Prognostic Value of FFR: Insight from IRIS-FFR Registry

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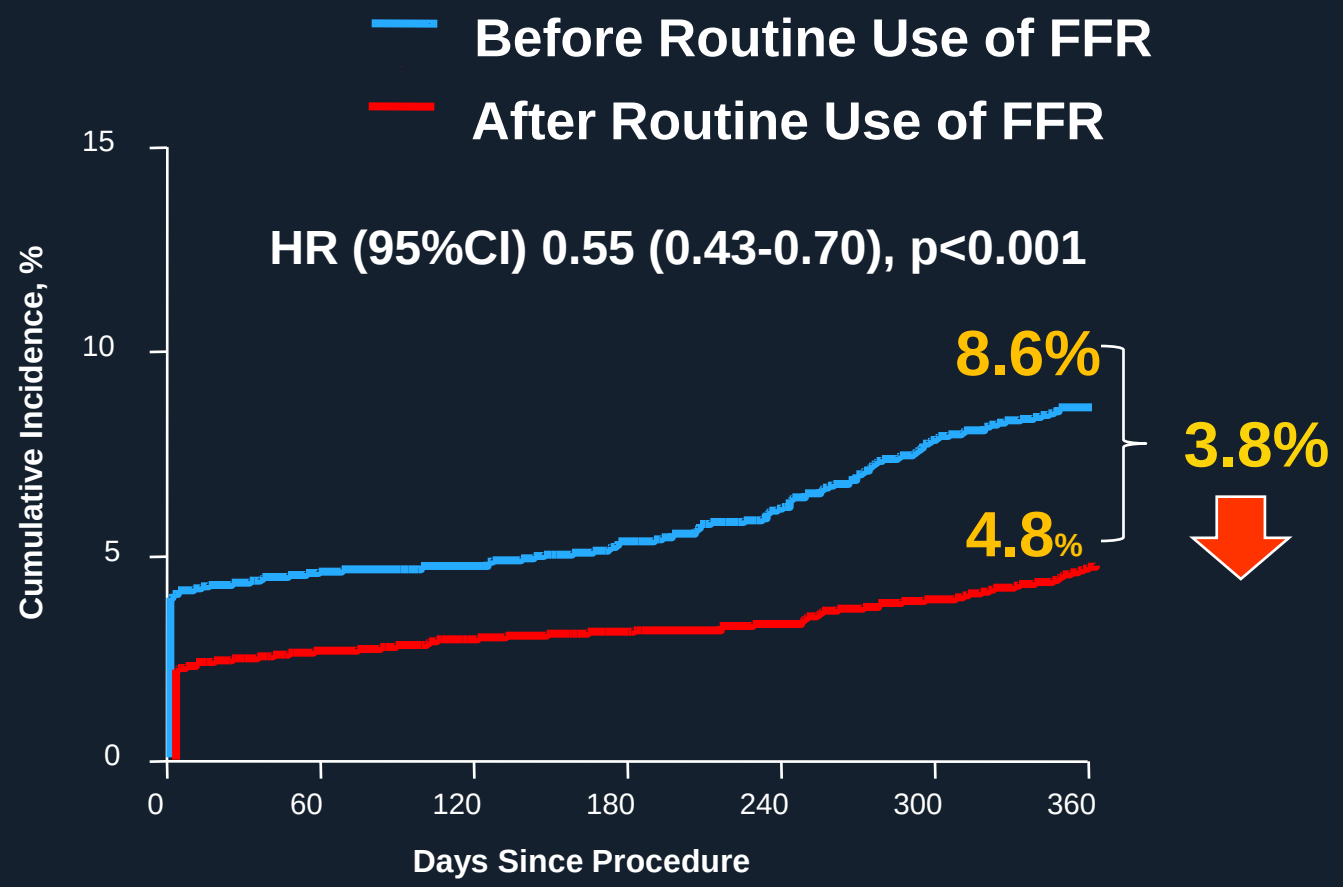
Real World PCI Registry



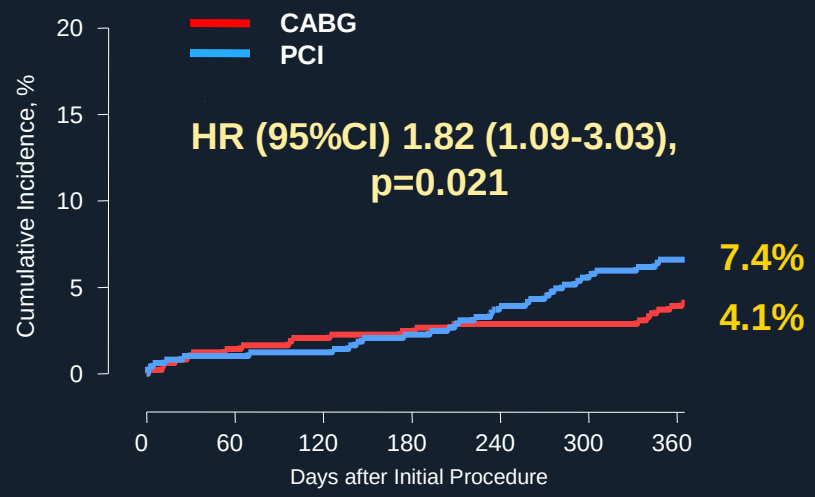
No. at Risk				
Before Routine Use	2178	2066	2011	1960
After Routine Use	2178	2092	2067	2037

Park SJ, Ahn JM et al. Eur Heart J. 2013 Nov;34(43):3353-61

CardioVascular Research Foundation
ASAN Medical Center

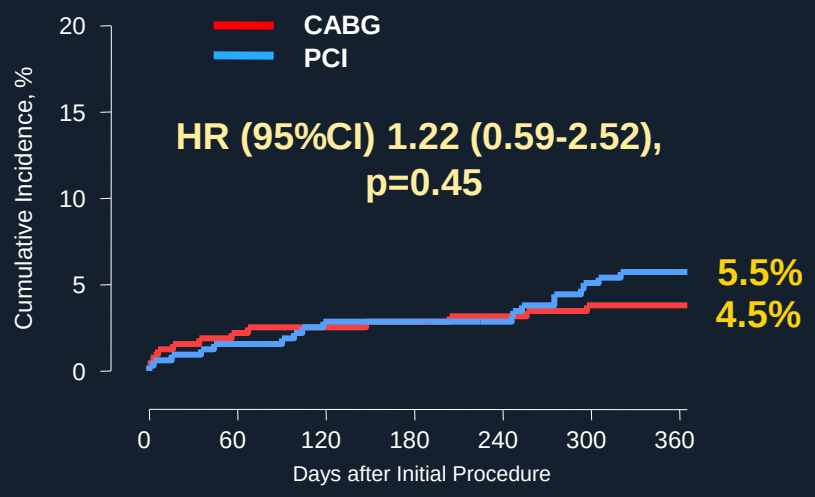
Left Main and 3 VD Registry

Before Routine FFR (2008-2009)



CABG	486	477	472	467
PCI	486	481	466	453

After Routine FFR (2010-2011)



