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3 Vessel OCT Imaging in ACS Patients

Koji Kato, IK Jang
Harvard Medical School

A Teaching Affiliate of Harvard Medical School

Background

- Pathological studies have demonstrated that plaque rupture with subsequent occlusive thrombus formation is a primary cause of ACS.
- Patients with ACS have a higher incidence of recurrent ischemic events.
- Pan-vascular plaque instability may be the underlying mechanism in this phenomenon. However, previous *in vivo* studies lack detail description of plaque morphology.

Aim

- To investigate the plaque characteristics of non-culprit lesions in ACS
- To compare the findings with those in non-ACS patients

Methods

- A total of 108 patients were identified who underwent 3 vessel OCT imaging from the MGH OCT Registry database.
  - 4 patients were excluded due to poor image quality
  - 104 patients (96.3%) were included in the final analysis.
- Non-culprit plaques with more than 30% diameter stenosis by OCT were included in our study.

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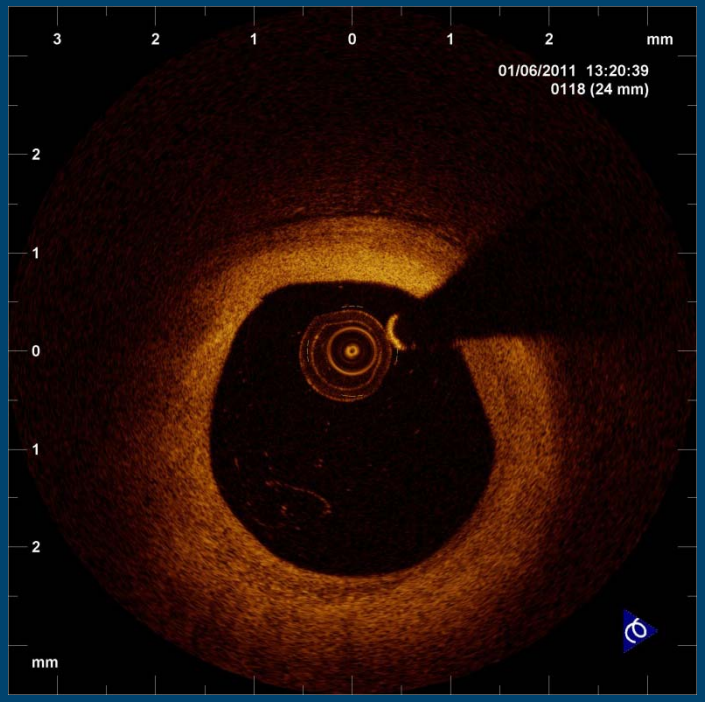
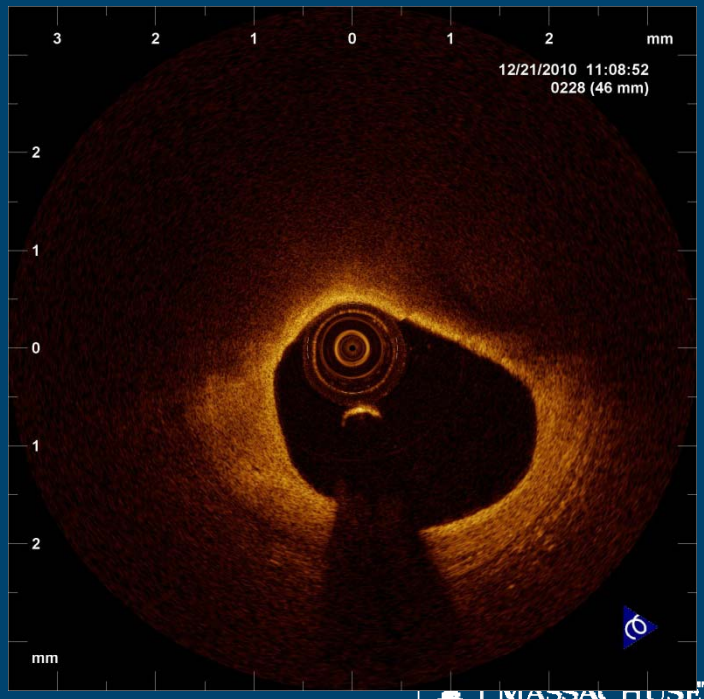
Plaque analysis by OCT

