21st CardioVascular Summit
TCTAP 2016 April 26-29, 2016
Coex, Seoul, Korea

Pitfalls with Comparative Assessment of BRS and DES with Angio, IVUS and OCT

April 28 7:30-7:40 AM

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Erasmus University, Rotterdam, The Netherlands
Professor of Cardiology
Imperial college, London, UK

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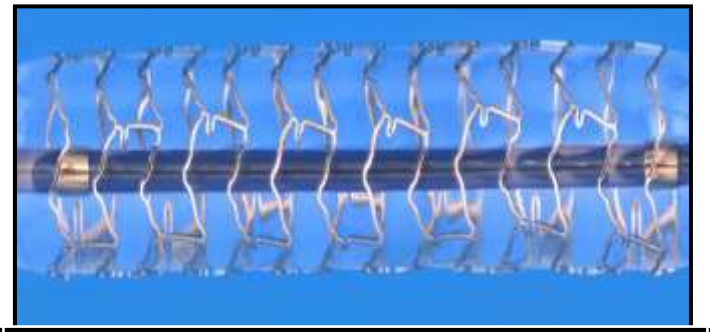
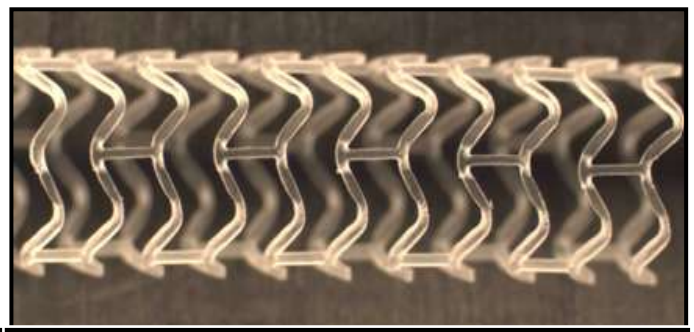
Academic Medical Center, University of Amsterdam, Amsterdam, the Netherlands

Yoshinobu Onuma, MD, PhD
Erasmus MC, Rotterdam , The Netherlands

Stents vs. Scaffolds



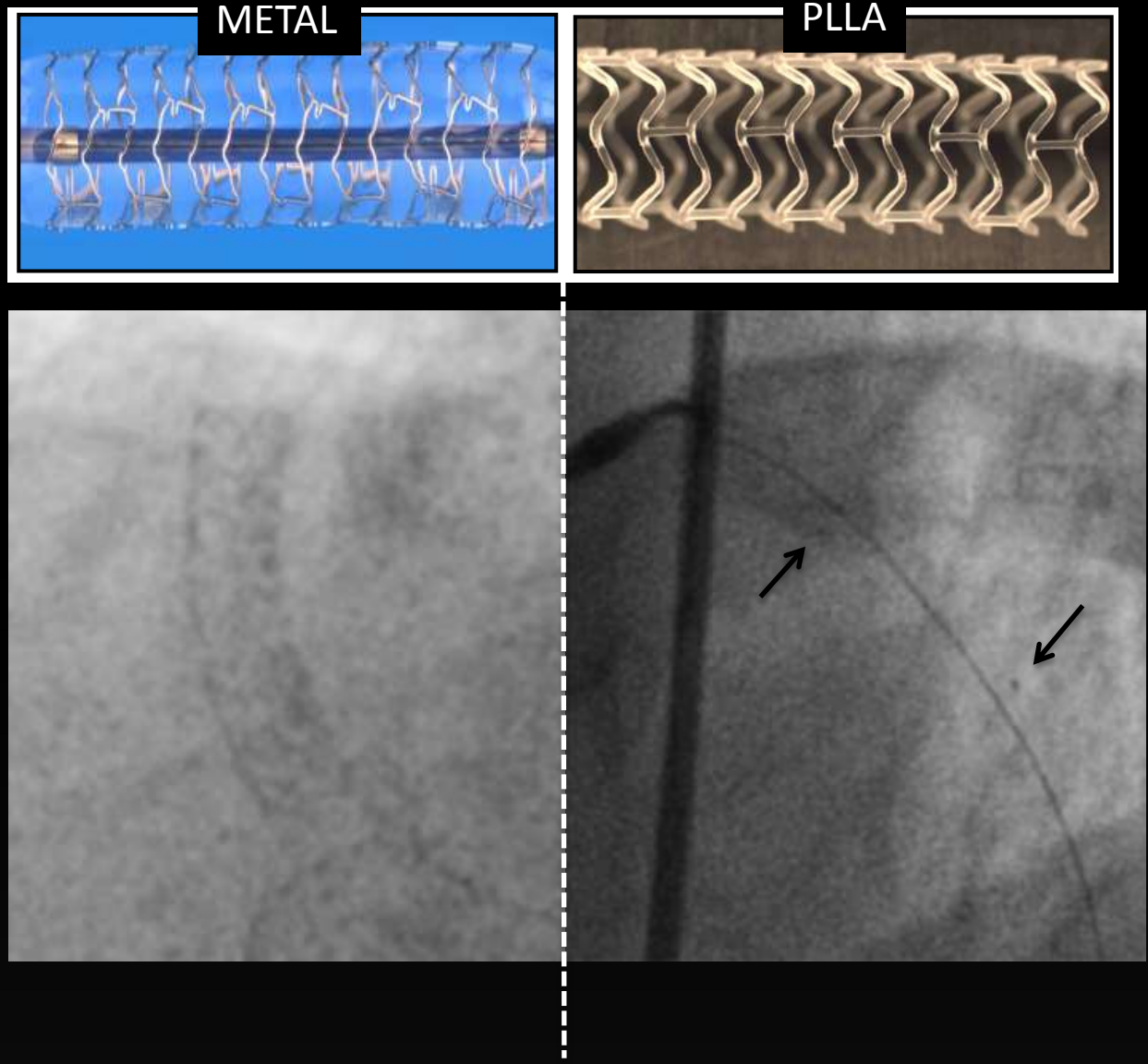


	Metallic (Xience)	PLLA Bioresorbable (ABSORB)
Platform	Cobalt chromium	Poly-L-lactide (PLLA)
Polymer coating	Nonerodable fluoro-polymer	Poly-D,L-lactide (PDLLA)
Anti-proliferative drug	Everolimus 100 μgr/cm^2	Everolimus 100 μgr/cm^2
Drug release	80% in 1 month 100% in 4 months	80% in 1 month 100% in 4 months
Strut thickness	87 μm	156 μm
Radio-opacity	Radio opaque	Radio-lucent
Optical property	Opaque	Translucent

Nakatani, Sotomi, Serruys, and Onuma et al. EuroIntervention 2015

Stents vs. Scaffolds

- **Angiography**
- **MSCT**
- **IVUS**
- **IVUS-VH**
- **OCT**



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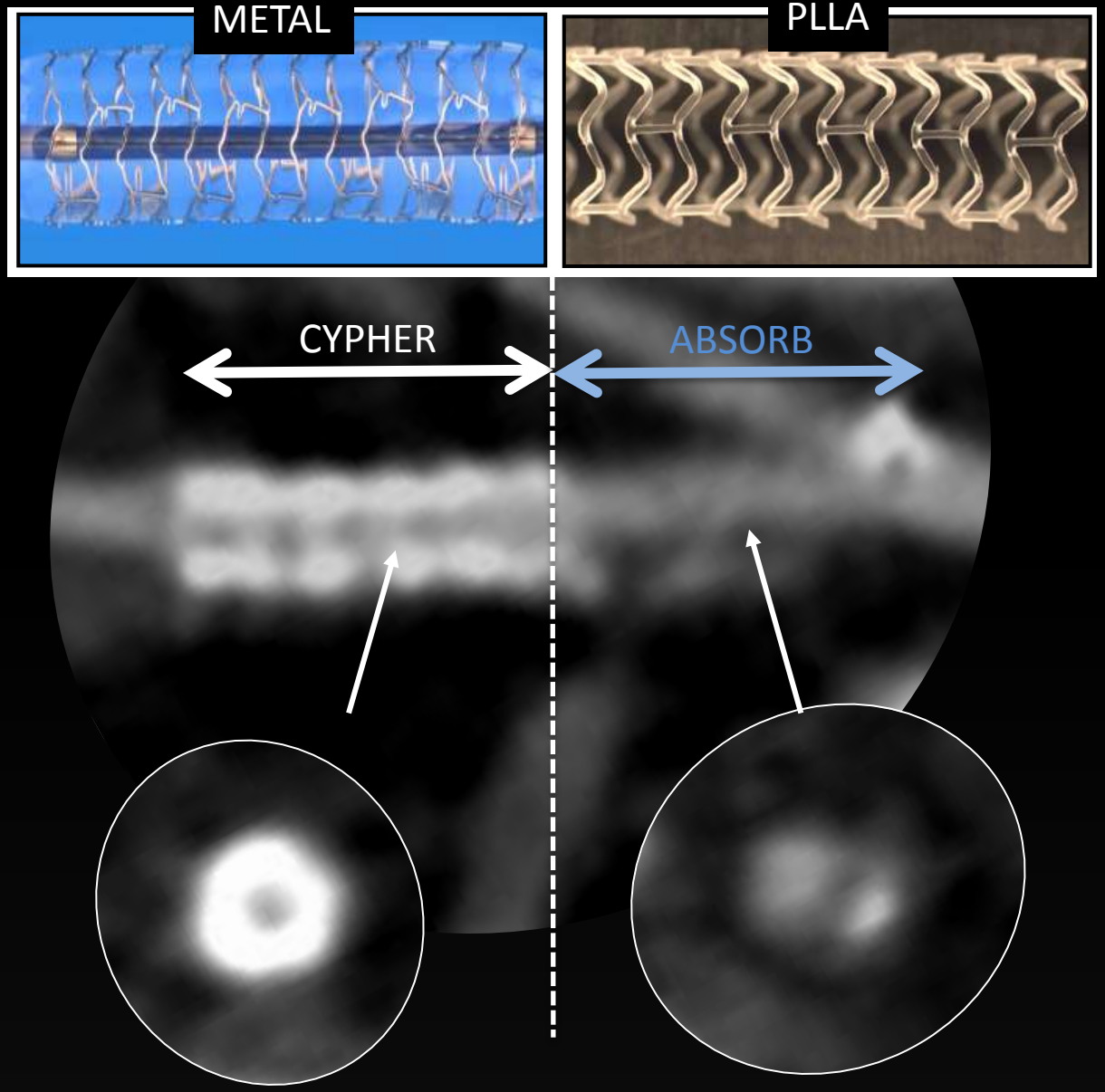

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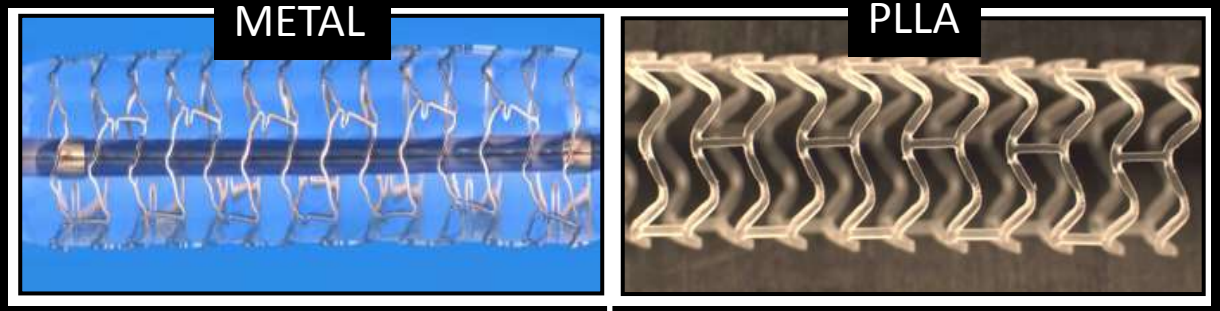

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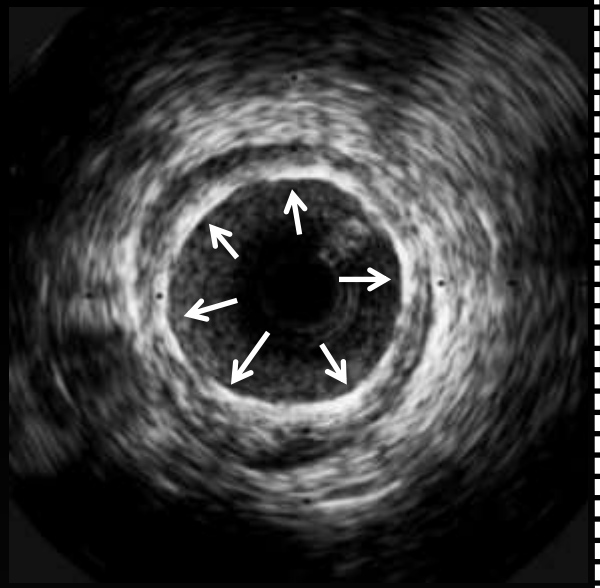

