

***The Morphological Characteristics of  
DES In-Stent Restenosis  
by Optical Coherence Tomography***

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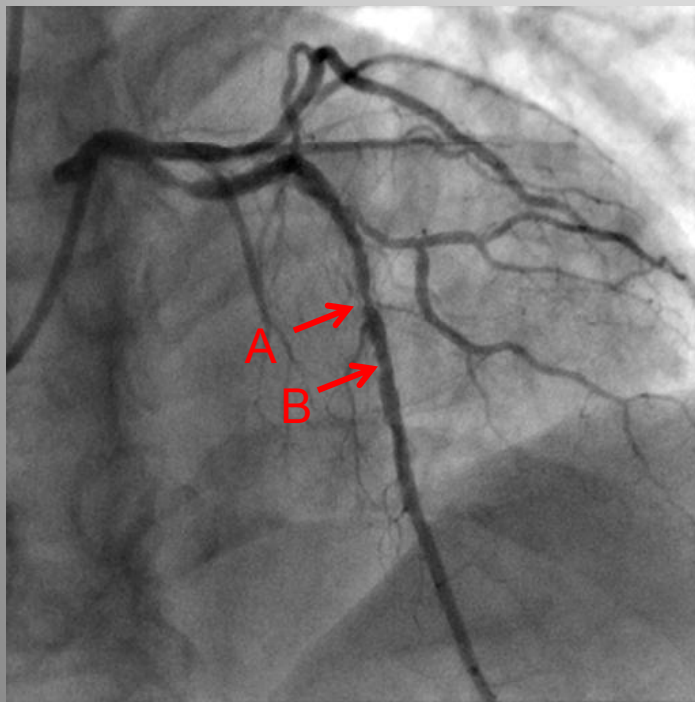
## <Case 1>

59 y.o, M OMI, DM

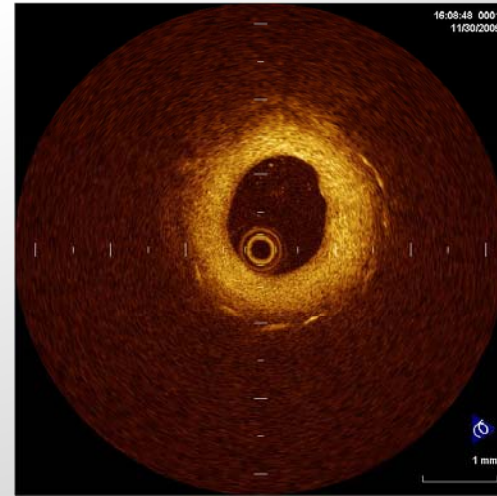
6 months after SES implanted

#7 SES ISR

OCT: Homogeneous  
with high backscatter



A



B



This patient had a severe ISR(A) and mild ISR(B) in mid-LAD with SES implanted 6 months ago. Plaque structure in A was homogenous and that in B was heterogeneous.

