TRANSCATHETER CARDIOVASCULAR THERAPEUTICS ASIA PACIFIC

ANGIOPLASTY SUMMIT
TCTAP 2013

APRIL 23-26, 2013
COEX(Convention & Exhibition Center)
SEOUL, KOREA
18TH

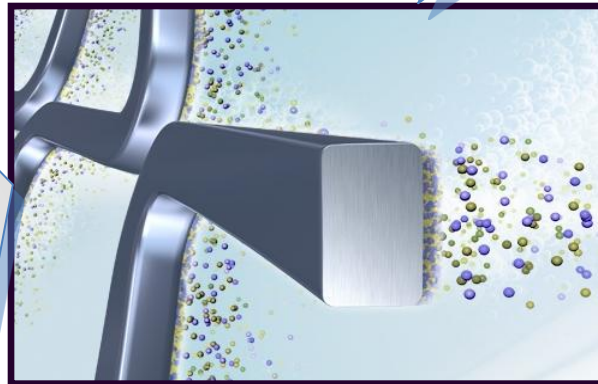# Long-term clinical outcome of LMT/Bifurcation: data from Nobori registries

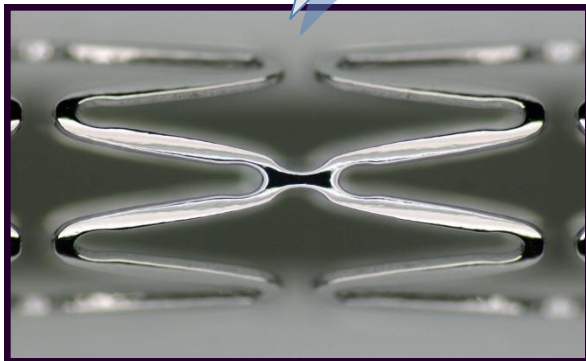## GB Danzi, MD

Milan – Italy

- Nobori Stent -

PLA Biodegradable Polymer

- Abluminal coating
- Controlled biodegradability
- Precise drug release kinetics
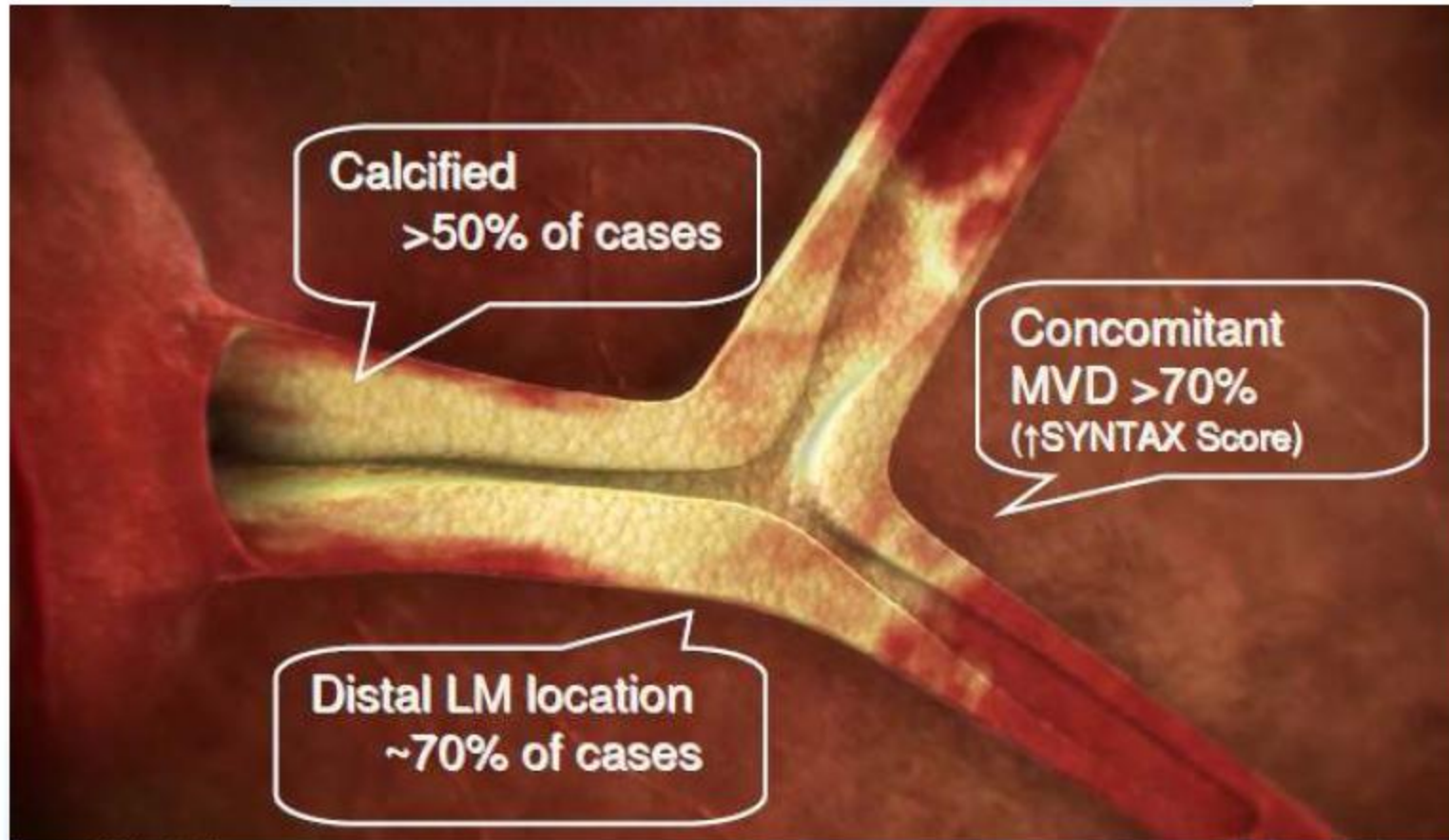- Simultaneous release of drug and polymer degradation

Biolimus A9™

- Anti-proliferative, anti inflammatory properties
- Highly lipophilic with optimal local tissue uptake

BMS Platform

- Excellent Flexibility and Scafolding
- Optimal Side Branch Access
- High Radial Force, Low recoil
- Innovative delivery system with hidrophilic M-coating

Incidence 4-6% (LM only <1%)

Calcified
>50% of cases

Concomitant
MVD >70%
(↑SYNTAX Score)

Distal LM location
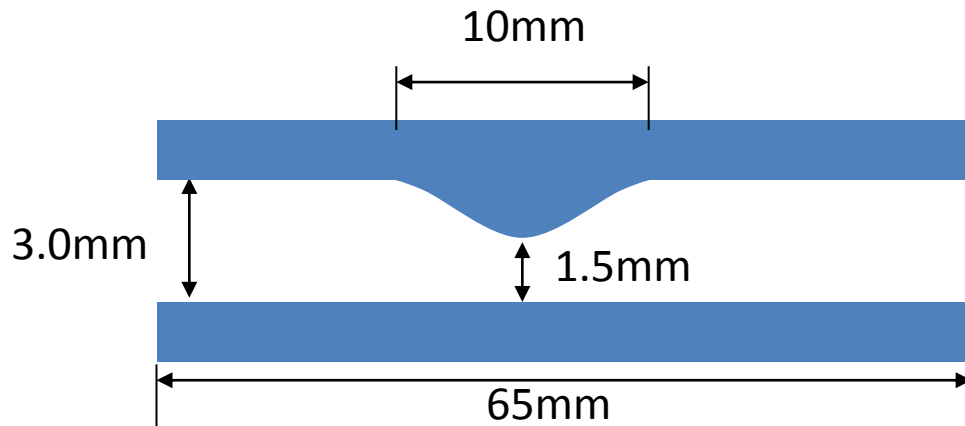~70% of cases

Christos, IICE2012

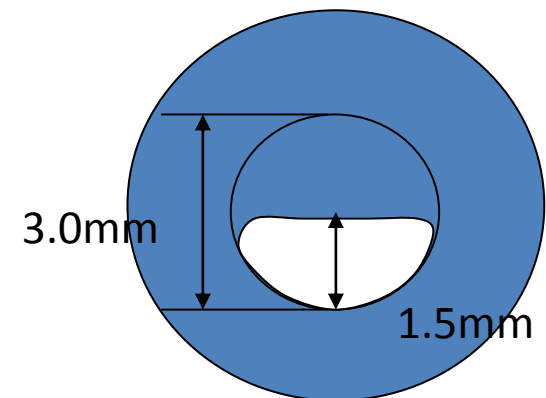# Radial Force in the calcified stenosis model

Method

1. Cross the lesion model with 4 different 3.0mm stent and dilate the lesion by stent specific nominal pressure.
2. Give additional post dilation by each Rated Burst Pressure (3times).

