
Complete Revascularization for Multivessel CAD: *Anatomic or Functional?*

William F. Fearon, MD
Professor of Medicine
Director, Interventional Cardiology
Stanford University School of Medicine



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

Grant/ Research Support:

Consulting Fees/Honoraria:

Major Stock Shareholder/Equity Interest:

Royalty Income:

Ownership/Founder:

Salary:

Intellectual Property Rights:

Other Financial Benefit:

Company

Abbott, Medtronic, CathWorks,

NIH R61 HL139929-01A1 (PI)

Minor Stock Options: HeartFlow



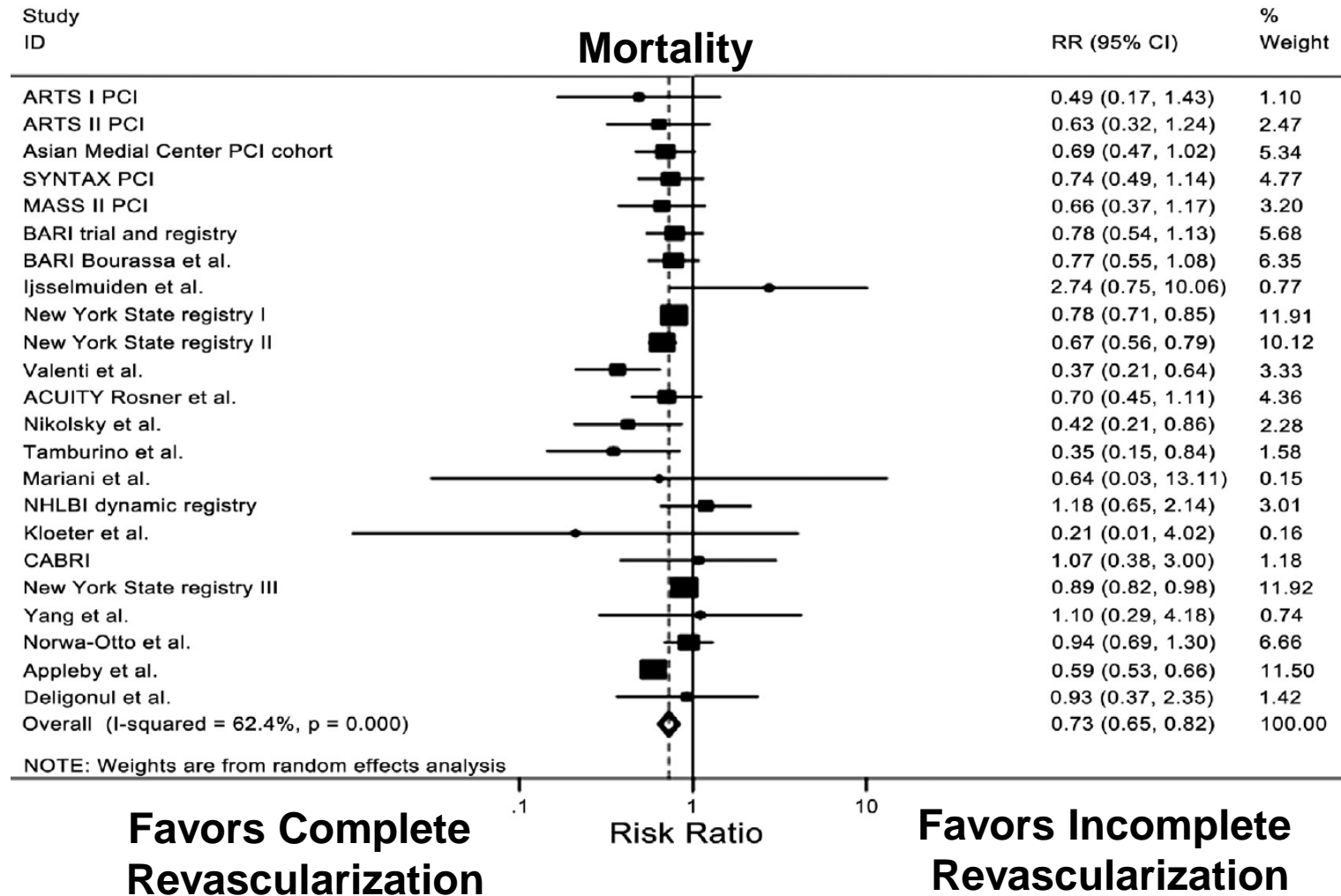
Complete vs. Incomplete Revascularization

- Is complete revascularization necessary with PCI for multivessel coronary disease?
- Is “functionally complete” revascularization with deferral of CAD based on FFR as effective as anatomic complete revascularization?
- Does ischemia trump anatomy?



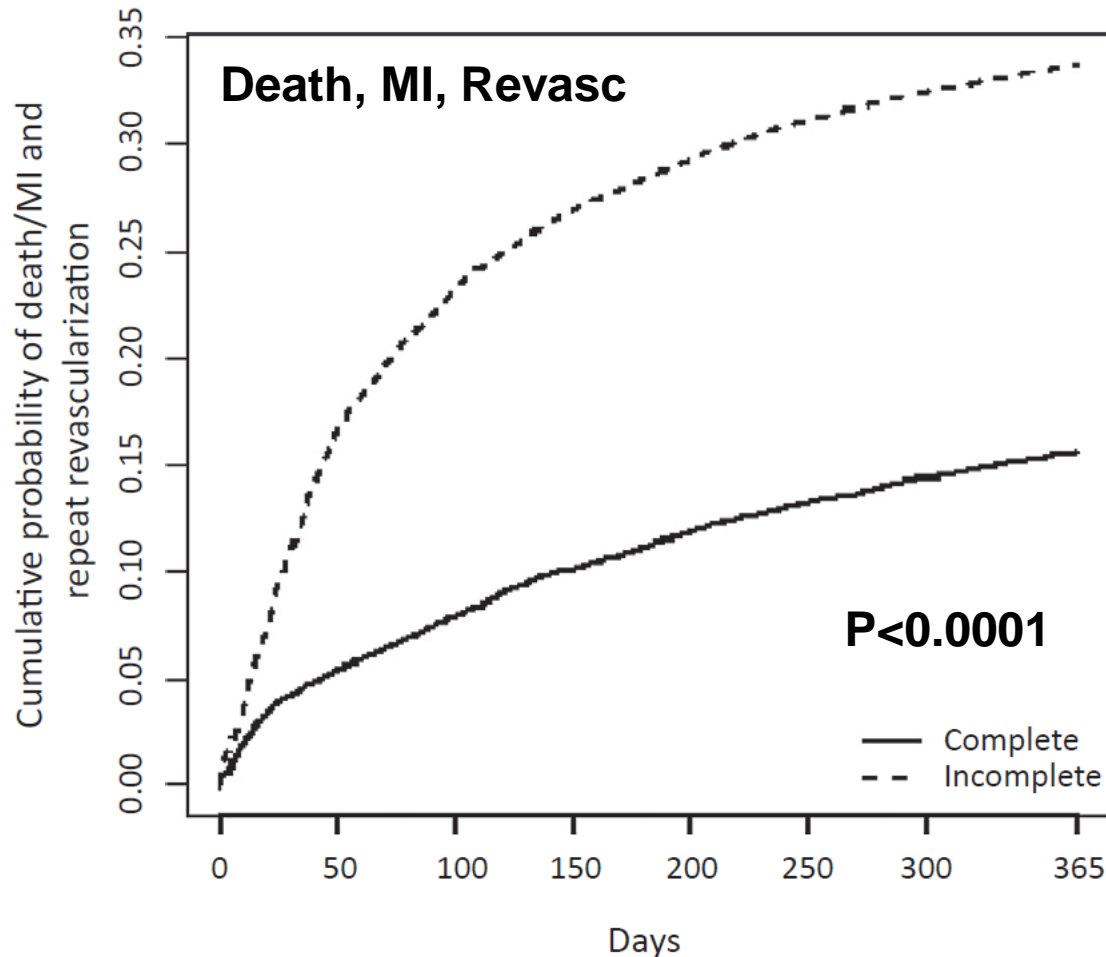
Does Complete Revascularization Matter?

