ACC.24

FULL REVASC

FFR-Guided Complete or Culprit-Only PCI in Patients with Myocardial Infarction

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On behalf of the FULL REVASC Trial Executive and Steering Committees and Investigators

AMERICAN COLLEGE of CARDIOLOGY

Disclosures

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- Coordinated by Uppsala Clinical Research Center, Sweden

Background

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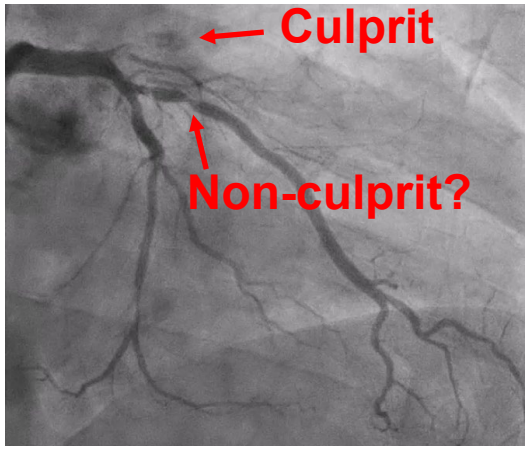
- Around half of patients undergoing primary PCI to the culprit lesion in STEMI have multivessel disease with 1 or more angiographically significant non-culprit lesions.

- Fractional Flow Reserve (FFR) has been shown to be of benefit in chronic coronary syndromes.[1-3]



- There is uncertainty regarding how to best manage non-culprit lesions in STEMI:
  - FFR-guided complete revascularization?
  - Conservative management with guideline-directed medical therapy alone?

- Previous RCT's have shown that non-culprit lesion PCI reduces repeat revascularization, but the effect on hard endpoints like death and MI have been variable,[4-7] and the benefit of FFR-guided complete revascularization on hard endpoints remains unclear.

- The FULL REVASC Trial was designed to address this evidence gap.

1. Tonino et al, NEJM, 2009
2. De Bruyne et al, NEJM, 2014
3. Zimmerman et al, Eur Heart J. 2015
4. Wald et al, NEJM 2013
5. Gershlick et al, JACC 2015
6. Engstrom et al, Lancet 2015
7. Smits et al, NEJM 2017

Primary objective

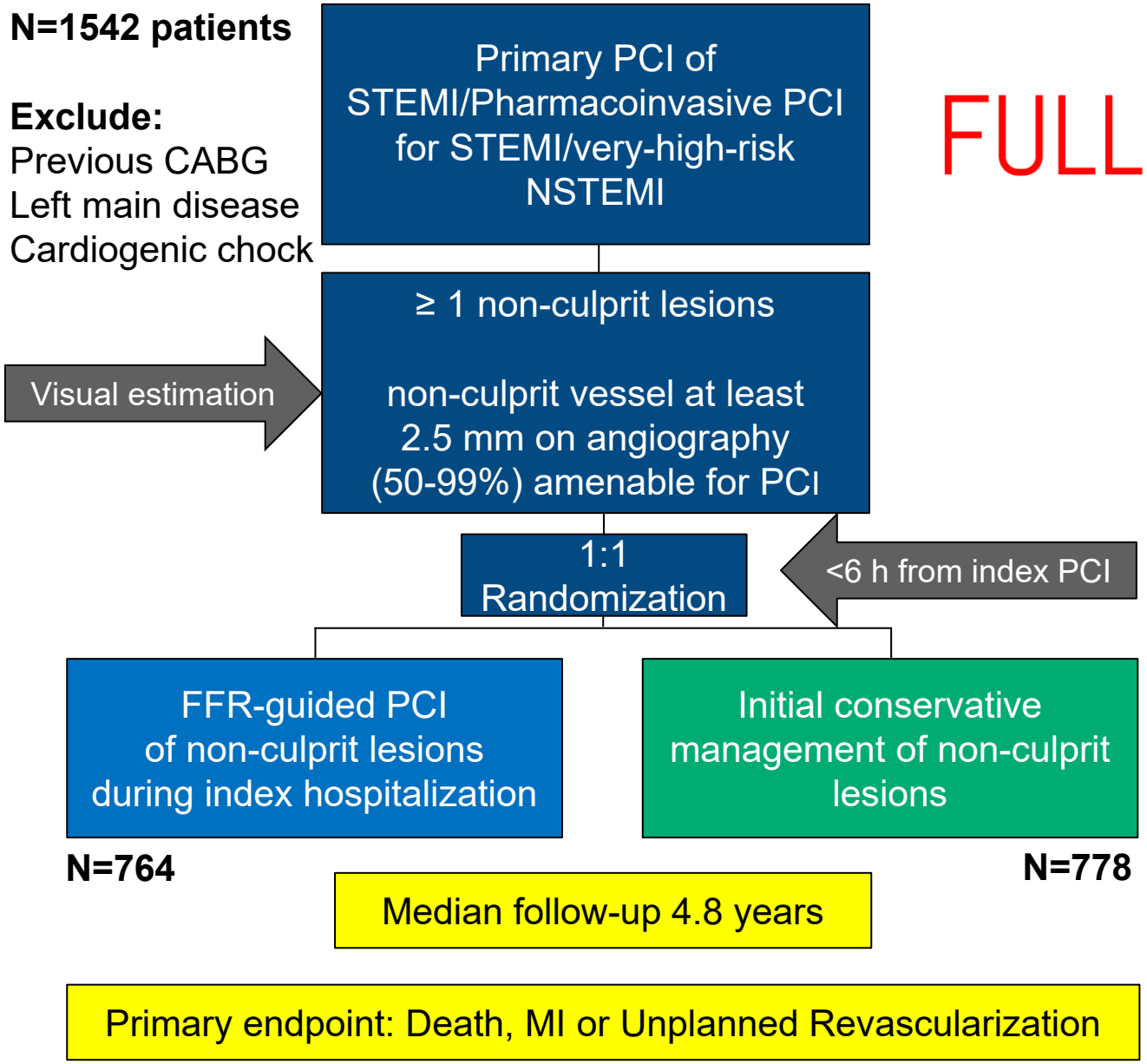
In patients with STEMI and multivessel disease, who had undergone culprit-lesion PCI, the objective was:

