



A Teaching Affiliate
of Harvard Medical School

The MGH OCT Registry

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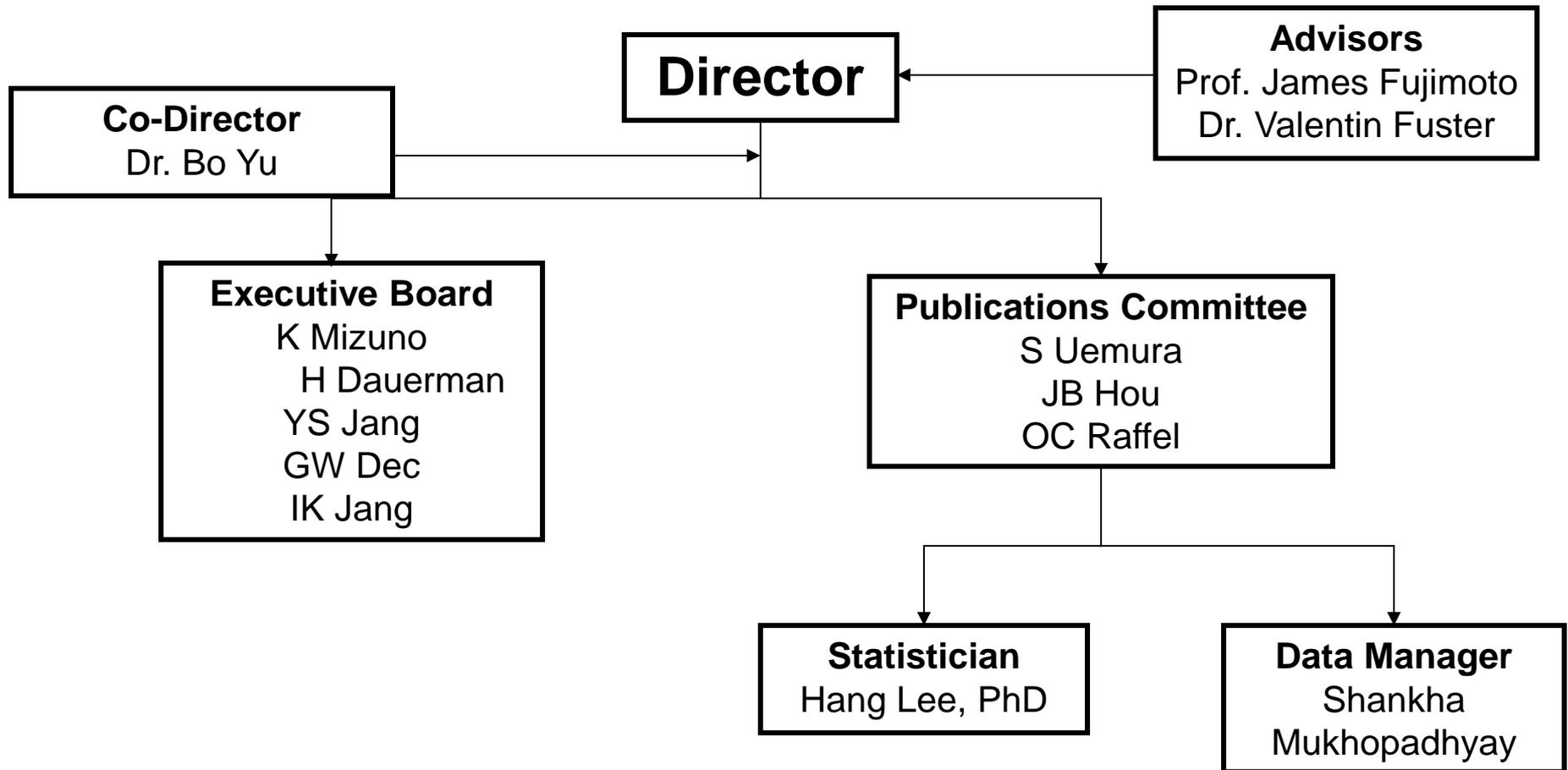
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HEART CENTER**

Overview

- Target 3000 patients x 3 years
- 21 sites from Australia, China, Japan, Korea, Singapore, and USA.
- Data collection started in 6/2010

- <http://www.massgeneral.org/octregistry>

Organization



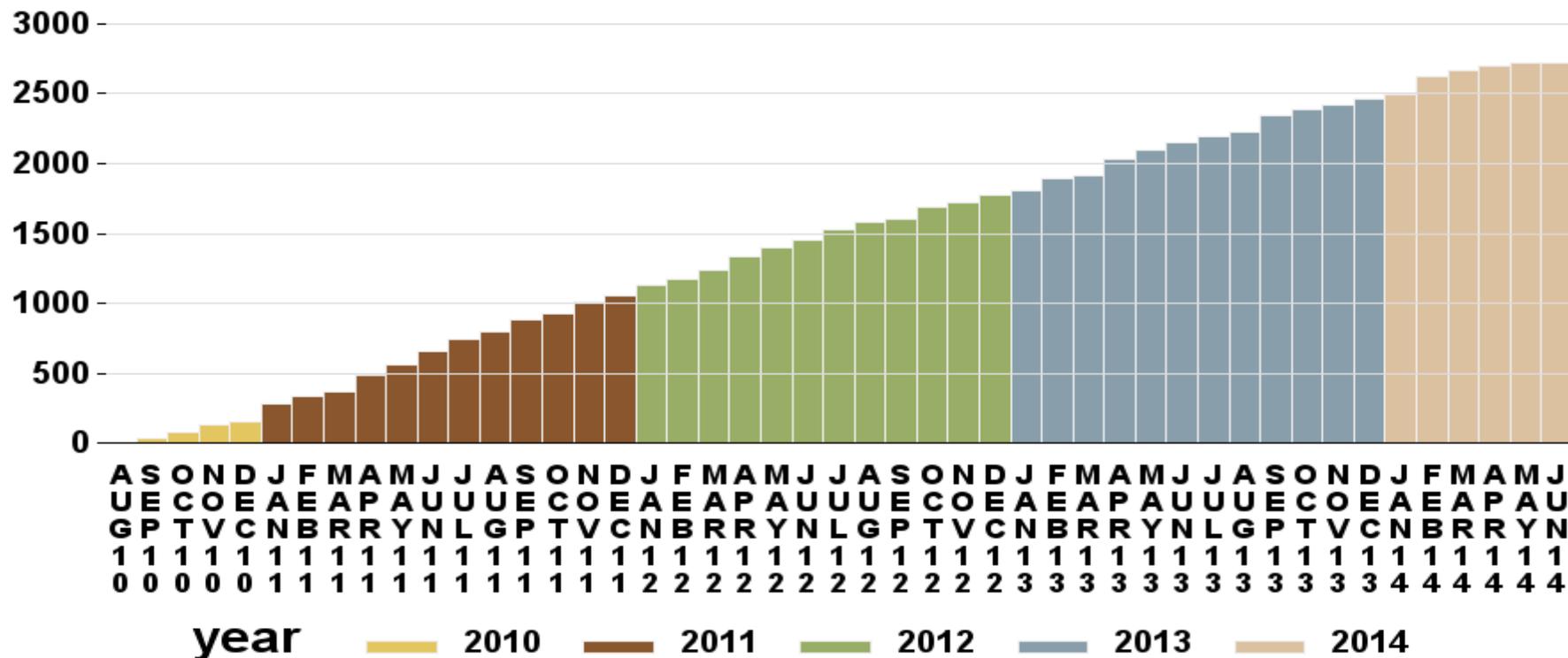
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Current Enrollment Overview

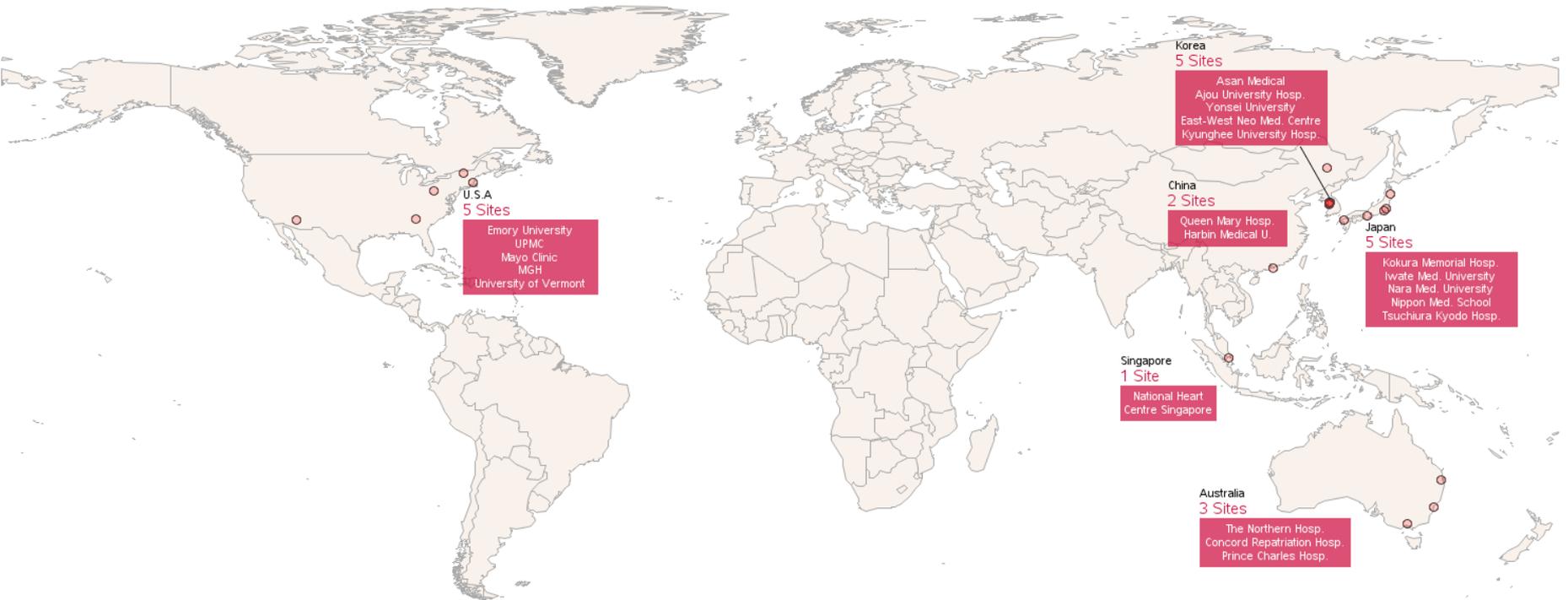
- As of July 1st 2014, 2719 patients have been enrolled.

