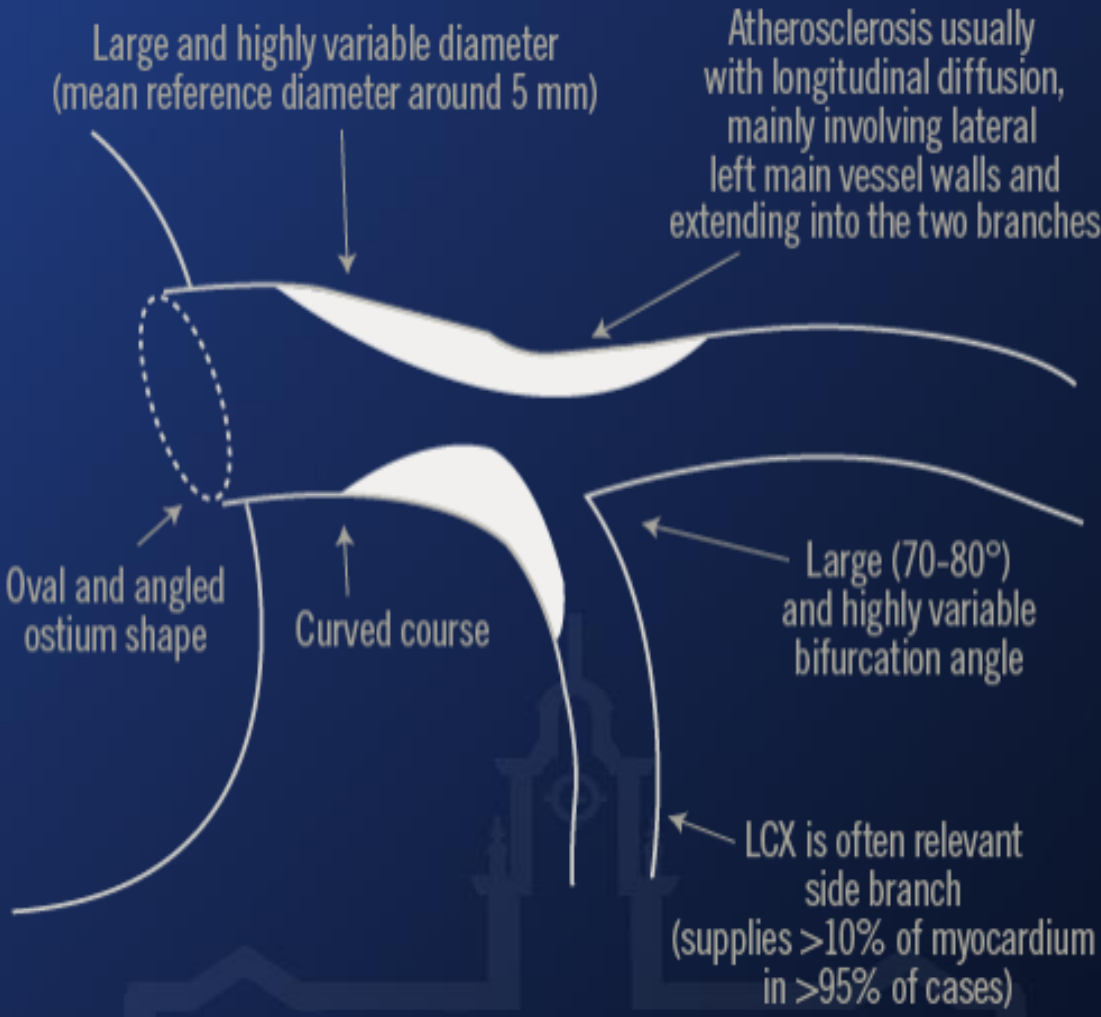
CHIPS 12/14 9:41-9:53

Recent update in Left Main / Bifurcation



Jeehoon Kang

Cardiology / Critical Care Medicine, SNUH

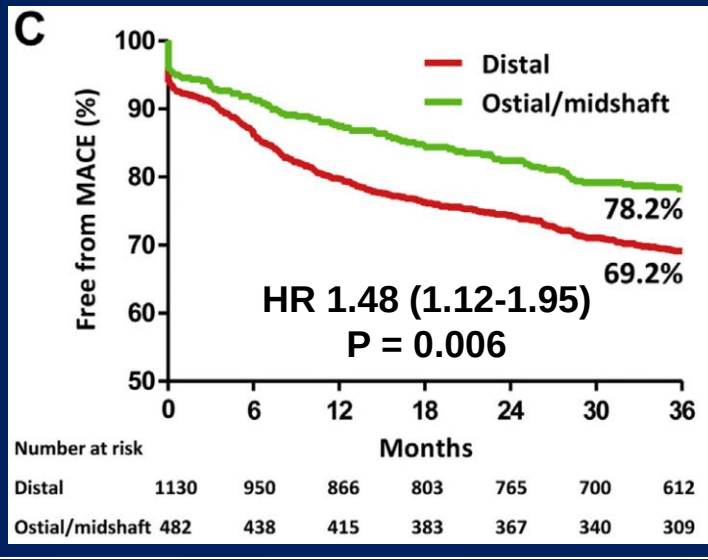
Distal Left Main Bifurcation

A Challenging Lesion Subset for PCI

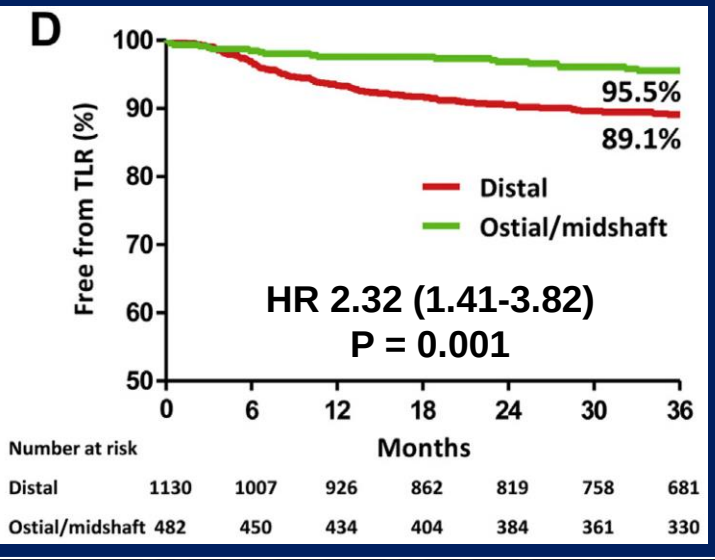
- LMCA supplies perfusion for more than half of total myocardium
- Up to 80% of LM lesion involves distal LM bifurcation
- Presents poorer prognosis compared to ostial or shaft lesion

The DELTA Registry: PS-Matched Analysis

MACE (Death, MI, TVR)



TLR



SNU-H (Seoul National University Hospital)

Rab T et al. JACC CV Interv 2017
Naganuma T et al. JACC CV Interv 2013

Distal Left Main Bifurcation

A Challenging Lesion Subset for PCI

Recommendation for the type of revascularization in patients with stable coronary artery disease with suitable coronary anatomy for both procedures and low predicted surgical mortality[d]

Recommendations according to extent of CAD	CABG		PCI	
	Class[a]	Level[b]	Class[a]	Level[b]
One-vessel CAD				
Without proximal LAD stenosis.	IIb	C	I	C
With proximal LAD stenosis.[68,101,139–144]	I	A	I	A
Two-vessel CAD				
Without proximal LAD stenosis.	IIb	C	I	C
With proximal LAD stenosis.[68,70,73]	I	B	I	C
Left main CAD				
Left main disease with low SYNTAX score (0 - 22).[69,121,122,124,145–148]	I	A	I	A
Left main disease with intermediate SYNTAX score (23 - 32).[69,121,122,124,145–148]	I	A	IIa	A
Left main disease with high SYNTAX score (≥33).[c 69,121,122,124,146–148]	I	A	III	B
Three-vessel CAD without diabetes mellitus				
Three-vessel disease with low SYNTAX score (0 - 22).[102,105,121,123,124,135,149]	I	A	I	A
Three-vessel disease with intermediate or high SYNTAX score (>22).[c 102,105,121,123,124,135,149]	I	A	III	A
Three-vessel CAD with diabetes mellitus				
Three-vessel disease with low SYNTAX score 0–22.[102,105,121,123,124,135,150–157]	I	A	IIb	A
Three-vessel disease with intermediate or high SYNTAX score (>22).[c 102,105,121,123,124,135,150–157]	I	A	III	A

5.4 Gaps in the evidence

It remains to be determined whether revascularization by PCI improves prognosis in patients with SCAD. The ISCHEMIA (International Study of Comparative Health Effectiveness With Medical and Invasive Approaches) study (NCT01471522) is currently recruiting 5000 patients with SCAD and evidence of moderate-to-severe ischaemia detected by non-invasive imaging, who are randomized before coronary angiography to medical therapy or an invasive strategy to detect differences in the primary endpoint of death or MI. Current techniques rely on coronary angiography and the detection of ischaemia-producing lesions. However, future adverse events are related at least in part to non-flow limiting, vulnerable plaques. Better identification of vulnerable plaques and the development of appropriate treatment strategies is needed. Along the same lines, the completeness and timing of revascularization are not well defined, and neither are the roles of residual ischaemia and lesions. Moreover, we need more research on the use of the SYNTAX and other scores for informing treatment allocation, as well as dedicated trials in specific subsets. Very long-term, extended follow-up (10 years) of trials comparing PCI and CABG, particularly in the setting of LM disease, will provide further insights into the relative merits of both revascularization techniques.