To determine whether a strategy of FFR-guided complete revascularization during the index hospitalization was superior to culprit-lesion-only PCI to reduce the composite of all-cause death, new myocardial infarction, or unplanned revascularization.

Trial design

N=1542 patients

Exclude:
Previous CABG
Left main disease
Cardiogenic chock



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Multinational RRCT hybrid

32 centers, 7 countries

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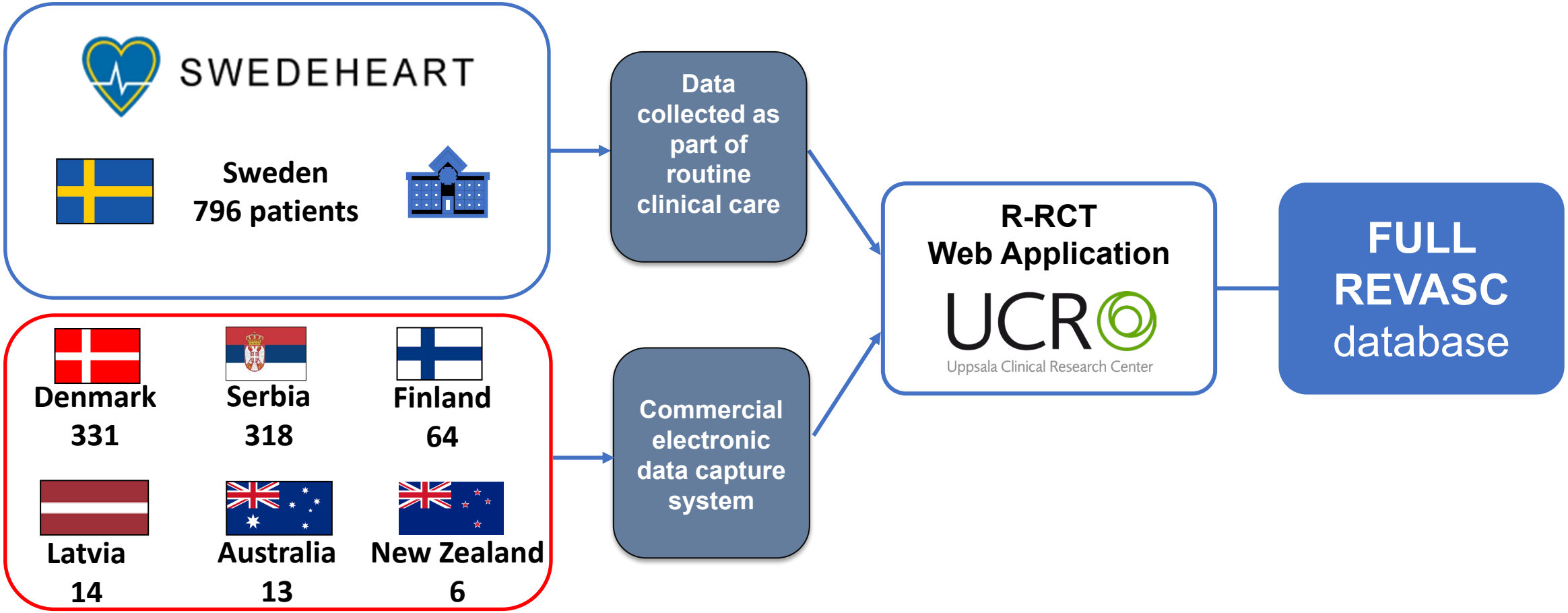

