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TCTAP2015
APRIL 28-MAY 1, 2015
COEX, SEOUL, KOREA

TCTAP Fellowship Course
Imaging & Physiology

2015/4/28 14:00-15:10

OCT: Pre- and Post Intervention

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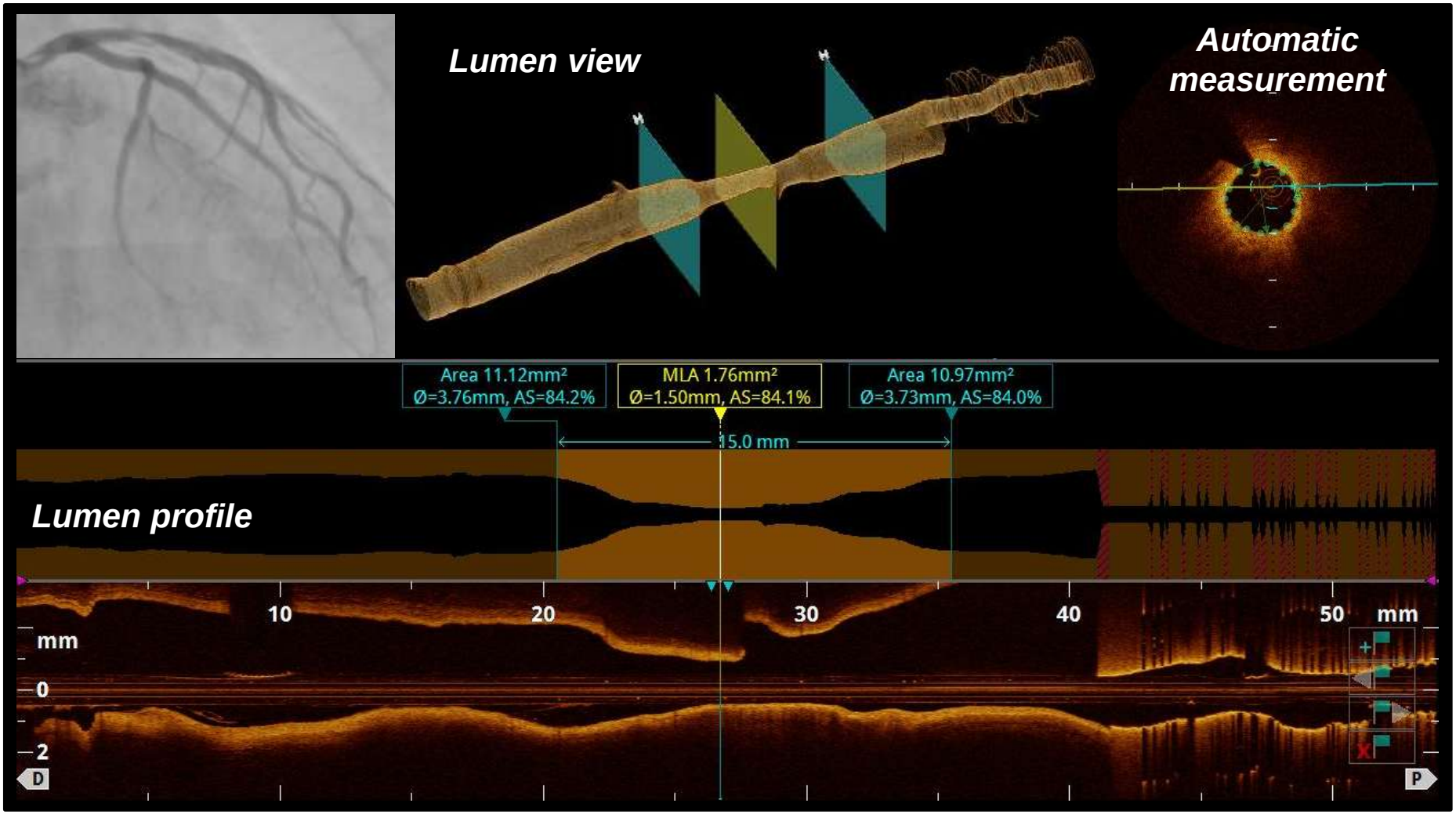
Disclosure Statement of Financial Interest

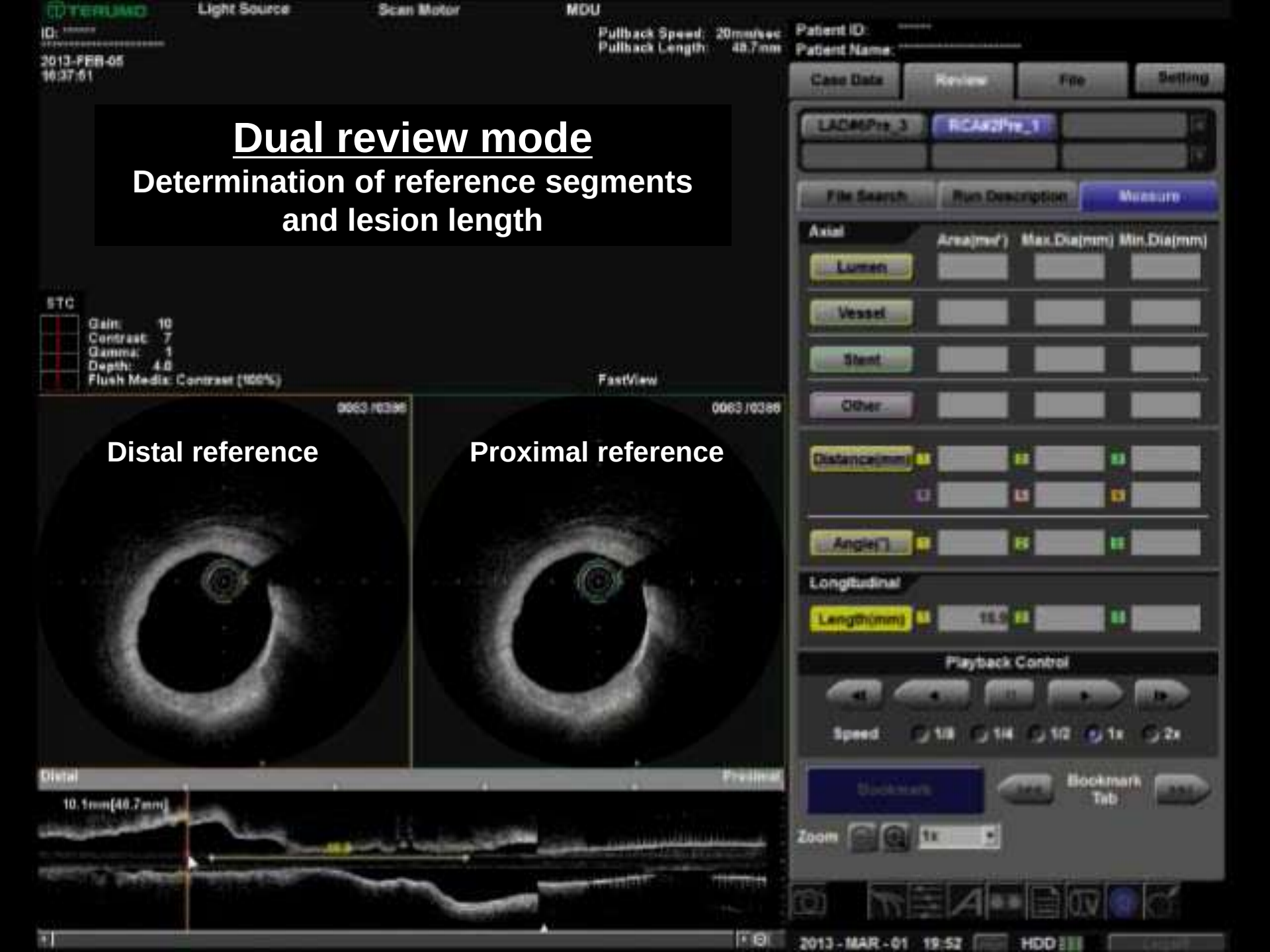
Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship	Company
• Grant/Research Support	• St. Jude Medical, Terumo, Abbott Vascular
• Consulting Fees/Honoraria	• St. Jude Medical, Terumo, Sumitomo elec.
• Major Stock Shareholder/Equity	• No
• Royalty Income	• No
• Ownership/Founder	• No
• Intellectual Property Rights	• No
• Other Financial Benefit	• No

