



# Novel optical coherence tomographic (OCT) finding suggesting organized thrombus within restenotic lesion.

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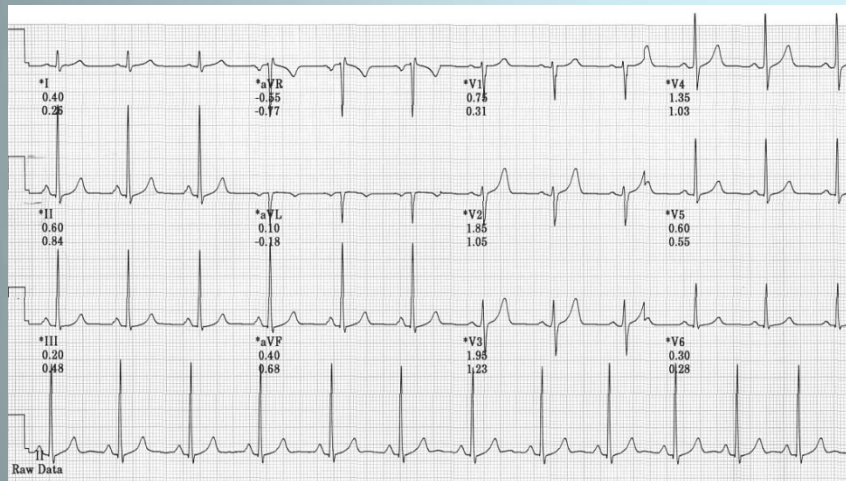
## Case 1

# 60 year old male (name ; KSI)

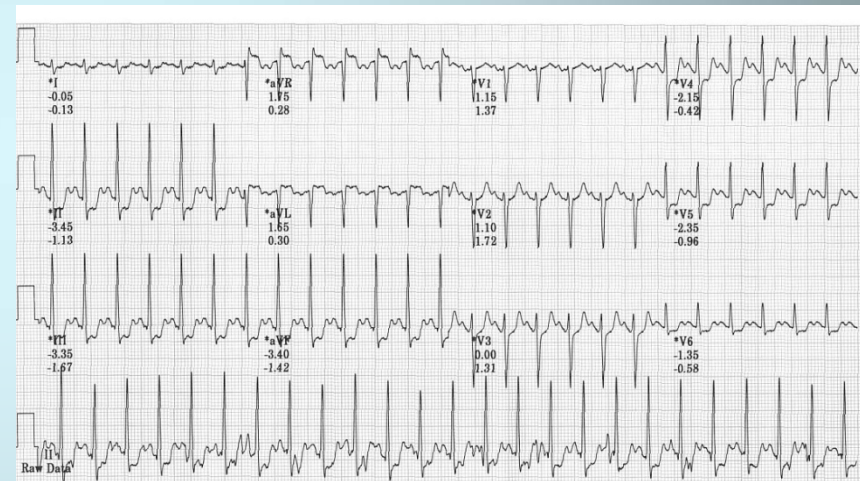
- Chief complaint : effort chest pain.
- History : Hypertension (+)  
Diabetes Mellitus (-)  
Smoking (-)



# Treadmil test (2010-6-14)

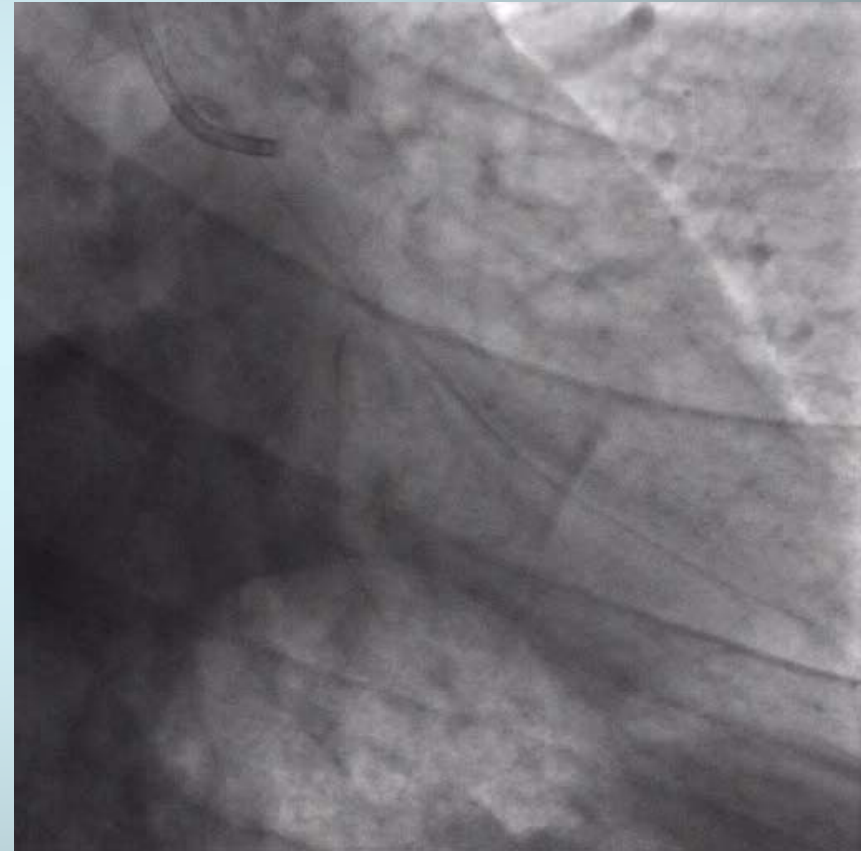
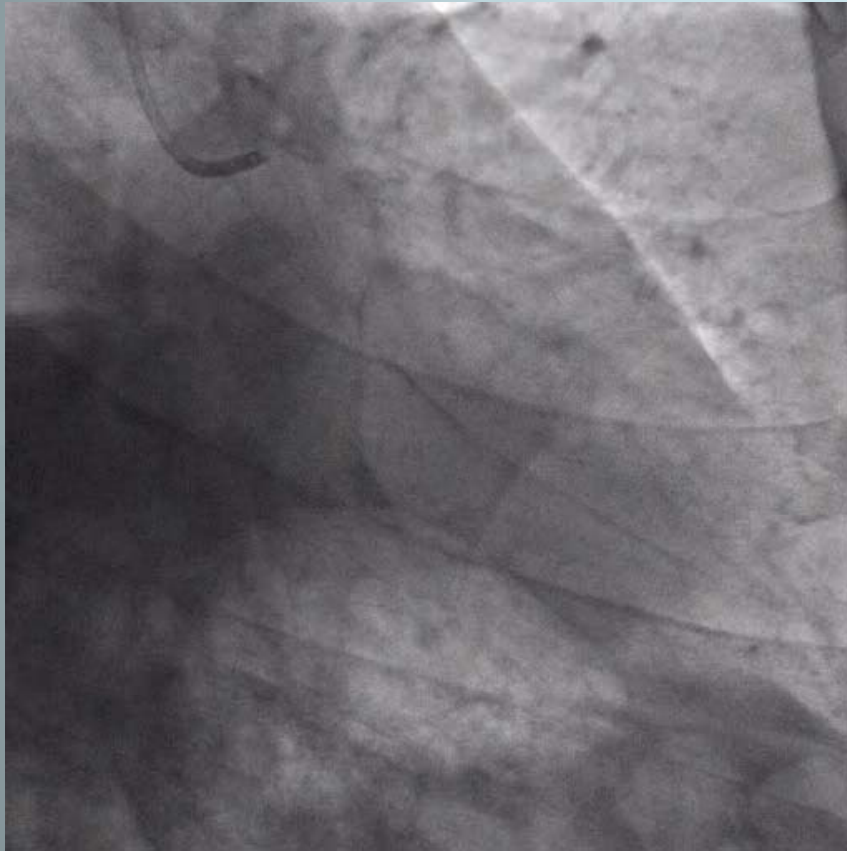