Distal Left Main Bifurcation

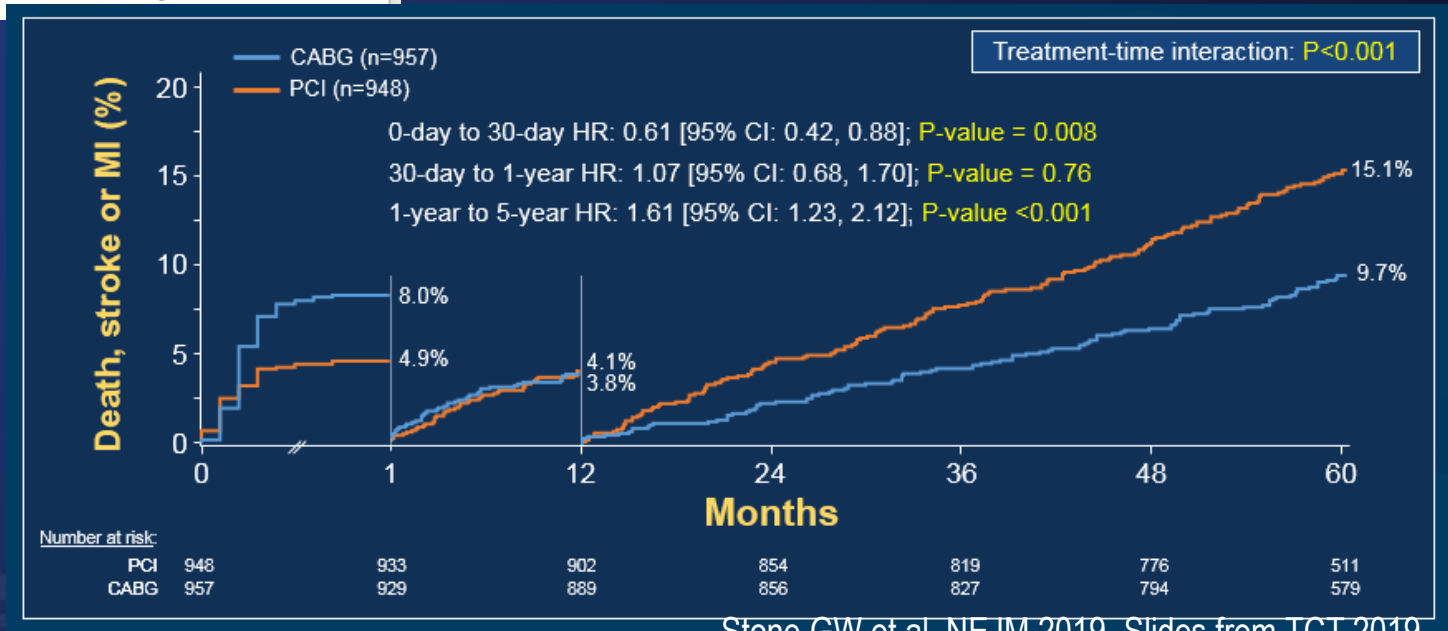
PCI vs. CABG

ORIGINAL ARTICLE

Five-Year Outcomes after PCI or CABG for Left Main Coronary Disease

G.W. Stone, A.P. Kappetein, J.F. Sabik, S.J. Pocock, M.-C. Morice, J. Puskas, D.E. Kandzari, D. Karmpaliotis, W.M. Brown III, N.J. Lembo, A. Banning, B. Merkely, F. Horkay, P.W. Boonstra, A.J. van Boven, I. Ungi, G. Bogáts, S. Mansour, N. Noiseux, M. Sabaté, J. Pomar, M. Hickey, A. Gershlick, P.E. Buszman, A. Bochenek, E. Schampaert, P. Pagé, R. Modolo, J. Gregson, C.A. Simonton, R. Mehran, I. Kosmidou, P. Généreux, A. Crowley, O. Dressler, and P.W. Serruys, for the EXCEL Trial Investigators*

- ✓ Evaluation of XIENCE versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization (EXCEL) trial
- ✓ Unprotected LMCA disease with angiographic DS >70%, as estimated visually, or 50%≤DS<70% with at least one of following: (1) noninvasive evidence of ischemia referable to LMCA lesion, (2) IVUS MLA ≤6.0 mm2, or (3) FFR ≤0.80
- ✓ DES: XIENCE, Abbott Vascular vs. CABG



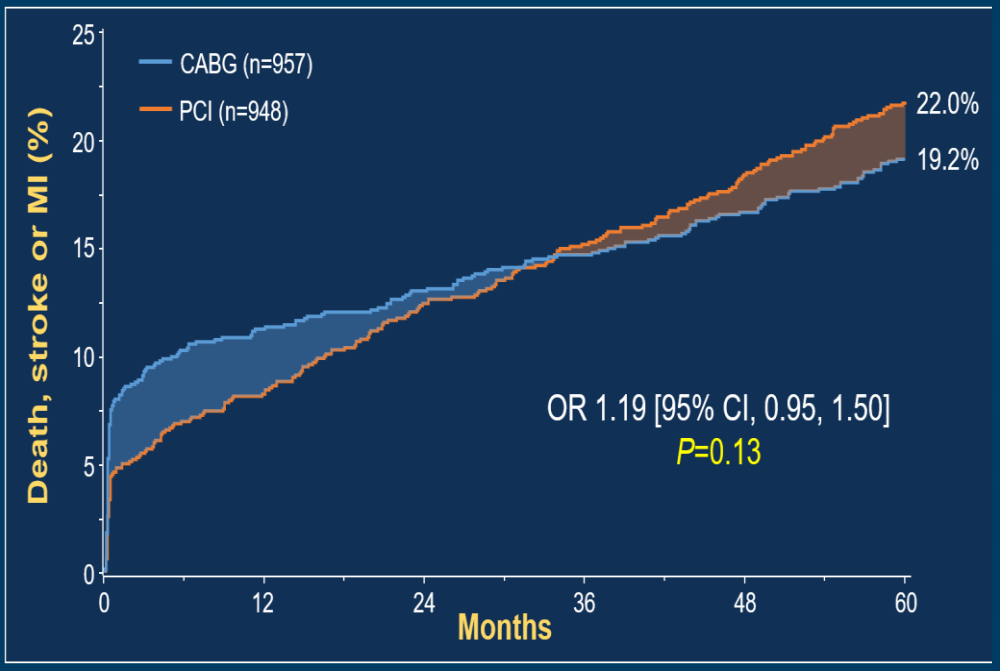
Stone GW et al. NEJM 2019, Slides from TCT 2019

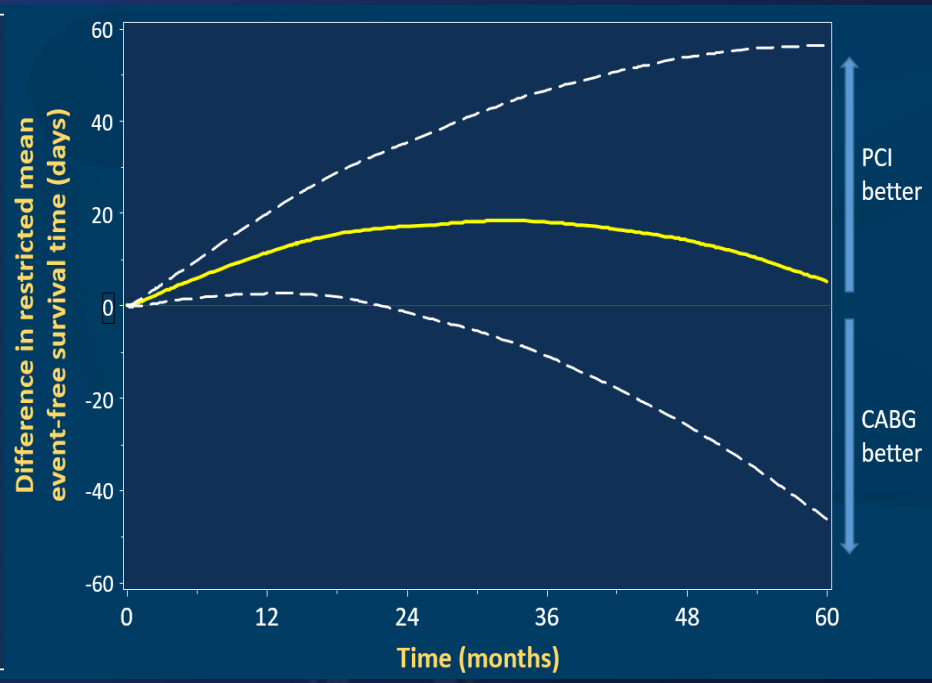
Distal Left Main Bifurcation

PCI vs. CABG

ORIGINAL ARTICLE

Five-Year Outcomes after PCI or CABG for Left Main Coronary Disease





Conclusion>

- ✓ At the end of the 5-year follow-up period, event-free survival time was 5.2 days (95% CI -46.1 to 56.5 days) longer after PCI compared with CABG
- ✓ Ten-year follow-up (or longer) is required to characterize the very late safety profile of PCI and CABG as both stents and bypass grafts progressively fail over time

Stone GW et al. NEJM 2019, Slides from TCT 2019

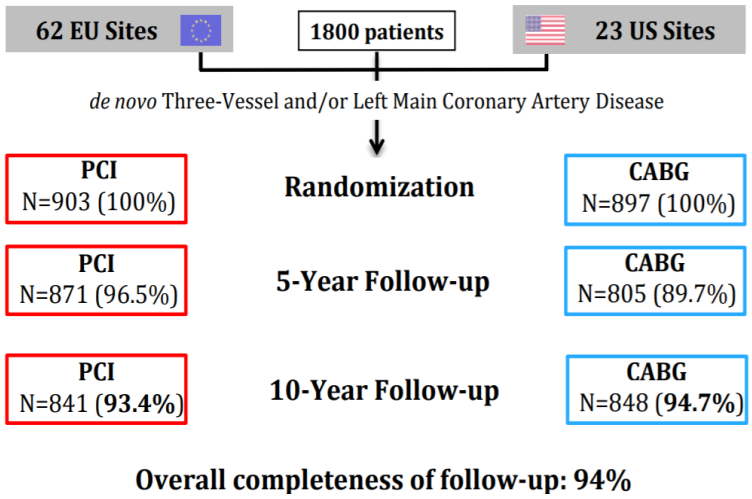
Former EXCEL Investigator Alleges Trial Manipulation, Prompting Vehement Denials

Surgeon David Taggart set the EACTS meeting ablaze when he accused EXCEL researchers of stacking the deck in PCI's favor.

