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Clinical, Angiographic and IVUS Outcomes of the NG PROMUS Clinical Trial Evaluating the Novel Promus PREMIER Stent

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Hot Line - First-in-man & novel DES and scaffolds
Wednesday 22nd May 2013,
10:21 to 10:31
Room 243

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Background

The NG PROMUS Trial aimed to evaluate the clinical, angiographic, and IVUS outcomes for the Promus PREMIER Everolimus-Eluting Platinum Chromium Coronary Stent System

Based on our longitudinal strength testing, we suggested a change to the Element design

EXPEDITED PUBLICATION: CLINICAL RESEARCH

Stent Longitudinal Integrity

Bench Insights Into a Clinical Problem

John A. Ormiston, MBChB, Bruce Webber, MHSc, Mark W. I. Webster, MBChB

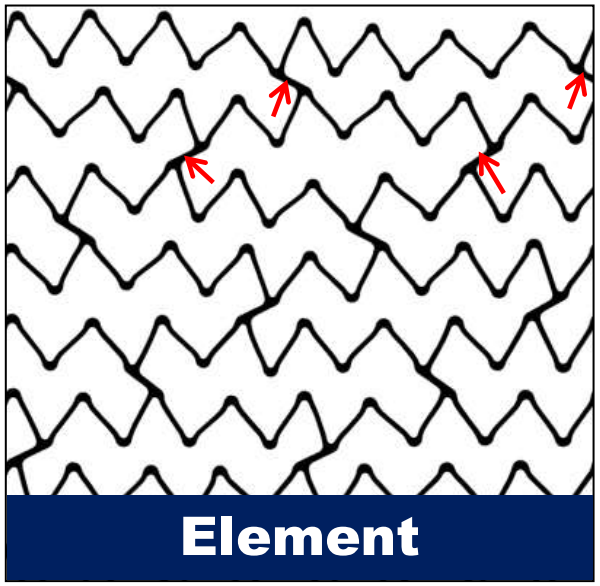
Auckland, New Zealand

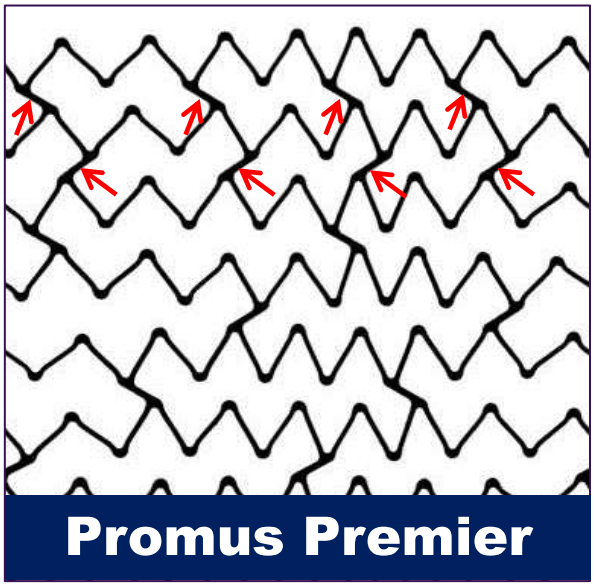
We recommended ***"A stent design change ensuring 3 connectors, especially at the proximal end of the stent, should increase longitudinal ntegrity……. "***

JACC Int 2011

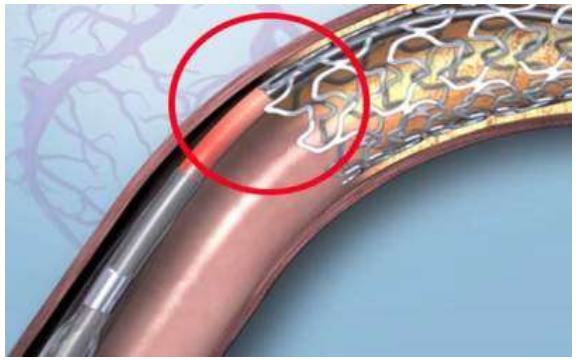
Promus Premier Stent

- Same as the Promus Element (same polymer/drug) but with the **additional proximal connectors** to improve longitudinal strength where distortion is most common