baseline



Stage 3

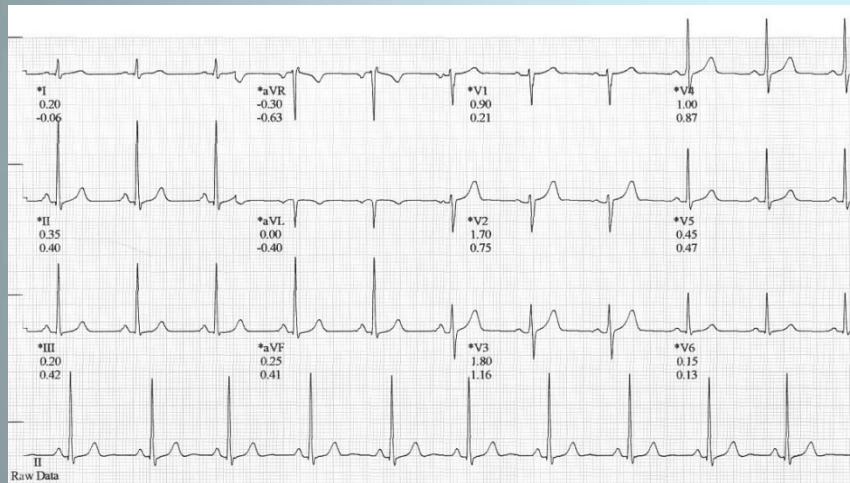
# 2010-6-29 PCI



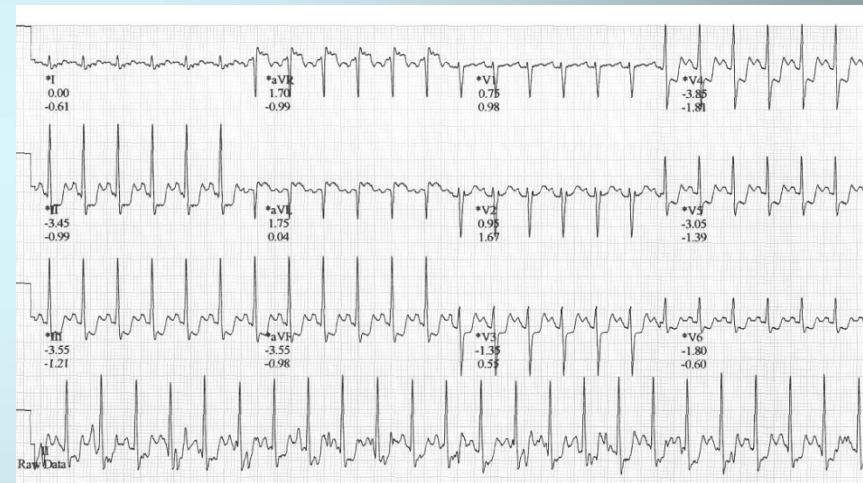
**Xience 2.75x12mm**



# Treadmil test (2011-8-22)

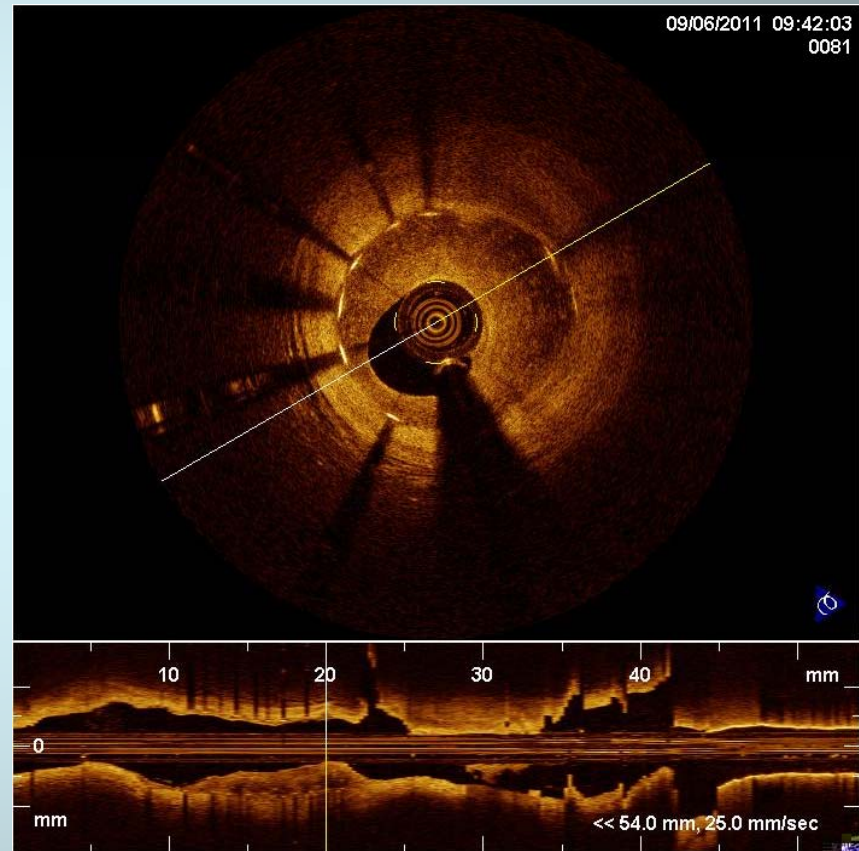
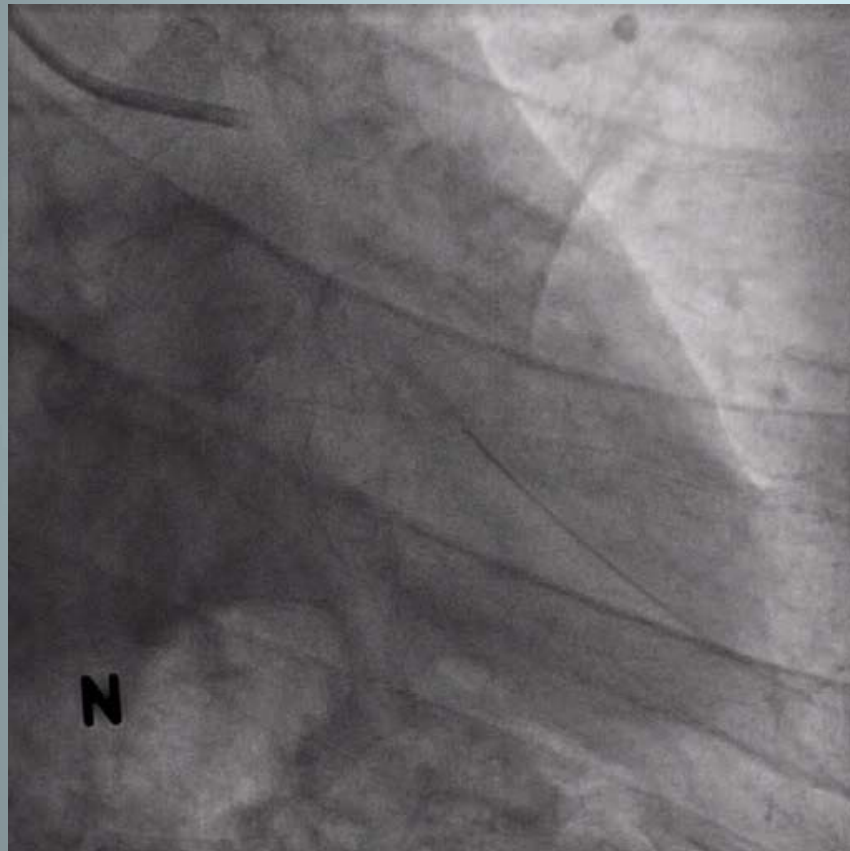