Meta-analysis of 63,945 patients with MVD undergoing PCI



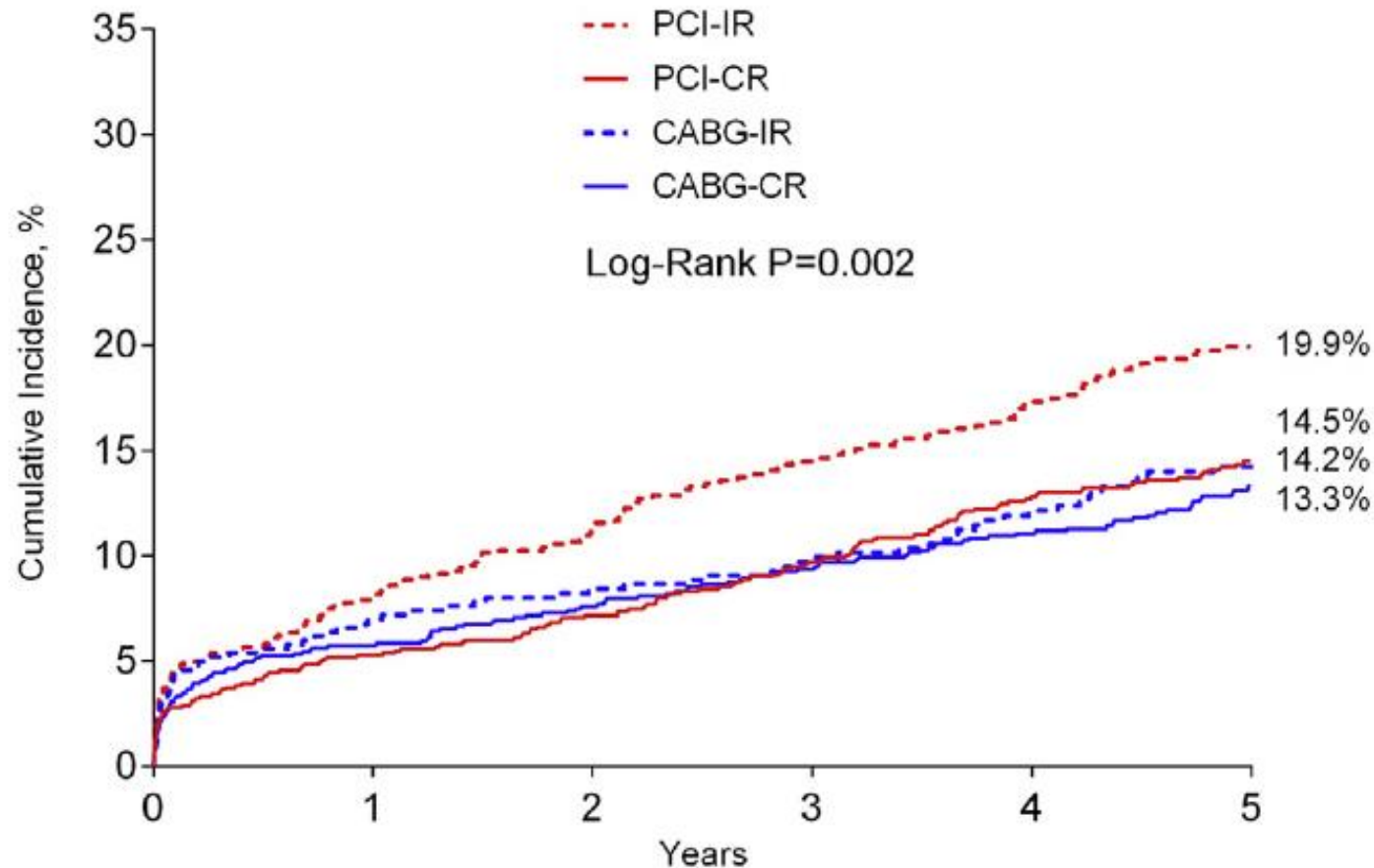
Does Complete Revascularization Matter?

SCAAR Registry of 23,342 patients undergoing PCI for MVD and comparing anatomic complete vs. incomplete revascularization



Does Complete Revascularization Matter?

Pooled analysis of 3 randomized trials (3,280 patients) comparing anatomic complete vs. incomplete revascularization with PCI and CABG and 5 year outcomes



Does Complete Revascularization Matter?

NY State Registry comparing 18,446 patients undergoing PCI with everolimus eluting stents with 18,446 matched CABG patients found a significant interaction with rate of myocardial infarction based on whether or not PCI achieved complete revascularization.

Complete Revascularization		P for interaction = 0.02			p
EES	1911	72	1.43	1.02(0.71,1.47)	0.93
CABG	1911	80	1.37	Reference	
Incomplete Revascularization [†]					
EES	7312	390	1.98%	1.66(1.39,1.98)	<0.001
CABG	7312	242	1.07%	Reference	



Does Complete Revascularization Matter?

- In patients with multivessel CAD undergoing PCI, anatomic complete revascularization is associated with better outcomes compared with incomplete revascularization.
- When comparing PCI with CABG, PCI patients who receive anatomic complete revascularization have similar outcomes with CABG patients.
- What about “functionally” complete revascularization guided by FFR?



