Contemporary Drug Eluting Stents Are Different: How I Choose DES Type According to Patient/Lesion Features

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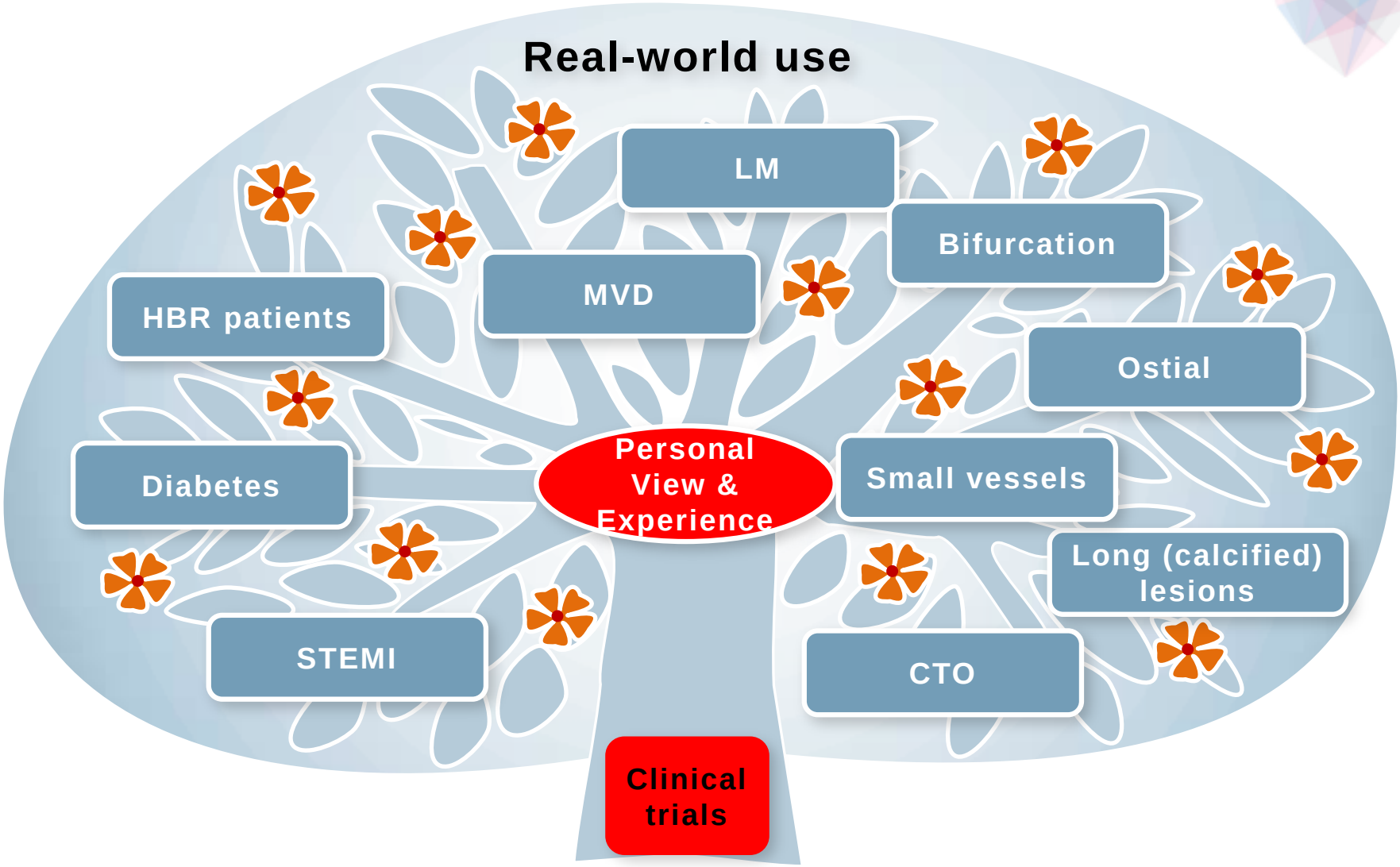
Disclosures of Conflict of Interest

Speaker's name: Andrejs Erglis

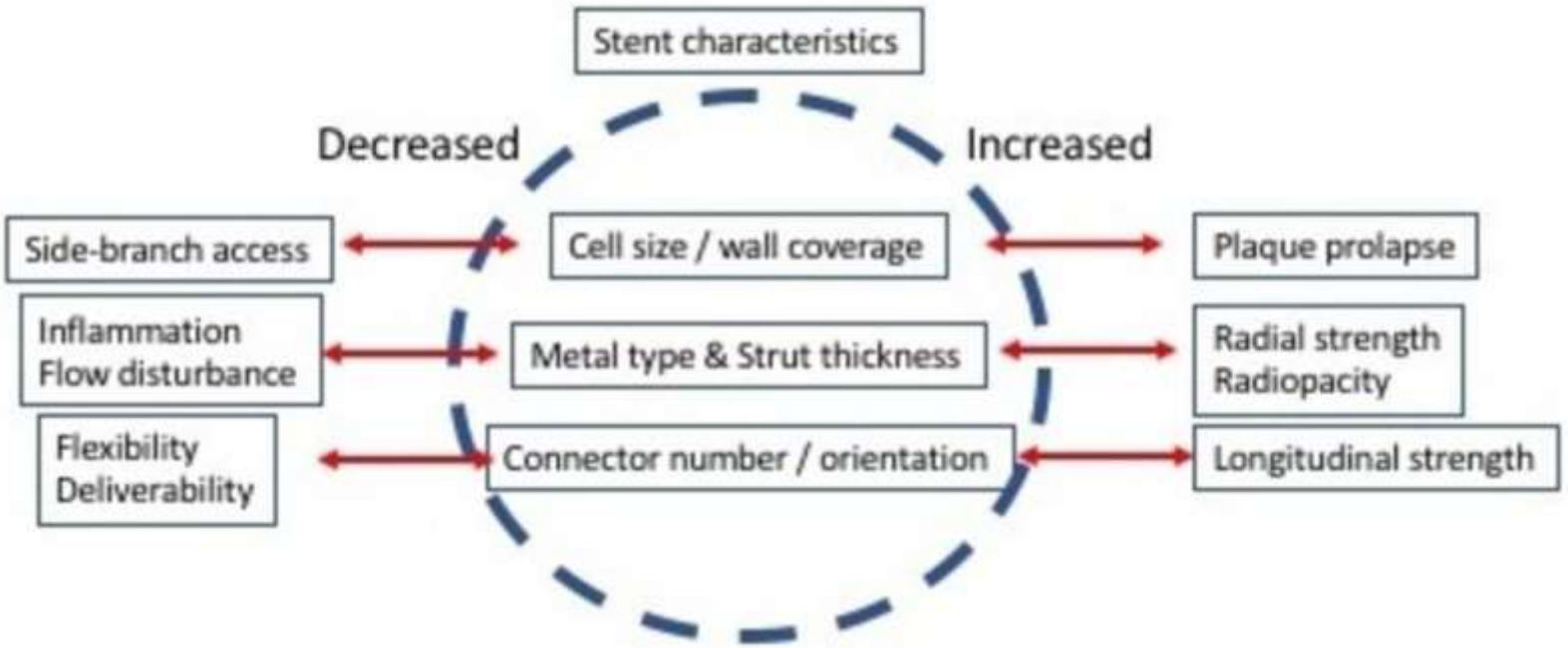
☑ **I have the following** potential conflicts of interest to report:

☑ Research contracts (Abbott Vascular, Boston Scientific)
☑ Consulting, Speakers Bureau (Amgen, Abbott Laboratories, Astra-Zeneca, Bayer, Boehringer Ingelheim, GlaxoSmithKline, Berlin Chemie / Menarini, Merck, Pfizer, Sandoz, Sanofi, Servier Laboratories, Siemens laboratories, Abbott Vascular, Boston Scientific, Biotronik, Biosensors, Cordis, MVRx)
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☐ **I do not have any potential conflict of interest**


Real-world use
LM
Bifurcation
MVD
HBR patients
Ostial
Diabetes
Personal View & Experience
Small vessels
Long (calcified) lesions
STEMI
CTO
Clinical trials

What is the ideal coronary stent?



Watson T et al. Open Heart. 2017 Oct 30;4(2):e000680.

What on the inventary shelf?

Generation	Charateristics	Examples
First generation	Nonbiodegradable (ie, durable) polymer-based thick strut Sirolimus- or paclitaxel-eluting stents	Cypher, Taxus
Second generation	Nonbiodegradable (ie, durable) polymer-based thin strut “Limus”-eluting stent (eliminated paclitaxel)	Xience, Promus Element, Endeavor, Resolute
Third generation	Biodegradable polymer-based thick or thin strut “Limus”-eluting stent	Biomatrix, Nobori, Ultimaster, Orsiro, MiStent, Synergy, Combo
Third generation "B"	Polymer-free strut “Limus”-eluting stents	Biofreedom, Cr8, Janus
Fourth generation	Bioresorbable, thick/thin strut “Limus”-eluting vascular scaffolds (PLLA or magnesium)	Absorb BVS, Magmaris, DeSolve

Waksman R. Cleve Clin J Med. 2017 Dec;84(12 Suppl 4):e20-e24.

ESC European Society of Cardiology
European Heart Journal (2018) 39, 119–177
doi:10.1093/eurheartj/ehx393
ESC GUIDELINES

2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

Procedural aspects of the primary PCI strategy

Recommendations	Class[a]	Level[b]
IRA strategy		
Primary PCI of the IRA is indicated.[114,116,139,140]	I	A
New coronary angiography with PCI if indicated is recommended in patients with symptoms or signs of recurrent or remaining ischaemia after primary PCI.	I	C
IRA technique		
Stenting is recommended (over balloon angioplasty) for primary PCI.[146,147]	I	A
Stenting with new-generation DES is recommended over BMS for primary PCI.[148–151,178,179]	I	A
Radial access is recommended over femoral access if performed by an experienced radial operator.[143–145,180]	I	A
Routine use of thrombus aspiration is not recommended.[157,159]	III	A
Routine use of deferred stenting is not recommended.[153–155]	III	B

Ibanez B et al. 2017 ESC Guidelines on STEMI. Eur Heart J. 2018 Jan 7;39(2):119-177.

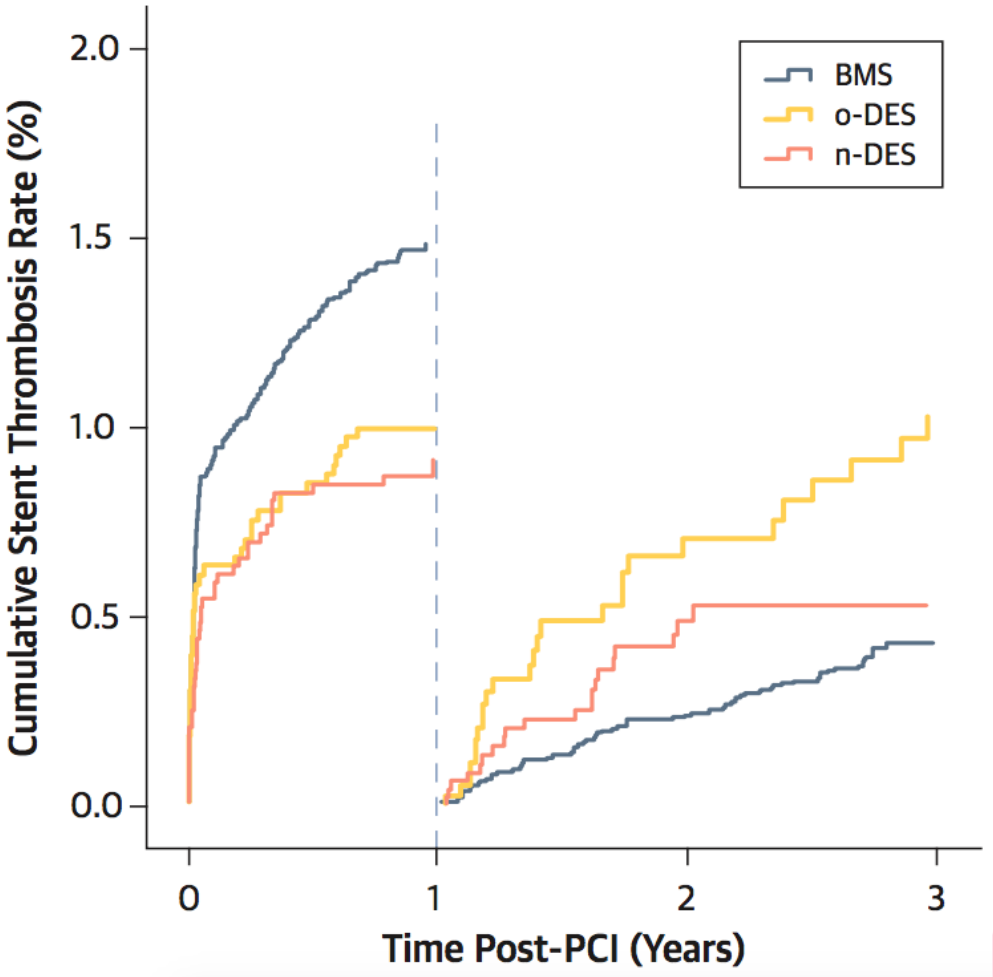
SCAAR (Swedish Coronary Angiography and Angioplasty Registry)

From January 2007 to January 2013, 34147 patients with STEMI were treated by PCI with n-DES (n=4811), o-DES (n=4271), or BMS (n=25065).

Cox regression landmark analysis showed

- **Significantly lower risk of early/late ST in n-DES (HR: 0.65; 95% CI: 0.43 to 0.99; p=0.04) and o-DES (HR: 0.60; 95% CI: 0.41 to 0.89; p=0.01) compared with BMS**
- Similar risk of very late ST between n-DES and BMS (HR: 1.52; 95% CI: 0.78 to 2.98; p= 0.21)
- **Higher risk of very late ST with o-DES compared with BMS (HR: 2.88; 95% CI: 1.70 to 4.89; p < 0.01).**
- No significant difference between n-DES and o-DES groups in the risk of early/late and very late ST

Landmark Analysis of Definite Stent Thrombosis



Sarno G et al. J Am Coll Cardiol. 2014 Jul 8;64(1):16-24.

