

*Optical Coherence
Tomographic Analysis of
Sirolimus-Eluting Stent*

Mitsuyasu Terashima, MD

Toyohashi Heart Center

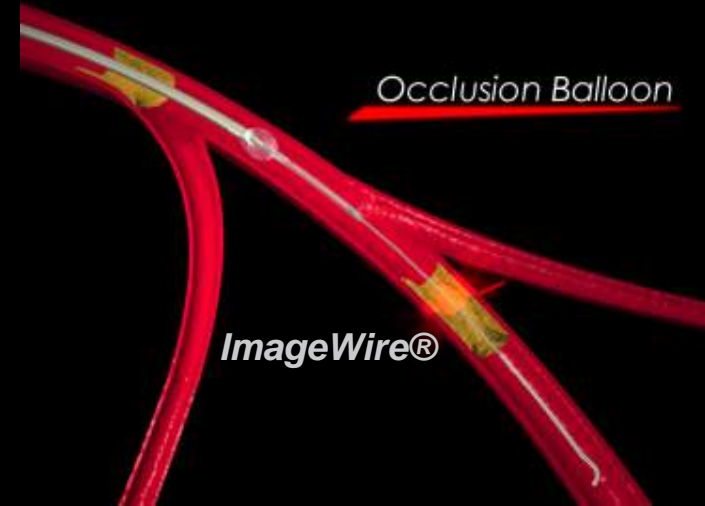


Lightlab OCT Imaging System

Console



Probe interface unit
motor drive unit
&
motorized pullback unit
(1.0mm/sec)



OCT image wire (ImageWire®)

- ✓ 1310 nm broadband light source
- ✓ 0.014 inch at the tip, 0.016 inch at the lens
- ✓ resolution: 10 ~ 15 μ m
- ✓ frame rate: 15fps

Balloon occlusion-flushing catheter

- ✓ 4Fr. catheter with high compliance balloon
- ✓ balloon size: 3.8mm @ 0.3 atm

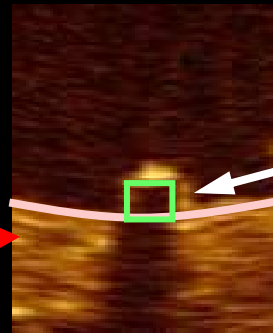
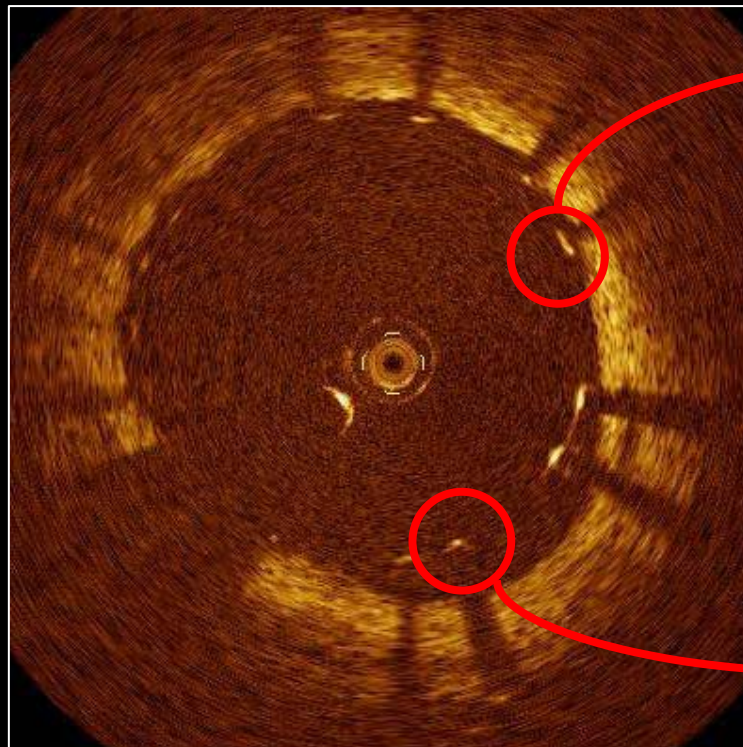


Implantation of SES



OCT Image of Implanted stent Just after Deployment

Complete stent apposition (CSA)



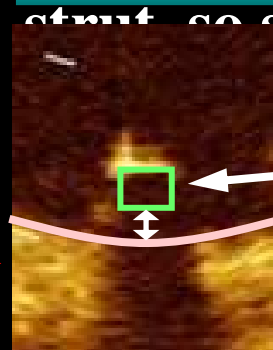
Stent Strut

\leq thickness of struts

Dorsal

Near infrared light used in OCT

Incomplete stent apposition (ISA)



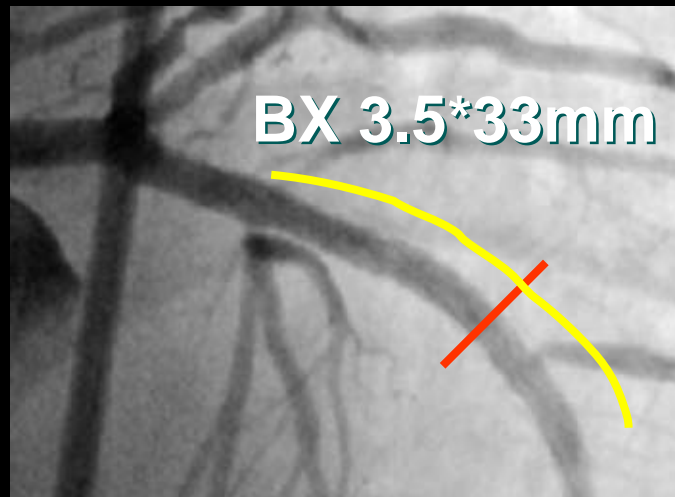
Stent Strut

thickness of struts

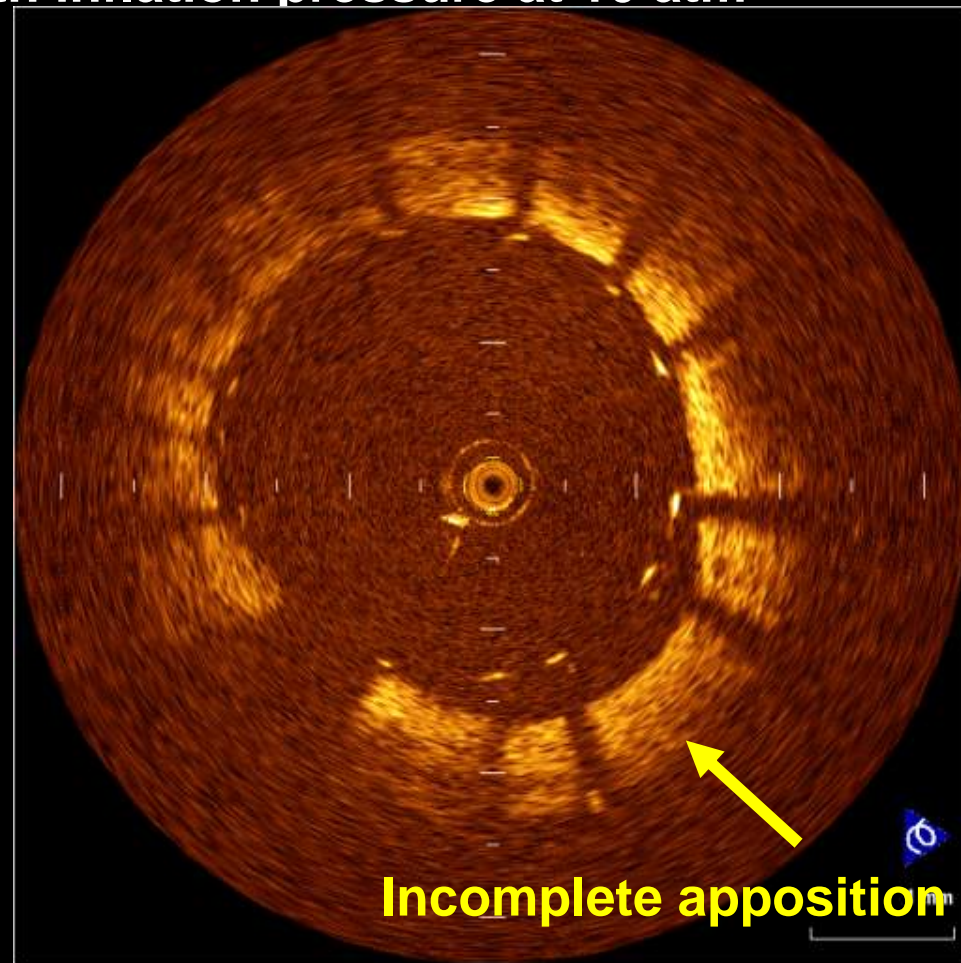
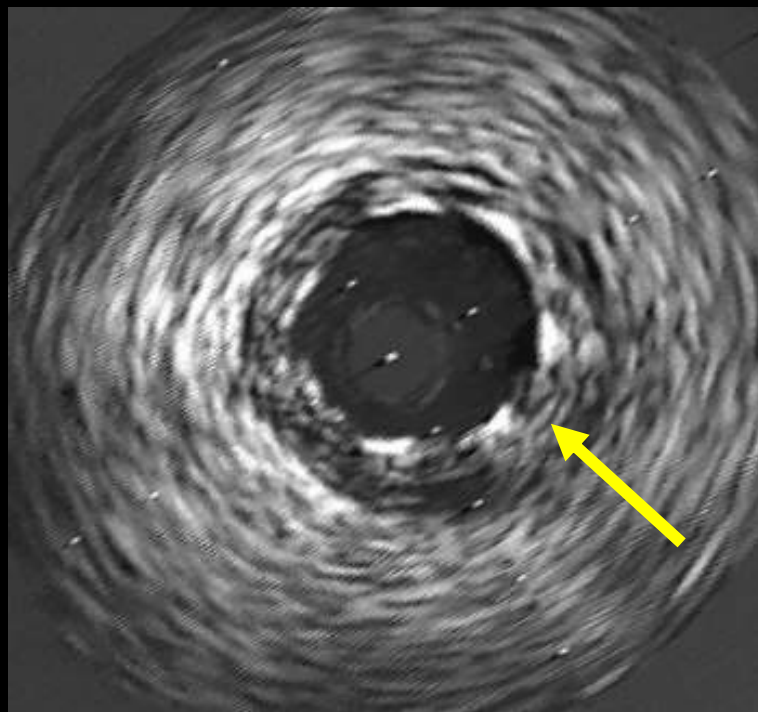
stent is visualized as highly reflective structures of the stent due to the typical dorsal shadowing in OCT.



