Cerebral Protection After TAVR

A Critical Analysis of Present Data on Cerebral Protection after TAVR

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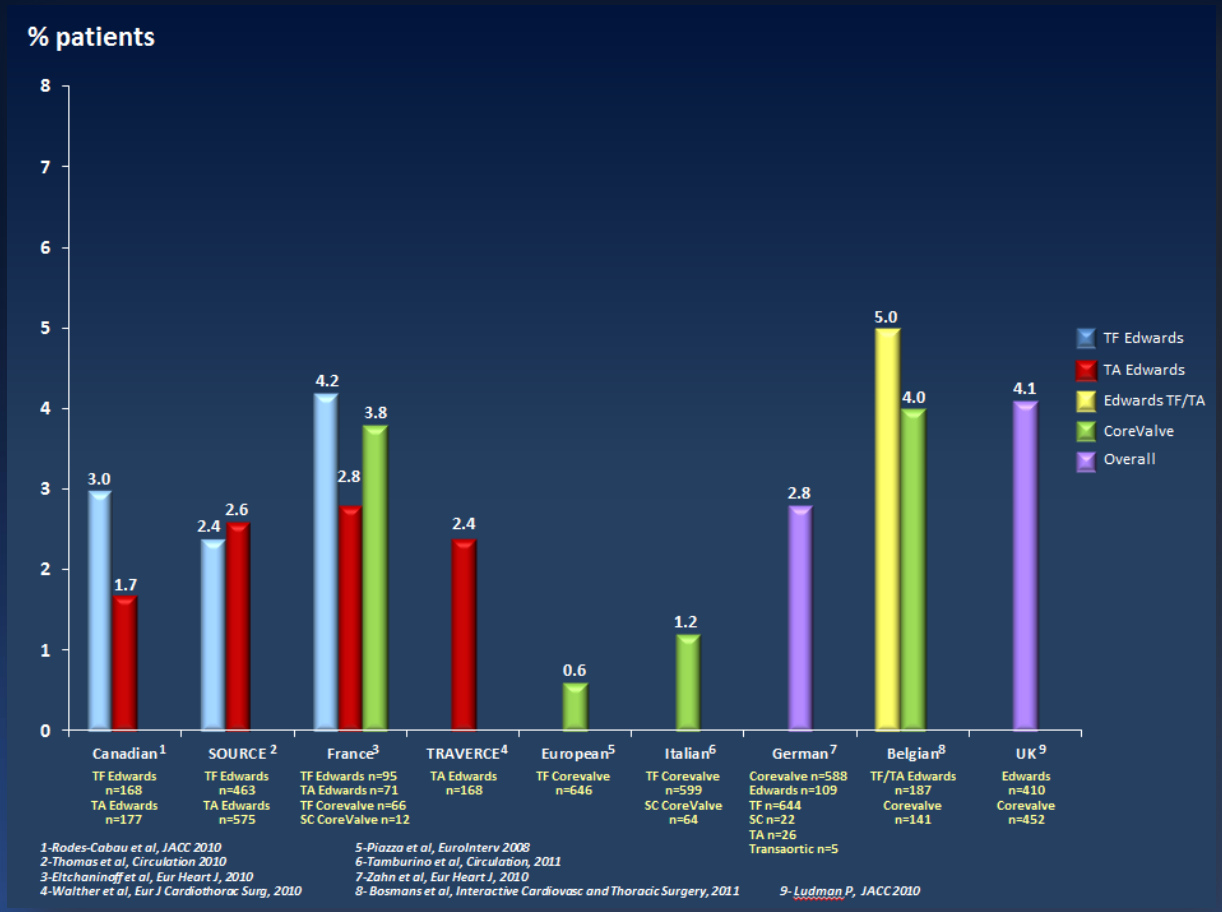
Disclosures

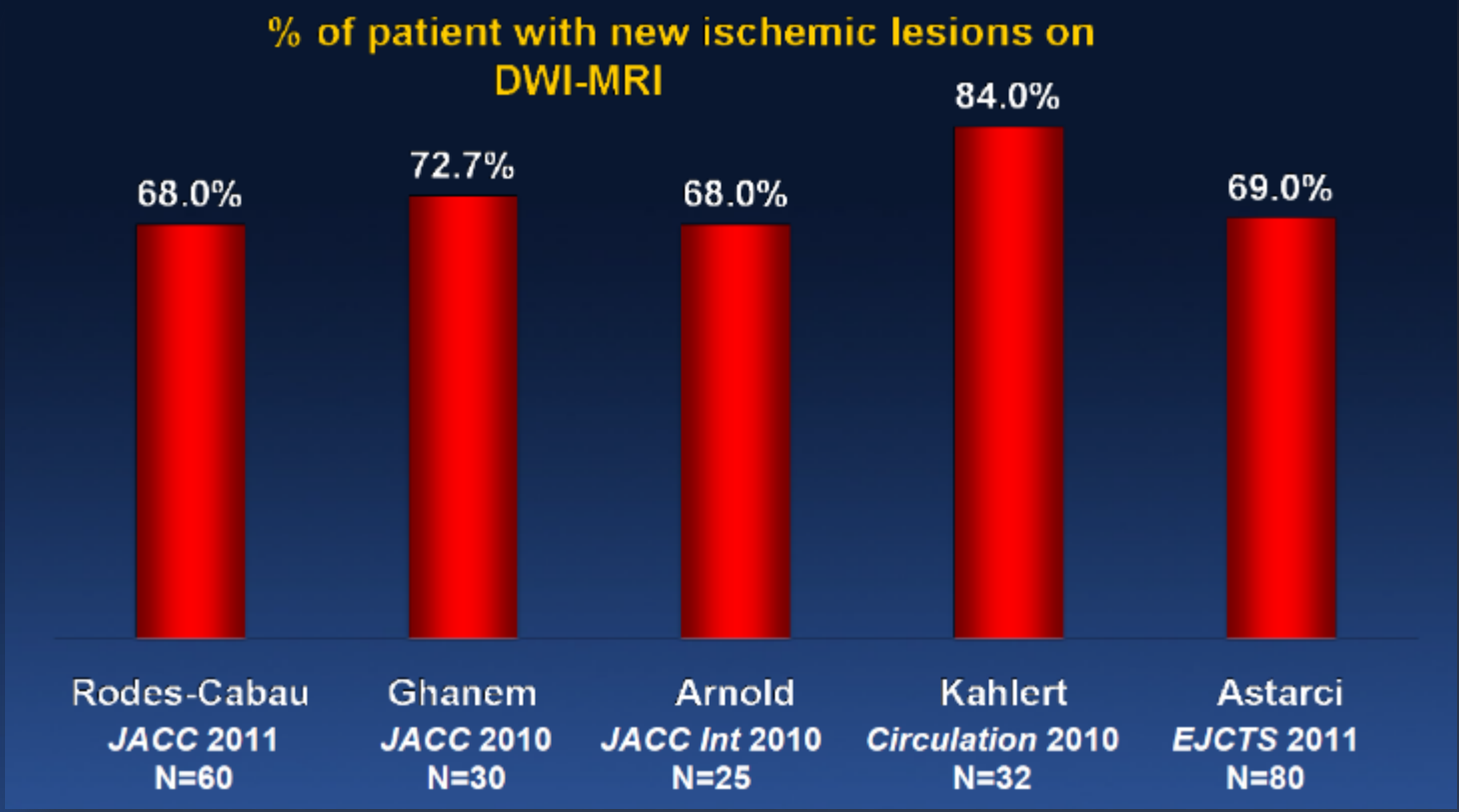
Consultant	Medtronic, Boston Scientific, S. Jude Medical Claret Medical
Speaker Honoraria	Medtronic, Boston Scientific, S. Jude Medical Edwards Lifesciences,
Grant support	Medtronic, Claret Medical

