Prognosis of Discordant Lesion Between FFR and Hyperemia Free Index

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FFR and Non-Hyperemic Pressure Ratios

Hyperemic Index: FFR

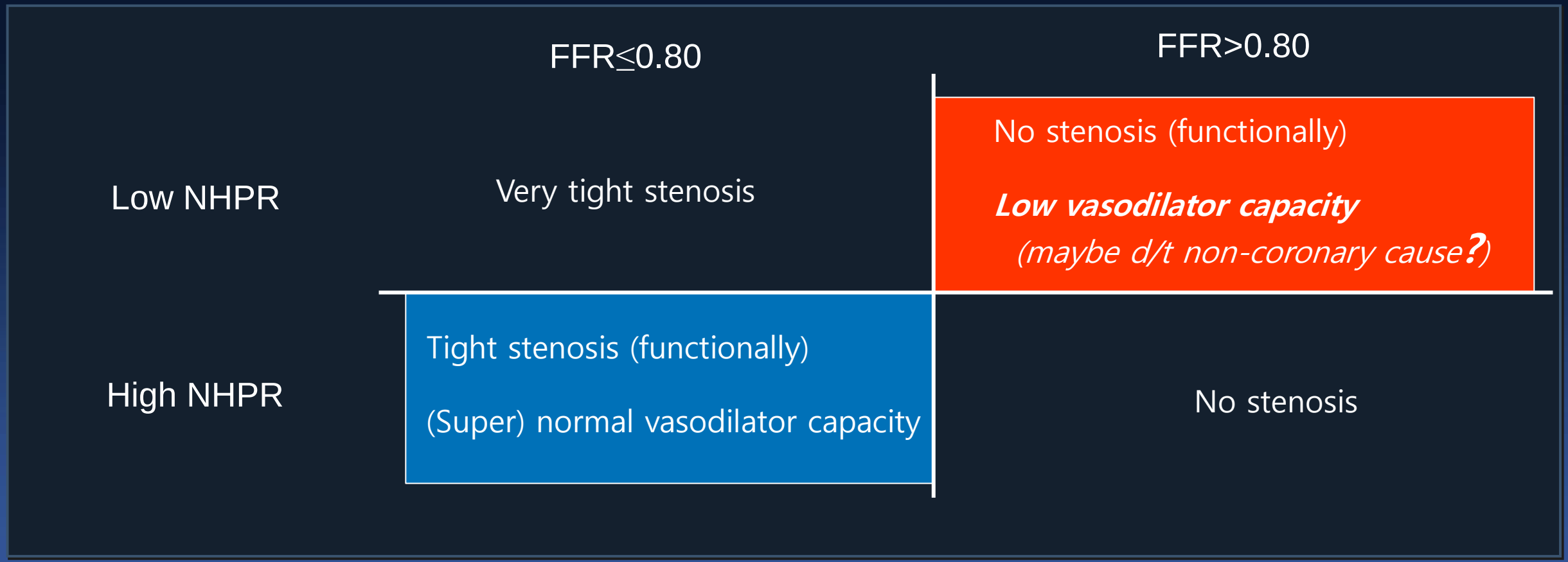
Non-Hyperemic Pressure Ratio: iFR, Resting Pd/Pa, dPR, DFR, RFR

	FFR	Pd/Pa	iFR	dPR	RFR	DFR
FFR	0.82 (0.75, 0.87)	ρ = 0.790 κ = 0.593	ρ = 0.782 κ = 0.570	ρ = 0.786 κ = 0.560	ρ = 0.793 κ = 0.593	ρ = 0.773 κ = 0.550
Pd/Pa		0.94 (0.91, 0.98)	ρ = 0.951 κ = 0.821	ρ = 0.960 κ = 0.834	ρ = 0.956 κ = 0.836	ρ = 0.959 κ = 0.832
iFR			0.92 (0.87, 0.97)	ρ = 0.991 κ = 0.932	ρ = 0.991 κ = 0.938	ρ = 0.992 κ = 0.935
dPR				0.93 (0.88, 0.97)	ρ = 0.991 κ = 0.901	ρ = 0.991 κ = 0.939
RFR					0.92 (0.87, 0.96)	ρ = 0.989 κ = 0.904
DFR						0.92 (0.88, 0.97)

