

All Data from Real World FFR Registry

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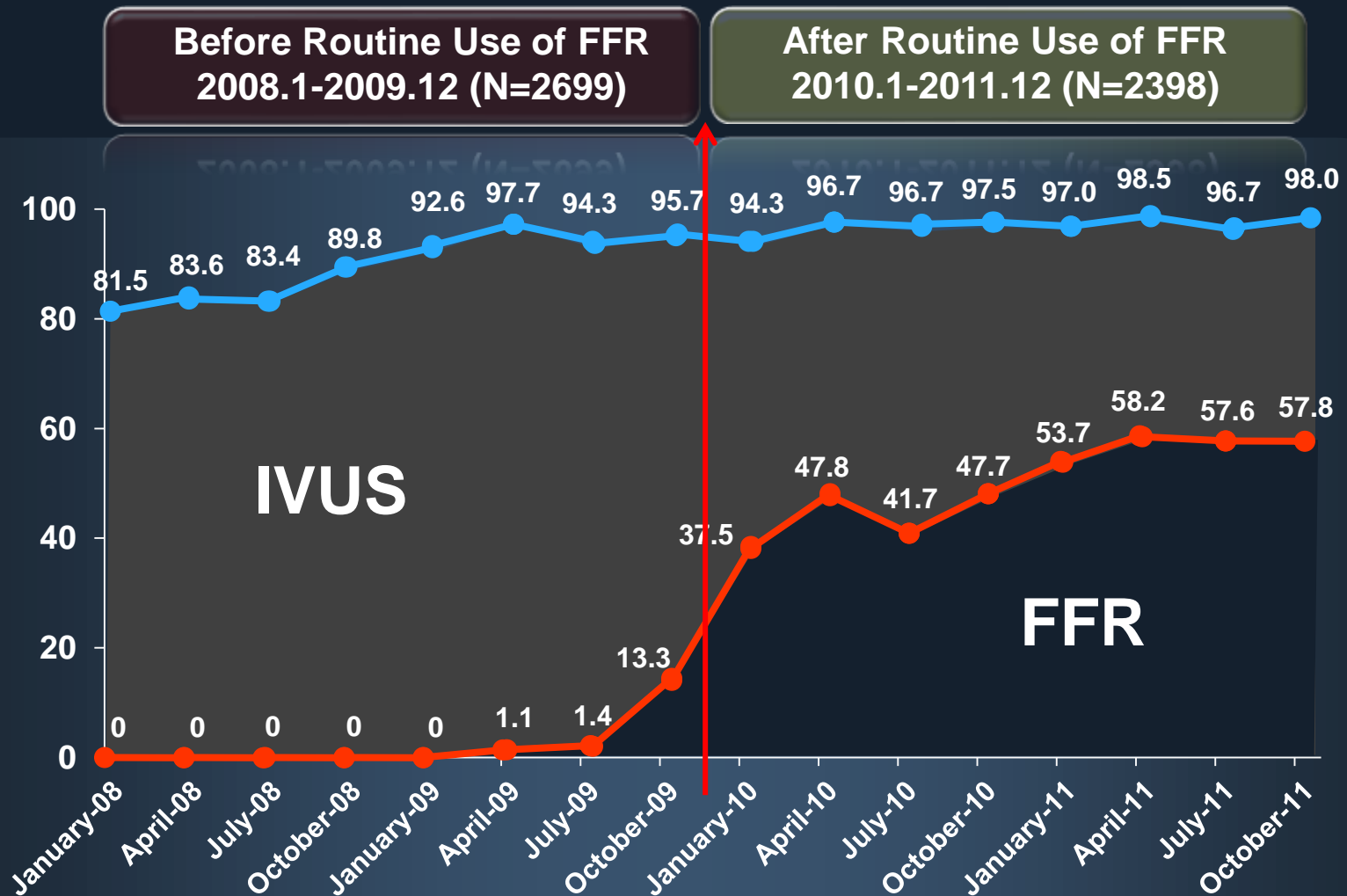
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Heart Institute, Asan Medical Center, Seoul, Korea

Real World Registry from Asan Medical Center

- **ASAN PCI Registry:** A prospective, single-center registry Between January 2008 and December 2011, a total of 5097 patients were enrolled (clinicaltrials.gov number NCT 0178859).
- **ASAN LM & 3VD Registry:** PCI: 1229 Patients, CABG: 1264 Patients, Medication: 119 Patients were included.
- **IRIS-FFR:** A multicenter prospective registry, To evaluate the natural history of coronary stenosis assessed by FFR (30 centers in Korea). Currently Total 9,257 patients were enrolled (NCT01366404).

Rate of FFR and IVUS Use

from ASAN PCI Registry



5097 patients from ASAN PCI registry
between 2008 and 2011

2699 before routine FFR use
(2008-2009)

2398 **after routine FFR use**
(2010-2011)

4356 patients (2178 pairs) after propensity-score matching

2178 before routine FFR use
(2008-2009)

2178 **after routine FFR use**
(2010-2011)

2158 remained at 1 year

2158 remained at 1 year

1968 remained at 3 years

1903 remained at 3 years

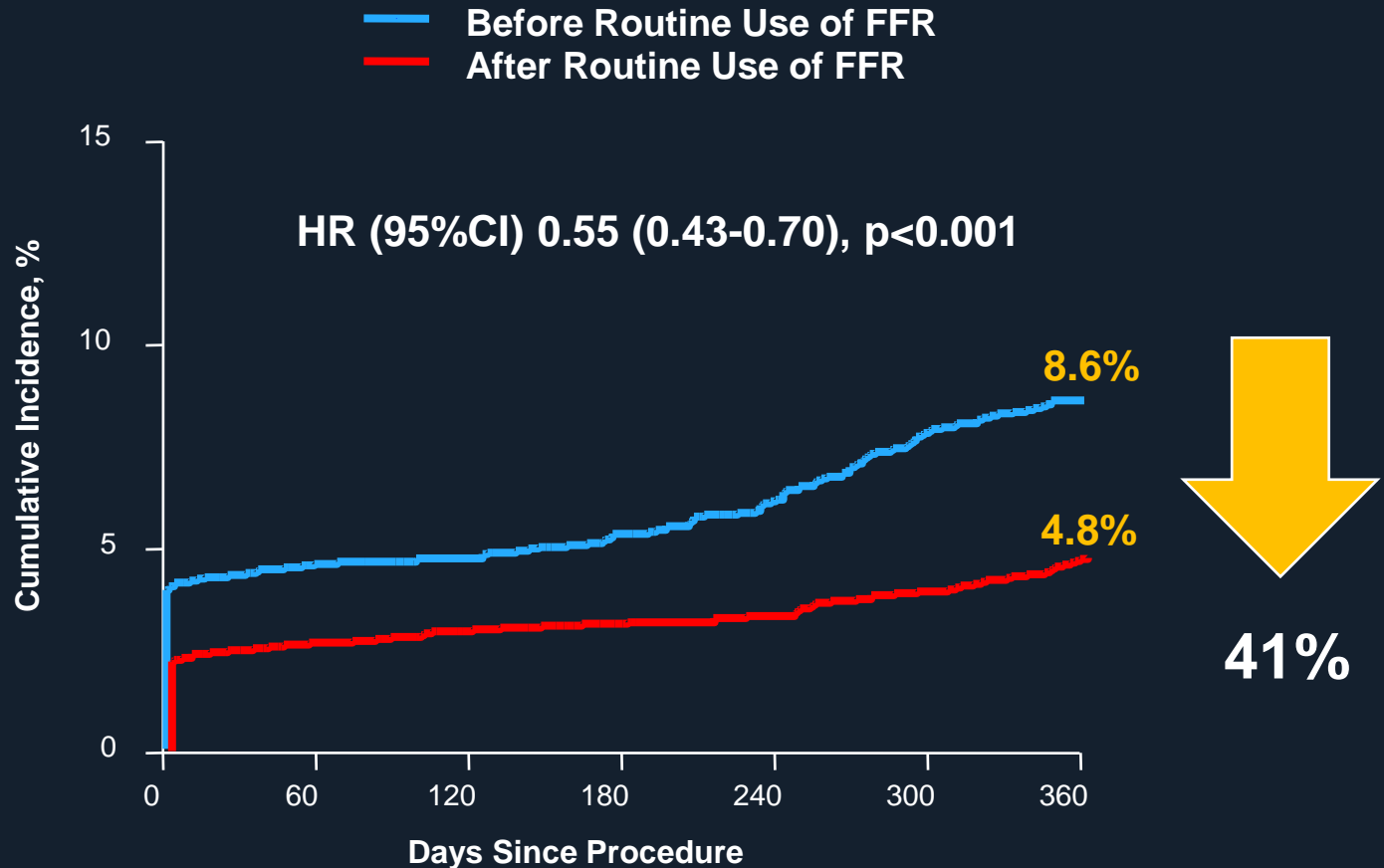
1548 remained at 5 years

1519 remained at 5 years

3 Year Follow-up Data

Primary End Point

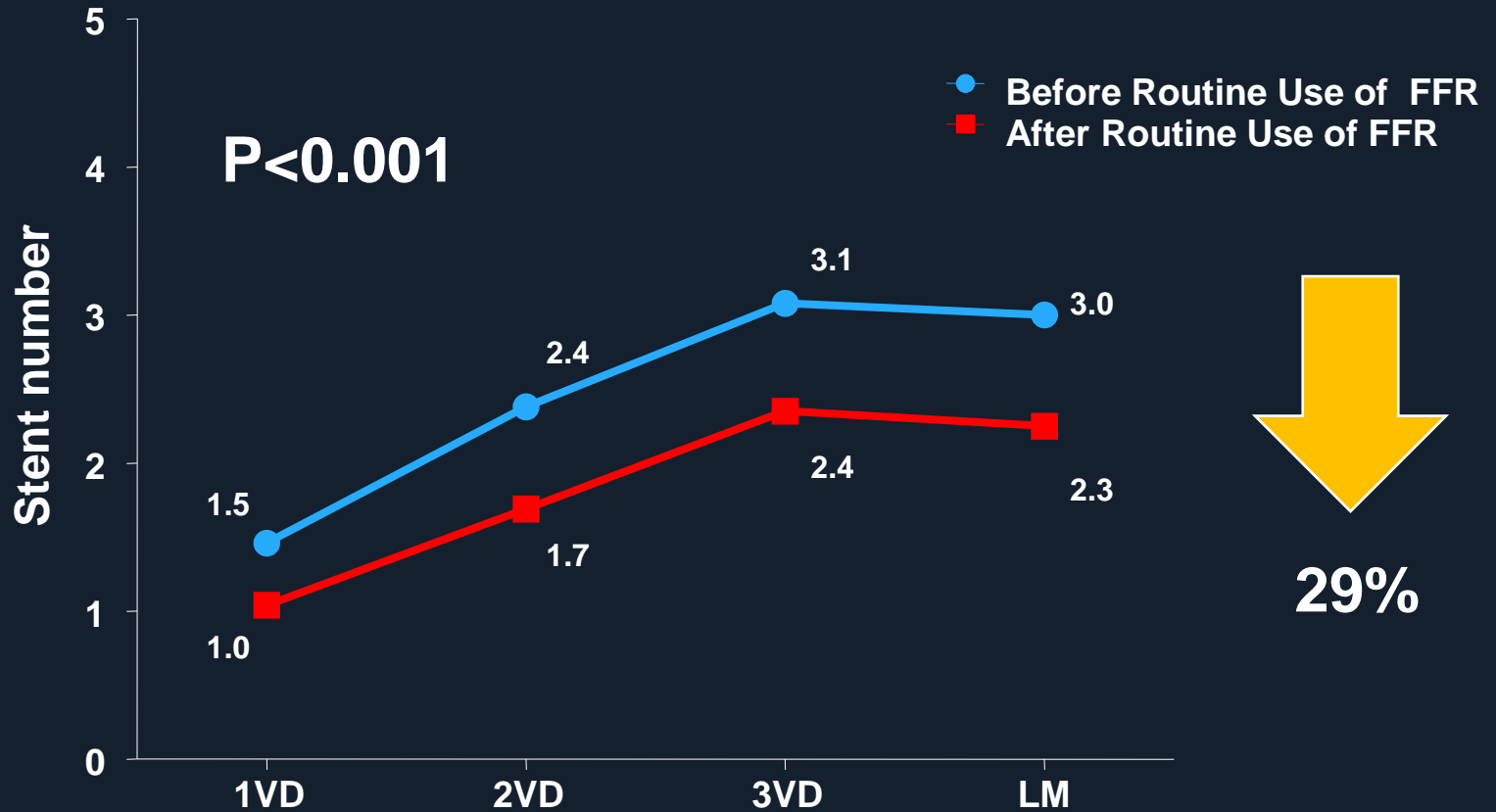
Death, MI, or Repeat Revascularization



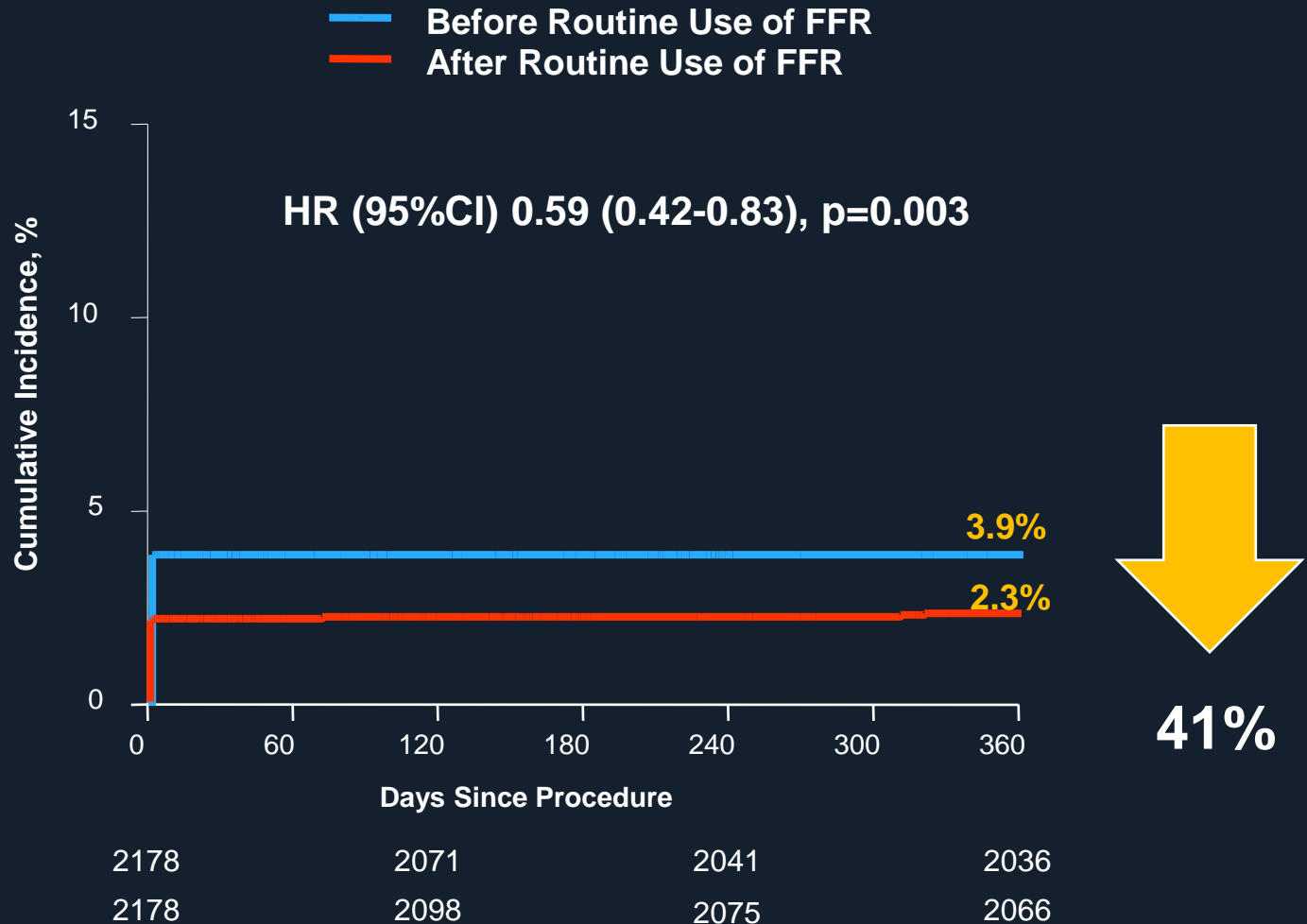
No. at Risk

	0	60	120	180	240	300	360
Before Routine Use	2178	2066	2011	1960			
After Routine Use	2178	2092	2067	2037			

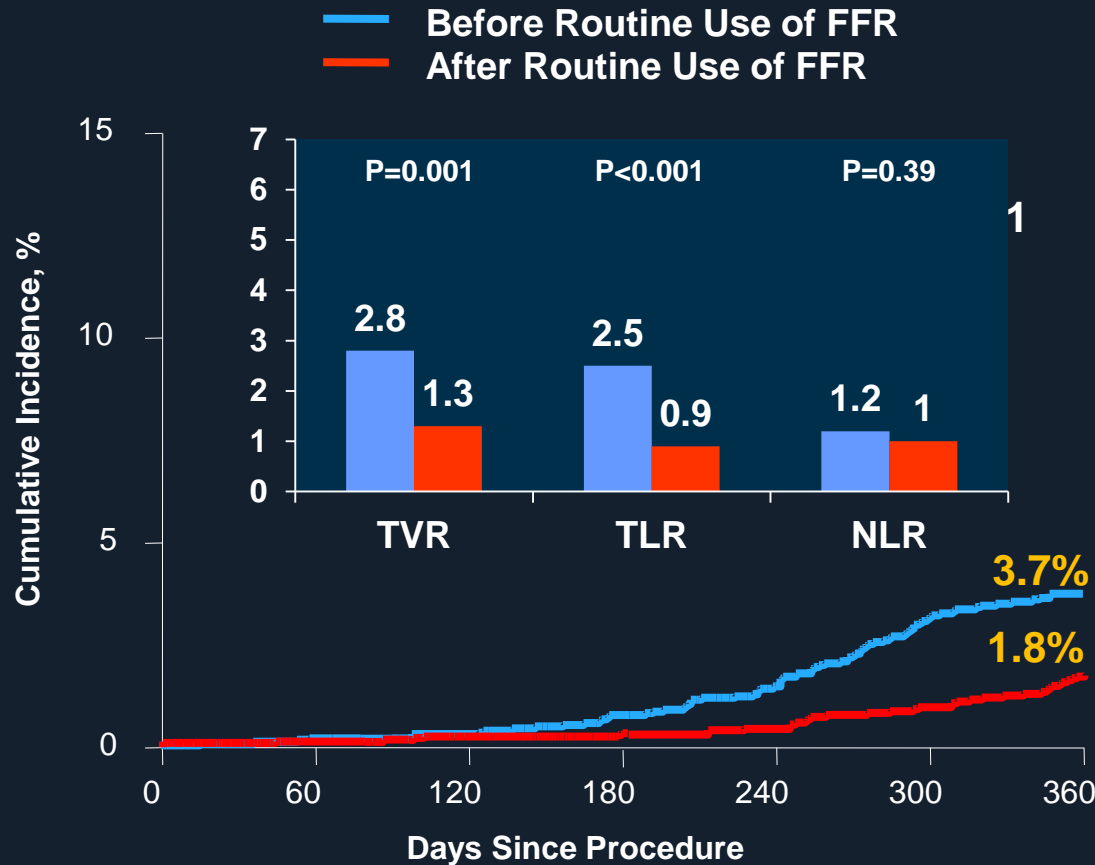
Stent Number Decreased



Myocardial Infarction



Repeat Revascularization



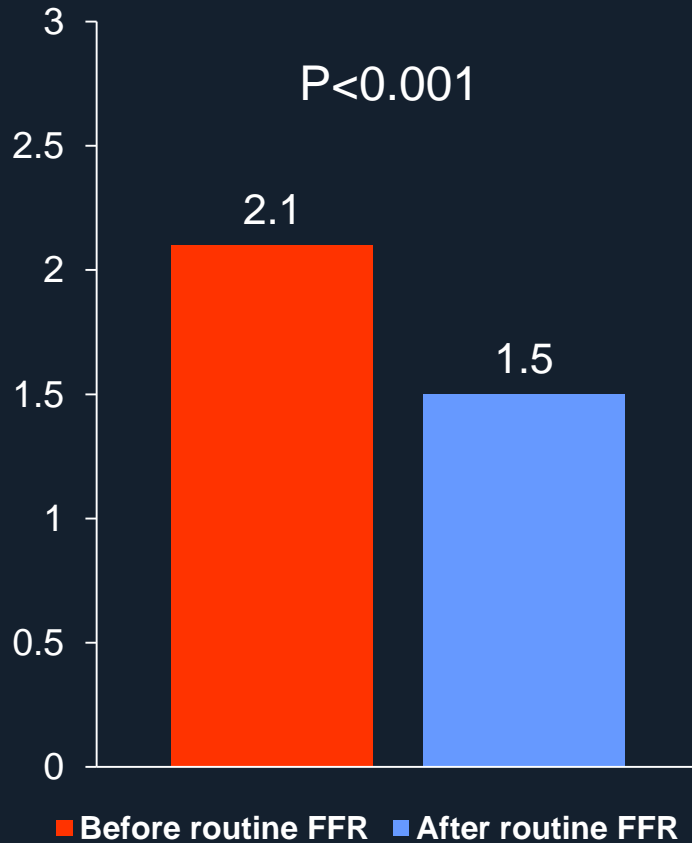
No. at Risk

	0	60	120	180	240	300	360
Before Routine Use	2178		2151		2095		2048
After Routine Use	2178		2136		2110		2083