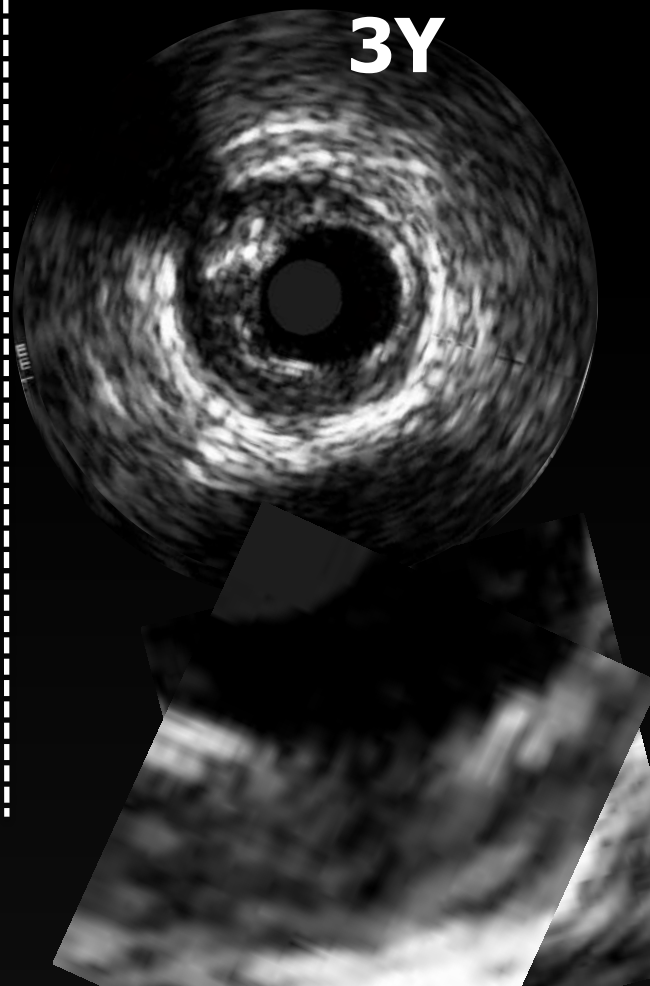

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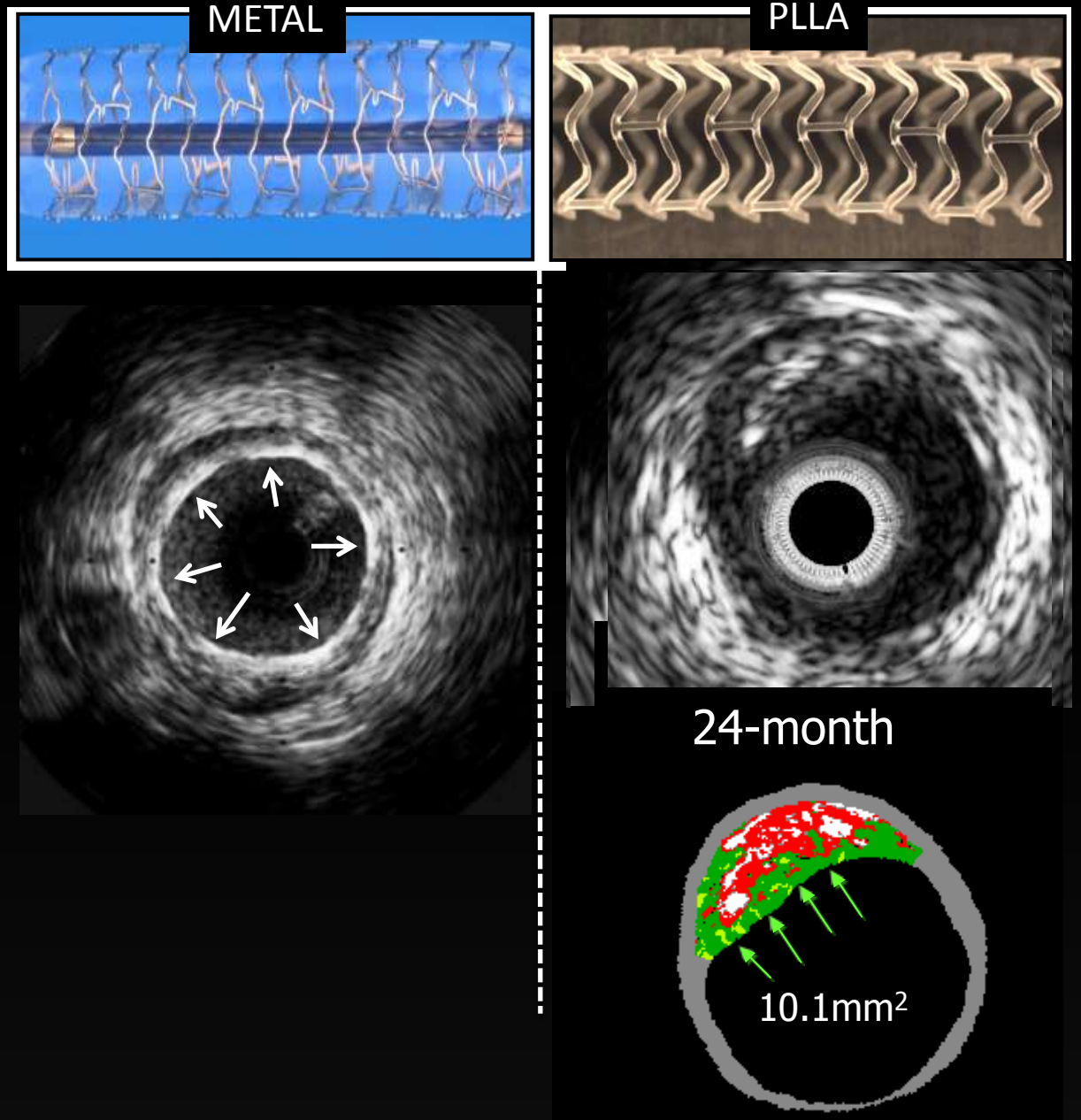

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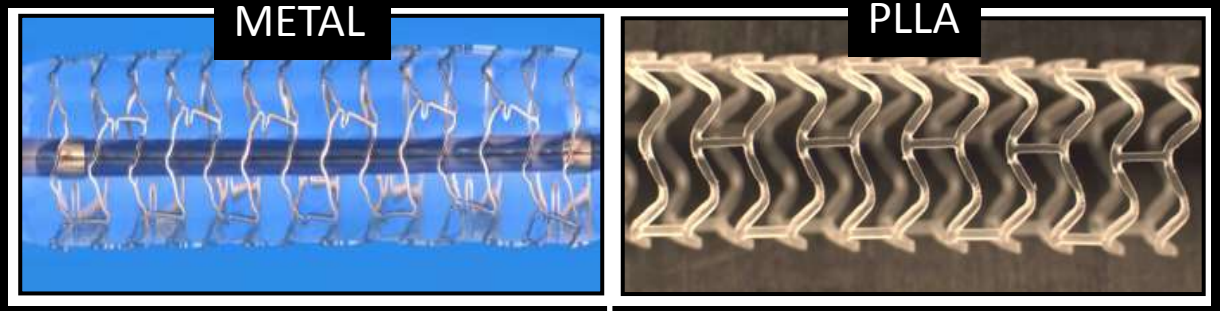

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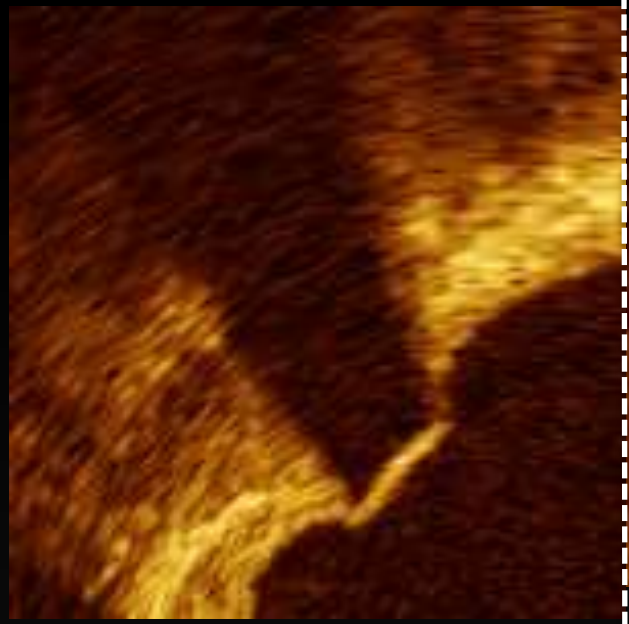
With shadowing



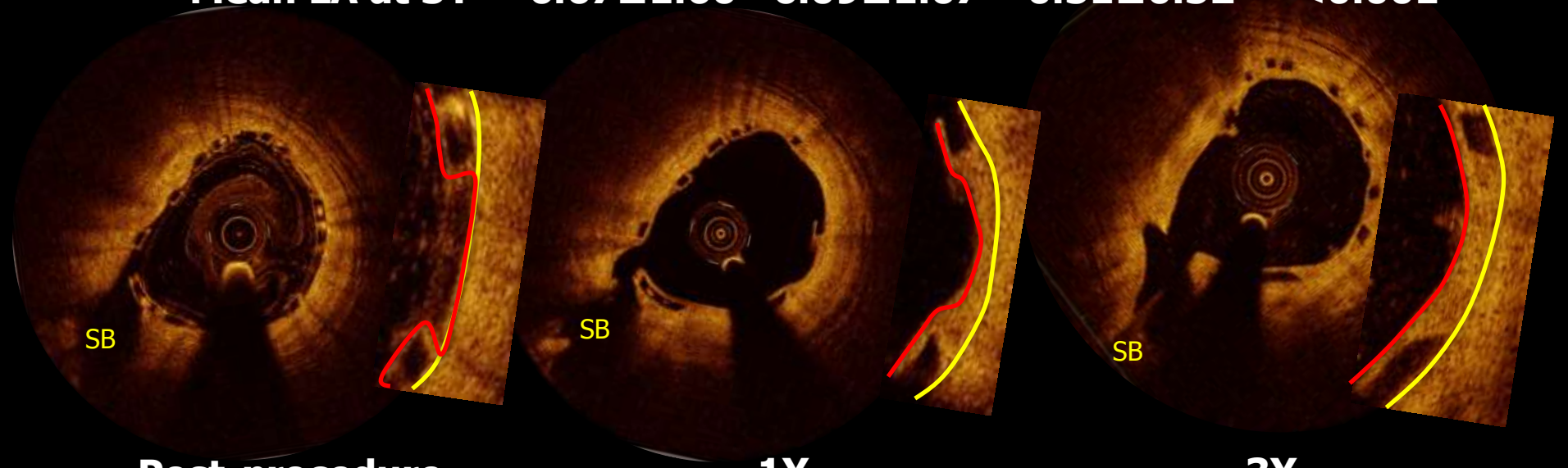
Without shadowing

Nakatani, Sotomi, Serruys, and Onuma et al. EuroIntervention 2015

Discrepancy between IVUS and OCT

Serruys et al . EuroIntervention 2014

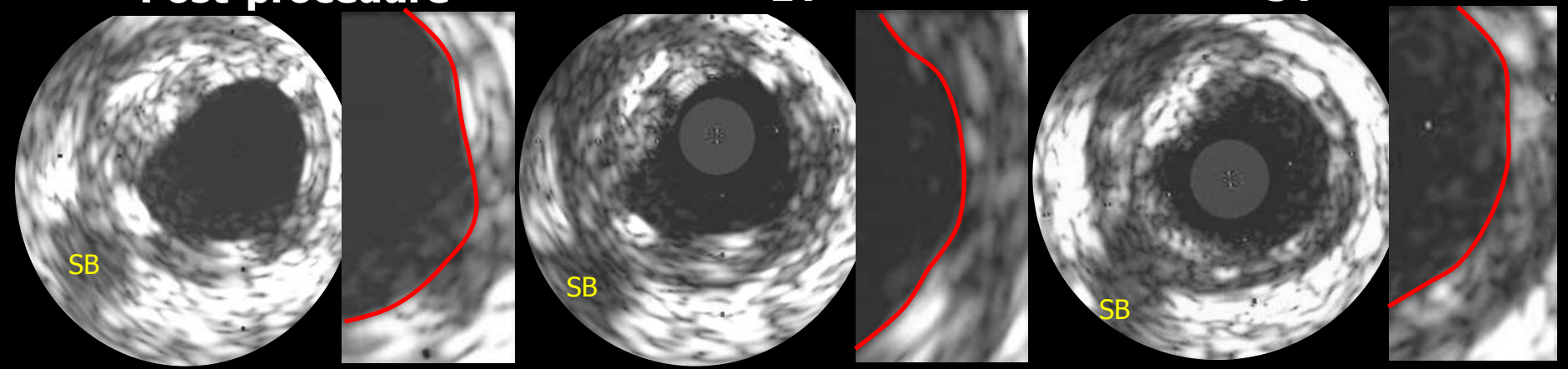
N = 19	IVUS	OCT	Difference IVUS-OCT	p
Mean LA at BL	6.32±0.84	7.72±1.17	-1.40±0.60	<0.001
Mean LA at 1Y	6.22±0.96	6.01±1.29	0.21±0.72	<0.001
Mean LA at 3Y	6.67±1.66	6.09±1.67	0.51±0.52	<0.001



