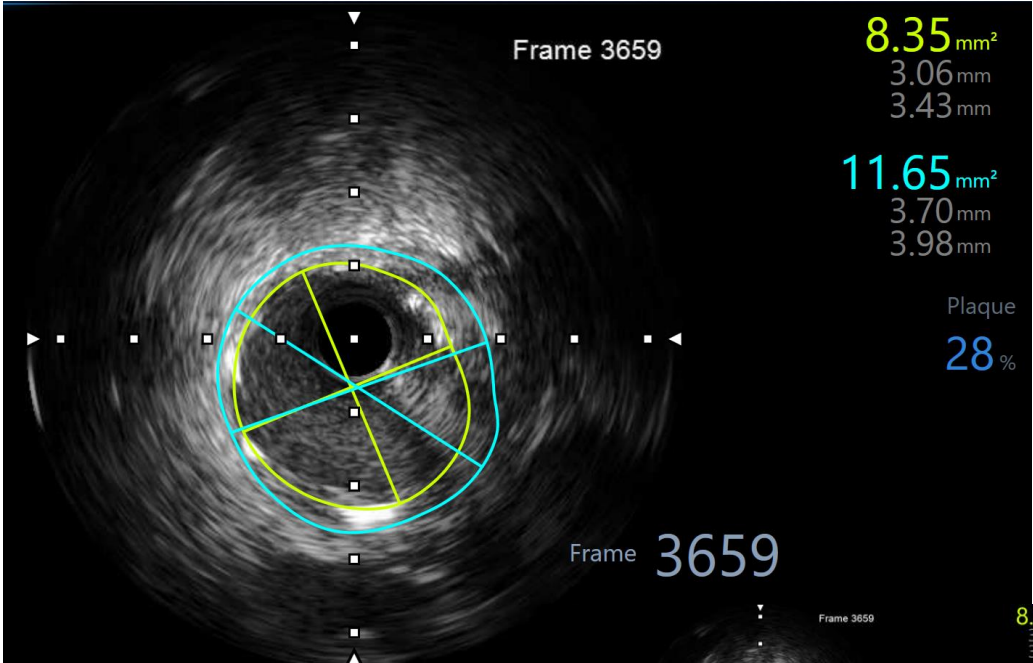
**VESSEL** ↑ **Increased**

**LUMEN** ↔ **Maintained**

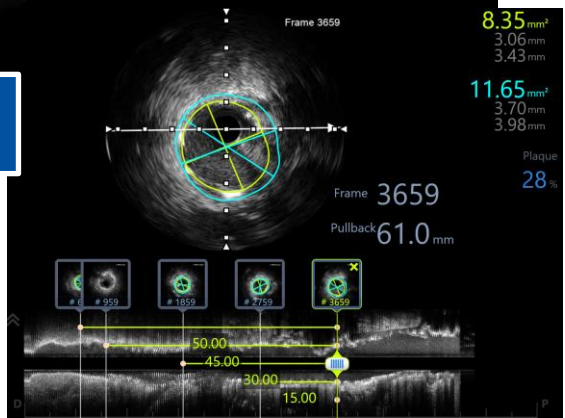
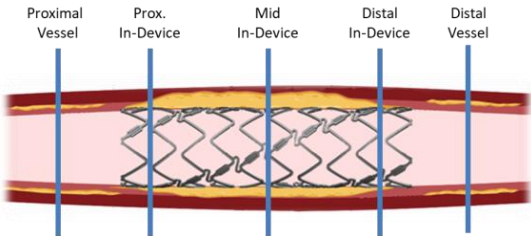
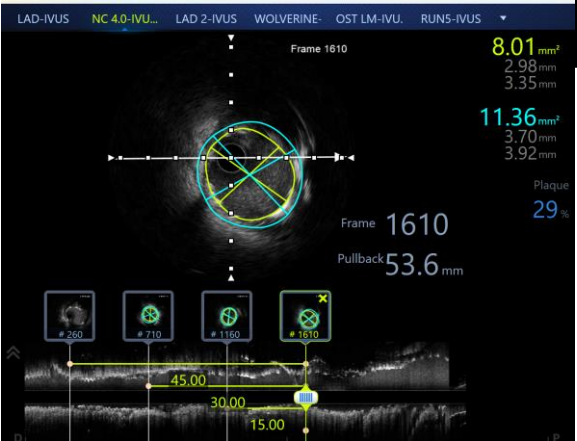
# IVUS LAD stent edge 45mm implant and 12 month follow-up



