Impact of Underlying Causes of Acute Coronary Syndrome on 1-Year Outcomes After Percutaneous Coronary Intervention:

Results from OCT Guided Primary PCI Registry -TACTICS Registry-

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On behalf of TACTICS investigators

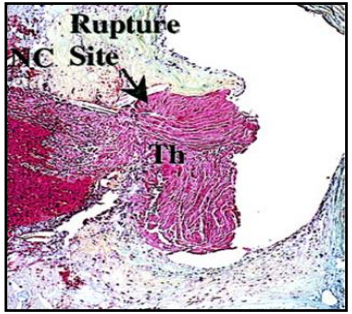
Disclosure Statement of Financial Interest

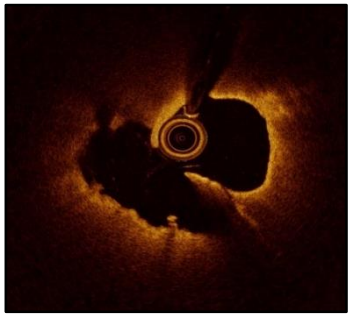
Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship	Company
Grant/Research Support	Abbott Medical Japan.
Consulting Fees/Honoraria	Abbott Medical Japan, Boston Scientific, Bayer, Daiichi-Sankyo, Bristol Meyers
Major Stock Shareholder/Equity	None
Royalty Income	None
Ownership/Founder	None
Intellectual Property Rights	None
Other Financial Benefit	None

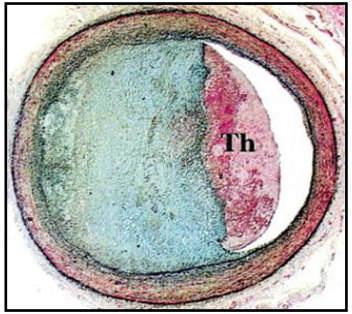
Underlying causes of ACS

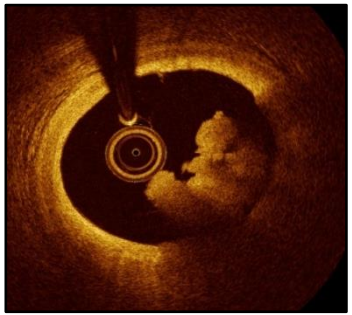
Plaque Rupture



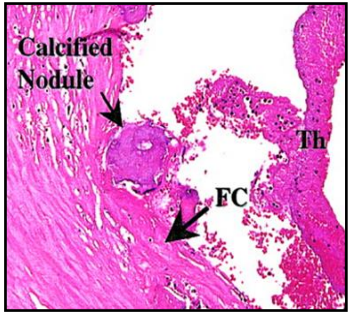


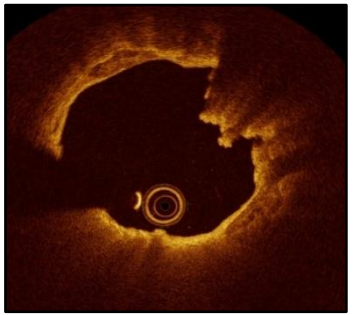
Plaque Erosion





Calcified Nodule





The retrospective studies have suggested optical coherence tomography (OCT) enables to diagnose underlying causes of acute coronary syndrome (ACS) such as plaque rupture, plaque erosion and calcified nodule.

Virmani R et al. *ATVB.* 2000;20:1262-1275.

