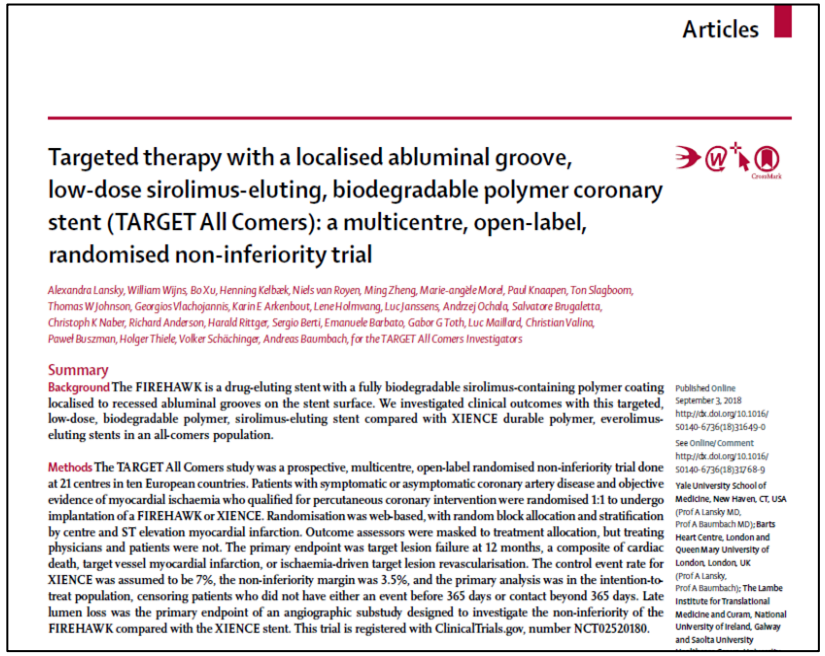
Current Status of DES and DES Failure

- The Target study -



Articles

Targeted therapy with a localised abluminal groove, low-dose sirolimus-eluting, biodegradable polymer coronary stent (TARGET All Comers): a multicentre, open-label, randomised non-inferiority trial

Alexandra Lansky, William Wijns, Bo Xu, Henning Kelbæk, Niels van Royen, Ming Zheng, Marie-angèle Morel, Paul Knaapen, Ton Slagboom, Thomas W Johnson, Georgios Vlachojannis, Karin E Arkenbout, Lene Holmvang, Luc Janssens, Andrzej Ochala, Salvatore Brugaletta, Christoph K Naber, Richard Anderson, Harald Rittger, Sergio Berti, Emanuele Barbato, Gabor G Toth, Luc Maillard, Christian Valina, Paweł Buszman, Holger Thiele, Volker Schächinger, Andreas Baumbach, for the TARGET All Comers Investigators

Summary

Background The FIREHAWK is a drug-eluting stent with a fully biodegradable sirolimus-containing polymer coating localised to recessed abluminal grooves on the stent surface. We investigated clinical outcomes with this targeted, low-dose, biodegradable polymer, sirolimus-eluting stent compared with XIENCE durable polymer, everolimus-eluting stents in an all-comers population.

Methods The TARGET All Comers study was a prospective, multicentre, open-label randomised non-inferiority trial done at 21 centres in ten European countries. Patients with symptomatic or asymptomatic coronary artery disease and objective evidence of myocardial ischaemia who qualified for percutaneous coronary intervention were randomised 1:1 to undergo implantation of a FIREHAWK or XIENCE. Randomisation was web-based, with random block allocation and stratification by centre and ST elevation myocardial infarction. Outcome assessors were masked to treatment allocation, but treating physicians and patients were not. The primary endpoint was target lesion failure at 12 months, a composite of cardiac death, target vessel myocardial infarction, or ischaemia-driven target lesion revascularisation. The control event rate for XIENCE was assumed to be 7%, the non-inferiority margin was 3.5%, and the primary analysis was in the intention-to-treat population, censoring patients who did not have either an event before 365 days or contact beyond 365 days. Late lumen loss was the primary endpoint of an angiographic substudy designed to investigate the non-inferiority of the FIREHAWK compared with the XIENCE stent. This trial is registered with ClinicalTrials.gov, number NCT02520180.

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SNUH Jeehoon Kang, MD

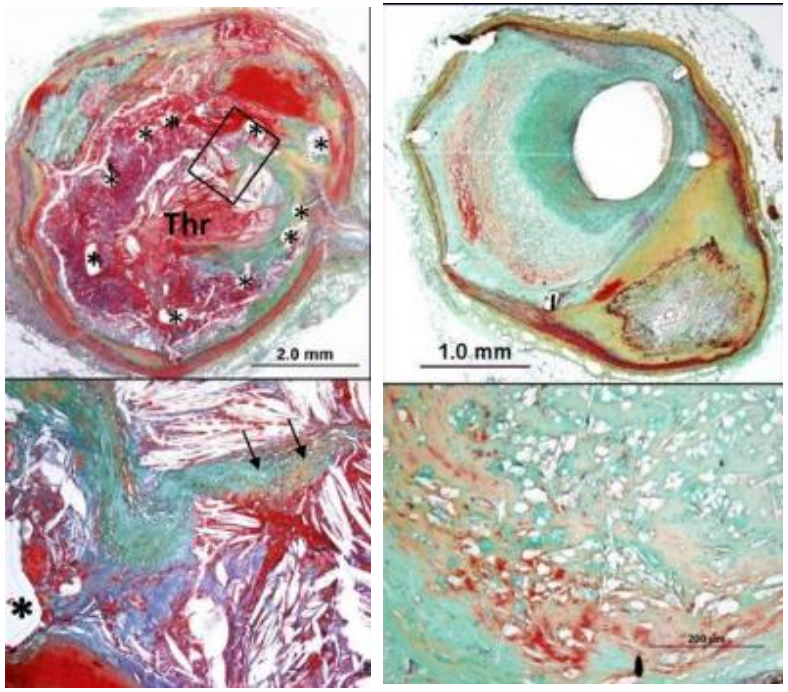
FIREHAWK™

Current development of DESs

1st generation DES

- ✓ Thick strut
- ✓ Uneven/thick polymer distribution
- ✓ High drug dose

- ✓ Uncovered struts
- ✓ Hypersensitivity
- ✓ Malapposition
- ✓ Stent fracture
- ✓ Stent thrombosis
- ✓ Neoatheroscleroisis



2nd generation DES

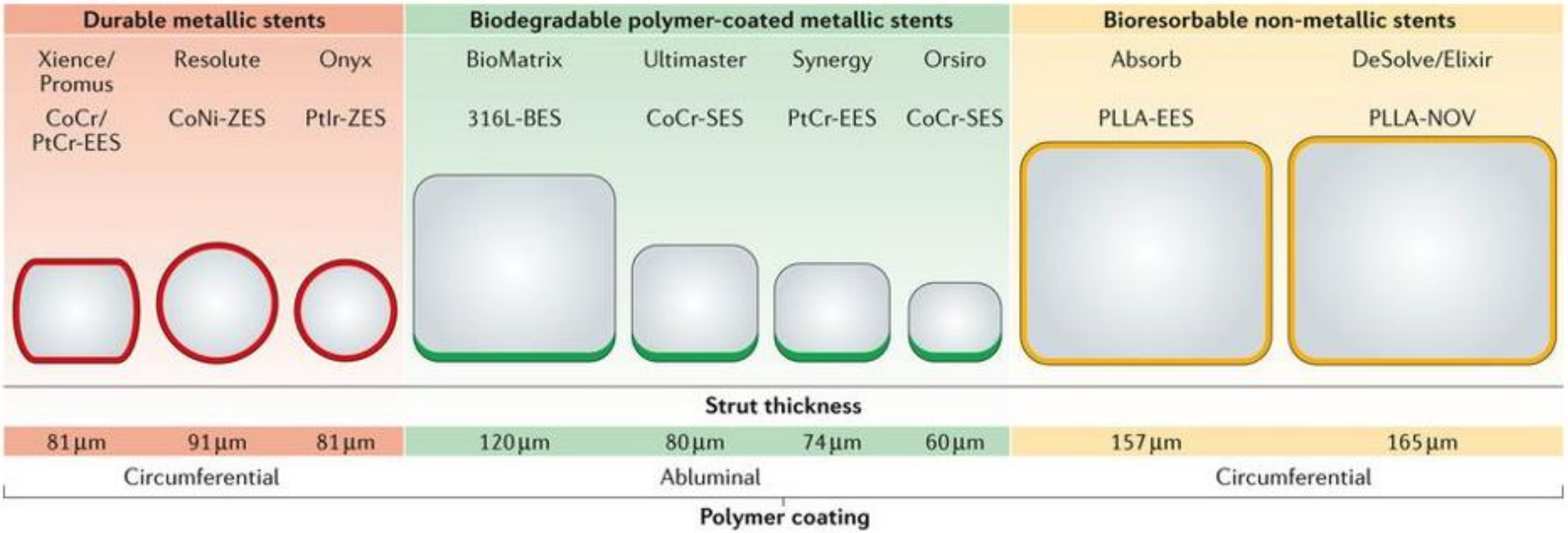
- ✓ Thinner strut
- ✓ Biocompatible / even polymer distribution
- ✓ Reduced drug dose

- ✓ Improved stent performance
- ✓ Decreased clinical outcomes

Anything more?

Current development of DESs

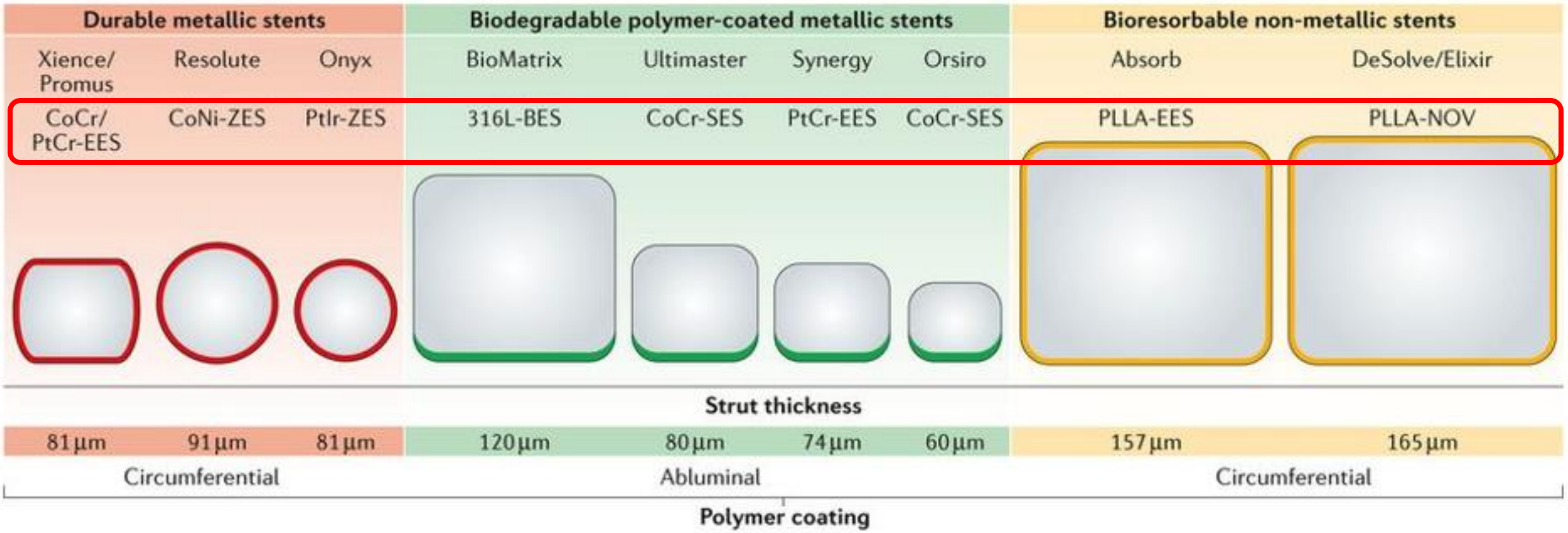
- Various designs of current stents



Nature Reviews Cardiology volume 13, pages 719–729 (2016)

Current development of DESs

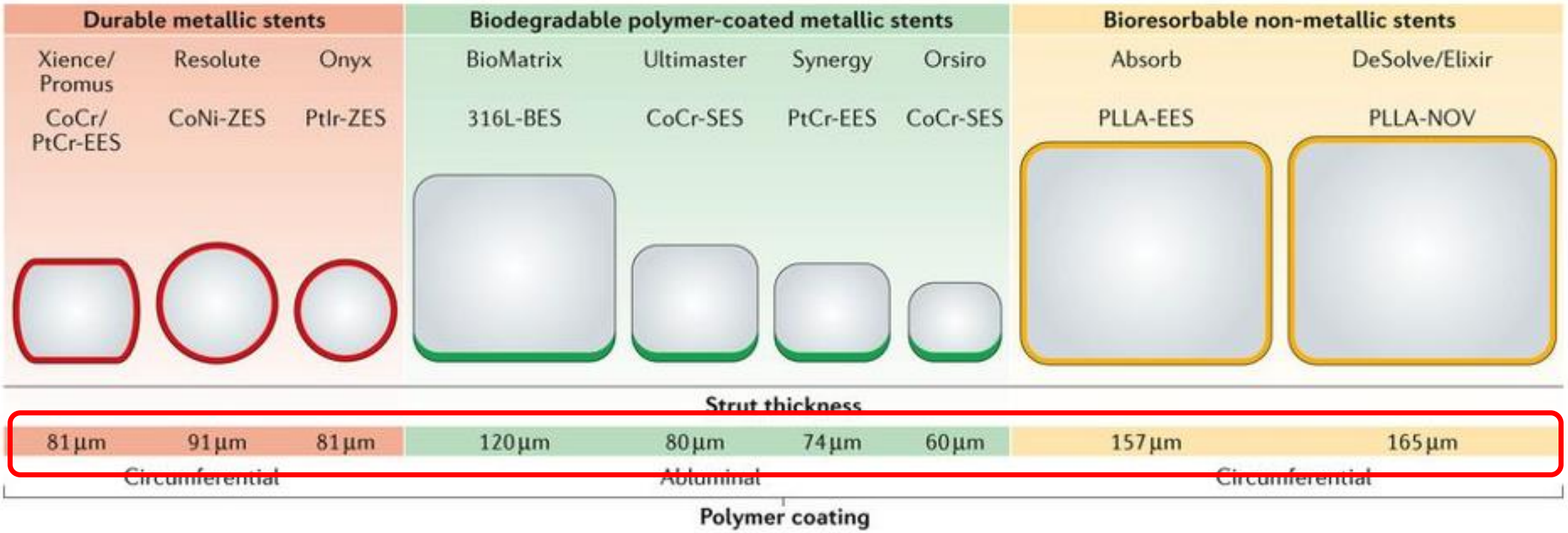
- Various designs of current stents
  - Backbone / Drug



Nature Reviews Cardiology volume 13, pages 719–729 (2016)

Current development of DESs

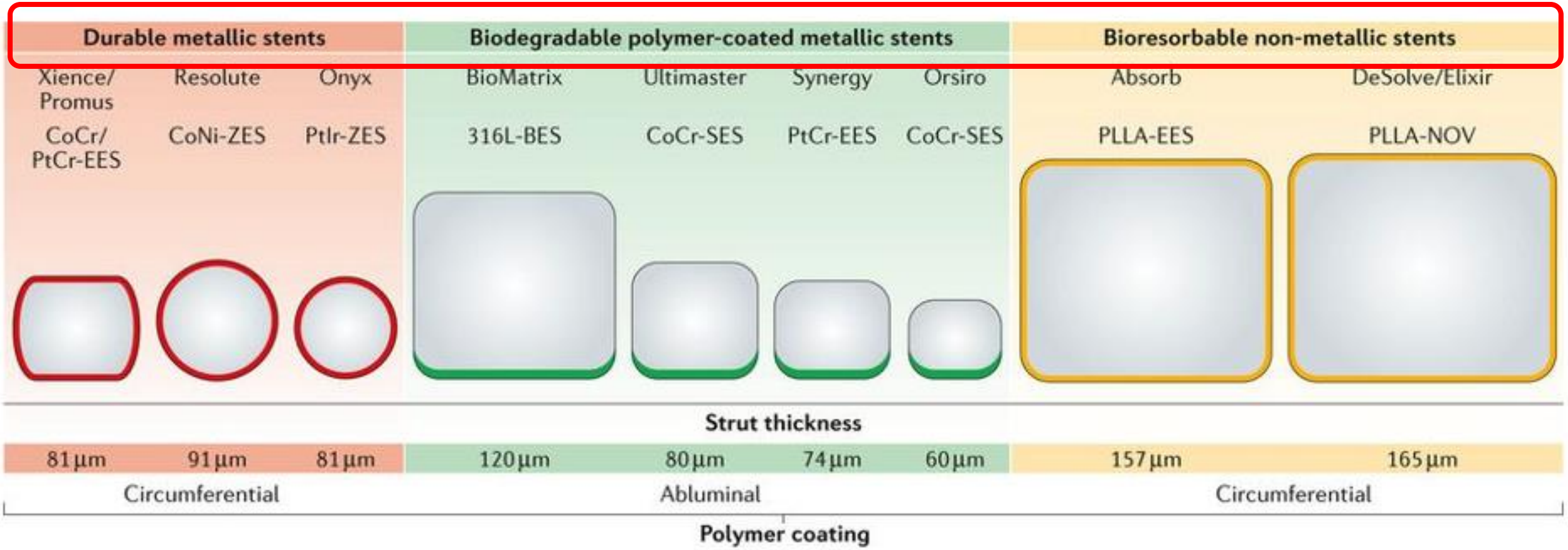
- Various designs of current stents
  - Strut thickness



Nature Reviews Cardiology volume 13, pages 719–729 (2016)

