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Complete Revascularization with Multivessel PCI
for Myocardial Infarction

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COMPLETE Trial Design

STEMI WITH MULTIVESSEL CAD AND SUCCESSFUL PCI TO THE CULPRIT LESION
MVD defined as at least one additional non-culprit lesion ≥ 2.5 mm diameter and $\geq 70\%$ stenosis or 50-69% with FFR ≤ 0.80

Exclusion Criteria: Intent to revascularize NCL, planned surgical revascularization, prior CABG

RANDOMIZATION

Stratified for intended timing of NCL PCI:
During initial hospitalization or after discharge (max 45 d)

Actual Time to study NCL PCI in Complete Group (median)
During initial hospitalization: 1 day (IQR 1-3)
After hospital discharge: 23 days (IQR 12.5-33.5)

COMPLETE REVASCULARIZATION
Routine staged PCI* of all suitable non-culprit lesions with the goal of complete revascularization
N=2016

CULPRIT-LESION-ONLY REVASCULARIZATION
No further revascularization of non-culprit lesions, guideline-directed medical therapy alone
N=2025

*Everolimus-eluting stents strongly recommended

Guideline-Directed Medical Therapy
ASA, P2Y12 inhibitor (Ticagrelor strongly recommended), Statin, BB, ACE/ARB + Risk Factor Modification

MEDIAN FOLLOW-UP: 3 YEARS

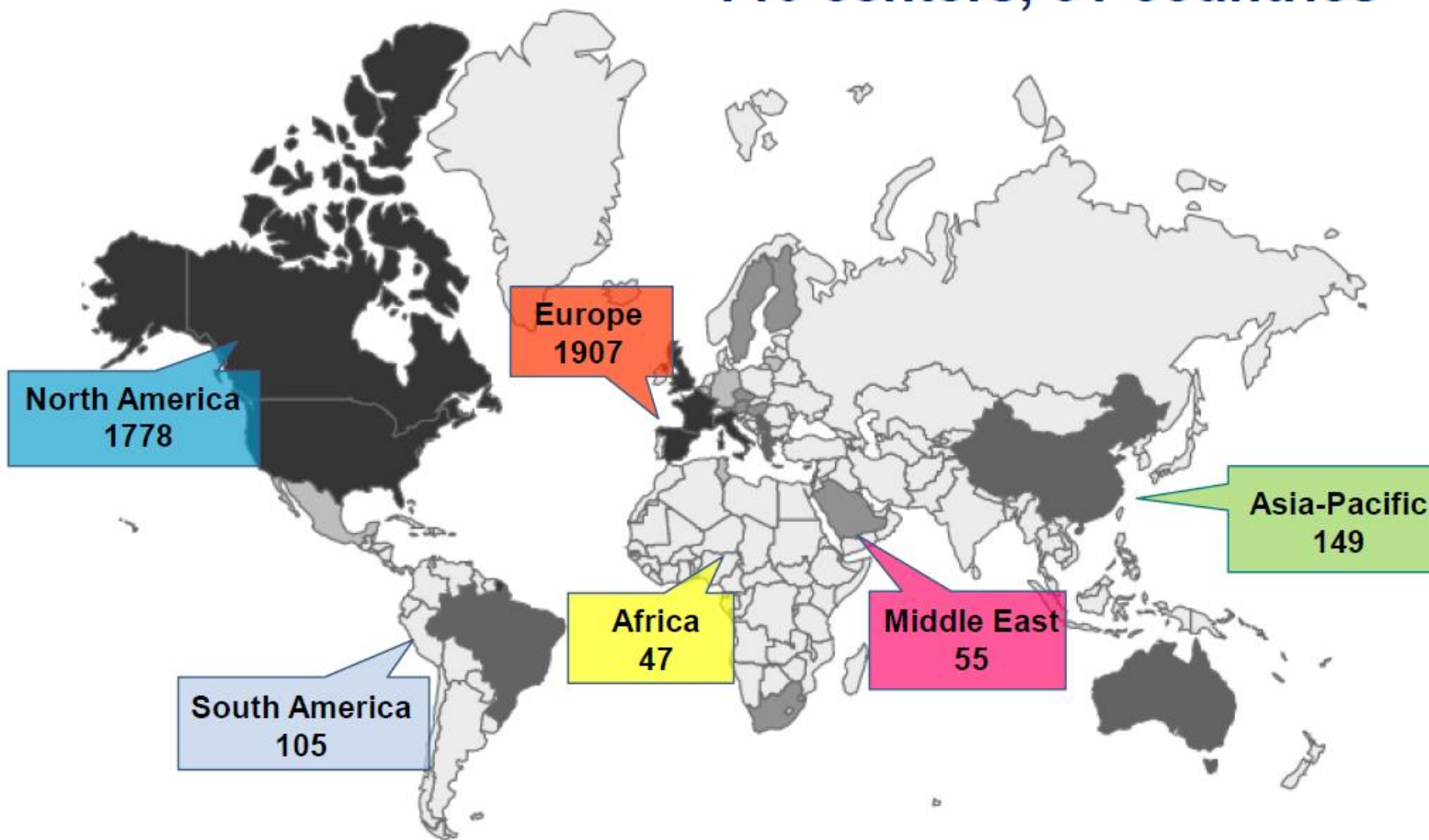
CO-PRIMARY OUTCOMES: 1. Composite of CV death or new MI
2. Composite of CV death, new MI or IDR