Clinical Need – 30 Day Strokes with TAVI in EU Studies



Stroke rates without embolic protection range from 0.6% - 5.0%

DW-MRI imaging of lesions

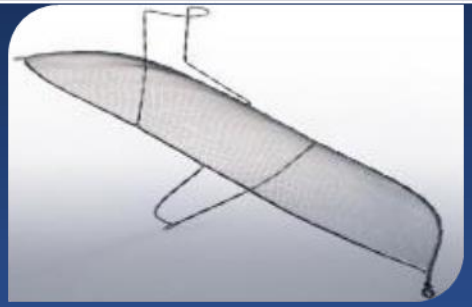


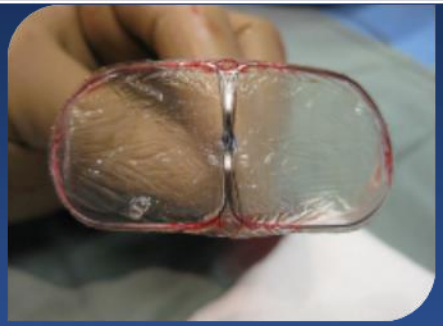
New lesions found in vast majority of diffusion-weighted MR images (DW-MRI) of the brain following TAVI

Daneault et al, JACC 2011;58: 2143-50

Embolic Protection Devices

TriGuard™ Cerebral Protection Device	Edwards Embrella™ Embolic Deflector	Claret Sentinel™ Cerebral Protection System
Deflector	Deflector	Filter capture
9F (femoral)	6F (radial)	6F (radial)
240 micron pore size	100 micron pore size	140 micron pore size
Aortic arch position	Aortic arch position	Brachiocephalic and LCC
CE Marked	CE Marked	CE Marked and Commercialized





Edwards Embrella Embolic Deflector

Frame

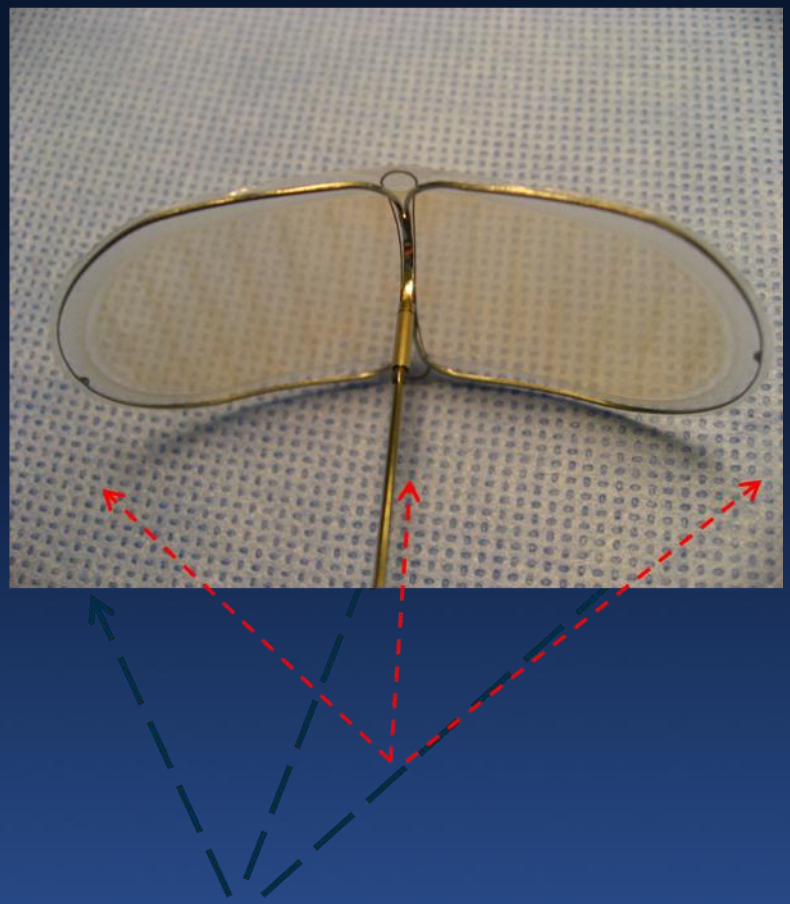
- **Nitinol® material**
- **58mm X 25mm**

