LEIPZIG INTERVENTIONAL COURSE

LINC

2025

Proximal Embolic Protection

a *must-know-how* for

competent carotid stenting

Piotr Musialek

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Disclosure

Speaker name: Piotr Musialek
I have the following potential conflicts of interest to report:

☑ Consulting/Proctoring: Abbott Vascular, Balton, Gore, InspireMD, Medtronic

☐ Employment in industry

☐ Stockholder in a healthcare company

☐ Owner of a healthcare company

☑ Others: ESC Stroke Council Scientific Documents Task Force
Polish Cardiac Society Board Representative for Stroke and Vascular Interventions
CGUARDIANS FDA IDE Co-PI

CAS (and CEA) are EMBOLOGENIC

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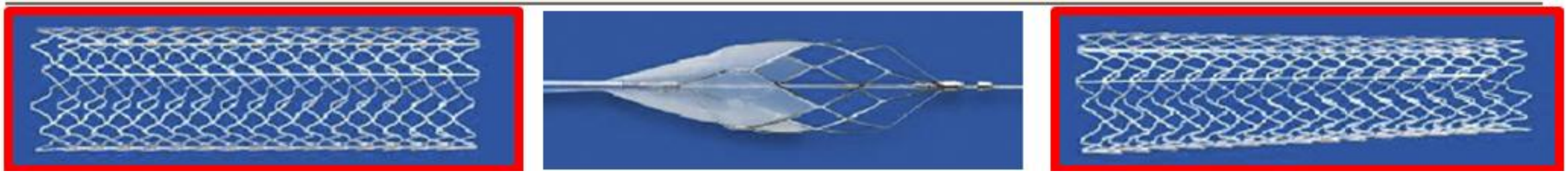
New ischaemic brain lesions on MRI after stenting or endarterectomy for symptomatic carotid stenosis: a substudy of the International Carotid Stenting Study (ICSS)

*Leo H Bonati, Lisa M Jongen, Sven Haller, H Zwenneke Flach, Joanna Dobson, Paul J Nederkoorn, Sumaira Macdonald, Peter A Gaines, Annet Waaijer, Peter Stierli, H Rolf Jäger, Philippe A Lyrer, L Jaap Kappelle, Stephan G Wetzel, Aad van der Lugt, Willem P Mali, Martin M Brown, H Bart van der Worp, Stefan T Engelter, for the ICSS-MRI study group**

1st-Gen CAS (Filter + Porous Nitinol Stent): More DWI lesions than with CEA



CAS –and CEA– are (and will remain) Emboli-generating

Effect of the Distal-Balloon Protection System on Microembolization During Carotid Stenting

Nadim Al-Mubarak, MD; Gary S. Roubin, MD, PhD; Jiri J. Vitek, MD, PhD; Sriram S. Iyer, MD; Gishel New, MD; Martin B. Leon, MD

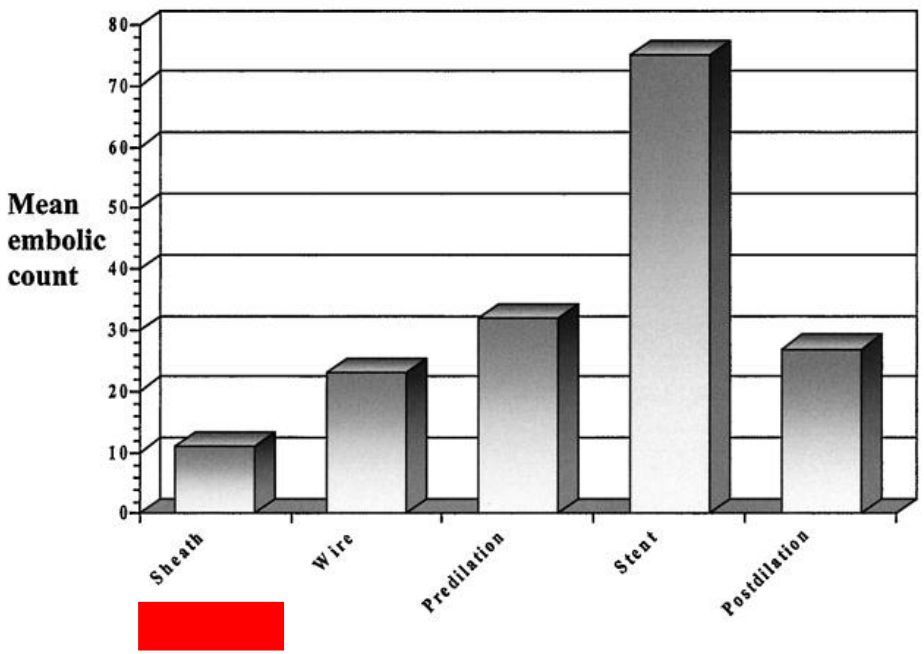


Figure 1. Microembolic profile during unprotected CAS. The mean MES counts during various phases of the procedure are displayed.