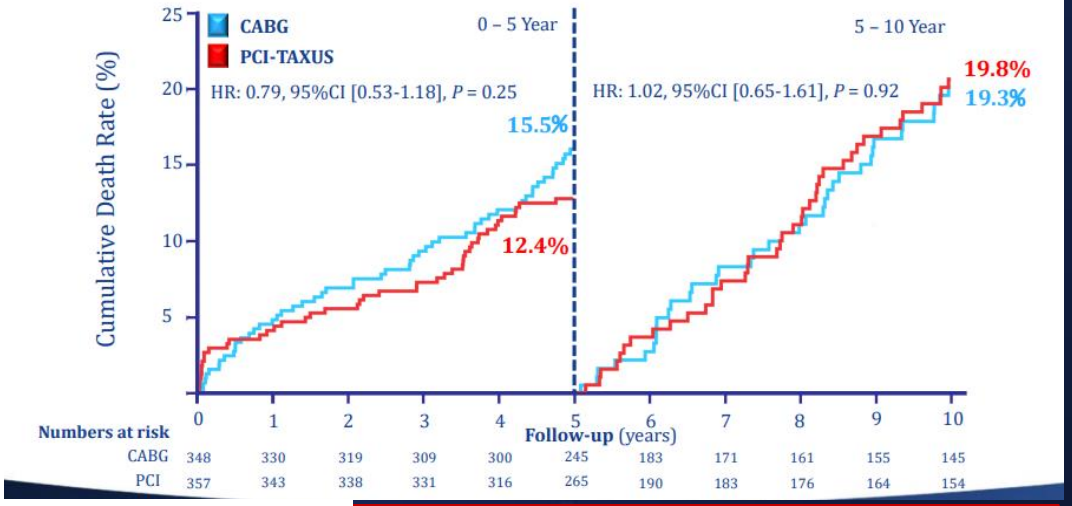
By Michael O'Riordan | October 07, 2019

Distal Left Main Bifurcation

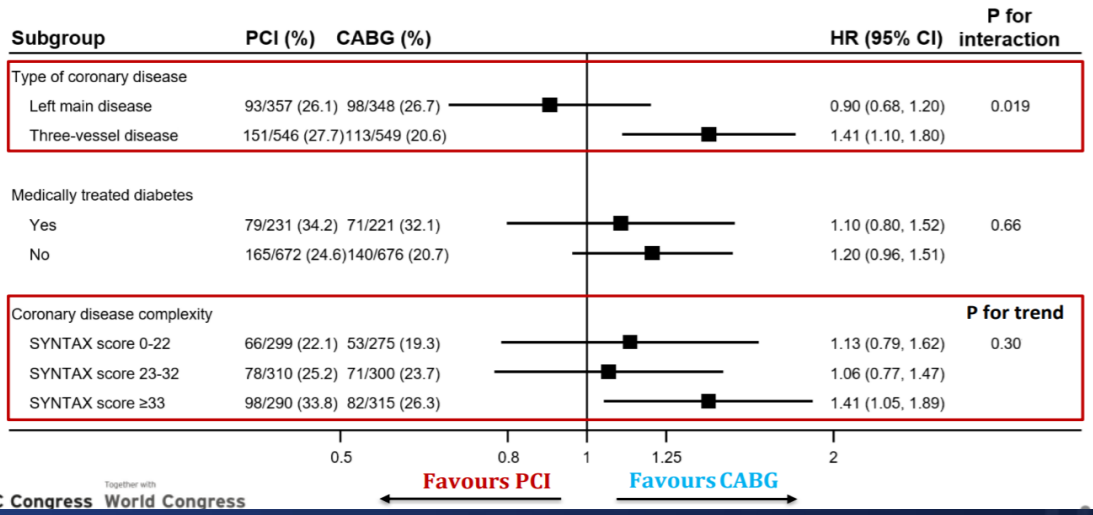
PCI vs. CABG



Overall completeness of follow-up: 94%



Treatment-by-Subgroup Interaction



- ✓ There is no MACCE free benefit of Surgery versus PCI with contemporary stents
- ✓ PCI had comparable 10y survival to CABG in patients with LM-disease.
- ✓ In subgroup analysis, No treatment difference in all-cause death with LM disease patients.

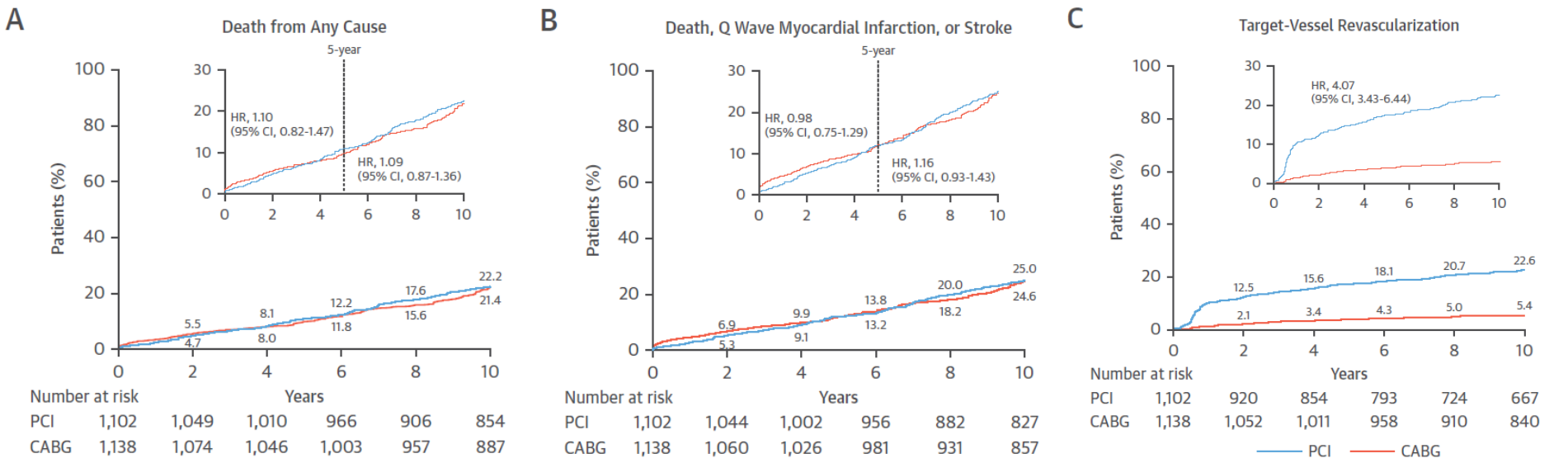
Daniel J.F.M. Thuijs et al. Presented at the TCT 2018 and ESC 2019

Distal Left Main Bifurcation

PCI vs. CABG

10-Year Outcomes of Stents Versus Coronary Artery Bypass Grafting for Left Main Coronary Artery Disease

Duk-Woo Park, MD,[a,*] Jung-Min Ahn, MD,[a,*] Sung-Cheol Yun, PhD,[b] Yong-Hoon Yoon, MD,[a] Do-Yoon Kang, MD,[a] Pil Hyung Lee, MD,[a] Seung-Whan Lee, MD,[a] Seong-Wook Park, MD,[a] Ki Bae Seung, MD,[c] Hyeon-Cheol Gwon, MD,[d] Myung-Ho Jeong, MD,[e] Yangsoo Jang, MD,[f] Hyo-Soo Kim, MD,[g] In-Whan Seong, MD,[h] Hun Sik Park, MD,[i] Taehoon Ahn, MD,[j] In-Ho Chae, MD,[k] Seung-Jea Tahk, MD,[l] Seung-Jung Park, MD[a]



During a 10 year follow-up period

- ✓ MACE (all cause death, Q wave MI, Stroke) were comparable in PCI vs. CABG
- ✓ TVR was more common in the PCI arm *(which did not translate into hard endpoints*

