



How to select three-vessel disease patients eligible for PCI and guide the treatment by angiography-derived physiology

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Panel members



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Helge
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Wykrzykowska



Chatmaster: Mattia
Lunardi

Potential conflicts of interest

Speaker Name :**Patrick Serruys**

I have the following potential conflicts of interest in this field to report:

Consultancy for SMT, Novartis, Xeltis, Philips and Meril life sciences

Speaker's name: **Javier Escaned**

I have the following potential conflicts of interest in this field to report:

Speaker at educational events by Abiomed, Abbott, Boston Scientific, Medis and Philips

Speaker's name: **Faisal Sharif**

I have no potential conflicts of interest in this field to report:

Speaker's name: **Yoshi Onuma**

I have no potential conflicts of interest in this field to report:

SESSION OBJECTIVES

1. **To identify the right patient for three-vessel PCI (precision medicine)**
2. **To select the lesions to be treated by angiography-derived physiology (quantitative flow ratio)**
3. **To appreciate how IVUS/OCT can improve the outcome of Multivessel stenting**

PART I

Clinical data – Angiography – SYNTAX Score

Demographic and clinical history

- 76 years old, BMI 31.8 kg/m²

Variable	Yes	No
Male	X	
Former smoker	X	
Hypertension	X	
Dyslipidaemia	X	
Peripheral vascular disease	X	
Family history of CAD	X	
COPD		X
Diabetes		X
Chronic kidney disease		X

- Therapy: ACEi, B-Blocker, Ca⁺⁺ channel blocker, statin

Clinical presentation

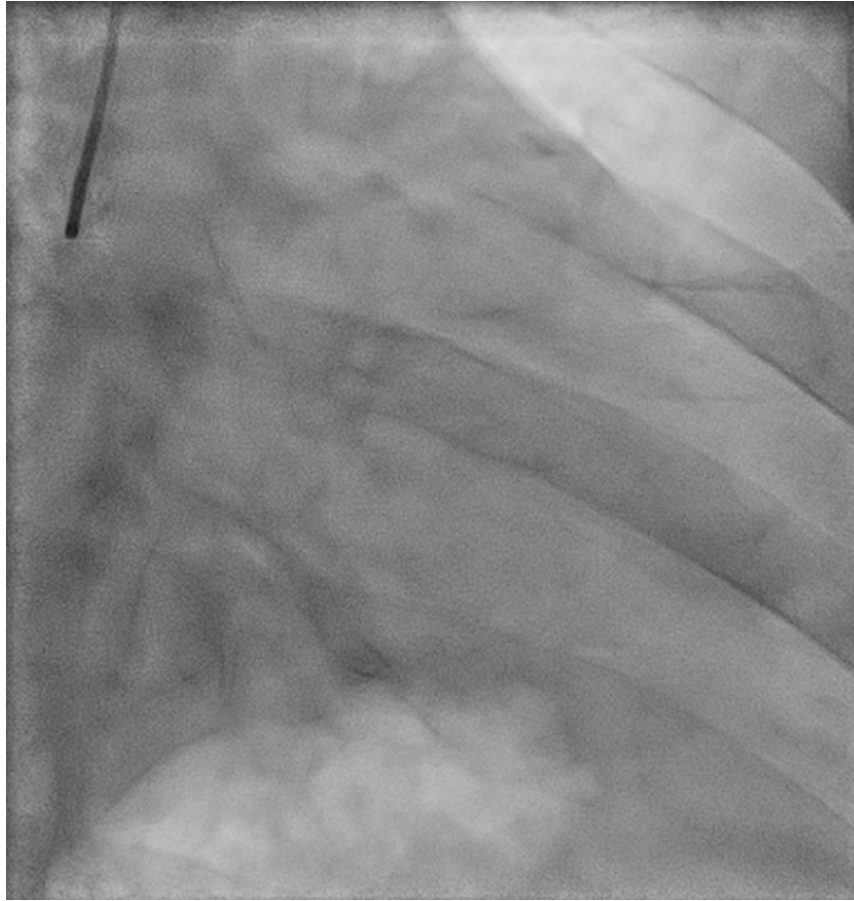
Symptoms

- Recent TIA (right eye blurring + dizziness), 2 months before
- Stable angina: CCS class II for 3 months

Examinations

- ECG: Sinus bradycardia + 1 AV block
- Echocardiography: LVEF 60%, mild lateral wall hypokinesis
- Lab: eGFR 68 ml/min, hs-TnT 18 ng/L (ULN: 14 ng/L)

Coronary angiography - LCA



Coronary angiography - RCA



Question poll

Which lesion/s do you consider significant?

Coronary	Yes	No
LAD		
L-Cx		
RCA		

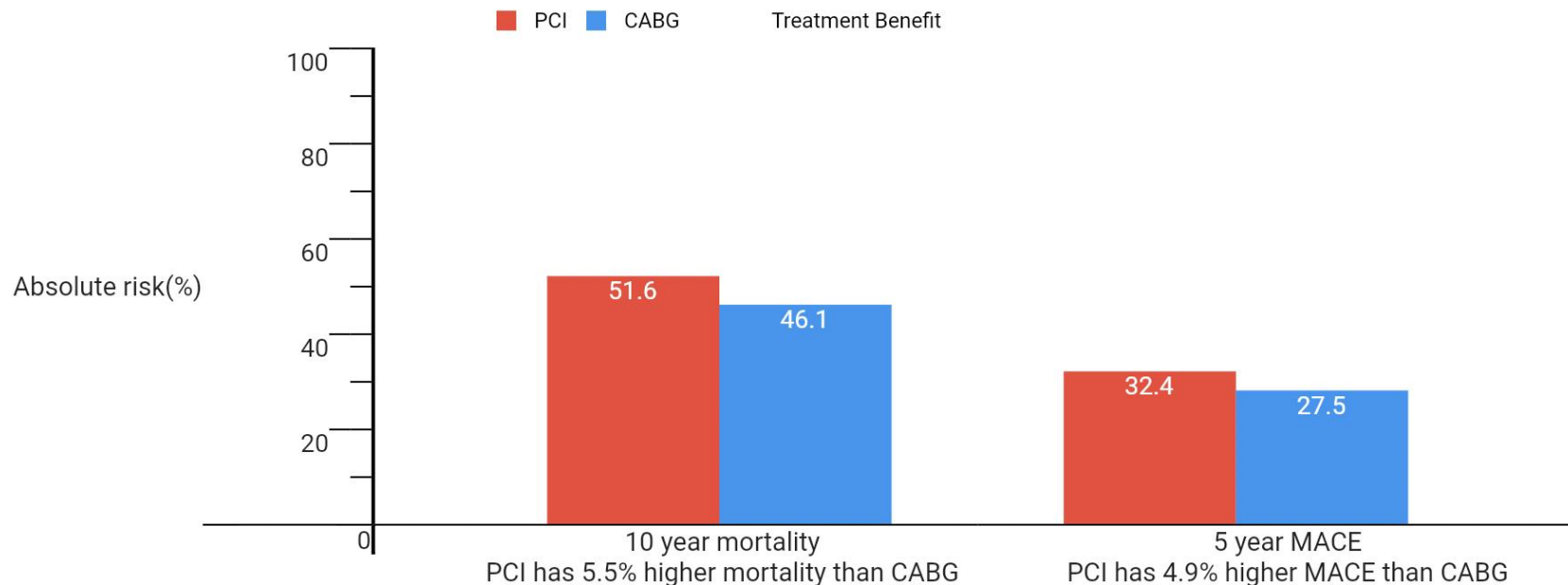
SYNTAX II

Variable	Value
Anatomical SYNTAX Score	14
Age	76
Creatine clearance (mL/min)	68
LVEF (%)	60
Left Main	No
Gender	Male
COPD	No
PVD	Yes
SYNTAX Score II - PCI	42.8
4-year mortality - PCI	18.7 %
SYNTAX Score II - CABG	47.3
4-year mortality - CABG	26.0 %

Indication

PCI or CABG

SYNTAX Score 2020 (background slide)



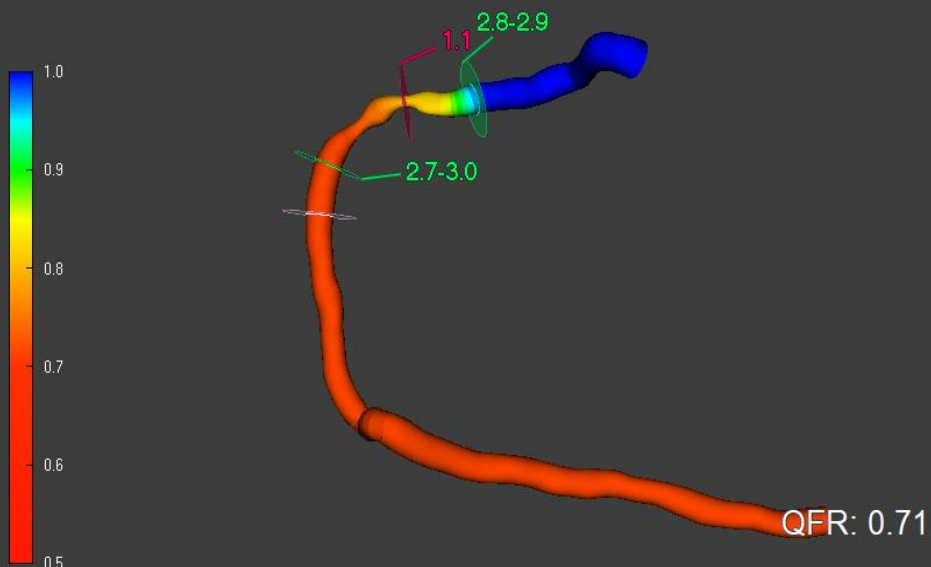
10-year mortality CABG, %	46,1
10-year mortality PCI, %	51.6
5-year MACE CABG, %	27.5
5-year MACE PCI, %	32.4

