FFR,
How to Change Our Practice ?

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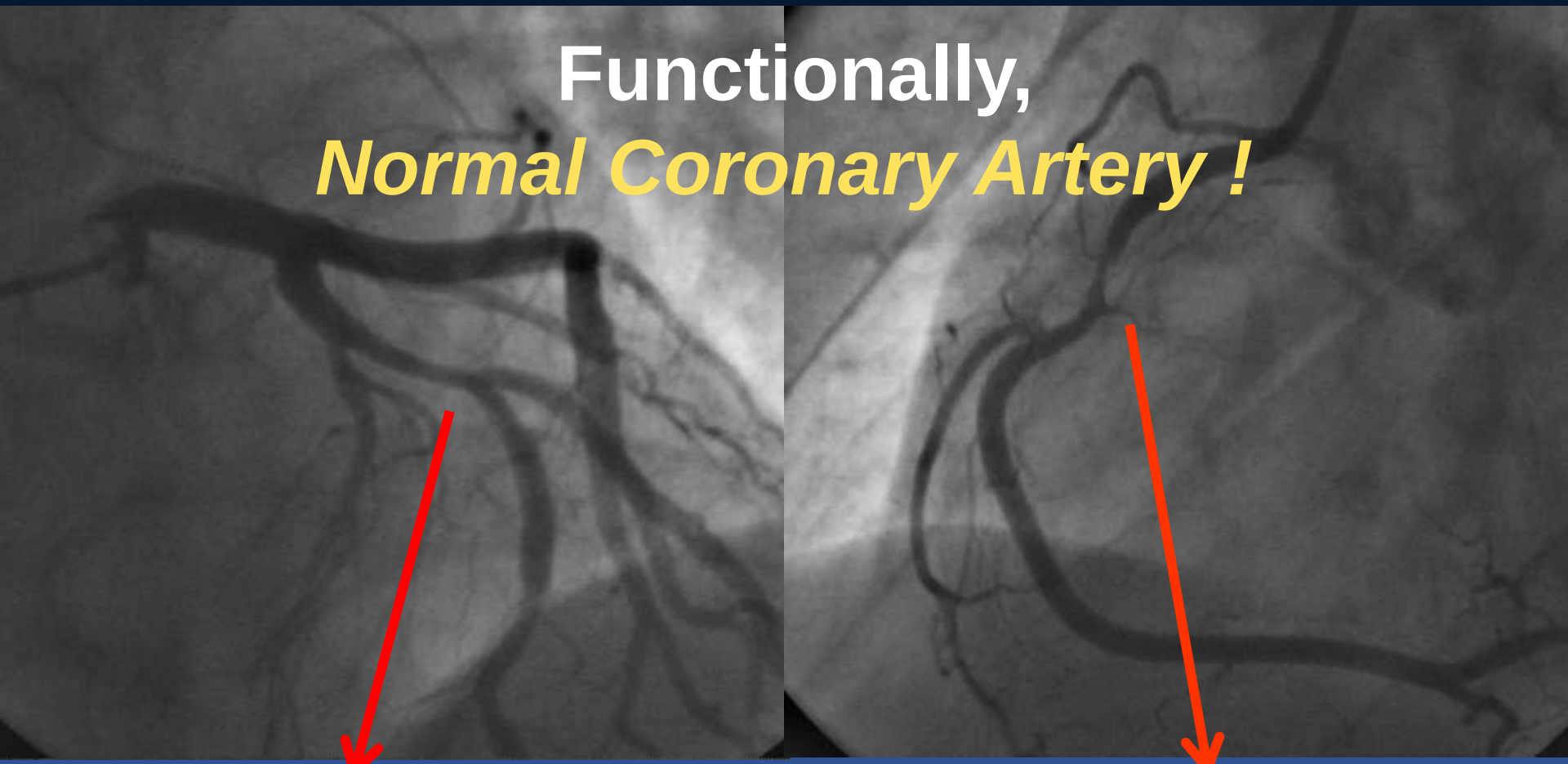
2-Vessel Disease ?



Functionally,

Normal Coronary Artery !

FFR : 0.84

FFR : 0.86

Impact of FFR on 3 Vessel Disease

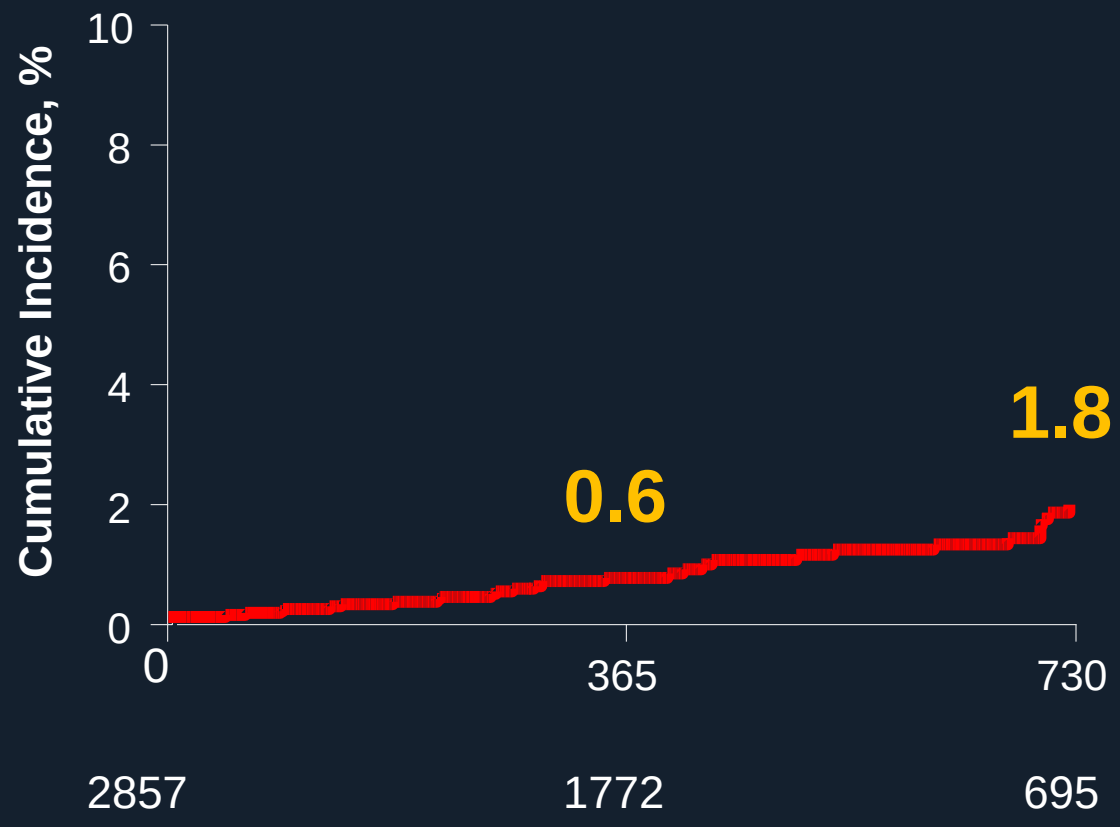
Functionally,
nt

Different World,
Different Concept
We Need Totally Different Data !

Tonino et al, JACC 2010;55:2816-2821

How Good FFR Guided ?

