CardioEgypt 2018

Drug-Eluting Stents
An Overview

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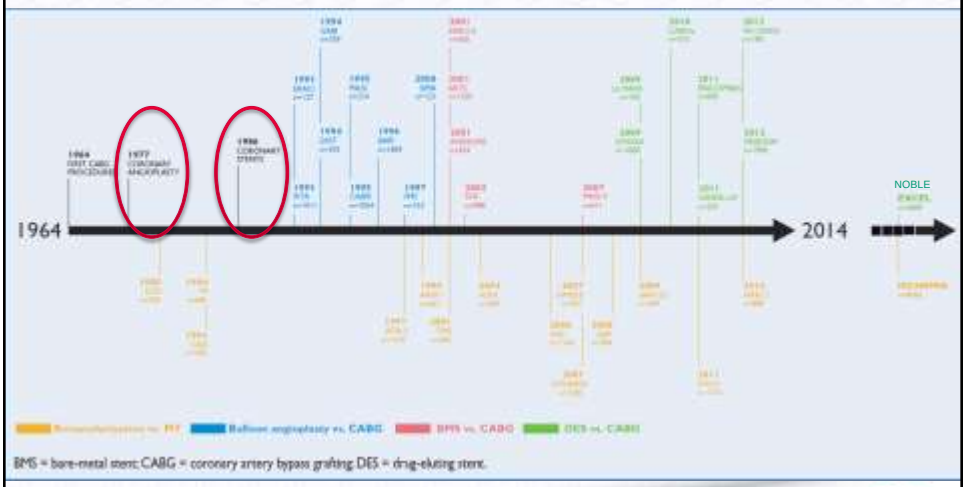
Disclosures

- Presenter: Adam Witkowski
- I have nothing to disclose

50 Year Anniversary of Myocardial Revascularization



www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

History of POBA and Coronary Stents

- First Coronary Balloon Angioplasty – A. Gruentzig, 1977

- First Coronary Stenting – U. Sigwart, J. Puel, 1986

To act as a scaffold, thus 1) preventing vessel closure during PTCA, and 2) reducing the incidence of angiographic restenosis, which had an occurrence rate of 30-40%.

- First Drug-Eluting Stent – JE Sousa, 2001

The First-in-Man feasibility study, conducted in Sao Paulo, Brazil and Rotterdam, the Netherlands showed the CYPHER® sirolimus-eluting stent (Cordis Corporation, Johnson & Johnson, Warren, NJ, USA) to be remarkably effective in eliminating the occurrence of restenosis. Circulation 2001; 103:192-5.

As a strategy to minimize restenosis and requirement for reintervention.

- First Bioabsorbable Stent (BVS), poly-L-lactic acid (PLLA) – J. Ormiston, 1st implantation on March 7th, 2006

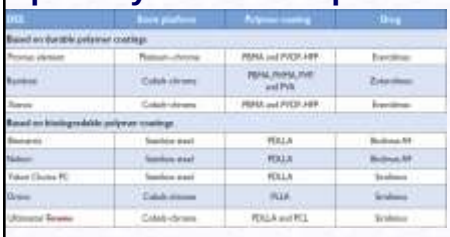
In contrast to a permanent metal stent, a completely absorbable stent may allow the vessel to react normally to pulsatile flow, to positively remodel and to respond normally to factors released by endothelium.

Catheterization and Cardiovascular Interventions 69:128–131 (2007)

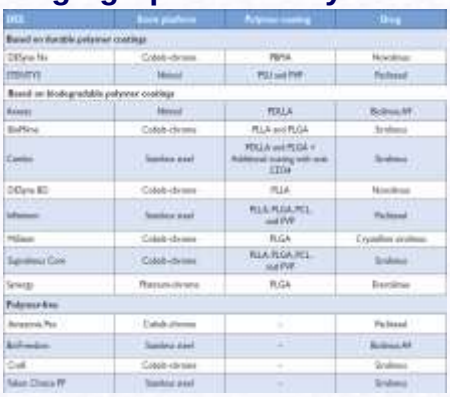
Design of 2nd generation DES

- Alloy: cobalt-chromium, platinium-chromium, thin struts (<80 mc)
- Polymer: durable or bioabsorbable vs non-polymeric, drug-coated stents, drug-filled stents
- Drug: ~~paclitaxel~~, sirolimus or sirolimus derivatives (EES, ZES, BES)
- Fully bioresorbable DES (3d generation DES or 1st generation BRS?)