Post-procedure

1Y

3Y



Comparative analysis method of permanent metallic stents (XIENCE) and bioresorbable poly-L-lactic (PLLA) scaffolds (Absorb) on optical coherence tomography at baseline and follow-up

Shimpei Nakatani[1], MD; Yohei Sotomi[2], MD; Yuki Ishibashi[1], MD, PhD; Maik J. Grundeken[2], MD; Hiroki Tateishi[1], MD, PhD; Erhan Tenekecioglu[1], MD; Yaping Zeng[1], MD, PhD; Pannipa Suwannasom[1], MD; Evelyn Regar[1], MD, PhD; Maria D. Radu[3], MD, PhD; Lorenz Räber[4], MD, PhD; Hiram Bezerra[5], MD, PhD; Marco A. Costa[5], MD, PhD; Peter Fitzgerald[6], MD, PhD; Francesco Prati[7,8], MD, PhD; Ricardo A. Costa[9], MD, PhD; Jouke Dijkstra[10], PhD; Takeshi Kimura[11], MD, PhD; Ken Kozuma[12], MD, PhD; Kengo Tanabe[13], MD, PhD; Takashi Akasaka[14], MD, PhD; Carlo Di Mario[15], MD, PhD; Patrick W. Serruys[16]*, MD, PhD; Yoshinobu Onuma[1,17], MD, PhD

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- ***Stent (endoluminal) / Scaffold (abluminal) area***
- ***Lumen area***
- ***Total strut area***
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- ***Malapposed strut assessment***
- ***Incomplete stent apposition (ISA) area***
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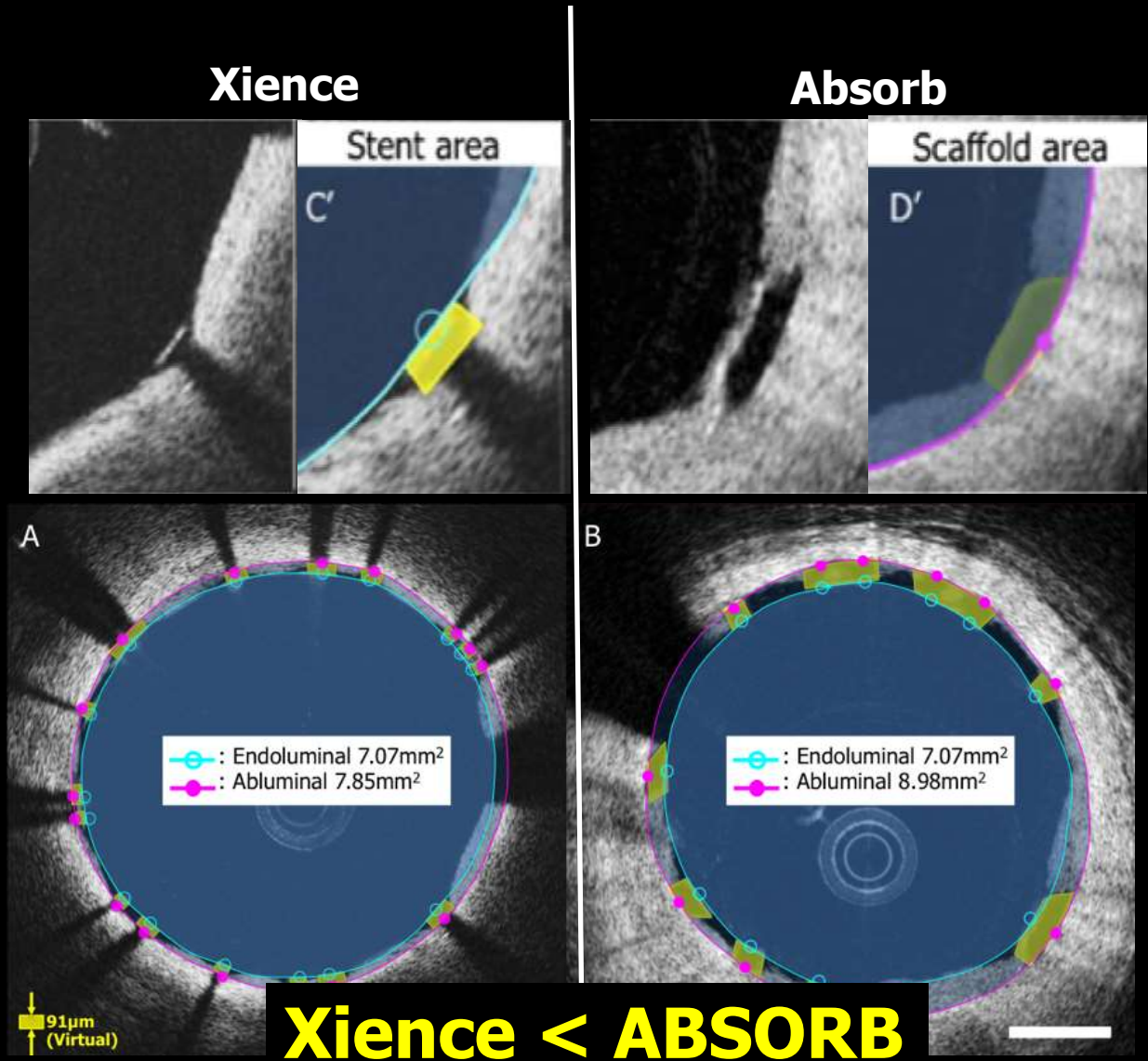

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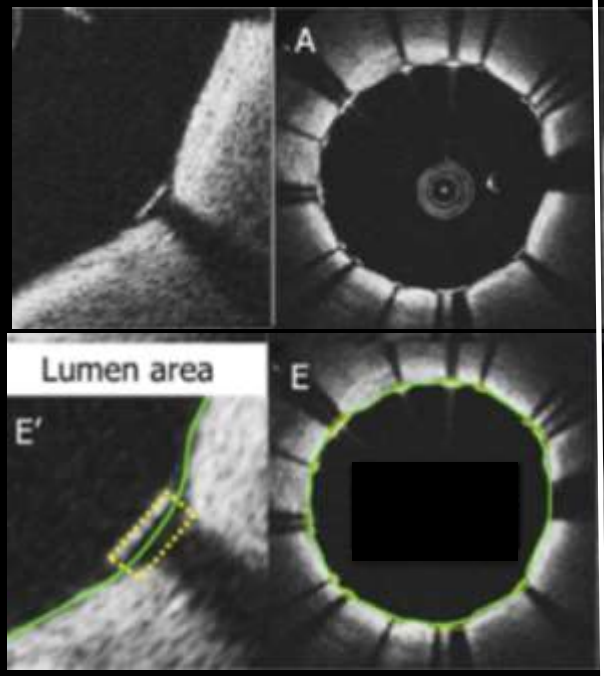
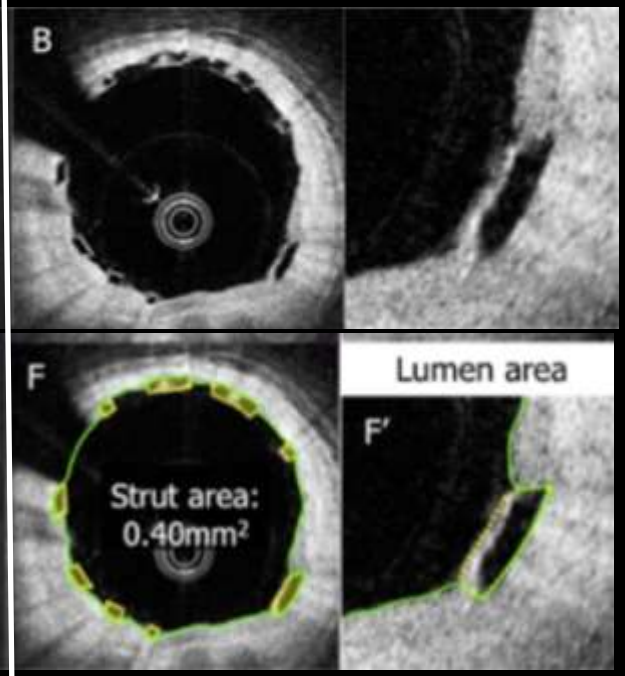
Xience



Stent area excluded (embedded) or partly included in lumen area

Absorb



Strut area included in lumen area

Xience < ABSORB

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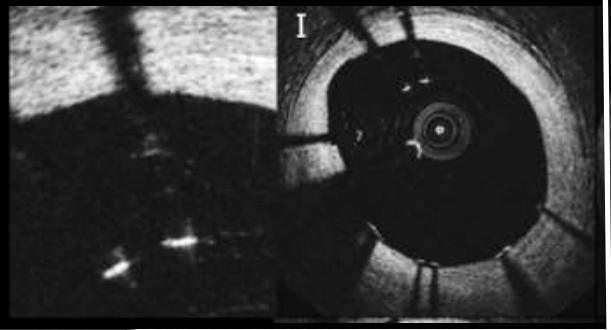
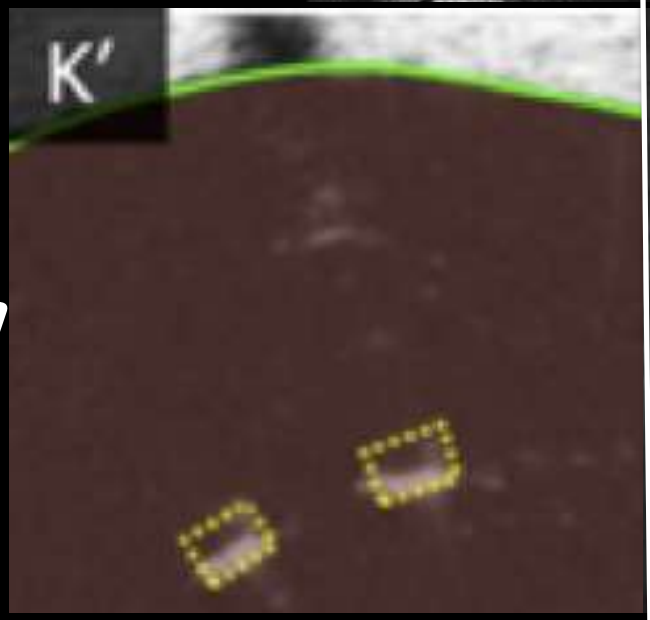
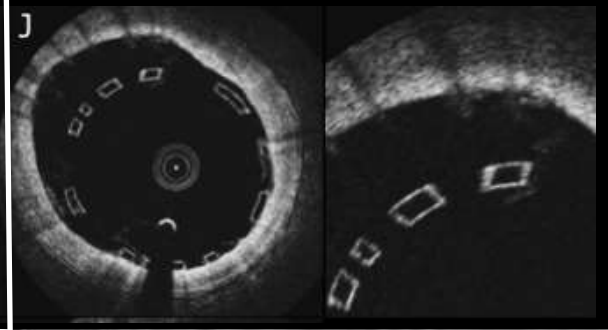
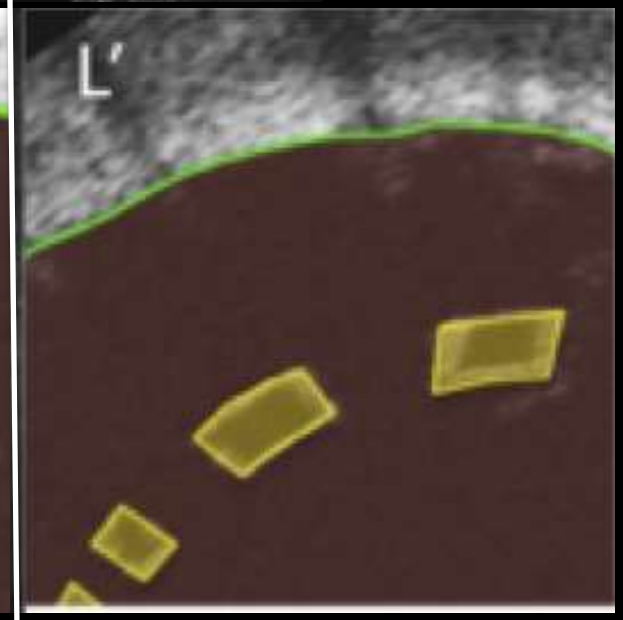




