

Prognostic Relevance of High-Risk Plaque Features in Guiding Treatment Strategy

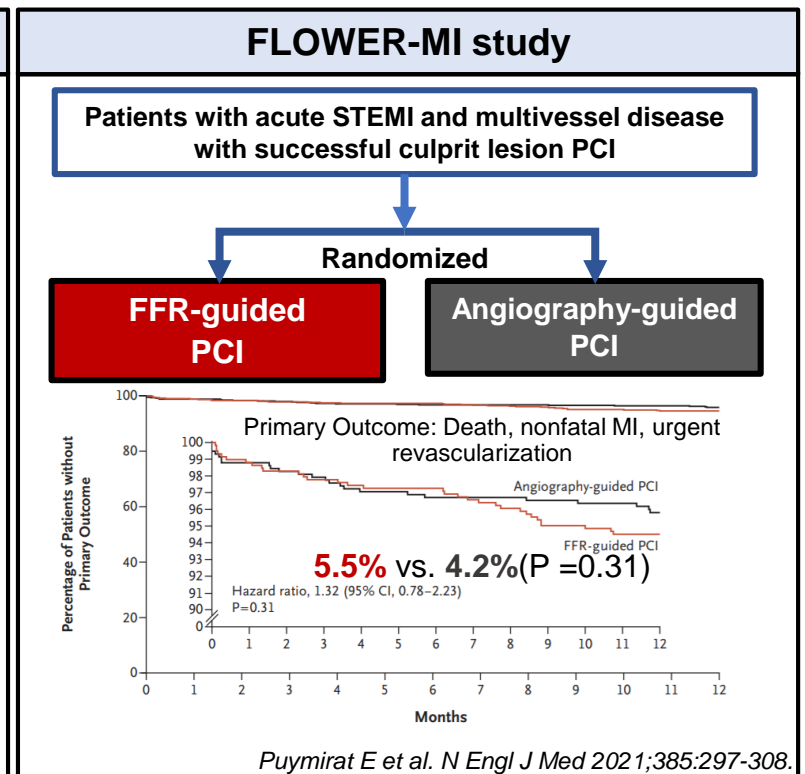
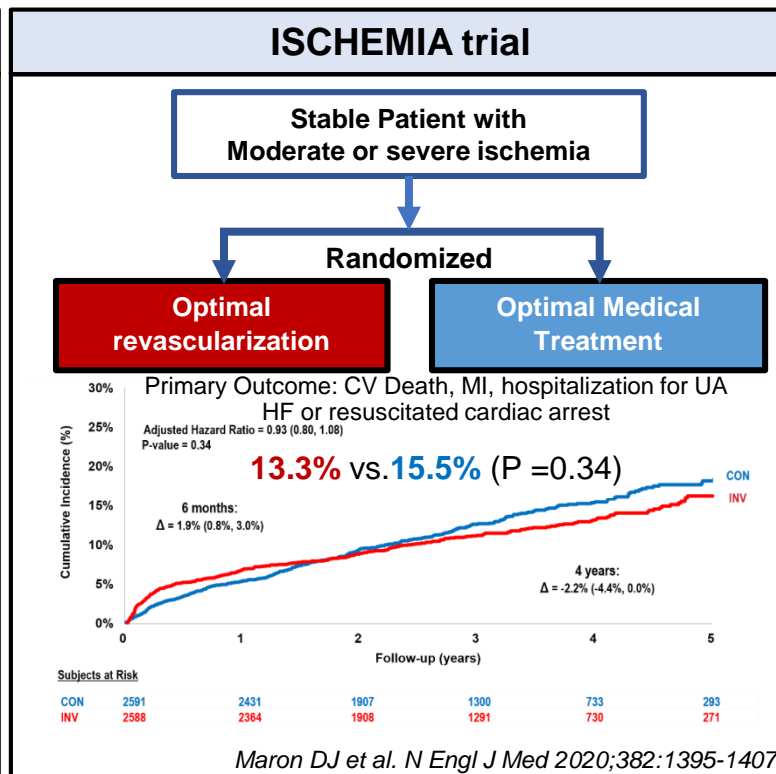
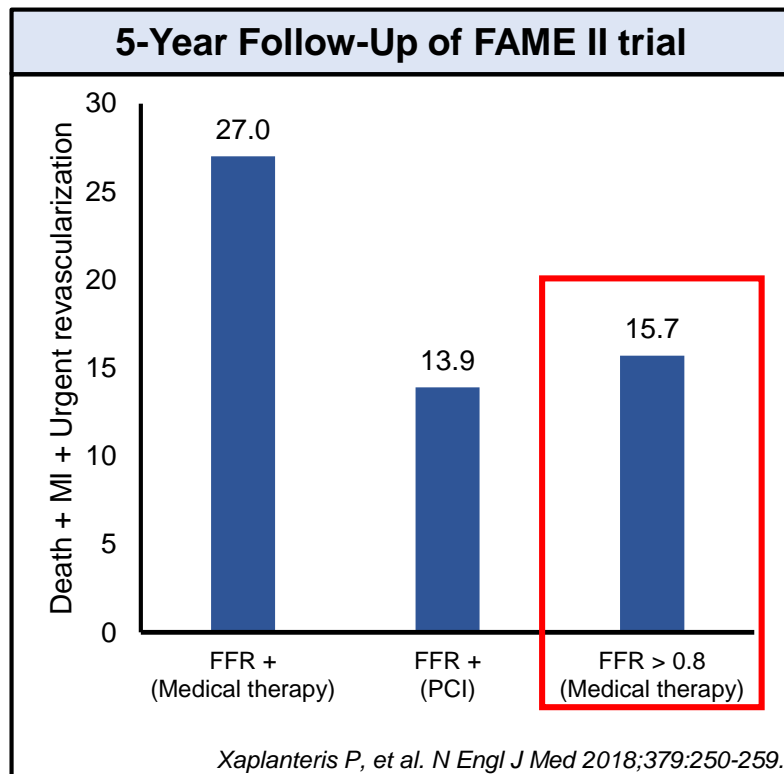
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Disclosure