PART II

Quantitative Flow Ratio

QFR analysis of RCA lesion

Contrast Vessel QFR: 0.71

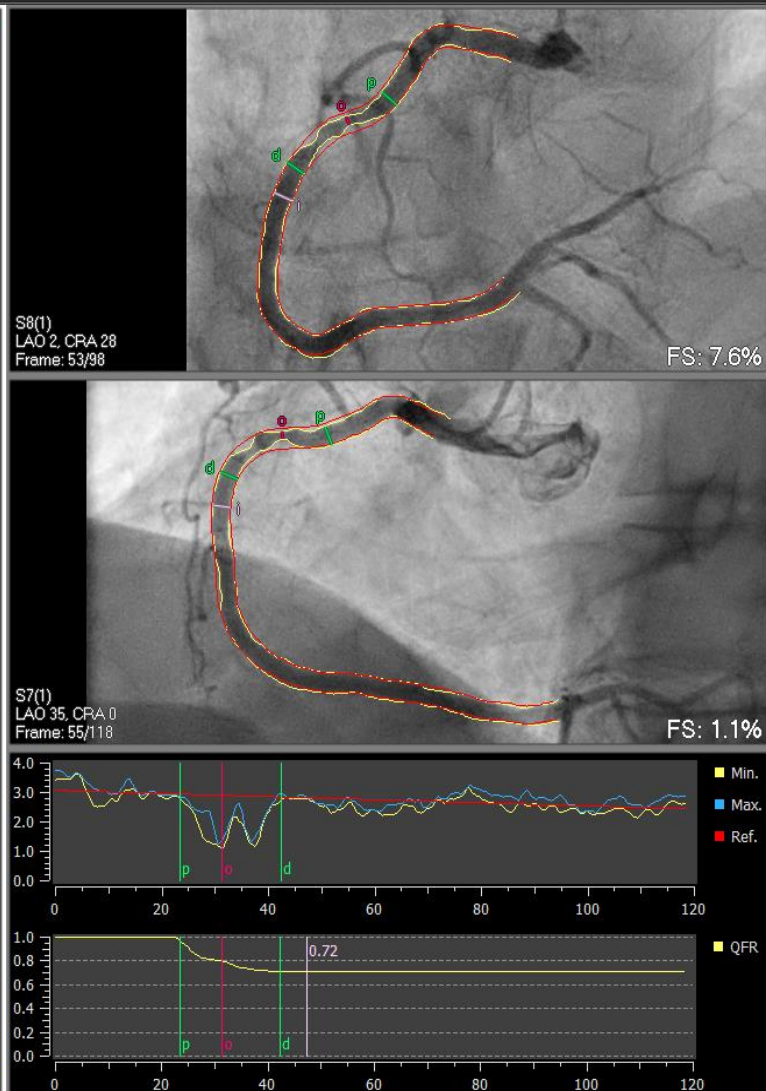


Δ QFR
Length
MLD
%D Stenosis
Residual QFR

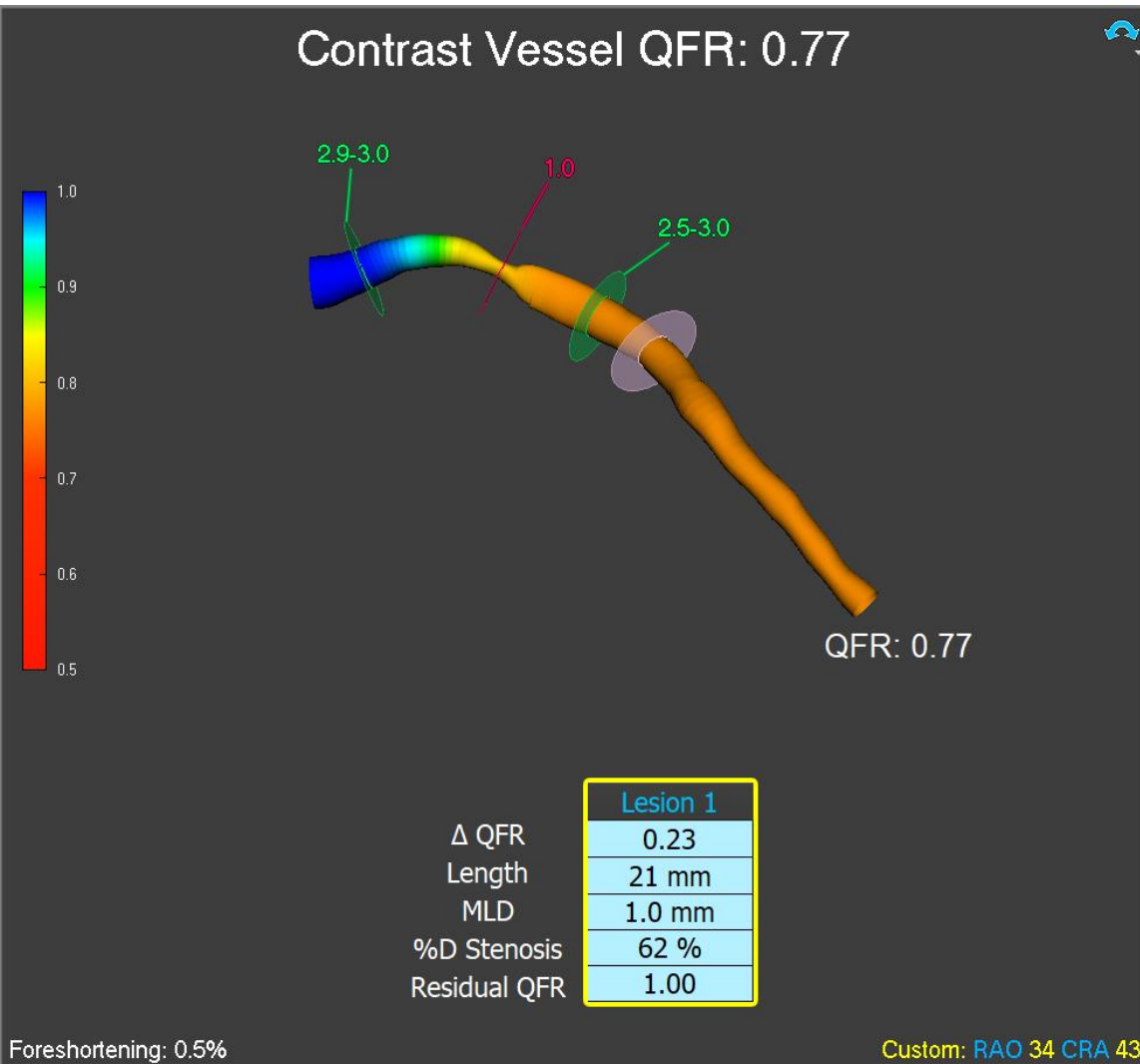
Lesion 1	
Δ QFR	0.25
Length	19 mm
MLD	1.1 mm
%D Stenosis	63 %
Residual QFR	0.97

Foreshortening: 0.4%

Optimal1: LAO 40 CAU 21

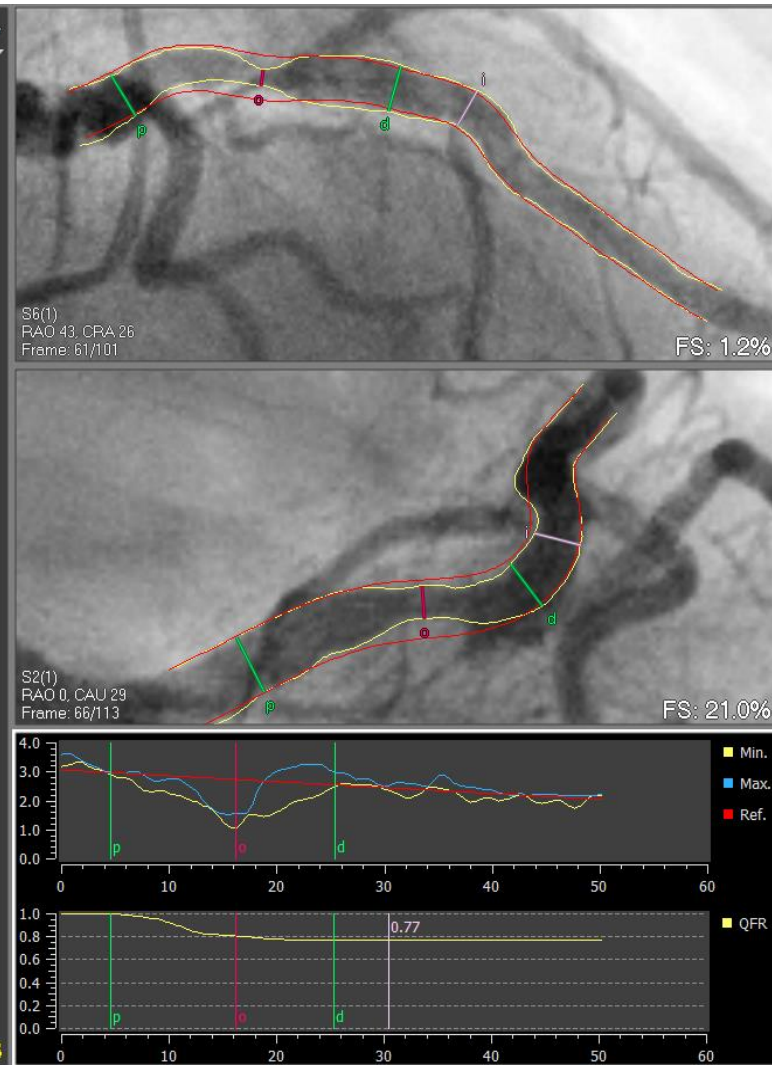


QFR analysis of LAD lesion



Foreshortening: 0.5%

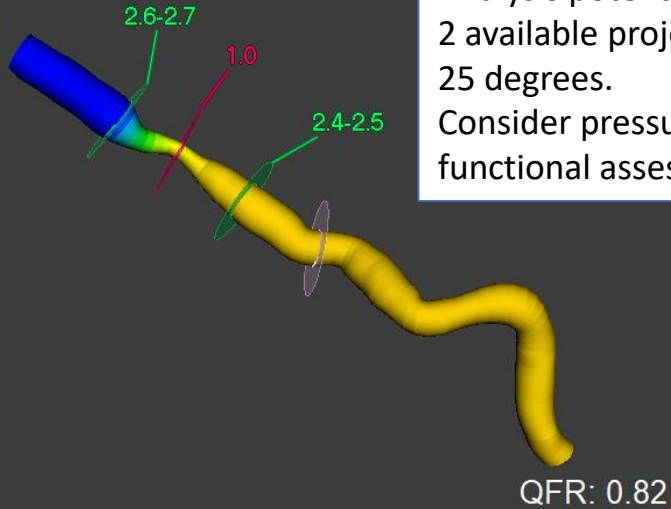
Custom: RAO 34 CRA 43



QFR analysis of L-CX lesion

Contrast Vessel QFR: 0.82

Analysis potentially inaccurate, as the 2 available projections differ less than 25 degrees.
Consider pressure-wire based functional assessment.

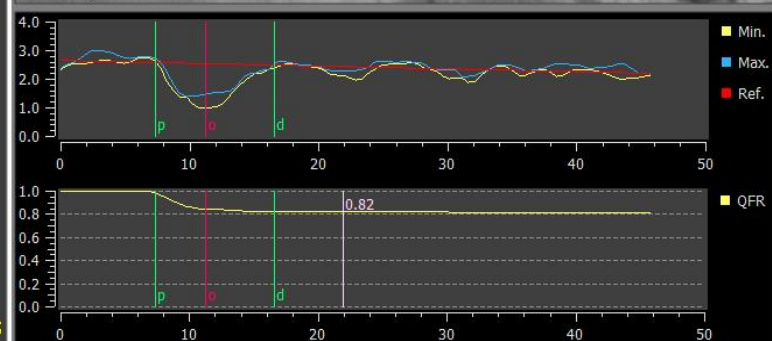
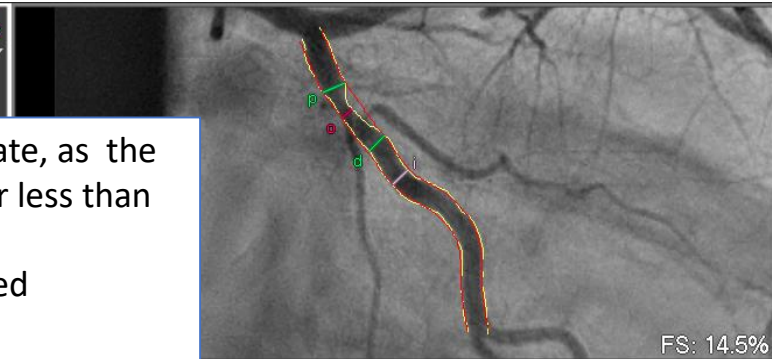