Cardiac Death and MI at 2 Years
(2857 patients, 3534 DFERred lesions)



Meta-Analysis
FFR vs. CAG Guided PCI

A total of 9,301 patients

(1 randomized trial and 4 observational studies)

Park SJ, Ahn JM, Unpublished Data, 2015

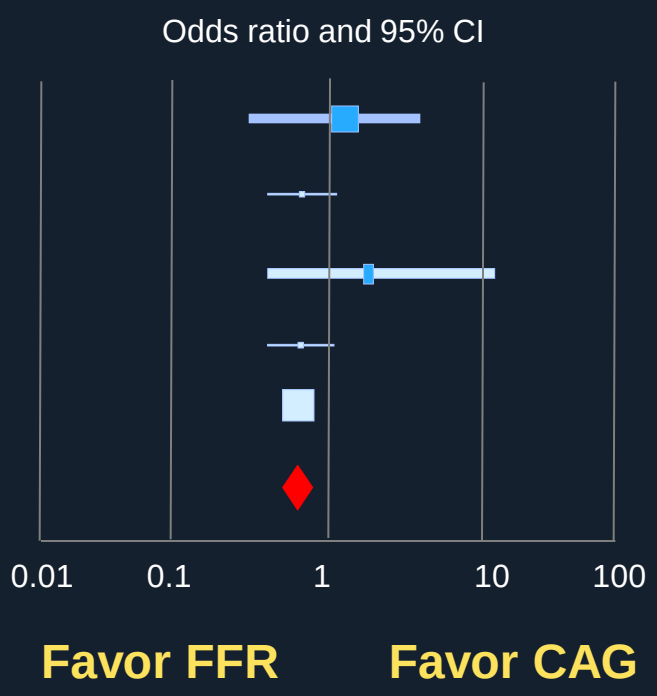
FFR vs. Angio-Guided PCI

(Meta-analysis n=9,301)

Death

		Odds Ratio	Lower Limit	Upper Limit	Z–Value	P–Value
Wongpraparut	2005	1.25	0.24	6.59	0.26	0.80
Pijls	2010	0.68	0.33	1.38	−1.08	0.28
Angkananard	2011	2.09	0.36	12.16	0.82	0.41
Puymirat	2012	0.61	0.30	1.20	−1.44	0.15
Lerman	2013	0.56	0.48	0.66	−7.22	0.00
Random pooled estimate		0.58	0.50	0.67	−724	<0.001

$I^2=0$



FFR vs. Angio-Guided PCI

(Meta-analysis n=9,301)

Outcomes	Relative Risk Reduction	P value
Death	↓ 42%	<0.001
MI	↓ 53%	<0.001
TVR	↓ 30%	0.06
MACE	↓ 29%	<0.001

Park SJ, Ahn JM et al. Unpublished data, 2015

Death and MI /yr

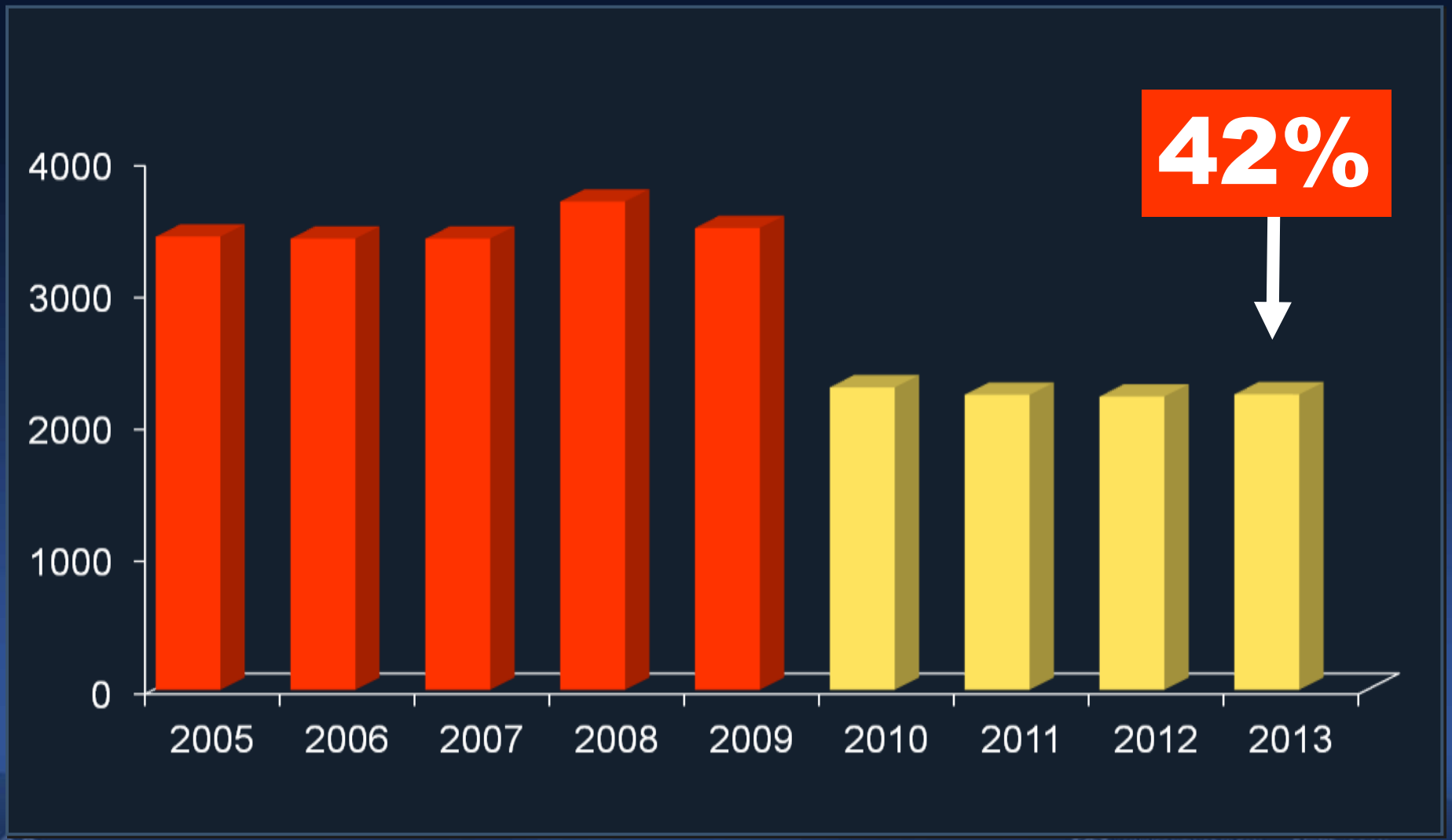
Negative FFR (>0.80 or 0.75) or Negative Non-Invasive Stress Tests: (NUCLEAR studies, DEFER, FAME)	**< 1 %**
Stented Segment : (DEFER, FAME, SYNTAX, and registries)	**2-3 %**
Untreated Positive FFR (<0.75 or 0.80) or Positive Non-invasive Stress Tests: (Registries, ACIP, etc)	**5-10 %**