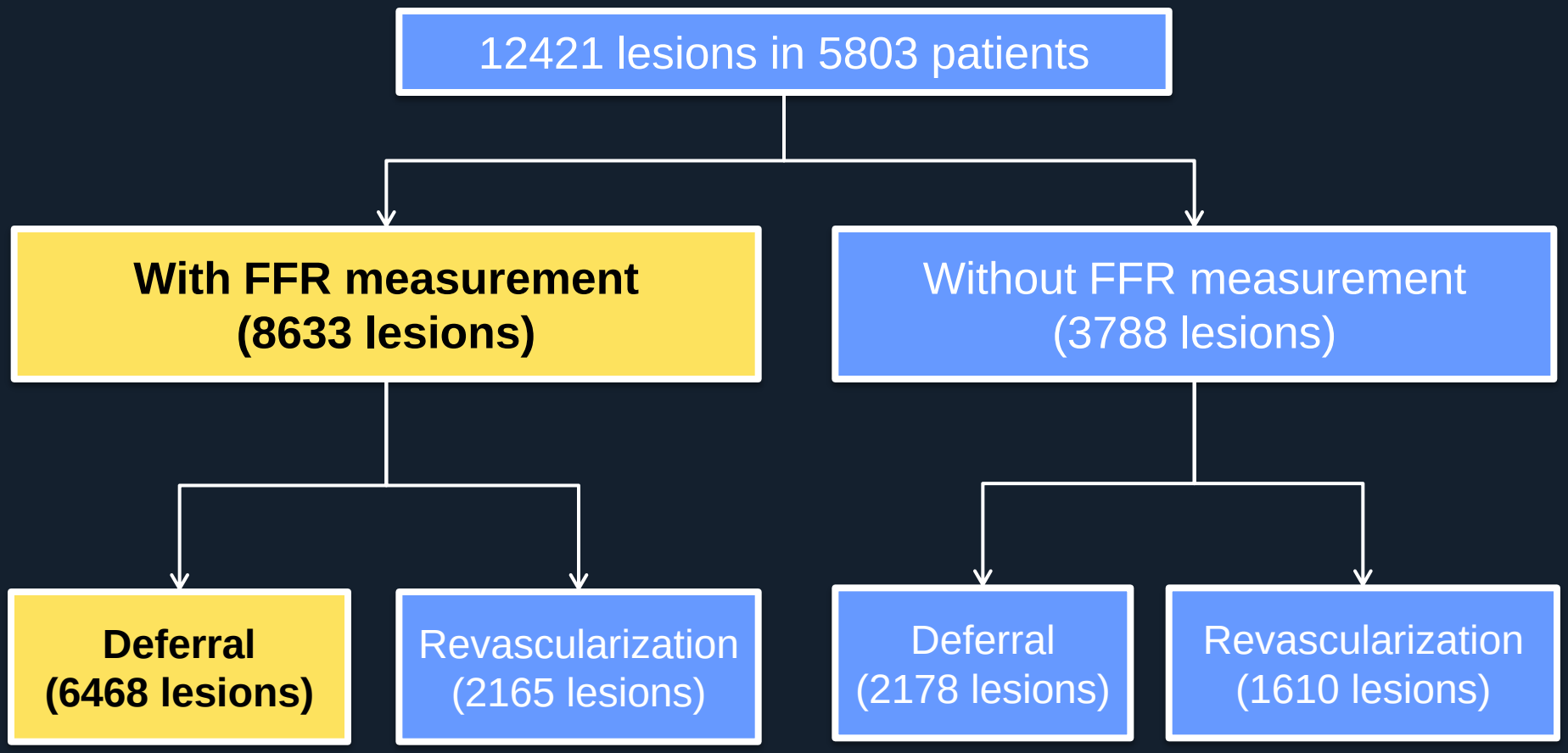
CABG	315	308	306	304
PCI	315	307	304	295

Ahn JM, Park SJ et al. Am J Cardiol. 2015 Oct 15;116(8):1163-71

Objective

- To evaluate natural prognosis of deferred or revascularized coronary stenosis after FFR measurement
- To assess the clinical outcome-derived revascularization threshold of FFR in the era of second-generation drug-eluting stent.

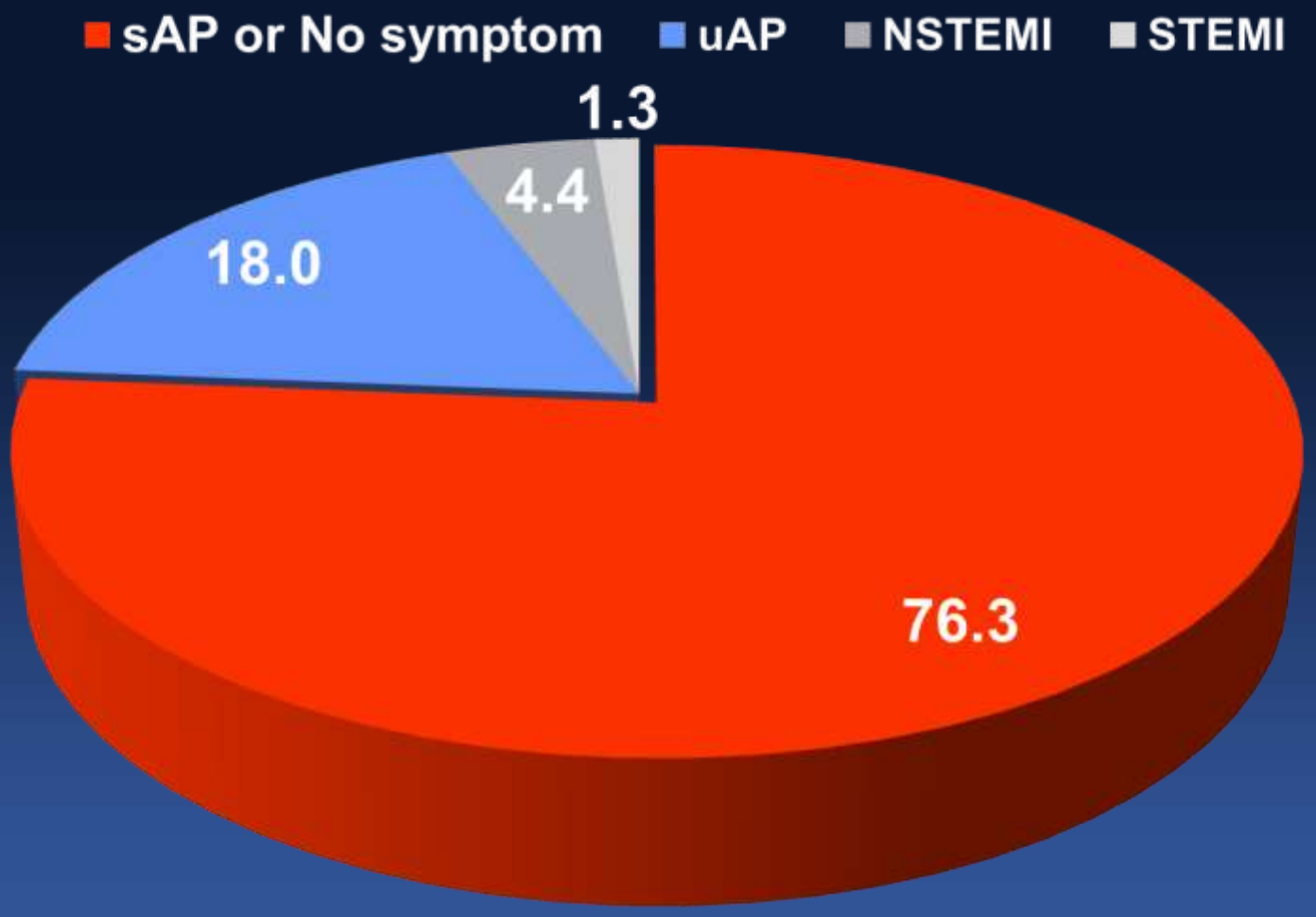
IRIS FFR Registry (2009.8-2015.8)