Automatic lumen measurement in all frames



Real time co-registration of angiography with OCT


Light Source
Scan Motor
MDU
Pullback Speed: 20mm/sec
Pullback Length: 48.7mm
Patient ID:
Patient Name:
Case Data
Review
File
Setting
Dual review mode
Determination of reference segments and lesion length
STC
Gain: 10
Contrast: 7
Gamma: 1
Depth: 4.0
Flush Media: Contrast (100%)
FastView
Distal reference
Proximal reference
Axial
Area(mm²)
Max.Dia(mm)
Min.Dia(mm)
Lumen
Vessel
Stent
Other
Distance(mm)
Angle(°)
Longitudinal
Length(mm)
Playback Control
Speed
1/8
1/4
1/2
1x
2x
Bookmark
Bookmark Tab
Zoom
Distal
Proximal
10.1mm(48.7mm)
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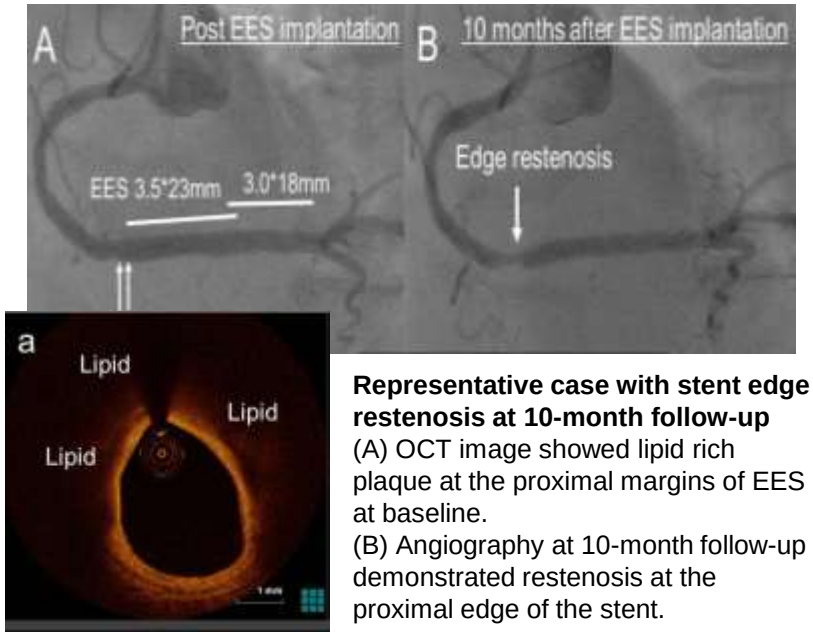
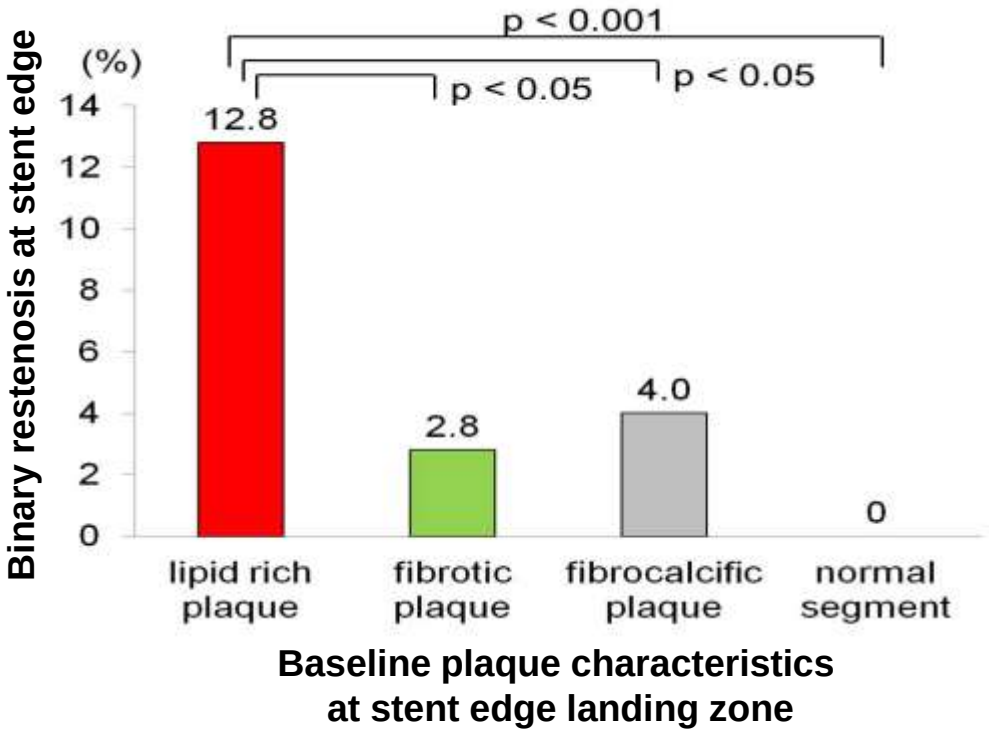
HDD

Plaque characteristics at stent edge landing zone and restenosis

OCT was used to assess baseline plaque characteristics at 641 EES stent edge landing zone, and angiographic follow-up was performed to evaluate stent edge restenosis 10 months after PCI.



Representative case with stent edge restenosis at 10-month follow-up
(A) OCT image showed lipid rich plaque at the proximal margins of EES at baseline.
(B) Angiography at 10-month follow-up demonstrated restenosis at the proximal edge of the stent.