Prevalence of ACS underlying causes

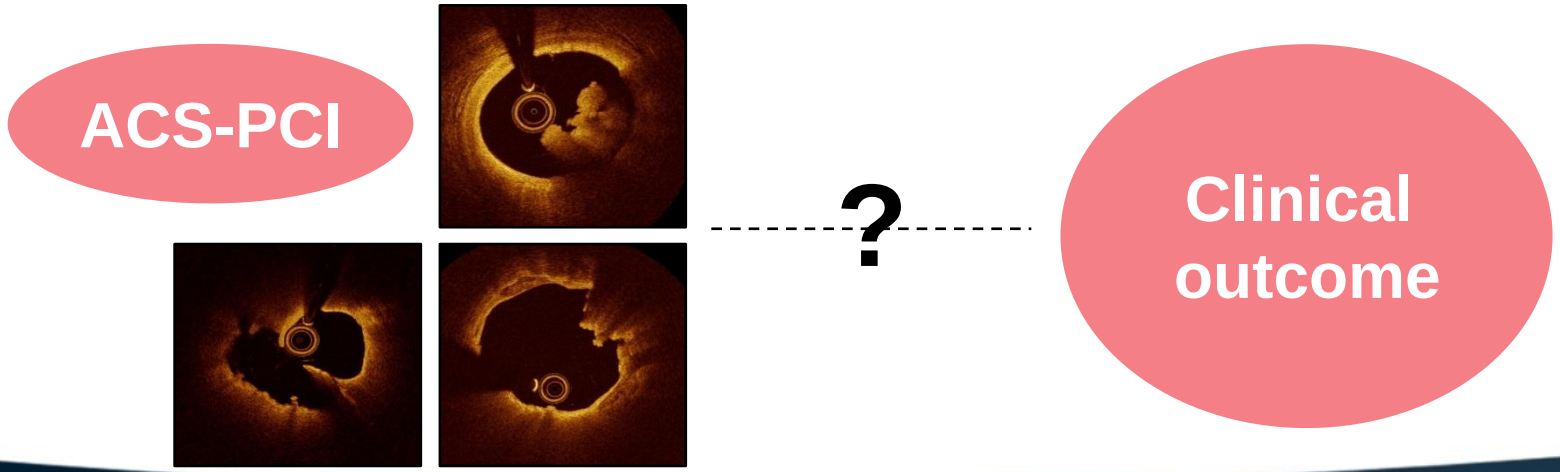
Author	Lesions	Plaque Rupture	Plaque Erosion	Calcified Nodule	Others
Jia et al.	126	55	39	10	19
Guagliumi et al.	128	63	32	–	31
Wang et al.	80	37	25	2	16
Higuma et al.	112	72	30	9	–
Kajander et al	70	34	31	5	–

The prevalence of the ACS underlying causes had been reported in several OCT studies with relatively slight populations.

Ali ZA et al. *JACC Cardiovasc Interv.* 2017;10(24):2473-2487.
Jia H et al. *J Am Coll Cardiol.* 2013;62:1748–58.
Guagliumi G et al. *J Am Coll Cardiol Intv.* 2014;7:958–68.
Wang L et al. *Eur Heart J Cardiovasc Imaging.* 2015;16:1381–9.
Higuma T et al. *J Am Coll Cardiol Intv.* 2015;8:1166–76.
Kajander OA et al. *EuroIntervention*. 2016;12:716–23.

Clinical outcomes related to underlying cause of ACS

- The clinical outcomes associated with the ACS underlying cause have not been evaluated in large-scale multicenter study.
- The clinical utility of OCT-guided primary PCI for ACS patients in the ***"real world"*** was still debatable.



TACTICS Registry

Tokyo / Kanagawa / Chiba / Shizuoka / Ibaraki active OCT applications for ACS

Investigator-initiated, prospective, multicenter, observational study

Showa University Hospital (Tokyo)
Nippon Medical School Chiba Hokusoh Hospital(Chiba)
Showa University Koto-Toyosu Hospital (Tokyo)
Showa University Fujigaoka Hospital (Kanagawa)
Tsuchiura Kyodo General Hospital (Ibaraki)
Hitachi Medical Center Hospital (Ibaraki)
New Tokyo Hospital (Chiba)
Tokyo Medical and Dental University (Tokyo)
Japanese Red Cross Musashino Hospital (Tokyo)
Juntendo University Graduate School of Medicine (Tokyo)
Teikyo University Hospital (Tokyo)
Tokyo Medical University Hospital (Tokyo)
Tokyo Women's Medical University (Tokyo)
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Ayase Heart Hospital (Tokyo)
Kanto Rosai Hospital (Kanagawa)
Yokohama Minami Kyosai Hospital (Kanagawa)
Kikuna Memorial Hospital (Kanagawa)
St. Marianna University School of Medicine(Kanagawa)
Tokai University School of Medicine (Kanagawa)
Showa University Northern Yokohama Hospital (Kanagawa)
Juntendo University Shizuoka Hospital (Shizuoka)

Study Design of TACTICS registry

Design	Investigator-initiated, prospective, multicenter, observational study
Objectives	• To identify the prevalence of underlying causes of ACS using OCT-defined morphology for the culprit lesion • To assess the impact of underlying causes of ACS on clinical outcomes
Subjects	• ACS patients underwent OCT-guided primary PCI within 24 hours from symptom onset.
Follow-up duration	up to 2 years
RESEARCH FUND	Abbott Medical Japan LLC.