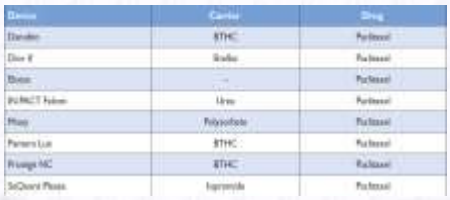
CE-approved DES with primary clinical endpoint



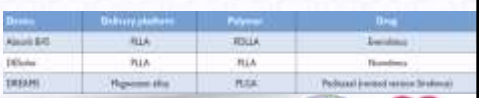
CE-approved DES with angiographic efficacy data



CE-approved DCB



Bioresorbable stents



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DES in ESC/EACTS Guidelines

- Second generation DES in STEMI: IA
- Second generetion DES in NSTE-ACS: IA
- Second generation DES in SCAD: New-generation DES should ……. be considered by default in all clinical conditions and lesion subsets

2014 ESC/EACTS Guidelines on Myocardial Revascularization
2015 ESC Guidelines on NSTE-ACS
2017 ESC Guidelines on STEMI

Antithrombotic treatment in SCAD patients undergoing PCI

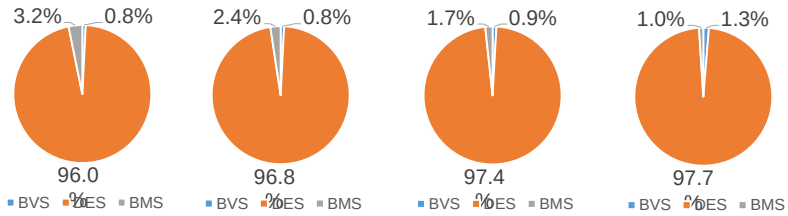
2014 ESC/EACTS Guidelines on MR

Pre-treatment with antiplatelet therapy		
Treatment with 600 mg clopidogrel is recommended in elective PCI patients once anatomy is known and decision to proceed with PCI preferably 2 hours or more before the procedure.	I	A
Pre-treatment with clopidogrel may be considered in patients with high probability for significant CAD.	IIb	C
In patients on a maintenance dose of 75 mg clopidogrel, a new loading dose of 600 mg or more may be considered once the indication for PCI is confirmed.	IIb	C
Antiplatelet therapy during PCI		
ASA is indicated before elective stenting.	I	B
ASA oral loading dose of 150–300 mg (or 80–150 mg i.v.) is recommended if not pre-treated.	I	C
Clopidogrel (600 mg loading dose or more, 75 mg daily maintenance dose) is recommended for elective stenting.	I	A
Antiplatelet therapy after stenting		
DAPT is indicated for at least 1 month after BMS implantation.	I	A
DAPT is indicated for 6 months after DES implantation.	I	B
Shorter DAPT duration (<6 months) may be considered after DES implantation in patients at high bleeding risk.	IIb	A
Life-long single antiplatelet therapy, usually ASA, is recommended.	I	A
Instruction of patients about the importance of complying with antiplatelet therapy is recommended.	I	C
DAPT may be used for more than 6 months in patients at high ischaemic risk and low bleeding risk.	IIb	C
GP IIb/IIIa antagonists should be considered only for bail-out.	IIa	C
Anticoagulant therapy		
Unfractionated heparin 70–100 U/kg.	I	B
Bivalirudin (0.75 mg/kg bolus, followed by 1.75 mg/kg/hour for up to 4 hours after the procedure) in case of heparin-induced thrombocytopaenia.	I	C
Bivalirudin (0.75 mg/kg bolus, followed by 1.75 mg/kg/hour during the procedure) in patients at high bleeding risk.	IIa	A
Enoxaparin i.v. 0.5 mg/kg.	IIa	B

