

Can intracoronary imaging change the DAPT duration after PCI

Myeong-Ki Hong, MD. PhD

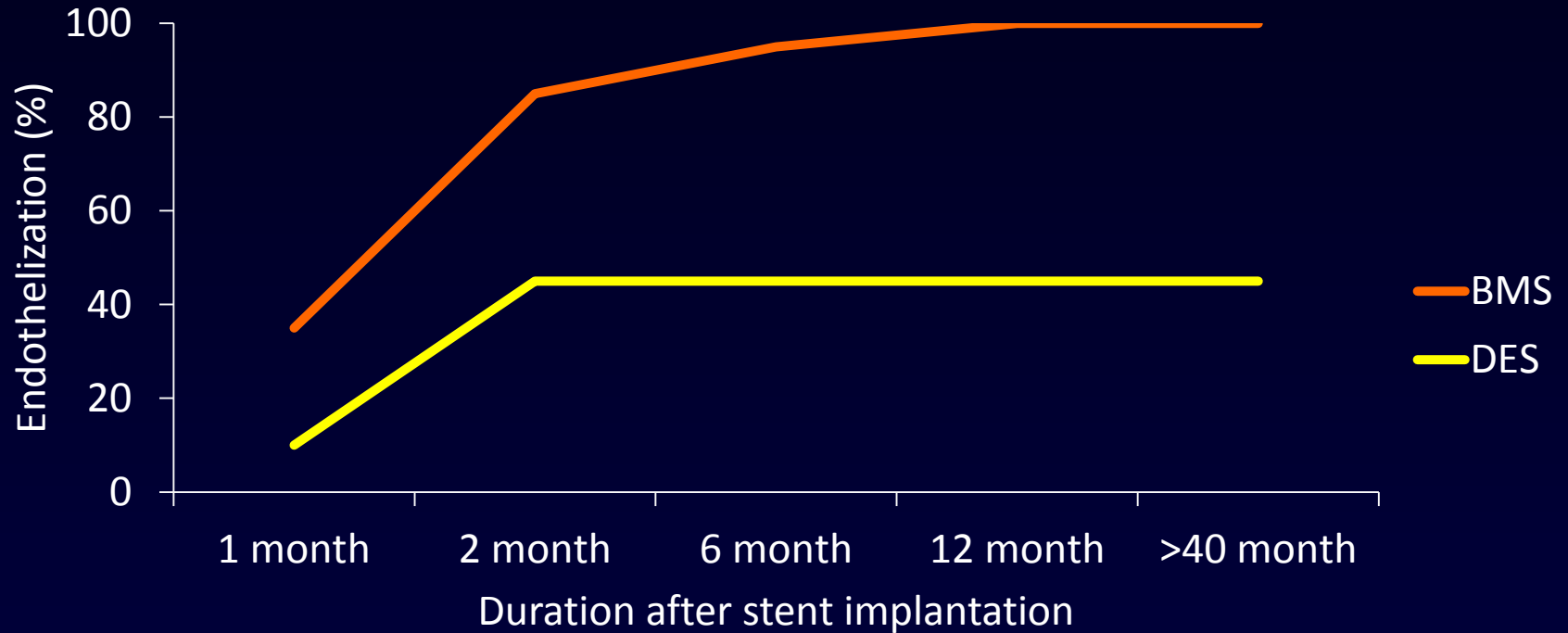
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Declaration of Interest

- I have nothing to declare

Delayed healing after first-generation DES



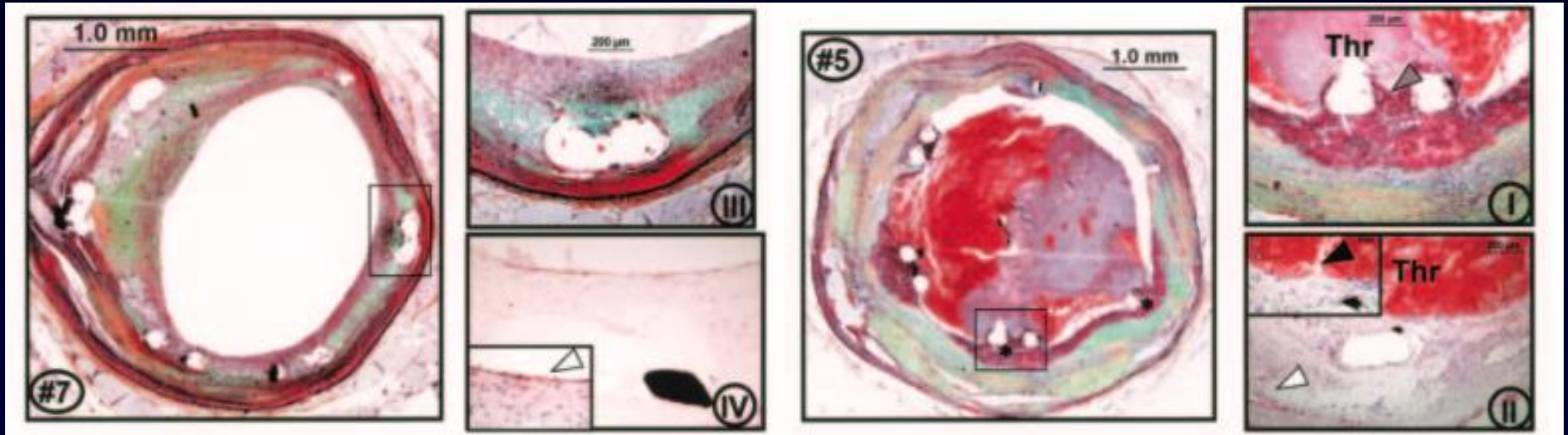
DES result in delayed arterial healing when compared with BMS of similar implant duration

Joner M et al. JACC 2006;48:193-202.

Pathologic Correlates of Late DES Thrombosis

No Thrombosis

DES Thrombosis



The best morphometric predictor of LST was the ratio of uncovered to total stent struts.

Therefore, prolonged DAPT was recommended in patients with first-generation DESs.