15-20% difference

Almost Identical

Physiologic Understanding of Discordant Lesion



Predictors of Resting Pd/Pa and FFR Discordance

	Odds Ratio	95% CI	P Value
Resting Pd/Pa≤0.92 and FFR>0.80 Very Small Hyperemic Pressure Drop			
Age	1.02	1.01-1.03	0.004
Gender (Male)	0.74	0.59-0.94	0.012
Diabetes Low CFR phenotype	1.50	1.19-1.89	0.001
Hyperlipidemia	0.72	0.57-0.91	0.005
Left main and LAD (vs. others)	4.38	3.28-5.85	<0.001
Proximal location (vs. mid to distal)	0.60	0.49-0.78	<0.001
Resting Pd/Pa>0.92 and FFR≤0.80 Very Big Hyperemic Pressure Drop			
Age	0.98	0.97-0.99	<0.001
Gender (Male) Super normal CFR phenotype		1.45-2.22	<0.001
Diabetes	0.80	0.66-0.96	0.016
Family history	0.65	0.50-0.87	0.003
Chronic renal failure	0.32	0.14-0.75	0.008
Left main and LAD (vs. others)	1.36	1.14-1.62	0.001
Diameter stenosis (≥50%)	4.06	3.16-5.21	<0.001
AHA/ACC lesion B2C lesion	1.44	1.20-1.71	<0.001

Objective

- Based on the large prospective IRIS-FFR registry, we evaluated the prognosis of discordant lesion between FFR and resting Pd/Pa.

IRIS FFR Registry (NCT01366404)*

- A prospective multicenter study designed to investigate the natural history of coronary stenosis assessed by FFR
- A total of 30 heart centers in South Korea participated.
- The registry consecutively enrolled 7945 patients who underwent FFR measurement of at least one coronary lesion with minimal exclusion criteria between August 2009 and May 2018.
- All events were centrally adjudicated

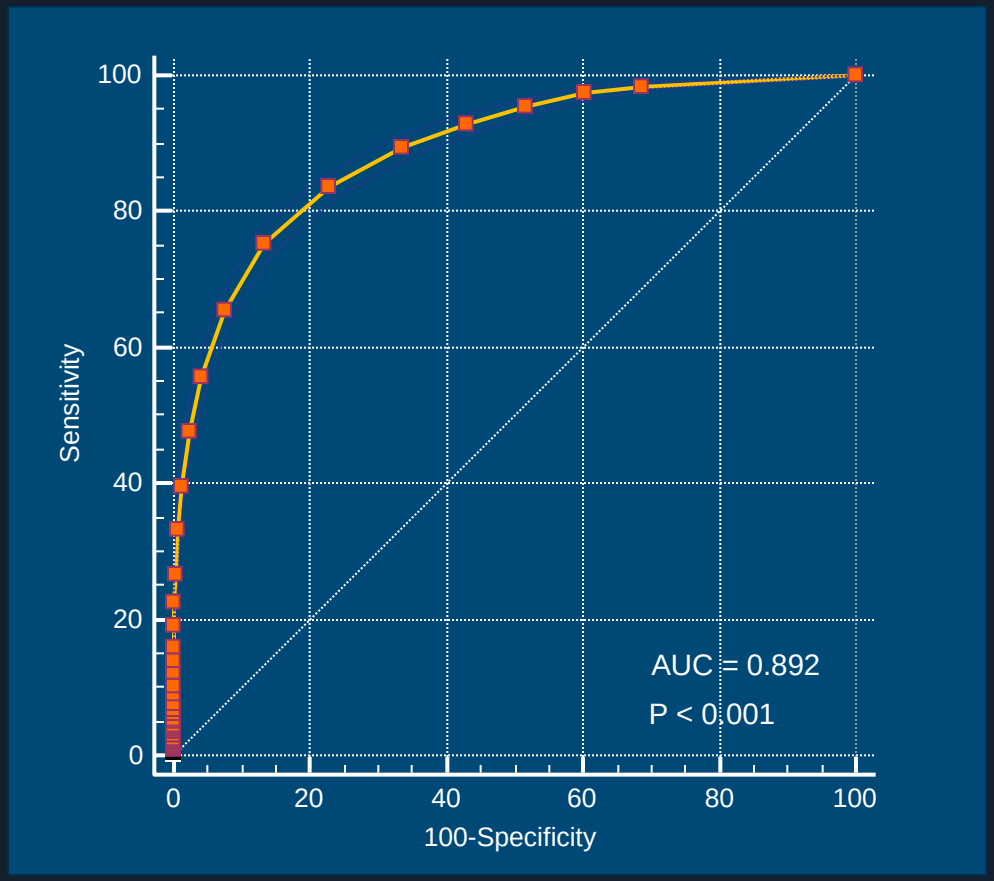
*Ahn JM, Park SJ et al. Circulation. 2017 Jun 6;135(23):2241-2251