Model

10mm

3.0mm

1.5mm

65mm

Horizontal cut

3.0mm

1.5mm

Cross cut

Courtesy : S.Yamada M.D., Himeji, Japan
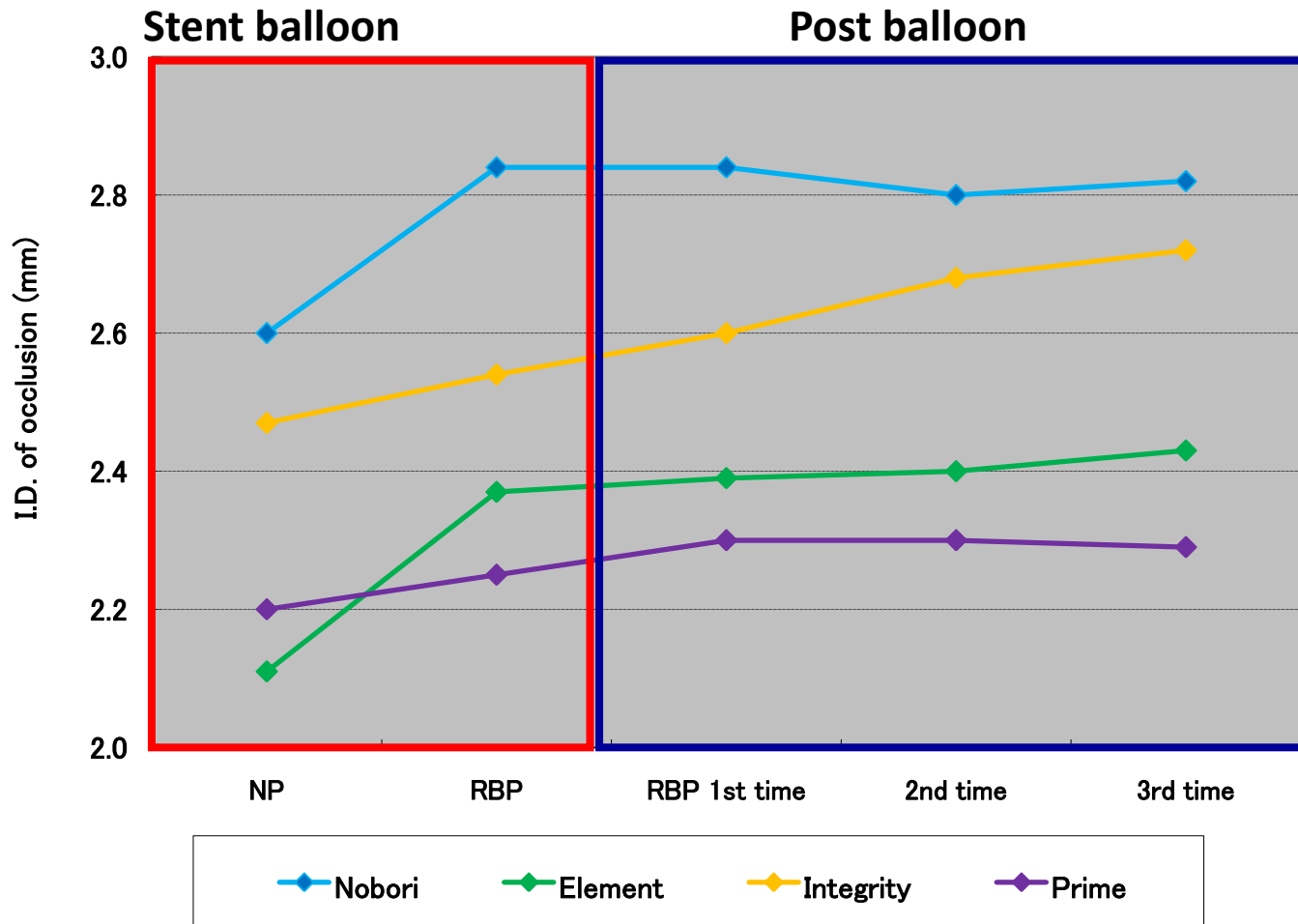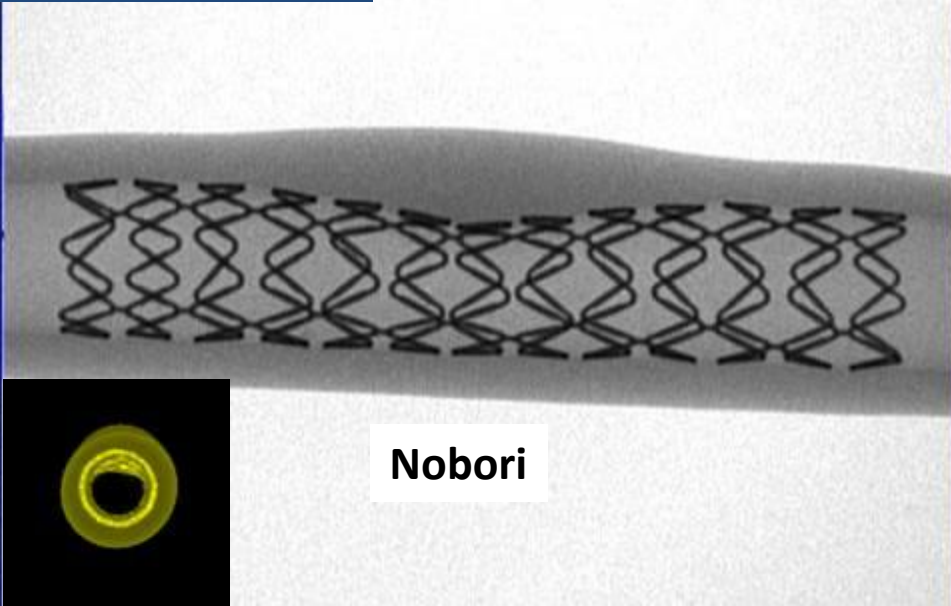
Acute gain by pressure, repeat dilatation
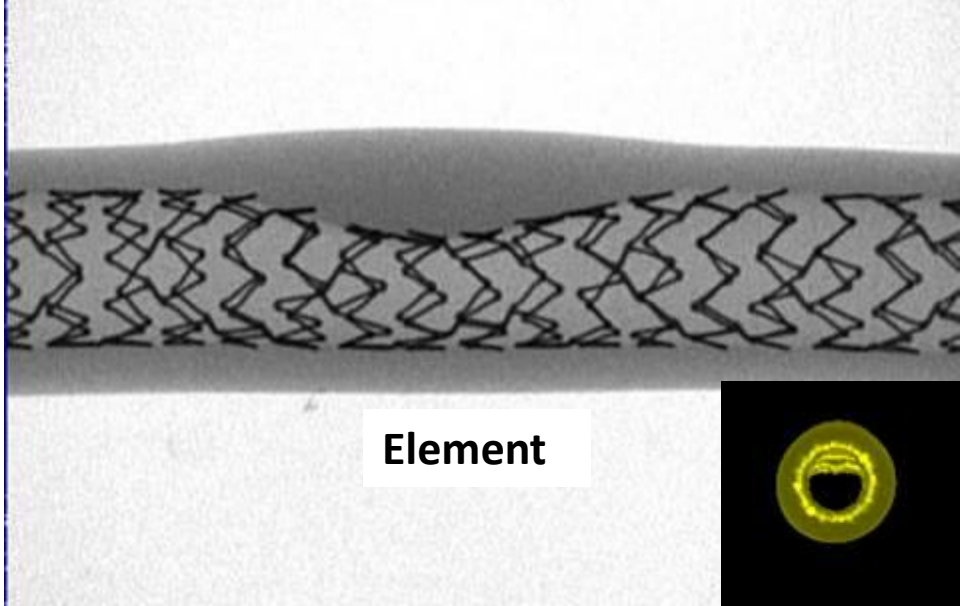
Result