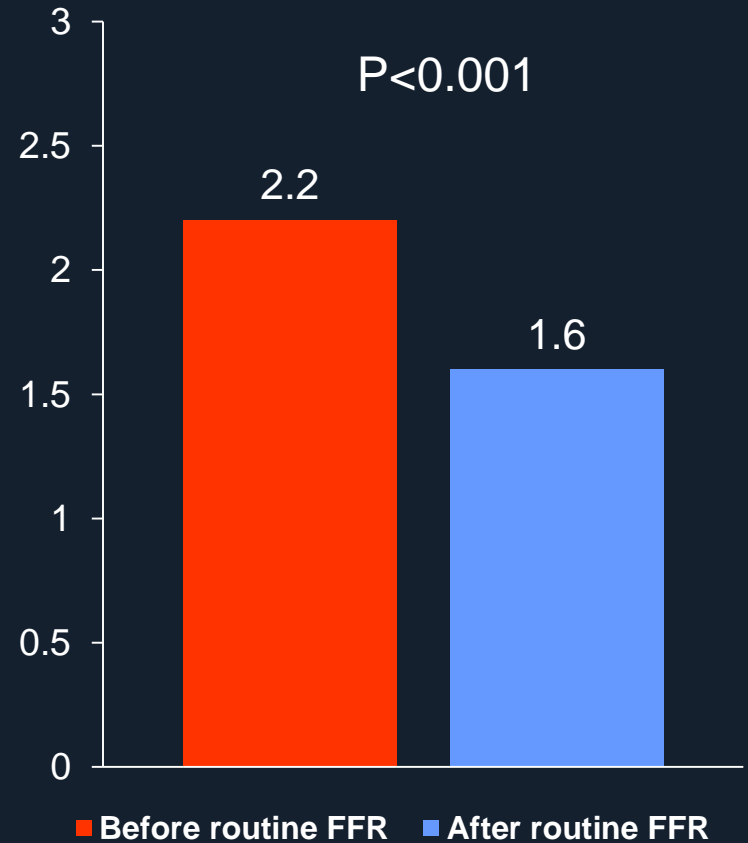
5 Year Follow-up Data

Number of Stent Used

Index PCI

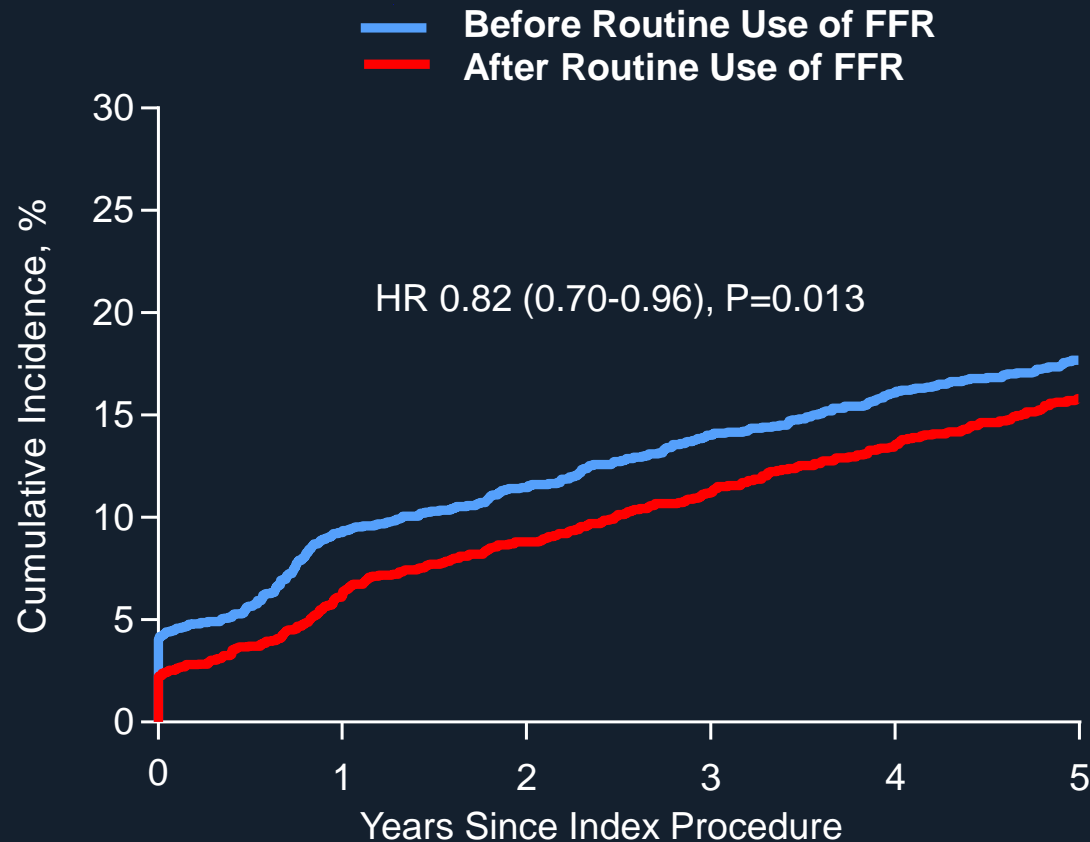


At 5 Years



Primary End Point

(Death, MI, or Repeat Revascularization)

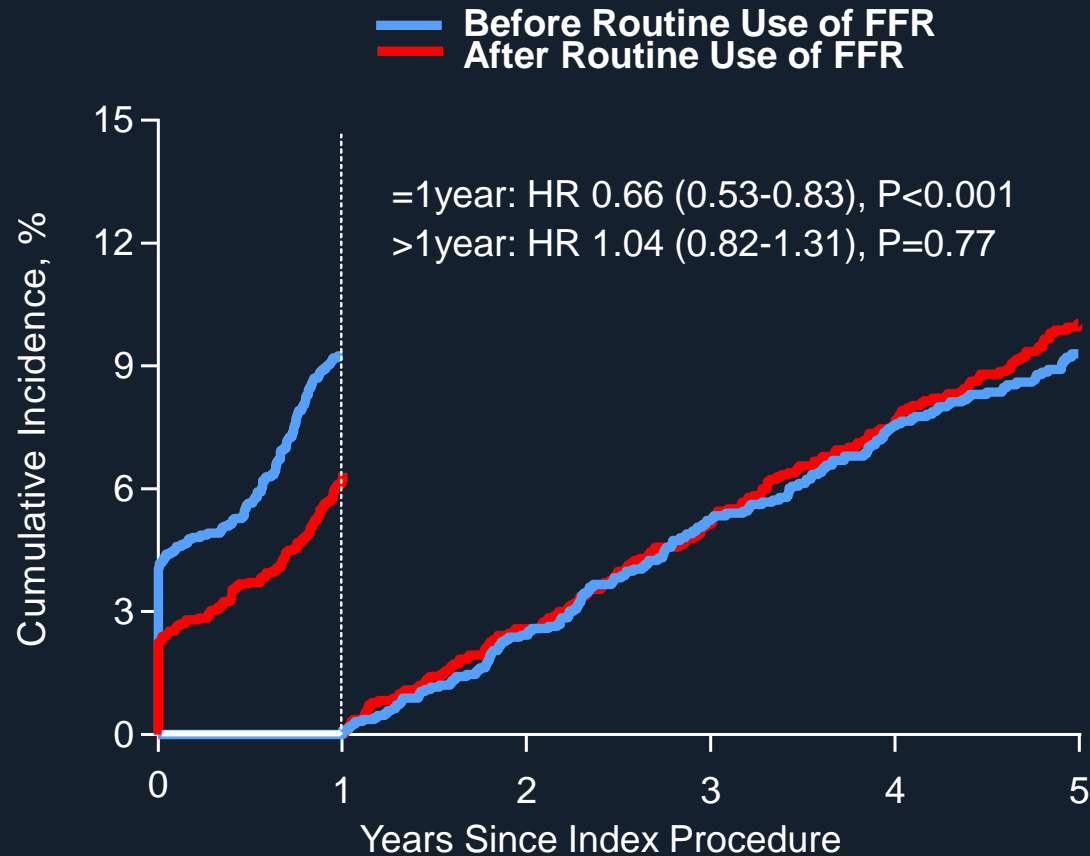


No. at Risk

Before Routine Use	2178	1965	1827	1735	1596	940
After Routine Use	2178	2035	1826	1722	1606	966

Primary End Point

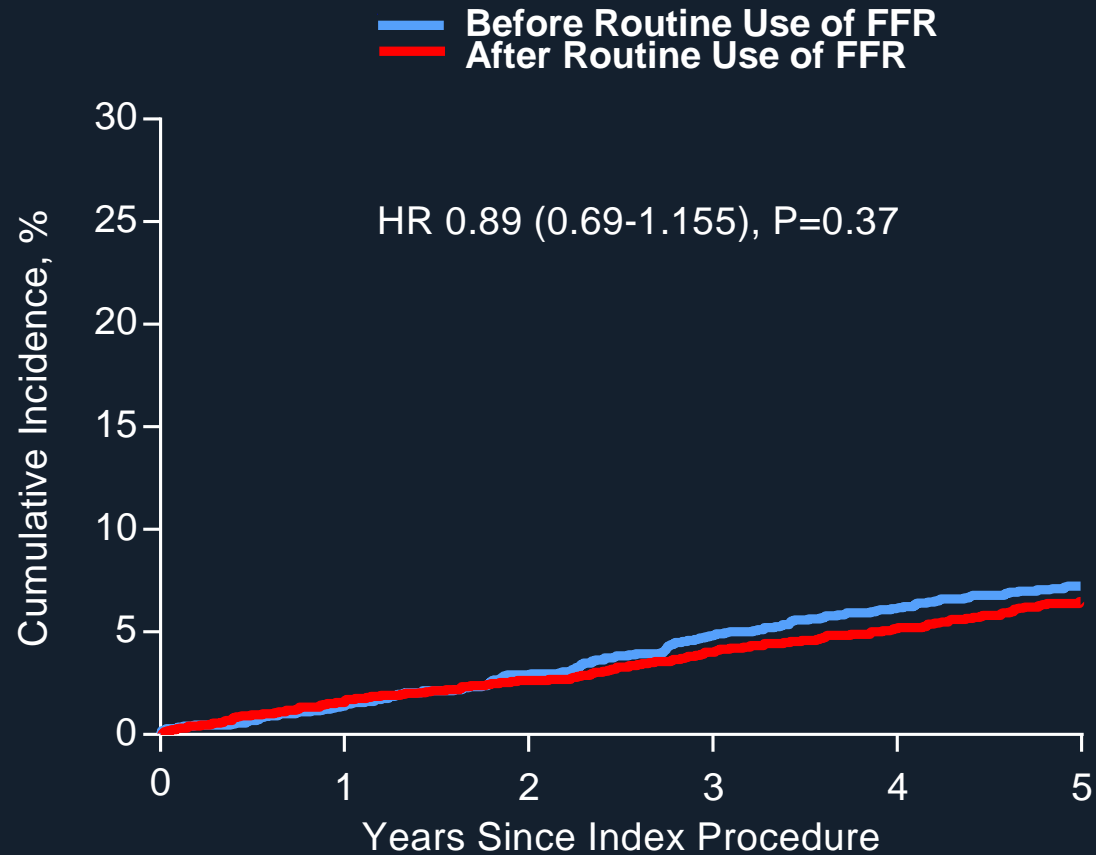
(Death, MI, or Repeat Revascularization)



No. at Risk

Before Routine Use	2178	1965	1827	1735	1596	940
After Routine Use	2178	2035	1826	1722	1606	966

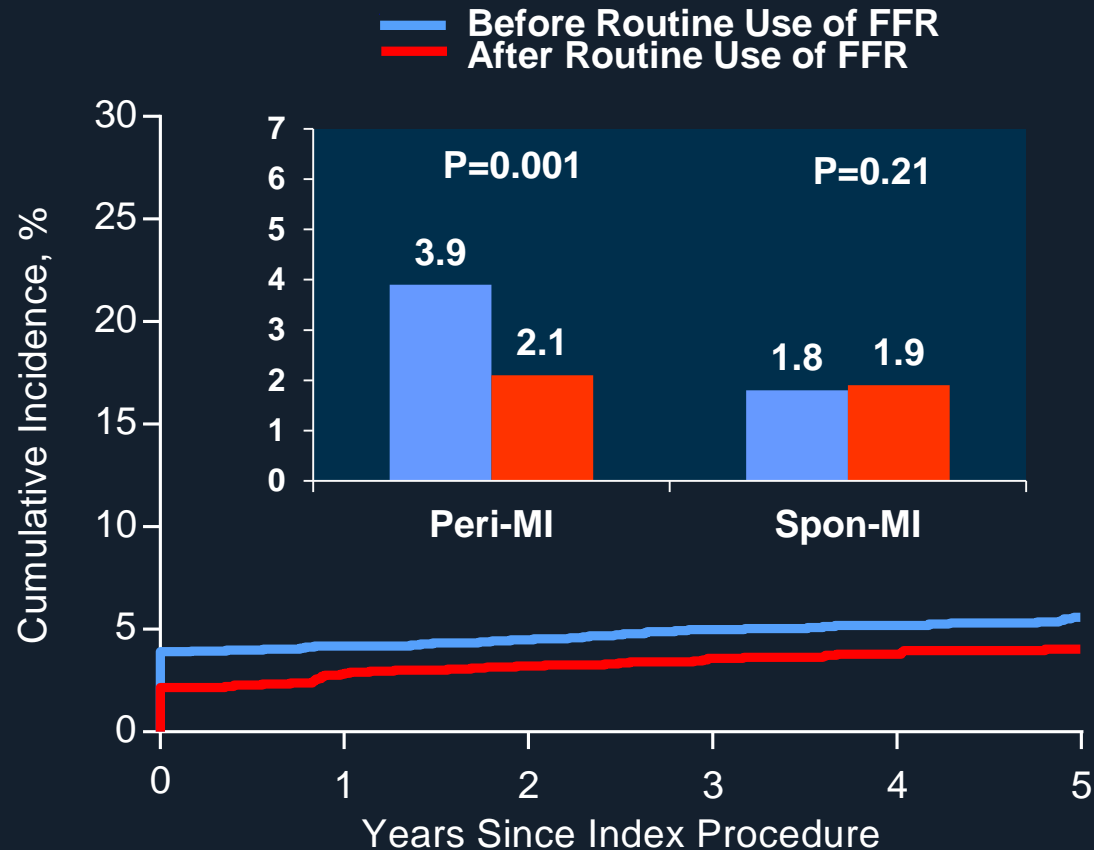
Death



No. at Risk

Before Routine Use	2178	2136	2006	1922	1787	1077
After Routine Use	2178	2135	1953	1862	1761	1089

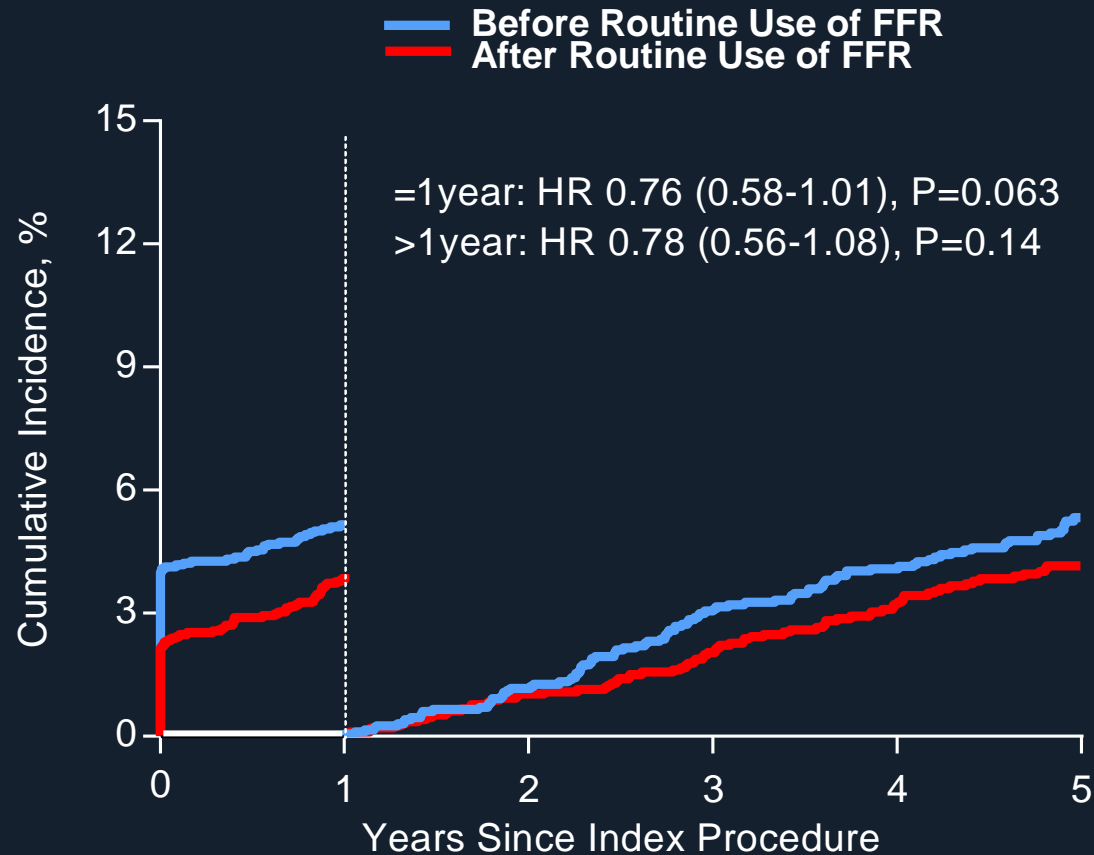
Myocardial Infarction



No. at Risk

Before Routine Use	2178	2045	1916	1828	1699	1014
After Routine Use	2178	2078	1893	1804	1705	1046