DEFER 15 Year Follow-Up

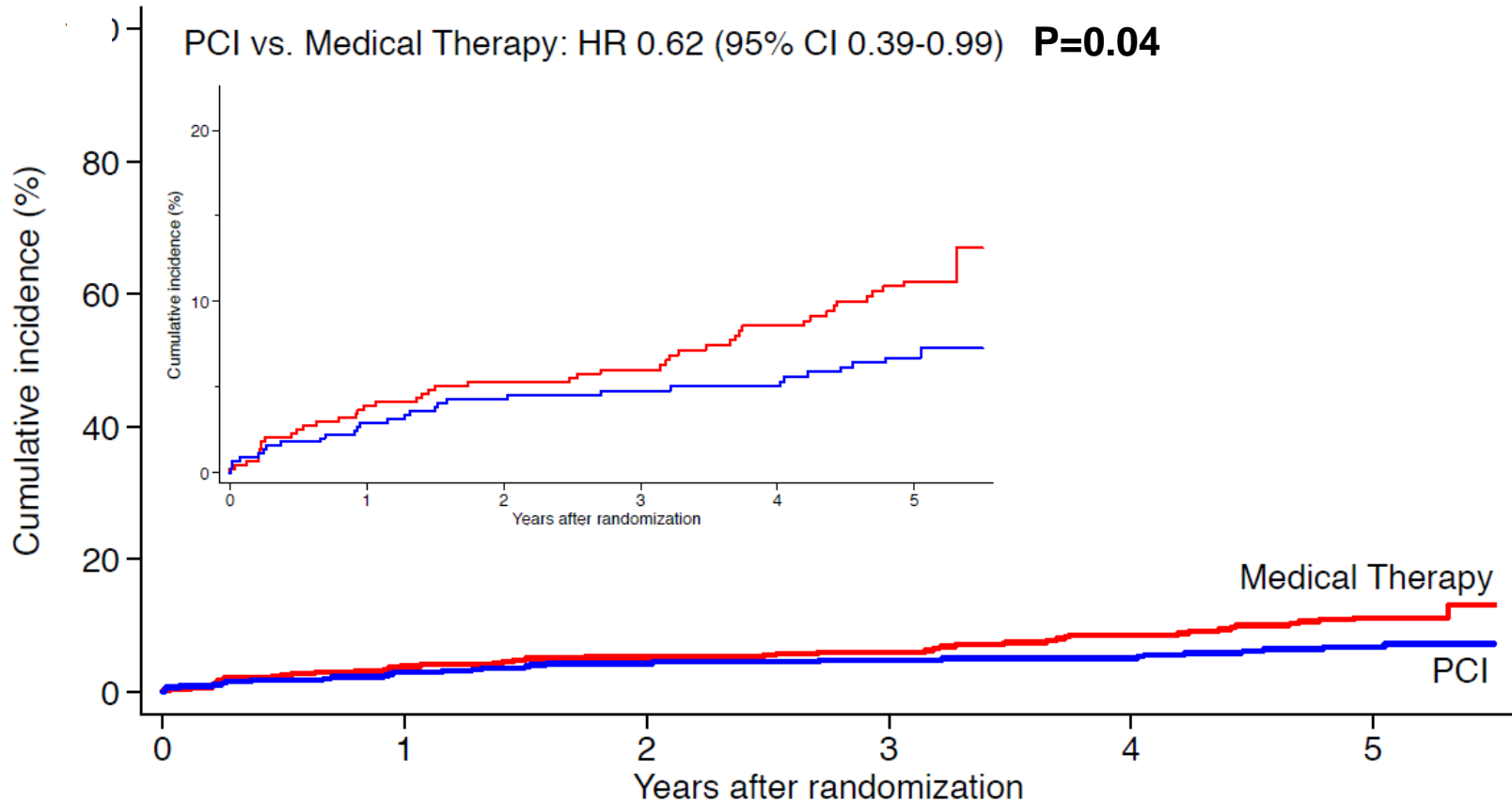
181 patients with non-ischemic FFR values randomized to PCI or Medical Rx

	Defer group (n = 91)	Perform group (n = 90)	P-value Defer vs. Perform
Mortality			
All cause	30 (33.0%)	28 (31.1%)	0.789
Cardiac	5 (5.5%)	4 (4.4%)	1.000
Unknown	13 (14.3%)	11 (12.2%)	0.682
Non-cardiac	12 (13.2%)	13 (14.4%)	0.806
MI			
All	2 (2.2%)	9 (10.0%)	0.033
Target vessel ^a	1 (1.1%)	8 (8.9%)	0.018
Revascularization			
All	39 (42.9%)	31 (34.4%)	0.245
Target vessel	33 (36.3%)	25 (27.8%)	0.221



FAME 2: Five Year Follow-Up

5 year rate of spontaneous MI in 881 patients with ischemic FFR values randomized to PCI or medical therapy



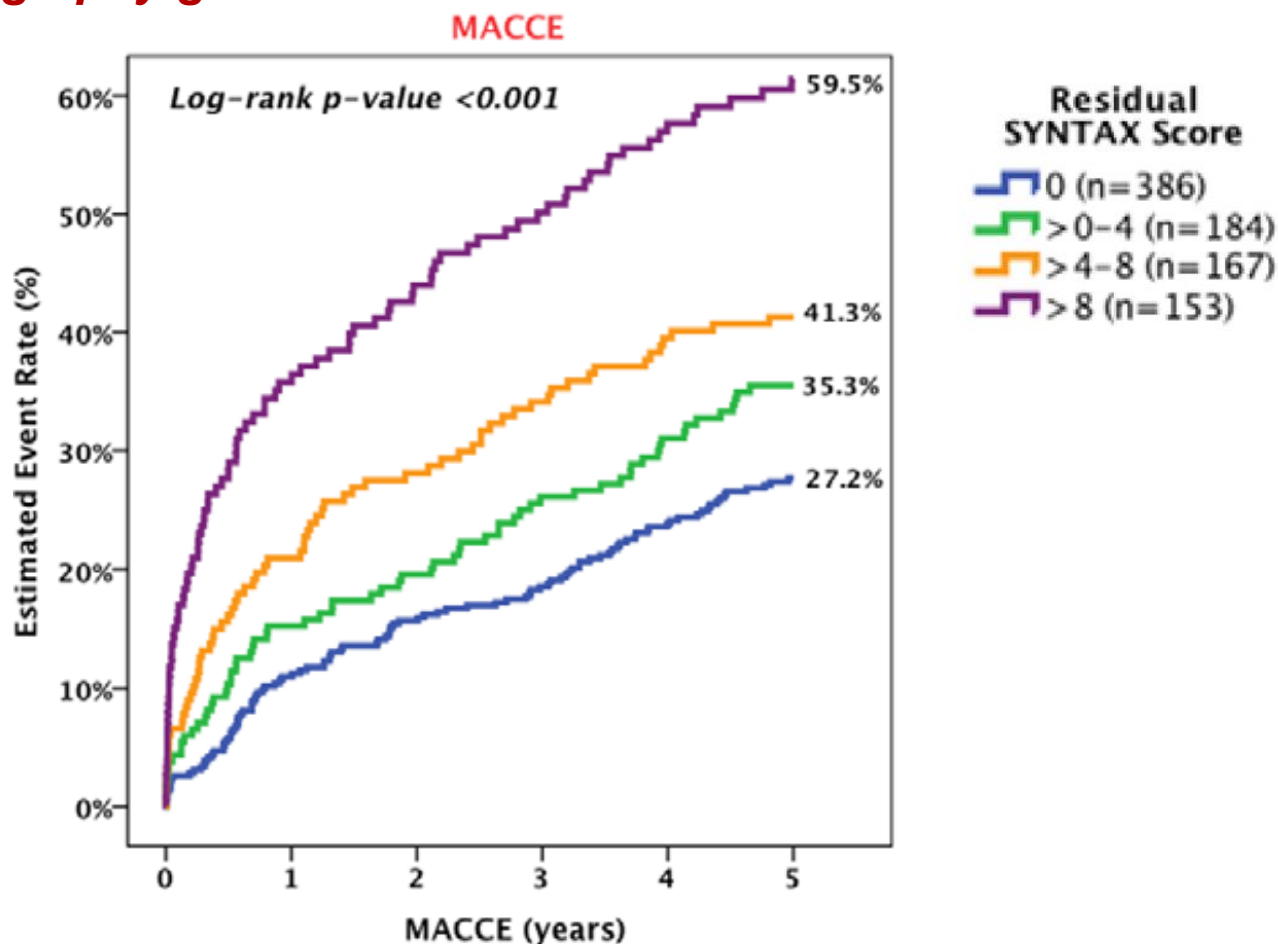
Residual SYNTAX Score (RSS)

- Calculation of the SYNTAX score after revascularization.
- A reflection of the residual degree of atherosclerosis.
- After angiography-guided revascularization, the RSS predicts future MACE.



