[Debate I: How to Do PCI?]
IVUS-Guidance is Better.
QCA-Guidance is Enough.

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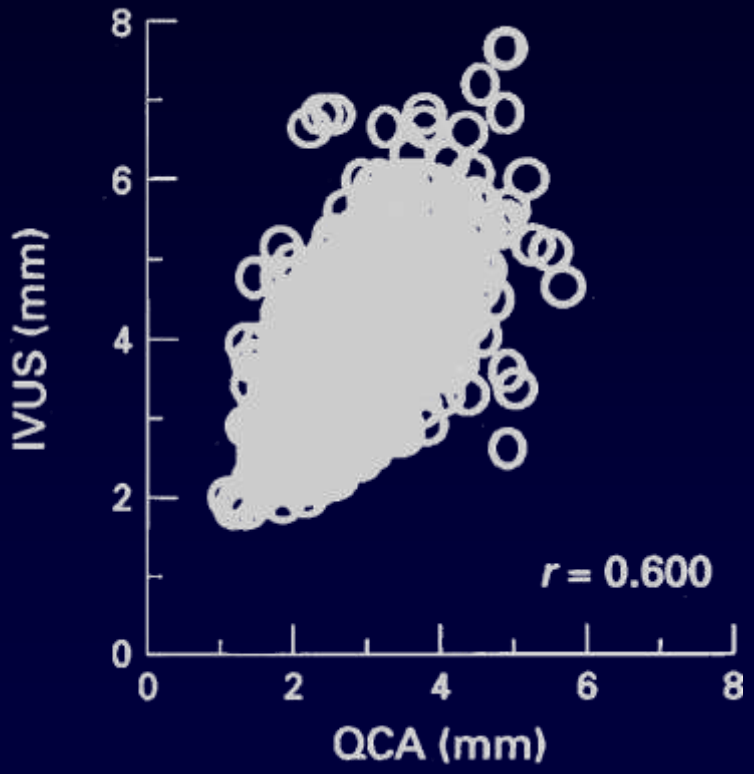
IVUS-guidance is Better.

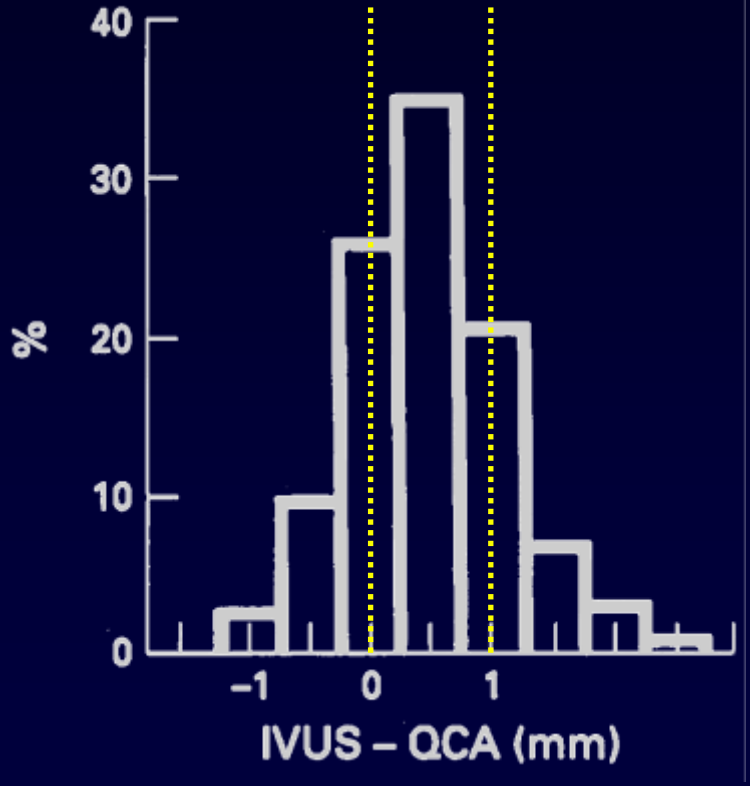
1. **IVUS-guided stent sizing is more accurate and typically larger than angiographic stent sizing.**

Reference lumen dimensions by IVUS and QCA

- The correlation between IVUS and QCA reference lumen dimensions



- Frequency distribution of the difference between IVUS and QCA reference lumen dimensions.



On average, the reference lumen by IVUS is 0.5 mm larger than by QCA;
but in a significant number of lesions, the IVUS measurement is larger by 1.0 mm or smaller by 0.5 mm.