baseline

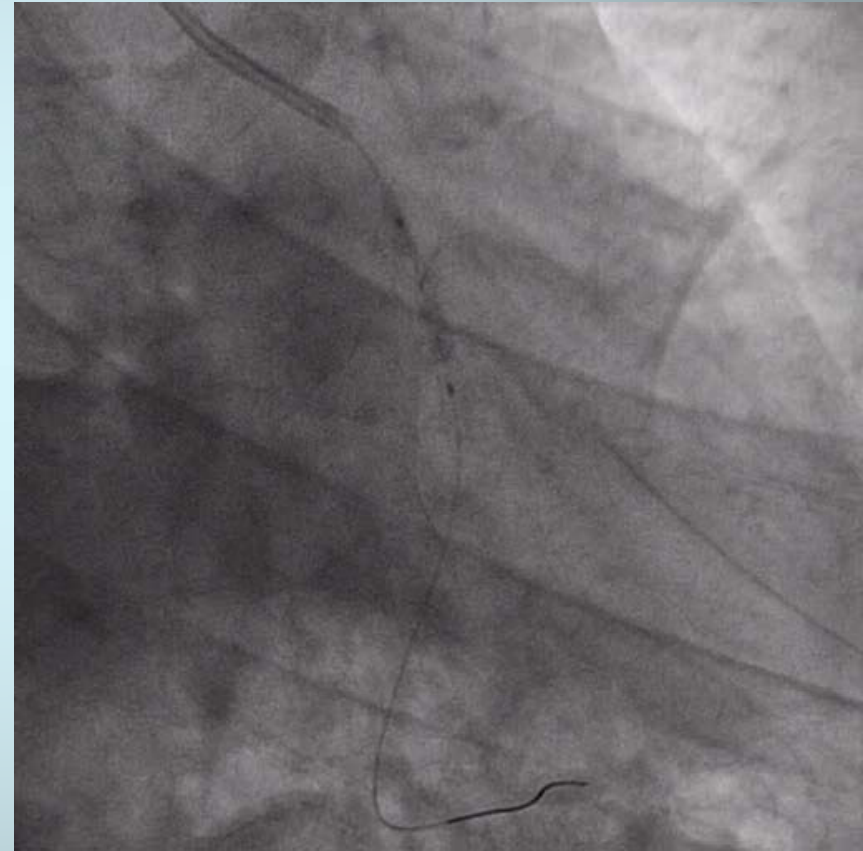
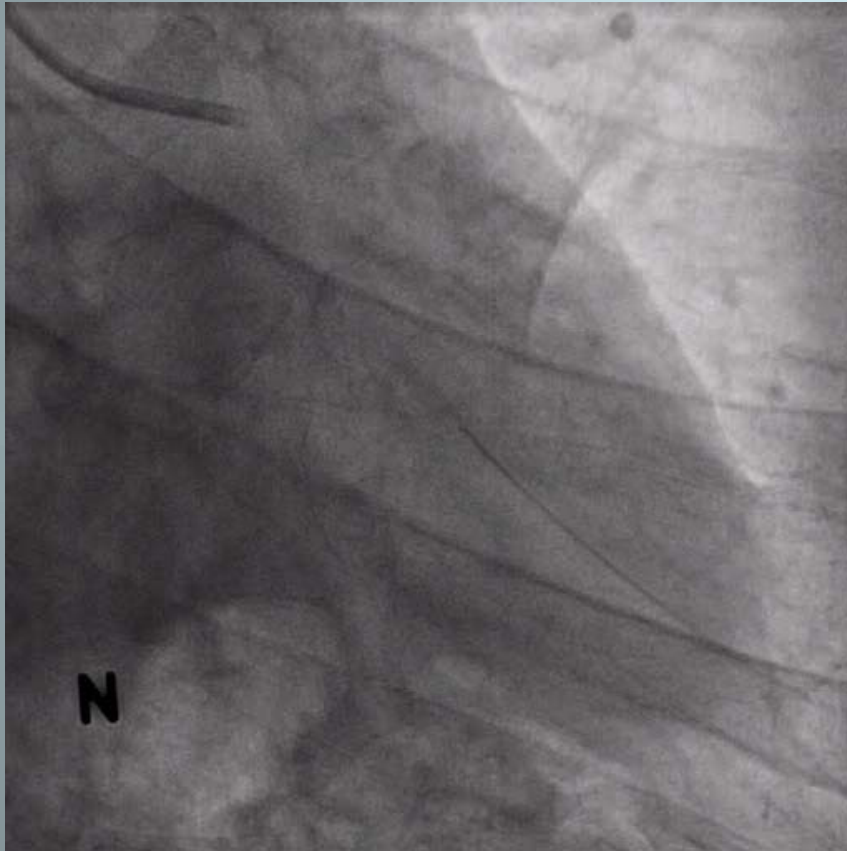


Stage 3

# CAG (2011-9-6)

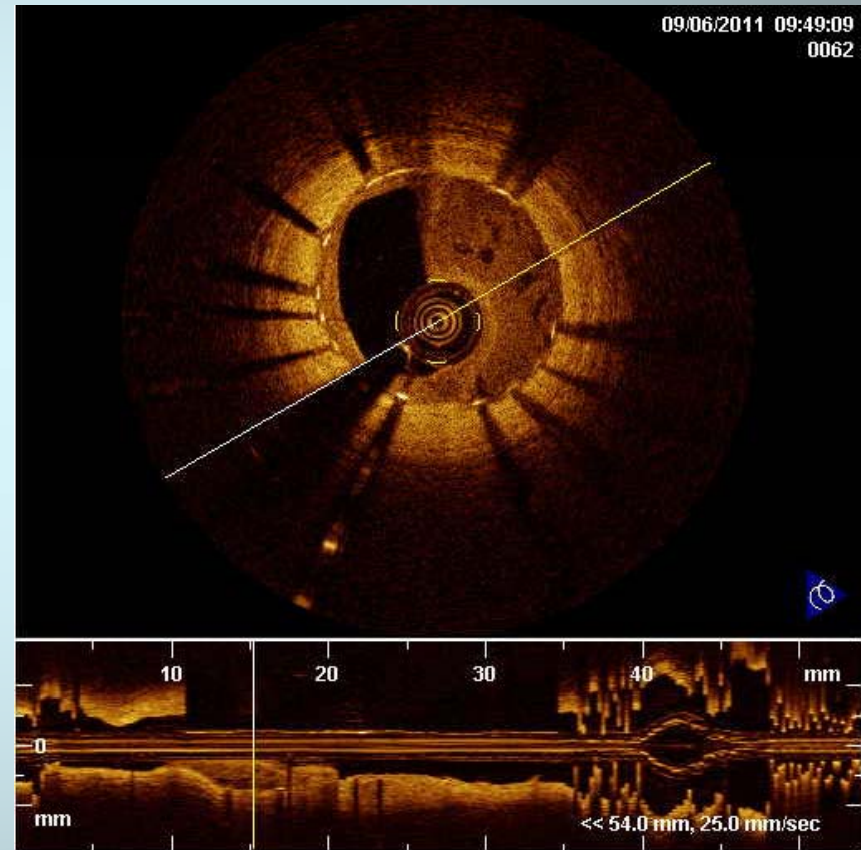
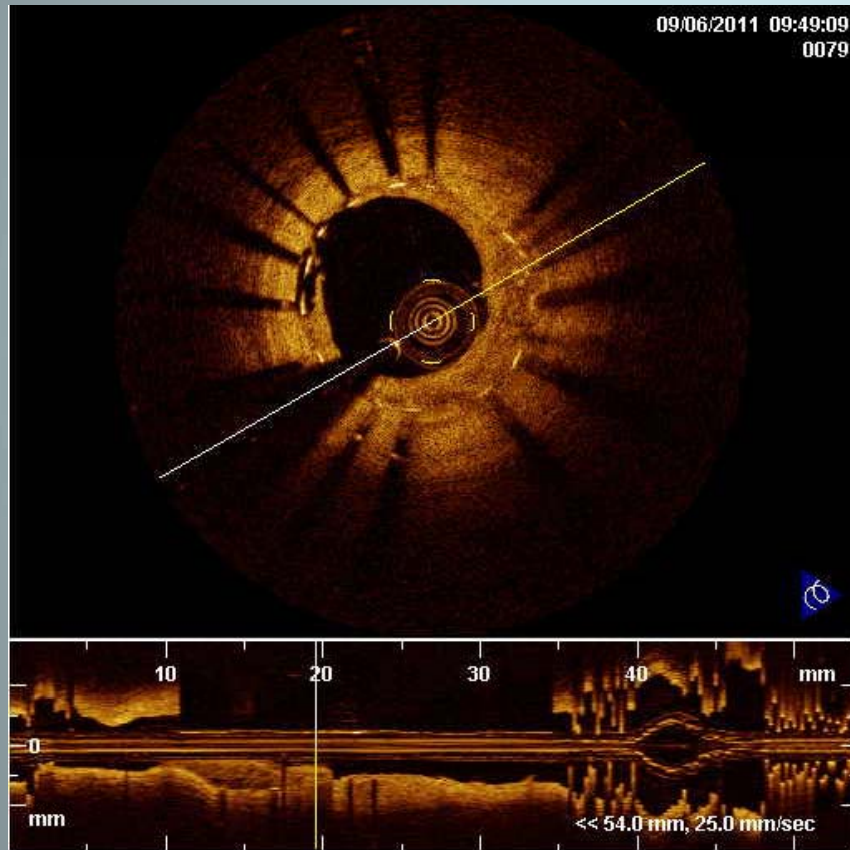