Incomplete apposition



After stenting of the mid-LAD
with inflation pressure at 10 atm




Post Dilatation of Incompletely Apposed Stent

10 atmosphere



Adjunctive ballooning at
20 atmosphere

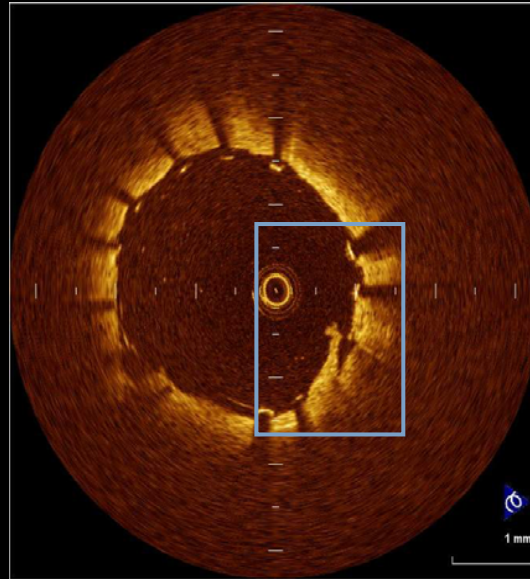


Incomplete apposition  [*Toyohashi Heart Center*](#)

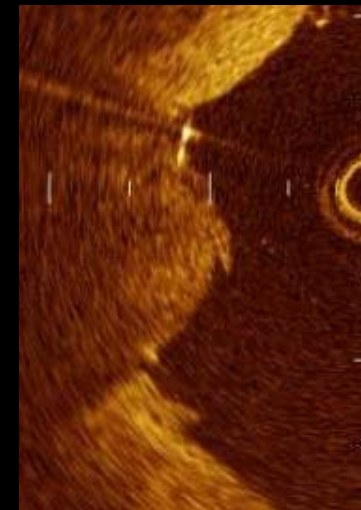
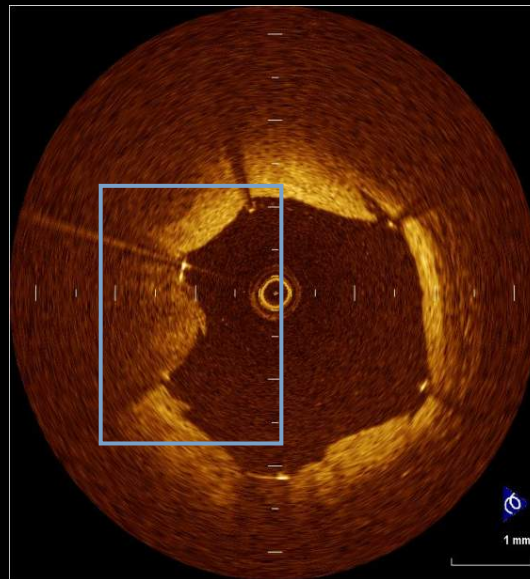


Findings after Stent Implantation

Dissection



Tissue prolapse



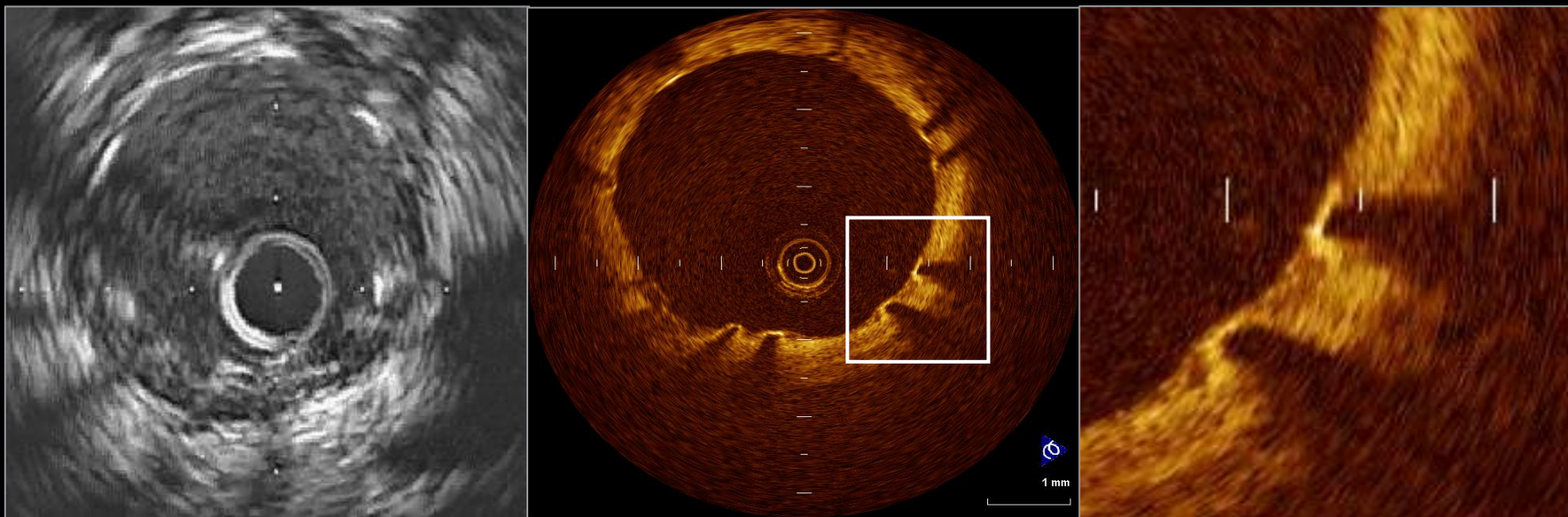
Neointimal Coverage of SES

Recently, stent thrombosis following DES implantation is a hot issue.

Incomplete neointimal coverage of stent struts is responsible for stent thrombosis.



IVUS and OCT image of SES at 3-month follow-up



✓ OCT provides detailed visualization of the individual stent struts and a thin neointimal layer over DES struts that IVUS can not detect.

Neointimal Coverage of SES

Male 87 y.o.

Diagnosis :

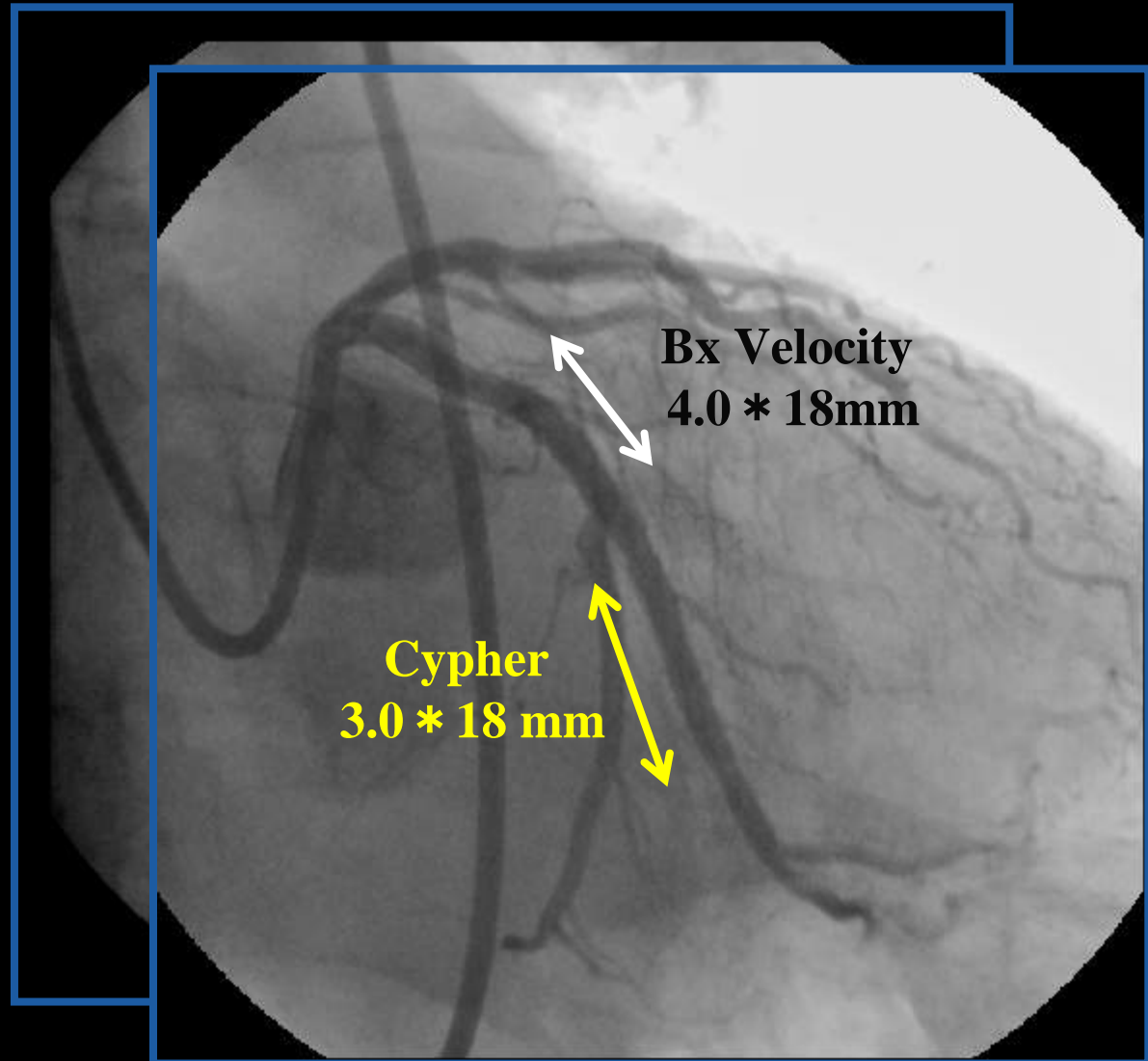
Stable AP

Risk Factor :