Study Power and Follow-up

- **Study Power:** Original plan: 4052 patients, 80% power for HRR of 0.75 for death or MI.
  - After COMPLETE, inclusion in the study was halted for feasibility and ethical reasons.
  - Adjusted plan: 1542 patients, 74% power for HRR for death, MI or unplanned revascularization.

- **Recruitment period:** August 8, 2016 - September 11, 2019

- **Analysis:** Intention-to-treat, Cox-proportional hazard models

- **Follow-up (vital status):** 100%. No patient lost to follow-up.

- **Crossovers during Index Hospitalization:** From *Complete revasc* to *Culprit-Only* = 4.1%
  From *Culprit-Only* to *Complete revasc* = 0.4%

Baseline characteristics

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	Complete N=764	Culprit-only N=778
Age (yrs)	65.0	65.7
Female sex (%)	21.3	26.0
BMI (kg/m²)	27.6	27.6
Diabetes (%)	16.0	16.3
Prior MI (%)	9.5	6.8
Current smoker (%)	35.8	33.6
Hypertension (%)	50.3	52.2
Dyslipidemia (%)	23.3	22.2
Prior PCI (%)	9.3	8.1
Sx onset to Culprit PCI ≤6 h (%)	71.4	74.6
6-12 h (%)	16.1	14.4
>12 h (%)	12.5	11.0

	Complete N=764	Culprit-only N=778
Killip class II-IV (%)	4.6	4.8
ECG to Culprit PCI (h)	1.13	1.12
Peak creatinine - µmol/L	91.1	90.1
Discharge Meds (%)		
Aspirin	97.5	97.6
P2Y12 inhibitor		
Any	98.4	98.3
Ticagrelor	88.9	87.1
Clopidogrel	9.5	11.2
Beta blocker	81.6	80.8
ACEi/ARB	79.8	78.5
Statin	97.6	96.9

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Procedural characteristics

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	Complete N=764	Culprit-only N=778
Indication for PCI (%)		
STEMI - Primary	88.2	88.7
STEMI - Pharmacoinvasive	2.7	3.2
Very-high-risk NSTEMI	9.0	8.1
Radial access (%)	93.2	93.4
Residual diseased vessels		
1	73.8	70.6
≥2	26.2	29.4
Non-Culprit Lesion Location		
Left main	0.3	0.3
LAD	51.4	56.0
Proximal LAD	21.1	20.2
Circumflex	44.2	43.2
RCA	30.1	29.9

	Complete N=764	Culprit-only N=778
Non-culprit lesion stenosis (%)		
50-69%	34.9	41.8
70-89%	47.6	42.2
90-99%	17.3	15.9
100% (+ other NCL)	5.5	4.5
Number of stents (median)	2.0	1.0
Total stent length (median)	43.0	28.0
Largest stent Ø (median)	4.0	3.0
FFR ≤0.80 in NCL (%)	47.3	
Any vessel with FFR≤0.80 per patient (%)	60.3	
Lowest FFR per patient	0.76	
PCI in NCL if FFR≤0.80 (%)	94.1	

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Complete revascularization was achieved in 94.1% after FFR-guided non-culprit lesion PCI