Strut area not measured

Absorb





Strut area measured

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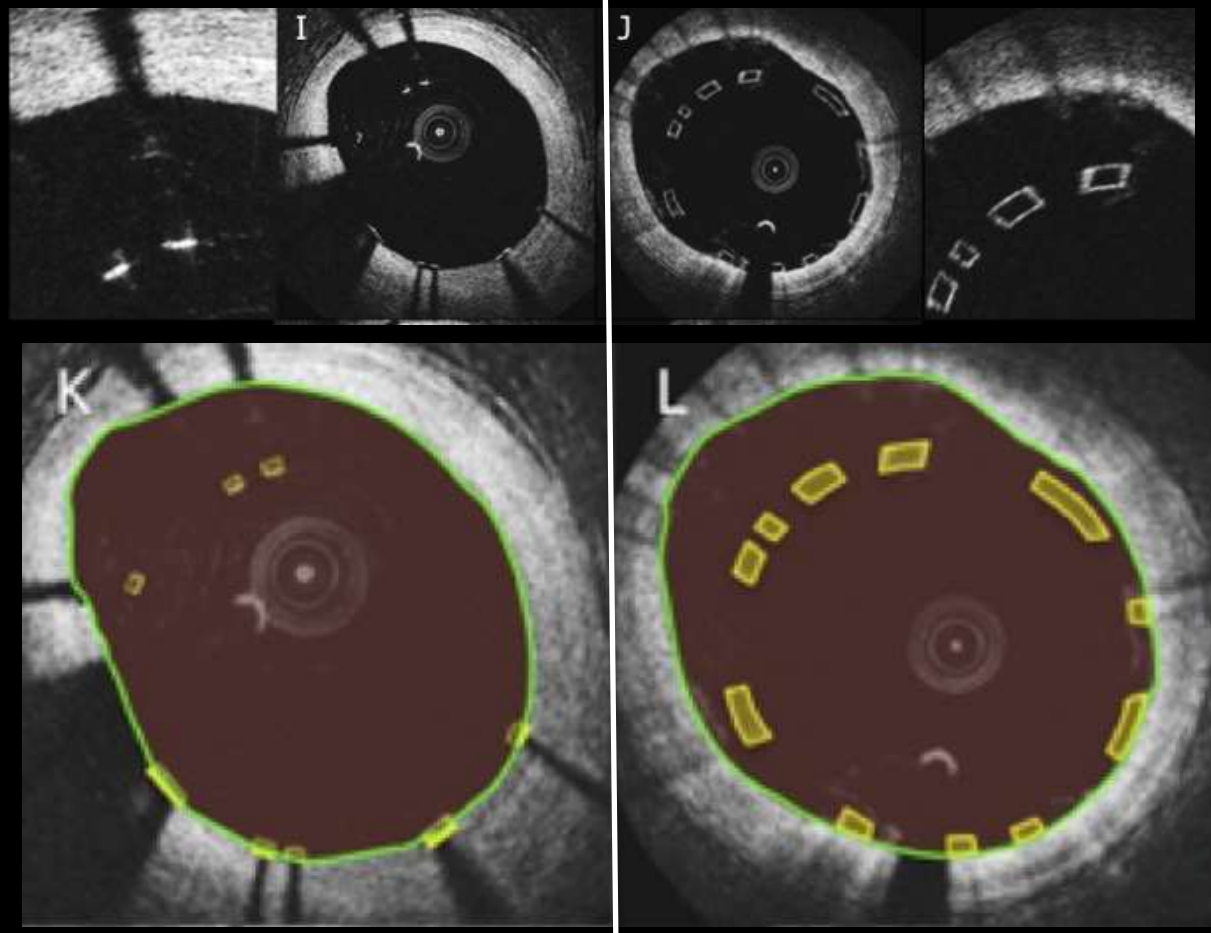
Xience | **Absorb**



Including malapposed struts (~0.2-0.3mm^2)

Excluding malapposed struts (~0.41mm^2)

Xience > ABSORB

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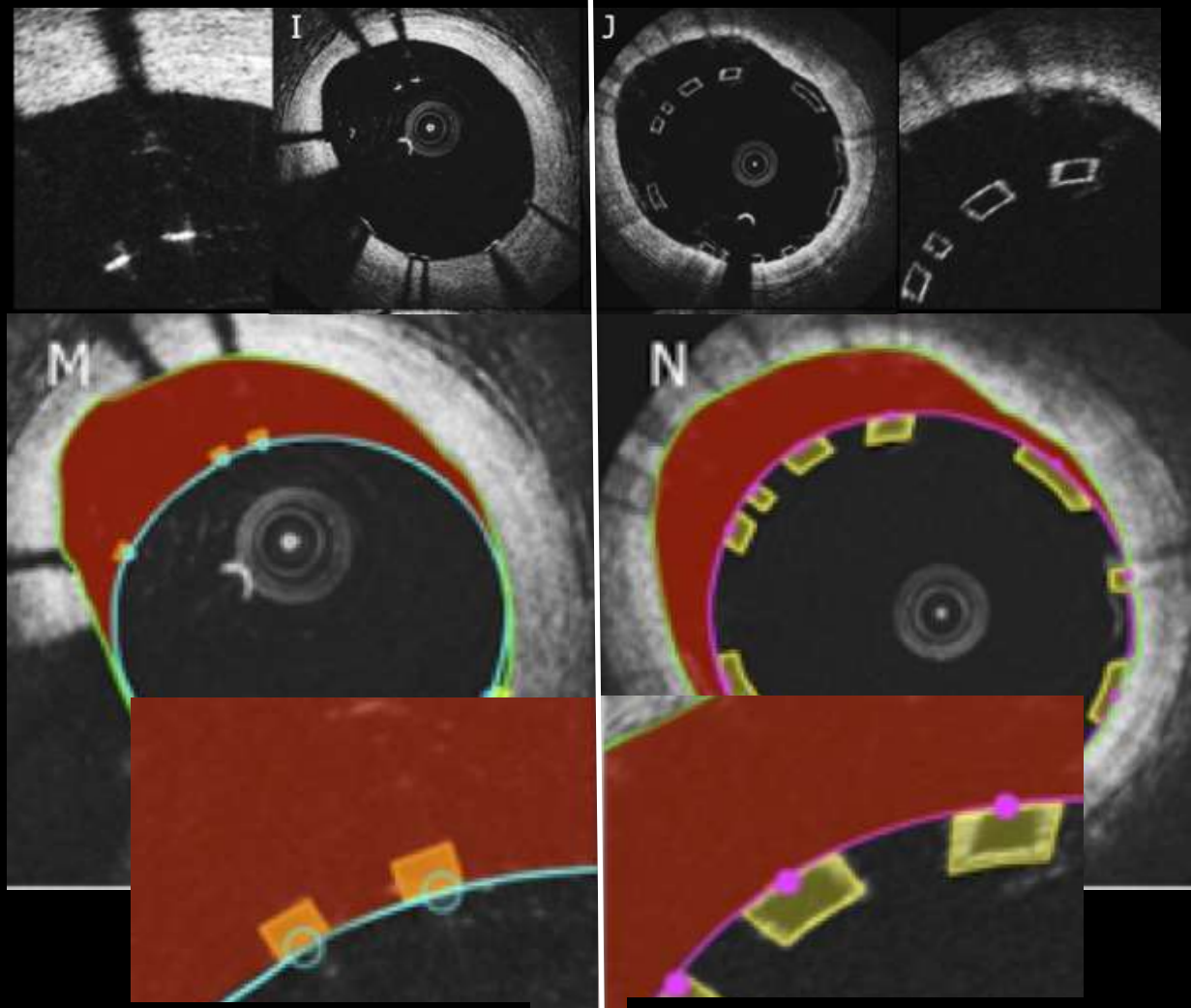

Including struts | **Excluding struts**

ISA area: Xience > ABSORB

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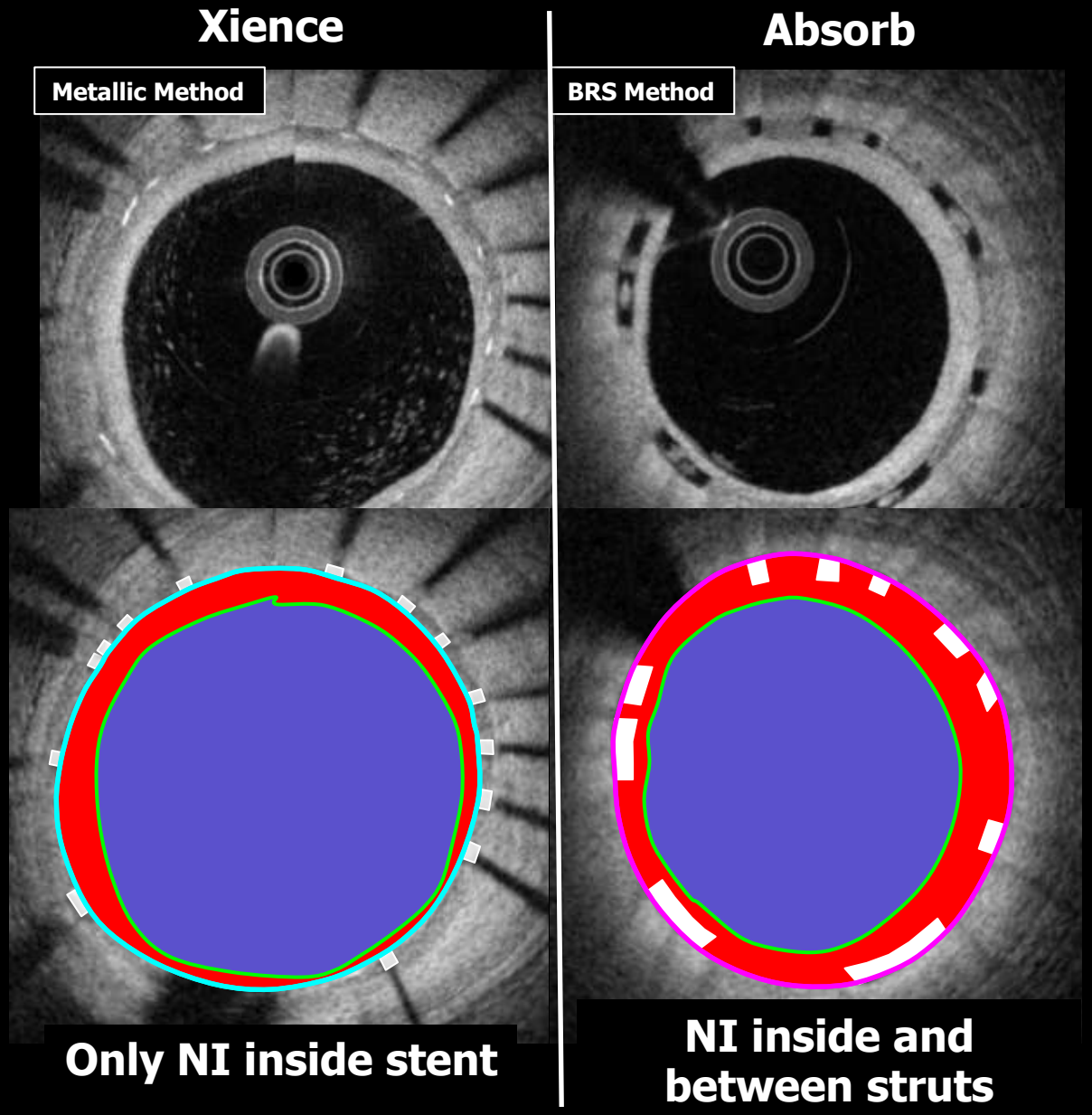

Neointima: Xience < ABSORB

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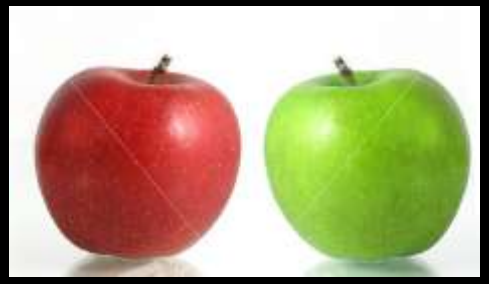