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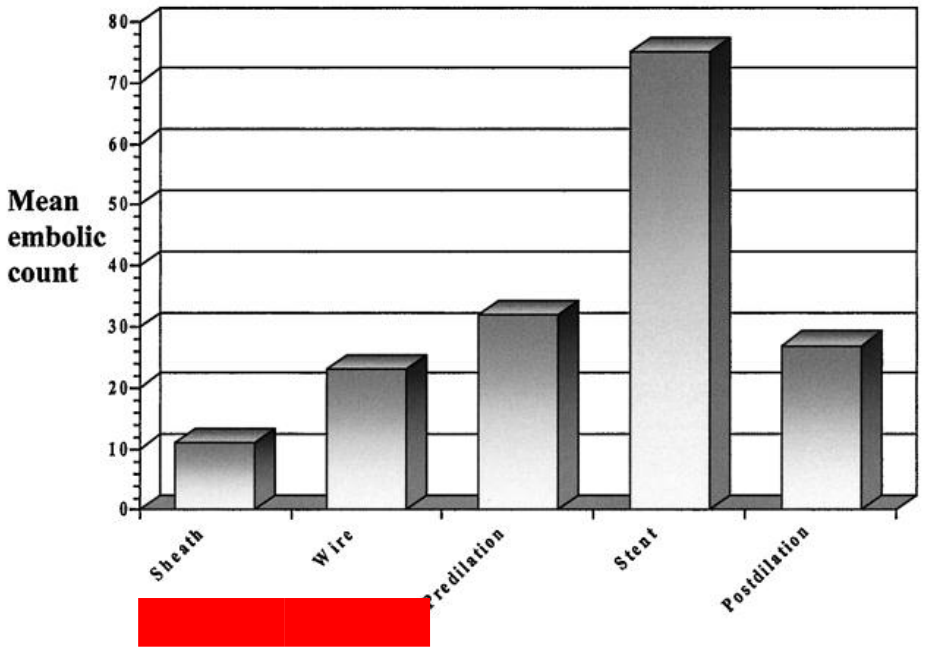

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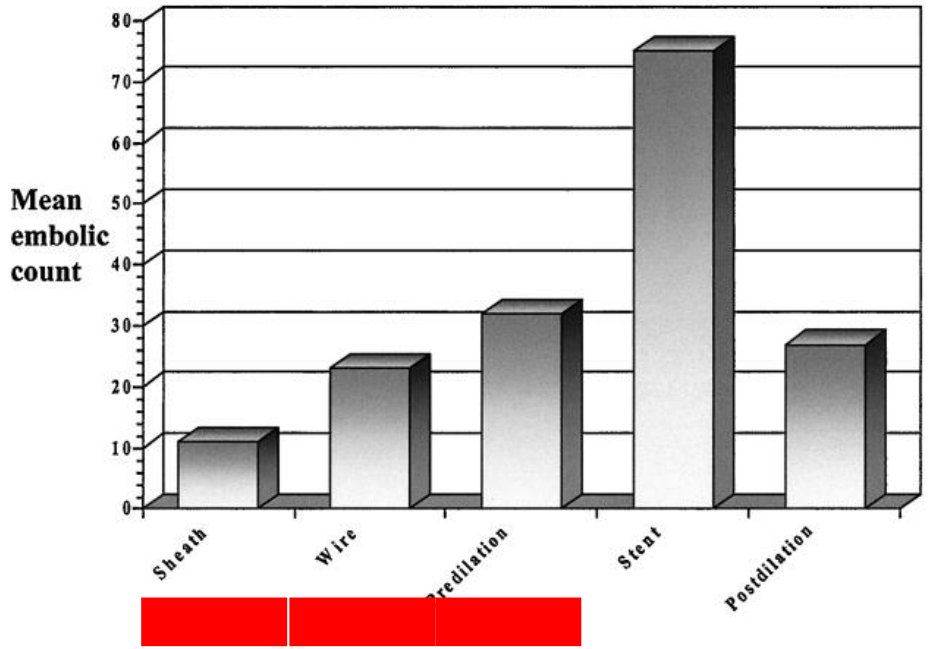

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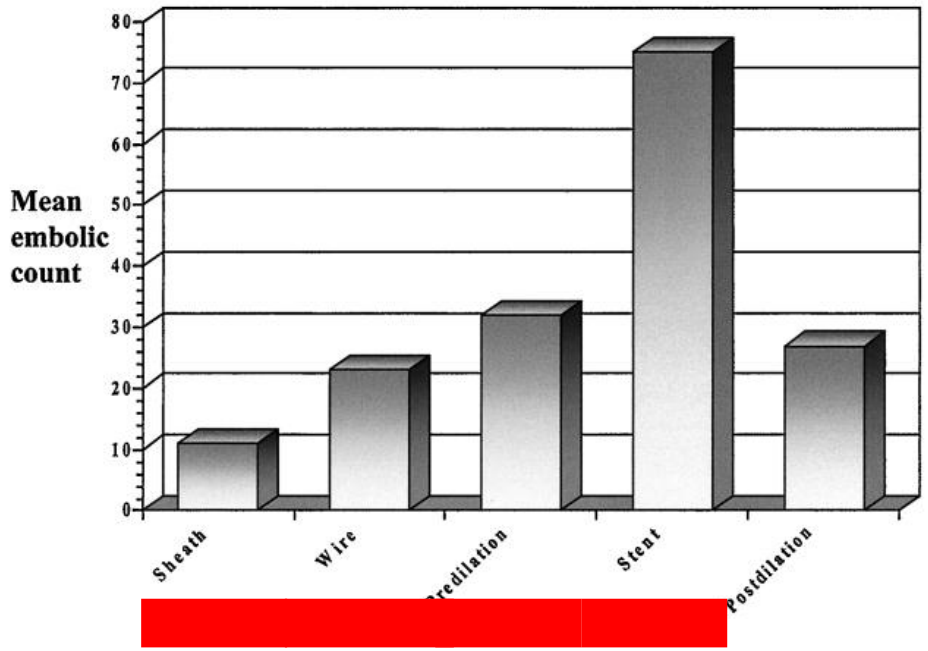