2013, ESC Guidelines

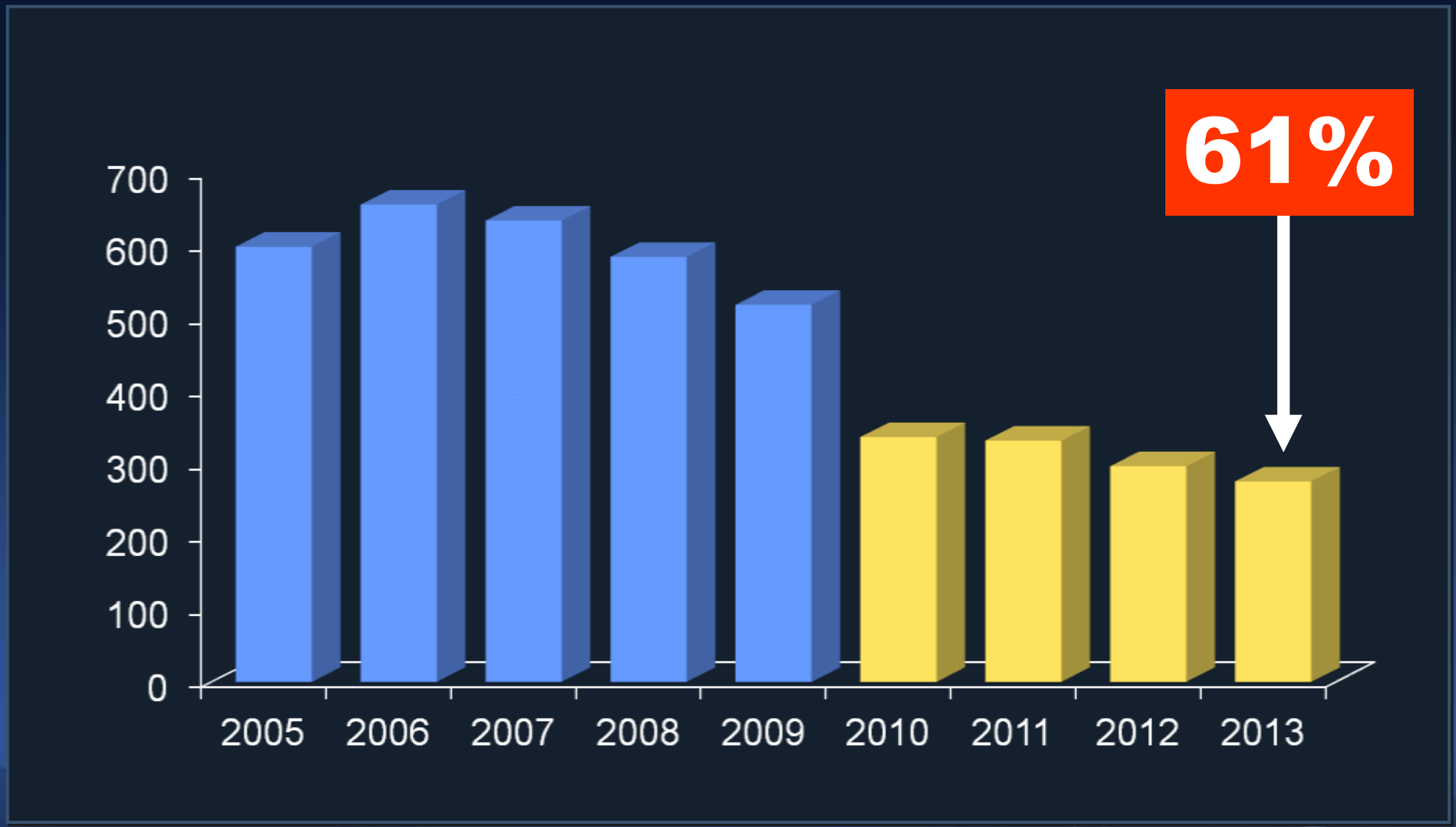
Recommendations	Class	Level
FFR is recommended to identify hemodynamically relevant coronary lesion(s) when evidence of ischemia is not available.	I	A
Revascularization of stenosis with FFR <0.80 is recommended in patients with angina symptoms or a positive stress test.	I	B
Revascularization of an angiographically intermediate stenosis without related ischemia or without FFR <0.80 is not recommended.	III	B

Impact of FFR
In Our AMC Practice

Number of Stent Decreased



Number of CABG Decreased

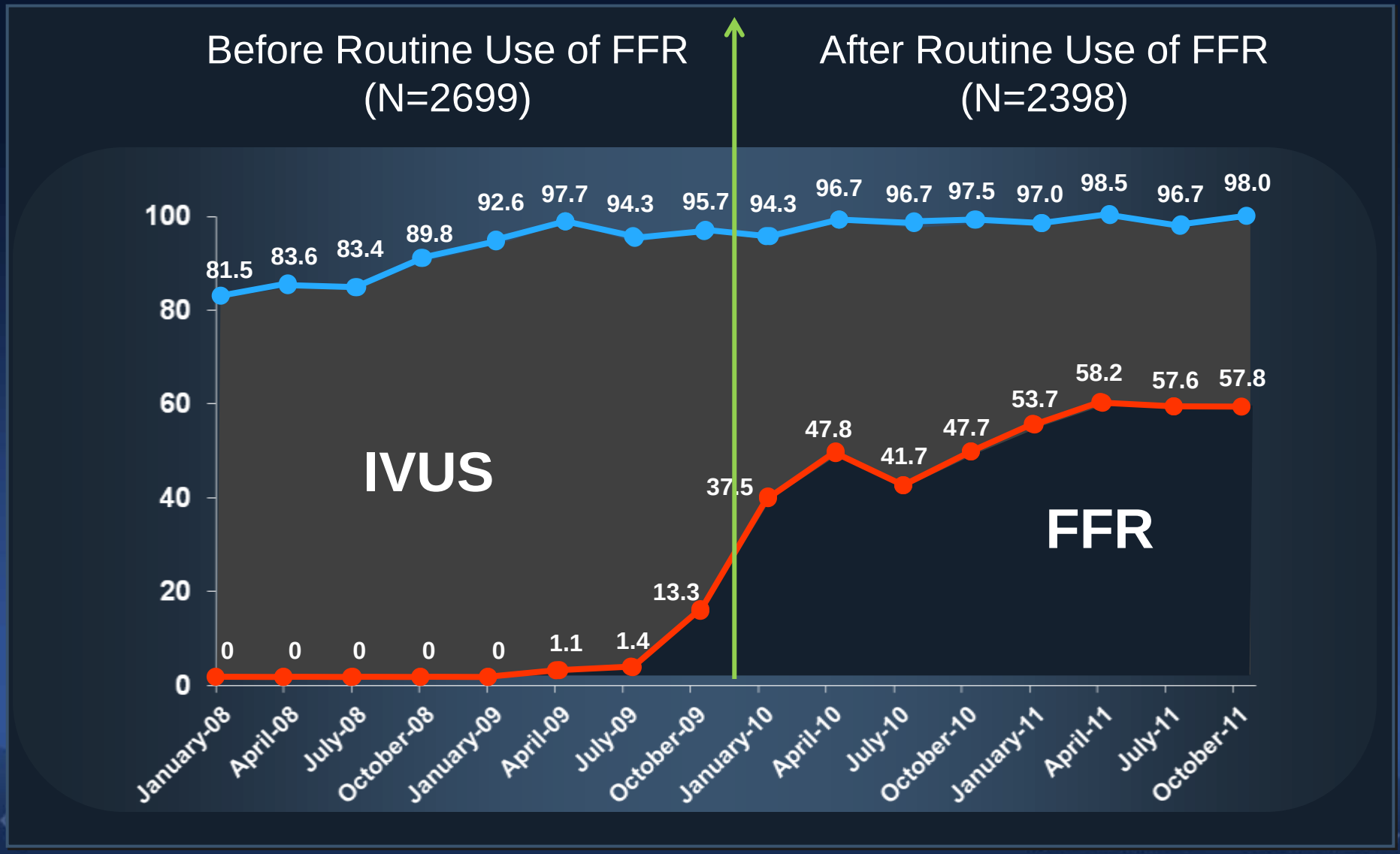


Impact of FFR,
Changes of PCI Outcomes

Park SJ, European Heart Journal. 2013 Nov;34(43):3353-61.

Integrated Use of FFR and IVUS

(AMC data, n=5097)