KEY SECONDARY OUTCOME: CV death, new MI, IDR, unstable angina, NYHA class IV heart failure



Global Recruitment

140 centers, 31 countries



- | | |
|-----------------------|-----------------------|
| <i>Australia</i> | <i>Lithuania</i> |
| <i>Austria</i> | <i>Macedonia</i> |
| <i>Belgium</i> | <i>Mexico</i> |
| <i>Brazil</i> | <i>Poland</i> |
| <i>Canada</i> | <i>Portugal</i> |
| <i>China</i> | <i>Romania</i> |
| <i>Colombia</i> | <i>Saudi Arabia</i> |
| <i>Czech Republic</i> | <i>Serbia</i> |
| <i>Finland</i> | <i>South Africa</i> |
| <i>France</i> | <i>Spain</i> |
| <i>Germany</i> | <i>Sweden</i> |
| <i>Greece</i> | <i>Switzerland</i> |
| <i>Hungary</i> | <i>Tunisia</i> |
| <i>Israel</i> | <i>United Kingdom</i> |
| <i>Italy</i> | <i>USA</i> |
| <i>Kuwait</i> | |

Metodika

- STEMI s MVD a úspěšnou PCI culprit léze
- Nejméně jedna další (non-culprit) léze schůdná k PCI
 - Tepna kalibru $\geq 2,5$ mm
 - DS > 70% nebo
 - DS 50-69% + FFR $\leq 0,80$
- Randomizace do 72 hodin od úspěšné PCI culprit-léze
- „staged“ PCI během hospitalizace nebo po propuštění, ale do 45 dnů

- Follow-up 3 roky: 99,1% (complete), 99,3% (culprit)
- Analysis: ITT
- Crossover:
 - *nový IM, hemodynamická nestabilita, refrakterní srdeční selhání, angina CCS 3,4 při medikaci*
- Crossover rate:
 - Complete to culprit = 3,9%
 - Culprit to complete = 4,7%



COMPLETE TRIAL

Baseline Characteristics

	Complete N=2016	Culprit-only N=2025		Complete N=2016	Culprit-only N=2025
Age (yrs)	61.6	62.4	Sx onset to Culprit PCI (%)		
Gender (% male)	80.5	79.1	<6 hours	69.4	67.1
Diabetes (%)	19.1	19.9	6~12 hours	16.1	17.7
Chronic renal insuff. (%)	2.0	2.3	>12 hours	14.5	15.3
Prior MI (%)	7.3	7.6	Discharge Meds (%)		
Current smoker (%)	40.6	38.9	ASA	99.8	99.5
Hypertension (%)	48.7	50.7	P2Y12 Inhibitor	99.4	99.7
Dyslipidemia (%)	37.9	39.4	Ticagrelor	64.4	63.3
Prior PCI (%)	7.0	7.0	Prasugrel	9.6	8.3
Prior stroke (%)	3.2	3.1	Clopidogrel	25.6	28.2
Hemoglobin A1C	6.3	6.3	Beta blocker	88.1	89.1
LDL (mmol/L)	3.1	3.1	ACEi/ARB	85.5	84.6
Creatinine (µmol/L)	84.7	85.2	Statin	98.2	97.2