Patient Characteristics

Variables	N=5846
Age	63.6±9.8
Sex (men)	4187 (71.6%)
Diabetes	1807 (30.9%)
Hypertension	3687 (63.1%)
Current smoker	1402 (24.0%)
Hyperlipidemia	3507 (60.0%)
Previous myocardial infarction	378 (6.5%)
Previous PCI	1138 (19.5%)
Previous stroke	345 (5.9%)
Chronic renal failure	119 (2.0%)
Chronic lung disease	125 (2.1%)
Peripheral artery disease	139 (2.4%)
Family history	600 (10.3%)

Clinical Presentation



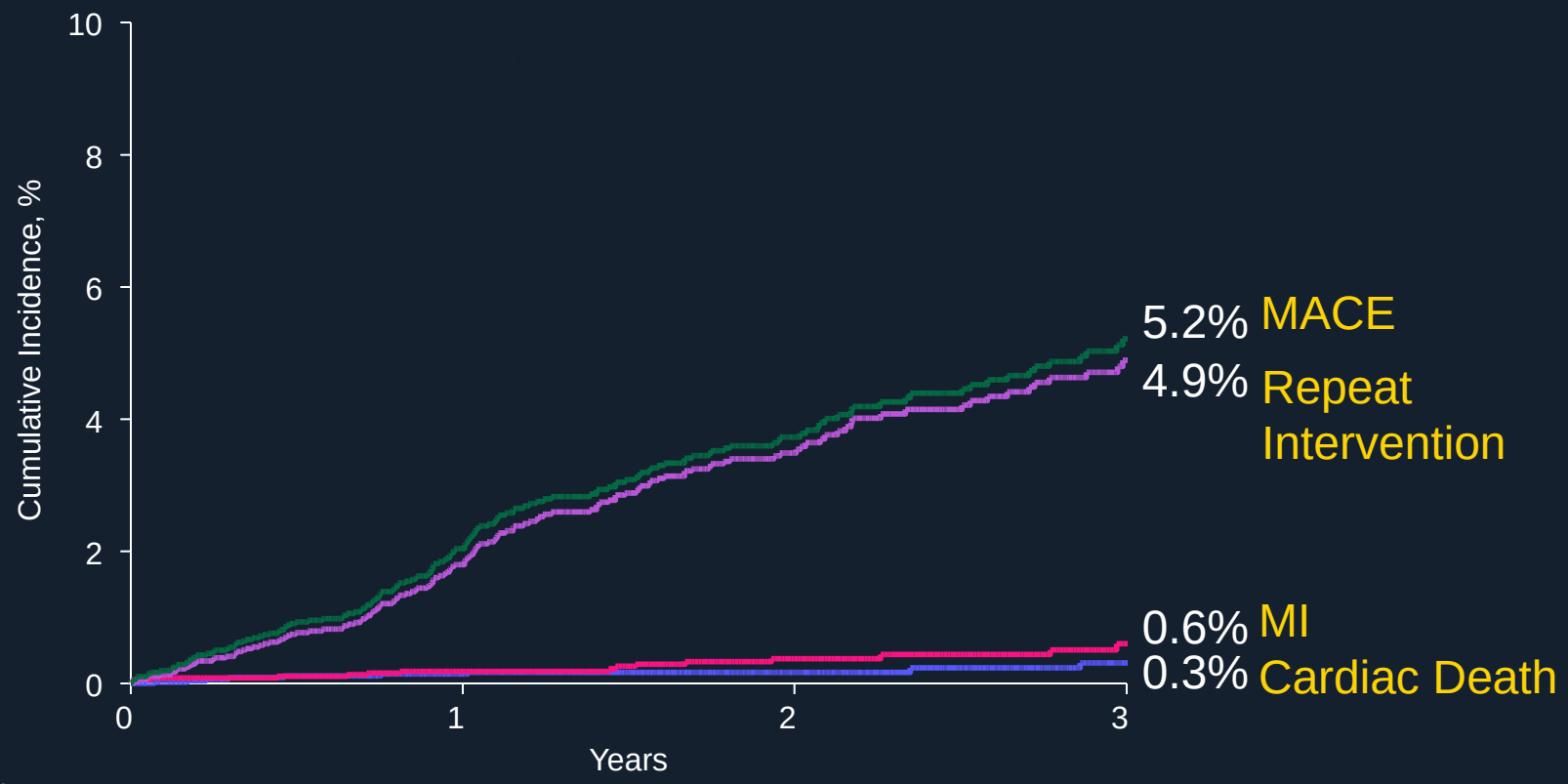
Lesion Characteristics

Variables	N=8633
Lesion territory	
Left main	345 (4.1%)
Left anterior descending artery	4372 (50.6%)
Left circumflex artery	2070 (24.0%)
Right coronary artery	1407 (16.3%)
ACC/AHA B2C lesion	4819 (55.8%)
Long lesion (>20mm)	3680 (42.6%)
Moderate to severe calcification	269 (3.1%)
Thrombus containing lesion	63 (0.7%)
Angiographic ulcerated lesion	55 (0.6%)
Diameter stenosis	
30-50%	2659 (30.7%)
50-70%	4057 (47.0%)
70-99%	1927 (22.3%)

