



Universitair Medisch Centrum
Utrecht

Drug Eluting Balloon in Bifurcations Trial : DEBIUT

Pierfrancesco Agostoni MD, PhD

On behalf of all DEBIUT investigators

University Medical Centre Utrecht

The Netherlands

p.agostoni@umcutrecht.nl

European Bifurcation Club





Where would DEB fit in into bifurcation PCI?

- Ease of procedure: 'Provisional T' technique
Absence of a SB-stent allows for preservation of the original vessel anatomy
- No crushing of DES-materials (*'uncontrolled' drug release*)
- Homogeneous local drug delivery over very short period of time: drug concentrations at vessel wall highest at time of injury
- Afterwards : absence of drug helps re-endothelialization: reduce DAPT
- Potentially comparable results to DES when combining BMS +DEB in MB



Aim

To assess the safety and efficacy of the DIOR™ Paclitaxel Drug-Eluting Balloon in coronary bifurcations in combination with a BMS, with a specific focus on the side branch (SB) using the provisional T-stenting technique with final kissing balloons.



Methods

Randomised multi-center study comparing 3 study arms:

BMS+DEB vs. **BMS+POBA** vs. **DES+POBA**

Using the **provisional T-stenting** technique

Using the **same stent platform** in all three study arms (Liberte)

Comparing the **same drug (Paclitaxel)** with Taxus Liberte & Dior

Sequential predilatation with DEB in MB and SB in DEB arm

3 month DAPT in DEB & BMS arms (12 months in DES arm)

Angiographic follow-up at 6 months and clinical up to 5 years

Approval by all Ethical committees

Independent CEC and independent core-lab (Genae)



Methods

Primary endpoint:

6-month angiographic late lumen loss

Secondary endpoints:

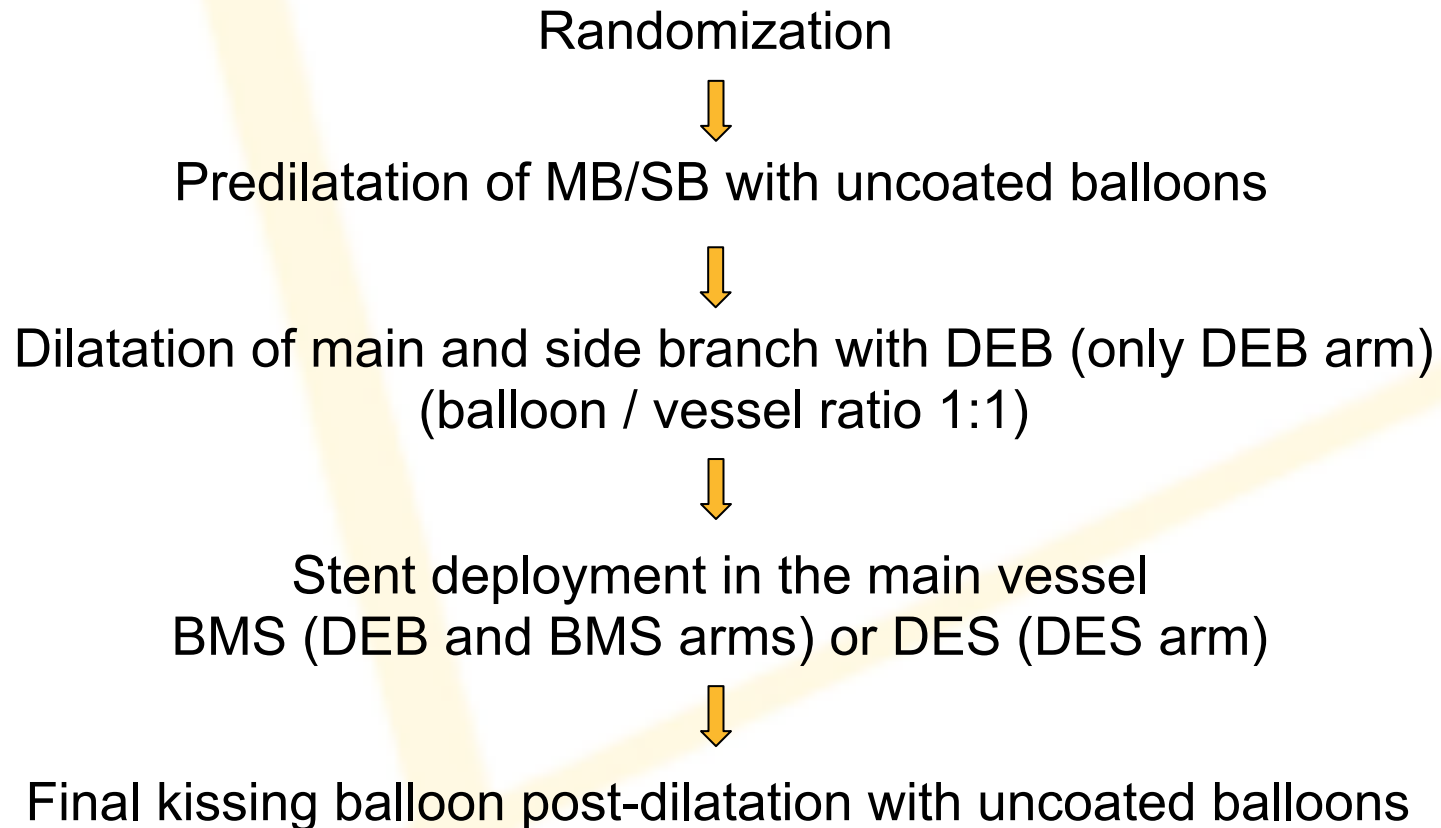
Binary restenosis, MACE up to 5 years

Based on the assumption of a reduction in MB late loss from 0.8 (BMS) to 0.4 (DEB) [with SD: 0.6, alfa: 0.05, power: 80%] and 50% reduction of SB late loss (BMS vs. DEB), 36 patients per group, with additional 10% for drop-outs [DES added as a 'control-arm']

A total of 117 patients were enrolled in Utrecht (57), Leuven (37), Genk (21) and Essen (2)



Procedure Flowchart



	DEB	BMS	DES	P-value DEB vs. BMS
N	40	37	40	
Age	63.3 ± 10.4	61.8 ± 10.1	65.7 ± 9.3	0.51
Male gender	25 (62.5%)	29 (78.4%)	31 (77.5%)	0.14
Risk factors				
Diabetes mellitus	2 (5%)	5 (13.5%)	6 (15%)	0.25
Hyperlipidemia	21 (52.5%)	22 (59.5%)	22 (55%)	0.65
Smoking	24 (60%)	24 (64.8%)	21 (52.5%)	0.14
Hypertension	22 (50%)	21 (56.8%)	24 (60%)	0.88
Previous MI	7 (17.5%)	8 (21.6%)	10 (25%)	0.78
Previous PCI	13 (32.5%)	12 (32.4%)	13 (32.5%)	0.99
Previous CABG	1 (2.5%)	2 (5.4%)	1 (2.5%)	0.61
Target bifurcation				0.53
LAD/Diagonal	31 (77.5%)	32 (86.5%)	36 (90%)	
CX/Marginal	8 (20%)	4 (10.8%)	3 (7.5%)	
RCA/Posterior Descending	1 (2.5%)	1 (2.7%)	1 (2.5%)	
“True” bifurcation (core lab: Medina 111,101,011)	17 (42.5%)	20 (54%)	14 (35%)	0.40

	DEB	BMS	DES	P-value DEB vs. BMS
N	40	37	40	
Age	63.3 ± 10.4	61.8 ± 10.1	65.7 ± 9.3	0.51
Male gender	25 (62.5%)	29 (78.4%)	31 (77.5%)	0.14
Risk factors				
Diabetes mellitus	2 (5%)	5 (13.5%)	6 (15%)	0.25
Hyperlipidemia	21 (52.5%)	22 (59.5%)	22 (55%)	0.65
Smoking	24 (60%)	24 (64.8%)	21 (52.5%)	0.14
Hypertension	22 (50%)	21 (56.8%)	24 (60%)	0.88
Previous MI	7 (17.5%)	8 (21.6%)	10 (25%)	0.78
Previous PCI	13 (32.5%)	12 (32.4%)	13 (32.5%)	0.99
Previous CABG	1 (2.5%)	2 (5.4%)	1 (2.5%)	0.61
Target bifurcation				0.53
LAD/Diagonal	31 (77.5%)	32 (86.5%)	36 (90%)	
CX/Marginal	8 (20%)	4 (10.8%)	3 (7.5%)	
RCA/Posterior Descending	1 (2.5%)	1 (2.7%)	1 (2.5%)	
“True” bifurcation (core lab: Medina 111,101,011)	17 (42.5%)	20 (54%)	14 (35%)	0.40

