Imaging guided approach

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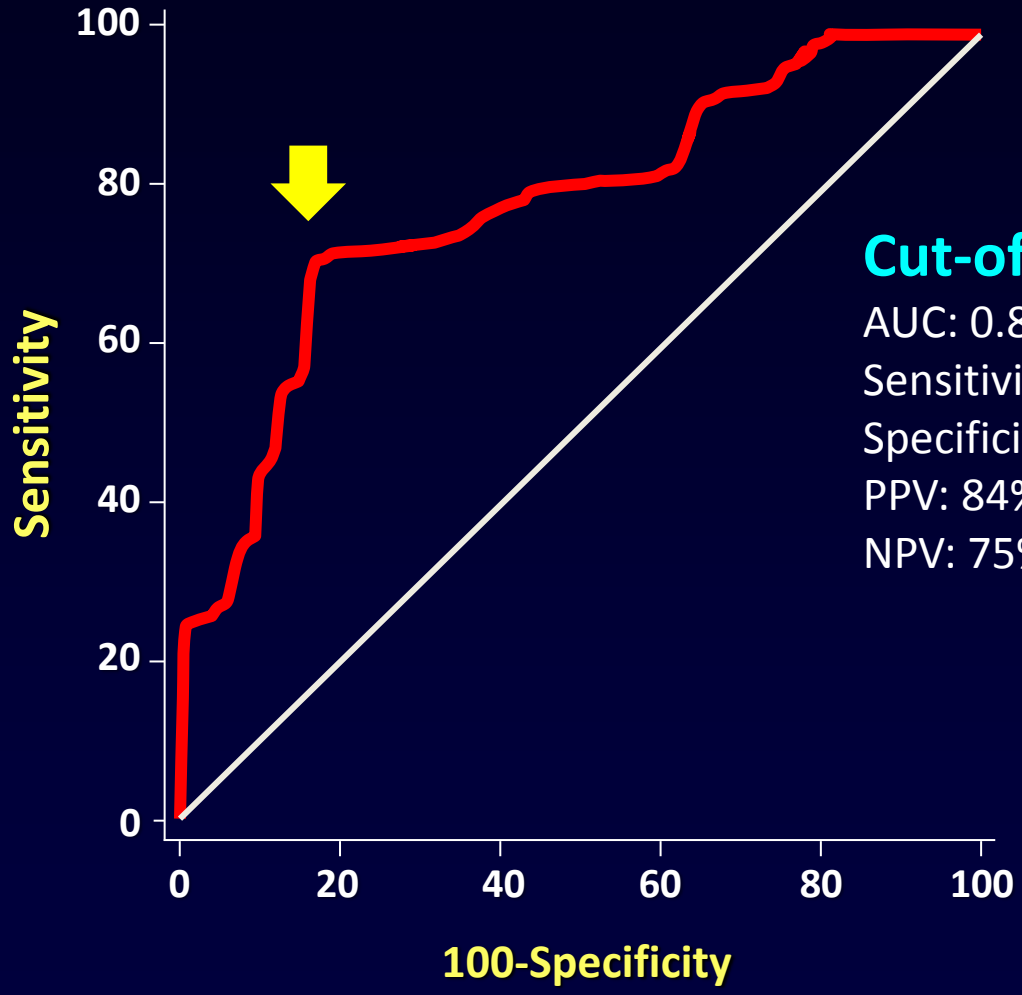
Lesion assessments

Culprit lesion: IVUS vs. FFR

Reference	Year	FFR	N	MLA (mm^2)	PPV	NPV
Briguori, AJC	2001	0.75	53	**4.0**	46%	96%
Kang, Circ Interv	2011	0.8	236	**2.4**	37%	96%
Koo, JACC Interv	2011	0.8	267	**3.0**	47%	
Gonzalo, JACC	2012	0.8	51	**2.4**	67%	65%
Waksman, JACC	2013	0.8	334	**3.1**	40%	83%