Current development of DESs

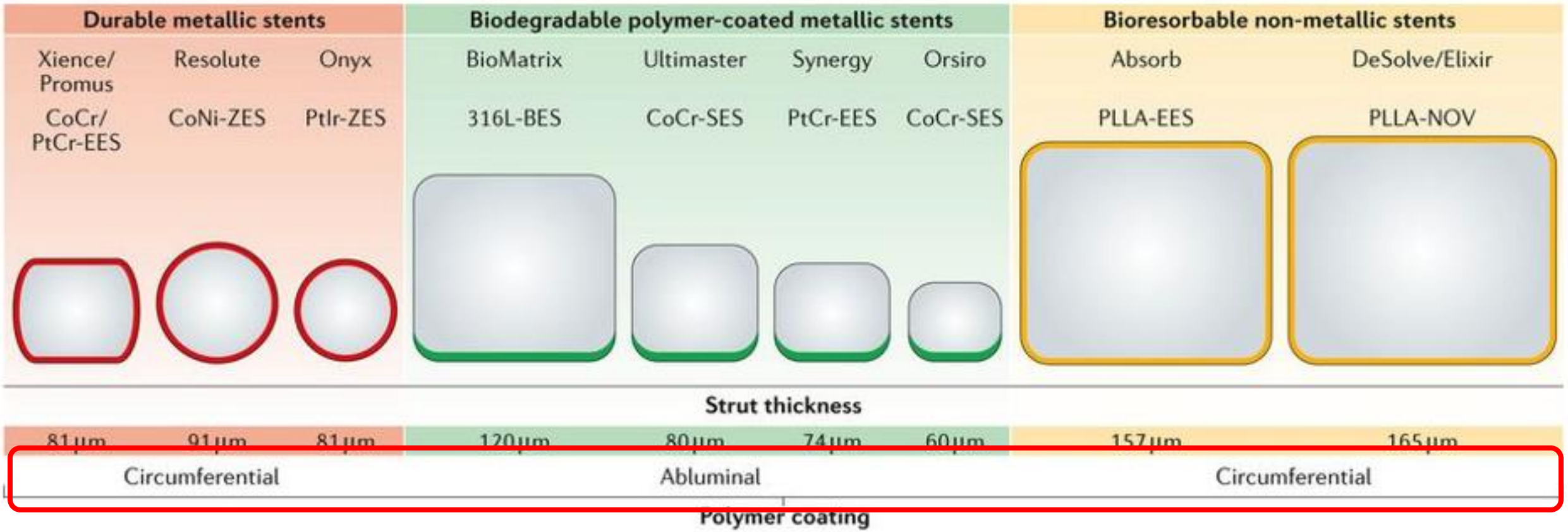
- Various designs of current stents
  - Polymer



Nature Reviews Cardiology volume 13, pages 719–729 (2016)

Current development of DESs

- Various designs of current stents
  - Drug coating



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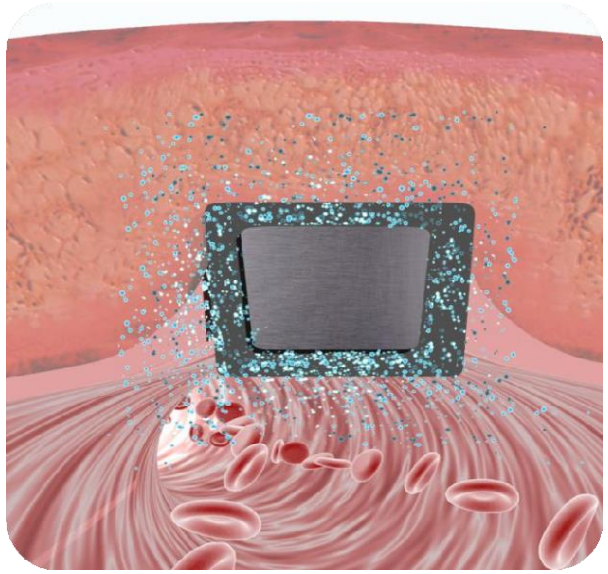
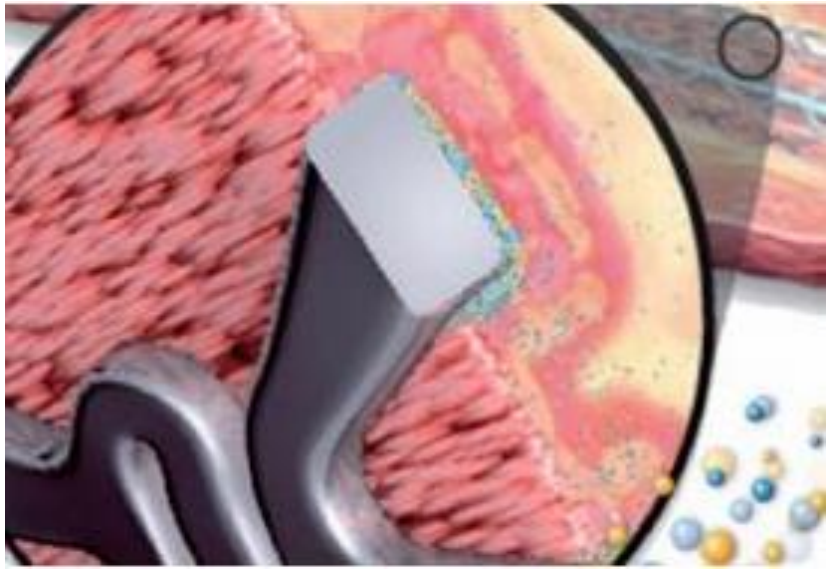
Fundamental limitations of current stents

- Drug concentration should be maximal at the abluminal side



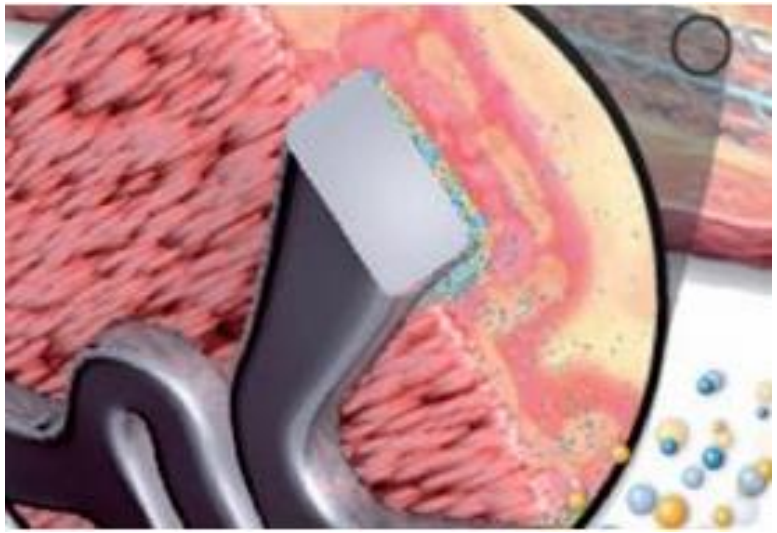
- ✓ Multi-directional Eluting
- ✓ The drug used on DES currently inhibits both SMC and EC
- ✓ The drug not only releases to vessel, but also to the blood.

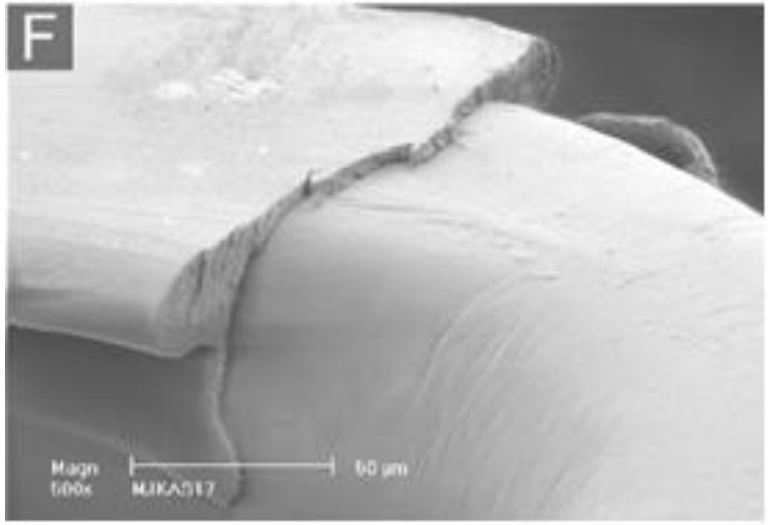


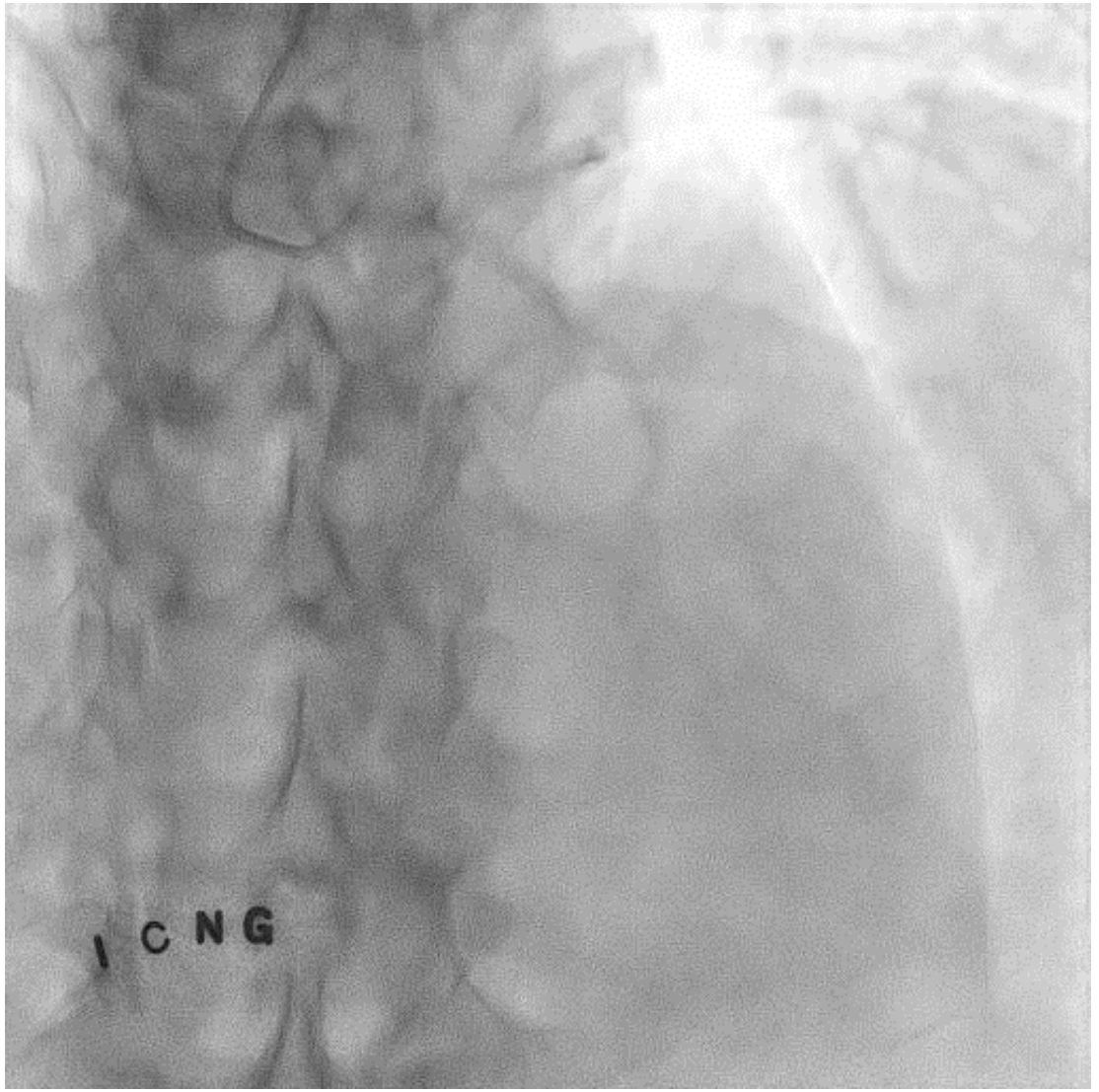
- ✓ Abluminal Eluting
- ✓ No direct antiproliferative drug on the EC side

Fundamental limitations of current stents

- …which is the most vulnerable, open site in a stent







Fundamental limitations of current stents

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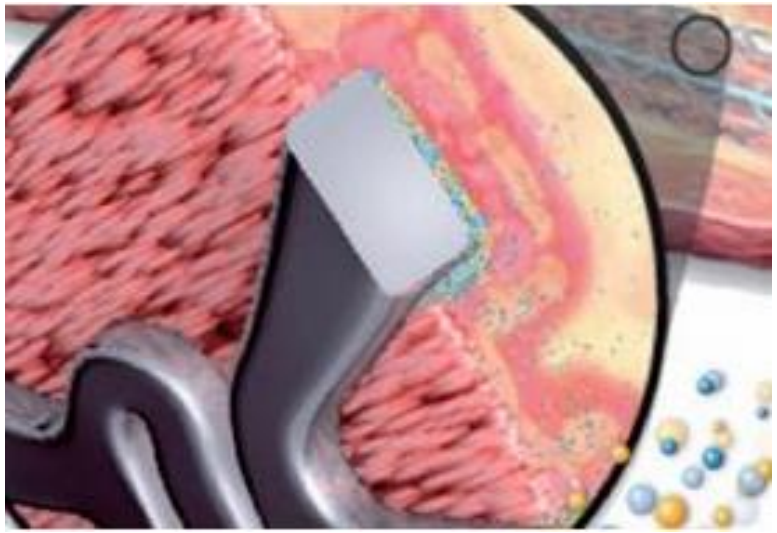
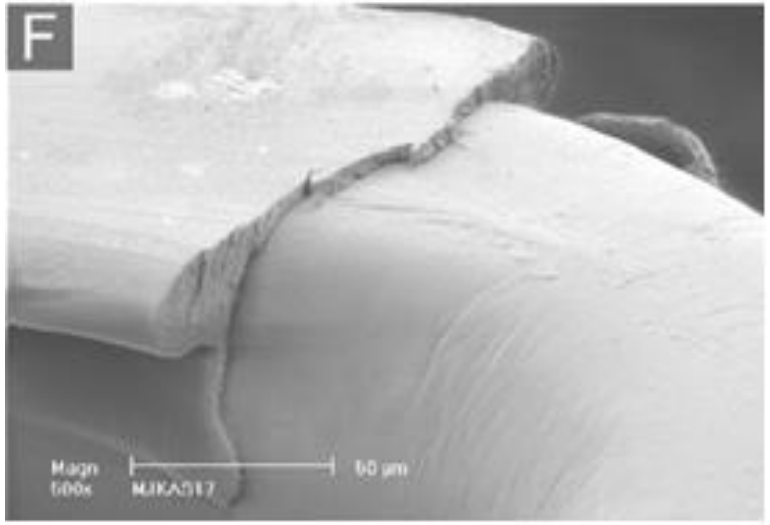
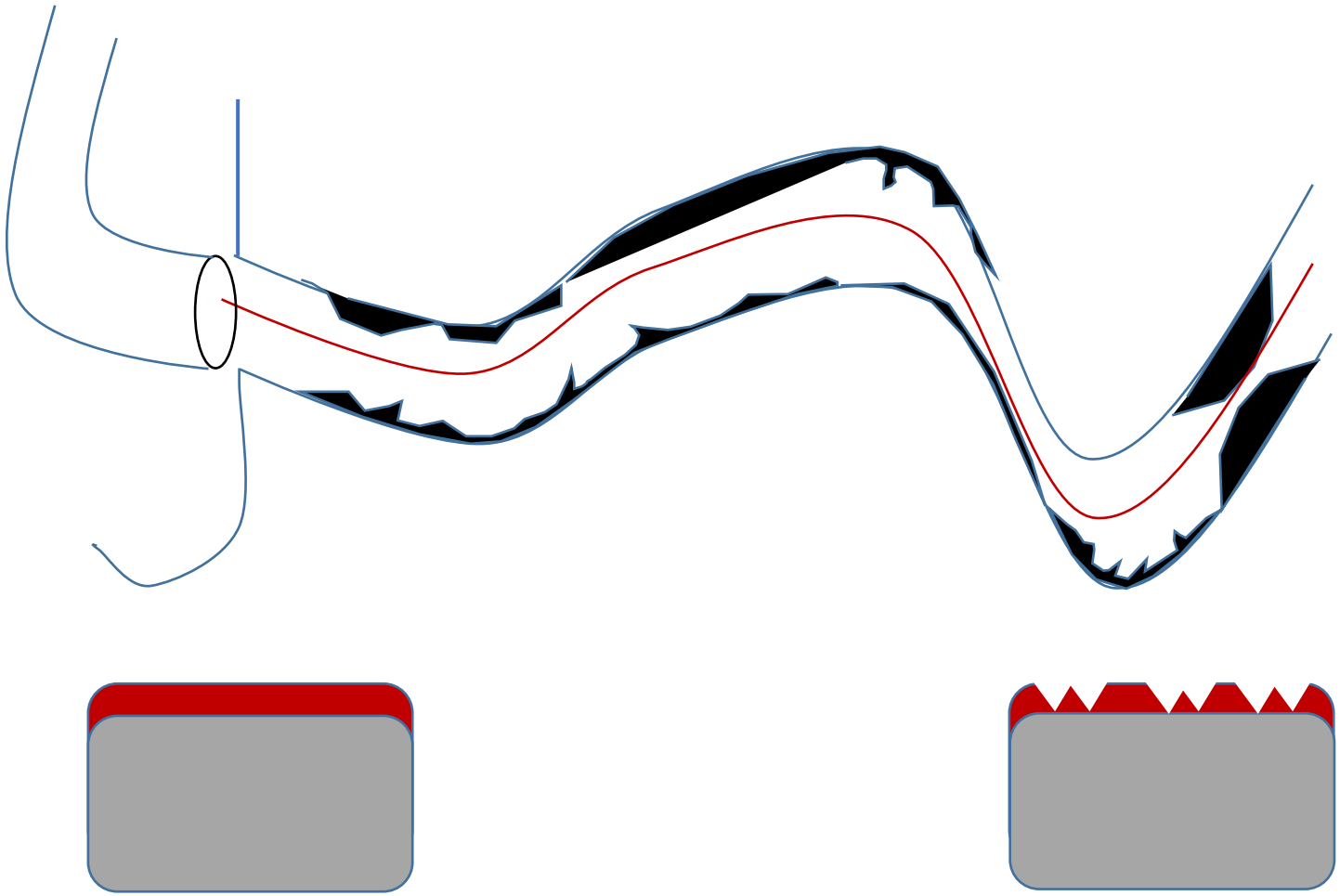
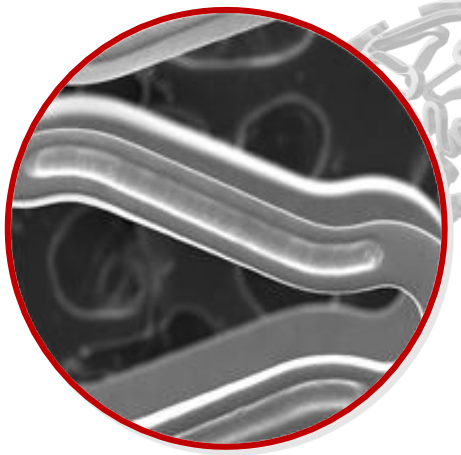