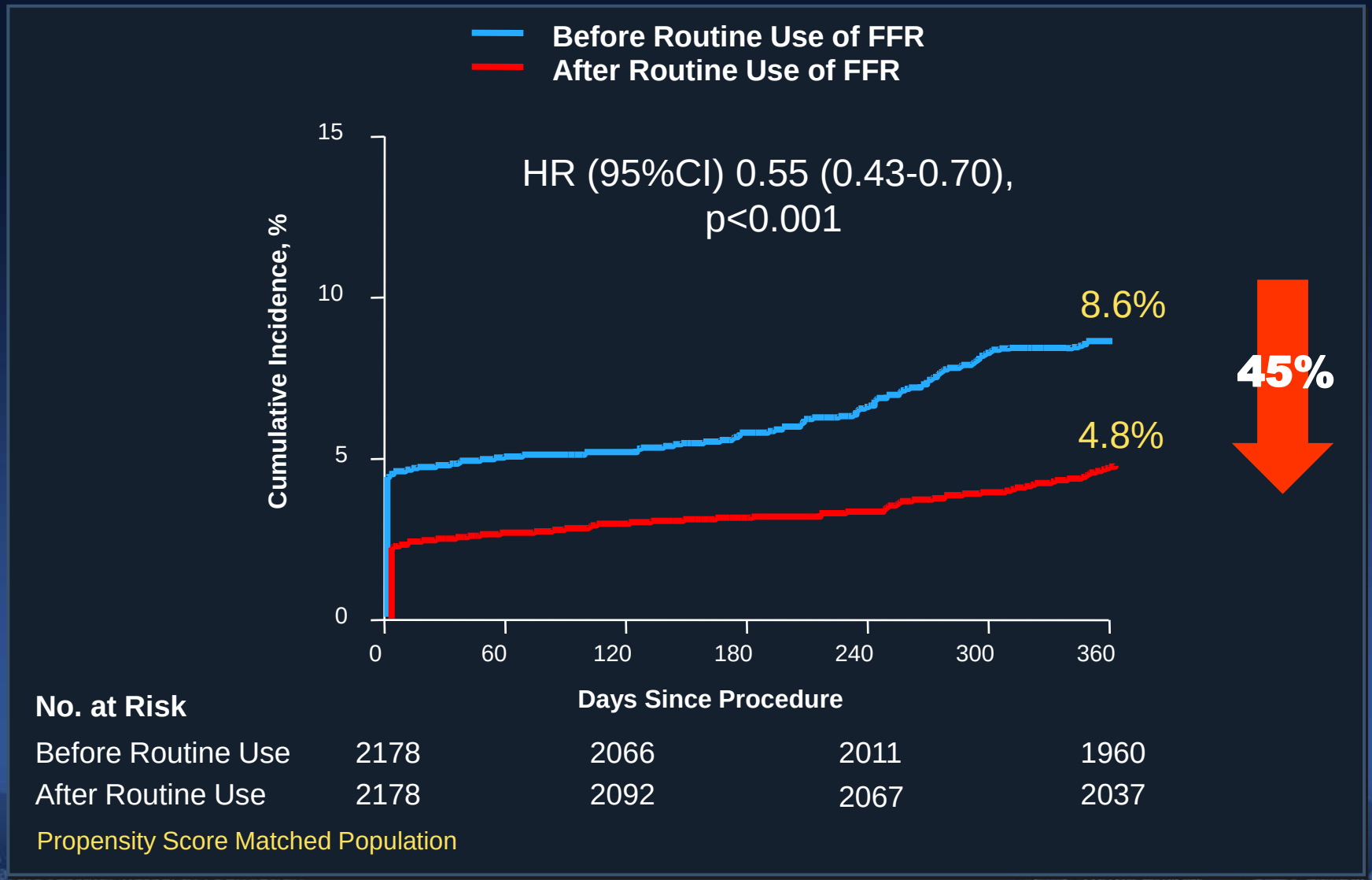


Procedural Characteristics

Propensity Score Matched Population

	Before Routine FFR (N=2178)	After Routine FFR (N=2178)	P value
Fractional flow reserve	47 (2.2)	1093 (50.2)	<0.001
Intravascular ultrasound	1967 (90.3)	2114 (97.1)	<0.001
No. of lesions	1.8±0.9	1.8±1.0	0.71
Average stent diameter, mm	3.3±0.3	3.3±0.4	0.31
No. of treated lesions	1.4±0.7	1.1±0.8	<0.001
No. of stents	2.1±1.3	1.5±1.2	<0.001
Total stent length, mm	53.7±36.1	40.1±34.1	<0.001
Multivessel stenting	772 (35.4)	563 (25.8)	<0.001

Primary End Point
(Death, MI, or Repeat Revascularization)

