

# **Precision Approaches for Acute Coronary Syndrome Based on OCT-determined Pathogenesis**

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# Disclosure

- Received speaking honorarium from Abbott, Boston Scientific, Shockwave
- Received consultant fee from Abbott, AMGEN, TERUMO

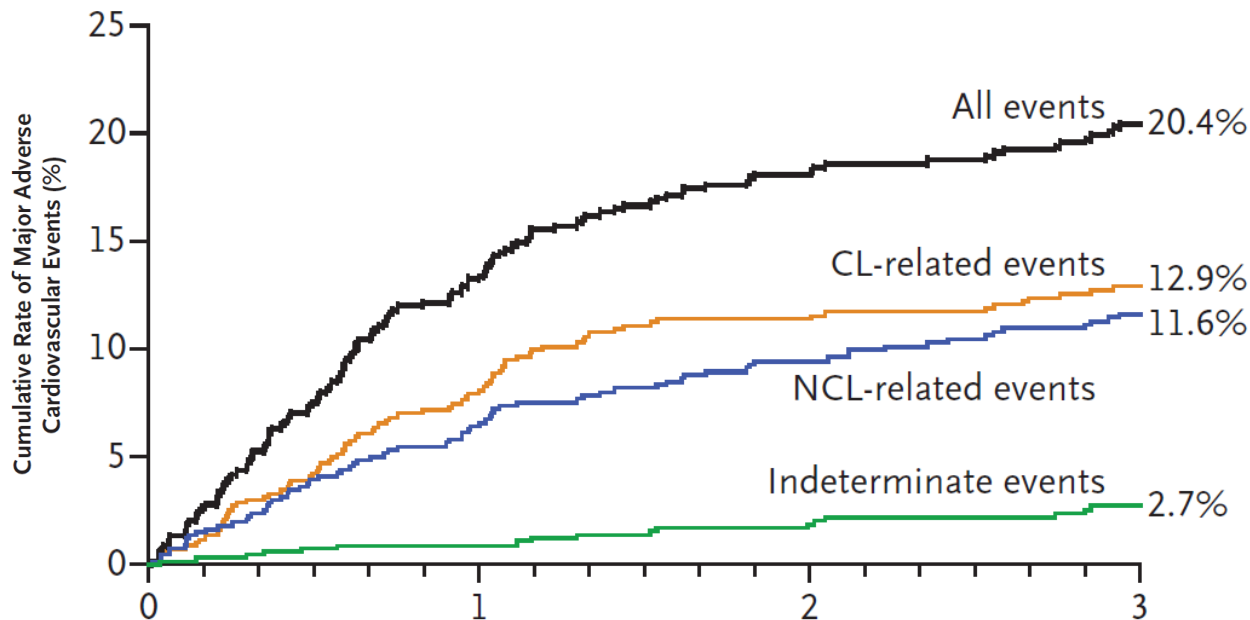
# Clinical outcomes in patients with ACS

*Incidence of recurrent adverse events is about 13% mainly caused by non-culprit lesion*

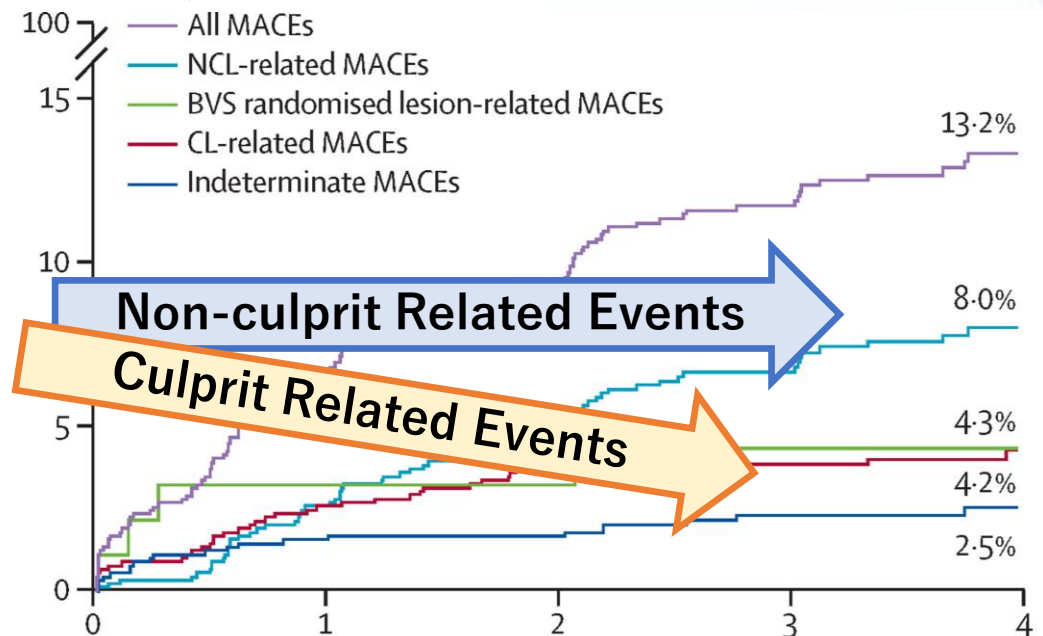
**PROSPECT study**

**10 years**

**PROSPECT II study**



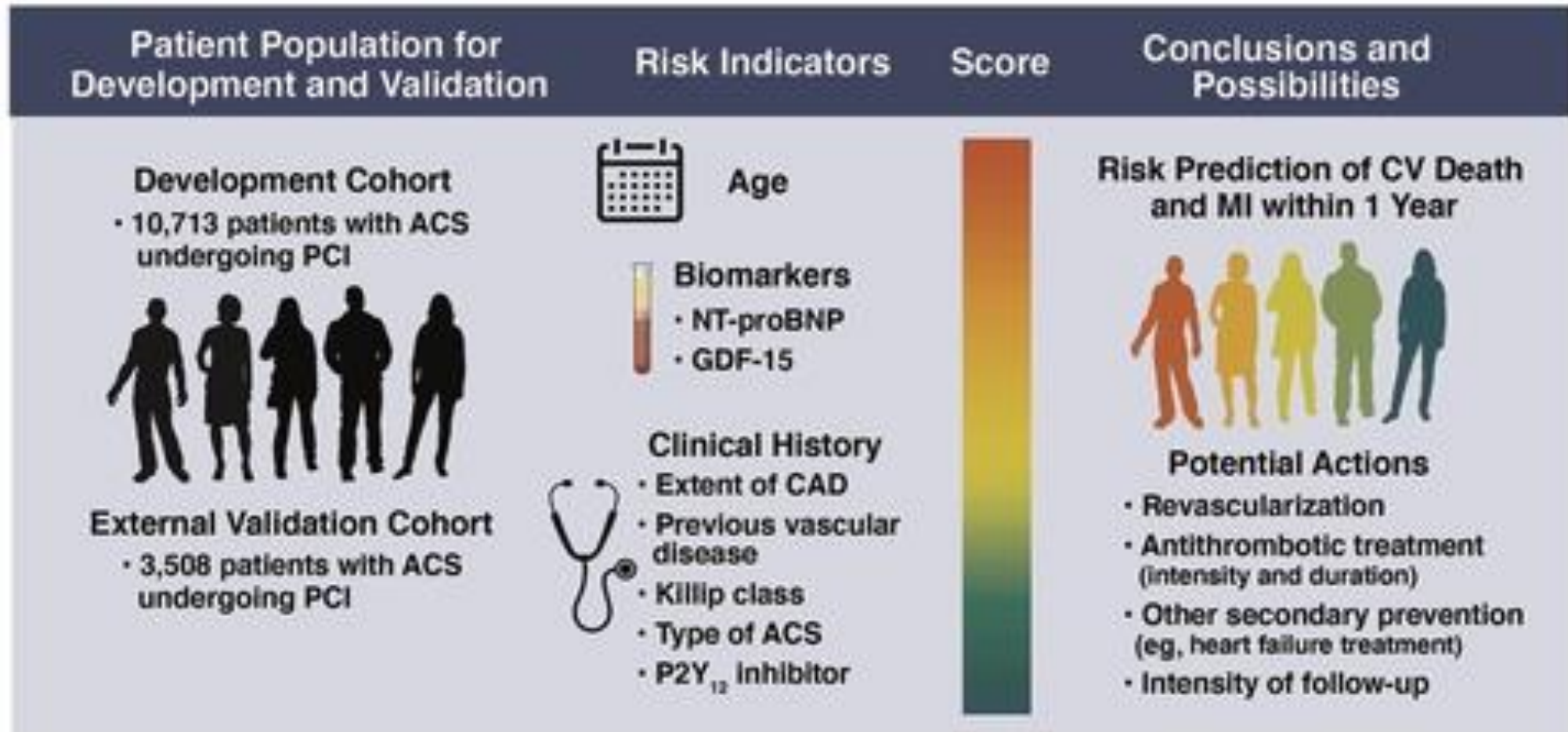
Stone GW, Maehara A et al. N Engl J Med 2011