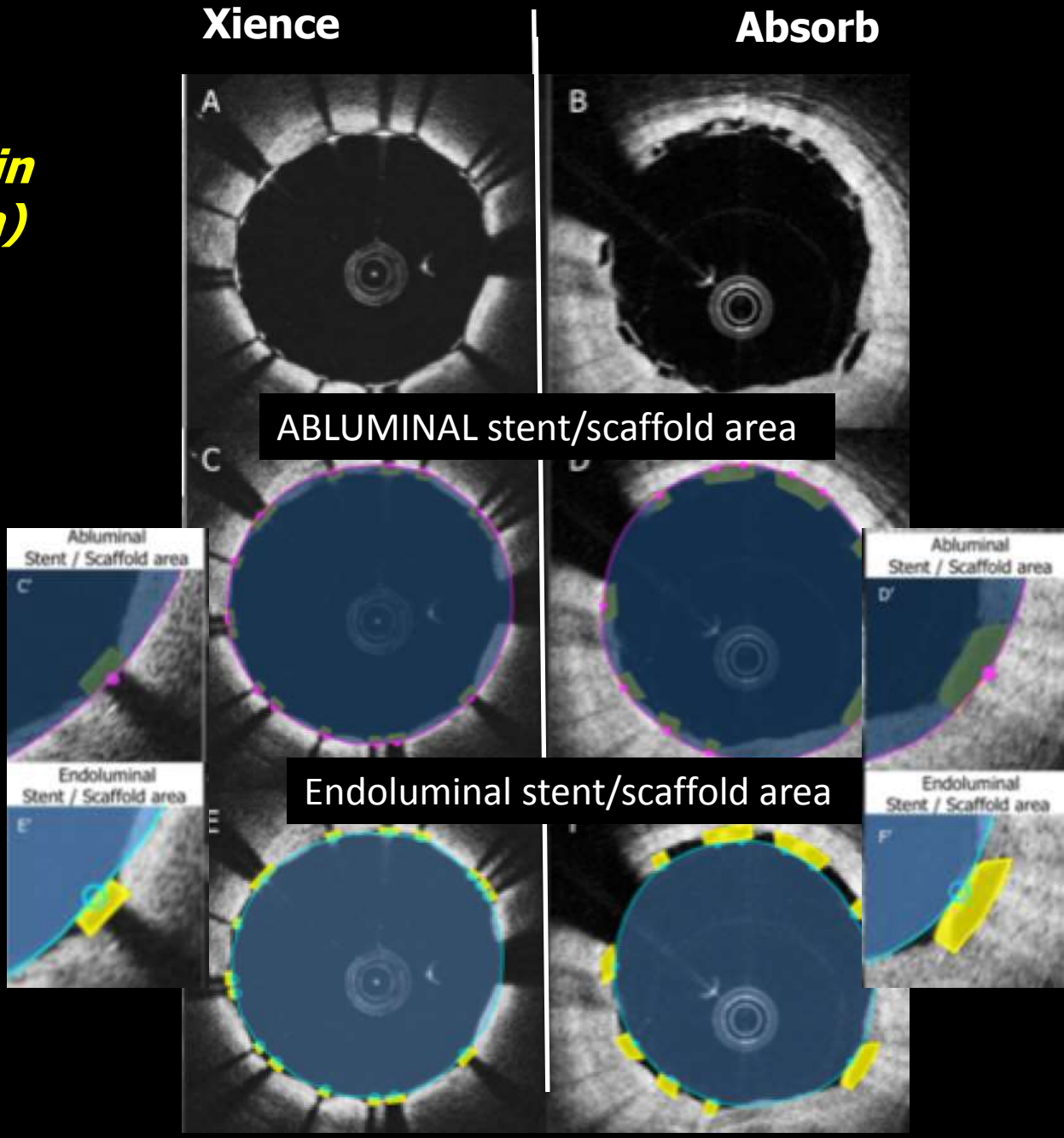

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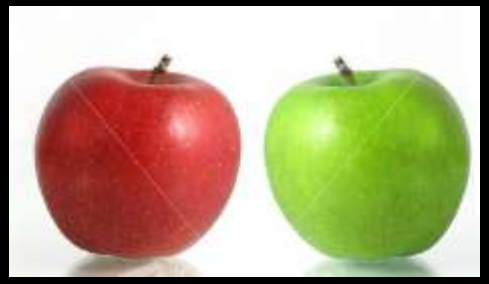

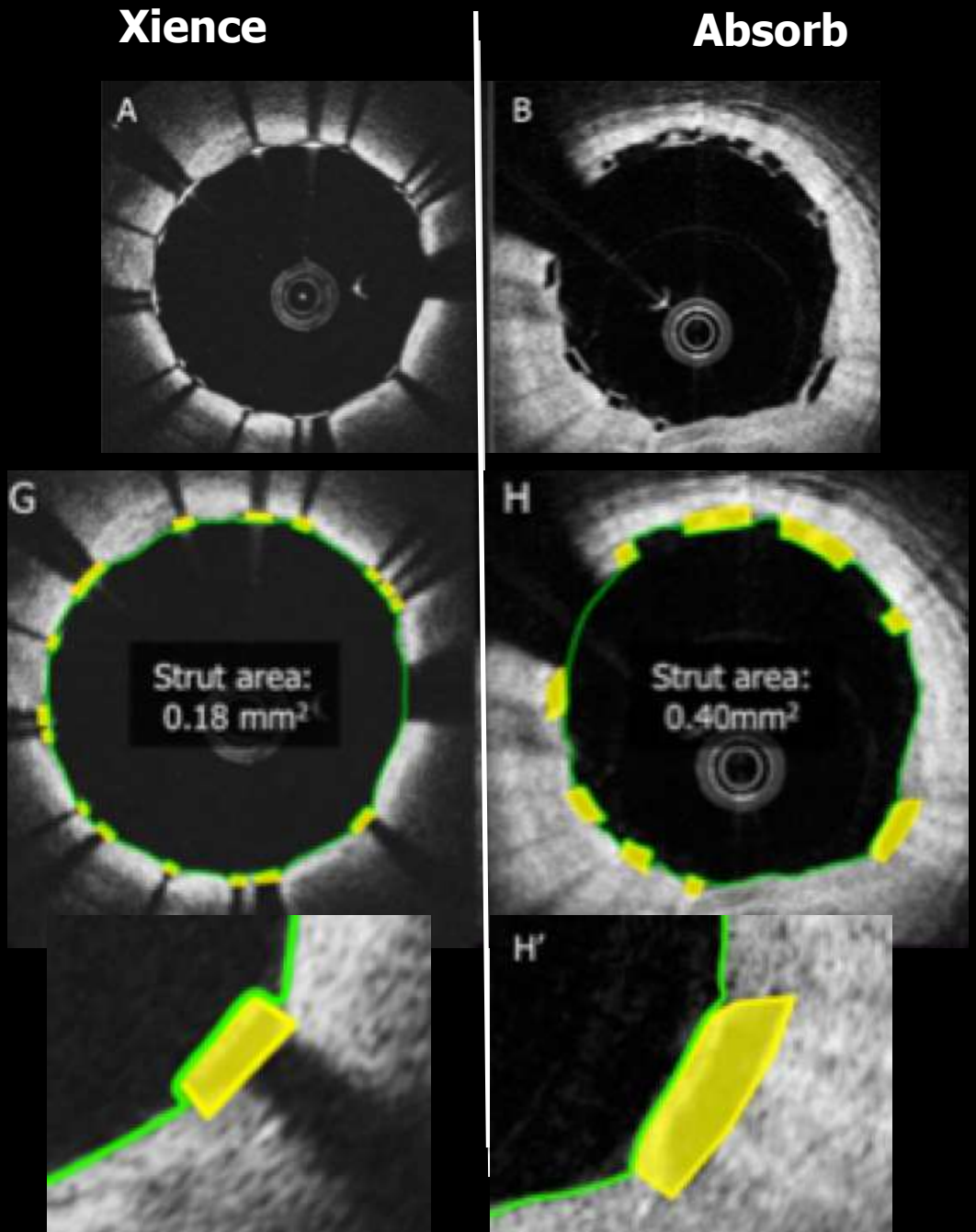

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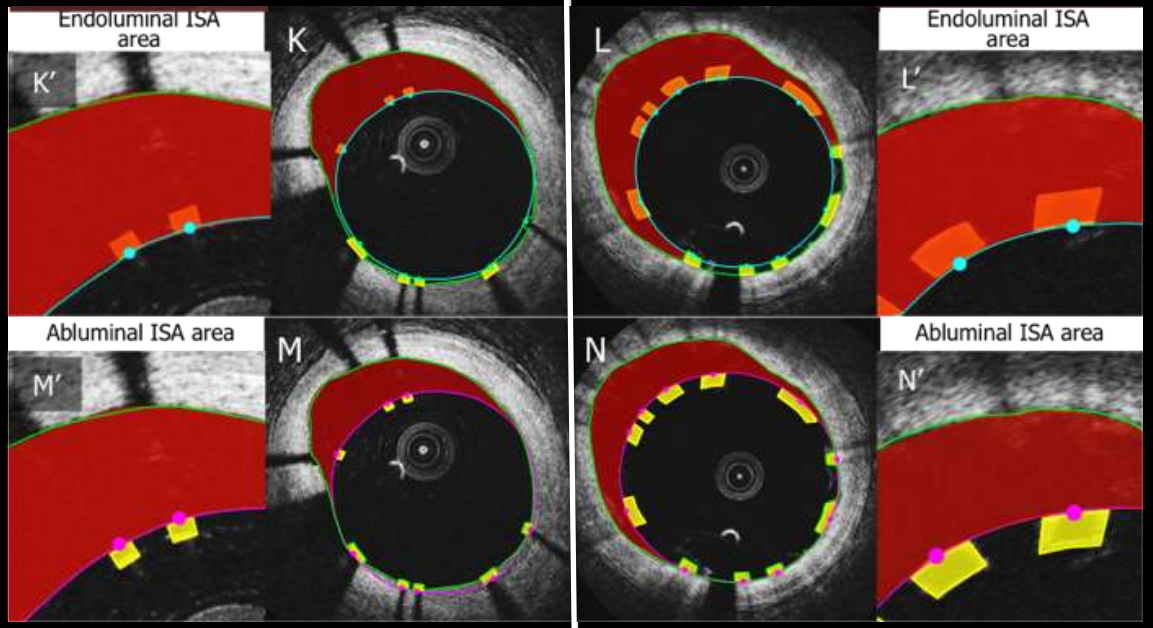

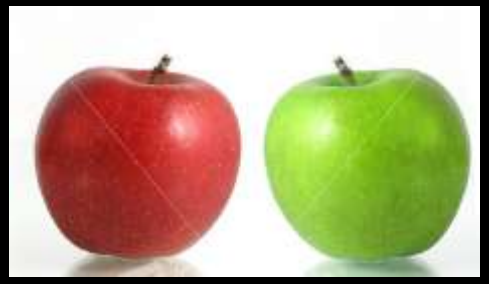

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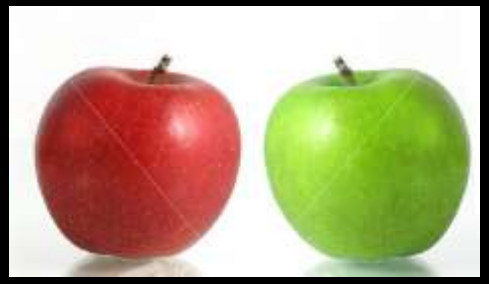

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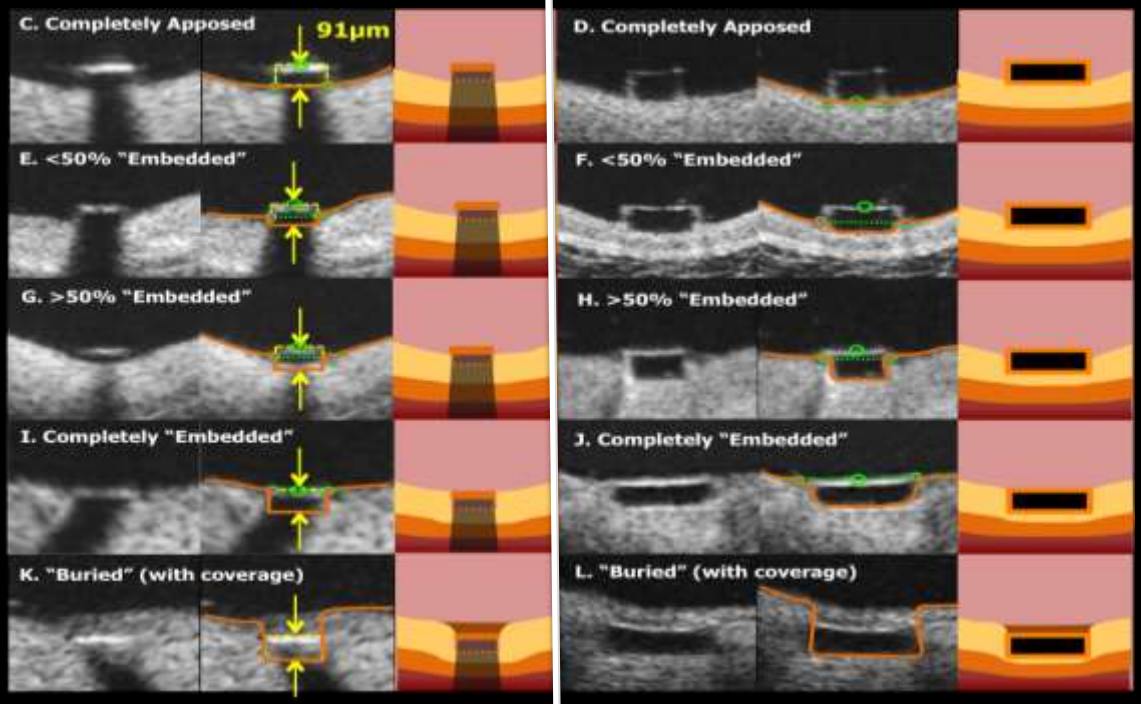

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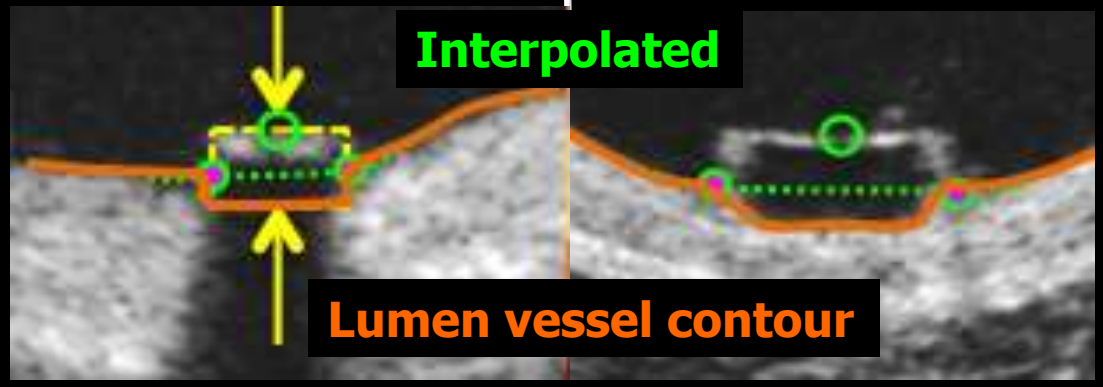