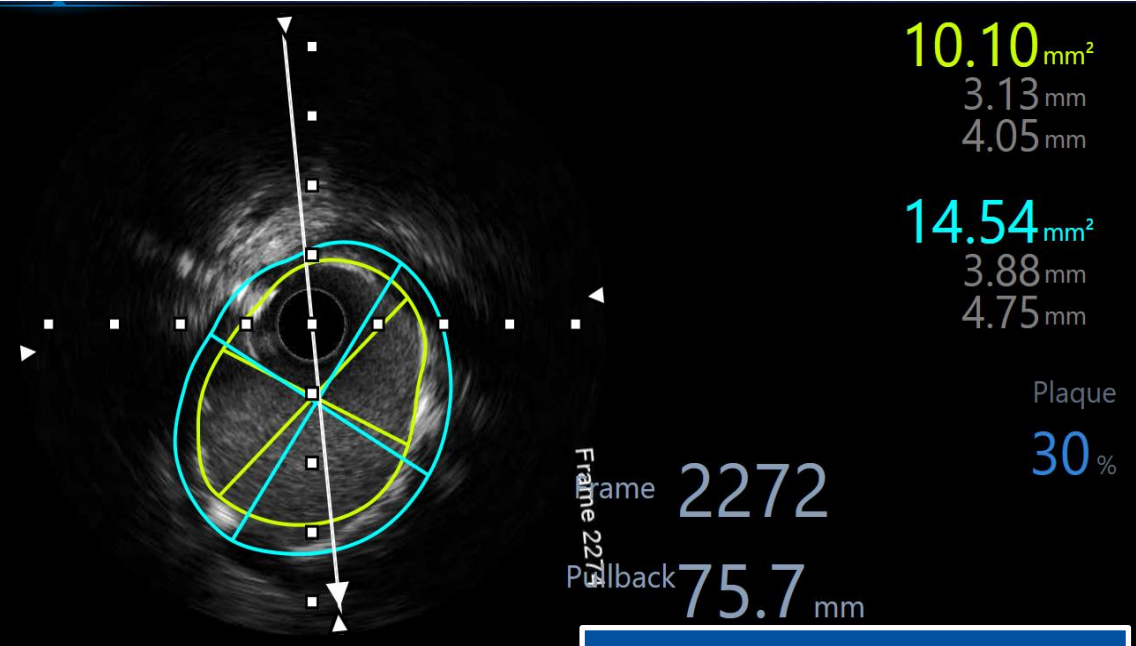
**Implant**



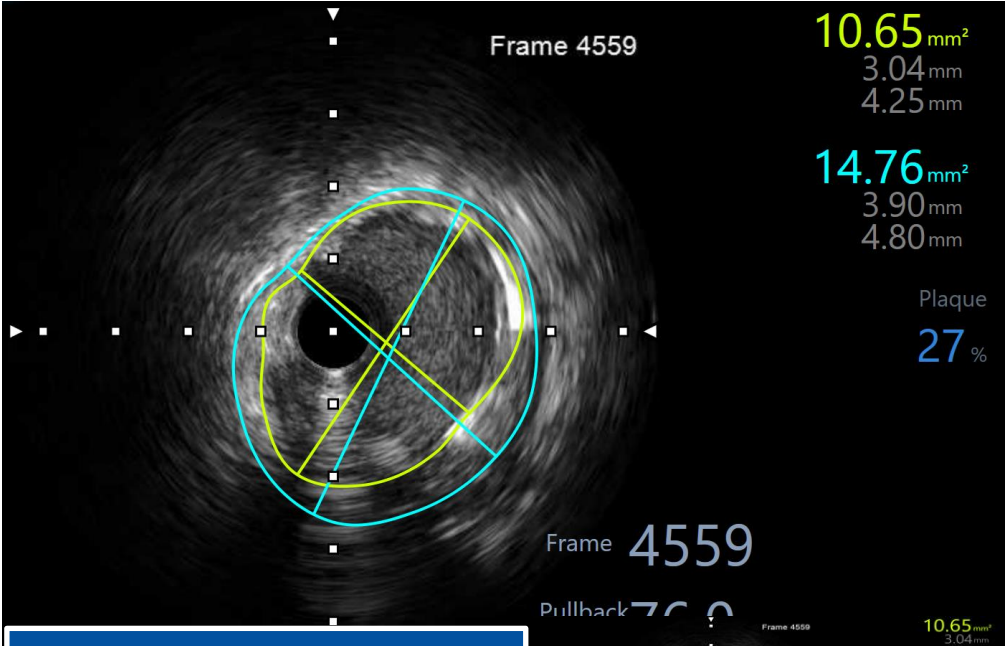
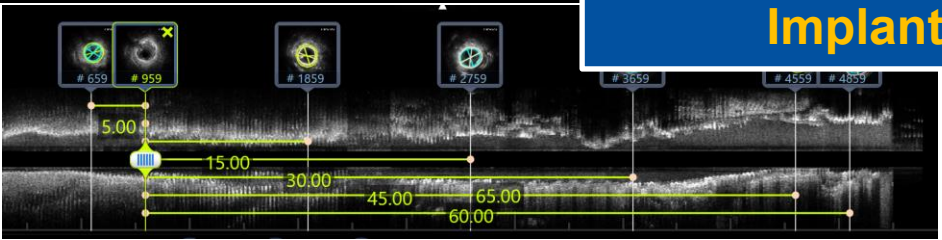
**12 Month Follow up**



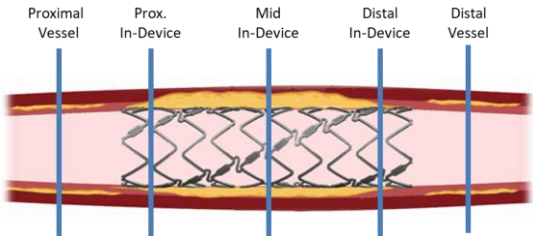
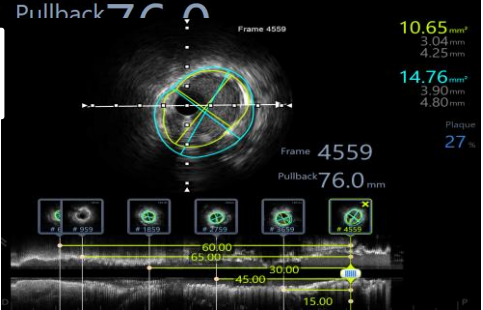
# IVUS LAD stent edge 60mm implant and 12 month follow-up