COMPLETE TRIAL

Procedural Characteristics

	Complete N=2016	Culprit-only N=2025
Index PCI for STEMI		
Primary	91.9%	93.1%
Pharmaco-invasive	3.2%	3.0%
Rescue	4.9%	3.9%
Radial access	80.8%	80.7%
Residual diseased vessels		
1	76.1%	77.1%
≥2	23.9%	22.9%
NCL location		
Left main	0.4%	0.1%
LAD	38.0%	41.2%
Proximal LAD	9.8%	10.4%
Mid LAD	21.7%	23.7%
Circumflex	36.4%	35.6%
RCA	25.3%	23.2%

	Complete N=2016	Culprit-only N=2025
NCL diameter	2.8 mm	2.9 mm
Mean NCL stenosis (visual)	79.3%	78.7%
NCL stenosis (visual)		
50-69% and FFR<0.80	0.8%	0.6%
70-79%	41.3%	45.1%
80-89%	33.5%	32.6%
90-99%	22.3%	19.7%
100%	2.1%	2.0%
SYNTAX score (Core Lab)		
Baseline	16.3	16.0
Culprit lesion specific	8.8	8.6
Non-culprit lesion specific	4.5	4.5
Residual (after index PCI)	7.2	7.0



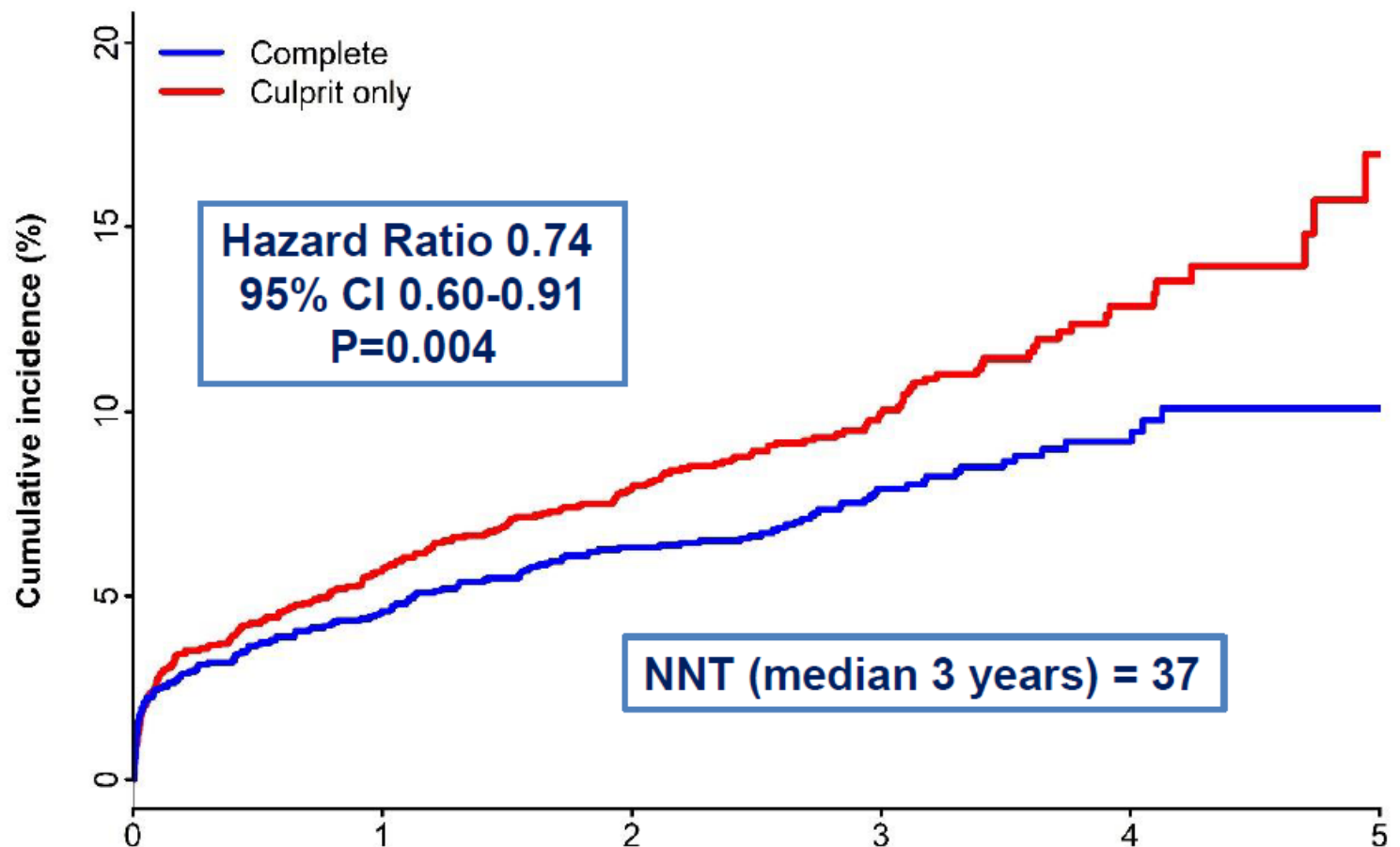
COMPLETE TRIAL

Procedural Characteristics

	Complete N=2016	Culprit-only N=2025		Complete N=2016	Culprit-only N=2025
Index PCI for STEMI			NCL diameter	2.8 mm	2.9 mm
Primary	91.9%	93.1%	Mean NCL stenosis (visual)	79.3%	78.7%
Pharmaco-i					
Rescue					0.6%
Radial access					45.1%
Residual diseased vessels					
1	76.1%	77.1%			
≥2	23.9%	22.9%			
NCL location					
Left main	0.4%	0.1%			
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RCA	25.3%	23.2%			
			SYNTAX score (Core Lab)		
			Baseline	16.3	16.0
			Culprit lesion specific	8.8	8.6
			Non-culprit lesion specific	4.5	4.5
			Residual (after index PCI)	7.2	7.0

Complete revascularization was achieved in 90.1% after NCL PCI (SYNTAX score = 0)