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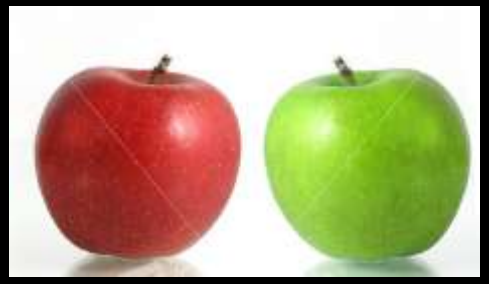

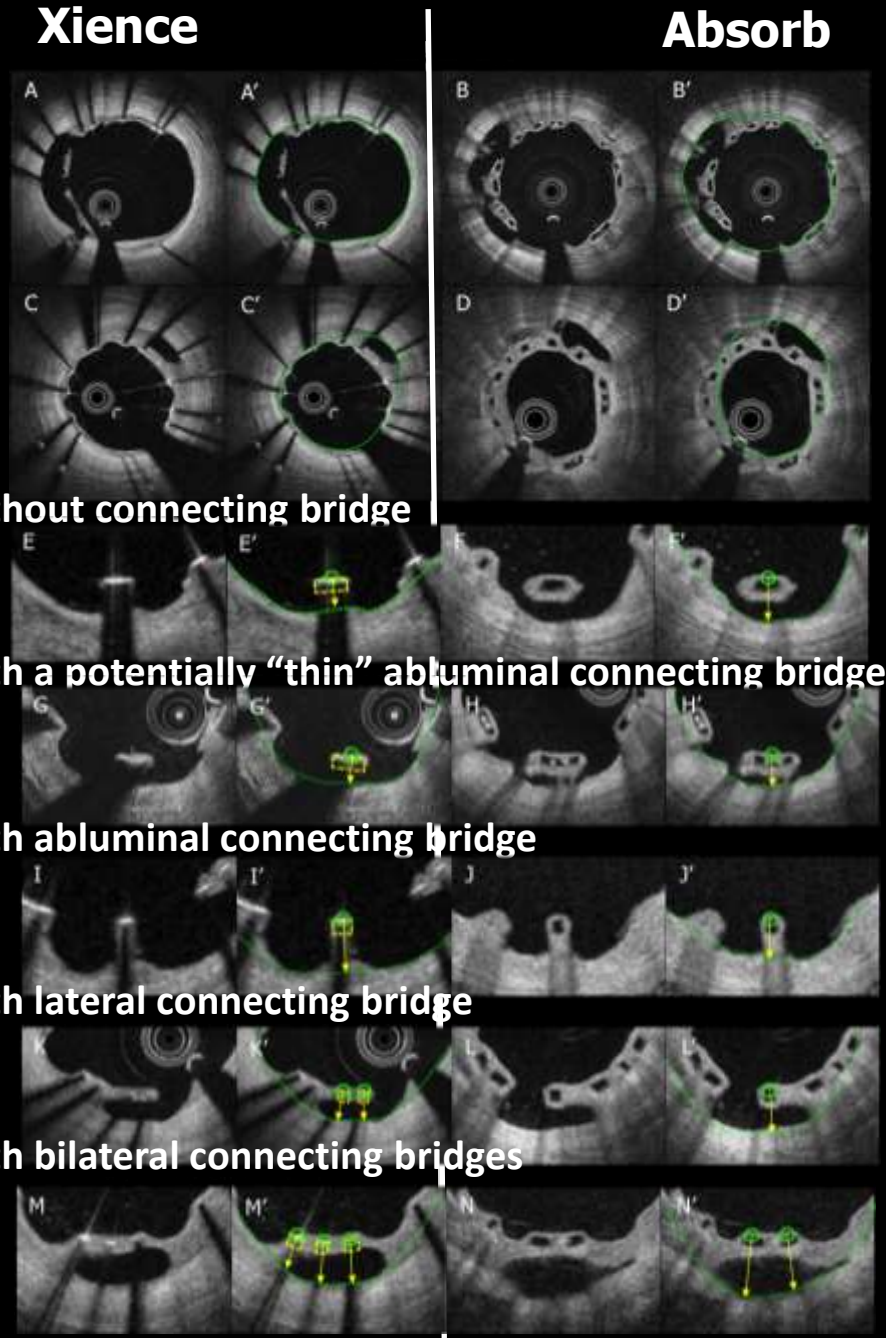

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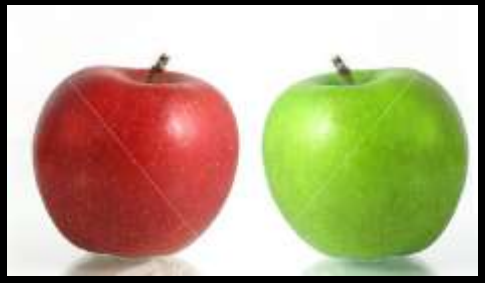
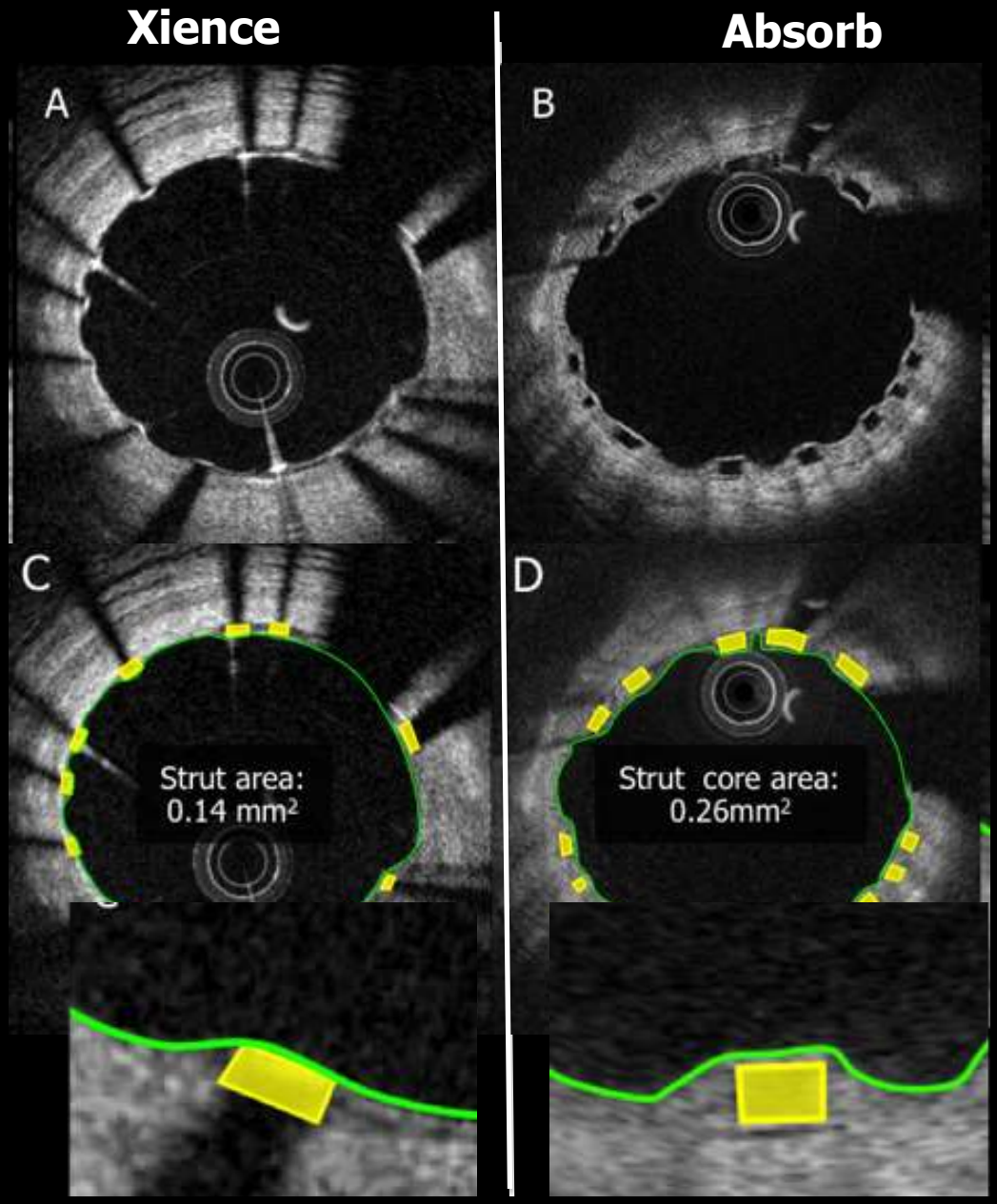
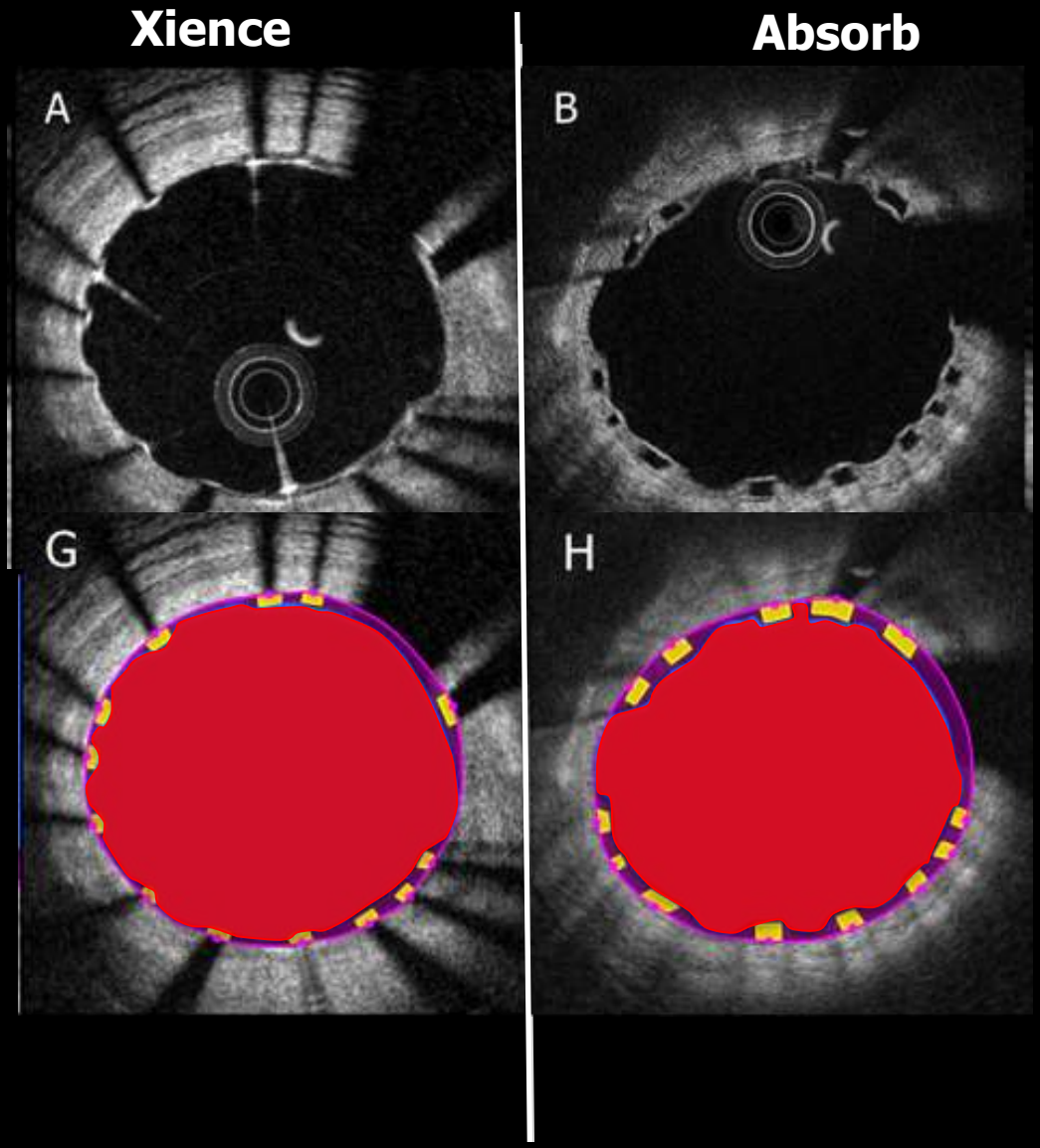


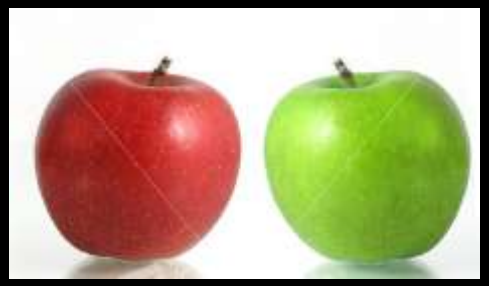


Virtual measurement vs. Real measurement

#2. Proposed Comparative Analysis Methods

- Stent/scaffold area (*Abluminal/Endoluminal stent/scaffold area)*
- Lumen area
- ISA area
- Embedment
- Interpolated Lumen contour
- Neointimal Bridge
- Strut area
- **Flow area**
- **Neointimal area**





Flow area is comparable using the endoluminal and abluminal contours.