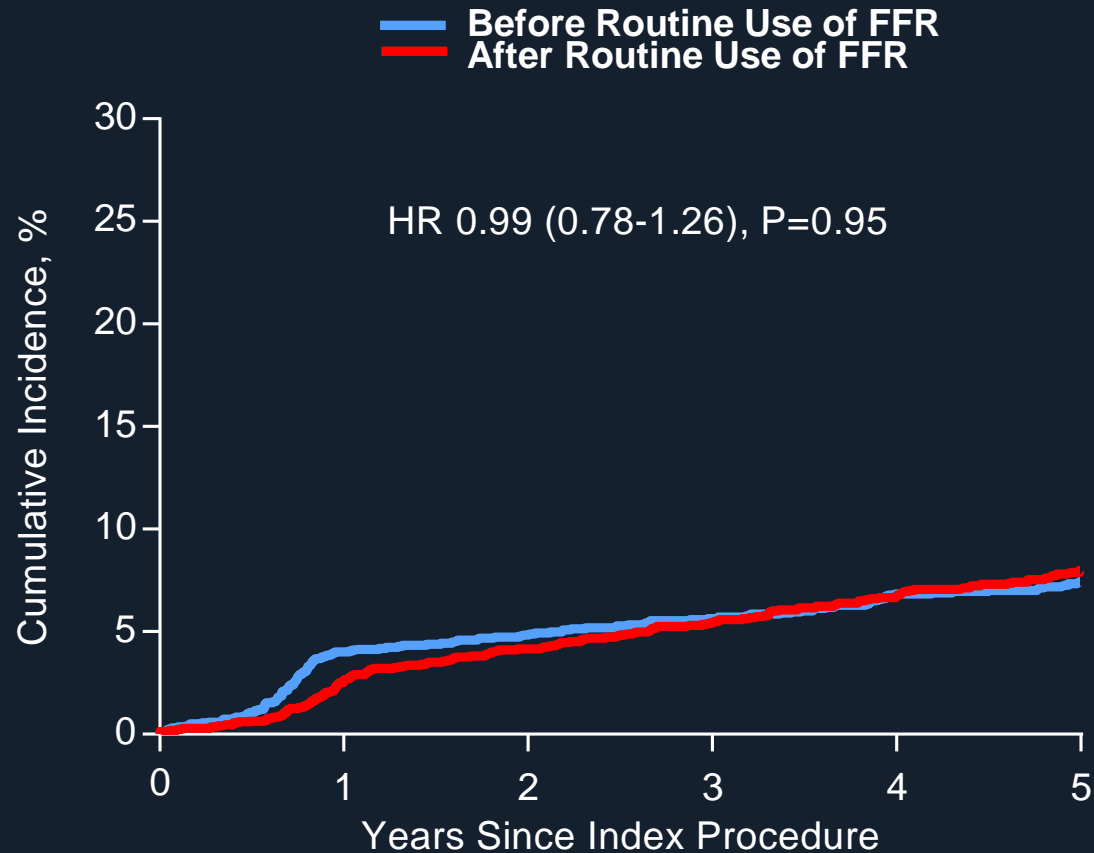
Cardiac Death or MI



No. at Risk

Before Routine Use	2178	2045	1916	1828	1699	1014
After Routine Use	2178	2078	1893	1804	1705	1046

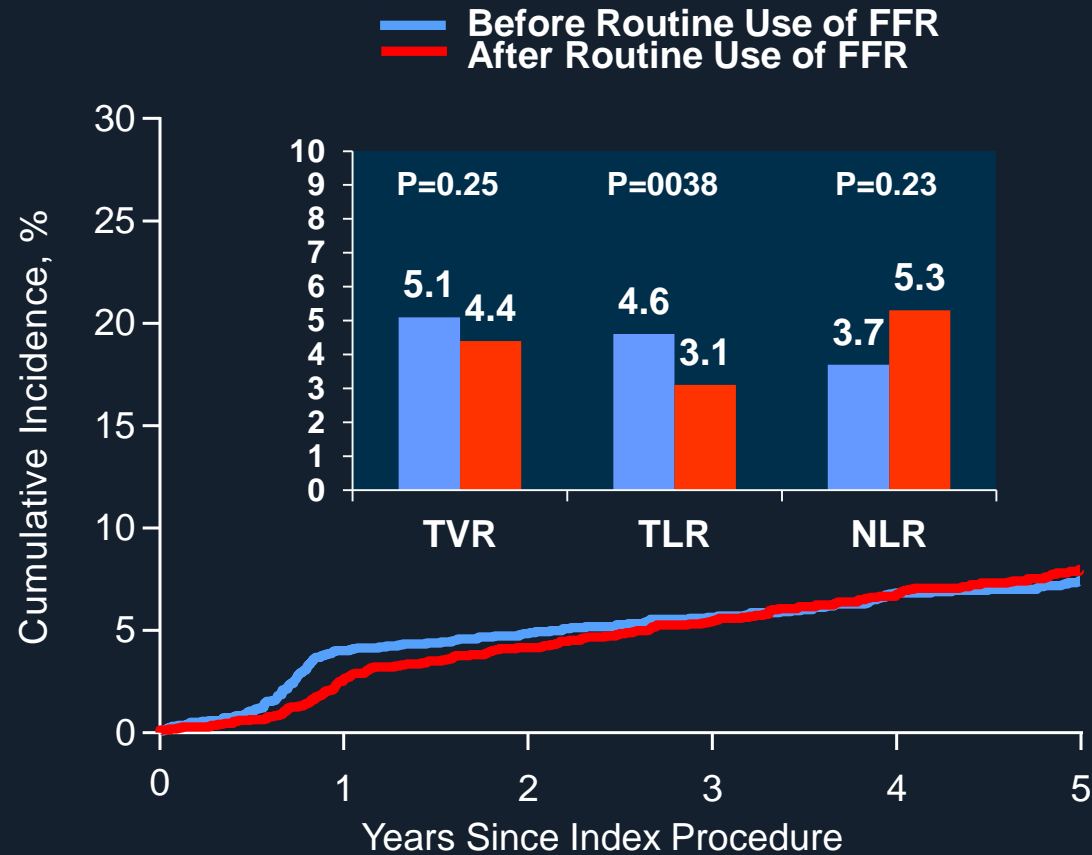
Repeat Revascularization



No. at Risk

Before Routine Use	2178	2050	1908	1814	1665	986
After Routine Use	2178	2083	1871	1764	1646	994

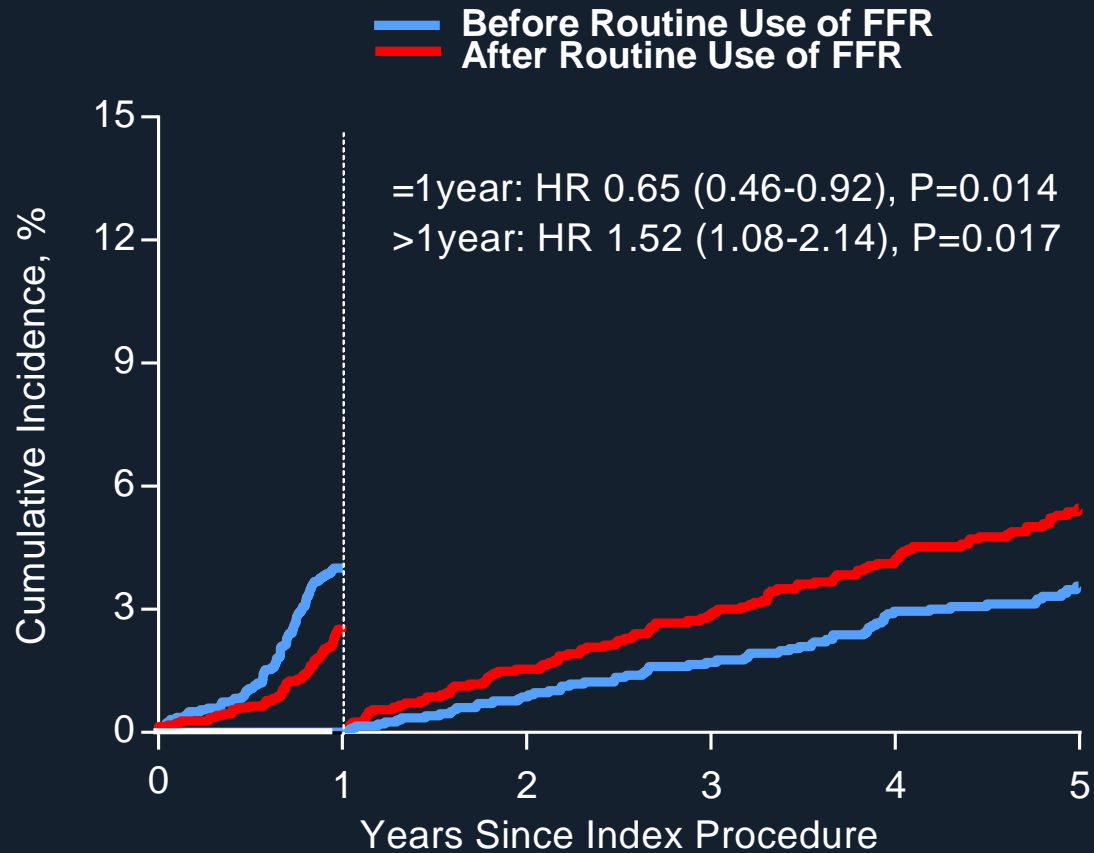
Repeat Revascularization



No. at Risk

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After Routine Use	2178	2083	1871	1764	1646	994

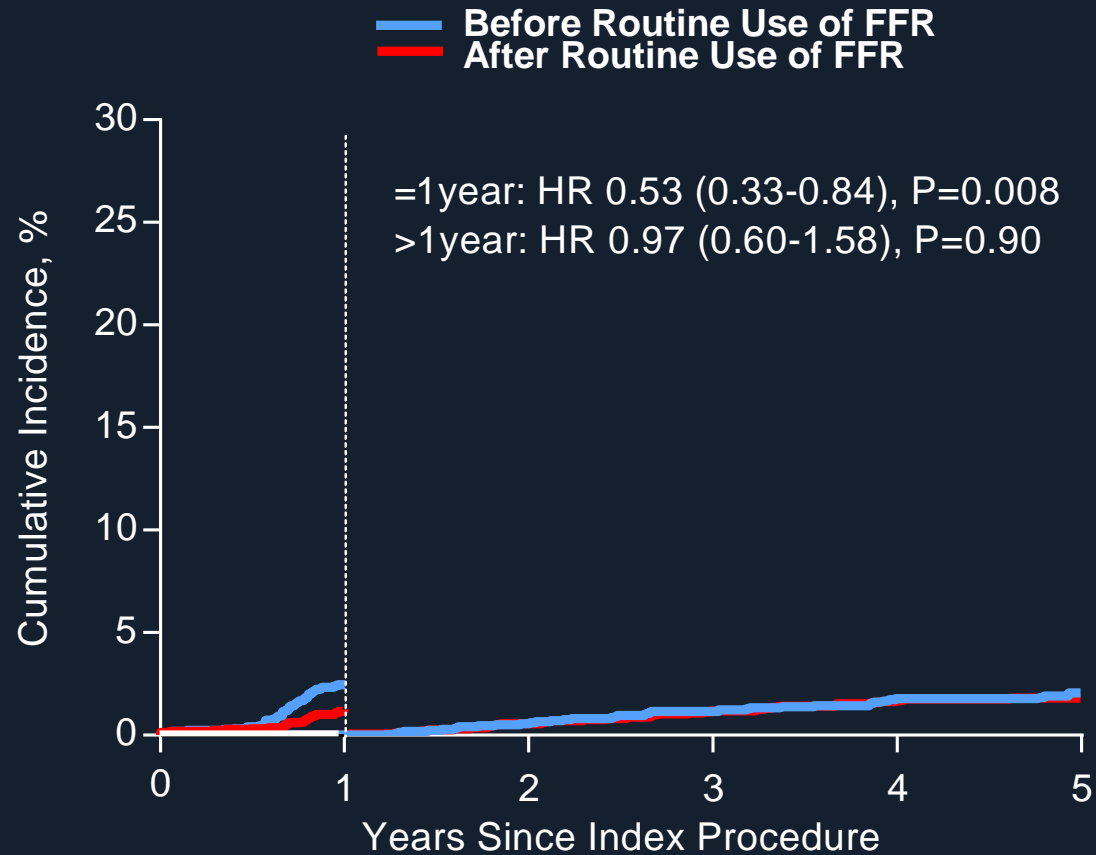
Repeat Revascularization



No. at Risk

Before Routine Use	2178	2050	1908	1814	1665	986
After Routine Use	2178	2083	1871	1764	1646	994

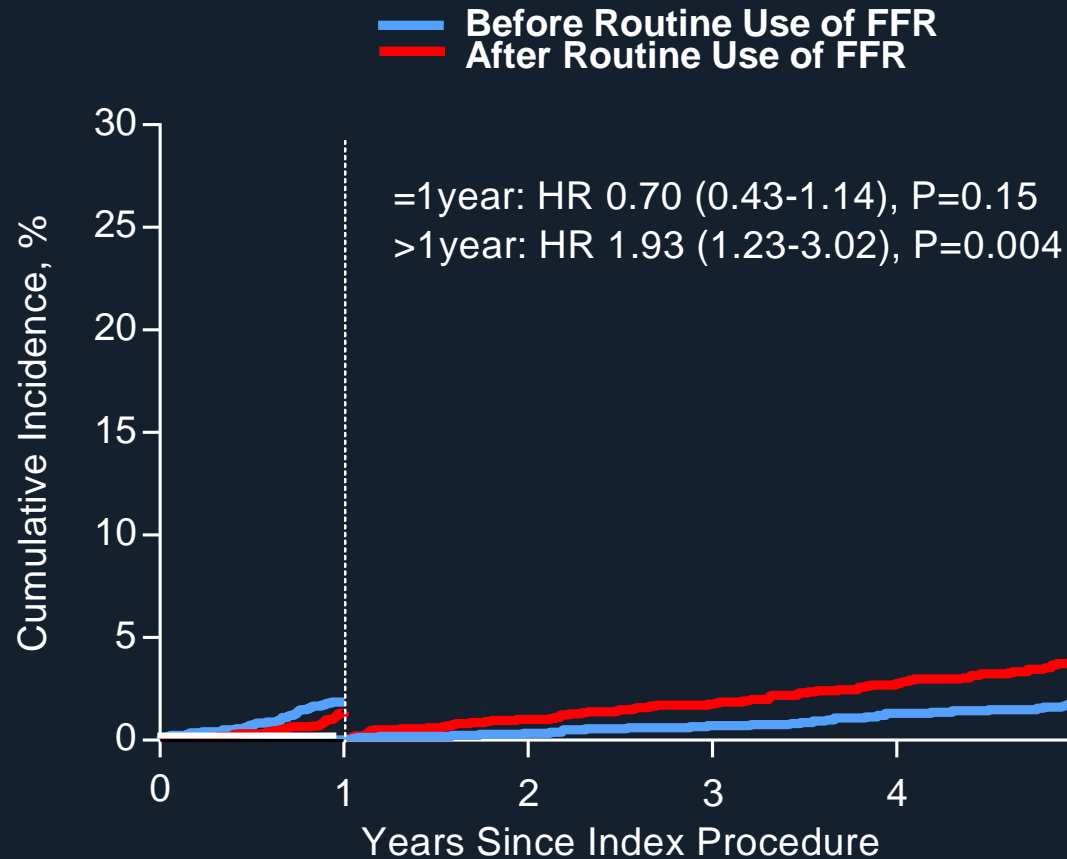
Target Lesion Revascularization



No. at Risk

Before Routine Use	2178	2083	1946	1852	1708	1020
After Routine Use	2178	2110	1917	1821	1715	1055

New Lesion Revascularization



No. at Risk

Before Routine Use	2178	2096	1962	1875	1735	1035
After Routine Use	2178	2108	1906	1803	1689	1024

Summary

- At 5 years, the cohort after *routine FFR use* was *associated with a significantly lower risk of major adverse cardiac events* compared with those before routine FFR use.
- An early increased risk of target lesion revascularization was observed in the cohort before routine FFR use, *which was offset by a late increased risk of new lesion revascularization in the cohort after routine FFR use.*

ASAN LM & 3VD Registry

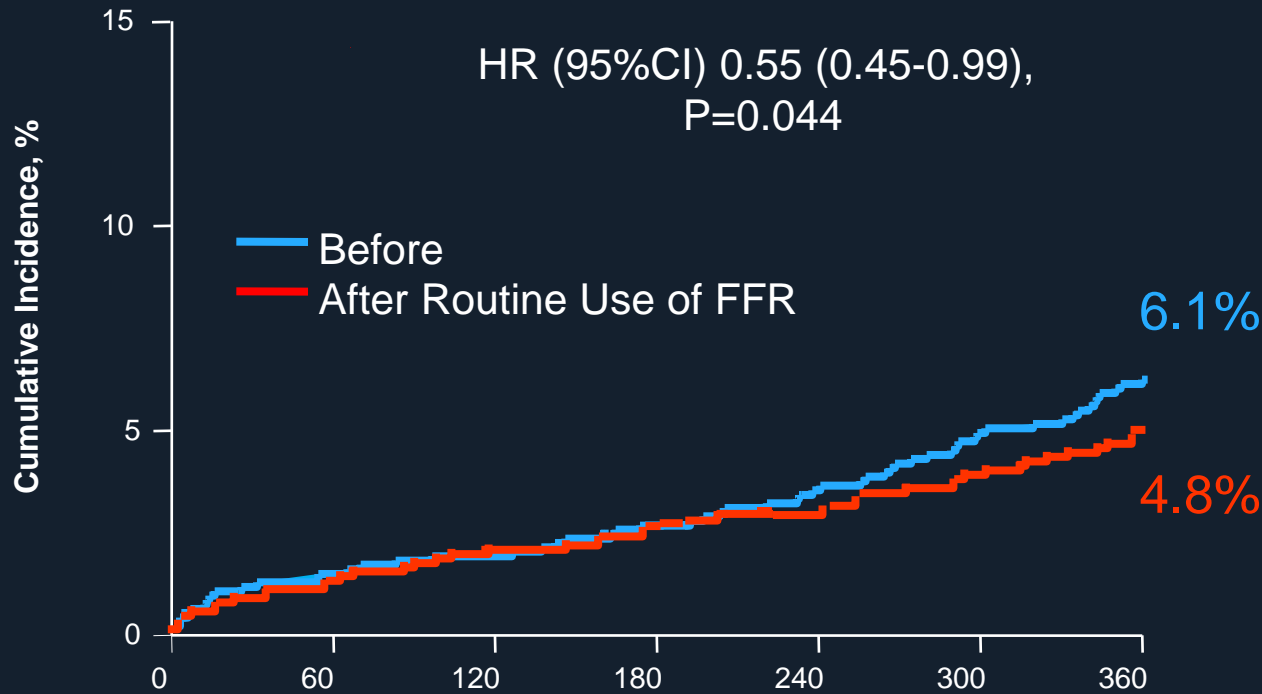
PCI: 1229 Patients

CABG: 1264 Patients

Medication: 119 Patients

Ahn JM, Park SJ et al. Am J Cardiol 2015;116:1163-1171

Improved Clinical Outcomes of LM and 3 VD Treatment Death /MI /Stroke or Repeat Revascularization