DW Park, J Am Coll Cardiol 2018;72:2813–22

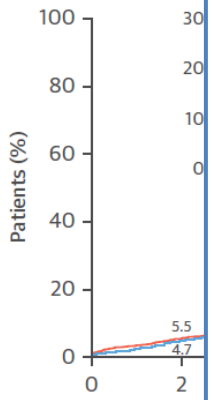
Distal Left Main Bifurcation

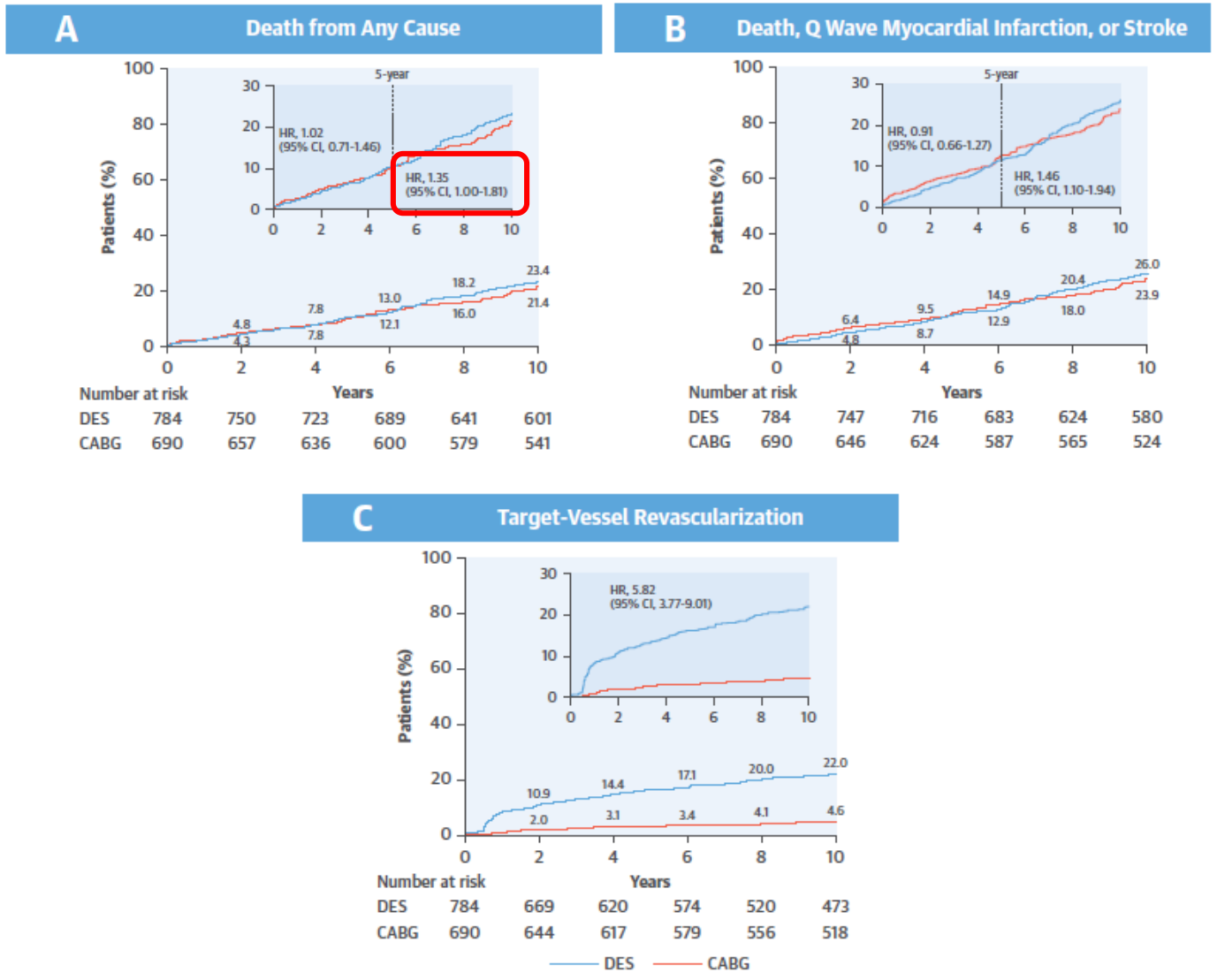
PCI vs. CABG

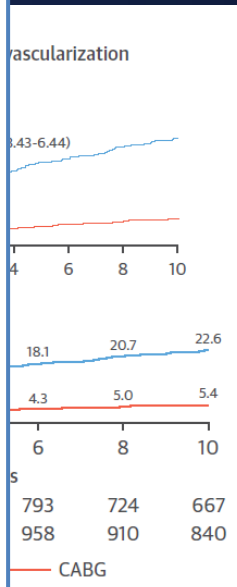
10-Year Out
Coronary Ar
Left Main Co

Duk-Woo Park, MD,[a,*] Jung-M
Pil Hyung Lee, MD,[a] Seung-W
Myung-Ho Jeong, MD,[e] Yangs
Taehoon Ahn, MD,[j] In-Ho Cha

A





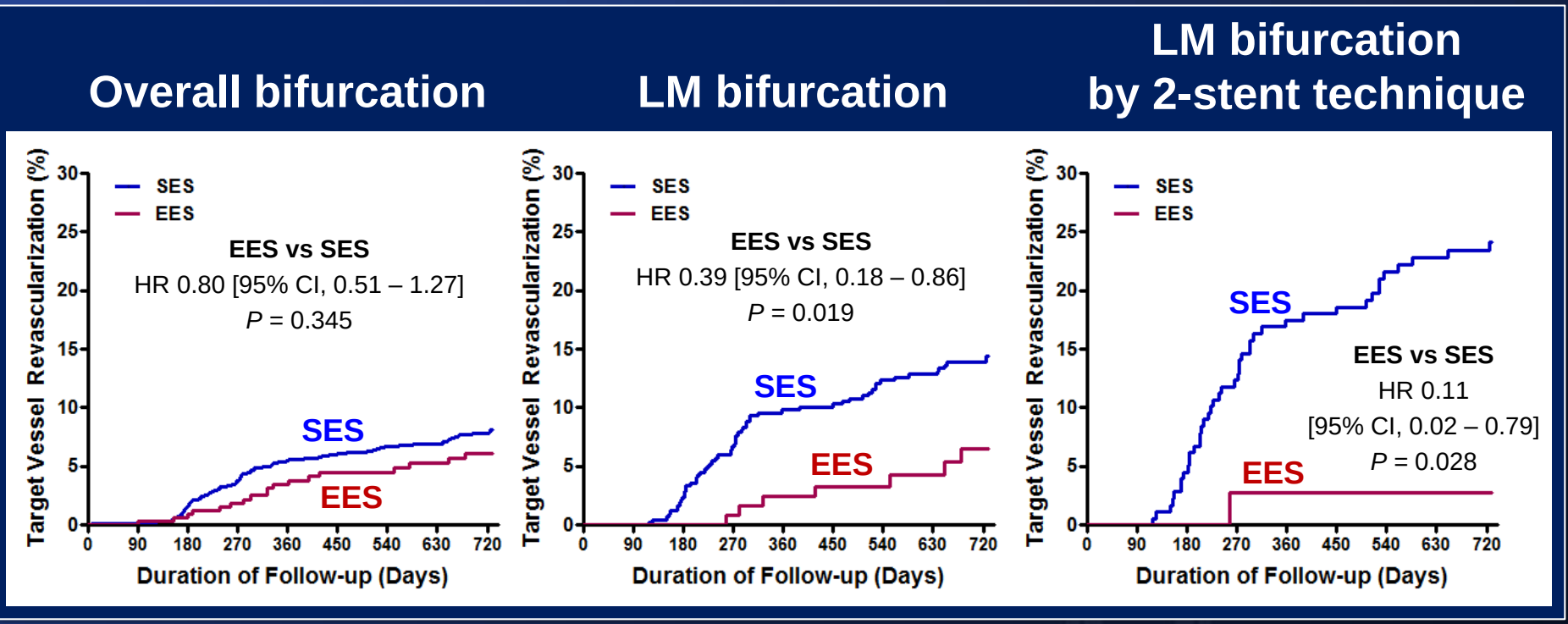


During a
✓ MACE
✓ TVR

DW Park, J Am Coll Cardiol 2018;72:2813–22

Impact of New-Generation DES

EES vs SES in COBIS II



Difference in performance between EES and SES for bifurcation lesion becomes greater when lesion is at LM and becomes more complex

Cho YJ, … , Kim HS. Circ J 2015

Impact of New-Generation DES

Korean Bifurcation Pooled Cohort (3Y)

TLR of LM in 1st Generation DES
(10.7% = 74 / 689 patients)

1-Stent Group
(5.5% = 22/397)

Diffuse ISR : 0.0%

2-Stent Group
(18% = 52/292)

Diffuse ISR : 1.9%

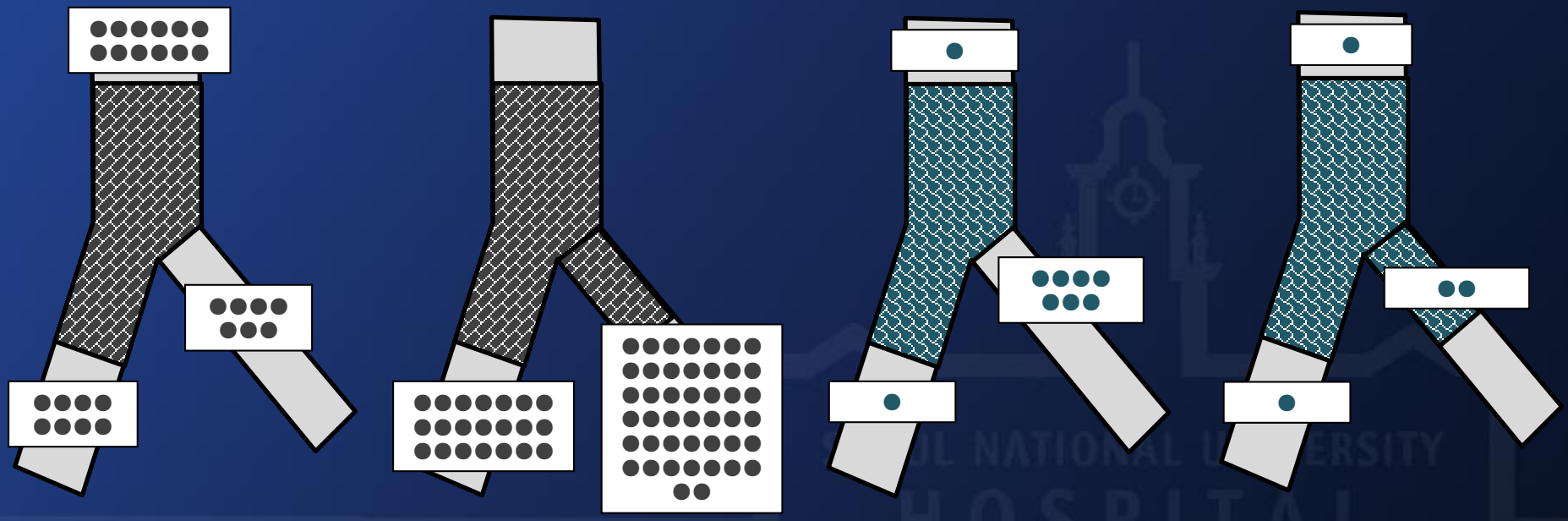
TLR of LM in 2nd Generation DES
(5.6% = 12 / 214 patients)