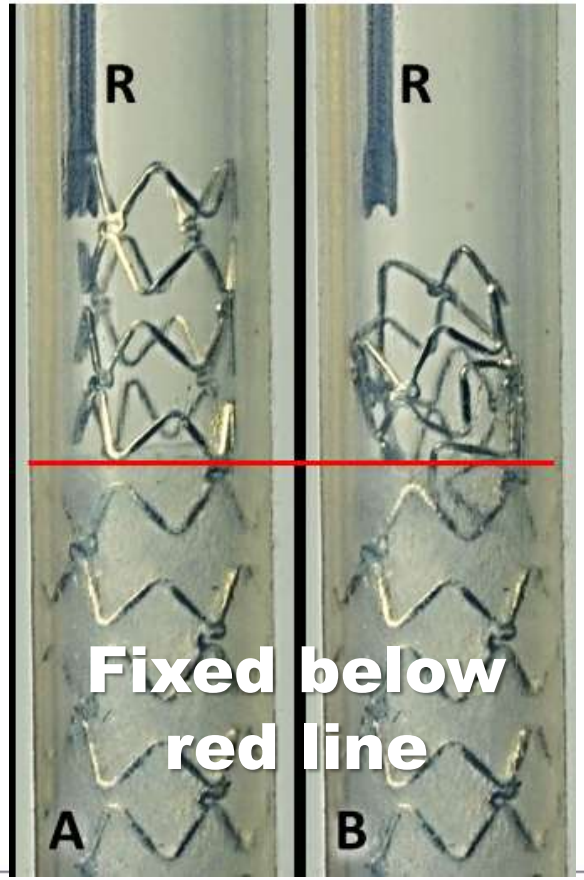


- Also improved delivery system



Longitudinal distortion is usually caused by a point force on a proximal strut

(Mamas *EuroIntervention* 2012; Aminian *EuroIntervention* 2012)



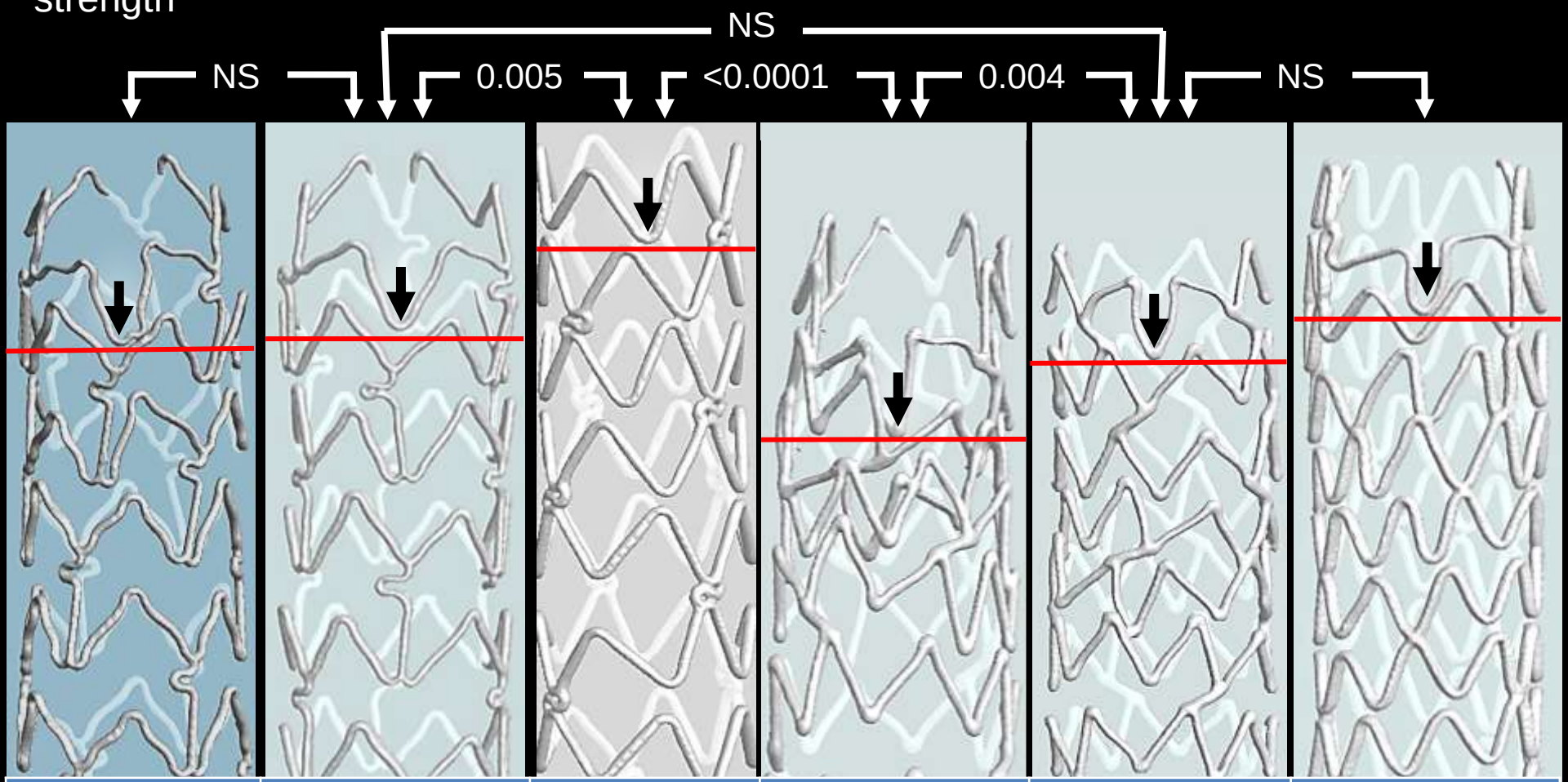
Our New Clinically Related Longitudinal Distortion Test