Interventional Cardiology in Poland 2017

PCI

DES stents in 2016 by diagnosis and in comparison to 2015



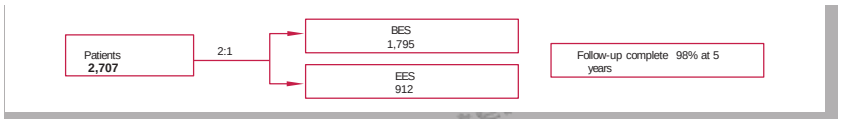
STEMI	NSTEMI	UA	SCAD
↑5.9% DES	↑6.7% DES	↑5.2% DES	↑4.8% DES

UNIWERSYTET JAGIELLOŃSKI COLLEGIUM MEDICUM

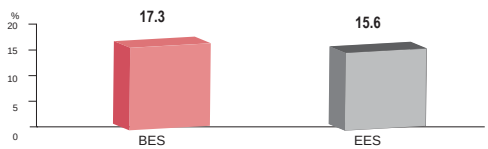
Ogólnopolski Rejestr Procedur Kardiologii Inwazyjnej

Biodegradable Polymer BES vs Durable EES: COMPARE II 5 years

Objective	to report the 5 year clinical outcome of the biodegradable polymer biolimus- eluting stent (BES) with durable polymer everolimus-eluting stent (EES)
Study	prospective, multicentre randomised non-inferiority trial (2:1)
Population	all-comers
Endpoints	MACE: cardiac death, MI, or TVR at 5 years



MACE 5 years
RR: 1.11 (95% CI 0.92-1.33) p=0.26



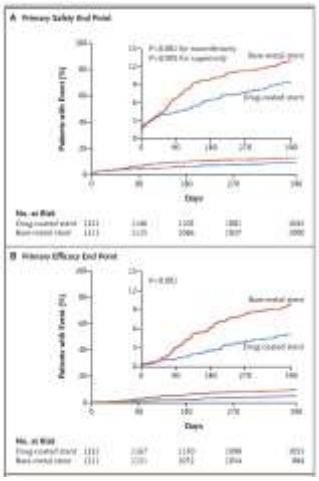
Conclusion	The clinical outcome after 5 year follow-up of BES implantation was non-inferior compared to EES implantation

Vlachojannis et al. J Am Coll Cardiol Intv. 2017;10:1215-21

LEADERS FREE

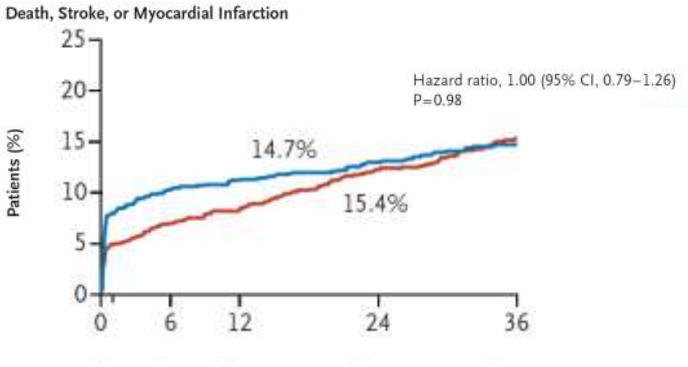
Polymer-free drug-coated stent (Biofreedom) vs BMS (Gazelle)
n=2.466 pts

- The primary safety end point, tested for both noninferiority and superiority, was a composite of cardiac death, MI, or stent thrombosis
- The primary efficacy end point was clinically driven TLR
- 1 month DAPT



P Urban et al. NEJM 2015

EXCEL Study



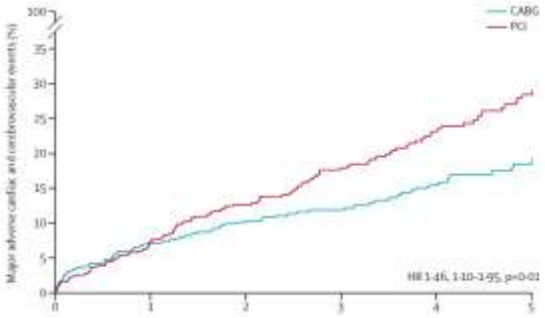
PCI non inferior to CABG for LM disease

LM and SYNTAX<32
Xience stent, 28% BIMA
CABG vs PCI, n= 1905
PEP= Death, MI, stroke