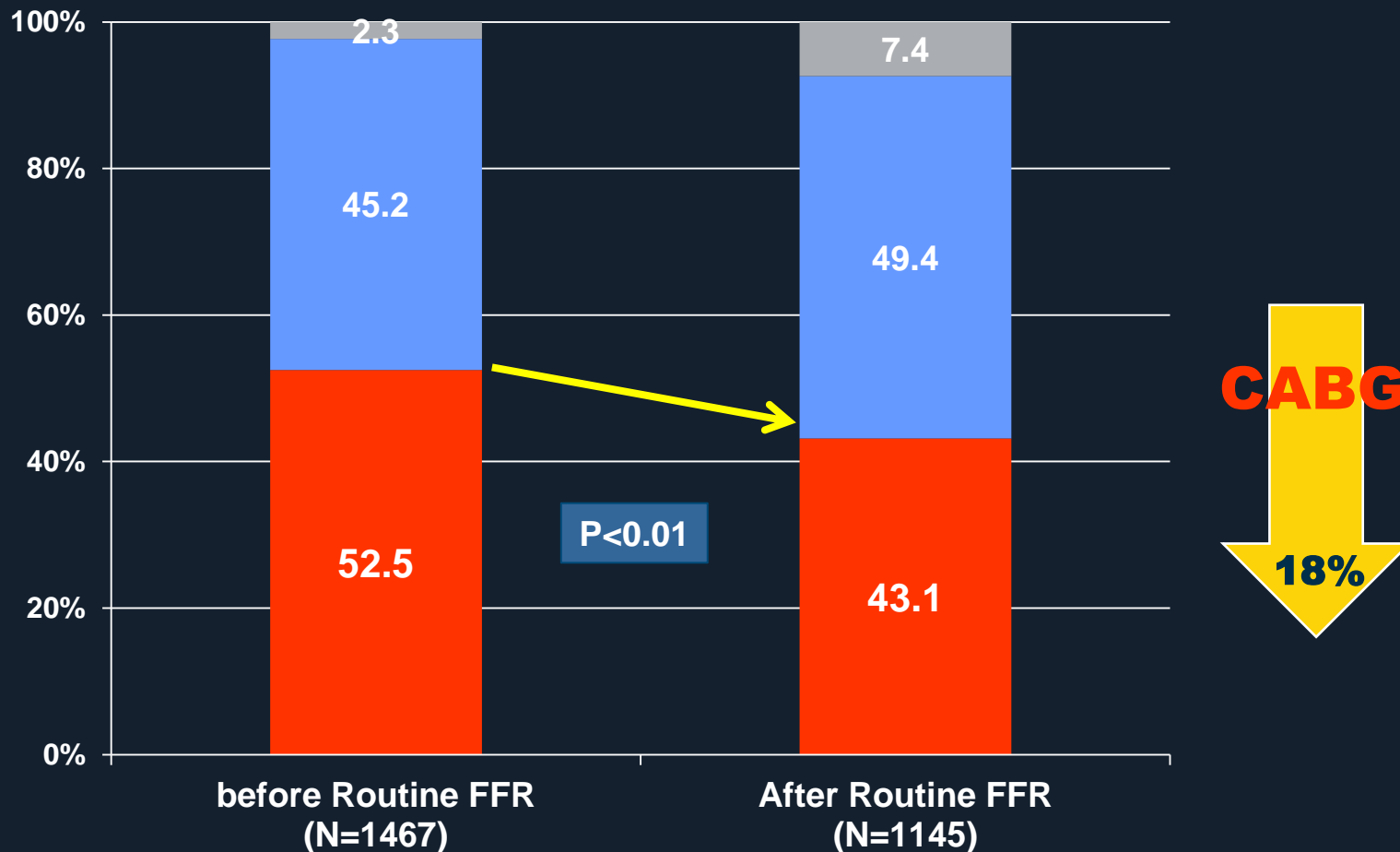
No. at Risk

Days Since Procedure

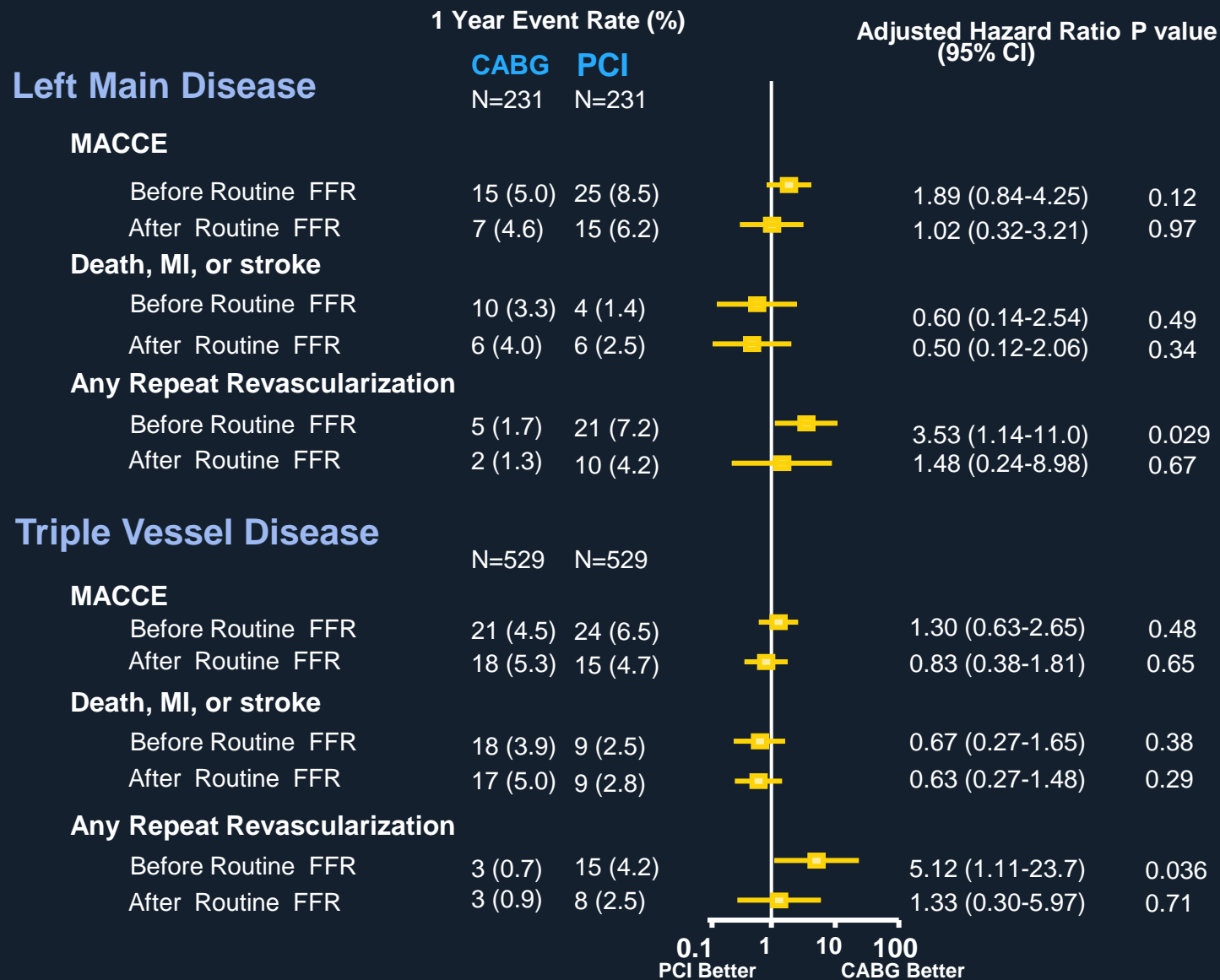
	0	60	120	180	240	300	360
Before Routine Use	917	901	883	857			
After Routine Use	917	898	886	869			

Decreased CABG

CABG **PCI** **DEFER**



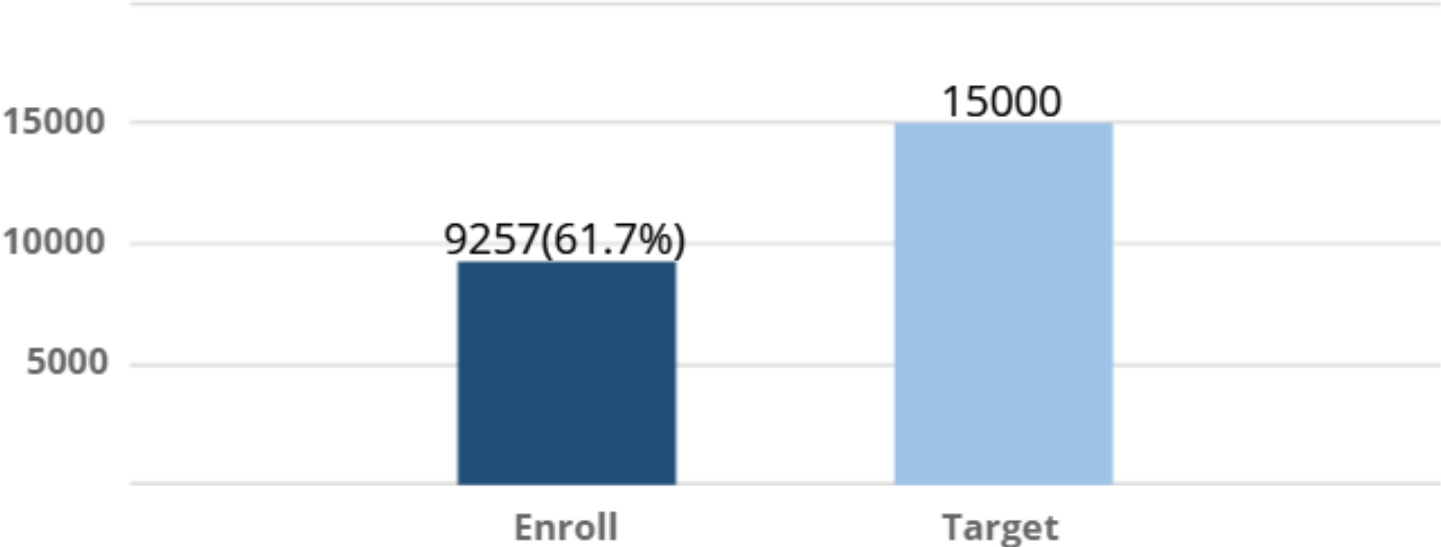
Subgroup Analysis



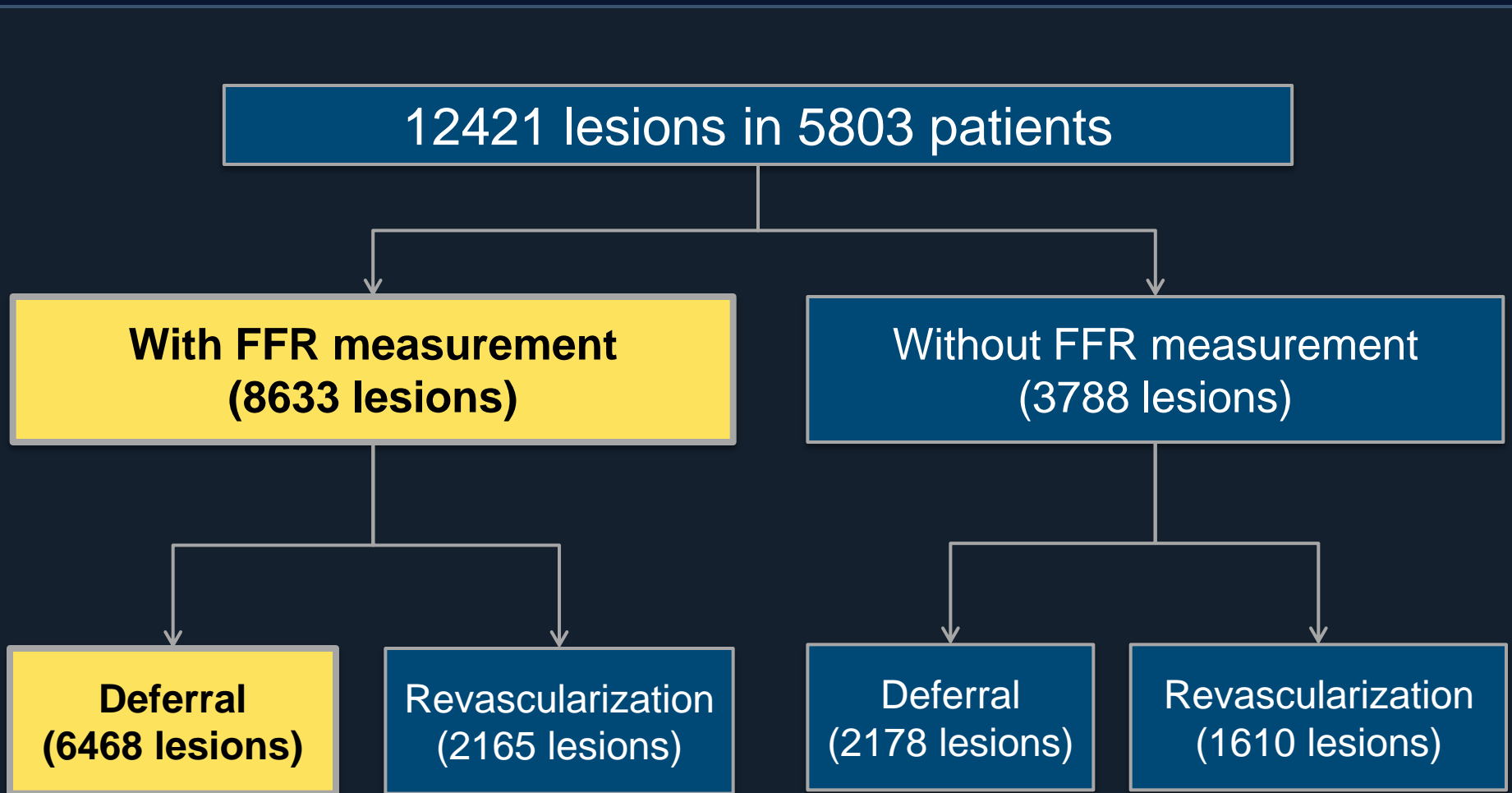
Conclusion

- *PCI with DES after routine use of FFR showed similar clinical outcomes with concurrent CABG at 1 year* in patients with left main or three vessel disease.

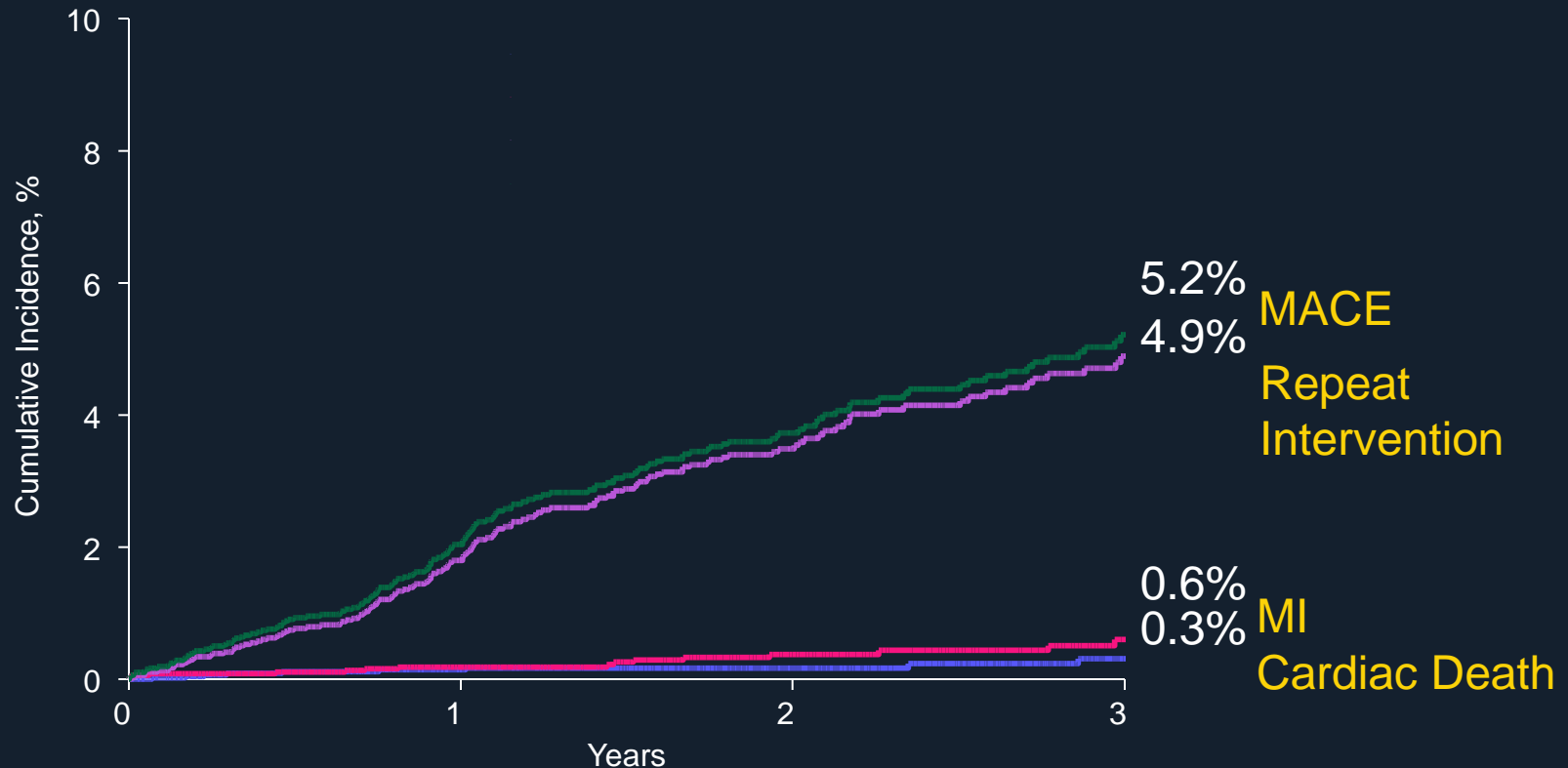
IRIS FFR Registry (2018.4)



IRIS FFR Registry (2009.8-2015.8)