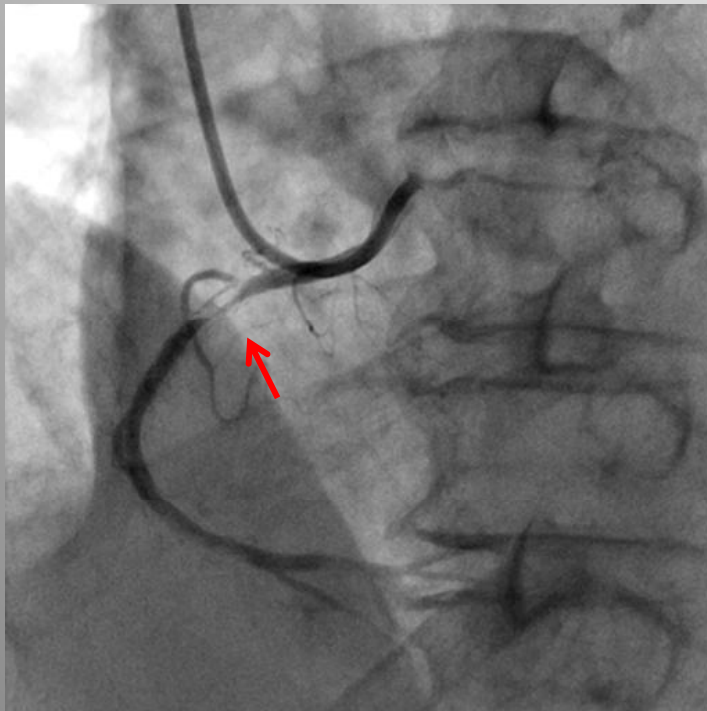
## <Case 2>

84 y.o M AP, HT

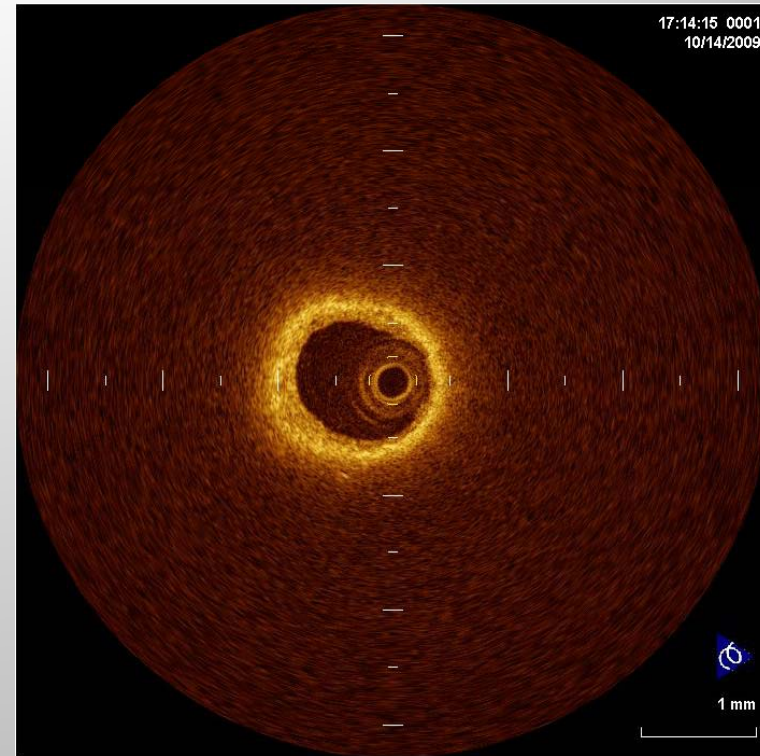
6 years after SES implanted

#1 SES ISR, ACS

OCT: Thin layer with high scattering  
→ Attenuation (Lipid-laden)



## OCT



In OCT image at this late catch-up lesion, thin layer with high scattering was inside lumen and attenuation plaque outside.