Study identifier: UMIN 000039050, UMIN 000042459

Inclusion and key exclusion criteria

Inclusion criteria

1. ACS patients underwent OCT-guided primary PCI within **24 hours** from symptom onset.
2. Age ≥20 years
3. Willing and able to provide written informed consent

Key exclusion criteria

1. In-stent thrombosis of previously implanted stent
2. Anticipated technical contraindication to OCT
3. Estimated life expectancy <2 years

OCT-Guided Primary PCI

Morphology

- **Prompt Recanalization**: Thrombus aspiration, pre-dilatation with ≦2.0 mm balloon or excimer laser before initial OCT if necessary
- **Underlying causes of ACS defined by OCT: Primary Endpoint**
- **Lesion preparation**

Sizing

- **Reference site**: Minimally diseased site with the least lipid plaque
- **Stent Sizing:** Based on lumen / EEL diameter at reference sites

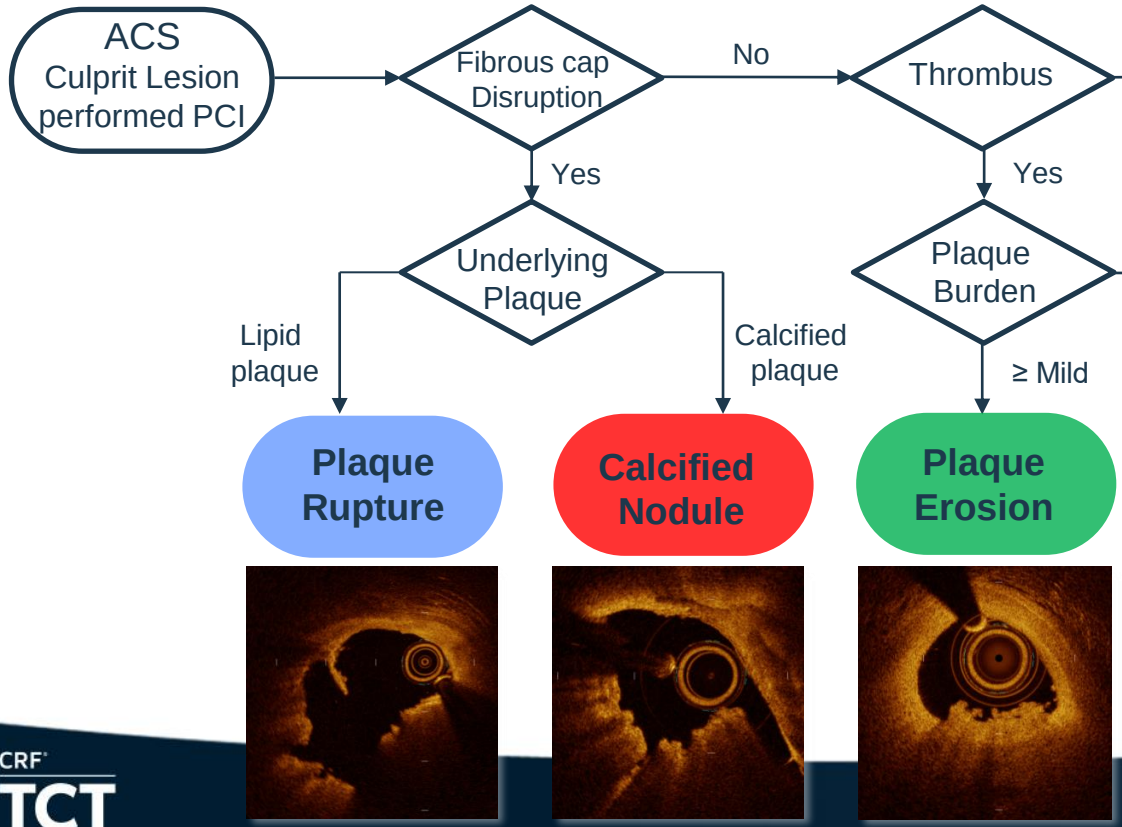
Optimization

- **TIMI III flow achievement**
- **Minimum stent / lumen area ≥4.5 mm^2 or % stent expansion ≥70%**
- No major dissection, large malapposition, extensive protrusion or thrombus

Changes in PCI strategy based on OCT findings were documented

Study design: Yamamoto MH et.al. J Cardiol. 2022;S0914-5087(22)00164-2.