Stone et al, NEJM 201

NOBLE Study

Death, non-procedural MI, Stroke, Revascularization



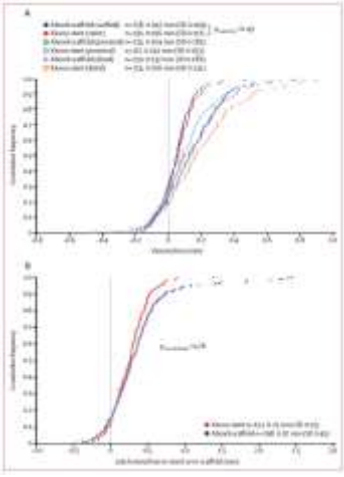
PCI not non-inferior to CABG for LM disease (HR>1.35)

Left Main
Biomatrix stent (>90%)
CABG vs PCI, n= 1201, 8% BIMA
PEP= Death, non procedural MI, stroke +

Mäkikallio et al, Lancet 201

ABSORB II: 3 years

- Comparison of an everolimus-eluting bioresorbable scaffold with an everolimus-eluting metallic stent for the treatmen tof coronary artery stenosis
- The primary endpoint was superiority of the Absorb bioresorbable scaffold versus the Xience metallic stent in angiographic vasomotor reactivity after administration of intracoronary nitrate
- The co-primary endpoint is the non-inferiority of angiographic late luminal loss



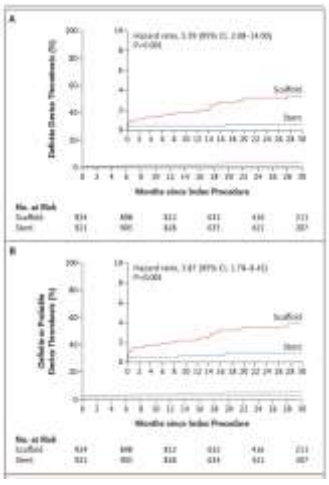
PW Serruys et al. Lancet 2016

ABSORB II: 3 years

- Late loss significantly higher in Absorb (0.37 mm [0.45] vs 0.25 mm [0.25]; p for non-inferiority=0.78)
- The secondary endpoints of patient-oriented composite endpoint, Seattle Angina Questionnaire score, and exercise testing were not statistically different in both groups
- A device-oriented composite endpoint was significantly different between the Absorb group and the Xience group (10% vs 5%, hazard ratio 2.17 [95% CI 1.01–4.70]; log-rank test p=0.0425), mainly driven by target vessel myocardial infarction (6% vs 1%; p=0.0108), including peri-procedural myocardial infarction (4% vs 1%; p=0.16).

PW Serruys et al. Lancet 2016

AIDA: Bioresorbable Scaffolds versus Metallic Stents in Routine PCI

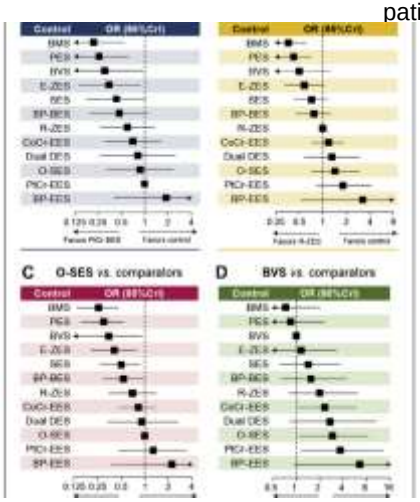


- Randomised: EES vs BVS
- 924 vs 921 pts
- no significant difference in the rate of TVF between the patients who received a bioresorbable scaffold and the patients who received a metallic stent
- The bioresorbable scaffold was associated with a higher incidence of device thrombosis than the metallic stent through 2 years of follow-up

JJ Wyrzykowska et al. NEJM 2017

Stent Thrombosis With Drug-Eluting Stents and Bioresorbable Scaffolds

Evidence From a Network Meta-Analysis of 147 Trials (n=126,526 patients)



- Contemporary DES, including biocompatible DP-DES, BP-DES, and polymer-free DES, showed a low risk of definite or probable stent thrombosis at 1 year
- BVS had an increased risk of device thrombosis compared with CoCr-EES, PtCr-EES, and H-SES
- Data from extended follow-up are warranted to confirm the long-term safety of contemporary coronary devices.