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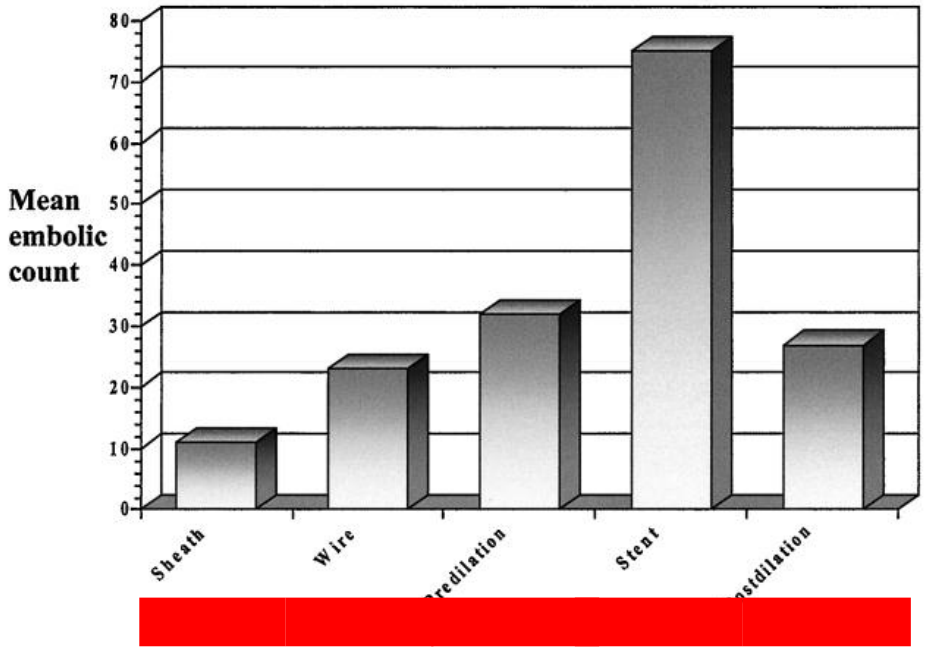

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Original research article

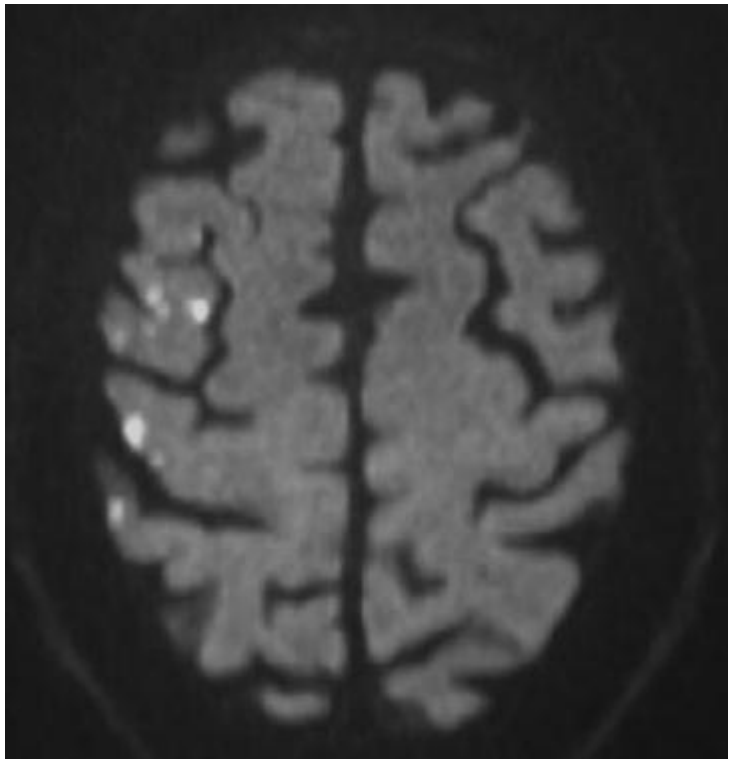
EUROPEAN STROKE JOURNAL

European Stroke Journal
0(0) 1–17

DOI: 10.1177/2396987318824491
journals.sagepub.com/home/eso
SAGE

Silent brain infarcts on diffusion-weighted imaging after carotid revascularisation: A surrogate outcome measure for procedural stroke? A systematic review and meta-analysis

Christopher Traenka[1,2], Stefan T Engelter[1,2], Martin M Brown[3], Joanna Dobson[4], Chris Frost[4] and Leo H Bonati[1,3]