**Implant**

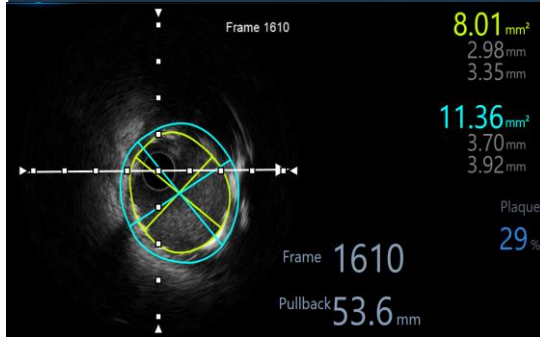


**12 Month Follow up**

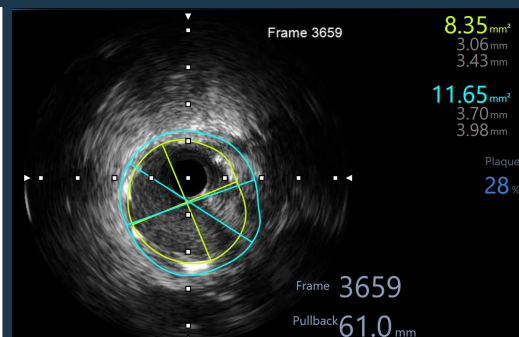


# IVUS Shows Adaptive Remodeling with Bioadaptor

## LAD stent edge 45mm (pLAD)



**Implant**

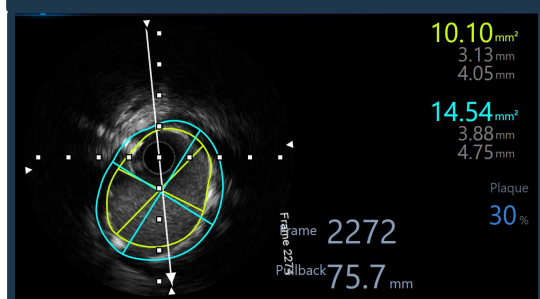


**12 Month Follow up**

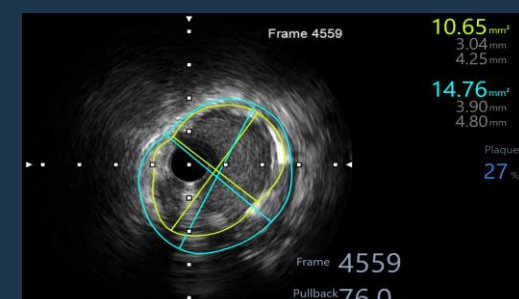
**At 12 months**  
 - lumen area increase **(+4%)**  
 - vessel area: increase **(+3%)**

Bioadaptor, when unlocked after 6 months, allows the vessel to accommodate NIH progression to maintain flow lumen area.