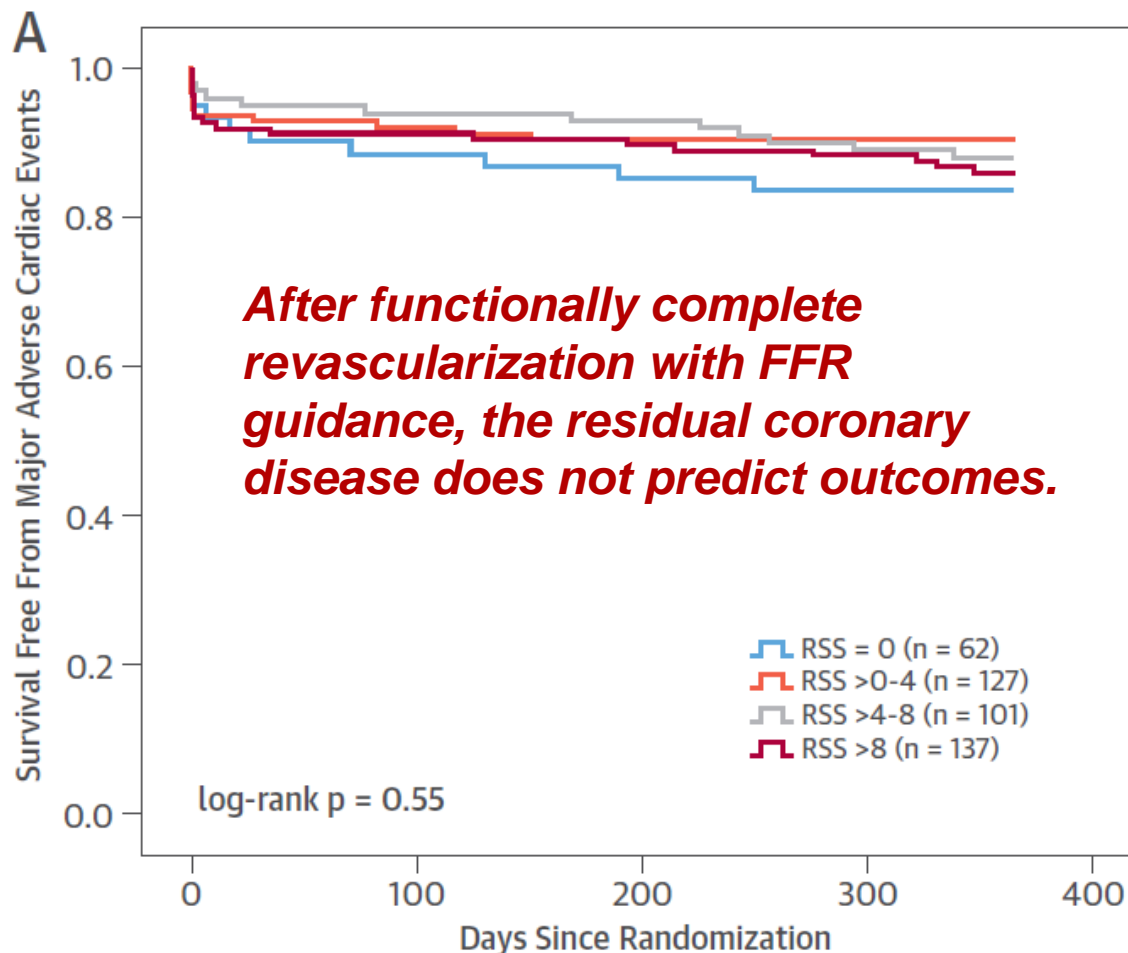
RSS after Angio-guided PCI

RSS was strongly correlated with outcome in the SYNTAX trial after angiography-guided PCI.