- Plaques were classified into 2 categories

Fibrous plaque



Lipid plaque



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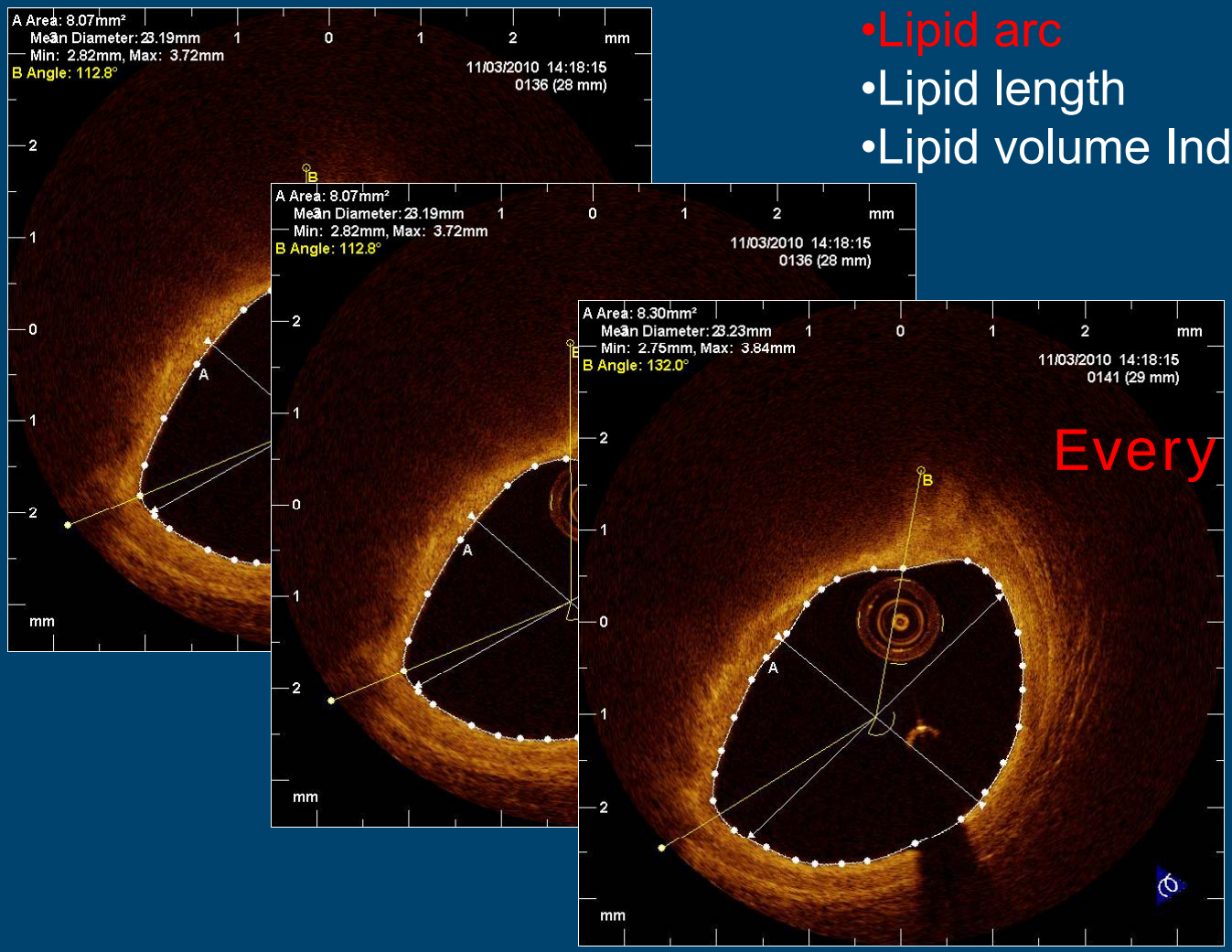
Lipid-rich plaque measurement



- Lipid arc
- Lipid length
- Lipid volume Index

Every 1 mm interval

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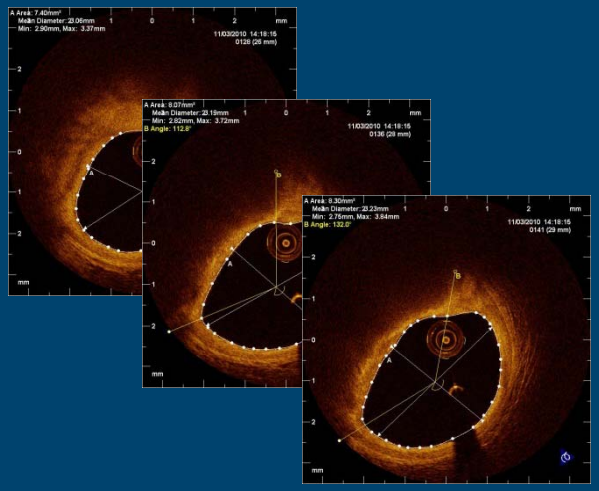
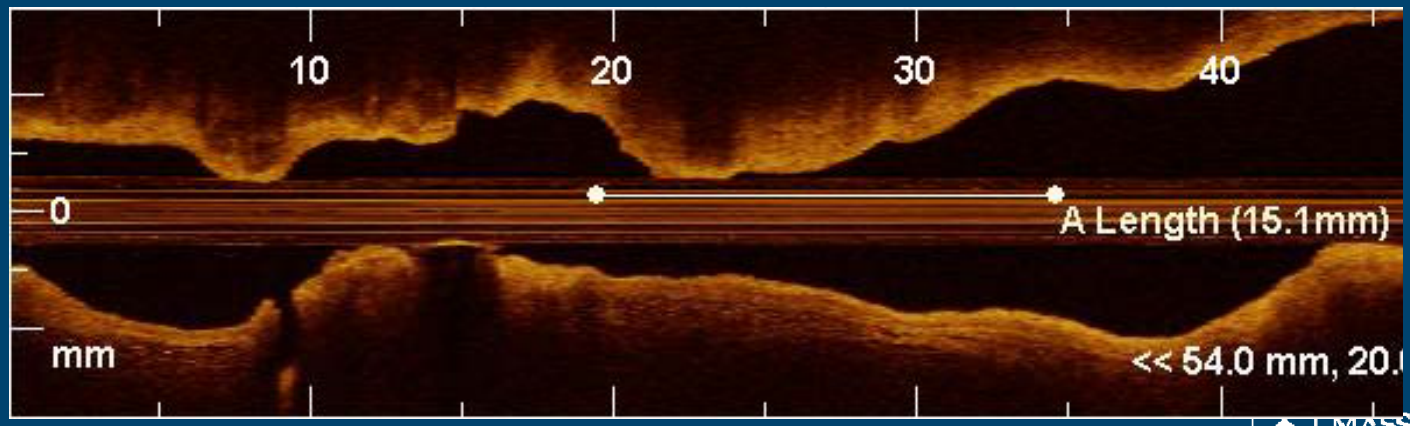
Lipid-rich plaque measurement