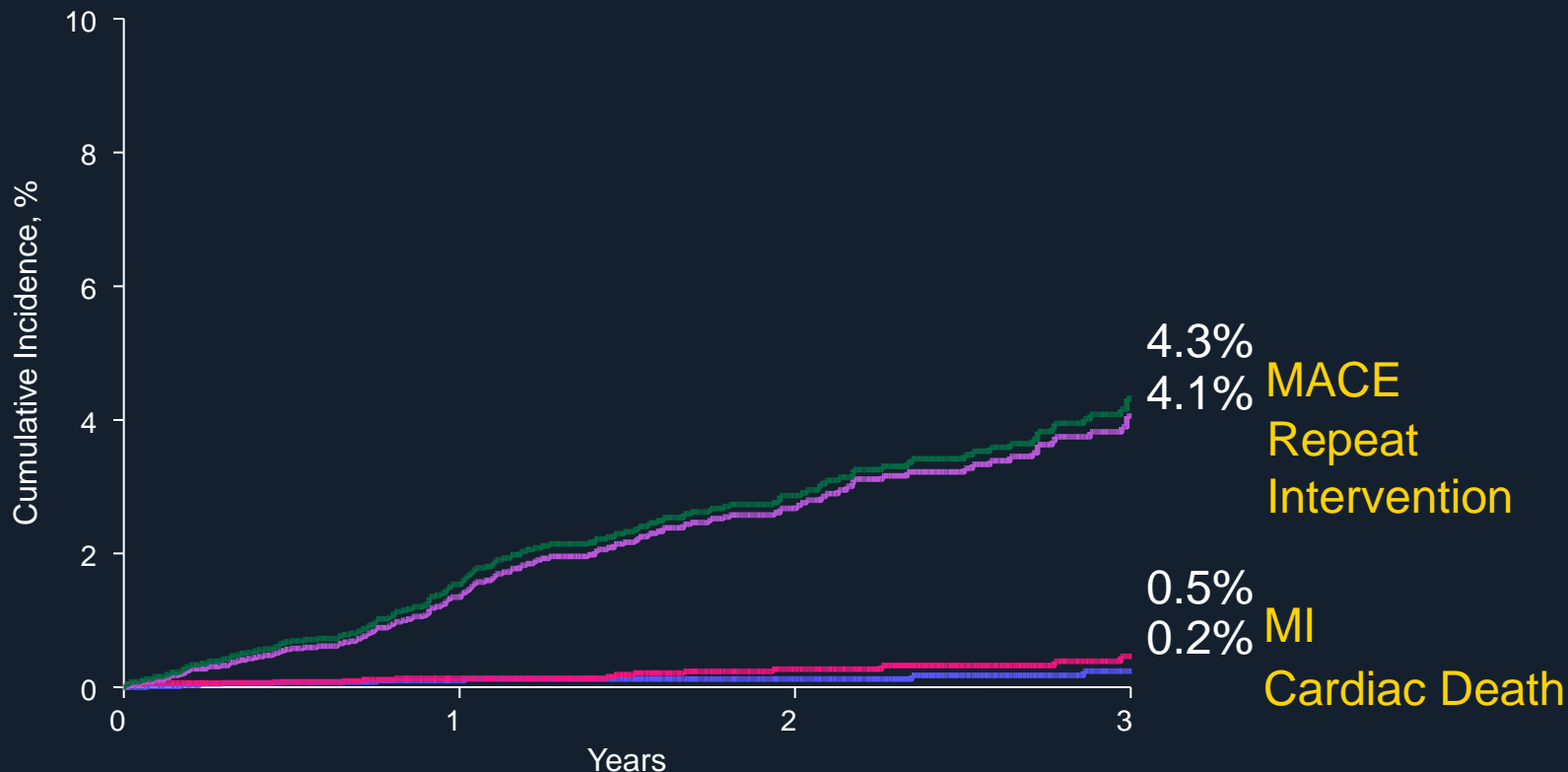


Deferred Lesion Outcome at 3 Year (per Patient)



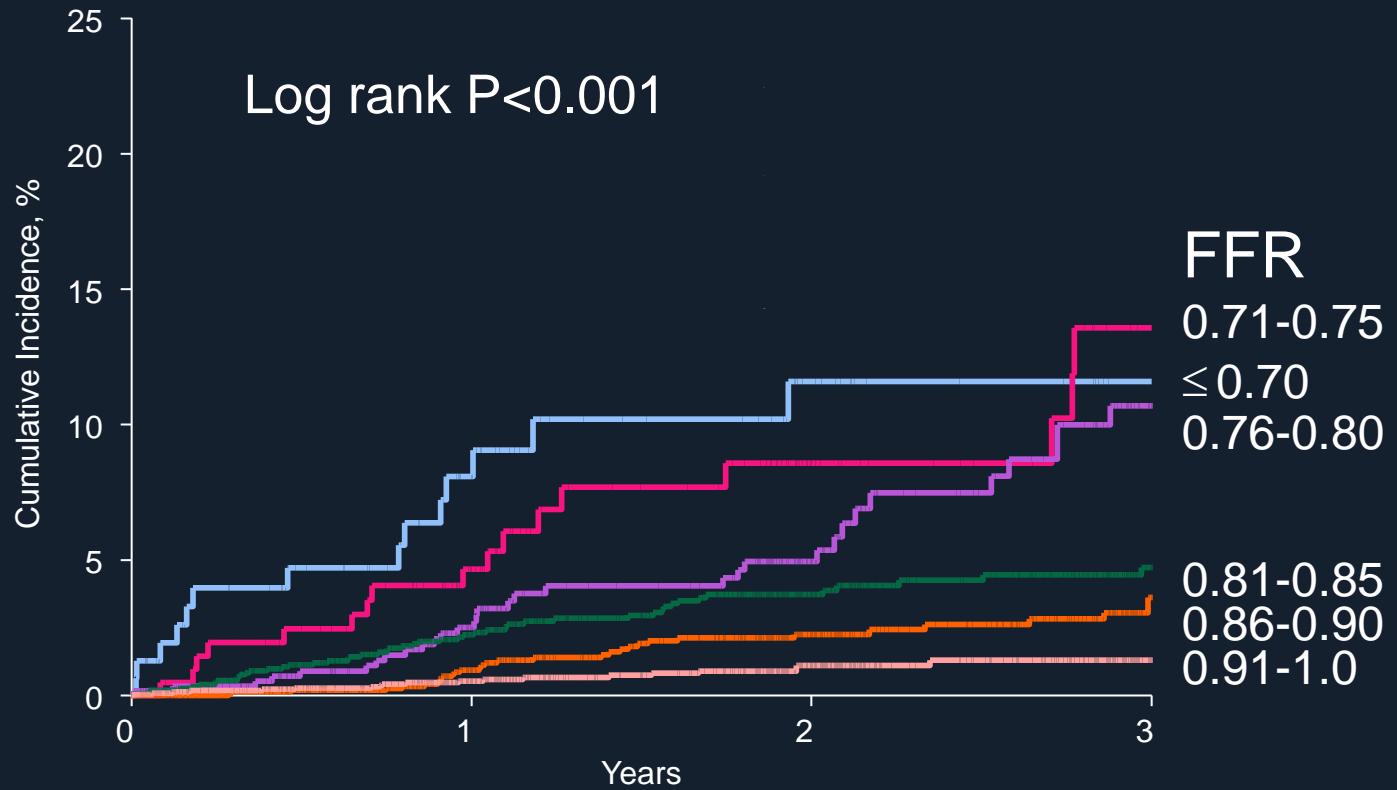
	0	1	2	3
Cardiac Death	4608	3393	2069	1036
Myocardial Infarction	4608	3445	2107	1059
Repeat Intervention	4608	3337	1998	987
MACE	4608	3333	1996	987

Deferred Lesion Outcome at 3 Year (per Lesion)



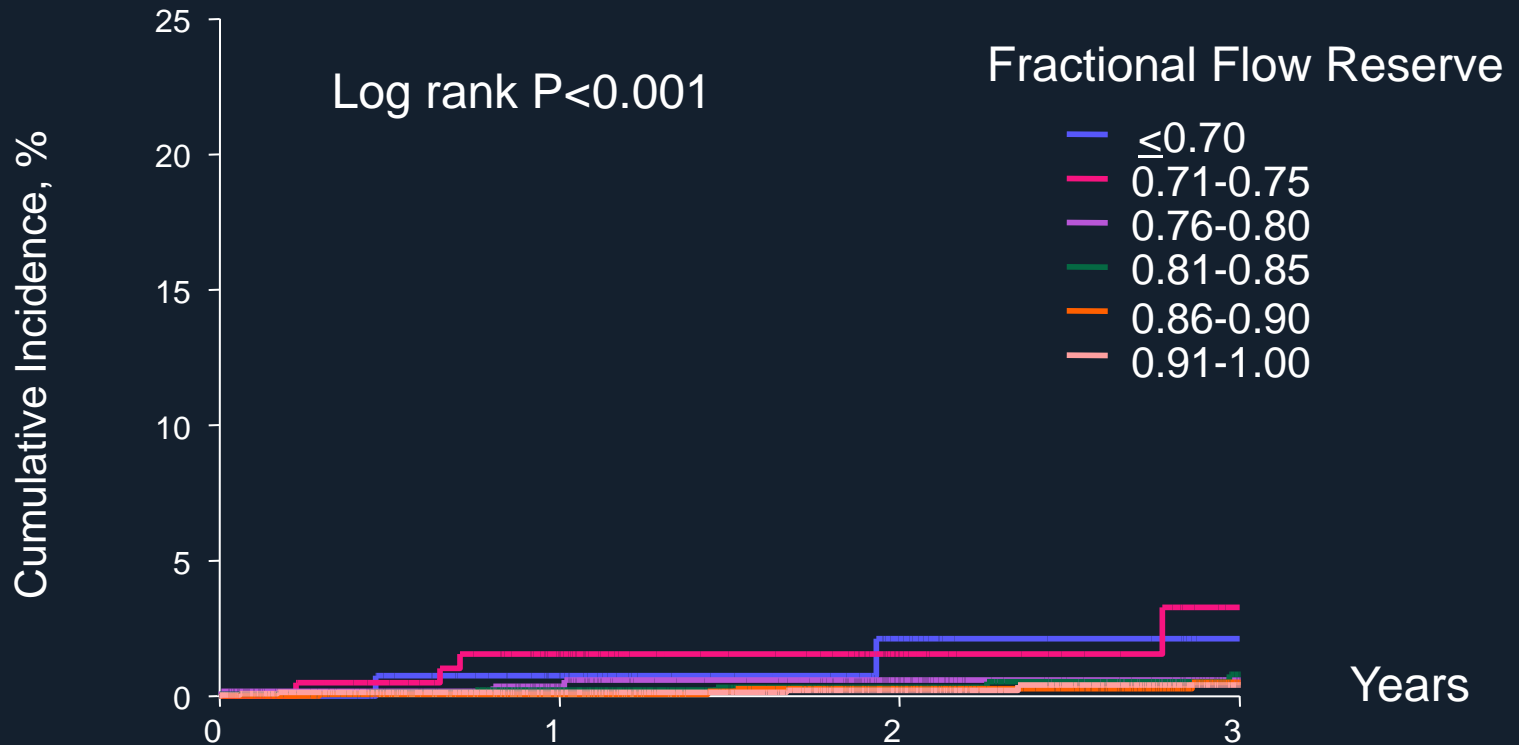
	0	1	2	3
Cardiac Death	6468	4745	2675	1229
Myocardial Infarction	6468	4740	2669	1225
Repeat Intervention	6468	4685	2599	1174
MACE	6468	4681	2597	1174

Deferred Lesion Failure



FFR	0	1	2	3
≤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

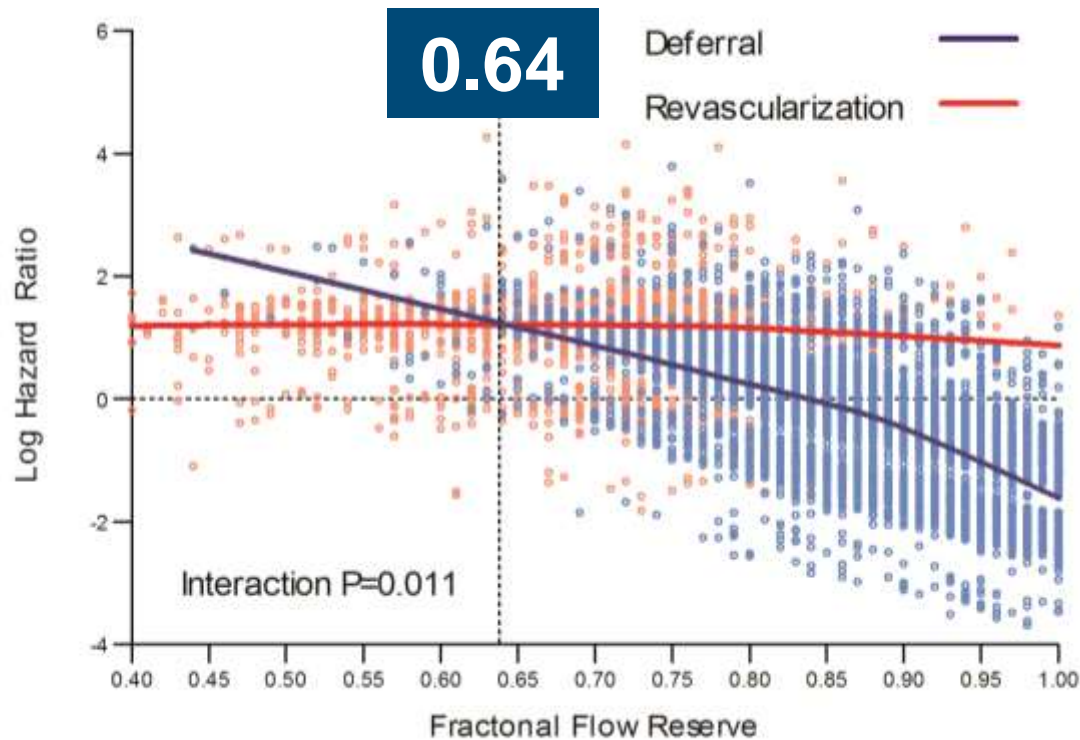
Cardiac Death or MI



≤0.70	156	109	60	27
0.71-0.75	212	160	78	45
0.76-0.80	596	440	253	126
0.81-0.85	1510	1109	682	350
0.86-0.90	1665	1220	708	348
0.91-1.0	2328	1703	888	333

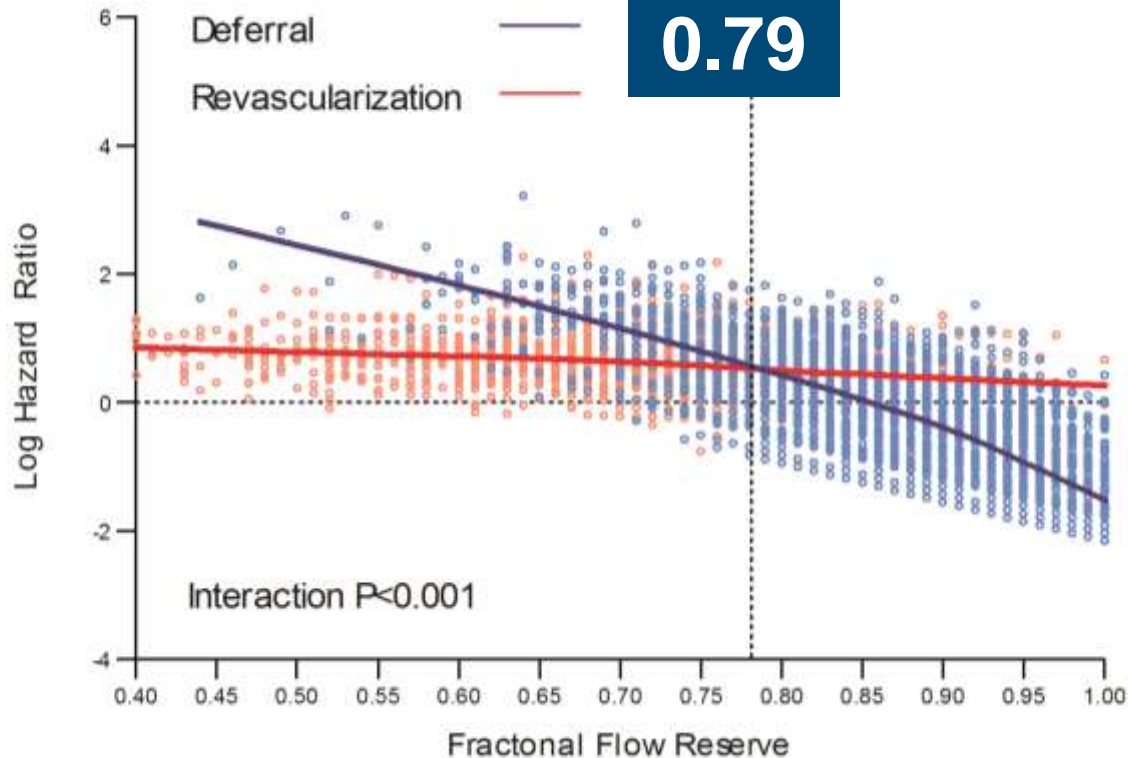
Outcome Derived Revascularization Threshold of FFR

Cardiac Death or MI



Outcome Derived Revascularization Threshold of FFR

Major Adverse Cardiac Events

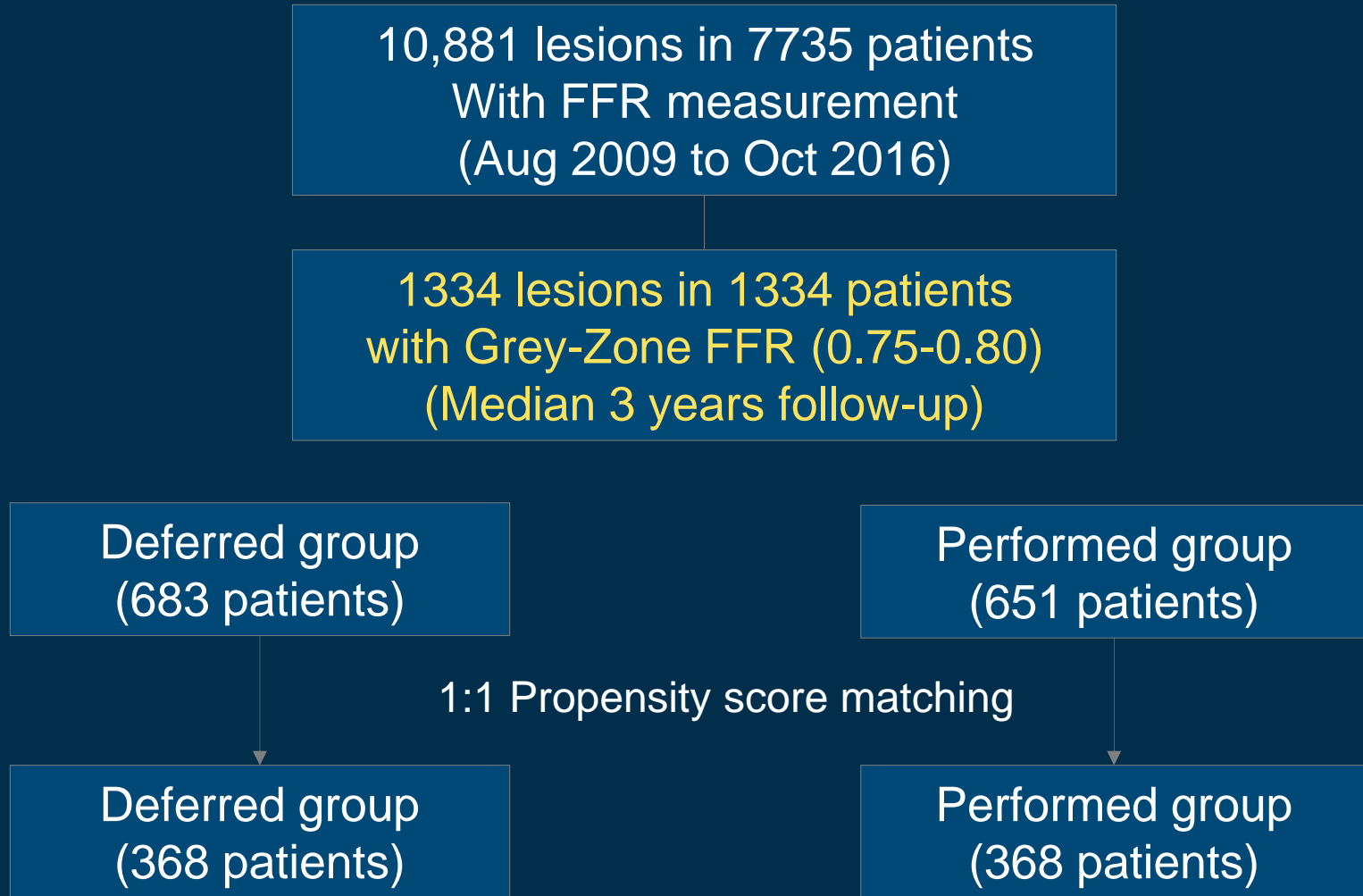


Conclusion

- 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 0.79.