FFR

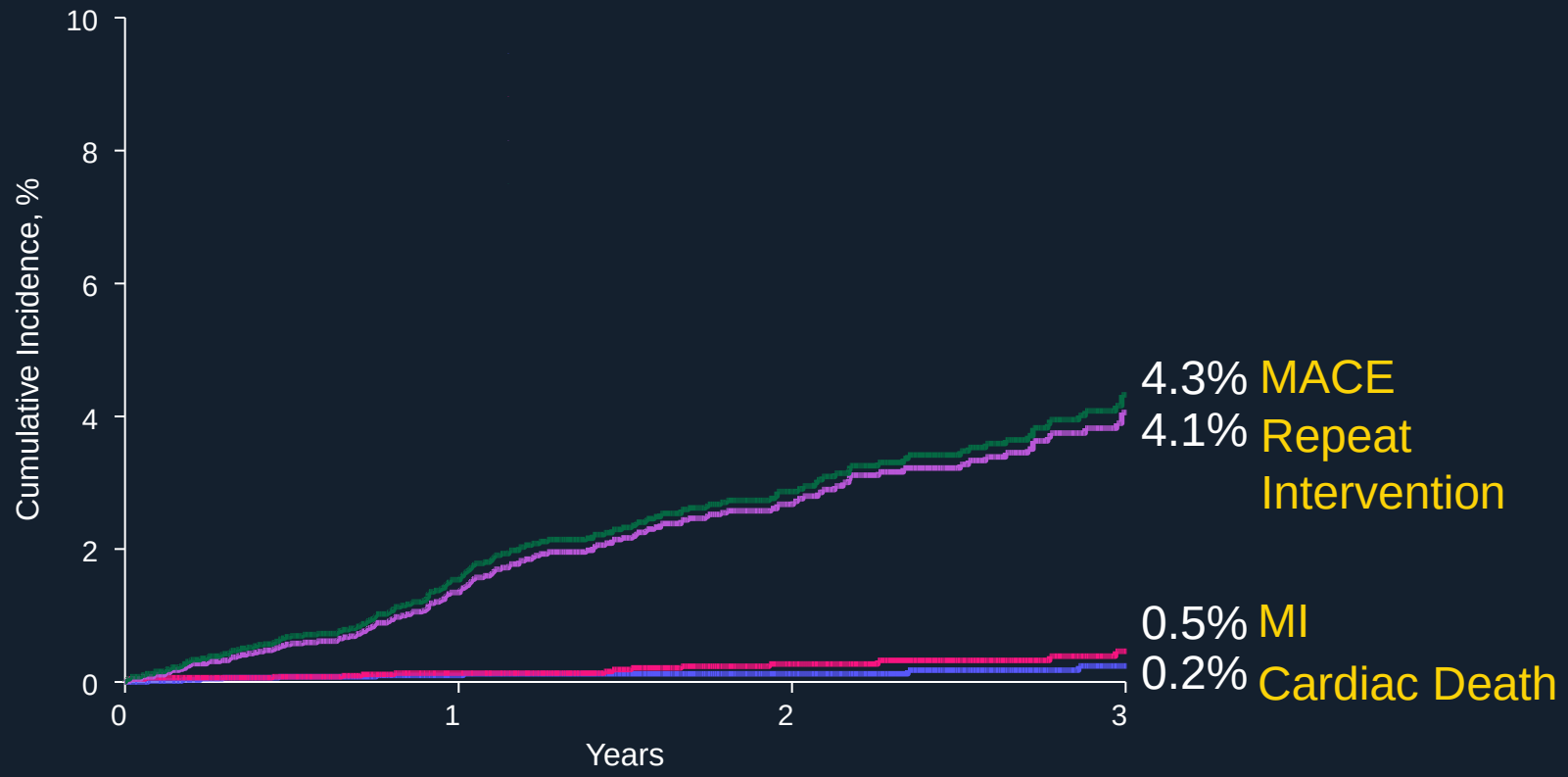
Variables	8633 lesions
Fractional flow reserve	
Mean	0.83±0.11
Median	0.85 (0.77, 0.91)
<0.75	1903 (22.1%)
0.75-0.80	1001 (11.6%)
>0.80	5729 (66.3%)
Route of adenosine	
Intravenous	7881 (91.3%)
Intracoronary	752 (8.7%)
Hyperemic Agent	
Adenonsine	8393 (97.2%)
Others	240 (2.8%)

Deferred Lesion Outcome (per Patient)



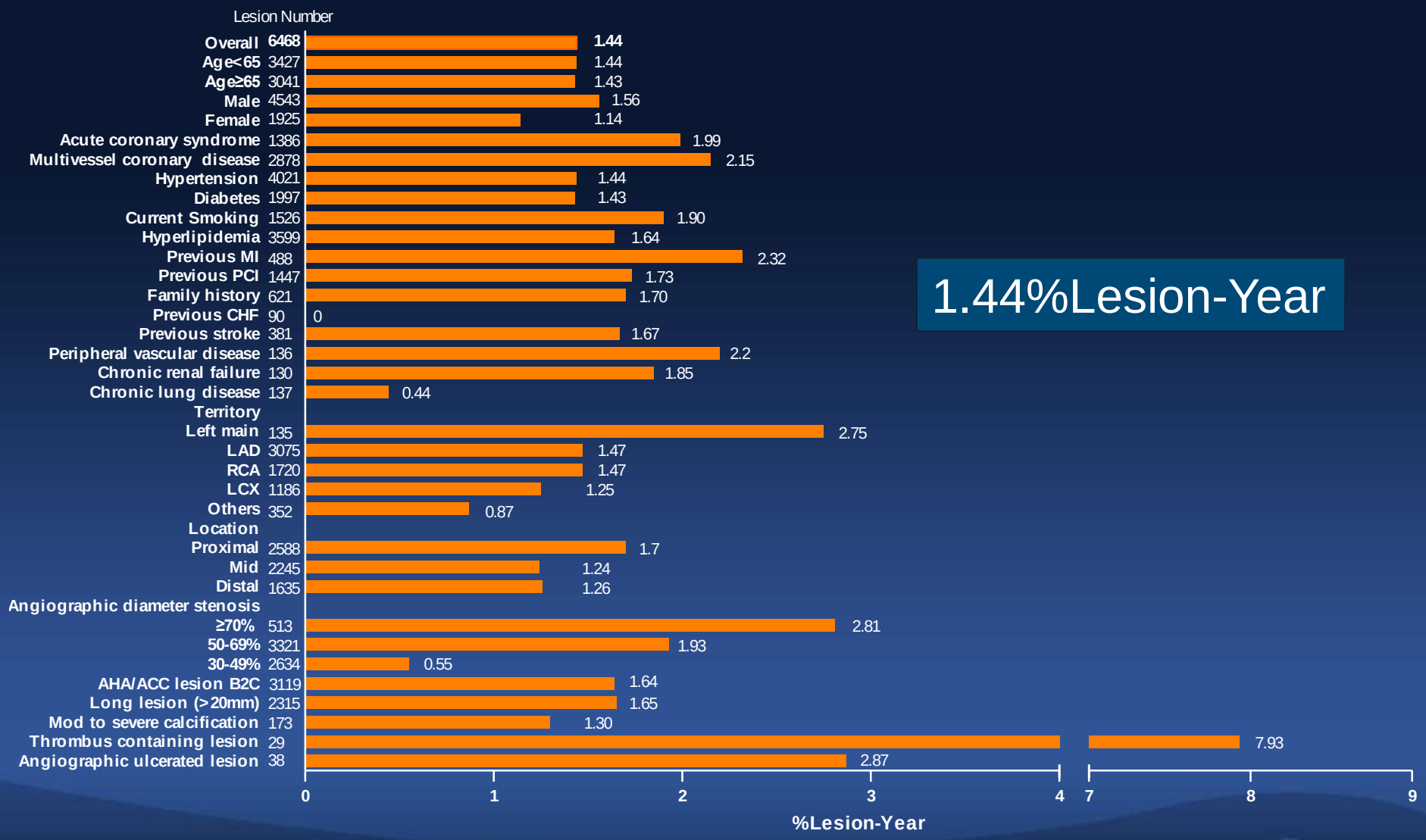
Cardiac Death	4608	3393	2069	1036
Myocardial Infarction	4608	3445	2107	1059
Repeat Intervention	4608	3337	1998	987
MACE	4608	3333	1996	987

Deferred Lesion Outcome (per Lesion)