Membrane

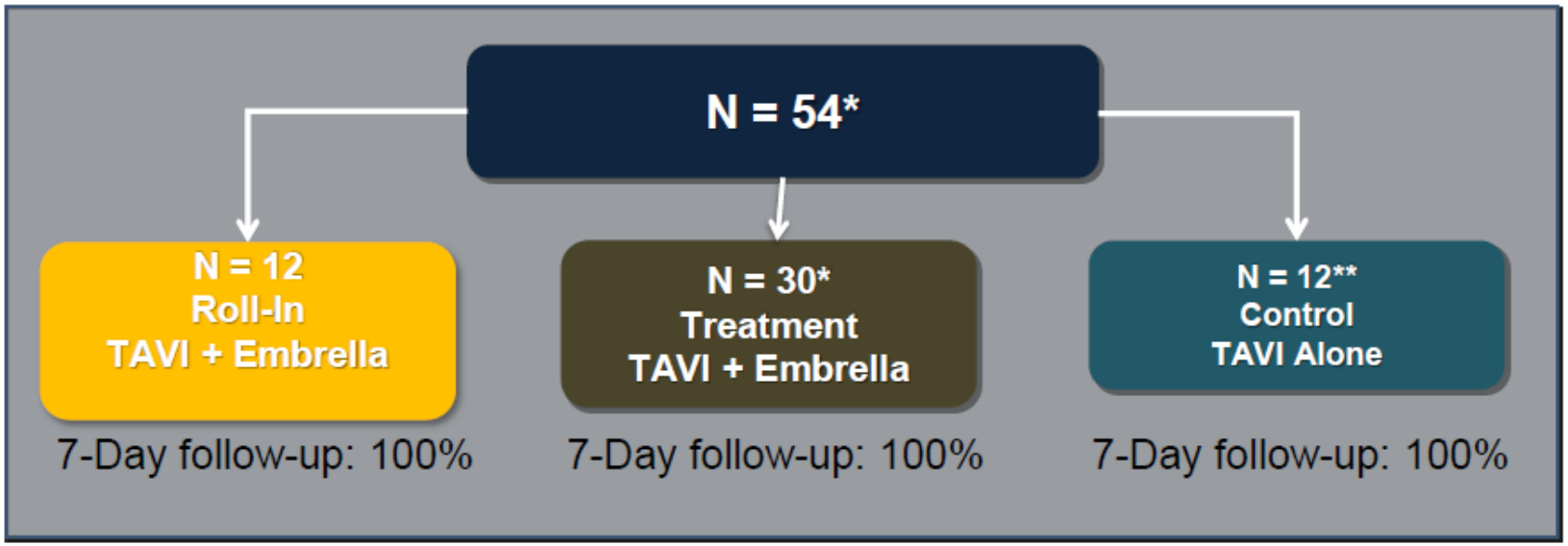
- **100 micron size pores**
- **Polyurethane material**
- **Hydrophilic coating**

Shaft

- **Nitinol material**
- **Length 110cm**



PROTAVI C Study Patient Flow Chart



Roll-in and treatment arms will be presented together

- *1 procedure aborted before Embrella insertion
- **Enrollment incomplete: 3 control patients pending

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DW-MRI Data

	Roll-In (n=9)	Treatment TAVI + Embrella (n=24)	P Value
Time from TAVI procedure, days, median (min, max)	3 (1,7)	3 (1-7)	NA
Patients with new Lesions	9/9 (100%)	24/24 (100%)	NA
Total No. of lesions, n			
Anterior cerebral artery	1 (11%)	6 (25%)	0.642
Medial cerebral artery	9 (100%)	20 (83%)	0.555
Posterior cerebral artery	6 (67%)	16 (67%)	>.999
Cerebellum	8 (89%)	15 (63%)	0.217
Border zone	0	2 (8%)	>.999
Patients with single lesions	0	4 (17%)	>.999
Patients with multiple lesions	9 (100%)	20	0.555
Lesions per patient, median (min, max)	9 (2, 21)	7 (1, 70)	0.361
Lesion volume (mm^3), median (min, max)	69.4 (25.0, 210.6)	40.0 (10.8, 196.7)	0.897