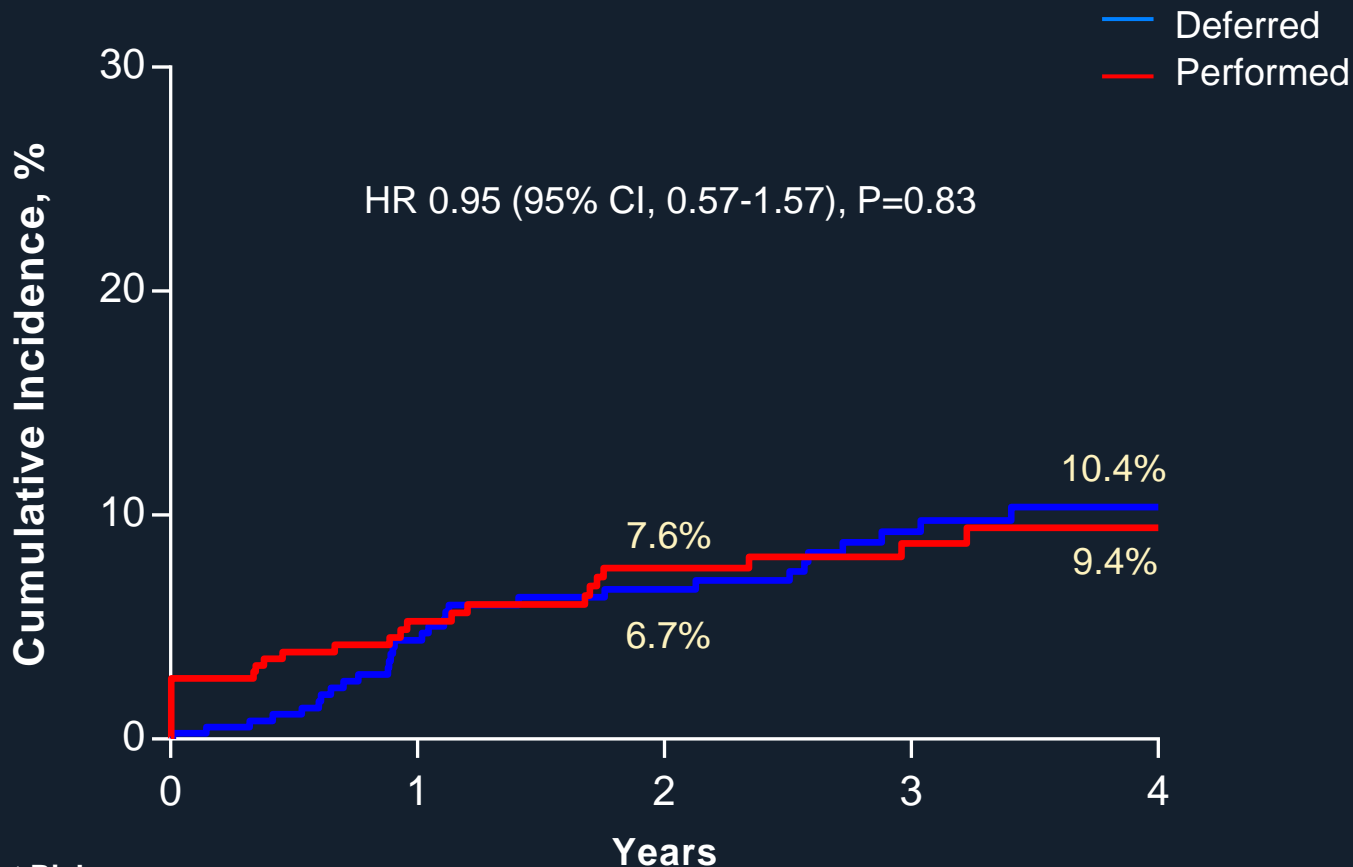
To Treat or Not To Treat ?
Grey-zone FFR (0.76~0.80)
From IRIS FFR Registry

Study Flow



Primary End Point

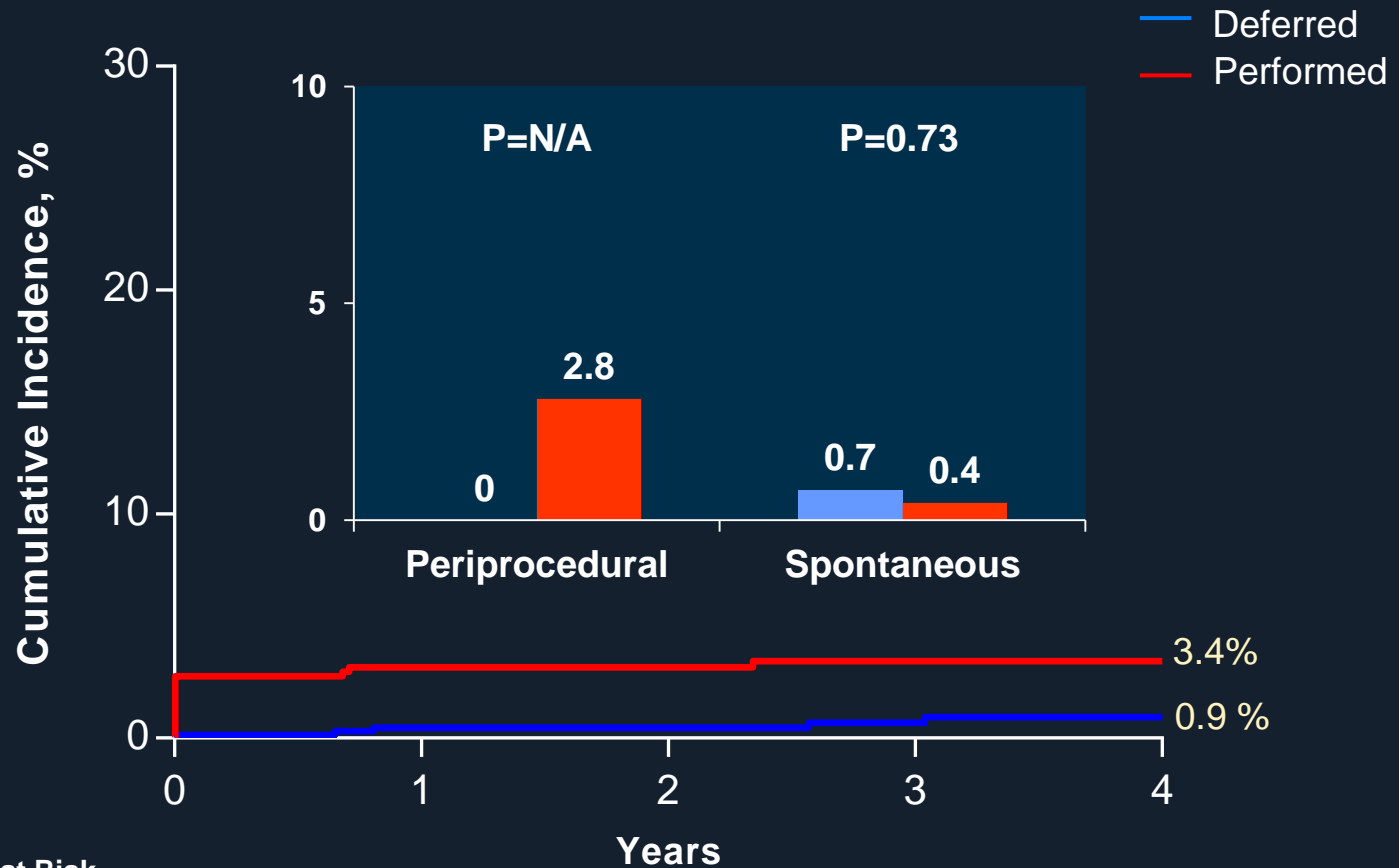
Death, TV-MI, Target Vessel Revascularization



No. at Risk

	0	1	2	3	4
Deferred	368	308	249	186	99
Performed	368	263	204	144	84

Myocardial Infarction

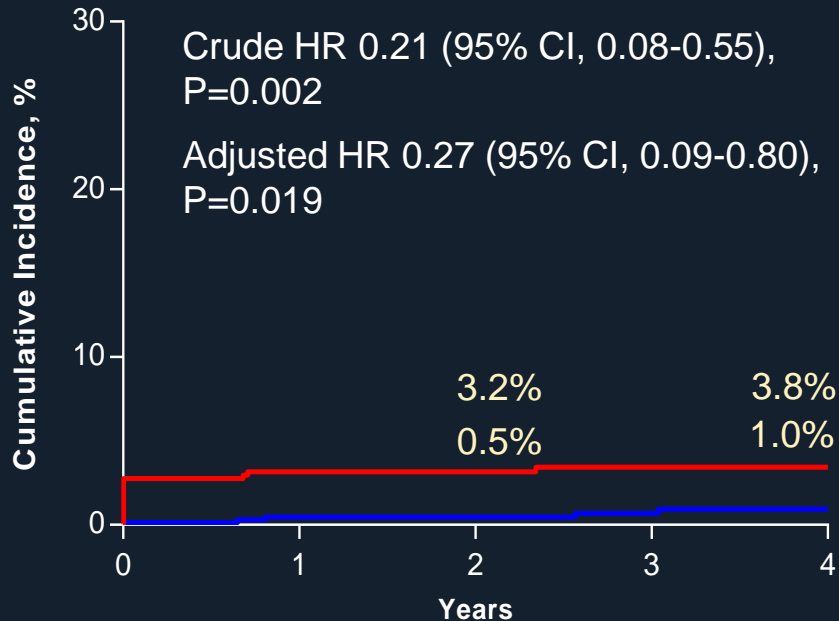


No. at Risk

Deferred	683	606	514	387	188
Performed	651	452	353	261	156

Myocardial Infarction

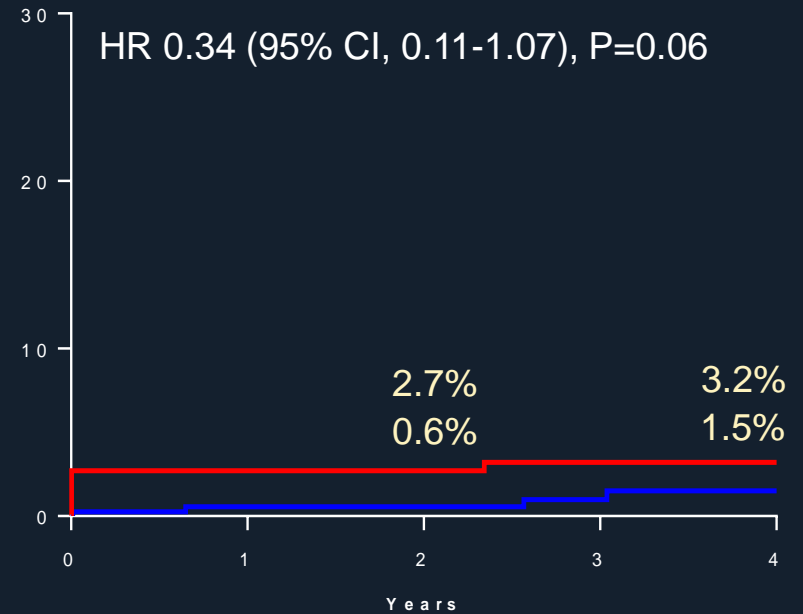
Overall Population



No. at Risk

	0	1	2	3	4
Deferred	683	606	514	387	188
Performed	651	452	353	261	156

Matched Population



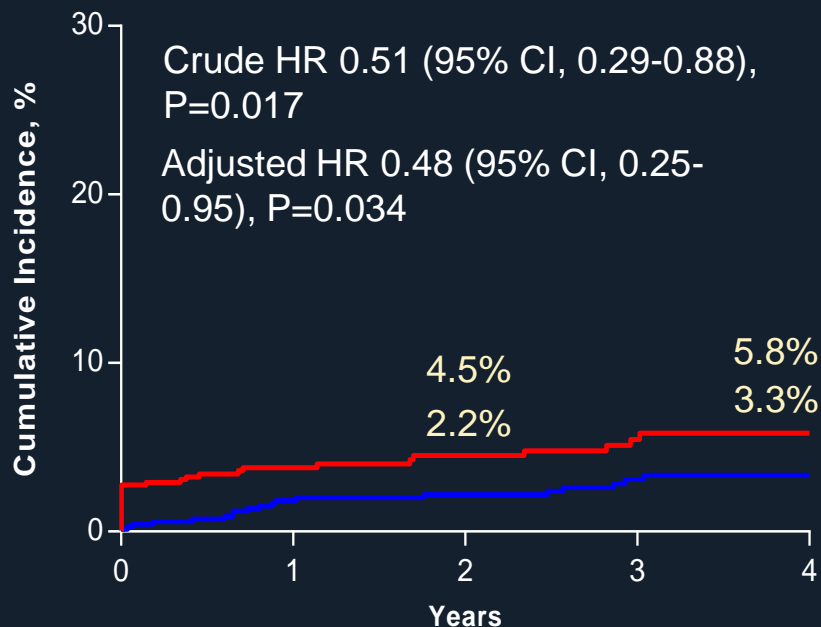
No. at Risk

	0	1	2	3	4
Deferred	368	318	260	200	109
Performed	368	264	210	151	89

Death and Myocardial Infarction

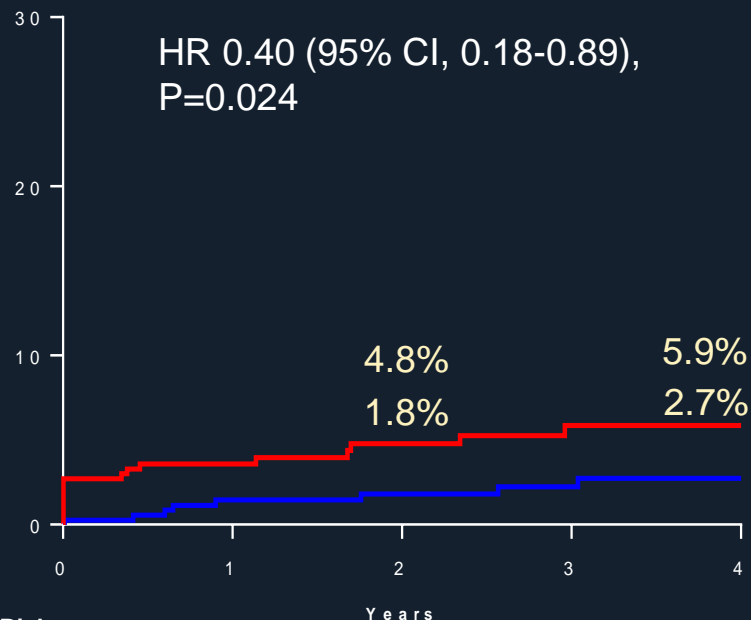
— Deferred
— Performed

Overall Population



No. at Risk	Years				
	0	1	2	3	4
Deferred	683	606	514	388	189
Performed	651	460	358	260	154

Matched Population

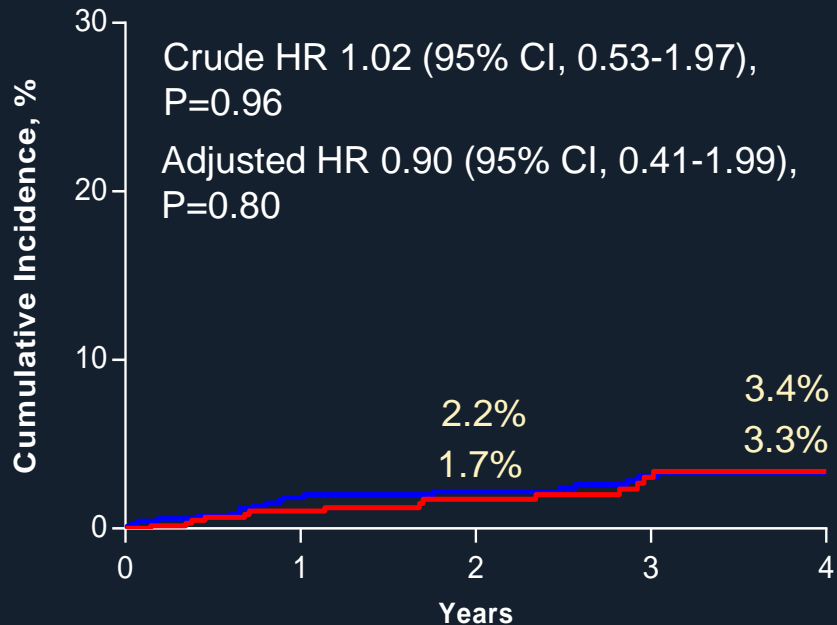


No. at Risk	Years				
	0	1	2	3	4
Deferred	368	317	260	200	109
Performed	368	268	212	150	87

Death and Spontaneous MI

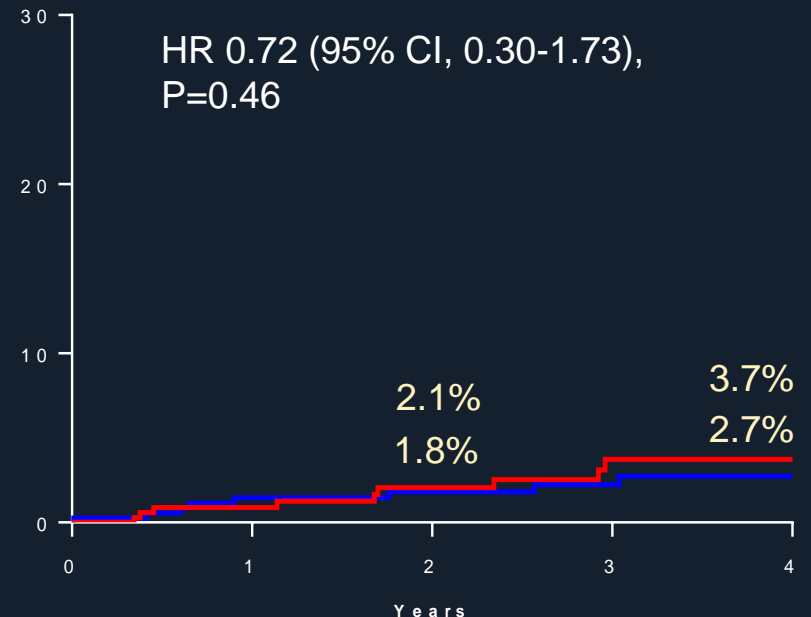
— Deferred
— Performed

Overall Population



No. at Risk	Years				
	0	1	2	3	4
Deferred	683	607	515	387	189
Performed	651	475	372	272	162