Abizaid A, et al. Heart 1997;78:27-30

Comparison of Stent Size From Recent Studies

Mean Stent Diameter

	IVUS-guidance N	Angio-guidance N	IVUS-guidance (mm)	Angio-guidance (mm)	P-value
Chieffo et al.[1]	142	142	2.95±0.38	2.86±0.36	0.19
CTO-IVUS[2]	201	201	2.91±0.52	2.85±0.41	0.23
ADAPT-DES[3]	3349	5234	3.4±0.6	3.0±0.7	<0.001
AIR-CTO[4]	115	115	3.05±0.46	2.86±0.37	0.001
Hong et al.[5]	201	201	2.96±0.38	2.83±0.37	0.001

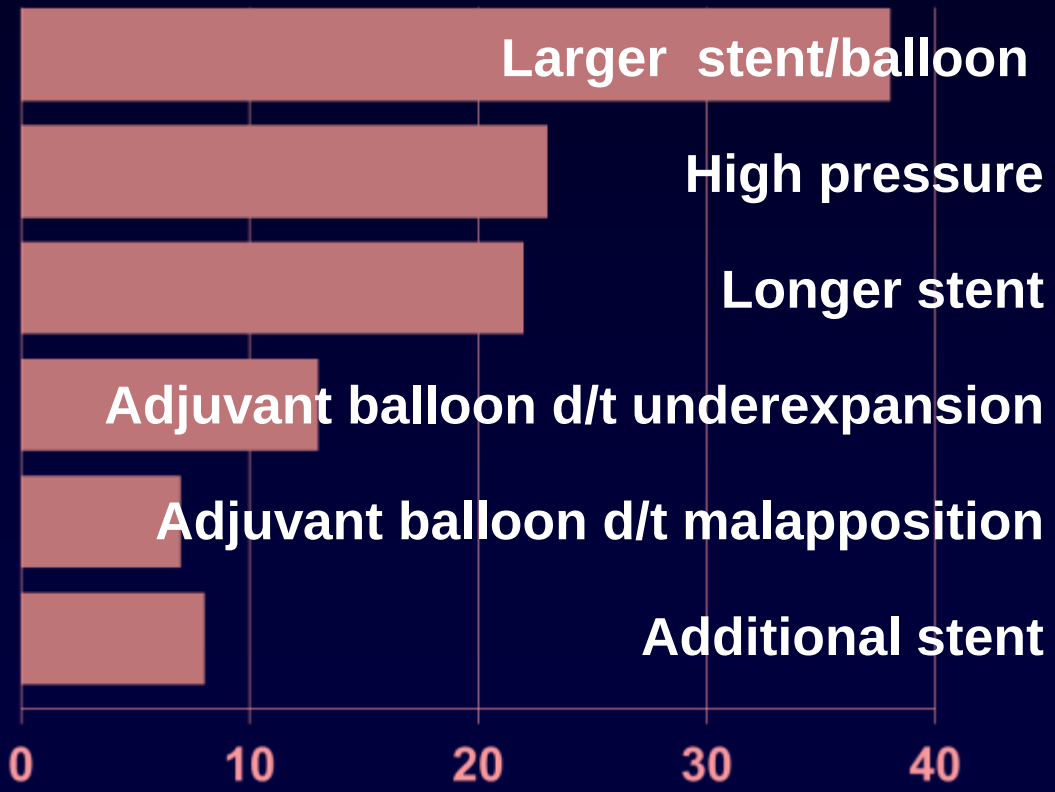
(1) Chieffo A et al, Am Heart J. 2013;165:65-72
(2) Kim BK, et al. Circ Cardiovasc Interv 2015:8:e002592
(3) Witzenbichler B et al. Circulation. 2014;129:463-470
(4) Tian NL et al. EuroIntervention 2015:10:1409-17
(5) Hong SJ, et al. Am J Cardiol. 2014;114:534-540

IVUS-guidance is Better.

1. IVUS-guided stent sizing is more accurate and typically larger than angiographic stent sizing.
2. Use of IVUS changes the strategies to optimize stent deployment.

How the IVUS information influenced the procedure? From ADAPT-DES Study

When IVUS was used, the operator was required to report the timing of IVUS imaging (eg, before intervention, after DES, after adjunct balloon inflation) and how the IVUS information influenced the procedure.