- The authors have no financial conflicts of interest to disclose concerning the presentation.

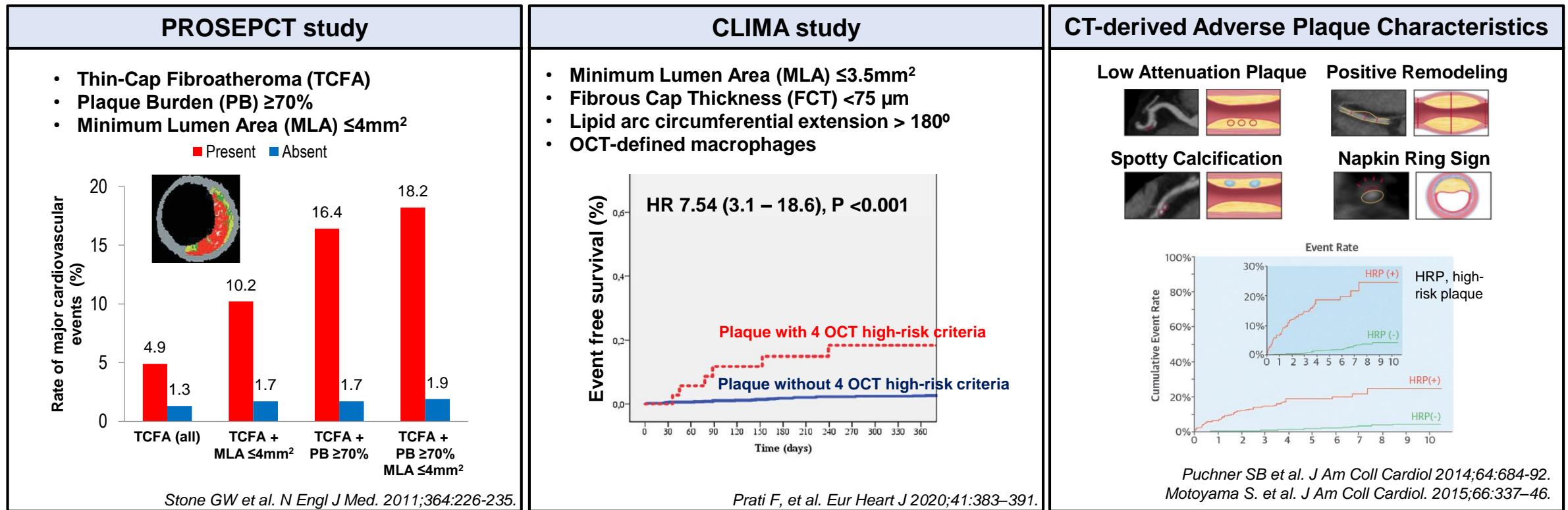
Limitations of Decision-Making by Ischemia

- Myocardial ischemia has been used as an indicator for revascularization.
- However, clinical outcomes may not be fully optimized by clinical decision-making solely based on myocardial ischemia.