Each stent exibits a different acute gain.
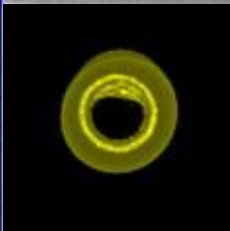Nobori gain is the closest to the index size (3mm)

Courtesy : S.Yamada M.D., Himeji, Japan

Result

Nobori

Element
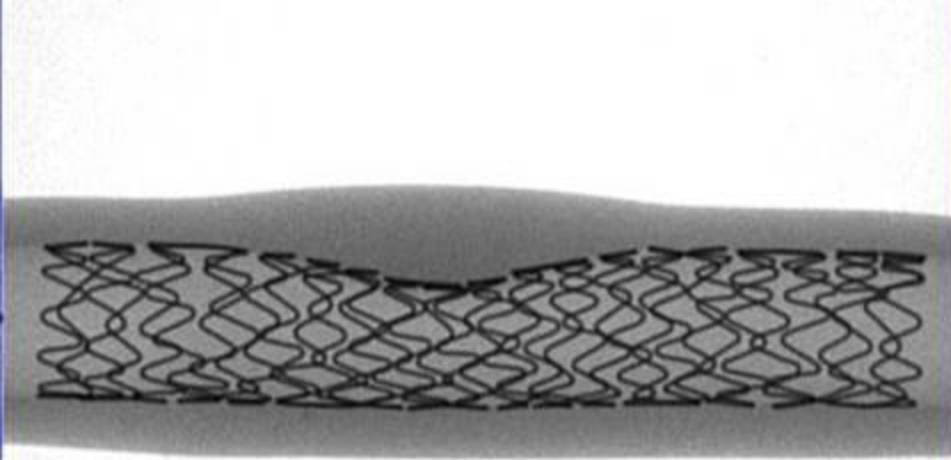
Integrity
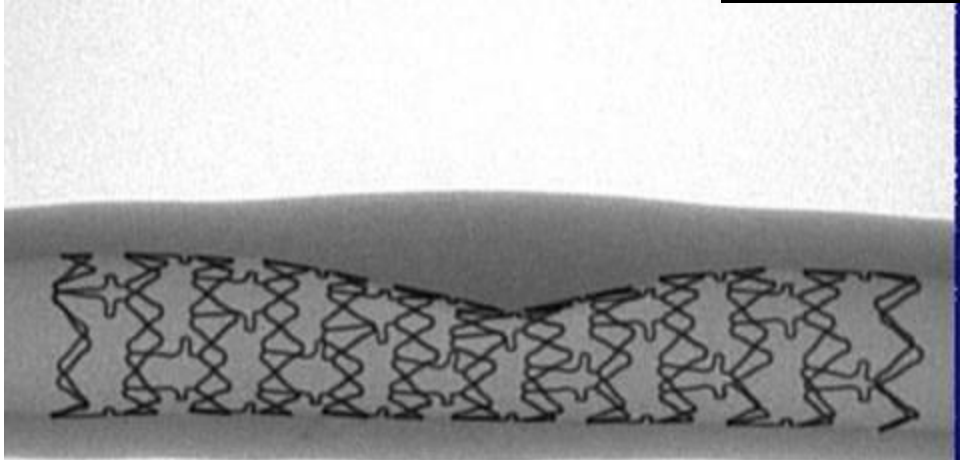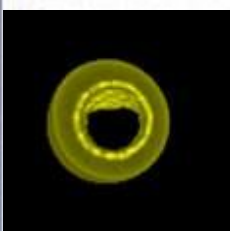
PRIME
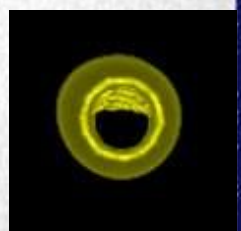
Courtesy : S.Yamada M.D., Himeji, Japan

Nobori has a high level of radial force and less recoil rate, which keeps well apposition.

Nobori

Nobori

Boston Scientific Co.
Element stent. White paper
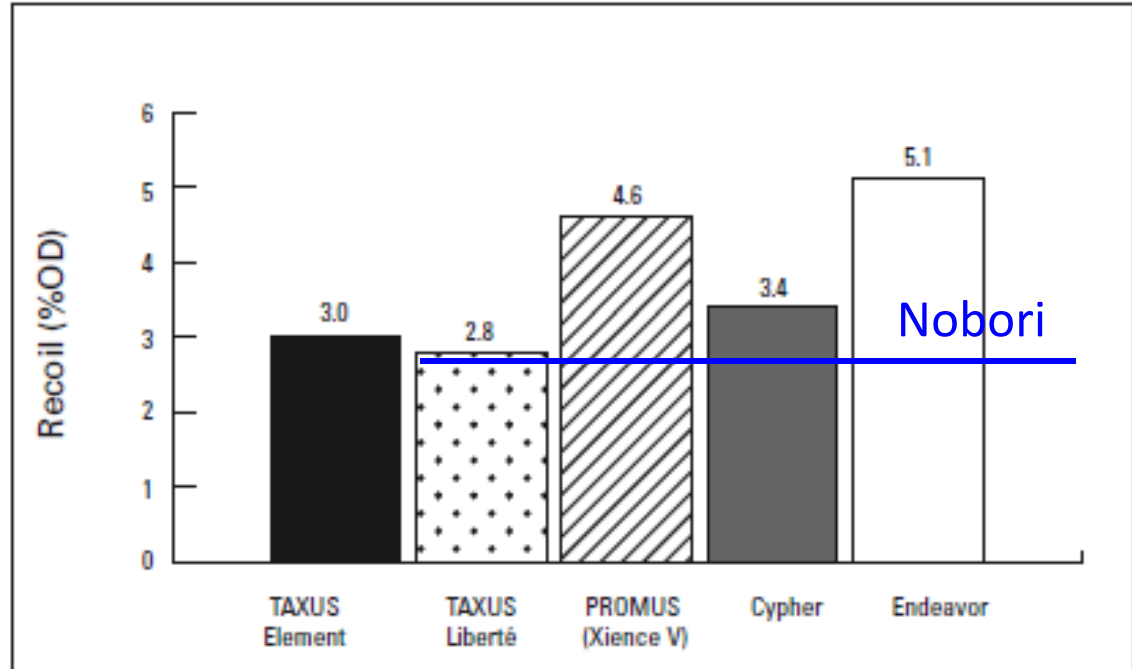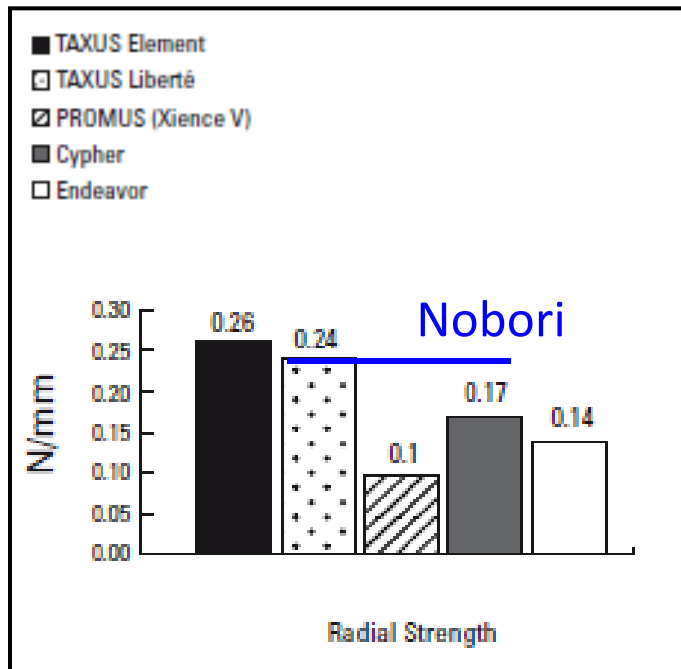
Short and Long Term Clinical Outcomes of Left Main Treatment with a Latest Generation of Drug Eluting Stent

Our aim was to analyze the short and long term outcomes of patients with LM disease treated with the latest generation drug eluting stent (DES) by pulling data from the NOBORI 2 and eNOBORI registries.