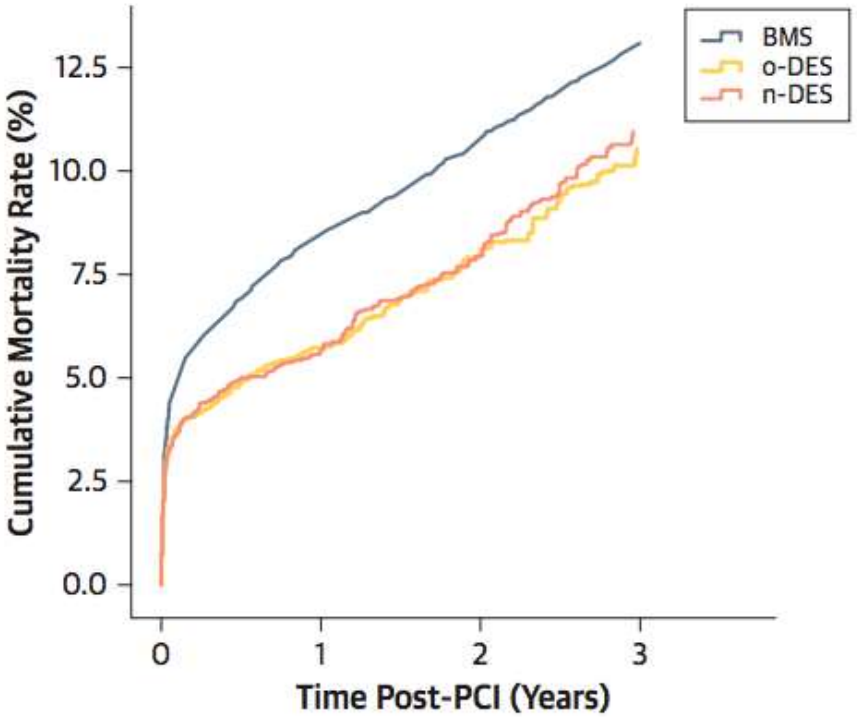
SCAAR (Swedish Coronary Angiography and Angioplasty Registry)

From January 2007 to January 2013, 34147 patients with STEMI were treated by PCI with n-DES (n=4811), o-DES (n=4271), or BMS (n=25065).

The risk of death was significantly lower in the n-DES (adjusted HR: 0.55; 95% CI: 0.48 to 0.62) and o-DES (adjusted HR: 0.58; 95% CI: 0.52 to 0.65) groups compared with the BMS group.

No significant differences were observed between the n-DES and o-DES groups (adjusted HR: 1.05; 95% CI: 0.89 to 1.24).

Cumulative Rates of All-Cause Mortality Up to 3 Years

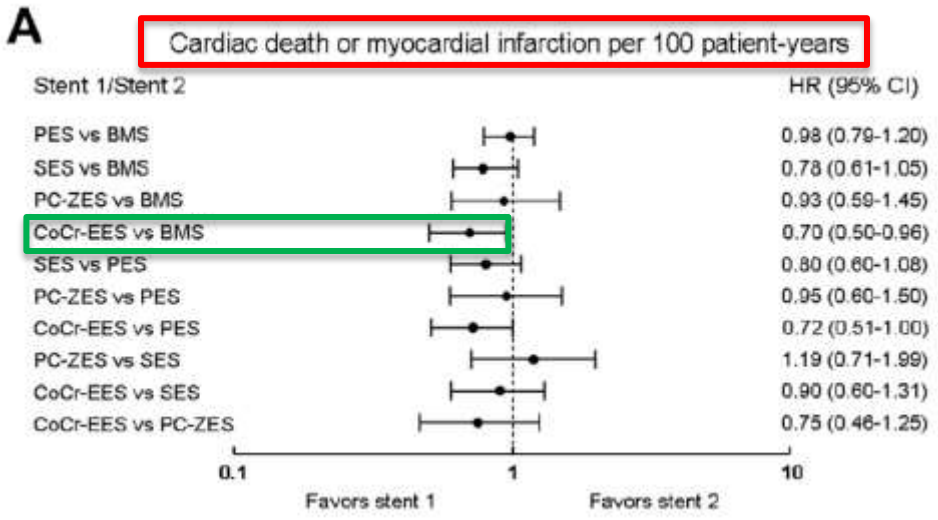


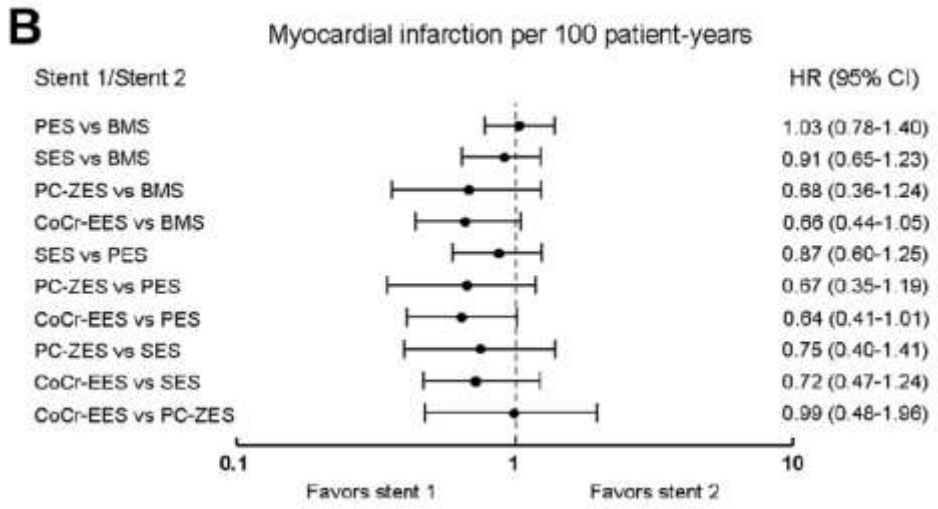
N patients at risk	0 months	30 days	1 year	2 years	3 years
BMS	25065	23893 (4.8%)	22757 (8.0%)	20322 (11.0%)	16954 (12.8%)
o-DES	4271	4148 (3.8%)	3912 (5.0%)	2228 (8.0%)	1754 (10.3%)
n-DES	4811	4657 (3.7%)	4520 (5.0%)	2793 (8.0%)	1266 (10.6%)

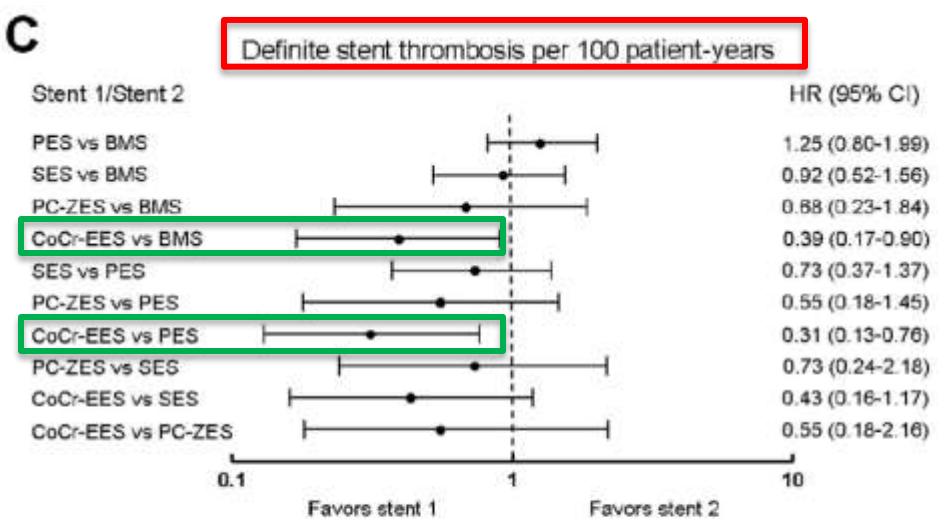
Sarno G et al. J Am Coll Cardiol. 2014 Jul 8;64(1):16-24.

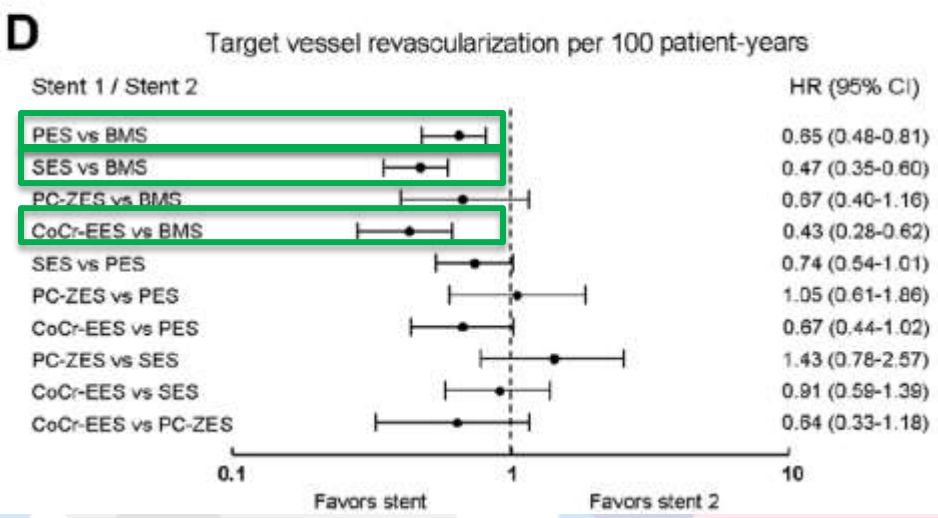
Meta-analysis: BMS vs DES in STEMI

Twenty-two trials including 12,453 randomized patients were analyzed.







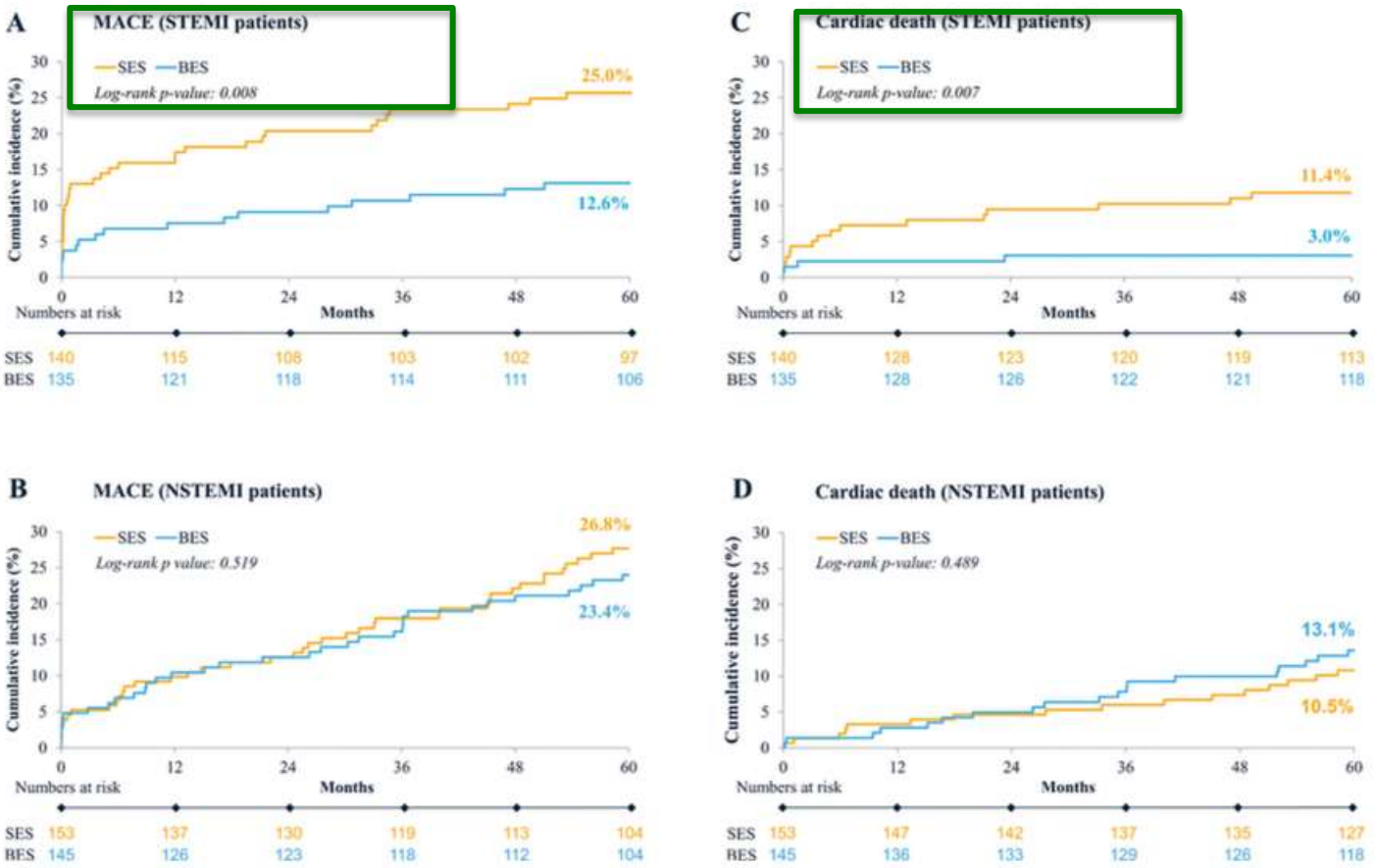


Palmerini T et al. J Am Coll Cardiol. 2013 Aug 6;62(6):496-504.