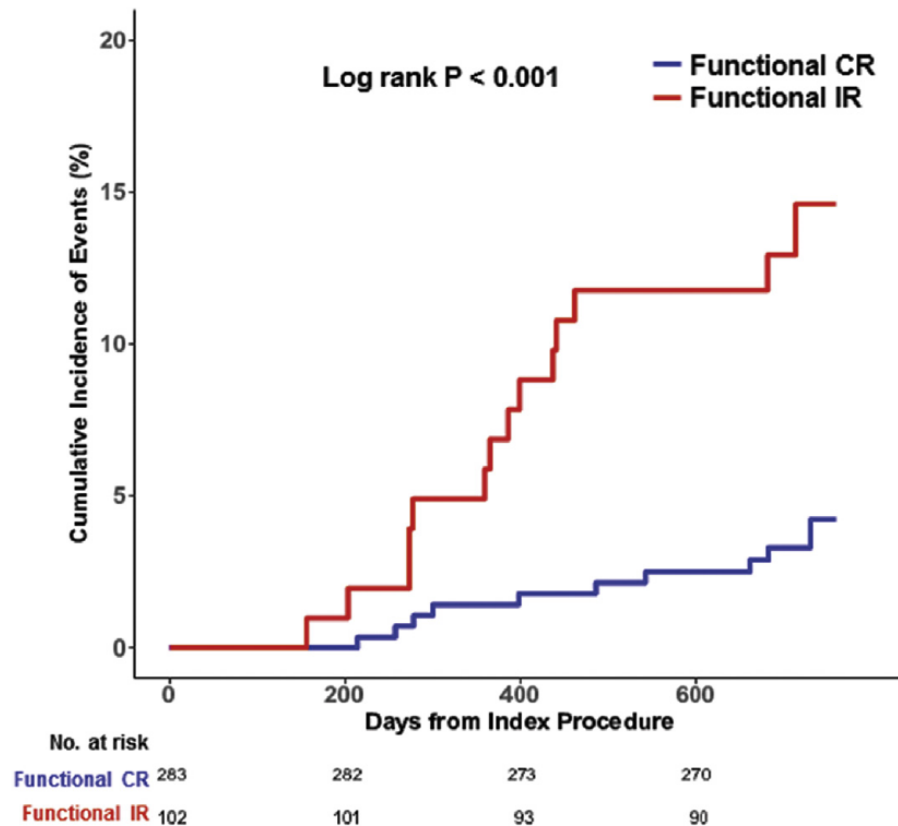
Residual SYNTAX Score

Residual SYNTAX Score calculated in FFR-guided patients from FAME



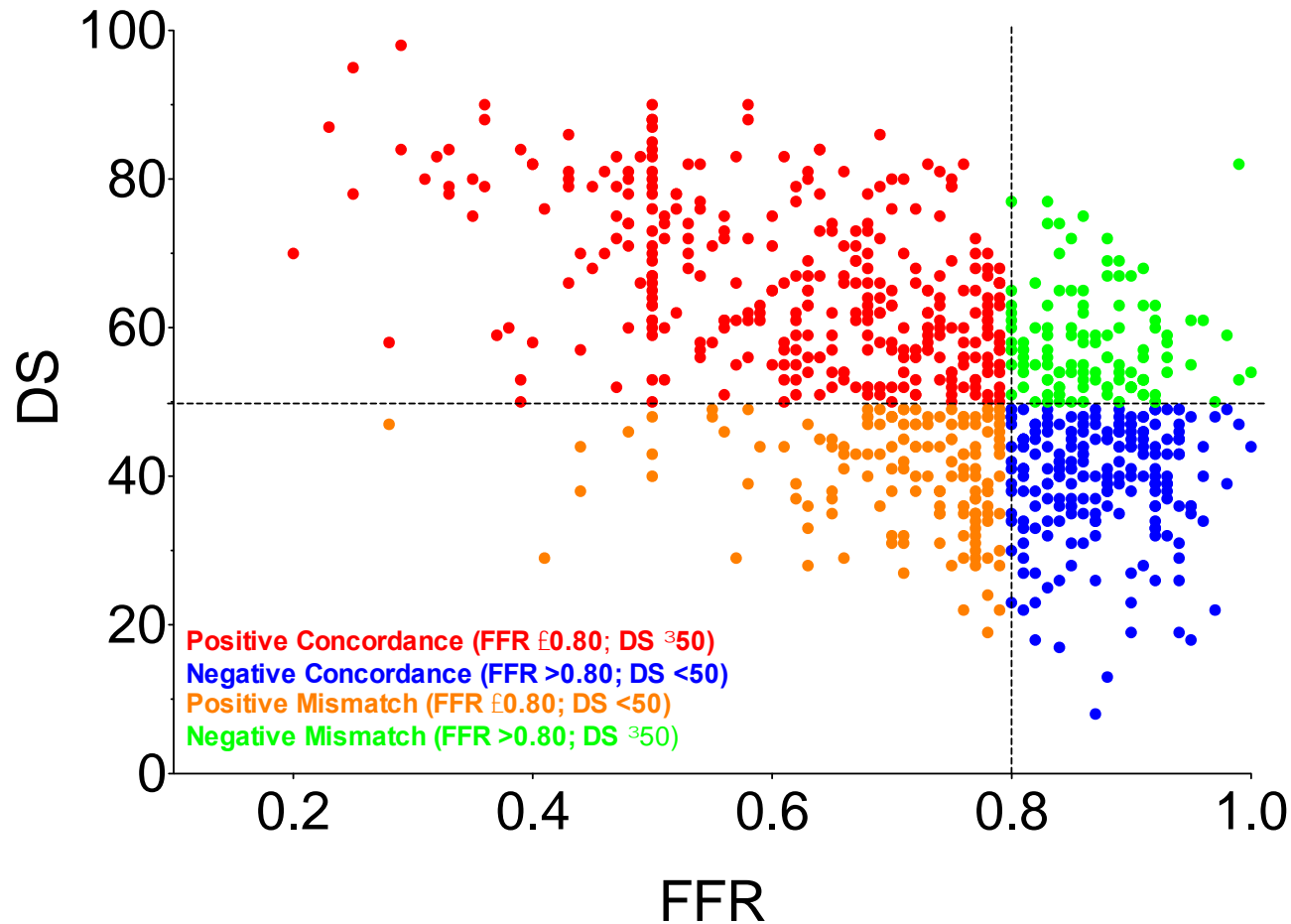
Residual Functional SYNTAX Score

385 patients underwent 3 vessel FFR and PCI. Functionally complete revascularization (residual functional SYNTAX score < 1) was compared with functionally incomplete revascularization (rFSS ≥ 1)



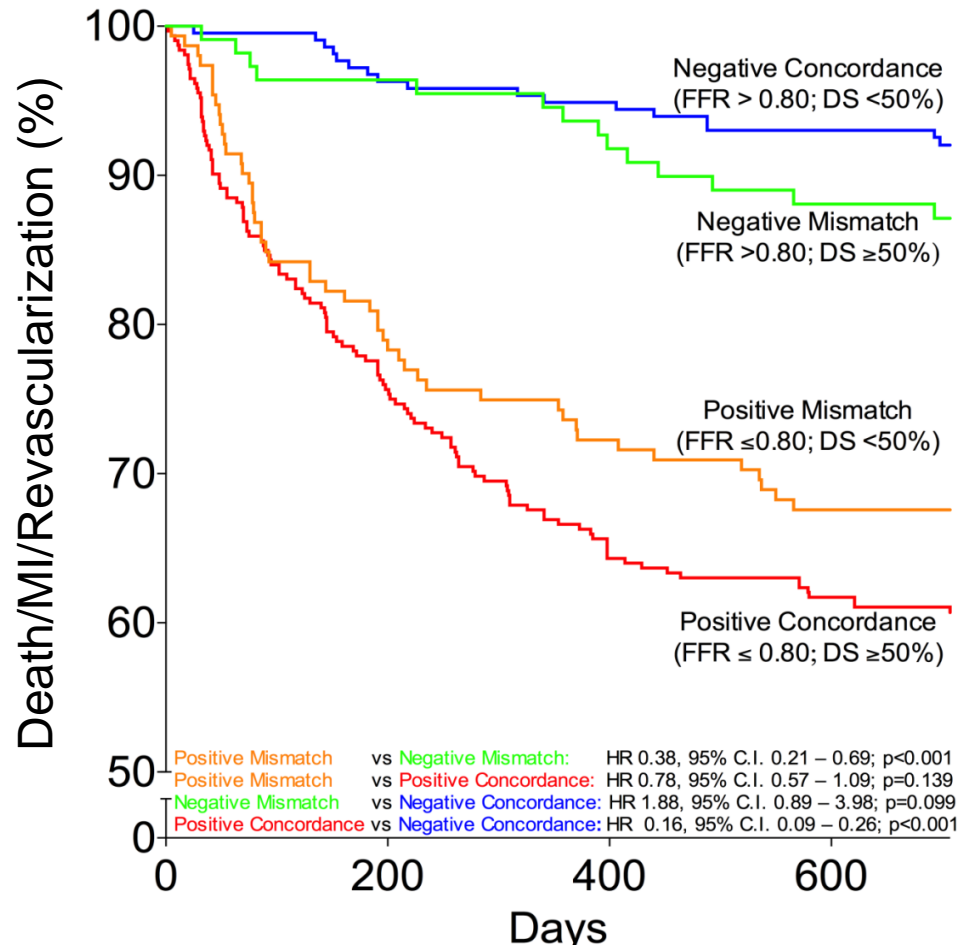
Ischemic vs. Anatomic CAD Burden

1,029 lesions from 607 medically treated patients in FAME 2



Ischemic vs. Anatomic CAD Burden

1,029 lesions from 607 medically treated patients in FAME 2



Negative Concordance : FFR >0.80; DS <50%
Negative Mismatch : FFR >0.80; DS ≥50%
Positive Mismatch : FFR ≤0.80; DS <50%
Positive Concordance : FFR ≤0.80; DS ≥50%