- Lipid arc
- Lipid length
- Lipid volume Index



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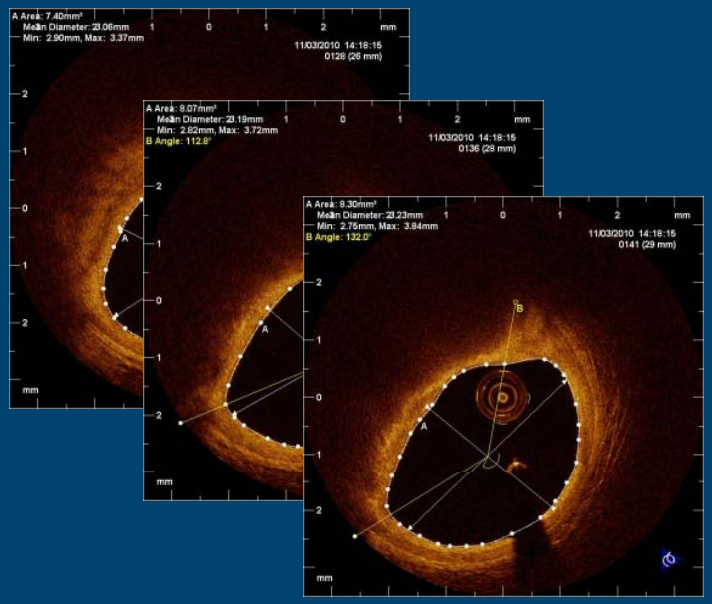
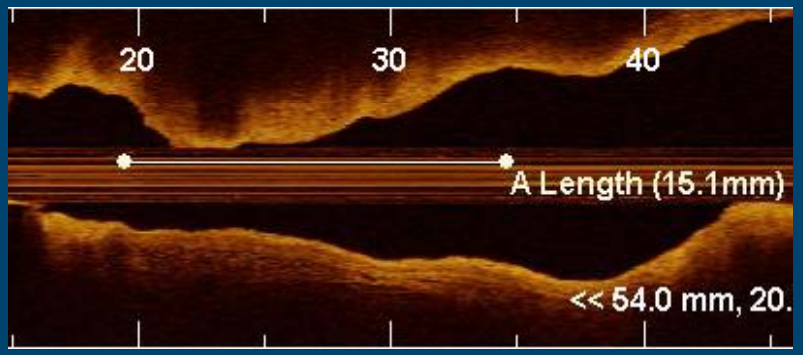
Lipid-rich plaque measurement