Si-Hyuck Kang et al, J Am Coll Cardiol Intv 2016

Not CE marked – not yet available

Magmaris components

A combination of proven Orsiro elements and the benefits of a resorbable Magnesium Scaffold

Backbone
Mg alloy
Tantalum markers

6-crown & 2-link design

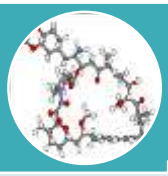
150µm strut thickness

BIOlute

Coating
PLLA

Proven resorption profile

Proven technology identical to Orsiro coating



Drug
Limus

1.4 µg/mm² same as for Orsiro

Release kinetics comparable to Orsiro

Delivery system
RX, 0.014"

6F compatible

Adapted from Orsiro system

20

BIOTRONIK excellence for life

Are DES really better?

The NEW ENGLAND JOURNAL of MEDICINE

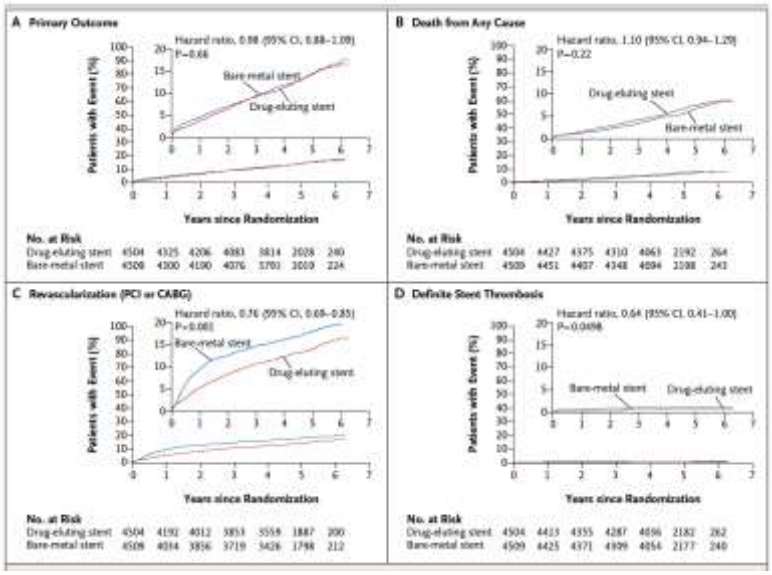
ORIGINAL ARTICLE

Drug-Eluting or Bare-Metal Stents for Coronary Artery Disease

K.H. Bønaa, J. Mannsverk, R. Wiseth, L. Aaberge, Y. Myreng, O. Nygård, D.W. Nilsen, N.-E. Kløw, M. Uchto, T. Trovik, B. Bendz, S. Stavnes, R. Bjørnerheim, A.-I. Larsen, M. Slette, T. Steigen, O.J. Jakobsen, Ø. Bleie, E. Fossum, T.A. Hanssen, Ø. Dahl-Eriksen, I. Njølstad, K. Rasmussen, T. Wilsgaard, and J.E. Nordrehaug, for the NORSTENT Investigators*

This article was published on August 30,2016, at NEJM.org.

Are DES really better?



This article was published on August 30,2016, at

CONCLUSIONS

- Contemporary, second generation DES are highly effective and safe (low thrombosis rate)
- The use of DES is recommended over BMS in ESC/EACTS Guidelines
- The use in EU country is ≈ 90%
- Long DAPT (6-12 months) is usually not required
- Bioresorbable stents: BVS is out (higher thrombosis and MI rate than with metallic DES)
- Magnesium scaffold: promising, larger clinically-oriented trials required