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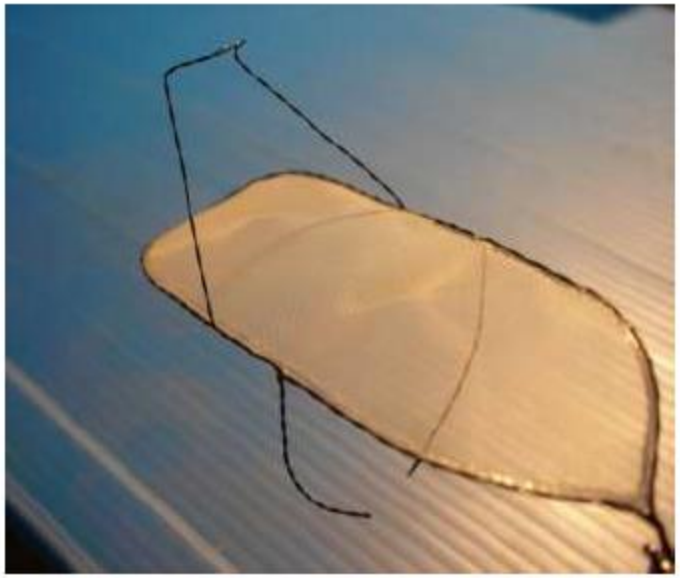
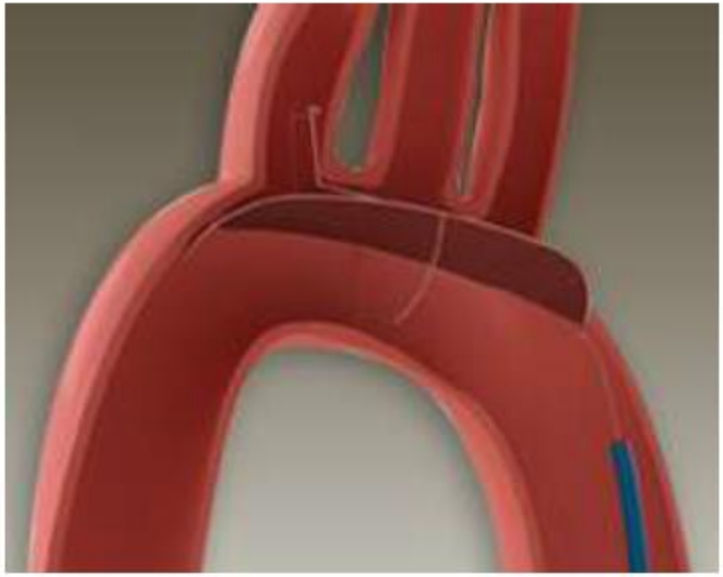
DEFLECT I – Device Description

- The TriGuard™ EDD is a nitinol mesh filter with a pore size of 250µm designed deflect cerebral emboli while allowing maximal blood flow.
- The filter's positioning across all 3 cerebral vessels is maintained by stabilizers.
- Delivered via 9 Fr sheath from femoral artery





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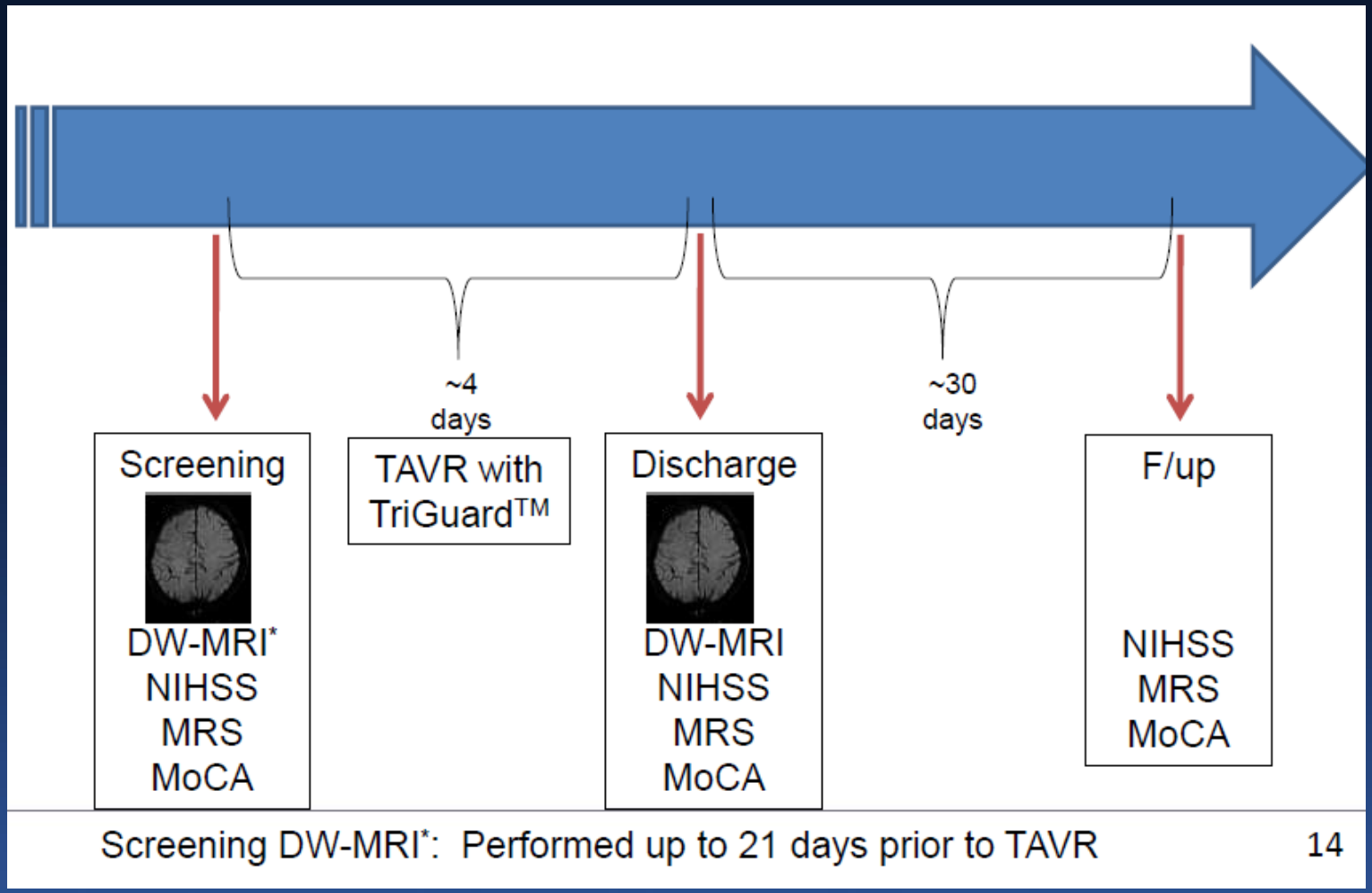
DEFLECT I – Key Study Procedures and Time Points