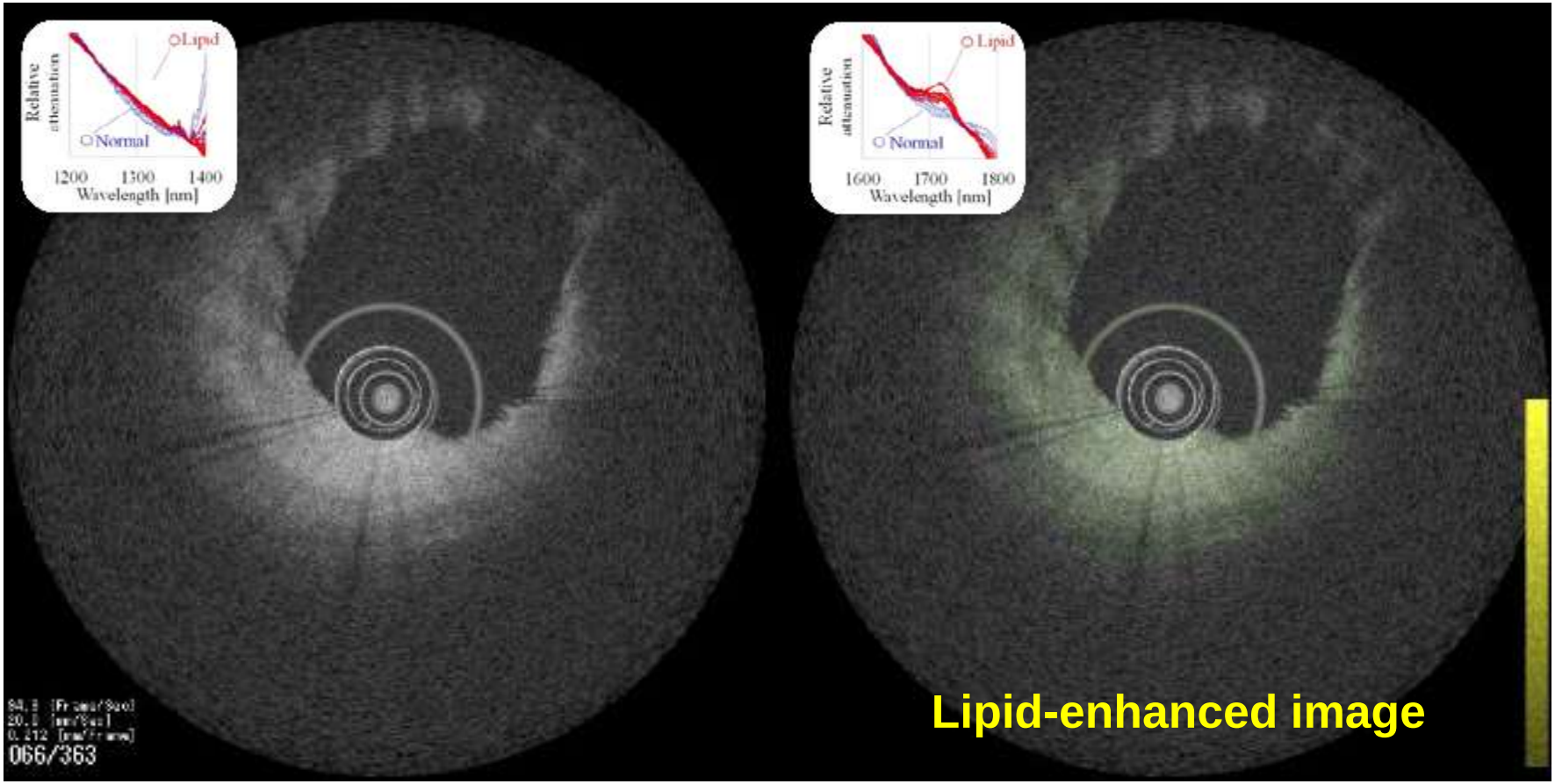
Conclusion: Lipid-rich plaque at stent edge landing zone was a potential predictor of stent edge restenosis 10 months after EES implantation.

SWIR-OCT spectroscopy

SWIR = Short wavelength infrared

Conventional OCT
(Wave length = 1.3 μm)

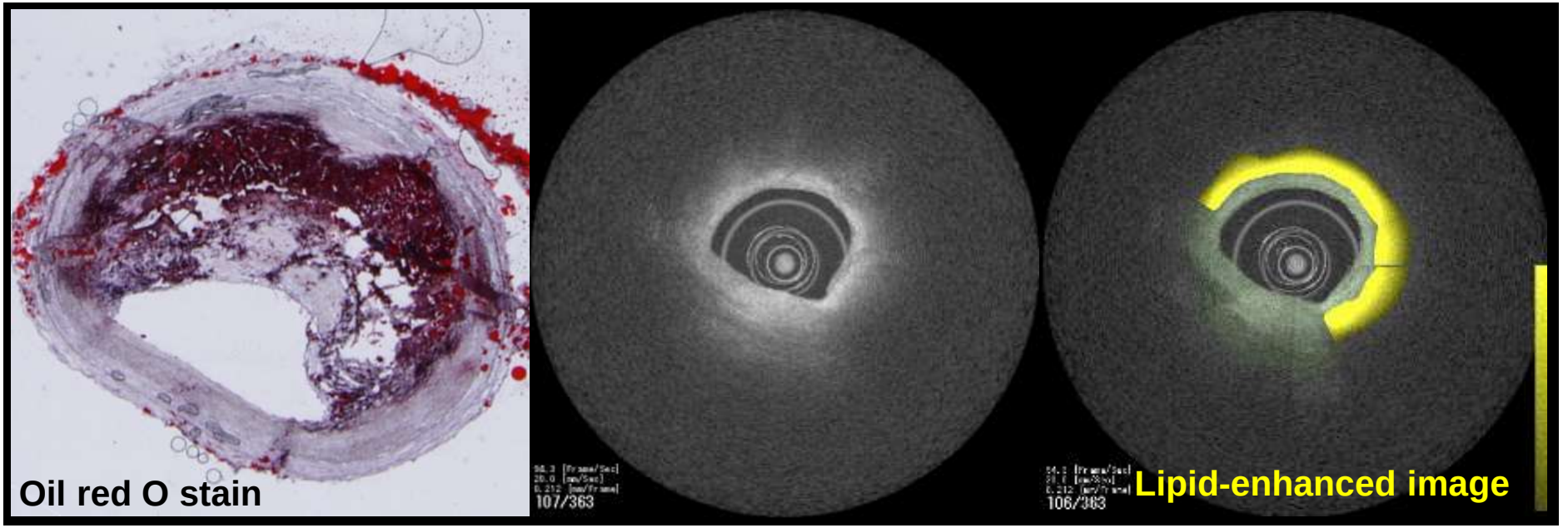
SWIR-OCT spectroscopy
(Wave length = 1.7 μm)



SWIR-OCT spectroscopy

SWIR = Short wavelength infra red

Histology | Conventional OCT | SWIR-OCT spectroscopy



Lipid enhance image of SWIR-OCT spectroscopy can identify lipid plaque accurately (sensitivity = 89%, specificity = 92%, PPV = 99%, NPV = 58%)