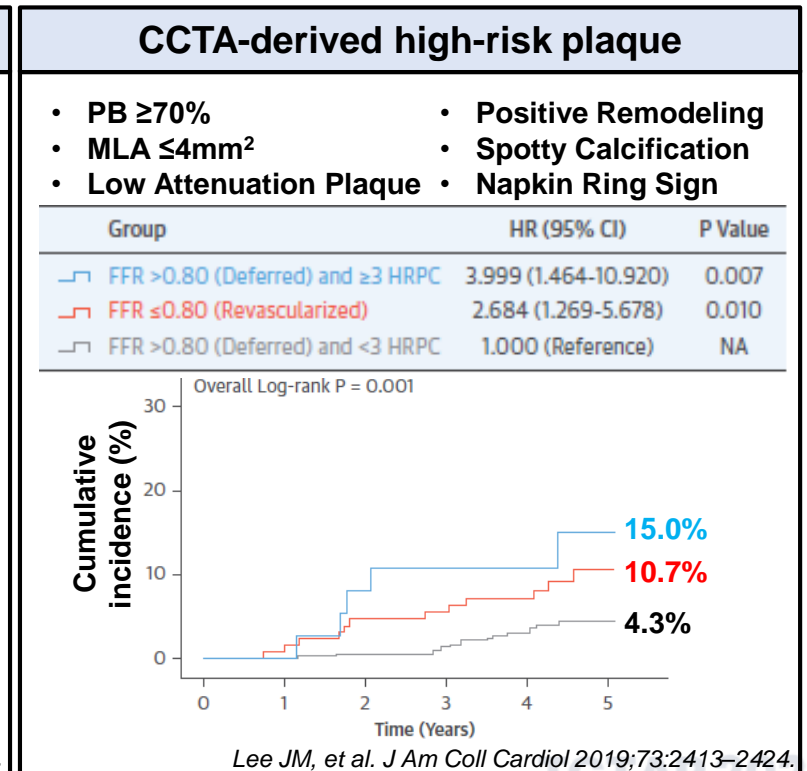
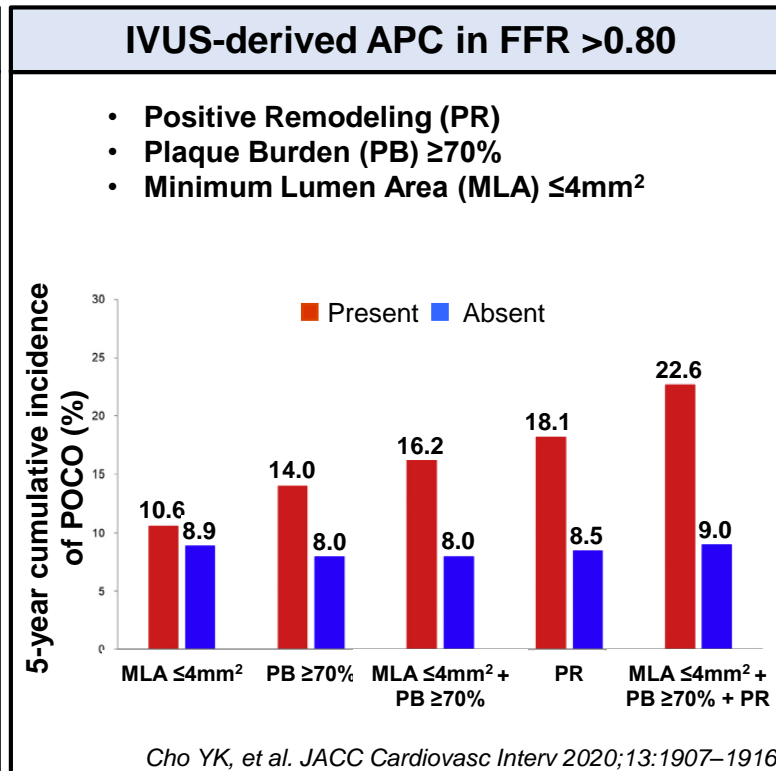
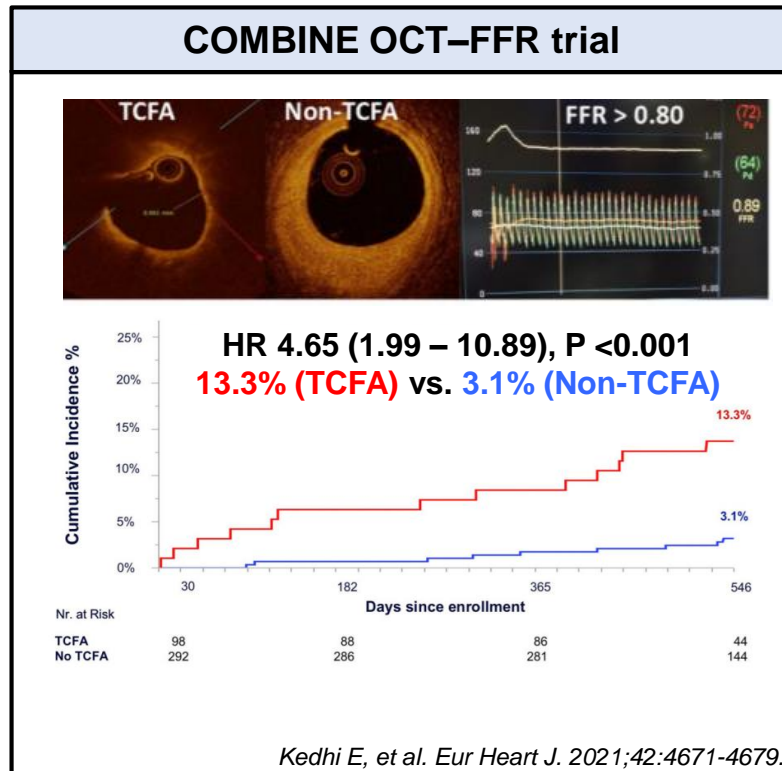
Importance of Plaque Quantity and Quality

- Quantitative and qualitative plaque features verified by various coronary imaging are predictors of coronary events.



High-Risk Plaque in Non-Ischemic Lesions

- In non-ischemic lesions, the presence of high-risk plaque features portended a higher risk of coronary events.
- Which component (quantity vs quality) is the main driver of clinical events and how high-risk plaque in non-ischemic lesions can be treated are not fully known.



Objectives

- To identify the individual and combined prognostic implications of quantitative and qualitative plaque metrics in non-ischemic lesions.
- To investigate their prognostic interactions with treatment strategies.