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TriGuard™ Performance

Characteristic	Before TAVR	Post TAVR	After TAVR Removal
TriGuard™ access to Aortic Arch	28 (100%)		
TriGuard™ positioned in arch	28 (100%)	27 (96%)	22 (79%)
TriGuard™ Covers all 3 vessels	26 (93%)	23 (82%)	19 (68%)
TriGuard™ stabilized anchored in innominate	24 (86%)	23 (82%)	18 (64%)
TriGuard™ retrieved intact			28 (100%)

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DW-MRI Results

Parameter	DEFLECT-I N=20	Historical Data N=150
Proportion of Patients with New Lesions	70%	76%
Number of New Lesions	5.1 (0 - 28)	4.4 (0 -39)
Average New Lesion Volume	0.12 (0 - 0.39) cm^3	0.34 cm^3
Max Single New Lesion Volume	0.39 cm^3	6.45 cm^3
Total New Lesion Volume	0.70 (0 – 3.94) cm^3	1.64 (0 – 70.3) cm^3

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TAVR – Cerebral MRI Studies

Study	n	Valve Type	New Ischemic Defects	Median Number of Lesions Per Patient	Lesion Volume (Per Lesion, mm^3)
Kahlert et al. ***Circulation 2010***	53	SAPIEN (n=22) CoreValve (n=10) SAVR (n=21)	SAPIEN: 86% CoreValve: 80% SAVR: 48%	SAPIEN: 4 (2.1-6.0) CoreValve: 2.6 (0.3-4.9) SAVR: 1.6 (0.6-2.69)	81 (60-103) 61 (37-86) 224 (111-338)
Ghanem et al. ***JACC 2010***	22	CoreValve	73%	2.5 (1.0-5.5)	NA
Rodés-Cabau et al. ***JACC 2011***	60	SAPIEN/ SAPIEN XT	TF: 66% TA: 71%	TF: 3 (1-7) TA: 4 (2-9)	NA
Fairbairn et al. ***Heart 2011***	31	CoreValve	77%	2 (1-5)	205 ± 350
Arnold et al. ***JACC Intv 2010***	25	SAPIEN	68%	NA	NA
PROTAVI-C Pilot	33	SAPIEN XT	100%	8 (1-70)	42.3 (27.5, 85)
Mullen et al.	**20**			**5 (0-28)**	**120 (0,390)**

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Summary

- There are no data available from RCT showing a reduction in DW-MRI lesion volume by any kind of deflector or filter in TAVR.

- The previous studies assessing cerebral lesion number and volume after TAVR are difficult to compare since different scanners were used, the MRI was performed at different time points after TAVR, and the scan protocols were not standardized.

Summary and Conclusion

- There value of TCD is completely unclear.

- Serial MRI studies are necessary to understand the evolution of lesions detected by DW-MRI over time.

- RCT are essential before a recommendation on the use of cerebral protection devices in TAVR can be given.

Thank You!

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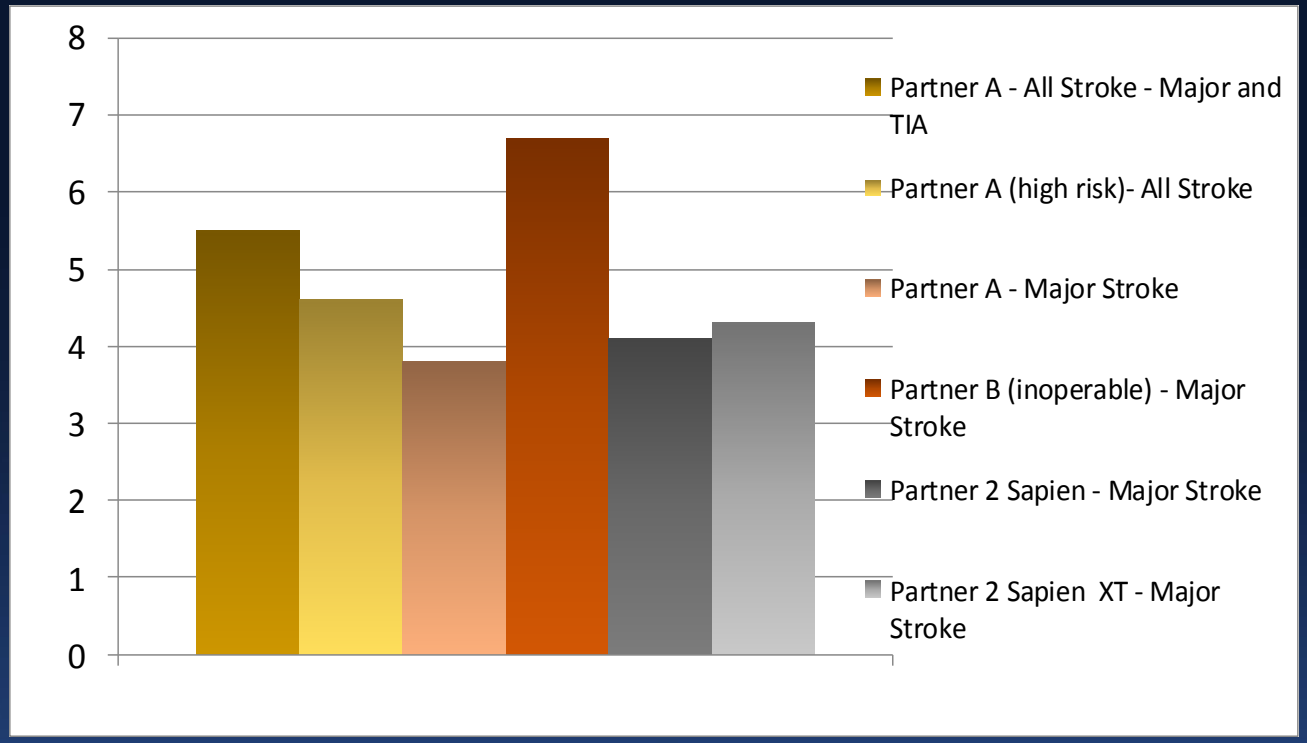
Clinical Need – 30 Day Strokes In PARTNER