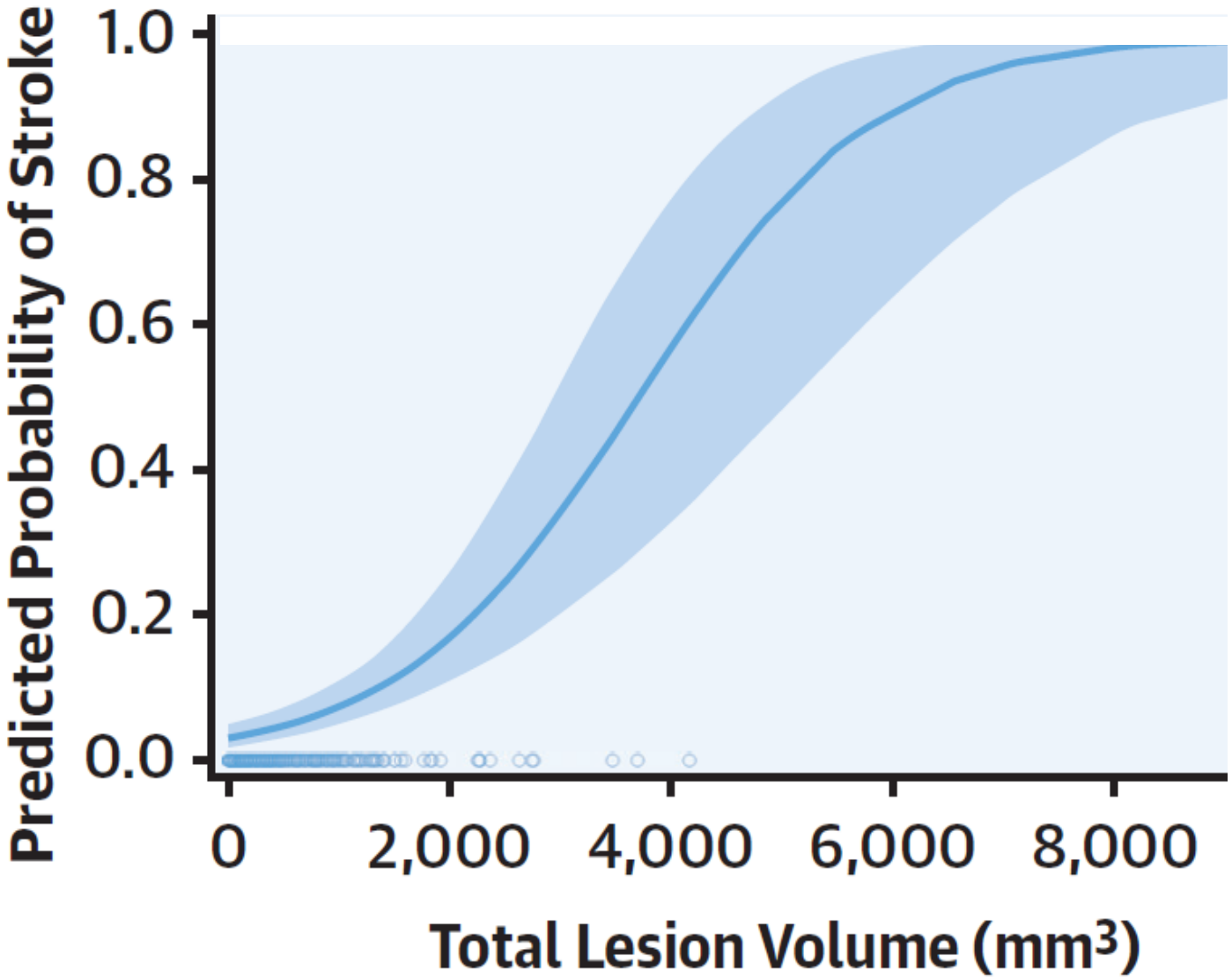


Conclusion: Our findings strengthen the evidence base for the use of DWI as a surrogate outcome measure for procedural stroke in carotid revascularisation procedures.

Clinical Significance of Diffusion-Weighted Brain MRI Lesions After TAVR

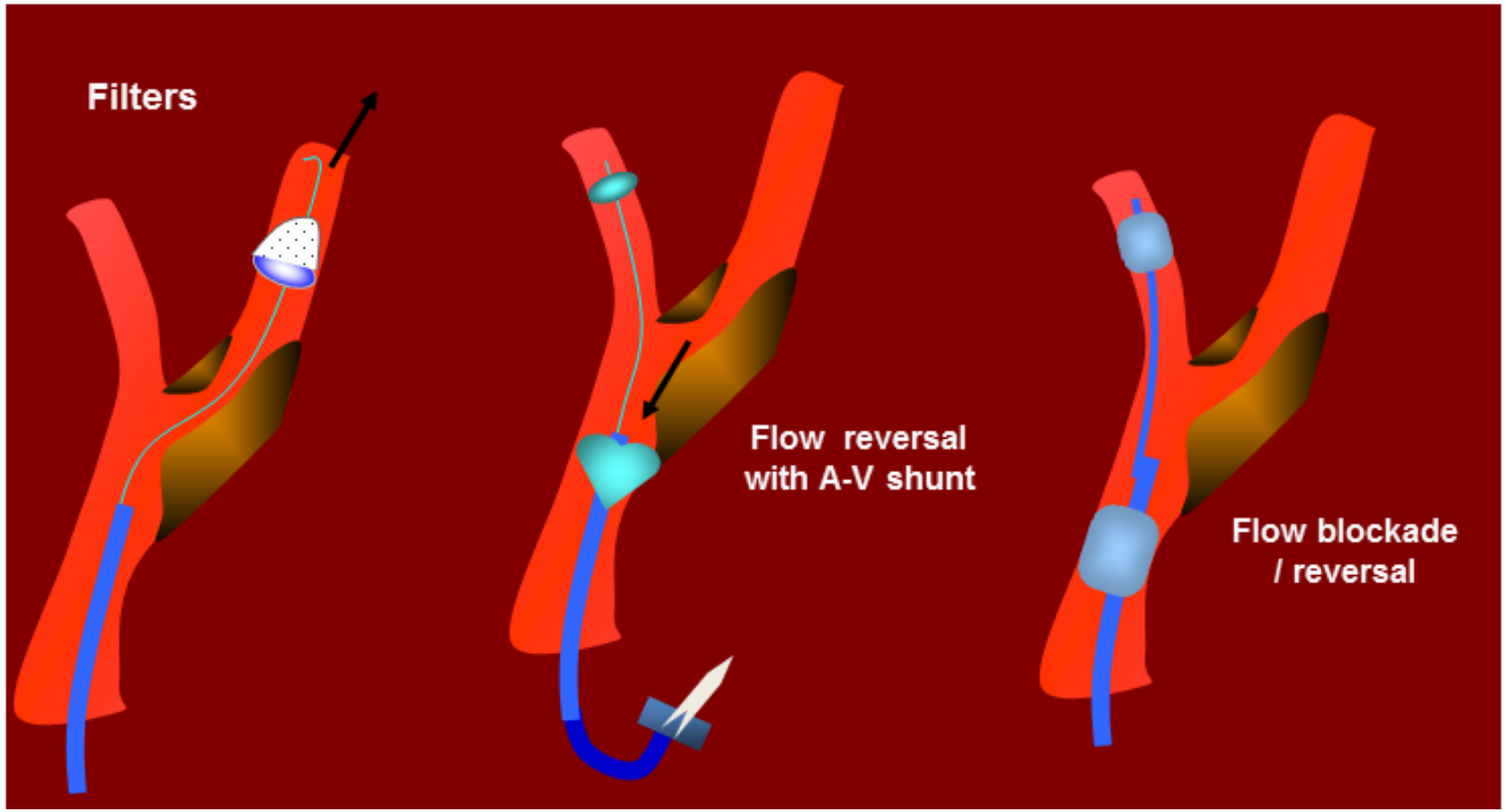
Results of a Patient-Level Pooled Analysis