Witzenbichler B et al. Circulation. 2014;129:463-470

Frequency of post-adjuvant ballooning From Recent Studies

Frequency of post-adjuvant ballooning

	IVUS-guidance N	Angio-guidance N	IVUS-guidance (mm)	Angio-guidance (mm)	P-value
CTO-IVUS*[1]	201	201	51.2%	41.3%	0.045
Roy et al.[2]	884	884	31.0%	17.7%	<0.001
RESET-IVUS[3]	297	246	54.6%	44.5%	0.03
IVUS-XPL[4]	700	700	76%	57%	<0.001
MOZART[5]	42	42	95.1%	78.6%	0.048

* High pressure poststent dilation

(1) Kim BK, et al. Circ Cardiovasc Interv 2015:8:e002592
(2) Roy P et al. Eur Heart J. 2008;29:1851-1857
(3) Kim JS et al. JACC Cardiovasc Interv. 2013;6:369-376
(4) Hong SJ, et al. JAMA. 2015;314:2155-2163
(5) Mariani J, Jr., et al. JACC Cardiovasc Interv. 2014;7:1287-1293

Comparison of final balloon size or balloon pressure from recent studies

Final Balloon Size or Balloon Pressure*

	IVUS-guidance N	Angio-guidance N	IVUS-guidance (mm or atm*)	Angio-guidance (mm or Atm*)	P-value
Chieffo et al.(1)	142	142	3.39±0.47	3.15±0.40	0.002
CTO-IVUS(2)	201	201	14.6±3.7*	13.8±3.8*	0.040
ADAPT-DES(3)	3349	5234	16.9±3.7*	16.7±3.5*	0.13
RESET-IVUS(4)	297	246	3.2±0.4	3.1±0.3	0.03
IVUS-XPL(5)	700	700	3.14±0.43	3.04±0.42	<0.001

(1) Chieffo A et al, Am Heart J. 2013;165:65-72
(2) Kim BK, et al. Circ Cardiovasc Interv 2015:8:e002592
(3) Witzenbichler B et al. Circulation. 2014;129:463-470
(4) Kim JS et al. JACC Cardiovasc Interv. 2013;6:369-376
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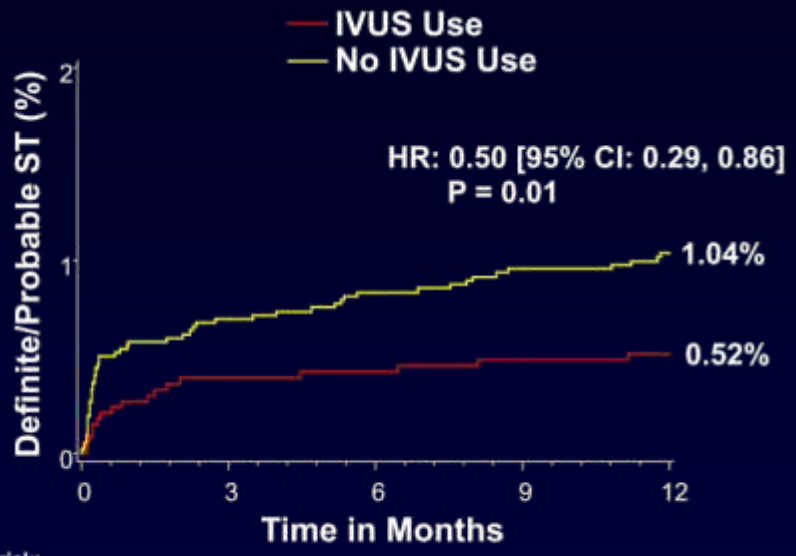
IVUS-guidance is Better.

1. IVUS-guided stent sizing is more accurate and typically larger than angiographic stent sizing.
2. Use of IVUS changes the strategies to optimize stent deployment.
3. Many evidences that IVUS improves clinical outcomes has been accumulated.