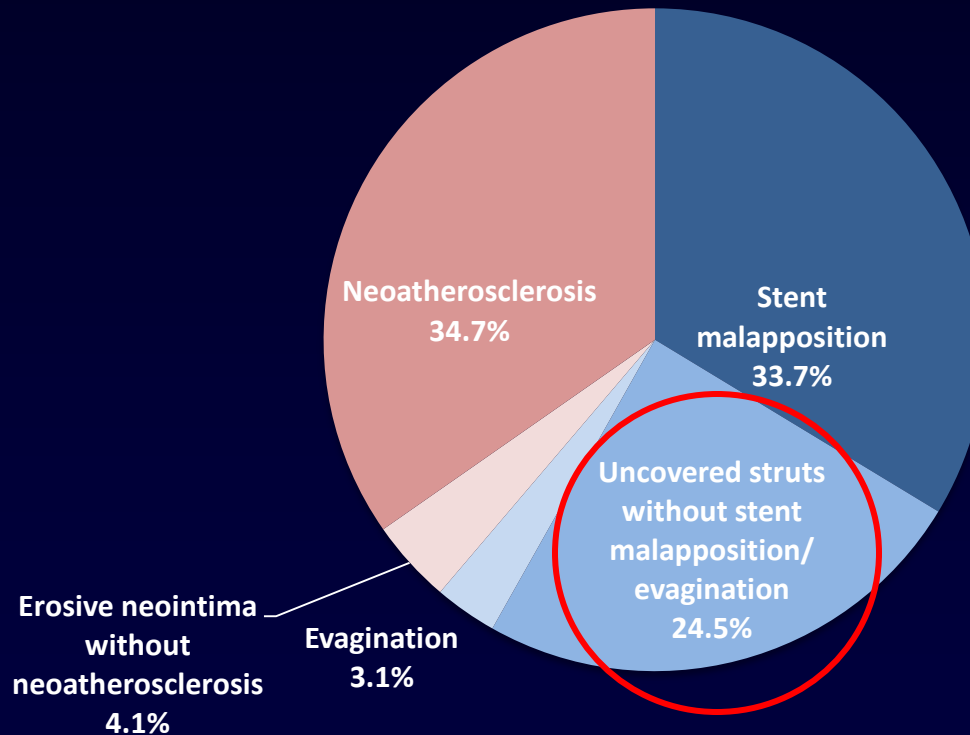
Finn AV et al. Circulation 2007;115:2435-2441.

Characteristics of earlier versus delayed presentation of very late DES thrombosis: Korean multicenter OCT study

98 very late DES thrombosis (27 next-generation DES and 71 first-generation DES)

Onset of VLST at a median 55.1 months after DES implantation

Mechanisms of very late DES thrombosis



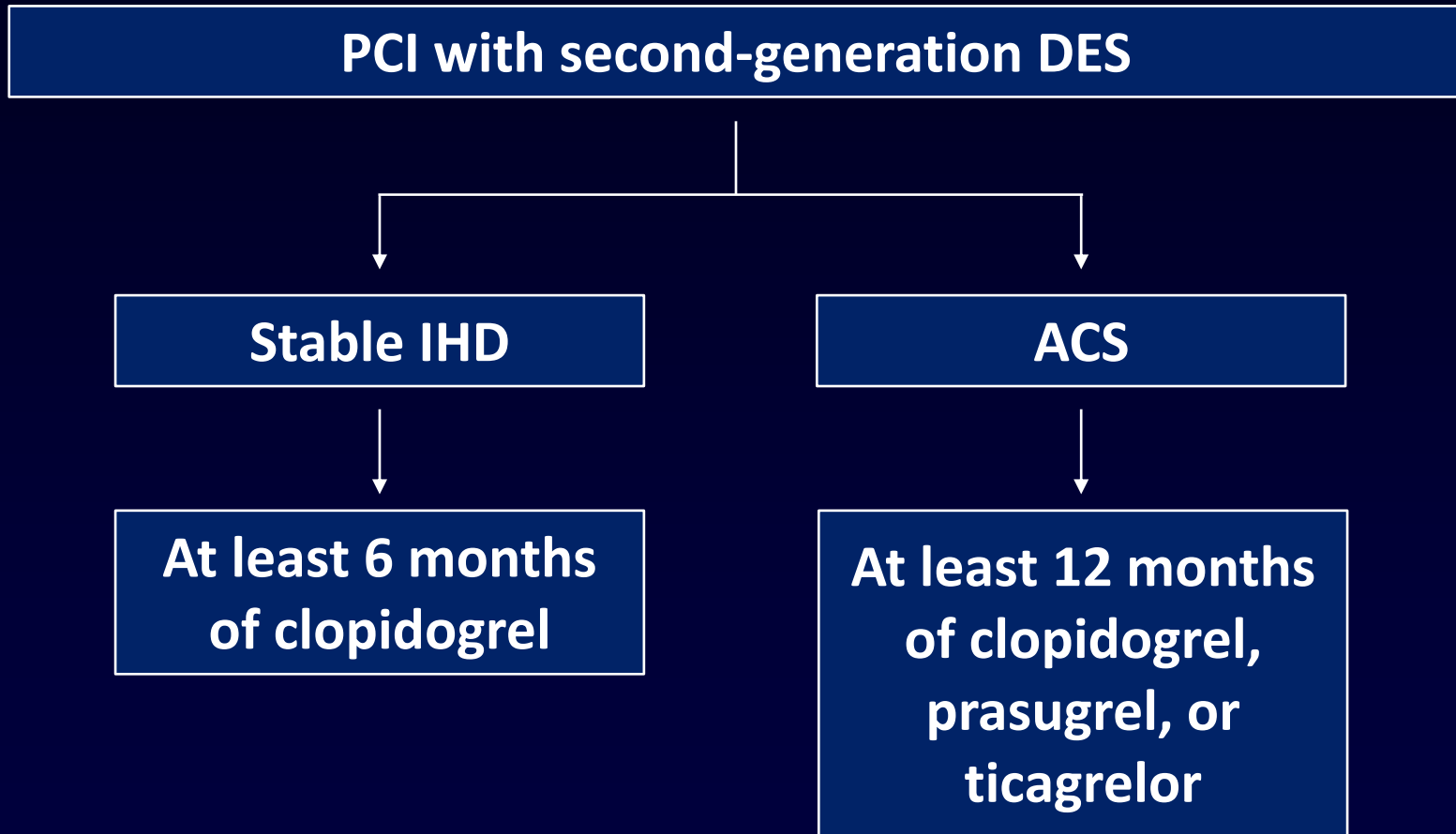
Lee SY, ..., Hong MK (correspondence). *J Am Heart Assoc* 2017;6: e005386. DOI: 10.1161/JAHA.116.005386.

DAPT duration for BMS

One month! Why safe?