- Lipid arc
- Lipid length (longitudinal view)
- Lipid volume Index



Lipid volume index = Averaged lipid arc × length

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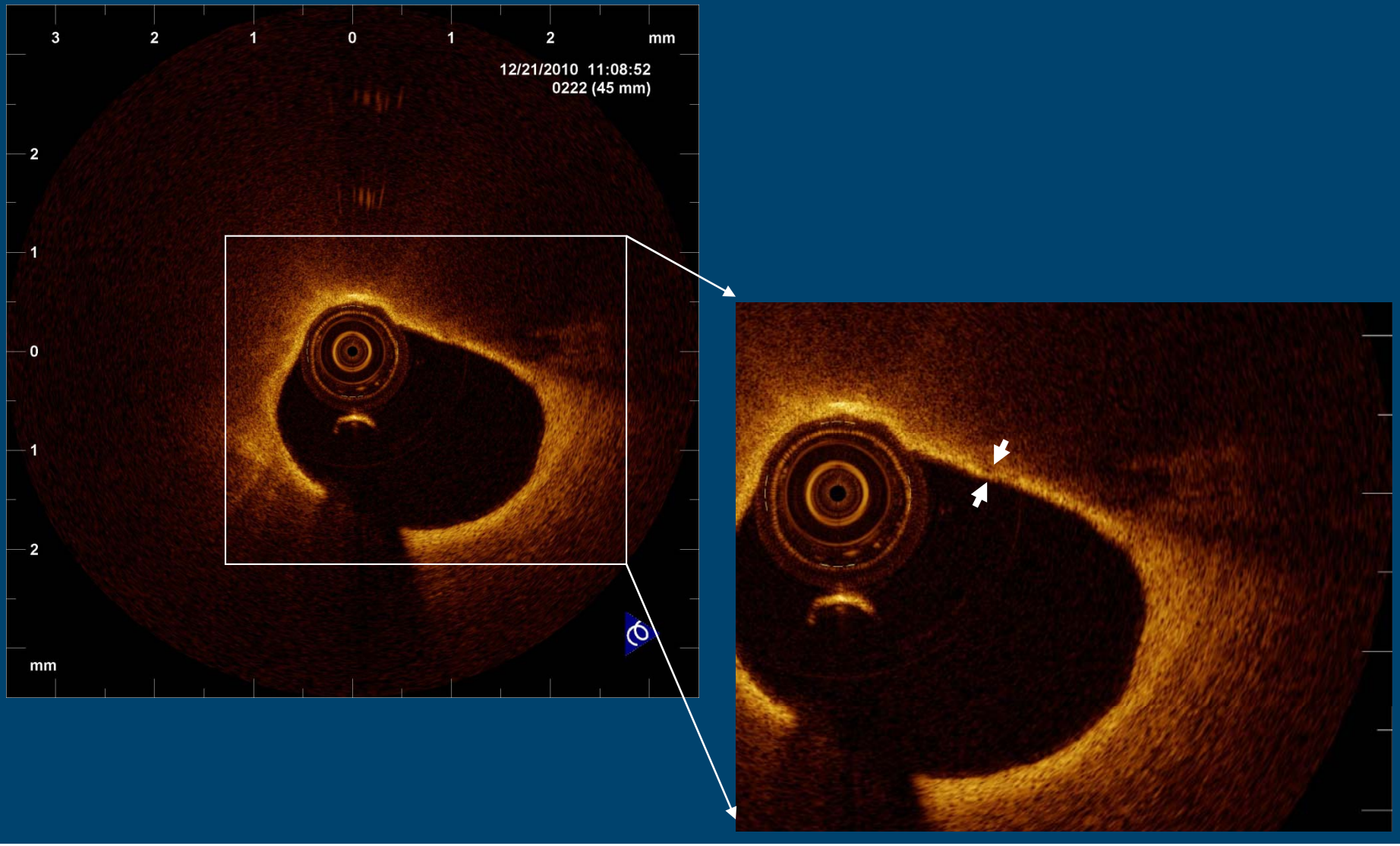
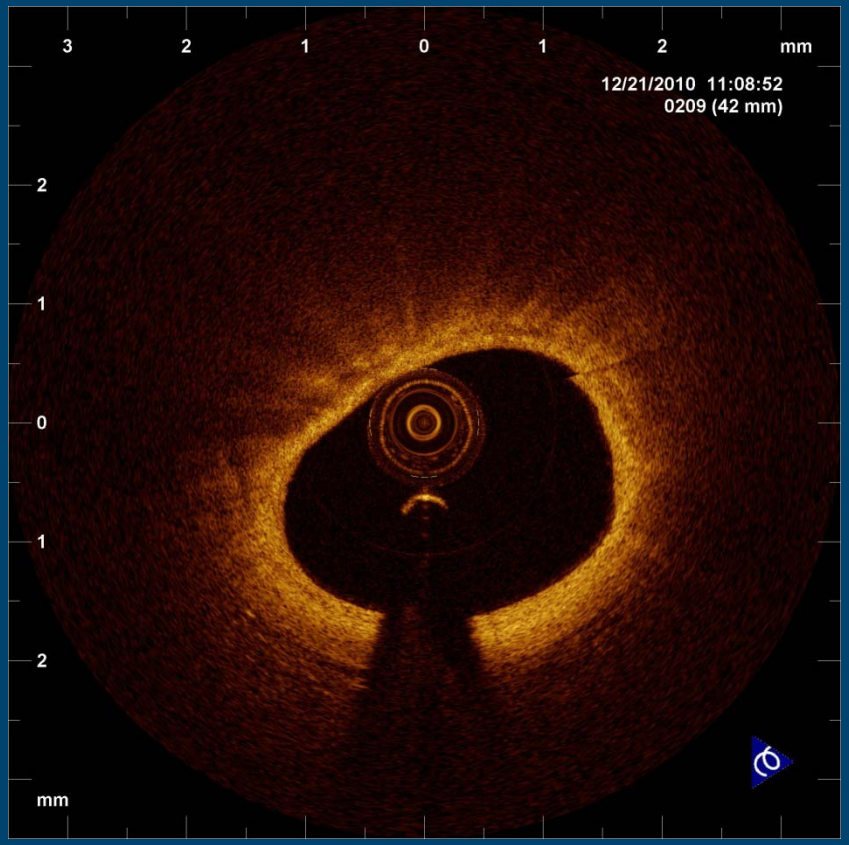
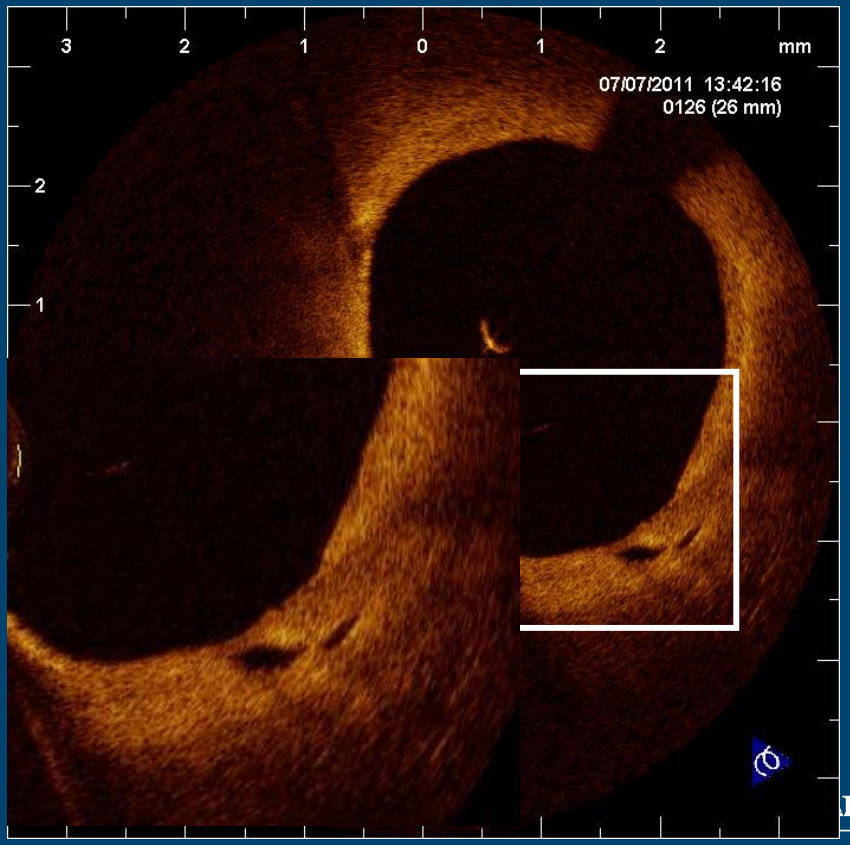
Fibrous cap thickness