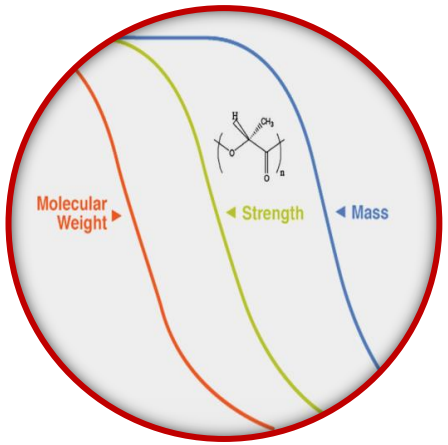


The Firehawk™ DES

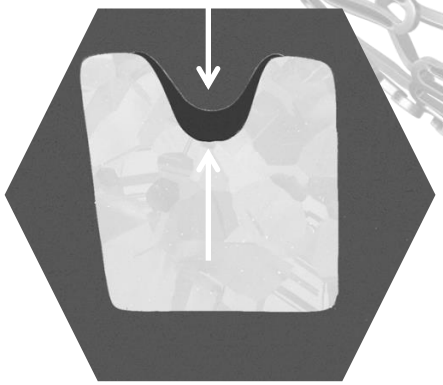
MicroPort
The Patient Always Comes First



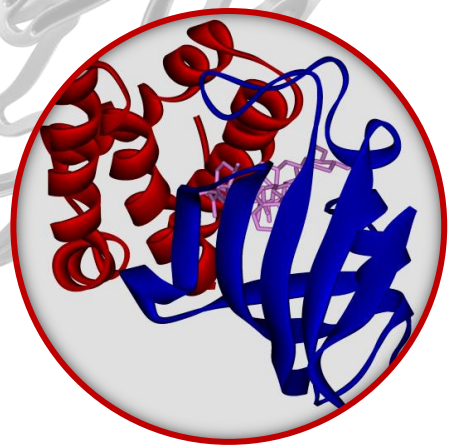
Co-Cr stent platform
with abluminal grooves



DL PLA absorbed after
6-9 months

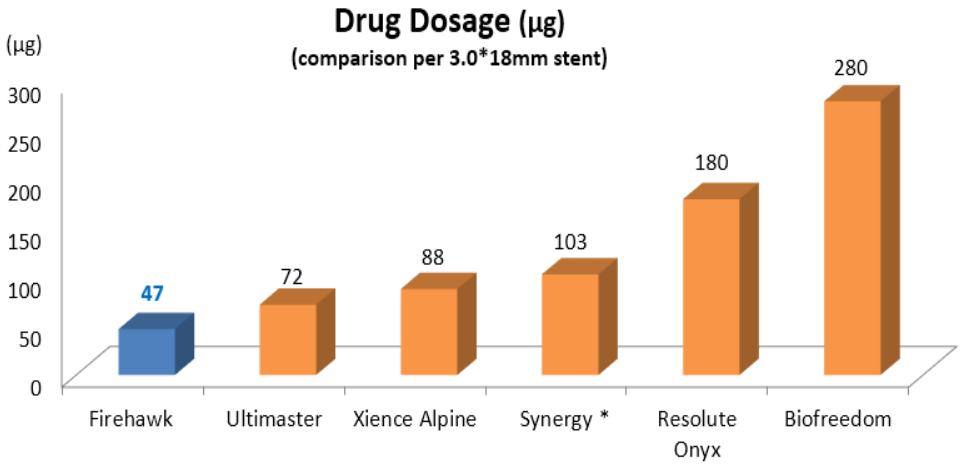


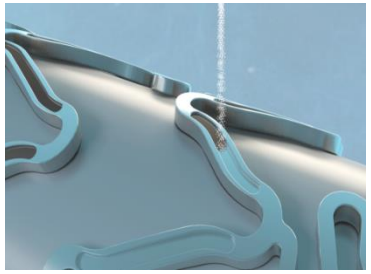
Depth of the groove is
1/3 of the strut

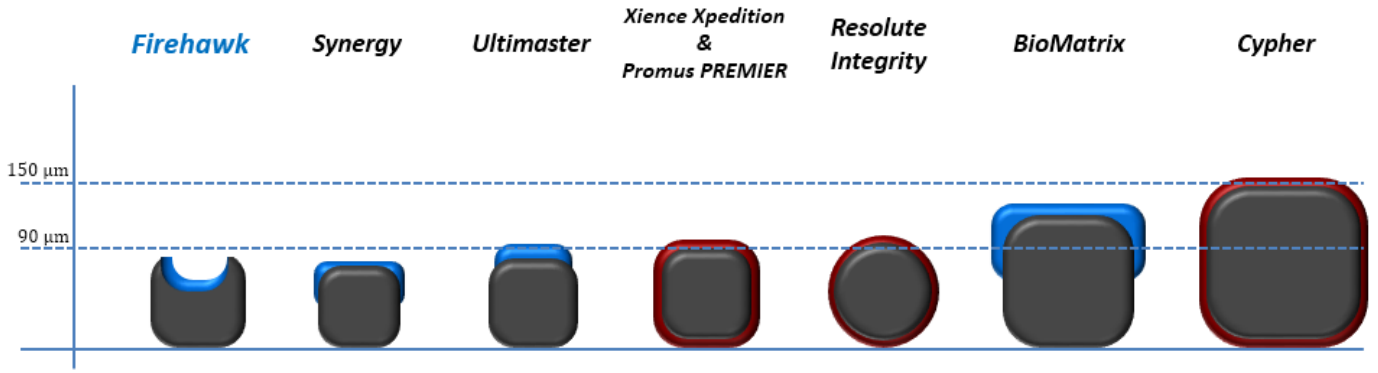


Sirolimus

The Firehawk™ DES







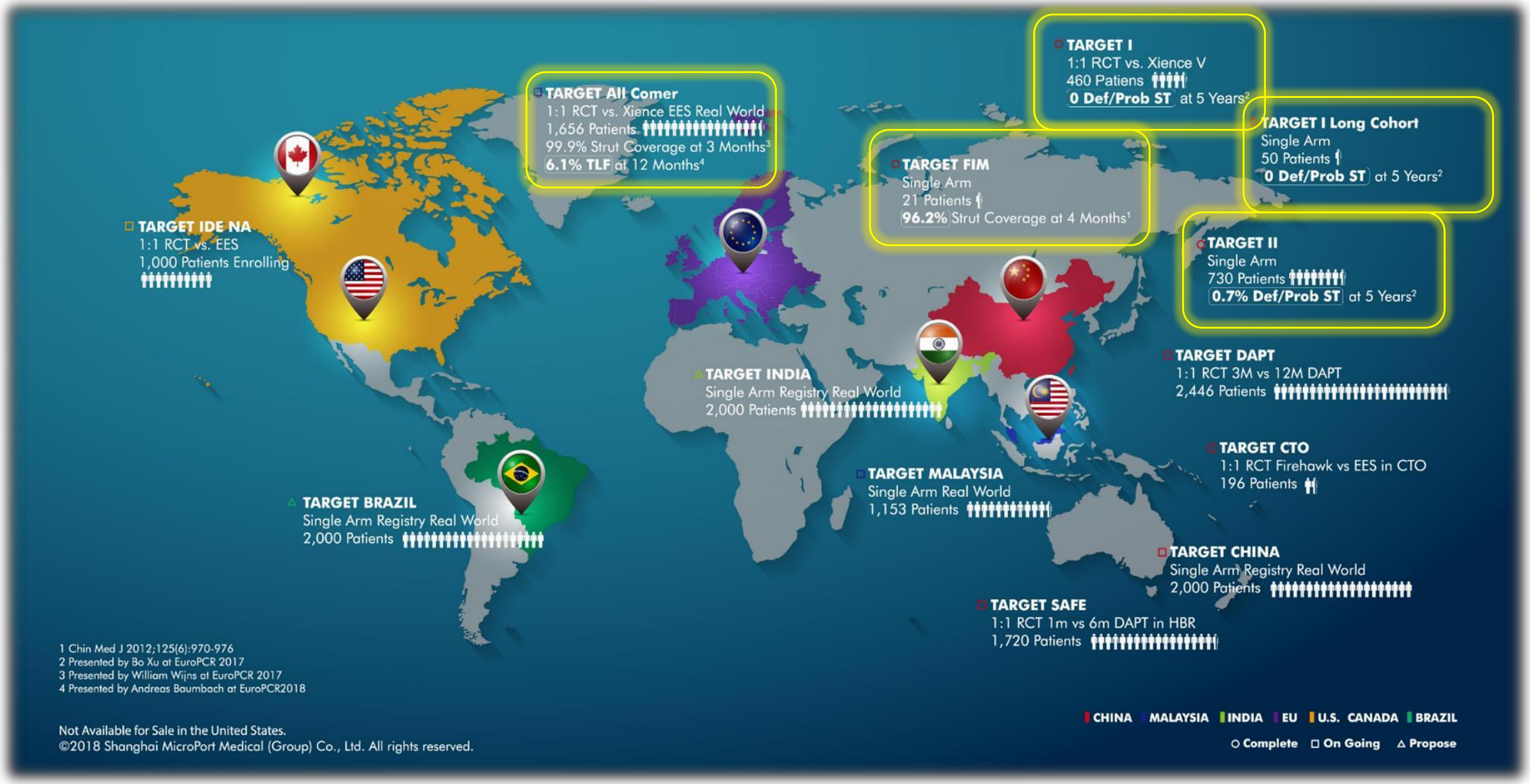
	Firehawk	Synergy	Ultimaster	Xience Xpedition & Promus PREMIER	Resolute Integrity	BioMatrix	Cypher
Total Thickness	**86 µm**	**78 µm**	**94 µm**	**97 µm**	**101 µm**	**130 µm**	**154 µm**
Strut Thickness	86 µm	74 µm	80 µm	81 µm	89 µm	120 µm	140 µm
Coating Thickness	Abluminal In-groove 10 µm	Abluminal 4 µm	Abluminal 14 µm	Conformal 8 µm/side	Conformal 6 µm/side	Abluminal 10 µm	Conformal 7 µm/side

Durable Polymer Bioabsorbable Polymer

- ✓ *Lower drug dosage enables fast healing and increase safety of the device potentially*
- ✓ *Shorter DAPT duration may be more feasible*

Clinical studies using the Firehawk DES

Clinical studies using the Firehawk DES



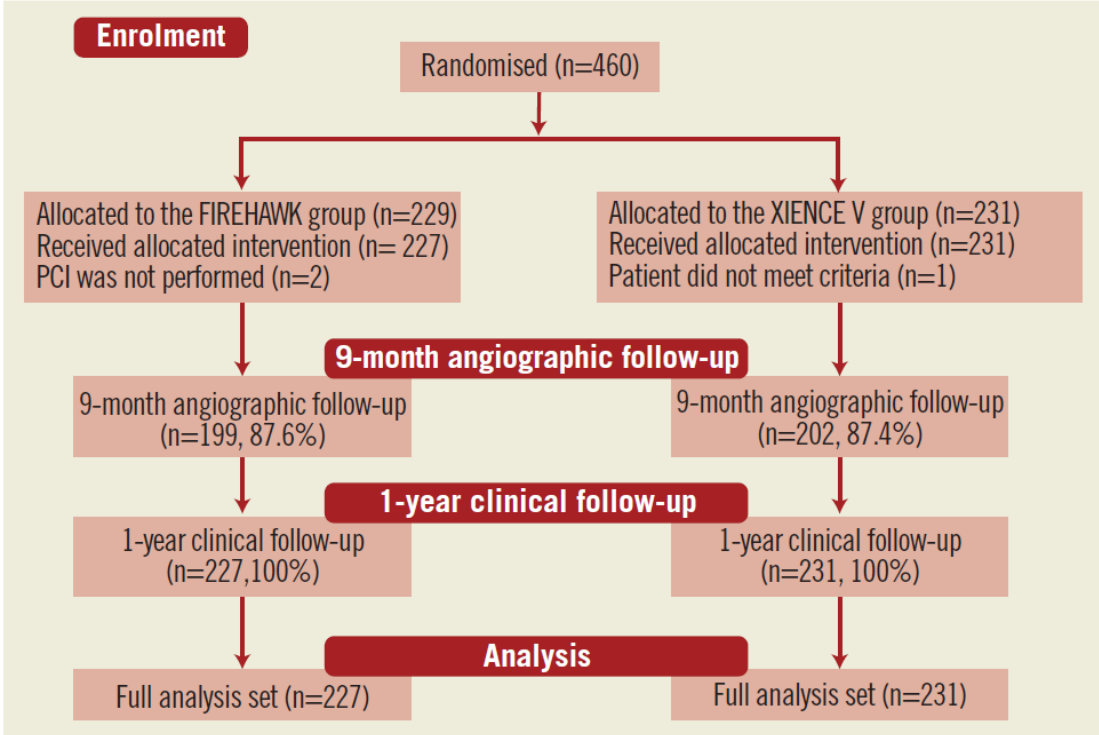
Clinical studies using the Firehawk DES

- **Target I study**
  - Prospective, multicenter RCT with ***single de novo coronary artery lesions*** in a 1:1 ratio to receive either the **FIREHAWK stent** or the **XIENCE V** in China.

A randomised comparison of a novel abluminal groove-filled biodegradable polymer sirolimus-eluting stent with a durable polymer everolimus-eluting stent: clinical and angiographic follow-up of the TARGET I trial

Run-Lin Gao[1]*, MD; Bo Xu[1], MBBS; Alexandra J. Lansky[2], MD; Yue-Jin Yang[1], MD; Chang-Sheng Ma[3], MD; Ya-Ling Han[4], MD; Shao-Liang Chen[5], MD; Hui Li[6], MD; Rui-Yan Zhang[7], MD; Guo-Sheng Fu[8], MD; Zu-Yi Yuan[9], MD; Hong Jiang[10], MD; Yong Huo[11], MD; Wei Li[1], PhD; Yao-Jun Zhang[5], MD; Martin B. Leon[12], MD; on behalf of the TARGET I Investigators

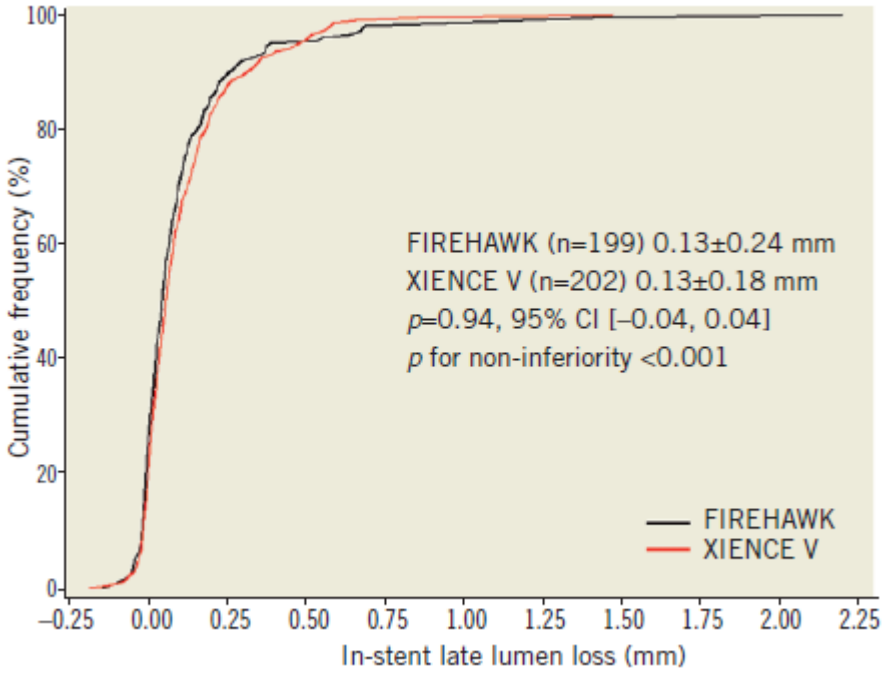
1. Fu Wai Hospital, National Center for Cardiovascular Diseases of China, Beijing, China; 2. Yale University School of Medicine, New Haven, CT, USA; 3. Affiliated An zhen Hospital of Capital Medical University, Beijing, China; 4. Shenyang Northern Hospital, Shenyang, China; 5. Nanjing First Hospital, Nanjing Medical University, Nanjing, China; 6. Daqing Oil Field General Hospital, Daqing, China; 7. Affiliated Ruijin Hospital of Shanghai Jiao Tong University School of Medicine, Shanghai, China; 8. Affiliated SRRS Hospital of Zhejiang University School of Medicine, Hangzhou, China; 9. 1st Affiliated Hospital of Xi'an Jiaotong University School of Medicine, Xi'an, China; 10. Wuhan University People's Hospital, Wuhan, China; 11. Peking University First Hospital, Beijing, China; 12. Columbia University Medical Center, New York, NY, USA