# CAG (2011-9-6)



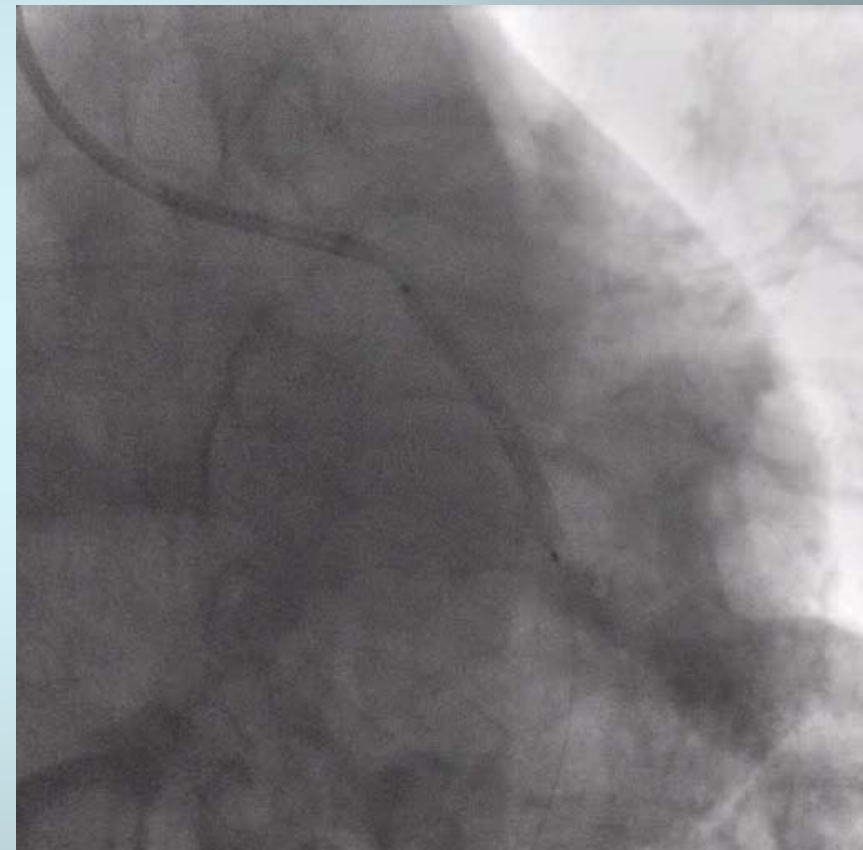
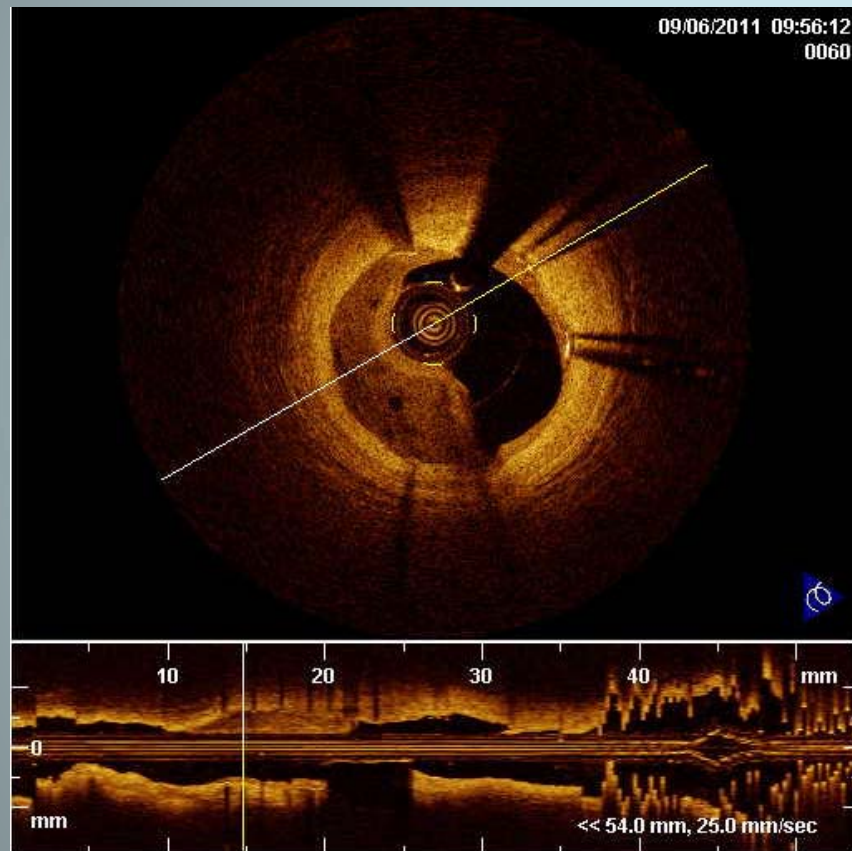
Voyager 2.5x20mm

# OCT





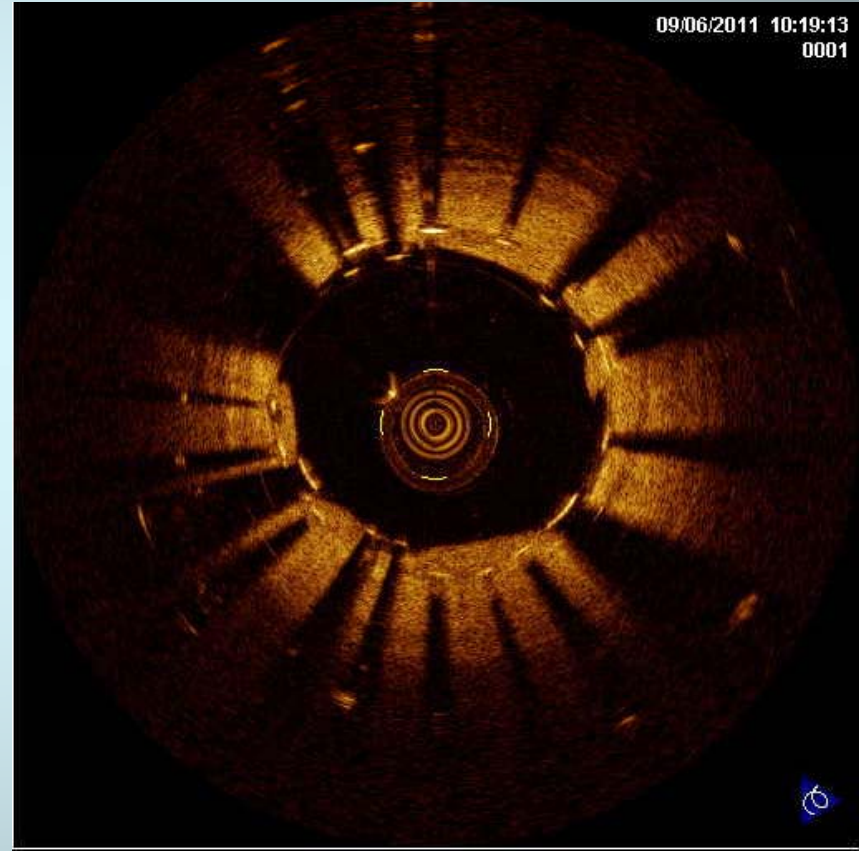
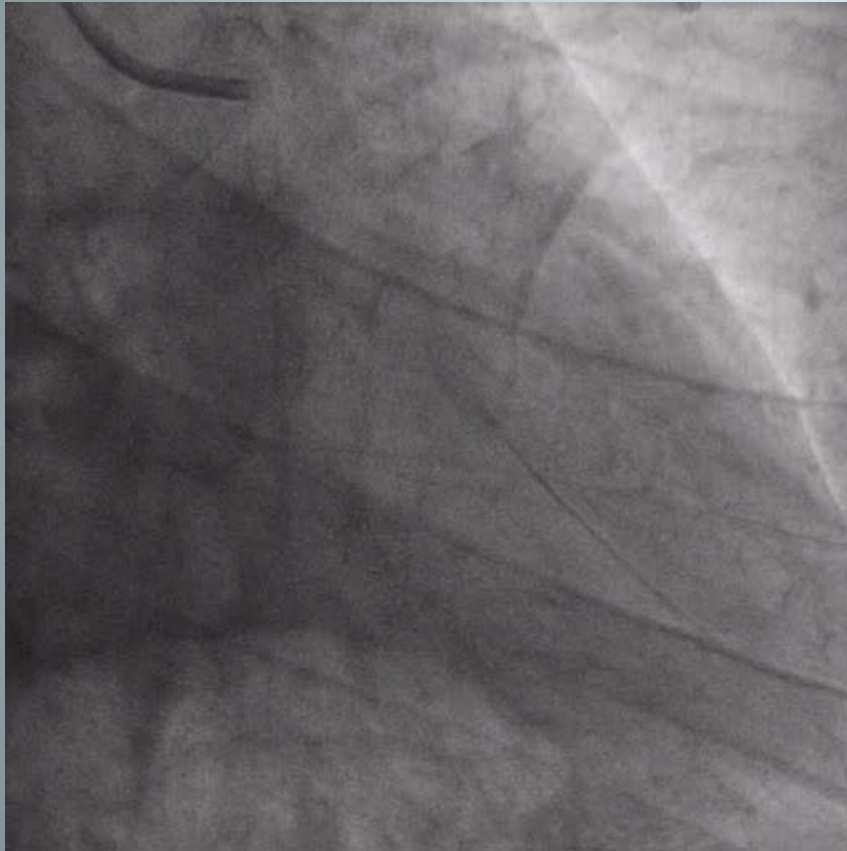
# PCI