Biodegradable polymer biolimus-eluting stent vs. durable polymer SES in AMI patients

From LEADERS study

The LEADERS trial is a multicentre all-comer study, where patients (n=1707) were randomised to BES containing biodegradable polymer (BioMatrix Flex) or SES (Cypher) containing durable polymer. Out of 1707 patients enrolled in this trial, 573 patients had PCI for AMI (BES=280, SES=293)

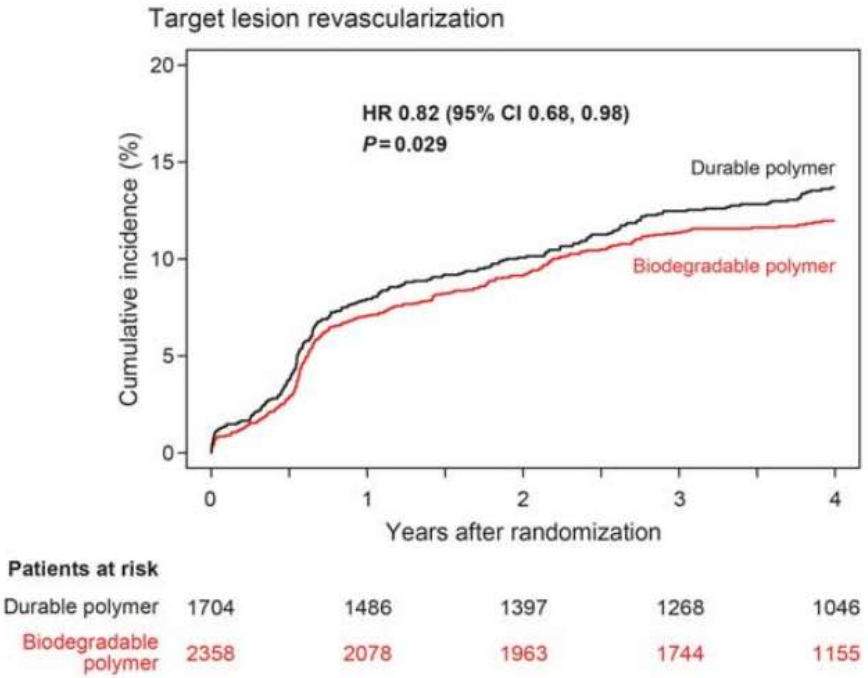


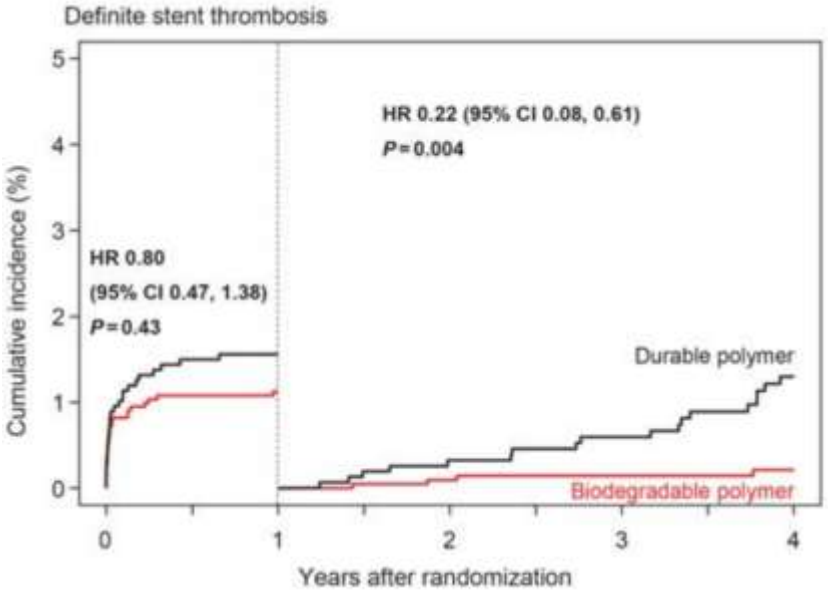
Zhang YJ et al. Heart. 2015 Feb;101(4):271-8.

Total population

Biodegradable polymer DES vs durable polymer SES

Pooled individual patient data from 3 large-scale multicentre RCT (ISAR-TEST 3, ISARTEST 4, LEADERS) comparing biodegradable polymer DES with durable polymer SES during follow-up through 4 years.

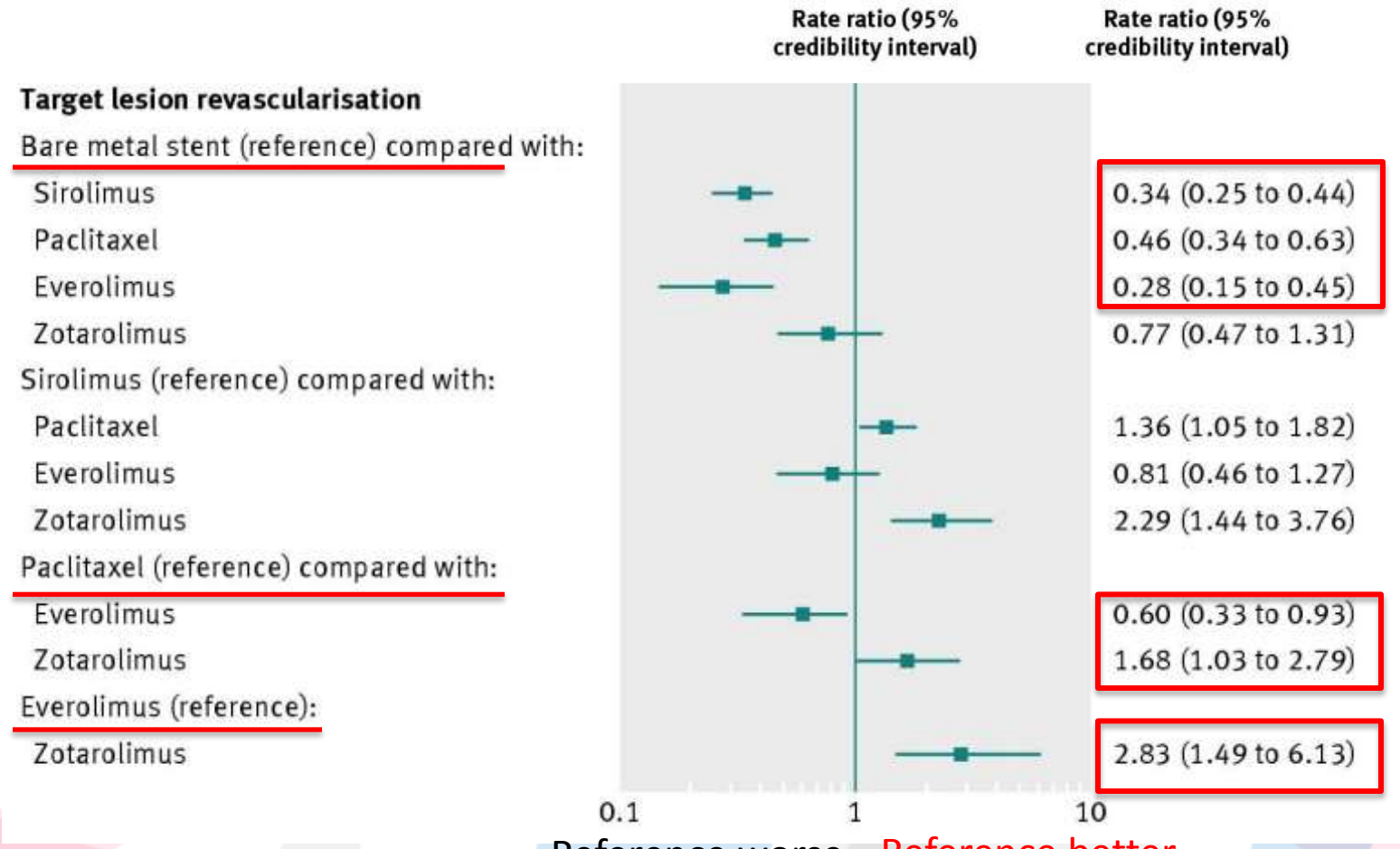




Stefanini GG et al. Eur Heart J. 2012 May;33(10):1214-22.

Various DES vs BMS in patients with diabetes mellitus

Mixed treatment comparison meta-analysis rom 42 trials with 22,844 patient years of follow-up



Bangalore S et al. BMJ. 2012 Aug 10;345:e5170.

Biodegradable polymer DES vs durable polymer SES in diabetes

Pooled individual patient data from 3 large-scale multicentre RCT (ISAR-TEST 3, ISARTEST 4, LEADERS) comparing biodegradable polymer DES with durable polymer SES during follow-up through 4 years. Of 1094 patients with diabetes included in the present analysis, 657 received biodegradable polymer DES and 437 durable polymer SES.

Cardiac death, MI or TLR

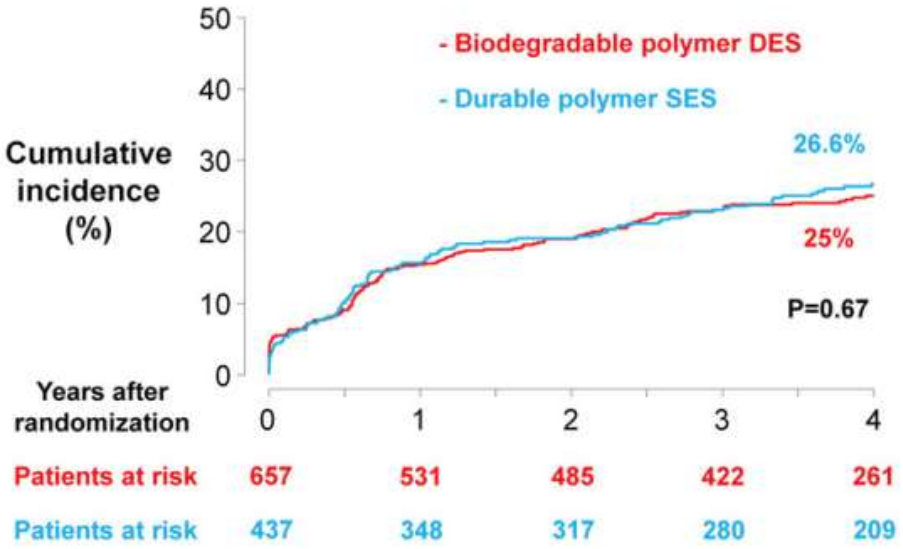


Fig. 1. Primary end point: cardiac death, myocardial infarction or TLR.

Stent thrombosis (def/prob)

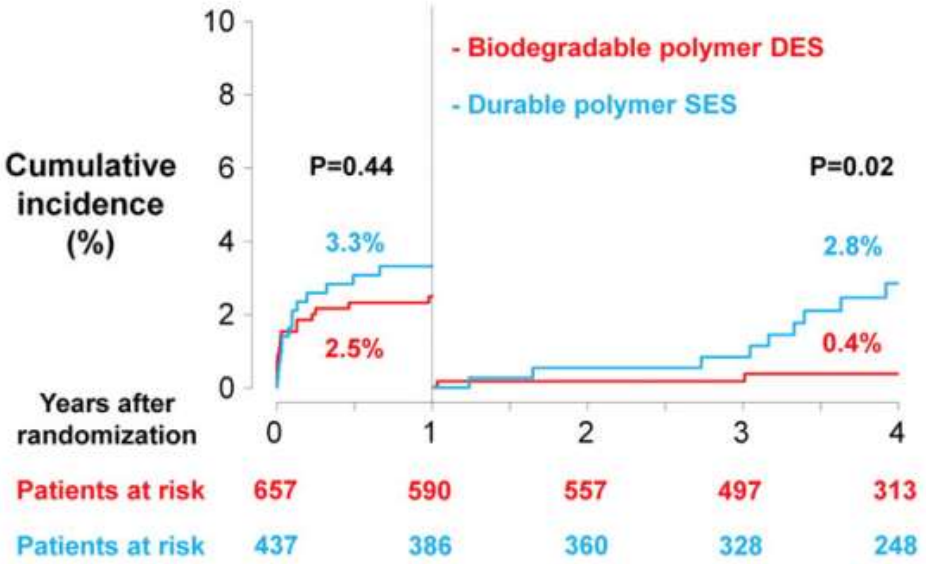


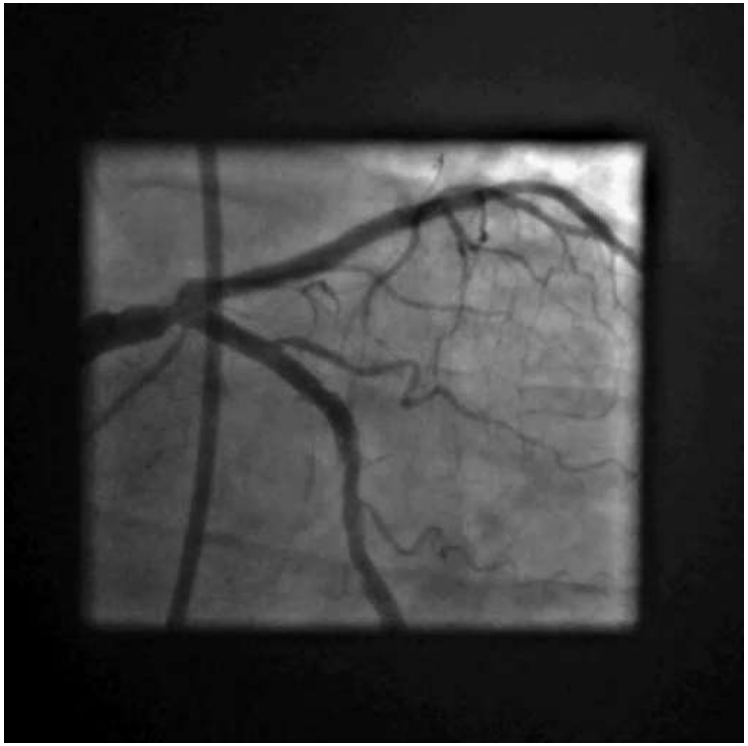
Fig. 3. Secondary safety end point: definite or probable stent thrombosis.

de Waha A et al. Int J Cardiol. 2013 Oct 15;168(6):5162-6.