Erlinge D, Maehara A et al. Lancet 2021

# Identification of patients at high-risk

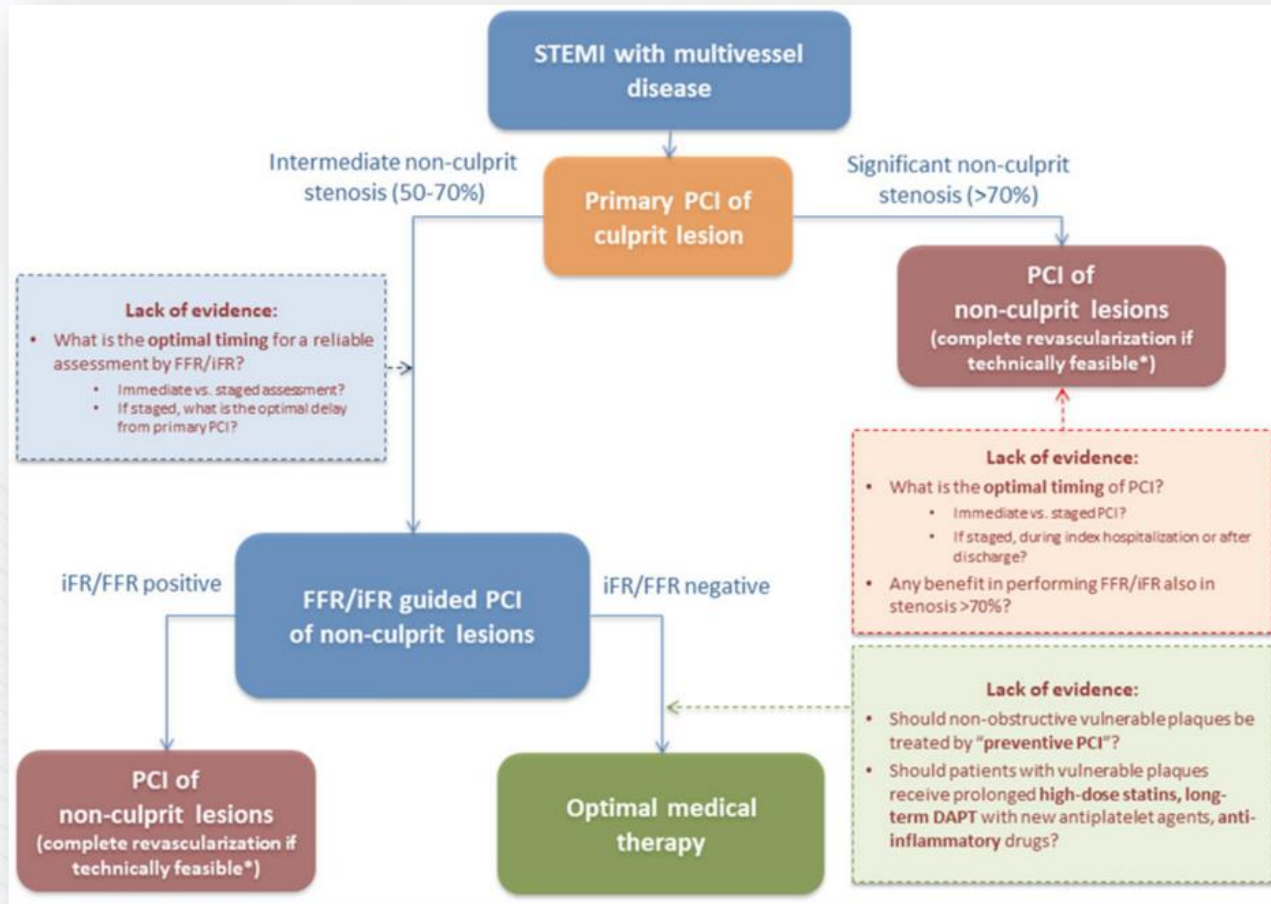
Several risk scores have been developed for the identification of patients at high-risk





# Identification of high-risk plaques

Angio, physiology, CT, intra-coronary imaging may stratify the risk in a region of interest



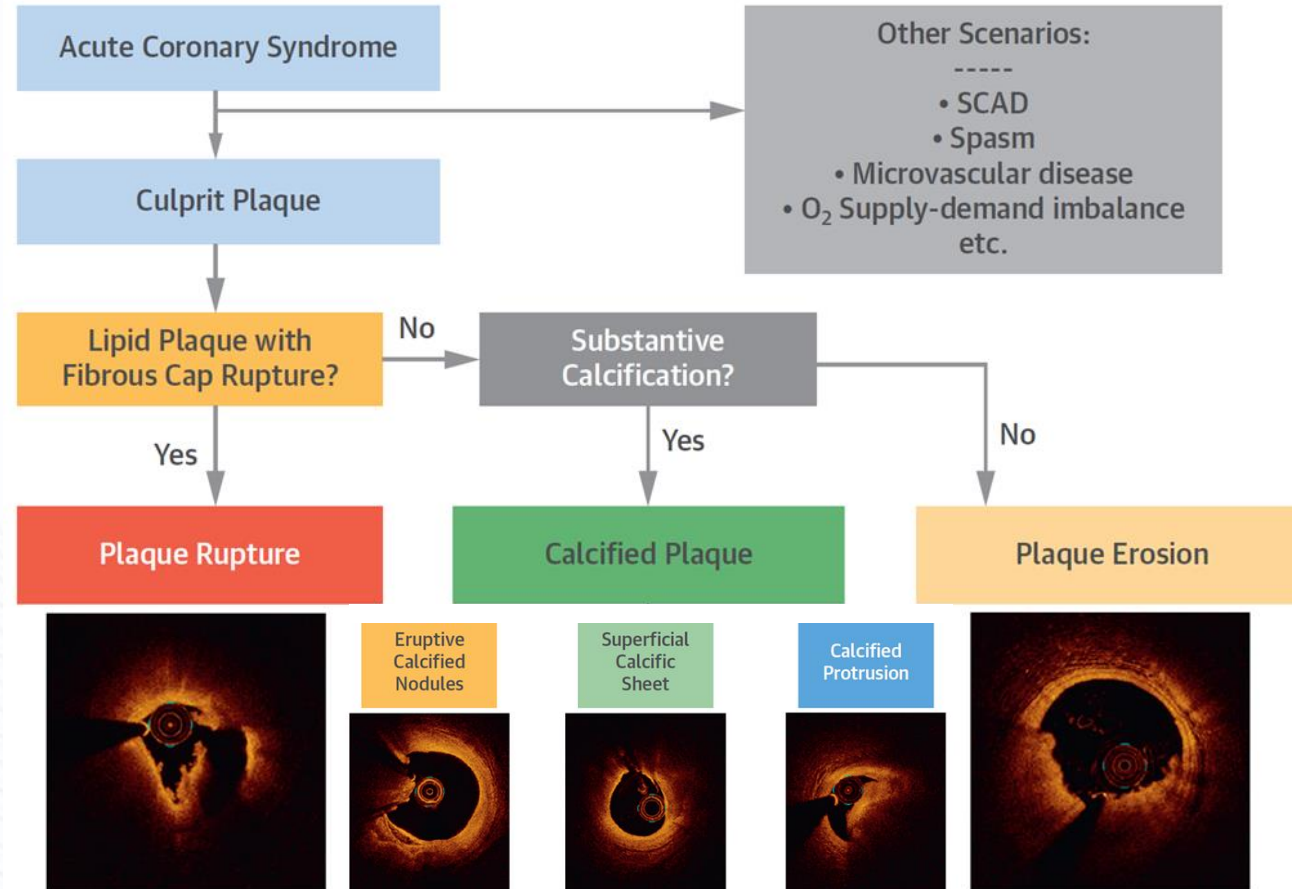
Montone RA et al. Eur Heart J 2020

	Odds ratio (95% CI)	p value
<b>Patient-level models with one high-risk feature</b>		
Model 1: MaxLCBI <sub>4mm</sub> ≥324.7	2.27 (1.25–4.13)	0.0071
Model 2: PB ≥70%	3.49 (1.83–6.63)	0.0001
Model 3: MLA ≤4.0 mm <sup>2</sup>	6.00 (2.12–17.00)	0.0007
<b>Lesion-level models with one high-risk feature</b>		
Model 1: MaxLCBI <sub>4mm</sub> ≥324.7	7.83 (4.12–14.89)	<0.0001
Model 2: PB ≥70%	12.94 (6.36–26.32)	<0.0001
Model 3: MLA ≤4.0 mm <sup>2</sup>	4.97 (2.59–9.53)	<0.0001
<b>Lesion-level models with one high-risk feature, secondary analysis*†</b>		
Model 1: MaxLCBI <sub>4mm</sub> ≥324.7	4.58 (2.34–8.97)	<0.0001
Model 2: PB ≥70%	6.53 (2.85–14.95)	<0.0001
Model 3: MLA ≤4.0 mm <sup>2</sup>	4.55 (2.32–8.95)	<0.0001
<b>Lesion-level model with all three high-risk features‡</b>		
MaxLCBI <sub>4mm</sub> ≥324.7	3.80 (1.87–7.70)	0.0002
PB ≥70%	5.37 (2.42–11.89)	<0.0001
MLA ≤4.0 mm <sup>2</sup>	1.85 (0.95–3.61)	0.072