HT

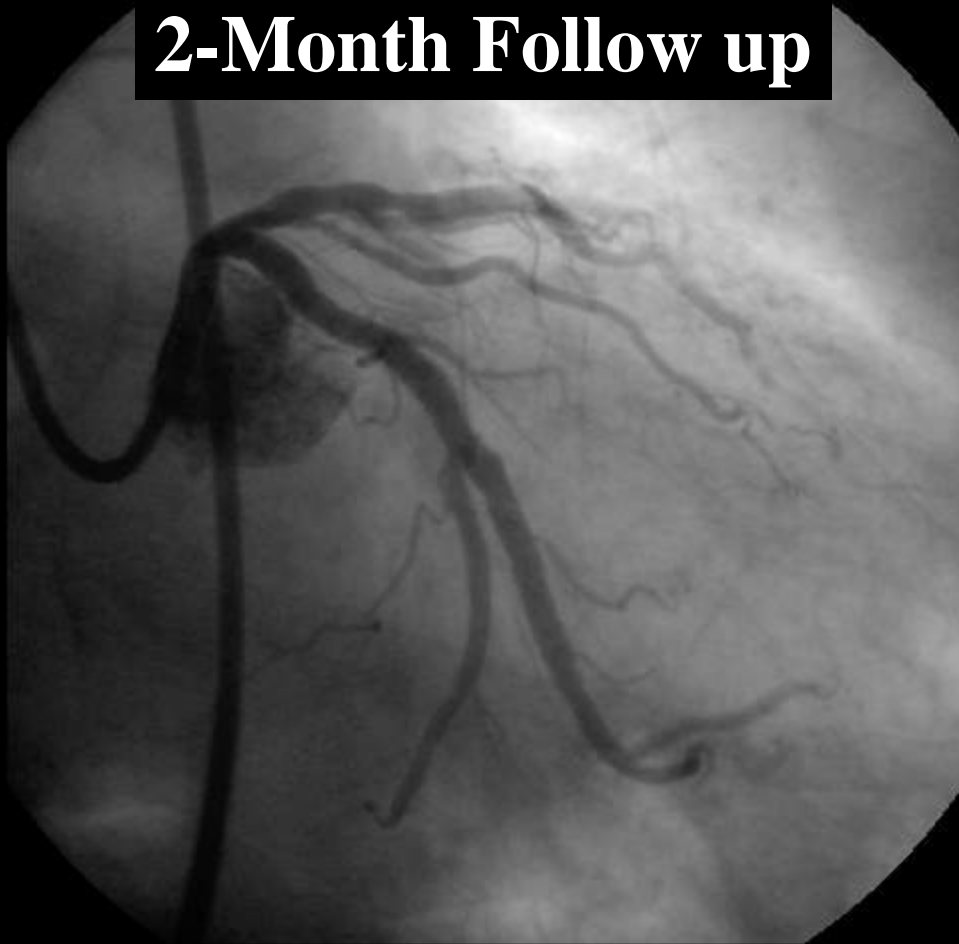
Target Lesions:

LCX seg.11 75%
seg.13 90%

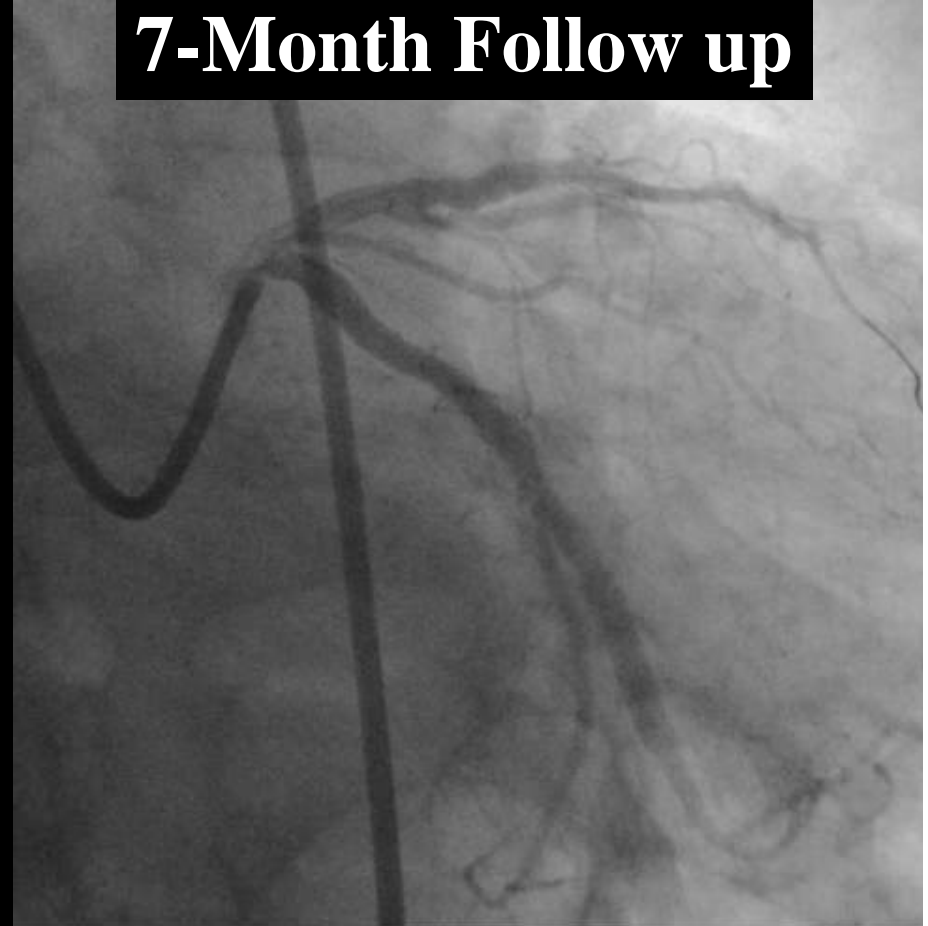


Follow-up CAG

2-Month Follow up



7-Month Follow up

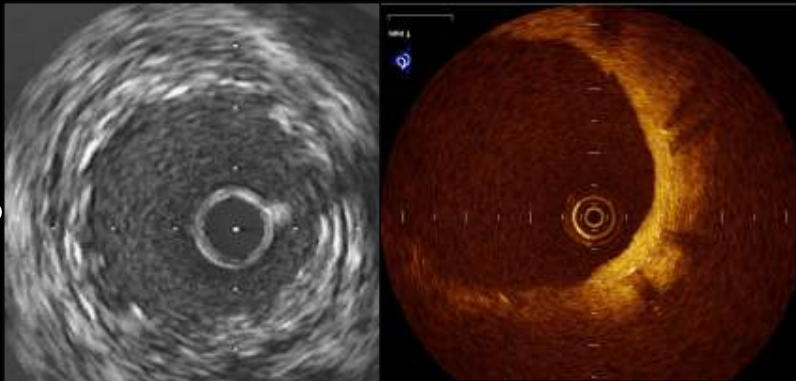


Comparison of IVUS and OCT images between BMS and SES

2-month follow up

7-month follow up

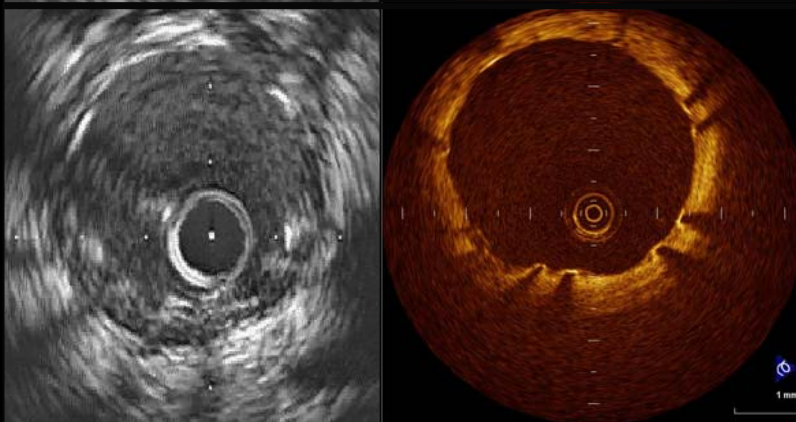
BMS



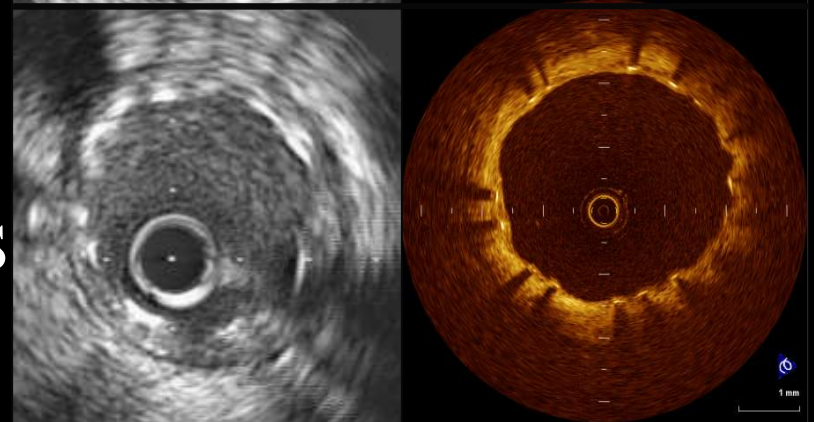
BMS



DES



DES



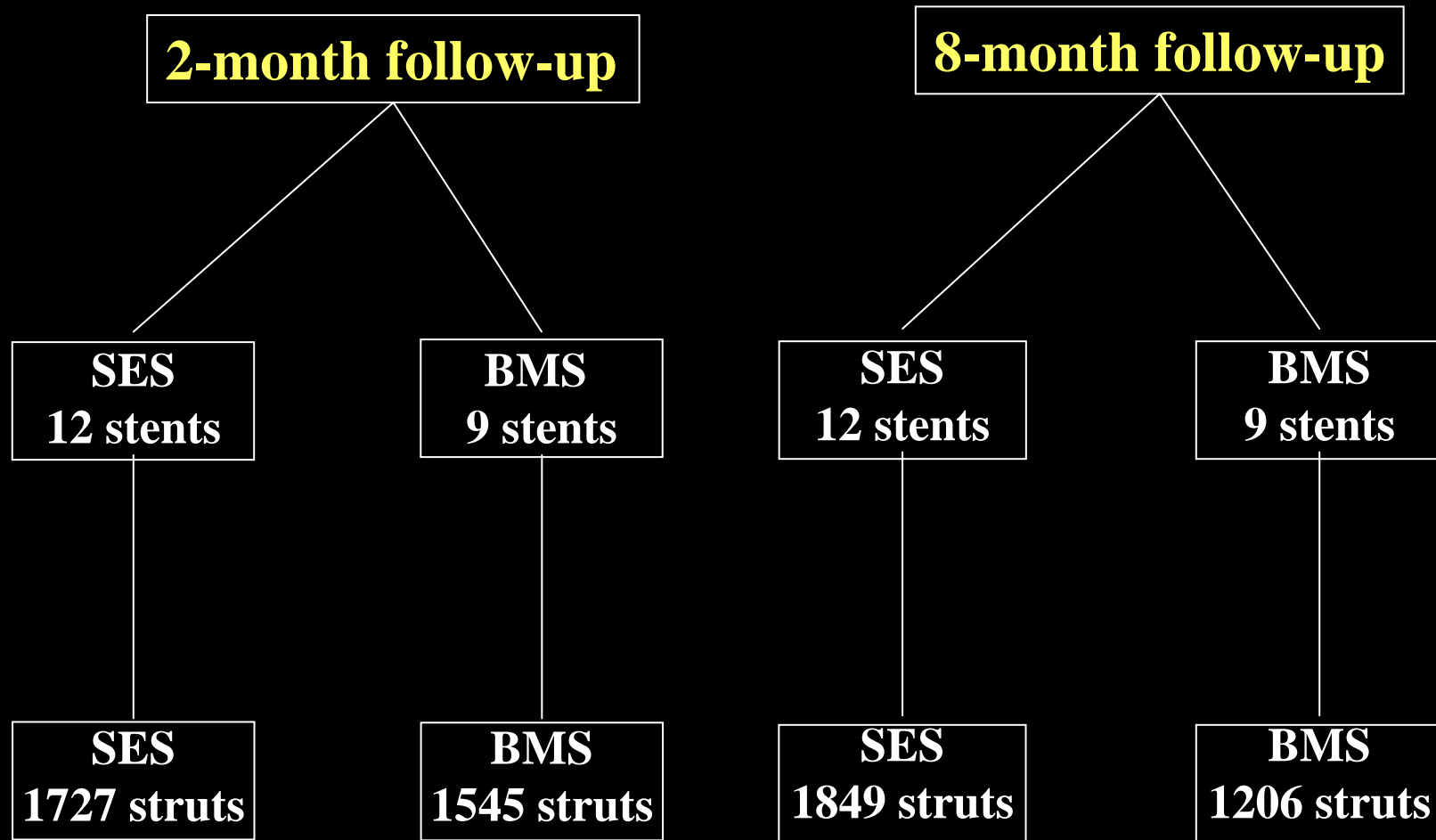
Optical Coherence Tomographic Analysis of Neointimal Stent Coverage in Sirolimus-eluting Stent, Compared with Bare Metal Stent

Toyohashi Heart Center, Toyohashi, Japan

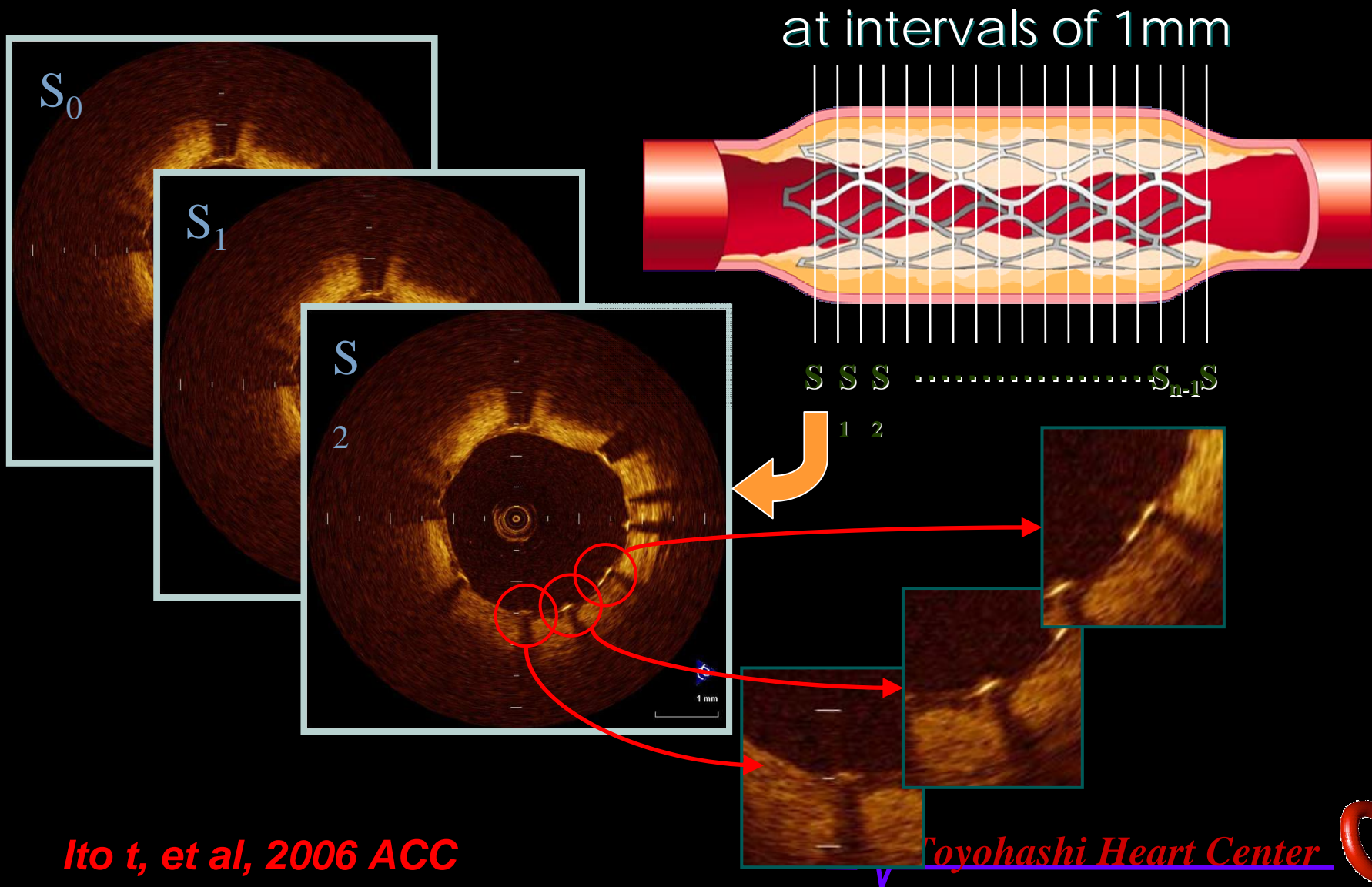
Tatsuya Ito, Mitsuyasu Terashima, Yoshihiro Takeda,
Osamu Katoh, Tetsuo Matsubara, Etsuo Tsuchikane, Mariko Ehara,
Yoshihisa Kinoshita, Kenya Nasu, Jean-François Surmely, Nobuyoshi
Tanaka, Akira Murata, Hiroshi Fujita, Koyo Sato, Takahiko Suzuki