Primary Endpoint
Death, MI or Unplanned Revasc

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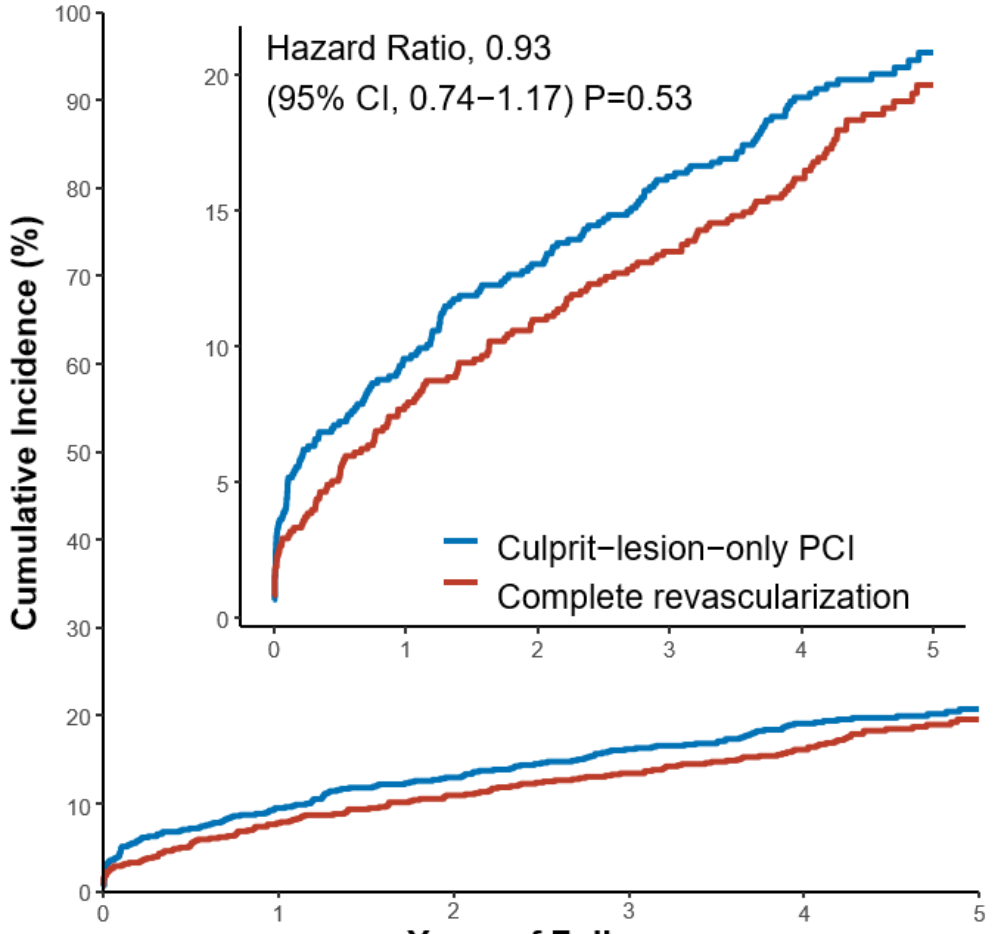

No. at Risk						
Culprit Only	778	705	676	651	552	245
Complete	764	699	675	656	573	232