	DEB	BMS	DES	P Value DEB vs. BMS
Pre-dilatation balloon max diameter				
MB	3.01±0.38	2.66±0.29	2.62±0.45	0.01
SB	2.45±0.33	2.52±0.30	2.45±0.43	0.65
Pre-dilatation balloon max length				
MB	25.7±3.6	13.9±3.4	12.9±3.3	0.01
SB	18.1±3.4	12.9±3.6	12.4±3.0	0.01
Final Kissing	39 (97.5%)	36 (97.3%)	40 (100%)	0.99
Number of stents (MB)	41	41	43	0.14
1	39	33	37	
2	1	4	2	
SB stent	4 (10%)	2 (5.4%)	3 (7.5%)	0.30
MB Stent diameter (mm)	3.11±0.38	3.15±0.30	3.10±0.39	0.63
MB Stent length (mm)	21.8±6.2	23.3±5.7	22.5±8.1	0.68
Procedure time (min)	56.6 ± 22.2	51.9 ± 15.5	53.5 ± 21.2	0.28
Fluoroscopy time (min)	14.7 ± 8.0	14.6 ± 6.2	13.0 ± 8.7	0.92
Contrast use (ml)	230±76	230±70	204±61	0.99

	DEB	BMS	DES	P Value DEB vs. BMS
Pre-dilatation balloon max diameter				
MB	3.01±0.38	2.66±0.29	2.62±0.45	0.01
SB	2.45±0.33	2.52±0.30	2.45±0.43	0.65
Pre-dilatation balloon max length				
MB	25.7±3.6	13.9±3.4	12.9±3.3	0.01
SB	18.1±3.4	12.9±3.6	12.4±3.0	0.01
Final Kissing	39 (97.5%)	36 (97.3%)	40 (100%)	0.99
Number of stents (MB)	41	41	43	0.14
1	39	33	37	
2	1	4	2	
SB stent	4 (10%)	2 (5.4%)	3 (7.5%)	0.30
MB Stent diameter (mm)	3.11±0.38	3.15±0.30	3.10±0.39	0.63
MB Stent length (mm)	21.8±6.2	23.3±5.7	22.5±8.1	0.68
Procedure time (min)	56.6 ± 22.2	51.9 ± 15.5	53.5 ± 21.2	0.28
Fluoroscopy time (min)	14.7 ± 8.0	14.6 ± 6.2	13.0 ± 8.7	0.92
Contrast use (ml)	230±76	230±70	204±61	0.99

Pre-procedure	DEB	BMS	DES	P Value DEB vs. BMS
Reference vessel diameter (mm)				
Proximal Main branch	2.78 ± 0.77	2.88 ± 0.68	2.81 ± 0.78	0.55
Distal Main branch	2.65 ± 0.73	2.53 ± 0.57	2.37 ± 0.54	0.43
Side branch	2.69 ± 0.76	2.56 ± 0.67	2.28 ± 0.59	0.43
Minimal luminal diameter (mm)				
Proximal Main branch	1.38 ± 0.88	1.55 ± 0.93	1.74 ± 0.88	0.39
Distal Main branch	1.19 ± 0.62	1.08 ± 0.62	1.09 ± 0.60	0.46
Side branch	1.13 ± 0.56	1.04 ± 0.58	1.08 ± 0.49	0.50
Diameter stenosis (%)				
Proximal Main branch	52.18 ± 26.92	46.75 ± 28.45	39.31 ± 23.33	0.39
Distal Main branch	54.06 ± 20.54	55.13 ± 25.29	53.81 ± 22.64	0.84
Side branch	56.20 ± 22.33	58.33 ± 21.85	50.88 ± 21.92	0.67
Lesion length (mm)				
Proximal Main branch	6.30 ± 2.81	6.09 ± 2.57	5.16 ± 2.06	0.74
Distal Main branch	4.10 ± 2.44	4.66 ± 3.10	4.28 ± 2.93	0.38
Side branch	3.83 ± 2.07	5.07 ± 2.42	3.70 ± 1.64	0.02