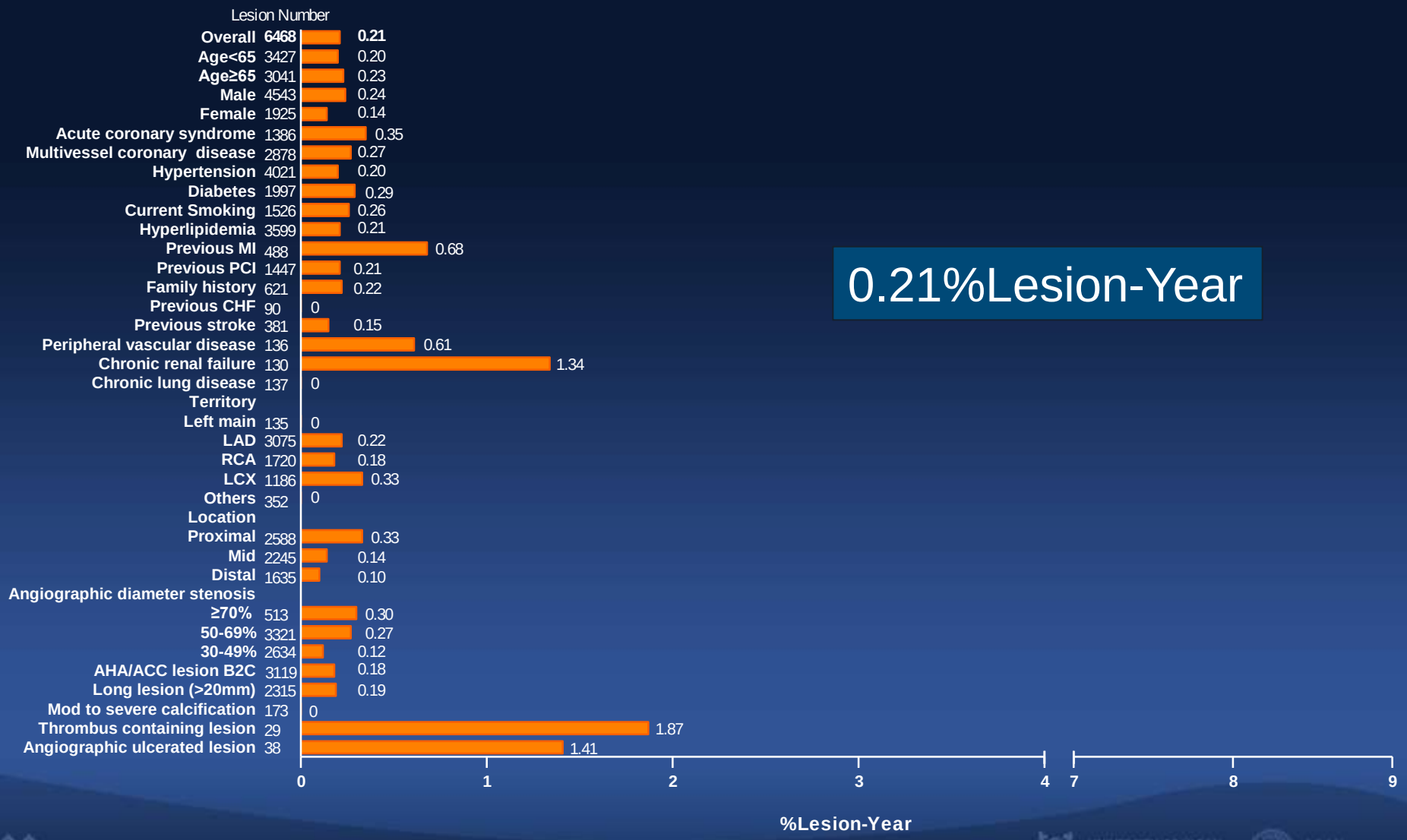
Cardiac Death	6468	4745	2675	1229
Myocardial Infarction	6468	4740	2669	1225
Repeat Intervention	6468	4685	2599	1174
MACE	6468	4681	2597	1174

Incidence Rate of Deferred Lesion Failure



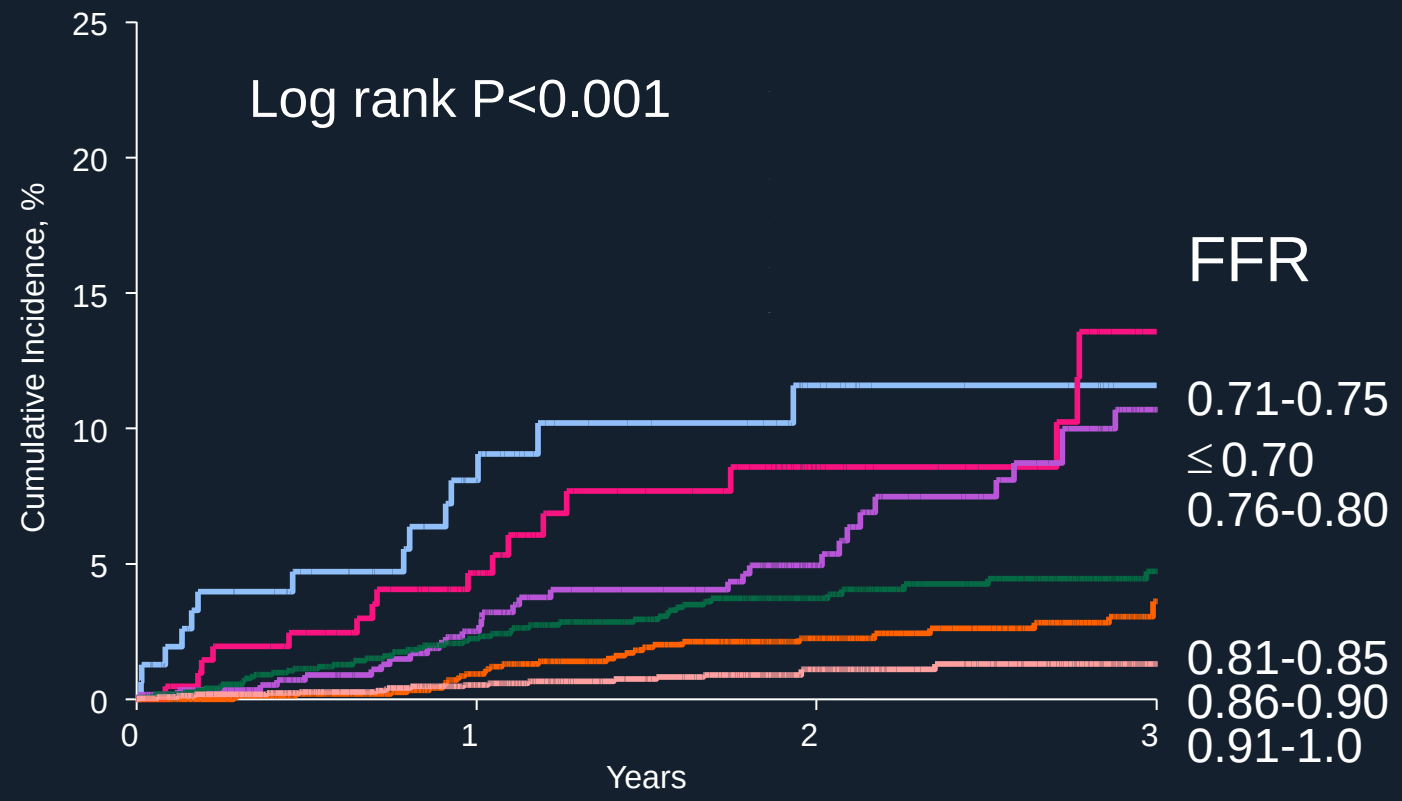
1.44%Lesion-Year

Incidence Rate of Cardiac Death/MI



0.21%Lesion-Year

Deferred Lesion Failure



≤0.70	156	99	56	27
0.71-0.75	212	155	73	43
0.76-0.80	596	430	240	110
0.81-0.85	1510	1088	656	333
0.86-0.90	1665	1214	696	338
0.91-1.0	2328	1695	877	328