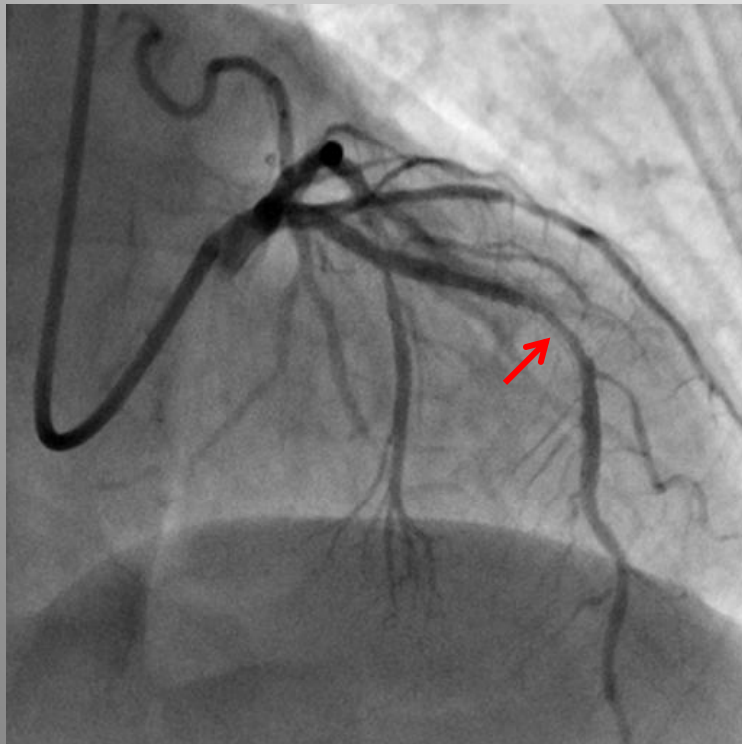
<Case 3>

74 y.o M AP, HT, HL, CRF

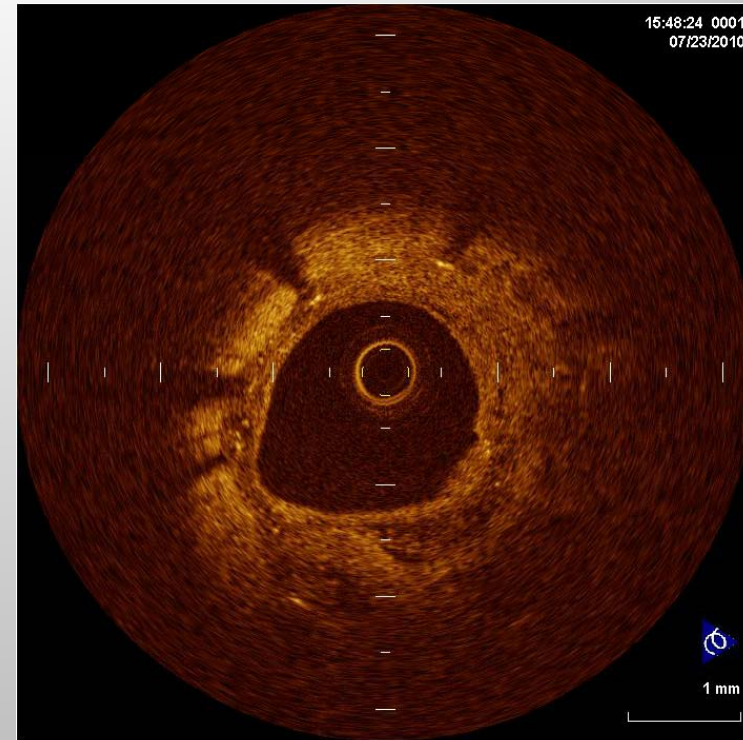
1.5 years after PES implanted

#7 PES ISR

OCT: Heterogeneous



## OCT

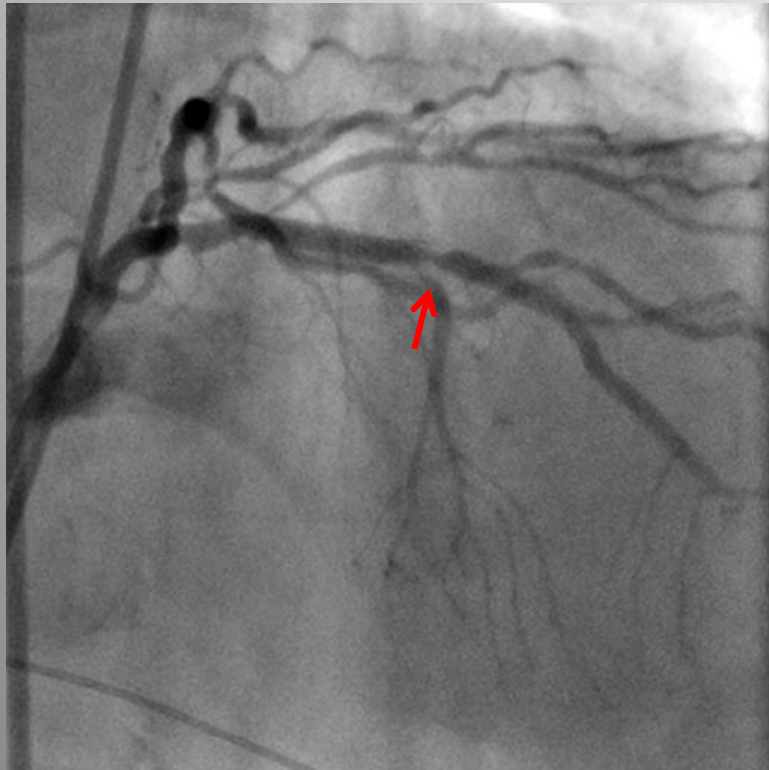


Heterogeneous structure was detected in mid-LAD with late catch-up by OCT.