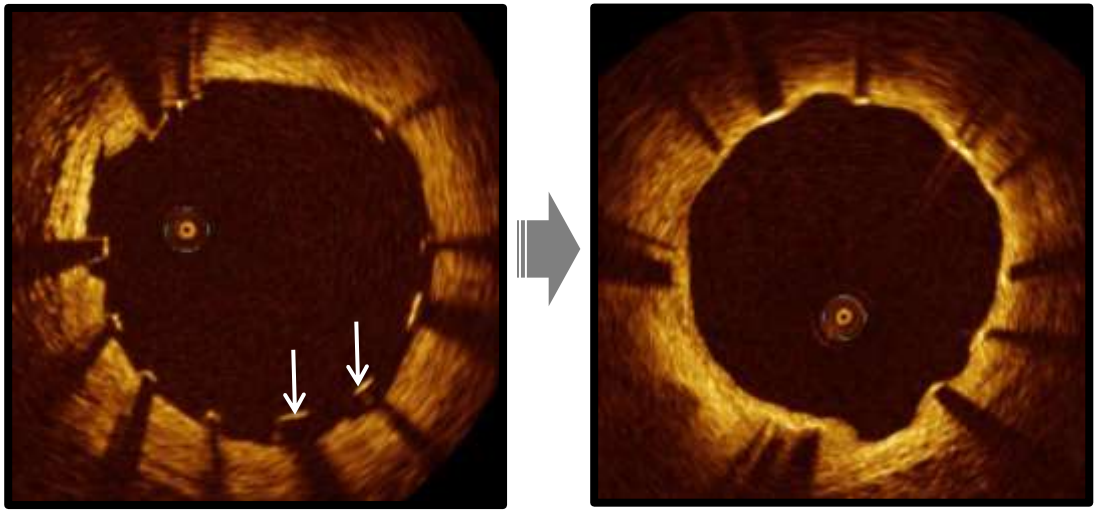
OCT criteria of optimal stent deployment in our daily clinical practice

	OCT-guided PCI	IVUS-guided PCI
Reference site	・Most normal looking ・No lipidic plaque	・Largest lumen ・Plaque burden < 50%
Determination of stent diameter	・By measuring lumen diameter at proximal and distal reference sites	・By measuring vessel diameter at proximal and distal reference sites
Determination of stent length	・By measuring distance from distal to proximal reference site.	
Goal of stent deployment	・In-stent minimal lumen area ≥90% of the average reference lumen area ・Complete apposition of the stent over its entire length against the vessel wall ・Symmetric stent expansion defined by minimum lumen diameter / maximum lumen diameter ≥ 0.7 ・No plaque protrusion, thrombus, or edge dissection with potential to provoke flow disturbances	

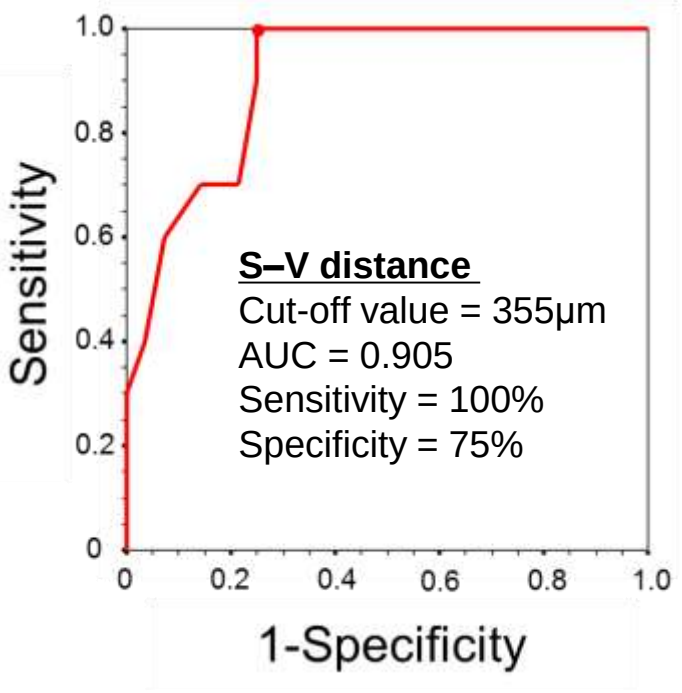
Resolution of stent malapposition in Xience EES

Serial OCT examination (post-stenting and 8-12 months follow-up) was performed to assess the change of stent malapposition of the 2nd generation EES (n=38).

Post-stenting **Follow-up**



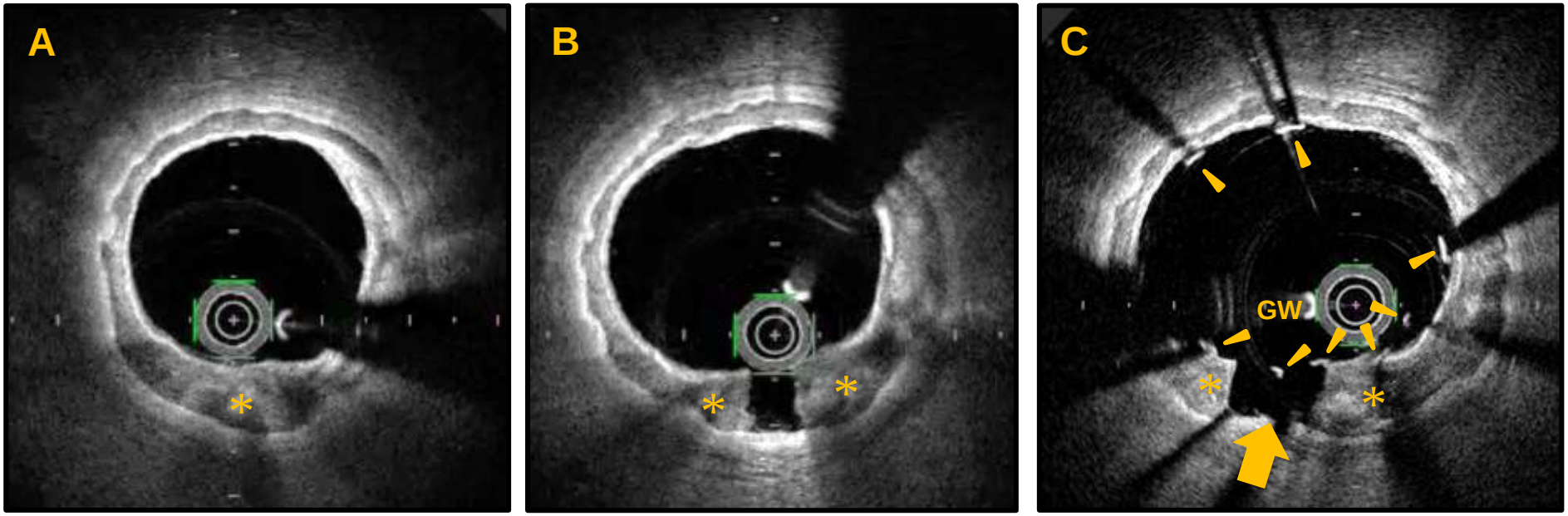
ISA at post-stenting (arrows) resolved at follow-up in EES [(A) Maximum ISA distance = 370 μm to 0 μm; ISA area = 0.71 mm^2 to 0 mm^2; intra-stent lumen area = 7.18 mm2 to 5.91 mm^2]



Conclusion. An S–V distance <355 μm was the corresponding cut-off value for a spontaneous resolution of malapposed strut after EES.