Alexandra J. Lansky, MD,[a,b] Daniel Grubman, MD,[a,b] Michael G. Dwyer III, PhD,[c,d] Robert Zivadinov, MD, PhD,[c,d] Helen Parise, ScD,[a,b] Jeffrey W. Moses, MD,[e,f] Tayyab Shah, MD,[a,b,g] Cody Pietras, BA,[a,b] Daniela Tirziu, PhD,[a,b] Louise Gambone, RN,[a,b] Martin B. Leon, MD,[e,h] Tamim M. Nazif, MD,[e] Steven R. Messé, MD[i]

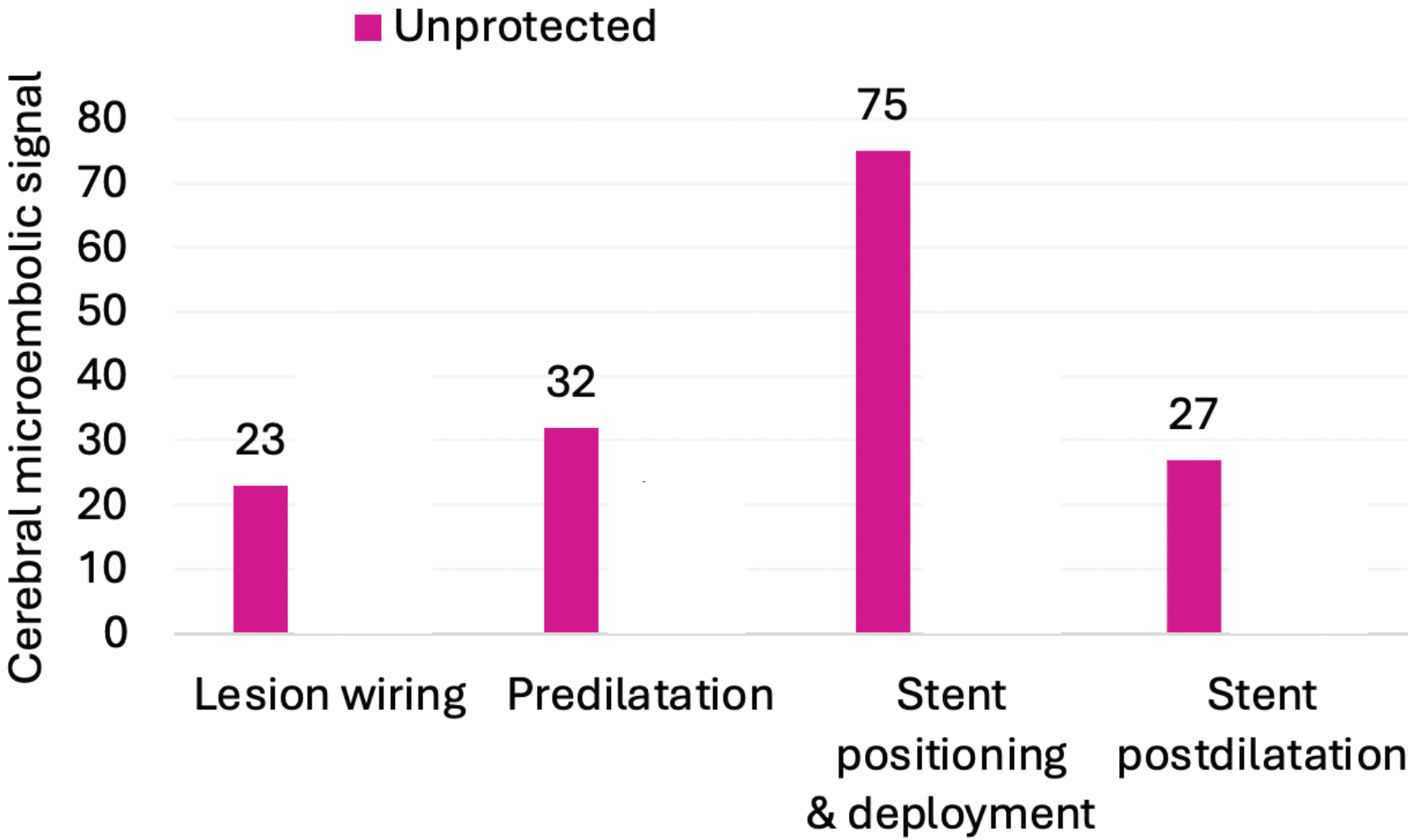


J Am Coll Cardiol 2024;84:712–722

Cerebral Protection in transfemoral/transradial CAS



PROTECTION HELPS!