Study Setup

125 participating centres worldwide (Total: 3,067 pts)

231 participating centres worldwide (Total: 9,549 pts)

"Real world / all-comer" studies

NOBORI 2 + **eNOBORI**

62 LM pts

260 LM pts
501 lesions

follow-up

| 1 month | N = 316 | 1 month |

| 1 year | N = 161 | 1 year |

3 years

"long term FUP" cohort
N = 62

Primary Endpoint:

Freedom from Target Lesion Failure (TLF) defined as a composite of:

cardiac death, target vessel related myocardial infarction and clinically driven target lesion revascularization (TLR)

@ 1 year

All major cardiac adverse events adjudicated by an independent CEC

Clinical Presentation

	Left main subgroup	
	NOBORI 2 **N = 62**	**eNOBORI** **N = 260**
Age (mean ± SD)	66.8 ± 10.4	66.1 ± 11.8
Male gender (%)	79.0	72.7
Diabetes (%)	32.3	34.2
Smoker (%)	16.4	18.8
Hypertension (%)	65.6	78.1
Renal Failure (%)	6.7	11.3

NOBORI 2 / eNOBORI Registries
LM Subgroup

Cardiovascular History	Left main subgroup	
	NOBORI 2 N = 62	**eNOBORI N = 260**
Peripheral Vascular Disease (%)	8.3	12.8
Previous stroke (%)	10.0	7.9
Previous MI (%)	32.8	32.13
Previous PTCA (%)	29.5	34.9
Previous CABG (%)	34.4	26.6
Acute MI (%) ▪ STEMI ▪ NSTEMI	4.8 4.8	5.8 16.9

Anginal Status

pre-procedural

- Stable angina
- ACS
- Silent ischemia

49.5 — 41.8 — 8.7

Procedural Characteristics
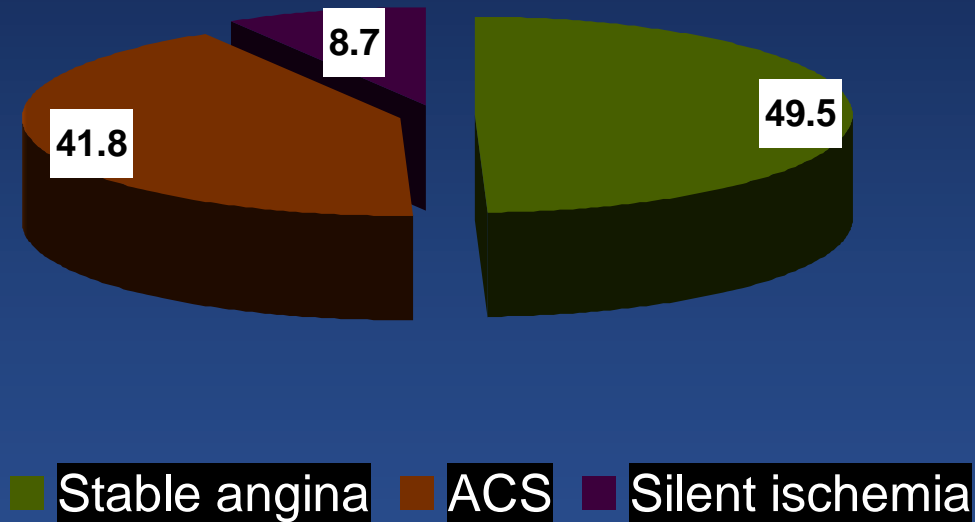
	Left main subgroup	
	NOBORI 2 **N = 62**	**eNOBORI** **N = 260**
%		
Multivessel treatment	74.2	58.1
Pre-dilatation	67.4	67.3
Post-dilatation	51.5	41.2
Mean ± SD		
Nb of lesions treated	2.10 ± 1.08	2.53 ± 1.55
Nb of stents / lesion	1.15 ± 0.52	1.17 ± 0.45
DS, pre-procedure	64.0 ± 15.4	78.4 ± 16.4
post-procedure	2.8 ± 0.6	2.1 ± 8.7

Lesion Characteristics

Lesion Characteristics (%)	Left main subgroup	
	NOBORI 2 N = 103	eNOBORI N = 501
B2/C	76.7	72.7
- ostial lesion	36.9	41.9
- thrombus containing	6.7	6.8
- bifurcation*	40.8	15.6
- calcified lesion	38.8	46.7

* In eNOBORI, only true bifurcations were considered

Lesion Characteristics

(%)	Left main subgroup	
	NOBORI 2 **N = 82**	**eNOBORI** **N = 260**
Left main isolated	16 (25.8%)	109 (41.9%)
Left main - two vessel disease	21 (33.9%)	105 (40.4%)
Left main - three vessel disease	25 (40.3%)	46 (17.7%)
Left main protected	23 (37.1%)	91 (34.9%)

Clinical Outcomes

Short term follow-up: data up to 1 month

(%)	Left Main Subgroup	
	NOBORI 2 N = 62	eNOBORI N = 254
Cardiac Death	0.0	0.0
MI	1.6	0.8
TLR - CABG	0.0	0.0
TLR - PCI	0.0	0.0
Left main TLR	0.0	0.0
TV non-TLR	0.0	0.0
TLF	1.6	0.4