Study Design and Methods

Study Population

CCTA-FFR registry (NCT04037163) from 9 centers and 3 countries

697 vessels (458 patients) with suspected CAD who underwent FFR-guided treatment strategy *and* coronary CT angiography (CCTA) before FFR measurement (≤ 90 days)

Seoul National University Hospital, Korea

Tschiura Kyodo General Hospital, Japan

Ulsan University Hospital, Korea

Keimyung University Dongsan Medical Center, Korea

Inje University Ilsan Paik Hospital, Korea

Samsung Medical Center, Korea

The Second Affiliated Hospital of Zhejiang University, China

Gifu Heart Center, Japan

Wakayama Medical University, Japan

FFR-guided Treatment Strategies

Medical Treatment group

- Deferral of PCI with high FFR (>0.80).

PCI group

- Revascularization with low FFR (≤ 0.80) and post-PCI FFR >0.80 were included.
- Post-PCI FFR was designated as the FFR value of the corresponding vessel.

Data and Outcome Measures

Data Analysis

- **CCTA Core Lab**
Severance Cardiovascular Hospital, Korea
- **Coronary Angiography Core Lab**
Seoul National University Hospital, Korea
- **Physiologic Index Core Lab**
Seoul National University Hospital, Korea

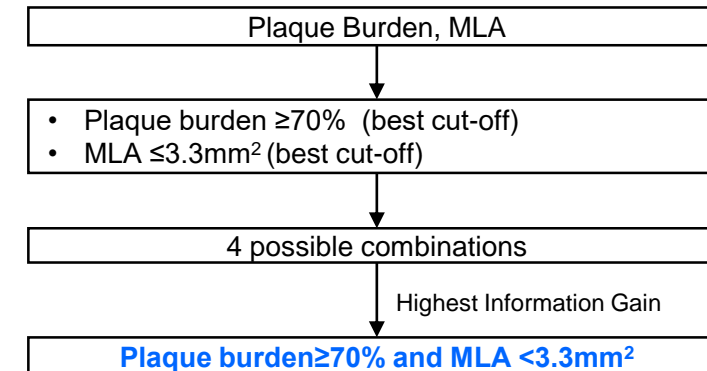
Primary Outcome

Vessel-oriented composite outcomes (VOCO)

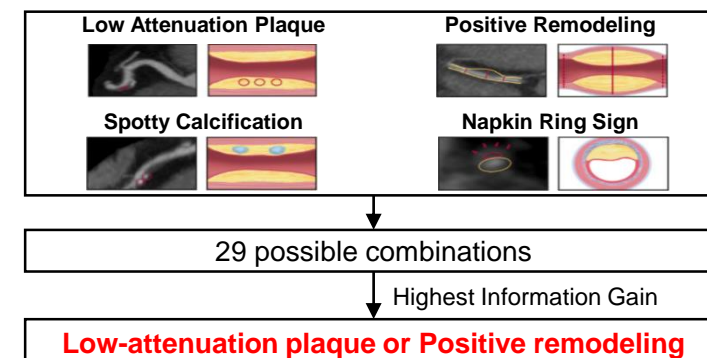
- A composite of cardiac death, target vessel myocardial infarction, and target vessel revascularization at 5-years.
- All clinical events were evaluated and adjudicated by an independent event committee.

Plaque Assessment in CCTA

Quantitative High-Risk Plaque (qn-HRP)



Qualitative High-Risk Plaque (ql-HRP)