**Sufficient endothelial
coverage in BMS in one
month**

Current Recommendations of DAPT

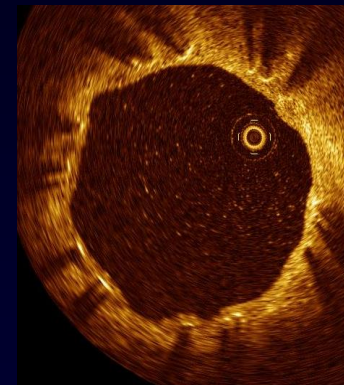


2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy

Optimal DAPT duration after DES



Clinical presentation
Underlying plaque characteristics
Stent type, length and diameter
Other risk factor: DM, ACS



Final determinants: Strut coverage at FU OCT

Next-generation
DES

Cypher and
Taxus

BMS

Endeavor splint ZES

1 month

3 M

6 M

9 M

12 M

Stent implantation

Evaluation in 3 months Duration of nEointimal coverage after zotarolimus-eluting stent implantation by OCT (ENDEAVOR OCT)

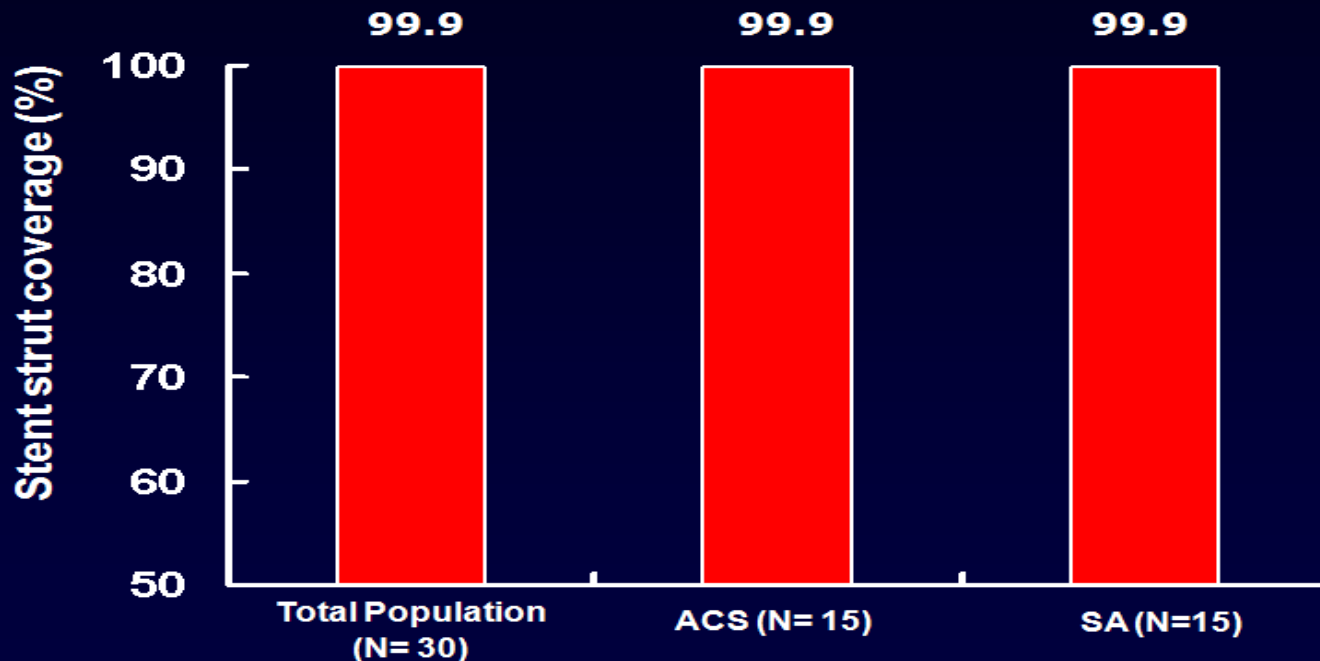
Sufficient strut coverage following E-ZES implantation as early as 3 months post-procedure.

OCT findings

Measured at every 0.5 mm

30 patients (16 stents in 15 ACS and 15 stents in 15 SA)

683 mm in stent length including 12074 struts



Kim JS, et al. *J Am Coll Cardiol Intv* 2009;12:1241-7

RESET multicenter randomized clinical trial

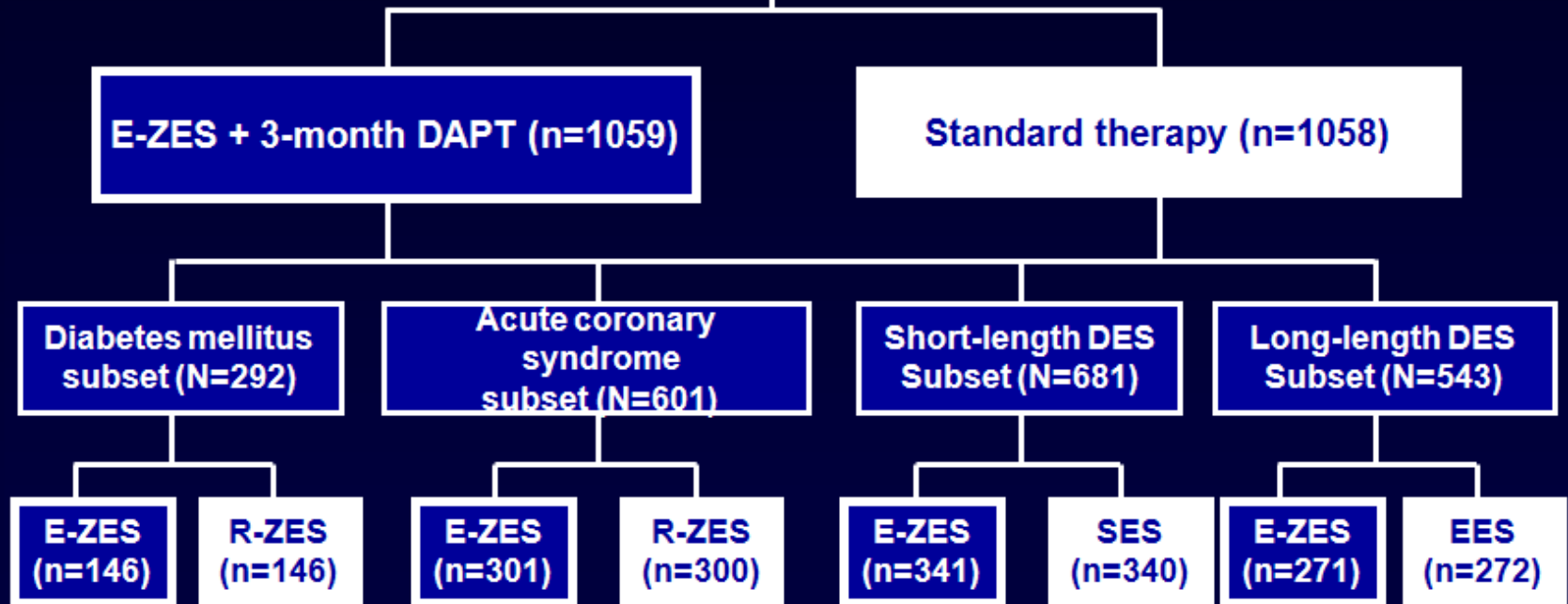
2,148 patients enrolled and randomized

PI: Myeong-Ki Hong, MD.