Pooled data: ENDOVASCULAR TODAY JUNE 2024 VOL. 23, NO. 6

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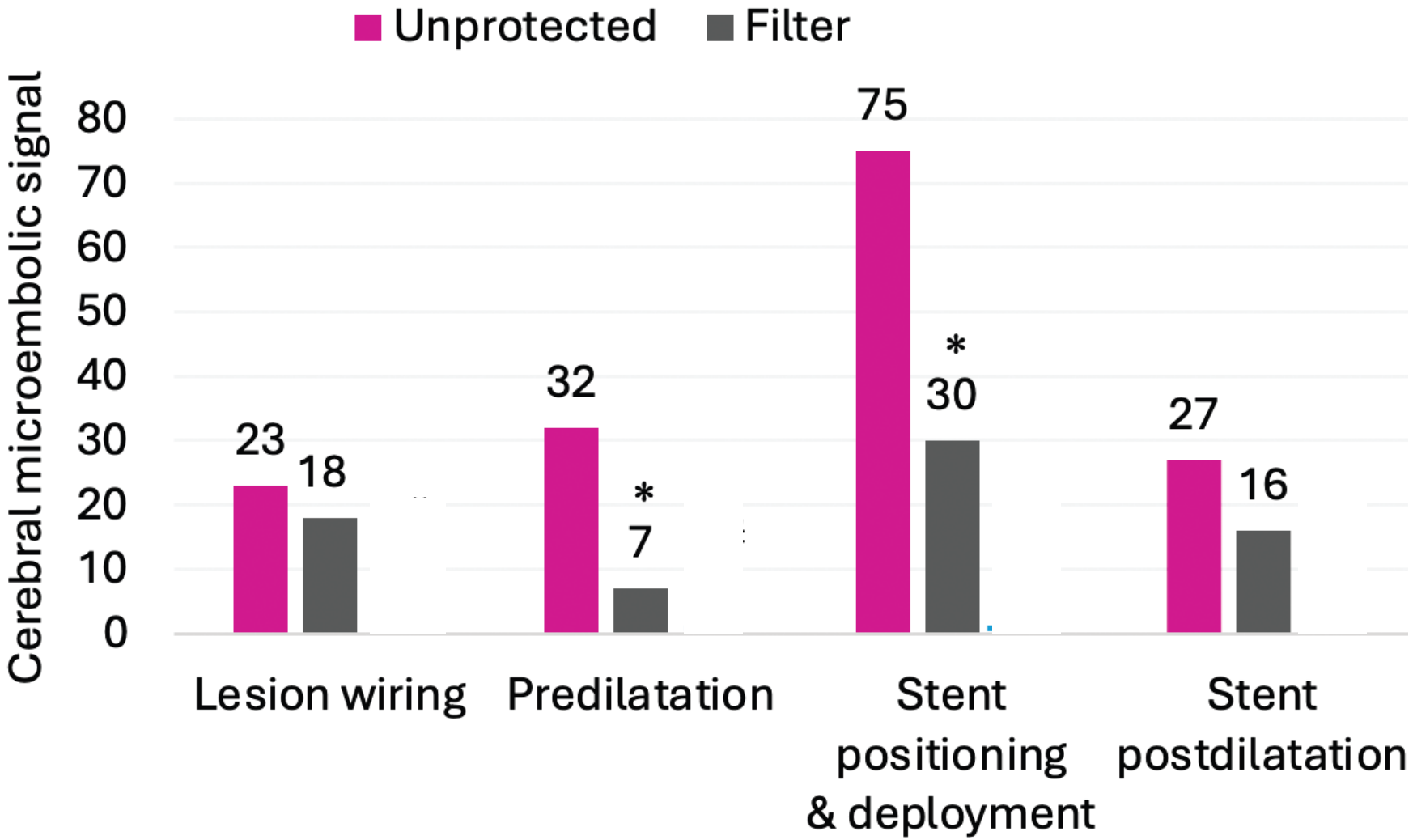

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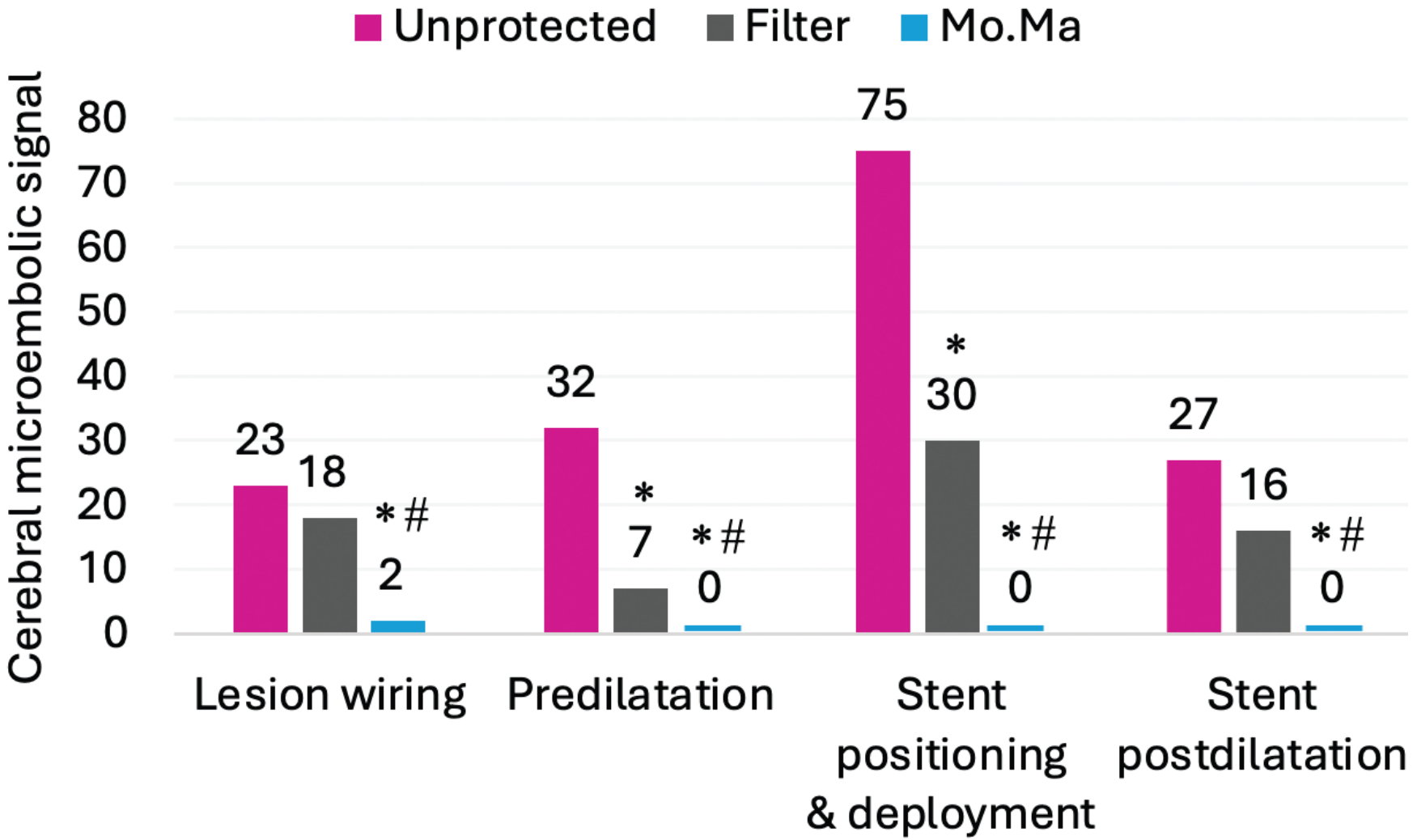