Monthly Enrollment for the MGH OCT Registry



MGH OCT Registry Sites

MGH OCT Registry Sites



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Follow-Up and Data Subsets

Complete Follow-Up

- 6 Months: 2,537
- 1 Year: 2,308
- 2 Years: 1,789
- 3 Years: 1,024
- 4 Years: 297
- 5 Years: 72

Subgroups

- 3-vessel imaging: 457
- >1 OCT follow-up: 437
- OCT + IVUS: 520



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Other Functions

- Fellowship training
- Interpretation of images for other sites
- Prototype device testing in experimental lab
- Education (symposium)



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OCT Fellowship

Current

- Y. Minami from Japan for 2 y
- L. Xing from China for 2 y
- T. Higuma from Japan for 6 m
- E. Yamamoto from Japan for 2 y

2016

- T. Zanchin from Switzerland for 2 y
- K. Bryniarski from Poland for 2 y
- J. Dai from China for 2 y

Former

- L. Xing from China for 6 m
- JH Yoon from US for 2 y
- SJ Kim from Korea for 1 y
- K. Kato from Japan for 2 y
- T. Yonetsu from Japan for 2 y
- F. Abtahian MGH for 1 y
- YS Cho from Korea for 2 m
- R. Vergallo from Italy for 3 y
- J. Tian from China for 2 y
- T. Soeda from Japan for 2 y
- H. Jia from China for 3 y
- S. Hu from China for 2 y
- L. Gao from China for 1 y
- K. Cheng from Taiwan for 6 m
- D. Ong from MGH for 1 y



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Publications since 2012

- JACC: 5
- Circulation: 1
- European Heart Journal: 2
- JACC Cardiovascular Interventions: 6
- JACC Cardiovascular Imaging: 1
- Heart: 1
- Circulation Cardiovascular Imaging: 7
- Circulation Cardiovascular Interventions: 2
- American Heart Journal: 2
- European Heart Journal Cardiovascular Imaging: 1
- International Journal of Cardiology: 2
- American Journal of Cardiology: 4
- Journal of Thrombosis and Thrombolysis: 1
- Thrombosis and Haemostasis: 1
- Catheter Cardiovasc Interv: 2
- International Journal of Cardiovascular Imaging: 4
- Coronary Artery Disease: 5
- Lancet: 1
- Nature Cardiology Review: 1
- Current Opinion Pharmacology: 1
- Circulation Journal: 1
- Heart: 1
- Journal of Nippon Medical School: 1
- JJCA: 1
- Interventional Cardiology Clinics: 1

Total 55 articles



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In submission / revision

- Circ img: 1
- ATVB: 1
- CCI: 1
- EHJ: 1
- EHJ Img: 1
- AJC: 1

Total 6 articles



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Abstracts

- ACC 2012: 11
- AHA 2012: 6
- ACC 2013: 8
- AHA 2013: 5
- TCT 2013: 1
- ACC 2014: 5
- AHA 2014: 14
- ACC 2015: 17
- AHA 2015: 11

Total 78 abstracts



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Findings

- Plaque erosion
- ACS: higher recurrent rate
- Multiple plaque rupture
- TCFA vs. Ruptured plaque
- TCFA: prevalence
- Plaque progression pattern/ESS
- Vascular response to statin therapy
- PCI



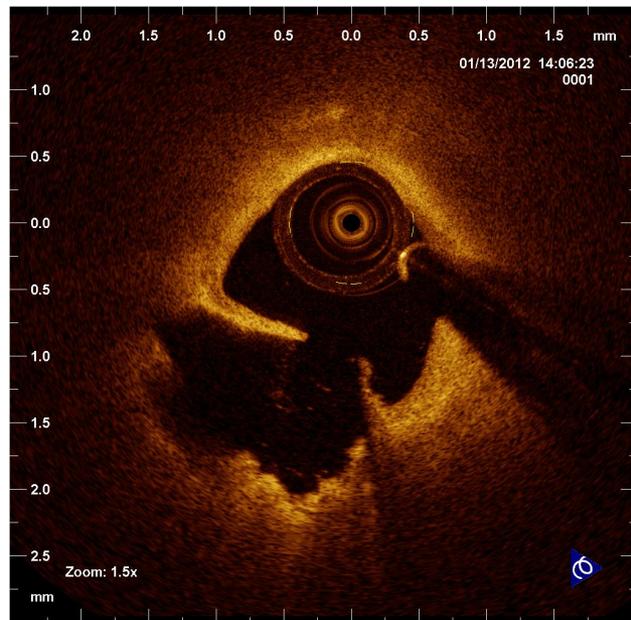
Summary

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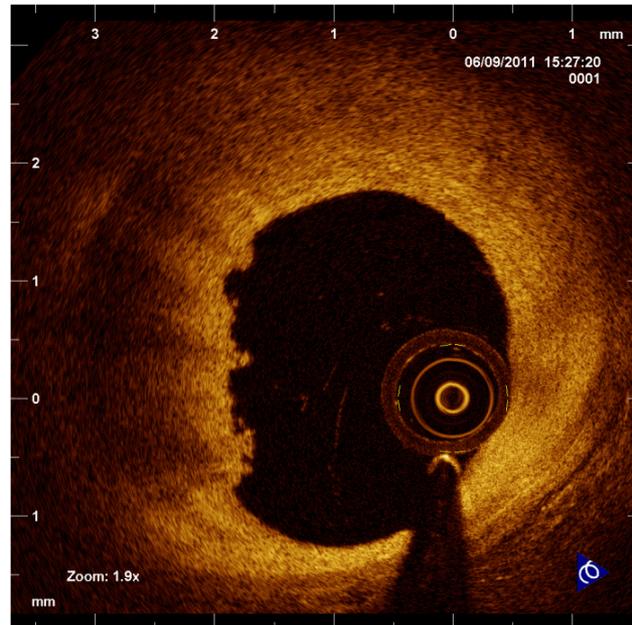