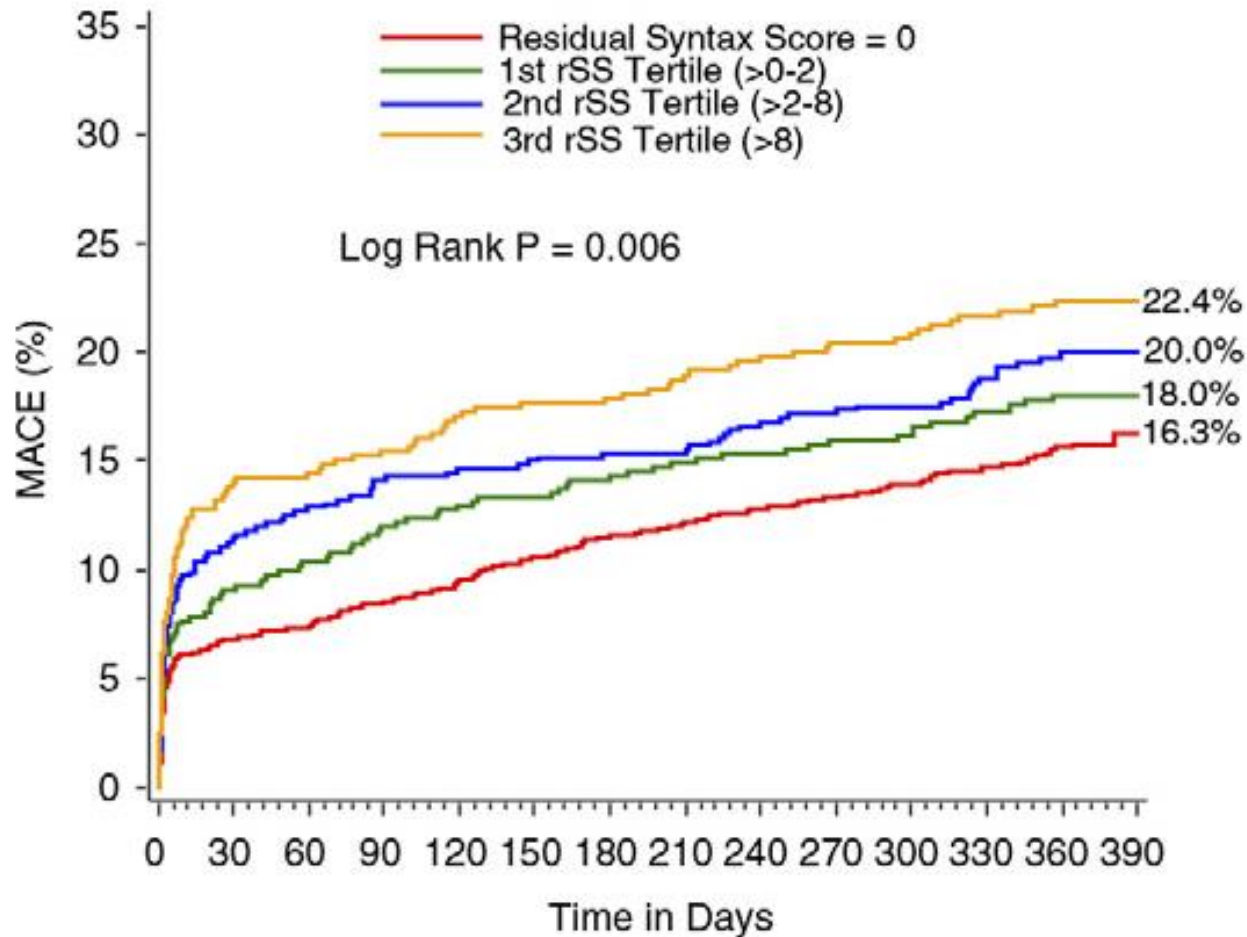
What about in ACS?

Are there non-culprit plaques which are biologically active and prone to rupture, even though they may not be functionally significant?

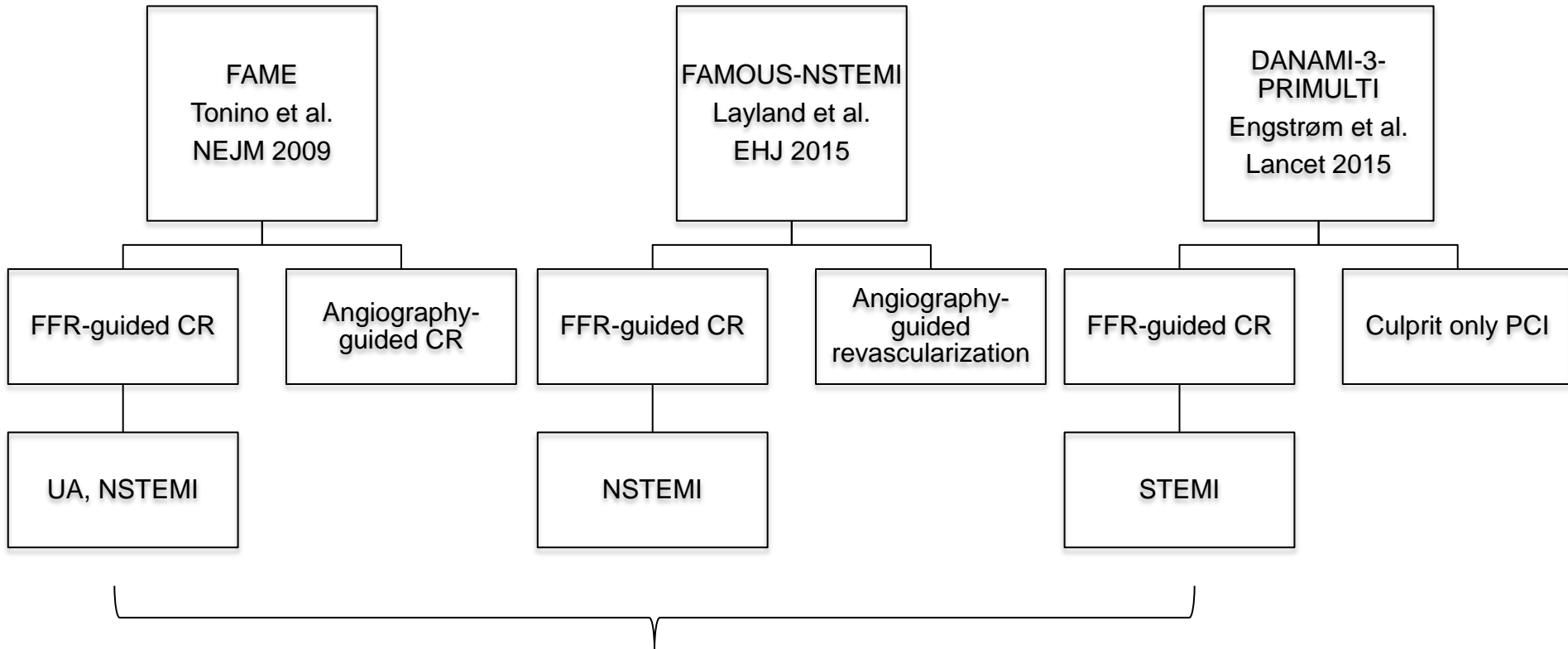


Residual SYNTAX Score in ACS?