Δ QFR
Length
MLD
%D Stenosis
Residual QFR

Lesion 1	
Δ QFR	0.16
Length	9 mm
MLD	1.0 mm
%D Stenosis	62 %
Residual QFR	0.98

Foreshortening: 2.4%

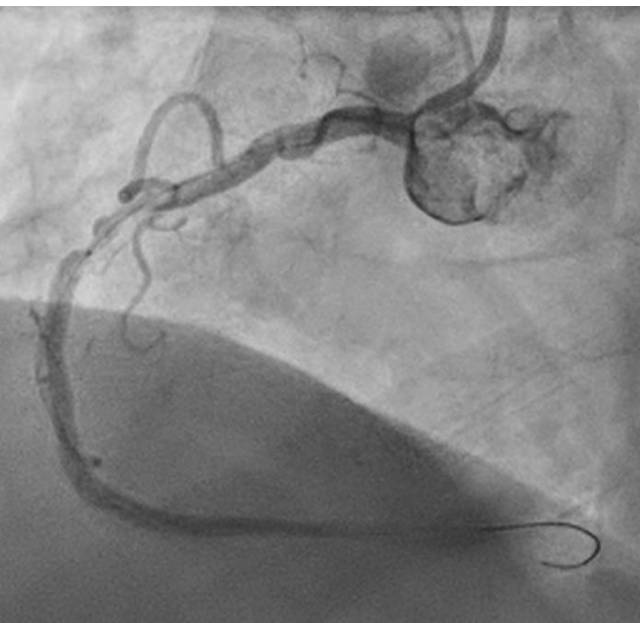
Optimal1: LAO 41 CRA 36



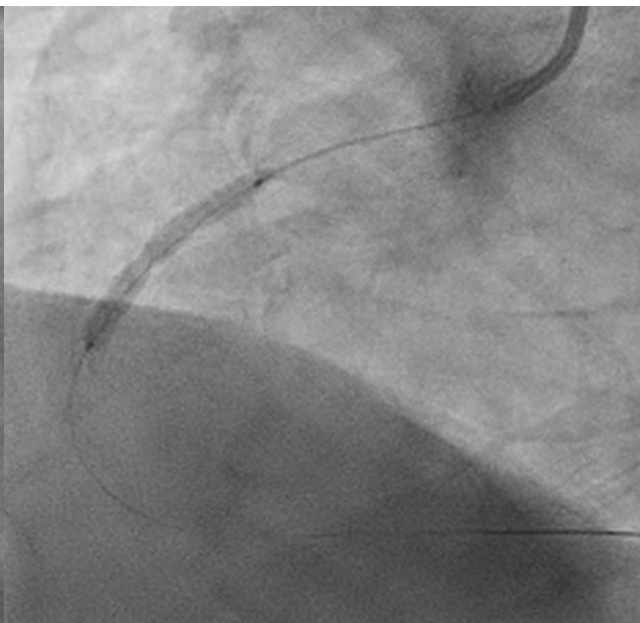
PART III

Stenting procedure

PCI to RCA



Pre-dilatation
SC 2.5x15 mm

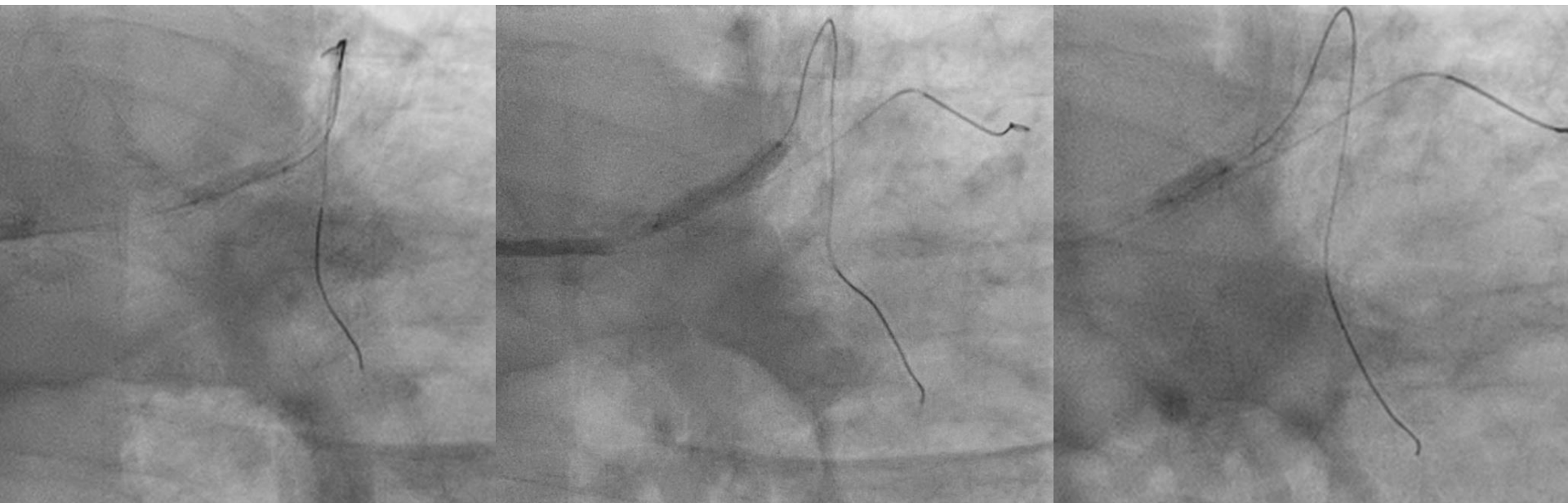


Stenting Supraflex Cruz
3.0x24 mm



Post-dilatation NC
3.5x20 mm

PCI to LAD



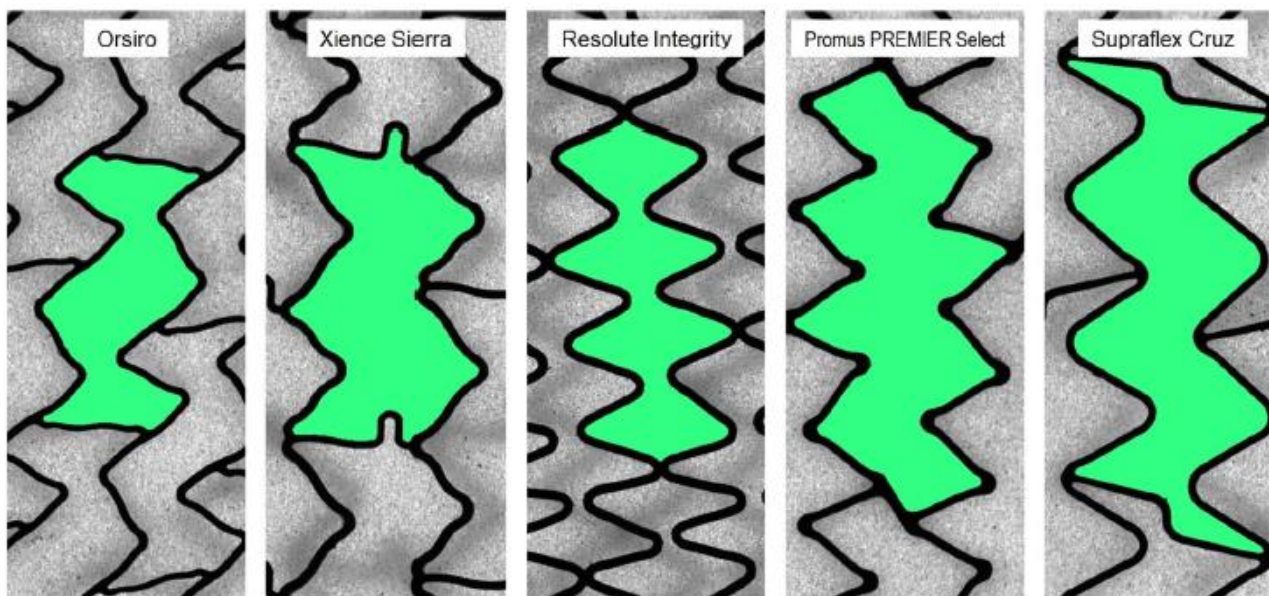
Pre-dilatation
SC 2.5x15 mm

Stenting Supraflex Cruz
3.0x20 mm

Post-dilatation NC
3.5x8 mm

Supraflex Cruz stent design

Cell design



Supraflex Cruz has largest cell area

The strut patterns of **Orsiro** and of distal **Promus PREMIER Select's** were denser, thereby resulting in smaller stent cells.

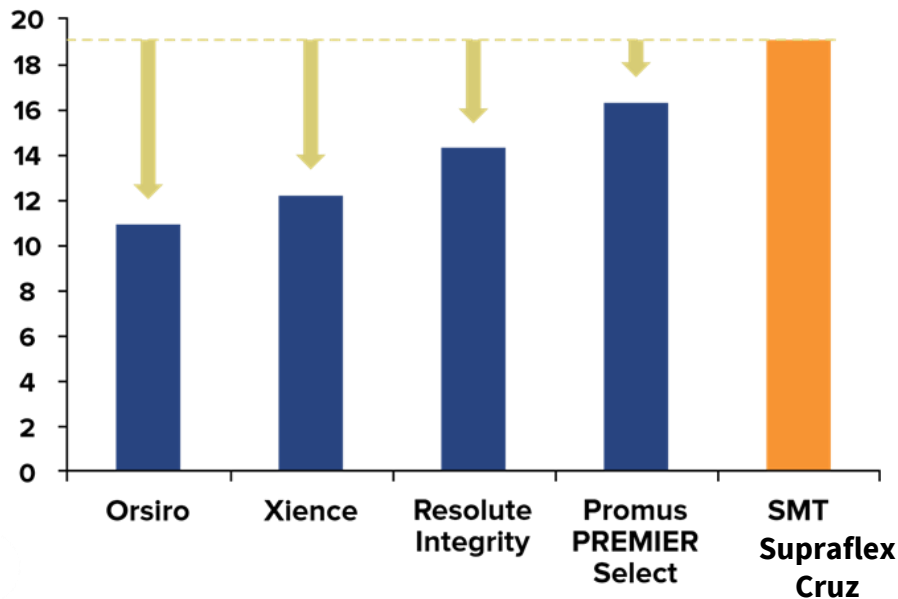
Cell design of the stent platforms expanded at nominal pressure. The same scale has been applied for the five images. Cells are represented in **green**

Disclaimer: Supraflex Cruz is a trademark of Sahajanand Medical Technologies Ltd. or its affiliates. Xience is trademark of the Abbott Group of Companies. Promus Premier Select is a trademark of Boston Scientific Corporation or its affiliates. Resolute Integrity is a trademark of Medtronic, Inc. Orsiro is a trademark of Biotronik SE & Co.

Ref: Öner et al. Eur J Med Res (2021) 26:121 <https://doi.org/10.1186/s40001-021-00595-7>

Supraflex Cruz stent design

Cell Perimeter (mm)



Supraflex Cruz has the largest cell perimeter **19.10±0.11 mm**

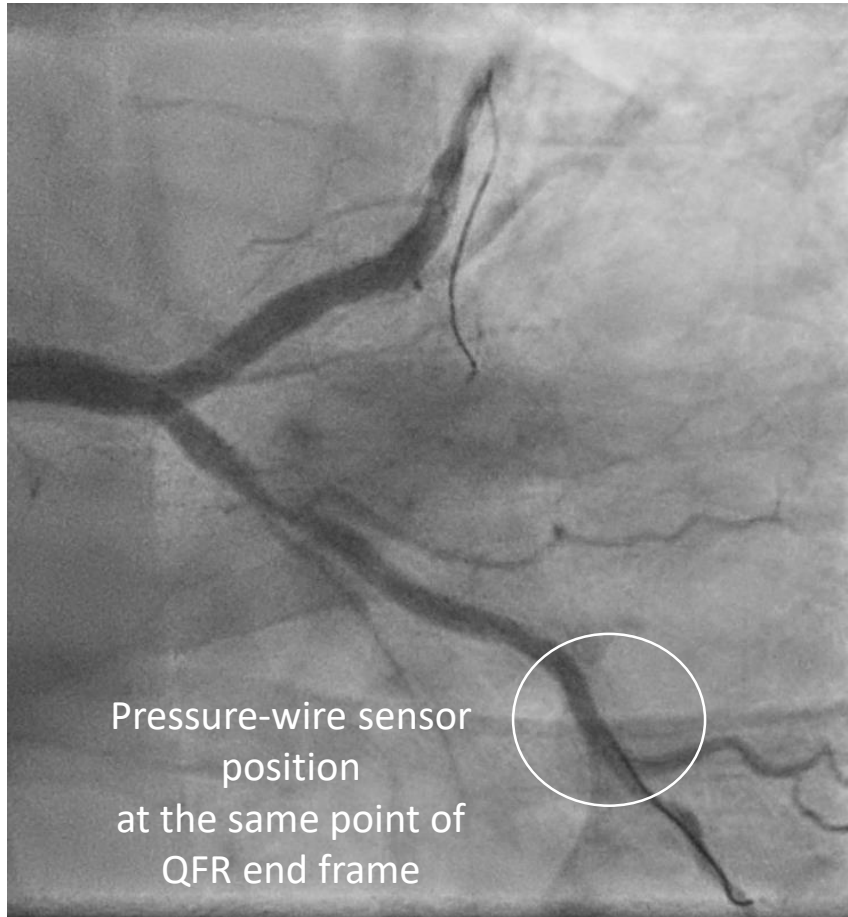
Orsiro displayed the **lowest cell perimeter** 10.97±0.55 mm