Calcium fracture

Pe-PCI ***Balloon angioplasty*** ***Stent***

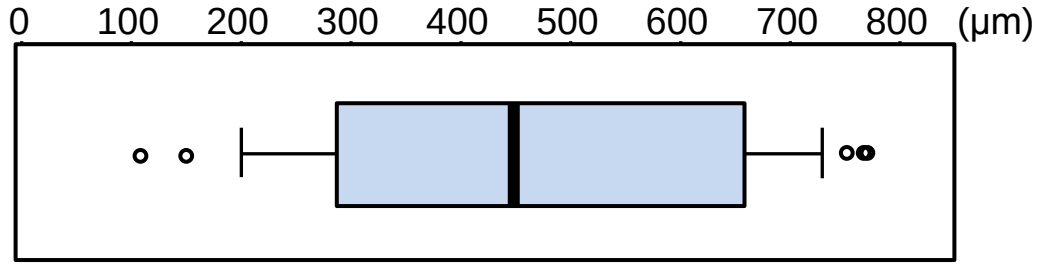


OCT before PCI (A) showed entire circumferential calcium. OCT after balloon angioplasty (B) and after PCI (C) demonstrated calcium fracture (6 o'clock). Thickness of the calcium fracture was 710 μm (arrow). Arrow heads = stent struts; Asterisk = Calcium; GW = guide wire.

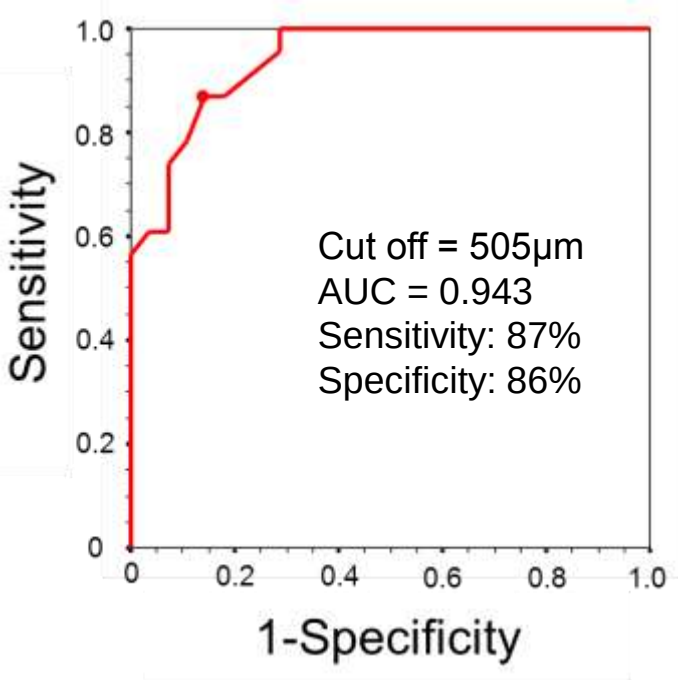
Prediction of calcium plate fracture by ballooning

OFDI was performed to assess vascular response immediately after high pressure ballooning in 61 patients with severe calcified coronary lesion.

Thickness distribution of calcium fracture



Median = 450μm; Lower quartile = 300μm; Upper quartile = 660μm; Minimum = 110μm; and Maximum = 770μm.



Conclusion. A calcium plate thickness < 505 μm was the corresponding cut-off value for predicting calcium plate fracture by high pressure ballooning

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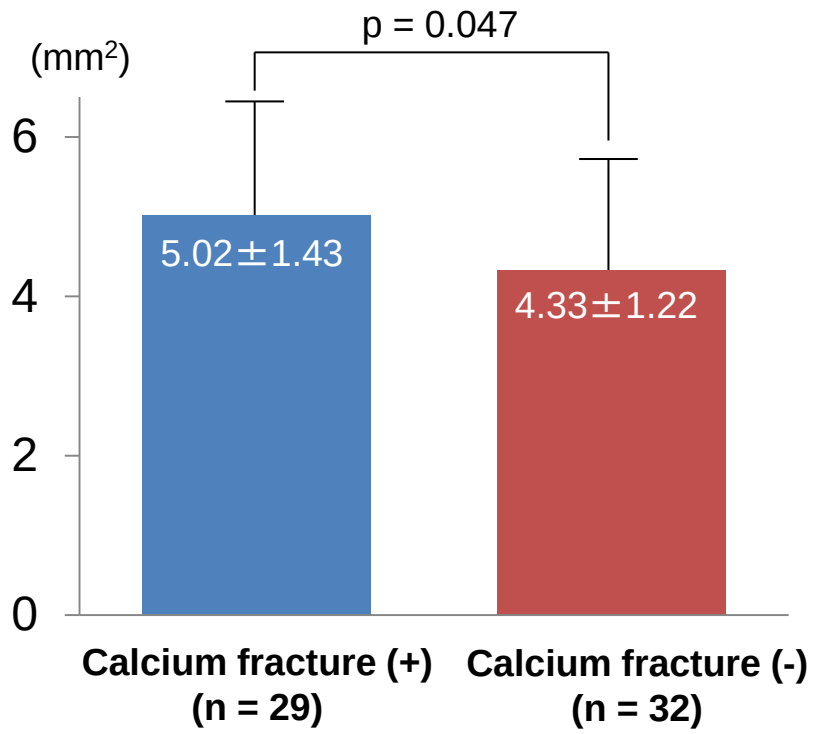
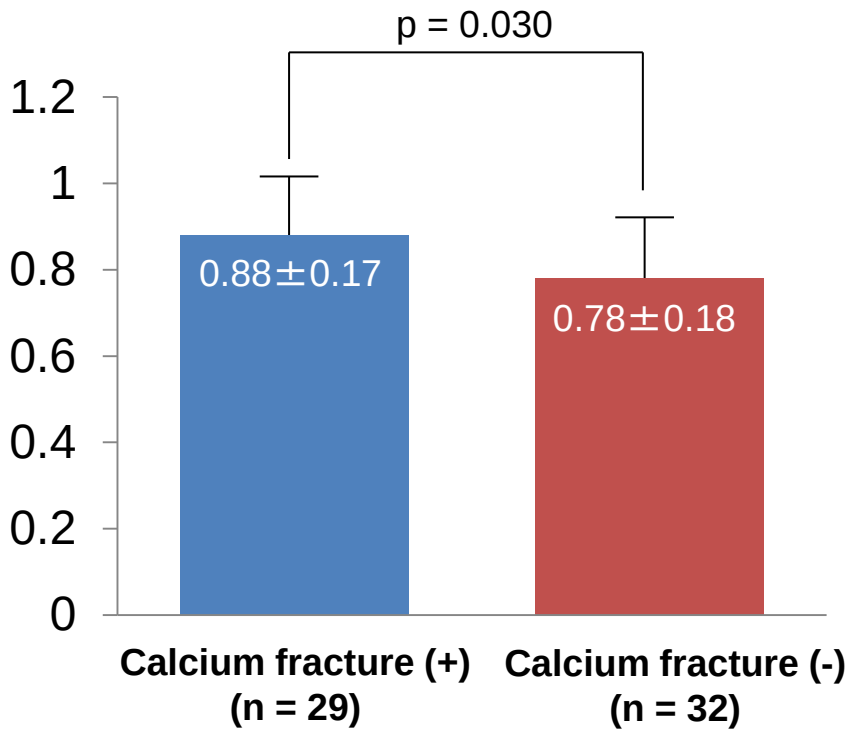
Stent expansion at post-PCI