**Biomatrix 2.75x28 mm**



# Final



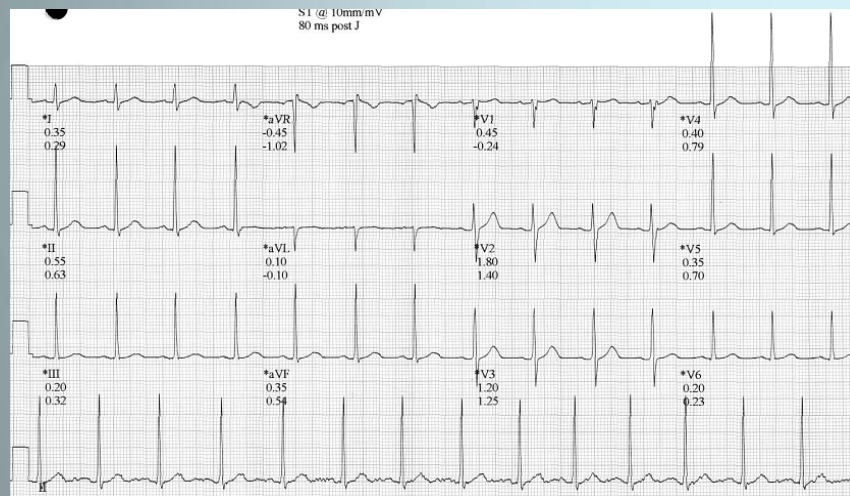
## Case 2

# 53 year old male (name ; LYC)

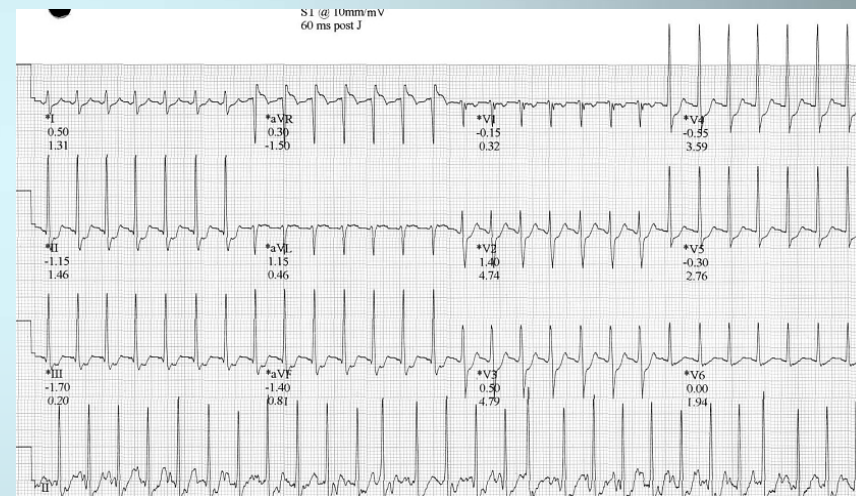
- Chief complaint : effort chest pain.
- History : Hypertension (-)  
Diabetes Mellitus (-)  
Ex-smoker (quit 10 years ago)



# Treadmil test (2010-8-25)

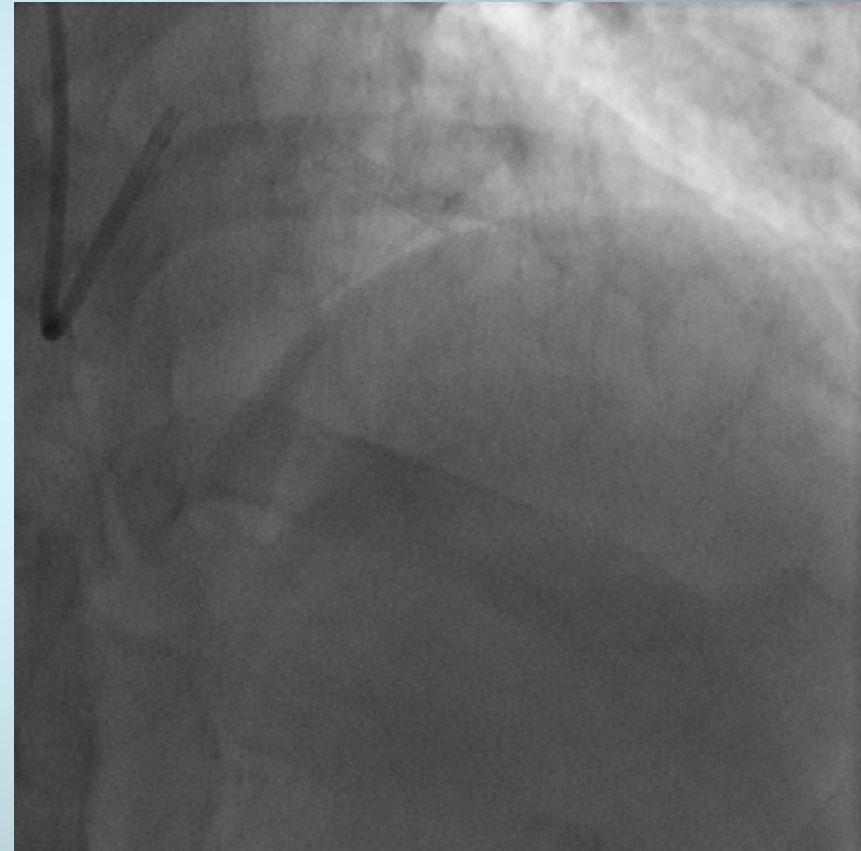
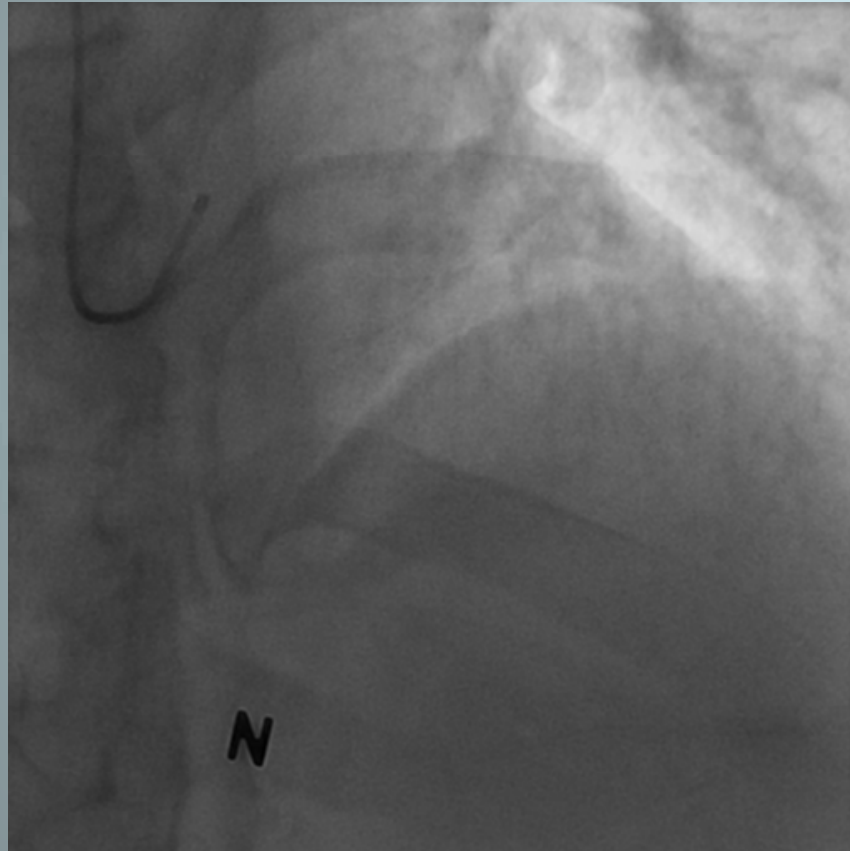