Plaque Erosion

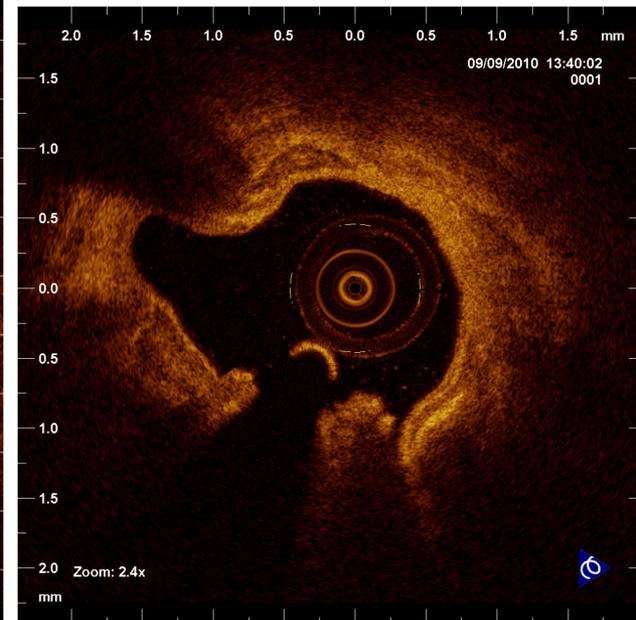
Rupture



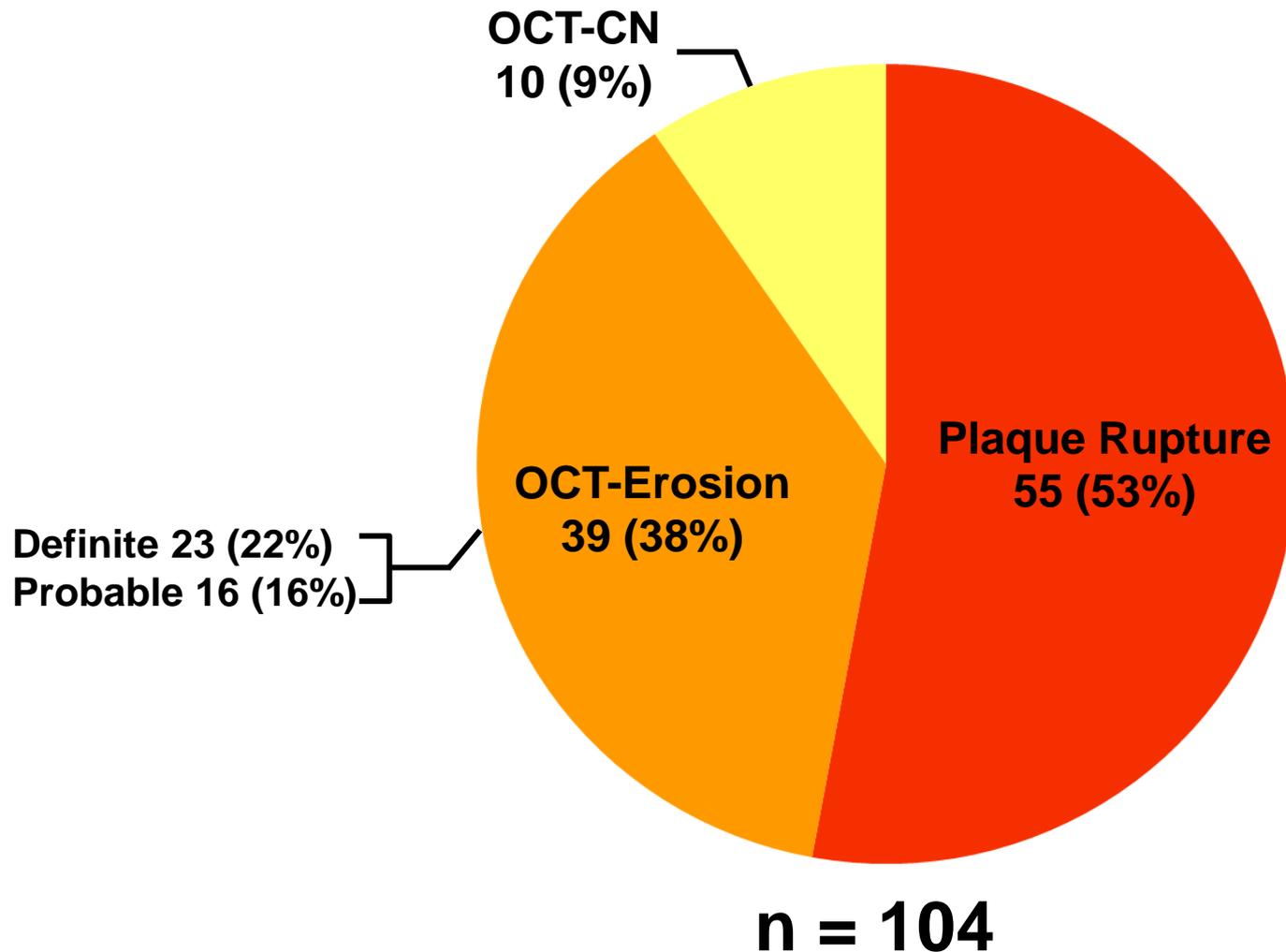
Erosion



Ca Nodule

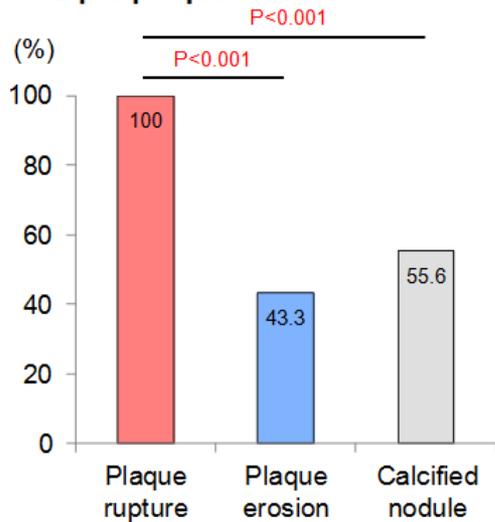


Incidence of Rupture, Erosion, and Calcified nodule

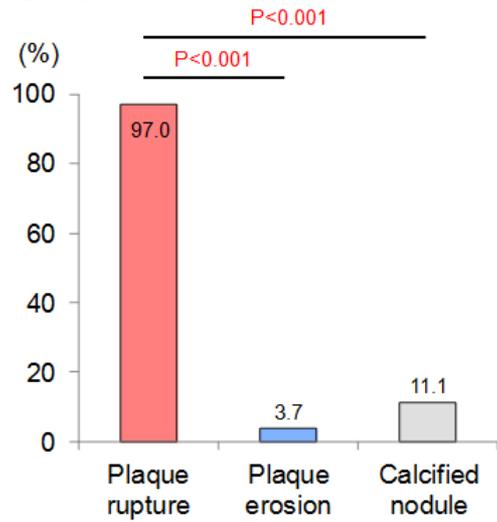


OCT Findings

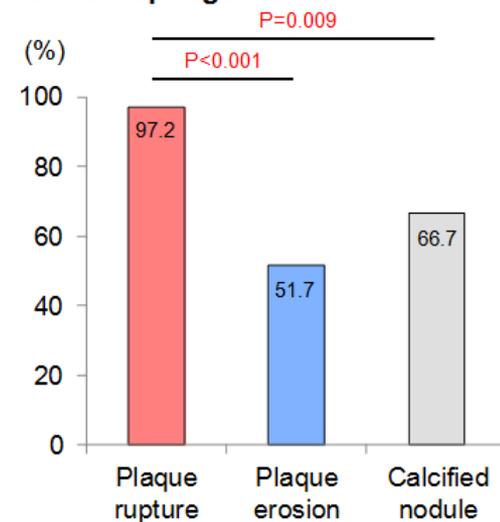
A. Lipid plaque



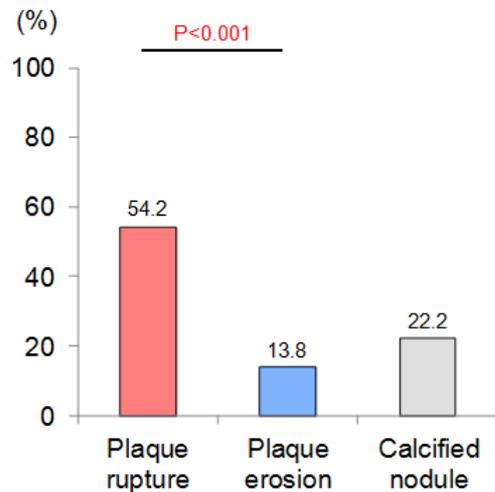
B. TCFA



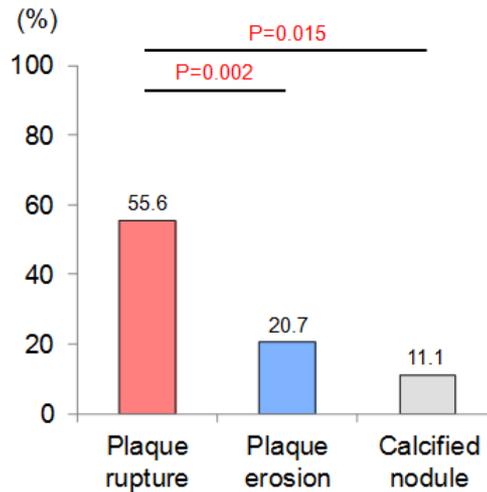
C. Macrophage



D. Microchannel



E. Cholesterol crystal

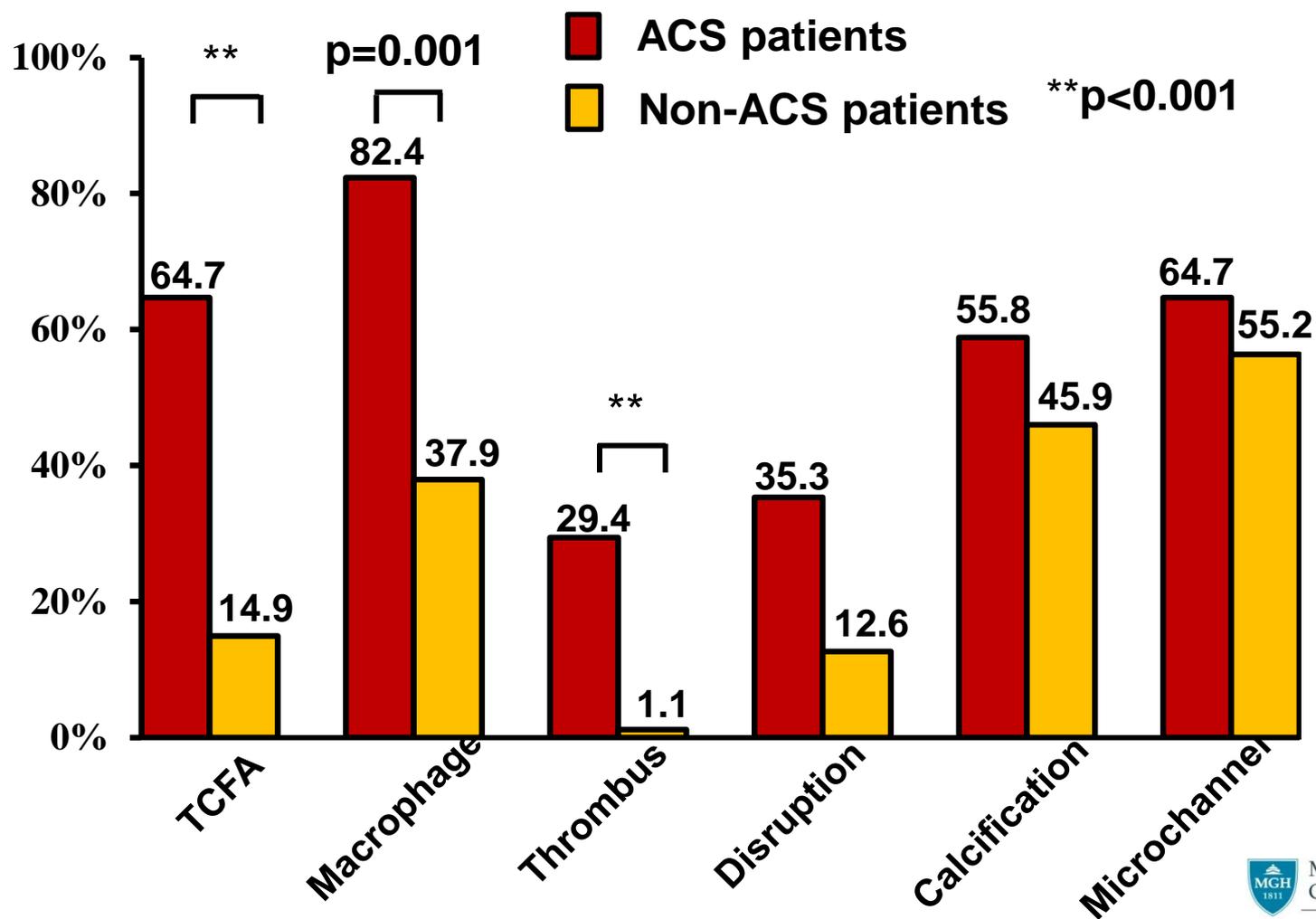


Summary

- Plaque erosion
- **ACS: higher recurrent rate**
- Multiple plaque rupture
- TCFA vs. Ruptured plaque
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Non-culprit lesion in ACS