Resolute Integrity exhibited the **highest standard deviation of cell perimeter** (14.88 ± 1.31 mm) which quantifies the strut pattern's **irregularity level post-deployment.**

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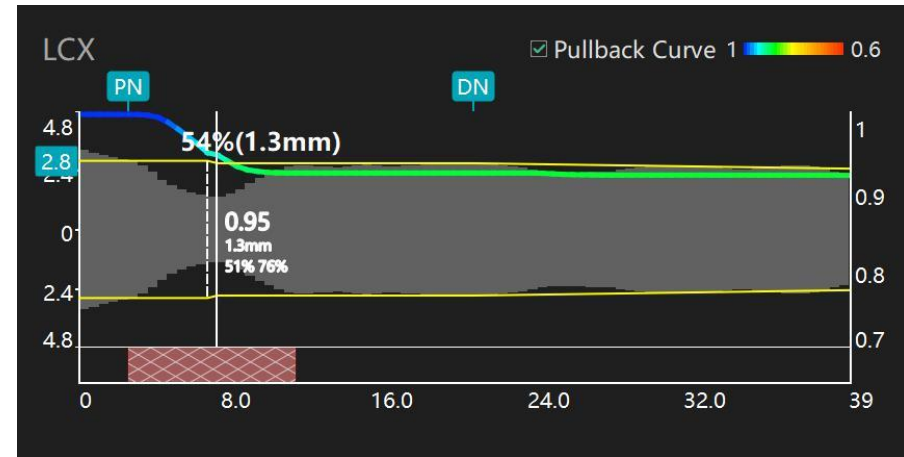
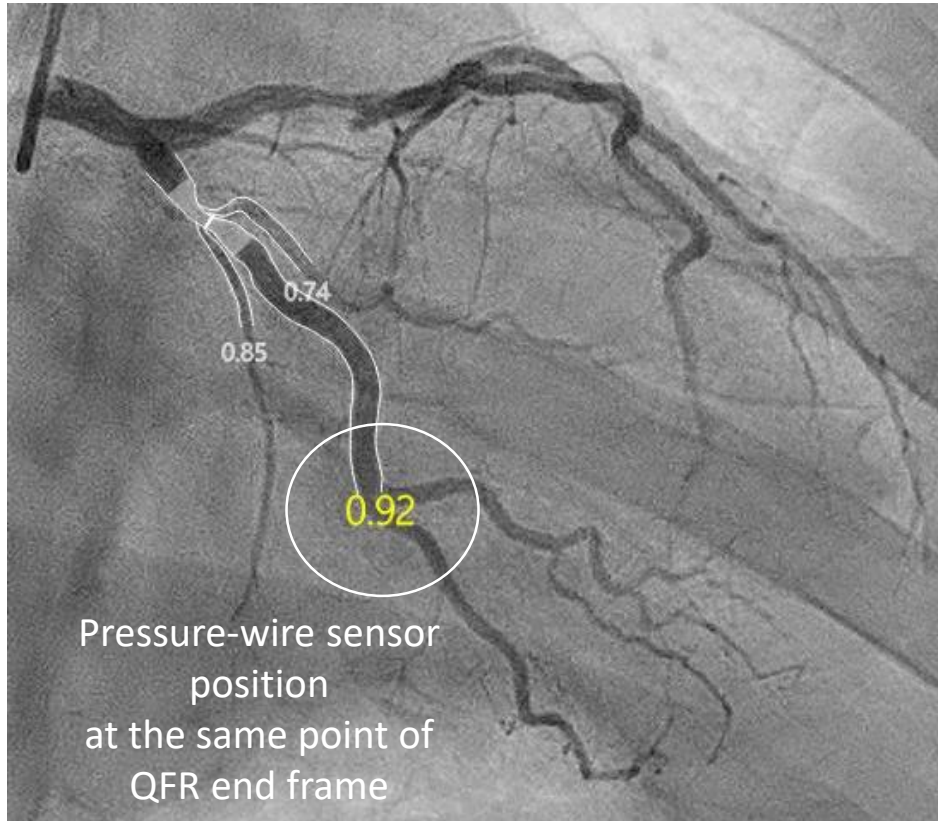
Ref: Öner et al. Eur J Med Res (2021) 26:121 <https://doi.org/10.1186/s40001-021-00595-7>

FFR to L-CX



Intra-venous regadenoson
400 mcg bolus

uQFR to Circ (background slide)



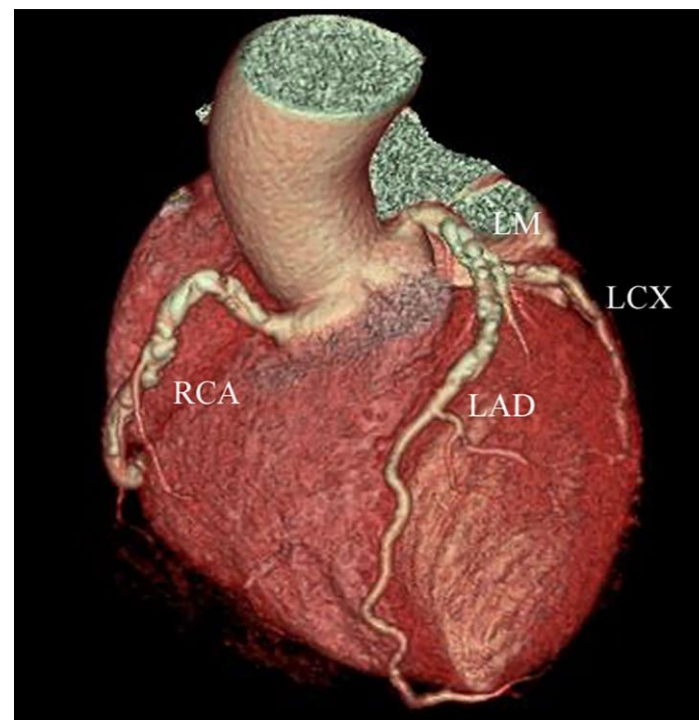


How and when to use IVUS for stent optimisation during multivessel PCI?

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Hospital Clínico San Carlos
Madrid / Spain

IVUS guidance in MVD PCI: what makes the difference?

- More extensive atherosclerosis
- Larger and more complex plaques (Ca²⁺)
- High prevalence of target vessel failure post PCI
- More complex patient profile



IVUS guidance in MVD PCI: what makes the difference?

- High atheroma burden → Selection of adequate landing zone for stent → DES length selection
- Longer lesions → Assessment of adequate DES expansion and apposition.
- Vessel calcification → Adequate lesion preparation before stenting (CB, RA, OAS, IVL)
- Complex patient profile → HBR: decrease risk of ST if DAPT/SAPT stopped by achieving large MSA.
CKD: decrease risk of AKI by reducing contrast use.

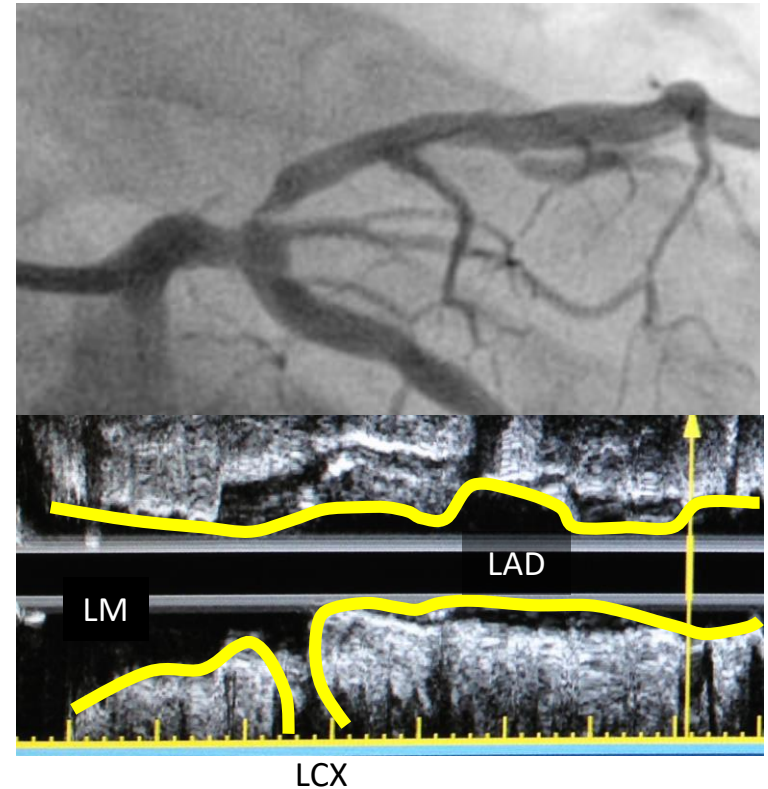
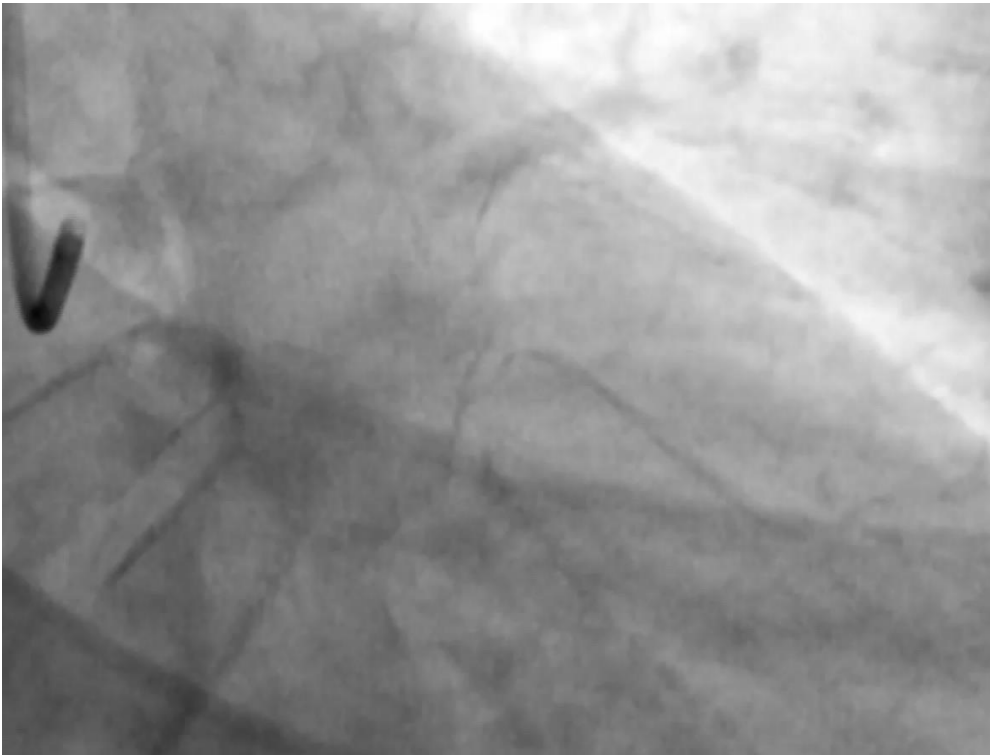
Selection of stent length in MVD is influenced by IVUS use