Subjects

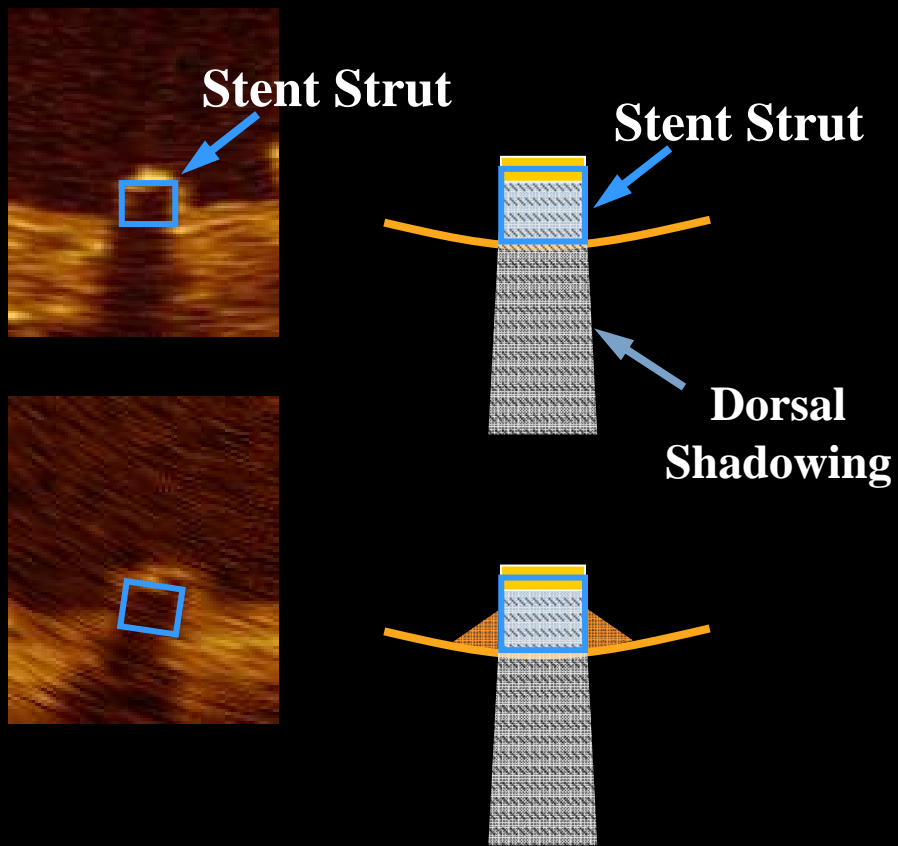


OCT Analysis of Stented segment

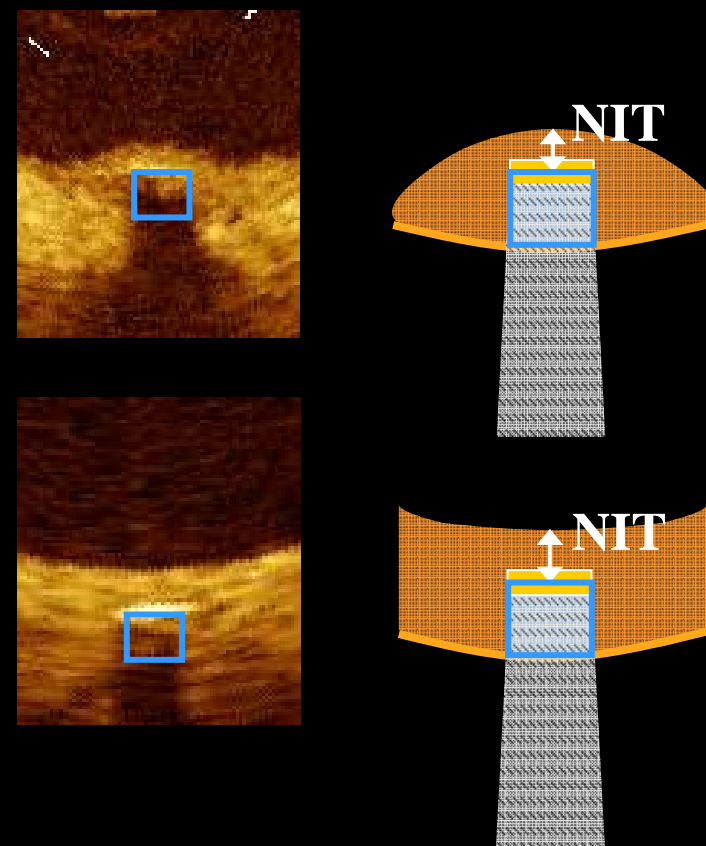


Pattern of “Intimal Stent Strut Coverage”