Key secondary endpoints

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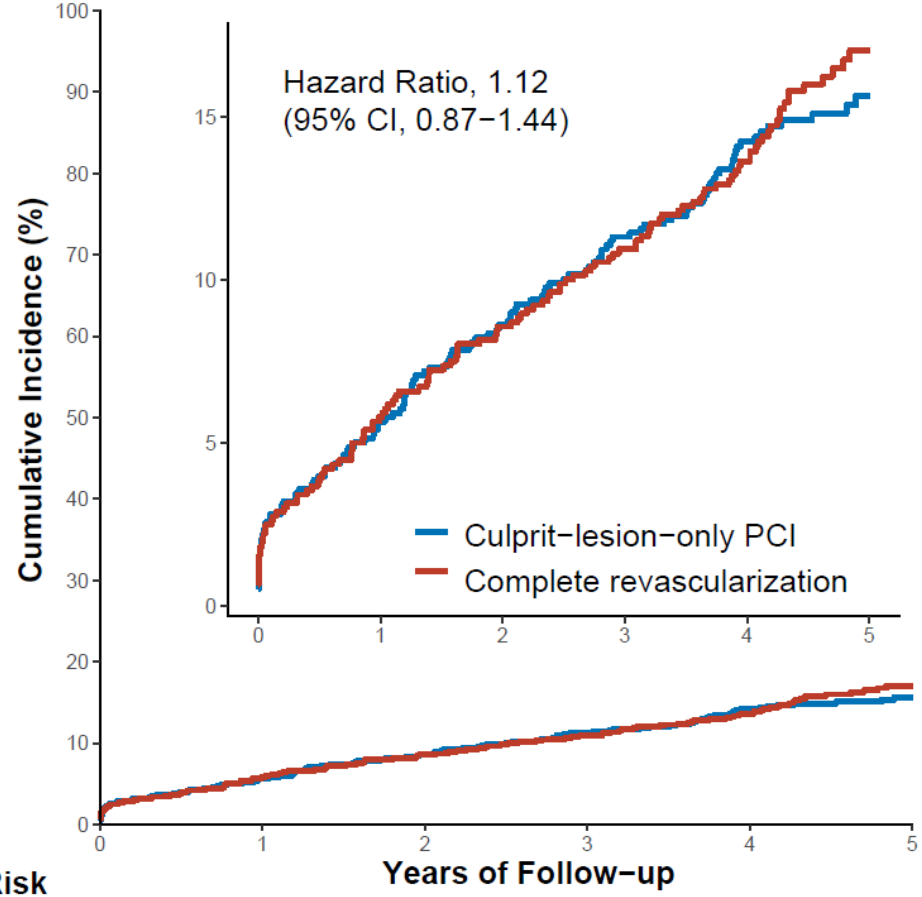
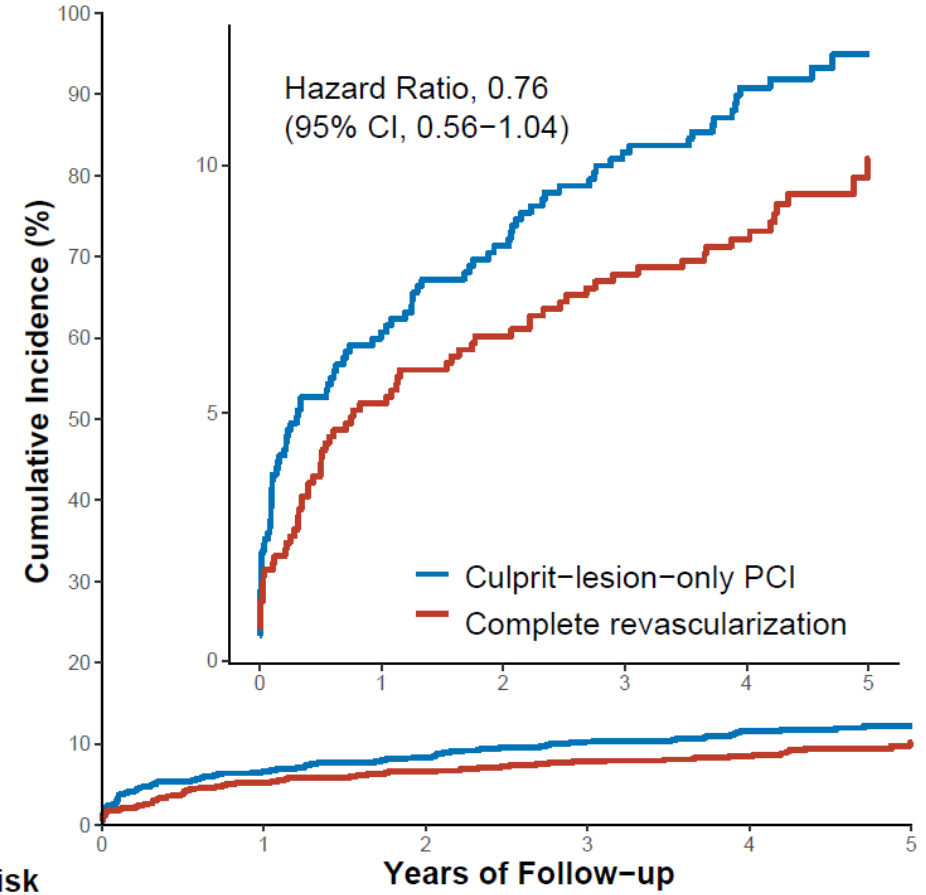
Death or MI



No. at Risk						
Culprit only	778	735	710	689	586	263
Complete	764	714	693	675	589	241