EuroIntervention 2013;9:75-83

Clinical studies using the Firehawk DES

- **Target I study**



	1 month			6 months			12 months		
	FIREHAWK (n=227)	XIENCE V (n=231)	*p*-value	FIREHAWK (n=227)	XIENCE V (n=231)	*p*-value	FIREHAWK (n=227)	XIENCE V (n=231)	*p*-value
Device-oriented composite endpoint	3 (1.3%)	4 (1.7%)	1.00	3 (1.3%)	4 (1.7%)	1.00	5 (2.2%)	5 (2.2%)	1.00
Patient-oriented composite endpoint	3 (1.3%)	4 (1.7%)	1.00	3 (1.3%)	5 (2.2%)	0.72	8 (3.5%)	17 (7.4%)	0.07
All-cause death	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	1 (0.4%)	1.00	1 (0.4%)	2 (0.9%)	1.00
Cardiac death	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA	1 (0.4%)	0 (0.0%)	NA
MI	3 (1.3%)	4 (1.7%)	1.00	3 (1.3%)	4 (1.7%)	1.00	3 (1.3%)	5 (2.2%)	0.72
Q-wave MI	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA
Non-Q-wave MI	3 (1.3%)	4 (1.7%)	1.00	3 (1.3%)	4 (1.7%)	1.00	3 (1.3%)	5 (2.2%)	0.72
Target vessel MI	3 (1.3%)	4 (1.7%)	1.00	3 (1.3%)	4 (1.7%)	1.00	3 (1.3%)	4 (1.7%)	1.00
Ischaemia-driven TLR	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA	1 (0.4%)	1 (0.4%)	1.00
TLR	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA	1 (0.4%)	1 (0.4%)	1.00
TVR	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA	1 (0.4%)	3 (1.3%)	0.62
Any revascularisation	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA	4 (1.8%)	11 (4.8%)	0.07
Definite/probable ST	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA	0 (0.0%)	0 (0.0%)	NA

Patient-oriented composite endpoint: all-cause death, all myocardial infarction, or any revascularisation; Device-oriented composite endpoint (TLF): cardiac death, target vessel myocardial infarction, or ischaemia-driven target lesion revascularisation; MI: myocardial infarction; NA: not available; ST: stent thrombosis; TLR: target lesion revascularisation; TVR: target vessel revascularisation; TLF: target lesion failure

The novel abluminal groove-filled biodegradable polymer SES FIREHAWK was non-inferior to the durable polymer EES XIENCE V for 9-month in-stent LLL.

EuroIntervention 2013;9:75-83

Clinical studies using the Firehawk DES: The Target All-comer trial

Targeted therapy with a localised abluminal groove, low-dose sirolimus-eluting, biodegradable polymer coronary stent (TARGET All Comers): a multicentre, open-label, randomised non-inferiority trial

Alexandra Lansky, William Wijns, Bo Xu, Henning Kelbaek, Niels van Royen, Ming Zheng, Marie-angèle Morel, Paul Knaapen, Ton Slagboom, Thomas W Johnson, Georgios Vlachojannis, Karin E Arkenbout, Lene Holmvang, Luc Janssens, Andrzej Ochala, Salvatore Brugaletta, Christoph K Naber, Richard Anderson, Harald Rittger, Sergio Berti, Emanuele Barbato, Gabor G Toth, Luc Maillard, Christian Valina, Paweł Buszman, Holger Thiele, Volker Schächinger, Andreas Baumbach, for the TARGET All Comers Investigators

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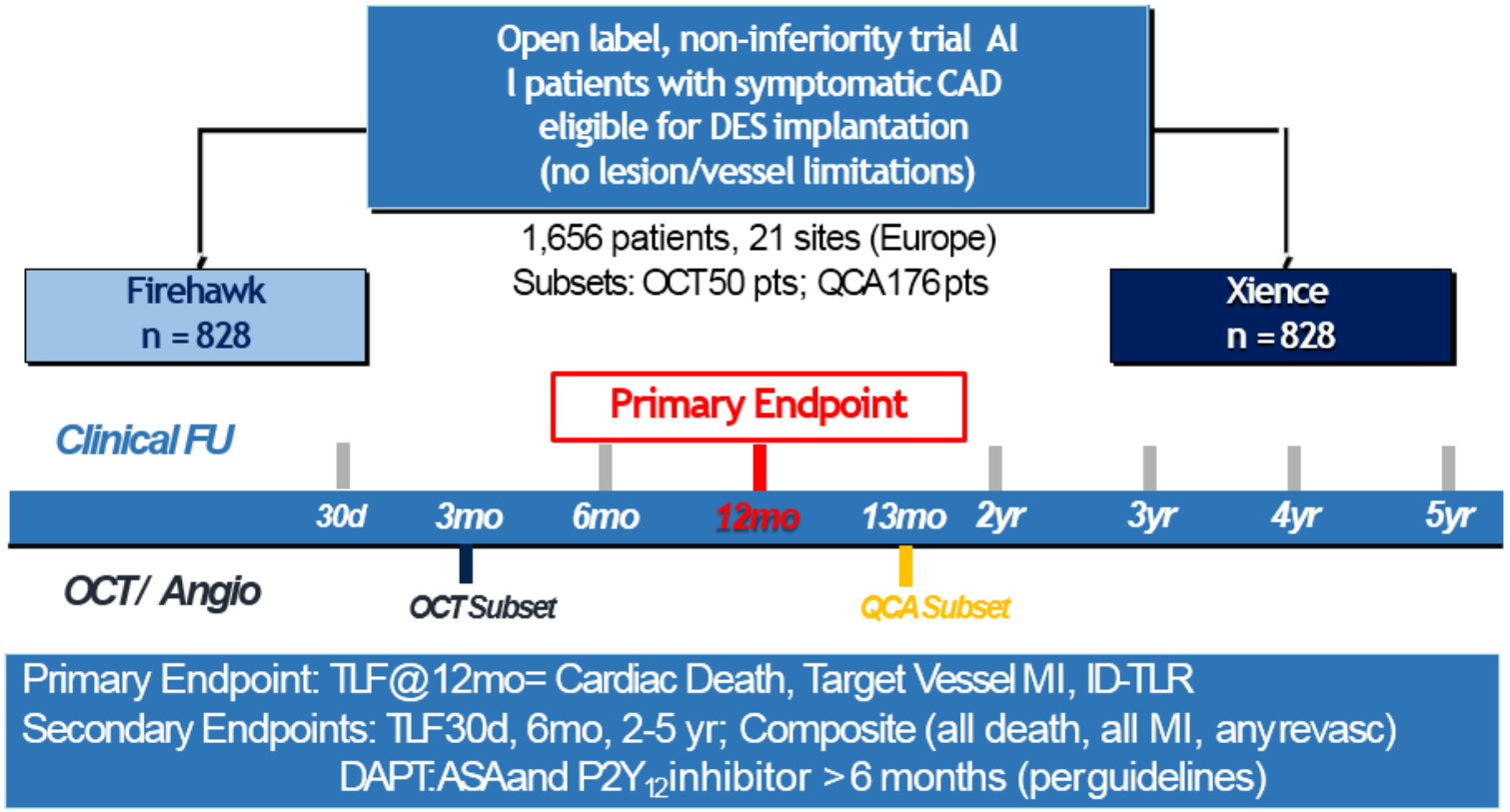
Methods The TARGET All Comers study was a prospective, multicentre, open-label randomised non-inferiority trial done at 21 centres in ten European countries. Patients with symptomatic or asymptomatic coronary artery disease and objective evidence of myocardial ischaemia who qualified for percutaneous coronary intervention were randomised 1:1 to undergo implantation of a FIREHAWK or XIENCE. Randomisation was web-based, with random block allocation and stratification by centre and ST elevation myocardial infarction. Outcome assessors were masked to treatment allocation, but treating physicians and patients were not. The primary endpoint was target lesion failure at 12 months, a composite of cardiac death, target vessel myocardial infarction, or ischaemia-driven target lesion revascularisation. The control event rate for XIENCE was assumed to be 7%, the non-inferiority margin was 3.5%, and the primary analysis was in the intention-to-treat population, censoring patients who did not have either an event before 365 days or contact beyond 365 days. Late lumen loss was the primary endpoint of an angiographic substudy designed to investigate the non-inferiority of the FIREHAWK compared with the XIENCE stent. This trial is registered with ClinicalTrials.gov, number NCT02520180.

Findings From Dec 17, 2015, to Oct 14, 2016, 1653 patients were randomly assigned to implantation of the FIREHAWK (n=823) or XIENCE (n=830). 65 patients in the FIREHAWK group and 66 in the XIENCE group had insufficient follow-up data and were excluded from the analyses. At 12 months, target lesion failure occurred in 46 (6·1%) of 758 patients in the FIREHAWK group and in 45 (5·9%) of 764 patients in the XIENCE group (difference 0·2%, 90% CI −1·9 to 2·2, $p_{\text{non-inferiority}}$=0·004, 95% CI −2·2 to 2·6, $p_{\text{superiority}}$=0·88). There were no differences in ischaemia-driven revascularisation or stent thrombosis rates at 12 months. 176 patients were included in the angiographic substudy, in which in-stent late lumen loss was 0·17 mm (SD 0·48) in the FIREHAWK group and 0·11 mm (0·52) in the XIENCE group (p=0·48), with an absolute difference of 0·05 mm (95% CI −0·09 to 0·18, $p_{\text{non-inferiority}}$=0·024).

Interpretation In a broad all-comers population of patients requiring stent implantation for myocardial ischaemia, the FIREHAWK was non-inferior to the XIENCE as assessed with the primary endpoint of target lesion failure at 12 months and in-stent late lumen loss at 13 months. The FIREHAWK is a safe and effective alternative stent to treat patients with ischaemic coronary artery disease in clinical practice.

Funding Shanghai Microport Medical.

- Prospective, multicenter, open label, RCT
- Non-inferiority trial



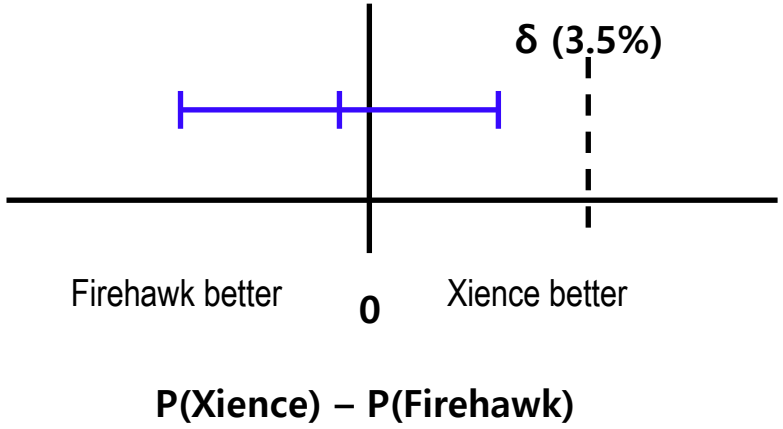
Lancet. 2018 Sep 29;392(10153):1117-1126.

The Target All-comer trial

- Statistical Assumptions

- **A total of 1654 randomized subjects (1572 evaluable) will provide 85% power to demonstrate non inferiority based on the following assumptions:**

  - 1:1 Randomization
  - **Primary Endpoint TLF Control event rate: 7%**
  - Non Inferiority Margin: 3.5% (50% relative)
  - One sided alpha: 0.05
  - Loss to follow-up: 5%
  - Intention-to-treat population



Lancet. 2018 Sep 29;392(10153):1117-1126.

The Target All-comer trial

Executive Operations Committee	TARGET All Comers Trial Chair: • William Wijns, MD (Galway, Ireland) CO-PI's: • Andreas Baumbach, MD (Bristol, UK) • Alexandra Lansky, MD (New Haven, US) Other Committee Members: • XU Bo, MBBS (Beijing, China) • Zheng Ming, MD (Shanghai, China) • Laure Artus-Jacenko, D.E.S.S. (Paris, France)
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OCT Core Lab	Cardialysis, (Rotterdam, The Netherlands) Dr Y. Onuma and team
Data Management	CON plc, (Dublin, Ireland.)

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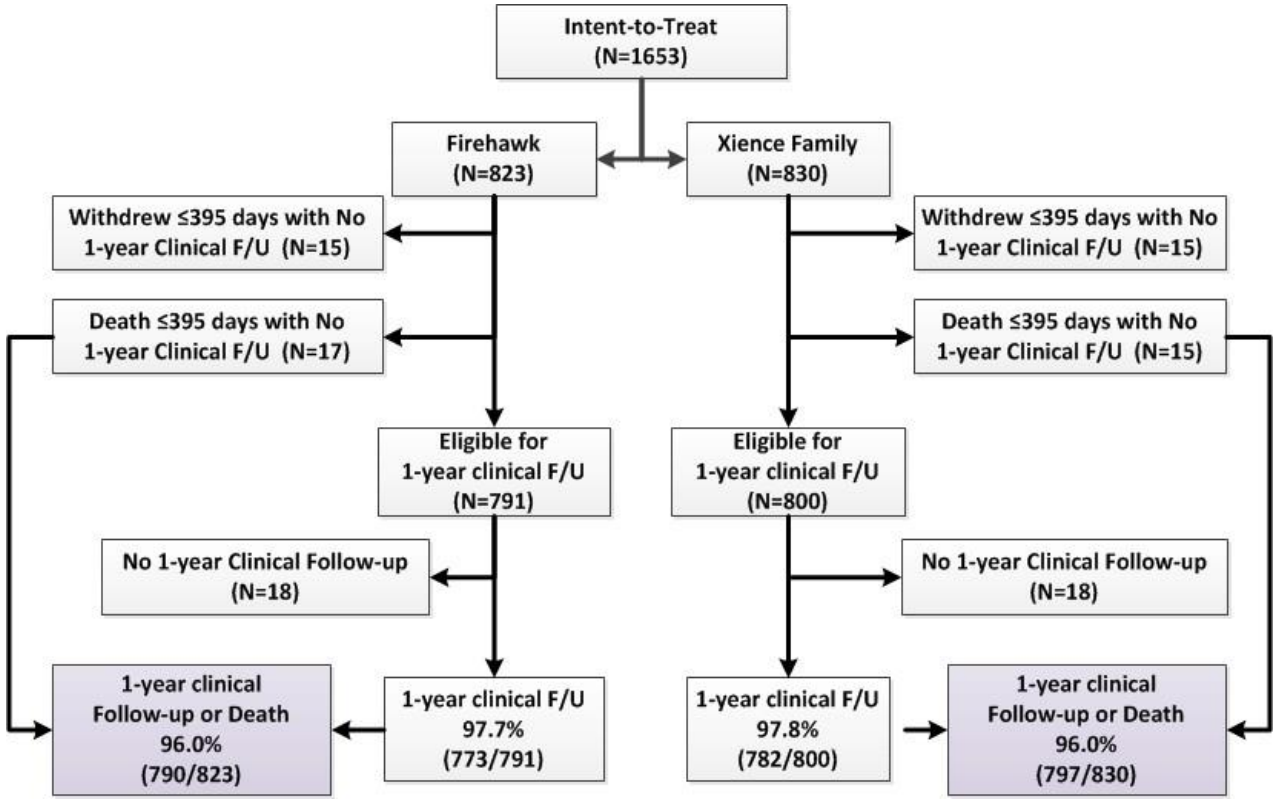

	Firehawk (N = 823 Pts)	Xience (N = 830 Pts)	P-value
Age (yrs)	64.9±9.8	65.3±10.5	0.40
Male	78.1% (641/821)	76.4% (634/830)	0.41
Diabetes mellitus	24% (197/820)	23% (191/830)	0.89
Hypertension	59.9% (492/821)	62.5% (519/830)	0.28
Hypercholesterolemia	53.0% (435/821)	51.2% (425/830)	0.47
Family history of CAD	42.8% (286/669)	43.4% (297/684)	0.80
Previous MI	21.7% (178/821)	24.8% (206/830)	0.13
Peripheral vessel disease	5.4% (44/821)	5.7% (47/830)	0.79
Previous PCI	28.7% (236/821)	31.6% (262/830)	0.21
Previous CABG	8.4% (69/821)	7.5% (62/830)	0.48
Renal insufficiency	5.5% (45/821)	7.0% (58/830)	0.21
Neurological events	8.1% (62/768)	7.7% (59/770)	0.76
Vessel location			
RCA	36.6% (299/817)	33.8% (280/829)	0.23
LAD	52.1% (426/817)	51.9% (430/829)	0.91
LCX	32.2% (263/817)	32.1% (266/829)	0.96
LMCA	3.1% (25/817)	2.1% (17/829)	0.19
Bypass graft	1.5% (12/817)	1.8% (15/829)	0.59
Any small vessel (<3.0mm)	74.4% (571/767)	71.0% (552/777)	0.13
Any long lesion	62.1% (439/707)	57.6% (411/713)	0.09
Any bifurcation lesions	39.1% (300/767)	38.2% (297/777)	0.72
Any total occlusion	14.2% (109/767)	12.0% (93/777)	0.19
Any coronary occlusion (>72 hrs)	6.0% (47/789)	6.4% (51/792)	0.69
Any in-stent restenosis	5.6% (43/766)	7.3% (57/777)	0.17