Short-DAPT Programs in HBR Pts with Contemporary Polymer-based DES

Study	Device	DAPT Duration	N	Design
EVOLVE Short DAPT NCT02605447	Synergy	3 months	2000	Registry
POEM NCT03112707	Synergy	1 month	1023	Registry
SENIOR NCT02099617	Synergy	1 month (SIHD) 6 months (ACS)	1200	Randomized (Synergy vs. BMS)
XIENCE 90 NCT03218787	Xience	3 months	2000	Registry
STOP-DAPT2 NCT02619760	Xience	1 month	3045	Randomized (1 vs 12 mo DAPT)
MASTER-DAPT NCT03023020	Ultimaster	1 month	4300	Randomized (1 vs 12 mo DAPT)
Onyx ONE NCT03344653	Onyx Resolute	1 month	2000	Randomized (Onyx vs. BioFreedom)

Left main

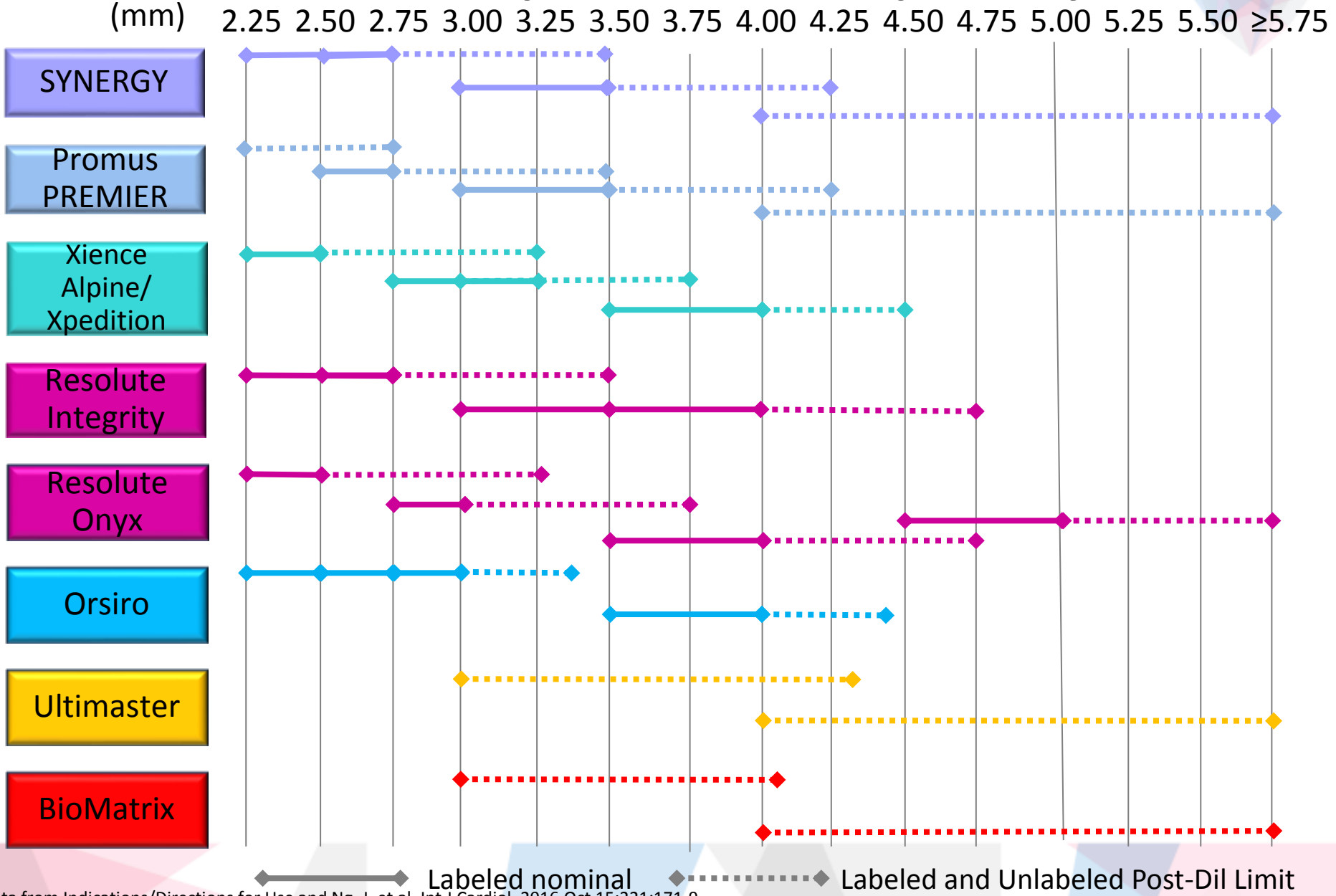


7F XB 3.5

- Lower rates of restenosis/stent thrombosis and improved clinical outcomes
- Stent expansion characteristics for appropriate sizing
- Stent architecture to uniformly and adequately scaffold the lesion without compromising side branch access
- Sufficient radial force to overcome lesion resistance and elastic recoil
- Stents with greater proven strength
- Radio-opacity

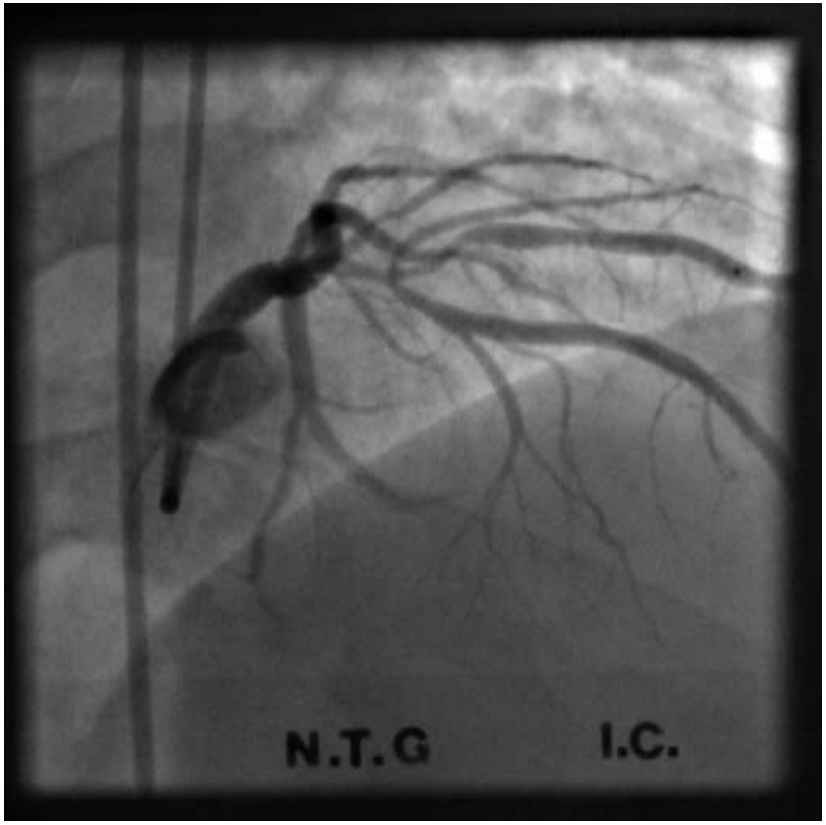
LM

Stent Expansion Capacity



Data from Indications/Directions for Use and Ng, J. et al. Int J Cardiol. 2016 Oct 15;221:171-9.

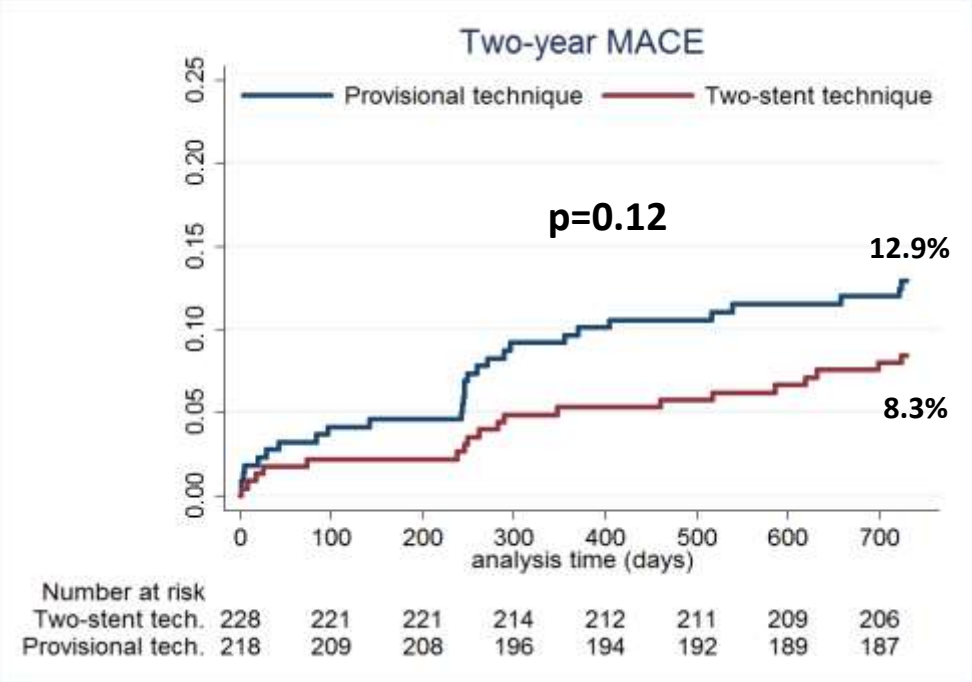
Bifurcation

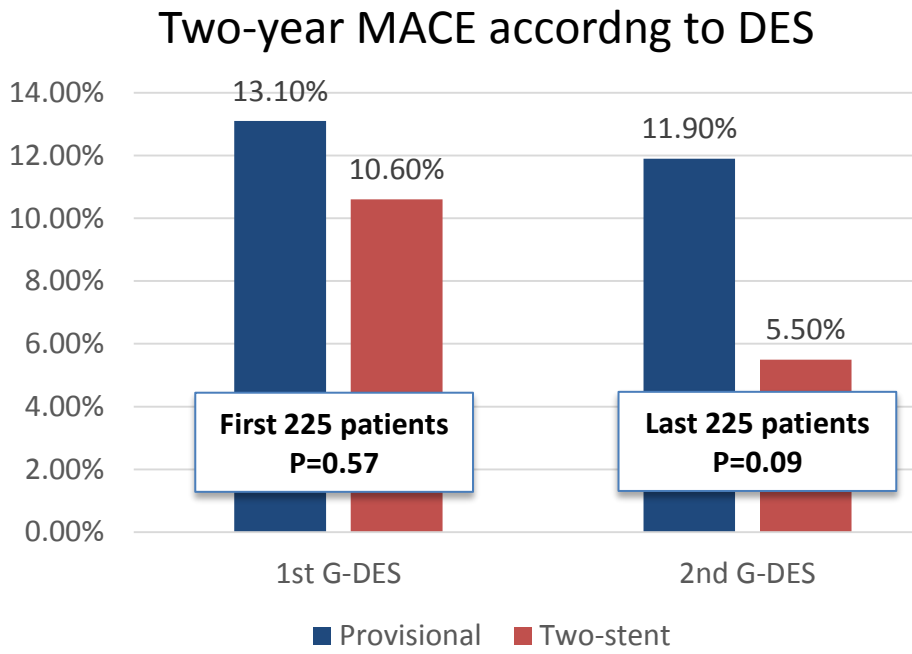


- Lower rates of restenosis/stent thrombosis and improved clinical outcomes
- Stent architecture to uniformly and adequately scaffold the lesion without compromising side branch access
- Stent expansion characteristics for appropriate sizing
- Stents with low profile and sufficiently flexible to facilitate deliverability to the lesion site without distortion or displacement
- Radio-opacity

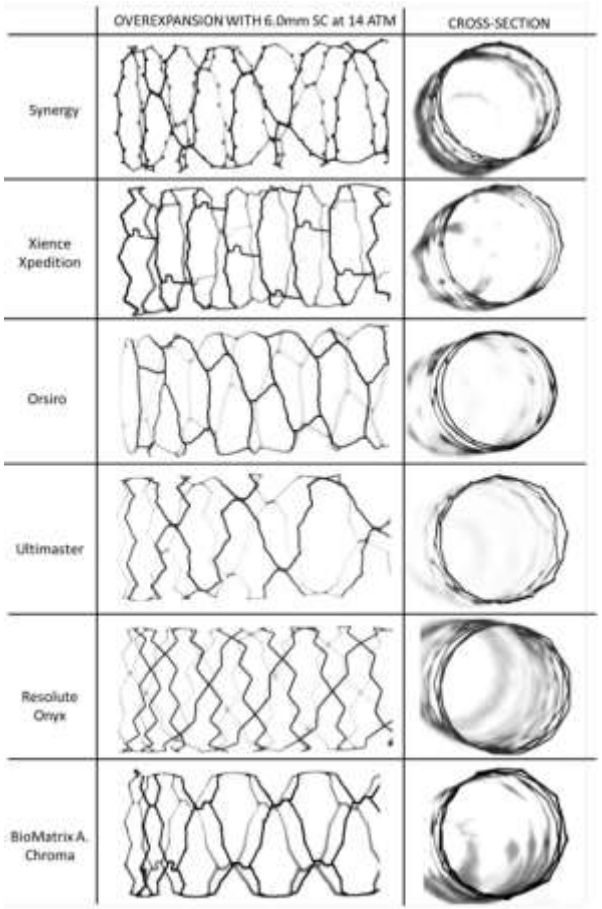
Nordic IV
MACE-Free Survival at 2-Year Follow-Up

MACE: cardiac death, non-procedural myocardial infarction, target lesion revascularization and definite stent thrombosis