Algorithm to classify underlying causes of ACS by independent OCT core-laboratory*



* Kobe Cardiovascular Core Analysis Laboratory
Kobe, Japan

Endpoints

- **Primary Endpoint**

  Prevalence of underlying causes of ACS using OCT-defined morphology (plaque rupture, plaque erosion, calcified nodule, and others)

- **Secondary Endpoints**

  Hazard ratios of major cardiovascular events (MACE: cardiovascular death, myocardial infarction, heart failure or ischemia-driven revascularization) at one-year in patients with each underlying cause

Statistical Design

Sample size estimation

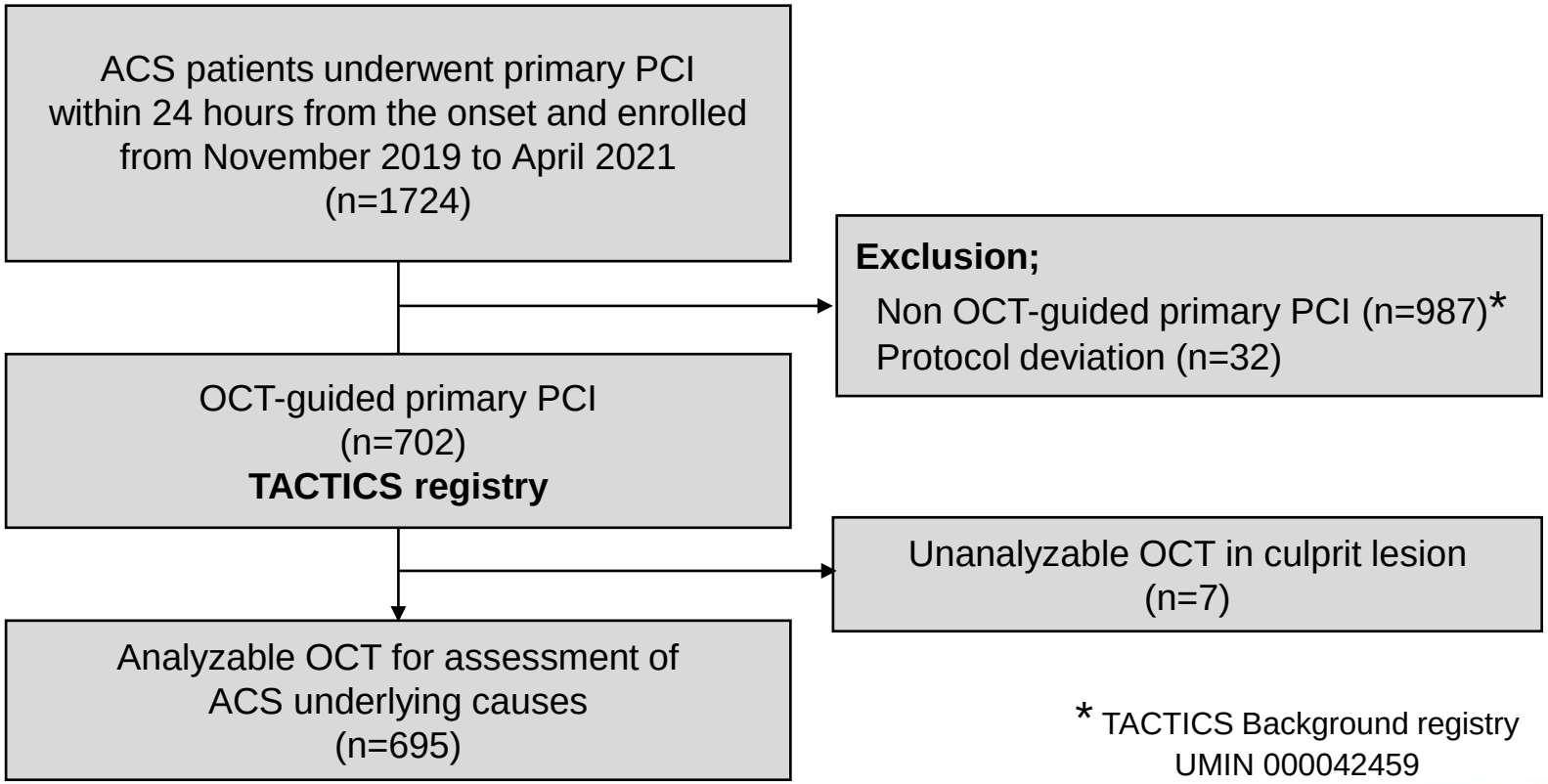
- This is an single-arm study designed to present descriptive information.
- Sample size estimation was based on the previous data reporting the incidence of plaque rupture, plaque erosion and calcified nodule were 44%, 33% and 8%[1)].
- Assuming that 8% of the subjects have a culprit lesion with calcified nodule, a sample size of 700 subjects is a sufficient number since we would be 95% confident that between 6.0% and 10.0% of subjects in the population have the factor of interest.
- The details of the study design is published previously[2)].