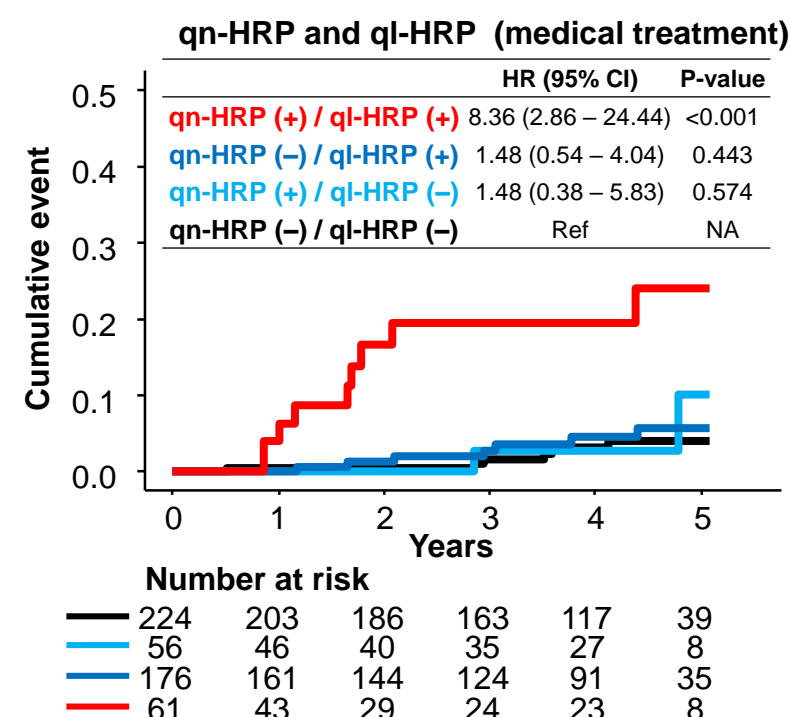
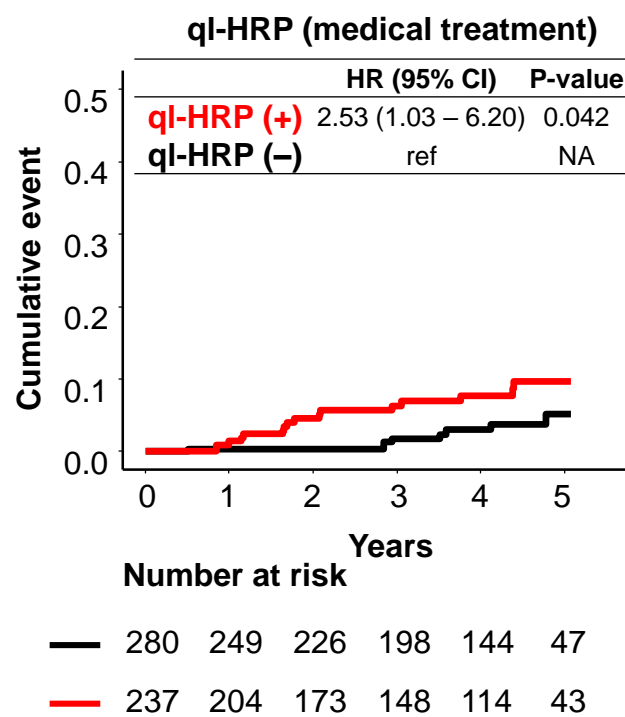
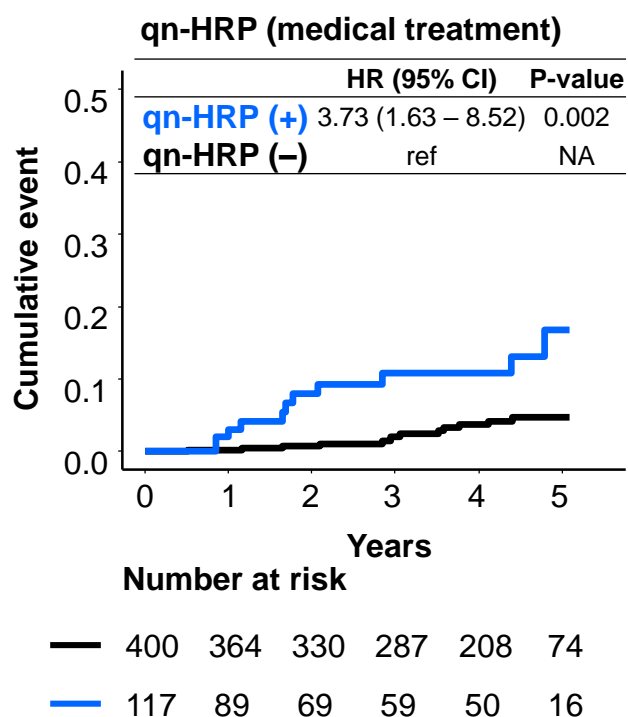
Baseline Characteristics

Patient Characteristics (N=458)		Lesion Characteristics (N=697)	
Age, years	65.7 ± 9.8	Treatment type at index procedure	
Male	330 (72.1)	Medical treatment	517 (61.7)
Hypertension	312 (68.1)	PCI	180 (25.8)
Diabetes mellitus	163 (35.6)	Located at LAD	326 (46.8)
Hypercholesterolemia	268 (58.5)	% Diameter Stenosis	45.5±17.2
Current smoker	105 (22.9)	Lesion length	12.1±9.5
Clinical presentation		Reference diameter	3.0±0.6
Stable ischemic heart disease	373 (81.4)	FFR	0.85±0.12
Unstable angina	55 (12.0)	High-Risk Plaque Features	
NSTEMI	30 (6.6)	Plaque burden ≥70%	259 (37.2)
		MLA ≤3.3mm ²	375 (53.8)
		Low-attenuation plaque	134 (19.2)
		Positive remodeling	282 (40.5)

FFR, fractional flow reserve; LAD, left anterior descending artery; MLA, minimum lumen area; NSTEMI, non-ST elevation myocardial infarction; PCI, percutaneous coronary intervention.