Procedural characteristics in SYNTAX II

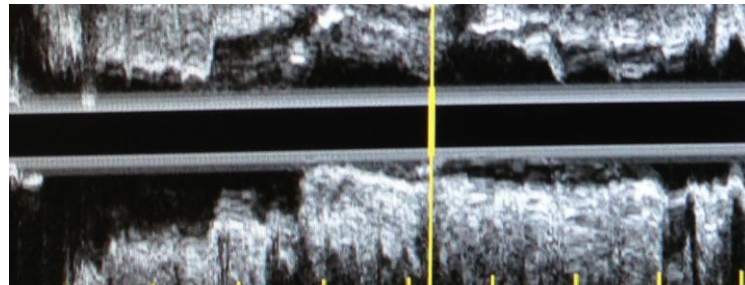
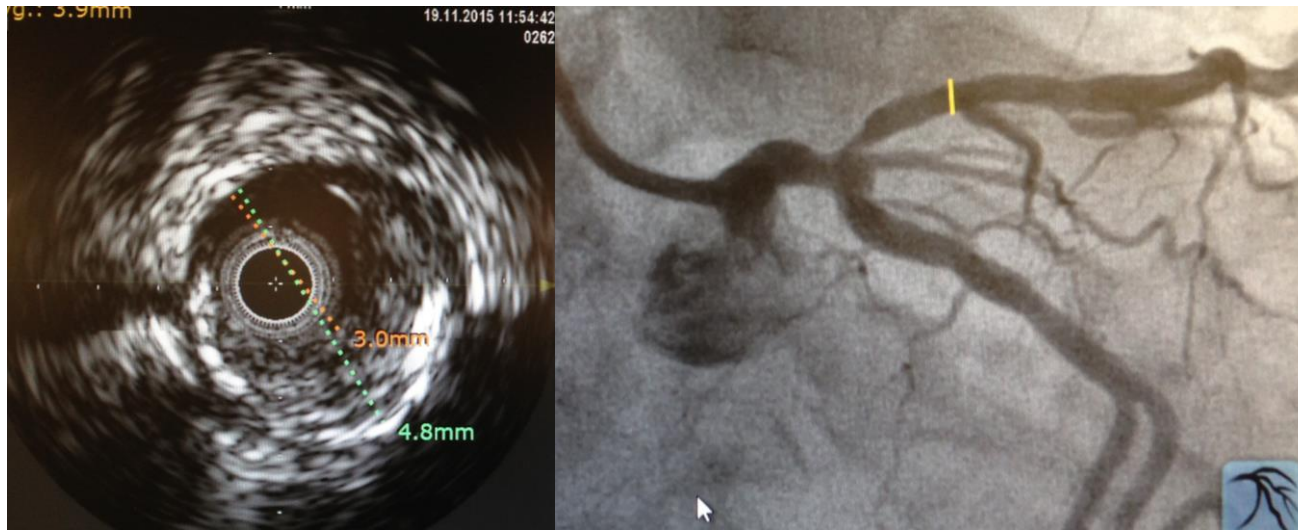
	Syntax PCI arm (n=315)	SYNTAX II trial (n=454)	Difference (95% CI)
N of Lesions (Anatomical Syntax score)	4.3±1.3	4.2±1.2	-0.2 [-0.34, 0.02]
N of Lesions intended to be treated	3.7±1.7	3.5±1.0	-0.2 [-0.5, 0.1]
iFR/FFR pre-procedure / per patient	NA	96.2%	
iFR/FFR pre-procedure / per lesion	NA	75.8%	
N of Treated Lesions	3.2±1.5	2.6±1.0	<u>-0.6 [-0.9, -0.4]</u>
Mean N of stents per patient	4.0±2.0	3.8±2.0	-0.2 [-0.5, 0.1]
Mean stent length (mm)	18.8±7.0	24.4±9.2	<u>5.6 [5.0, 6.2]</u>
Total stent length (mm)	74.9±41.9	92.9±53.9	<u>18.0 [10.8, 25.2]</u>

Key message: less lesions treated (iFR/FFR) but longer stents used (IVUS) in SYNTAX II

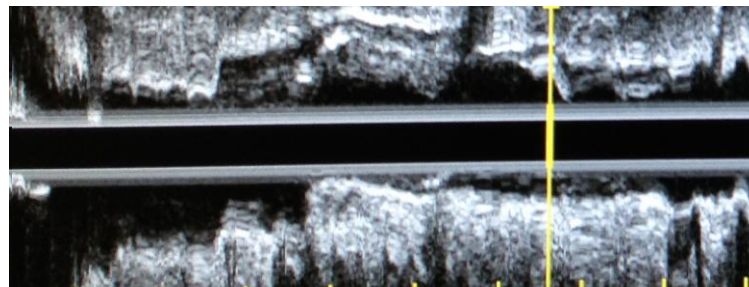
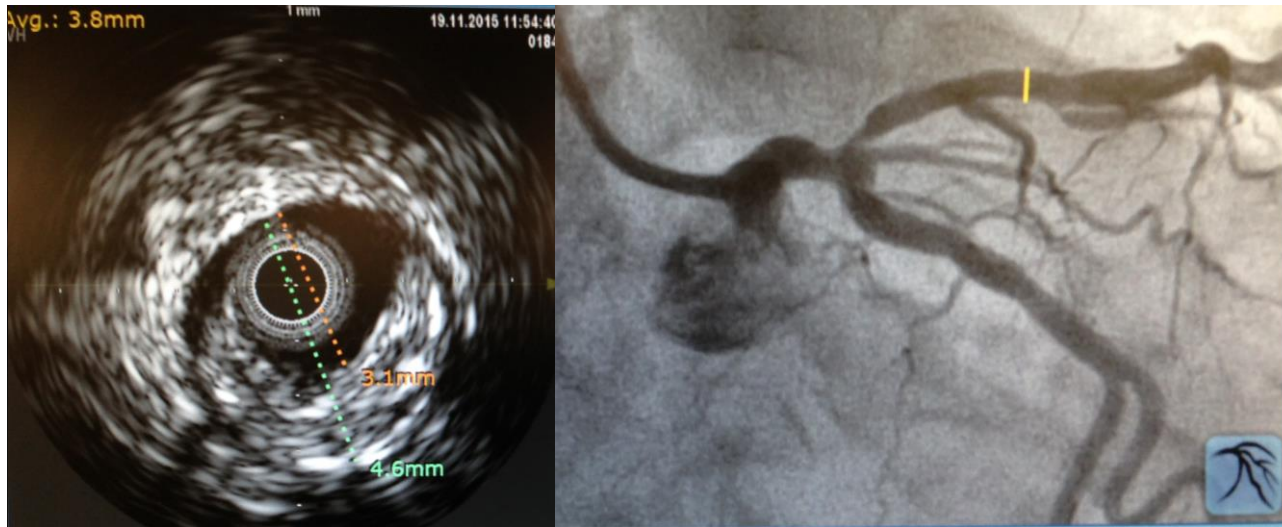
Selection of stent length in MVD is influenced by IVUS use



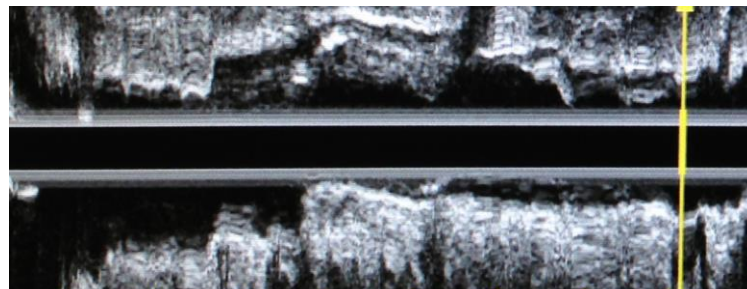
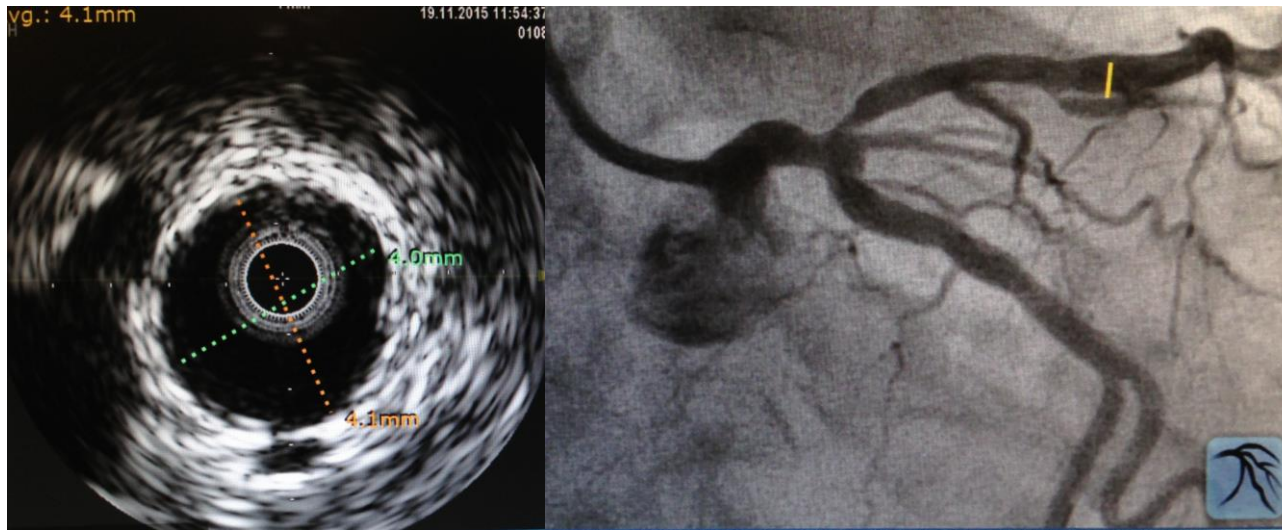
Selection of stent length in MVD is influenced by IVUS use