baseline



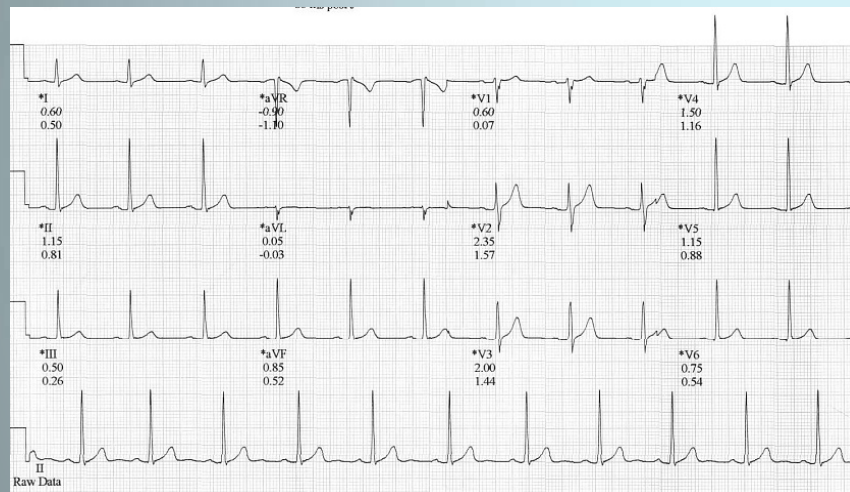
Stage 4

# PCI (2010-9-7)

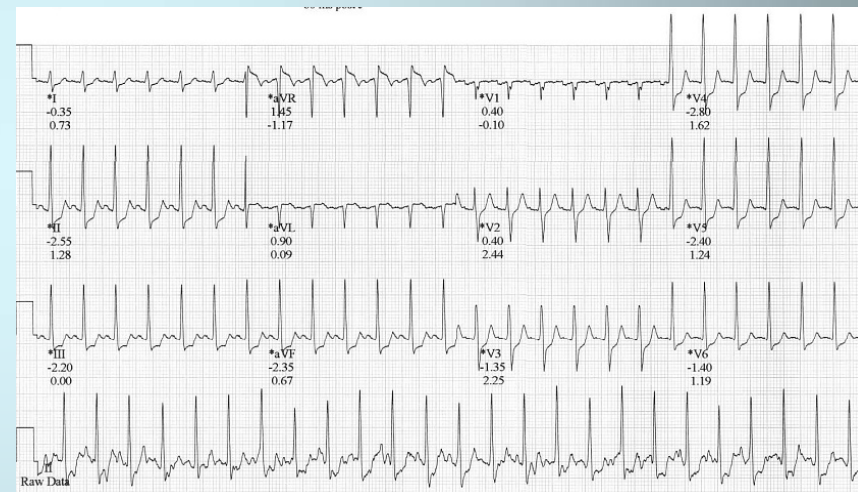


**Xience 3.5x18 mm**

# Treadmil test (2011-5-9)

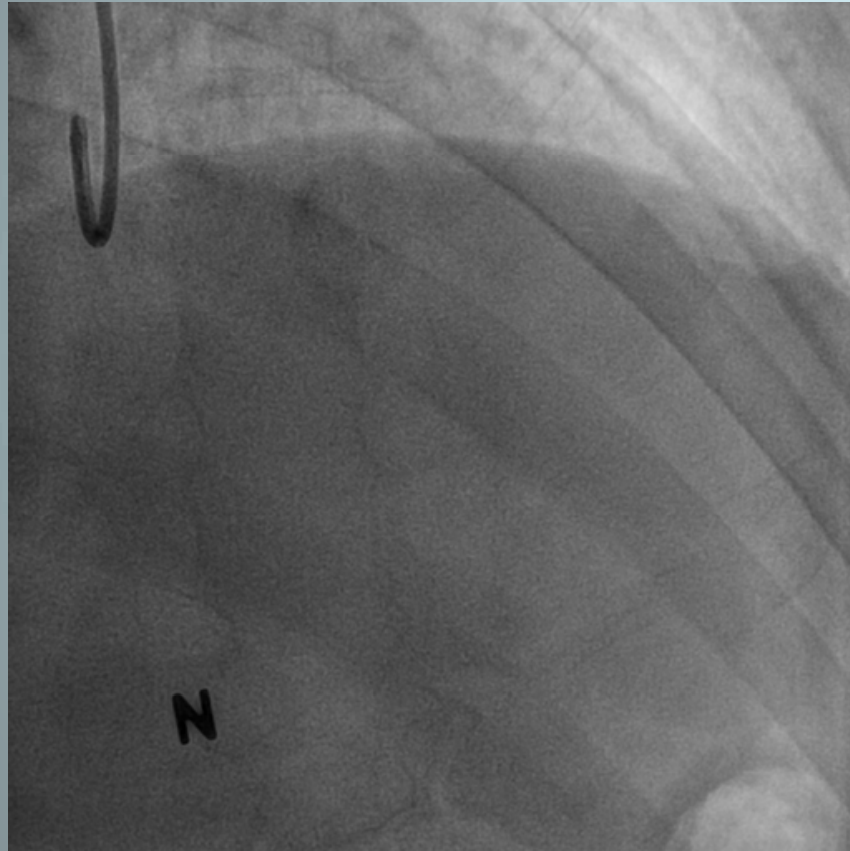


baseline

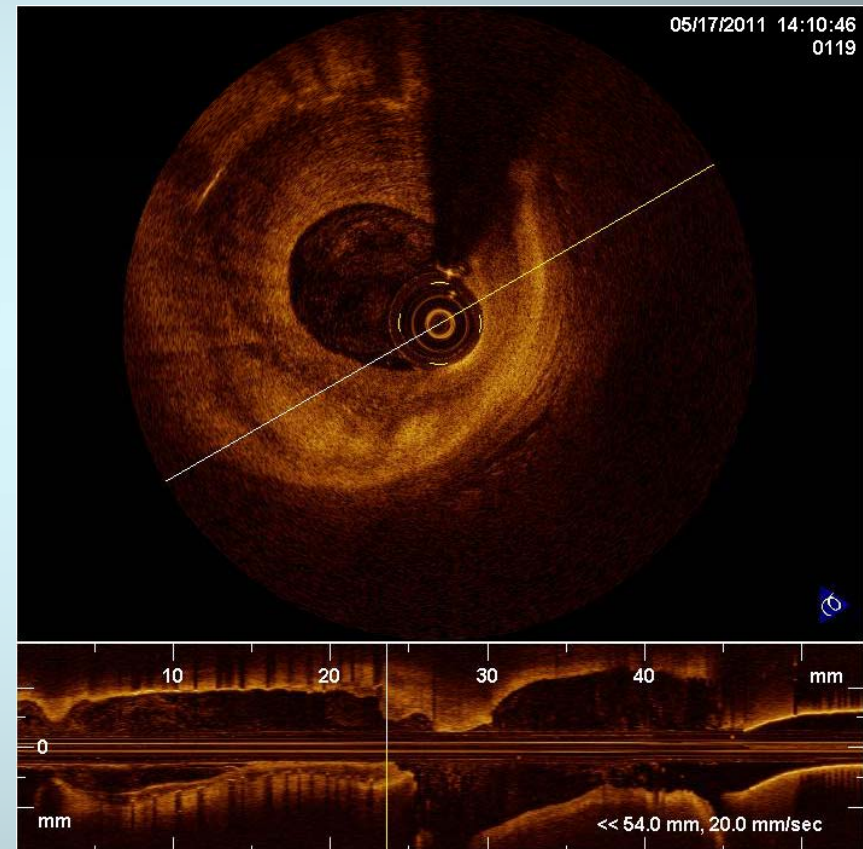
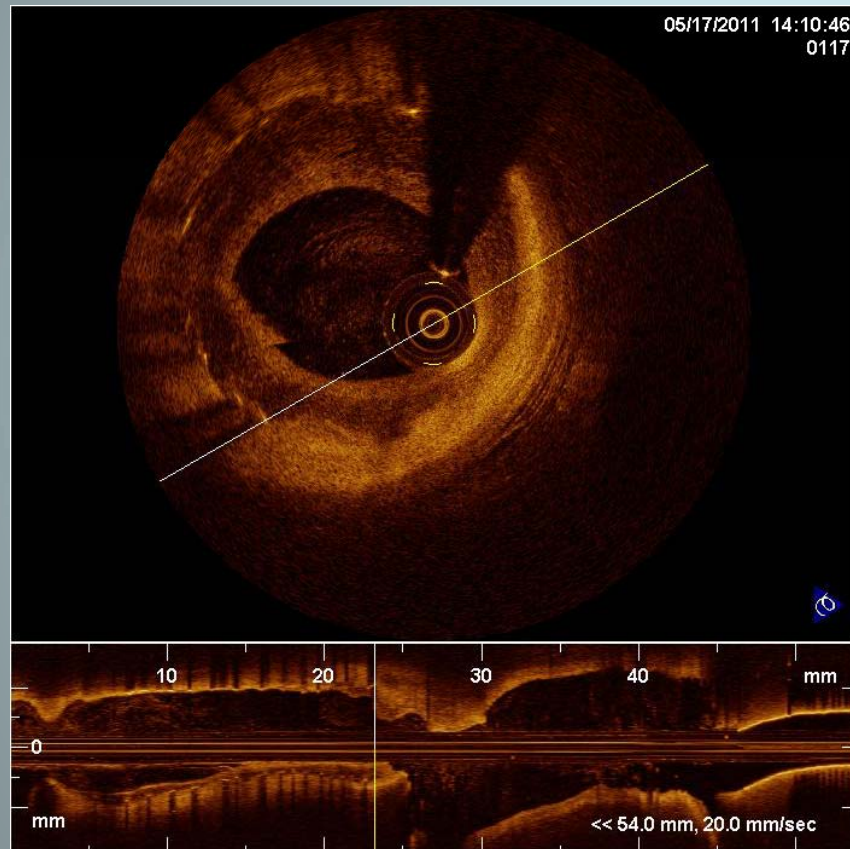