Residual SYNTAX Score calculated in ACS patients undergoing angio-guided PCI



RSS after FFR-guided PCI in ACS

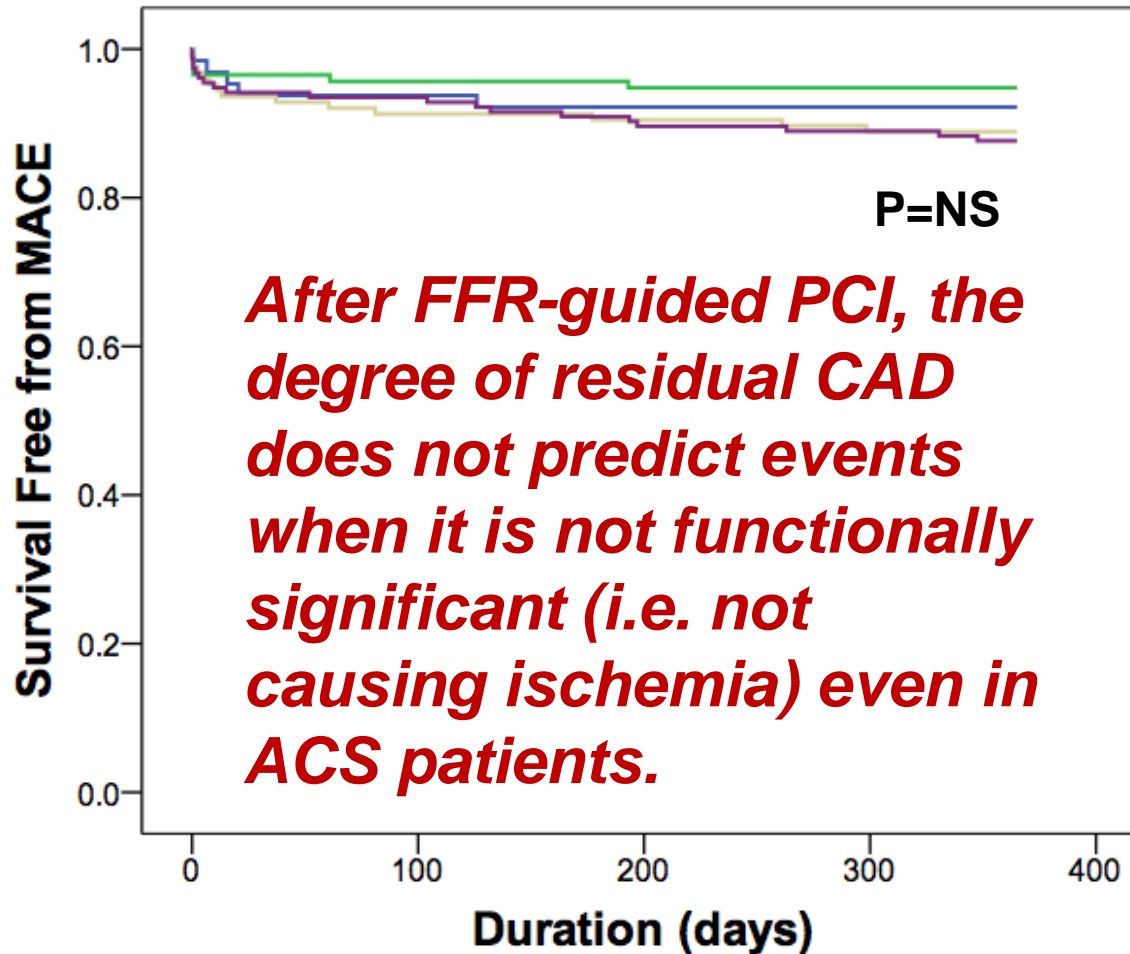


A total of 547 patients presenting with ACS who underwent "functionally" complete revascularization.