Matched Population

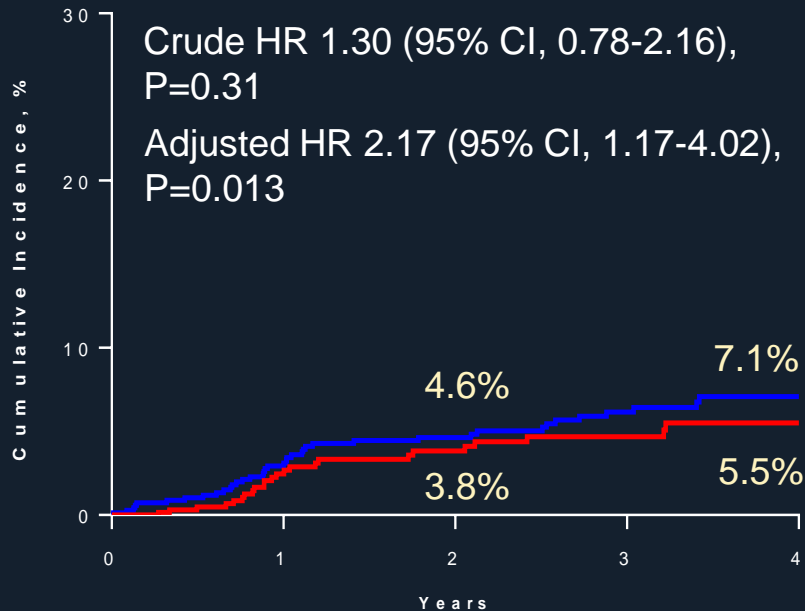


No. at Risk	Years				
	0	1	2	3	4
Deferred	368	318	260	200	109
Performed	368	276	219	154	90

Target Vessel Revascularization

— Deferred
— Performed

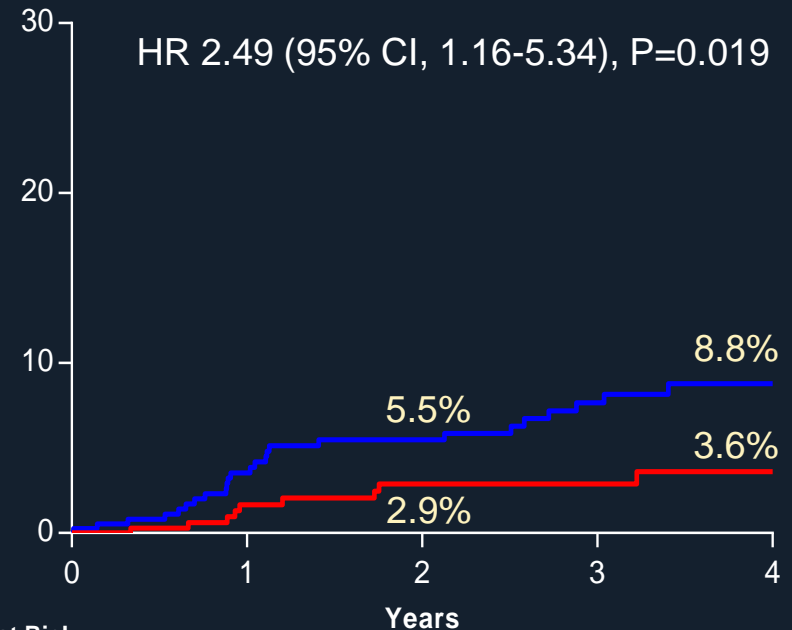
Overall Population



No. at Risk

	0	1	2	3	4
Deferred	683	592	494	362	171
Performed	651	463	356	259	151

Matched Population



No. at Risk

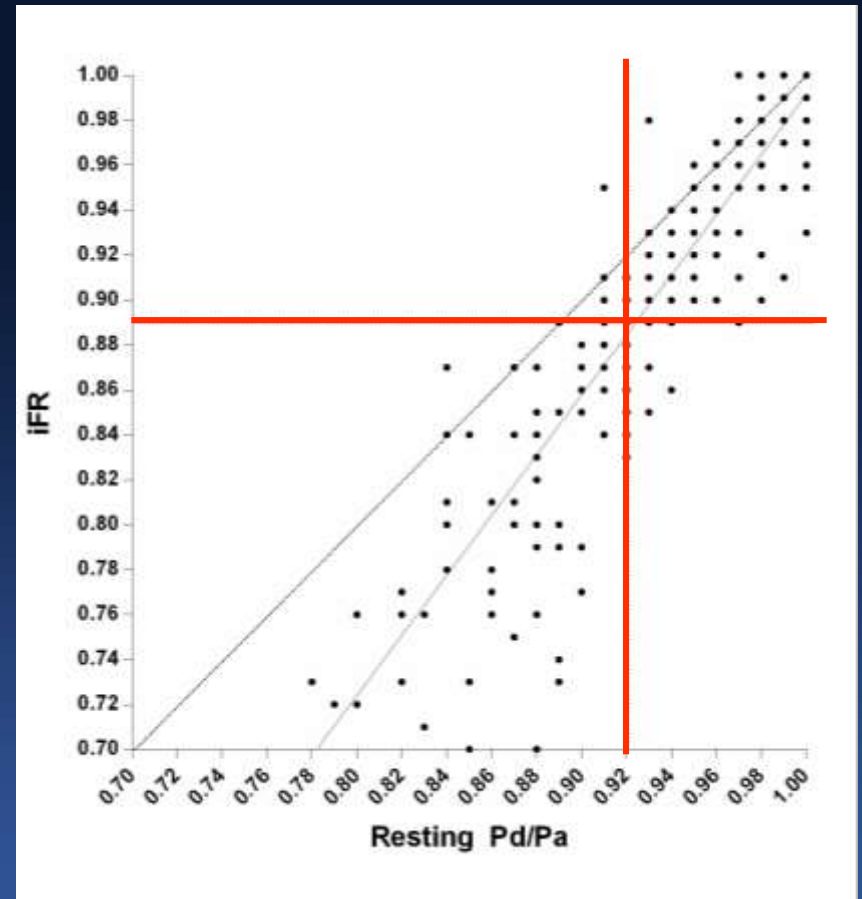
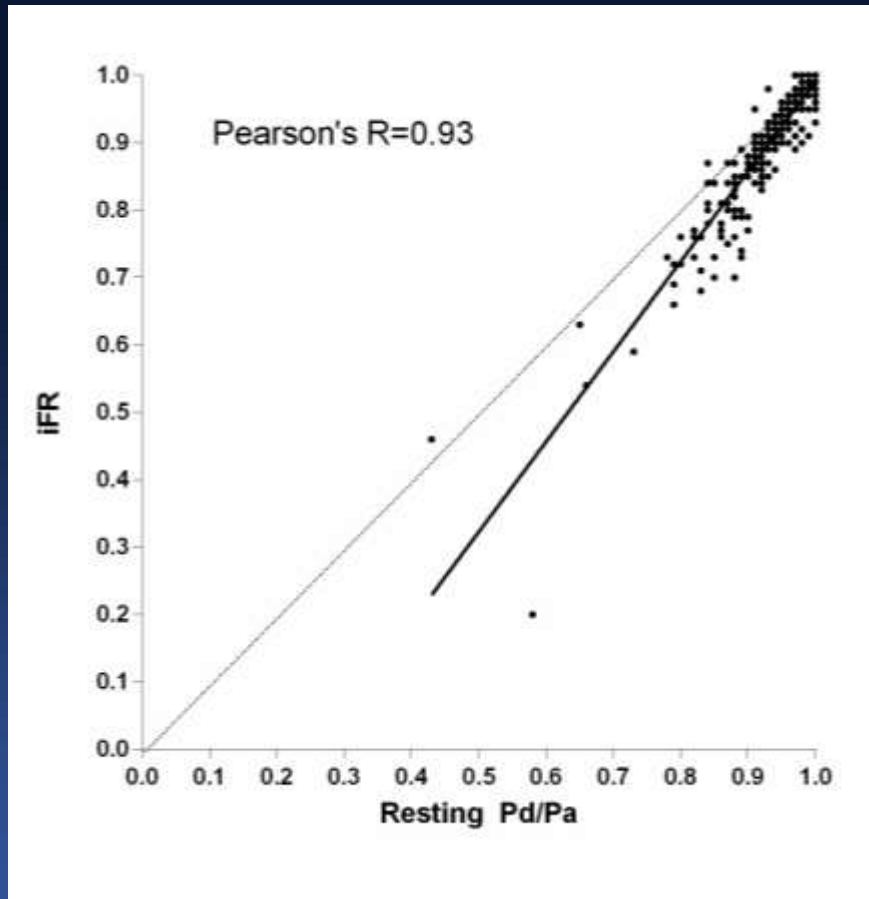
	0	1	2	3	4
Deferred	368	309	249	186	99
Performed	368	271	211	148	87

Conclusion

- *The risk of a composite of death, MI, and TVR was not significantly different between deferred and performed groups with the grey zone FFR.*
- Higher risk of periprocedural MI in performed group was offset by higher risk of TVR in deferred group.
- The trend was consistent after adjustment by propensity-score matching and IPTW.

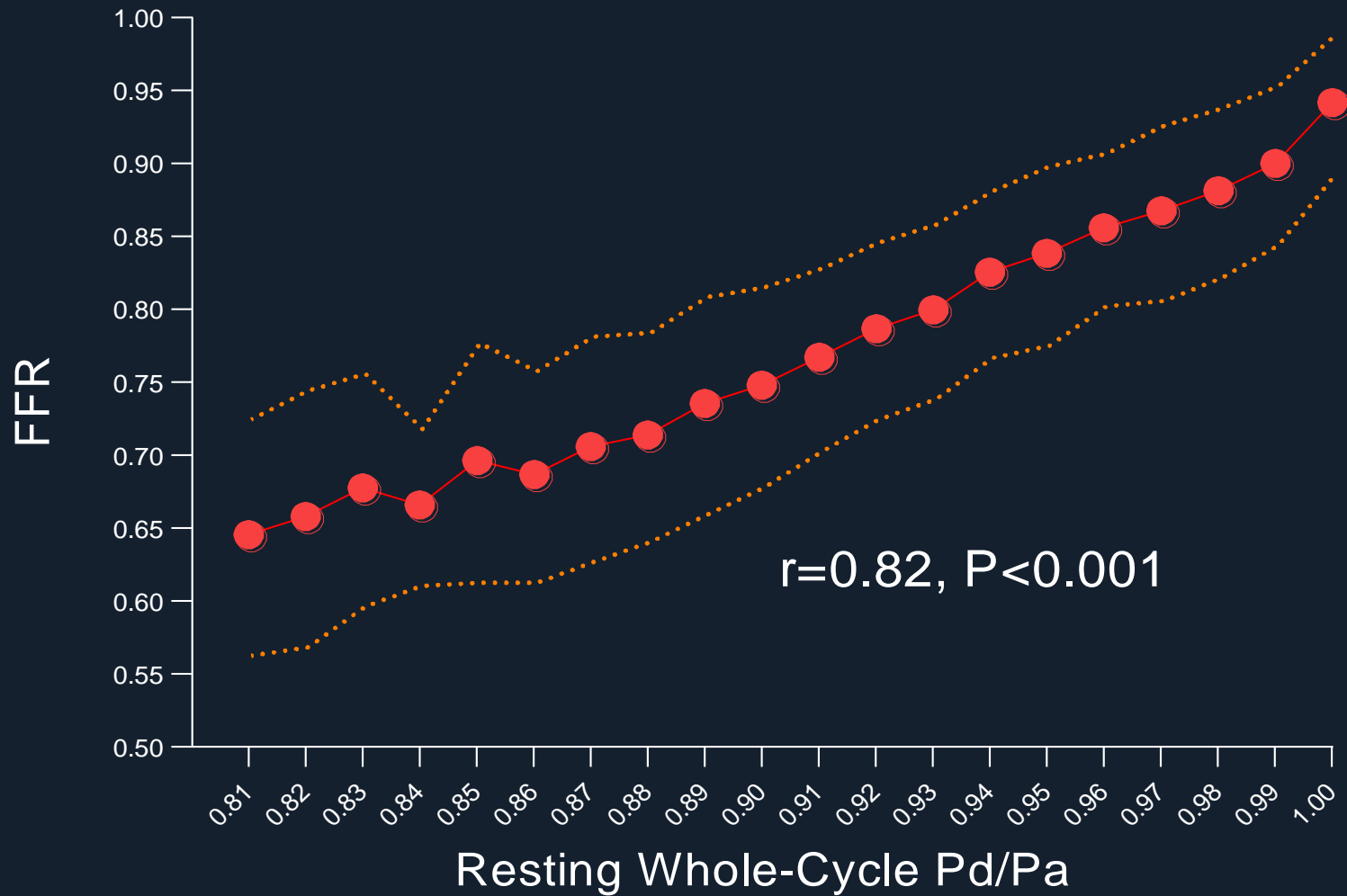
***Resting Whole-Cycle Pd/Pa
vs. FFR To Predict Outcomes
From IRIS FFR Registry***