- E-ZES + 3-month DAPT
- Standard Therapy:
Other DES with 12-month DAPT

Divided into 4 subsets and 1:1 randomization was performed.

31 patients excluded
- 16 Withdrawal of consent
- 15 Met exclusion criteria

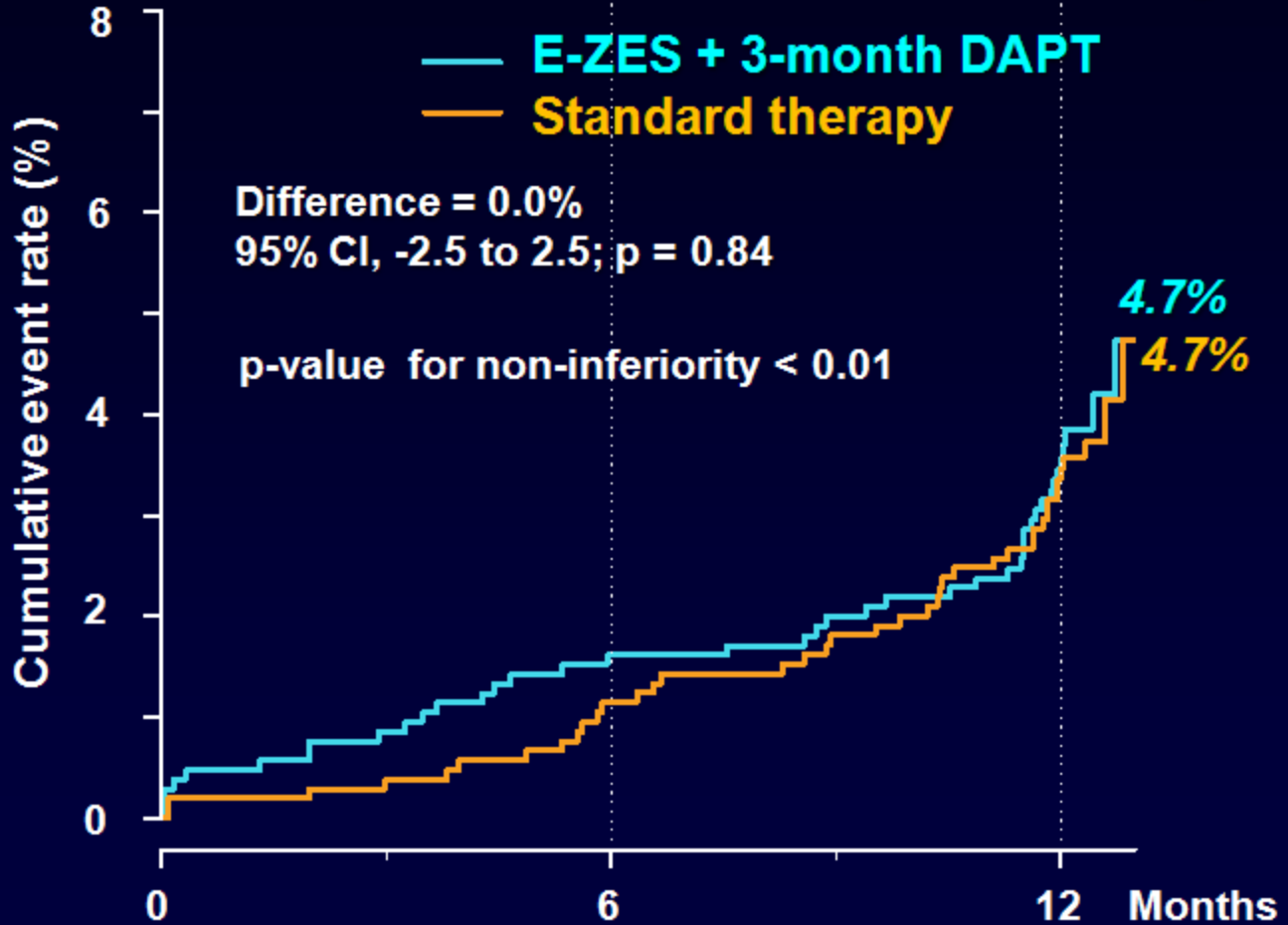


R-ZES = Resolute zotarolimus-eluting stent ; SES = sirolimus-eluting stent; EES = everolimus-eluting stents

Kim BK, Hong MK (corresponding author). *JACC* 2012;60;1340-1348

Primary endpoint, by Kaplan-Meier method

* A composite of CV death, MI, stent thrombosis, TVR or bleeding at 1 yr



No. at risk

E-ZES +3-month
DAPT

1059

1049

1037

1027

945

Standard therapy

1058

1046

1032

1024

920

Kim BK, Hong MK (corresponding author). *JACC* 2012;60;1340-1348

Traditional OCT image analysis

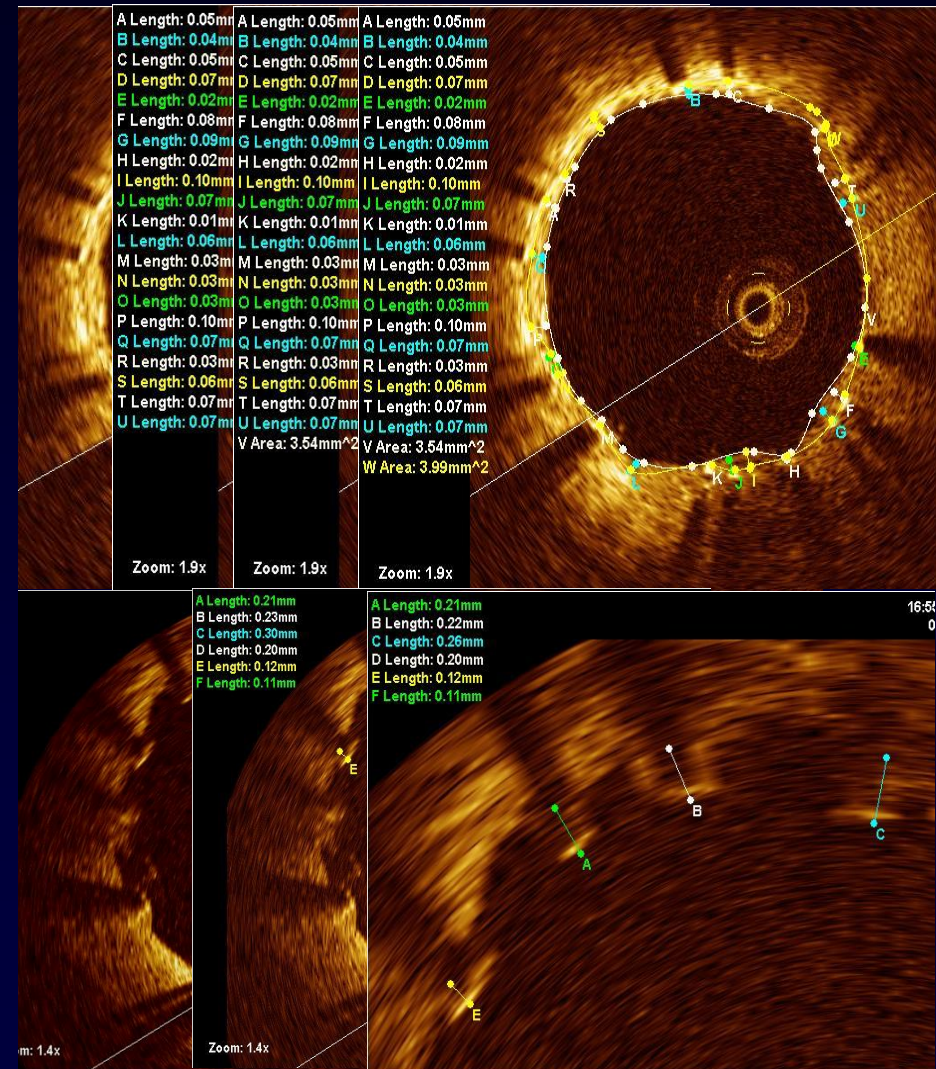
Analysis of cross-sectional OCT images at a 1-mm interval (every 15 frames).