There were moderate correlations between FFR and IVUS-derived MLA

IVUS-derived MLA of FFR ≤0.80: Lt main



Cut-off value: 4.5mm^2

AUC: 0.83

Sensitivity: 77%

Specificity: 82%

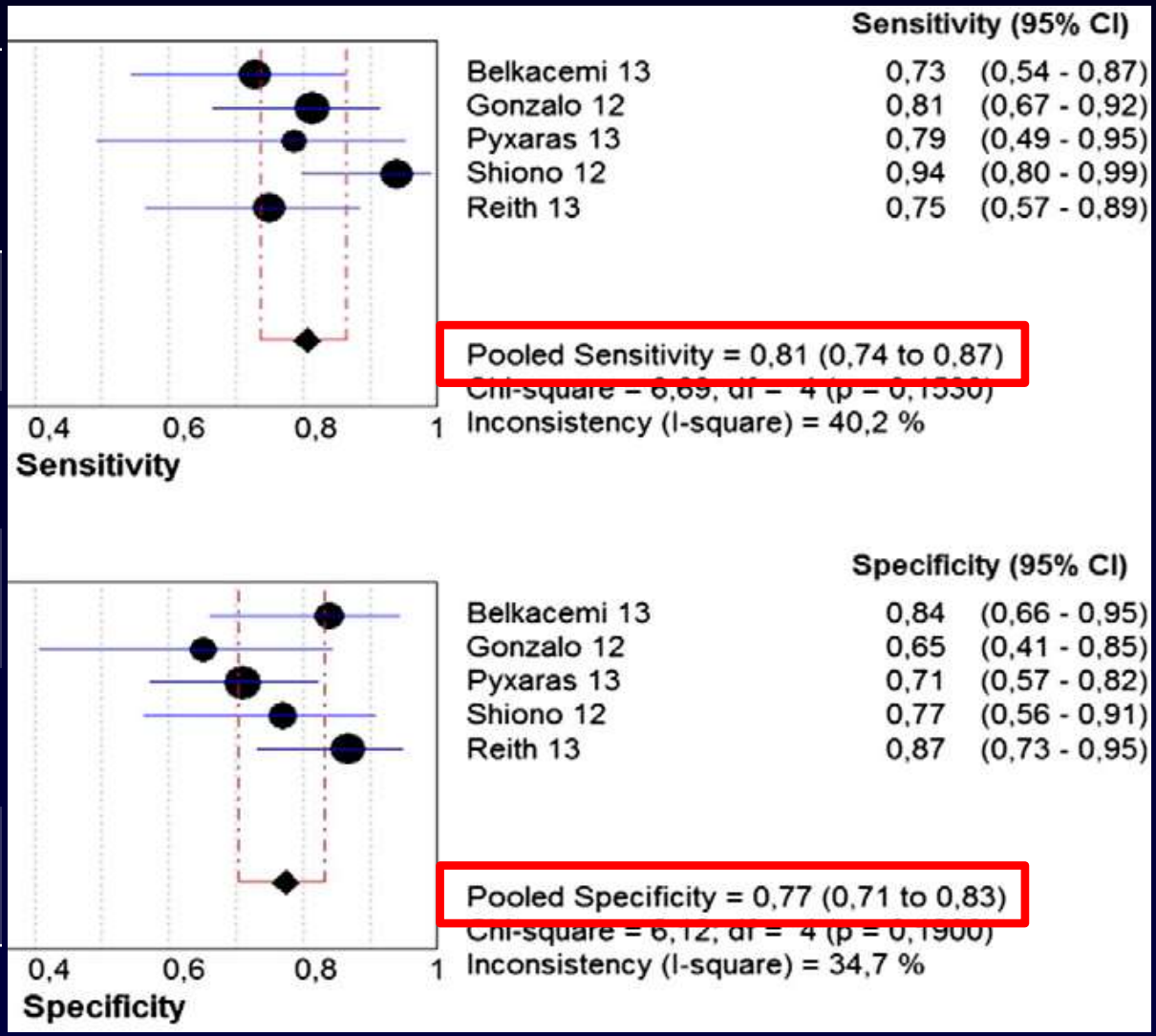
PPV: 84%

NPV: 75%

Park SJ et al. *J Am Coll Cardiol Intv* 2014;7:868-74

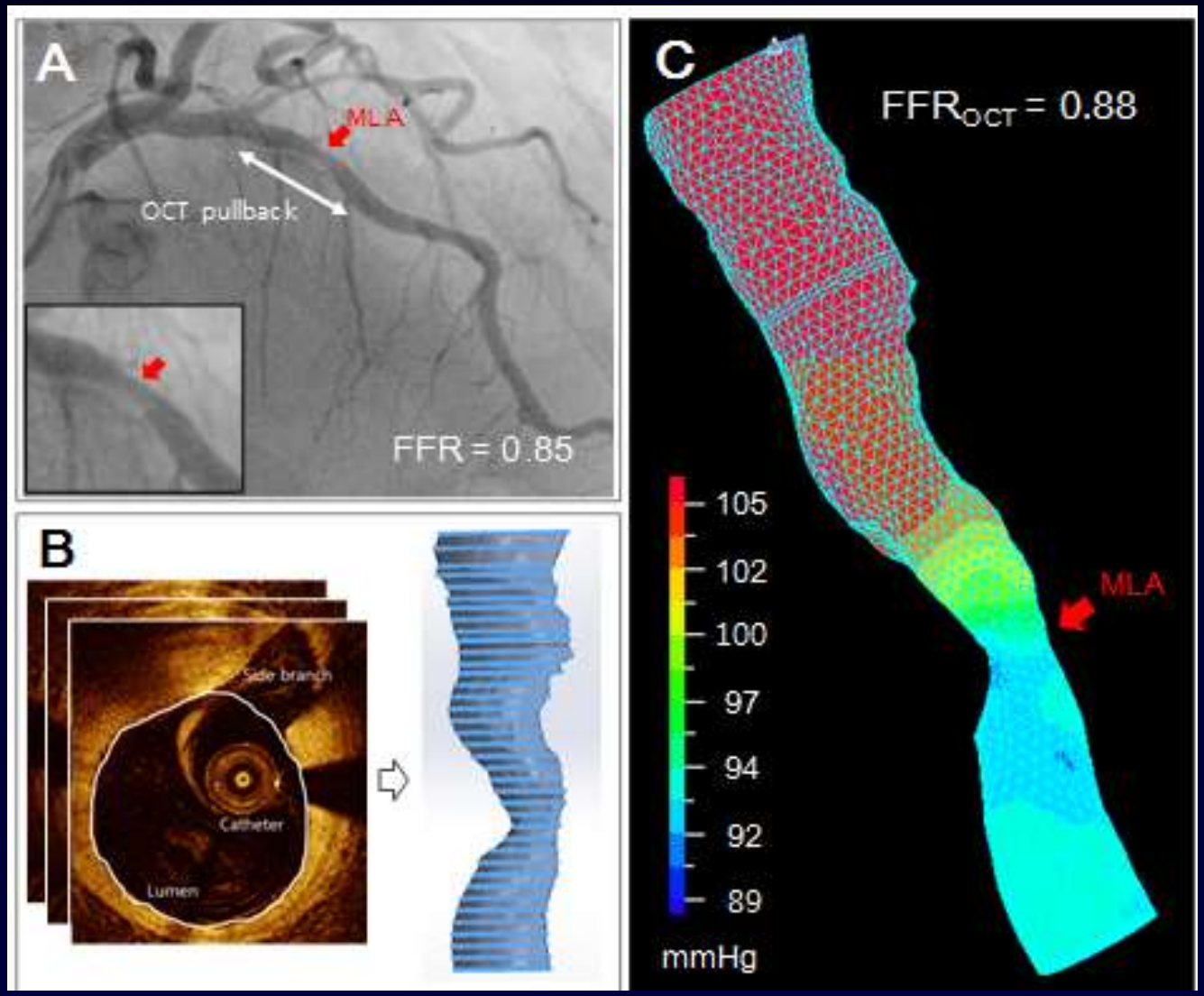
Accuracy and cut-off value for OCT-derived MLA to predict functionally significant stenosis

Cutoff for MLA (mm^2)	
Gonzalo et al	1.95
Shiono et al	1.91
Belkacemi et al	2.54
Pyxaras et al	1.85
Reith et al	1.59



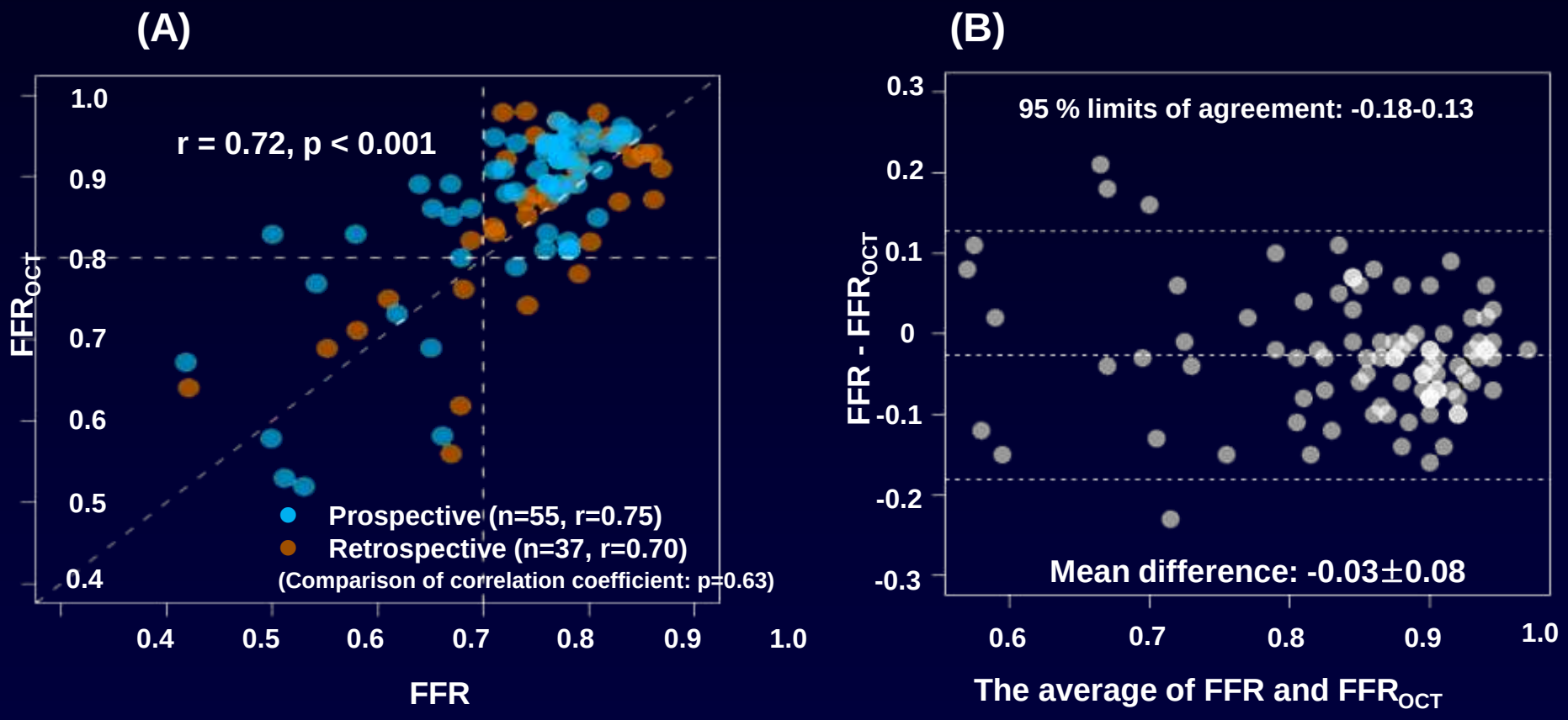
D'Ascenzo F, Am Heart J. 2015;169:663-73