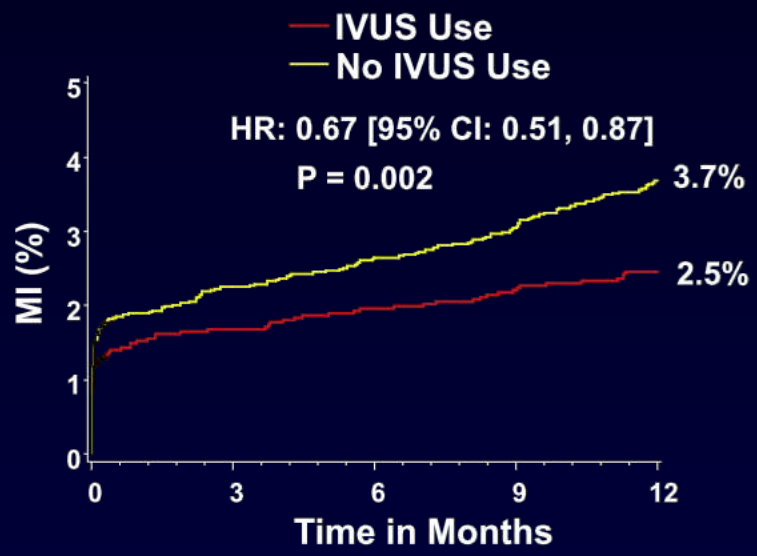
ADAPT-DES substudy (n=8,583 pts, IVUS=3,349 pts and no IVUS=5,234 pts

Definite/Probable Stent Thrombosis



Number at risk:					
IVUS Use	3349	3251	3221	3197	3023
No IVUS Use	5234	5015	4978	4938	4585

MI



Number at risk:					
IVUS Use	3349	3209	3171	3141	2969
No IVUS Use	5234	4932	4882	4830	4460

IVUS guidance during DES PCI may result in less stent thrombosis as well as fewer myocardial infarctions and MACEs

Witzenbichler B, et al. *Circulation* 2014;129: 463-470

Effect of IVUS vs. Angiography-Guided Everolimus-Eluting Stent Implantation in Long Coronary Lesions: the IVUS-XPL Trial

Patients with long coronary lesions
(Implanted EES stent ≥28 mm in length), N=1400

EES implantation with IVUS guidance, n=700

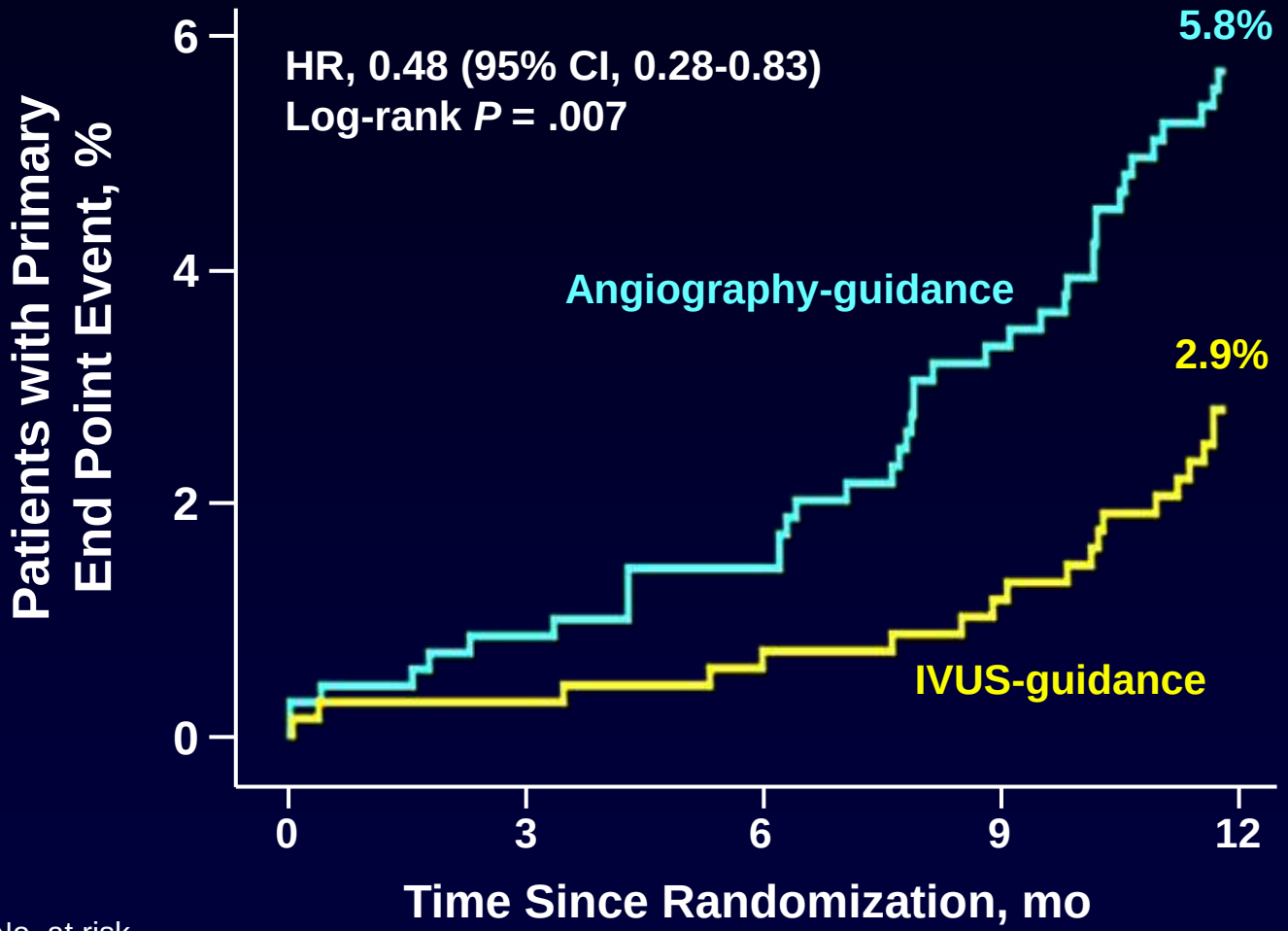
EES implantation with angiography guidance, n=700