TLF= Cardiac death, Tareget vessel related MI, TLR

Clinical Outcomes

Up to 1 year

Clinical Outcomes
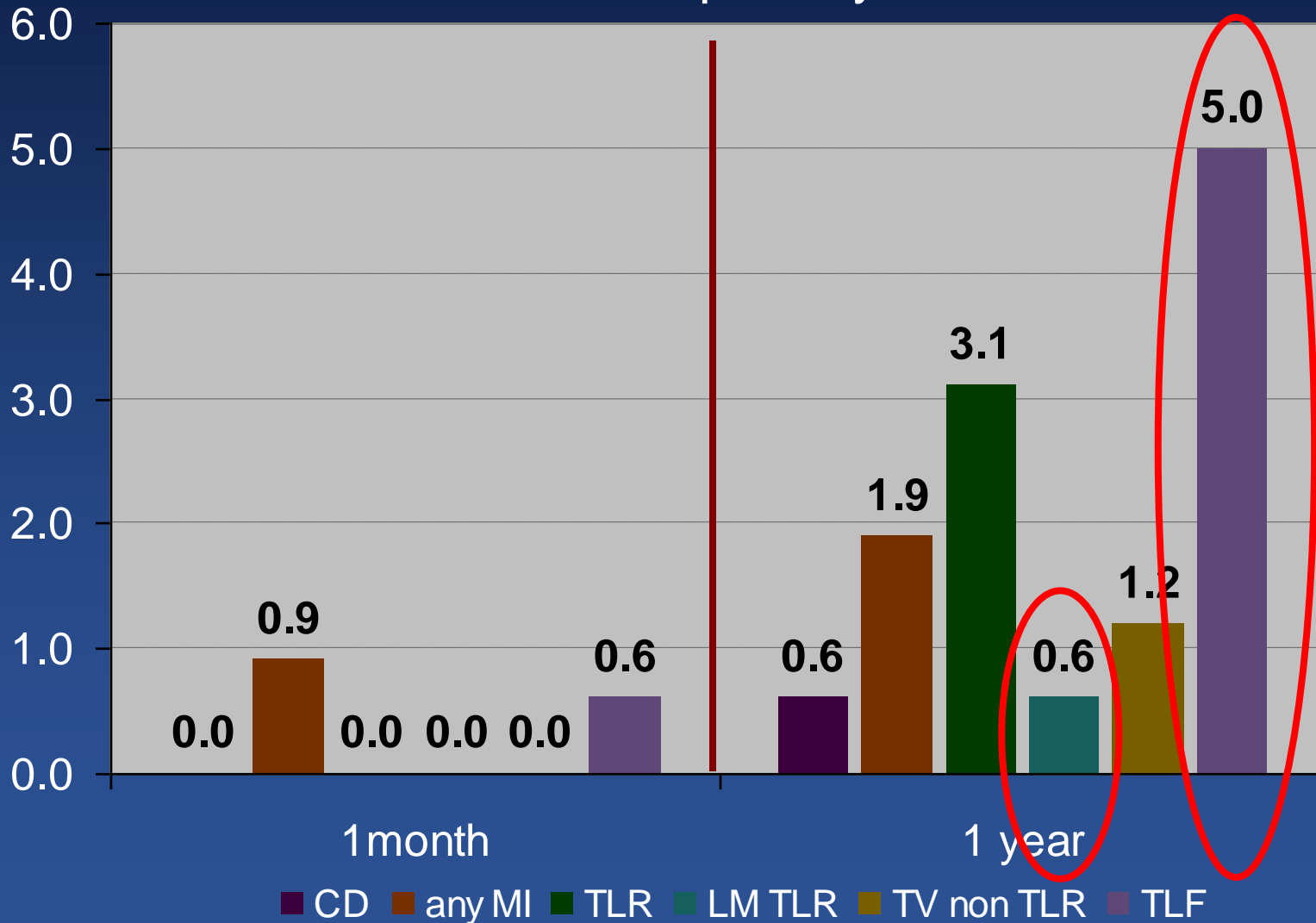
@ 3 years - long term follow-up cohort

(%)	NOBORI 2 Left Main group N=62
Cardiac Death	4.8
MI	3.2
TLR - CABG	1.6
TLR - PCI	9.8
Left main TLR	1.6
TV non-TLR	3.2
TLF	14.8

NOBORI 2 / eNOBORI Registries
LM Subgroup

- **In-Hospital = 0%**
- **1-Month FU = 0%**
- **1-Year FU = 0%**
- **3-Year FU = 0%**

Treatment of Bifurcation Lesions with a Drug Eluting Stent with Biodegradable Polymer

Our aim was to study the short and long-term safety and performance of the Nobori® drug-eluting stent in this lesion subset.

Nobori Open Strut

Ø 3.72mm

10.9mm²
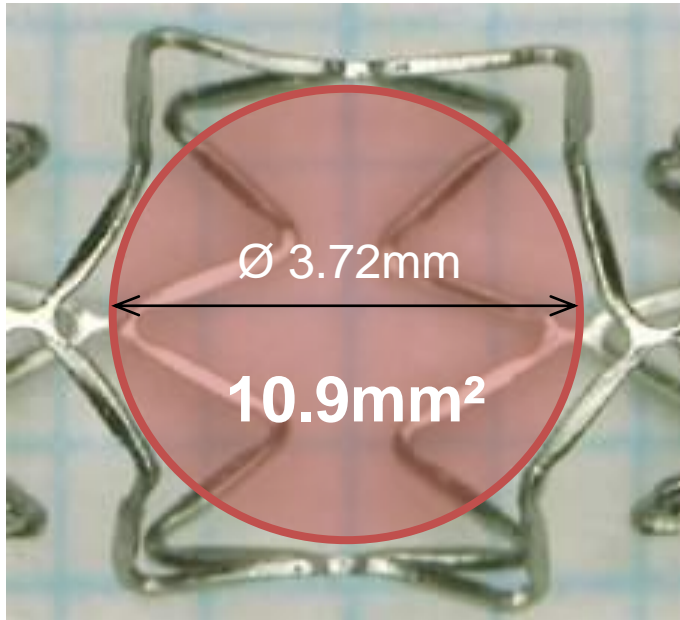
3.5mm Stent Cell
dilated by 4.0mm
balloon
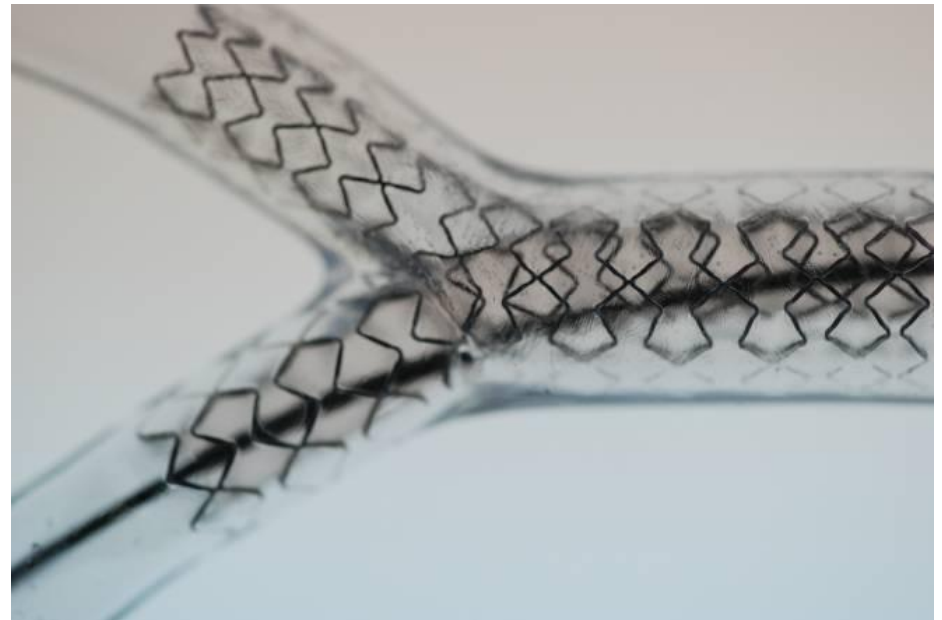
Nobori Culotte stenting
In vitro model

*** Nobori design of 3.5mm stent is different in Japan and Europe
EU design = 9 cells, 3 link JP design = 10 cells, 2 link**