#2. Proposed Comparative Analysis Methods

- Stent/scaffold area (*Abluminal/Endoluminal stent/scaffold area)*
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- Embedment
- Interpolated Lumen contour
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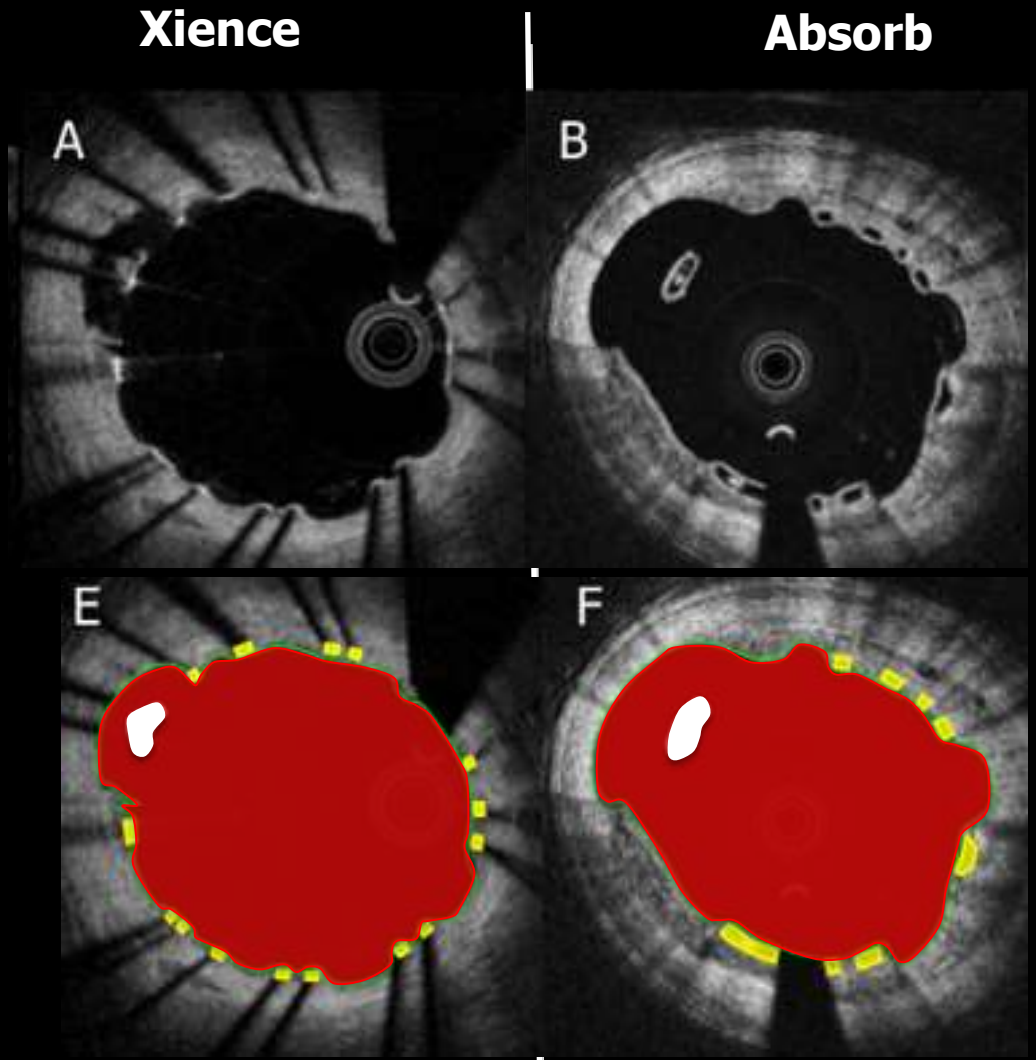
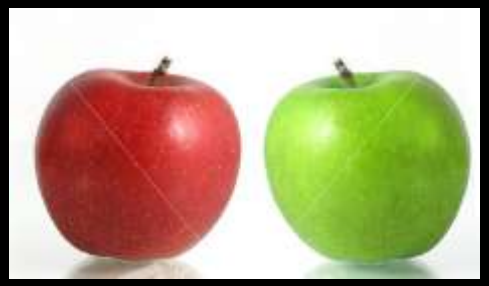
- **Neointimal area**



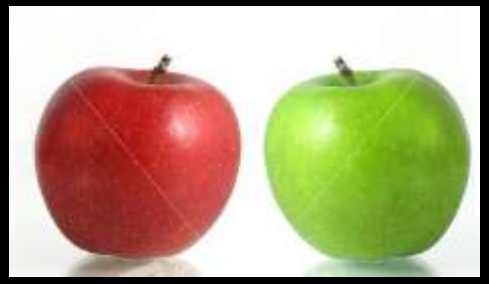


#2. Proposed Comparative Analysis Methods

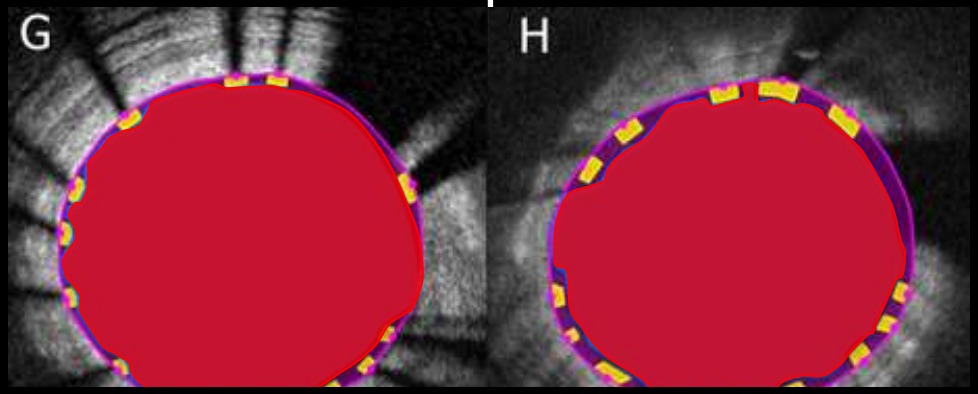
Neointimal area

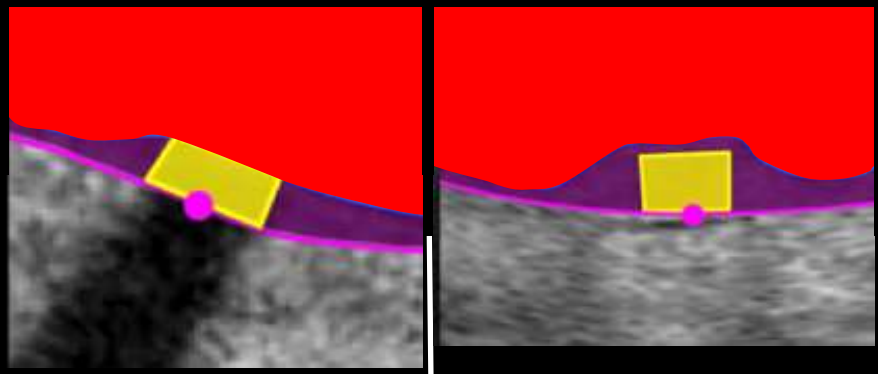
Neointimal area including neointima between and on-top of the struts
= Abluminal stent contour (virtual or real)
– lumen (flow) contour
– strut area

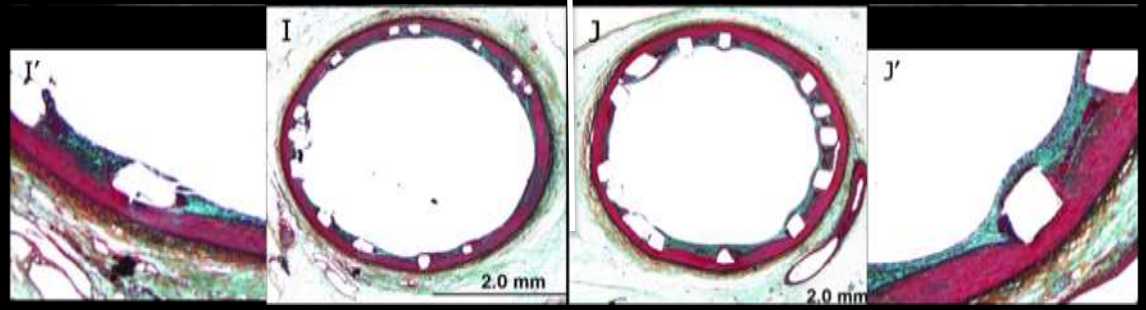
- Stent/scaffold area (*Abluminal/Endolumin al stent/scaffold area*)
- Lumen area
- ISA area
- Embedment
- Interpolated Lumen contour
- Neointimal Bridge
- Strut area
- Flow area
- **Neointimal area**



Xience | **Absorb**







Discrepancy between OCT and Angiography measurements

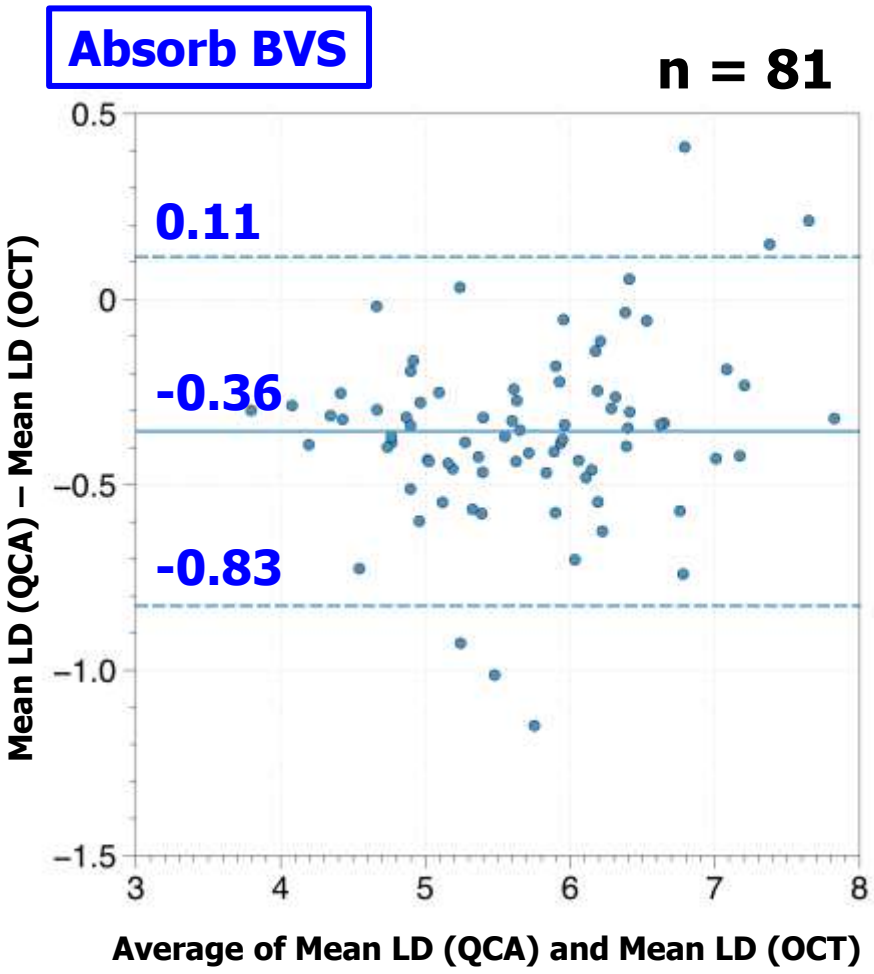
Comparison of BRS and DES

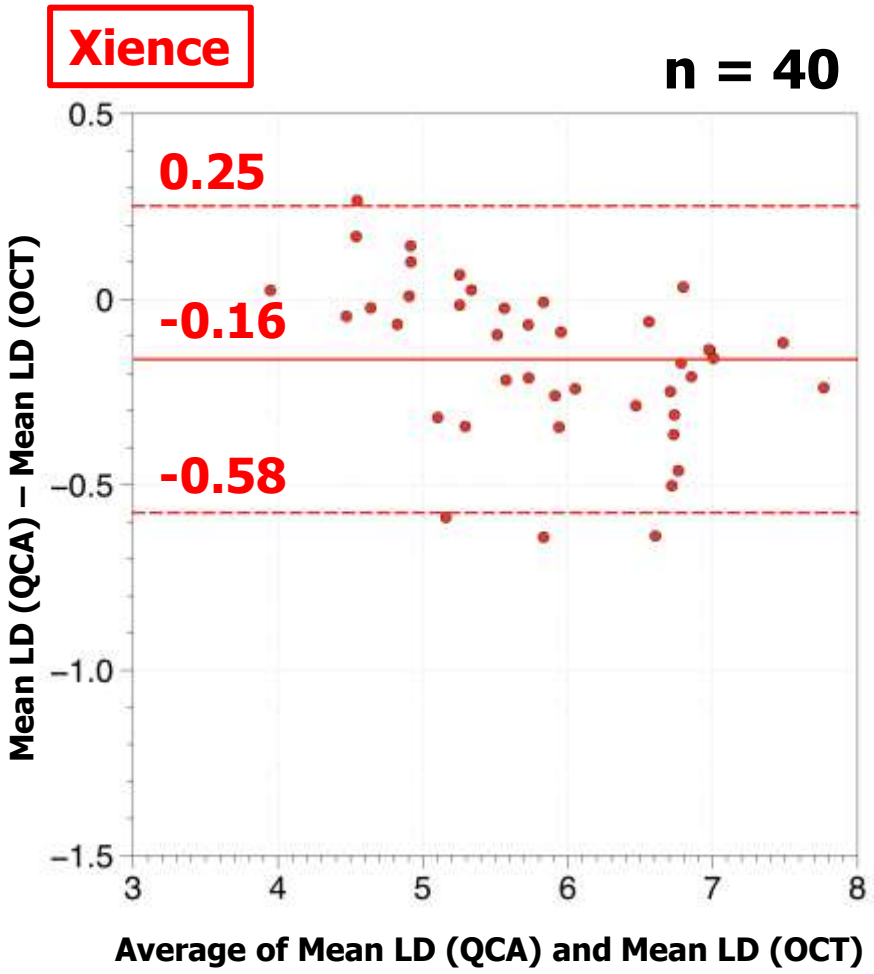
Collaboration with …

Takeshi Kimura: Kyoto university
Gregg W. Stone : Cardiovascular Research Foundation
Jeffrey J. Popma: Beth Israel Deaconess Medical Center
Yoshinobu Onuma: Erasmus medical center
Patrick W Serruys: Imperial College London
and
Academic researh team of Cardialysis