First Co-Primary Outcome: CV Death or New MI

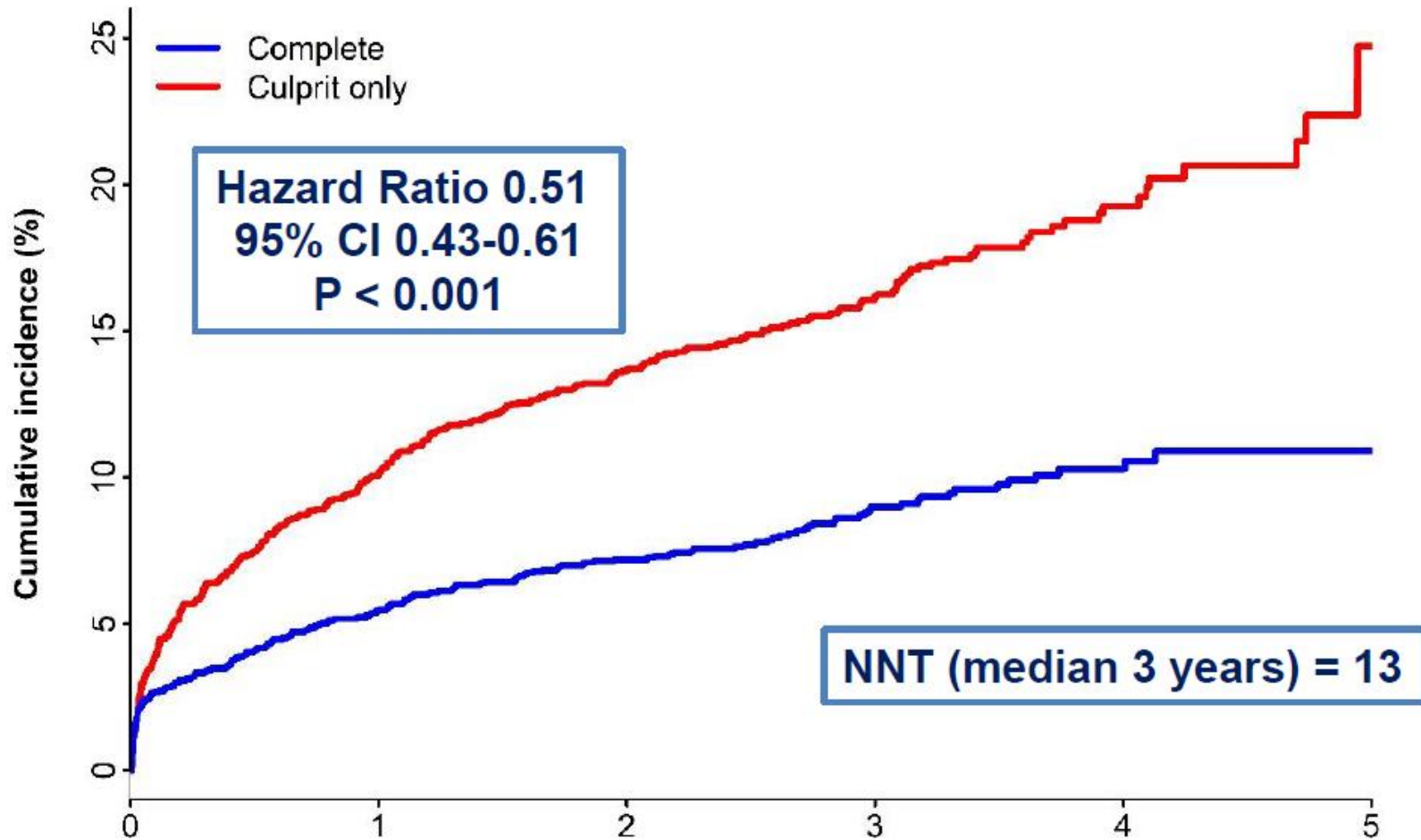


No. at Risk	Years of Follow-up					
	0	1	2	3	4	5
Complete	2016	1904	1677	938	337	70
Culprit only	2025	1897	1666	933	310	59



2nd Co-Primary Outcome: CV Death, New MI, or IDR

- IDR:** Ischemia Driven
Revascularization:
AP CCS ≥ 2 plus:
- Positivní imaging test
 - Nové ekg změny
 - $\text{FFR} \leq 0,80$



	Years of Follow-up					
No. at Risk	0	1	2	3	4	5
Complete	2016	1886	1659	925	329	66
Culprit only	2025	1808	1559	865	294	57



COMPLETE TRIAL

Efficacy Outcomes

	Complete Revasc. N=2016		Culprit Lesion Only N=2025		HR (95% CI)	P value
	N (%)	%/year	N (%)	%/year		
Co-Primary Outcomes						
CV death or MI	158 (7.8)	2.7	213 (10.5)	3.7	0.74 (0.60-0.91)	0.004
CV death, MI or IDR	179 (8.9)	3.1	339 (16.7)	6.2	0.51 (0.43-0.61)	<0.001
Key Secondary Outcome						
CV death, MI, IDR, unstable angina or class IV HF	272 (13.5)	4.9	426 (21.0)	8.1	0.62 (0.53-0.72)	<0.001