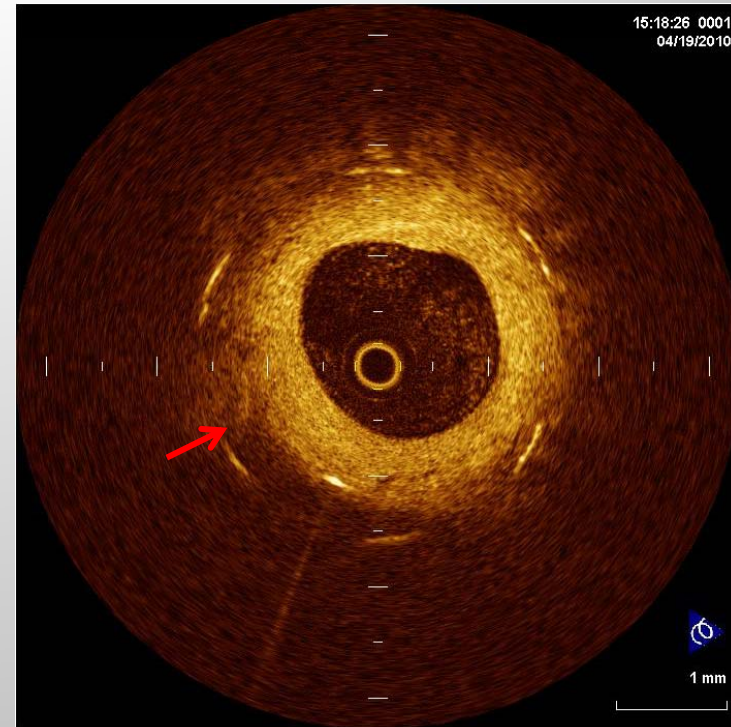
## <Case 4>

79 y.o M AP, HT, HL, CRF(HD)  
1.5 years after SES implanted  
#7 SES ISR

OCT: Layered

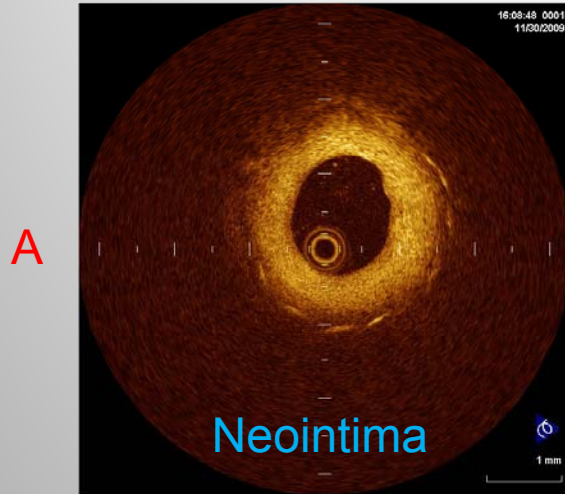


## OCT

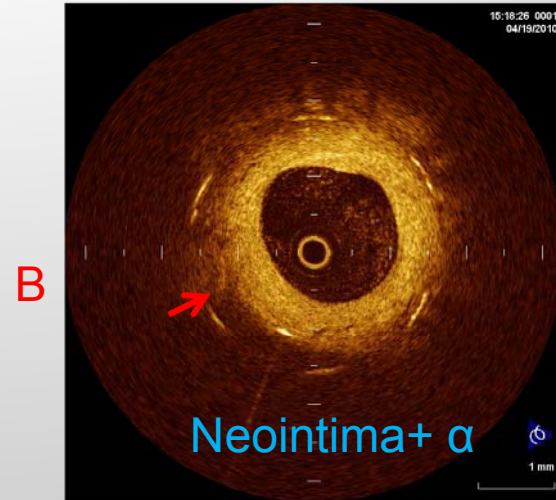


This patient with chronic hemodialysis and SES implanted 18 months ago had a late catch-up ISR in mid-LAD. OCT showed a layered structure.