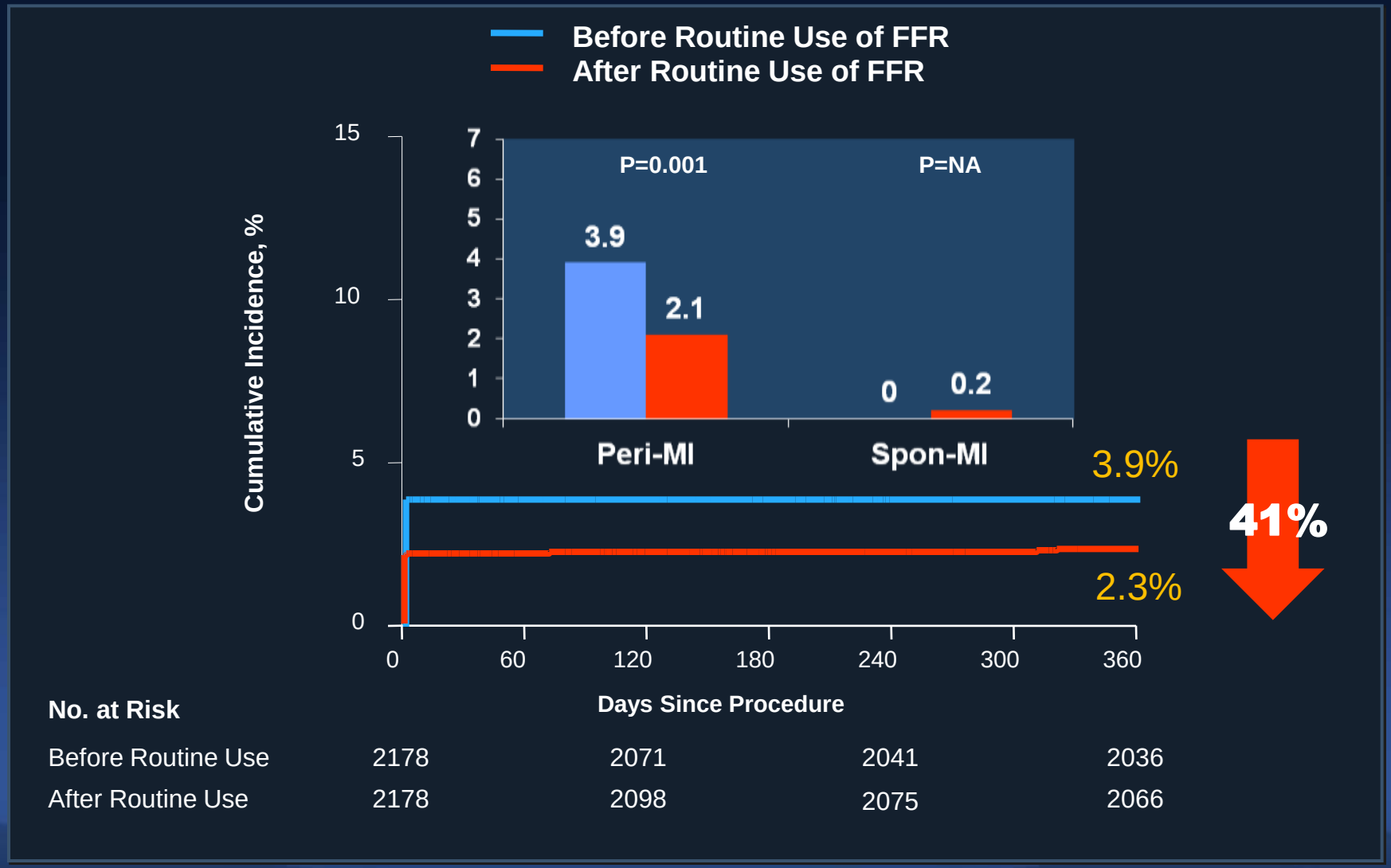


No. at Risk

Before Routine Use	2178	2066	2011	1960
After Routine Use	2178	2092	2067	2037

Propensity Score Matched Population

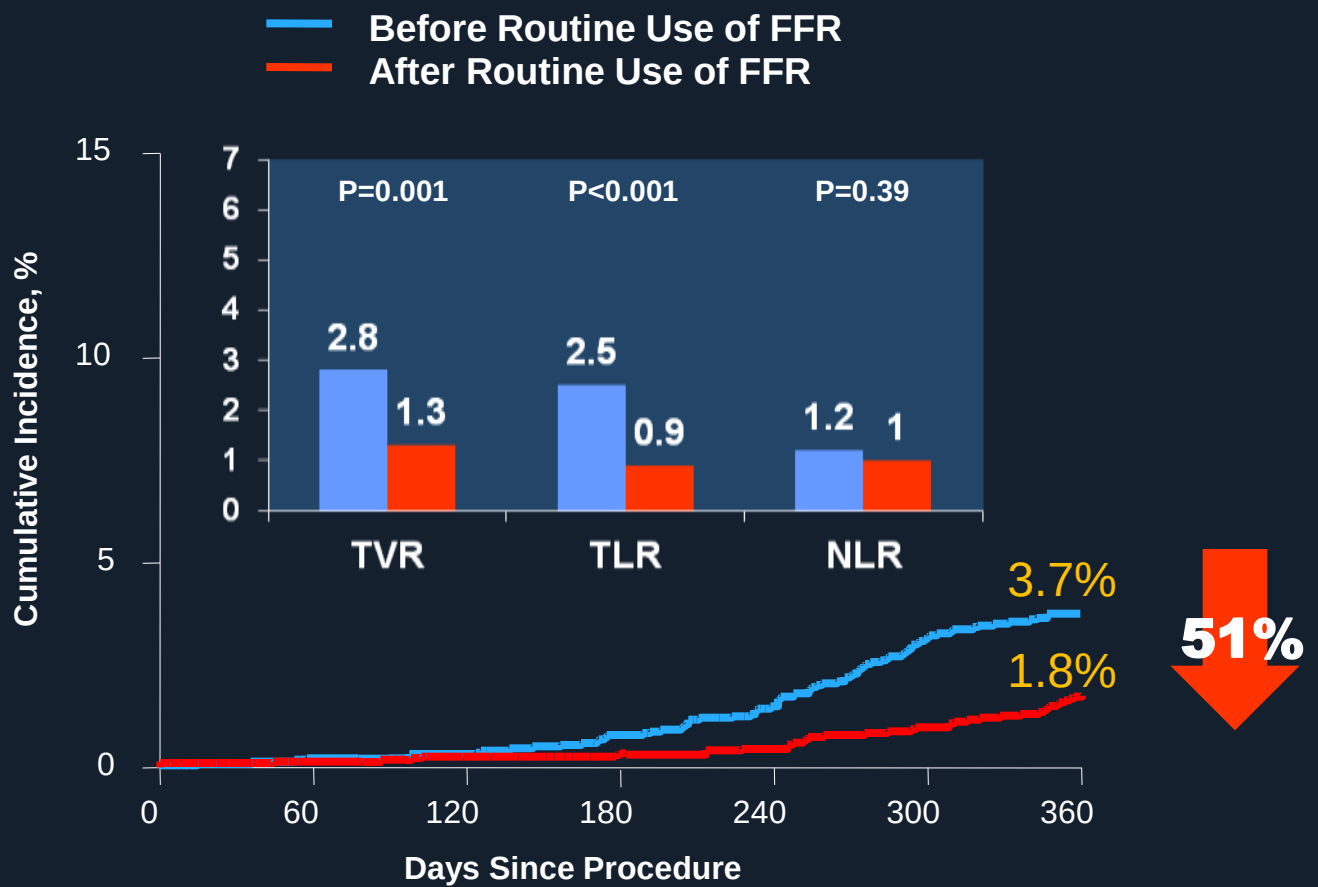
Myocardial Infarction



No. at Risk

Before Routine Use	2178	2071	2041	2036
After Routine Use	2178	2098	2075	2066