"Kissing with 3.5mm stents"
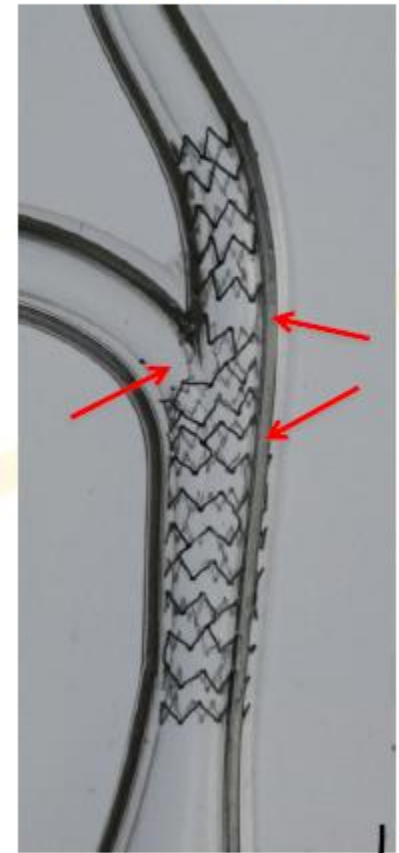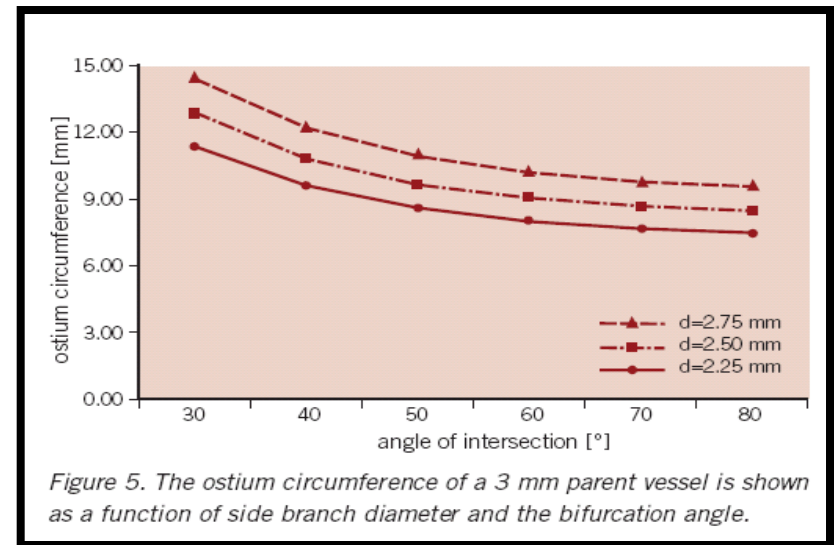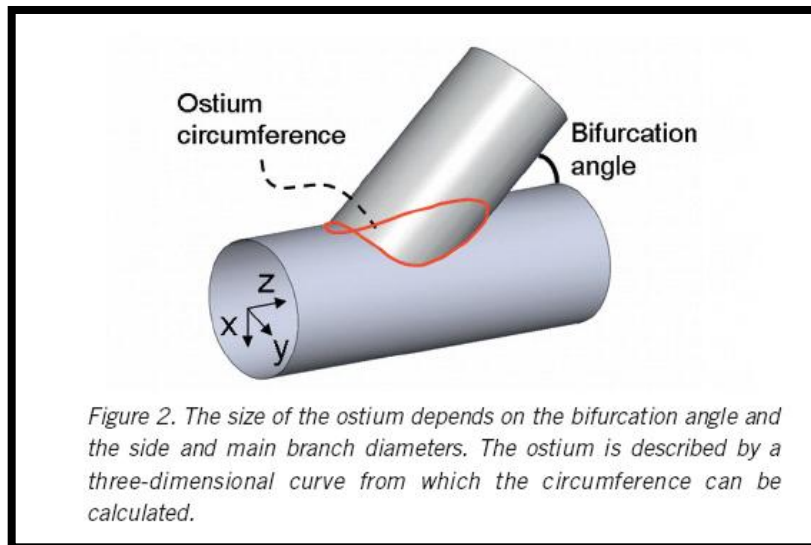
NOBORI XIENCE Prime INTEGRITY ELEMENT

3 connectors +-1 2 connectors

Darremont O, EBC2012

Comparison of drug-eluting stent cell size using micro-CT: important data for bifurcation stent selection

Peter Mortier[1]*, MEng; Denis Van Loo[2], MEng; Matthieu De Beule[1], PhD; Patrick Segers[1], PhD; Yves Taeymans[3], MD, PhD; Pascal Verdonck[1], PhD; Benedict Verhegghe[1], PhD

1. Institute Biomedical Technology (IBiTech), Ghent University, Ghent, Belgium; 2. Centre of X-ray Tomography (UGCT), Ghent University, Ghent, Belgium; 3. Department of Cardiology, Ghent University Hospital, Ghent, Belgium

Figure 2. The size of the ostium depends on the bifurcation angle and the side and main branch diameters. The ostium is described by a three-dimensional curve from which the circumference can be calculated.

Figure 5. The ostium circumference of a 3 mm parent vessel is shown as a function of side branch diameter and the bifurcation angle.

Two large, prospective, single arm, multicenter registries -
NOBORI2 + eNOBORI:
1,489 pts with 2,441 BFL*

Clinical Follow-up

Short Term

Long Term

1m   **1yr**   **3yr**

NOBORI2 +
eNOBORI

N = 1,472

NOBORI2 +
eNOBORI

N = 1,032

NOBORI2

N = 728

* In NOBORI 2, all BFL were included whereas in eNOBORI, only true BFL were considered

Baseline Characteristics

	BFL NOBORI2 (N=728)	BFL eNOBORI (N=761)
Age (mean ± SD)	64.5±10.8	62.7 ±11.6
%		
Male	82.8	79.6
DM	27.1	28.0
Hypertension	67.8	74.5
Current Smoker	24.2	26.0
Previous MI	31.3	31.2
Previous PCI	30.1	26.3
Previous CABG	6.4	3.9
Peripheral Vascular disease	6.3	8.7
Renal Failure	3.3	6.6

Lesion Characteristics

%	BFL NOBORI2 (N=1,115)	BFL eNOBORI (N=1,326)
B2/C lesions	83.8	73.8
Ostial	17.0	21.5
Occlusion	8.0	4.9
Thrombus	7.7	10.1
Calcification	28.2	35.2

NOBORI 2 / eNOBORI
Registries - Bifurcation

NOBORI 2

eNOBORI

NOBORI 2 values: 0.4, 3.0, 27.2, 21.4, 48.0

eNOBORI values: 0.1, 4.8, 23.8, 16.6, 54.8

Legend: RCA | LAD | LCX | LM | SVG

Procedural Characteristics
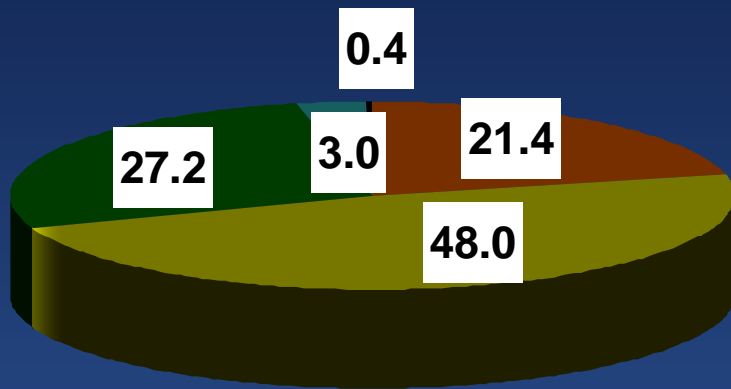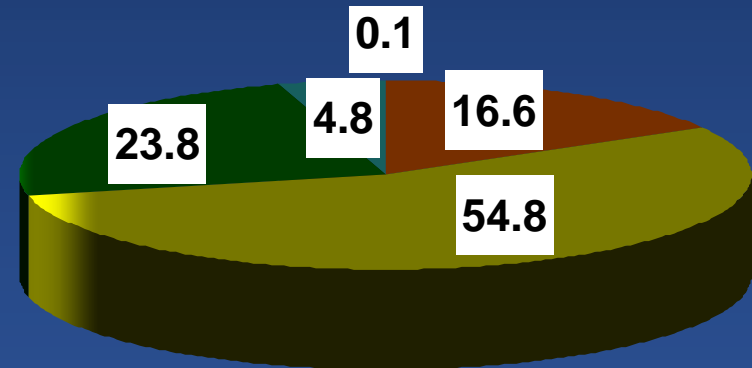
	BFL NOBORI2 (N=728)	BFL eNOBORI (N=761)
Multivessel treatment, %	31.5	34.3
Lesions treated / Pt (mean±SD)	1.72±0.90	2.4±1.5
Stents / Lesion (mean±SD)	1.0±0.6	1.2±0.5
Total sum of stent length / Pt	38.9±25.1	31.9±18.9
Post-dilatation, %	41.7	47.1