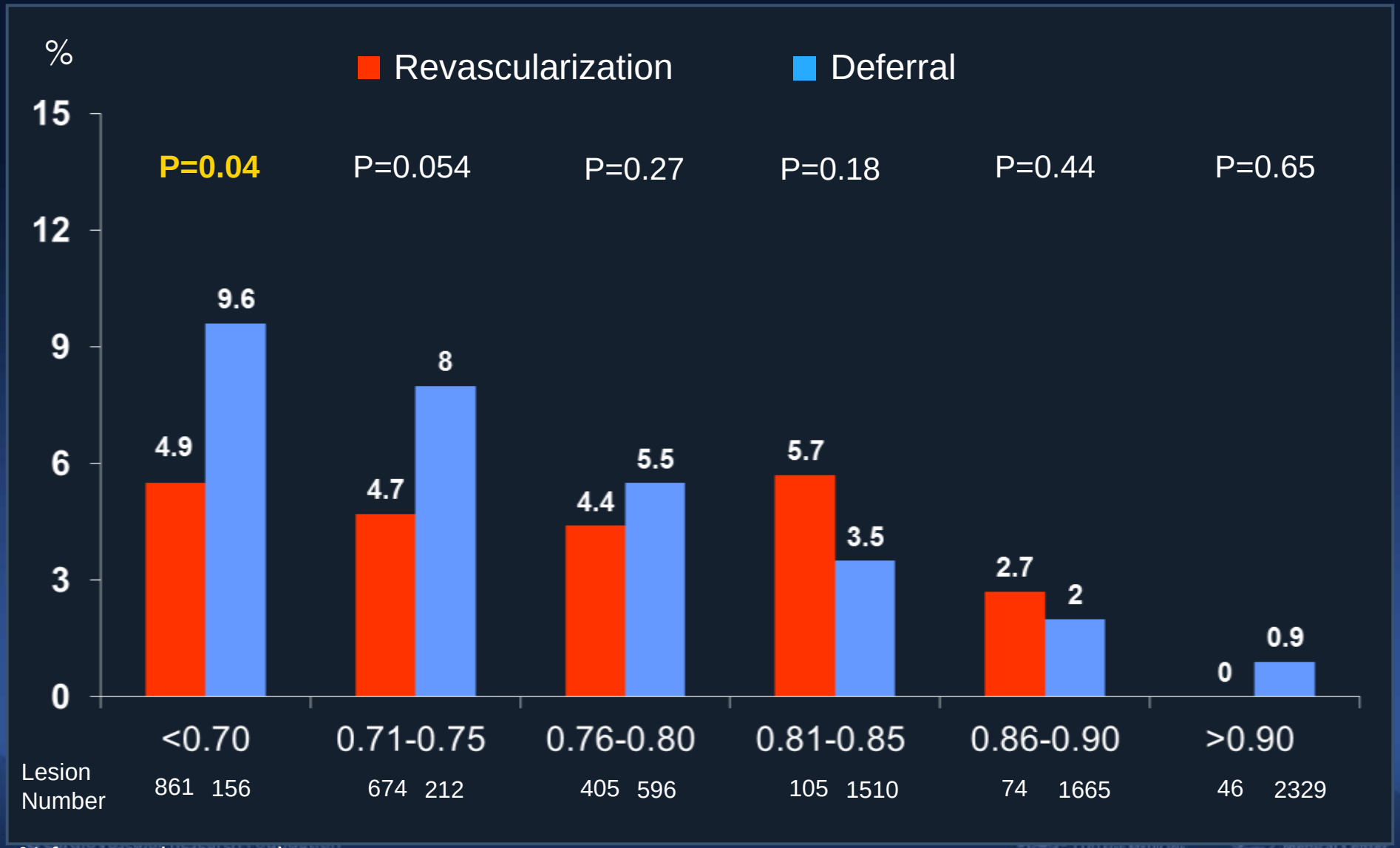
Adjusted Risk of Deferred Lesion Outcomes

	FFR as categorical variables						P for trend
	Hazard ratio (95% confidence interval)						
	≤0.70 (N=156)	0.71-0.75 (N=212)	0.76-0.80 (N=596)	0.81-0.85 (N=1510)	0.86-0.90 (N=1665)	0.91-1.00 (N=2329)	
Deferred lesion failure	6.66‡ (3.28-13.5)	5.04 (2.58 – 9.82)	3.99 (2.26 – 7.05)	2.48 (1.47 – 4.20)	1.60 (0.91 – 2.80)	1 reference	< 0.001
Cardiac death	3.03 (0.16 – 56.8)	5.18 (0.84 – 31.9)	2.26 (0.37 – 13.8)	0.44 (0.04 – 4.35)	0.81 (0.13 – 5.11)	1 reference	0.19
Myocardial infarction	12.0 (0.99 – 144.1)	22.1 (3.39 – 143.8)	8.87 (1.56 – 49.4)	3.43 (0.75 – 15.7)	0.85 (0.13 – 5.42)	1 reference	< 0.001
Cardiac death or MI	5.00 (0.79 – 31.7)	9.34 (2.40 – 36.5)	3.48 (0.87 – 13.85)	1.78 (0.48 – 6.55)	1.03 (0.26 – 4.00)	1 reference	< 0.001
Repeat intervention	10.4 (4.52 – 24.1)	7.73 (3.51 – 17.0)	5.73 (2.90 – 11.3)	3.49 (1.88 – 6.49)	2.07 (1.09 – 3.91)	1 reference	< 0.001

Predictors of Deferred Lesion Failure

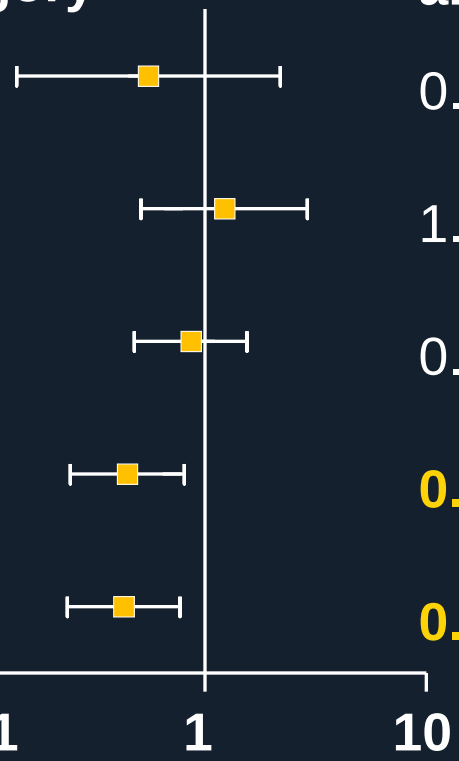
	HR (95% CI)	P value
FFR (by increase of 0.01)	0.94 (0.93-0.96)	<0.001
Multivessel CAD	1.66 (1.19-2.33)	0.003
Thrombus containing lesion	5.46 (1.98-15.0)	0.001
Diameter stenosis		<0.001
30-50%	1 (reference)	
50-70%	2.20 (1.41-3.44)	<0.001
>70%	2.50 (1.41-4.44)	0.002