Macrophages



Microchannels



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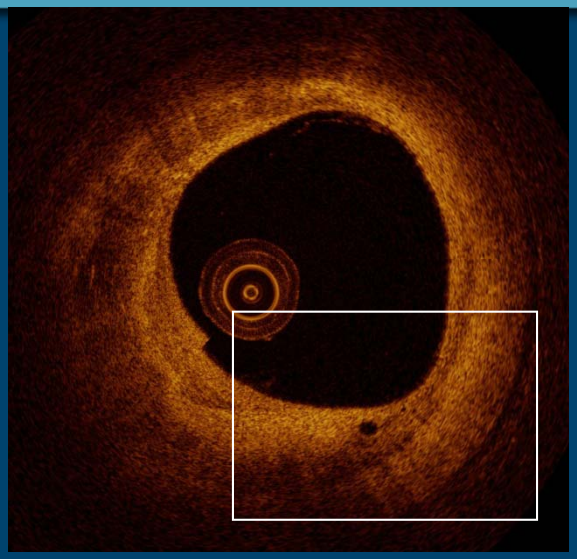
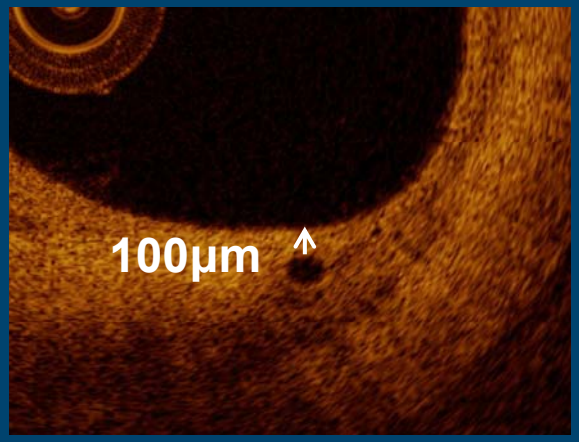
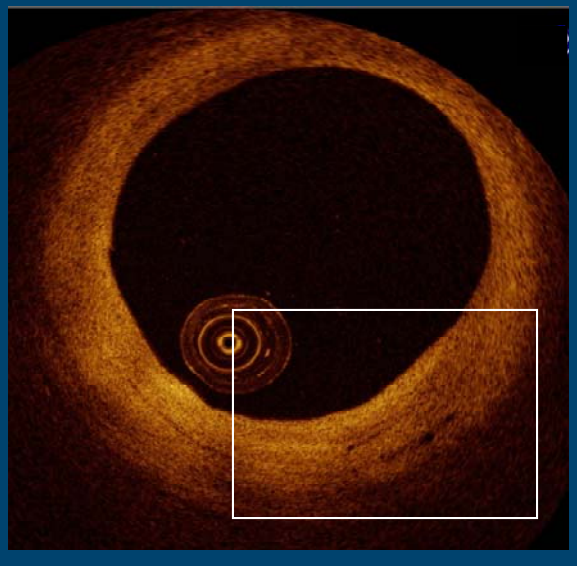
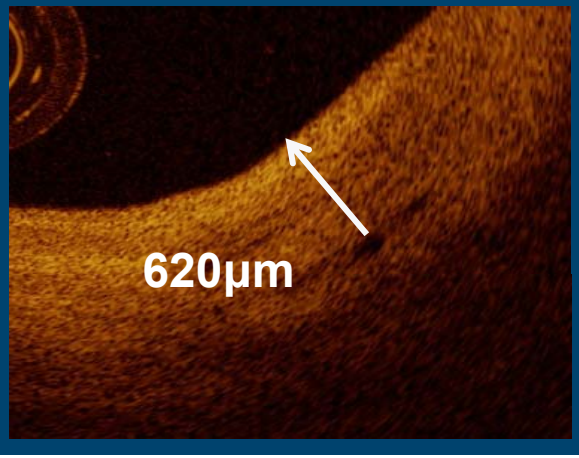
Measurement of Microchannels