Selection of stent length in MVD is influenced by IVUS use

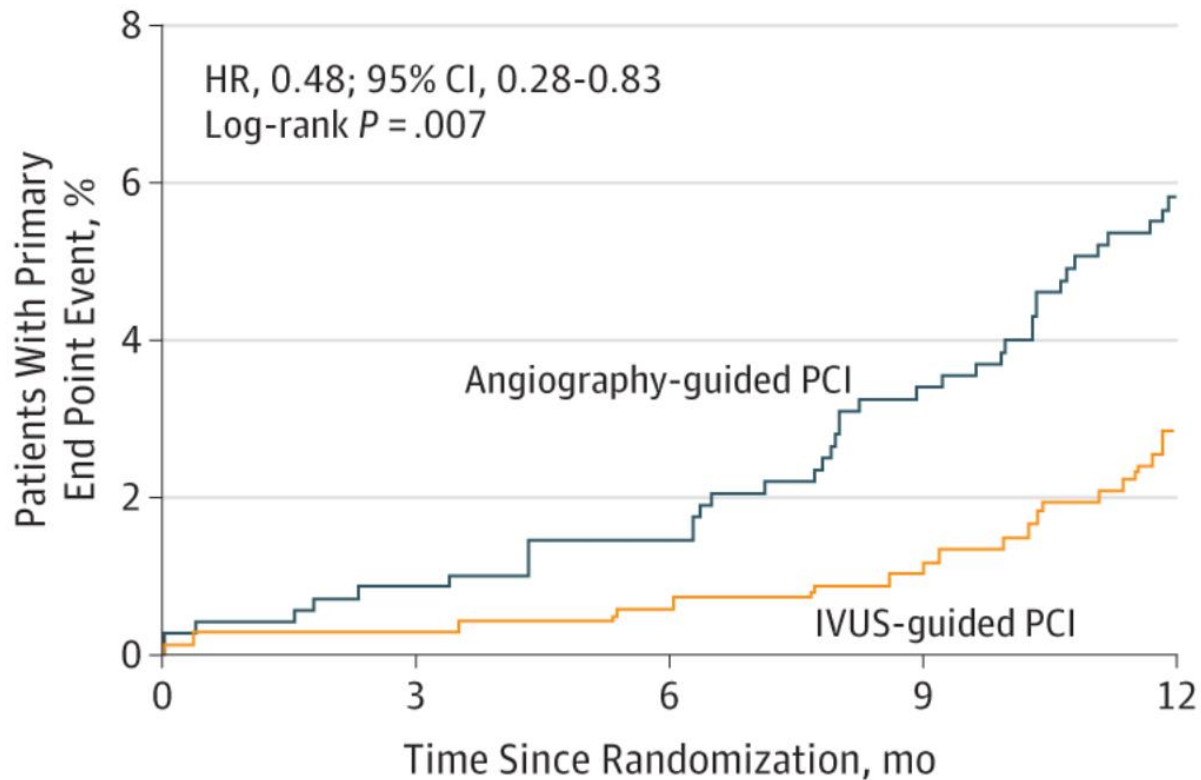


Selection of stent length in MVD is influenced by IVUS use



Selection of stent length in MVD is influenced by IVUS use

Impact of IVUS guidance in long lesion PCI: IVUS-XPL trial

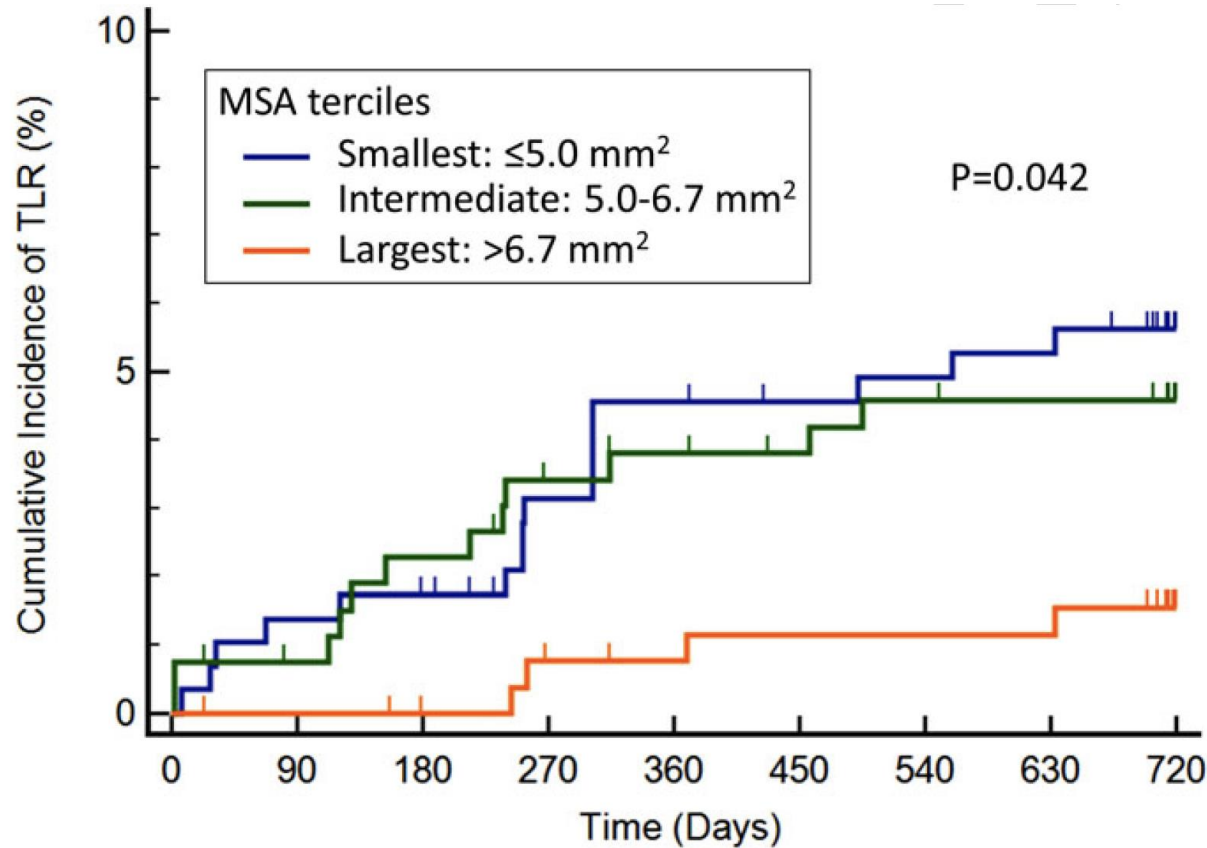


No. at risk
PCI

Angiography-guided	700	673	660	643	624
IVUS-guided	700	671	665	654	641

Hong et al. JAMA 2015;314:2155-63

Cumulative incidence of TLR according to post-PCI minimal stent area terciles

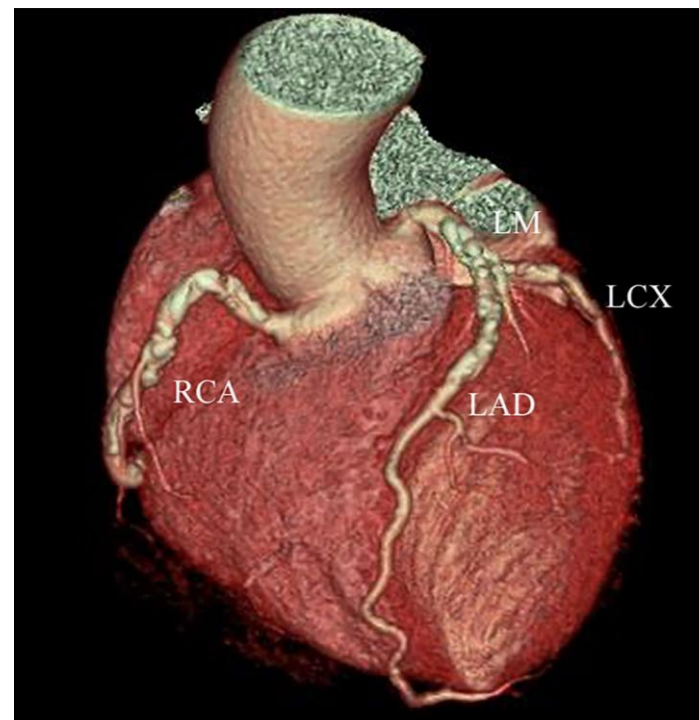


Katagiri Y et al. Catheter Cardiovasc Interv. 2019 Mar 1;93(4):E225-E234.

IVUS guidance in MVD PCI: what makes the difference?

In patients undergoing MVD PCI, use of IVUS may improve long-term procedural outcome through:

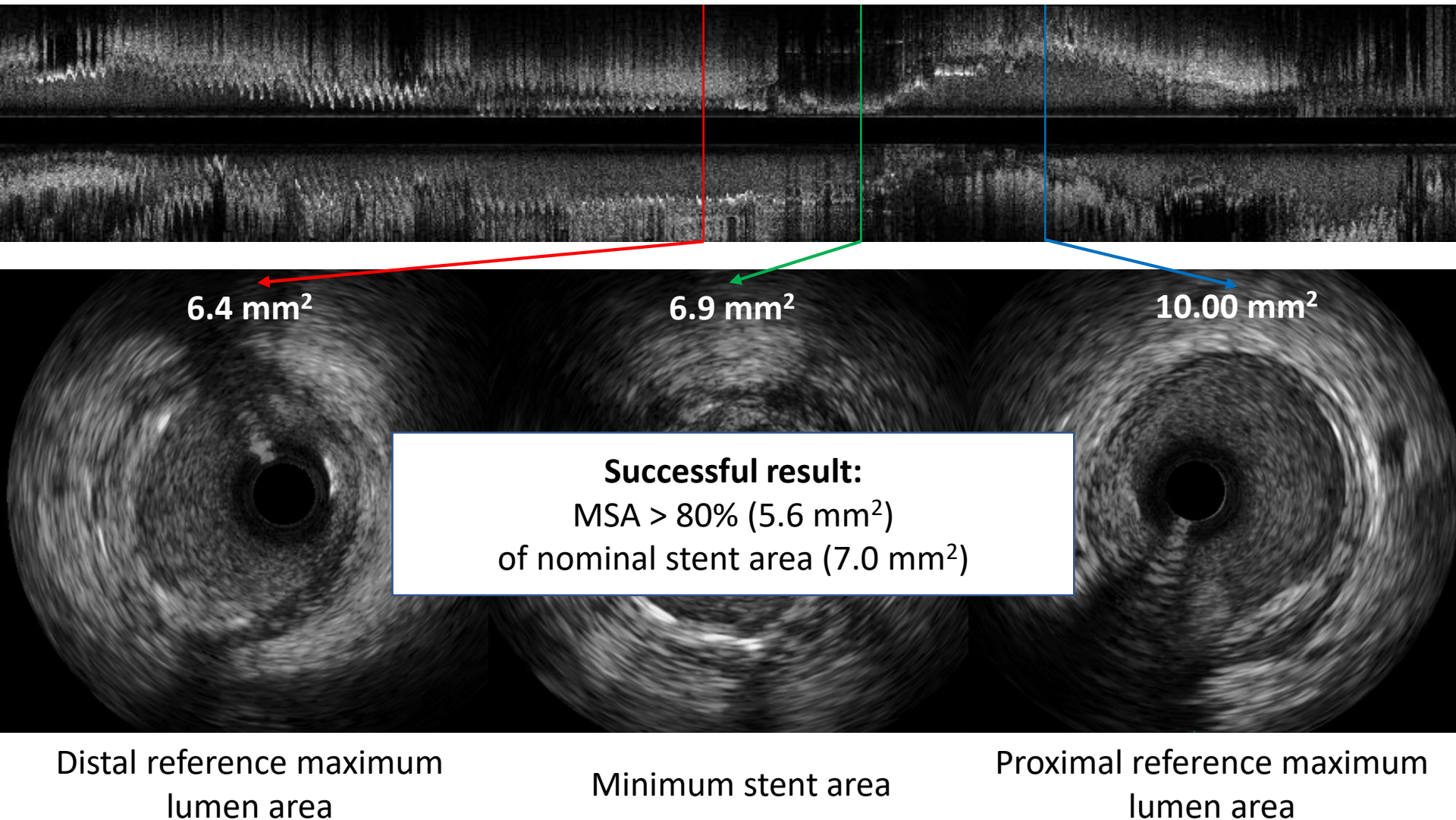
- Better PCI planning: plaque preparation, selection of DES landing zones and stent length.
- Optimisation of DES implantation to achieve large MSA.
- Addressing safety issues related to patient risk profile (HBR, CKD)