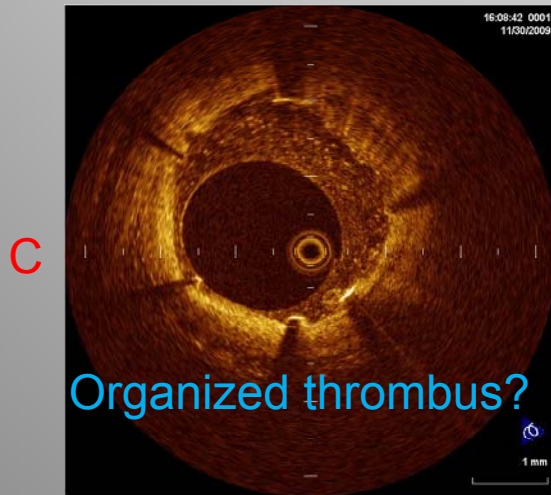
**What is the morphological and histological diagnosis of the each OCT finding.**



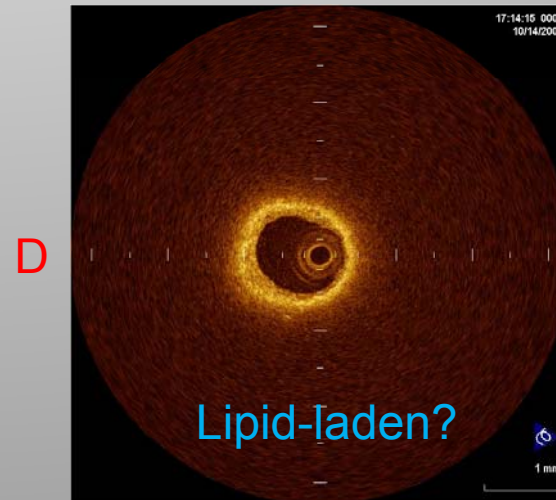
Homogenous



Layered



Heterogenous



Attenuated plaque

## *Aim*

To evaluate morphologic characteristics of early (less than one year) and late (more than one year) re-stenosis (ISR) using optical coherence tomography (OCT).

# Objectives

630 cases implanted with SES or PES (April 2008 to Jan. 2010)

6-month follow-up CAG were performed in 564 cases



Early In-stent restenosis within one year: 37 cases (6.5%)