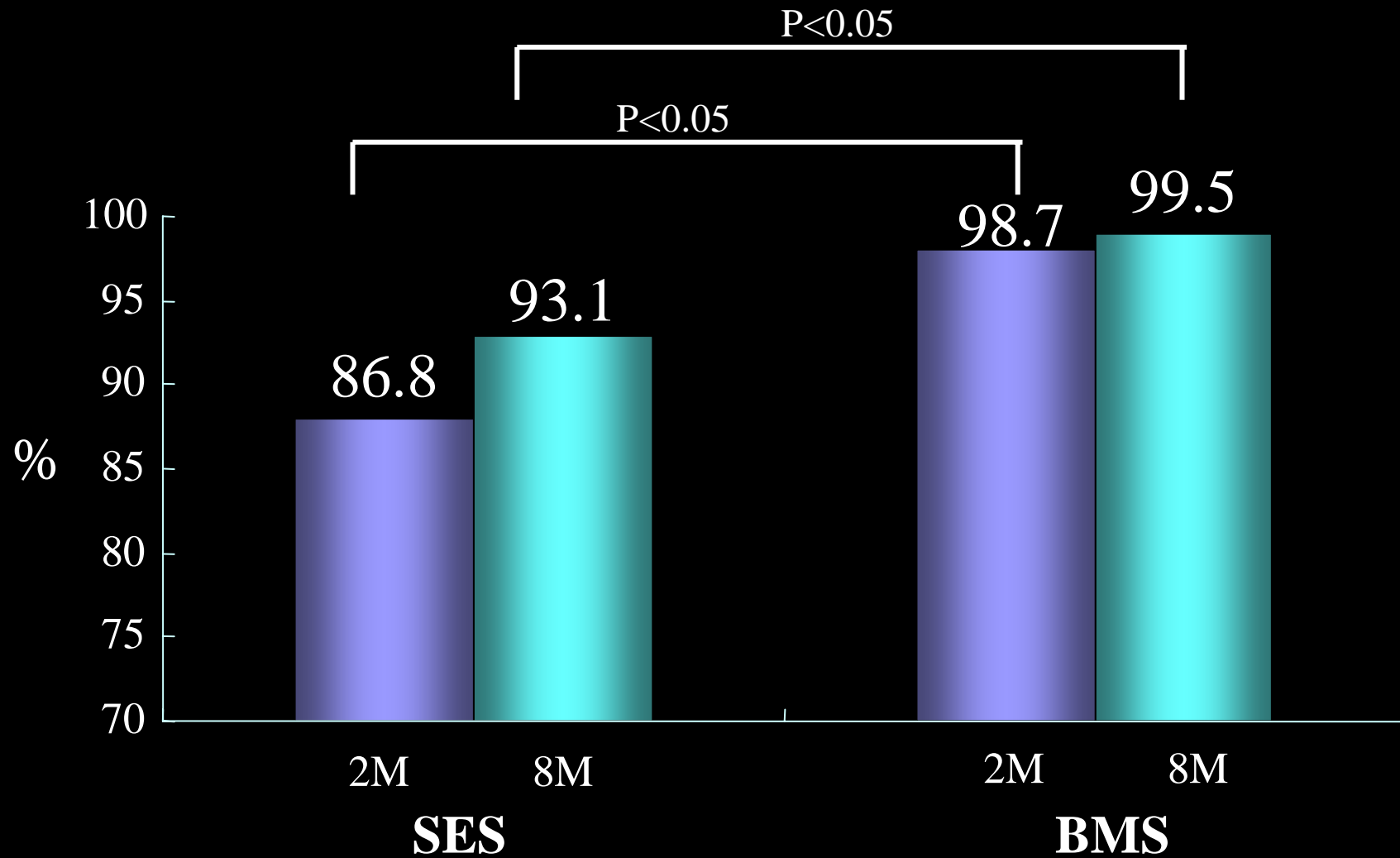
Uncovered Struts



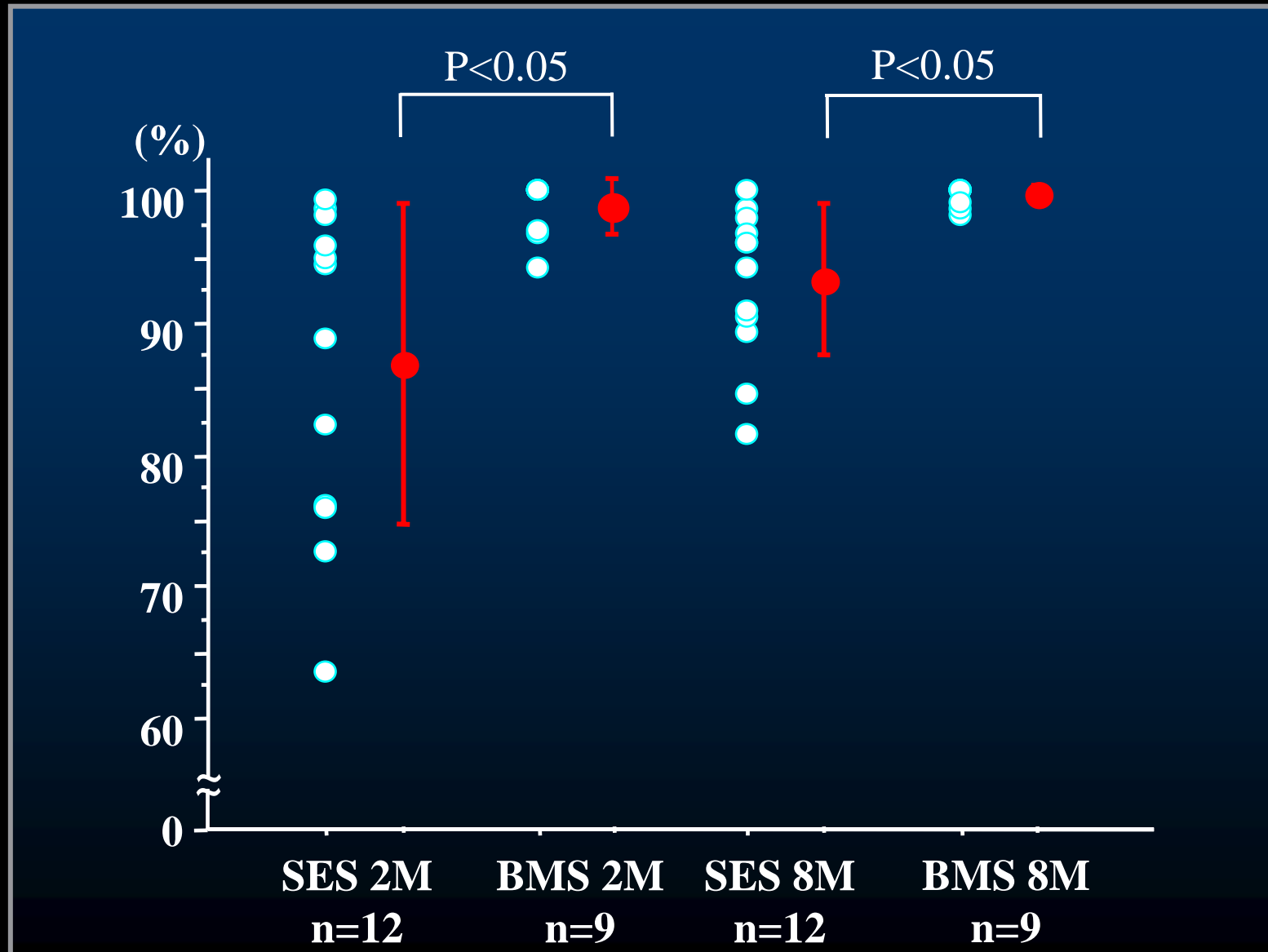
Covered Struts



Neointimal Stent Coverage (%)



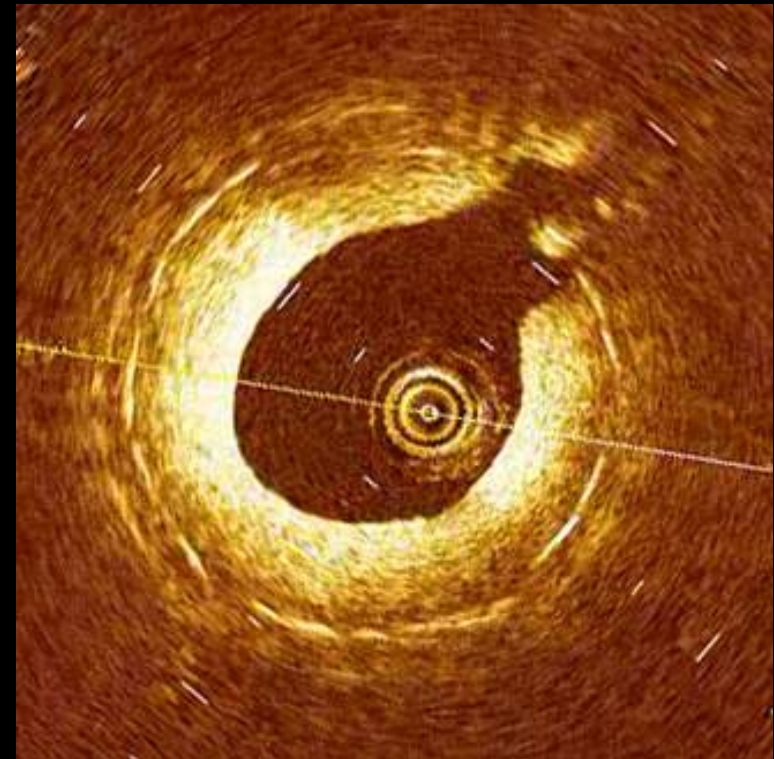
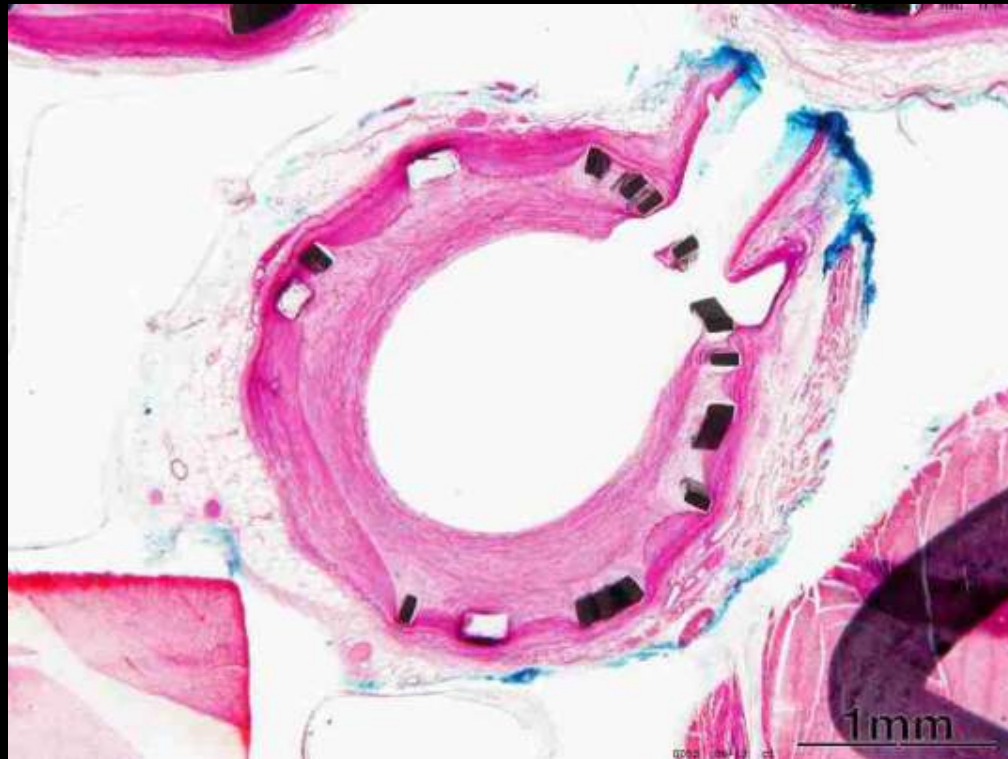
Neointimal Stent Coverage (%)



*Neointimal Coverage of SES struts
Crossing a Side-branch*

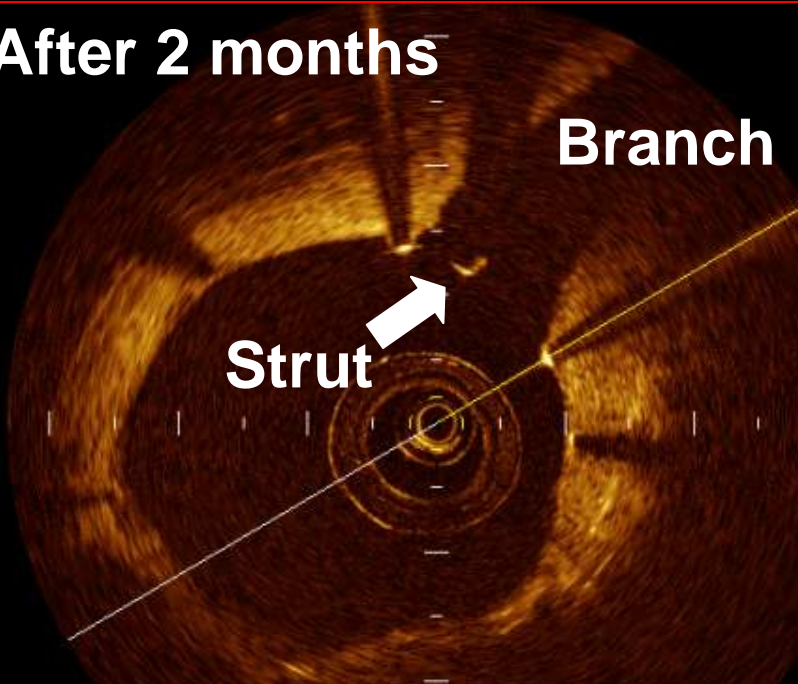


Neointimal Growth on SES Struts Crossing a Side Branch on Porcine Model



Representative Case

After 2 months

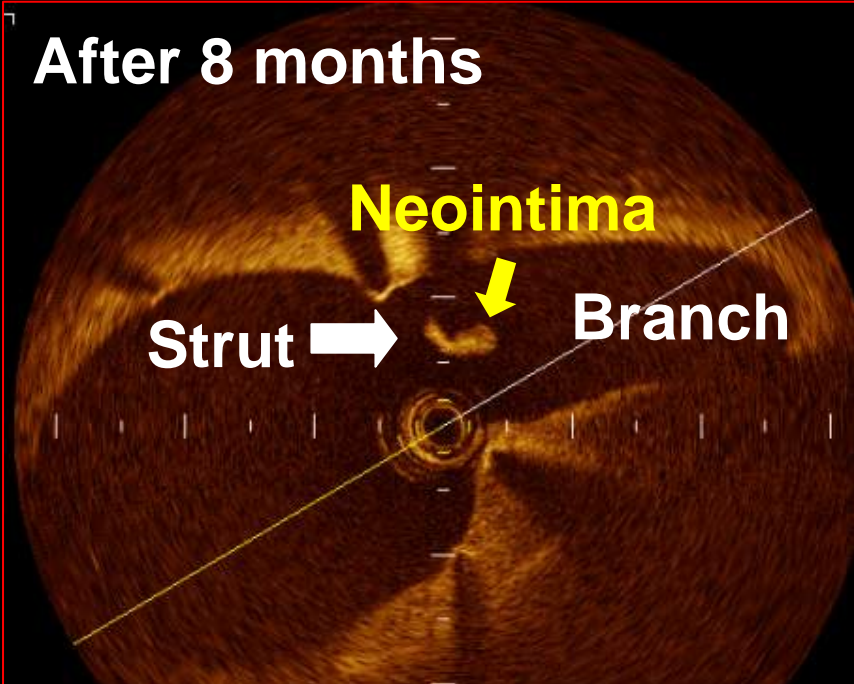


Branch

Strut

Incomplete neointimal coverage of a strut

After 8 months



Neointima

Strut

Branch

Complete neointimal coverage of a strut



A Time-course Analysis of Neointimal Growth on the Sirolimus-Eluting Stent Struts Crossing a Side Branch Using Optical Coherence Tomography