1-Stent Group
(6.7% = 9/134)

Diffuse ISR : 0.0%

2-Stent Group
(4% = 3/80)

Diffuse ISR : 0.0%



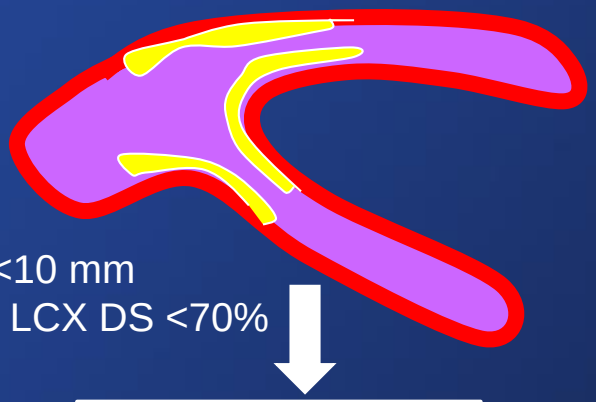
SNU-H (Seoul National University Hospital)

Lee JM, … , Kim HS. JACC CV Interv 2015

Room for Improvement beyond Devices

Optimal Selection of PCI Strategy

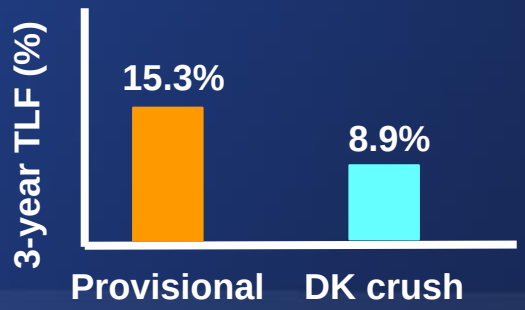
DKCRUSH-V : Outcomes By Lesion Complexity (3Y)

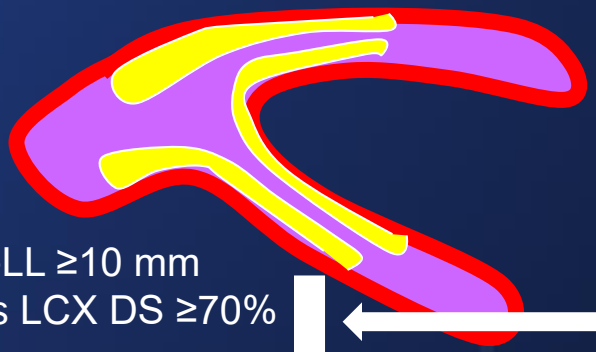


LCX-LL<10 mm
and/or os LCX DS <70%

Simple Lesions

HR 0.56, 95% CI 0.29-1.07





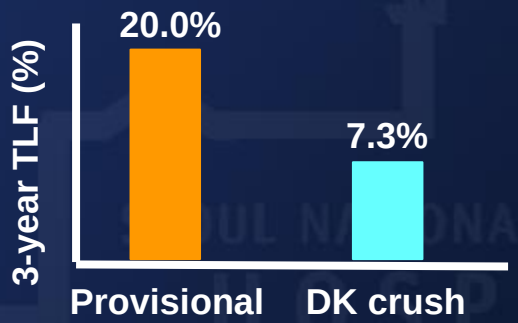
LCX-LL ≥10 mm
and os LCX DS ≥70%

Plus ≥2 of 6 in minor criteria

Complex Lesions

Multiple bifurcations
Thrombus-containing
MV RVD ≤2.5 mm
MV lesion ≥25 mm
Severe calcification
Bifur angle ≥70º or ≤45º

HR 0.35, 95% CI 0.14-0.90

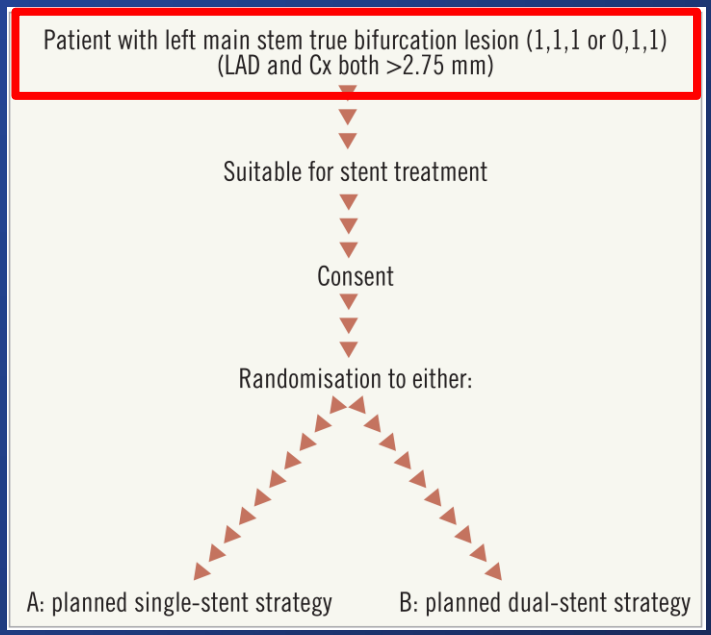


Chen SL et al. JACC CV Interv 2019

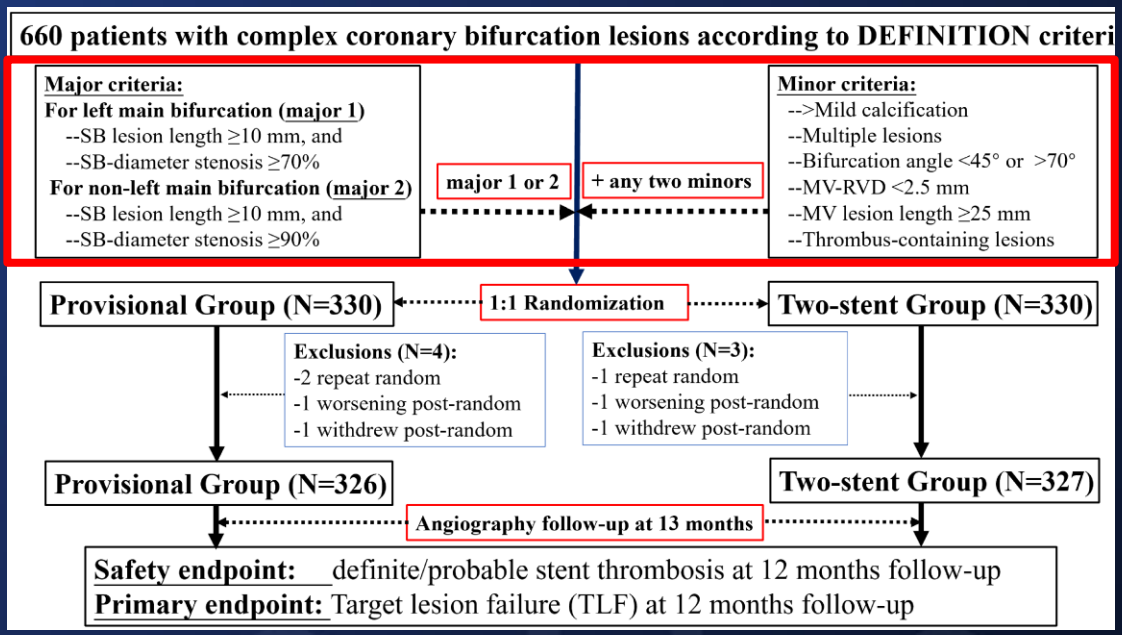
Room for Improvement beyond Devices

Optimal Selection of PCI Strategy

EBC MAIN (NCT02497014)



DEFINITION II (NCT02284750)



- **Results of ongoing trials may help establish the optimal criteria for selecting LM bifurcation PCI strategy**