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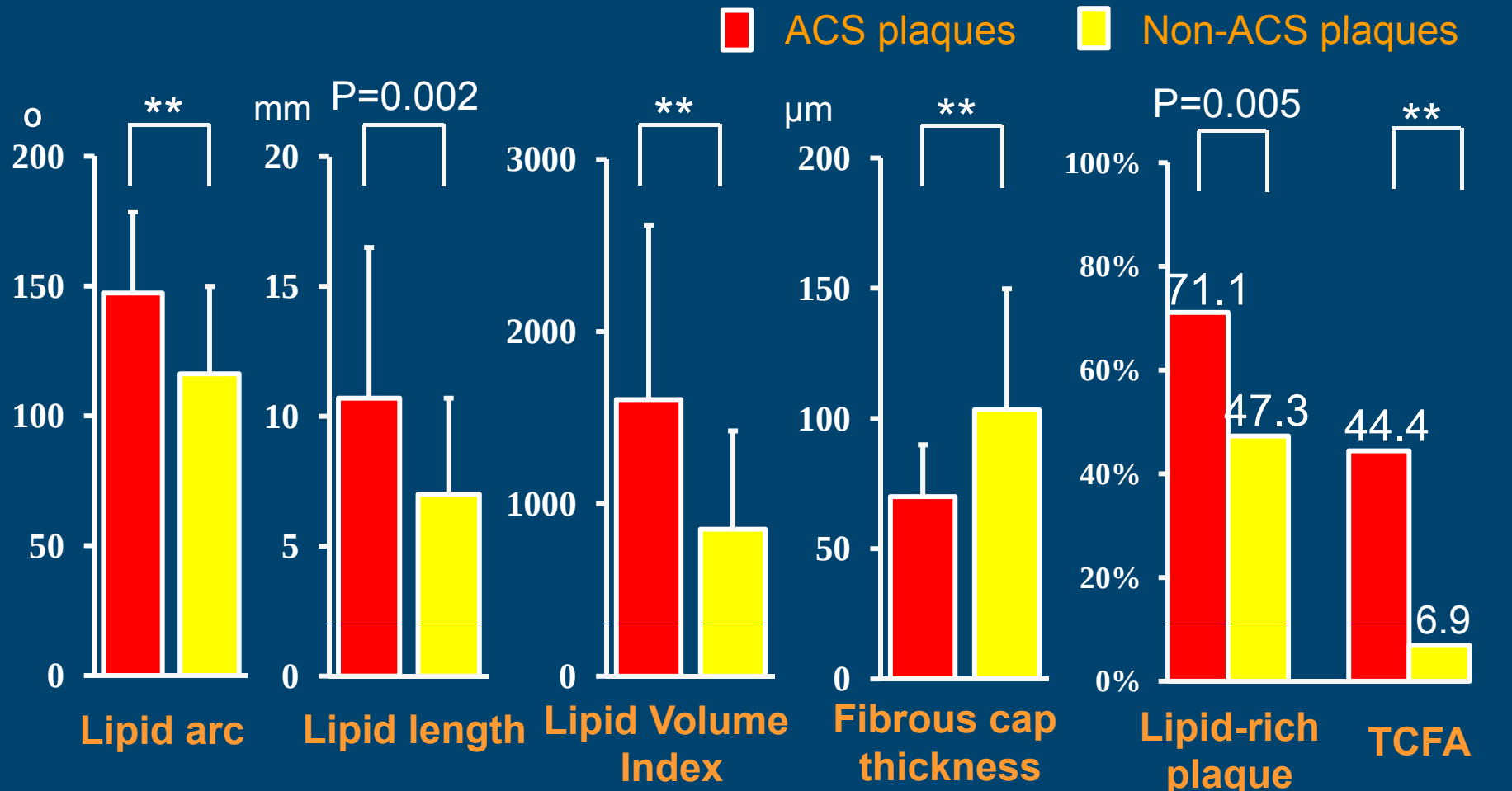
Results

Baseline Characteristics

	ACS (n=17)	Non-ACS (n=87)	p value
Age	58.8±14.1	59.1±9.6	0.931
Male	14 (82.4%)	60 (69.0%)	0.383
Hypertension	10 (58.8%)	55 (63.2%)	0.787
Hyperlipiemia	14 (82.4%)	71 (81.6%)	0.999
Smoking	10 (58.8%)	47 (54.0%)	0.794
Diabetes Mellitus	6 (35.3%)	30 (34.5%)	0.999
Prior myocardial infarction	5 (29.4%)	32 (36.8%)	0.783
Peripheral artery disease	1 (5.9%)	3 (3.4%)	0.516
Chronic kidney disease	2 (11.8%)	8 (9.2%)	0.666