Repeat Revascularization



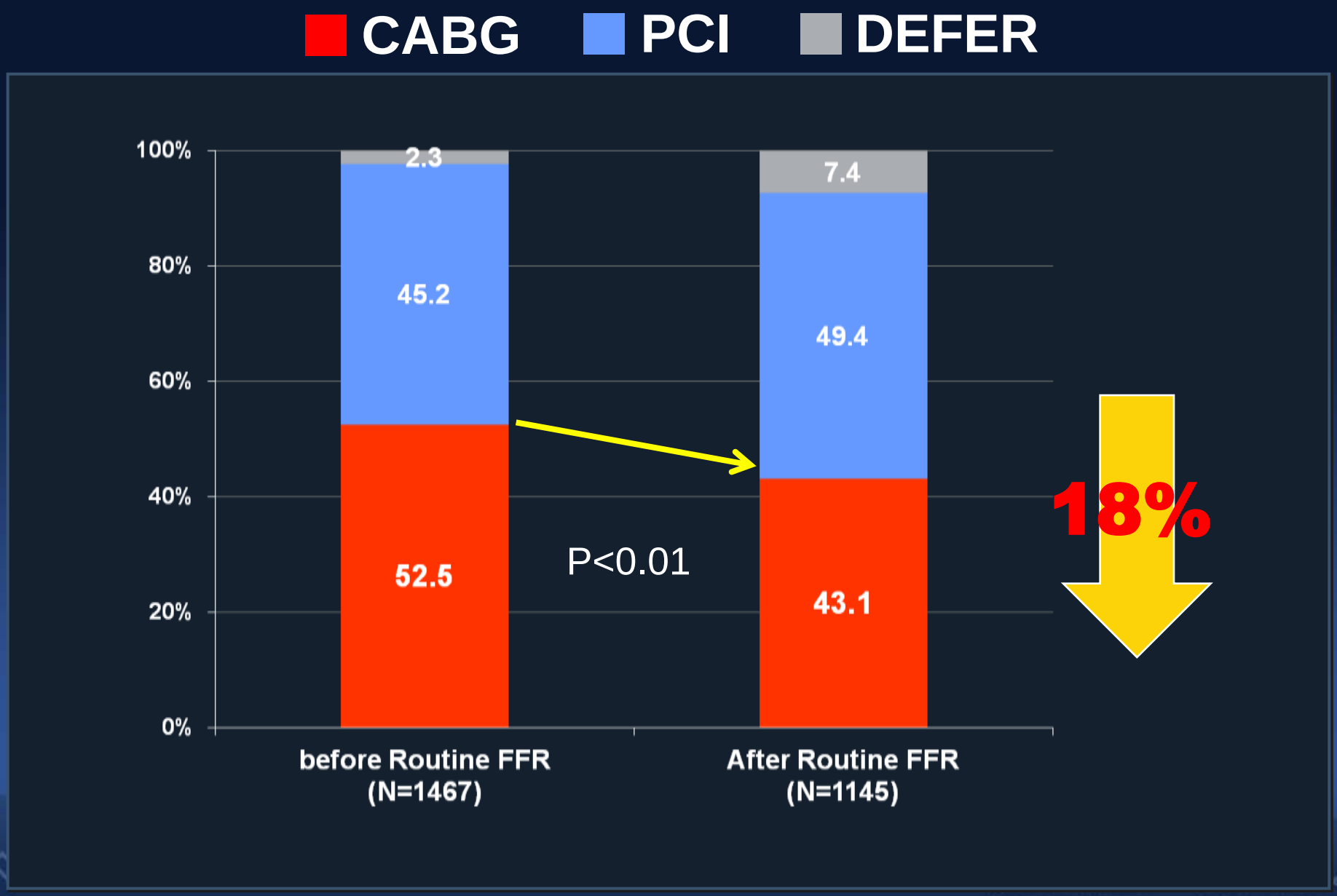
No. at Risk

Before Routine Use	2178	2151	2095	2048
After Routine Use	2178	2136	2110	2083

Impact of FFR, *Changes of LM and 3-VD Treatment Outcomes*

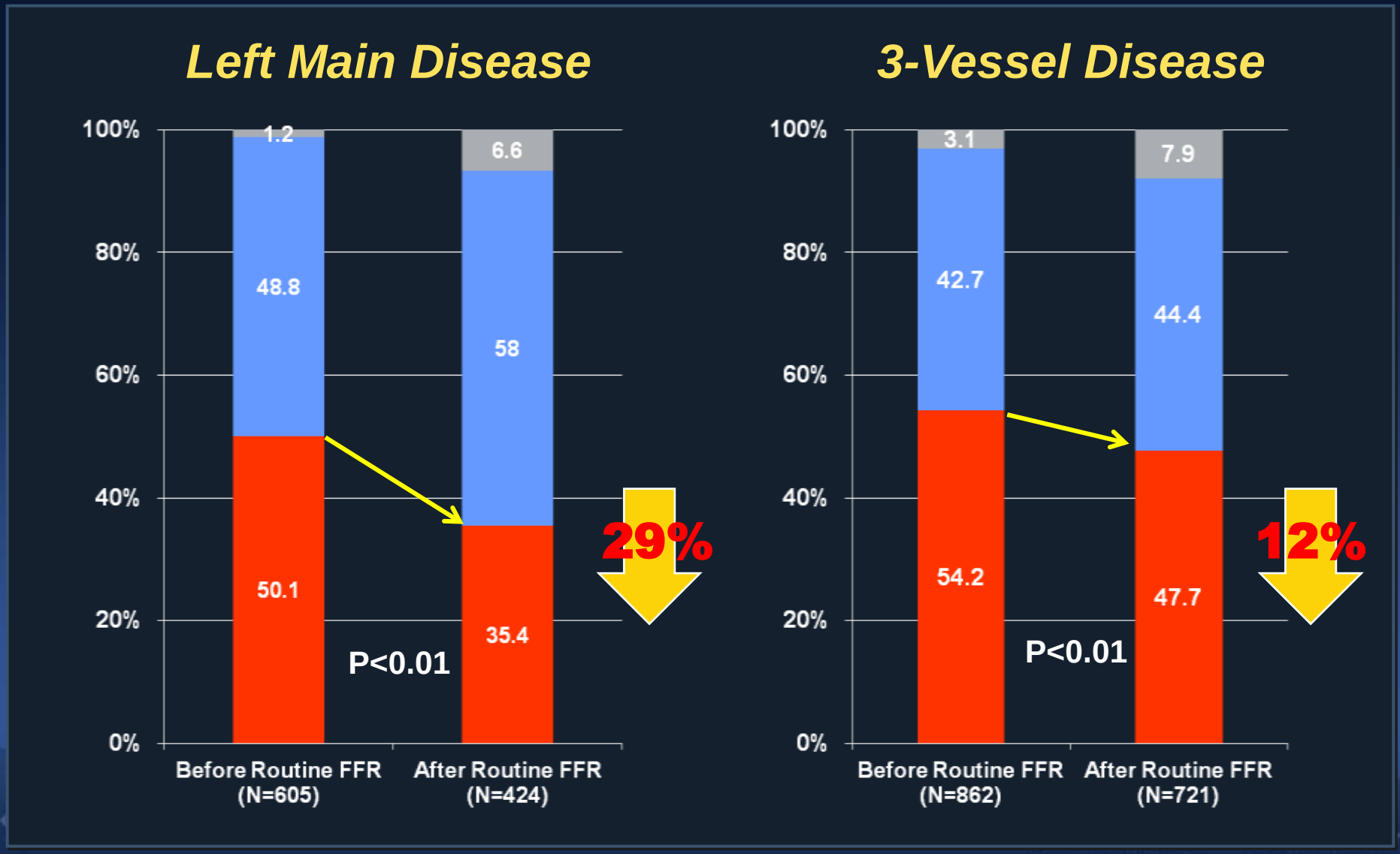
Ahn JM, et al, AJC 2015 (in press)