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	Biodegradable polymer, sirolimus-eluting stent (FIREHAWK)	Durable polymer, everolimus-eluting stent (XIENCE)	p value
Lesions treated	1221	1179	
Stent implantation characteristics			
Number of stents per lesion, mean (SD), range	1·1 (0·5), 0–6	1·2 (0·6), 0–4	0·10
Stent length per lesion (mm), mean (SD), range	26·7 (15·3), 8–149	27·1 (16·9), 8–134	0·46
Stent diameter, mm	3·07 (0·47)	3·07 (0·50)	0·88
Procedure characteristics			
Assigned study stent implanted	1148 (94·2%)	1127 (95·6%)	0·013
Non-assigned stent implanted	26 (2·1%)	26 (2·2%)	0·90
Crossover	9 (0·7%)	0	0·004
No stent implanted	30 (2·5%)	23 (2·0%)	0·40
Any overlapping stent	179 (16·7%)	187 (17·7%)	0·91
Pre-dilation	859 (71%)	841 (71·8%)	0·68
Maximum pressure (atm)	14·4 (3·3)	14·3 (3·7)	0·85
Post-dilation	565 (46·7%)	541 (46·2%)	0·79
Maximum pressure (atm)	16·9 (3·5)	17·2 (3·6)	0·20
Lesions with core lab analysis	1074	1058	
Target vessel location*			
Left anterior descending	453 (42·2%)	463 (43·8%)	0·46
Left circumflex	272 (25·3%)	269 (25·4%)	0·96
Right coronary artery	313 (29·1%)	288 (27·2%)	0·32
Left main	19 (1·8%)	18 (1·7%)	0·90
Bypass graft	17 (1·6%)	20 (1·9%)	0·59
ACC/AHA lesion class*			0·80
A	24 (2·2%)	30 (2·8%)	
B1	157 (14·6%)	155 (14·7%)	
B2	432 (40·2%)	432 (40·8%)	
C	461 (42·9%)	441 (41·7%)	
Total occlusion (TIMI 0/1)	102 (9·5%)	86 (8·1%)	0·27
Calcification (moderate or severe)	65 (6·1%)	65 (6·2%)	0·41
Thrombus	25 (2·3%)	18 (1·7%)	0·30
In-stent restenosis	46 (4·3%)	58 (5·5%)	0·20
Bifurcation	359 (33·4%)	344 (32·5%)	0·65
Bifurcation side branch treatment			0·96
Side branch stent	79 (22·5%)	73 (21·7%)	
Side branch balloon only	23 (6·6%)	22 (6·5%)	
Baseline QCA results*			
Reference diameter (mm)	2·77 (0·49)	2·77 (0·52)	0·77
Minimal lumen diameter (mm)	0·78 (0·47)	0·79 (0·48)	0·83
Diameter stenosis	71·7% (15·9)	71·5% (16·1)	0·76
Lesion length (mm)	19·0 (11·8)	18·8 (12·4)	0·76
Final QCA results			
In-stent minimum lumen diameter (mm)	2·56 (0·45)	2·55 (0·47)	0·54
In-stent diameter stenosis	7·4% (6·9)	7·6% (6·5)	0·54
In-stent acute gain (mm)	1·77 (0·55)	1·76 (0·57)	0·50
Segment minimal lumen diameter (mm)	2·23 (0·49)	2·24 (0·51)	0·64
Segment diameter stenosis	16·2% (11·5)	15·7% (10·7)	0·31
Segment acute gain (mm)	1·45 (0·57)	1·45 (0·59)	0·82

Data are n, n (%), or mean (SD), unless noted otherwise. ACC=American College of Cardiology. AHA=American Heart Association. TIMI=Thrombolysis In Myocardial Infarction. *Results reported based on angiographic core laboratory analysis. QCA=quantitative coronary analysis.

Table 2: **Angiographic and procedural characteristics**

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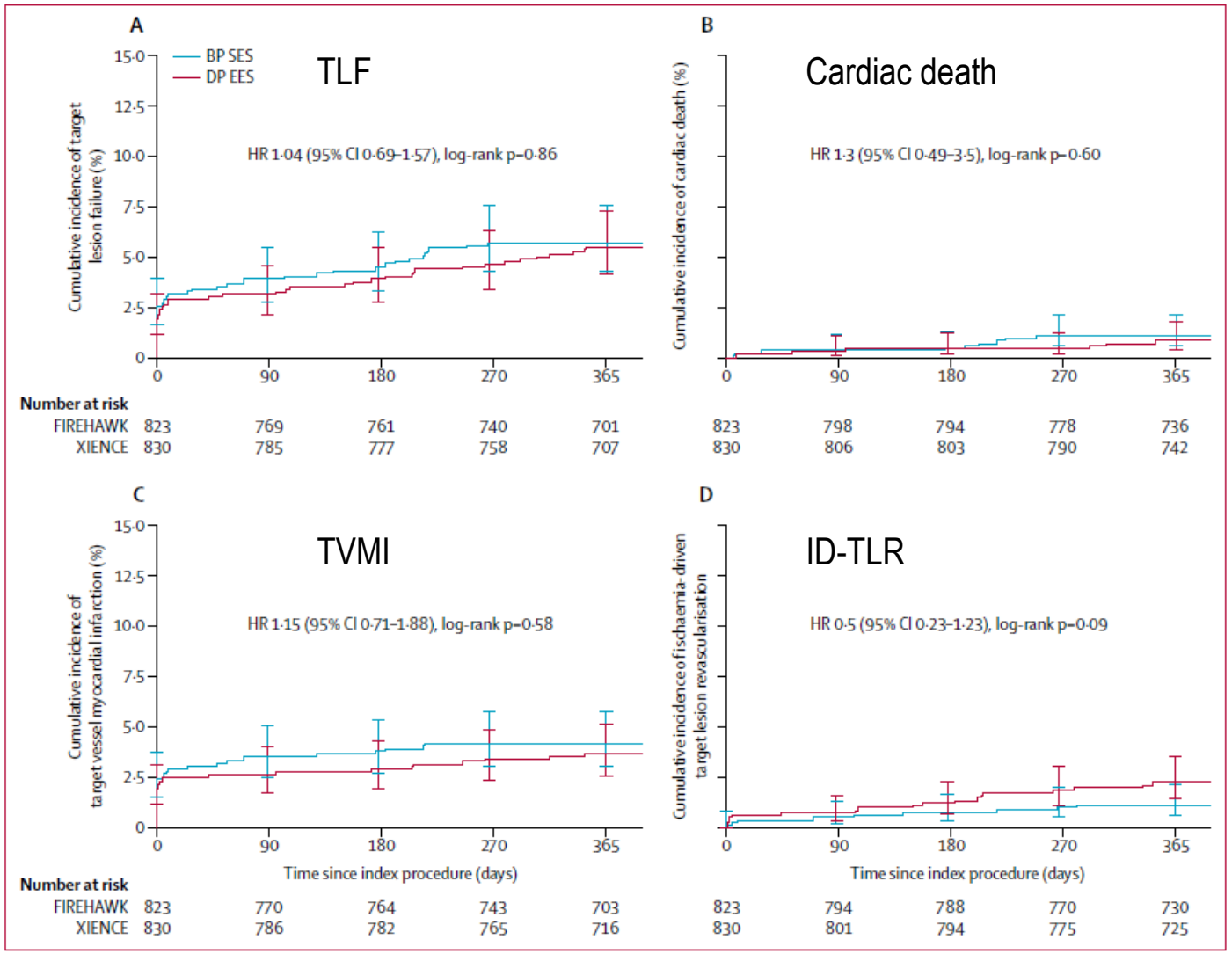
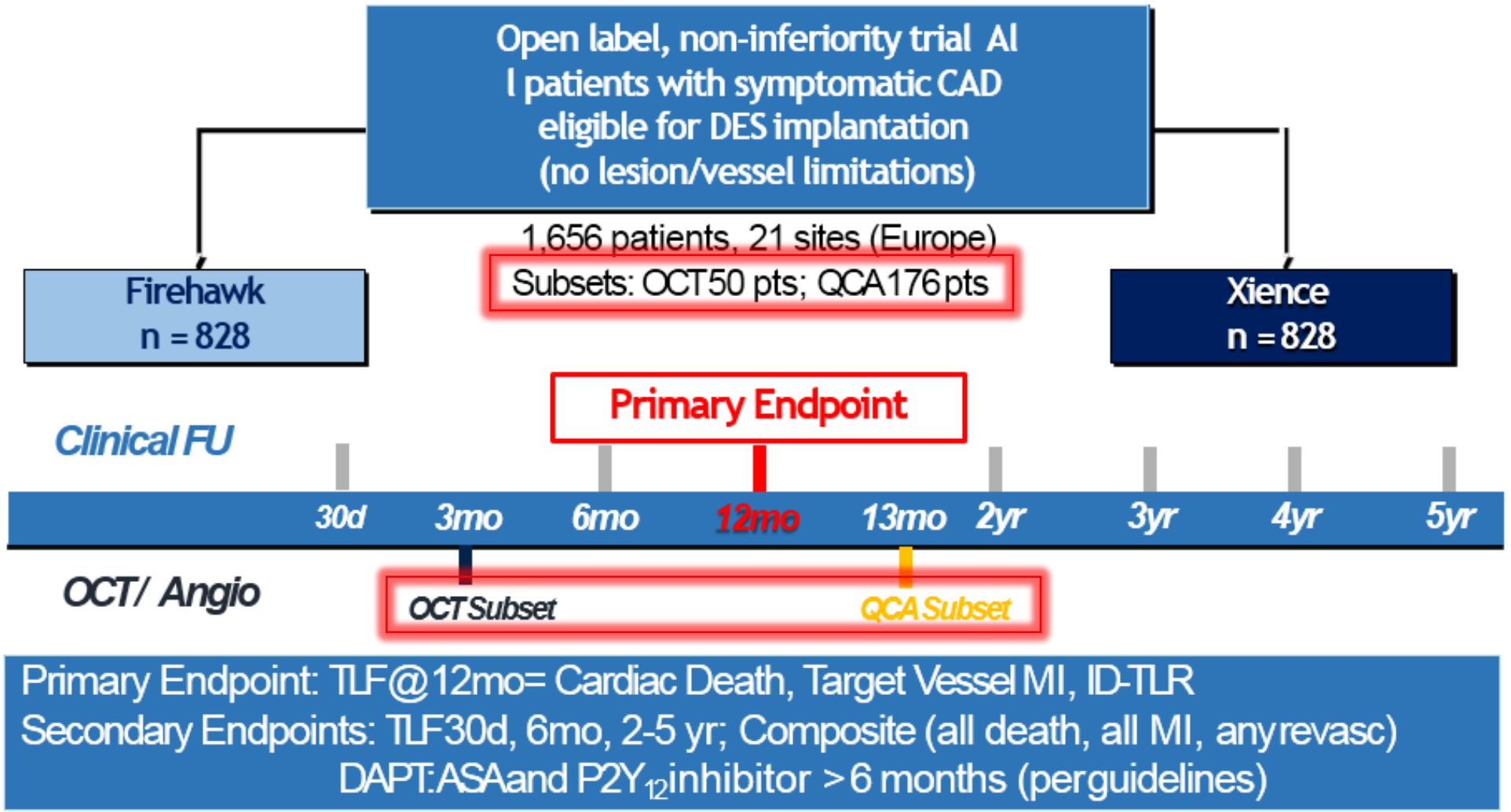
- 12 month fu
  - Mean fu: 373 days (SD 95.7 days)

	Biodegradable polymer, sirolimus-eluting stent (FIREHAWK; n=823)	Durable polymer, everolimus-eluting stent (XIENCE; n=830)	Difference (95% CI)	p value
Primary outcome				
Target lesion failure	6·1% (46/758)	5·9% (45/764)	0·2% (–2·2 to 2·6)	0·88
Primary outcome components				
Cardiac death	1·2% (9/758)	0·9% (7/764)	0·3% (–0·8 to 1·3)	0·60
Target vessel myocardial infarction	4·5% (34/758)	3·9% (30/764)	0·6% (–1·5 to 2·6)	0·59
Ischaemia-driven target lesion revascularisation	1·2% (9/758)	2·4% (18/764)	–1·2% (–2·5 to 0·2)	0·08

- TLF
  - Absolute: 0·2%
    - 90% CI: 1·9 - 2·2, $p_{non\text{-}inferiority} = 0{\cdot}004$, 95% CI: 2·2 - 2·6, $p_{superiority} = 0{\cdot}88$)

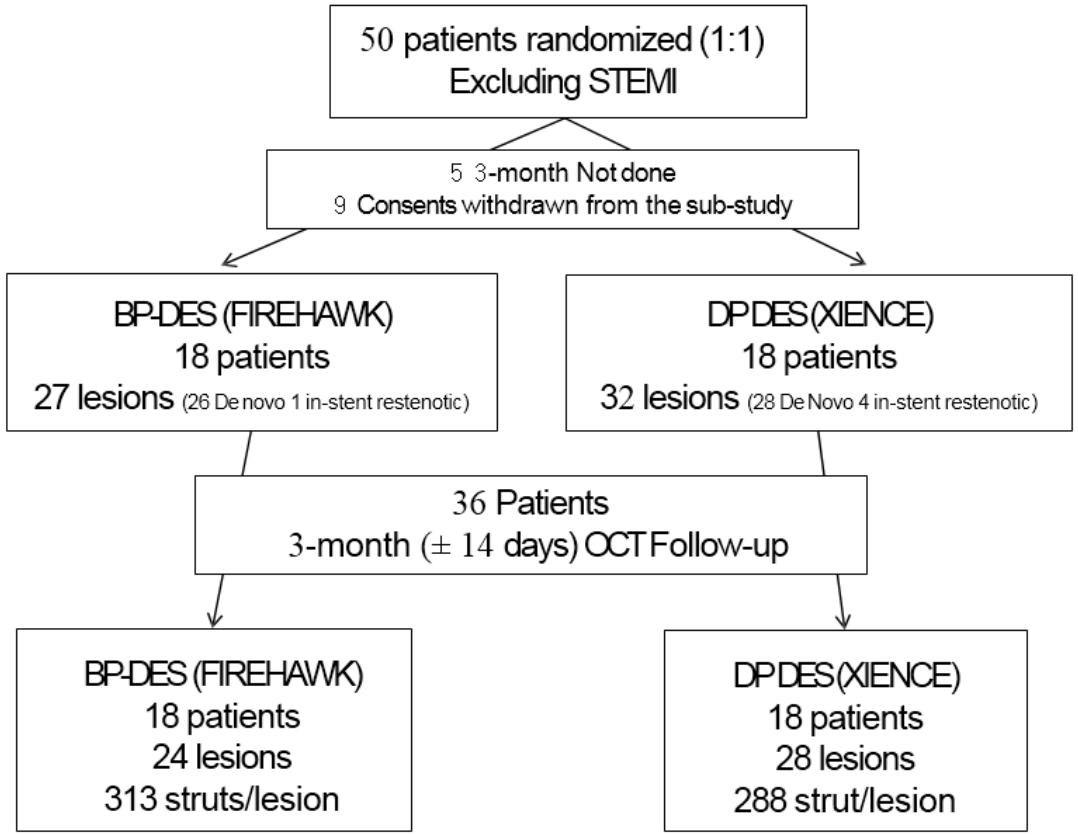


The Target All-comer trial

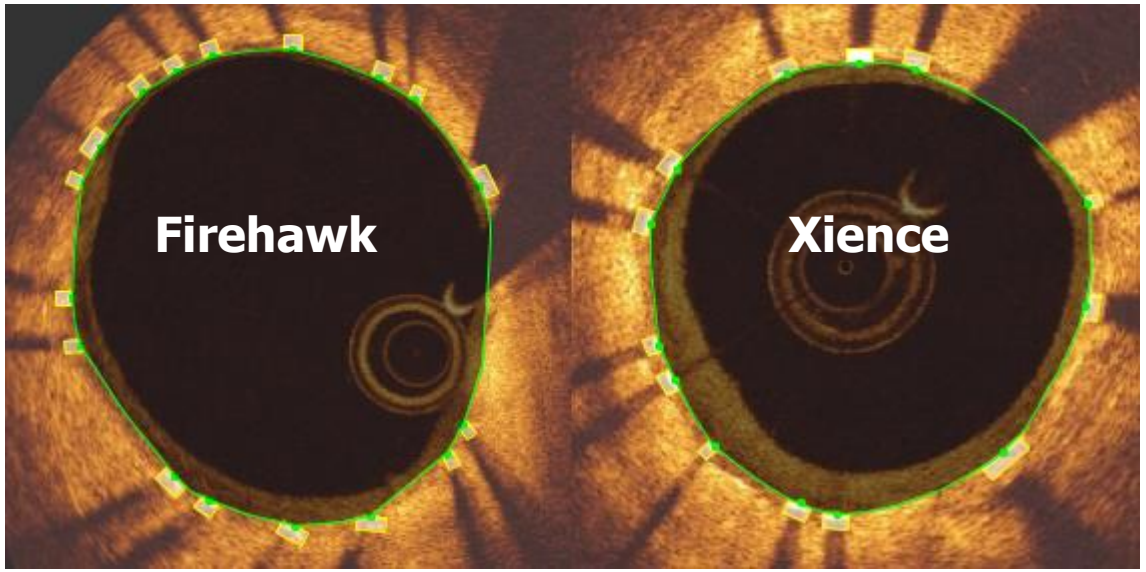


The Target All-comer trial

- OCT subset



Characteristic	Firehawk (N=24 les.)	Xience (N=28 les.)	P-value
Mean neointimal thickness/strut coverage (µm)	75.5 ± 25.8	82.3 ± 31.1	P_{noninf}*: <0.001 $P_{t\text{-}test}$*: 0.40
Length stented region (mm)	28.85 ± 20.86	27.28 ± 12.18	0.75
Mean stent diameter (mm)	3.07 ± 0.51	2.92 ± 0.50	0.29
Minimum stent diameter (mm)	2.71 ± 0.40	2.53 ± 0.51	0.17
Mean stent area (mm^2)	7.63 ± 2.78	6.92 ± 2.46	0.33
Minimum stent area (mm^2)	5.88 ± 1.71	5.23 ± 2.25	0.25