Mitsuyasu Terashima

*Tatsuya Ito, Yoshihiro Takeda, Jean-François Surmely,
Osamu Katoh, Tetsuo Matsubara, Etsuo Tsuchikane,
Mariko Ehara, Yoshihisa Kinoshita, Kenya Nasu, Nobuyoshi
Tanaka, Takahiko Suzuki*

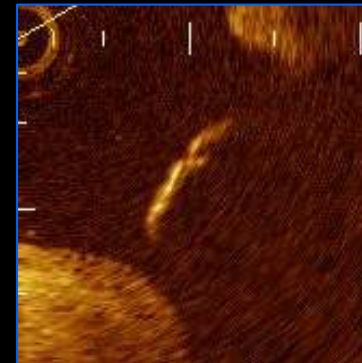
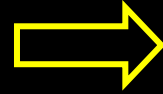
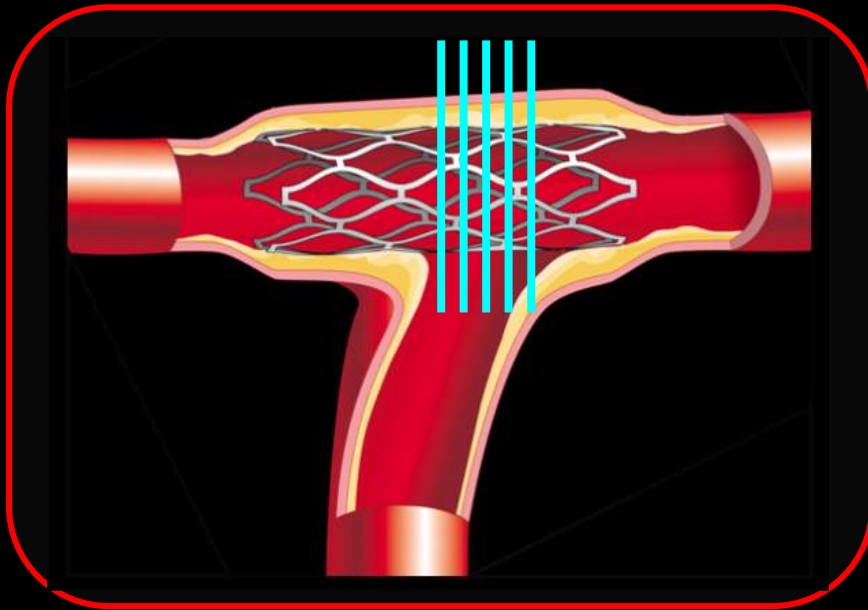
Toyohashi Heart Center, Toyohashi, Japan

Terashima M, et al, 2006 TCT

 **Toyohashi Heart Center**



OCT Analysis



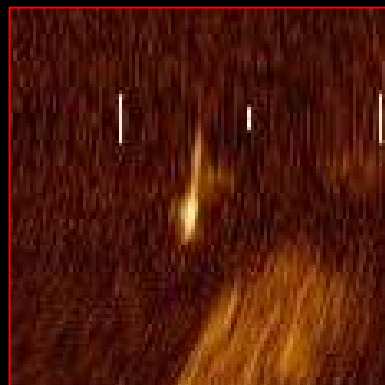
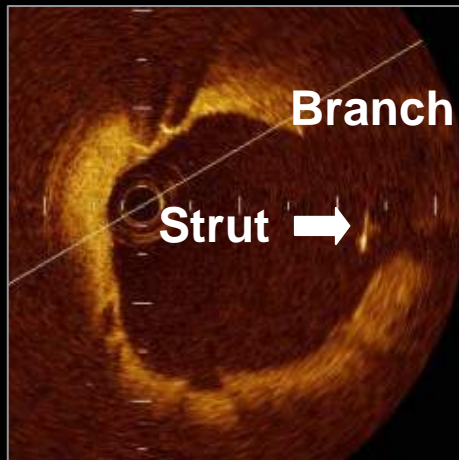
- **24 struts of 9 SES** crossing a side branch
- **At 2 months and 8 months** after SES implantation



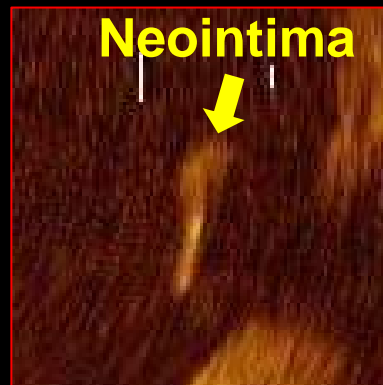
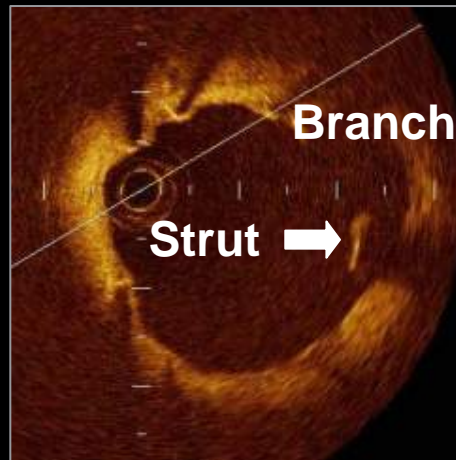
Definition of Neointimal Coverage of Stent Struts Crossing a Side Branch

Incomplete Coverage

Uncovered

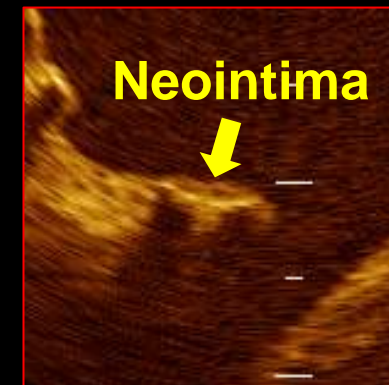
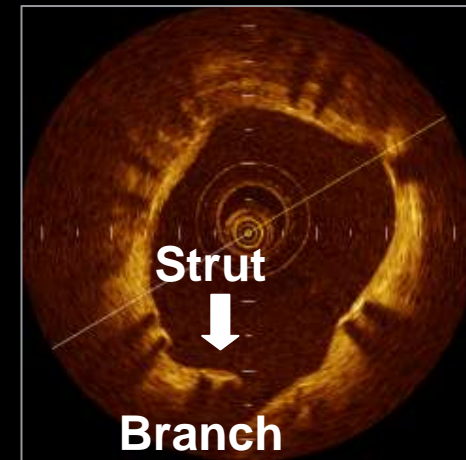