Stroke rates in TAVR reported in literature without embolic protection range from 3.8-6.7%

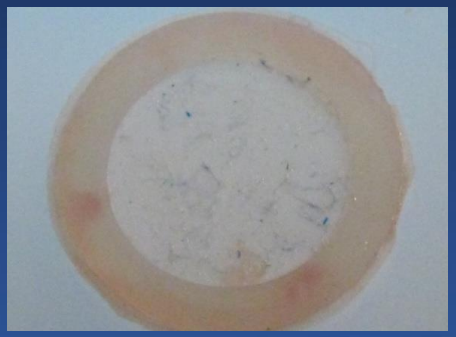
Leon et al, NEJM Smith et al, NEJM,
Kodali et al, ACC 2013, Leon et al, ACC 2013

Edwards Embrella Embolic Deflector – Experimental Study

- No significant pressure gradients across the deployed devices
- Deflection downstream : 98.7%.
- Deflection efficiency : 91.1% (% of total injected partciles deflected downstream)
- Surface of adherent particles <1% of total device area
- No injury at the site of deployment

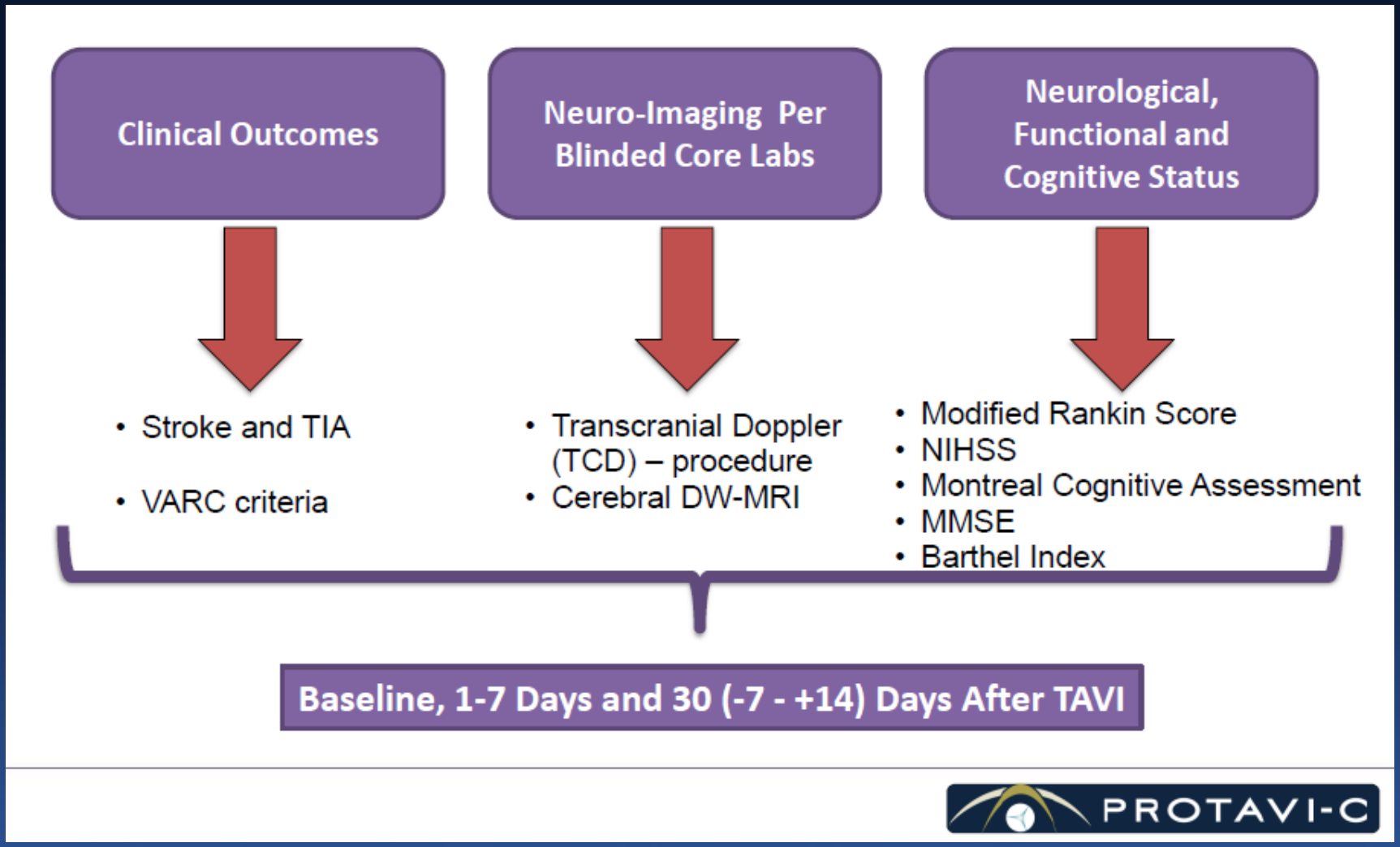
No Deflector

Deflector



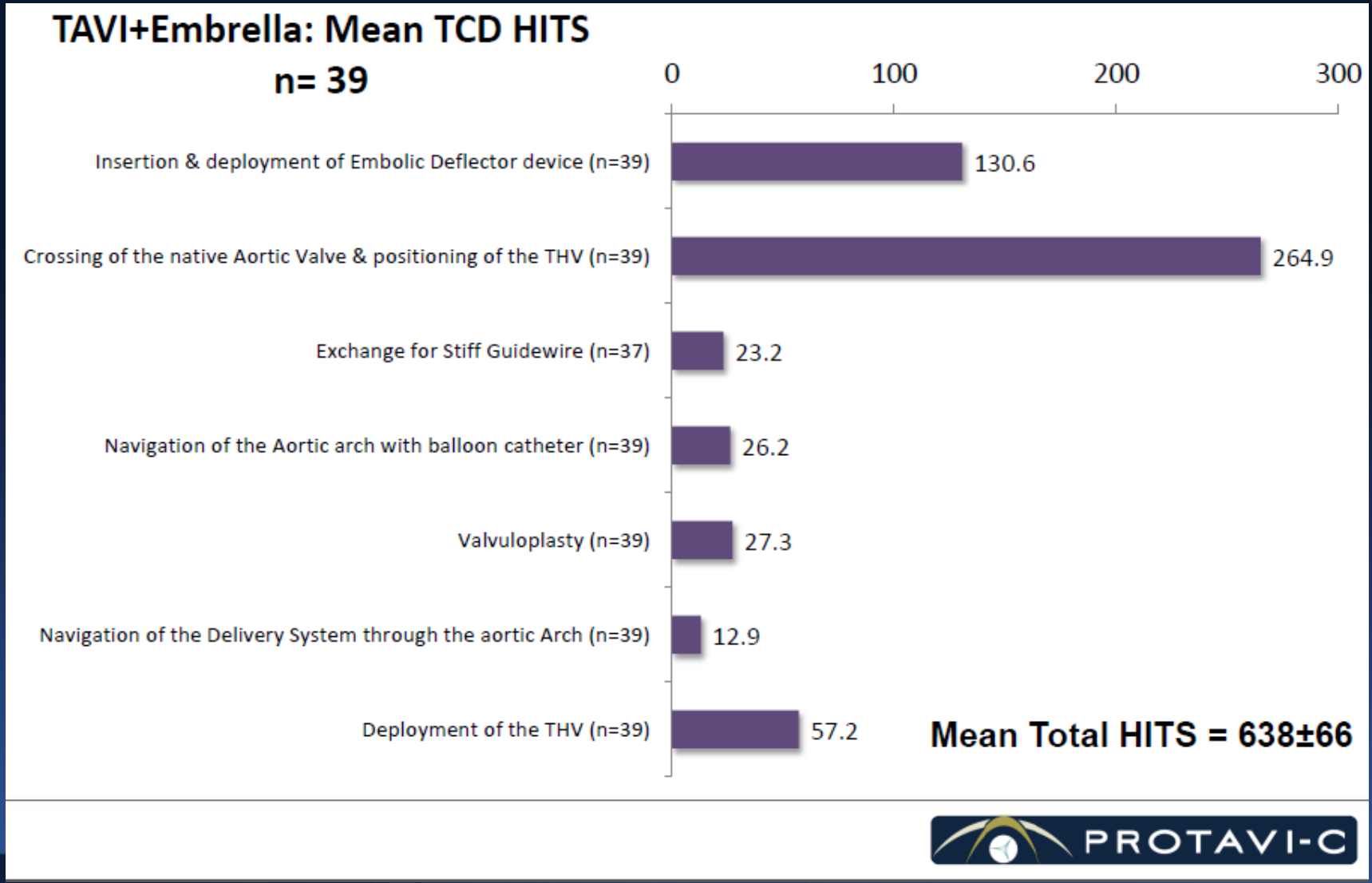
(Carpenter,J Vasc Surg 2011;54:174-81)