1) Jia H et al. *J Am Coll Cardiol.* 2013;62:1748-58.
2) Yamamoto MH et.al. *J Cardiol.* 2022;S0914-5087(22)00164-2.

Results

TACTICS

Flowchart

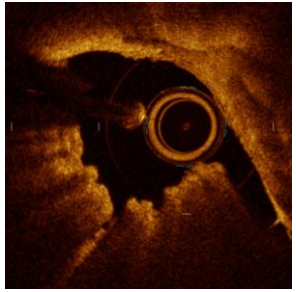


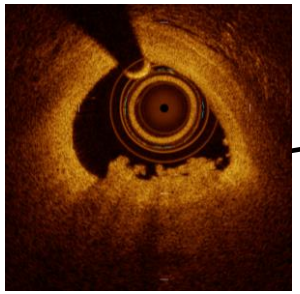
* TACTICS Background registry
UMIN 000042459

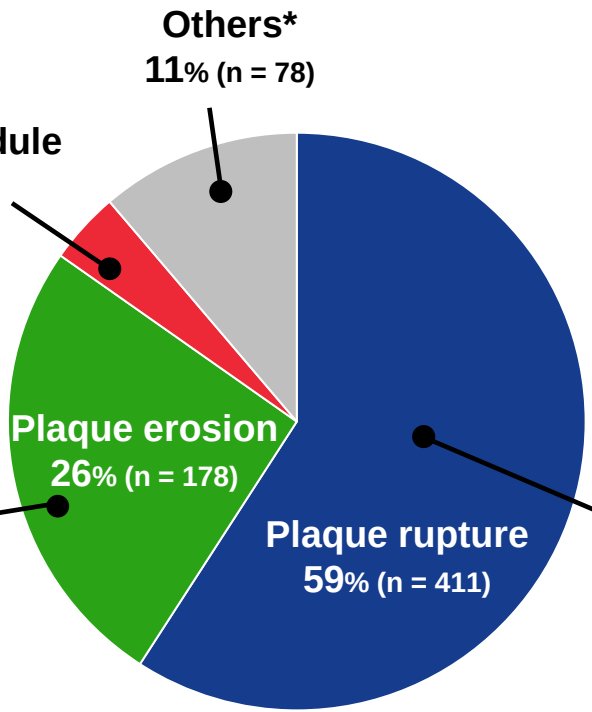
Baseline characteristics

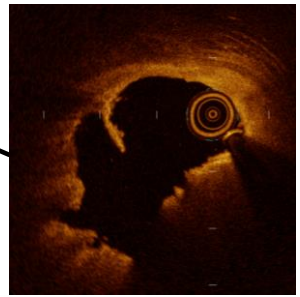
Variables	N=702
Age, years	66.2 ± 12.8
Clinical presentation	
STEMI, n(%)	441 (62.8)
NSTEMI, n(%)	199 (28.3)
UAP, n(%)	62 (8.8)
Culprit vessel, n(%)	
LM	5 (0.7)
LAD	371 (52.8)
LCX	68 (9.7)
RCA	258 (36.8)
TIMI flow grade 0 to 1, n(%)	374 (53.3)
In-hospital mortality, n(%)	7 (1.0)

Prevalence of underlying causes of ACS (primary endpoint)









***Others**

Significant stenosis	64 (9.1%)
Coronary spasm	7 (1.0%)
Ectasia	3 (0.4%)
Embolism	3 (0.4%)
Spontaneous coronary dissection	1 (0.1%)

N=695

Inter-observer kappa coefficient for plaque rupture, plaque erosion or calcified nodule was 0.890.

Patient characteristics

Variables	Plaque Rupture	Plaque Erosion	Calcified Nodule	p-value
Number of patients, n	411	178	28	
Age, years	66.5 ± 12.3	63.7 ± 13.4	75.0 ± 11.3	<0.001
Male, n(%)	332 (80.8)	150 (84.3)	18 (64.3)	0.042
BMI, kg/m^2	24.6 ± 4.0	25.0 ± 4.4	23.0 ± 4.0	0.056
Clinical presentation				0.014
STEMI, n(%)	299 (72.7)	106 (59.6)	16 (57.1)	
NSTEMI, n(%)	94 (22.9)	58 (32.6)	9 (32.1)	
UAP, n(%)	18 (4.4)	14 (7.9)	3 (10.7)	
Killip III/IV heart failure, n (%)	30 (7.3)	5 (2.8)	6 (21.4)	0.001
LVEF, %	55.2 ± 10.3	55.7 ± 10.5	56.8 ± 8.8	0.71
Current smoker, n(%)	143 (34.8)	77 (43.3)	4 (14.3)	0.007
Hemodialysis, n(%)	6 (1.5)	4 (2.2)	6 (21.4)	<0.001
Previous MI, n(%)	17 (4.1)	5 (2.8)	2 (7.1)	0.493
Previous PCI, n(%)	32 (7.8)	9 (5.1)	4 (14.3)	0.175
Previous CABG, n(%)	2 (0.5)	0 (0.0)	1 (3.6)	0.041