Patient and Lesion Characteristics

Patient	N=7945
Age	63.4±9.8
Gender (Male)	72.0%
ACS	21.1%
Hypertension	36.4%
Diabetes	30.8%
Current smoking	23.7%
Hyperlipidemia	63.2%
Previous MI	6.3%
Previous PCI	19.6%
Family history	11.3%
Previous CHF	1.1%
Previous stroke	5.7%
PAD	2.7%

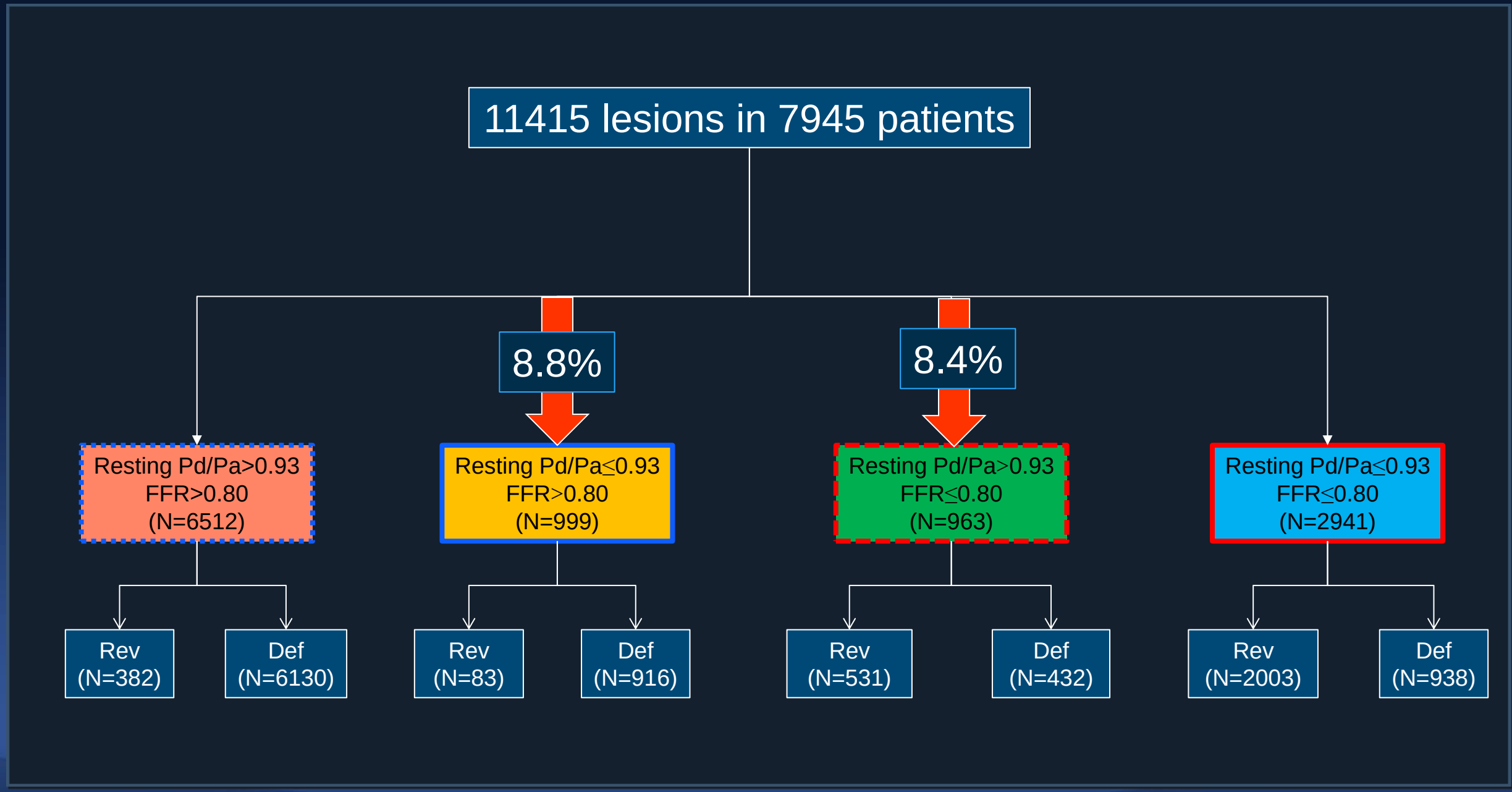
Lesion	N=11415
Revascularization	23.6%
Lesion territory	
Left main	4.3%
LAD	50.3%
RCA	24.1%
LCX	16.3%
Lesion location	
Proximal/Mid/Distal	45.3/31.8/22.9%
Diameter stenosis (%)	
≥70/50-69/30-49	20.2/45.9/33.6%
AHA/ACC B2C lesion	57.2%
Long lesion (>20mm)	43.4%
Calcified lesion	2.6%