Erlinge D, Maehara A et al. Lancet 2021

# Optical coherence tomography (OCT)

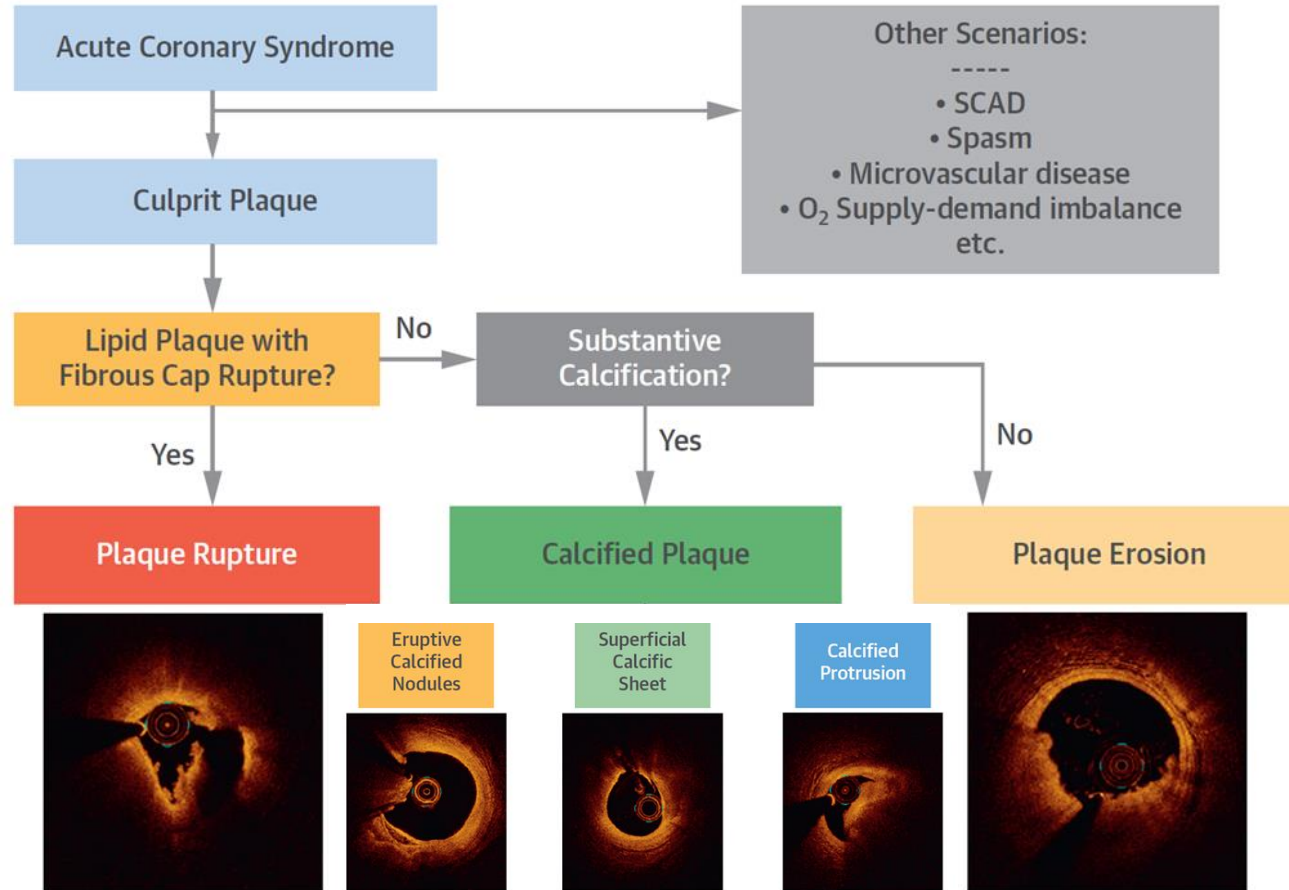
*OCT enables differential diagnosis of ACS and morphological assessment of non-culprit segment*



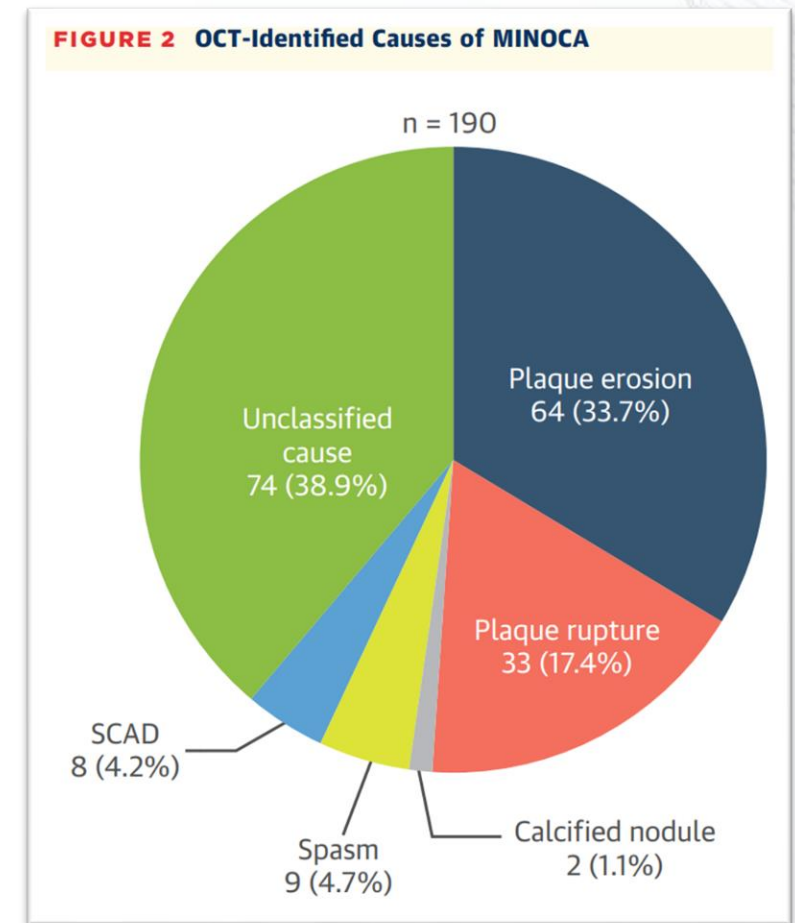
Sugiyama T, Minami Y, Jang IK et al. J Am Coll Cardiol Intv 2019

# Optical coherence tomography (OCT)

OCT enables differential diagnosis of ACS and morphological assessment of non-culprit segment



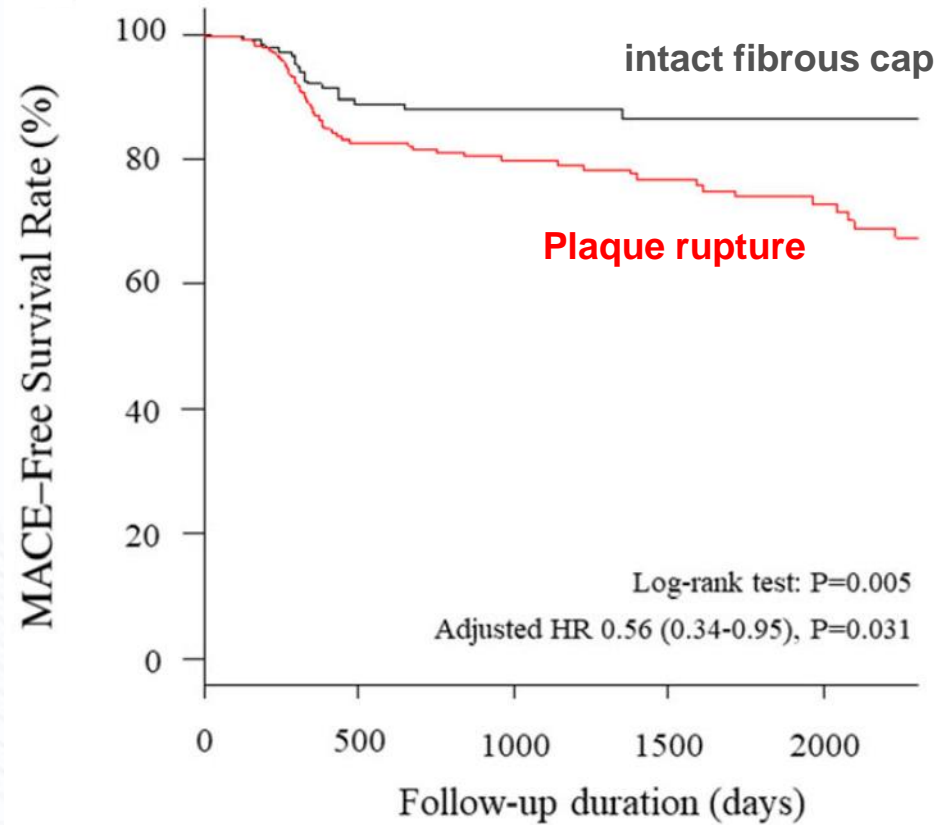
Sugiyama T, Minami Y, Jang IK et al. J Am Coll Cardiol Intv 2019