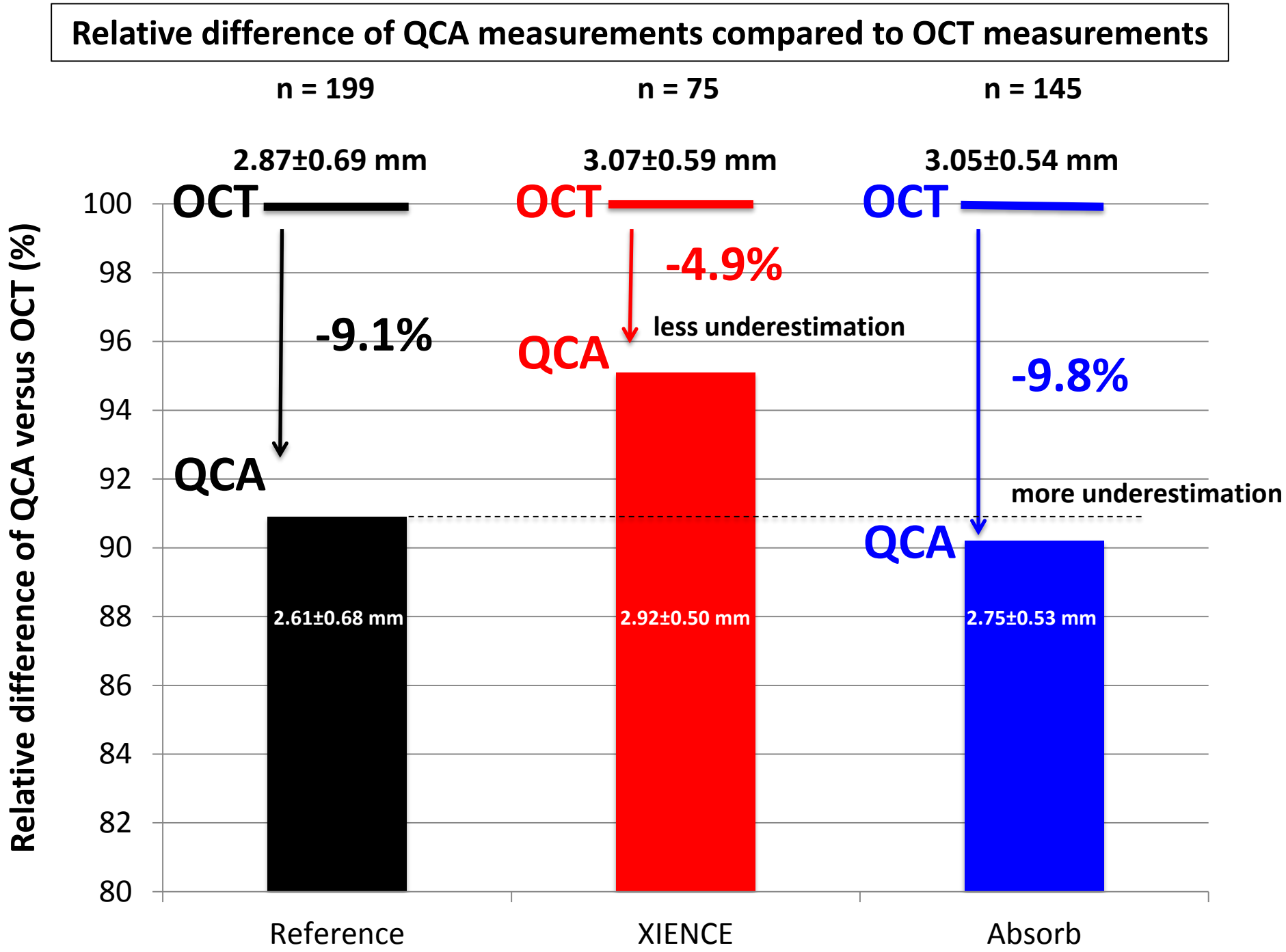
QCA potentially underestimates MLD with BVS compared to Xience as demonstrated by OCT …

Agreement between Mean LD (QCA) and Mean LD (OCT)





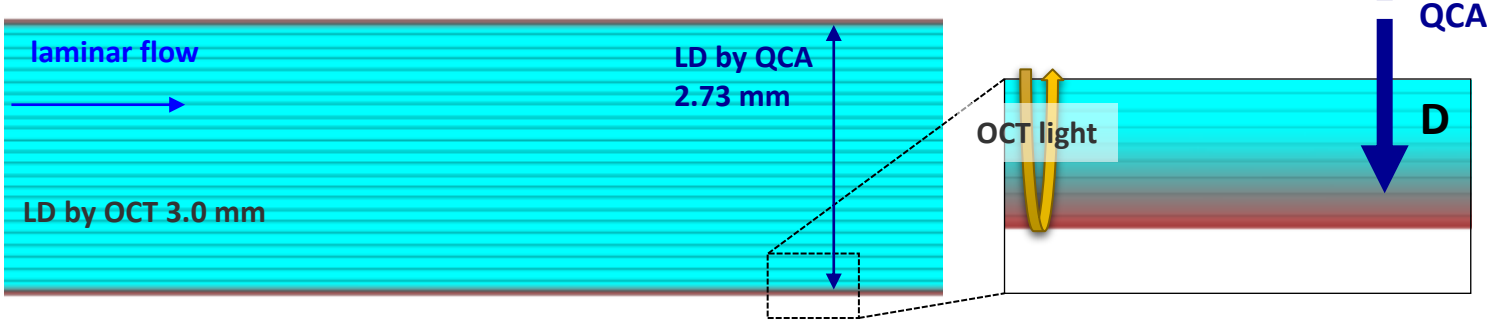
QCA: A single monoplane view was analyzed per lesion treated.

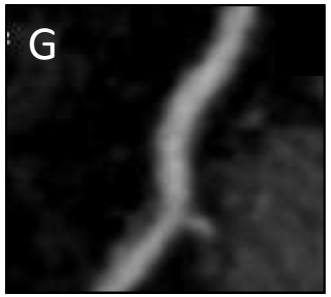

Relative difference of QCA measurements compared to OCT measurements
n = 199
n = 75
n = 145
2.87±0.69 mm
3.07±0.59 mm
3.05±0.54 mm
OCT
OCT
OCT
-9.1%
-4.9%
less underestimation
-9.8%
more underestimation
QCA
QCA
QCA
2.61±0.68 mm
2.92±0.50 mm
2.75±0.53 mm
Relative difference of QCA versus OCT (%)
100
98
96
94
92
90
88
86
84
82
80
Reference
XIENCE
Absorb

Possible causes of QCA-OCT discrepancy

Native vessel

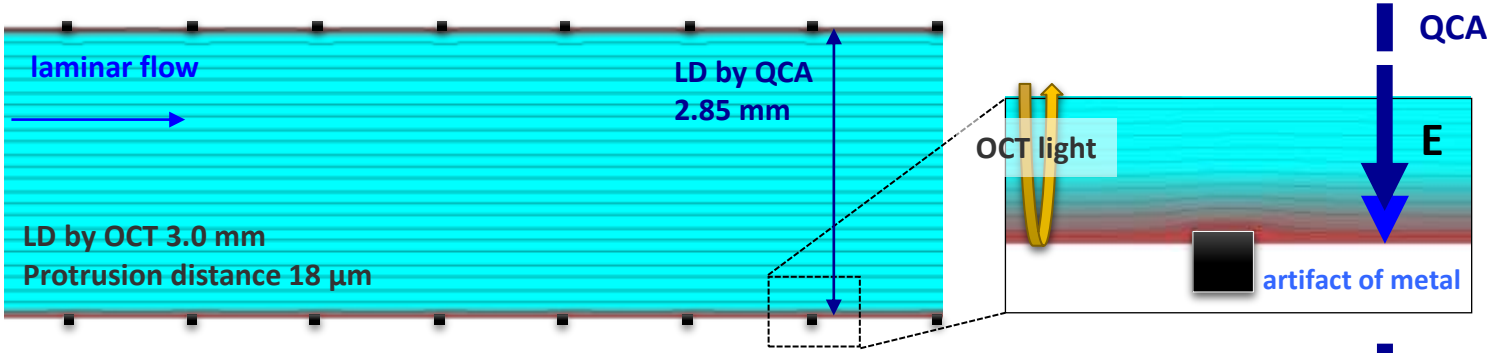
A

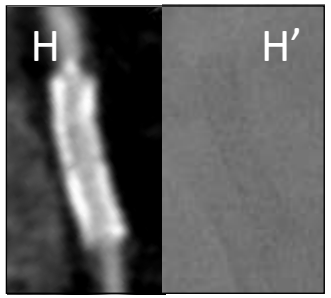




Stented vessel

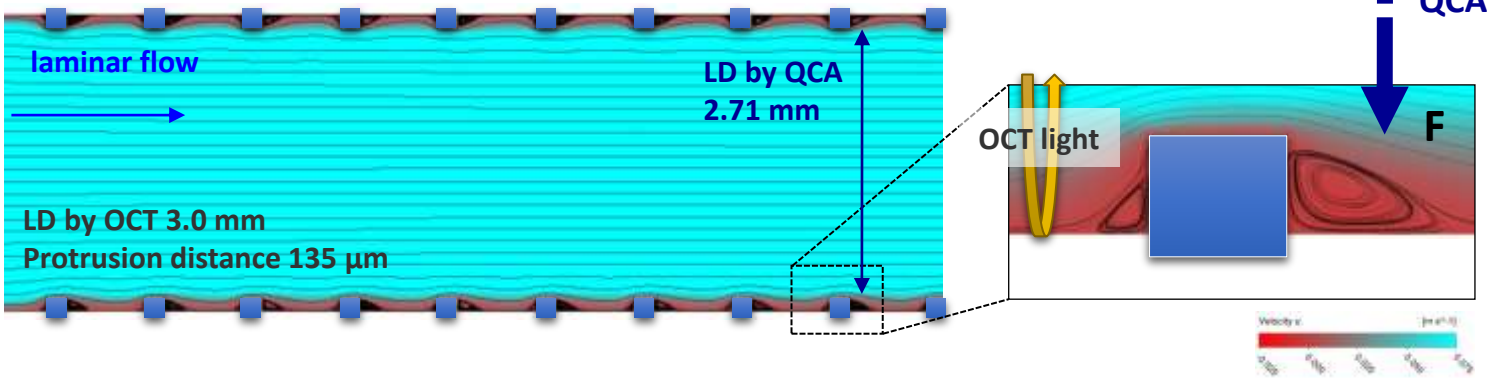
B

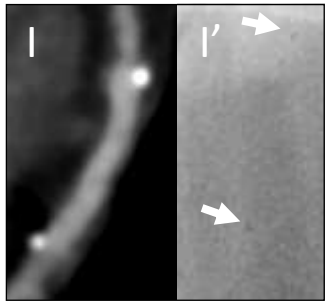




Scaffolded vessel

C





Conclusions

- **We presented a standardised OCT measurement methodology. This should be implemented in ongoing and future trials comparing the Absorb scaffolds and metallic stents.**

- **Using OCT and untreated segment as a method and vessel of reference, it is demonstrated that QCA is differently affected by the presence of a metallic stent or a polymeric scaffold; a fact that has a significant impact on the QCA assessment of acute gain and post-procedural MLD.**

Thank You!

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EDITORIAL

ASIA-PACIFIC HOTLINES AT TCT 2015

HOW SHOULD I TREAT?