Assessing computational FFR from OCT in patients with intermediate coronary stenosis in the LAD (N=92): OCT-derived FFR



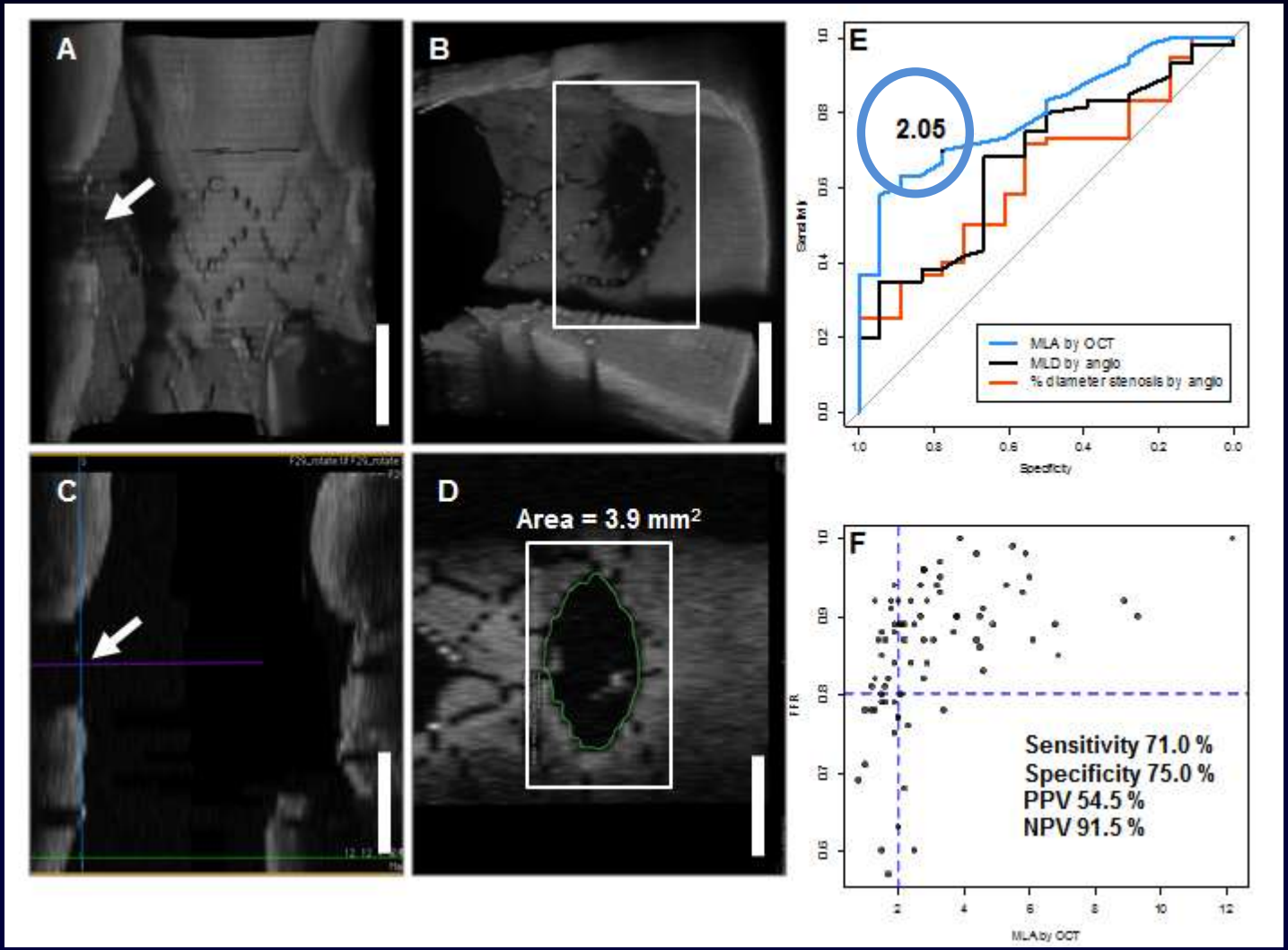
HA J, Kim JS, Hong MK (corresponding author), et al. *Circ Cardiovasc Interv* 2016;9:e003613

Correlation and agreement between FFR and FFR_{OCT}



HA J, Kim JS, Hong MK (corresponding author), et al. *Circ Cardiovasc Interv* 2016;9:e003613

Comparison of 3-dimentional OCT vs. FFR in the assessment of jailed side-branch ostial stenoses (n=90)



Ha J, Kim JS, Hong MK (corresponding author). *J Am Coll Cardiol Img* 2014;7:204-5

Optimize acute stent results

2014 ESC/EACTS Guidelines

IVUS in selected patients to optimize stent implantation.	IIa	B
IVUS to assess severity and optimize treatment of unprotected left main lesions.	IIa	B
IVUS or OCT to assess mechanisms of stent failure.	IIa	C
OCT in selected patients to optimize stent implantation.	IIb	C