Medina Classification
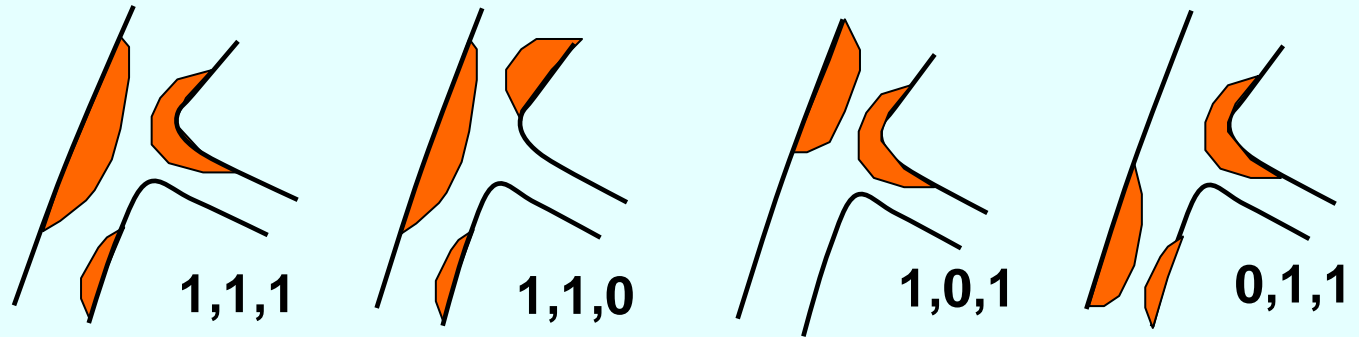
	1,1,1	1,1,0	1,0,1	0,1,1
NOBORI 2 (%)	21	41	3	3
eNOBORI (%)	40	17	8	10
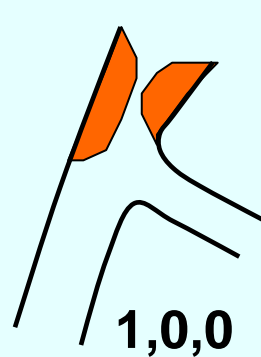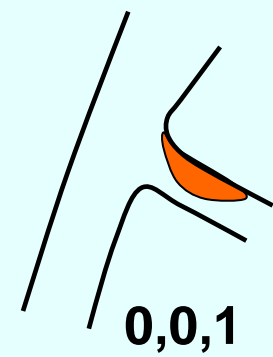
	1,0,0	0,1,0	0,0,1
NOBORI 2 (%)	8	16	8
eNOBORI (%)	9	10	6

Procedural Characteristics

Kissing balloon
24.7%

Kissing stents
2.9%

Culotte
4.0%

Crush
4.9%

Bifurcation Technique*

Other
40.2 %

Modified Crush
2.0%

V-stenting
2.2%

Other techniques mainly consist of:
- **1 stent in main branch**
    - **> + kissing balloon**
    - **> + side-branche balloon**

T-stenting
18.9%

* Data only collected in eNOBORI registry
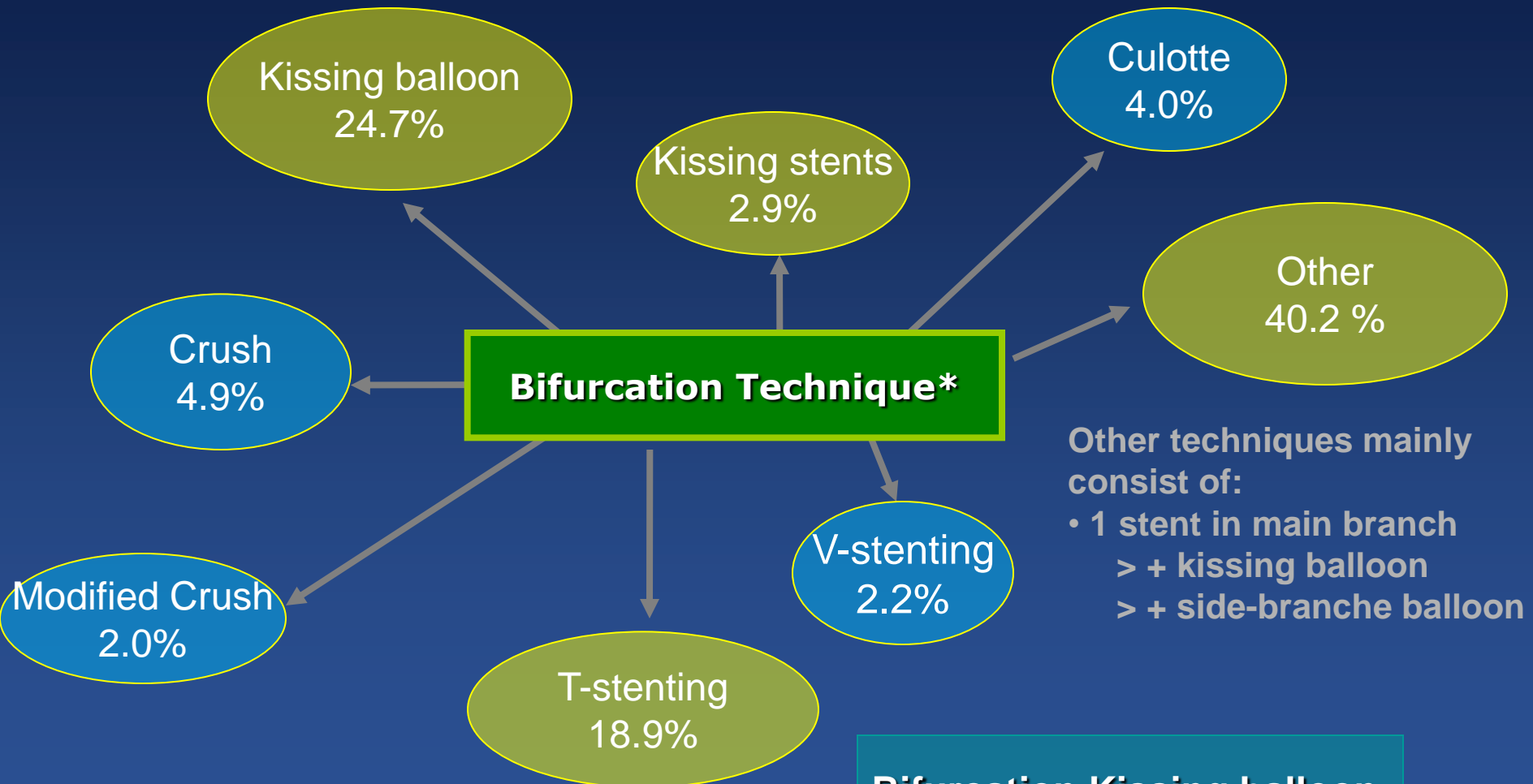
Bifurcation Kissing balloon post stenting: 58.8%

NOBORI 2 / eNOBORI Registries - Bifurcation — **Clinical Outcomes**

Chart data:

Outcome	1 month, N=1472	1 year, N=1032	3 years, N=728
Cardiac Death	0,3	0,7	0,8
Any-MI	1,9	3,2	3,2
TLR	0,5	2,5	4,4
TLF	2,0	4,2	6,7
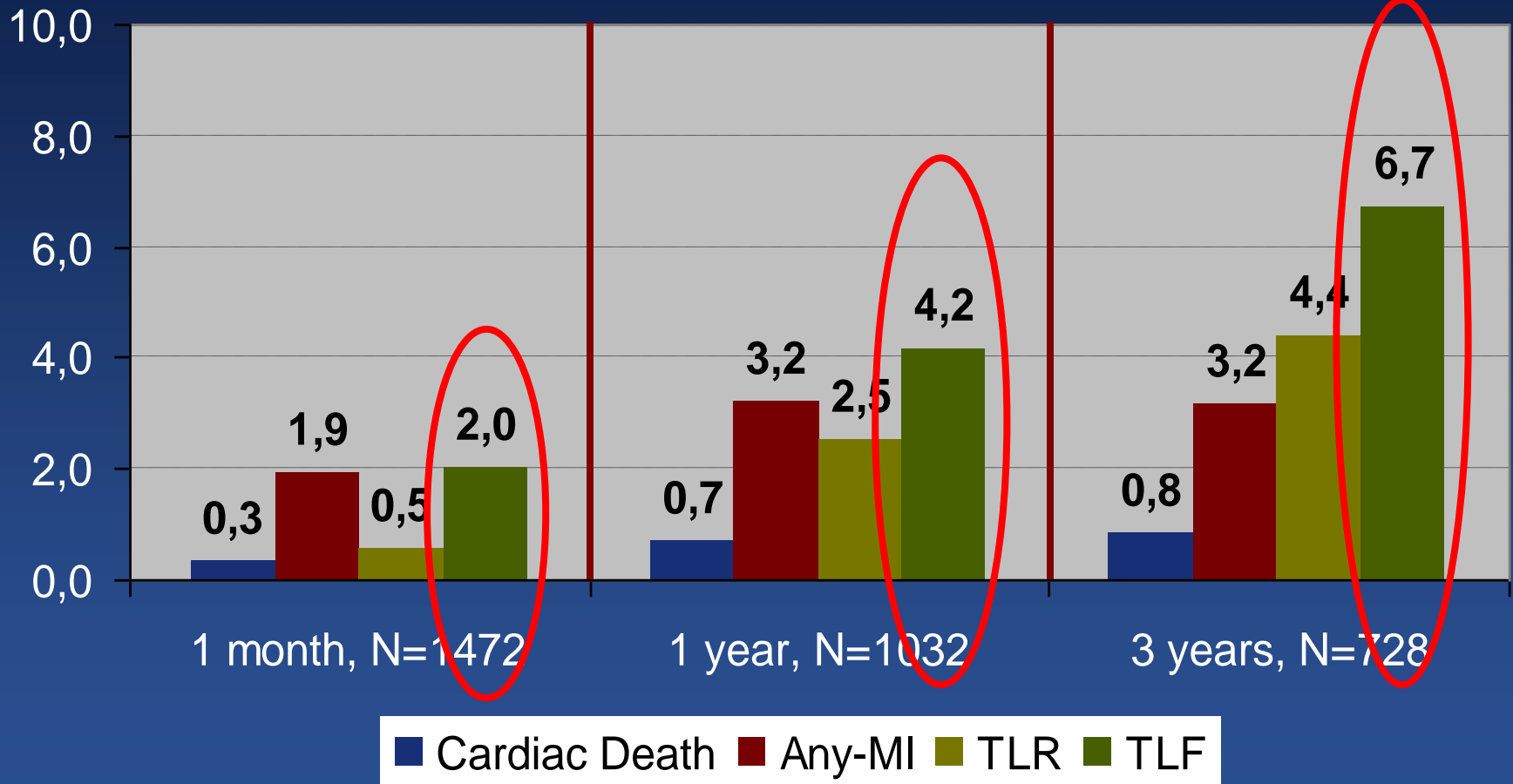
Stent Thrombosis (ARC)

Stent thombosis in bifurcation subgroup of both registries

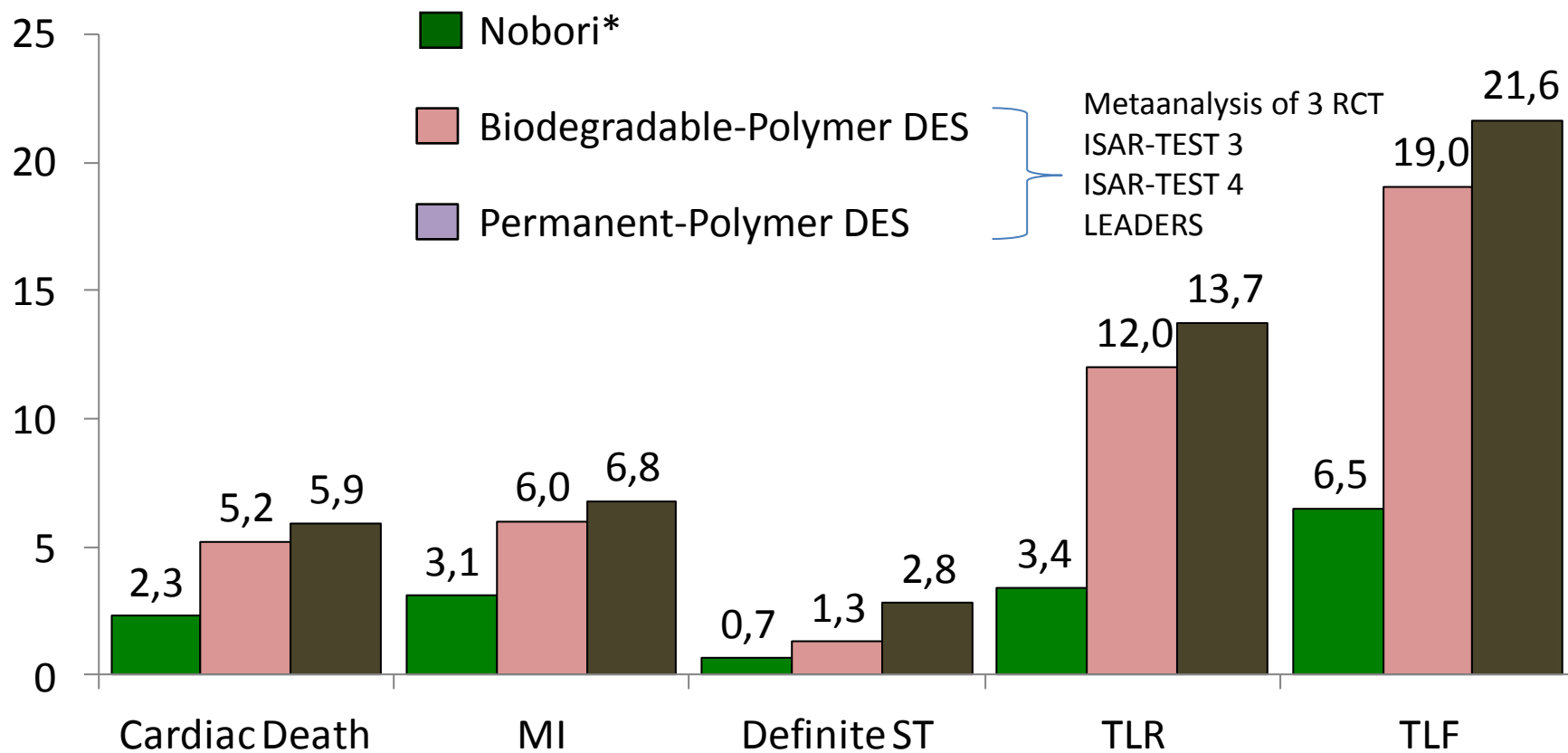|	
1-Month	**= 7/1472 (0.48%)**
1M-1Year	**= 0/1032 (0.0%)**
1Year-3Year	**= 2/ 728 (0.27%)**

Stent Thrombosis in 3-Years Cohort = 0.69%

3- Year Outcomes
All-Comer NOBORI 2 vs. Randomized Trials

Legend:
- Nobori*
- Biodegradable-Polymer DES
- Permanent-Polymer DES

Metaanalysis of 3 RCT
ISAR-TEST 3
ISAR-TEST 4
LEADERS

Cardiac Death: 2,3 / 5,2 / 5,9
MI: 3,1 / 6,0 / 6,8
Definite ST: 0,7 / 1,3 / 2,8
TLR: 3,4 / 12,0 / 13,7
TLF: 6,5 / 19,0 / 21,6

Stefanini at al., Eur Heart J 2012

* Nobori data at 3-year (no angio FU), others at 4-year

Long-term outcome of LMT/Bifurcation:
Data from Nobori ® Registries

Conclusions

• Nobori® Biolimus A9 eluting stent, with its optimal scaffolding, specific open cell design and biodegradable polymer, is safe and highly effective for the treatment of challenging left main stenoses and bifurcation lesions.

• Nobori® registries showed very good long-term clinical outcomes, with low rates of death, TLF and stent thrombosis.

• These results are maintained up to 3-year of follow-up.