Summary

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MACE at 1 year

	Overall patients (n=256)	Patients with non-culprit plaque rupture (n = 51)	Patients without non-culprit plaque rupture (n = 205)	p value
Overall MACE	16 (6.3)	6 (11.8)	10 (4.9)	0.061
Death	1 (0.4)	0 (0.0)	1 (0.5)	0.617
<i>Cardiac</i>	1 (0.4)	0 (0.0)	1 (0.5)	0.617
<i>Non-cardiac</i>	0 (0.0)	0 (0.0)	0 (0.0)	–
Non-fatal AMI	2 (0.8)	1 (2.0)	1 (0.5)	0.216
Non-TLR	15 (5.9)	6 (11.8)	9 (4.4)	0.039

In submission



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Summary

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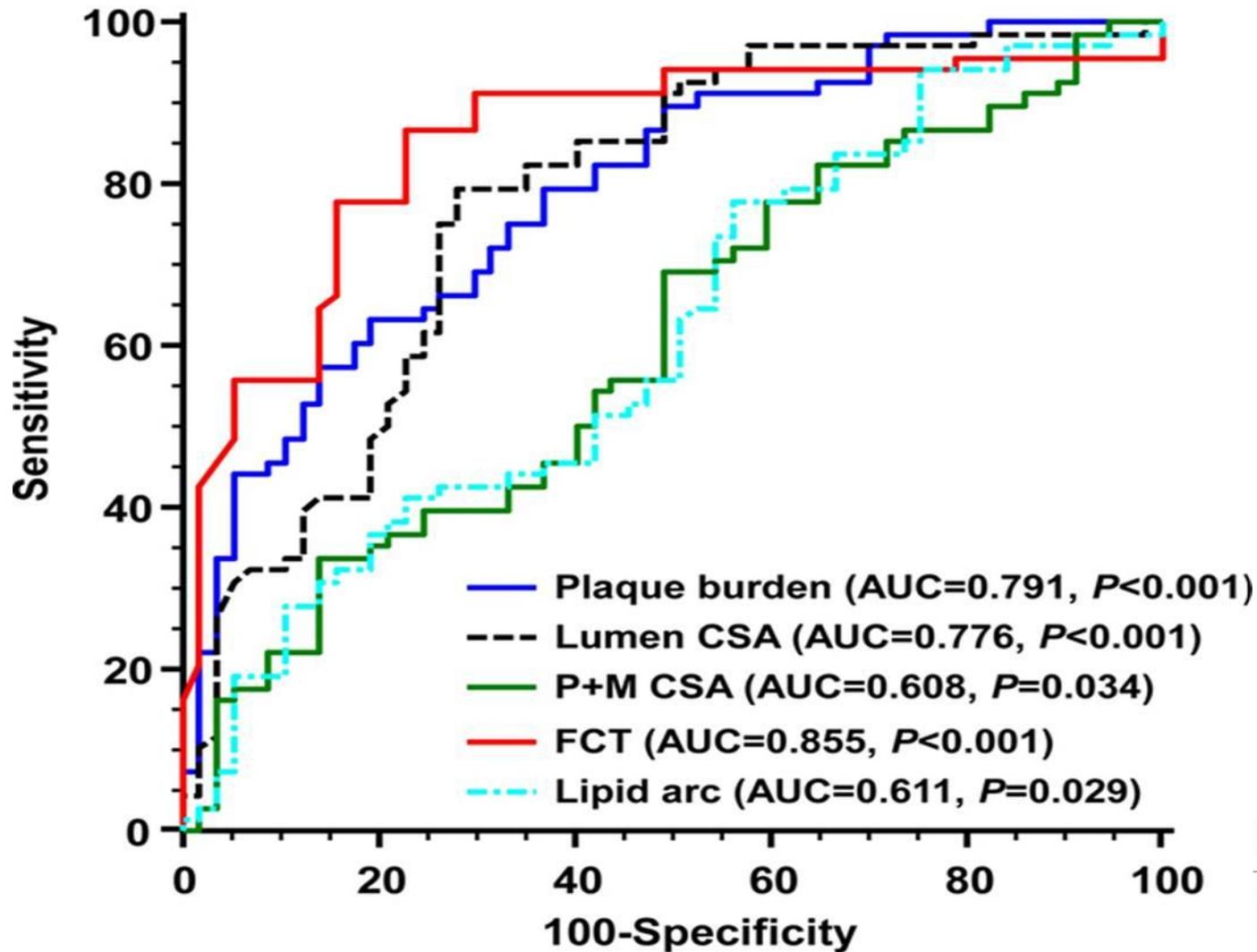


Aim

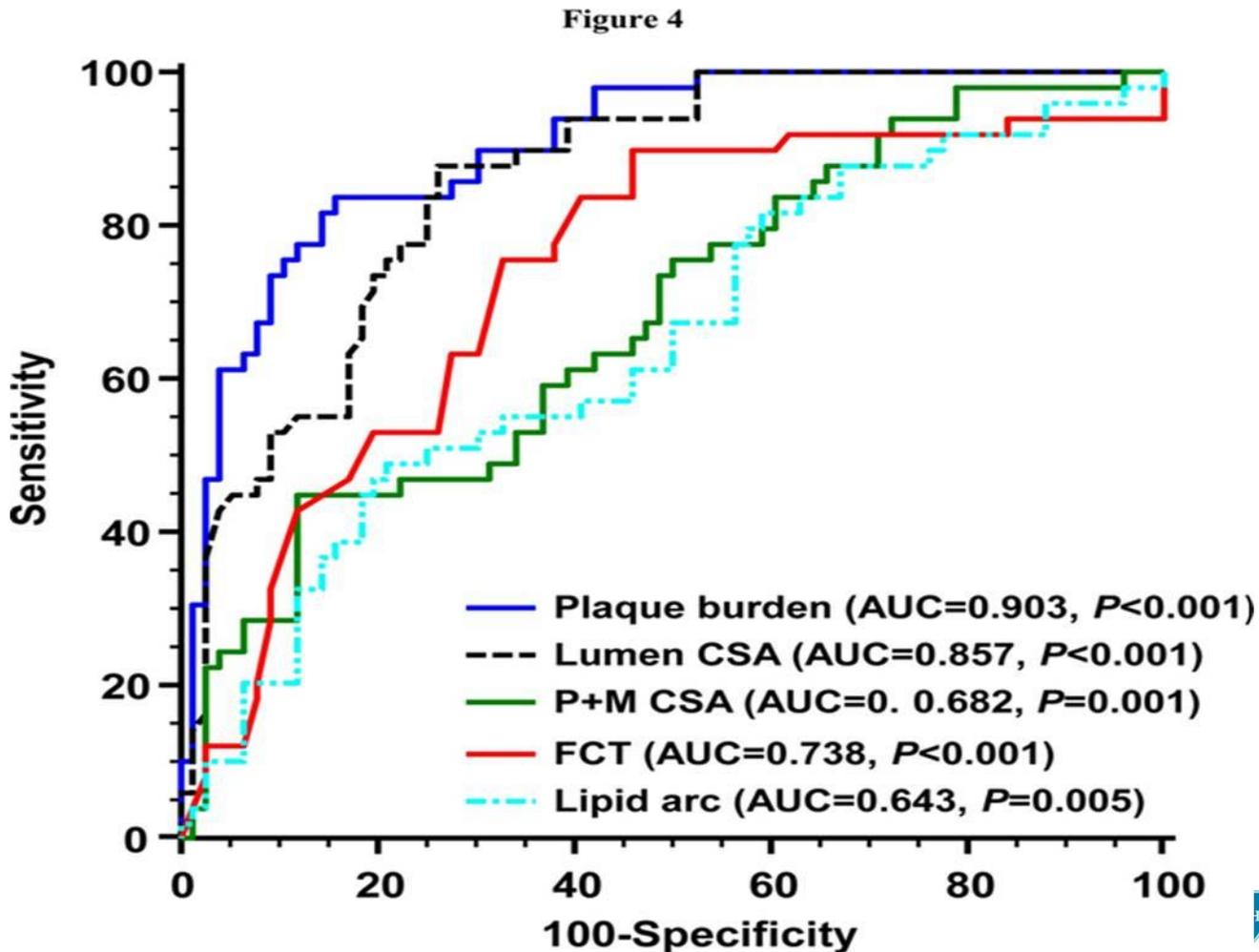
- To analyze OCT and IVUS images of all 3 major epicardial arteries in ACS patients, and compare the morphological characteristics between the 3 groups.
 - ruptured culprit plaque (RCP)
 - ruptured non-culprit plaque (RNCP)
 - non-ruptured TCFA

Ruptured vs Non-rupture

Figure 3



Clinical event vs Silent



Summary

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Background

1. It was generally believed that ACS most frequently occurred at the site of mild to moderate coronary stenosis.
2. However, recent studies have shown that most ACS occur at the site of severe coronary stenosis.