Minimum stent area



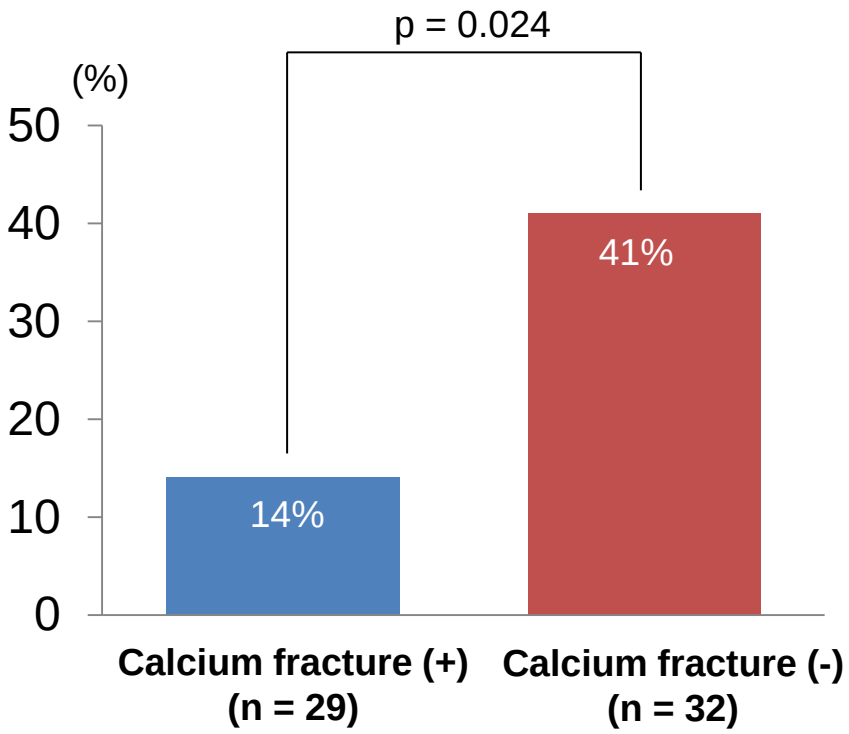
Stent expansion index



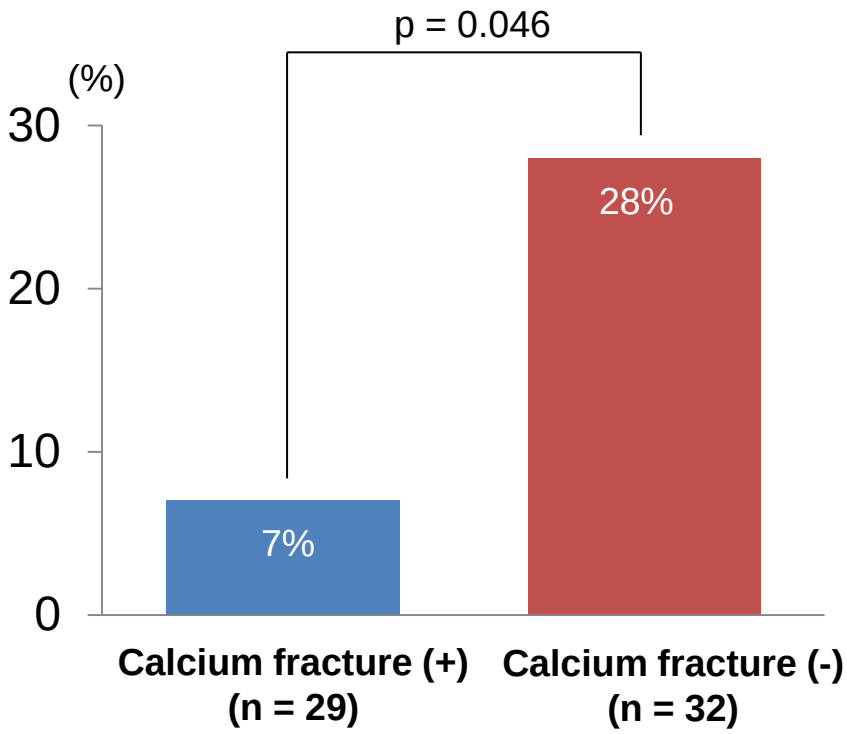
Minimum stent area and stent expansion index were significantly greater in the group with calcium fracture compared with the group without calcium fracture.