1. Neointimal thickness

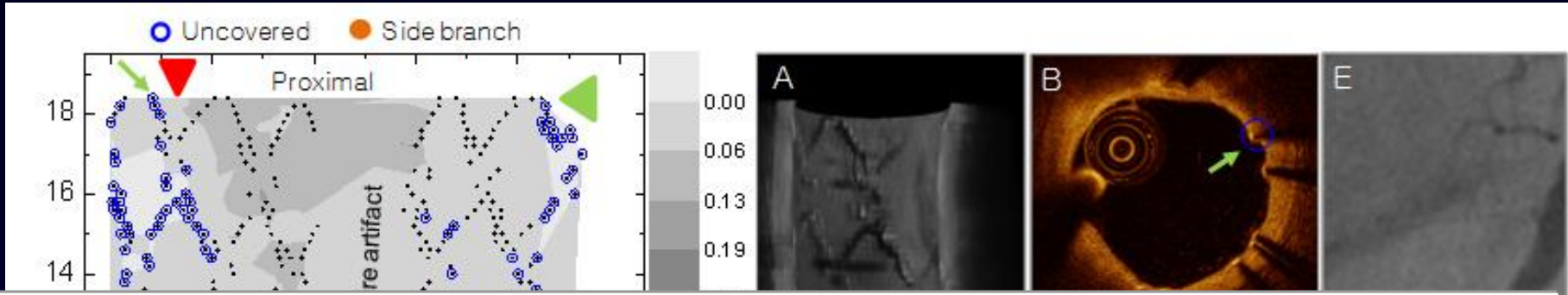
The distances between the endoluminal surface of neointimal and the strut reflection

2. Stent apposition

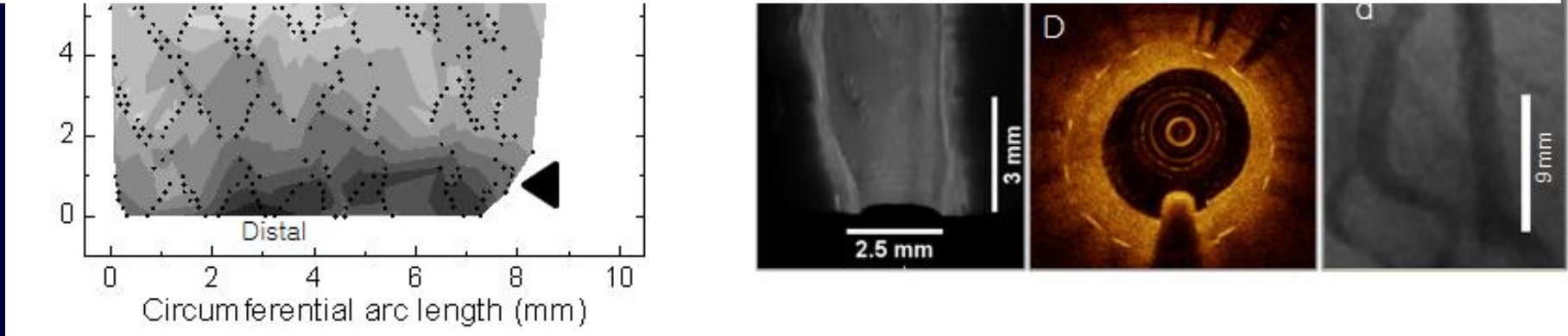
The distances between the endoluminal surface of the strut reflection and the vessel wall



Creation of contour map



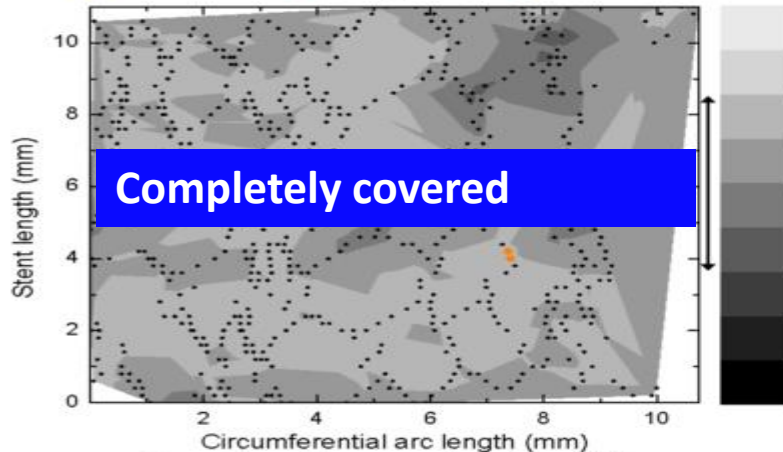
This technology provides detailed information previously obtainable only by gross pathologic examination.