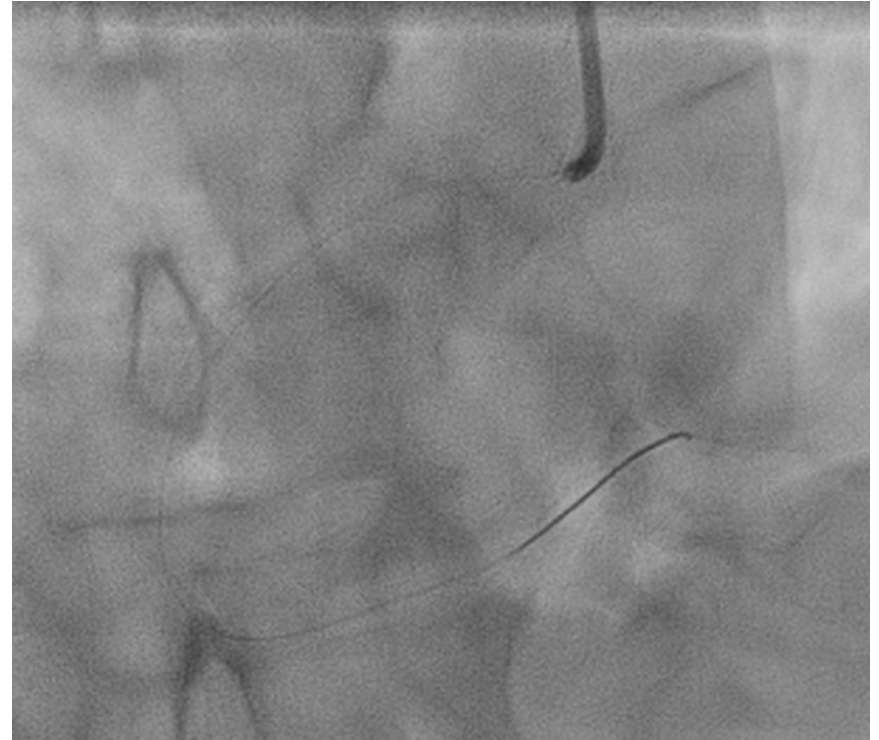
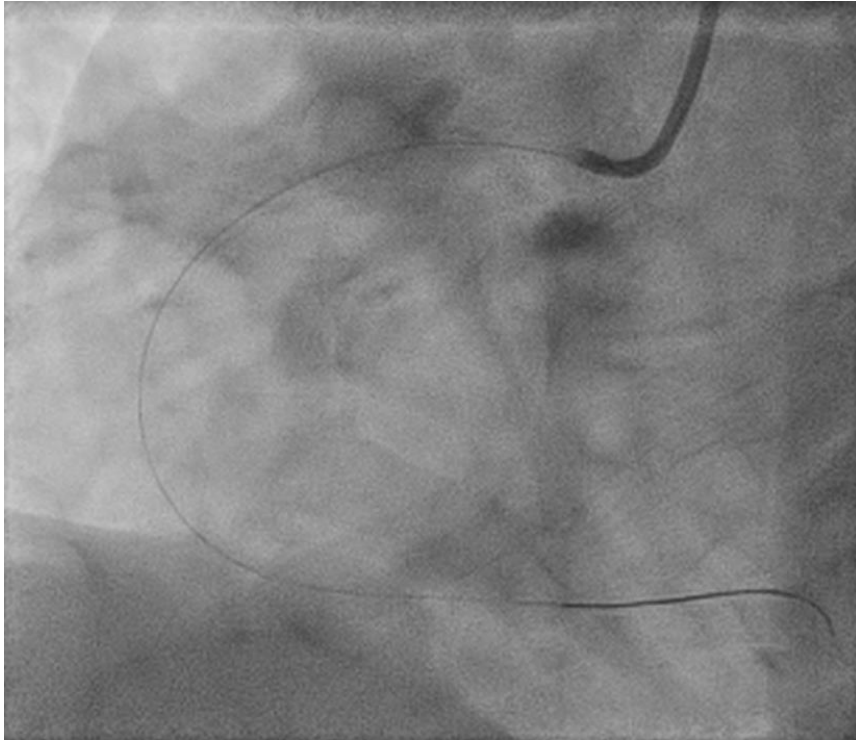
PART IV

IVUS post-stenting - procedural outcome - follow-up

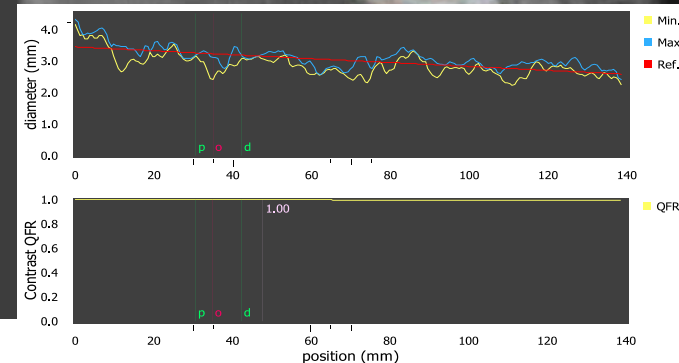
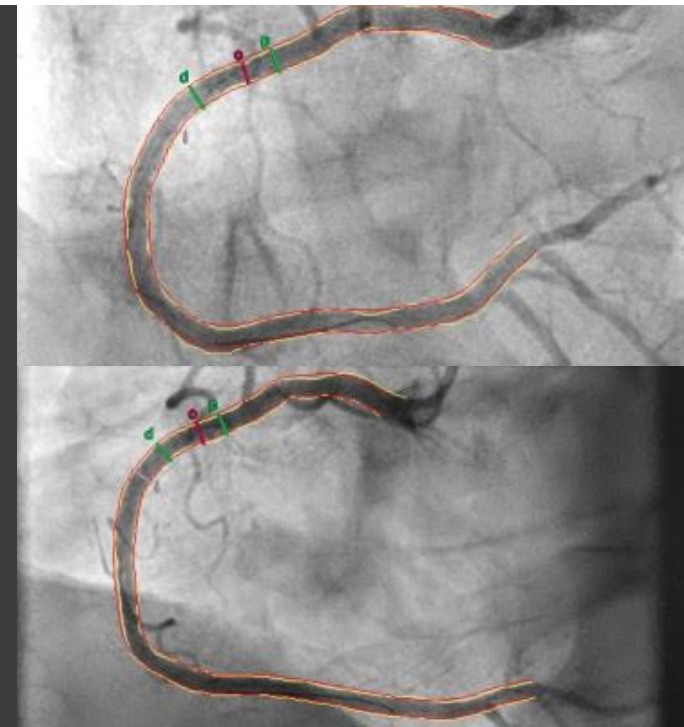
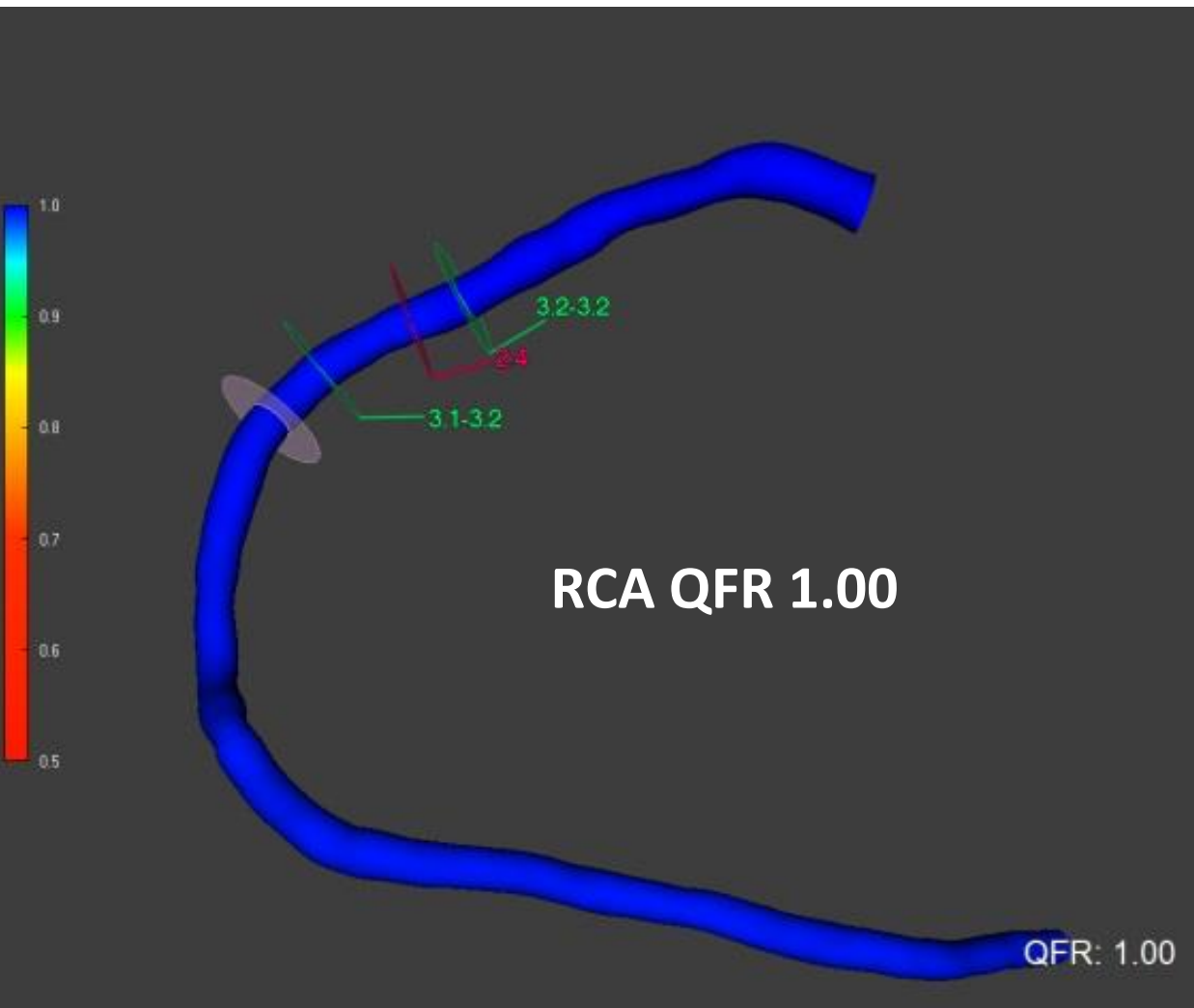
IVUS to RCA



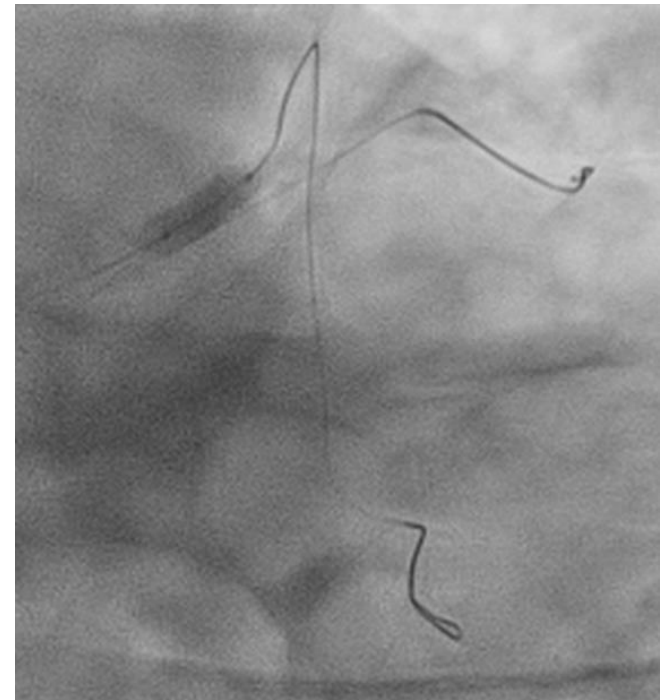
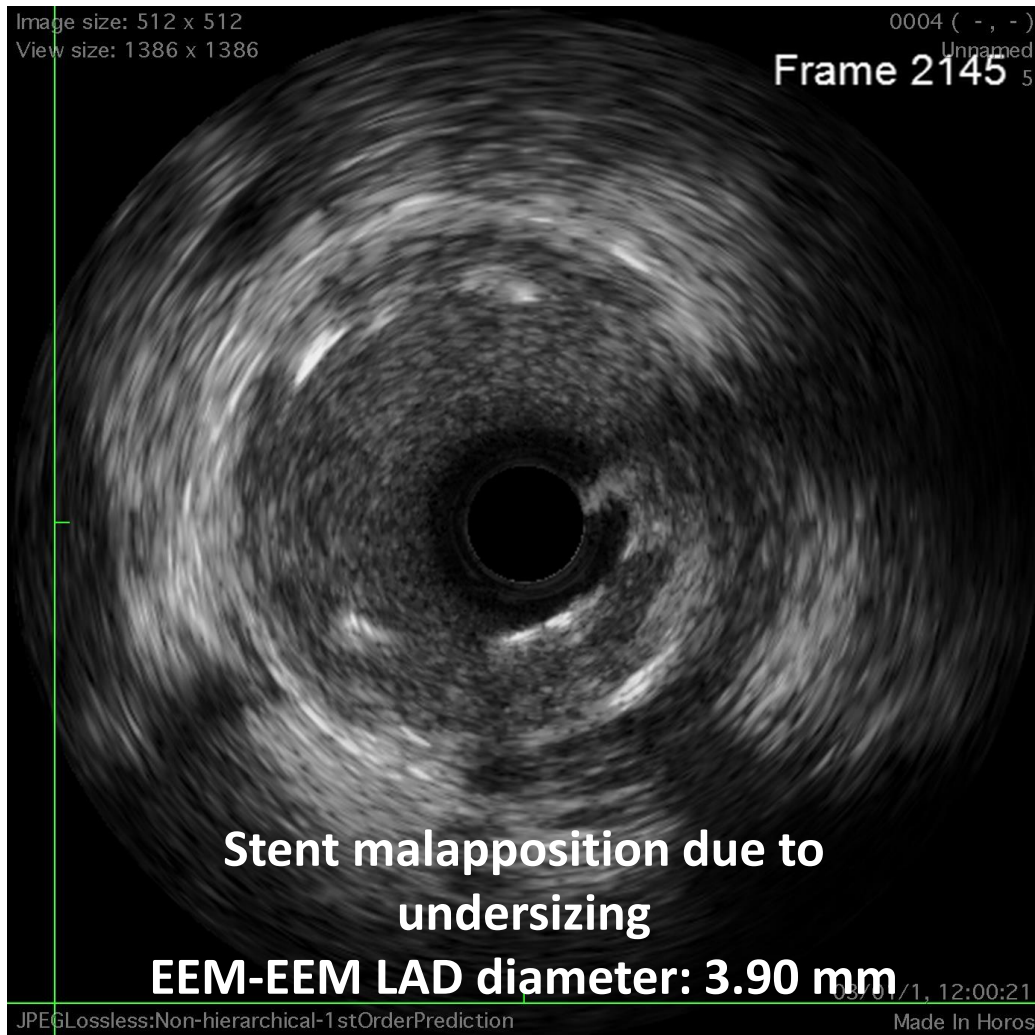
Final angiographic result of RCA stenting