Cut off Value of Resting Pd/Pa to Predict FFR



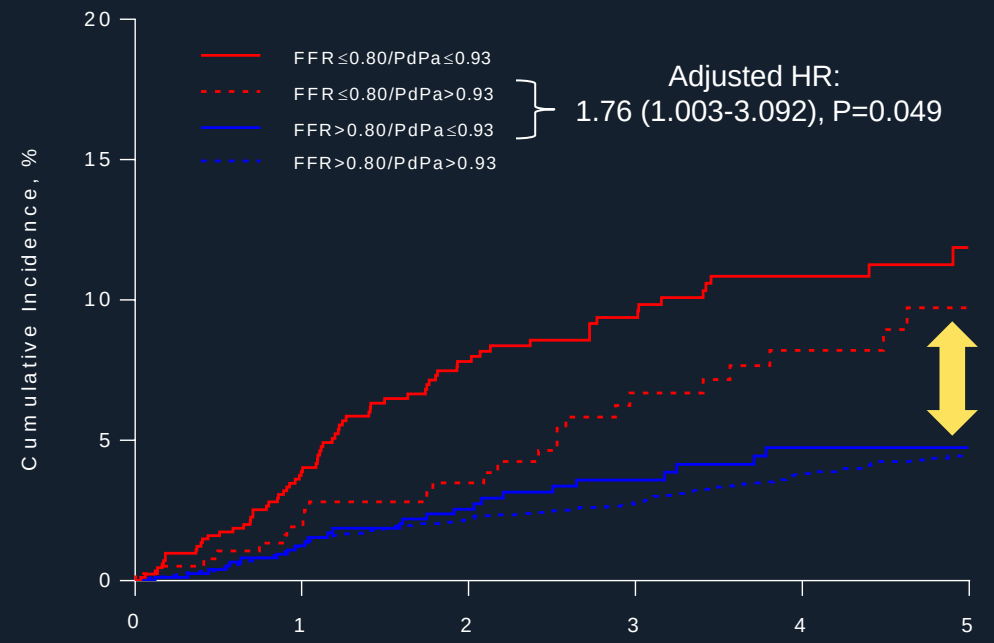
From IRIS-FFR registry,
11415 lesions had valid resting Pd/Pa and FFR

Best cut-off value of resting Pd/Pa to predict FFR was
≤0.93 with 75.3% sensitivity and 86.7% specificity