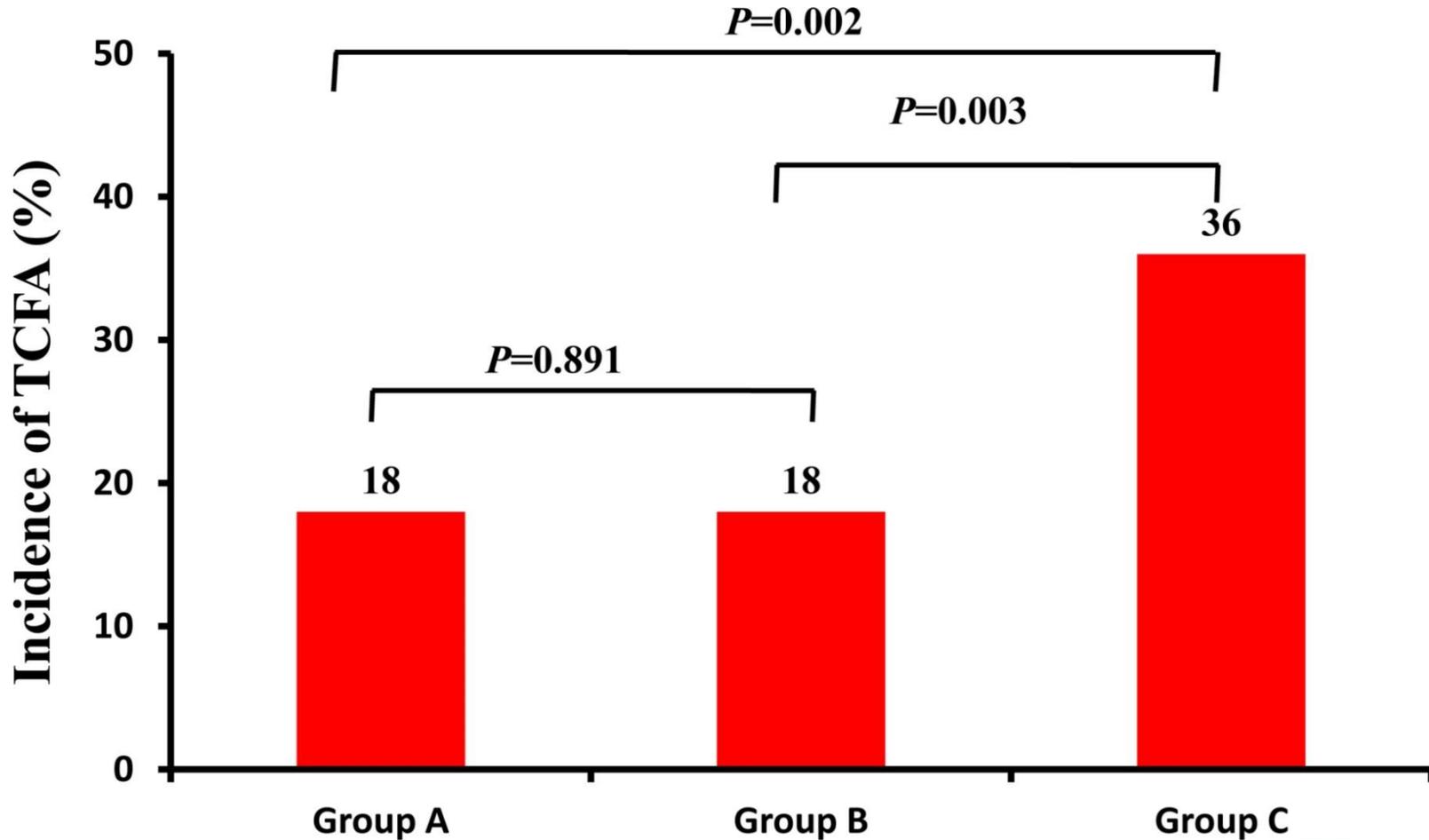


Method

- 643 plaques with $>30\%$ angiographic diameter stenosis were detected from 255 subjects.
- Of 643 lesions,
 - Group A (30-49%DS)
 - Group B (50-69%DS)
 - Group C ($>70\%$ DS)



Prevalence of TCFA

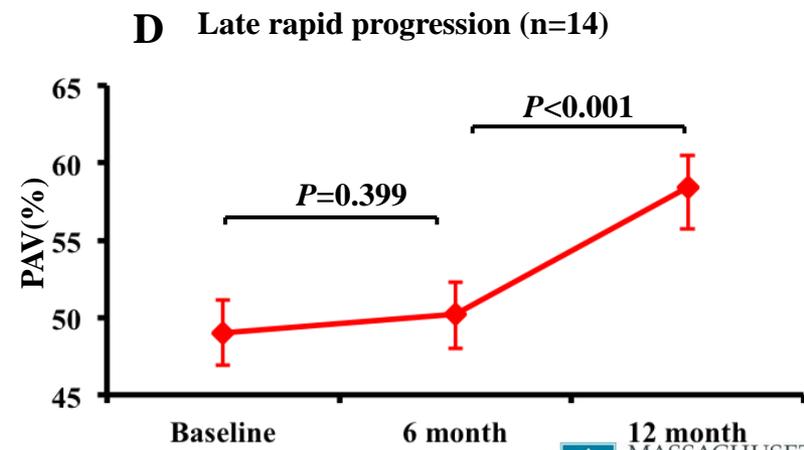
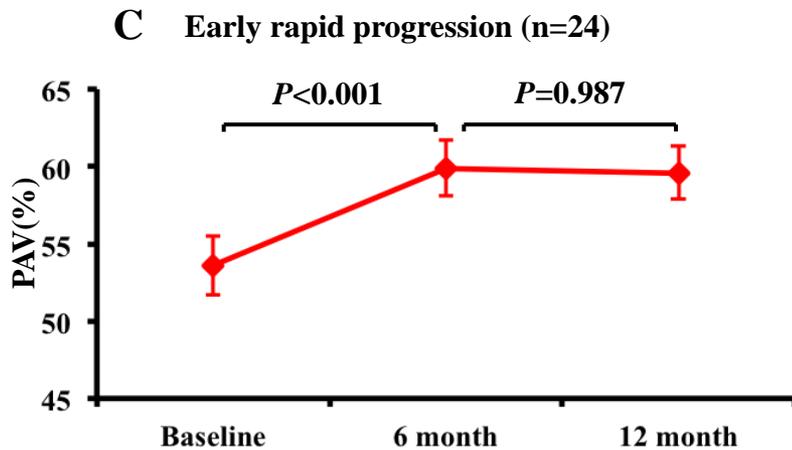
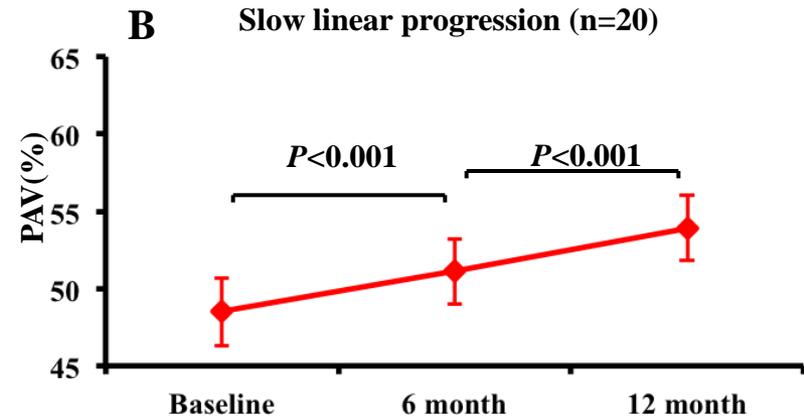
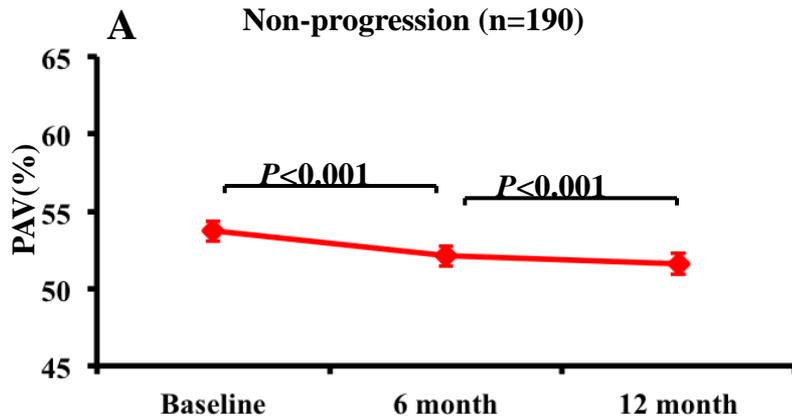