Concordant Resting Pd/Pa vs. iFR

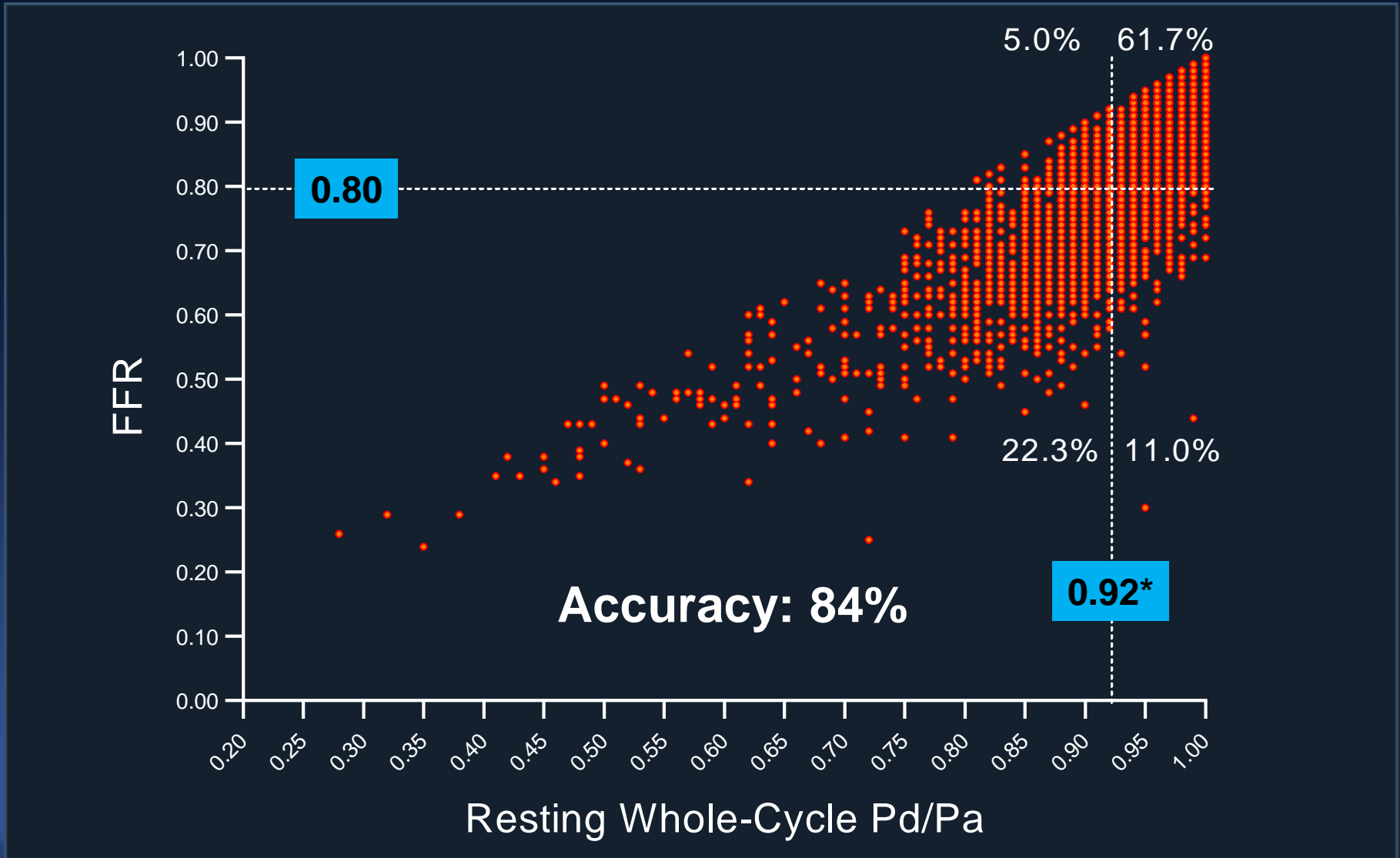


Concordant Rate of Resting Pd/Pa and iFR is **94.1%**

Good Correlation Resting Pd/Pa and FFR

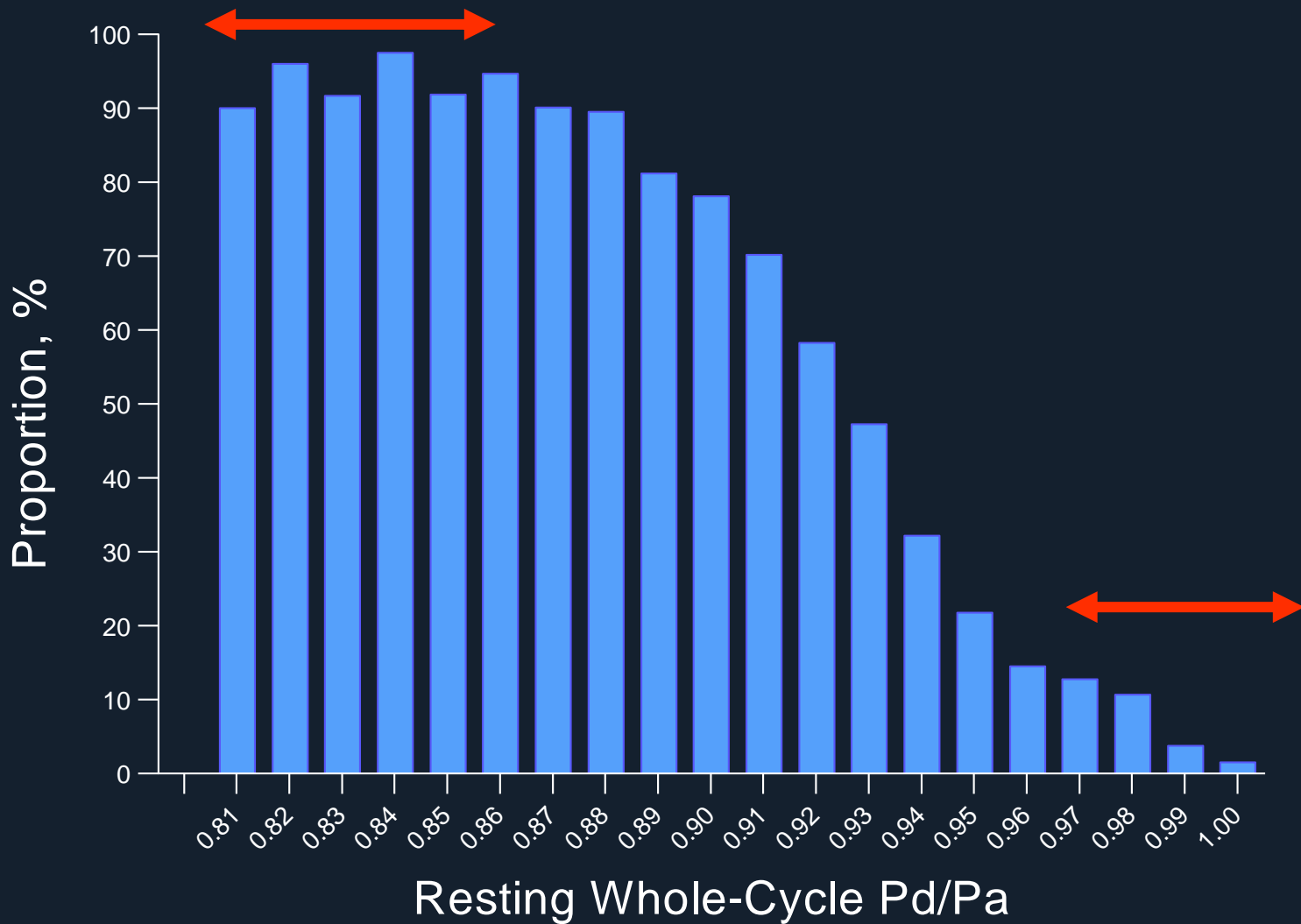


Accuracy of Resting Pd/Pa

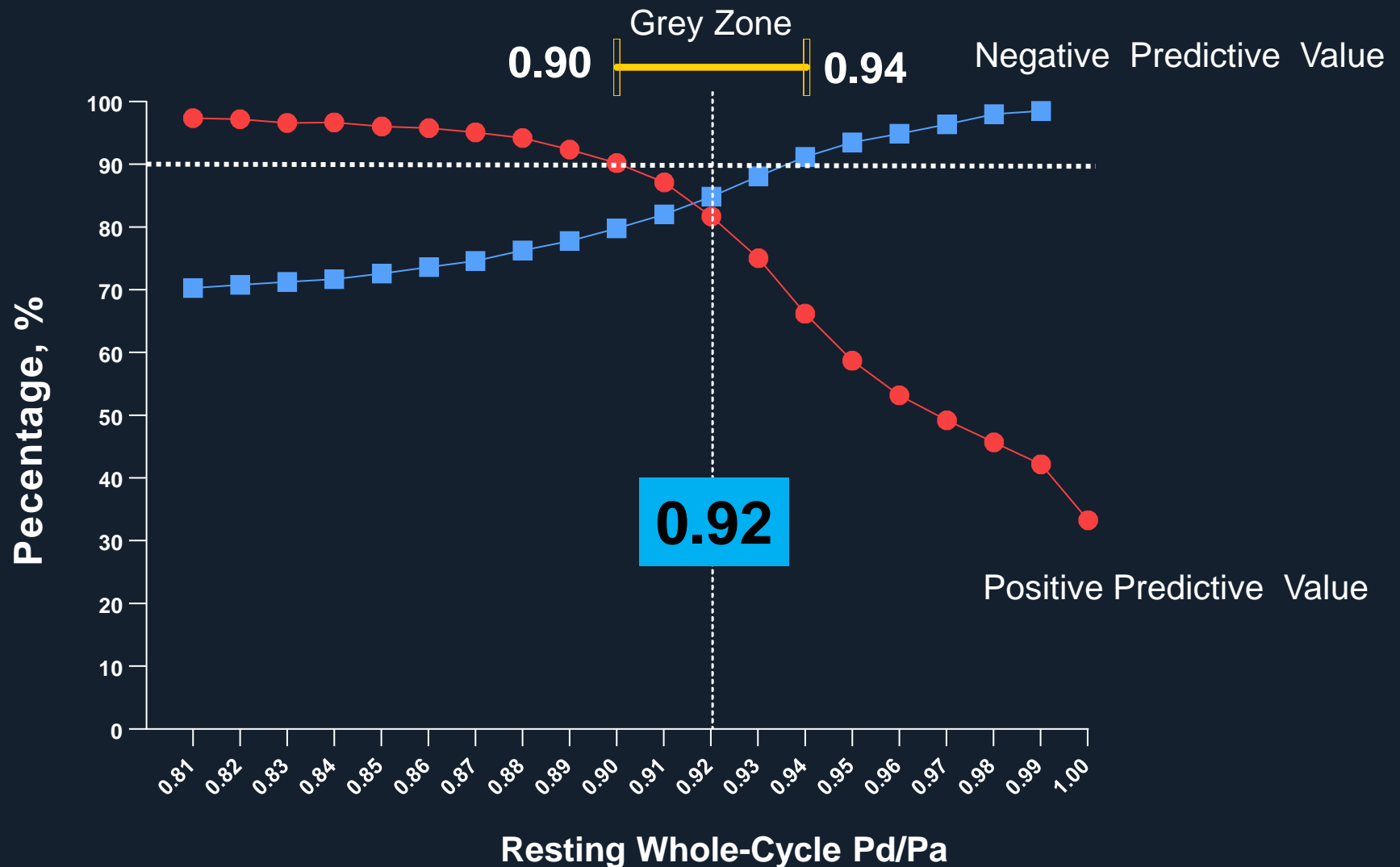


*The RESOLVE Study J Am Coll Cardiol. 2014 Apr 8;63(13):1253-1261
The VERIFY II Study Circ Cardiovasc Interv. 2016 Nov;9(11)

Proportion of $FFR \leq 0.80$

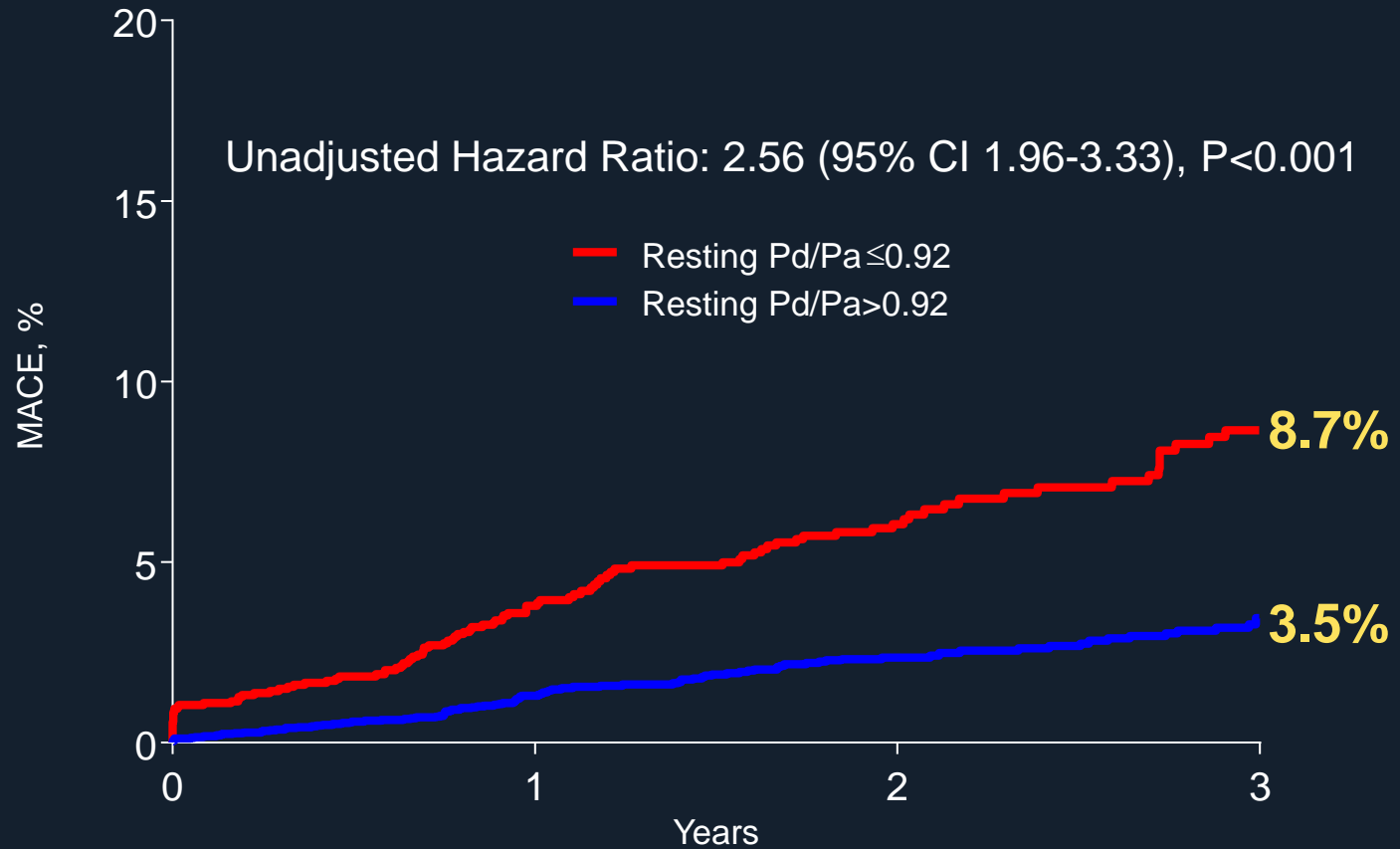


Positive/Negative Predictive Value >90%



Resting Whole-Cycle Pd/Pa

Cardiac Death, MI, RR

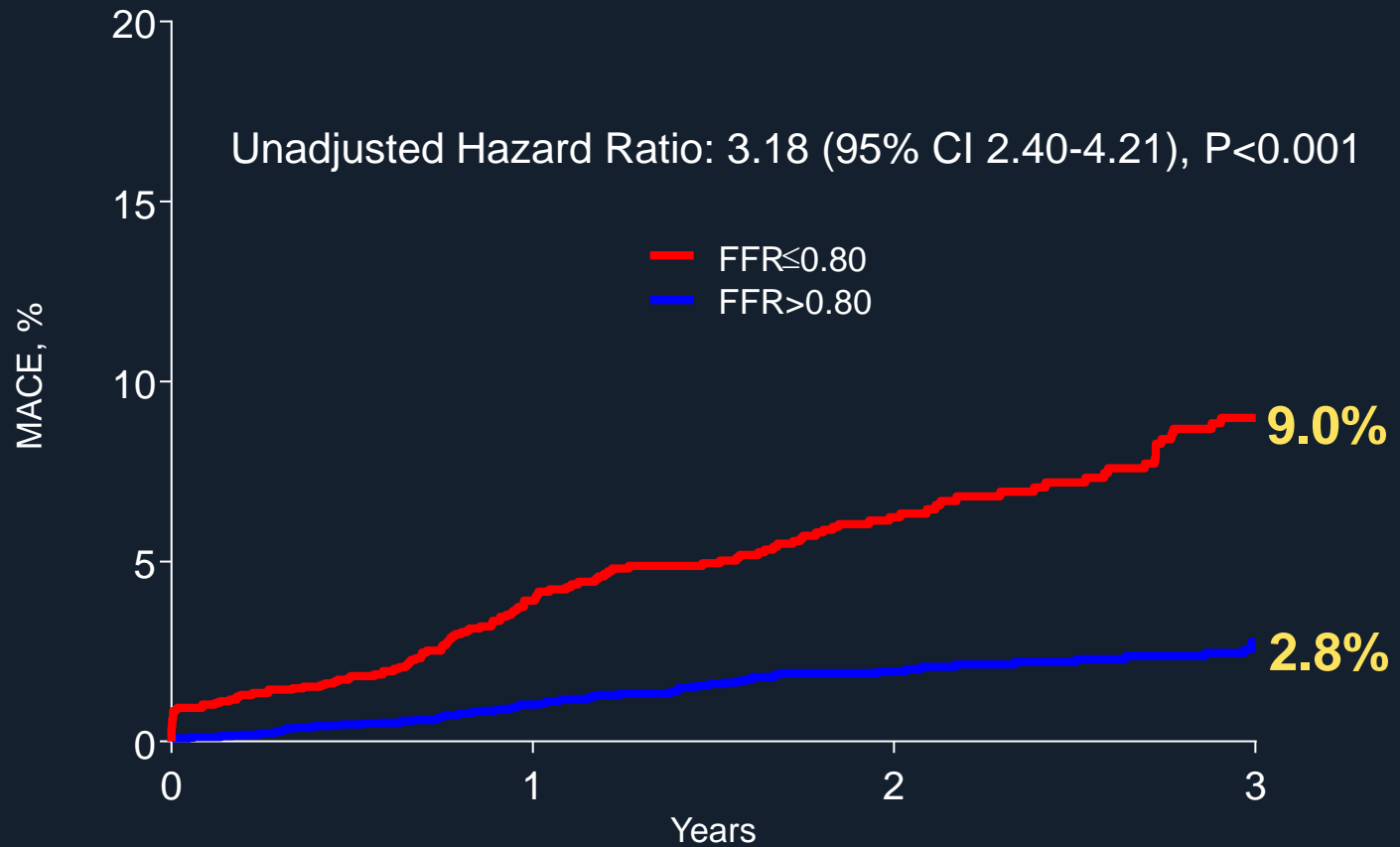


Lesion at risk

Resting Pd/Pa ≤ 0.92	1917	1323	774	413
Resting Pd/Pa > 0.92	5097	3626	2054	1046

FFR

Cardiac Death, MI, RR



Lesion at risk

FFR ≤ 0.80

2338

1606

947

528

FFR > 0.80

4676

3343

1881

935

8633 lesions in 5843 patients

Data not available:
1619 lesions

7014 lesions in 4707 patients

Resting Pd/Pa > 0.92
FFR > 0.80
(N=4325)

Resting Pd/Pa ≤ 0.92
FFR > 0.80
(N=351)

Resting Pd/Pa > 0.92
FFR ≤ 0.80
(N=772)

Resting Pd/Pa ≤ 0.92
FFR ≤ 0.80
(N=1566)

Rev
(N=146)

Def
(N=4179)

Rev
(N=27)

Def
(N=324)

Rev
(N=376)

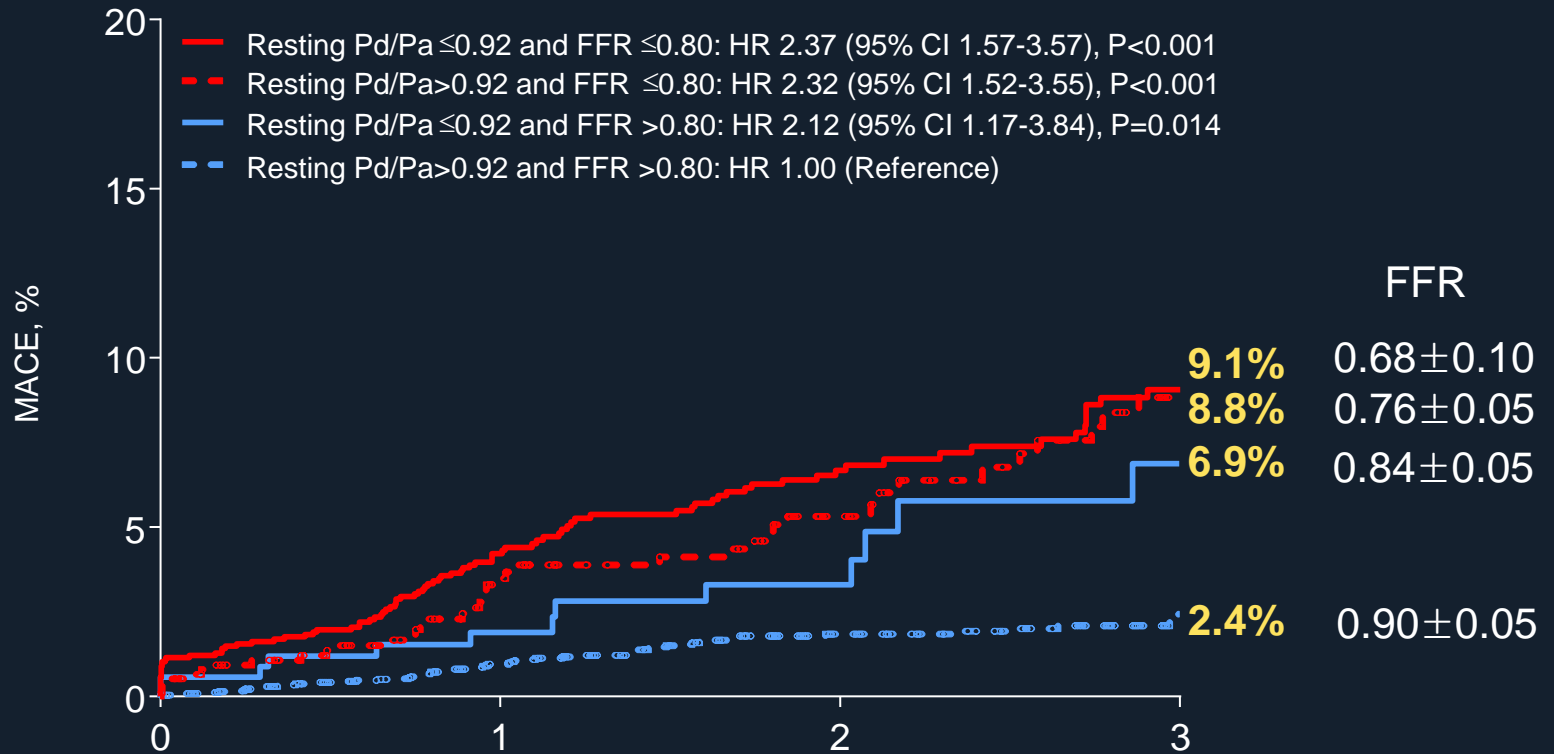
Def
(N=396)

Rev
(N=1103)

Def
(N=463)

Resting Pd/Pa and FFR

Cardiac Death, MI, RR



Lesion at risk

	0	1	2	3
Pd/Pa ≤ 0.92 and FFR ≤ 0.80	1566	1079	623	345
Pd/Pa > 0.92 and FFR ≤ 0.80	772	527	324	183
Pd/Pa ≤ 0.92 and FFR > 0.80	351	244	151	71
Pd/Pa > 0.92 and FFR > 0.80	4325	3099	1730	864

Years

Summary

- Overall concordance rate between resting Pd/Pa using cutoff 0.92 and FFR using cutoff 0.80 was 84%.
- *Use of a hybrid resting Pd/Pa-FFR strategy, incorporating FFR measurement* for only lesions within the resting Pd/Pa grey zone of 0.90-0.94 would improve agreement rate with FFR upto 93.7%, with diagnosis achieved without the need for hyperemia in 73.1% patients.



Thank You !!

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