11415 lesions in 7945 patients
8.8%
8.4%
Resting Pd/Pa>0.93
FFR>0.80
(N=6512)
Resting Pd/Pa≤0.93
FFR>0.80
(N=999)
Resting Pd/Pa>0.93
FFR≤0.80
(N=963)
Resting Pd/Pa≤0.93
FFR≤0.80
(N=2941)
Rev
(N=382)
Def
(N=6130)
Rev
(N=83)
Def
(N=916)
Rev
(N=531)
Def
(N=432)
Rev
(N=2003)
Def
(N=938)

Cardiac Death, MI, or Repeat Revascularization

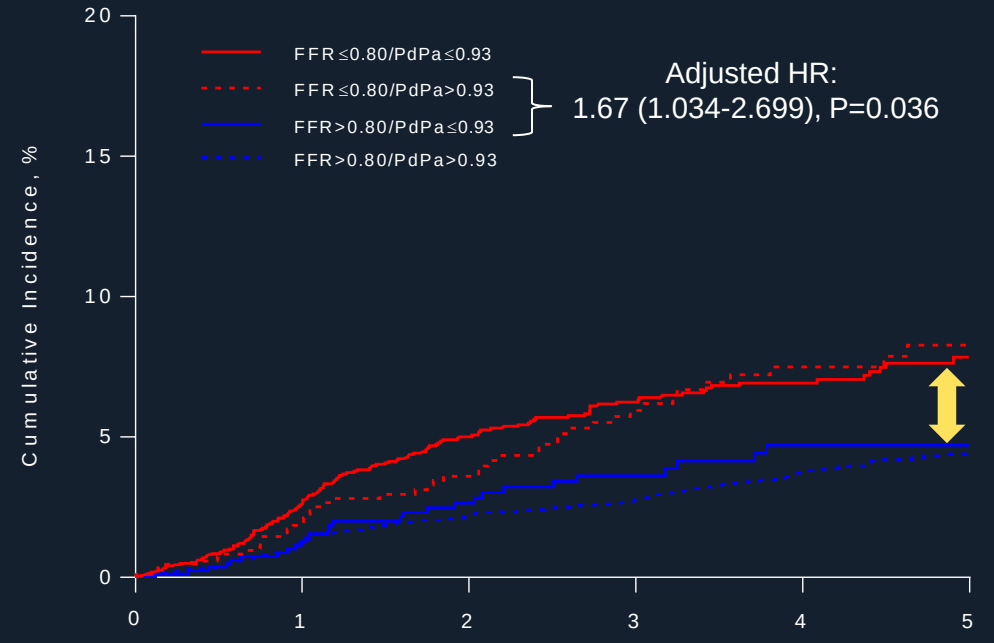
Medically treated coronary stenosis (N=8416)



No. at Risk

FFR≤0.80/PdPa≤0.93	938	692	522	400	282	96
FFR≤0.80/PdPa>0.93	432	335	273	212	147	66
FFR>0.80/PdPa≤0.93	916	666	515	391	265	107
FFR>0.80/PdPa>0.93	6130	4740	3828	3038	2070	768

Overall coronary stenosis* (N=11425)