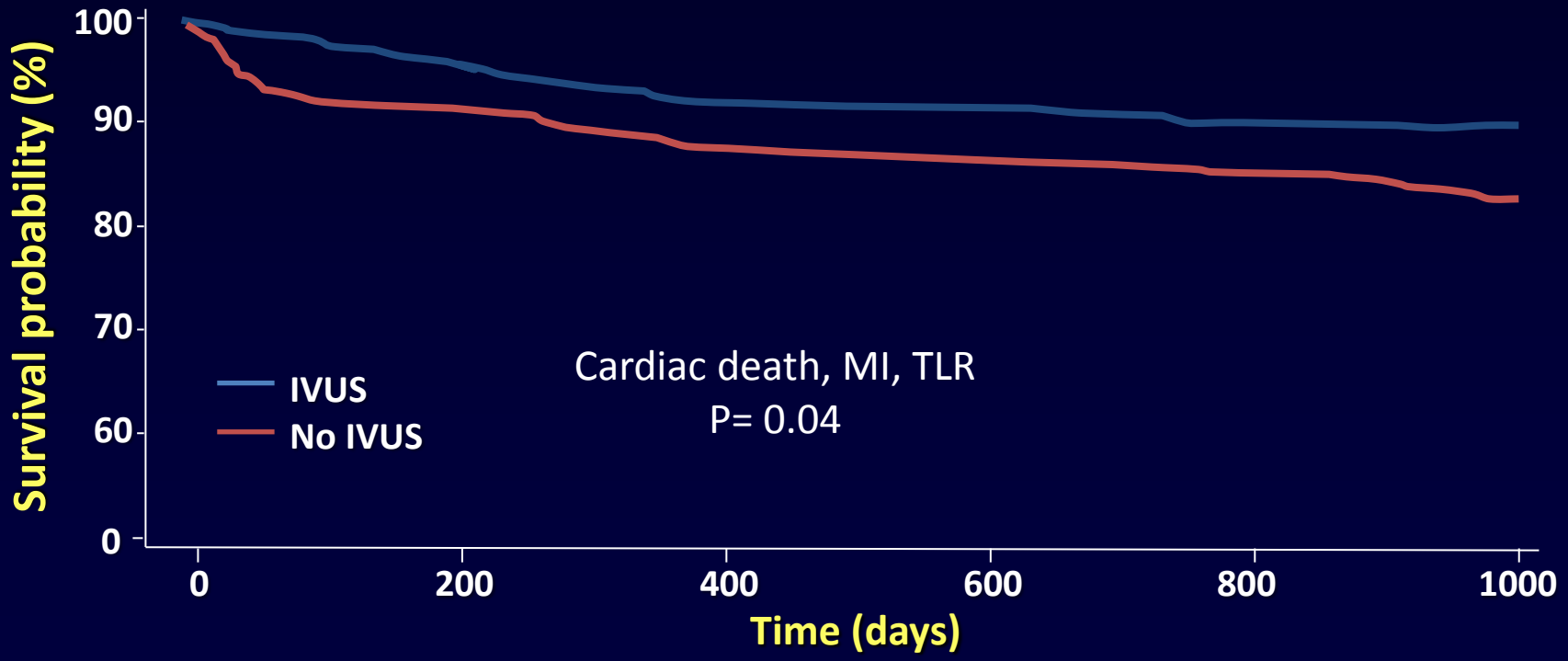
Benefits from IVUS-guided PCI

- Left main
- Bifurcation
- Diffuse long lesion
- Calcified lesion
- Chronic total occlusion
- Chronic kidney disease

Im E, Kim JS, Hong MK (corresponding author). J Vasc Diag 2015:3:41-51

Left Main: Meta-analysis

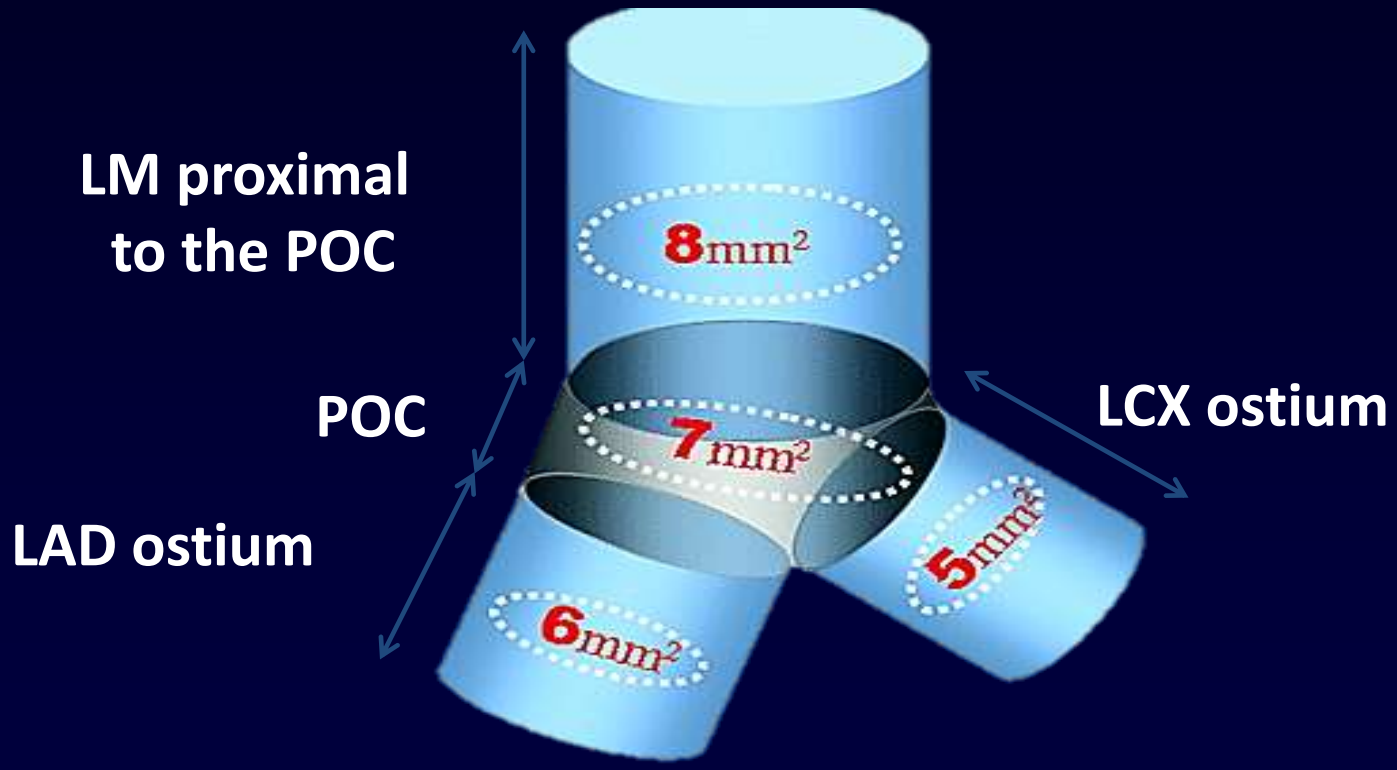
- **Patient-level analysis of 4 registries**
- A total of 1,670 patients
- 505 patients (30.2%) underwent DES implantation under IVUS guidance