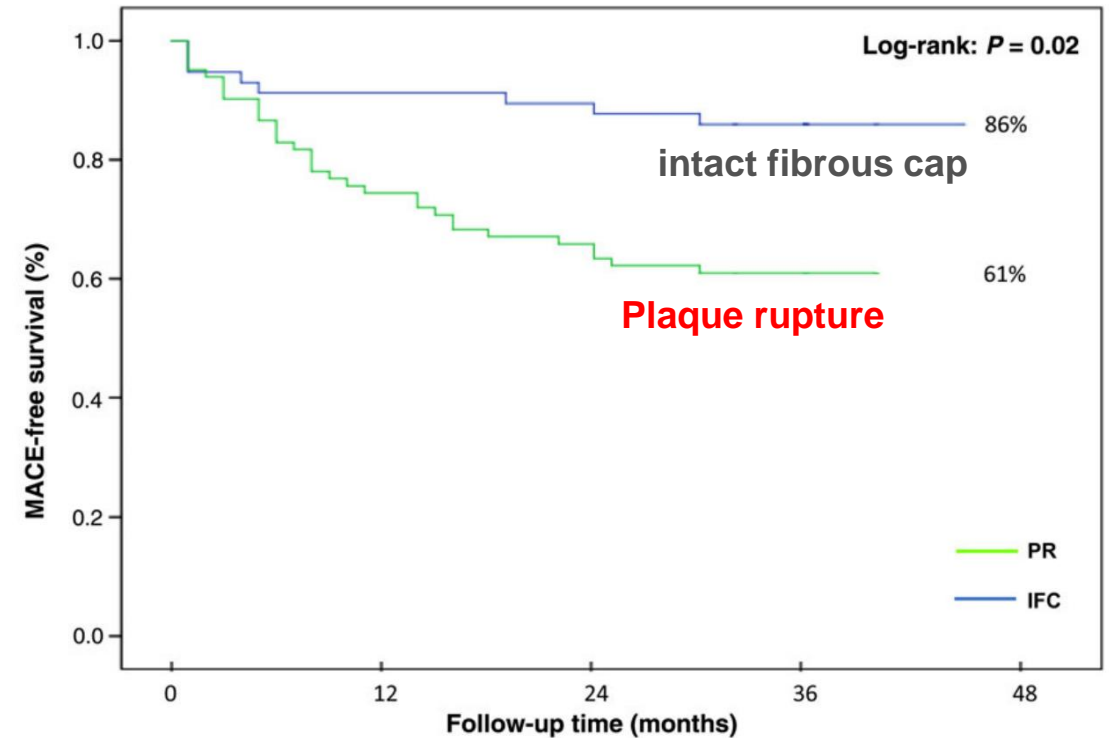
Zeng M, Yu B et al. J Am Coll Cardiol Img 2022

# Plaque rupture

*Higher incidence of recurrent adverse events in pt with plaque rupture has been demonstrated*



Hoshino M, et al. J Am Heart Assoc 2019



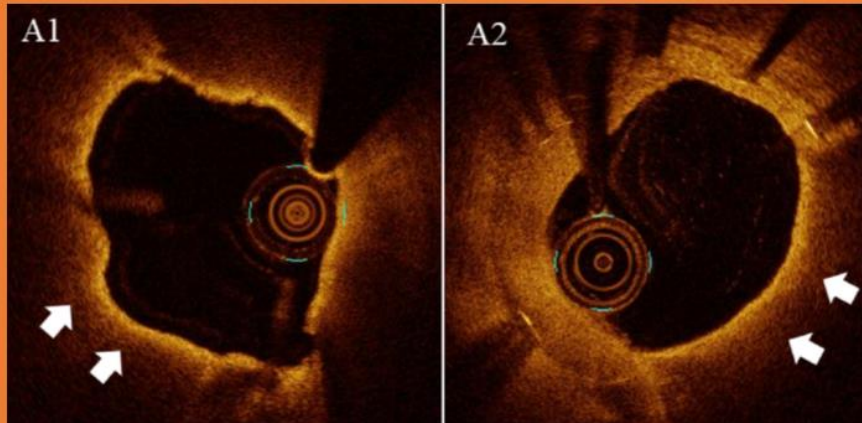
Niccoli G, et al. Eur Heart J 2015



# Plaque rupture

*Both culprit and non-culprit cause recurrent events if lipid-lowering is insufficient*