## LAD stent edge 60mm (LM)



**Implant**

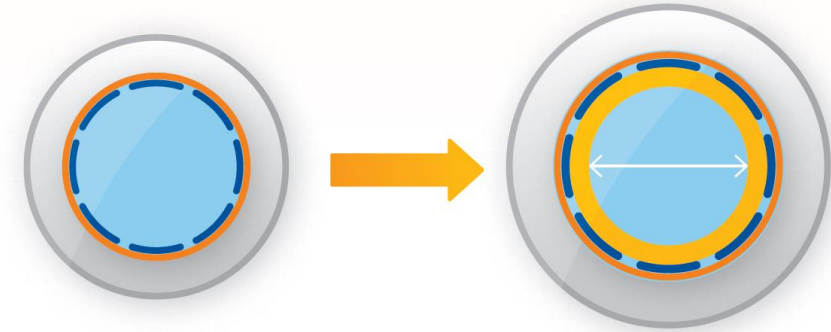


**12 Month Follow up**

**At 12 months**  
 - lumen area increase **(+5%)**  
 - vessel area: increase **(1.5%)**

IMMEDIATELY POST-BIOADAPTIVE PCI

12 MONTHS POST-BIOADAPTIVE PCI

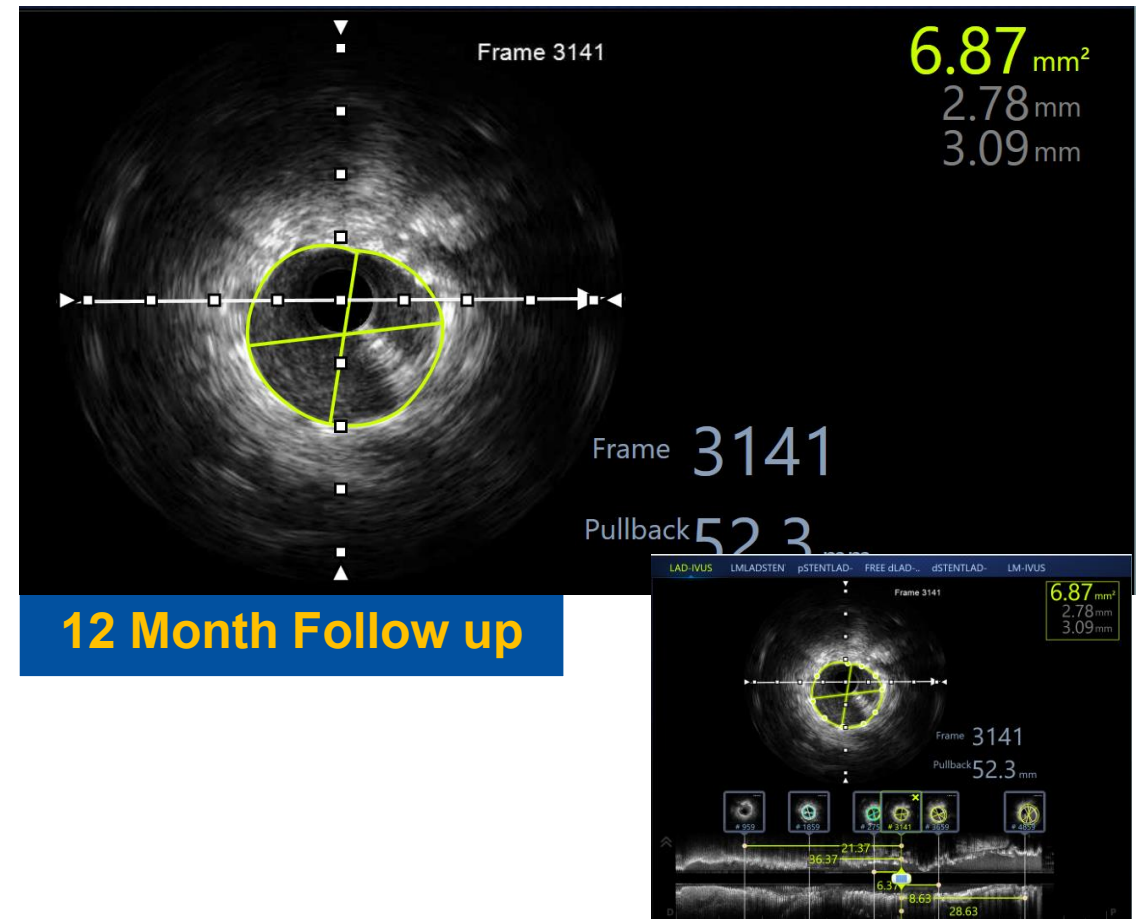
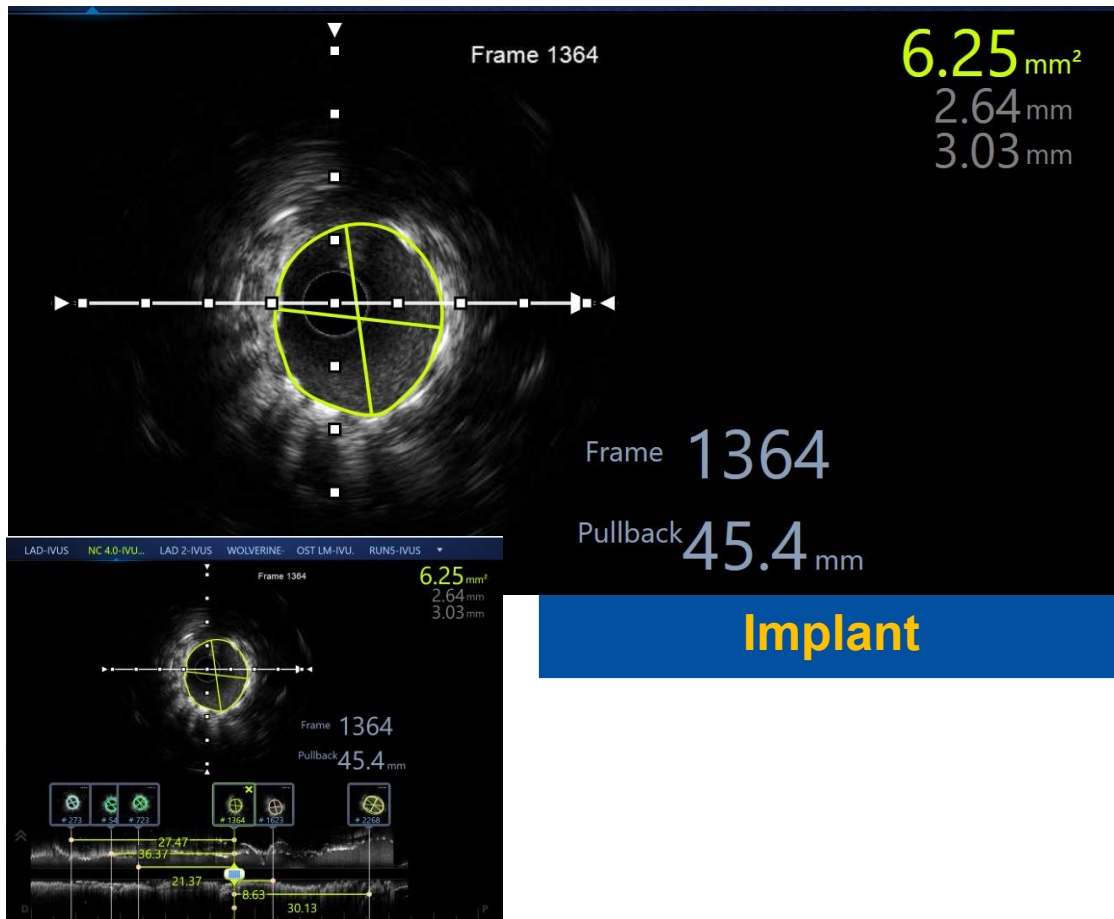