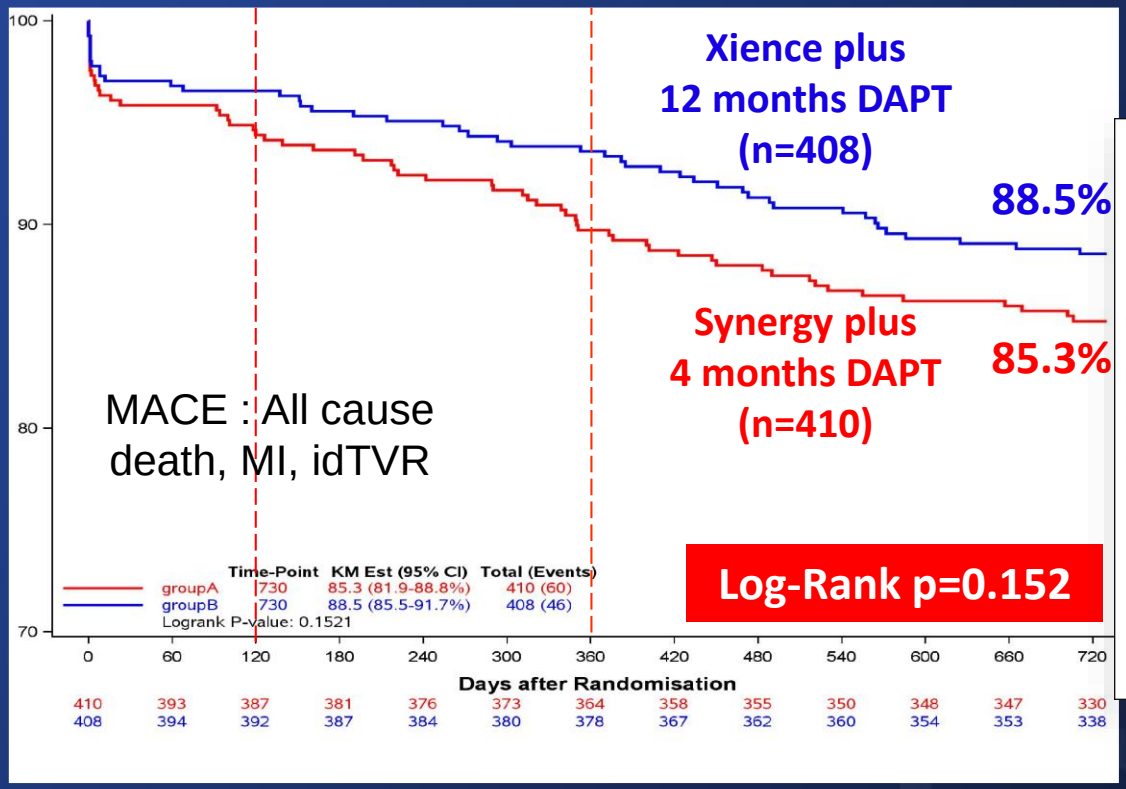
Chieffo A et al. EuroIntervention 2016
Zhang JJ et al. BMJ Open 2018

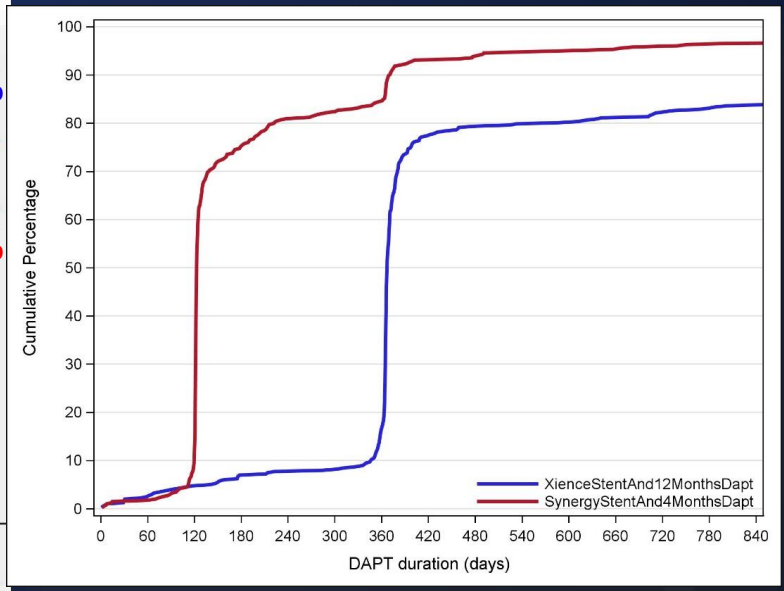
Room for Improvement beyond Devices

Optimal Antithrombotic Management

IDEAL-LM

Synergy:	RCT	Xience:
• Platinum-Chromium backbone		• Cobalt-Chromium backbone
• Strut thickness: 74μm		• Strut thickness: 81μm
• Biodegradable polymer		• Permanent polymer
• Abluminal coating		• Circumferential coating
+ Short DAPT (4 months)		+ Standard DAPT (12 months)





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van Geuns RJ et al. TCT 2019

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Optimal Antithrombotic Management

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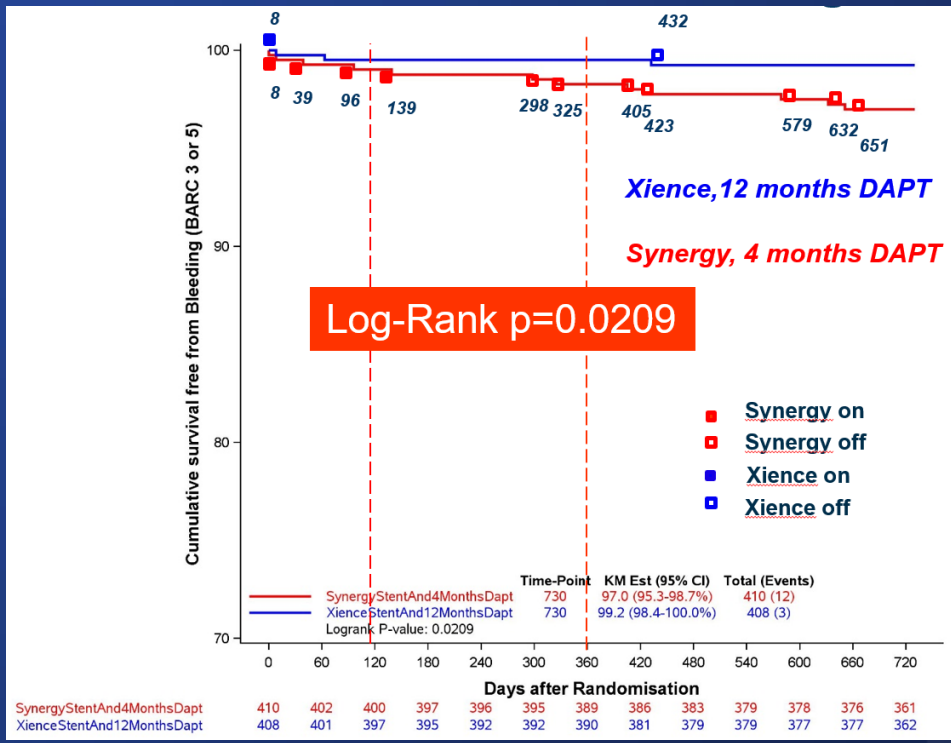
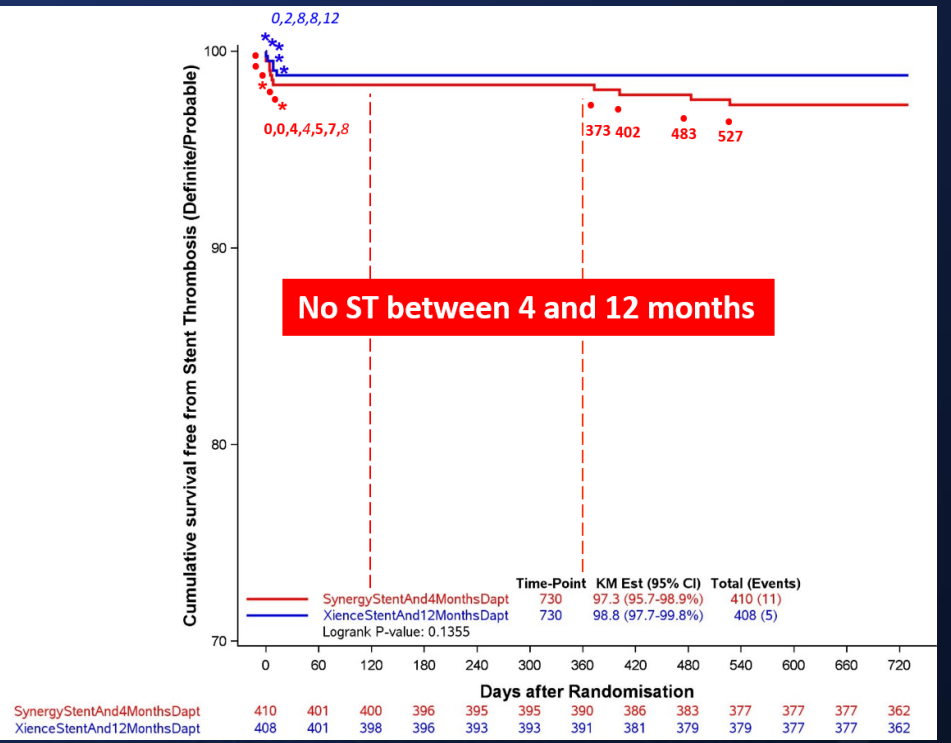