Unplanned Revasc



No. at Risk						
Culprit only	778	708	681	658	560	249
Complete	764	702	681	663	582	240

Efficacy Outcomes

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Outcome	Complete (N = 764)	Culprit only (N = 778)	Hazard Ratio (95% CI)	P-value
	number of patients (%)			
Primary outcome				
Death, MI, or unplanned revascularization	145 (19.0)	159 (20.4)	0.93 (0.74-1.17)	0.93
Key secondary outcomes				
Death or myocardial infarction	126 (16.5)	119 (15.3)	1.12 (0.87-1.44)	0.37
Unplanned revascularization	70 (9.2)	91 (11.7)	0.76 (0.56-1.04)	0.092
Other secondary outcomes				
Death from any cause	76 (10.0)	72 (9.3)	1.15 (0.83-1.58)	0.41
Death from cardiovascular causes	32 (4.2)	40 (5.1)	0.87 (0.55-1.39)	0.56
Myocardial infarction	61 (8.0)	58 (7.5)	1.09 (0.76-1.57)	0.62
Any revascularization (planned or unplanned)	78 (10.2)	128 (16.5)	0.59 (0.45-0.78)	0.00027
CV death, MI, or unplanned revascularization	104 (13.6)	132 (17.0)	0.80 (0.62-1.03)	0.085

Main subgroup analyses

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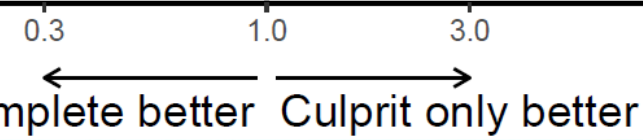
Subgroup	Complete	Culprit only	Hazard Ratio for Primary Outcome (95% CI)
	no. of events (%)		
Age (years, median)			
Below 66	55(14.1)	61(16.7)	0.84(0.58−1.21)
66 or above	90(24.1)	98(23.8)	0.99(0.74−1.32)
Sex			
Male	122(20.3)	115(20.0)	1.02(0.79−1.32)
Female	23(14.1)	44(21.8)	0.65(0.39−1.08)
Diabetes mellitus			
No	110(17.2)	129(19.8)	0.86(0.67−1.11)
Yes	35(28.7)	30(23.6)	1.25(0.77−2.03)
Degree of stenosis			
50−69%	40(16.1)	54(18.1)	0.92(0.61−1.38)
70−89%	70(19.5)	59(18.3)	1.09(0.77−1.54)
90−99%	35(22.6)	46(29.7)	0.69(0.45−1.08)
Severity of coronary disease (vessels)			
1−2	96(17.9)	94(18.1)	0.98(0.74−1.31)
3	49(21.6)	65(25.0)	0.87(0.60−1.26)
Nonculprit proximal LAD			
No	111(18.6)	117(19.2)	0.97(0.75−1.26)
Yes	34(20.5)	42(24.7)	0.81(0.51−1.27)



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Safety and Other Outcomes

Outcome	Complete (N = 764)	Culprit only (N = 778)	Hazard Ratio (95% CI)	P-value
	number of patients (%)			
Stent thrombosis	19 (2.5)	7 (0.9)	2.80 (1.18-6.67)	0.02
Restenosis	32 (4.2)	18 (2.3)	1.84 (1.03-3.28)	0.039
Target vessel revascularization	66 (8.6)	43 (5.5)	1.57 (1.07-2.31)	0.021
Contrast-associated acute kidney injury	89 (11.7)	91 (11.8)	0.99 (0.73-1.35)	0.96
Stroke	22 (2.9)	22 (2.8)	1.03 (0.57-1.87)	0.91
Major bleeding	19 (2.5)	17 (2.2)	1.18 (0.61-2.28)	0.61
Rehospitalization for heart failure	23 (3.0)	26 (3.3)	0.97 (0.55-1.70)	0.92