Angiographic characteristics

Variables	Plaque Rupture	Plaque Erosion	Calcified Nodule	p-value
Pre-PCI assessment				
Culprit vessels				0.001
LM, n(%)	2 (0.5)	1 (0.6)	1 (3.6)	
LAD, n(%)	195 (47.9)	111 (62.7)	12 (42.9)	
LCX, n(%)	38 (9.3)	20 (11.3)	0 (0.0)	
RCA, n(%)	172 (42.3)	45 (25.4)	15 (53.6)	
Type B2/C, n(%)	270 (65.7)	104 (58.5)	23 (82.2)	0.032
TIMI 0/I flow grade, n(%)	251 (61.1)	91 (51.1)	12 (42.8)	0.014
SYNTAX score	14.0 ± 8.2	13.0 ± 7.5	20.4 ± 13.6	<0.001
Post-PCI assessment				
TIMI III flow grade, n (%)	394 (95.9)	173 (98.3)	28 (100)	0.192
SYNTAX score	4.5 ± 6.5	3.0 ± 4.8	10.9 ± 12.2	<0.001

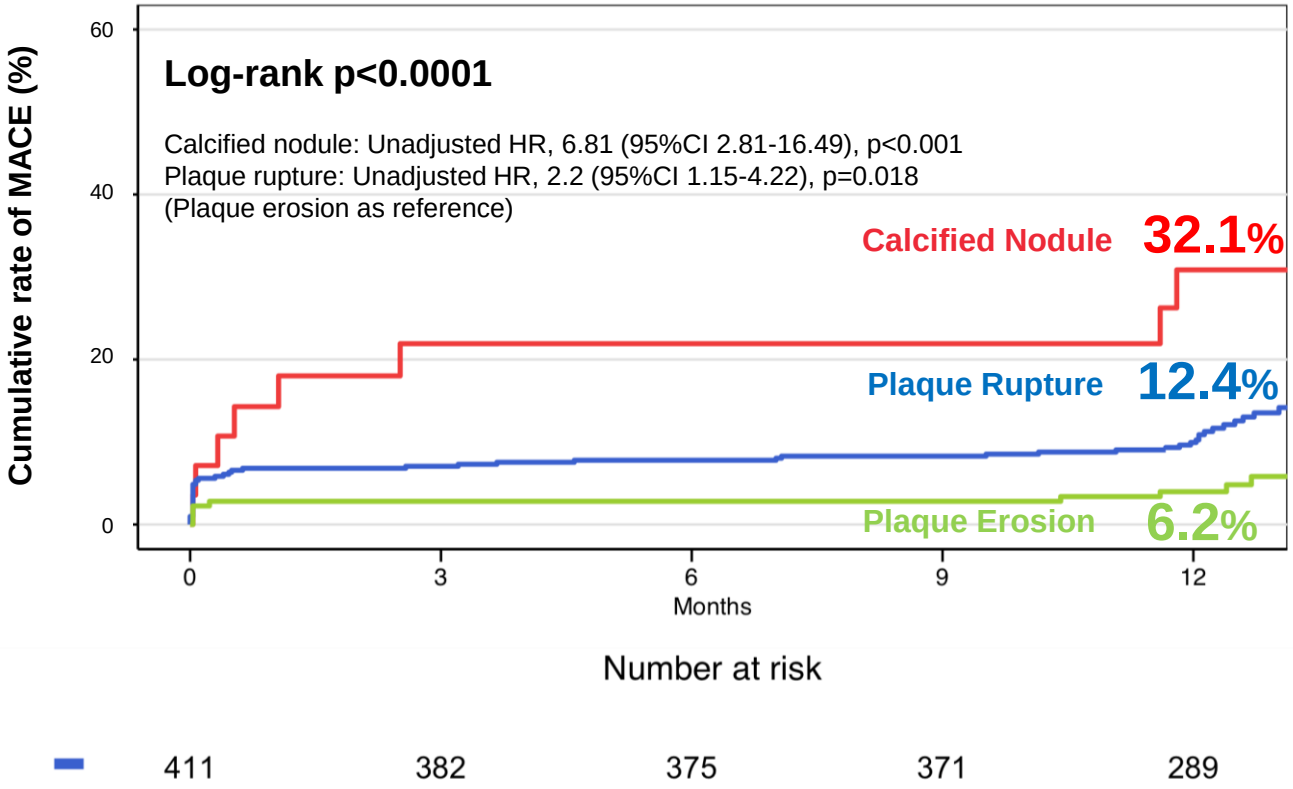
97% of the patients achieved TIMI III flow