EuroIntervention 2018

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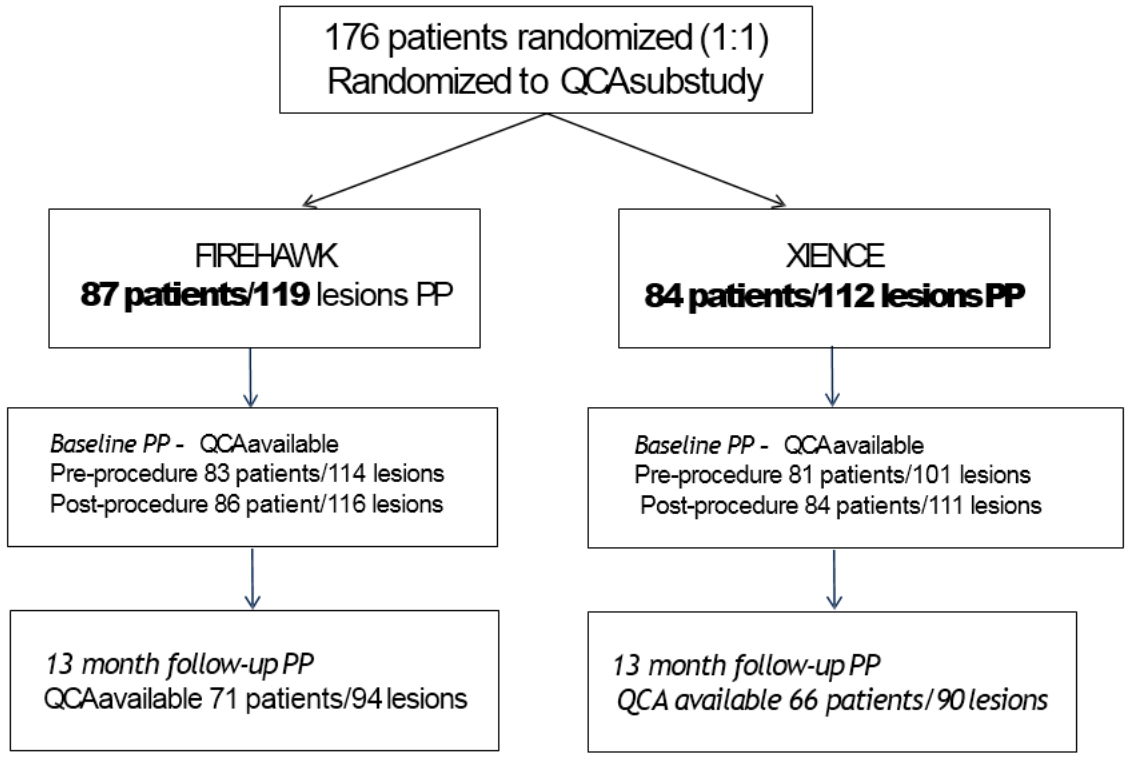
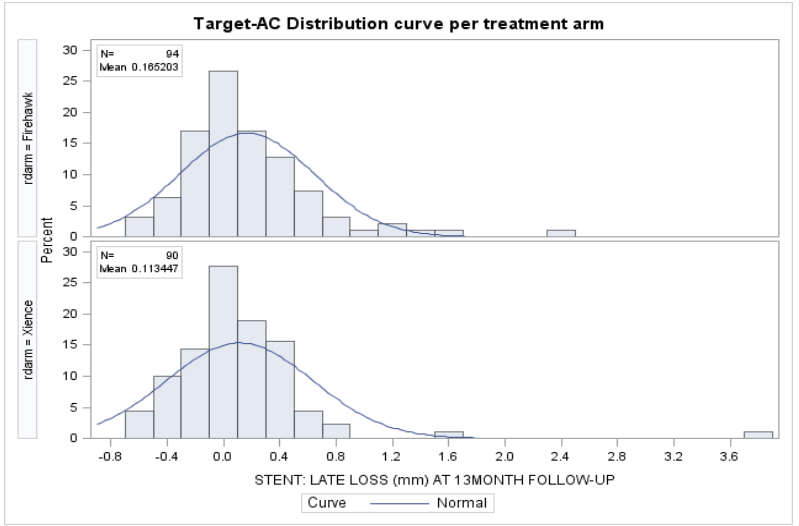
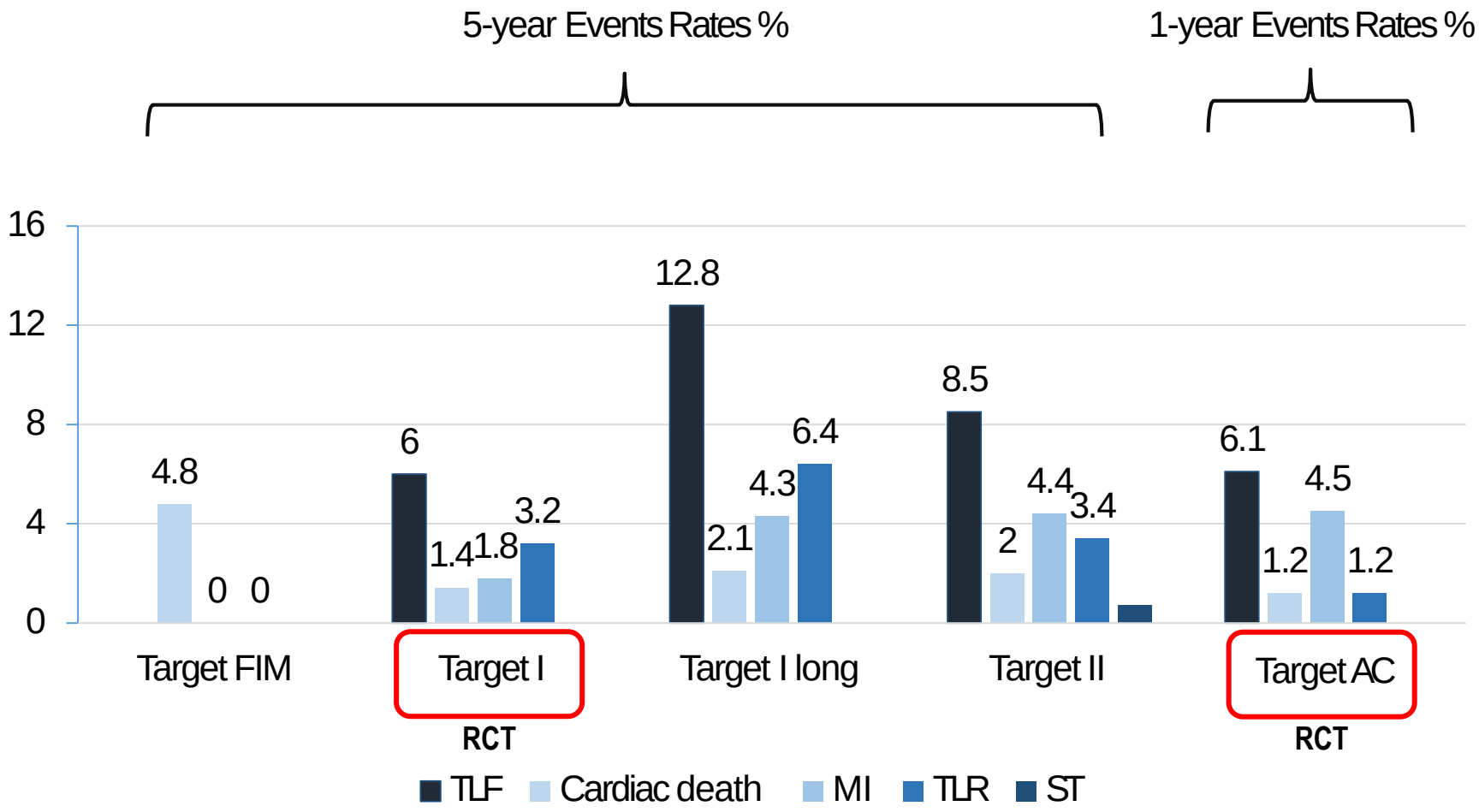
- QCA subset



	Firehawk (N =87Pts/119 lesions)	Xience (N =84Pts/112 lesions)	P-value
In-stent			
MLD (mm)	2.40±0.45	2.33±0.43	0.23
Acute gain (mm)	1.57±0.64	1.45±0.50	0.12
Diameter stenosis(%)	12.3±7.2	12.1±6.7	0.80
In-segment			
MLD (mm)	2.05±0.46	1.99±0.52	0.38
Acute gain (mm)	1.22±0.65	1.09±0.55	0.13
Diameter stenosis(%)	22.3±9.2	22.0±9.2	0.86
In-stent Late Loss (mm)	0.17±0.05	0.11±0.05	$P_{non\text{-}inf}$=0.024

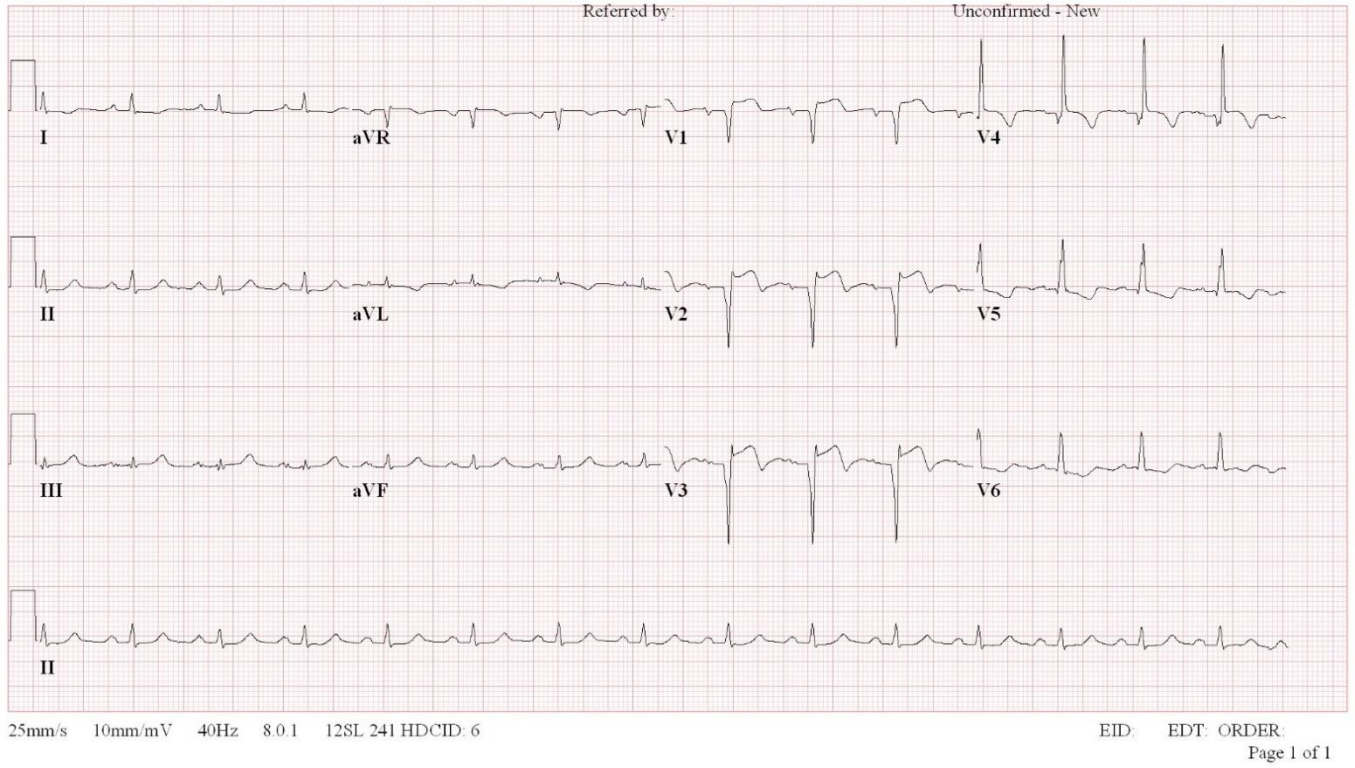


Results of all 5 Clinical studies using the Firehawk DES

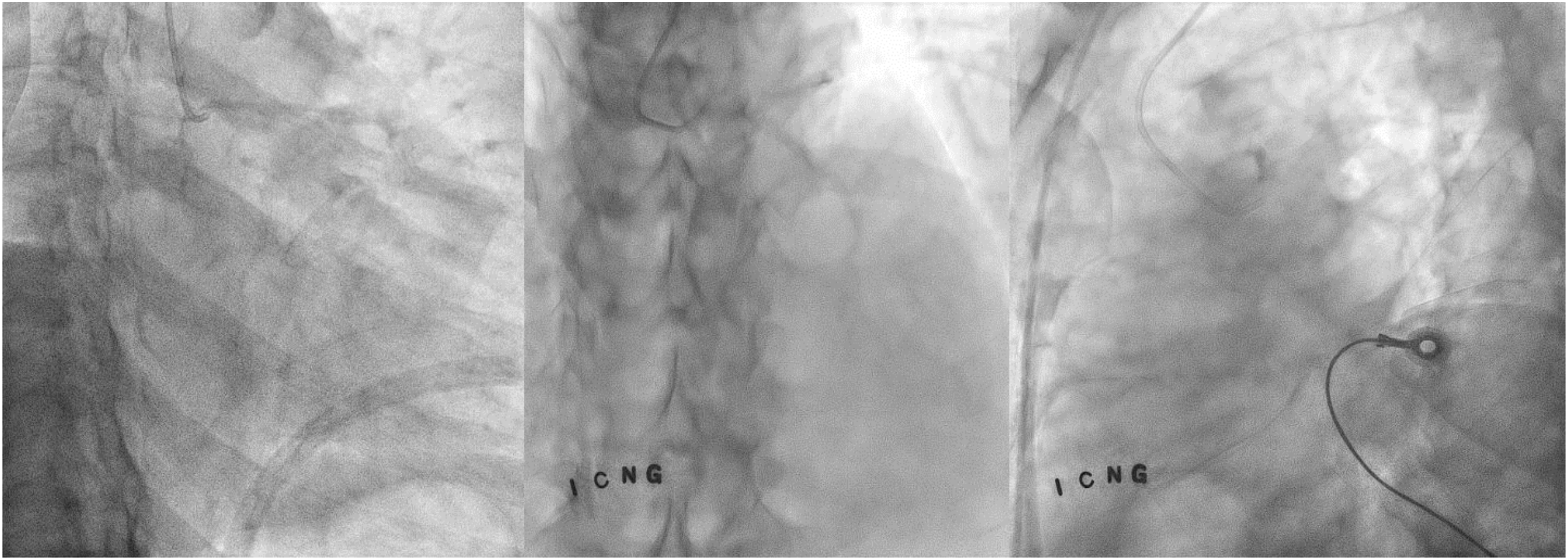


Case Presentation

- 76/M, 160cm, 49kg, BMI 19.2 kg/m2
  - Recurrent DOE since 2MA
  - GB polyp & stone, s/p LC ('17.5.2), Ex-smoker: 30PY, quit 20YA
  - Visited the OPD clinic (Friday) due to severely aggravated chest discomfort at 4P30
  - Sent to the ER for further evaluation