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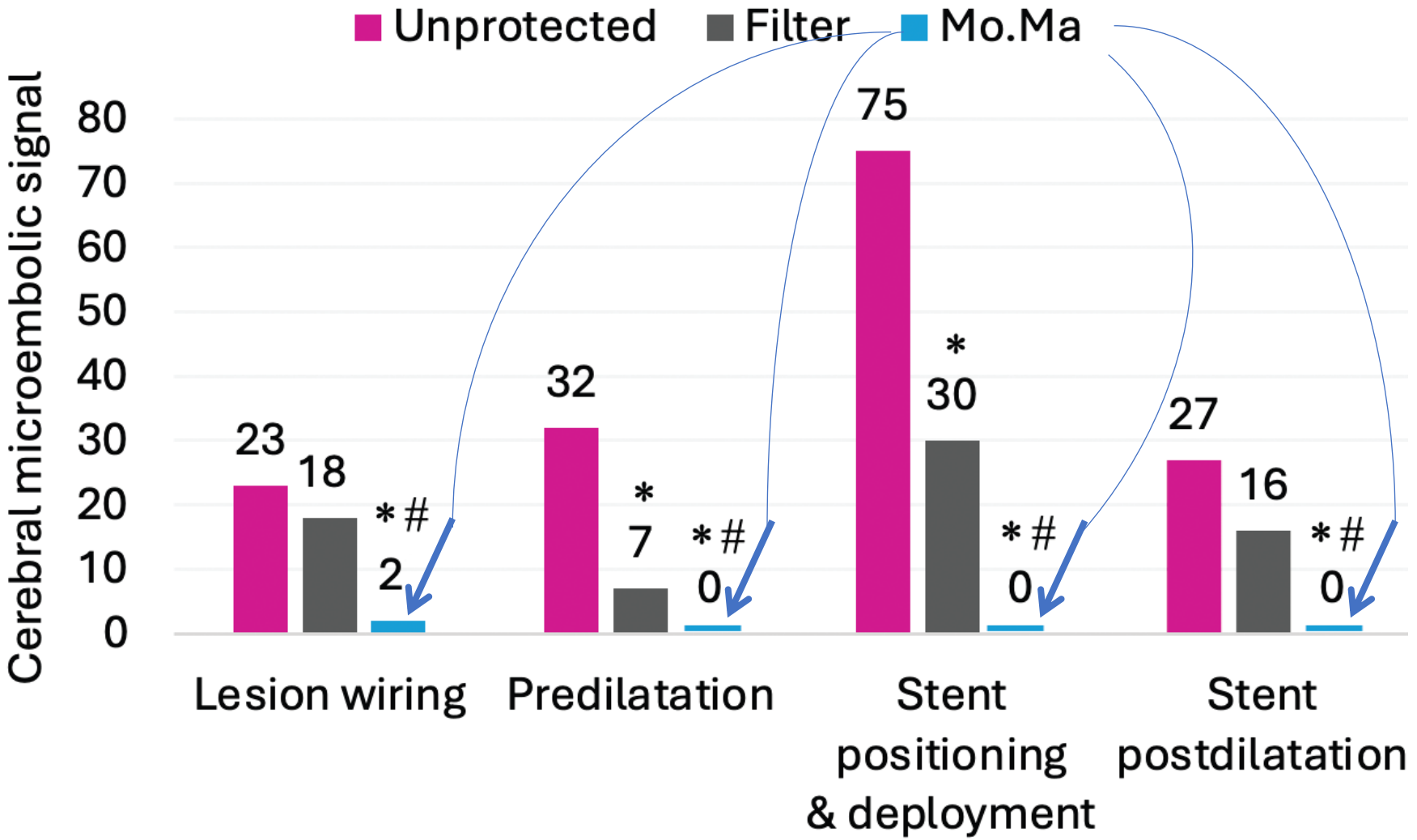