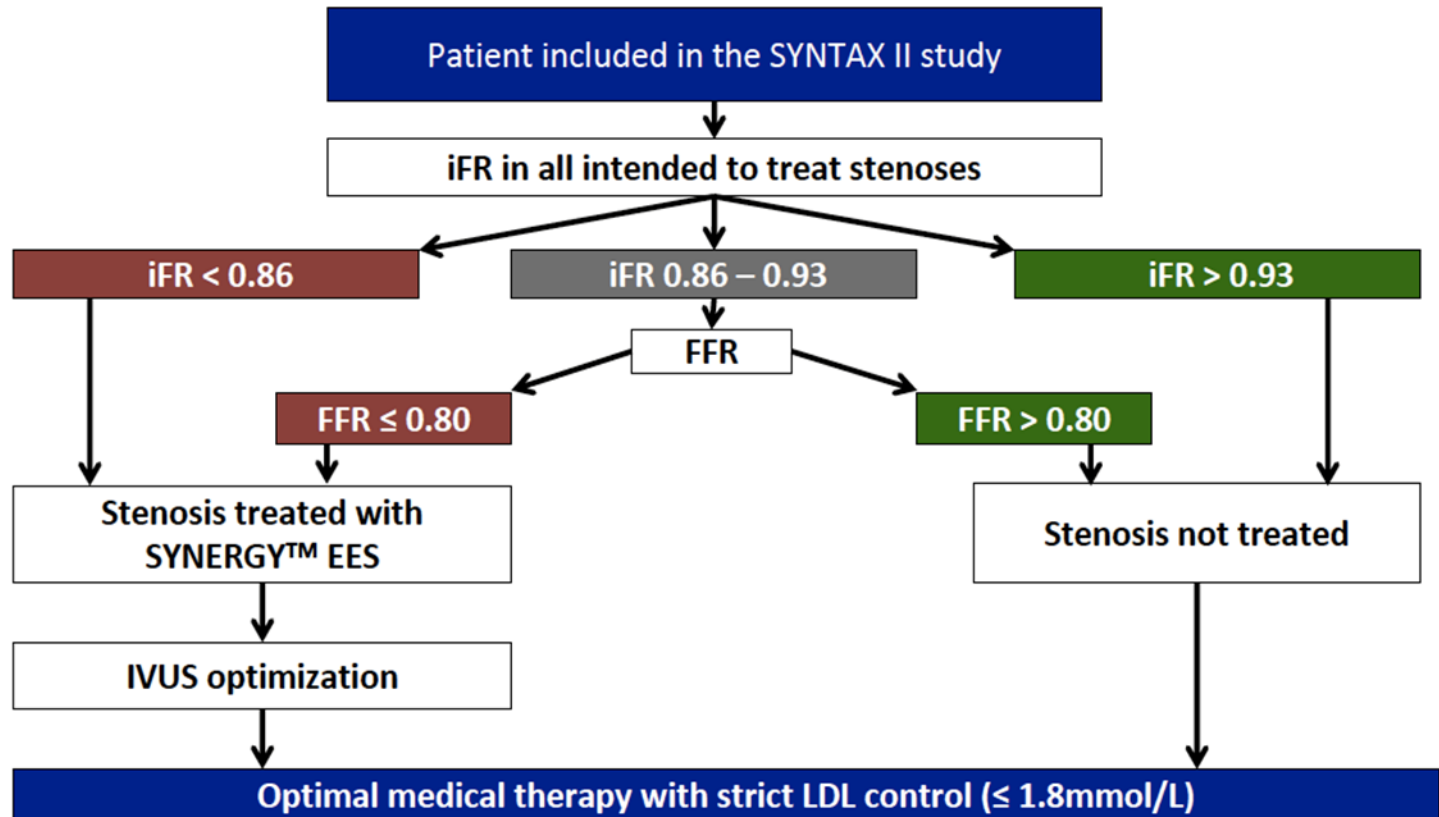
RSS after FFR-guided PCI in ACS

After functionally complete revascularization, RSS was not predictive



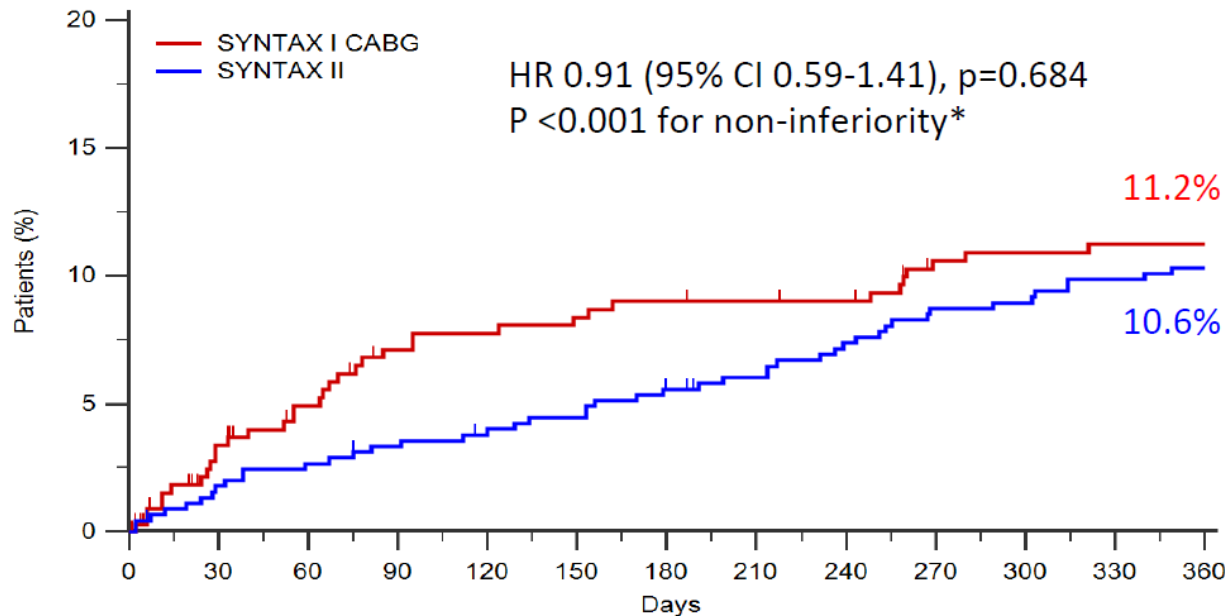
SYNTAX II

Single arm study comparing physiology guided PCI to historical control



SYNTAX II

Single arm study comparing physiology guided PCI to historical control

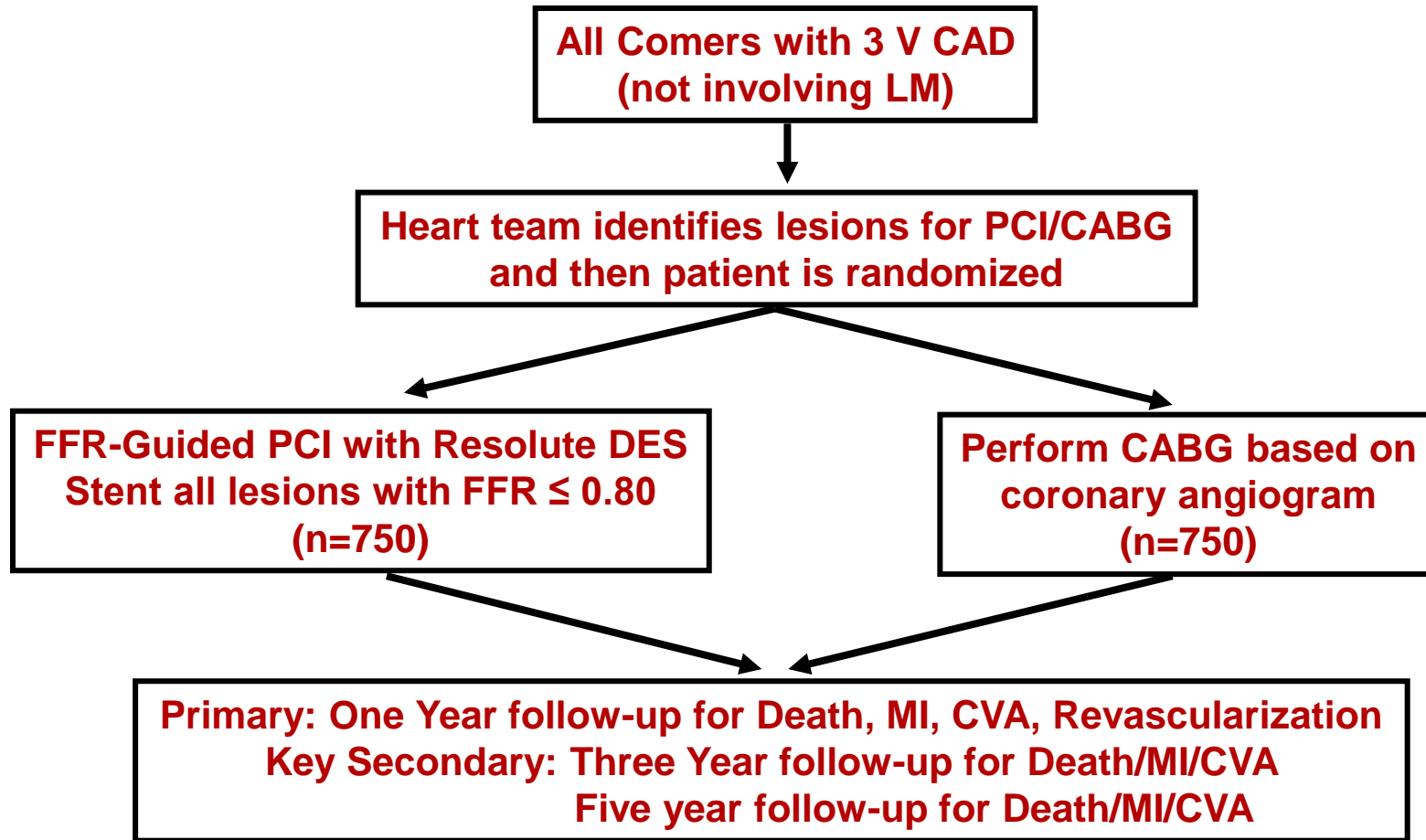


SYNTAX I CABG	334	313	304	295	293	291	289	288	287	279	278	277	277
SYNTAX II	450	441	437	433	429	427	421	417	411	405	404	400	398

*Non-inferiority margin of 5% with a one-sided alpha of 5%



FAME 3 Trial



Non-inferior Design



Conclusion

- Anatomic complete revascularization is associated with improved outcomes after PCI.
- Anatomic complete revascularization with PCI compares favorably with CABG.
- Functionally complete revascularization guided by FFR may result in even better outcomes with PCI.
- This approach is being tested in a prospective fashion in the FAME 3 trial.