Stage 4

# CAG (2011-5-17)

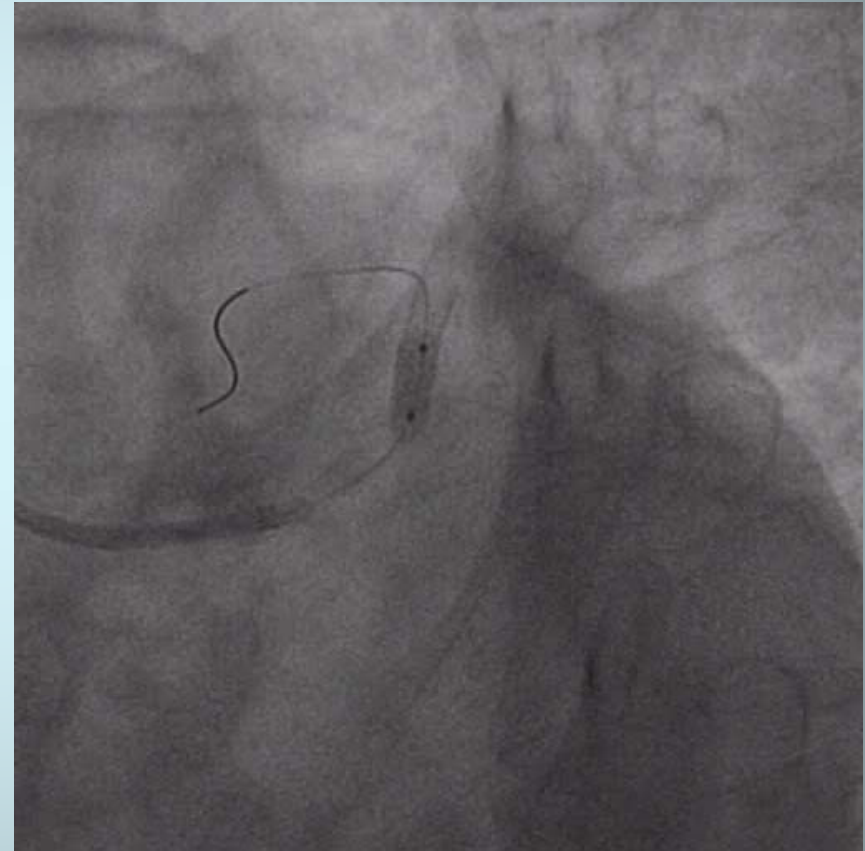
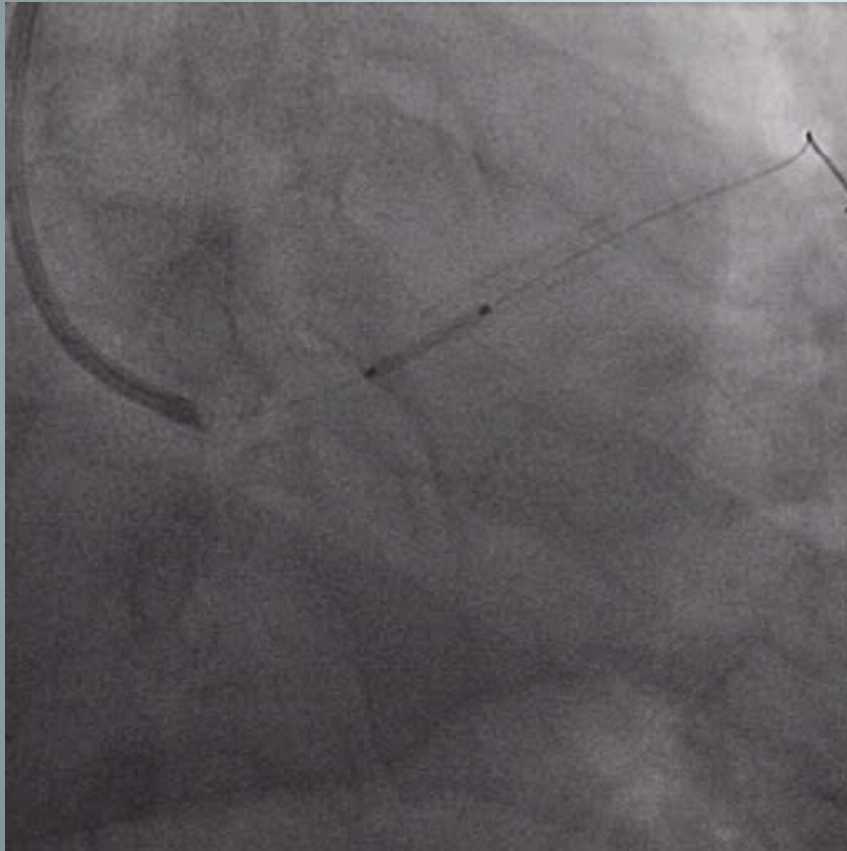


# OCT



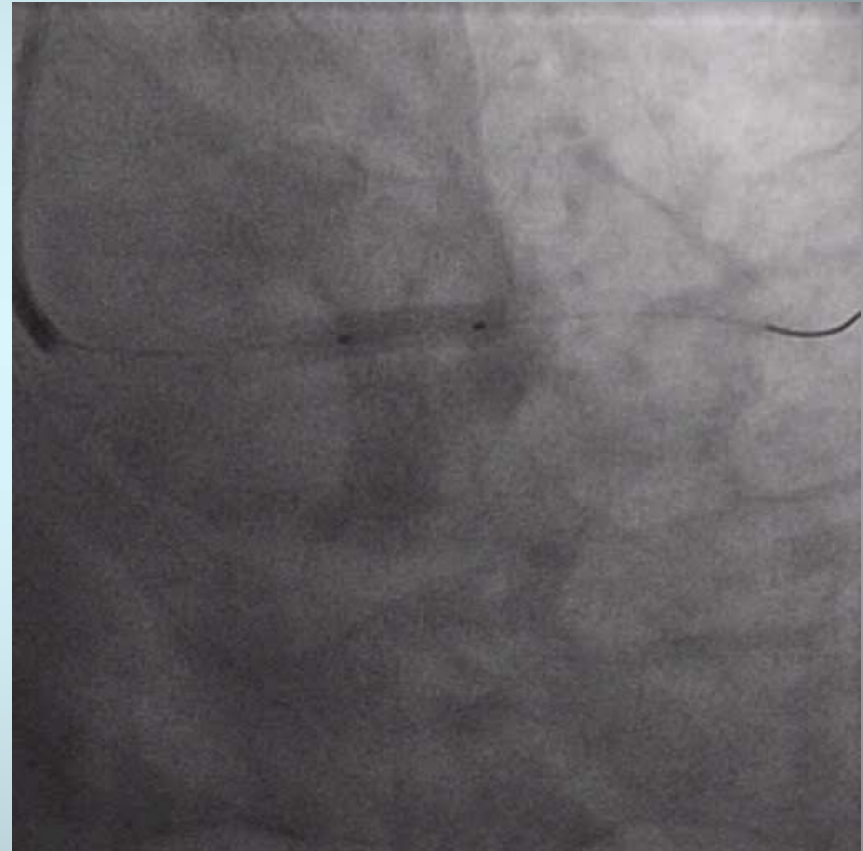
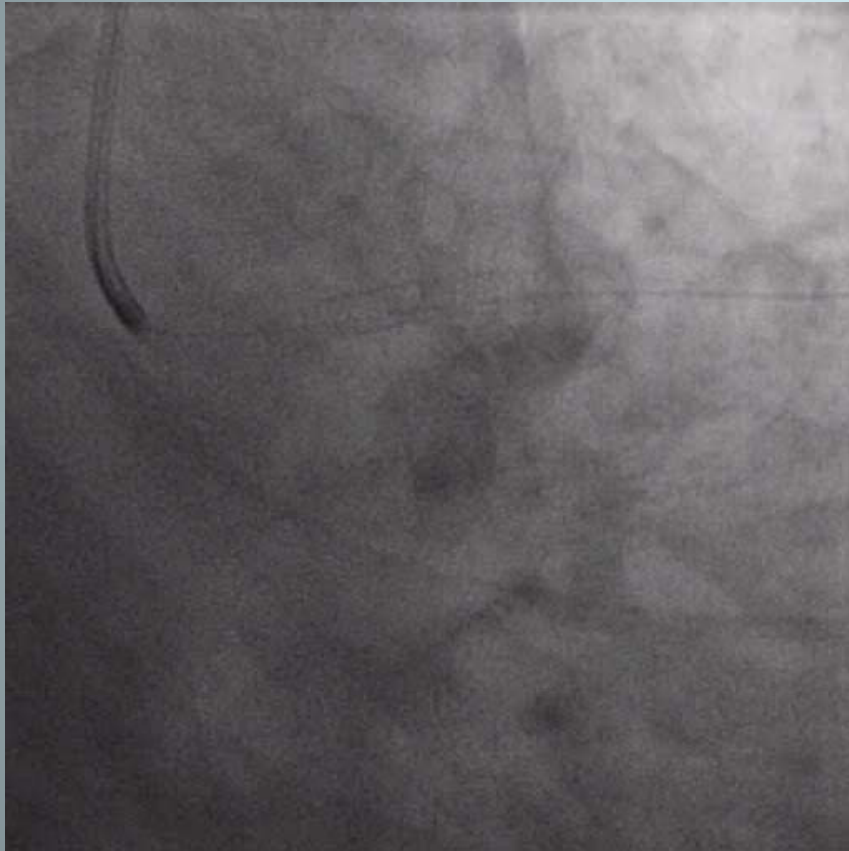