Integrative Prognostic Impact of qn-HRP/ql-HRP

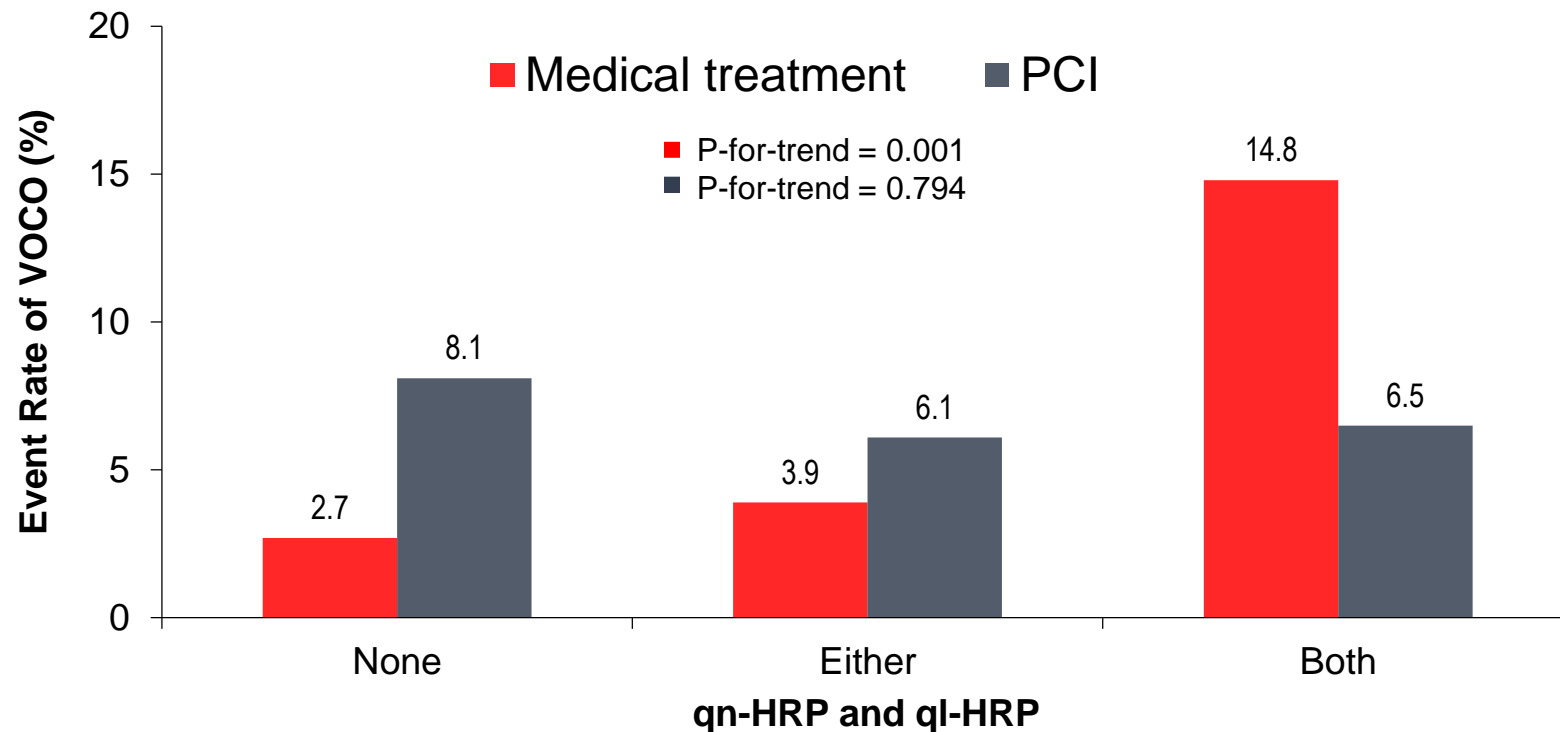
- qn-HRP and ql-HRP were associated with the increased risk of 5-year VOCCO, but only lesions with qn-HRP (+)/ql-HRP (+) had a clinical significance.



CI, confidence interval; HR, hazard ratio; HRP, high-risk plaque;; ql-HRP, qualitative HRP; qn-HRP, quantitative HRP; VOCCO, vessel-oriented composite outcomes.