Plaque-based comparison



**p<0.001

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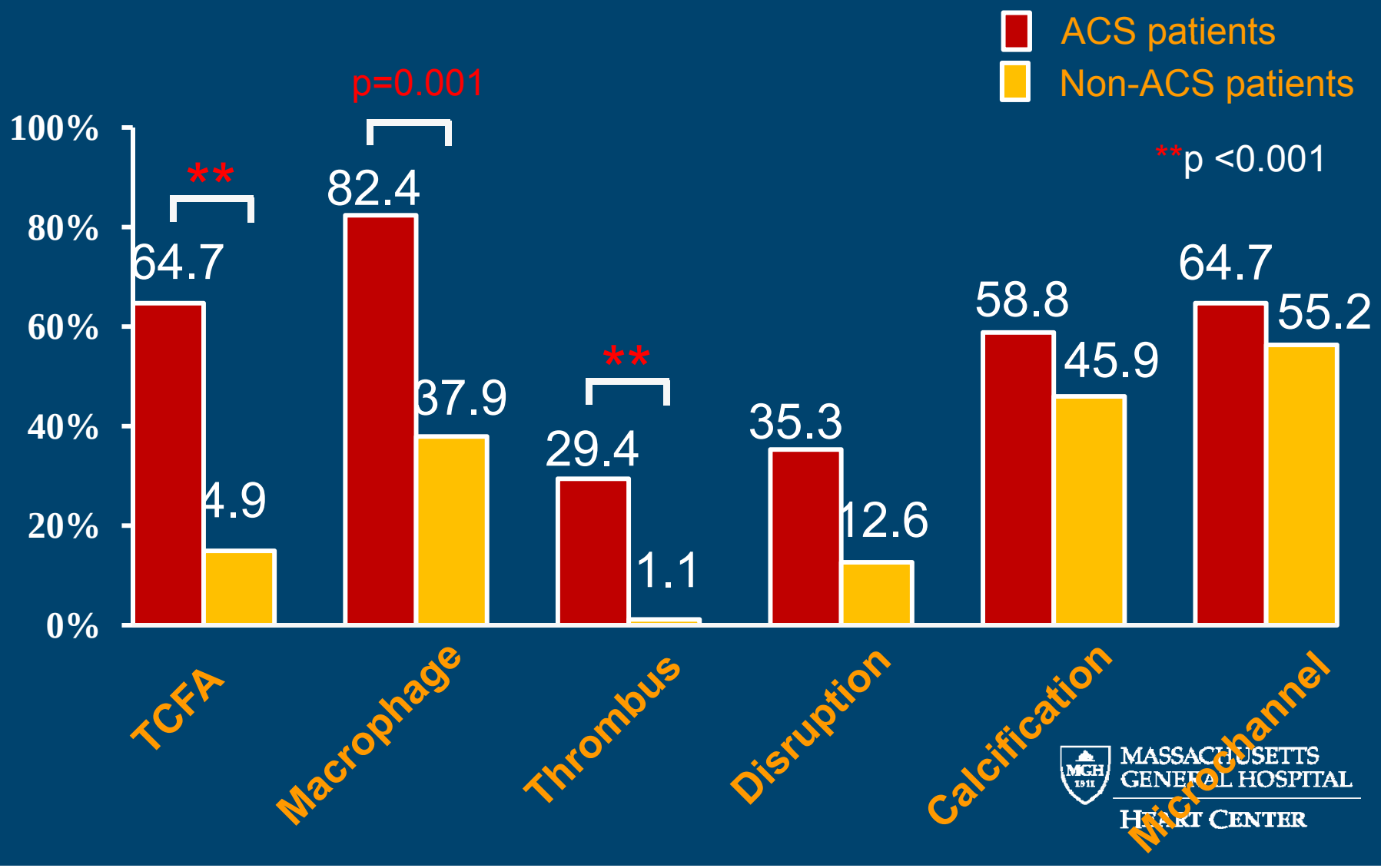
Patient-based comparison



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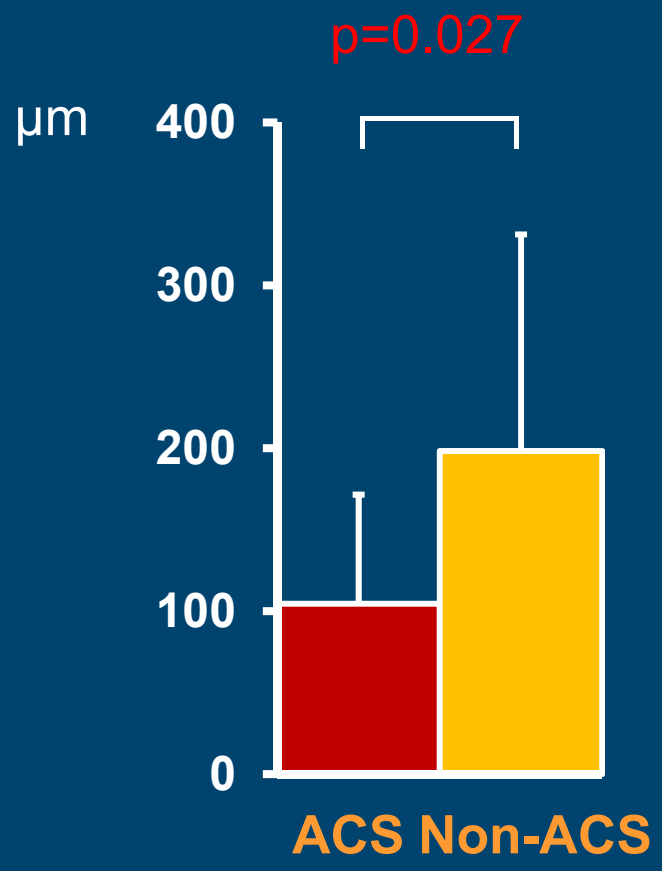
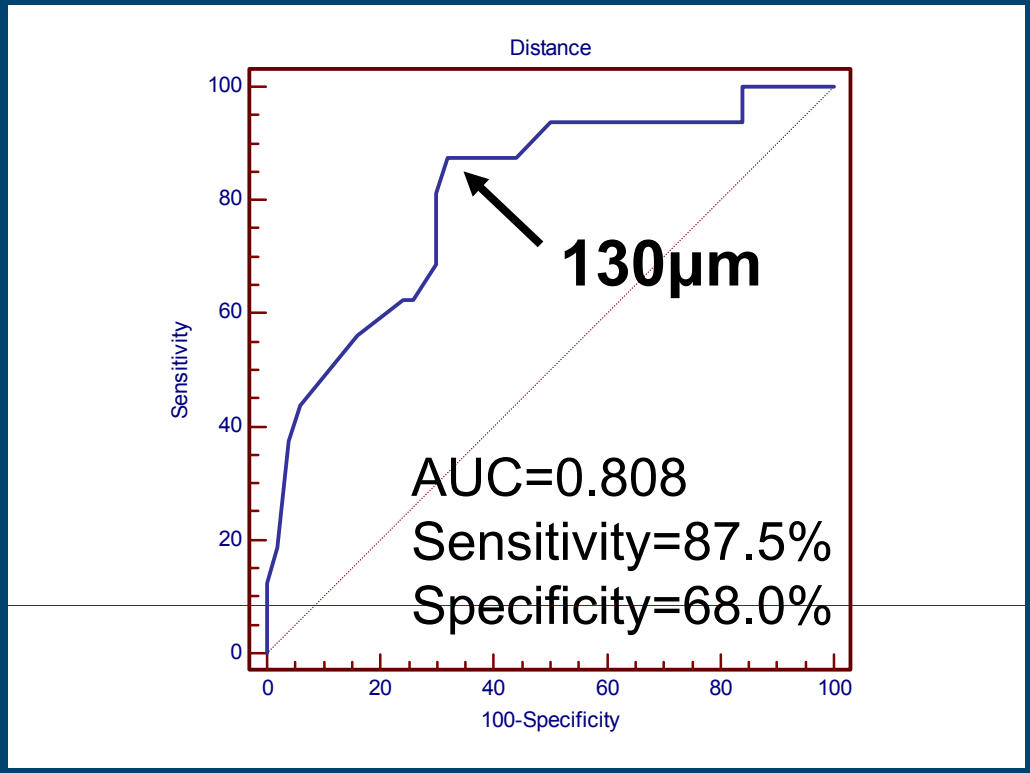
Distance from microchannel to lumen