	DEB	BMS	DES	P Value DEB vs. BMS
Post-procedure	N=40	N=37	N=40	
Minimal luminal diameter (mm)				
Proximal Main branch	2.84 ± 0.63	2.88 ± 0.64	2.75 ± 0.62	0.81
Distal Main branch	1.91 ± 0.57	1.98 ± 0.39	1.83 ± 0.48	0.56
Side branch	1.51 ± 0.41	1.58 ± 0.43	1.43 ± 0.39	0.46
Diameter stenosis (%)				
Proximal Main branch	16.85 ± 6.71	15.41 ± 8.48	18.39 ± 7.93	0.41
Distal Main branch	25.43 ± 8.89	22.61 ± 9.56	25.75 ± 10.26	0.19
Side branch	33.87 ± 13.94	29.67 ± 11.89	28.75 ± 15.20	0.16
Follow up	N=33	N=35	N=37	
Minimal luminal diameter (mm)				
Proximal Main branch	2.59 ± 0.65	2.42 ± 0.68	2.60 ± 0.77	0.32
Distal Main branch	1.73 ± 0.58	1.73 ± 0.44	1.87 ± 0.56	0.99
Side branch	1.57 ± 0.37	1.46 ± 0.55	1.52 ± 0.44	0.33
Diameter stenosis (%)				
Proximal Main branch	21.06 ± 8.35	22.25 ± 12.46	22.58 ± 14.67	0.64
Distal Main branch	32.21 ± 15.11	28.41 ± 13.40	25.97 ± 10.84	0.28
Side branch	36.14 ± 11.50	38.69 ± 18.97	30.43 ± 14.88	0.50

	DEB	BMS	DES	P Value DEB vs. BMS
--	------------	------------	------------	--------------------------------

Late lumen loss

Proximal Main branch	0.30 ± 0.67	0.48 ± 0.89	0.14 ± 0.66	0.37
Distal Main branch	0.26 ± 0.57	0.25 ± 0.54	-0.06 ± 0.57	0.96
Side branch	-0.01 ± 0.45	0.11 ± 0.57	-0.12 ± 0.44	0.34

Binary angiographic restenosis

Proximal Main branch	0 (0%)	1 (2.9%)	2 (5.4%)	0.99
Distal Main branch	3 (9.1%)	3 (8.6%)	2 (5.4%)	0.99
Side branch	3 (9.1%)	8 (22.9%)	4 (10.8%)	0.11
Overall bifurcation restenosis	4 (12.1%)	10 (28.6%)	7 (18.9%)	0.07

	DEB	BMS	DES	P Value DEB vs. BMS
	n = 40	n = 37	n = 40	

In hospital

Death	0	0	0	-
Peri-proc. MI (CK-MB>3uIn)	3 (7.5%)	2 (5.4%)	3 (7.5%)	0.69
TLR	0	0	0	-

Up to 6 months

Death	0	0	0	-
Myocardial infarction	0	0	1 (2.5%)	-
TLR	6 (15%)	10 (27%)	6 (15%)	0.19
TVR (non-TLR)	0	2 (5.4%)	1 (2.5%)	0.14
Stent thrombosis	0	0	1 (2.5)	-
MACE	6 (15%)	11 (29.7%)	7 (17.5%)	0.12



Conclusions

1. The use of DEB in bifurcation PCI is feasible
2. The pre-defined primary endpoint of 50% reduction in MB late loss has not been reached (due to better than expected BMS “angiographic” performance)
3. There is a strong trend showing a favorable outcome combining DEB with a BMS in MB and using a DEB in SB with regards to overall bifurcation binary restenosis rate
4. Concerning clinical endpoints, there is a consensual trend favoring DEB+BMS in terms of TLR and total MACE rates compared to BMS +POBA
5. The use of DEB+BMS in bifurcations with only 3 months of DAPT seems safe with 0% occurrence of stent thrombosis
6. The non-powered randomised comparison between all three arms shows a clear unfavorable outcome for the use of BMS+POBA in bifurcations