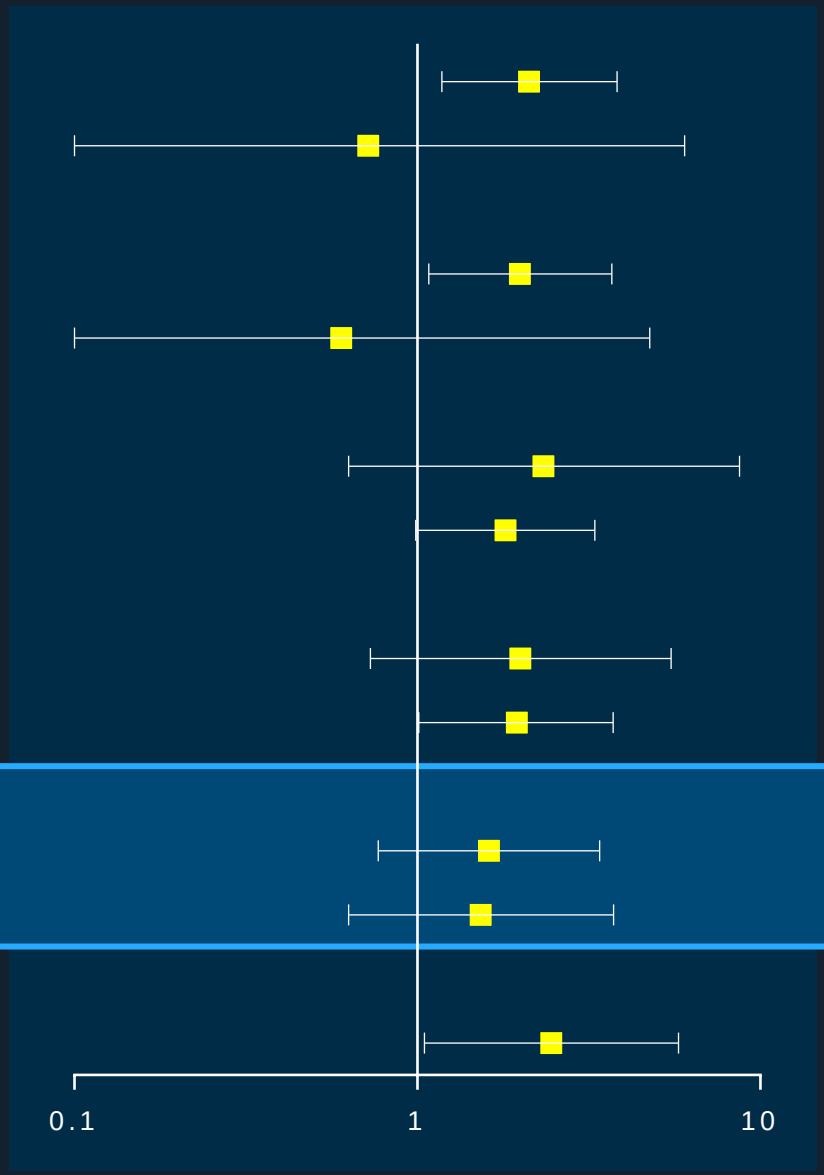


No. at Risk

FFR≤0.80/PdPa≤0.93	2941	2258	1665	1230	834	311
FFR≤0.80/PdPa>0.93	963	737	556	417	288	125
FFR>0.80/PdPa≤0.93	999	725	546	415	280	115
FFR>0.80/PdPa>0.93	6512	4990	3974	3151	2153	796

*Stented lesion plus non-stented lesion

Comparison of Discordant Lesion in Various Subgroup



	HR (95% CI)	P for interaction
Age		0.42
<75 years old (N=7200)	2.12 (1.18-3.82), P=0.012	
≥75 years old (N=1216)	0.72 (0.09-6.02), P=0.77	
Sex		0.37
Male (N=5923)	1.99 (1.08-3.69), P=0.029	
Female (N=2492)	0.60 (0.08-4.77), P=0.63	
Presentation		0.21
ACS(N=1353)	2.33 (0.63-5.49), P=0.18	
Stable IHD (N=7051)	1.81 (0.99-3.29), P=0.053	
Diabetes		0.98
Yes (N=2627)	2.00 (0.73-5.497), P=0.18	
No (N=5711)	1.95 (1.01-3.73), P=0.045	
Lesion Location		0.99
LAD (N=4207)	1.62 (0.77-3.40), P=0.21	
Non-LAD (N=4209)	1.53 (0.63-3.74), P=0.35	
Sensitivity Analysis		
Resting Pd/Pa Cut-Off: 0.91	2.46 (1.05-5.77), P=0.039	

Favoring FFR≤0.80 and Resting Pd/Pa>0.93 *Favoring FFR>0.80 and Resting Pd/Pa≤0.93*

Summary

- Both FFR and resting Pd/Pa independently predict clinical events.
- About 17.2% has discrepancy between FFR and resting Pd/Pa.
- Compared with lesions with Pd/Pa≤0.93 and FFR>0.80, lesions with Pd/Pa>0.93 and FFR≤0.80 are associated with higher rate of coronary event including cardiac death, myocardial infarction, and repeat intervention.
- This trend is consistently observed in the various subgroup including LAD and non-LAD subgroup.
- Therefore, in daily practice, coronary risk assessment and subsequent revascularization should be guided by FFR, not by resting Pd/Pa.