Restenosis and TLR at 10 months follow-up

Binary restenosis

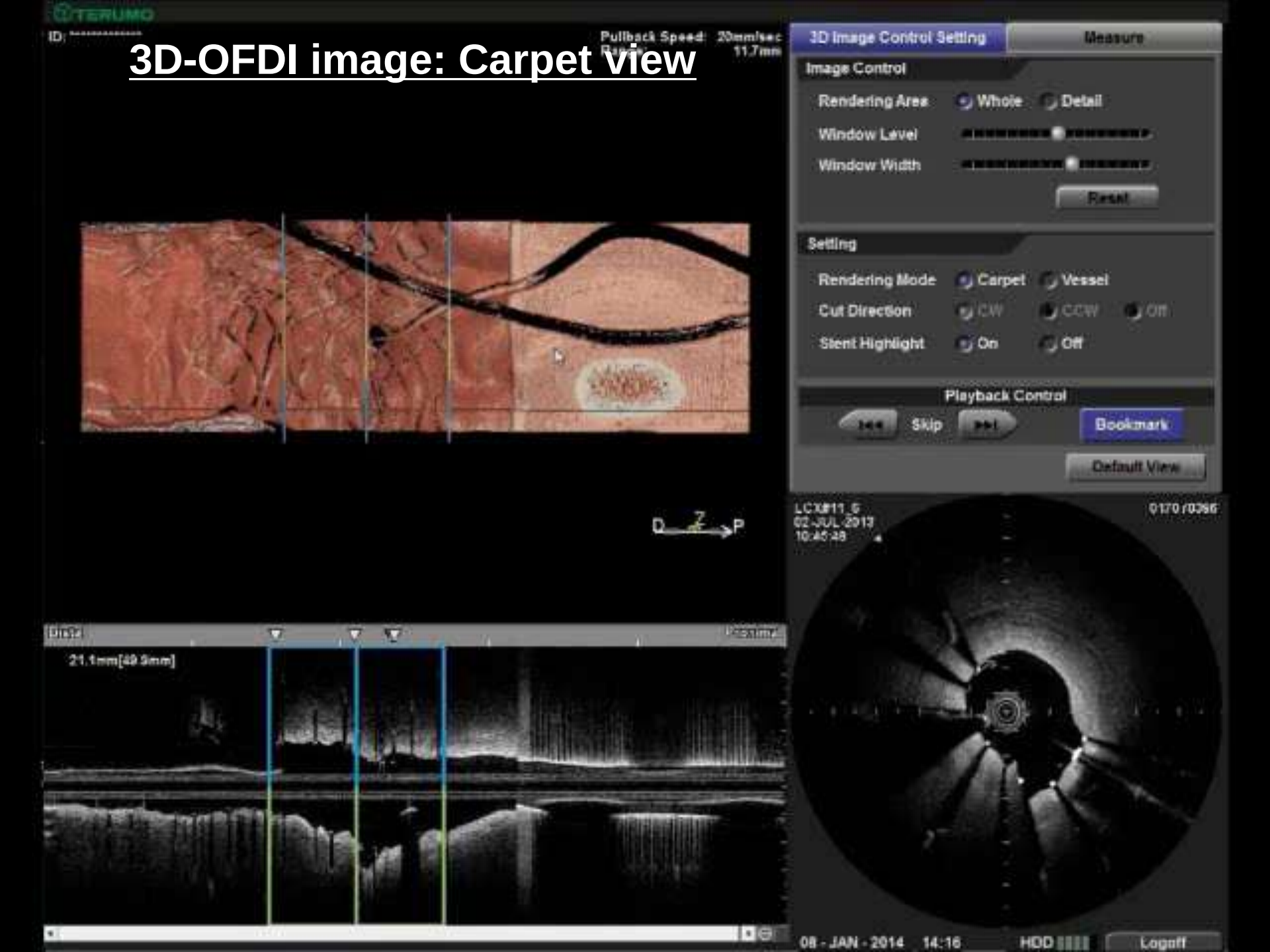


Target lesion revascularization

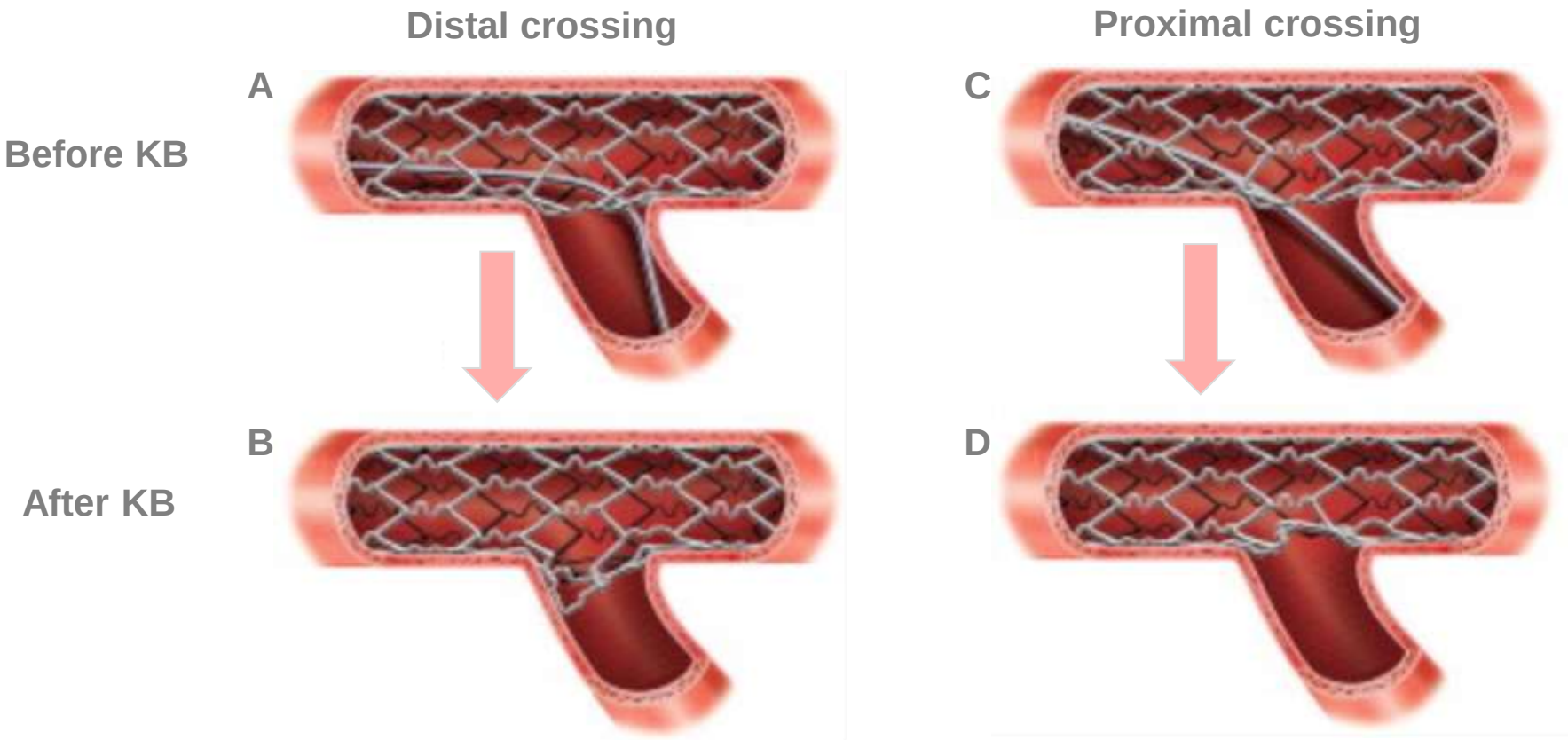


The frequency of binary restenosis and target lesion revascularization was significantly lower in the group with calcium fracture compared with the group without calcium fracture.