University Medical Center
Utrecht

P. Stella, P. Agostoni
E. Van Belle, A. Belkacemi



C. Dubois, T. Adriaenssens

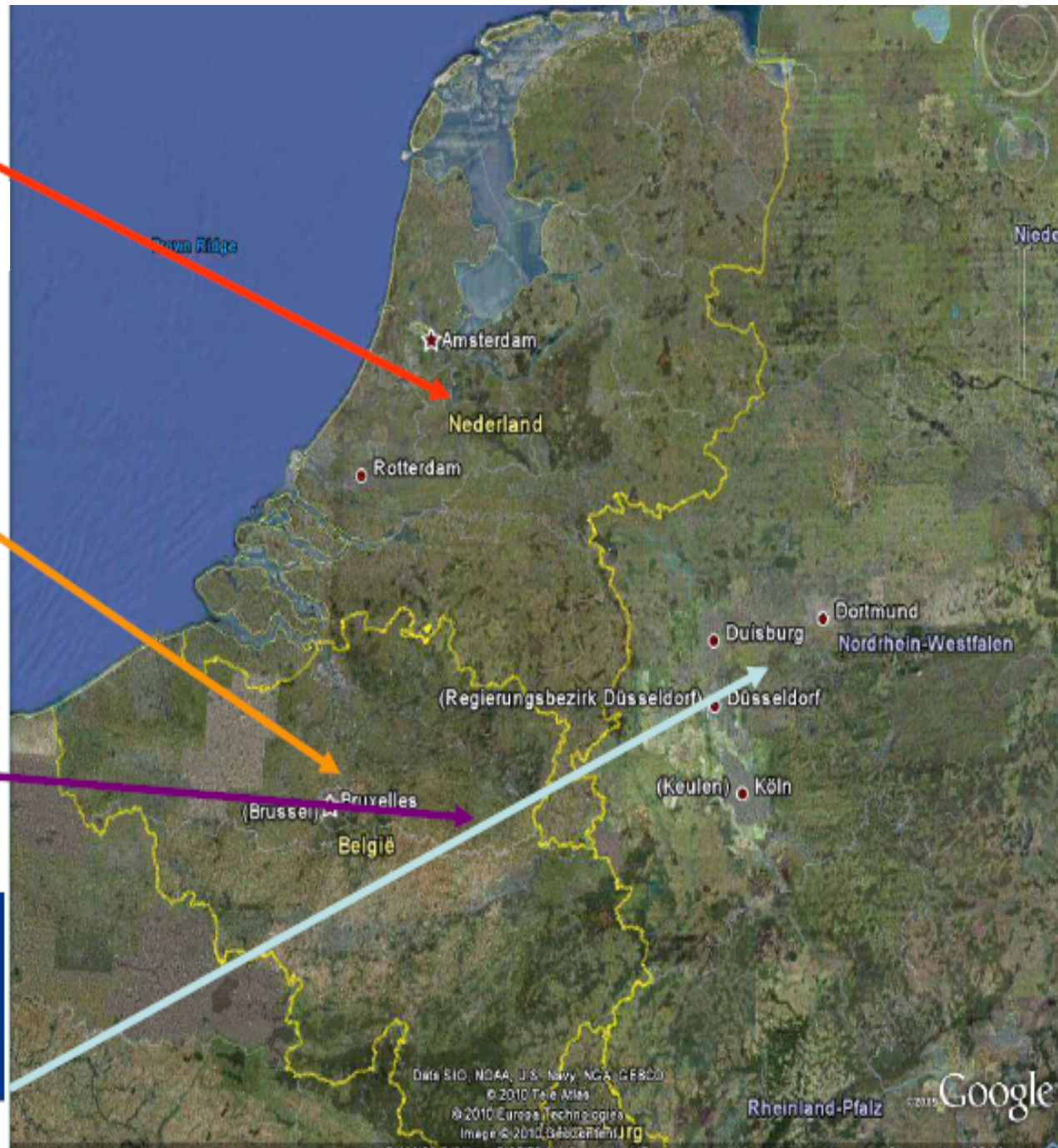


J. Dens, M. Vrolix

Internationales Herz- und
Gefäßzentrum Rhein-Ruhr



C. Naber



Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2010 Tele Atlas
© 2010 Europa Technologies
Image © 2010, 04/06/2010, 11/10

Rheinland-Pfalz
© 2015 Google