- 3mm diam Stent is fixed distally and malapposed proximally in a 3.5mm tube
- Instron applies force via a rod (R)
- Hoops are compressed on side of force and are displaced into the lumen
- Struts pulled away from the opposite side with obstruction and malapposition
- Instron can measure force and distance compressed

Ormiston CRT 2013

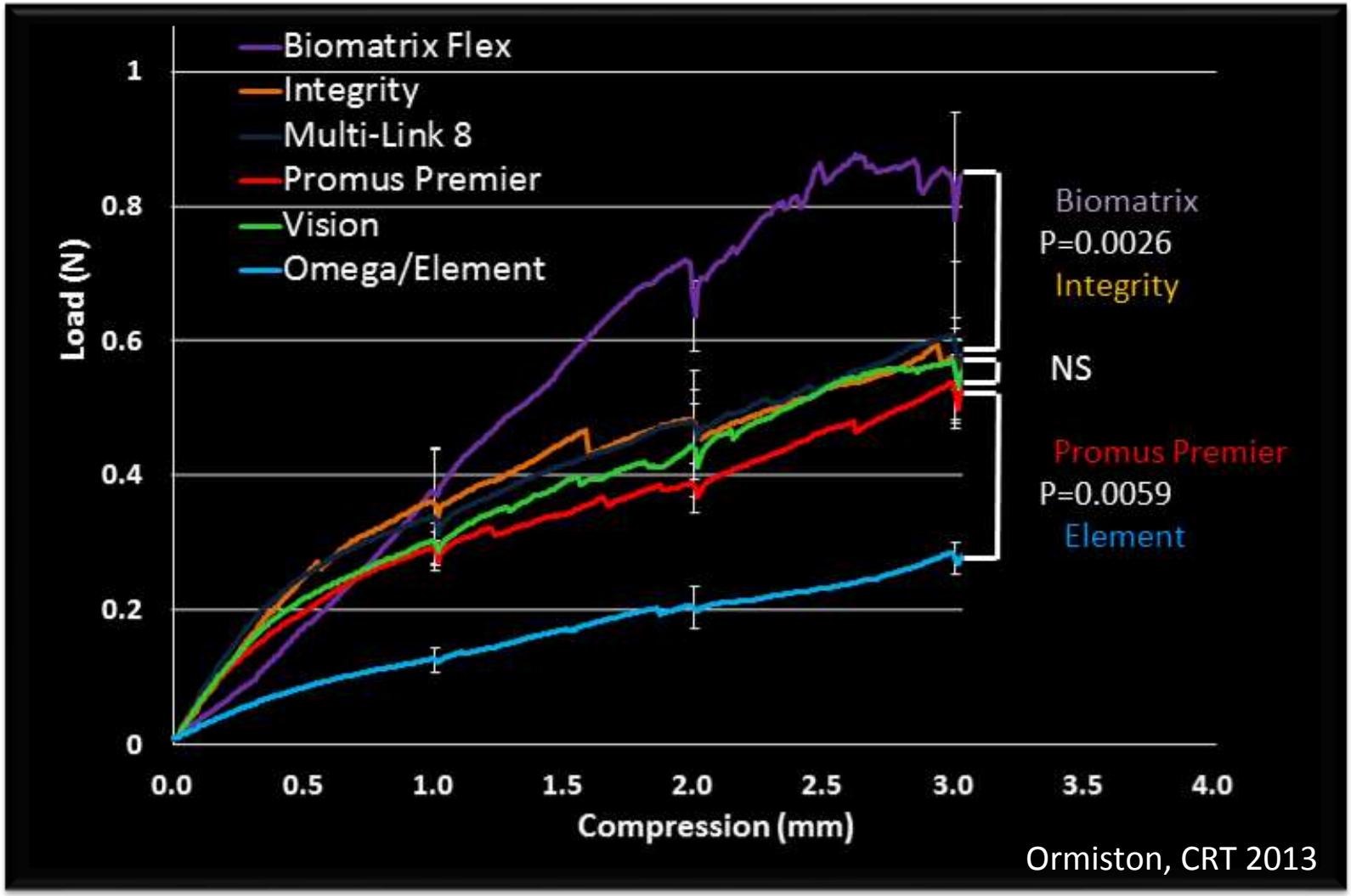
Point compression with 0.5N force – Equal force, different distances