Summary

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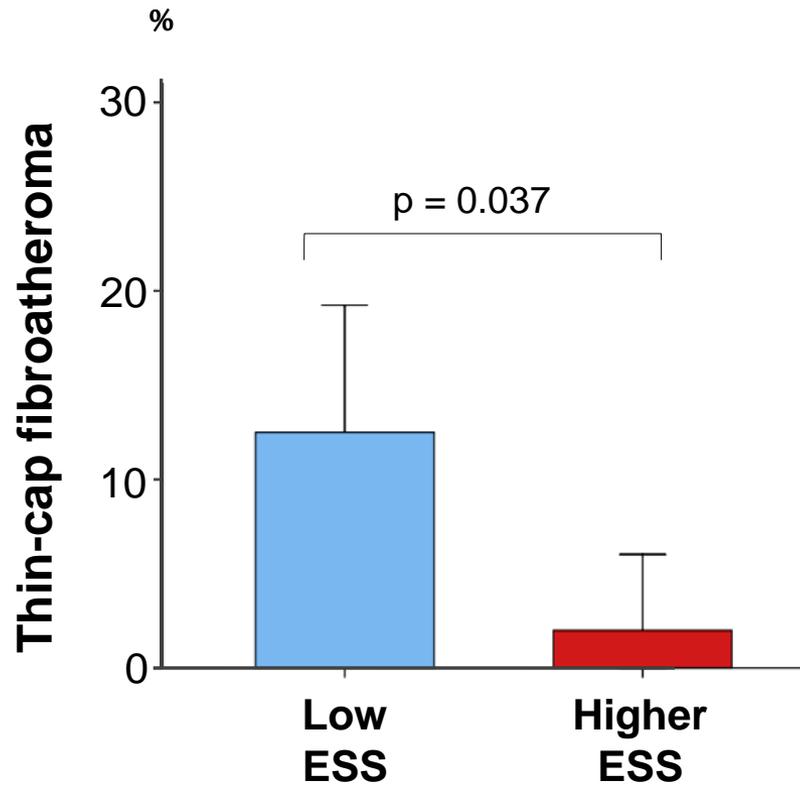


Patterns of Plaque Progression



In press

ESS ~ TCFA



Summary

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Laboratory Results

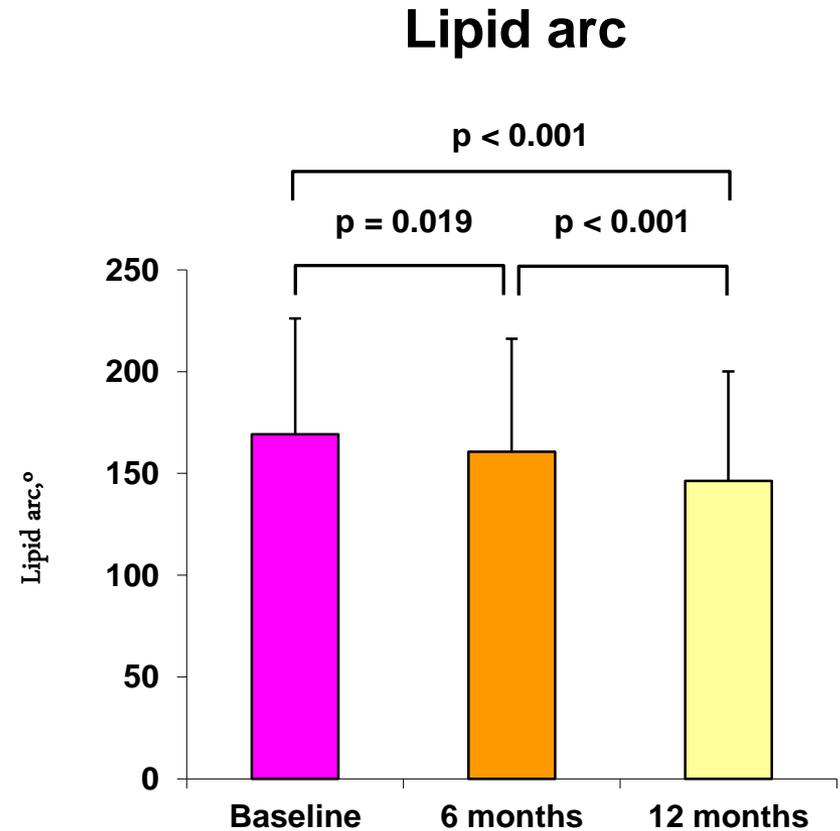
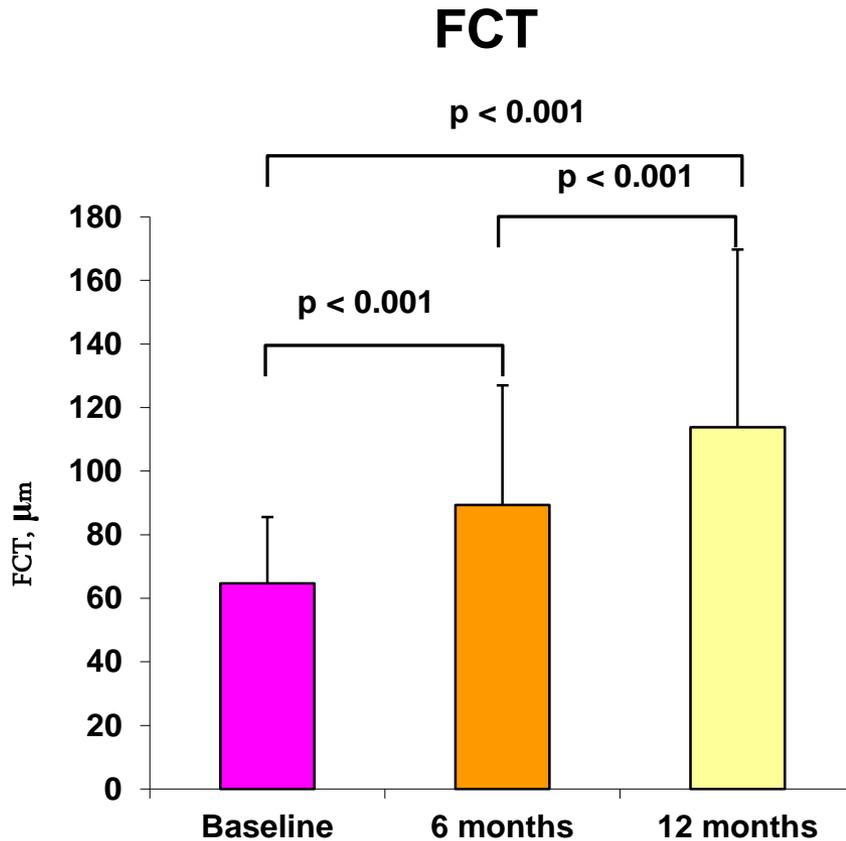
	Baseline (n=68)	6 months (n=68)	12 months (n=68)	p value BL vs. 6M	p value 6M vs. 12M	p value BL vs. 12M
TC (mg/dL)	200.0±46.3	144.8±35.5	150.2±44.8	<0.001	0.477	<0.001
TG (mg/dL)	202.4±95.0	151.4±112.6	142.6±84.5	0.003	0.615	<0.001
LDL-C (mg/dL)	105.8±37.5	73.0±28.6	79.2±30.9	<0.001	0.295	<0.001
HDL-C (mg/dL)	53.3±15.8	45.6±12.4	42.9±10.8	0.001	0.227	<0.001
LDL-C/HDL-C ratio	2.1±0.8	1.7±0.7	1.9±0.9	0.006	0.306	0.085
hs-CRP (mg/dL)	0.73±1.44	0.11±0.12	0.19±0.38	0.007	0.736	0.006
HbA1c (%)	6.5±1.3	6.4±1.0	6.5±1.1	0.538	0.598	0.894



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OCT findings: quantitative



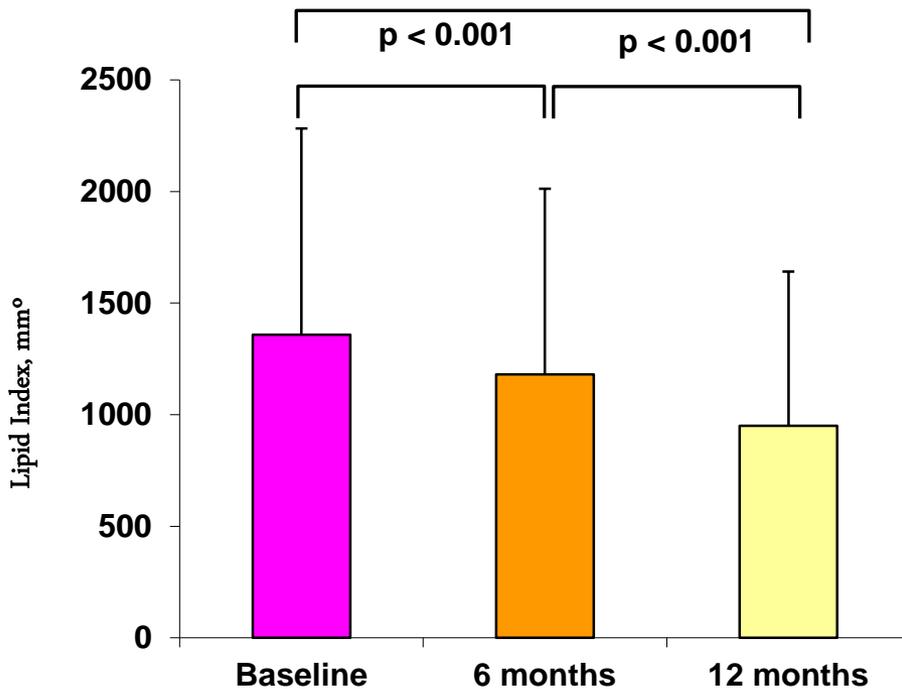
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OCT findings: quantitative