**DEVICE** ↑ **Increased**

**VESSEL** ↑ **Increased**

**LUMEN** ↔ **Maintained**

# IVUS LAD stent edge 36,37mm (overlap stent) implant and 12 month follow-up

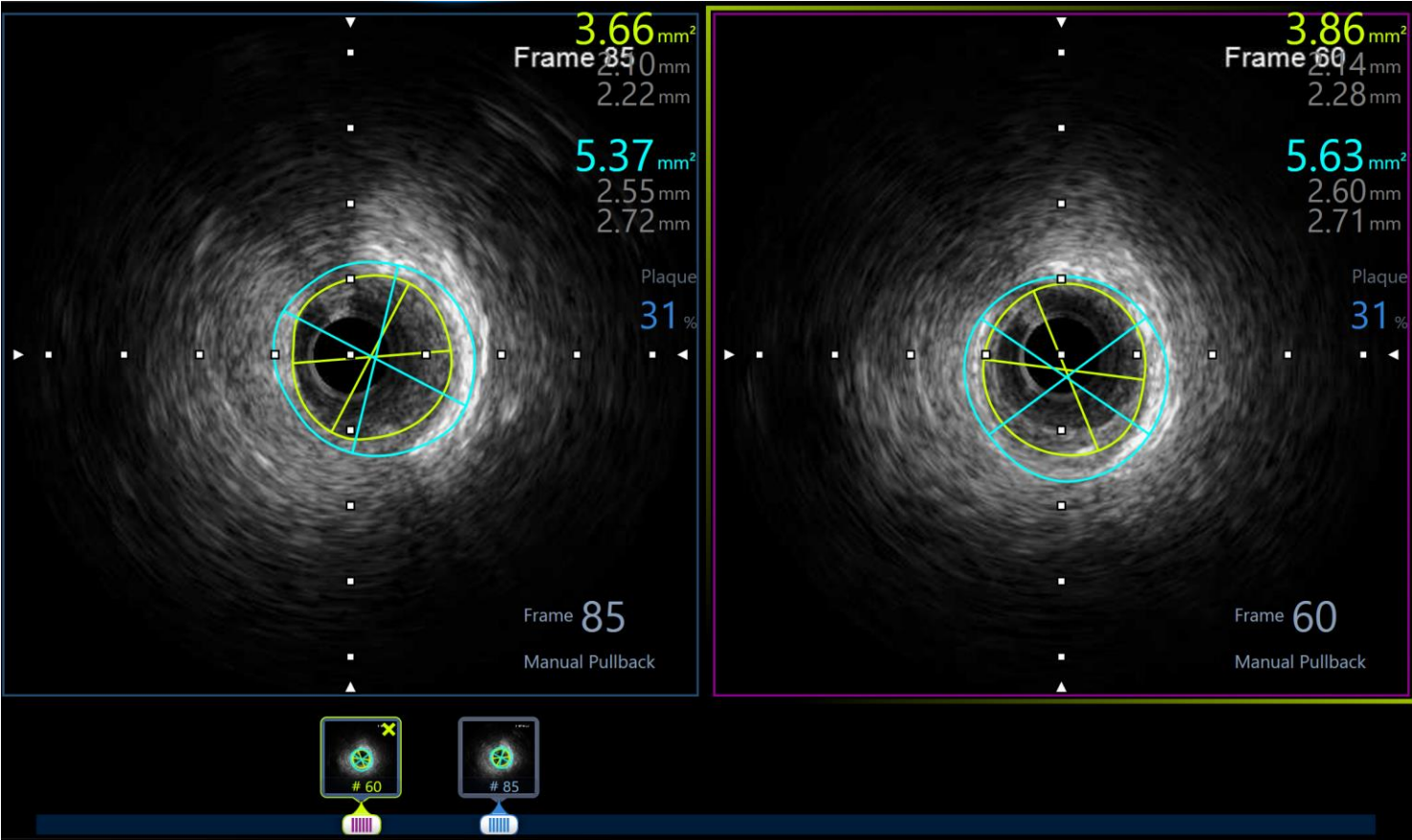


At 12 months lumen area increase (+9%)