- The Biomatrix Flex was the least and Element the most compressed
- Premier had similar compression to Vision, ML8 and Integrity and less than Element
- Additional connectors proximally for Promus Premier have improved longitudinal strength



Vision	MultiLink 8	Biomatrix Flex	Element	Promus Premier	Integrity
2.5±0.5mm	2.4±0.8mm	1.3±0.1mm	4.1 ± 0.1mm	2.8±0.3mm	2.2 ±0.7mm

Promus Premier resistance to compression



- **PREMIER has similar compression to Vision, ML8 and Integrity and less than Element**

- **Promus Premier- Addition of struts proximally has improved**

Trial design: NG PROMUS Trial

Design	Prospective, single-arm, multicenter; clinical follow-up at 30 days by telephone
Clinical criteria	Symptomatic CAD + objective evidence of ischemia/silent ischemia
Lesion criteria	▪ Located in a native coronary artery; ≤34 mm long and between ≥2.50 - ≤4.0 mm in diameter* ▪ Up to 3 native coronary artery lesions in 2 major epicardial vessels could be treated ▪ Treatment of lesions across a side branch was allowed as long as more than 1 stent was not required
Stenosis*	≥50% and <100% with TIMI flow >1 and one of the following: ▪ stenosis ≥70% ▪ abnormal fractional flow reserve ▪ abnormal stress or imaging stress test ▪ elevated biomarkers prior to the procedure
Index Procedure	▪ Femoral or radial access used ▪ Magnified angiography without contrast to assess distortion

*visually estimated

Endpoints

PRIMARY ENDPOINT:
Technical success: Successful delivery and deployment of the study stent to the target lesion, with post-procedure diameter stenosis of <30% and TIMI 3 flow in the target lesion
SECONDARY ENDPOINTS:
Clinical (post-procedure and at 30 days): Target lesion revascularisation, target lesion failure, target vessel failure, myocardial infarction, death, and stent thrombosis (by Academic Research Consortium definition)
Angiographic (periprocedure): in-stent and in-segment percent diameter stenosis, minimum lumen diameter, acute gain, and longitudinal stent deformation
Intravascular ultrasound (periprocedure): stent, vessel and lumen areas and volumes, incomplete apposition, and percent net volume obstruction