Cell opening



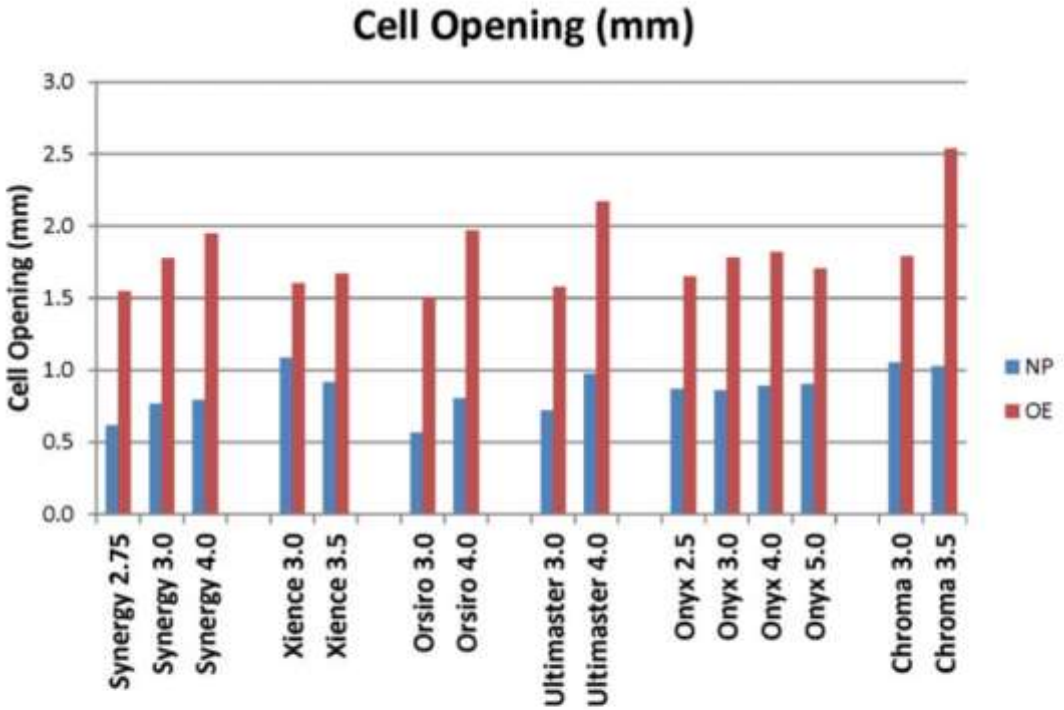
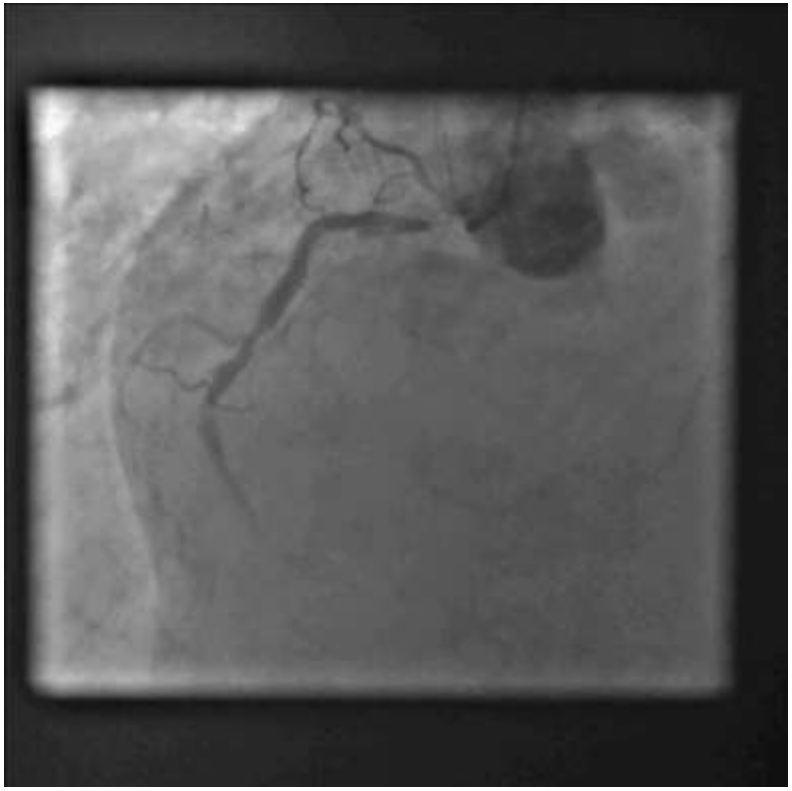


Fig. 3. Cell opening measurements at nominal pressure (NP) deployment and at over expansion (OE): Cell opening values are the average values across 6 measurements. Comparable cell opening values between the platforms and designs are observed at nominal diameter. Overexpansion increased cell opening by more than two folds, which is likely to affect scaffolding and drug delivery.

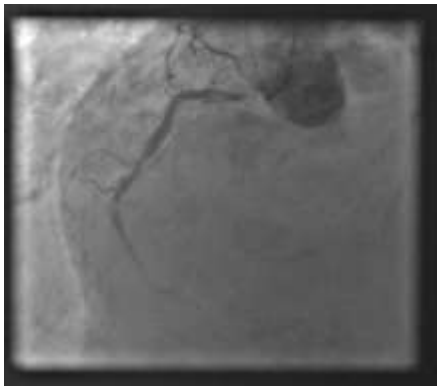
Ng J et al. Int J Cardiol. 2016 Oct 15;221:171-9.

Ostial lesions



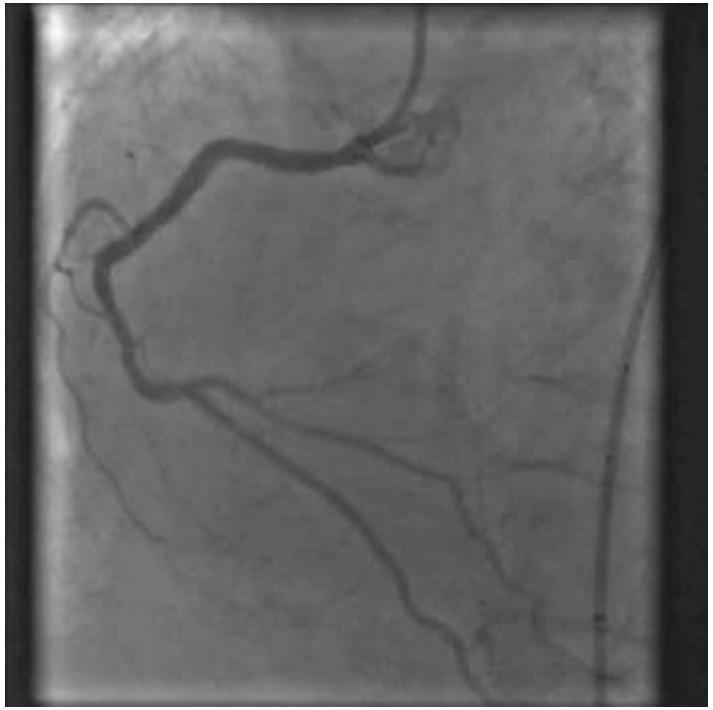
- Lower rates of restenosis/stent thrombosis and improved clinical outcomes
- Sufficient radial force to overcome lesion resistance and elastic recoil
- Stents with greater proven strength
- Stent expansion characteristics for appropriate sizing
- Radio-opacity

Ostial: PCI

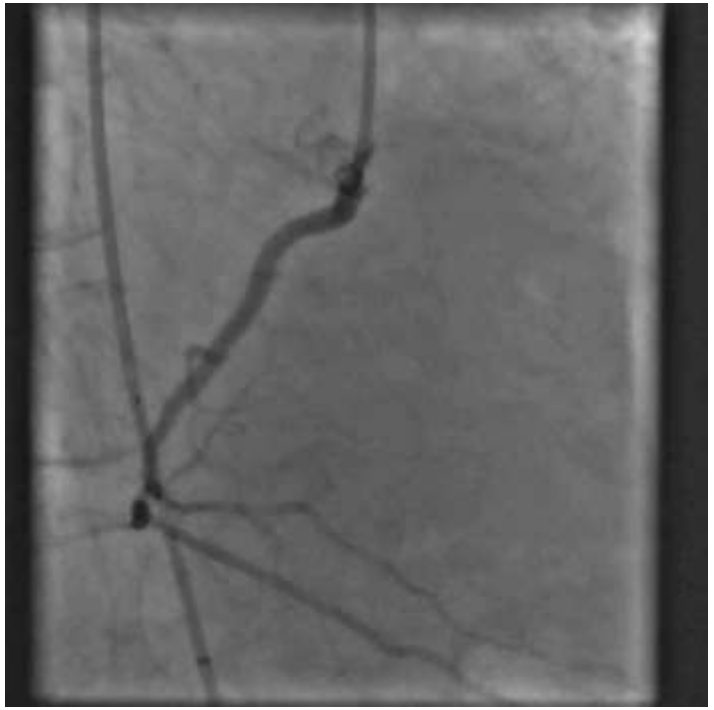


Pre-intervention

80yo female with stable angina class III
Stenting:
Synergy 3.0x32 mm mid RCA & Synergy 3.0x24 mm prox RCA
Postdilatation:
NC Emerge 3.5x20 mm & NC Emerge 4.0x15 mm

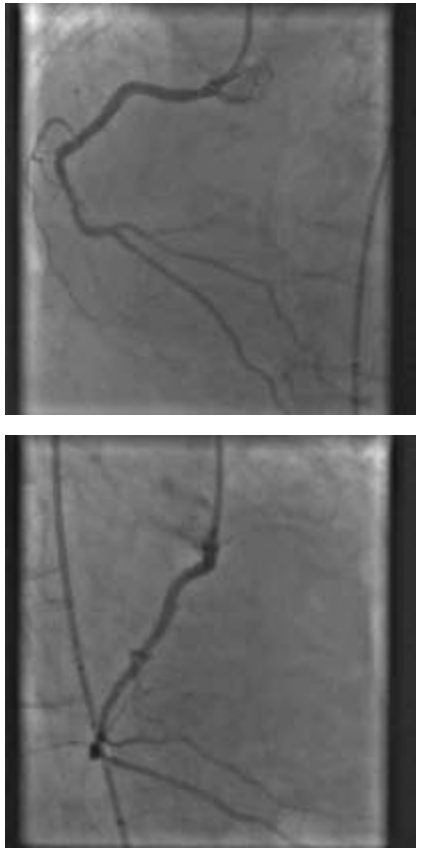


Post-intervention



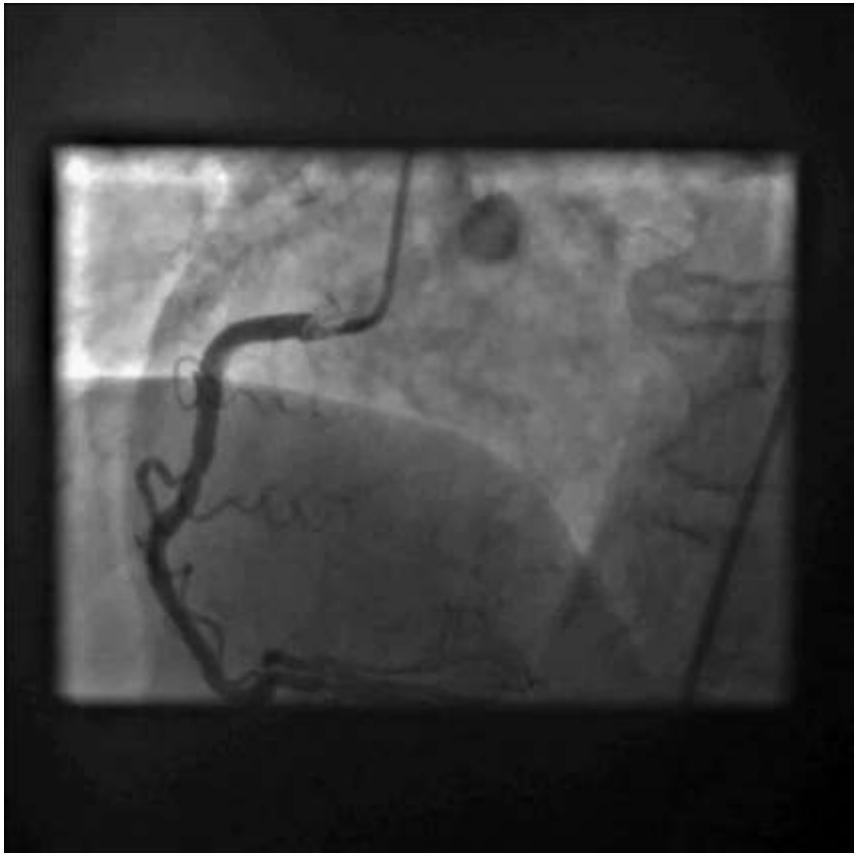
Post-intervention

Ostial: 2 months follow-up



Post-intervention

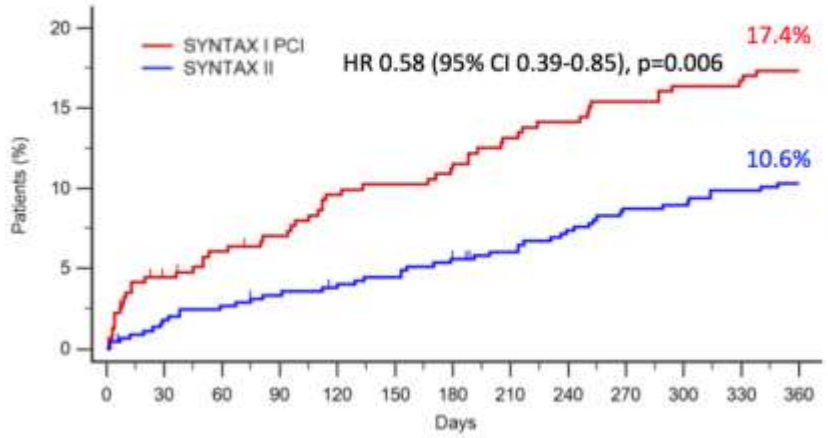
80yo female with stable angina class II hospitalized for elective staged PCI LAD



Multivessel disease

1 year results of SYXTAX II study

Primary endpoint: MACCE



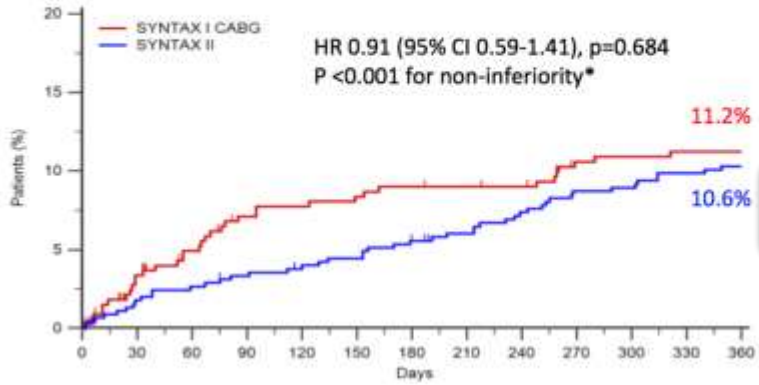
Taxus (SYNTAX I)

Synergy (SYNTAX II)

The SYNTAX II study is a multicenter, all-comers, open-label, single arm study that investigated the impact of a contemporary PCI strategy (SYNERGY DES) on clinical outcomes in patients with 3VD in 22 centres from four European countries.