Other Secondary Outcomes						
MI	109 (5.4)	1.9	160 (7.9)	2.8	0.68 (0.53-0.86)	0.002
IDR	29 (1.4)	0.5	160 (7.9)	2.8	0.18 (0.12-0.26)	<0.001
Unstable Angina	70 (3.5)	1.2	130 (6.4)	2.2	0.53 (0.40-0.71)	<0.001
CV death	59 (2.9)	1.0	64 (3.2)	1.0	0.93 (0.65-1.32)	0.68
All-cause Death	96 (4.8)	1.6	106 (5.2)	1.7	0.91 (0.69-1.20)	0.51



COMPLETE TRIAL

Sub-types of MI

	Complete Revasc. N=2016		Culprit Lesion Only N=2025		HR (95% CI)
	N (%)	%/year	N (%)	%/year	
Subtype of MI					
NSTEMI	66 (3.27)	1.11	105 (5.19)	1.78	0.63 (0.46-0.85)
STEMI	43 (2.13)	0.72	53 (2.62)	0.88	0.81 (0.54-1.22)
Universal MI Definition					
Type 1	63 (3.13)	1.05	128 (6.32)	2.17	0.49 (0.36-0.66)
Type 2	16 (0.79)	0.26	13 (0.64)	0.21	1.24 (0.60-2.58)
Type 3	4 (0.20)	0.07	1 (0.05)	0.02	4.04 (0.45-36.17)
Type 4a	16 (0.79)	0.27	8 (0.40)	0.13	2.01 (0.86-4.70)
Type 4b	8 (0.40)	0.13	13 (0.64)	0.21	0.62 (0.26-1.49)
Type 5	1 (0.05)	0.02	1 (0.05)	0.02	1.00 (0.06-15.92)