Clinical follow-up at 12 months
Primary end point: MACE

Cardiac death, target-lesion related MI, and ischemia-driven TLR

Hong SJ, Kim BK, Hong MK (corresponding author). *JAMA* 2015;314:2155-63 and 2015 AHA Late Breaking Clinical Trials

Primary End Point



No. at risk					
Angiography arm	700	673	660	643	624
IVUS arm	700	671	665	654	641

Hong SJ, Kim BK, Hong MK (corresponding author). *JAMA* 2015;314:2155-63 and 2015 AHA Late Breaking Clinical Trials

IVUS-XPL: Randomized Trial

	IVUS-guidance (n=700)	Angiography-guidance (n=700)	Hazard ratio (95% CI)	Log-Rank *P* value
Primary End Point				
MACE	19 (2.9%)	39 (5.8%)	0.48 (0.28–0.83)	.007
Secondary End Point				
Cardiac death	3 (0.4%)	5 (0.7%)	0.60 (0.14-2.52)	.48
Target lesion related MI	0	1 (0.1%)	-	.32
Ischemia-driven TLR	17 (2.5%)	33 (5.0%)	0.51 (0.28-0.91)	.02
Stent thrombosis	2 (0.3%)	2 (0.3%)	1.00 (0.14-7.10)	1.00
Acute	1 (0.1%)	1 (0.1%)	-	-
Sub-acute	1 (0.1%)	0	-	-
Late	0	1 (0.1%)	-	-

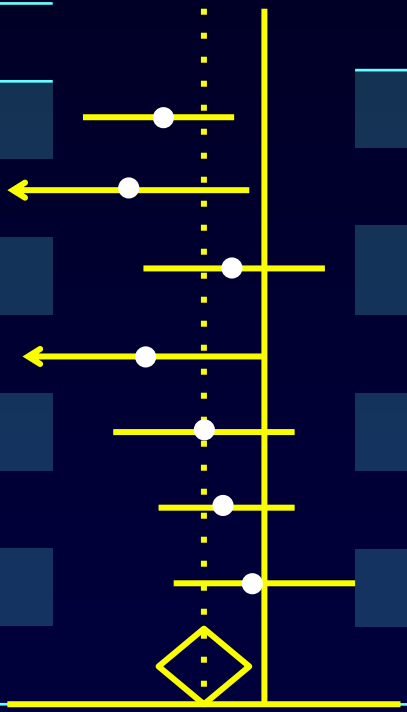
Hong SJ, Kim BK, Hong MK (corresponding author). JAMA 2015 :314:2155-63

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 (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