MACCE=composite of all-cause death, cerebrovascular event, any myocardial infarction and any revascularisation

Exploratory End-Point: MACCE PCI vs. CABG

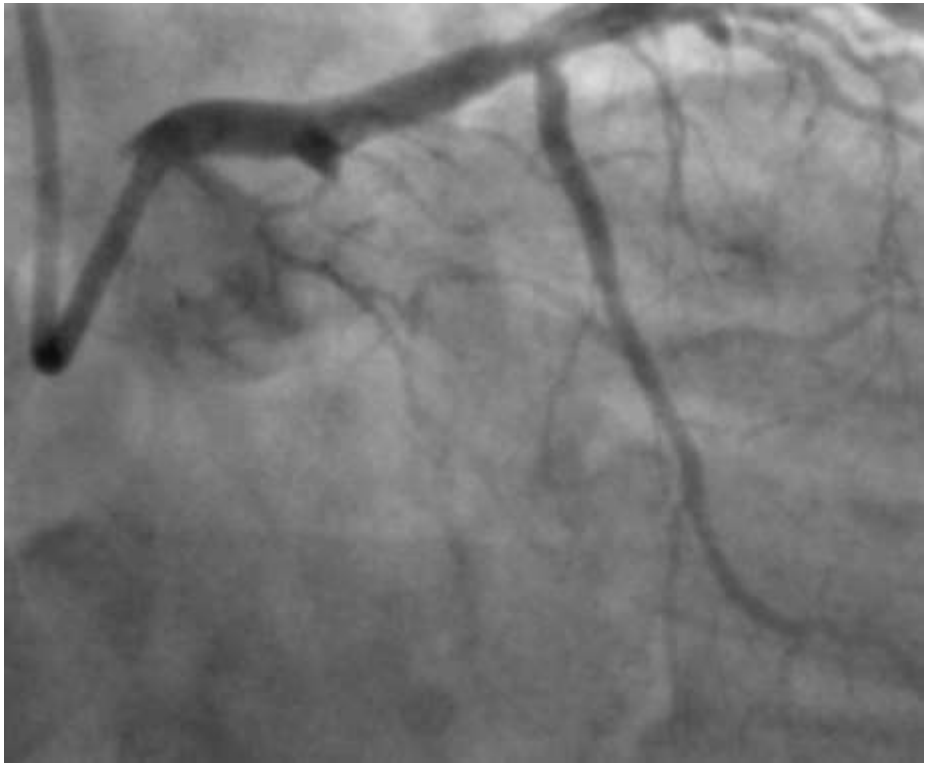


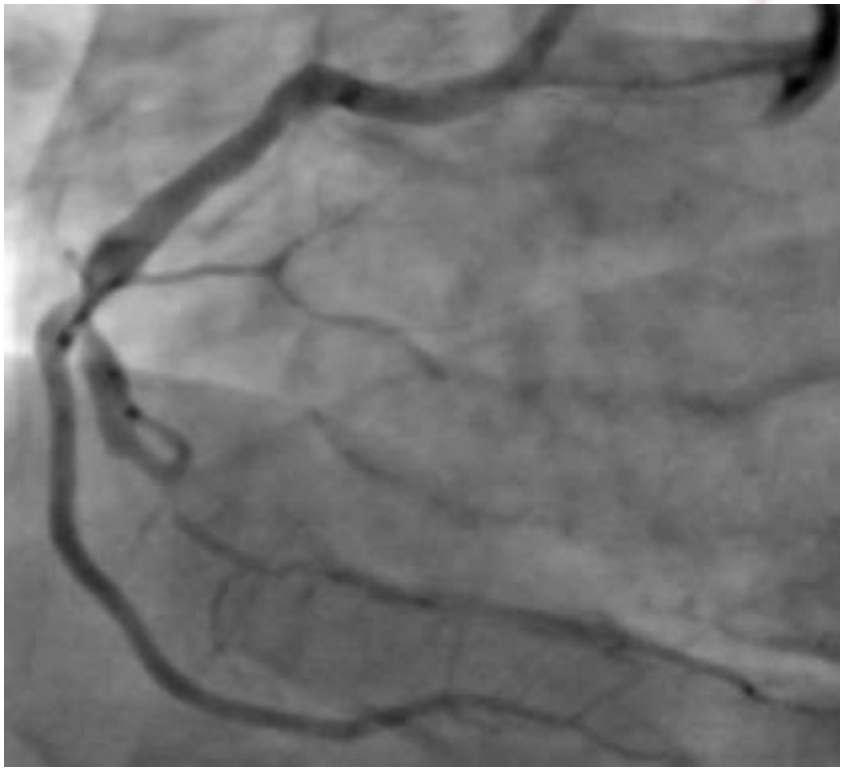
CABG (Syntax I)

Synergy PCI (Syntax II)

Escaned J. ESC 2017; Escaned J et al. Eur Heart J. 2017 Nov 7;38(42):3124-3134.

Clinical case – CTO - "Today"

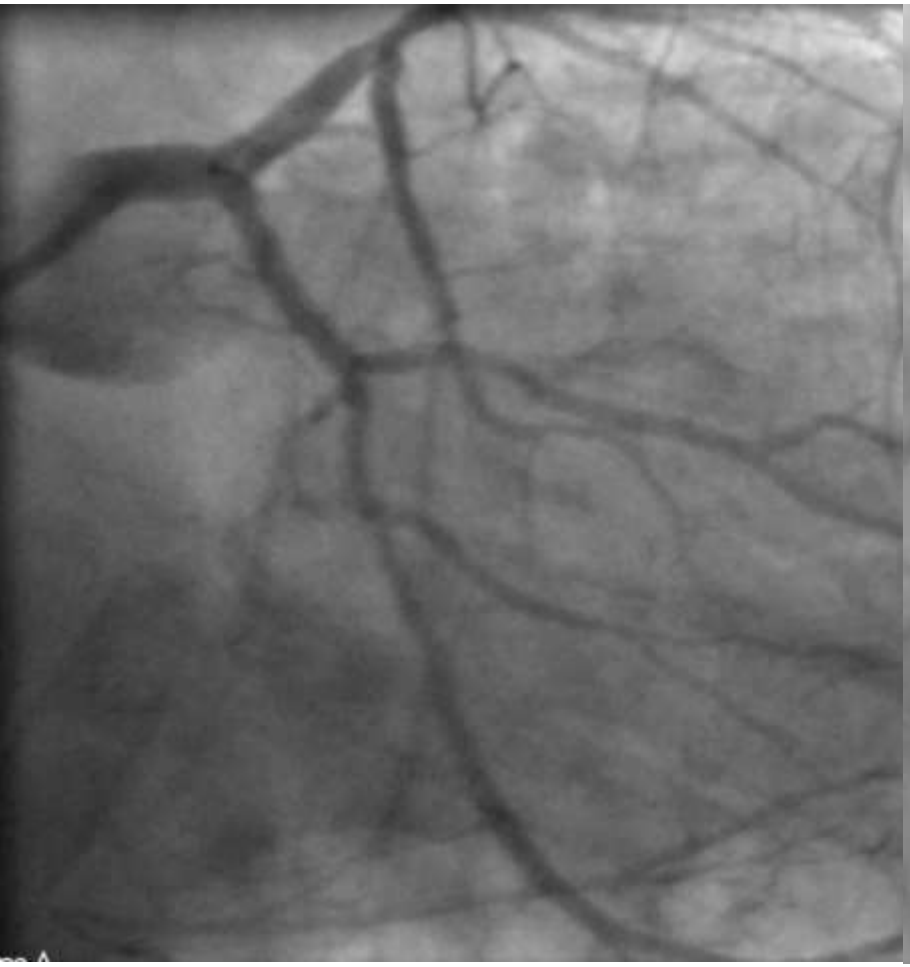


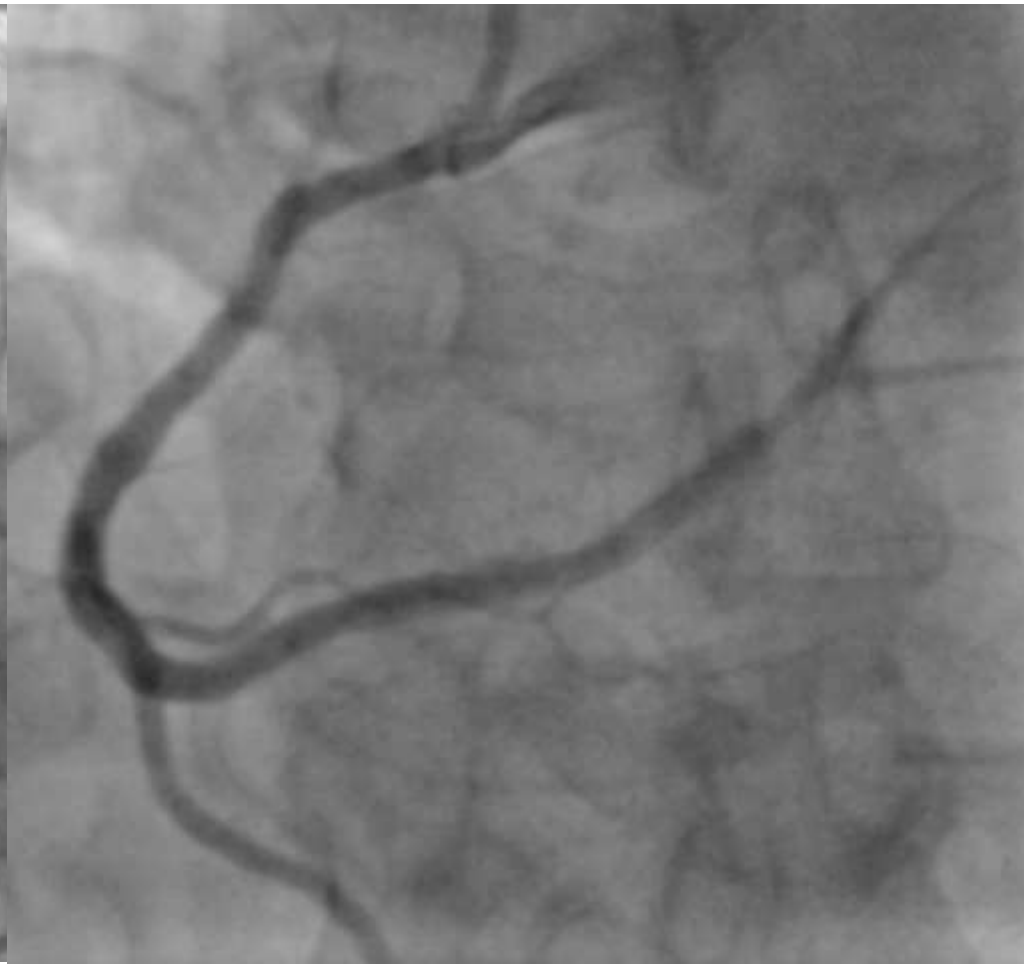


- Antegrade approach 6F– OTW 1.5 x 8 mm
- Pretreatment – SC 2.5 x20 mm, CB 2.5 x 10 mm
- **Absorb – 2.5 x 18 mm**
- NC balloon – 3.0 x 12 mm – 17 bar