Treatment Strategy



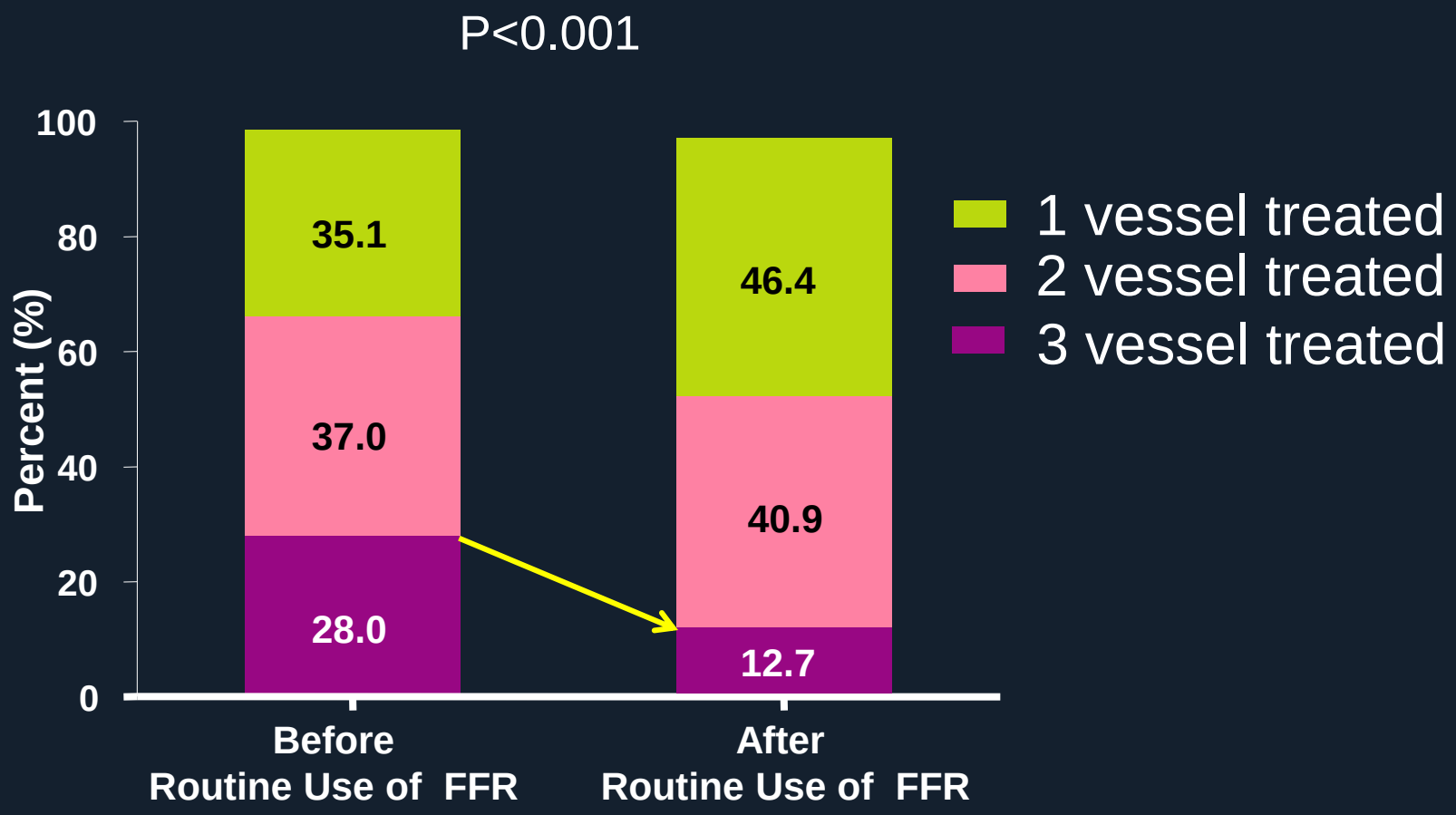
Treatment Strategy

CABG PCI DEFER



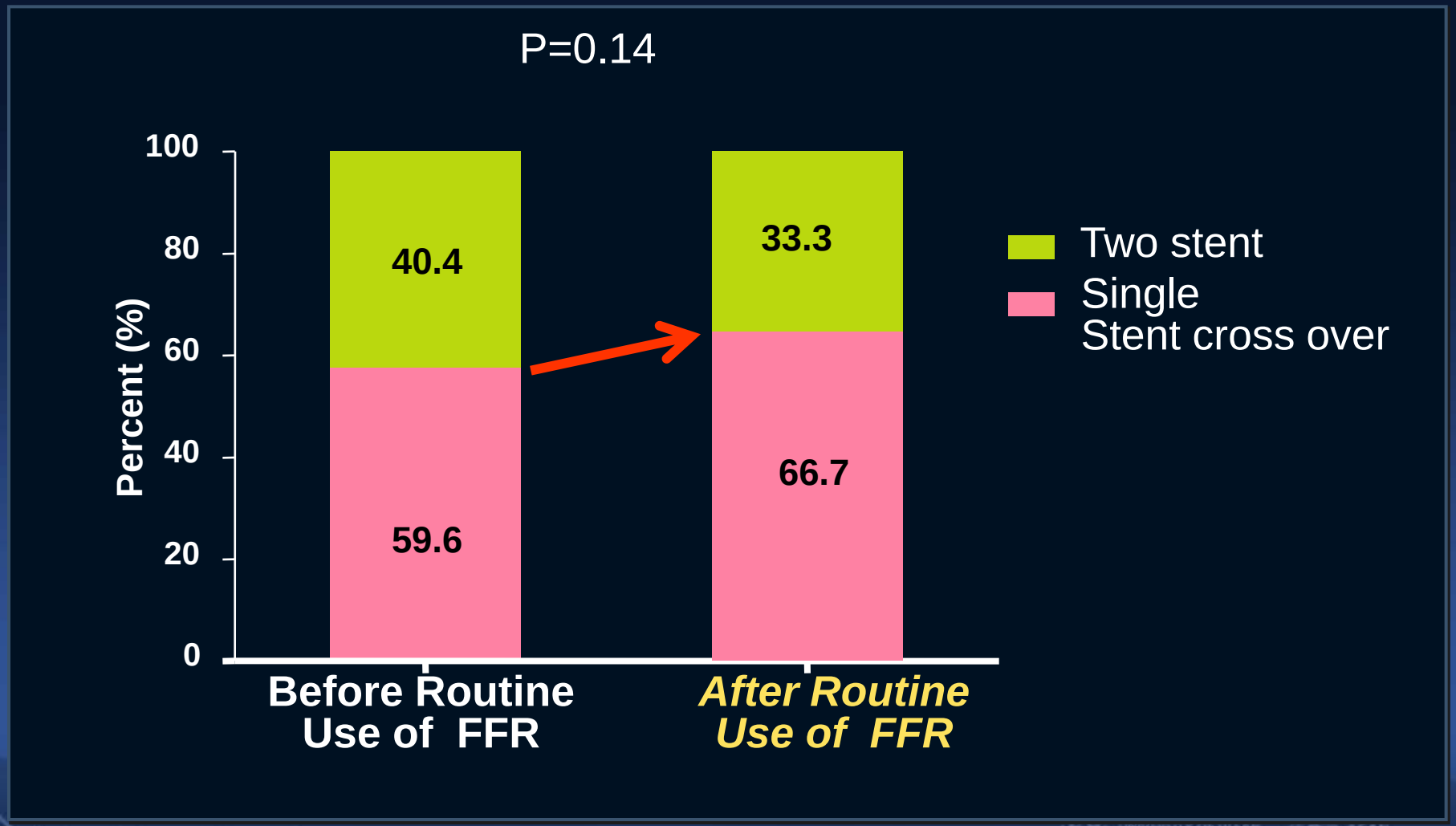
3 Vessel Disease Treatment

Multi-Vessel Stenting Decreased !

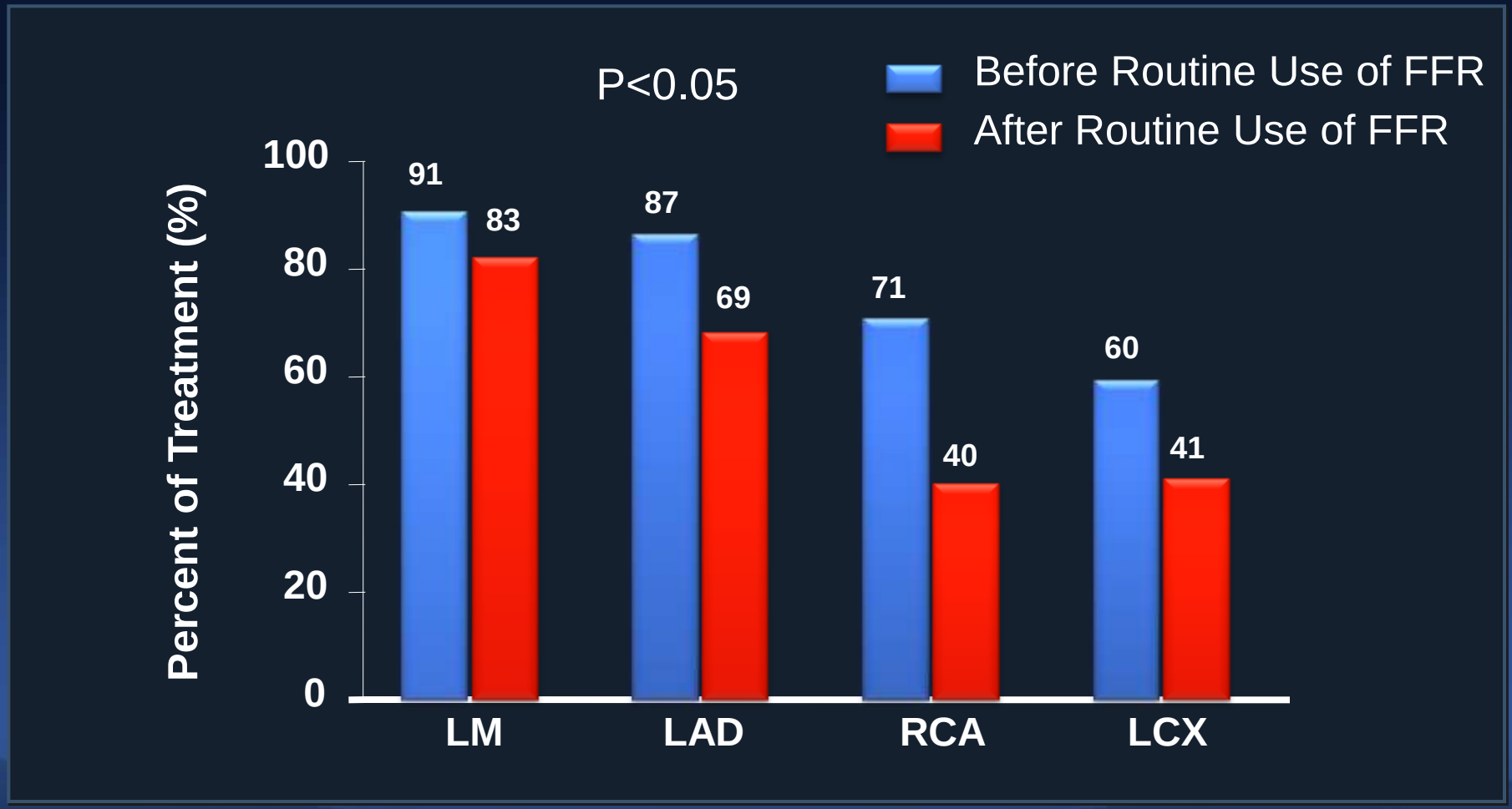


Distal LM Stent Technique

Simple Procedure Increased !