de la Torre Hernandez JM, et al. *JACC Cardiovasc Interv*. 2014;7:244–254

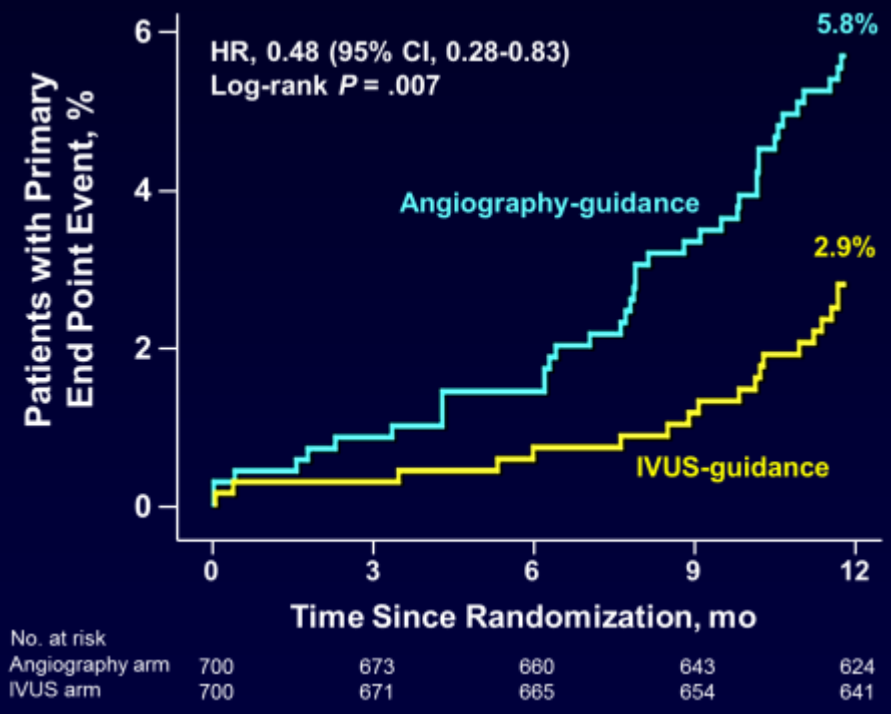
IVUS optimization: Left main

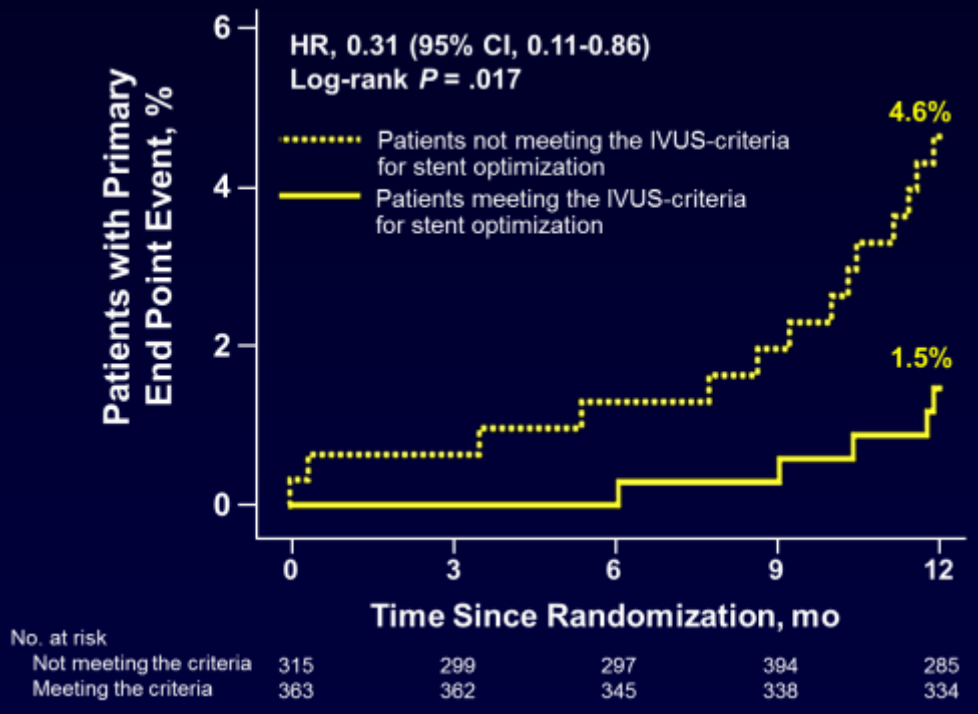
Post-stenting MLA cutoff values that best predicted ISR