OCT measurements

Variables	Plaque Rupture	Plaque Erosion	Calcified Nodule	p-value
Pre-PCI assessment				
Lipid plaque, n(%)	411 (100.0)	142 (79.8)	10 (35.7)	<0.001
TCFA, n(%)	340 (82.7)	46 (25.8)	5 (17.9)	<0.001
Calcification, n(%)	254 (61.8)	102 (57.3)	28 (100.0)	<0.001
Thrombus, n(%)	397 (96.6)	178 (100.0)	27 (96.4)	0.044
Post-PCI assessment				
Minimum lumen area, mm^2	5.88 ± 2.10	5.83 ± 2.24	5.52 ± 2.59	0.75
Stent expansion, %	75.3 ±18.5	75.2±16.6	74.0±17.8	0.94
Stent eccentricity index	0.82 ± 0.06	0.82 ± 0.07	0.71 ± 0.08	<0.001
Max tissue protrusion area, mm^2	1.25 ± 0.74	0.98 ± 0.62	0.80 ± 0.33	<0.001
Max stent malapposed area, mm^2	0.91 ± 0.75	0.91 ± 0.72	1.15 ± 0.57	0.32

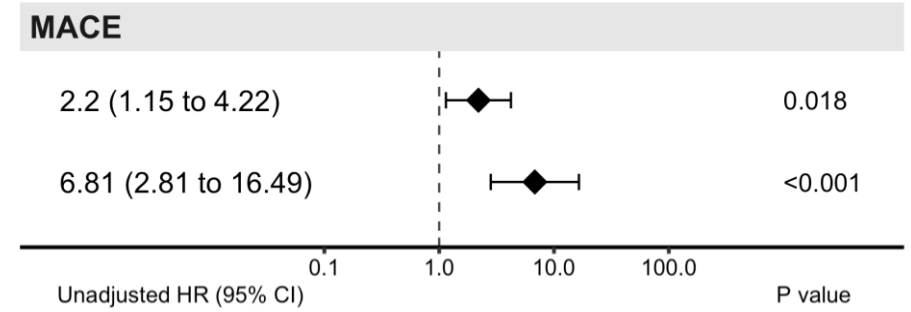
85% of the patients: **Minimum lumen area ≥4.5 mm^2** or **stent expansion ≥70%**