18-month follow-up CAG were performed in 384 cases



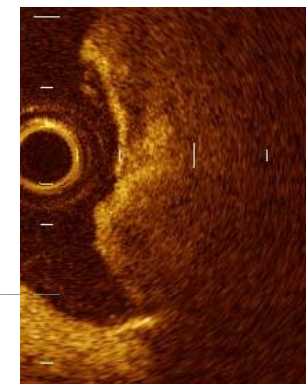
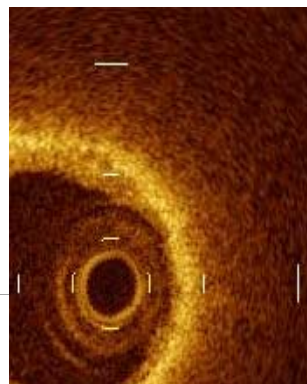
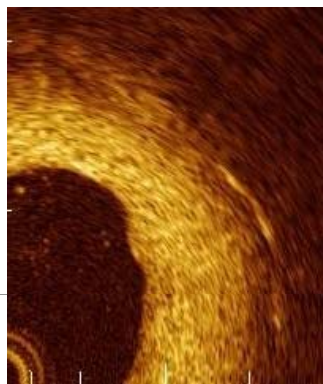
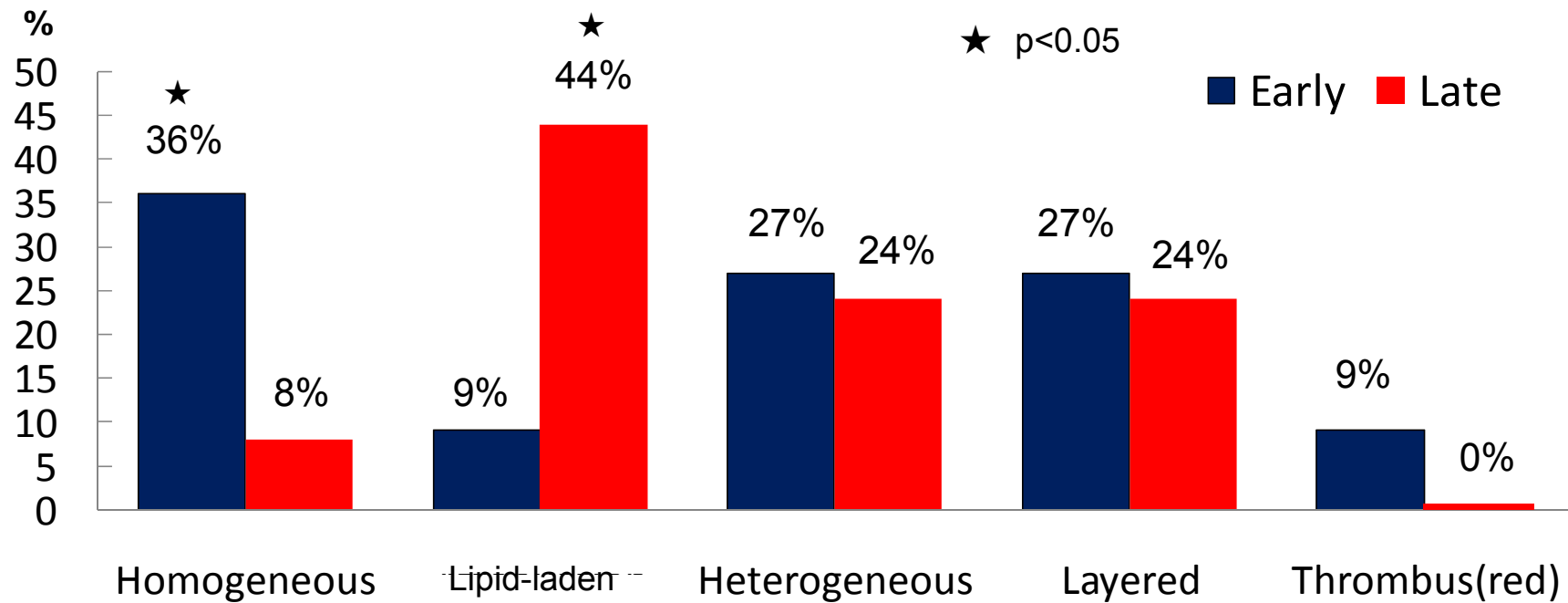
OCT: 11 cases

Late In-stent restenosis over one year: 34 cases (8.9%)