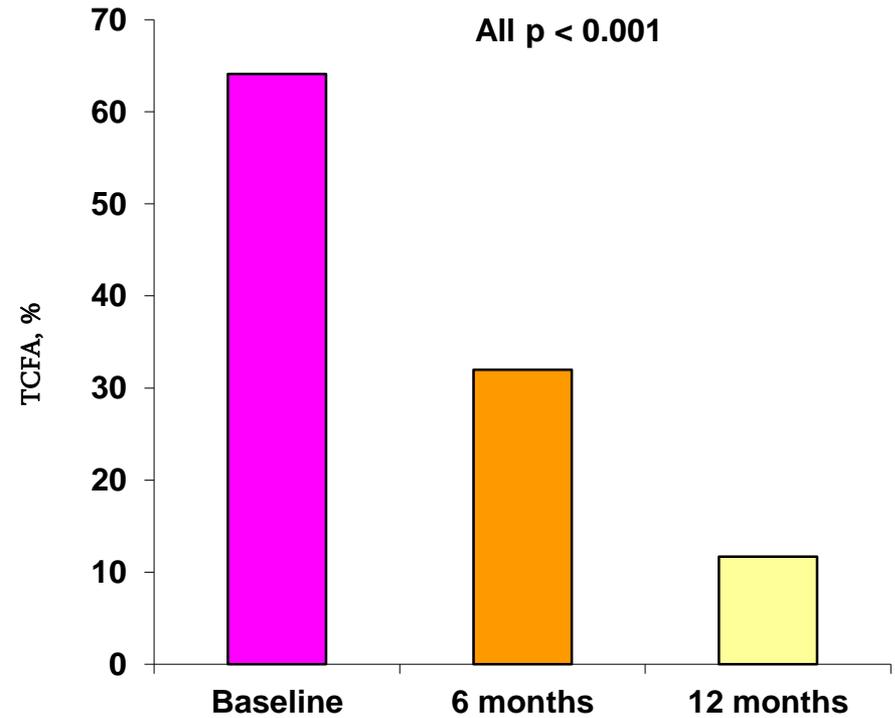
Lipid index

$p < 0.001$



TCFA

All $p < 0.001$



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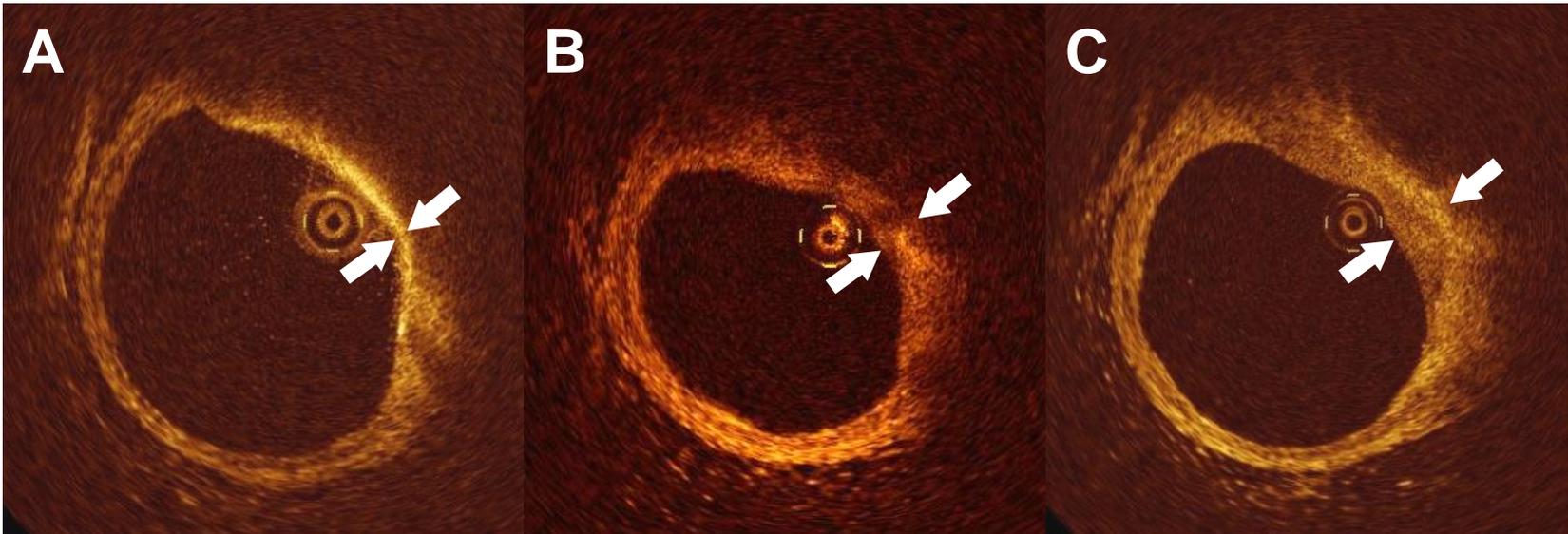
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Representative case (FCT)

Baseline

6-month

12-month

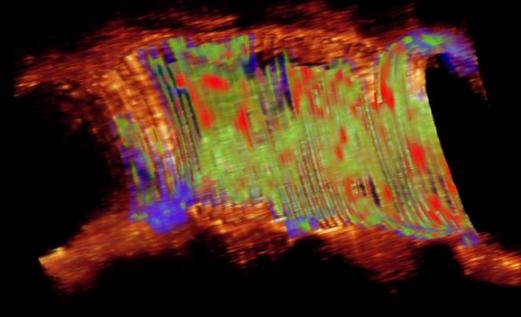
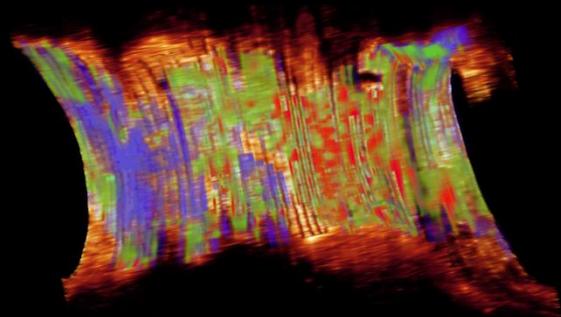


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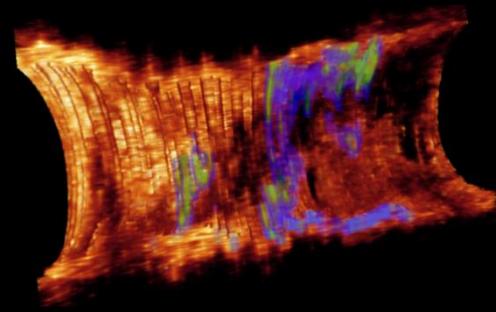
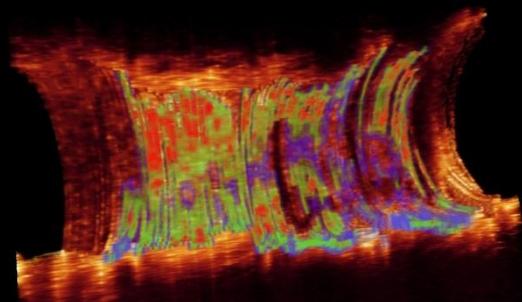
Atorvastatin 20mg