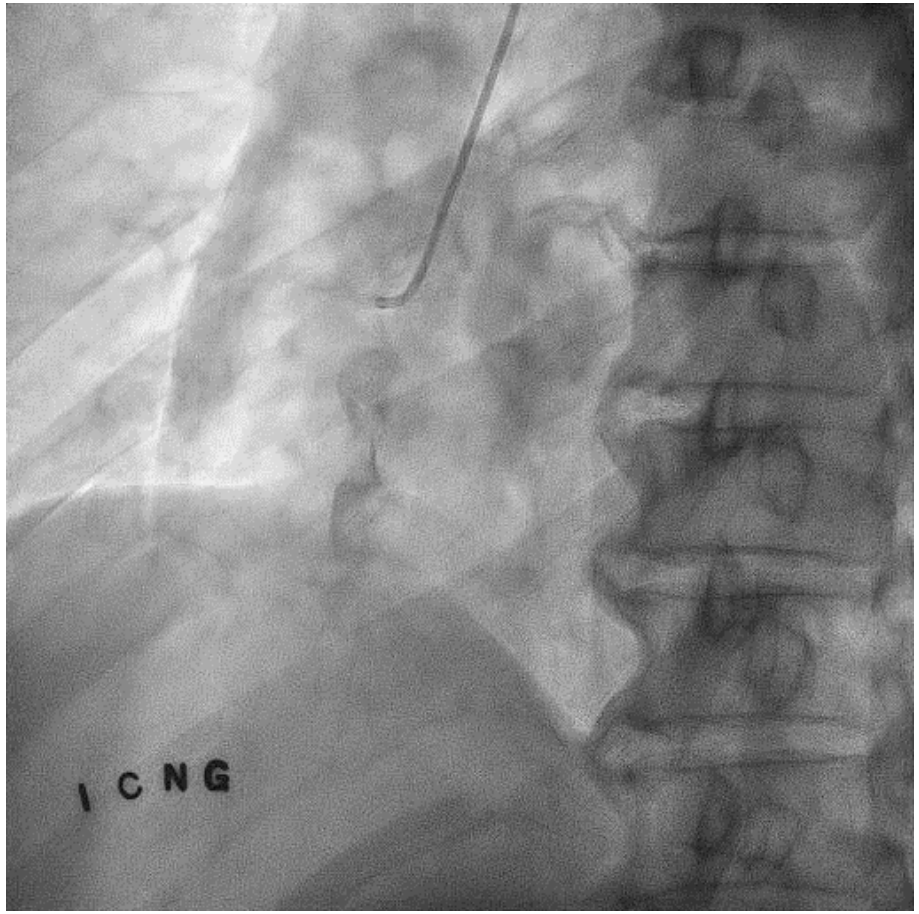


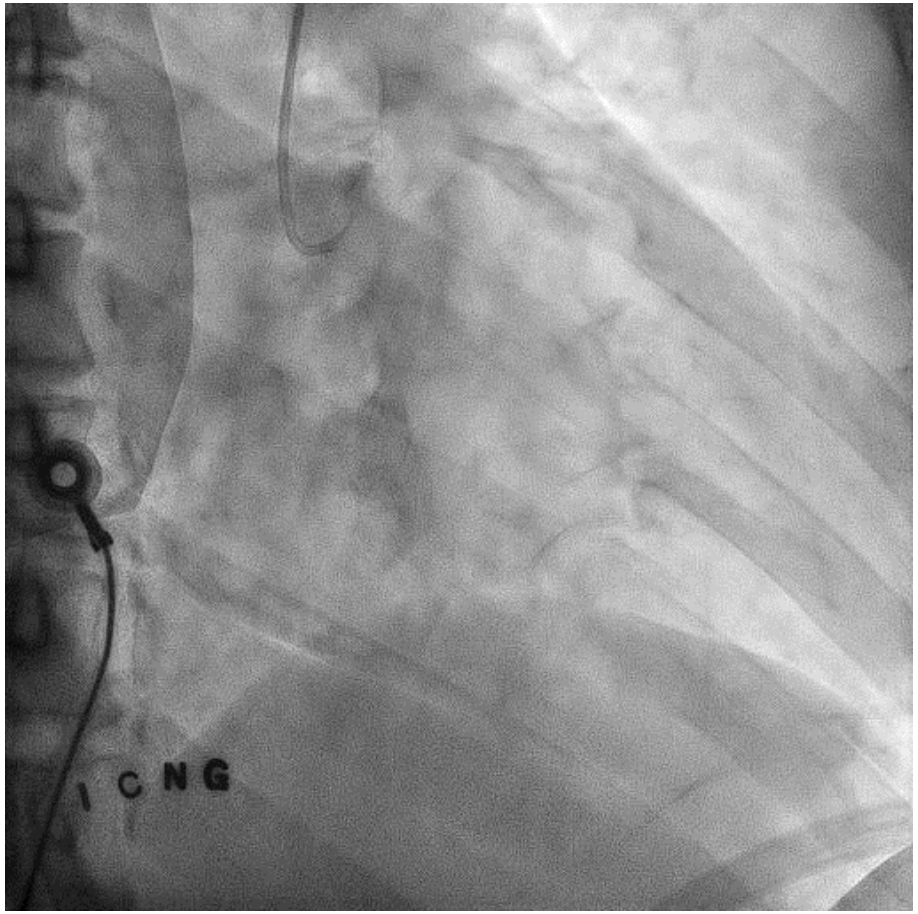
Case Presentation: Initial CAG



LAD: pLAD tubular near total occlusion with heavy calcification
m-dLAD diffuse upto 90% stenosis
LCx: os focal 80% stenosis, pLCx near total occlusion

Case Presentation: Initial CAG



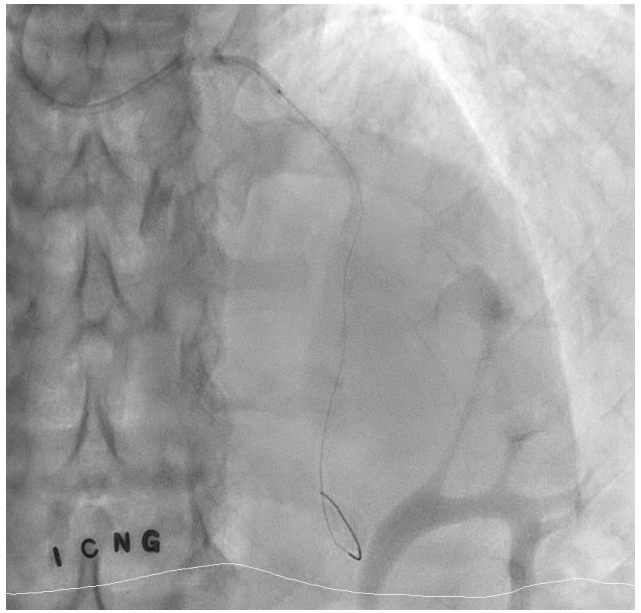


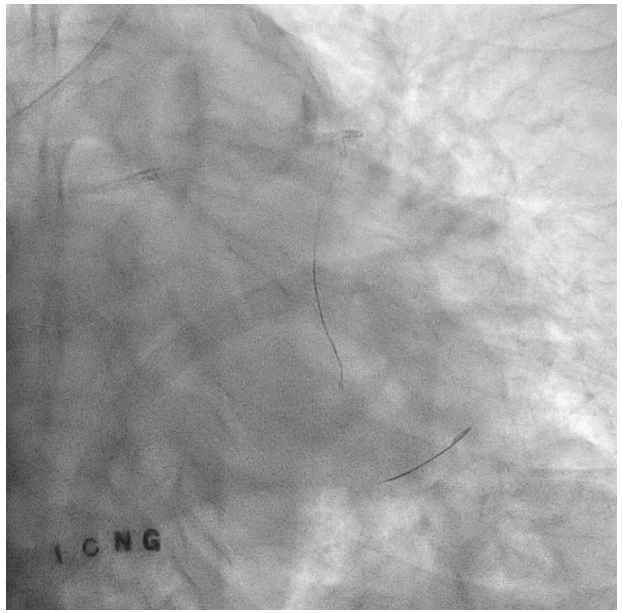
Which is the culprit?

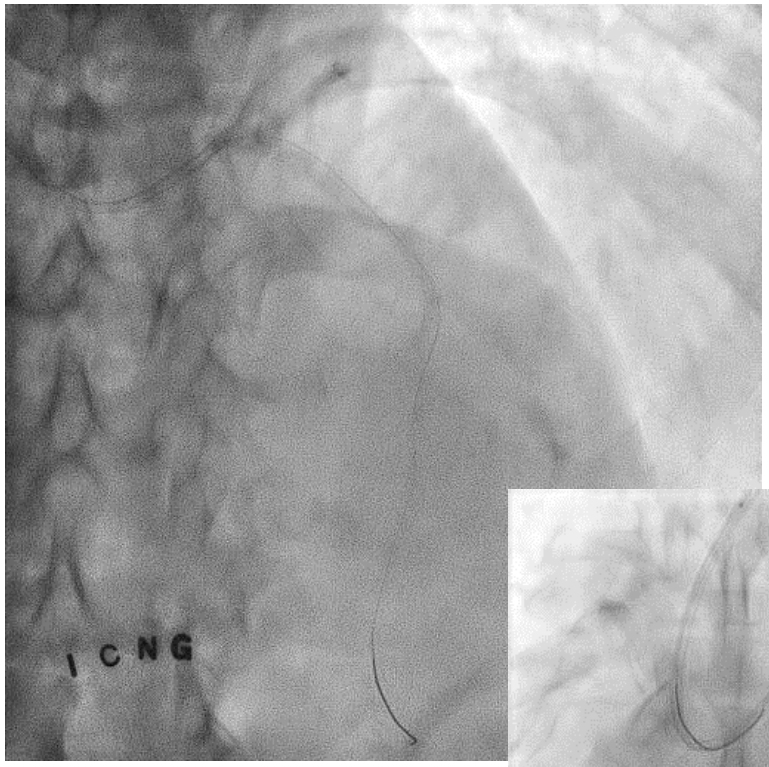
One stage PCI? Or two staged?

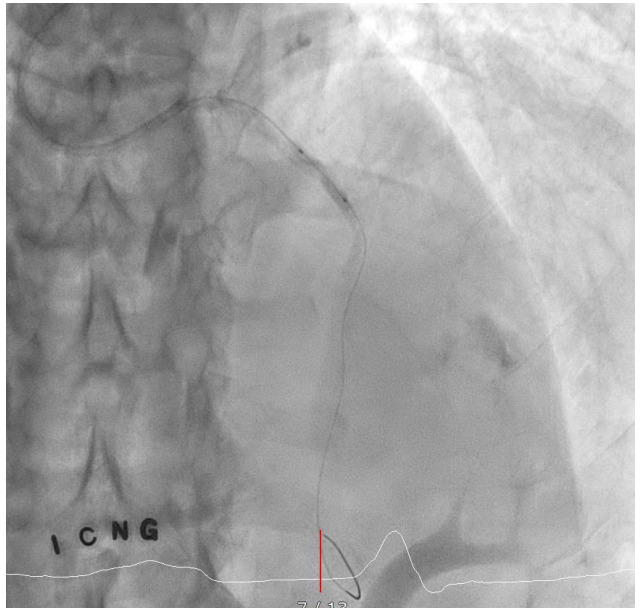
RCA: pRCA focal 20% stenosis
mRCA diffuse upto 50% stenosis

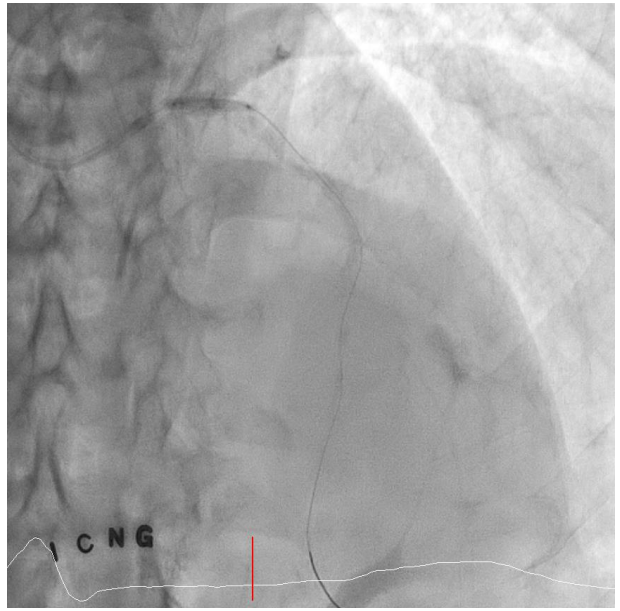
Case Presentation: PCI #1

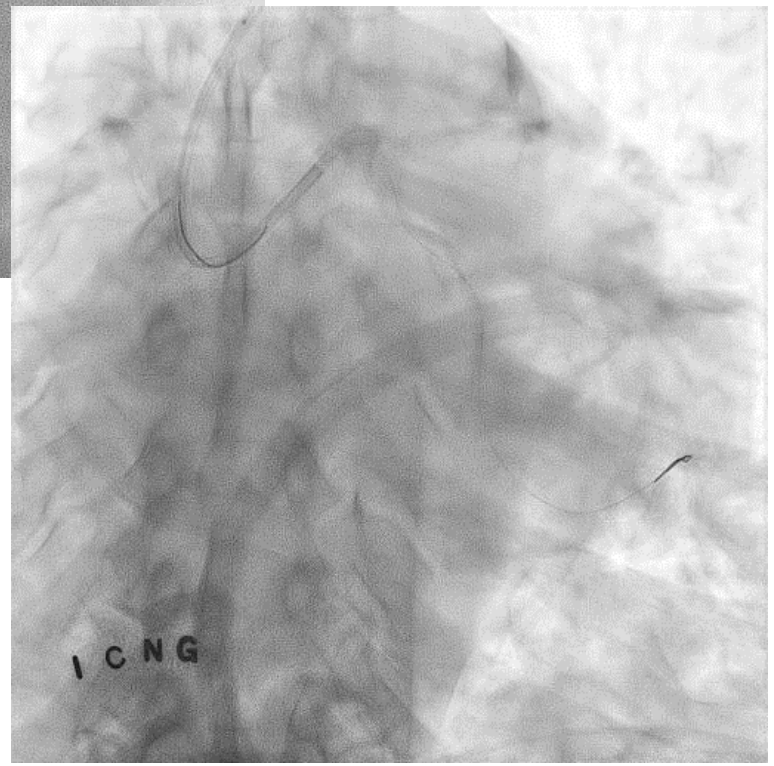




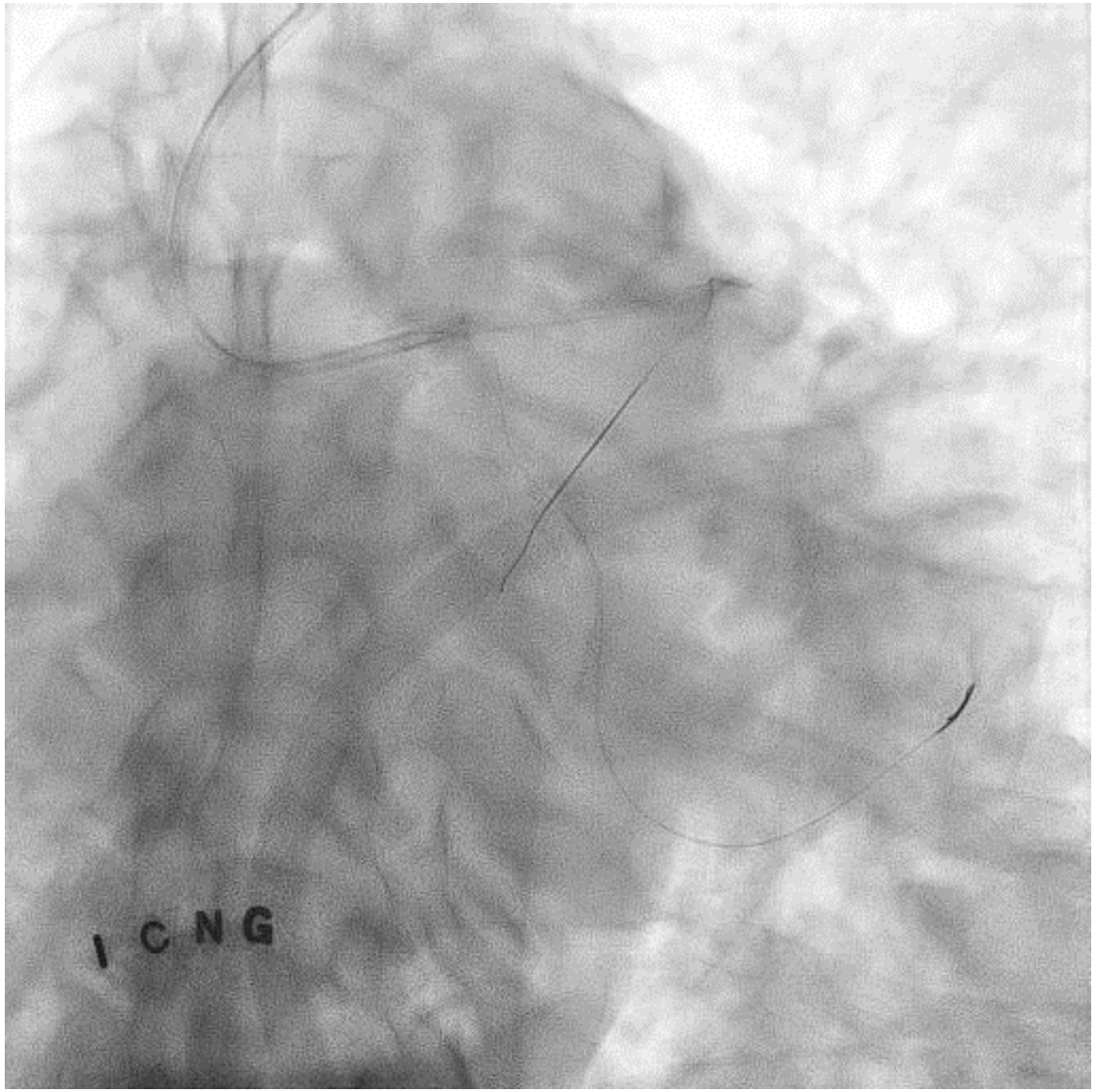








Case Presentation: PCI #1..and proceed?