Post PCI to RCA QFR results

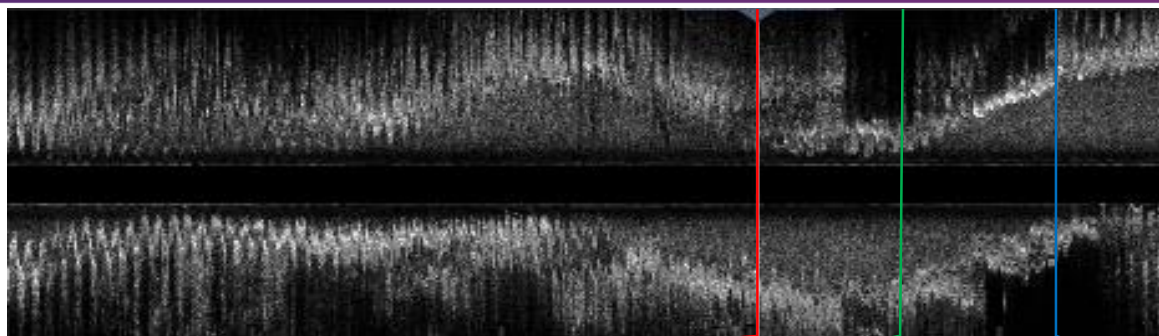


IVUS to LAD



Additional post-dilation
NC 4.0x12 mm

Final IVUS to LAD



9.7 mm²

8.3 mm²

9.9 mm²

Successful result:
MSA > 80% (5.6 mm²)
of nominal stent area (7.0 mm²)

Distal reference maximum
lumen area

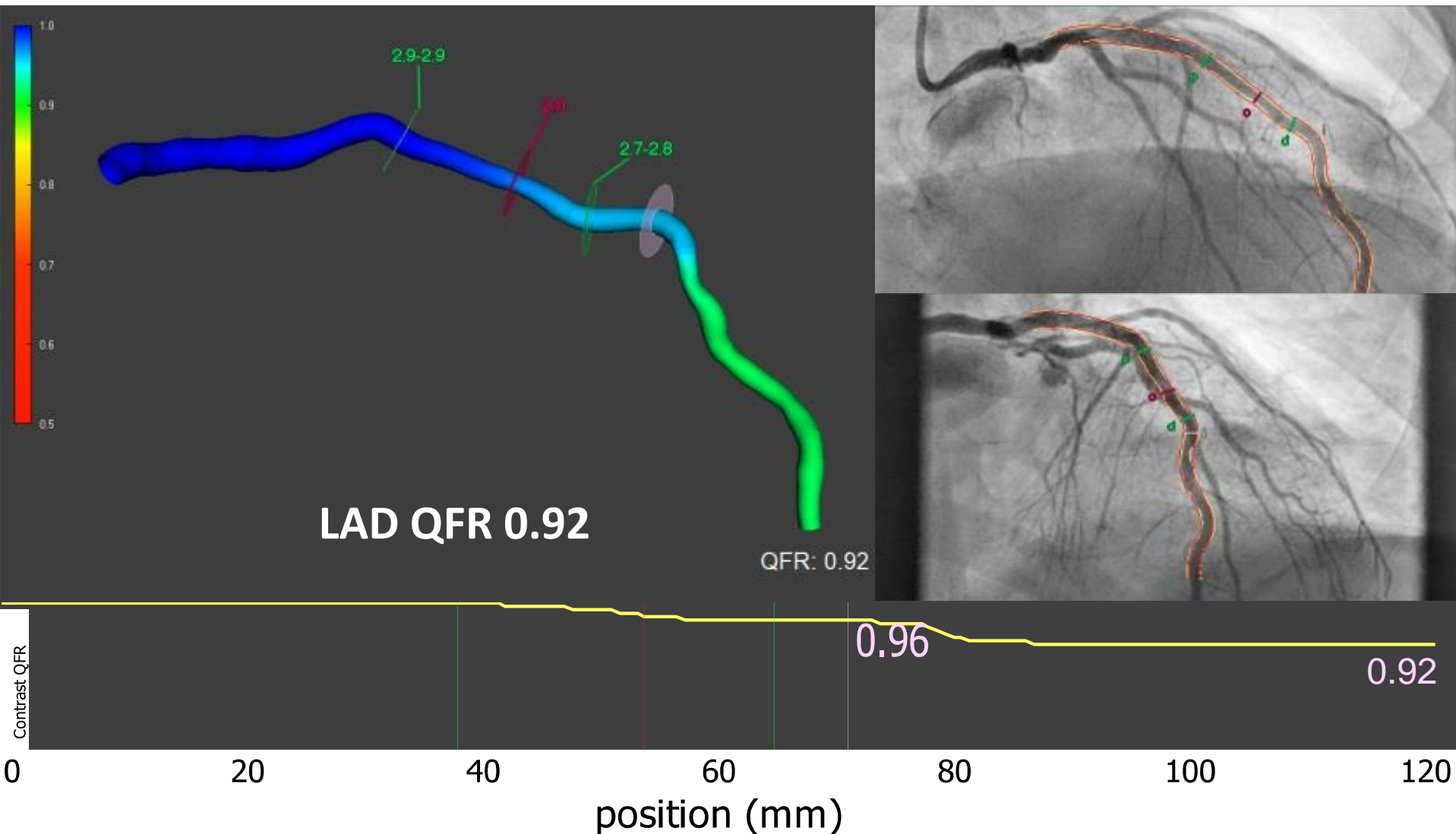
Minimum stent area

Proximal reference
maximum lumen area

Final angiographic result of LAD stenting



Post PCI to LAD QFR results



Discharge and Follow-up

- Discharge after 1 day on DAPT (aspirin + prasugrel)
- Aspirin stopped at 1 month
- Prasugrel alone for 11 months
- Prasugrel stopped at 1 year and aspirin lifelong
- Uneventful follow up up to 18 months

Have we answered our key questions? Key points to remember:

1, To identify the right patient for three-vessel PCI (precision medicine)

Use of SYNTAX Score 2020 that predicts 5-years MACCE and Mortality as well as 10-years mortality.

2, To select the lesions to be treated by angiography-derived physiology (quantitative flow ratio)

Treat the lesion responsible for a QFR of the vessel <0.08 .

Treat a delta QFR >0.06

Post-PCI, QFR should be ≥ 0.91

3, To appreciate how IVUS/OCT can improve the outcome of Multivessel stenting

Thumb's rule:

- Minimal Stent Area (MSA) with IVUS: 5.5mm^2

- MSA with OCT: 4.5mm^2

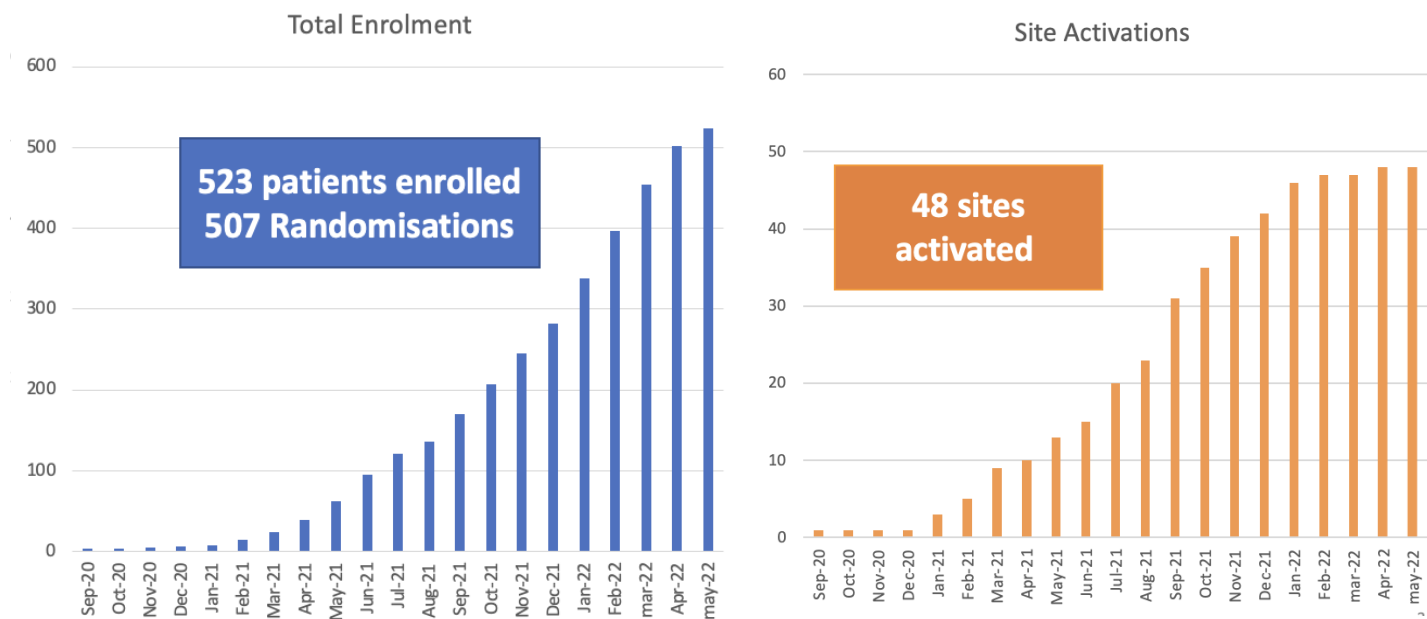
- Relative MSA with respect to Proximal and Distal Reference: 80%

Status of the Multivessel TALENT Trial



Status of the Multivessel TALENT Trial

Recruitment & Site Activations



PCR

PCRONline.com