Atorvastatin 60mg

Baseline

12 month



Distal

Proximal

Distal

Proximal

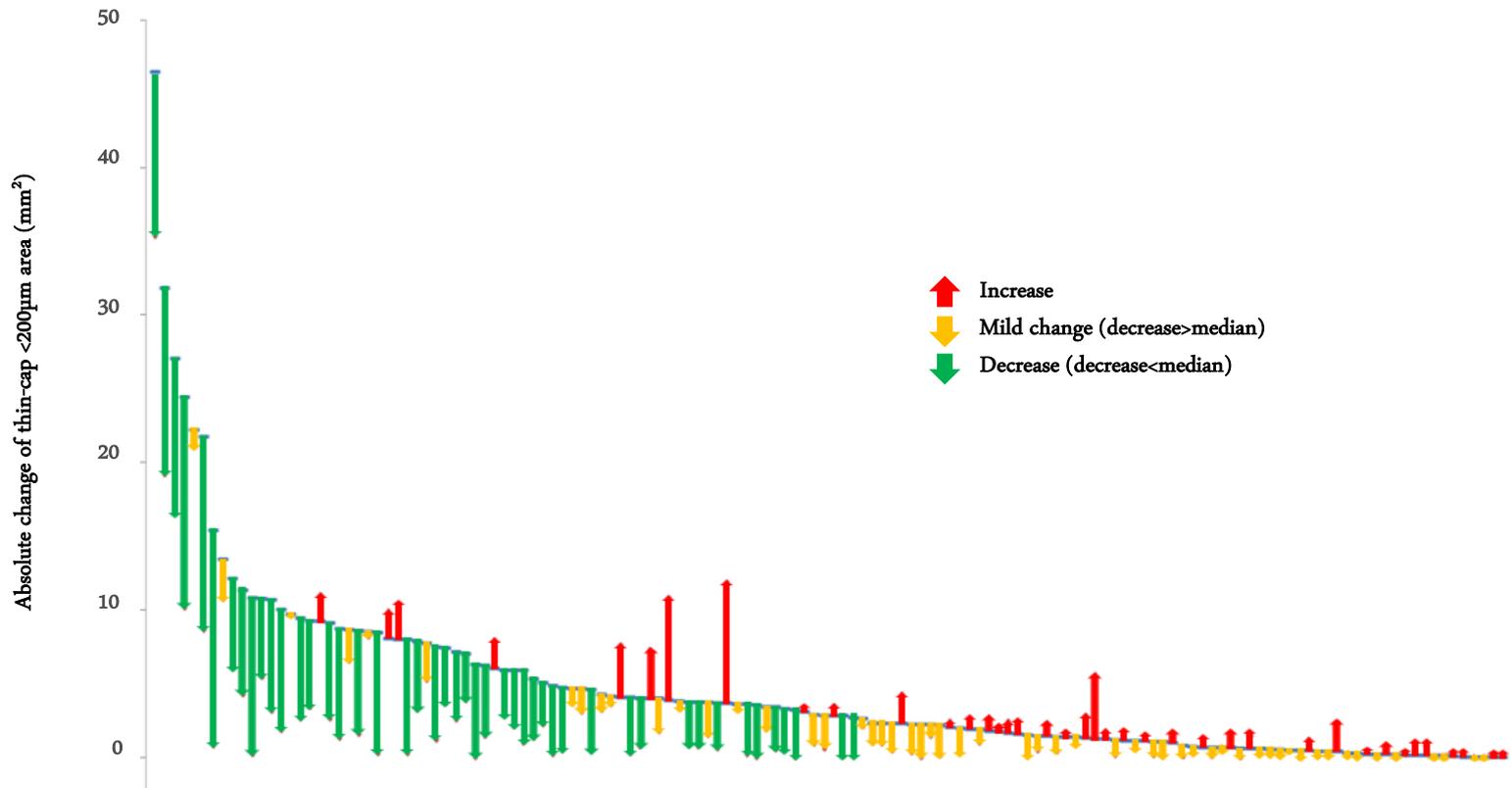
1mm



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Change of FCT<200 μ m area in individual plaques



In submission

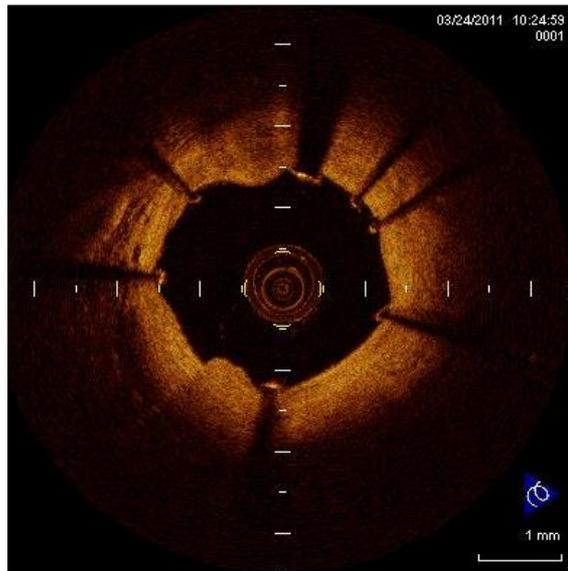
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- Vascular response to statin therapy
- **PCI**



Instant protrusion

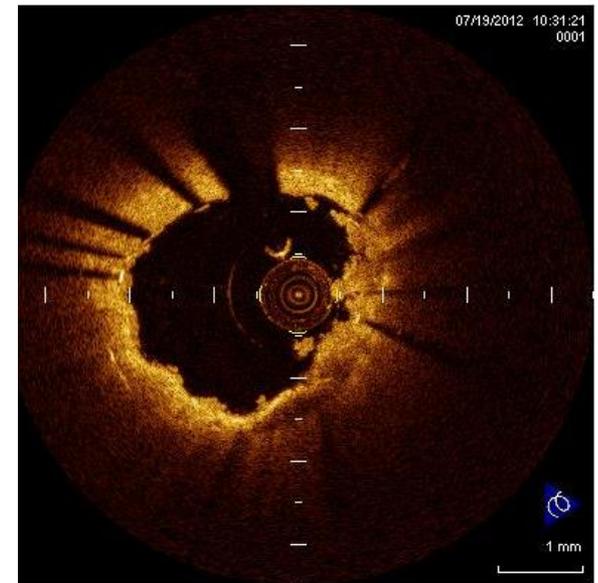
Smooth protrusion



Disrupted fibrous plaque



Irregular protrusion

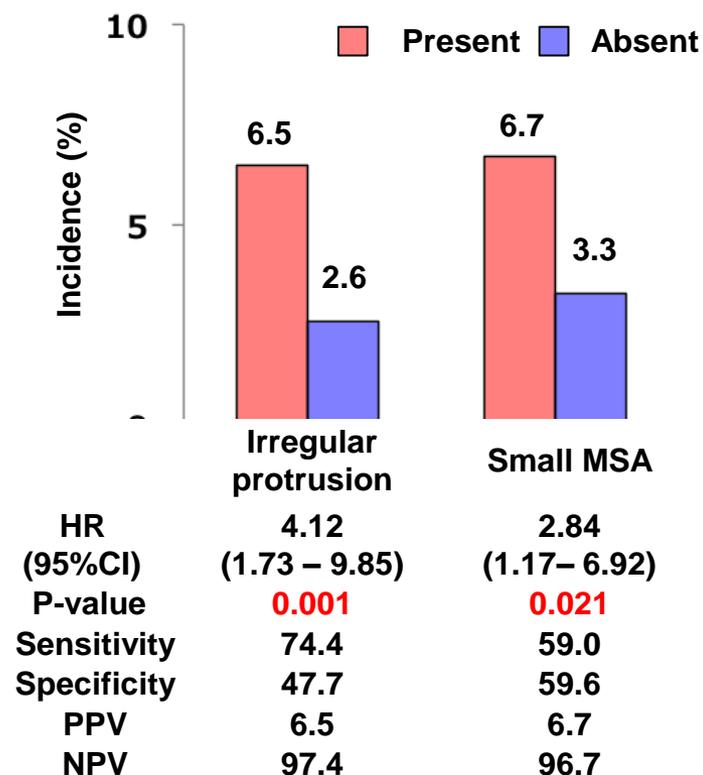


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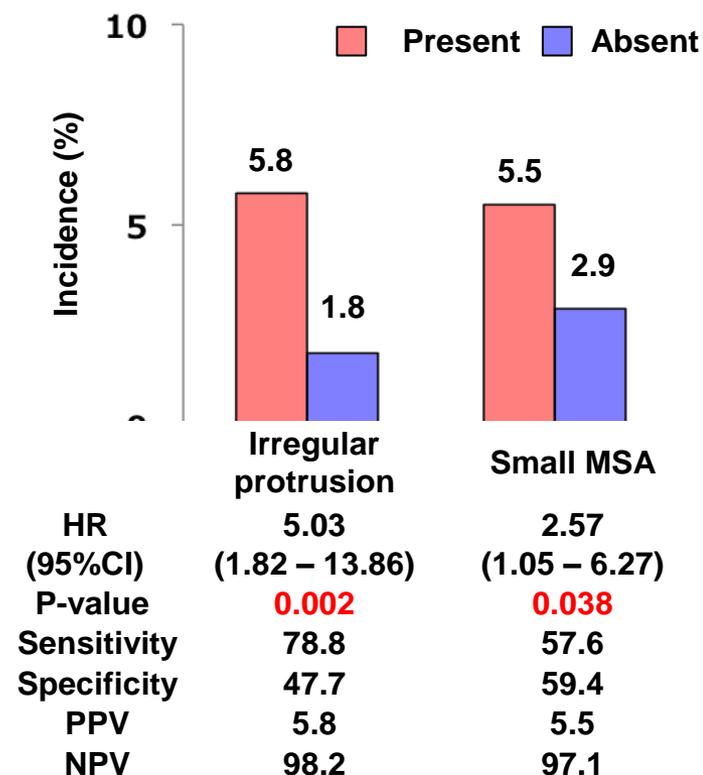
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Incidence of DoCE and TLR

A. Device-oriented clinical endpoint



B. Target lesion revascularization



Summary



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Summary (1)

- In vivo diagnosis of plaque erosion has become possible by OCT.
- Plaque erosion is associated with less vulnerability and more eccentric plaque.
- ACS patients have more vulnerable features in non-culprit plaques.
- ACS patients with ruptured culprit plaque have higher prevalence of TCFA in non-culprit plaques.



Summary (2)

- Thin fibrous cap is a predictor for plaque rupture, whereas plaque burden and small lumen are determinants for development of ACS.
- TCFA is more prevalent in severely stenotic lesions, although absolute number of TCFA is greater in less severe lesions.
- Three different patterns of plaque progression: non progression, slow linear, and rapid phasic.



Summary (3)

- Low ESS areas have plaques with larger lipid burden and thinner fibrous cap.
- Lipid plaques stabilize rapidly with contemporary medical therapy.
- ACS is a positive predictor and renal dysfunction is a negative predictor for favorable vascular response to statin therapy



Collaborators

Registry

20 sites

MGH

Cath Lab

Yoshiyasu Minami, MD, PhD

Lei Xing, MD, PhD

Erika Yamamoto, MD, PhD

Jiannan Dai, MD

Krzysztof Bryniarski, MD

Thomas Zanchin, MD

Paul Lee

Koji Kato, MD

Taishi Yonetsu, MD

Haibo Jia, MD

Sining Hu, MD

Jinwei Tian, MD

Lei Gao, MD

Tsunenati Soeda, MD

MIT

James Fujimoto, PhD

Zhao Wang, PhD

Aaron Aguirre, MD, PhD

BWH

Peter Stone, MD

Univ. Texas

Marc Feldman, MD PhD

Hirosaki Univ.

Takumi Higuma, MD PhD

Harbin Medical Univ. China

Bo Yu, MD, PhD

Shanghai Univ. China

Jujie Xiao, MD, PhD

Athens Medical School, Greece

Christofus Stefanadis, MD, PhD

Catholic University, Italy

Filippo Crea, MD

Luigi Biasucci, MD



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Thank You



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