MACE stratified by ACS underlying causes

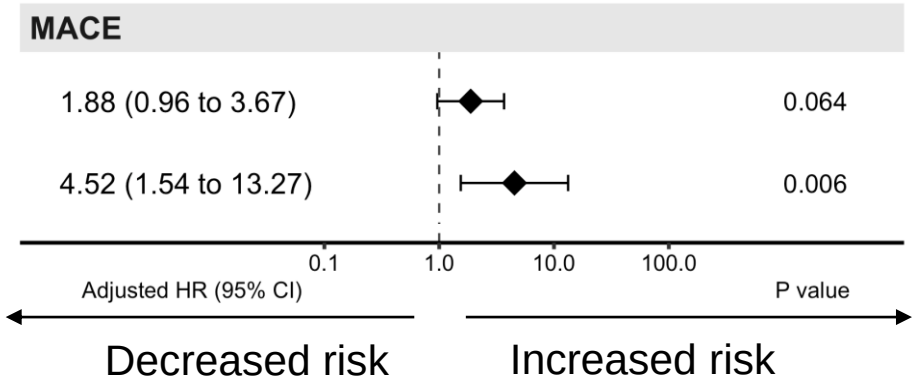


Hazard ratios for MACE

Unadjusted



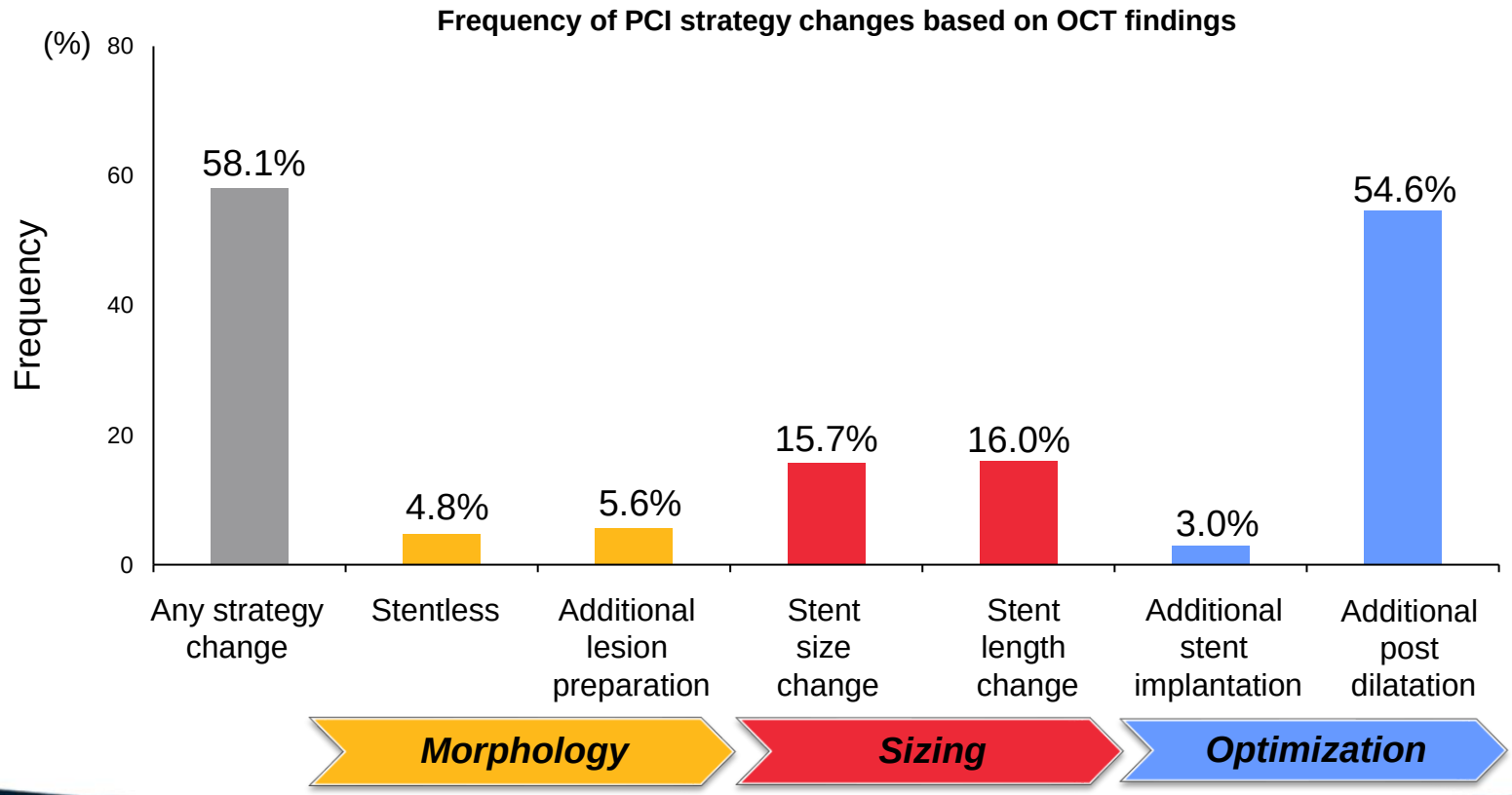
Adjusted*



(Plaque erosion as reference)

*Adjusted by age, gender, hemodialysis, ACS presentation, insulin use, LVEF, reference lumen area and stent length.

Impacts of OCT guidance on PCI



Limitations

- Selection bias due to enrollment of only ACS patients underwent OCT-guided primary PCI may have influenced this study results.
- OCT-based assessment of underlying causes of ACS was not supported by histological definition of those mechanisms.
- This study was conducted as an observational study and OCT-guided PCI strategy was not standardized according to the underlying cause of ACS.

Take Home Message

- The proportions of the ACS underlying causes based on OCT-defined morphology were 59% of plaque rupture, 26% of plaque erosion, and 4% of calcified nodule in the present large-scale multicenter prospective study (n = 702).
- ACS underlying causes evaluated by OCT enable us to stratify the future risk of MACE.
- OCT guidance affected the PCI strategy in 58% of the ACS patients.
- The further study to evaluate the possibility of OCT-guided optimization based on the ACS underlying cause is warranted.

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Thank you for your attention