## Culprit lesion



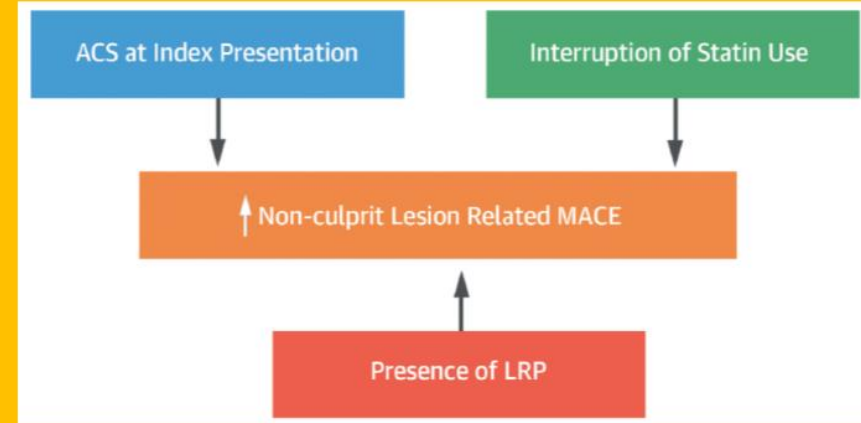
Plaque rupture  
TCFA  
Poor LDL-C



Neo  
atherosclerosis

Hoshino M, et al. J Cardiol 2019

## Non-culprit lesion



Lipid-rich plaque  
TCFA  
Poor lipid lowering

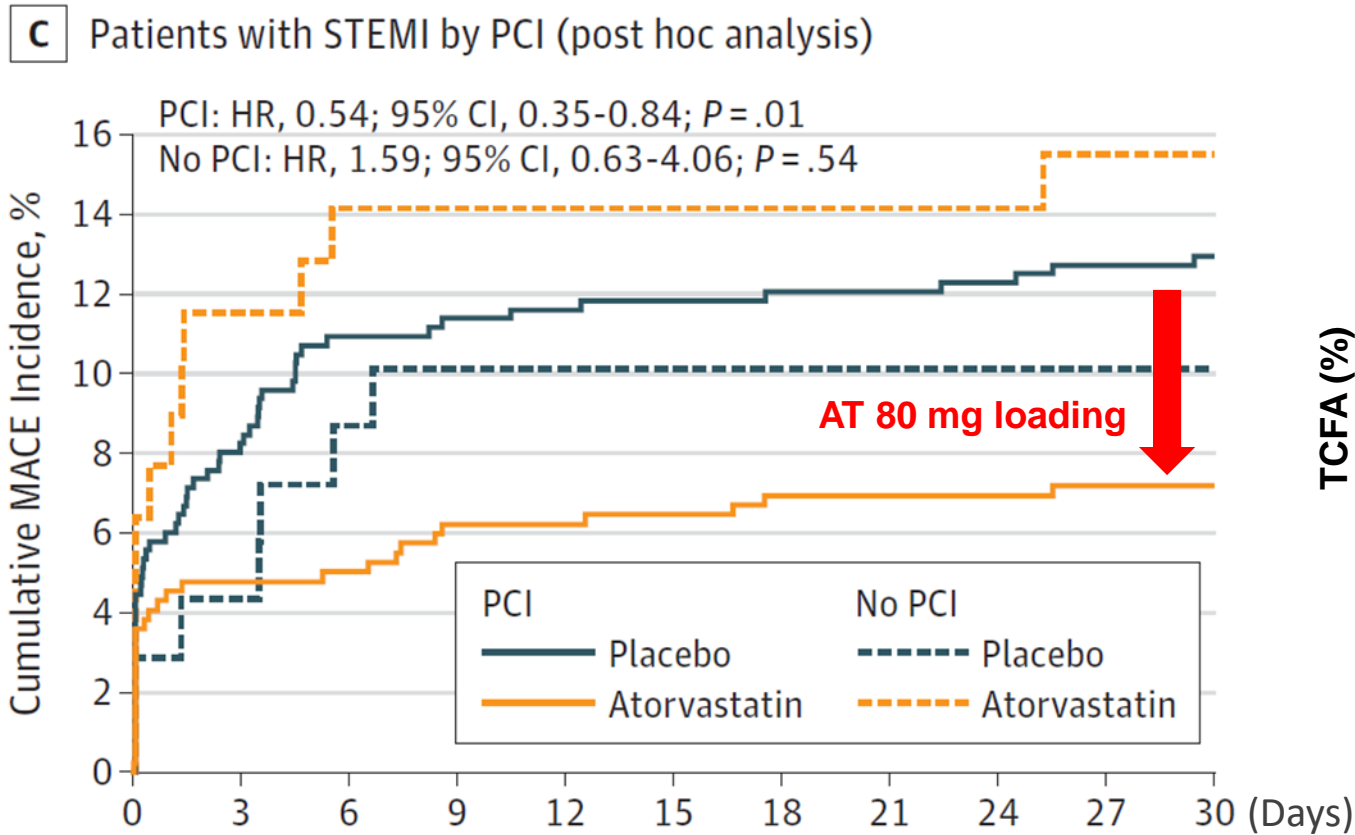


ACS

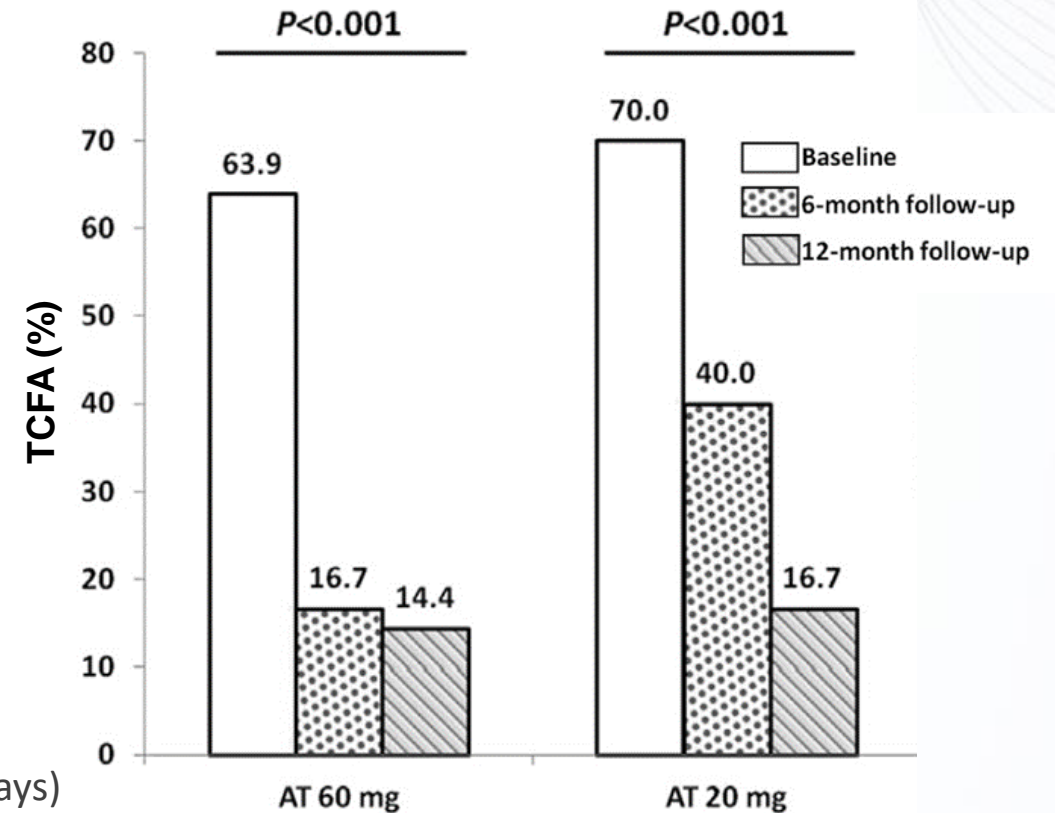
Xing L, Jang IK et al. J Am Coll Cardiol 2017

# Plaque rupture

*Early initiation of strong lipid-lowering may reduce the adverse event by stabilizing LRP*