Outcome Trend in Medical Treatment and PCI groups

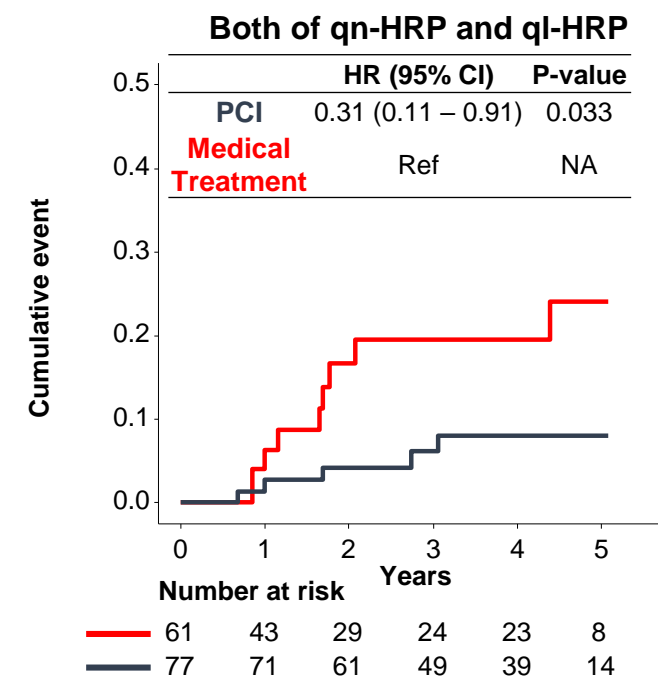
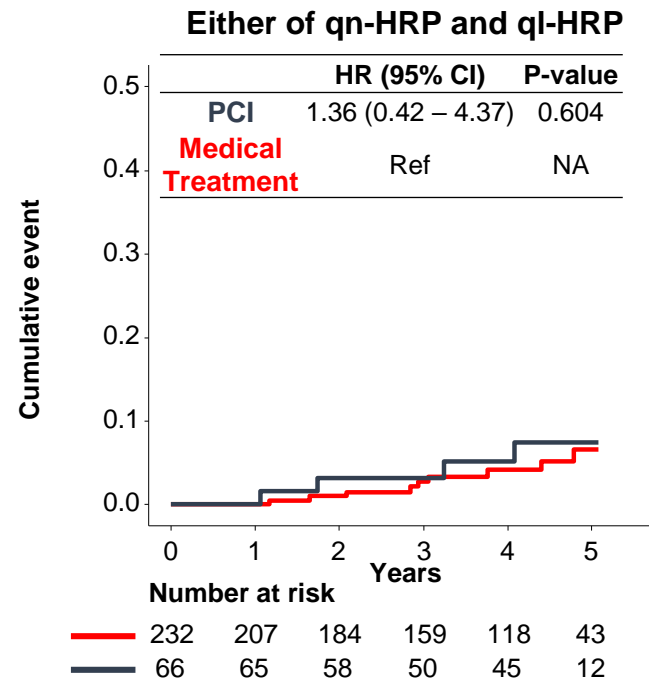
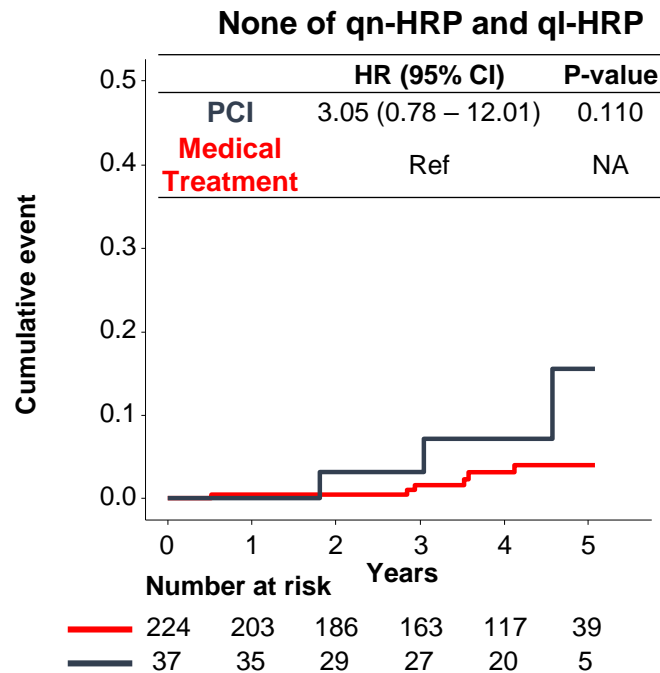
- To evaluate the possible interaction of qn-HRP/ql-HRP with treatment types
- In contrast to the medical treatment group, outcome was not different according to qn-HRP/ql-HRP in the PCI group.



HRP, high-risk plaque; PCI, percutaneous coronary intervention; ql-HRP, qualitative HRP; qn-HRP, quantitative HRP; VOCO, vessel-oriented composite outcomes.

Medical Treatment vs. PCI by qn-HRP/ql-HRP Status

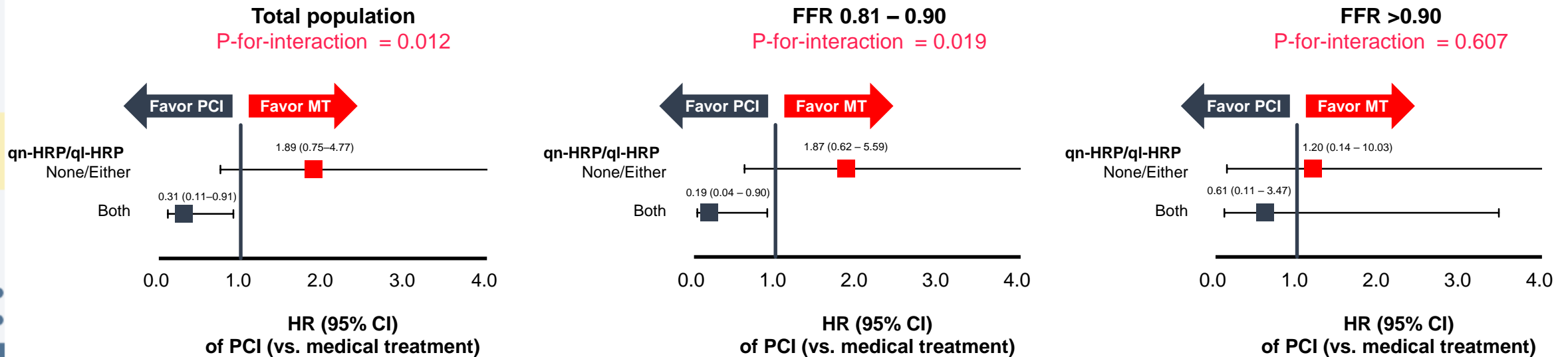
- To investigate the implications of qn-HRP/ql-HRP on guiding treatment strategies
- Both assessments of qn-HRP and ql-HRP may reveal lesion subsets that can benefit from PCI in non-ischemic lesions.



CI, confidence interval; HR, hazard ratio; HRP, high-risk plaque; PCI, percutaneous coronary intervention; ql-HRP, qualitative HRP; qn-HRP, quantitative HRP.