IVUS better Angio better

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

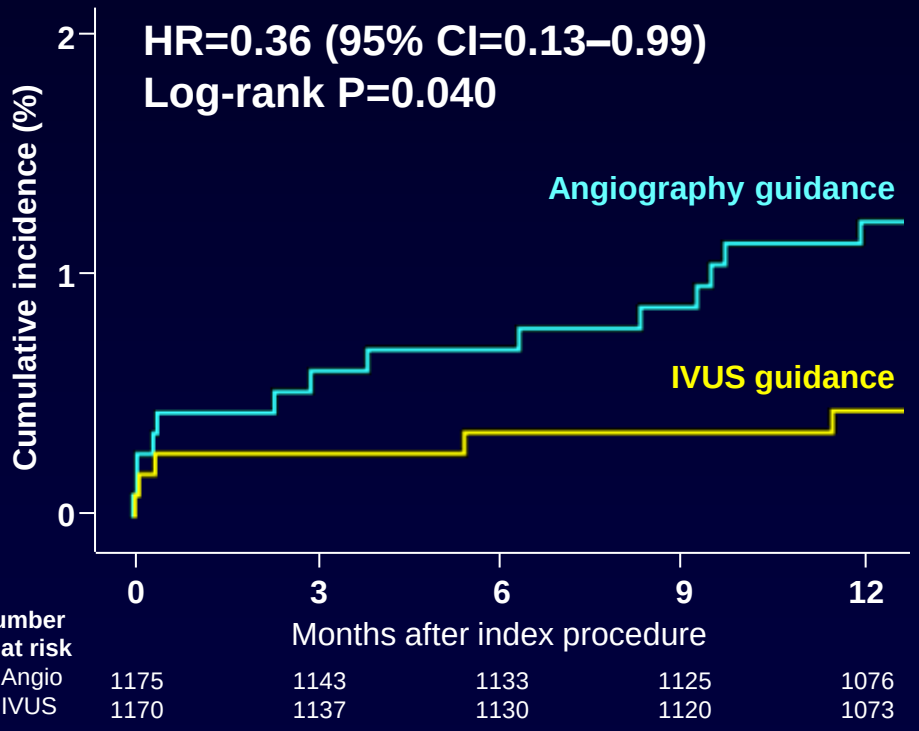
From the IVUS-XPL Trial

- Can IVUS reduce only TLR?
- Can IVUS improve HARD CLINICAL OUTCOMES such as cardiac death, MI, or stent thrombosis?
- Is there patient-level meta-analysis with second-generation DES alone?

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

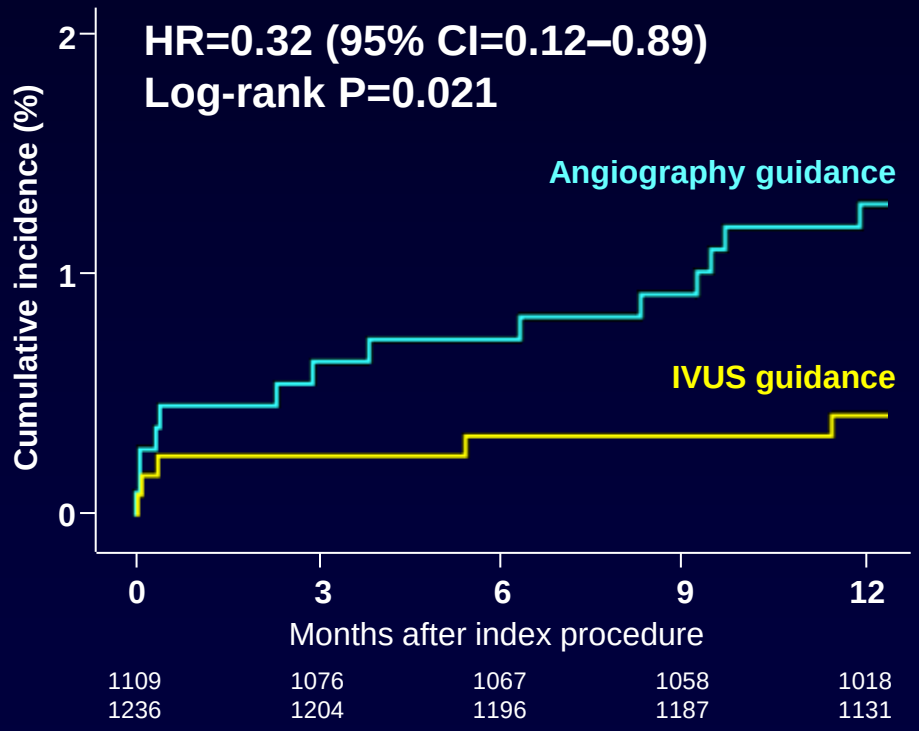
Hard events of MACE (cardiac death, MI, or stent thrombosis)

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). *JACC Intv* 2016;9:2232-9

Conclusions

[Debate I: How to Do PCI?]

IVUS-Guidance is Better.

QCA-Guidance is Enough.

IVUS-guidance PCI is better.

"Enough" is not enough.


Dreams will
come true