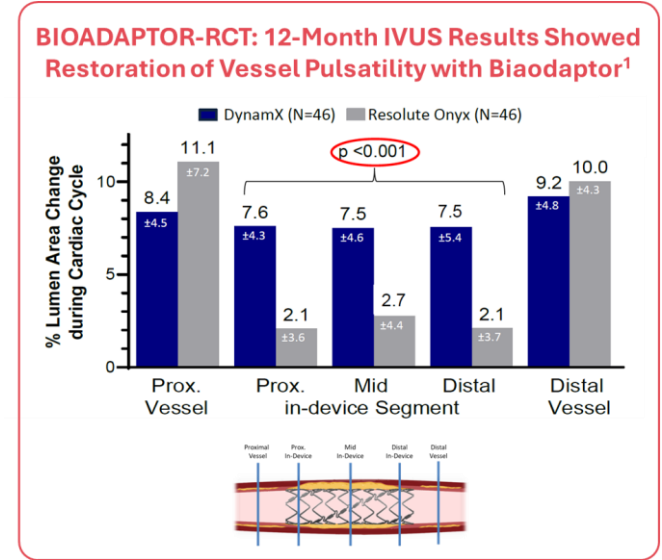


# Stationary IVUS 12 months follow up

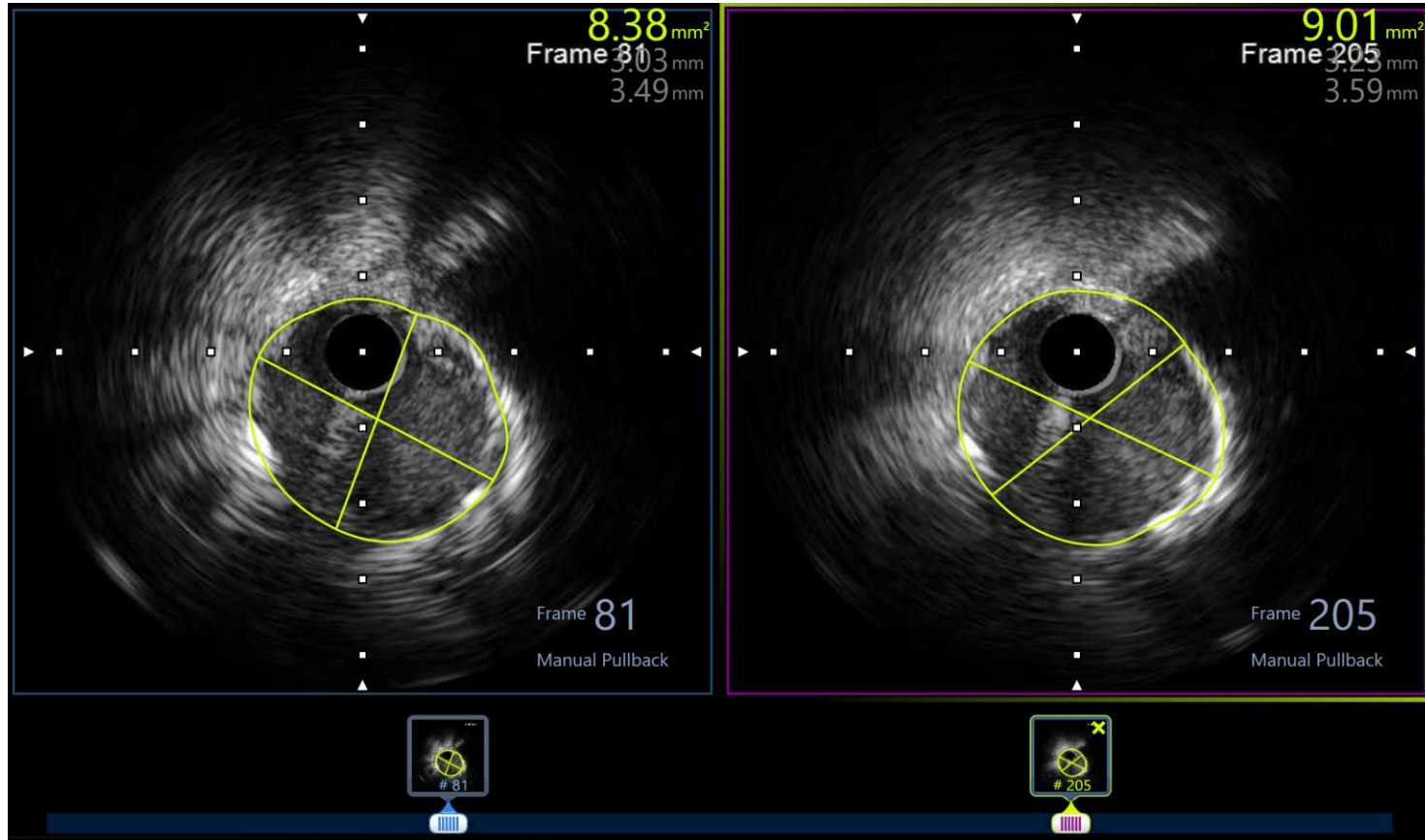
# Stationary IVUS 2025 free dLAD



$\Delta$  Lumen Area =  
 (Diastole – Systole)/Systole  
 = 5.5%

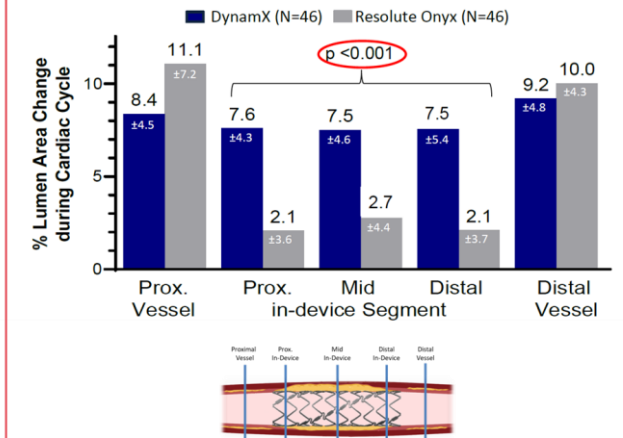


# Stationary IVUS 2025 stent pLAD

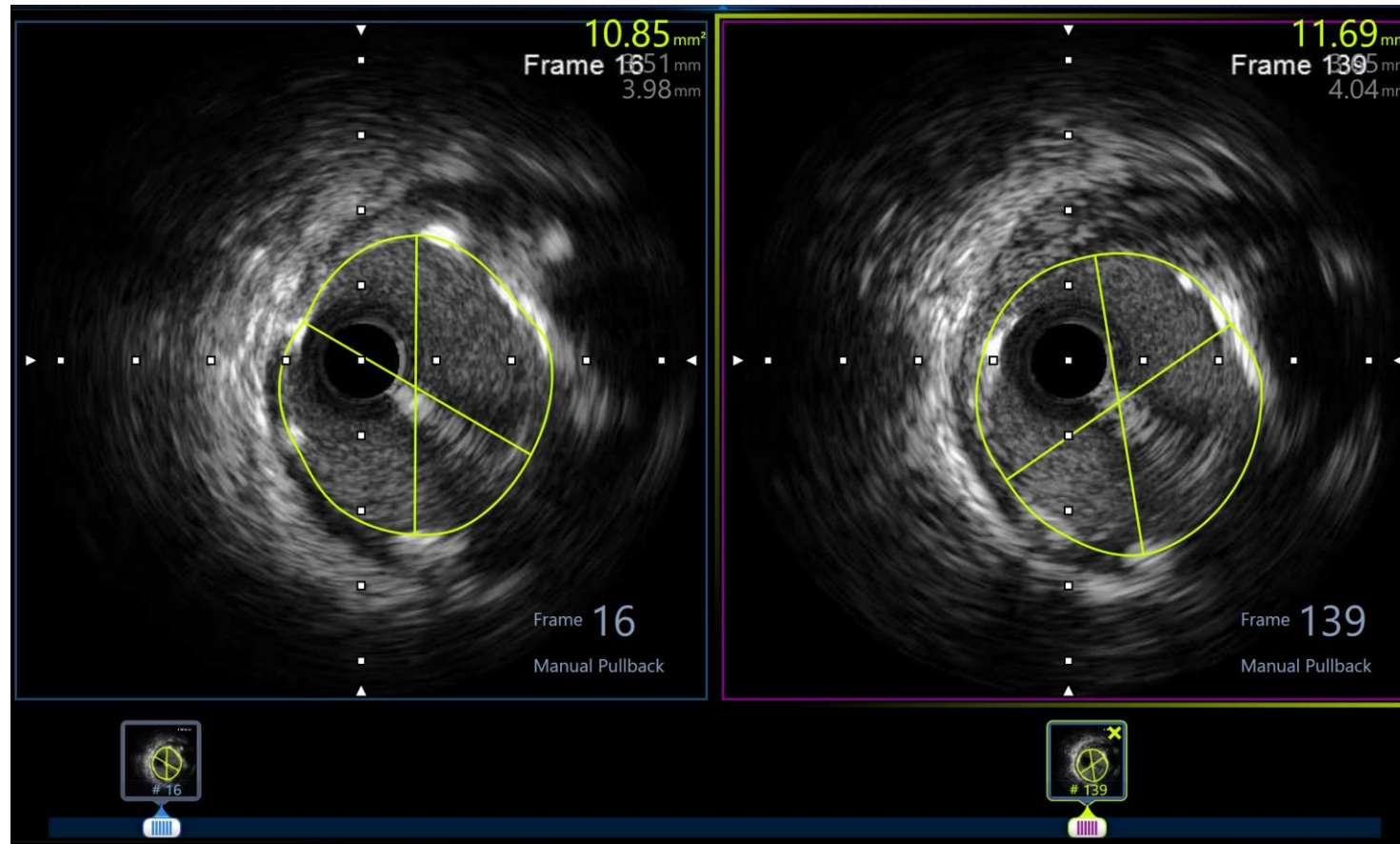


$\Delta$  Lumen Area =  
 (Diastole – Systole)/Systole  
 = 7.5%