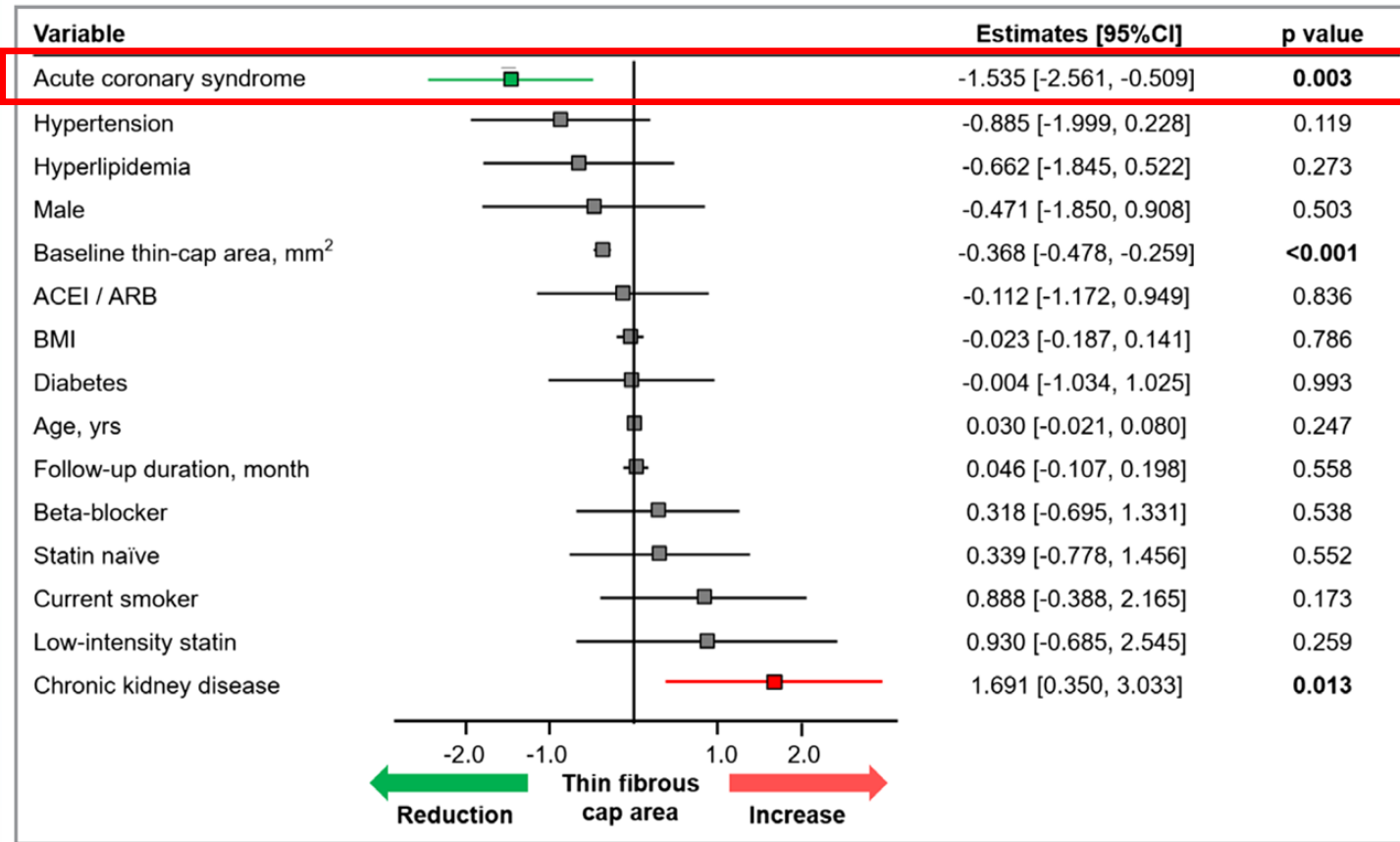
Berwanger O, et al. JAMA 2018



Hou J, Minami Y, Jang IK et al. Am J Cardiol 2016

# Plaque rupture

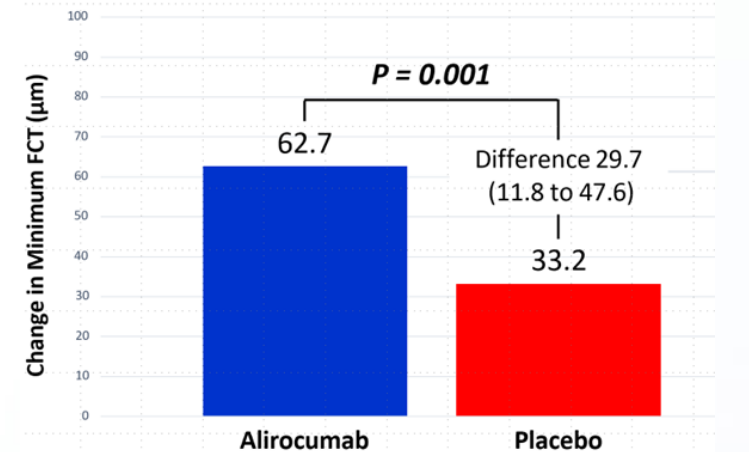
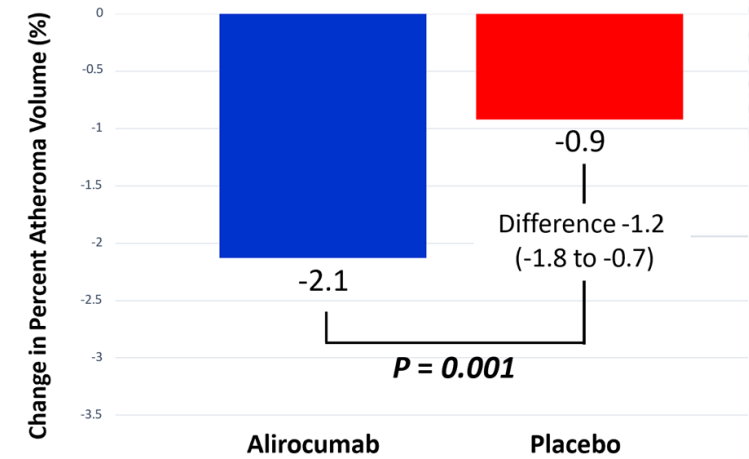
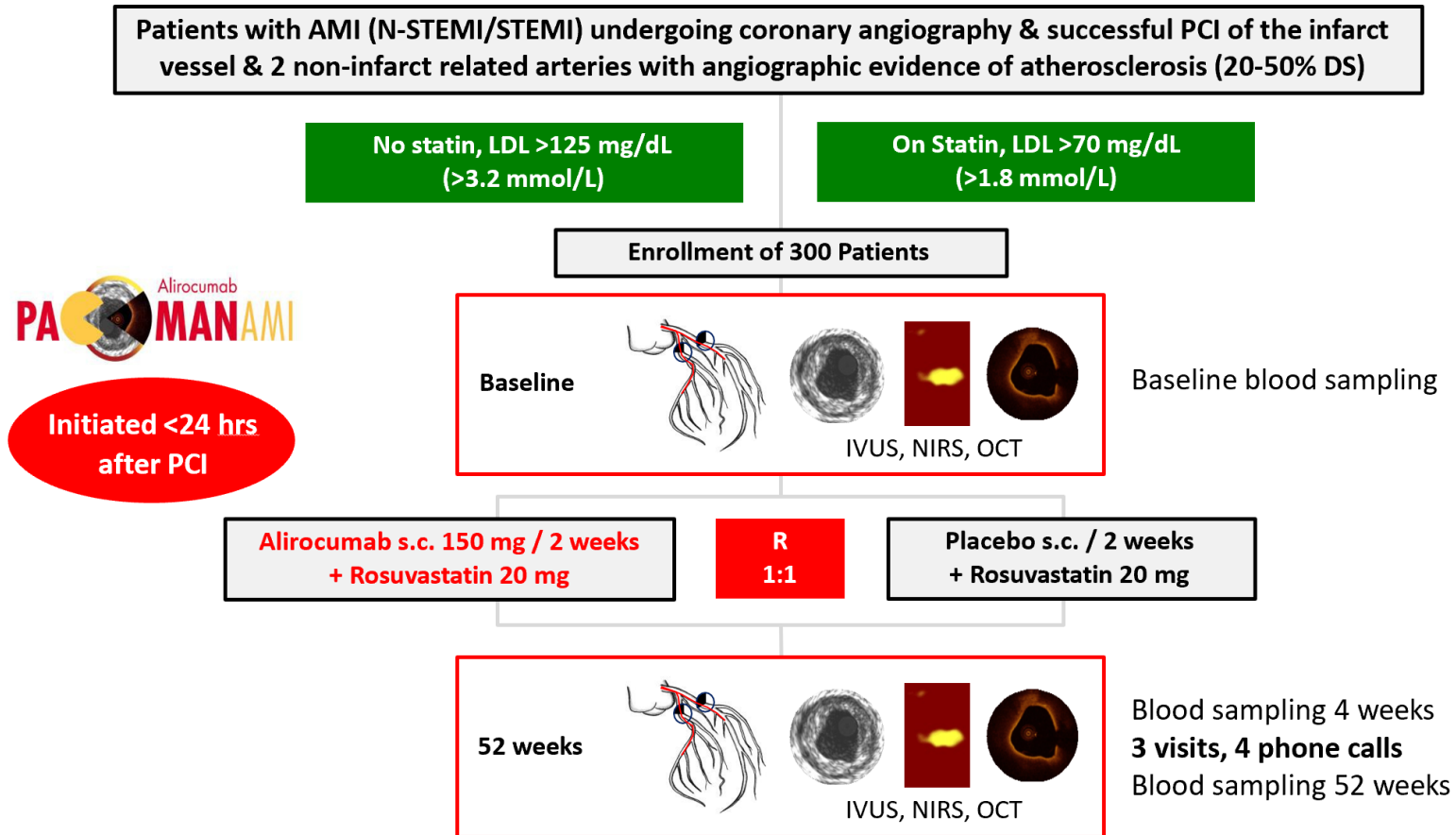
*ACS presentation is identified as a favorable factor for the response to lipid-lowering therapy*



Minami Y, Jang IK, et al. J Am Heart Assoc 2017

# Plaque rupture

*Additional PCSK9i may further stabilize LRP and reduce recurrent adverse events*

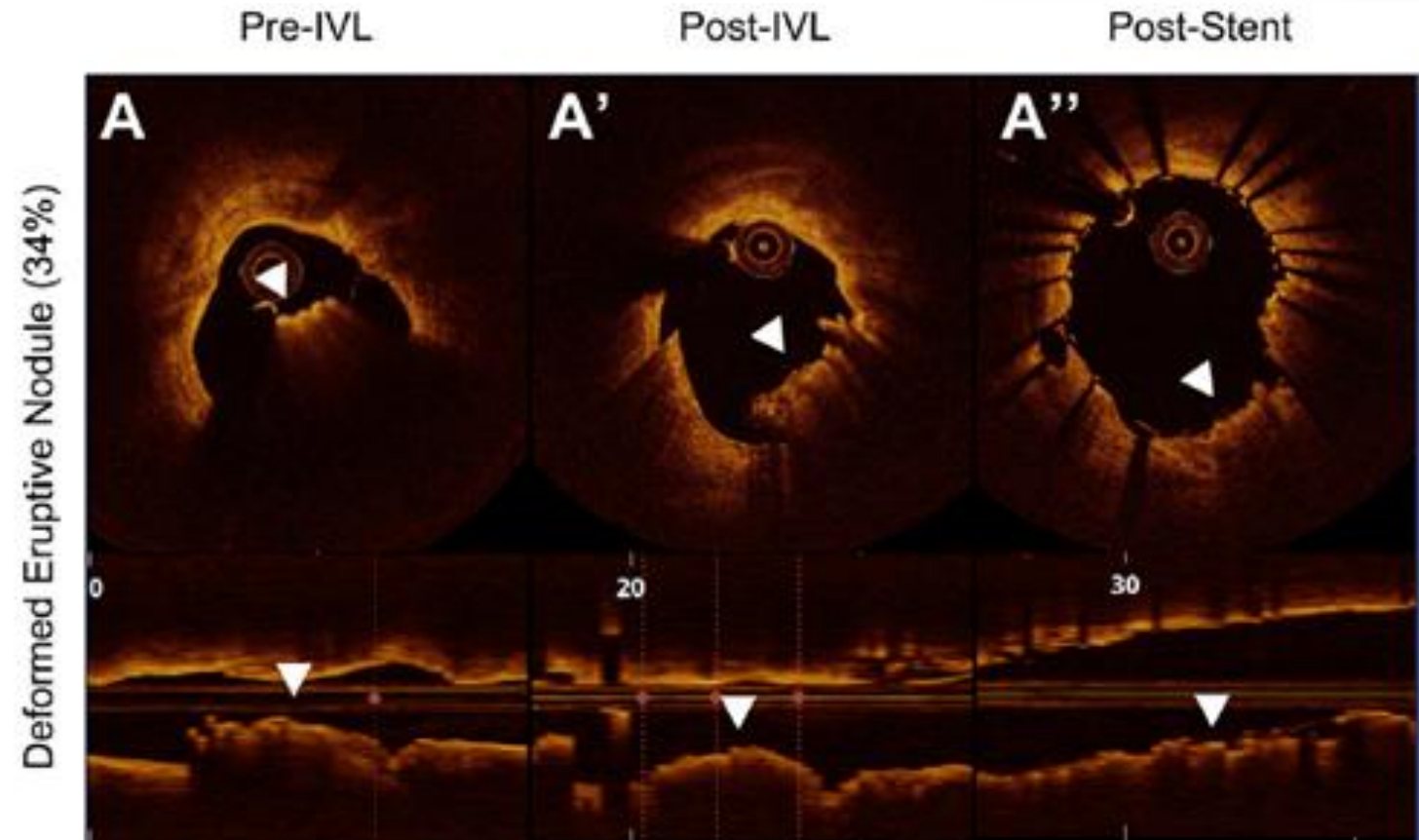
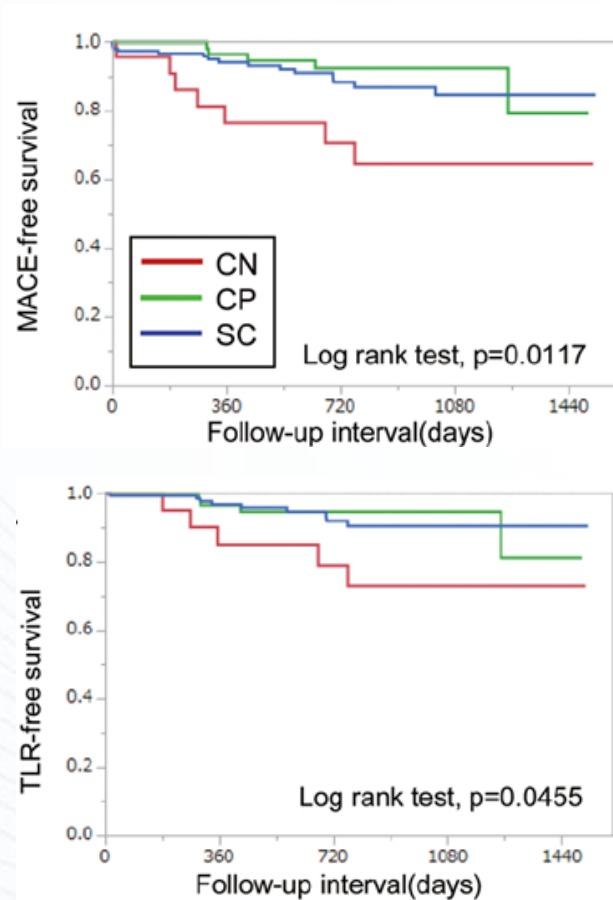