Kang SJ et al. *Circ Cardiovasc Interv*. 2011;4:562–569

Diffuse long lesion: IVUS-XPL Trial

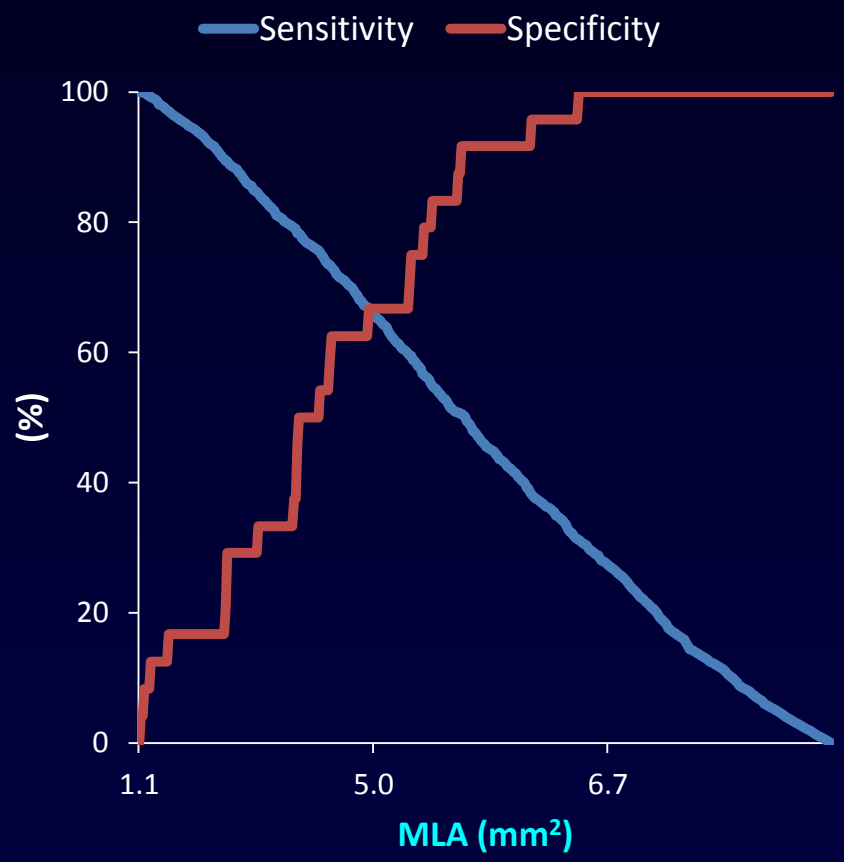


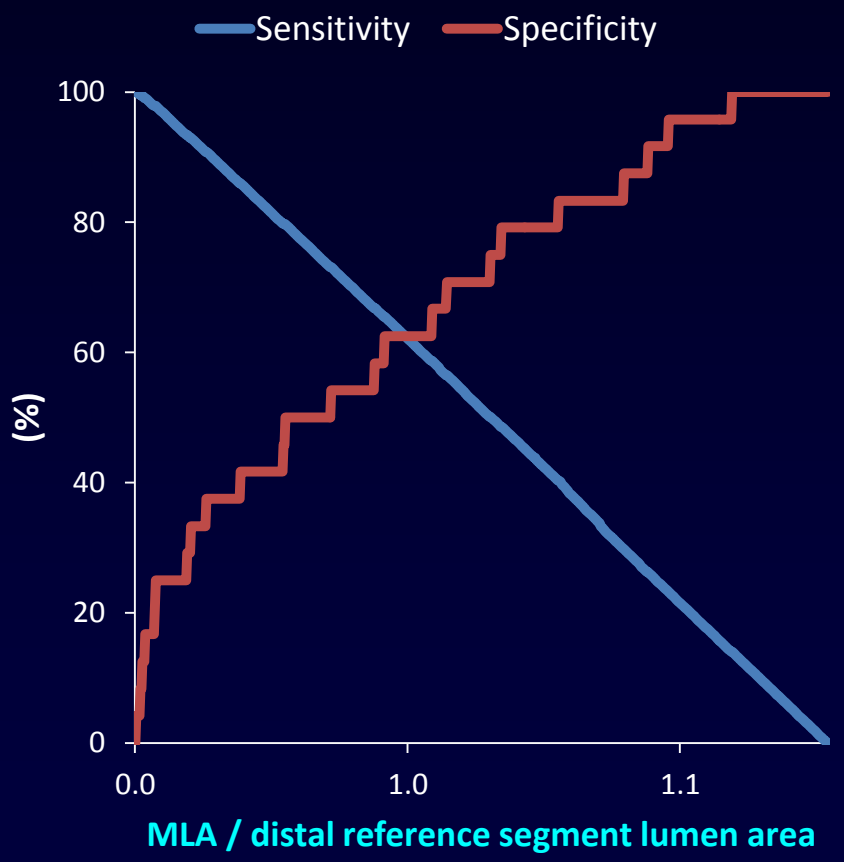


Hong SJ, Hong MK (corresponding author), et al. *JAMA*:314:2155-63

IVUS optimization: Long lesion

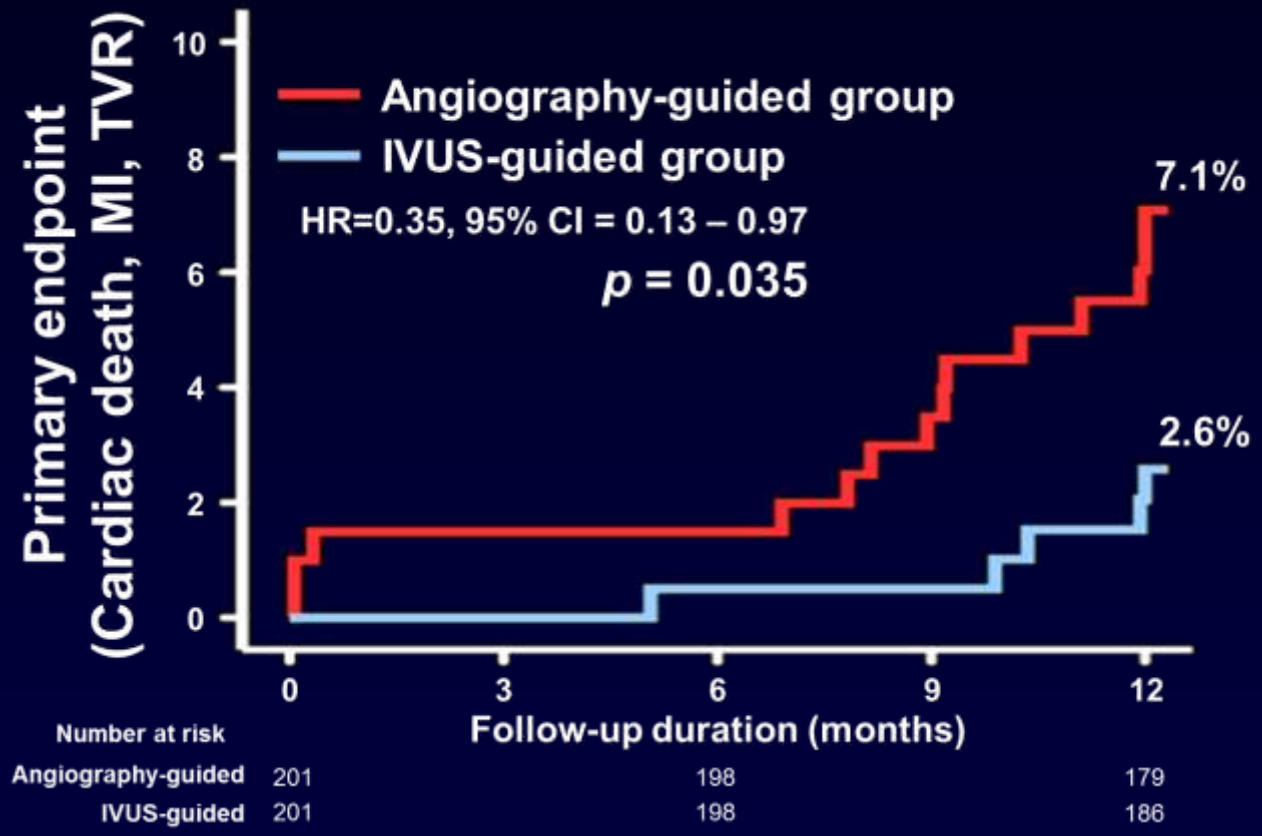
Post-stenting criteria that best predicted 1-year MACE





Lee SY, Hong MK (corresponding author) et al. *Rev Esp Cardiol (In press)*

Chronic total occlusion: CTO-IVUS Trial



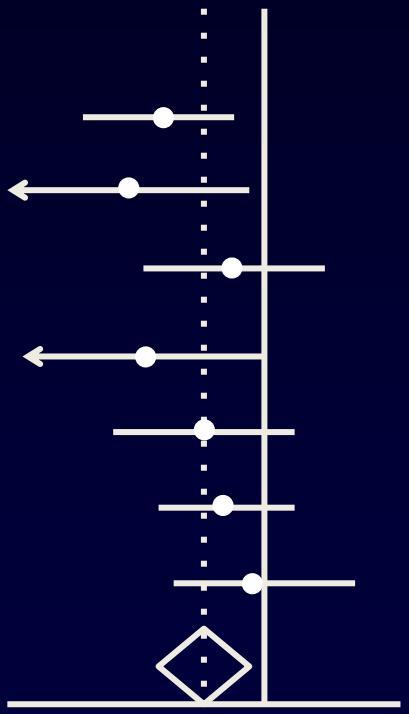
Kim BK, Jang Y et al, *Circ Cardiovasc Interv*. 2015;8:e002592

Meta-analysis of 7 randomized trials: IVUS vs. angio-guided (first and next-generation) DES implantation

Event: cardiac death, MI, TLR

Study-level meta-analysis

Study	Year	OR	Events: IVUS	Events: Angio
IVUS-XPL	2015	0.49	19/700	39/700
CTO-IVUS	2015	0.37	5/201	14/201
AIR-CTO	2015	0.82	25/115	29/115
Tan et al	2015	0.42	8/61	17/62
Kim et al (RESET)	2013	0.60	12/269	20/274
AVIO	2013	0.67	24/142	33/142
HOME DES IVUS	2010	0.91	11/105	12/105
Overall		**0.60**	**104/1593**	**164/1599**