**BIOADAPTOR-RCT: 12-Month IVUS Results Showed Restoration of Vessel Pulsatility with Biaodaptor<sup>1</sup>**

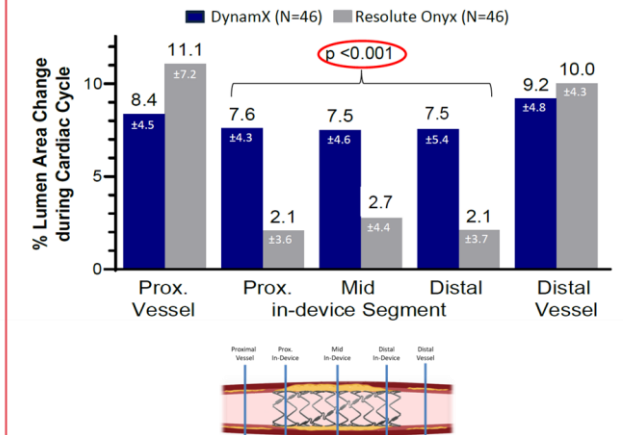


# Stationary IVUS 2025 stent LM

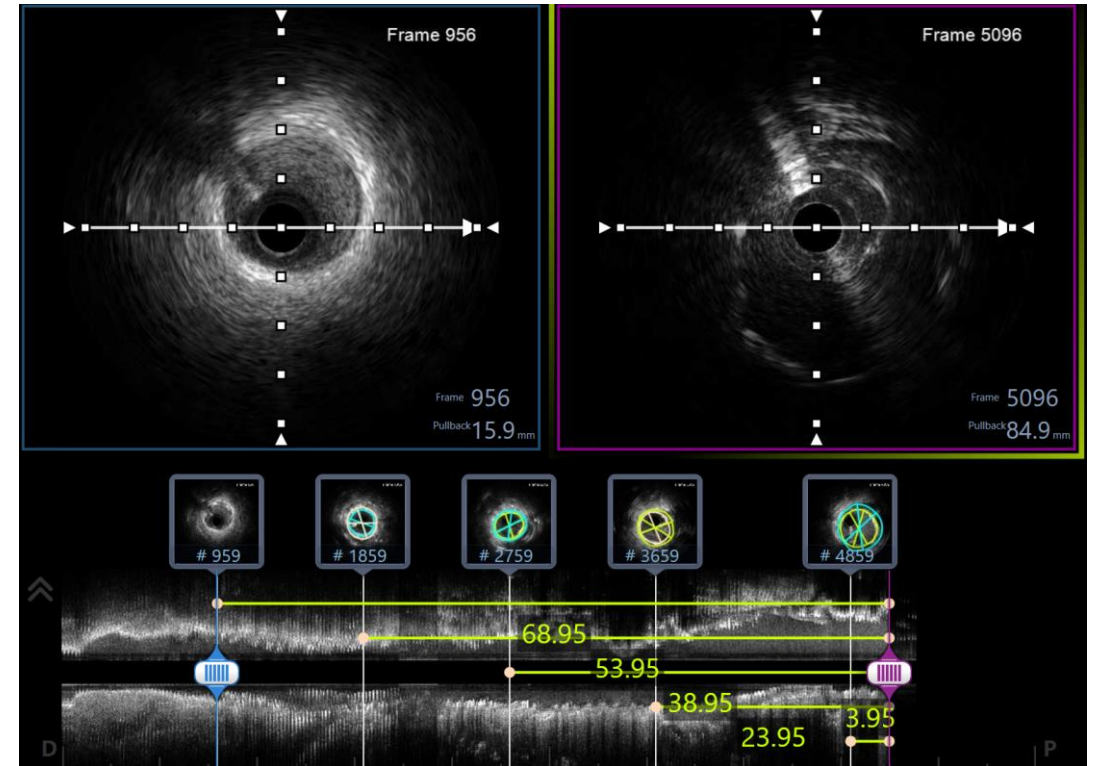
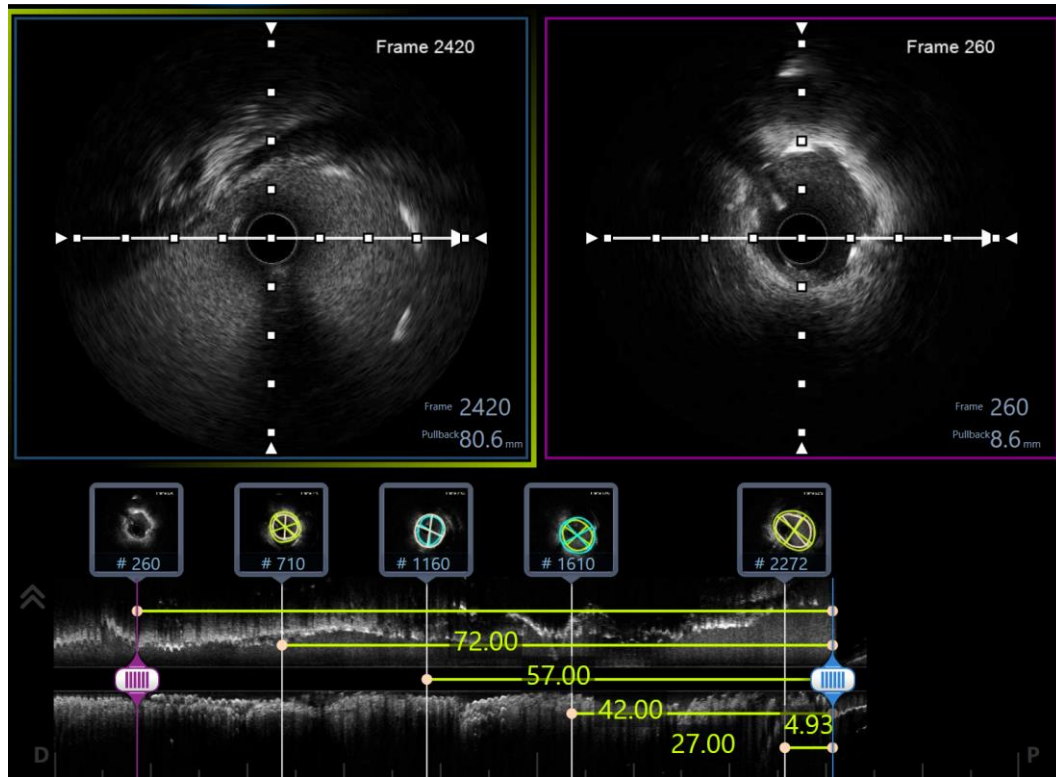


$$\Delta \text{ Lumen Area} = \frac{(\text{Diastole} - \text{Systole})}{\text{Systole}} = 7.7\%$$

**BIOADAPTOR-RCT: 12-Month IVUS Results Showed Restoration of Vessel Pulsatility with Biaodaptor<sup>1</sup>**



# Total stent length after stent Implant **72 mm** After 12 month follow-up **69 mm**



# Take-home messages

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- RCTs show superior clinical outcomes of bioadaptors compared with contemporary best-in-class DES.
- Bioadaptors restore vessel physiology and geometry, enabling adaptive remodeling, pulsatility, vasomotion, and compliance.
- IVUS follow-up in our case demonstrated scaffold area enlargement, supporting durable vessel restoration over time.



**Thank you very much for your attention**