HA J, Hong MK (corresponding author). *J Am Coll Cardiol Img* 2012;5:852-853

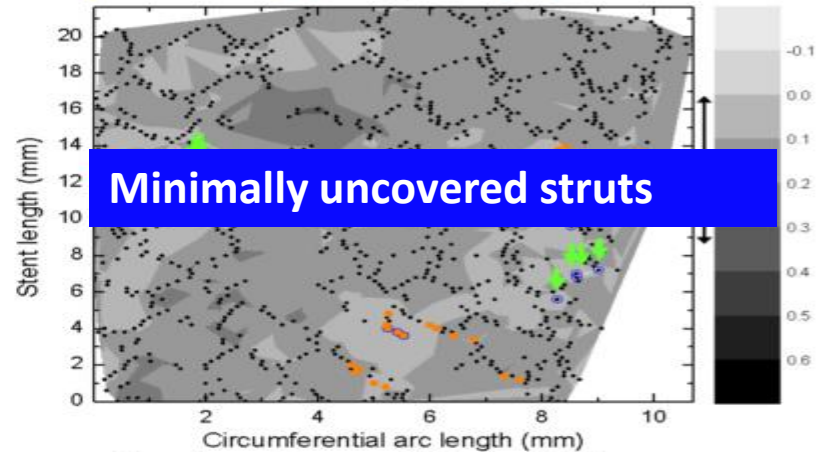
Contour map of SES at follow-up OCT

A. ○ Uncovered ○ Malapposed ○ Side branch



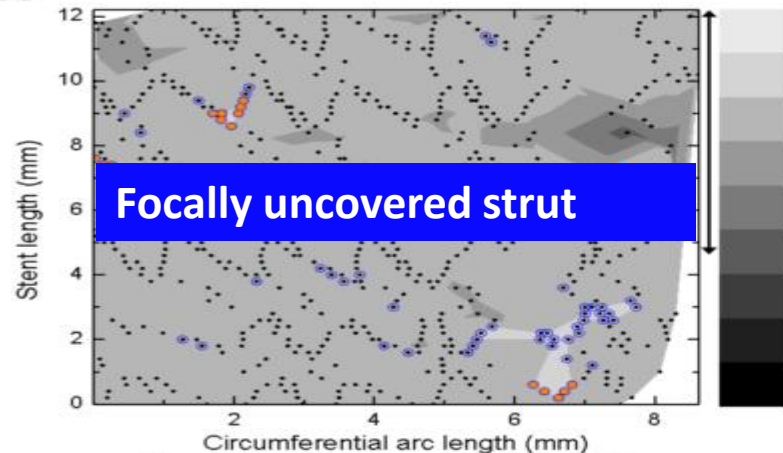
Percentage of uncovered struts = 0.0%
Percentage of malapposed struts = 0.0%

B. ○ Uncovered ○ Malapposed ○ Side branch



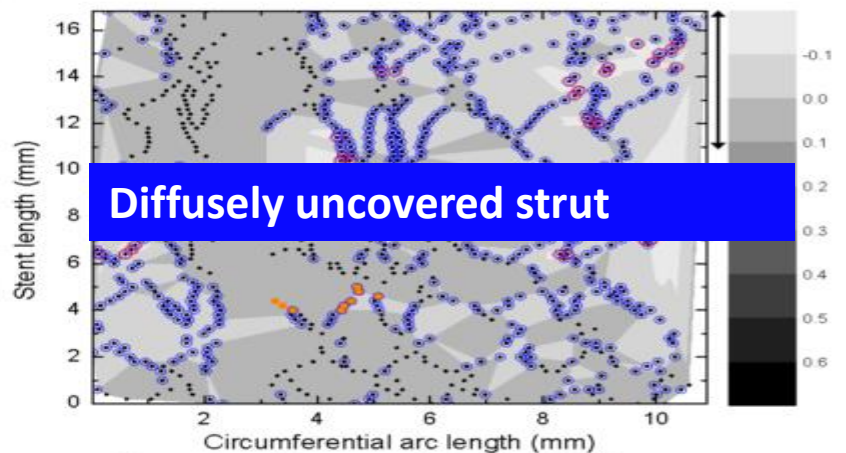
Percentage of uncovered struts = 0.8%
Percentage of malapposed struts = 0.0%

C.



Percentage of uncovered struts = 8.6%
Percentage of malapposed struts = 0.8%

D.

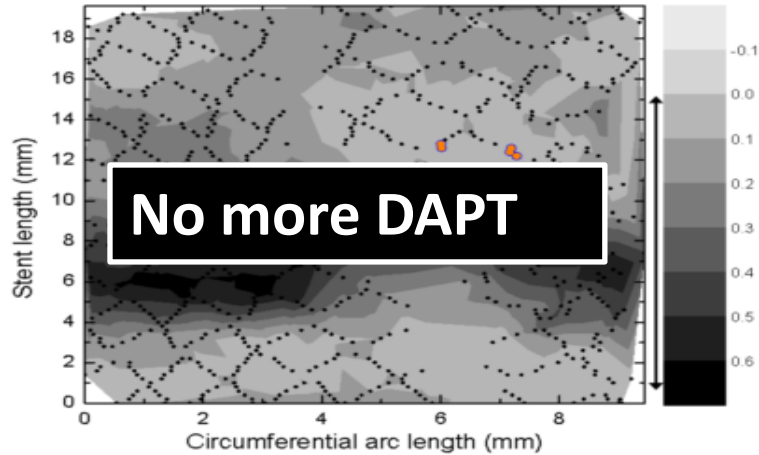


Percentage of uncovered struts = 64.7%
Percentage of malapposed struts = 5.9%

Kim BK, Hong MK (corresponding author). *EuroIntervention* 2014;9:1389-1397

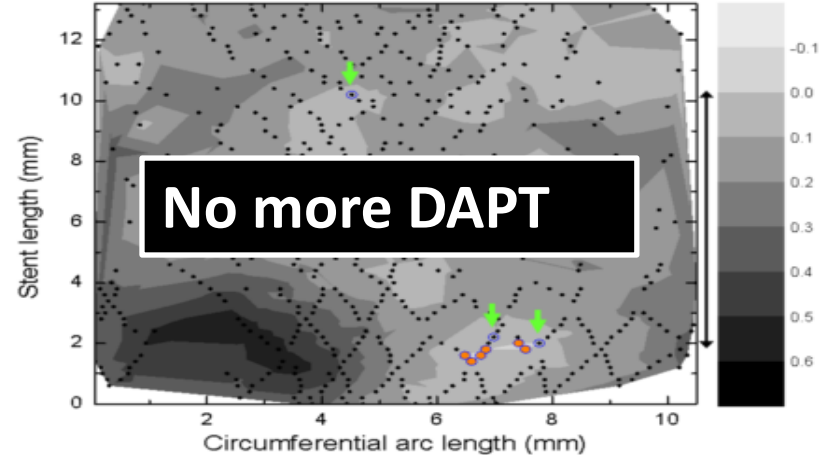
Contour map of Nobori BES at 6-month follow-up OCT