Recent RCTs

COMPLETE: Angio-guided Complete Revasc

FIRE: Physiology-guided Complete Revasc

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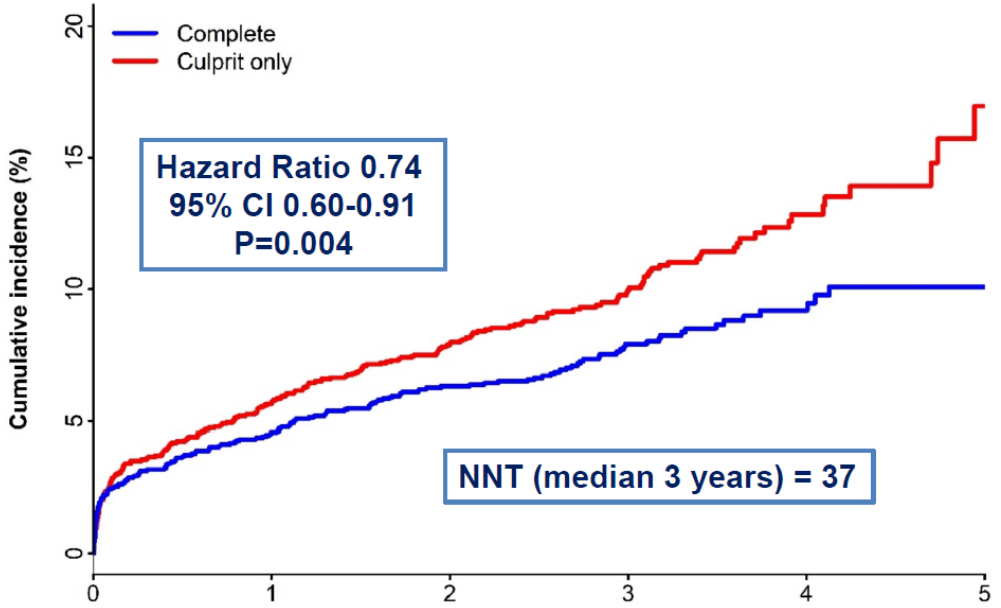
COMPLETE:

CV Death or New MI

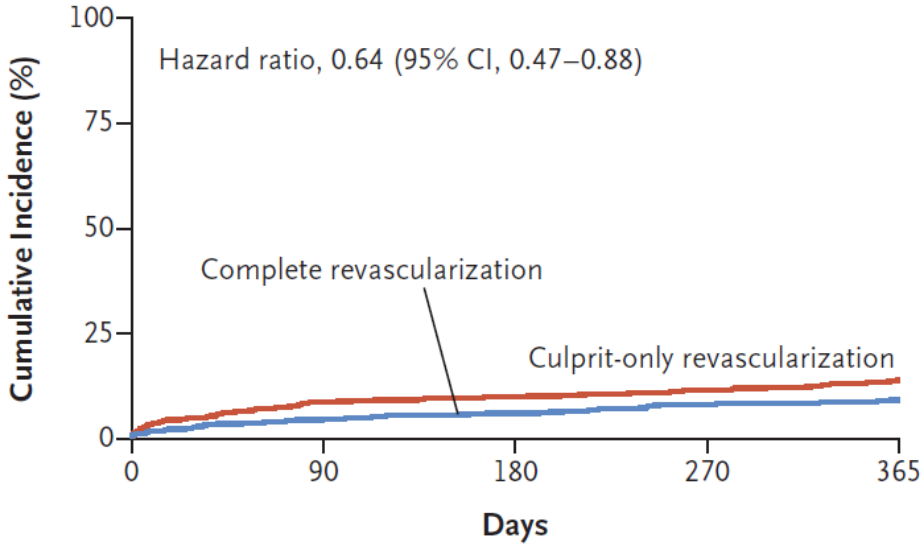


No. at Risk						
Complete	2016	1904	1677	938	337	70
Culprit only	2025	1897	1666	933	310	59

Mehta et al, NEJM, 2019

FIRE:

CV Death or New MI



No. at Risk					
Culprit-only revascularization	725	654	634	618	592
Complete revascularization	720	675	659	641	627

Biscaglia et al, NEJM, 2023

Conclusions

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In patients with STEMI/very-high-risk NSTEMI and multivessel disease:

- Compared with Culprit-lesion-only PCI, FFR-guided complete non-culprit revascularization:
  - **Did not reduce Death, MI or Unplanned Revasc** (HR 0.93; p=0.53)
  - **Did not reduce Death or MI** (HR 1.12; p=0.37)
  - **Did not reduce Unplanned Revasc** (HR 0.76; p=0.092)

- There was a benefit of reducing any revascularization (planned and unplanned), but higher incidence of stent thrombosis by the Complete strategy.

- There were no apparent differences in stroke, bleeding, heart failure or acute kidney injury.

Acknowledgments

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