NG PROMUS Trial Organization

NG PROMUS Trial		Patients
Principal Investigator	John Ormiston Mercy Angiography Unit, Auckland New Zealand	22
Investigators	Mark Webster Auckland City Hospital, Auckland New Zealand	24
	Warwick Jaffe Ascot Hospital, Auckland New Zealand	14
	Douglas Scott Middlemore Hospital, Auckland New Zealand	11
	Seif El-Jack North Shore Hospital, Auckland, New Zealand	9
	Dougal McClean Christchurch Hospital, Christchurch, New Zealand	8
	Aaron Wong: National Heart Centre, Singapore	6
	Huay Cheem Tan National University Heart Centre & Yong Loo Lin School of Medicine, National University of Singapore, Singapore	4
	Alan Whelan Fremantle Hospital, Fremantle, Australia	2

Patient Flow

100 Patients Enrolled at 9 Clinical Sites
(New Zealand, Singapore, Australia)

↓

Index Procedure: Intent-To-Treat
Number of Patients N=100; Number of Lesions N=119

↓

Post-procedure Angiographic assessment: 100% (119/119)
Post-procedure IVUS assessment: 85% (101/119)

→ No 30 d Clinical Follow-up (N=1)

↓

30 d Clinical Follow-up: 99% (99/100)

Baseline Demographics

Patients (N=100 patients)			
Male, %	85	Dyslipidemia*, %	78
Age, years	61.7 ± 9.7	Hypertension*, %	70
Diabetes*, %	16	Previous MI, %	16
Insulin-requiring, %	2	Previous PCI, %	23
Current Smoker, %	14	Unstable angina, %	25
Target Lesion (QCA, N=119 lesions)			
Lesion length, mm	16.1 ± 7.1	Diameter Stenosis, %	69.12 ± 9.69
RVD, mm	2.78 ± 0.45	B2/C, %	79.8

*Medically-treated

PRIMARY Endpoint: Technical Success

PRIMARY Endpoint: Technical Success* (N=119 lesions)		
	NG PROMUS	[95% Confidence Interval]
Technical Success, %	99.2 (118/119)†	[95.4, 100]

Other Procedural Characteristics (N=100 patients, N=119 lesions)	
Clinical procedural success‡, %	96 (96/100)
Time from sheath placement to last guide catheter removal, min	54.1 ± 18.7 (99)
Total fluroscopy time, min	16.2 ± 11.2 (98)
Pre-dilatation used, %	100 (119/119)
Post-dilatation used, %	92.9 (92/119)

*Defined as visually assessed (site reported) successful delivery and deployment of the study stent to the target lesion without balloon rupture or stent embolization and with post-procedure diameter stenosis <30% and TIMI 3 flow in the target lesion; lesion-based analysis;

†In 1 target lesion, there was no attempt made to implant a study stent because a previously implanted device was noted in the lesion after subject enrollment (stent was very difficult to see); a commercial device was used instead.

‡Defined as visually assessed post-procedure diameter stenosis <30% with TIMI 3 flow in all target lesions without the occurrence of in-hospital MI, TVR, or cardiac death