Major Adverse Cardiac Events



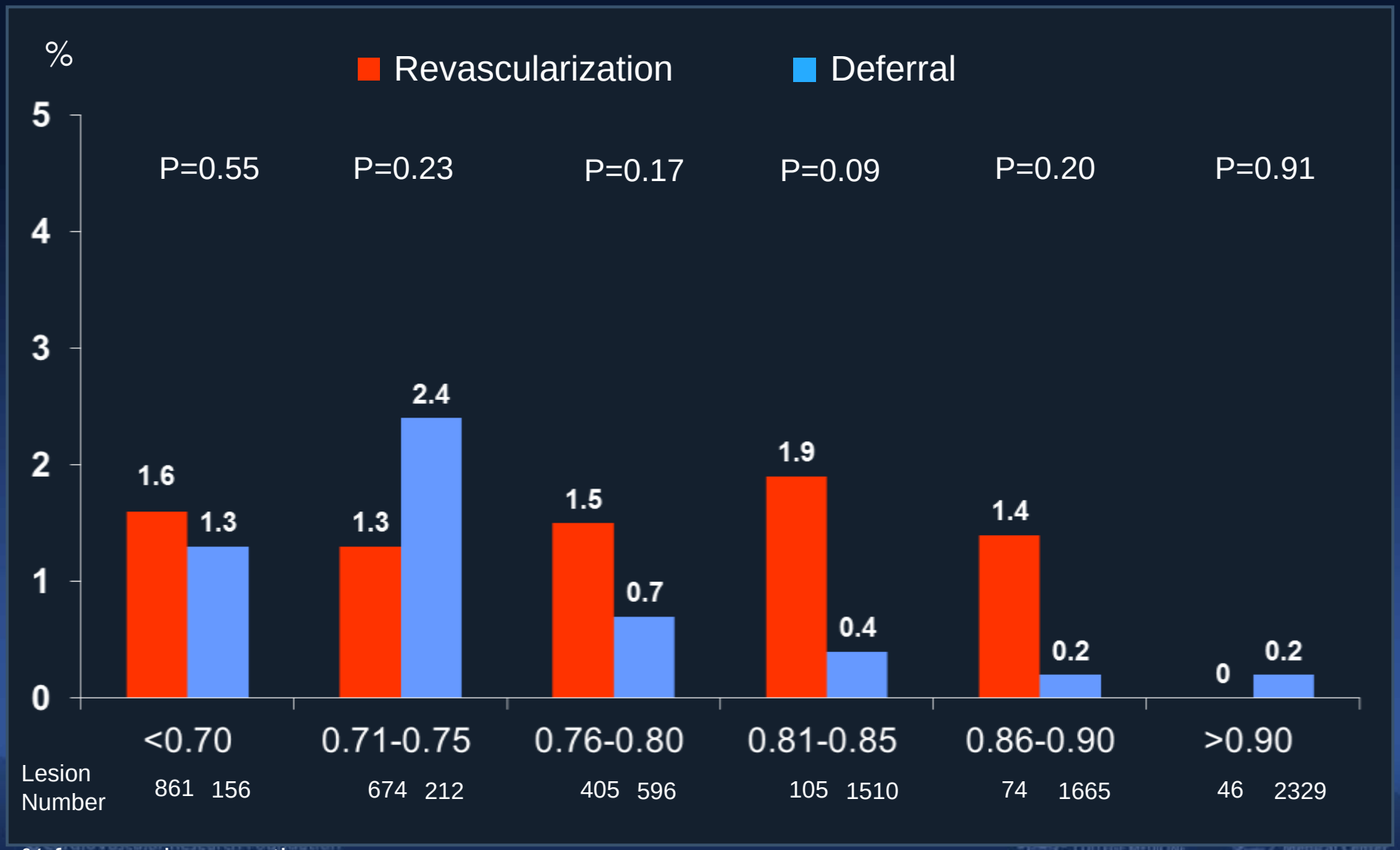
% from crude proportion

Adjust Hazard Ratio: MACE



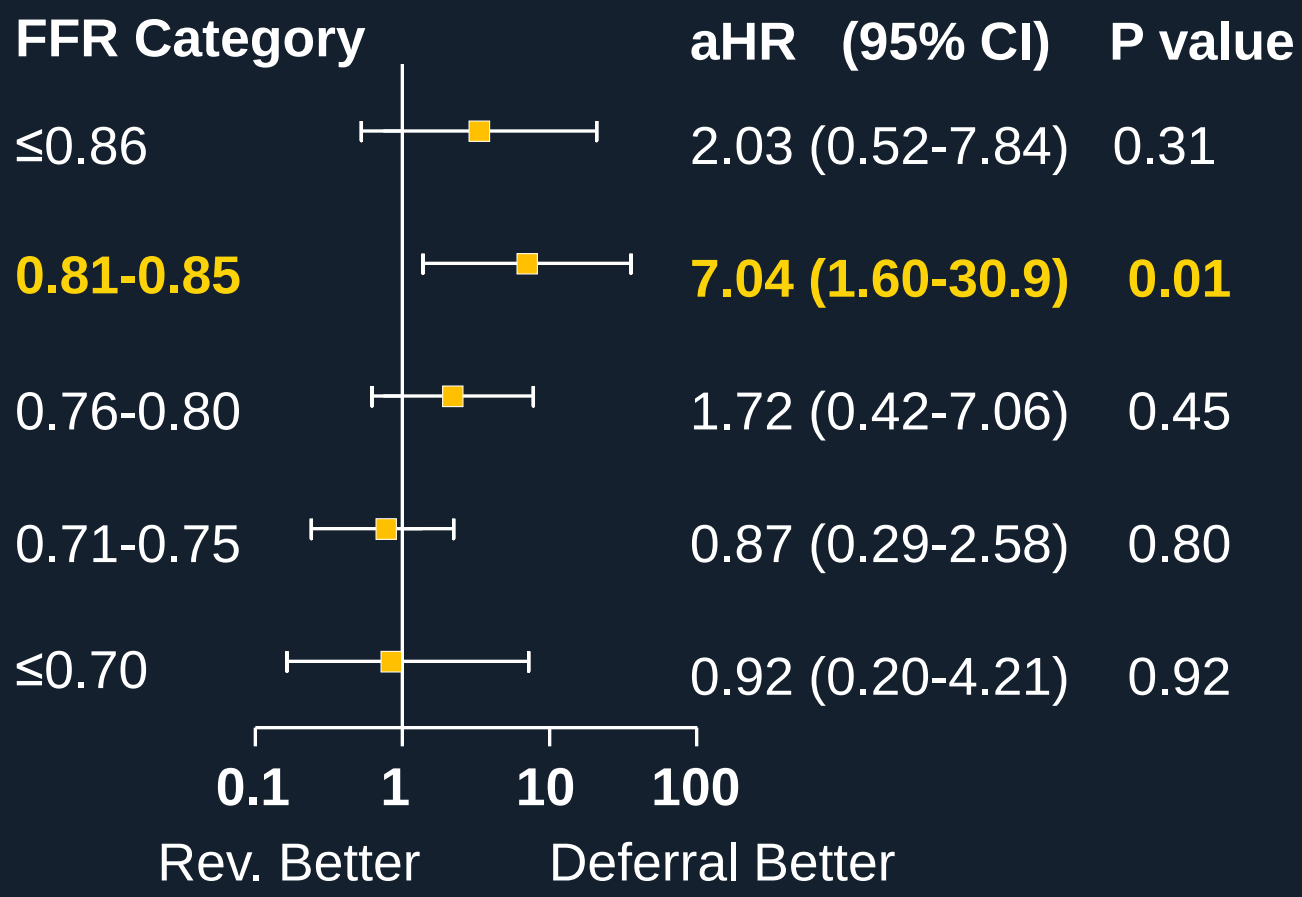
FFR Category	aHR (95% CI)	P value
≥0.86	0.42 (0.09-1.97)	0.27
0.81-0.85	1.21 (0.44-3.36)	0.71
0.76-0.80	0.83 (0.46-1.50)	0.53
0.71-0.75	**0.47 (0.24-0.89)**	**0.021**
≤0.70	**0.47 (0.26-0.84)**	**0.012**