Safety and Other Outcomes

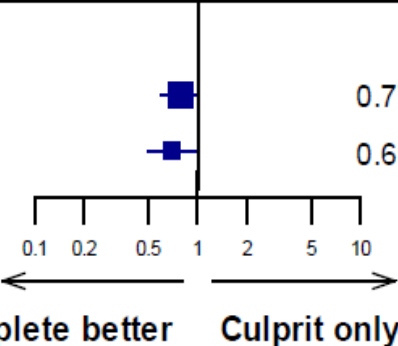
	Complete Revasc. N=2016		Culprit Lesion Only N=2025		HR (95% CI)	P value
	N (%)	%/year	N (%)	%/year		
Stroke	38 (1.9)	0.6	29 (1.4)	0.5	1.31 (0.81-2.13)	0.27
Stent thrombosis	26 (1.3)	0.4	19 (0.9)	0.3	1.38 (0.76-2.49)	0.28
All cause death or new MI	194 (9.6)	3.3	251 (12.4)	4.3	0.77 (0.64-0.93)	0.006
Major bleeding	58 (2.9)	1.0	44 (2.2)	0.7	1.33 (0.90-1.97)	0.15
Contrast-associated acute kidney injury*	30 (1.5)	-	19 (0.9)	-	1.59 (0.89-2.84)	0.11
NYHA class IV heart failure	58 (2.9)	1.0	56 (2.8)	0.9	1.04 (0.72-1.50)	0.83
Clinically non-significant bleeding	32 (1.6)	0.5	27 (1.3)	0.4	1.19 (0.71-1.99)	0.50

* There were 7 vs 0 patients with AKI associated with complete revasc during index hospitalization

Timing of Non-Culprit Lesion PCI: During or After Initial Hospitalization

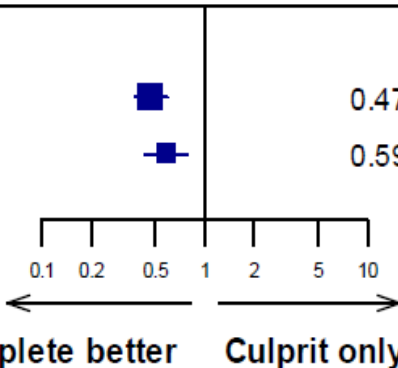
CV death or New MI

	Complete <i>no. of events/total no. (%/yr)</i>	Culprit Only <i>no. of events/total no. (%/yr)</i>	HR (95% CI)	Interaction P
Intent to perform non-culprit lesion PCI				0.62
During initial hospitalization	101/1353 (2.7)	130/1349 (3.5)	0.77 (0.59-1.00)	
After initial hospitalization	57/663 (2.7)	83/676 (3.9)	0.69 (0.49-0.97)	



CV death, New MI, or IDR

	Complete <i>no. of events/total no. (%/yr)</i>	Culprit Only <i>no. of events/total no. (%/yr)</i>	HR (95% CI)	Interaction P
Intent to perform non-culprit lesion PCI				0.27
During initial hospitalization	113/1353 (3.0)	227/1349 (6.6)	0.47 (0.38-0.59)	
After initial hospitalization	66/663 (3.1)	112/676 (5.4)	0.59 (0.43-0.79)	