A. ○ Uncovered ○ Malapposed ○ Side branch



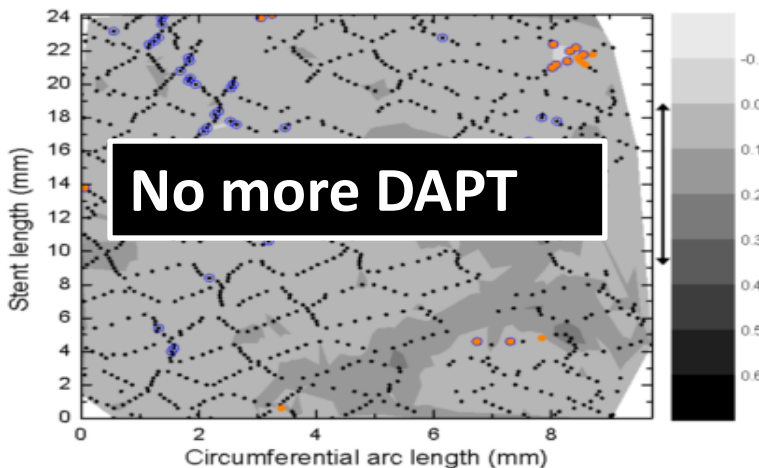
Percentage of uncovered struts = 0.0%
Percentage of malapposed struts = 0.0%

B. ○ Uncovered ○ Malapposed ○ Side branch



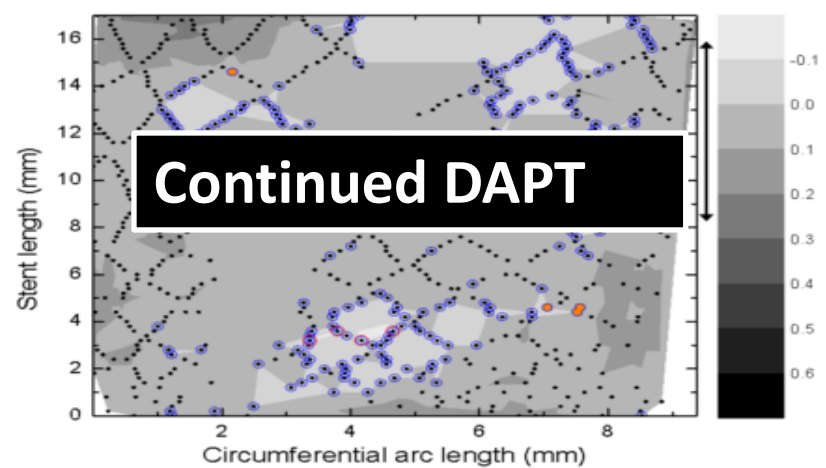
Percentage of uncovered struts = 0.4%
Percentage of malapposed struts = 0.0%

C.



Percentage of uncovered struts = 4.0%
Percentage of malapposed struts = 0.0%

D.



Percentage of uncovered struts = 32.0%
Percentage of malapposed struts = 0.8%

Kim BK, Hong MK (corresponding author). *EuroIntervention* 2014;9:1389-1397

2012 Expert opinion regarding strut coverage



European Heart Journal (2012) **33**, 2513–2522
doi:10.1093/eurheartj/ehs095

CURRENT OPINION

Expert review document part 2: methodology, terminology and clinical applications of optical coherence tomography for the assessment of interventional procedures

- It is difficult to offer any recommendation at this stage for the use of OCT for the late follow-up of **individual patients**
- However, anecdotal cases of OCT application to rule out the need for the prolongation of a dual antiplatelet treatment in patients requiring undeferrable surgery have been reported

Prati F et al. Eur Heart J 2012;33:2513-2522.

2018 European expert consensus documents regarding stent strut coverage



European Heart Journal (2018) 00, 1–20

FASTTRACK CLINICAL RESEARCH

In the OCTACS study, 100 ACS patients were randomized to either OCT-guided or angiography-guided implantation of newer-generation DES; OCT-guidance resulted in a lower proportion of uncovered struts at 6 months (4.3% vs. 9.0%, $P < 0.01$).³¹ Similarly, the DETECT OCT study showed a superior stent coverage at 3 months (7.5% vs. 9.9%, $P = 0.009$) when OCT-guidance PCI was applied in 894 stable CAD patients.³²

of the European Association of Percutaneous

What is the clinical implication of DES strut coverage?

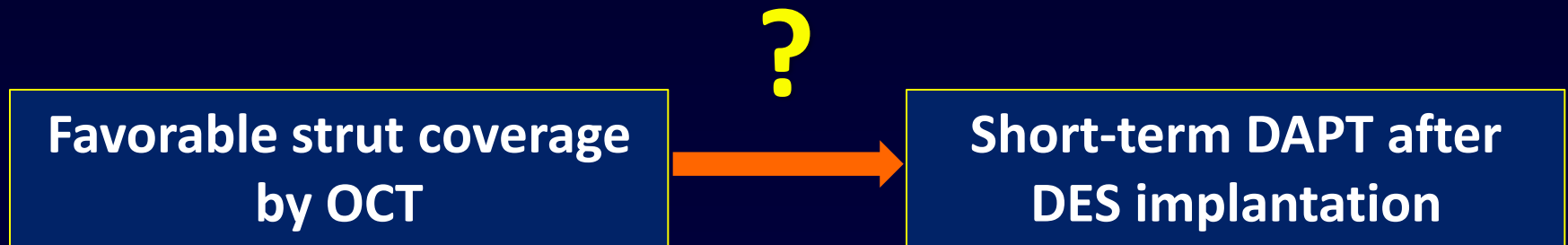
No consensus documents.

Lorenz Räber¹, Gary S. Mintz², Konstantinos C. Koskinas¹, Thomas W. Johnson³, Niels R. Holm⁴, Yoshinubo Onuma⁵, Maria D. Radu⁶, Michael Joner^{7,8}, Bo Yu⁹, Haibo Jia⁹, Nicolas Meneveau^{10,11}, Jose M. de la Torre Hernandez¹², Javier Escaned¹³, Jonathan Hill¹⁴, Francesco Prati¹⁵, Antonio Colombo¹⁶, Carlo di Mario¹⁷, Evelyn Regar¹⁸, Davide Capodanno¹⁹, William Wijns²⁰, Robert A. Byrne²¹, and Giulio Guagliumi^{22*}

Raber L et al. Eur Heart J 2018 (in press)

Critical Question on DAPT Duration

In patients treated with second-generation DES for SIHD or ACS, compared with 12 months of DAPT, is short-term DAPT determined by OCT-defined strut coverage as effective in preventing MACE and/or reducing bleeding complications?