3D-OFDI image: Carpet view



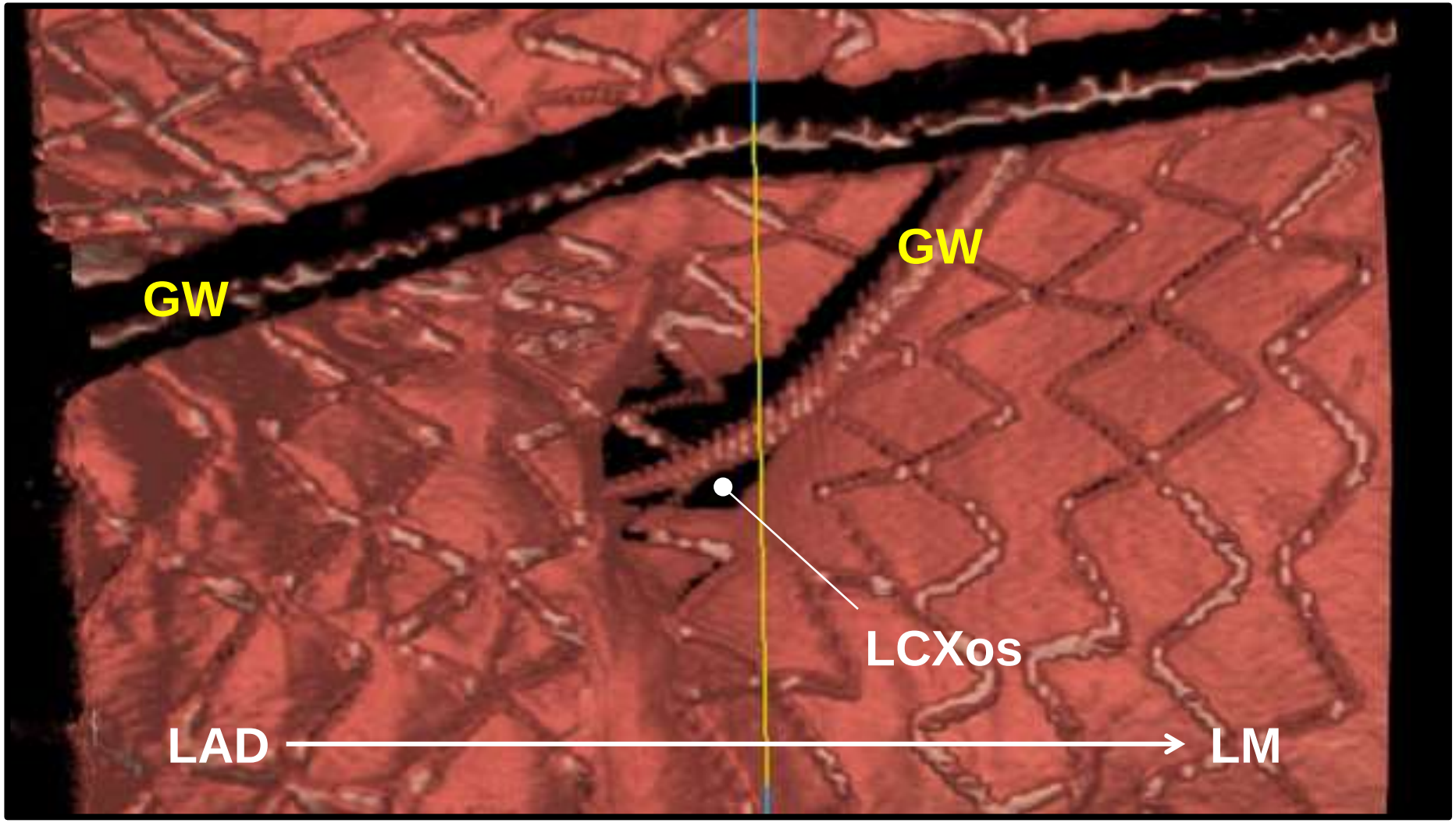
Influence of main vessel stent cell rewiring on stent deformation following KB angioplasty



Access to the side branch through the strut of a stent is usually possible through 2 or 3 different cells. The cell choice affects stent deformation. Bench testing has shown that wire crossing through the strut closest to the carina (A and B) provides better scaffolding of the origin of the side branch than proximal crossing that pushes the struts inward towards the main vessel lumen (C and D).

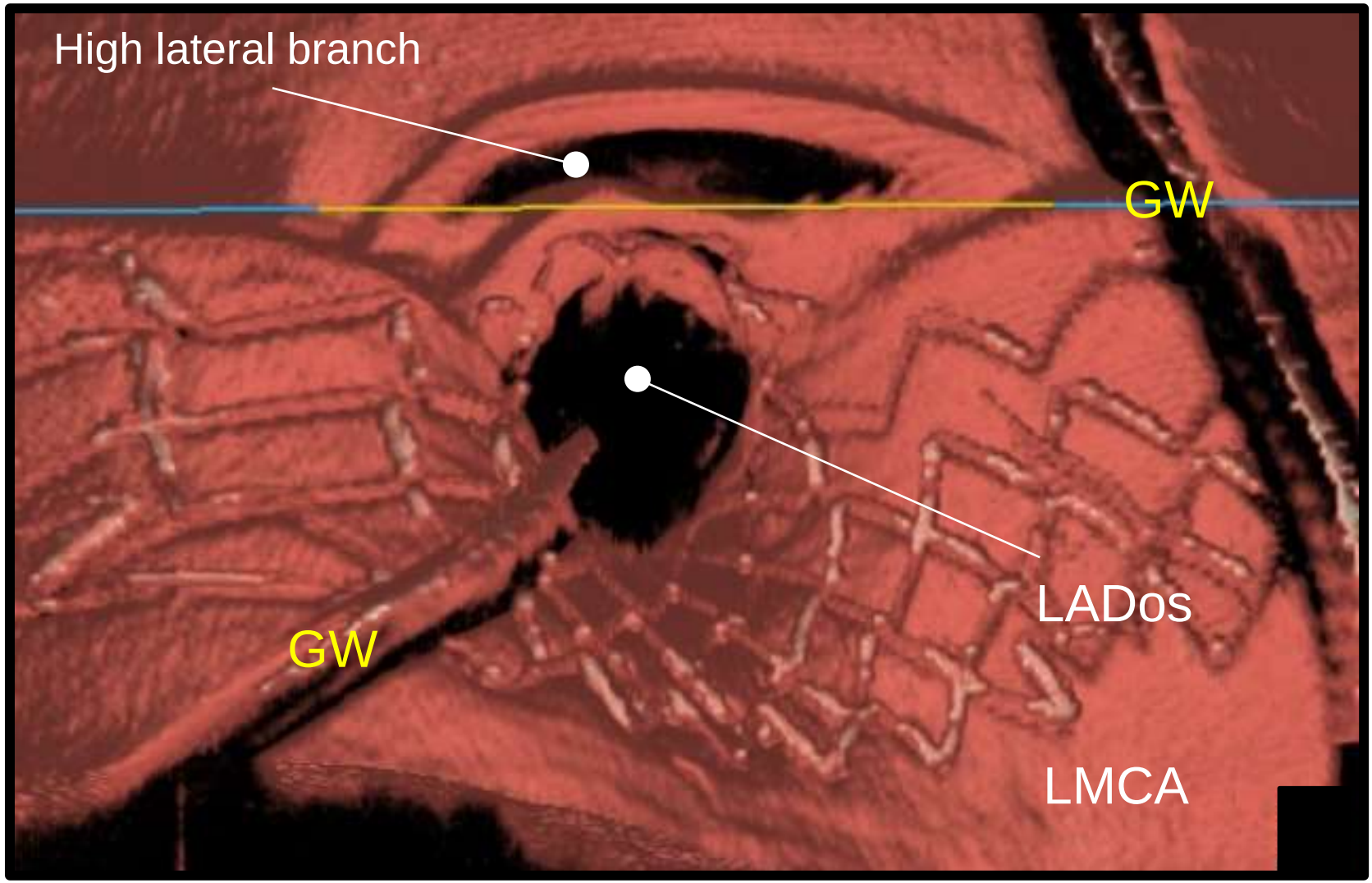
3D-OFDI image: Carpet view

Before KB, Distal crossing



3D-OFDI image: Carpet view

“Ostial stenosis of side branch” due to carina sift



Conclusion

- OCT is helpful to guide PCI, and then this adjunctive imaging technique has a potential to improve the procedural outcome.

Thanks for your attention !