# PCI



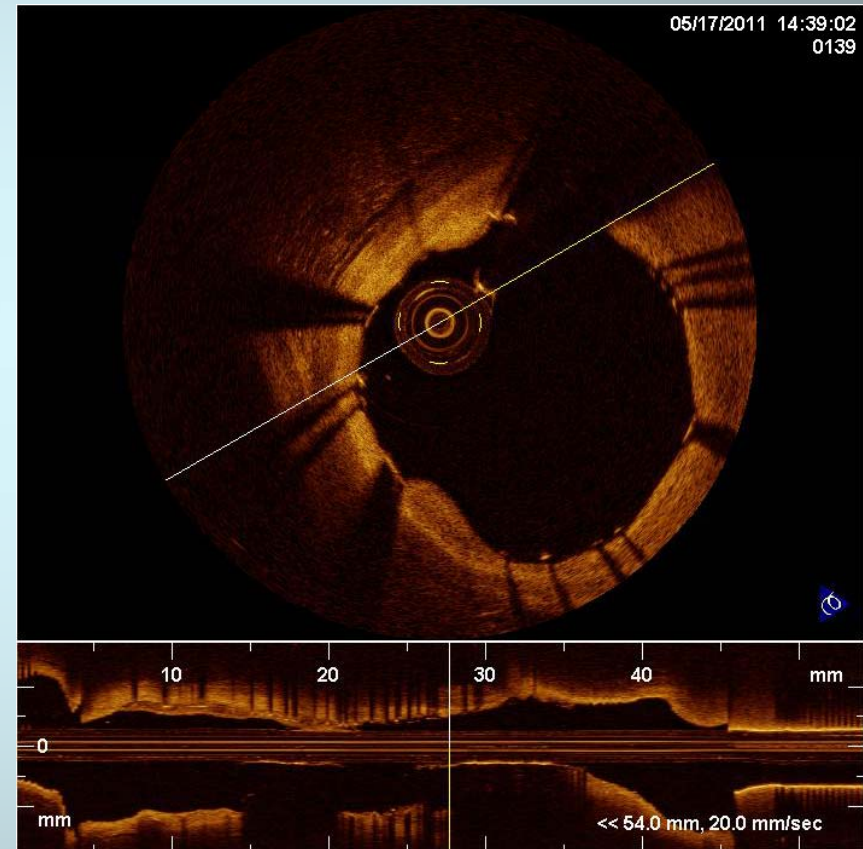
**Xience 3.5x12 mm, 12atm-15"**

# Shifting!



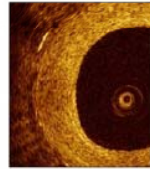
**Ballooning 3.5x12 mm, 8atm-15''**

# Final angio and OCT

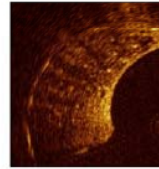


# OCT patterns of stent restenosis

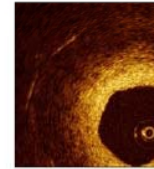
## Restenotic tissue structure



**Homogeneous:** restenotic tissue has uniform optical properties and does not show focal variations in backscattering pattern.

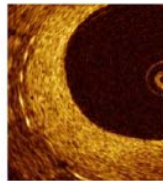


**Heterogeneous:** restenotic tissue has focally changing optical properties and shows various backscattering patterns

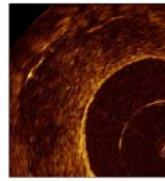


**Layered:** restenotic tissue consists of concentric layers with different optical properties: an adluminal high scattering layer and an abluminal low scattering layer

## Restenotic tissue backscatter

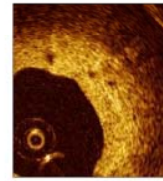


**High:** the majority of the tissue shows high backscatter and appears bright

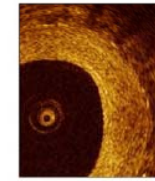


**Low:** the majority of the tissue shows low backscatter and appears dark or black

## Microvessels visible

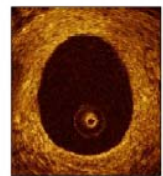


**Yes:** microvessels appear as well delineated low backscattering structures less than 200 micron in diameter that show a trajectory within the vessel

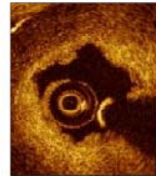


**No**

## Lumen shape



**Regular:** lumen border is sharply delineated, smooth and circular

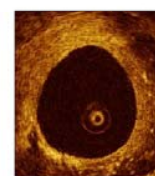


**Irregular:** lumen border irregular with tissue protrusions from the vessel wall into the lumen

## Presence of intraluminal material



**Yes:** there is visible material inside the vessel lumen.



**No**



Am Heart J 2009;158:284-93.



## Contribution of organized thrombus to in-stent restenosis after sirolimus-eluting stent implantation: optical coherence tomography findings

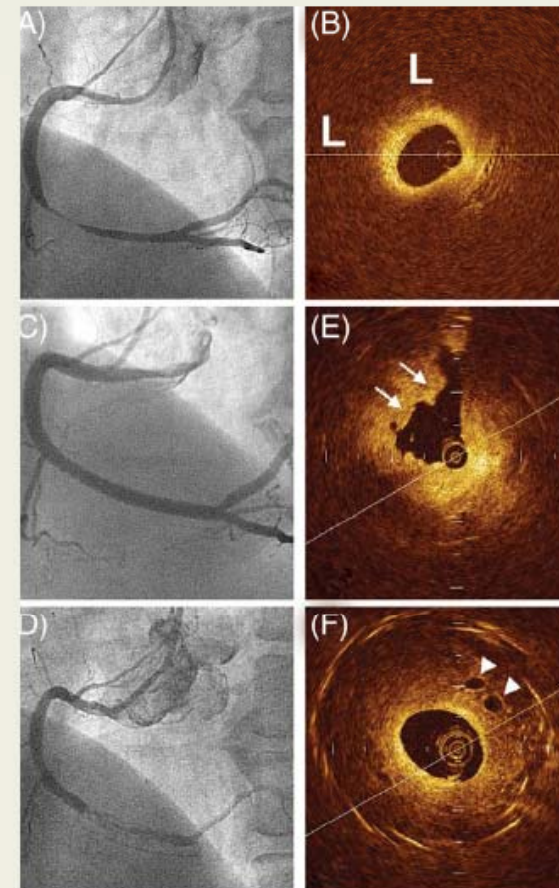
Kenichi Fujii\*, Motomaru Masutani, and Mitsumasa Ohyanagi

Division of Coronary Heart Disease, Department of Internal Medicine, Hyogo College of Medicine, 1-1 Mukogawa-cho, Nishinomiya, Hyogo 6638501, Japan

\* Corresponding author. Tel: +81 798 45 6553, Fax: +81 798 45 6551. Email: kfujii@hyo-med.ac.jp

A 58-year-old man with hypercholesterolaemia and diabetes mellitus was admitted for exertional angina pectoris. Coronary angiography showed a 90% stenosis in the mid-right coronary artery (Panel A) and optical coherence tomography (OCT: LightLabTM) was performed to assess plaque morphology. OCT revealed diffusely bordered signal poor region with overlying signal-rich band at the culprit site (L indicates lipid core in Panel B). Two sirolimus-eluting stents (CypherTM; 3.0 × 33 and 3.0 × 33 mm) were deployed in the culprit lesion and excellent angiographic results were obtained (Panel C). The final intravascular ultrasound also demonstrated the well-expanded and apposed stents with no plaque protrusion. The patient was prescribed aspirin 100 mg and ticlopidin 200 mg orally daily for 1 year. Twelve months follow-up coronary angiography showed a 99% stenosis with contrast filling defect in the stents (Panel D). At this site, OCT revealed a low-backscattering projections irregular mass protruding into the lumen (white arrows in Panel E) with some microchannels (white arrowheads in Panel F). This finding may suggest that organized thrombus was the main component of restenotic tissue 12 months after sirolimus-eluting stent implantation.

Stent fracture and suboptimal stent expansion are thought to be the mechanism of restenosis after sirolimus-eluting stent implantation. Our images suggest that intra-stent thrombus accumulation may represent a new potential mechanism of restenosis after sirolimus-eluting stent implantation. OCT, which is a new high-resolution (approximately 10 µm) imaging modality, may be a useful tool for assessing the mechanism of restenosis after drug-eluting deployment.



# Organized thrombus in restenosis

- Pathologic examinations of human atherectomy specimens have demonstrated that restenosis in DES can consist of heterogeneous components including proteoglycan-rich tissue, organized thrombus, atheroma, inflammation, and fibrinoid.
- Restenosis presenting with unstable angina symptoms was more frequently associated with irregular lumen shape and intraluminal material, suggestive of the presence of thrombus.

# Conclusions

- OCT findings such as

1) Low backscatter,

2) Heterogeneous pattern,

3) Microvessels,

4) Irregular margin

are considered organized thrombus  
in restenosis.