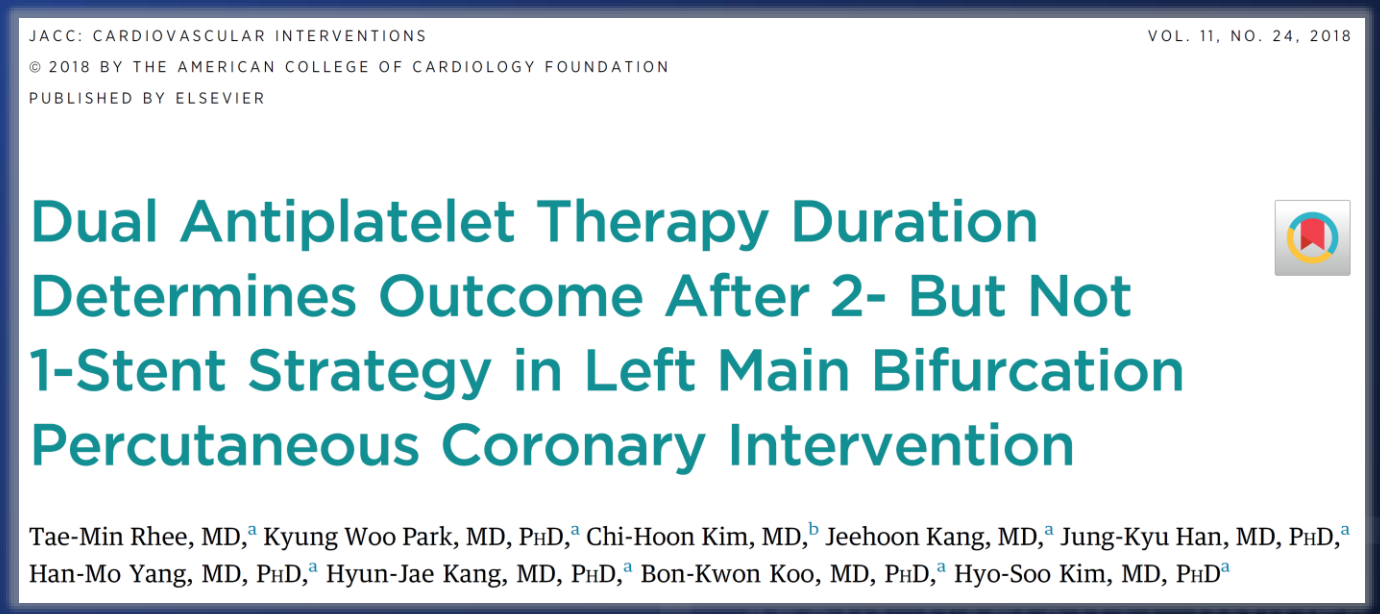
SNU-H (Seoul National University Hospital)

van Geuns RJ et al. TCT 2019

Room for Improvement beyond Devices

Optimal Antithrombotic Management

Real-World Data of DAPT Duration after LM Bifurcation PCI in the New-Generation DES Era

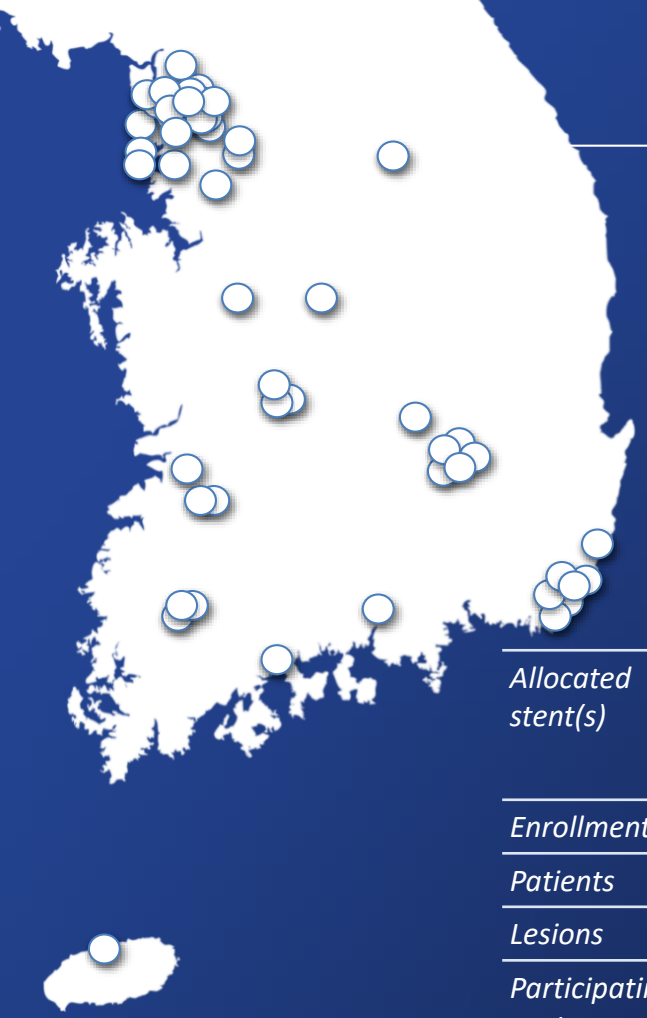


JACC: CARDIOVASCULAR INTERVENTIONS VOL. 11, NO. 24, 2018

PUBLISHED BY ELSEVIER

Dual Antiplatelet Therapy Duration Determines Outcome After 2- But Not 1-Stent Strategy in Left Main Bifurcation Percutaneous Coronary Intervention

Tae-Min Rhee, MD,[a] Kyung Woo Park, MD, PhD,[a] Chi-Hoon Kim, MD,[b] Jeehoon Kang, MD,[a] Jung-Kyu Han, MD, PhD,[a] Han-Mo Yang, MD, PhD,[a] Hyun-Jae Kang, MD, PhD,[a] Bon-Kwon Koo, MD, PhD,[a] Hyo-Soo Kim, MD, PhD[a]



Grand DES cohort

10 years of clinical excellence

Dedicated 3-year follow-up for contemporary DESs

Seoul National University Hospital & other 55 centers across the country

Allocated stent(s)	***Biomatrix/ Nobori/ Biomatrix Flex***	***Xience Prime***	***Xience V/ Promus***	***Resolute Integrity***	***Resolute***
Enrollment	*2010.4~2014.11.*	*2010.12~2012.8.*	*2008.4~2010.5.*	*2011.10~2014.7*	*2009.1~2010.6.*
Patients	*3007*	*2076*	*3078*	*3004*	*2007*
Lesions	*4137*	*2913*	*4184*	*4128*	*2806*
Participating centers	*24*	*26*	*29*	*22*	*25*

***13172** patients*

***18168** lesions*

Biolimus-3000-Korea

Excellent Prospective Cohort

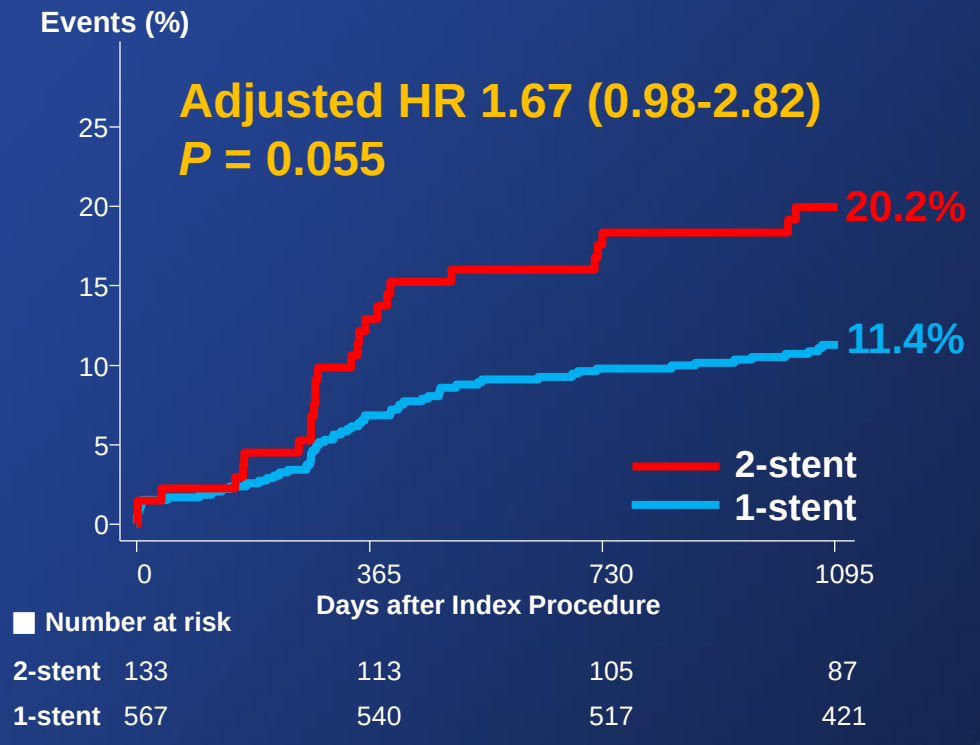
Excellent Prime

Resolute Korea

Resolinte

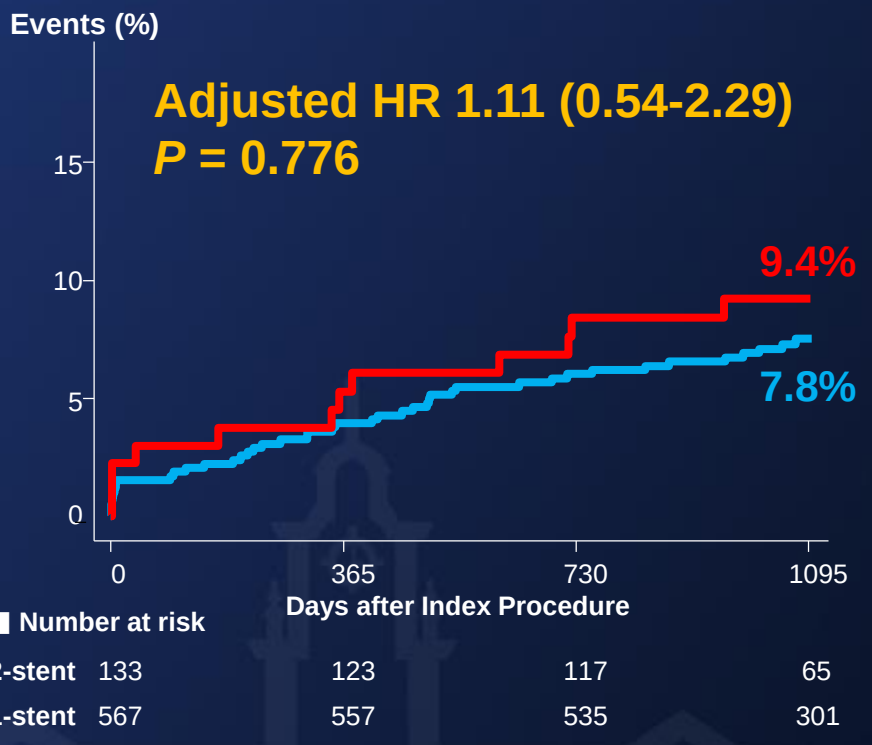
1-stent vs 2-stent
Composite Outcomes at 3-Year