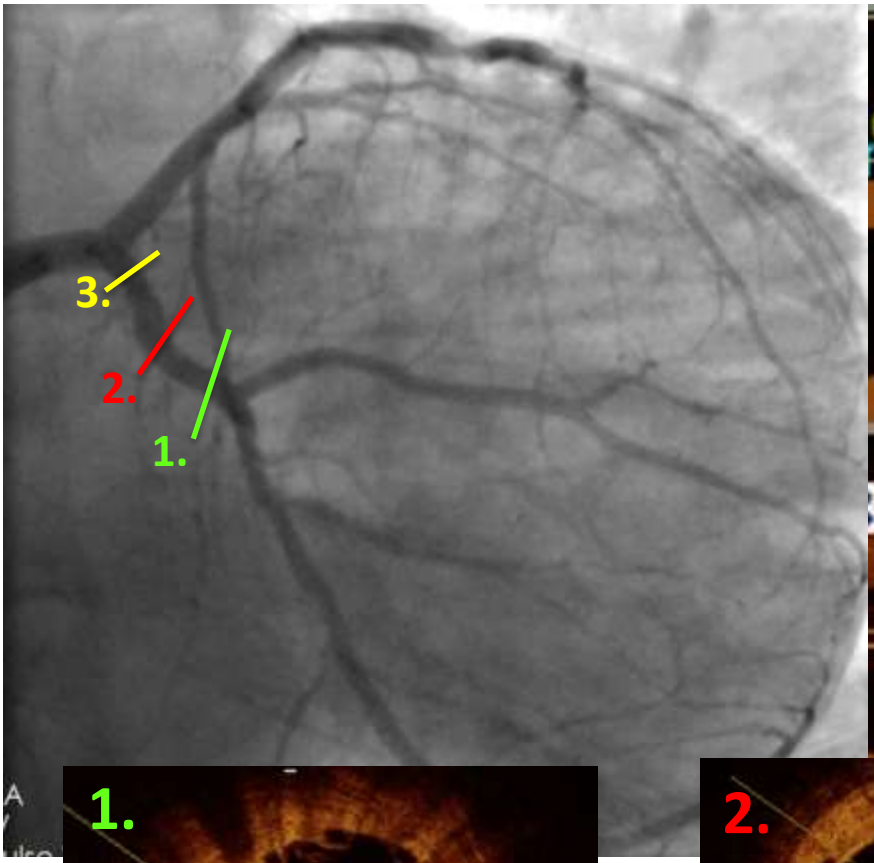
- Retrograde approach – 7F, Finecross catheter
- IVUS, CB – 3.25 x 20 mm
- **2 Absorb 3.5 x 28 mm**
- NC 3.75 x 20 mm – 17 bar