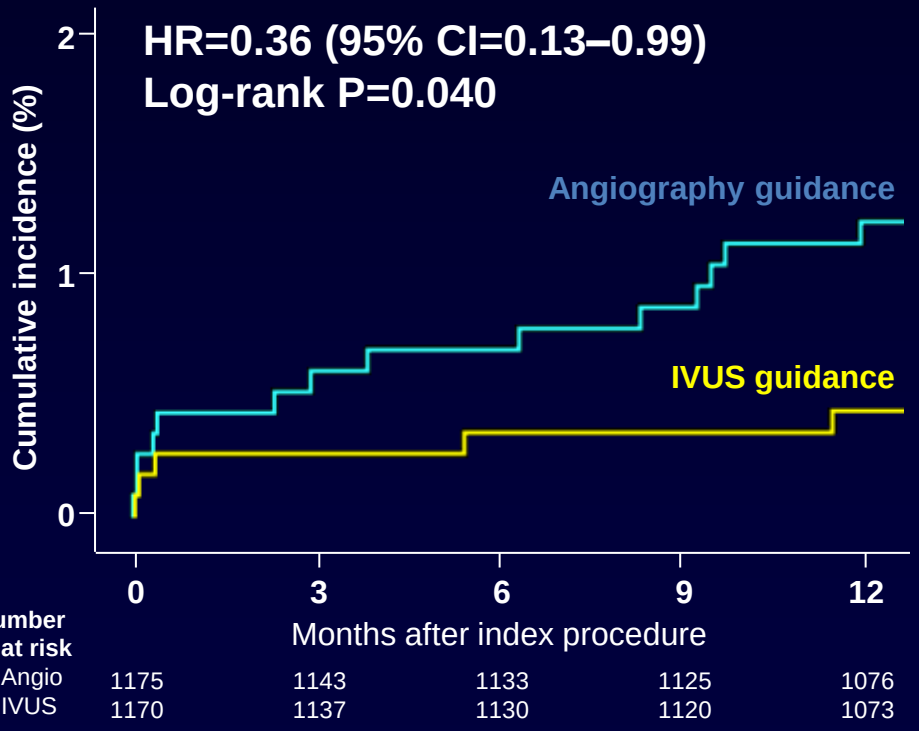


Islam Y. Elgendy et al. *Circ Cardiovasc Interv*. 2016;9:e003700

Meta-analysis with Individual Patient-Level Data from 2,345 Randomized Patients with second-generation DES (RESET Long, CTO IVUS and IVUS XPL)

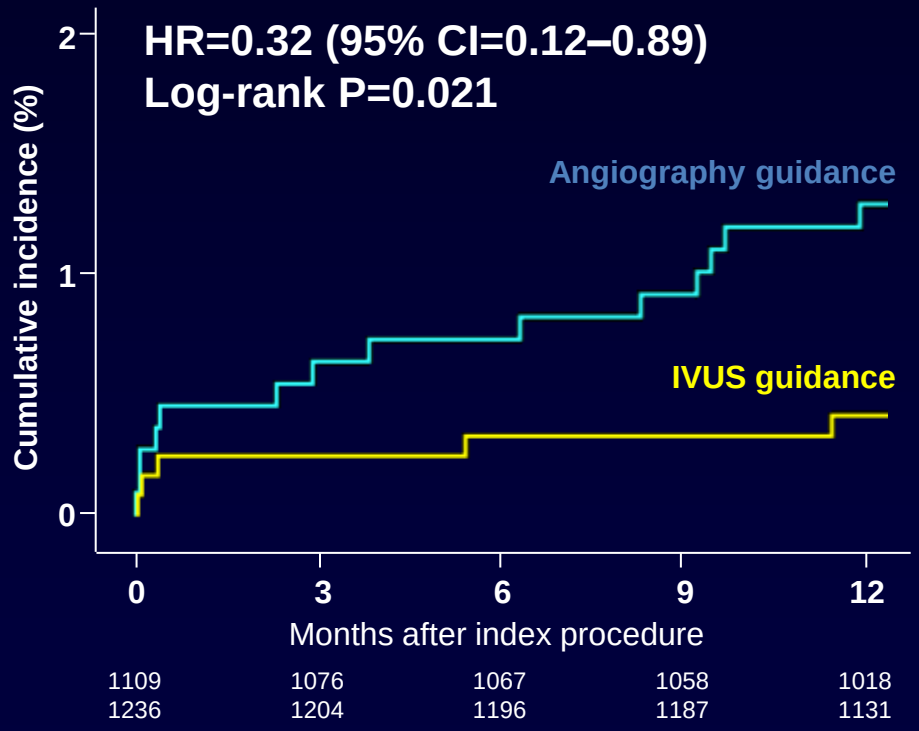
Hard events of MACE (cardiac death, MI, or stent thrombosis)