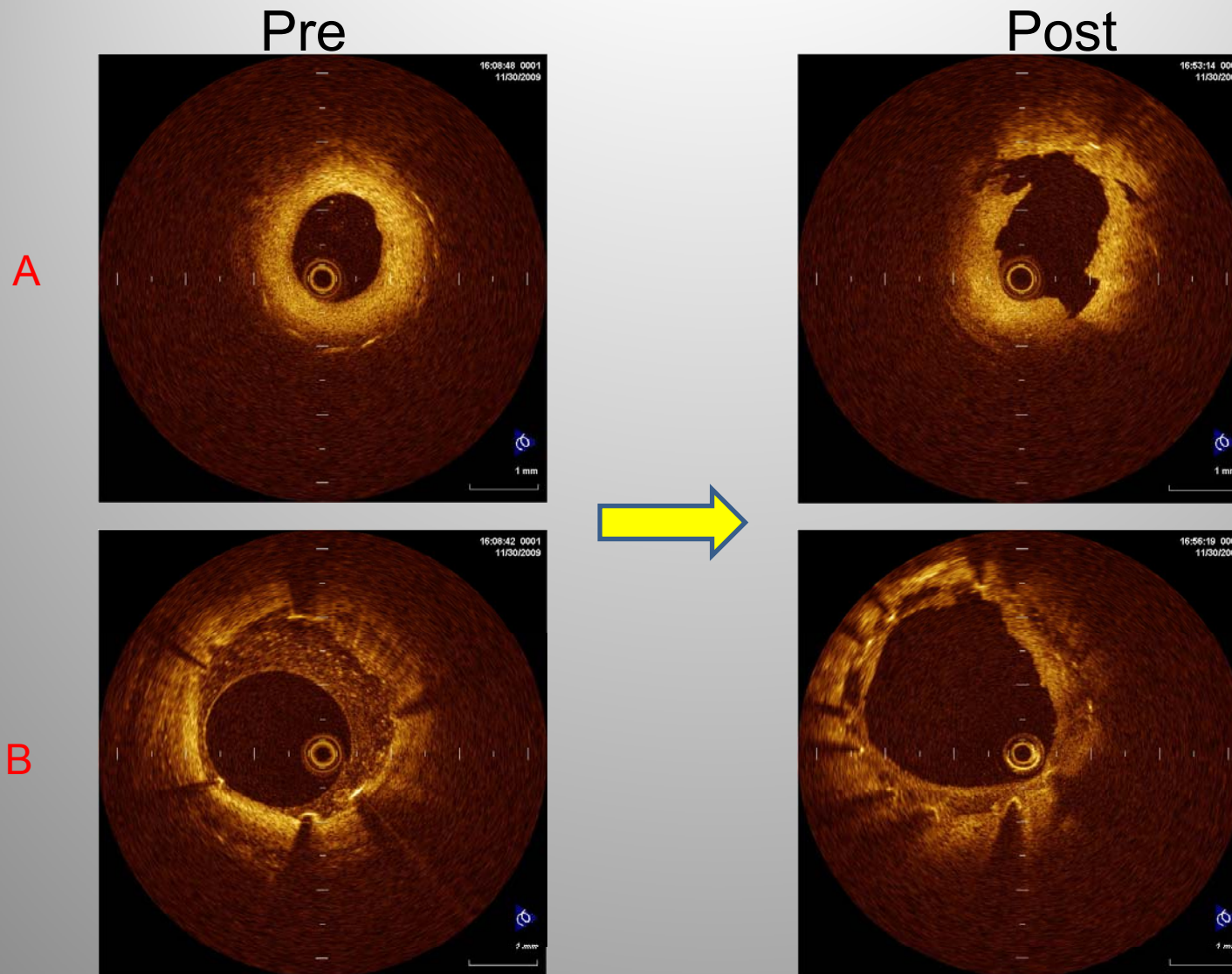
OCT: 25 cases



# The Morphological Characteristics of DES In-Stent Restenosis by Optical Coherence Tomography



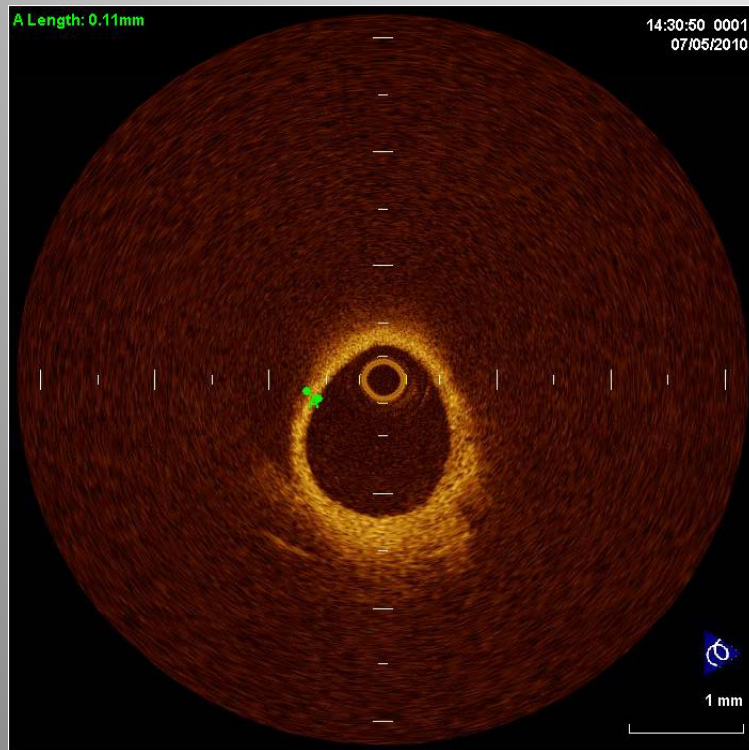
## *Vessel Response to Balloon Angioplasty*