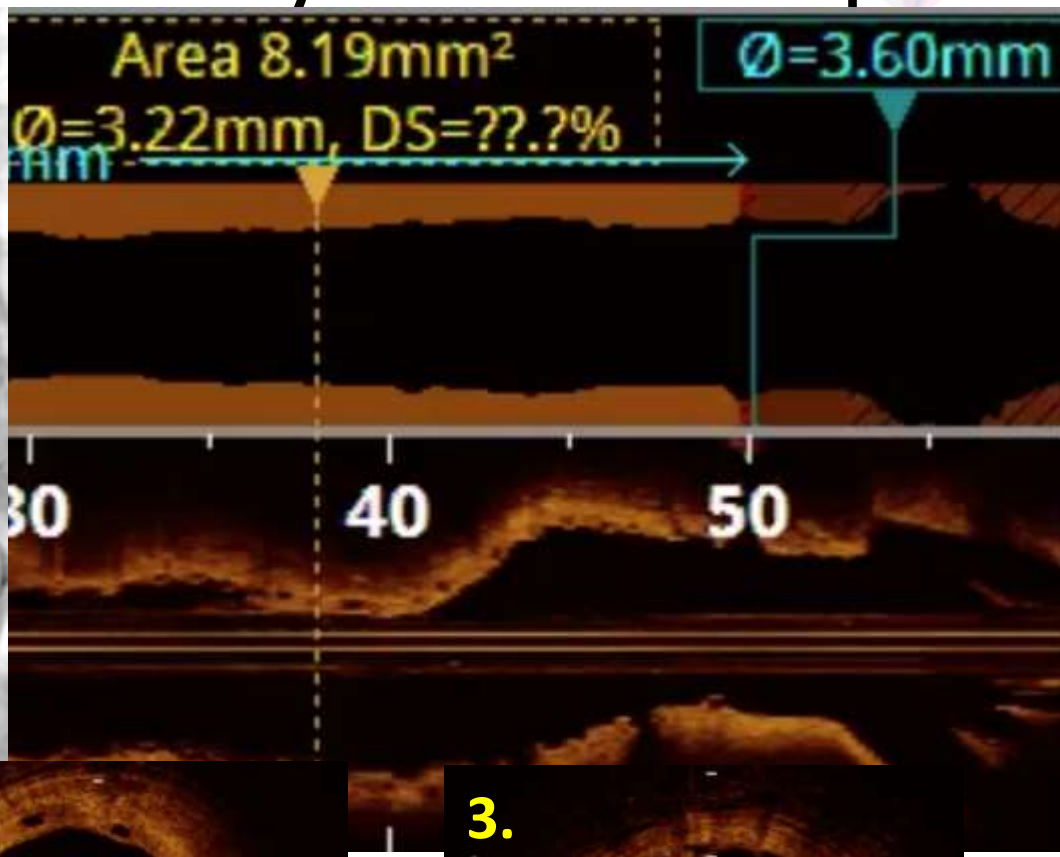
Clinical case – CTO – final result

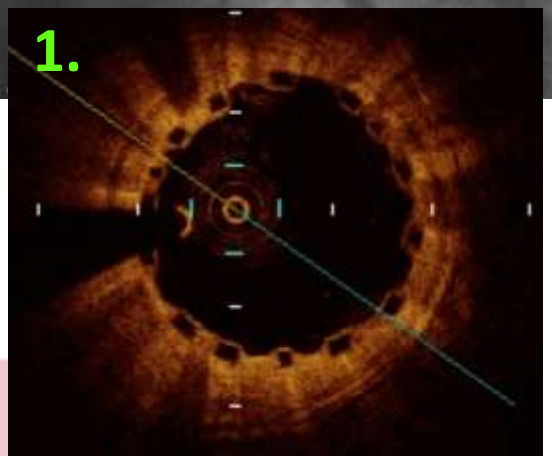


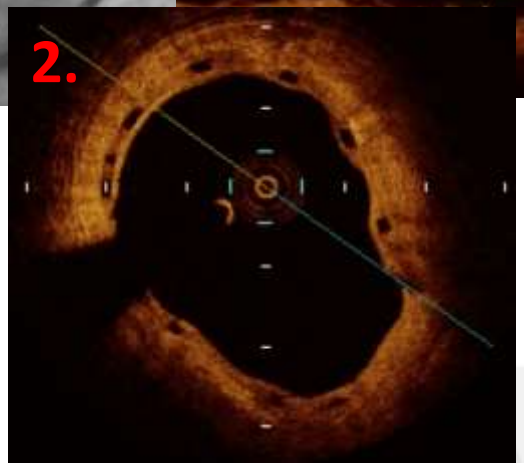


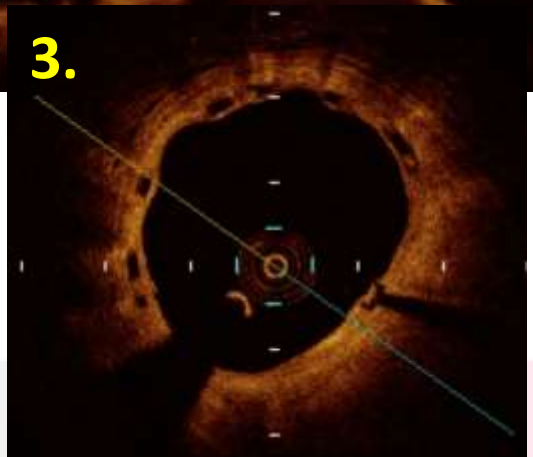
Clinical case – CTO – 1 year follow up



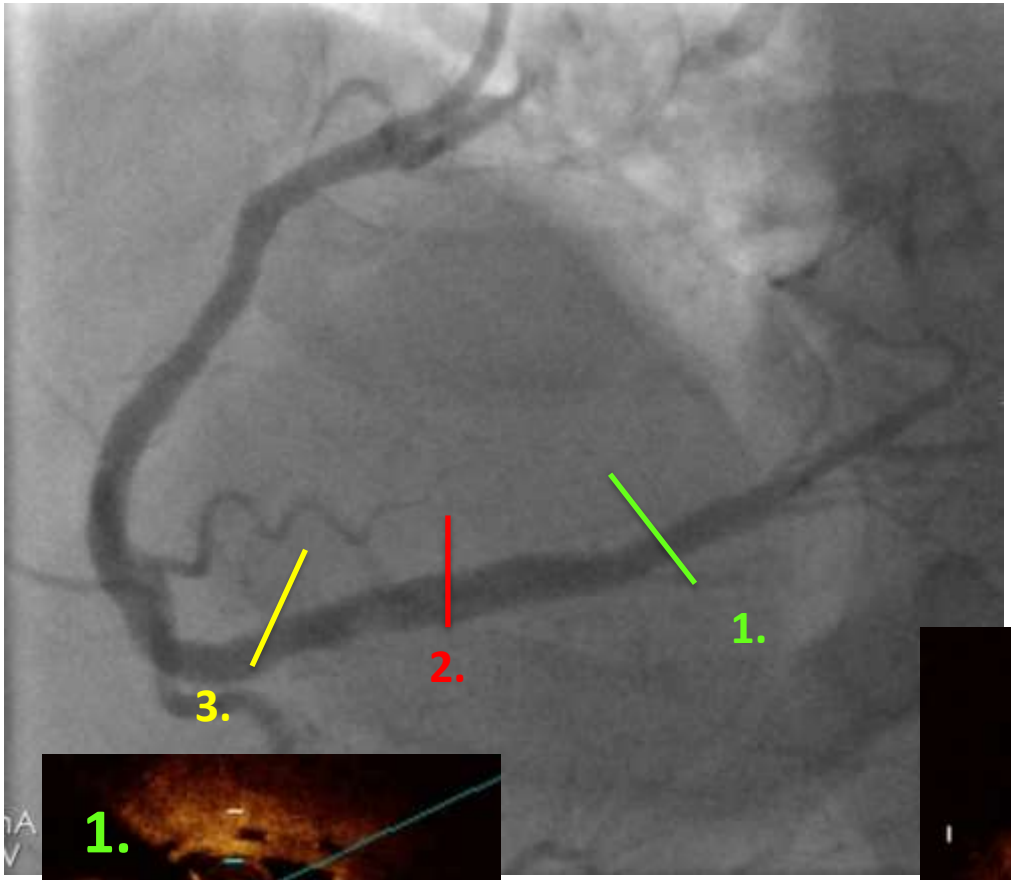


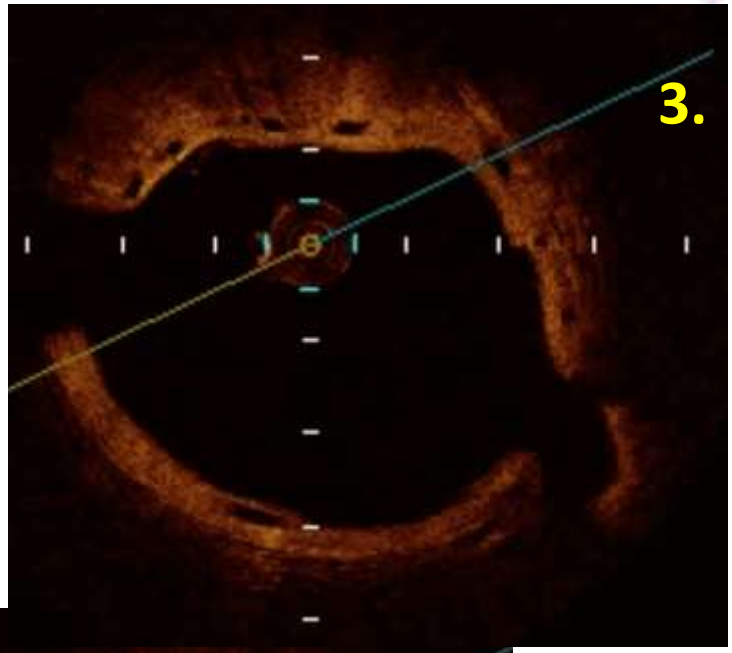


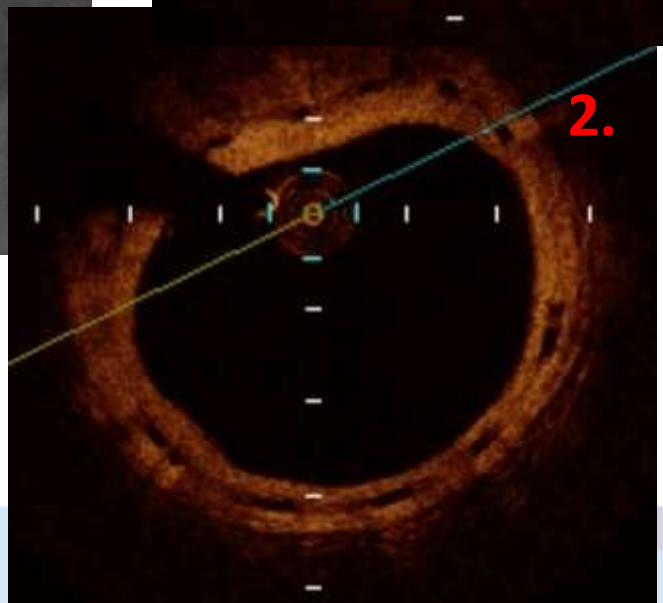


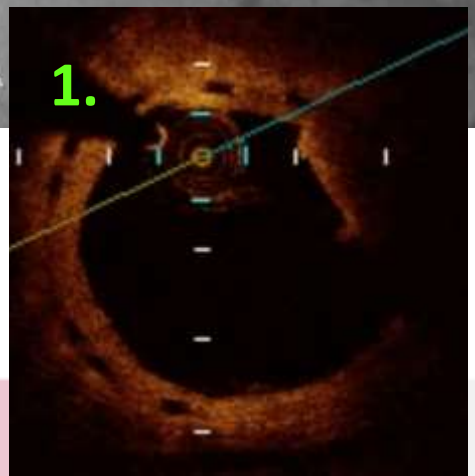


Clinical case – CTO – 1 year follow up

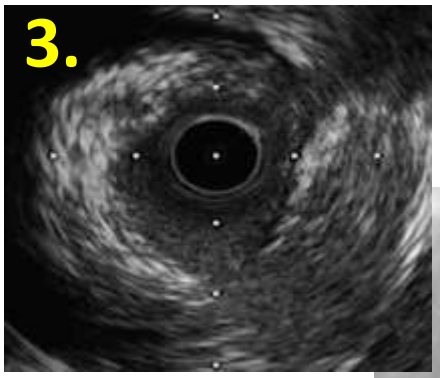


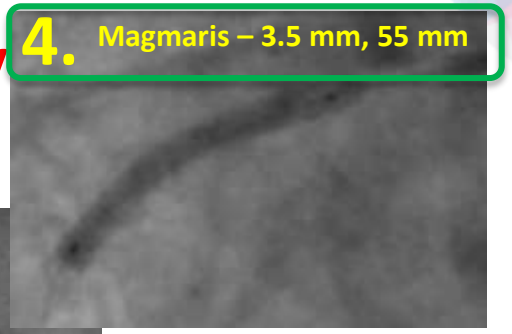


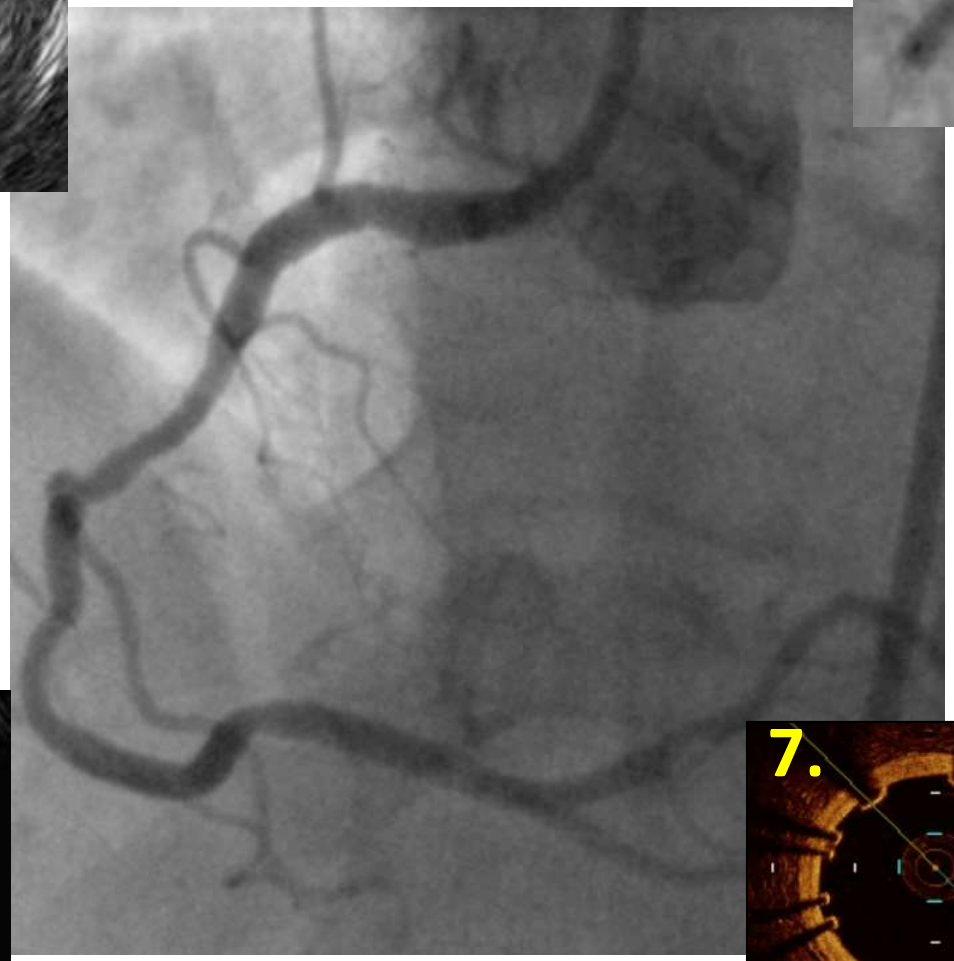


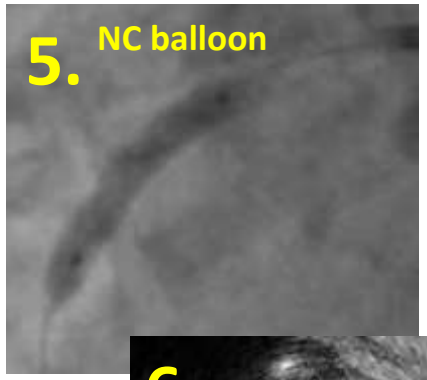


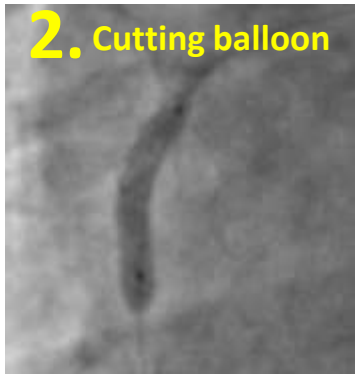
Clinical case – Long coronary lesions with BRS "Today"

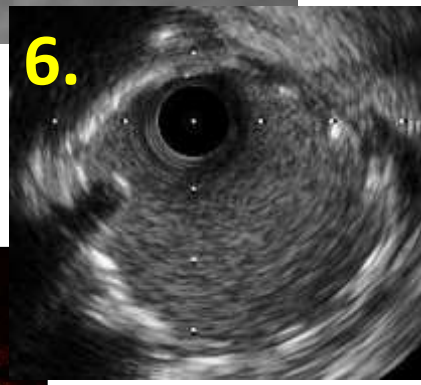


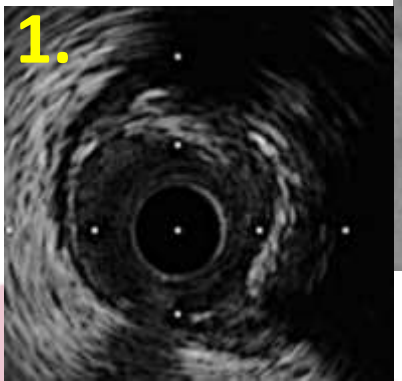


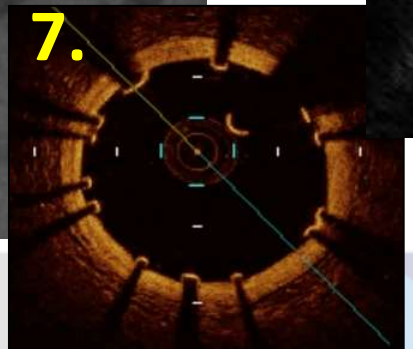




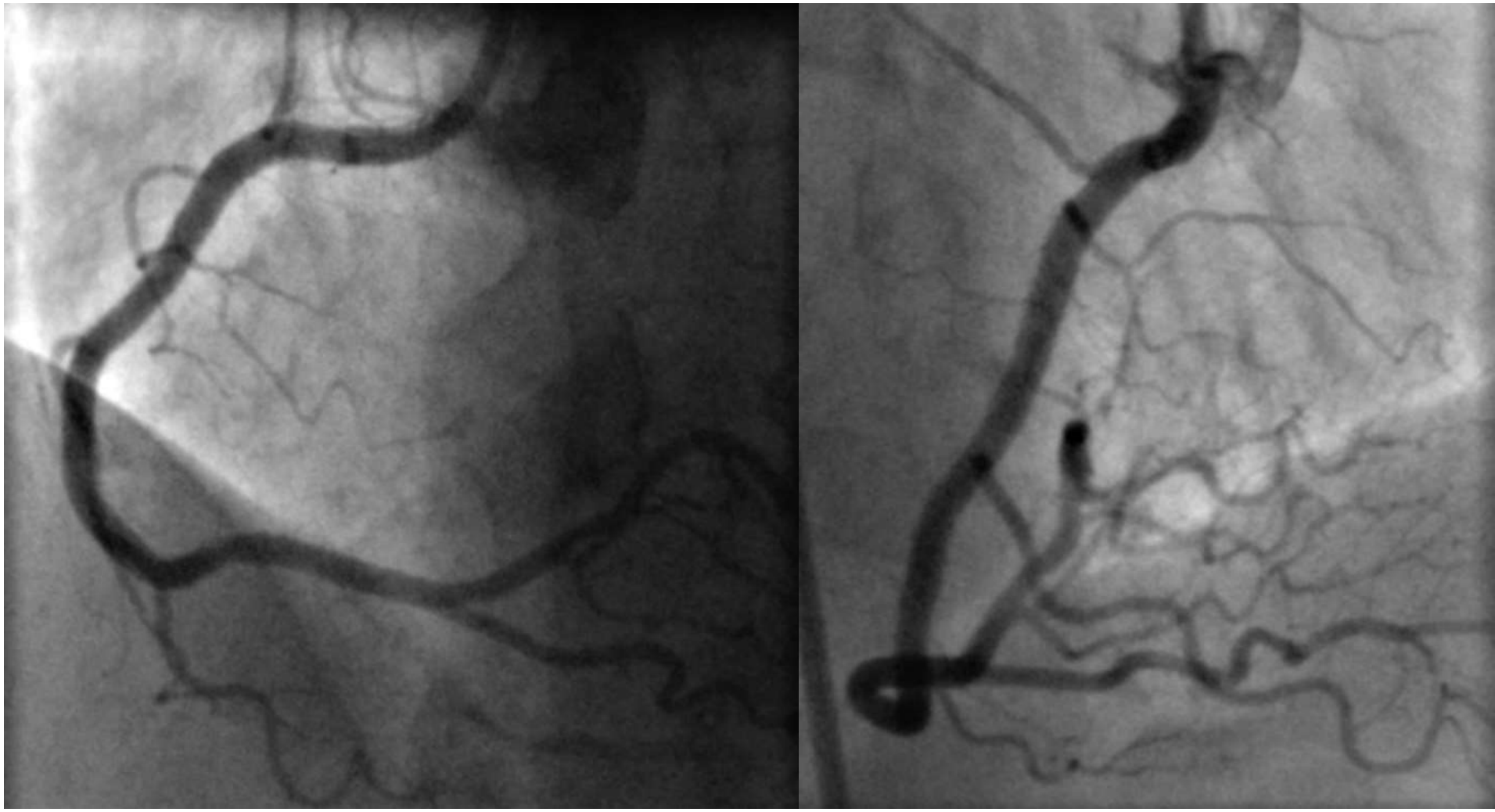




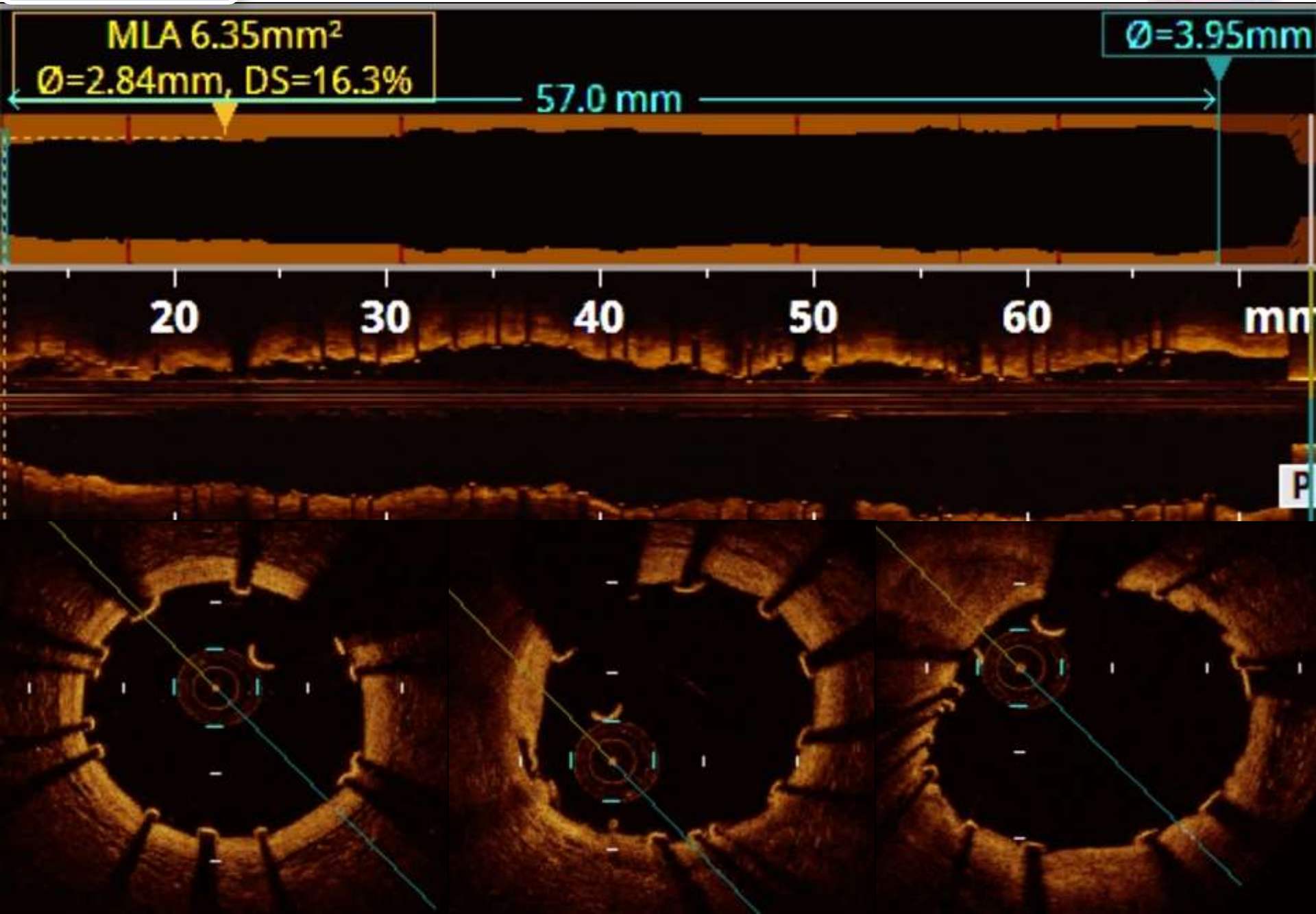




Clinical case – Long coronary lesions, final result



inical case – final OCT result (Magmaris)



Doubt is not a pleasant condition, but certainty is absurd.

~ Voltaire

AZ QUOTES