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Summary

- Compared to the non-ACS plaques, ACS plaques had a wider lipid arc, a longer lipid length, a larger lipid volume index, and a thinner fibrous cap.
- TCFA, macrophage, and thrombus were more frequently observed in ACS patients.
- The prevalence of disruption and calcification were not different between the groups.
- Although the prevalence of microchannels did not differ between the groups, the distance from the closest microchannel was shorter in ACS patients.

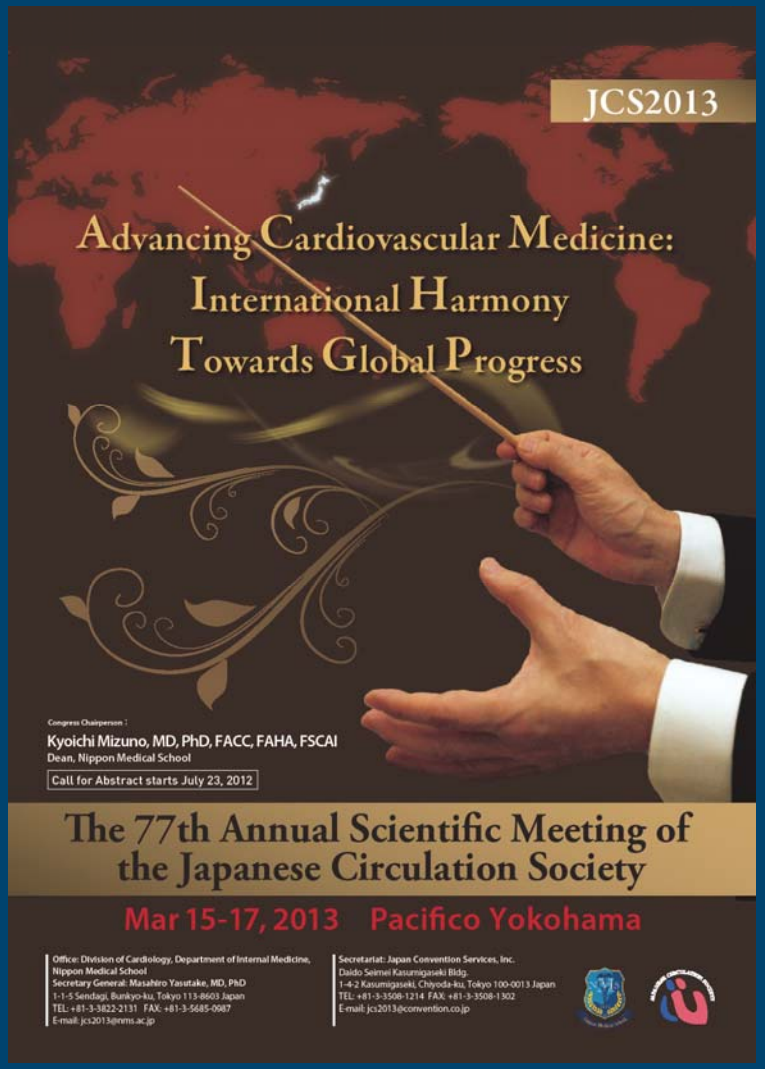
Limitations

- Retrospective study using a registry database.
- The exact quantification of necrotic core and plaque burden by OCT is difficult.
- No validation study for disruption, microchannel, macrophage.
- Limited sample size in 3-vessel OCT imaging
- Limited zone of OCT in far distal segments and occasionally very proximal segment.

Conclusions

- The non-culprit plaques in patients with ACS have more vulnerable plaque characteristics compared to those with non-ACS.
- This finding supports the concept that plaque vulnerability is a pan-vascular phenomenon in ACS.
- More aggressive plaque stabilizing therapy such as cholesterol lowering and/or anti-inflammatory agents may have additional value in ACS patients.

4th MGH OCT Registry Symposium



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