Cardiac Death or MI



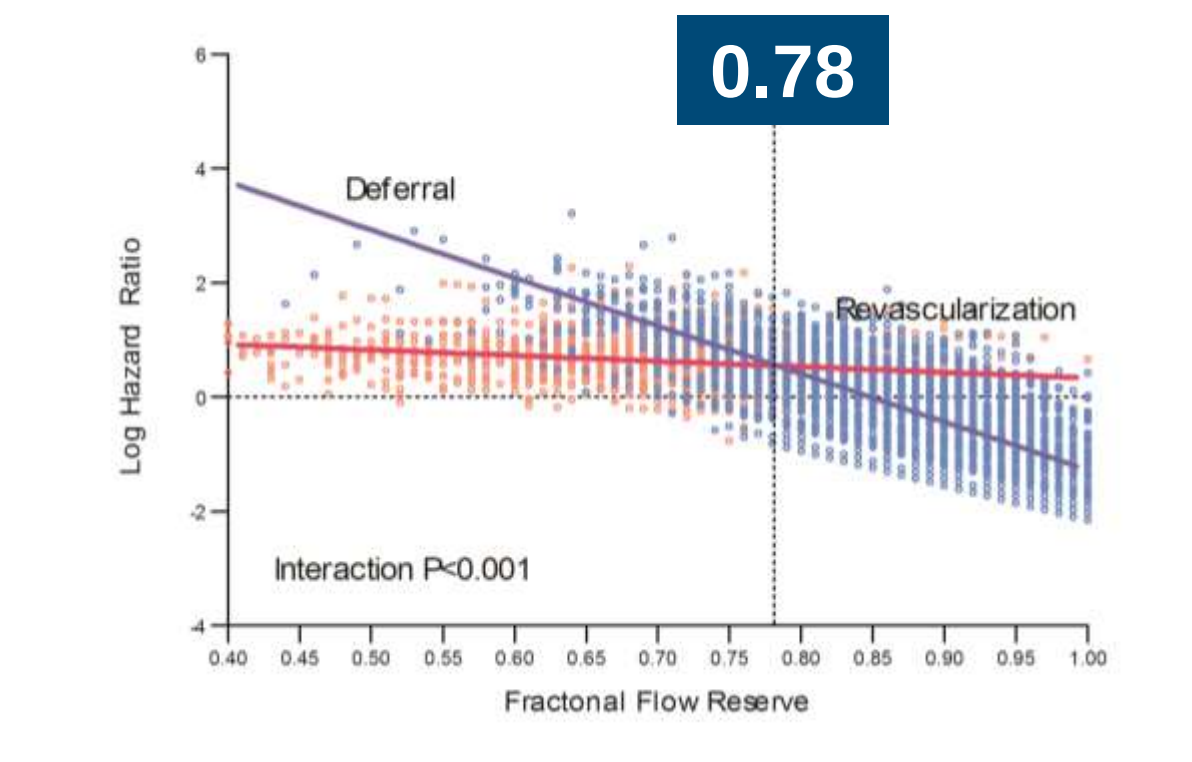
% from crude proportion

Adjust HR: Cardiac Death and MI



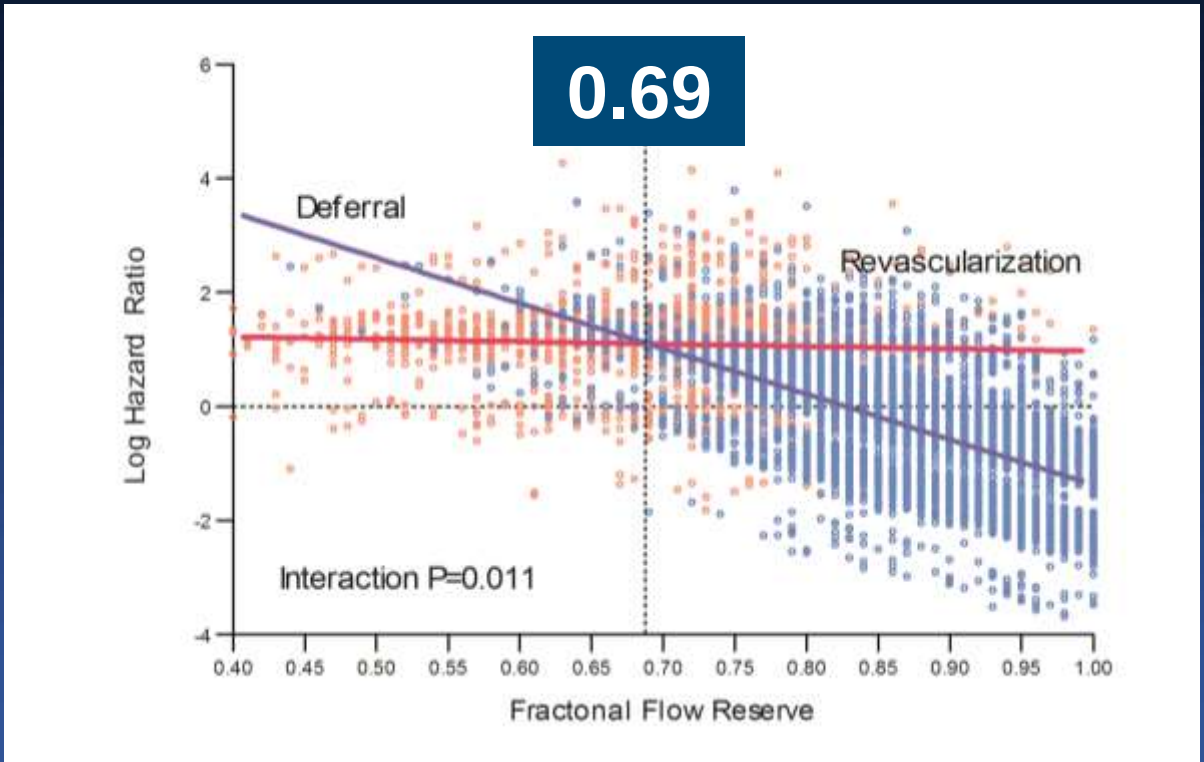
Outcome Derived Revascularization Threshold of FFR

Major Adverse Cardiac Events



Outcome Derived Revascularization Threshold of FFR

Cardiac Death or Myocardial Infarction



Summary

- In this large prospective multicenter registry, we found that the natural prognosis of coronary artery stenosis after FFR measurement was excellent when lesions were deferred.

- Although the risk of MACE in the deferred lesion increased significantly while FFR decreased, the risk of MACE was not significantly different in the range of FFR ≥0.76 (including “grey zone”) between deferred and revascularized lesions

Summary

- Only in the lesions with FFR of ≤0.75, the significant benefit of revascularization over deferral was observed in terms of the risk of MACE. Subsequently, the outcome-derived revascularization threshold of FFR was located at the FFR of 0.78.

- We confirmed the value of FFR for decision making in daily cath lab practice by its stratifying value for clinical outcome: stenosis with low FFR benefit from revascularization, stenosis with high FFR can be better treated medically.

Thank You !!

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