Early strut coverage in patients receiving new-generation drug-eluting stents and its implications for dual antiplatelet therapy: a randomized clinical trial

The DETECT OCT trial investigators

894 patients requiring DES implantation with two-by-two factorial design

EES (Xience) versus BES (Nobori) were randomized

OCT versus angiography guidance were randomized

Primary outcome: percentage of uncovered strut at 3 months by OCT

Uncovered strut $\leq 6.0\%$

Uncovered strut $> 6.0\%$

Stop clopidogrel
(3-month DAPT)

Continue clopidogrel
(12-month DAPT)

Secondary outcome: cardiac death, MI, ST, and major bleeding at 12 months

Lee SY, Kim JS, Hong MK (corresponding author), et al. *JACC Img* 2018;11:1810-9 and presented at ESC Late Breaking Science 2017

Primary Outcome: percentage of uncovered strut

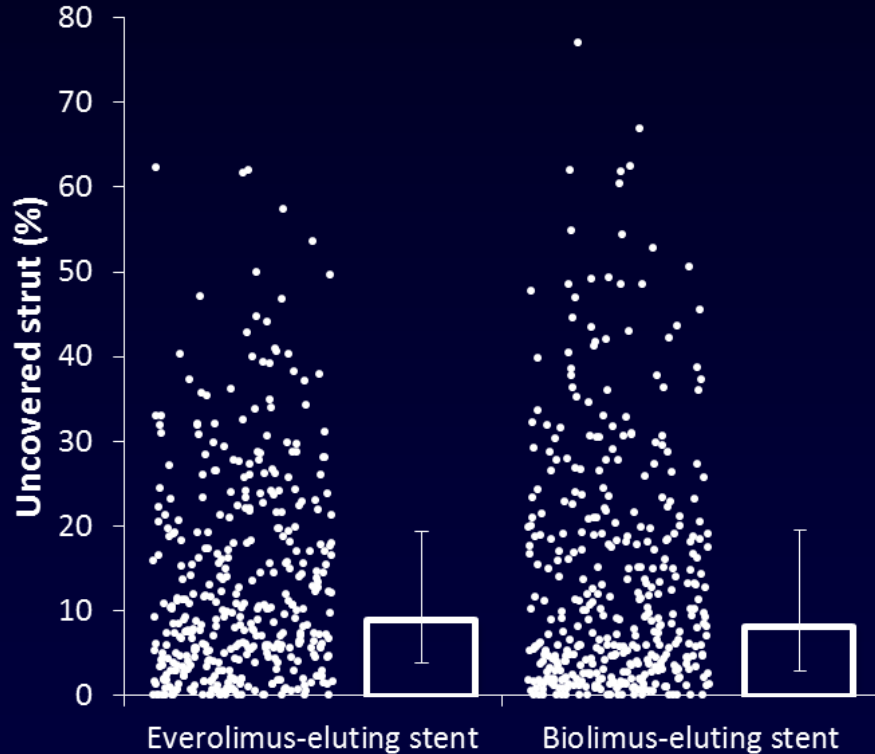
EES vs. BES

Mean difference of 0.4%
95% confidence interval, -1.6–2.4
p=0.69

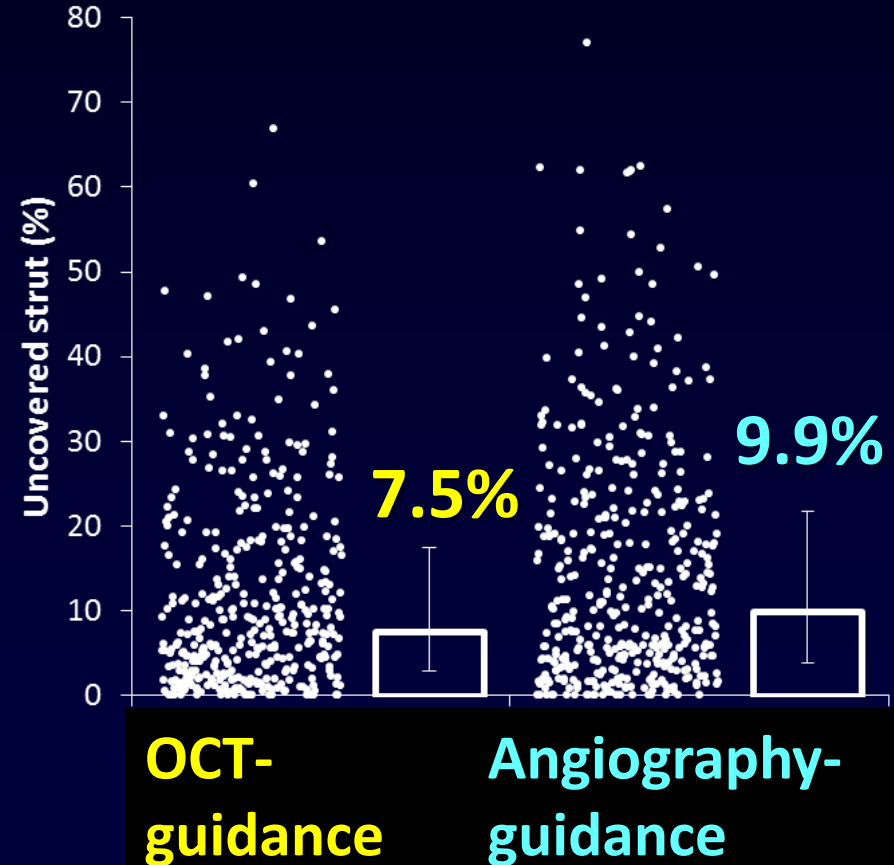
OCT vs. Angiography

Mean difference of 2.8%
95% confidence interval, 0.8–4.8
p=0.009

Median percentage of uncovered strut: 8.9% in EES and 8.2% in BES



7.5% in OCT guidance and 9.9% in angiography guidance



Lee SY, Kim JS, Hong MK (corresponding author), et al. *JACC Img* 2018;11:1810-9 and presented at ESC Late Breaking Science 2017

Secondary Outcome

	3-month DAPT (n=320)	12-month DAPT (n=459)	Difference (95% CI)	p
Cardiac death	0	0		-
MI	1 (0.3%)	0	0.3% (-0.3–0.9)	0.4108
Definite or probable ST	1 (0.3%)	0	0.3% (-0.3–0.9)	0.4108
Bleeding	1 (0.3%)	3 (0.7%)	-0.3% (-1.3–0.6)	0.5138
Major	0	1		
Minor	1	2		
Target-vessel revascularization	2 (0.6%)	2 (0.4%)	0.2% (-0.9–1.2)	0.7175
A composite of cardiac death, MI, definite/probable ST, and major bleeding	1 (0.3%)	1 (0.2%)	0.1% (-0.7–0.8)	0.7967

Lee SY, Kim JS, Hong MK (corresponding author), et al. *JACC Img* 2018;11:1810-9 and presented at ESC Late Breaking Science 2017

Conclusions

Three-month DAPT based on a favorable degree of strut coverage upon OCT evaluation was feasible in selected patients receiving new-generation DES.

Dreams will come true