Räber L et al. JAMA 2022



# Eruptive calcified nodule

*Can IVL reduce the incidence of TLR by the efficacy of acute gain for lesion with eruptive nodule?*

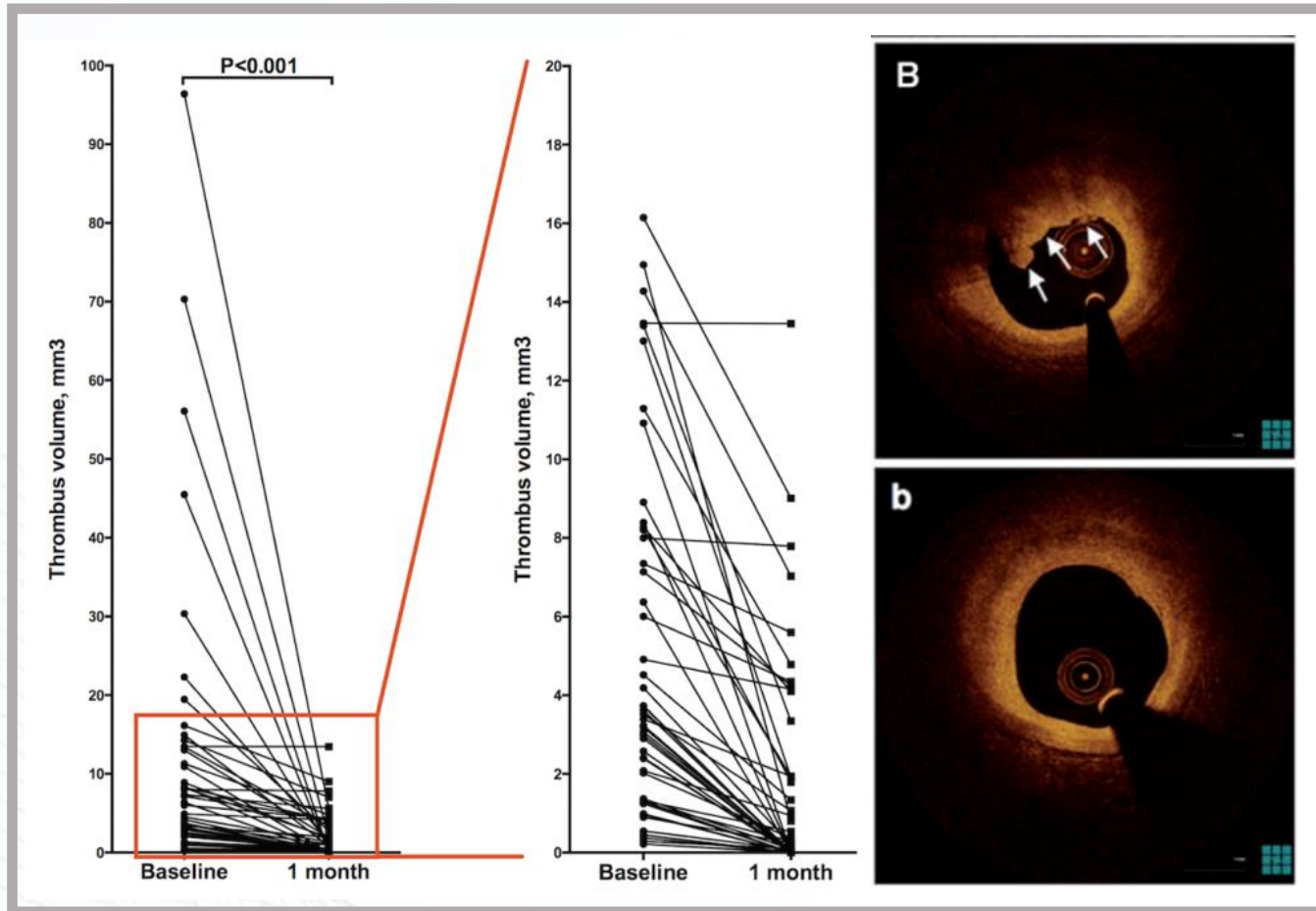


Iwai S et al. Circ J 2021

Ali ZA, Maehara A et al. J Am Coll Cardiol Intv. 2023

# Plaque erosion

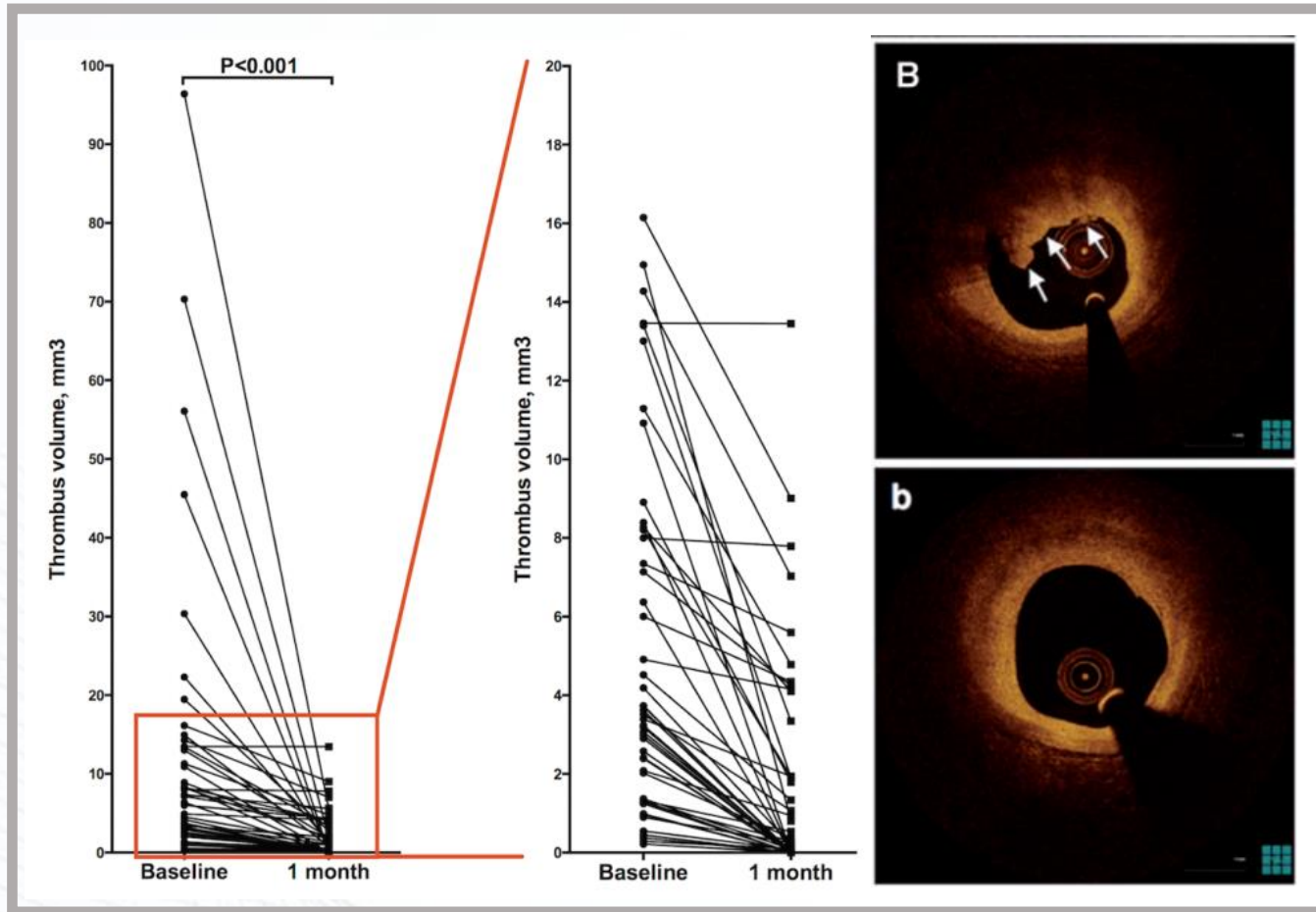
*Is non-stent strategy shown in the EROSION study feasible for all patients with plaque erosion??*