Intention-to treat analysis



Number at risk					
Angio	1175	1143	1133	1125	1076
IVUS	1170	1137	1130	1120	1073

Per-protocol analysis



Angio	1109	1076	1067	1058	1018
IVUS	1236	1204	1196	1187	1131

Shin DH, Hong MK (corresponding author), et al. *JACC Intv* 2016;9:2232-2239

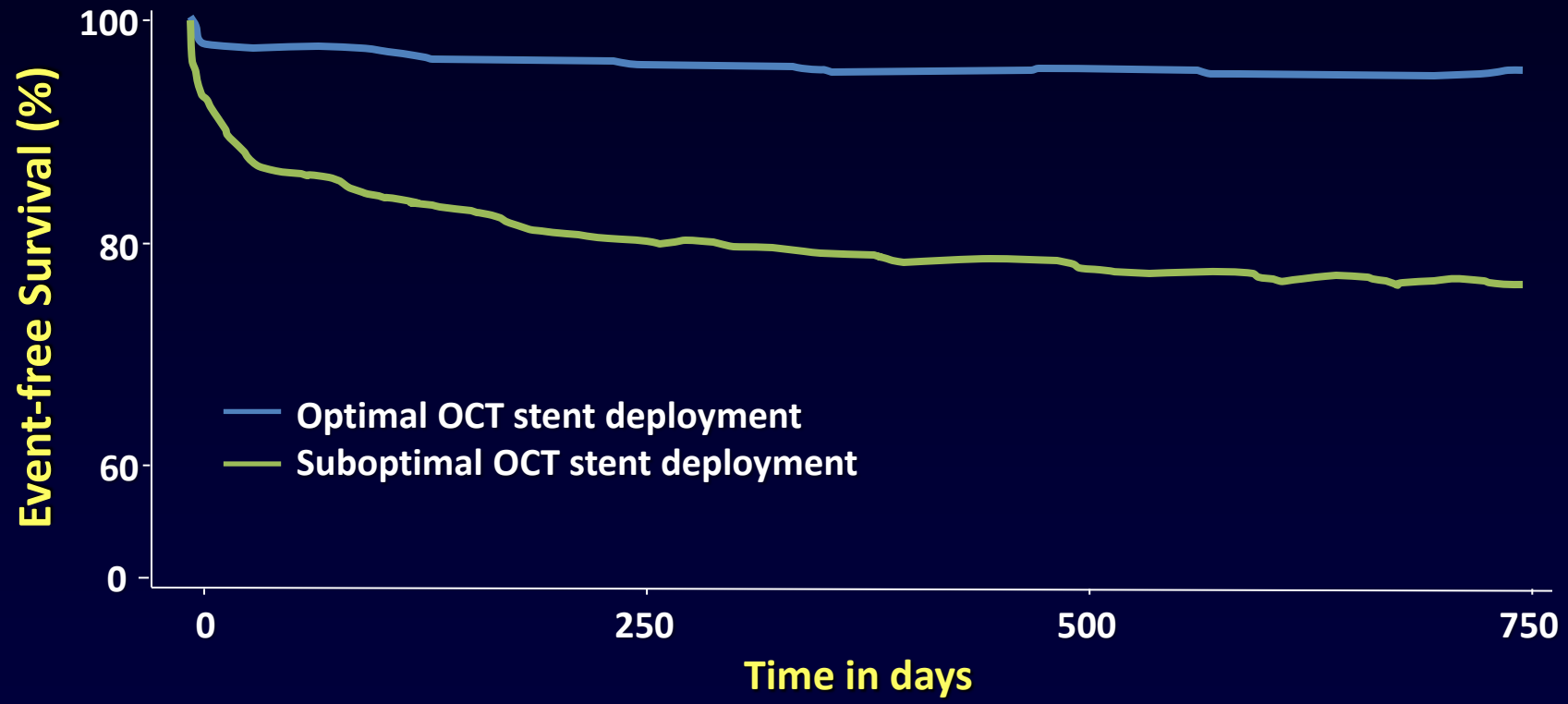
OCT optimization: CLI-OPCI II Study

Predictive Value of OCT Criteria for 1-year MACE

Adjusted	HR (95% CI)	p
In-stent minimum lumen area <4.5 mm^2	**1.64 (1.1–2.6)**	**0.040**
Distal dissection >200µm	**2.54 (1.3–4.8)**	**0.004**
Proximal dissection >200µm	0.83 (0.4–1.9)	0.65
In-stent lumen underexpansion	1.21 (0.7–1.9)	0.45
Malapposition >200µm	1.15 (0.8–1.7)	0.52
Intrastent plaque/thrombus protrusion >500µm	1.00 (0.6–1.6)	0.99
Distal reference narrowing	**4.65 (2.5–8.8)**	**<0.001**
Proximal reference narrowing	**5.73 (2.2–14.6)**	**<0.001**

J Am Coll Cardiol Img. 2015;8(11):1297-1305.

OCT optimization: CLI-OPCI II Study

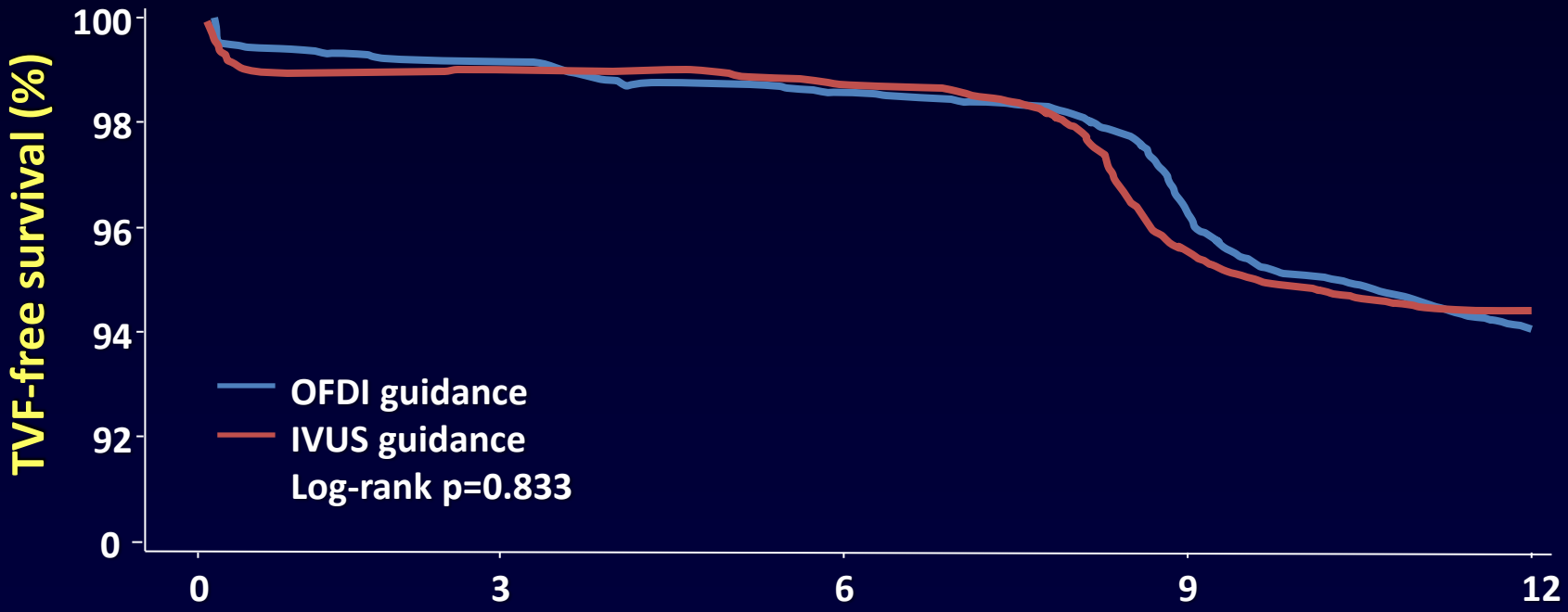


J Am Coll Cardiol Img. 2015;8(11):1297-1305.

IVUS vs. OCT: Opinion Trial

The largest study comparing head to head OCT versus IVUS

TVF = composite of cardiac death, target vessel-related MI and clinically-driven TVR



Number at risk			
OFDI	401	392	265
IVUS	390	381	285

EuroPCR 2016 presented

Acute stent malapposition: OCT

- Frequency of acute stent malapposition

Reference	Year	N	Frequency
Kubo et al. JACC Img	2013	100	**39%**
Kawamori et al. EHJ Cardiovasc Imaging	2013	40	**65%**
Im et al. Circ Cardiovasc Interv	2014	356	**62%**
Soeda et al. Circulation	2015	1001	**39%**
Pratiet al. JACC Img	2015	1002	**49%**

- Spontaneous resolution of acute stent malapposition

Reference	Year	ASM	Resolution
Kawamori et al. EHJ Cardiovasc Imaging	2013	26	**77%**
Im et al. Circ Cardiovasc Interv	2014	221	**69%**

- Predictors of spontaneous resolution: **malapposed distance** or **area**

Summary

- Angiography-guided PCI is not enough in complex lesions
- Stent optimization (underexpansion) using IVUS or OCT may reduce adverse cardiac events during follow-up period

Thank you for your attention