Partially covered



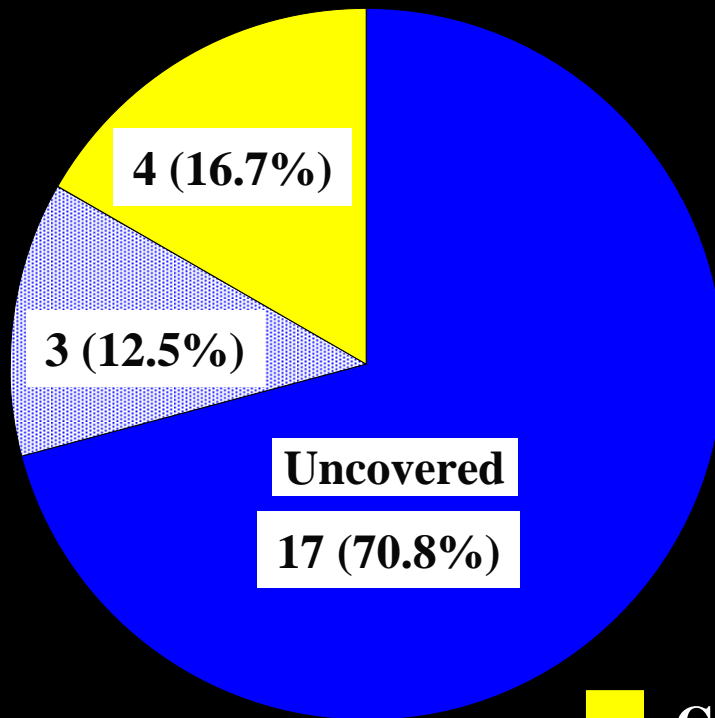
Complete Coverage

Completely covered

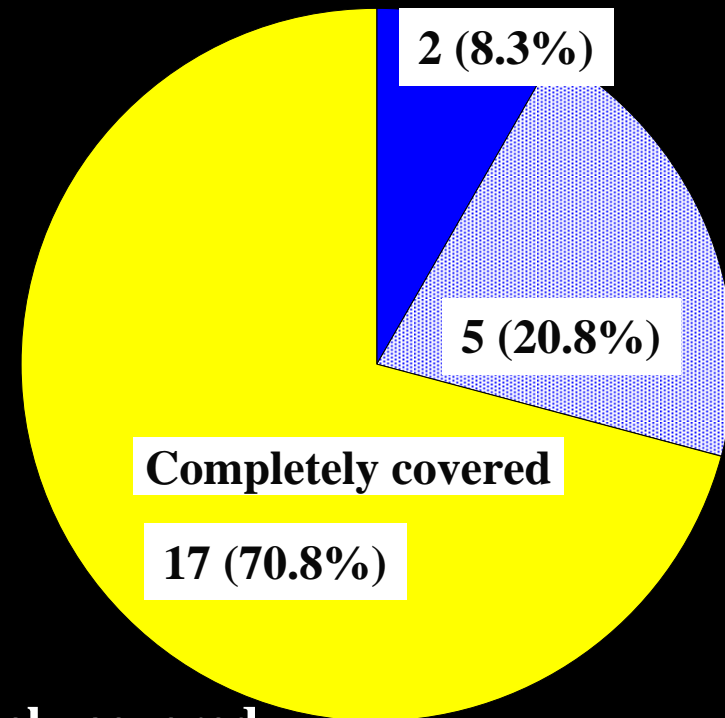


Neointimal Coverage of Struts Crossing a Side Branch at 2 and 8 months After SES Implantation

2-month



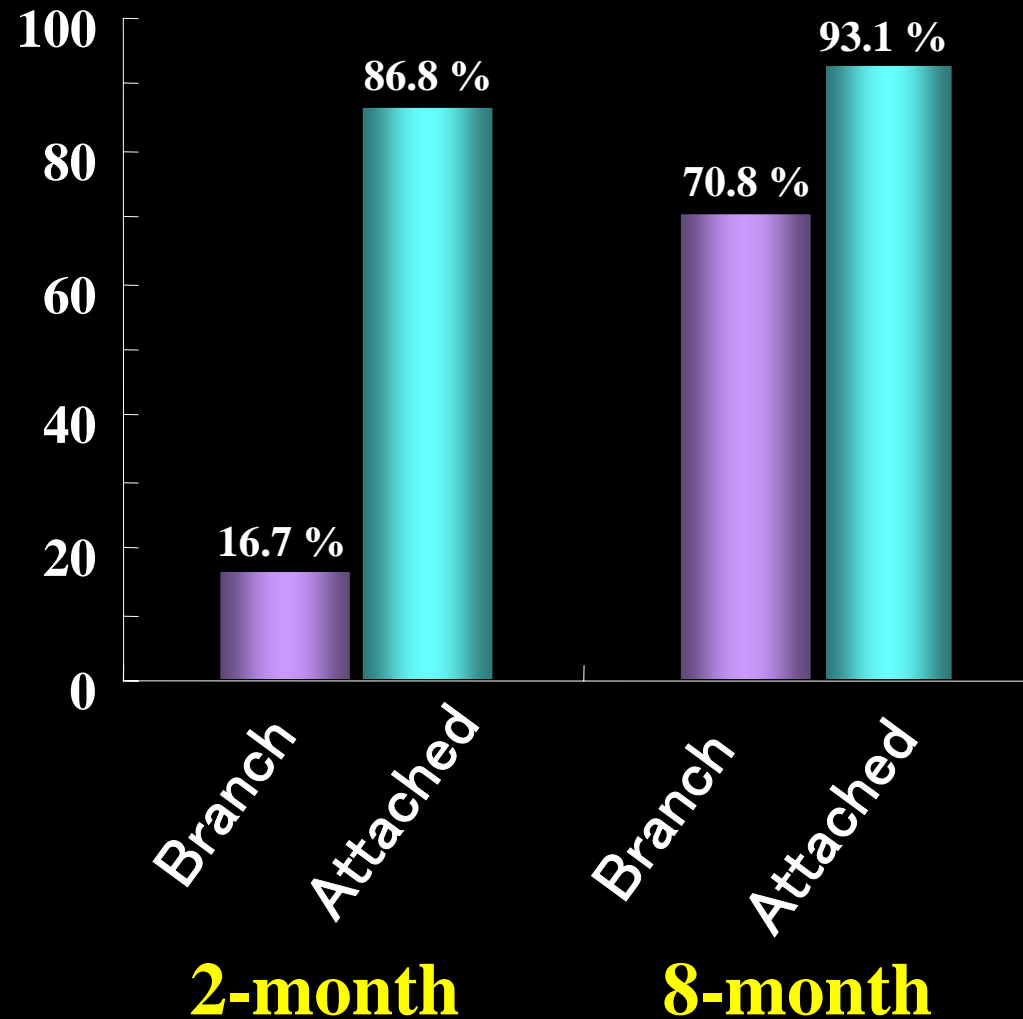
8-month



- Completely covered
- Partially covered
- Uncovered



Comparison of Frequencies of Complete Neointimal Coverage between Side-branch and Attached struts



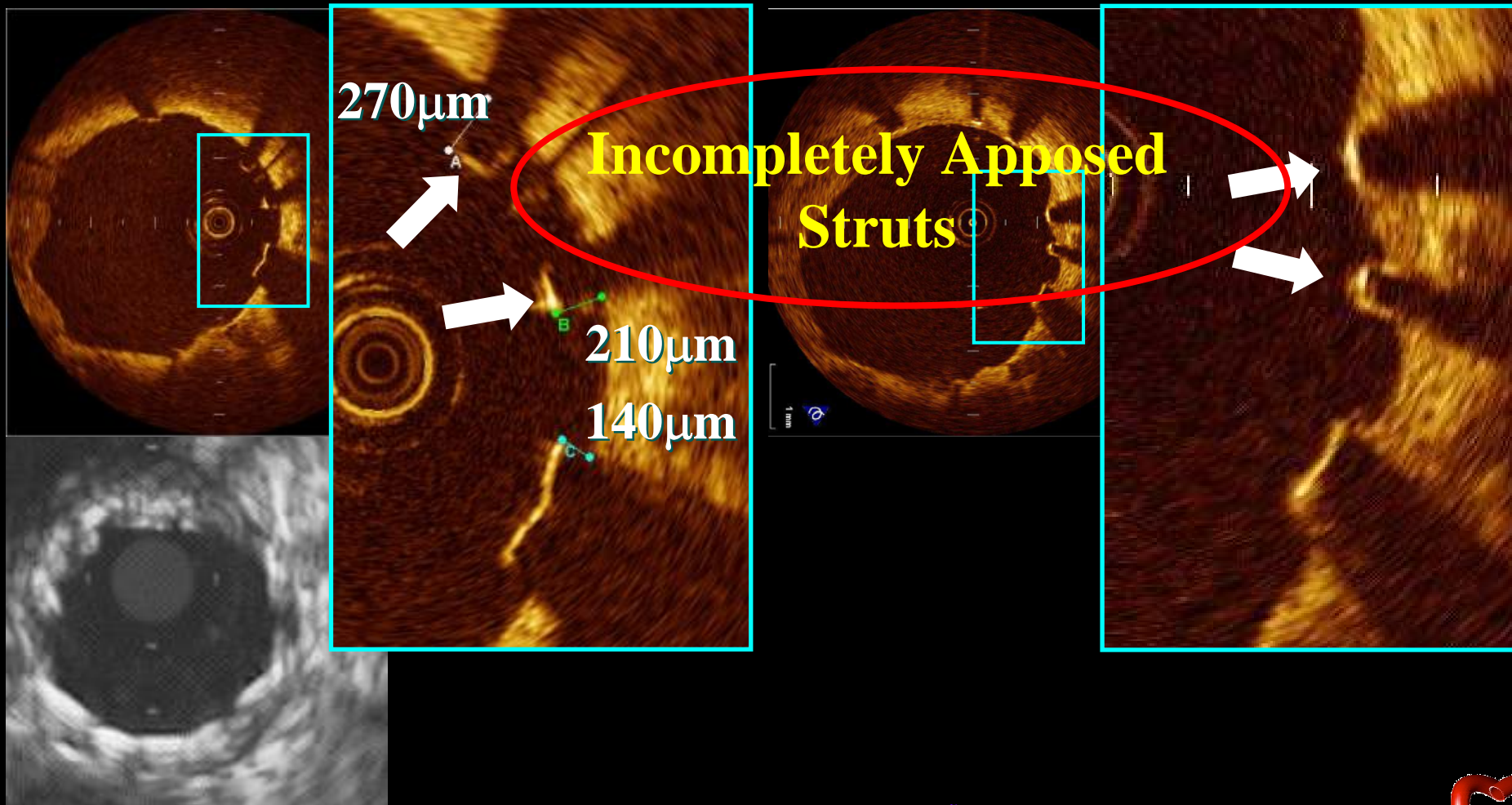
*Neointimal Coverage of
Malapposed Stent Struts*



Follow-up of Struts with Incomplete apposition

Post PCI

2Mo. FU



Summary

- ✓ Thin neointimal layers over SES struts can be detected by OCT.
- ✓ Neointimal coverage of SES struts is delayed, especially on the struts not attached to the vessel wall.
- ✓ Dual antiplatelet therapy should be continued >3 months after SES implantation.



Conclusion

- ✓ **OCT provides various information of DES.**
- ✓ **OCT might be a powerful imaging tool in DES era.**