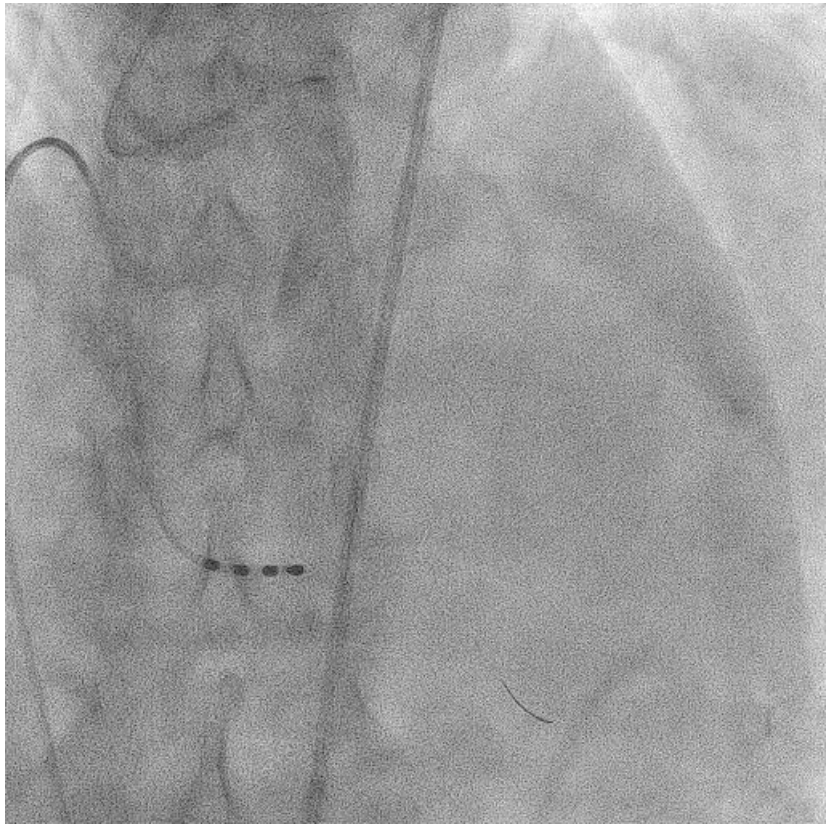


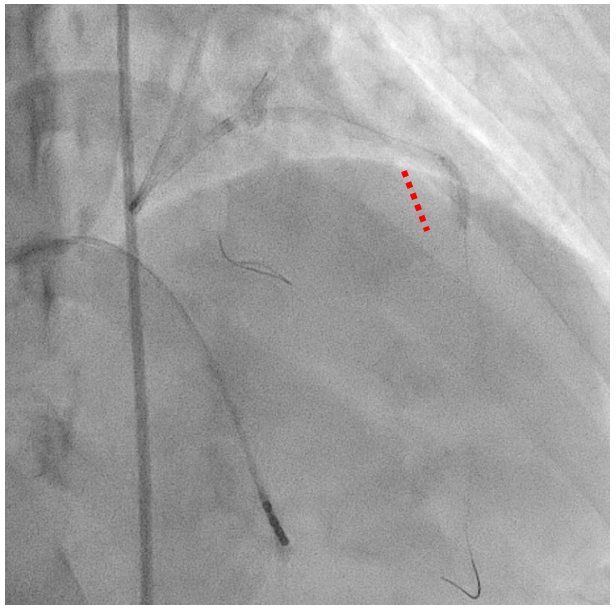
PCI for the LCX lesion without difficulty
(Resolute Onyx 2.75mm x 30mm)

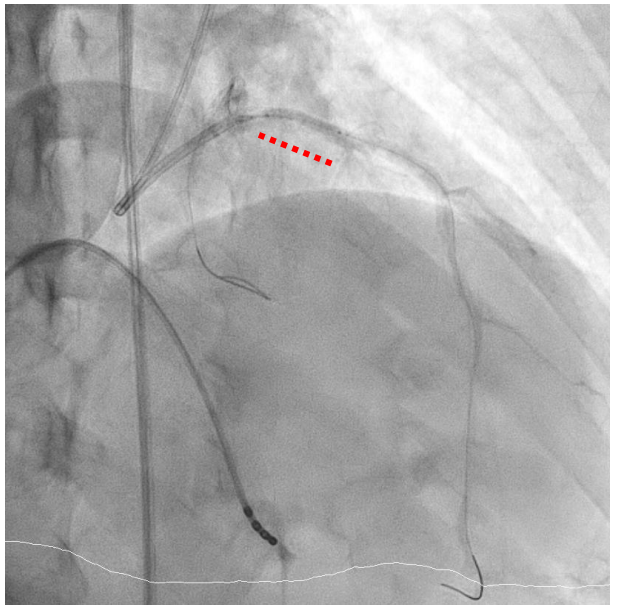
Vital sign stable

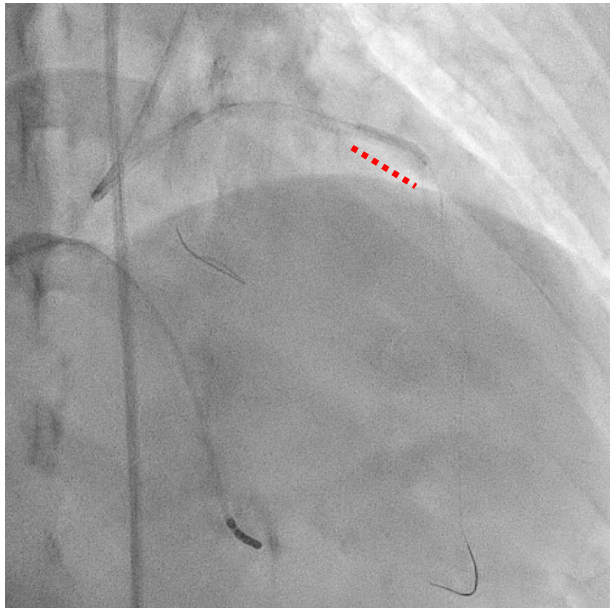
LAD PCI may need….
Rota-ablation needed
which is not appropriate on Friday night?

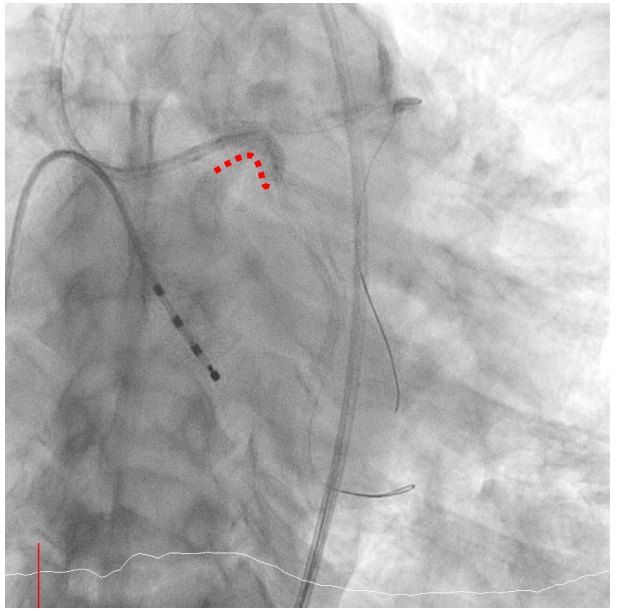
Case Presentation: PCI #2





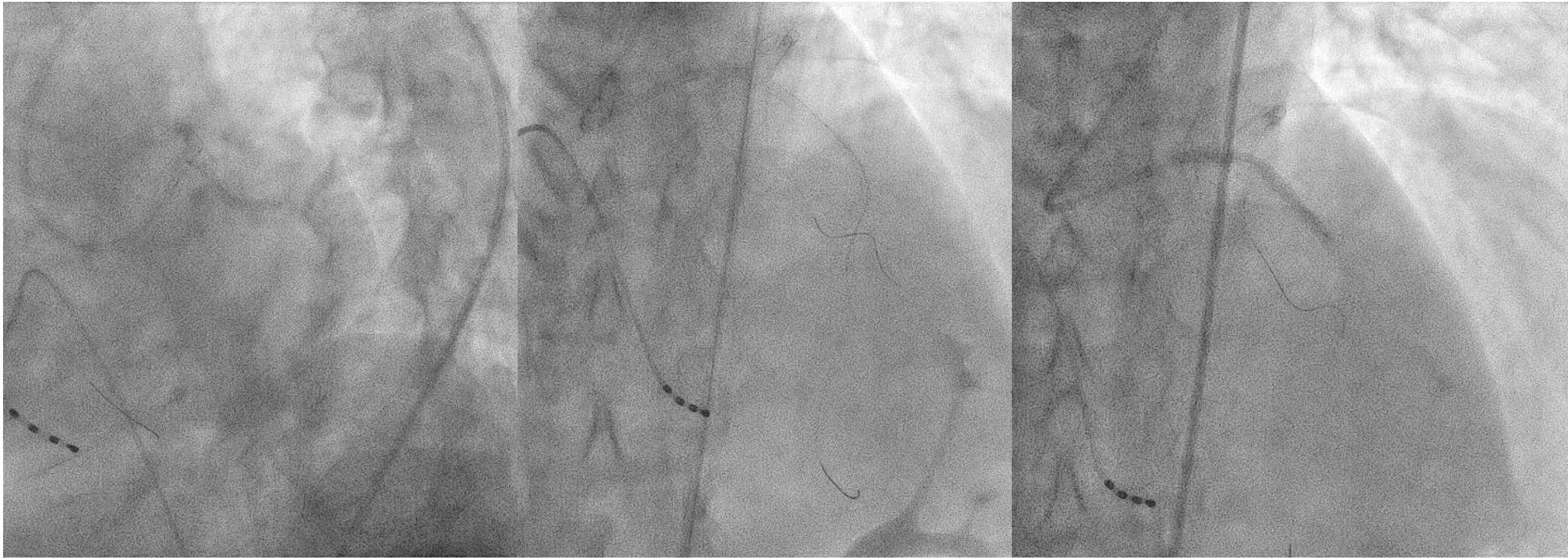






Rota-ablation with 1.5 burr
Successful ballooning to LM-pLAD

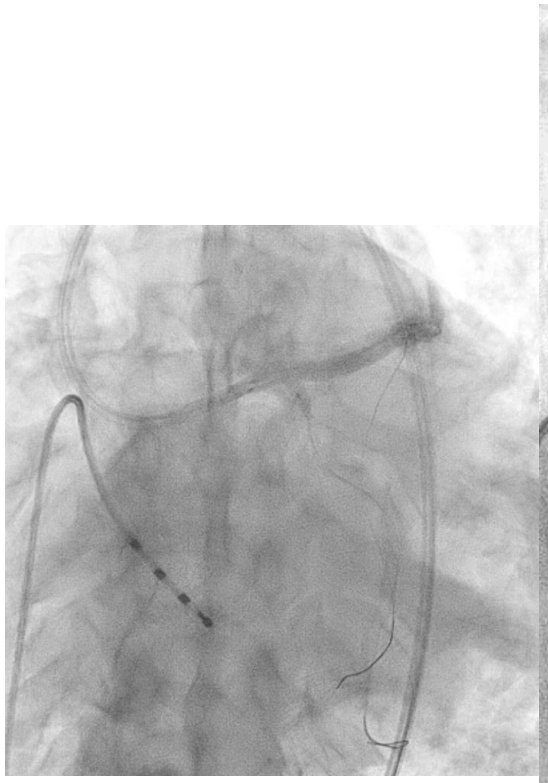
Case Presentation: PCI #2

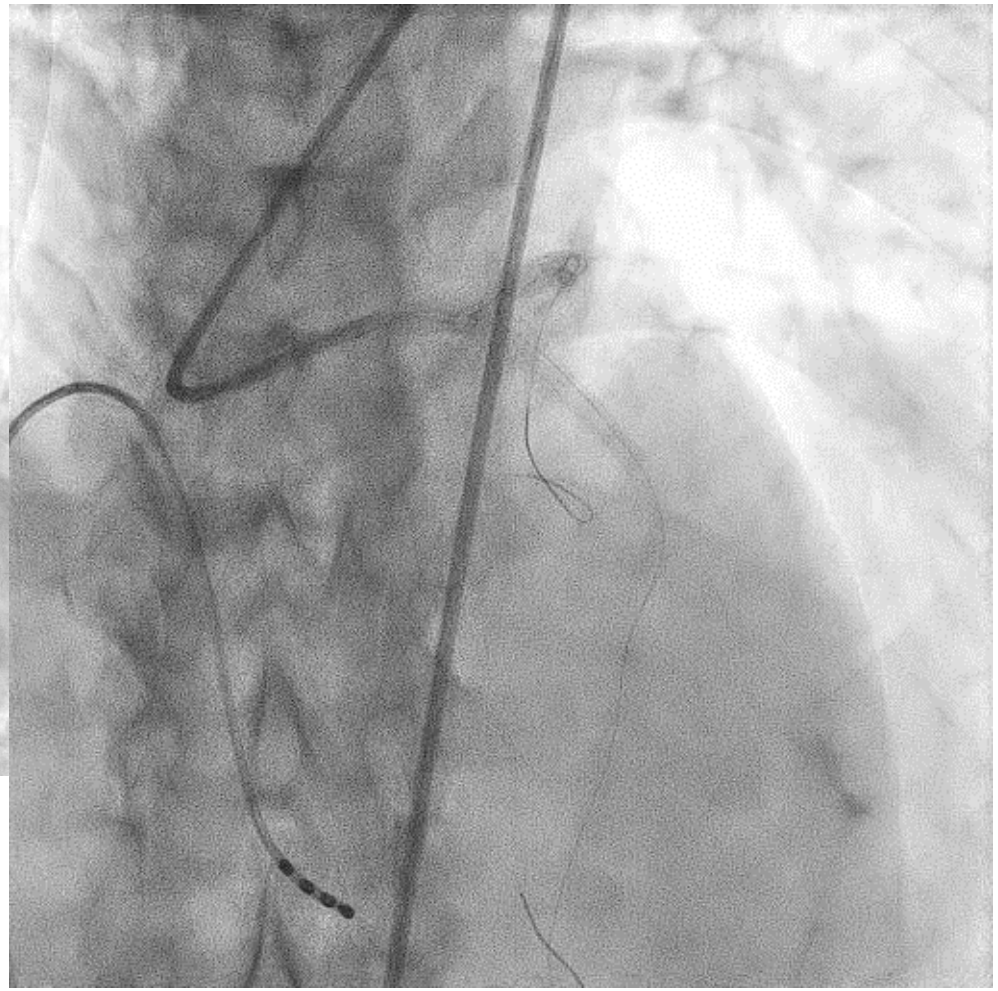


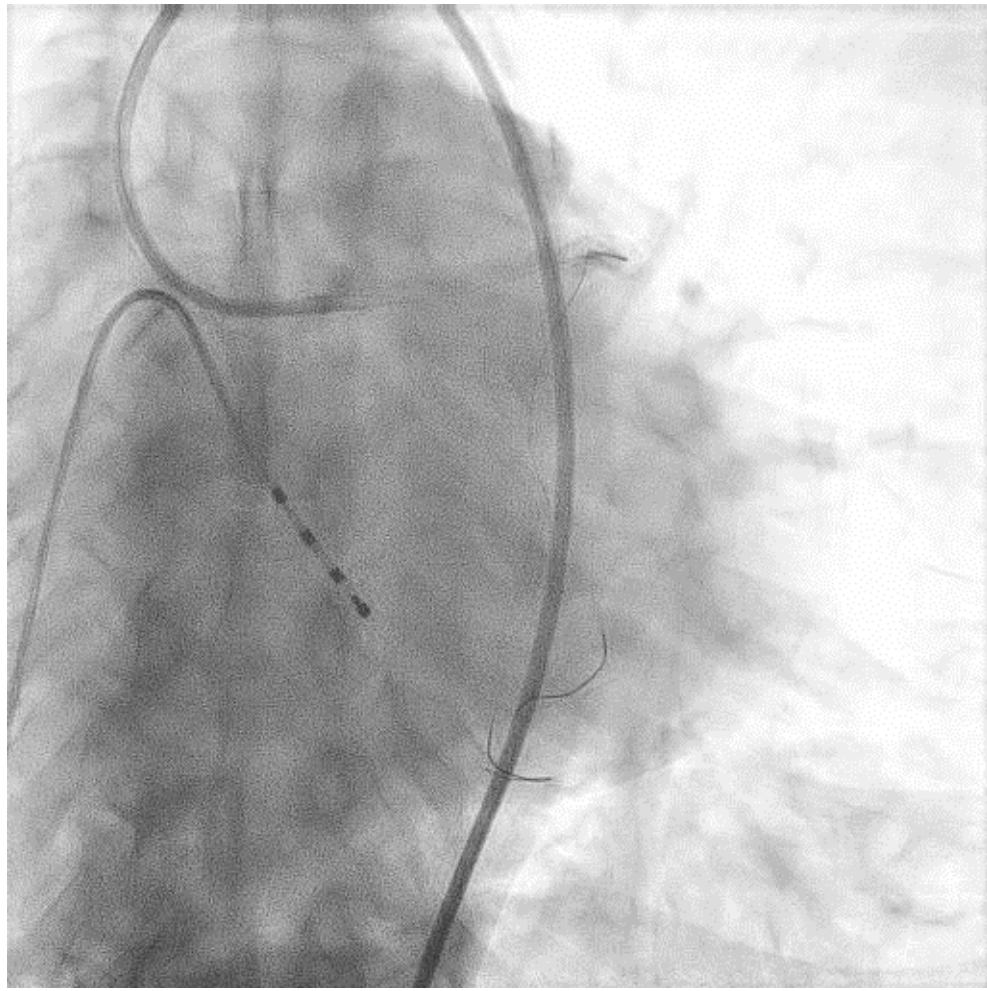
Minicrush stenting: pLCX: Firehawk 3.0mm x 23mm

LM-pLAD: Firehawk 3.5mm x 38mm, Firehawk 3.0mm x 38mm

Case Presentation: PCI #2







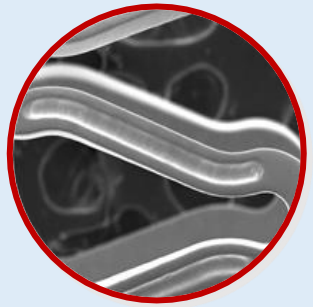
Final results after, kissing balloon to LM-LAD / LCX

Case Presentation

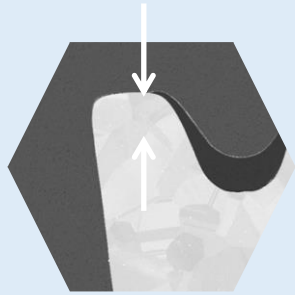
- EchoCG
  - Dilated LV (LVEDD 59mm) with depressed LVEF (33%)
  - RWMA: LAD/LCX territory akinesia

- Discharged 2 days after the 2nd PCI, free from cardiac symptoms

- Medication >
  - Aspirin+Plavix, Rosuvastatin 20mg, Bisoprolol 1.25mg, Valsartan 49mg 0.5T qd, Isoket 40mg bid



Successful PCI for a heavily calcified coronary artery using the localized abluminal groove Sirolimus-eluting DES



Thank You For Your Attention

For any comments, questions, suggestions, please contact

medikang@gmail.com