PROTAVI C Follow-ups



J. Rodes-Cabau, presented at PCR 2013

PROTAVI C TCD Findings



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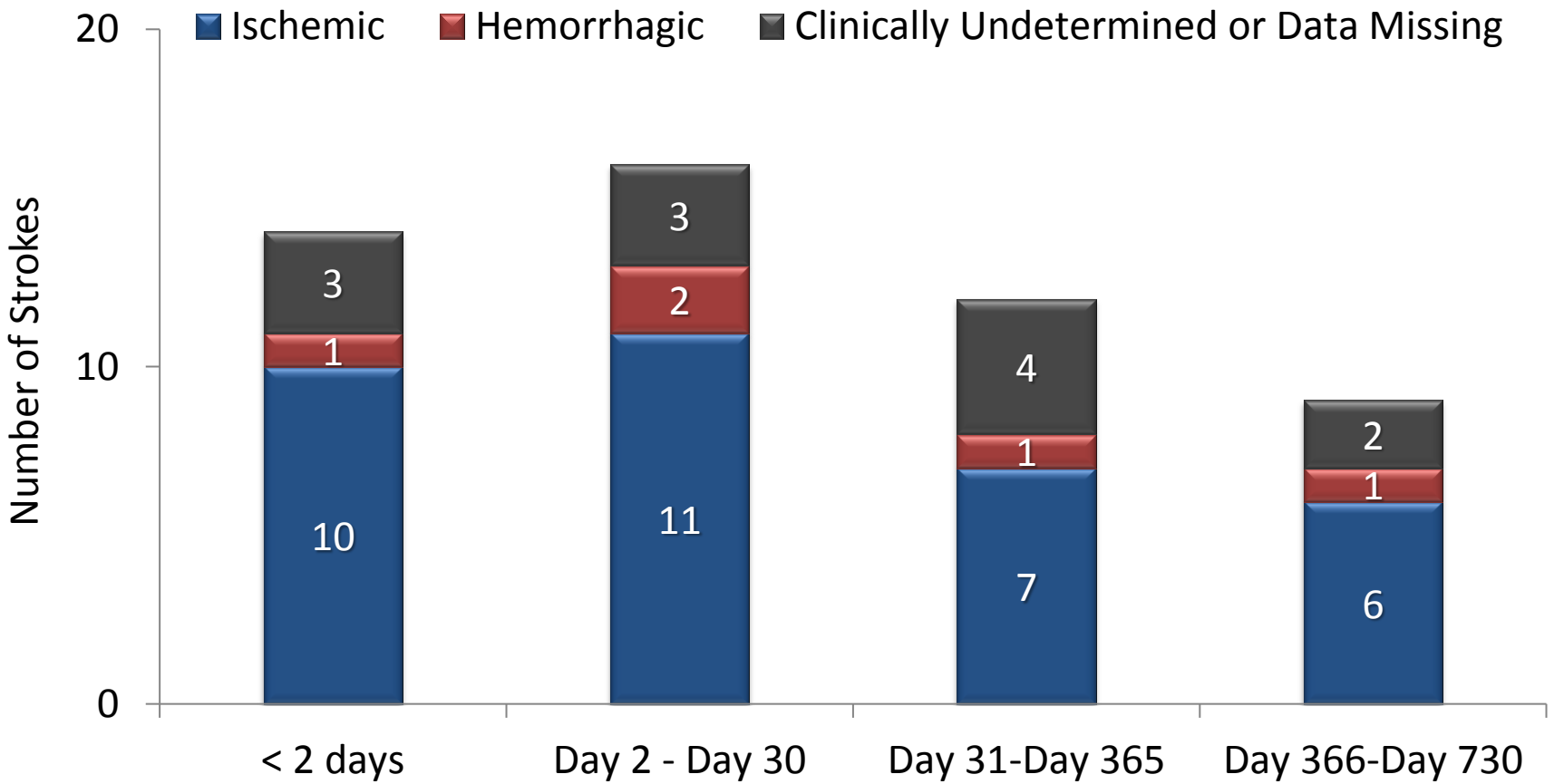
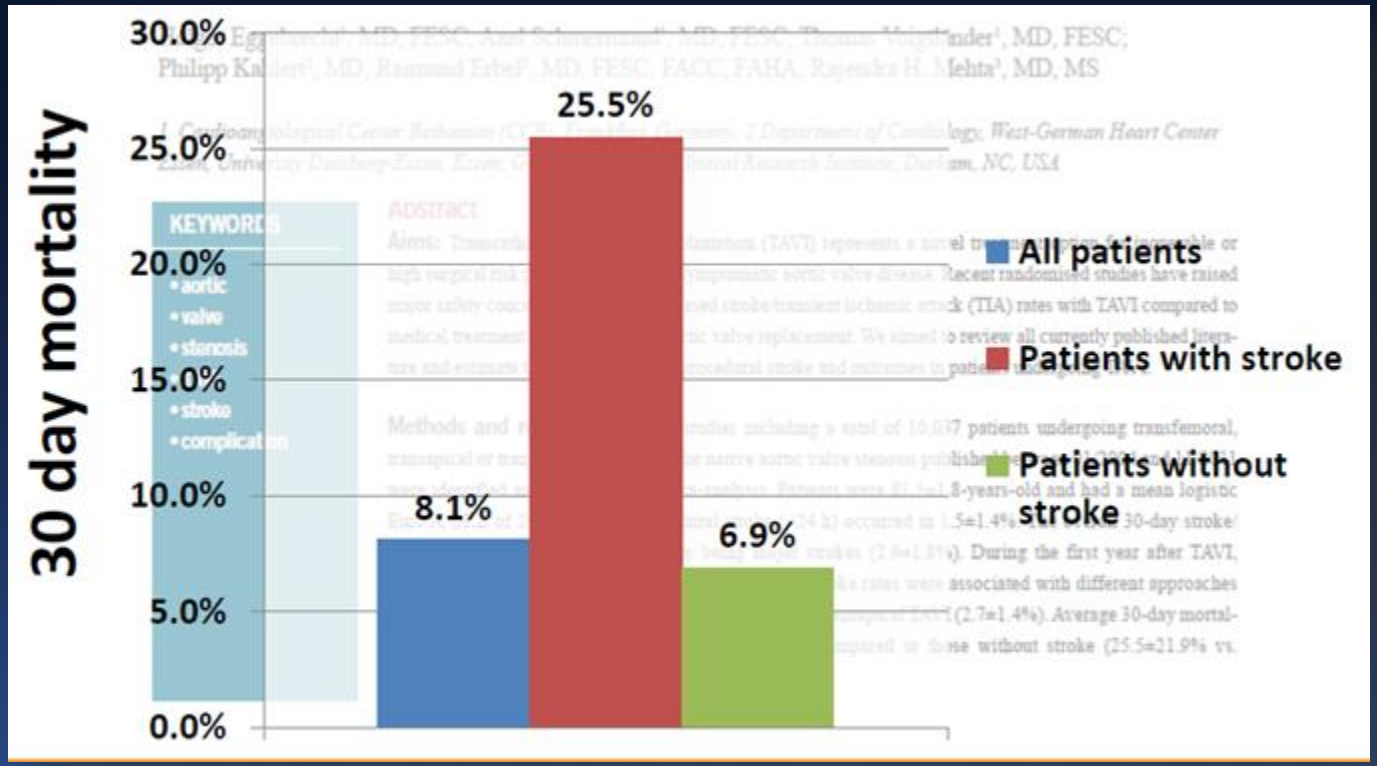
The Type and Timing of Stroke – ADVANCE Study



Bosmans et al, presented at EuroPCR 2014

Clinical Need – Impact of Stroke on Mortality

Meta-analysis of 10,037 published patients



H. Eggebrecht et al, EuroIntervention 2012, 8: 129-138

PROTAVI C Design

- Six centers allotted 9 patients each as follows (total 54 patients):
  - First 2 patients "roll-in" group with Embrella
  - Next 5 patients treatment group with Embrella
  - Last 2 patients controls without Embrella
- TAVI procedure by transfemoral approach with the Edwards SAPIEN XT valve (sizes: 23, 26 or 29-mm)
- TAVI Indication consistent with approved CE Mark indication
- Antithrombotic regimen: Aspirin (80 mg) + clopidogrel (75 mg) administered before the procedure. Heparin administered during the procedure (ACT > 300s)

PROTAVI-C

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