Treated Vessel Territory, *Reasonable Incomplete Revascularization !*



Procedural Characteristics of PCI

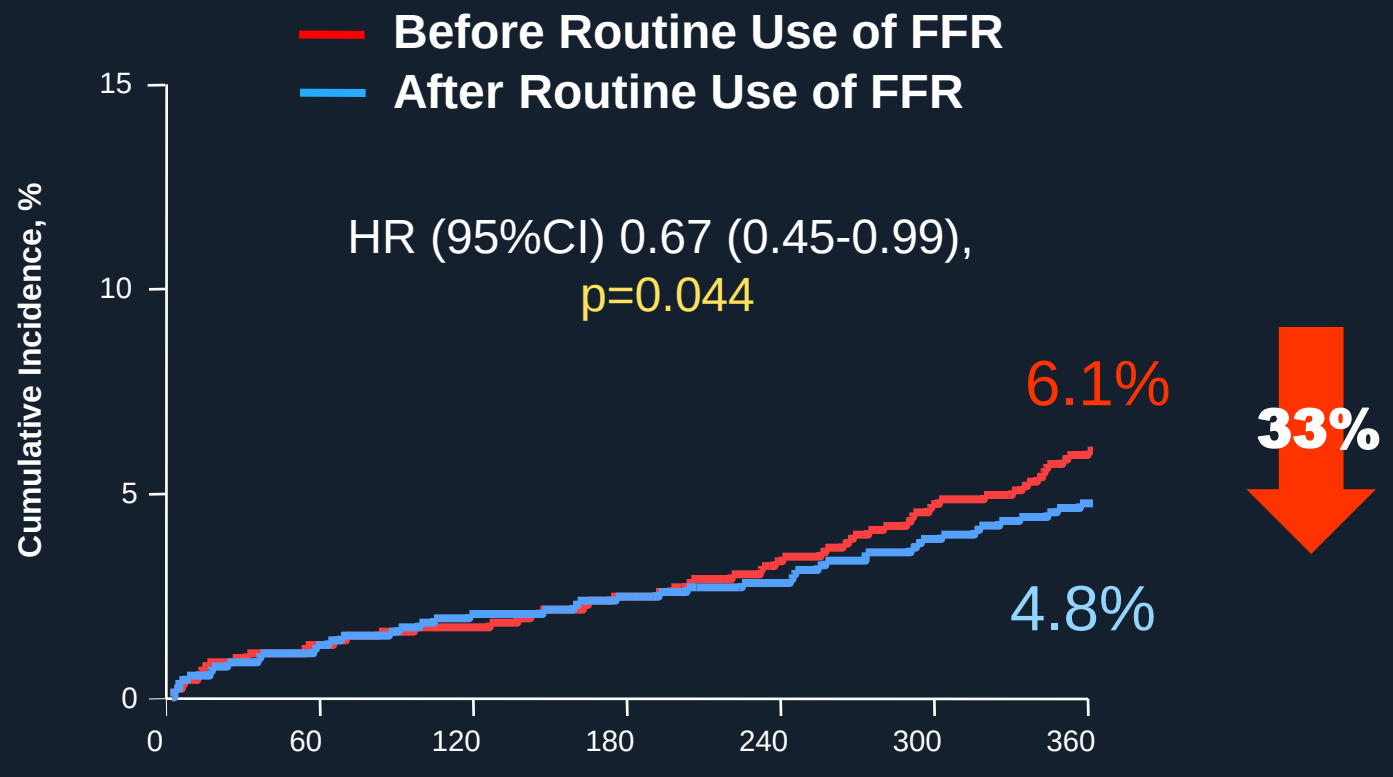
	Before Routine FFR (N=663)	After Routine FFR (N=566)	P value
Fractional flow reserve	13 (2.0)	237 (41.9)	<0.001
Mean	0.87±0.08	0.77±0.12	
>0.80	13 (86.7)	133 (39.8)	
0.75-0.80	0	77 (23.1)	
<0.75	2 (13.3)	124 (37.1)	
N. of Deferred lesions	13 (86.7)	145 (43.4)	
No. of stents	3.04±1.52	2.51±1.39	<0.001
Total stent length, mm	77.7±40.9	65.6±39.0	<0.001
Average stent diameter, mm	3.32±0.28	3.33±0.32	0.63

Procedural Characteristics of CABG

	Before Routine FFR (N=770)	After Routine FFR (N=494)	P value
Number of conduit	2.97±0.94	3.08±0.94	0.038
Number of vein conduit	1.17±0.90	1.30±0.85	0.009
Number of arterial conduit	1.80±0.87	1.78±0.90	0.69
Internal thoracic artery	757 (98.3)	481 (97.4)	0.25
Off-pump	499 (64.8)	433 (87.7)	<0.001

Primary End Point

Death, MI, Stroke or Repeat Revascularization



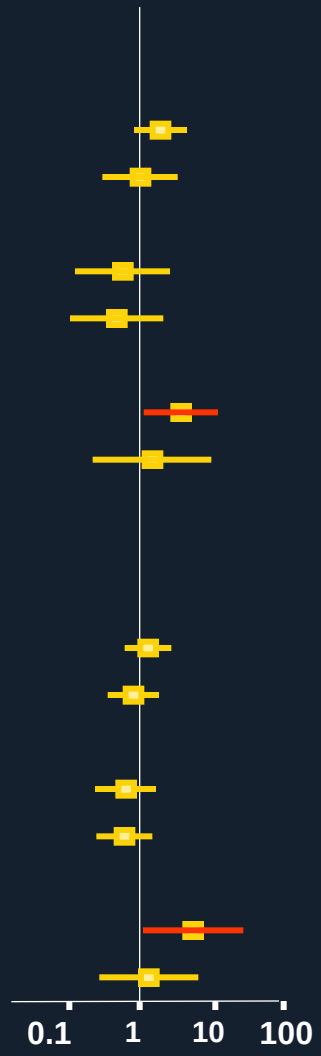
No. at Risk

Before Routine Use	917	901	883	857
After Routine Use	917	898	886	869

Ahn JM, et al, AJC 2015 (in press)

Clinical Outcomes, PCI vs. CABG

	1 Year Event Rate (%) CABG N=231	PCI N=231	Adjusted Hazard Ratio (95% CI)	P value
Left Main Disease				
MACCE				
Before Routine FFR	15 (5.0)	25 (8.5)	1.89 (0.84-4.25)	0.12
After Routine FFR	7 (4.6)	15 (6.2)	1.02 (0.32-3.21)	0.97
Death, MI, or stroke				
Before Routine FFR	10 (3.3)	4 (1.4)	0.60 (0.14-2.54)	0.49
After Routine FFR	6 (4.0)	6 (2.5)	0.50 (0.12-2.06)	0.34
Any Repeat Revascularization				
Before Routine FFR	5 (1.7)	21 (7.2)	3.53 (1.14-11.0)	0.029
After Routine FFR	2 (1.3)	10 (4.2)	1.48 (0.24-8.98)	0.67
3 Vessel Disease	N=529	N=529		
MACCE				
Before Routine FFR	21 (4.5)	24 (6.5)	1.30 (0.63-2.65)	0.48
After Routine FFR	18 (5.3)	15 (4.7)	0.83 (0.38-1.81)	0.65
Death, MI, or stroke				
Before Routine FFR	18 (3.9)	9 (2.5)	0.67 (0.27-1.65)	0.38
After Routine FFR	17 (5.0)	9 (2.8)	0.63 (0.27-1.48)	0.29
Any Repeat Revascularization				
Before Routine FFR	3 (0.7)	15 (4.2)	5.12 (1.11-23.7)	0.036
After Routine FFR	3 (0.9)	8 (2.5)	1.33 (0.30-5.97)	0.71



PCI Better **CABG Better**

Independent Predictors for
Death, MI, Stroke or Repeat Revascularization

	Hazard Ratio (95% CI)	P value
Chronic renal failure	2.41 (1.61-3.59)	<0.001
Multivessel disease	1.89 (1.45-2.46)	<0.001
Peripheral vascular disease	1.84 (1.07-3.17)	0.027
Bifurcation lesion	1.37 (1.09-1.71)	0.006
Acute coronary syndrome	1.37 (1.10-1.69)	0.004
Total stent length per patient	1.01 (1.00-1.01)	<0.001
Fractional flow reserve	0.72 (0.53-0.98)	0.036
Intravascular ultrasound	0.57 (0.40-0.81)	0.002

FAME 3, RCT

Patients with Angiographically 3 Vessel Disease without LM

R

FFR Guided PCI + OMT

CABG

Primary Endpoint at 2 years: Death + MI + Repeat R + Stroke

PI ; William Fearon,MD

FFR
How to Change Our Practice ?

- Less DES,
- More Less Surgery,
- More Optimal Medical Treatment,
- Minimize MACE and Maximize Clinical Outcomes,
- Save Money and Save Lives.

Thank You !!

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