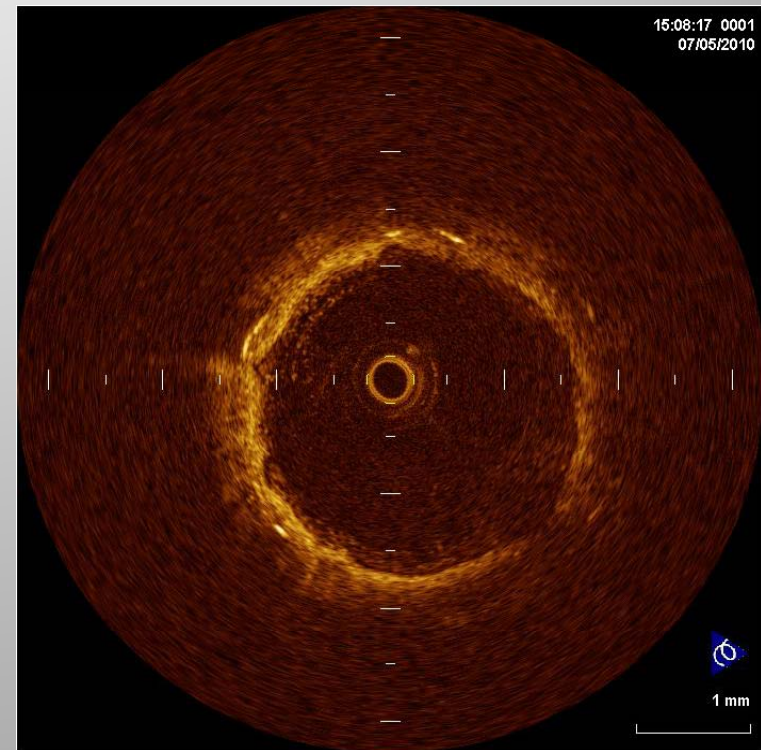
There is a clear difference in balloon angioplasty response between the two structures. Plaque area reduction was greater in the heterogeneous structure B than in the homogenous structure A.

## *Vessel Response to Balloon Angioplasty For lipid-laden plaque*

Pre



Post



Great lumen area was achieved in the lipid-laden structure only by balloon angioplasty.

## ***Optimal strategy for In-stent restenosis of DES***

1. Homogeneous structure	—————>	re-DES (homo- or hetero-)
2. Lipid-laden structure	—————>	POBA
3. Heterogeneous structure	—————>	POBA
4. Layered structure	—————>	POBA or re-DES
5. Thrombus (red)	—————>	Aspiration and POBA

# *Summary*

1. By OCT analysis, morphology of DES in-stent restenosis(ISR) in early stage and in late stage is mainly homogeneous and lipid-laden, respectively.
2. Plaque with heterogeneous or lipid-laden pattern has good response to balloon angioplasty, but that with homogeneous or two layered pattern has poor response.

# ***Conclusions***

OCT was a useful method for identifying the plaque tissue after DES implantation. Restenotic tissues of late ISR was clearly different from those of early ISR.

In cases with ISR of DES, PCI should be performed based on the plaque tissue.