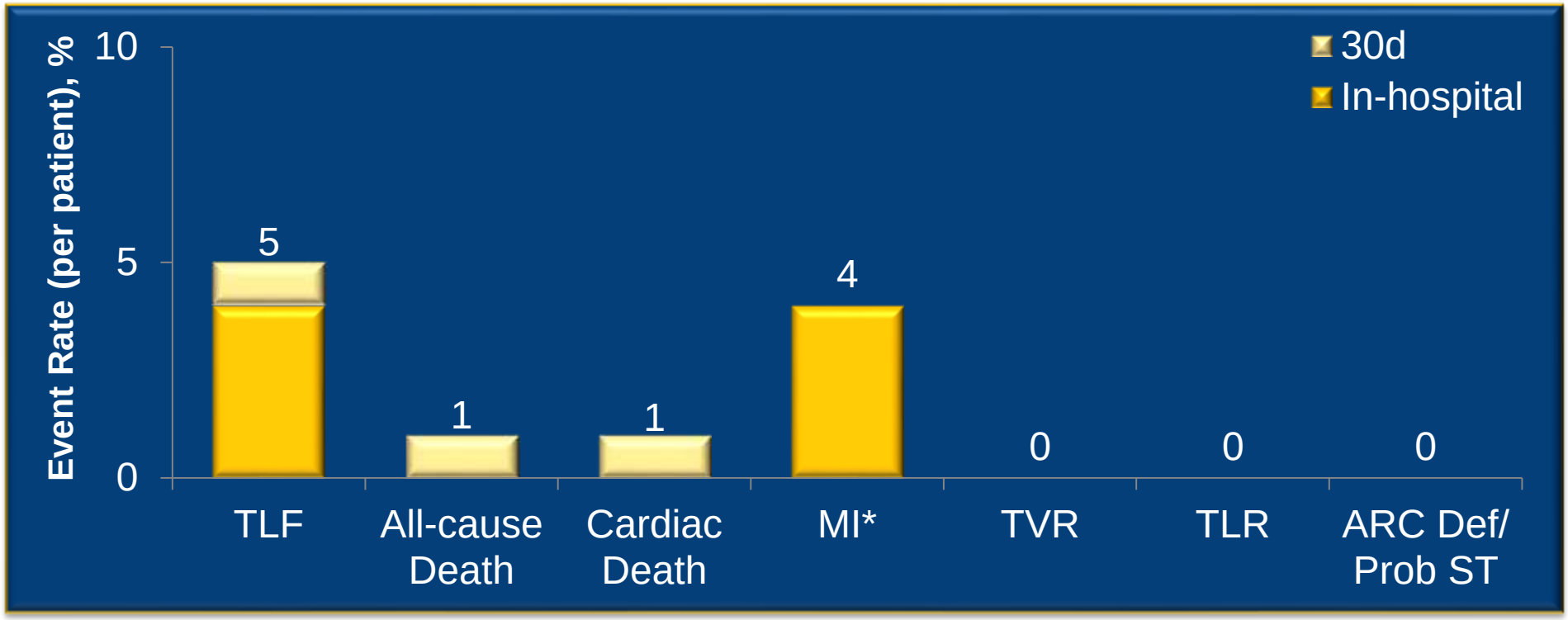
Angiographic Outcomes

Post-procedure N=119 lesions N=127 stents	
MLD, in-stent, mm	2.69 ± 0.43 (119)
MLD, in-segment, mm	2.31 ± 0.46 (119)
DS, in-stent, %	3.86 ± 8.43 (119)
DS, in-segment, %	18.14 ± 7.90 (119)
Acute gain, in-stent, mm	1.84 ± 0.45 (119)
Acute gain, in-segment, mm	1.46 ± 0.47 (119)
Longitudinal Stent Deformation, %	0.0 (0/127)

IVUS Outcomes

Post-procedure N=101 lesions	
Incomplete stent apposition, %	12.9 (13/101)
Mean vessel area, mm^2	15.10 ± 4.34 (99)
Mean stent area, mm^2	7.83 ± 2.38 (101)
Mean lumen area, mm^2	7.76 ± 2.25 (100)
Vessel volume, mm^3	354.34 ± 181.60 (99)
Stent volume, mm^3	185.30 ± 91.75 (101)
Lumen volume, mm^3	182.62 ± 87.93 (100)
% In-stent net volume obstruction, %	0.00 ± 0.01 (100)

Clinical Outcomes (30 days)



There was 1 Cardiac death:

- 53 year old male, prior smoker with Type 2 diabetes mellitus, history of prior MI, depressed ejection fraction and history of ventricular fibrillation
- On day 11, the subject was found unresponsive and treated for ventricular fibrillation but was pronounced dead after unsuccessful CPR

*Protocol, Peri-PCI MI defined as: i) Biomarker elevation within 48 hours of PCI [Troponin or CK-MB (preferred) > 3X URL and no evidence that cardiac biomarkers were elevated prior to the procedure] OR both of the following must be true [≥ 50% increase in cardiac biomarker result and evidence that cardiac biomarker values were decreasing]; ii) New pathological Q waves or, iii) Autopsy evidence of acute MI

†TLF (Target Lesion Failure) is any ischemia-driven revascularization of the target lesion, MI related to the target vessel, or cardiac death

Conclusions

- Promus PREMIER is a novel platinum chromium EES that is the same as Promus Element but with improved deliverability and increased resistance to longitudinal compression
- Technical Success (primary endpoint) was 99.2%
- Angiographic, IVUS and clinical results from this trial support the safety and efficacy of Promus PREMIER
- No stent longitudinal deformation