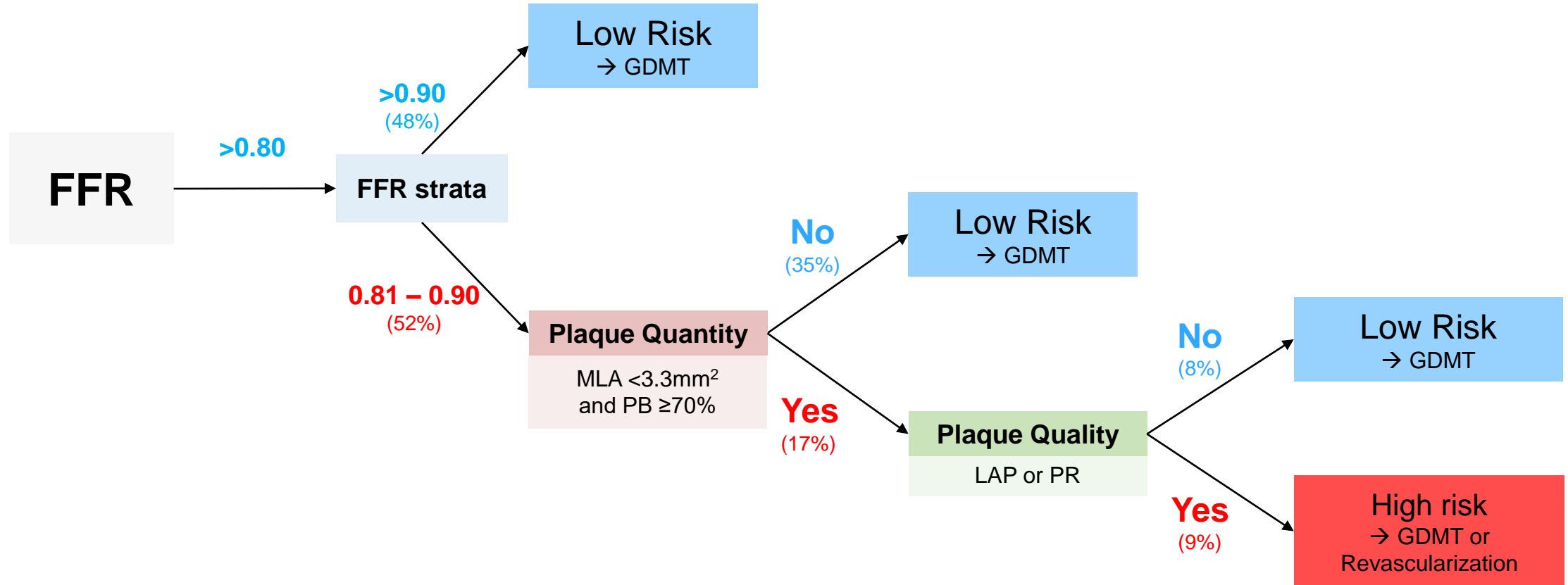
Influence of Physiological Lesion Severity

- To test the interaction between high-risk plaque and treatment types according to FFR strata given a risk continuum by FFR even in a non-ischemic range
- FFR strata (>0.90) needs to be considered in the prognostic interaction between high-risk plaque and treatment types



CI, confidence interval; FFR, fractional flow reserve; HR, hazard ratio; HRP, high-risk plaque; MT, medical treatment; PCI, percutaneous coronary intervention; ql-HRP, qualitative HRP; qn-HRP, quantitative HRP.

Risk Assessment Flow of Non-Ischemic Lesions



Summary

- In non-ischemic lesions (FFR >0.80), quantitative high-risk plaque (qn-HRP, MLA < 3.3 mm² and plaque burden ≥ 70.0%) and qualitative high-risk plaque (ql-HRP, low-attenuation plaque or positive remodeling) had a synergistic prognostic impact on the clinical outcomes.
- In lesions with both qn-HRP and ql-HRP, the PCI group showed a better prognosis than the medical treatment group.
- This association was consistently observed in those with an FFR of 0.81–0.90 but not in those with an FFR of >0.90.

Discussion

- The incremental prognostic value of plaque quantity and quality can be supported by PROSPECT II study that observed the highest event rate in lesions with both plaque burden $\geq 70\%$ and high maximum lipid core burden index. *Lancet 2021;397:985-995.*
- Better outcomes of qn-HRP (+)/ ql-HRP (+) in the PCI groups aligns with a pilot RCT study (PROSPECT-ABSORB) that reported lower clinical events of bioresorbable vascular scaffold-treated lesions than medically-treated ones among non-ischemic, high plaque burden lesions. *J Am Coll Cardiol 2020;76:2289-2301.*
- Differential prognostic interaction between high-risk plaque and treatment types according to FFR strata may be due to very low clinical events in lesions with FFR > 0.90 . *J Am Coll Cardiol 2014;64:1641-1654.*

Limitations

- A post-hoc analysis of a pooled registry
- Hypothesis generation study
- Hard outcomes could not be analyzed due to the small number of events.
- Not interrogated invasive imaging

Conclusion

- In non-ischemic lesions, quantitative and qualitative plaque features and physiological lesion severity can be helpful for risk stratification and selection of appropriate treatment strategies.

Thank you for your attention