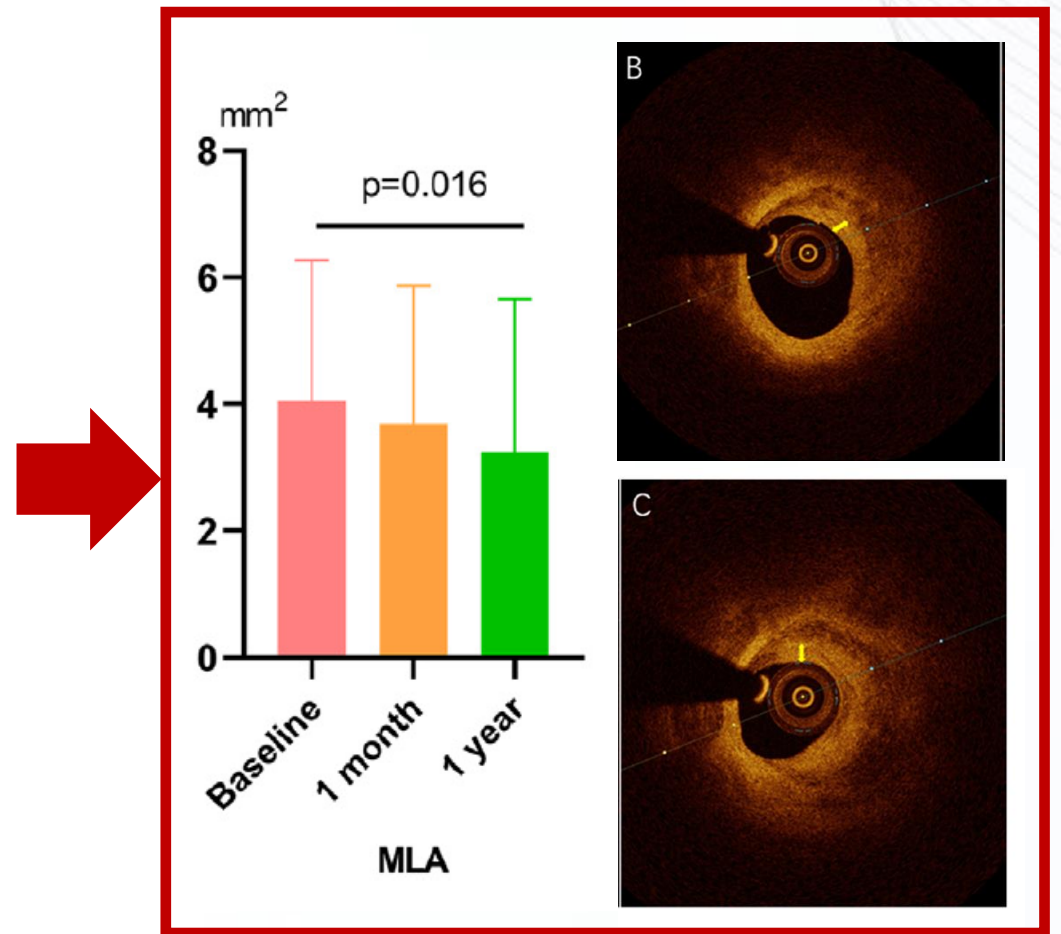
Jia H, Jang IK et al. Eur Heart J 2016

# Plaque erosion

Is non-stent strategy shown in the EROSION study feasible for all patients with plaque erosion??



Jia H, Jang IK et al. Eur Heart J 2016



Yin Y, Yu B et al. Am Heart J 2022

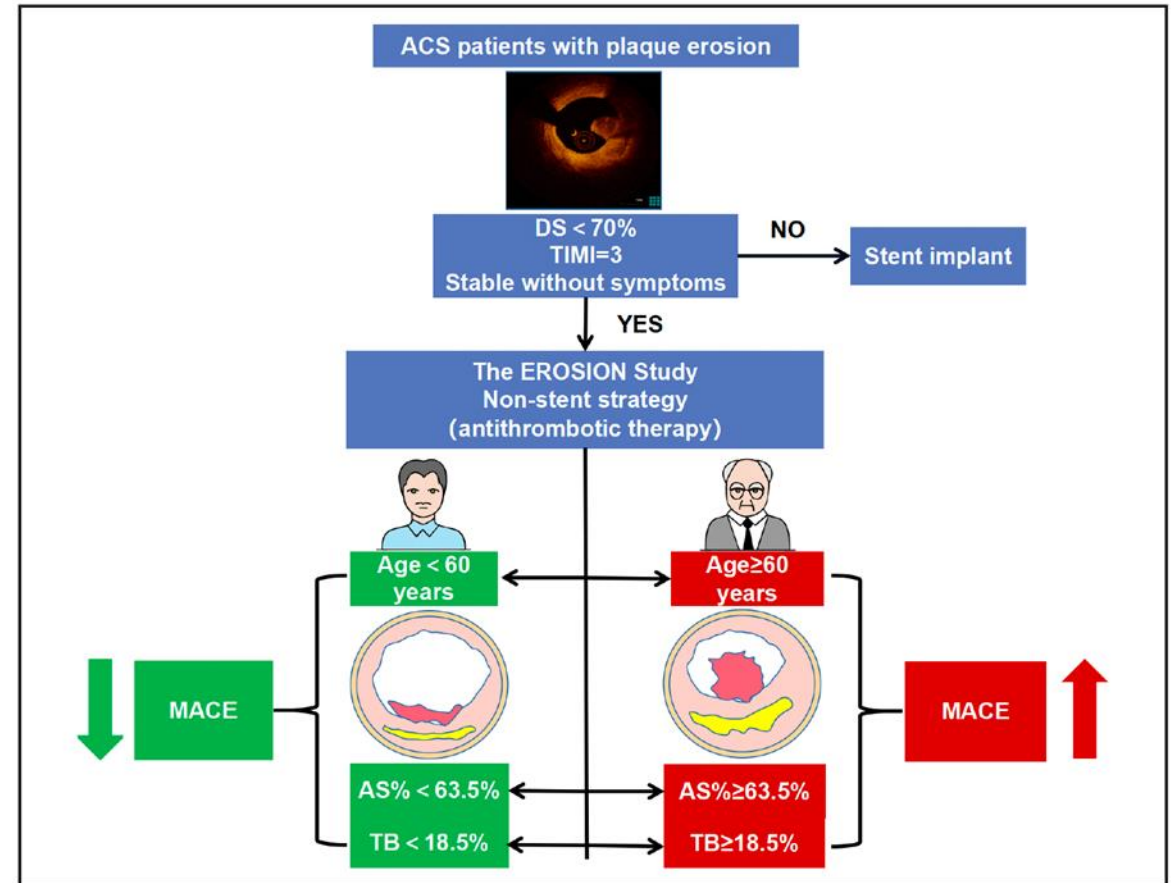


# Plaque erosion

*Residual stenosis, thrombus burden and older age are factors for MACE*

MACE	No. of Pt (%)
Any events	50/232 (21.6)
Cardiac death	6 (2.6)
Recurrent MI	3 (1.3)
Ischemia-driven TLR	29 (12.5)
Rehospitalization*	36 (15.5)
Major bleeding	2 (0.9)
Stroke	5 (2.2)

\*because of unstable angina or progressive angina



Yin Y, Yu B et al. J Am Heart Assoc 2022



# Conclusion

- OCT may enable precision approach for ACS patients including MINOCA although the concept has not been supported by evidences
- Plaque rupture is the most reasonable candidate for the early intensive lipid-lowering therapy (strike early, strike strong) including PCSK9i
- Eruptive calcified nodule is still requiring optimal revascularization strategy, and the efficacy of IVL should be further evaluated
- Plaque erosion without residual stenosis may be able to skip stenting, but prolonged anti-platelet therapy may be desirable