Median Time to study NCL PCI in Complete Group

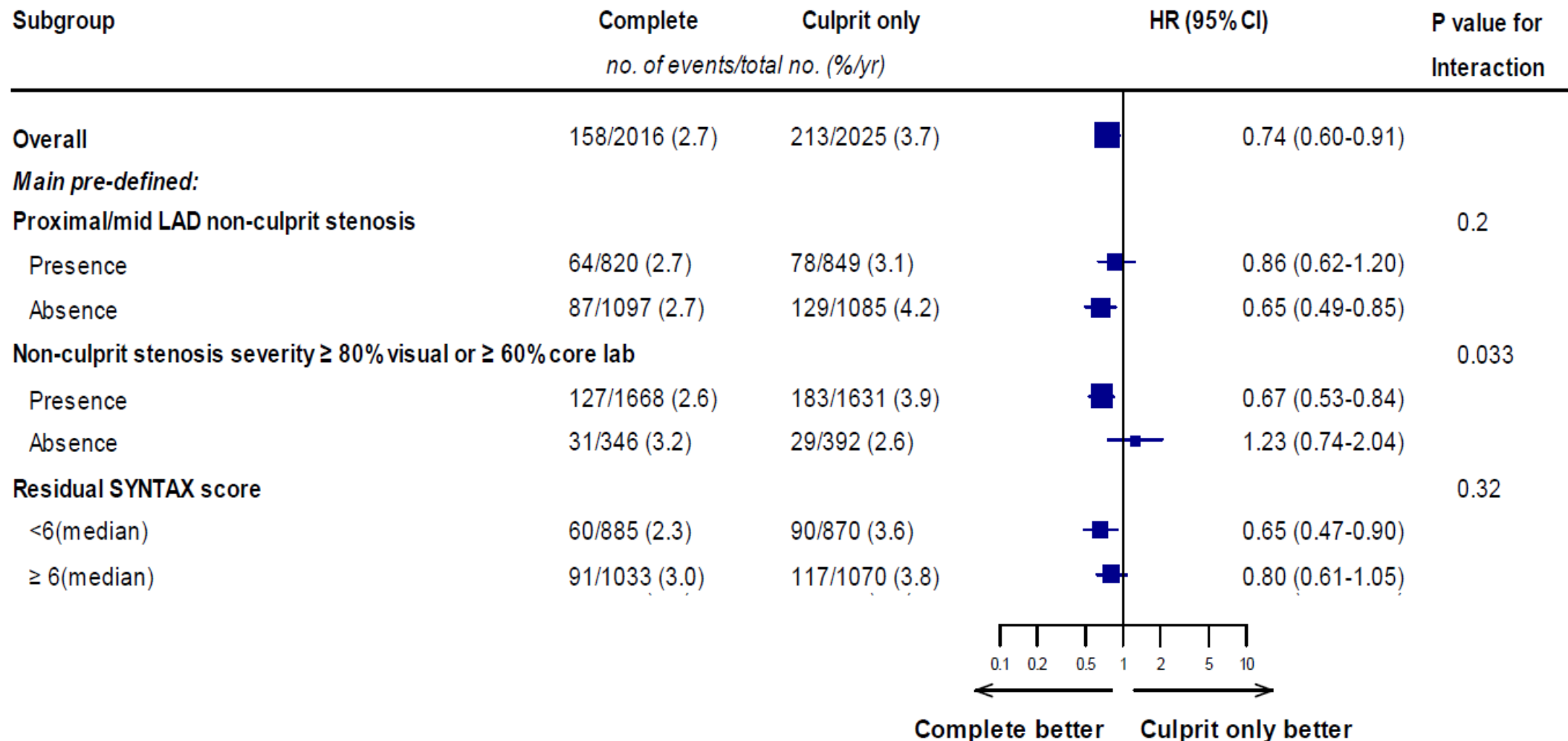
During initial hospitalization: 1 day (IQR 1-3)

After Hospital Discharge: 23 days (IQR 12.5-33.5)



Main Pre-Defined Subgroup Analyses

CV death/MI





Conclusions

In patients with STEMI and multi-vessel coronary artery disease:

- Compared with culprit-lesion-only PCI, routine non-culprit lesion PCI with the goal of complete revascularization:
 - **Reduced CV death or new MI by 26%** ($P=0.004$), NNT = 37
 - **Reduced CV death, new MI or IDR by 49%** ($P<0.001$), NNT = 13
- The benefit of complete revascularization was similar in those undergoing non-culprit lesion PCI during the index hospitalization (median 1 day) and several weeks after hospital discharge (median 3 weeks)
- There were no significant differences in bleeding, stent thrombosis, AKI or stroke