3-Year Target Lesion Failure



† Composite of cardiac death, target-vessel MI, and clinically-driven target lesion revascularization

3-Year Thrombotic MACE

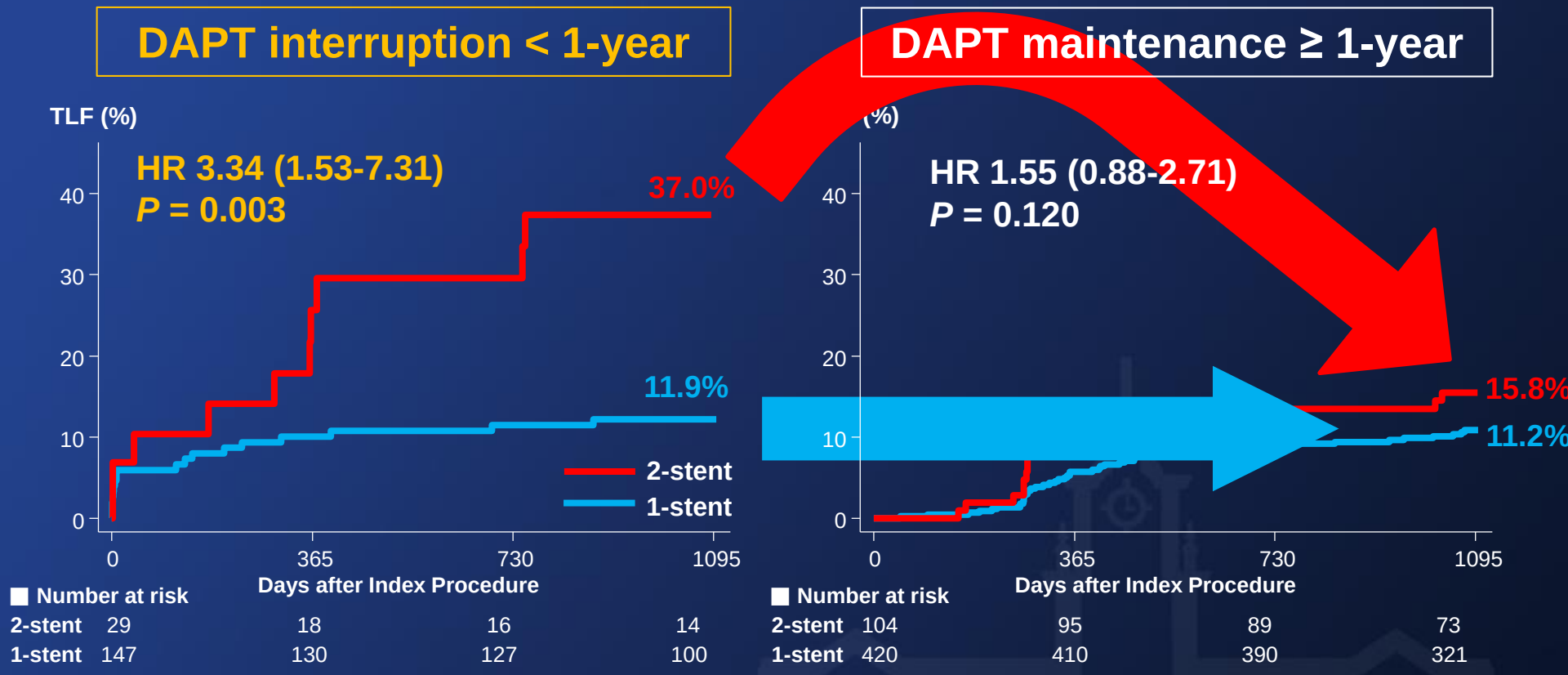


‡ Composite of cardiac death, all-cause MI, and definite/probable stent thrombosis

Adjusted HR was calculated with multivariable Cox PH model, including covariates as follows:
Age, Gender, DM, CKD, Peripheral vascular disease, AMI at presentation, Previous history of PCI, LV dysfunction (EF <40%), 3-vessel disease, true bifurcation, severe calcification, in-stent restenosis, and type of stent (BP-BES, DP-EES, DP-ZES)

1-stent vs 2-stent by DAPT Duration

Target Lesion Failure



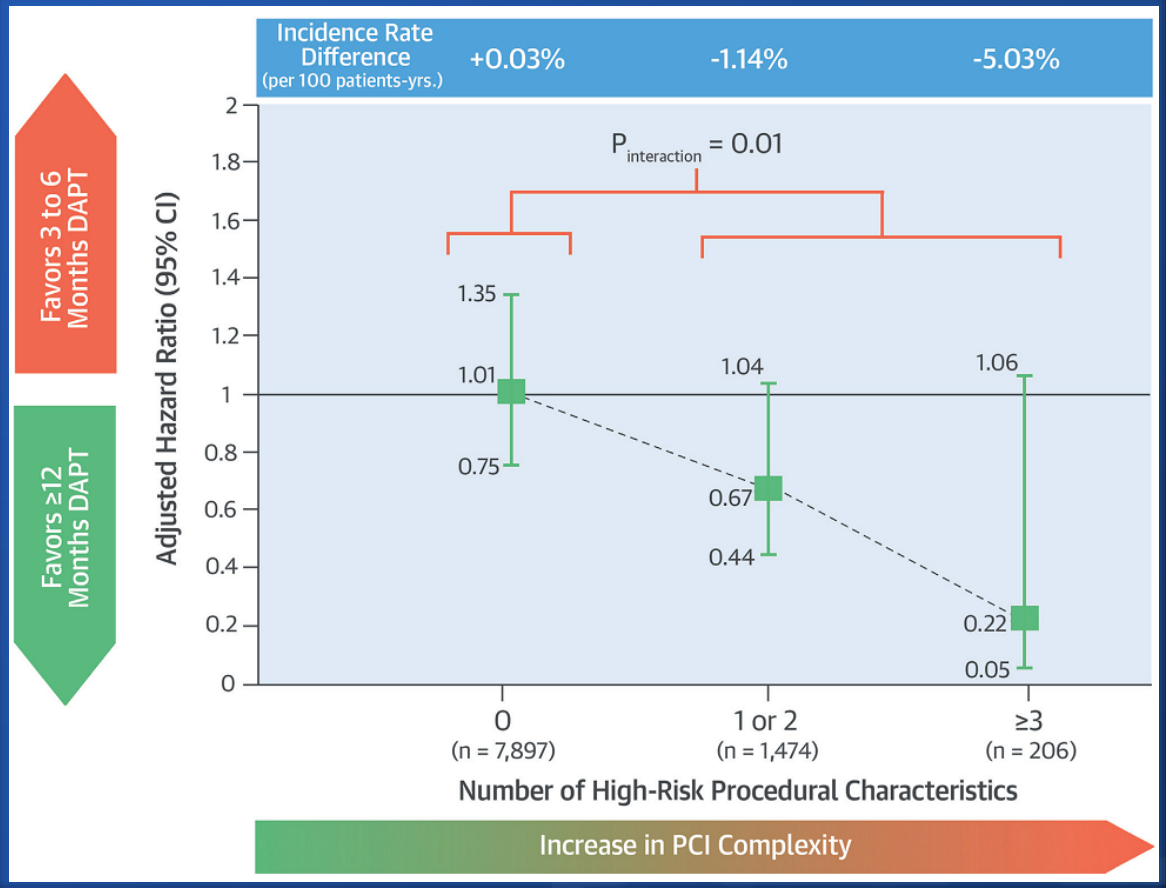
***P* for interaction = 0.012**

SNU-H (Seoul National University Hospital)

Rhee TM, Park KW, … , Kim HS. JACC CV Interv 2018

Room for Improvement beyond Devices

Optimal Antithrombotic Management



- ✓ Some types of complex procedures (e.g., bifurcation PCI with 2 stents) are associated with higher thrombotic risk than others, which may require prolonged DAPT

Giustino G et al. J Am Coll Cardiol 2016

Conclusion

- The optimal treatment option for distal LM disease, is still under controversy.
  - PCI vs CABG
- Regarding PCI, 2nd generation DES has improved the clinical outcome, while technical aspects are evolving.
  - More sophisticated devices and techniques
- Medical therapy, including prolonged DAPT, is essential in improving clinical outcomes.

Thank You For Your Attention