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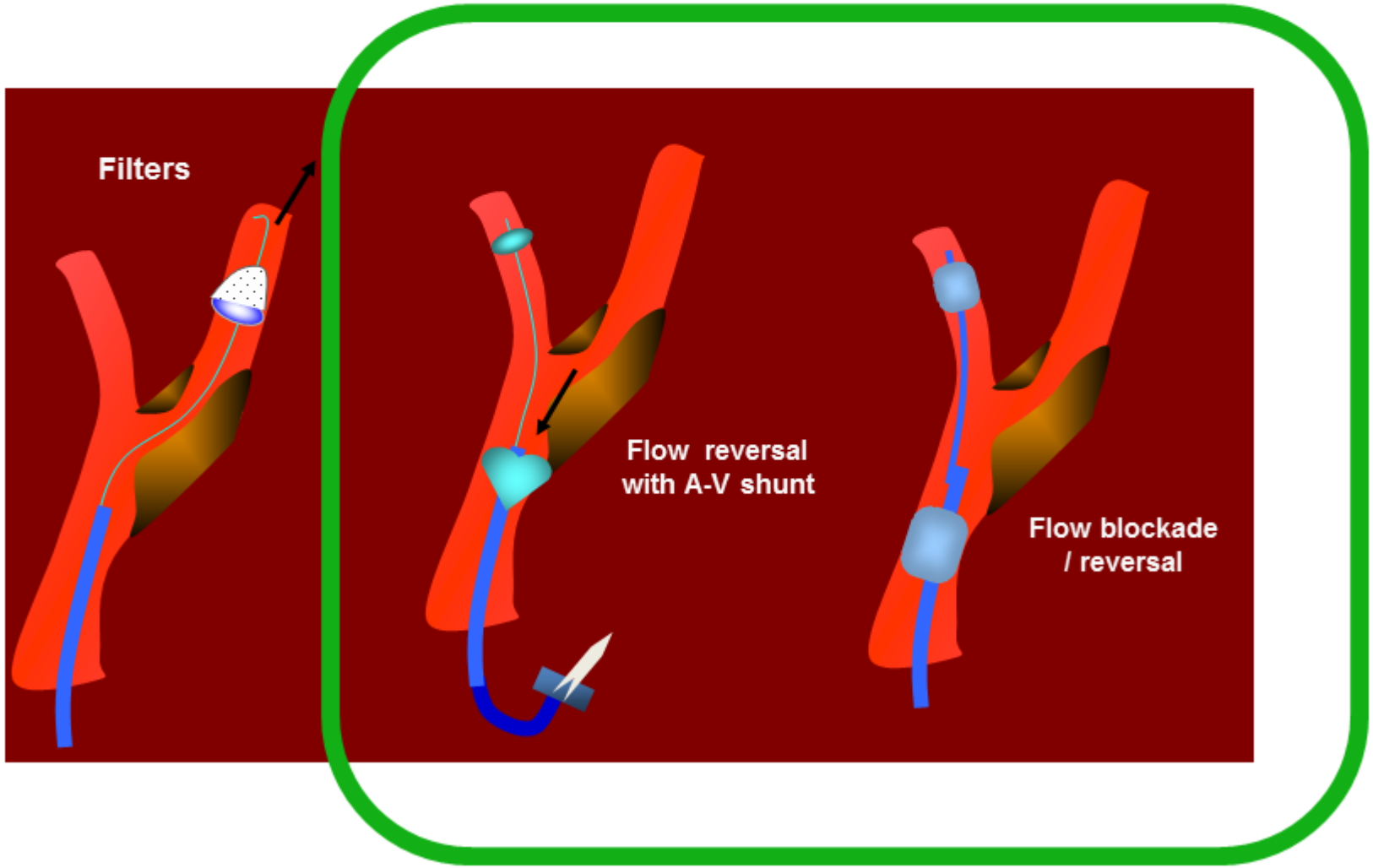
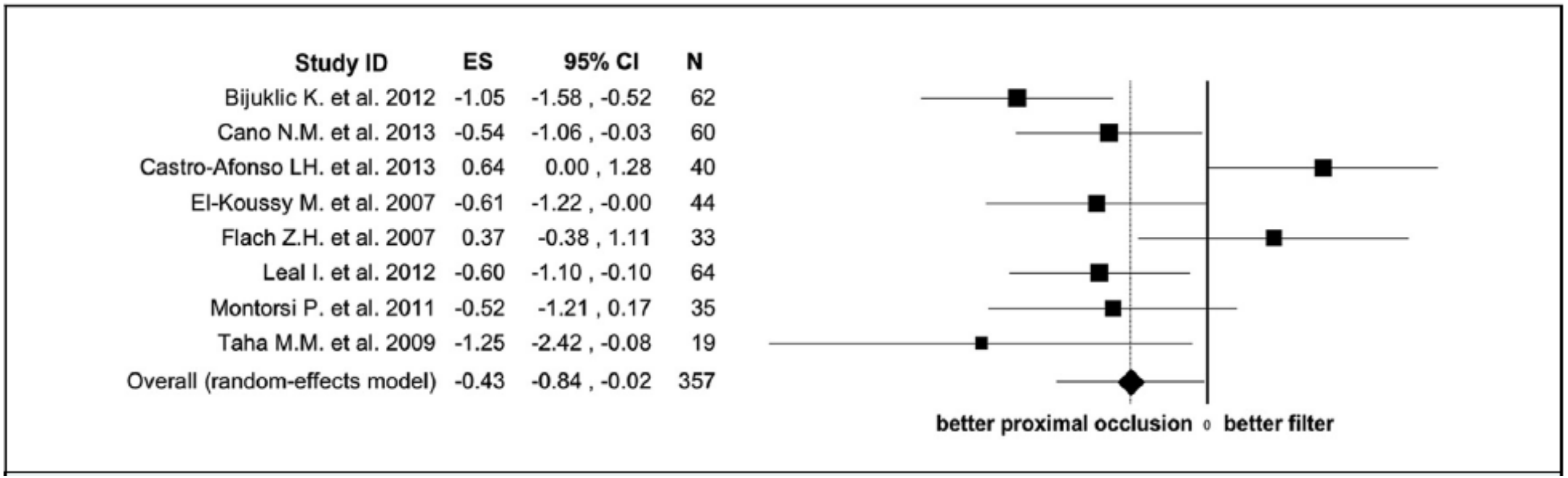


Cerebral Embolic Lesions Detected With Diffusion-Weighted Magnetic Resonance Imaging Following Carotid Artery Stenting

A Meta-Analysis of 8 Studies Comparing Filter Cerebral Protection and Proximal Balloon Occlusion

Eugenio Stabile, MD, PhD, Anna Sannino, MD, Gabriele Giacomo Schiattarella, MD, Giuseppe Gargiulo, MD, Evelina Toscano, MD, Linda Brevetti, MD, Fernando Scudiero, MD, Giuseppe Giugliano, MD, Cinzia Perrino, MD, PhD, Bruno Trimarco, MD, Giovanni Esposito, MD, PhD



Proximal occlusion versus distal filter for cerebral protection during carotid stenting: updated meta-analysis of randomised and observational MRI studies

Salvatore Cassese[1]*, MD; Gjin Ndrepepa[1], MD; Lamin A. King[1], MB BCh; Mateja Nerad[3], MD; Heribert Schunkert[1,2], MD; Adnan Kastrati[1,2], MD; Ilka Ott[1], MD; Massimiliano Fusaro[1], MD

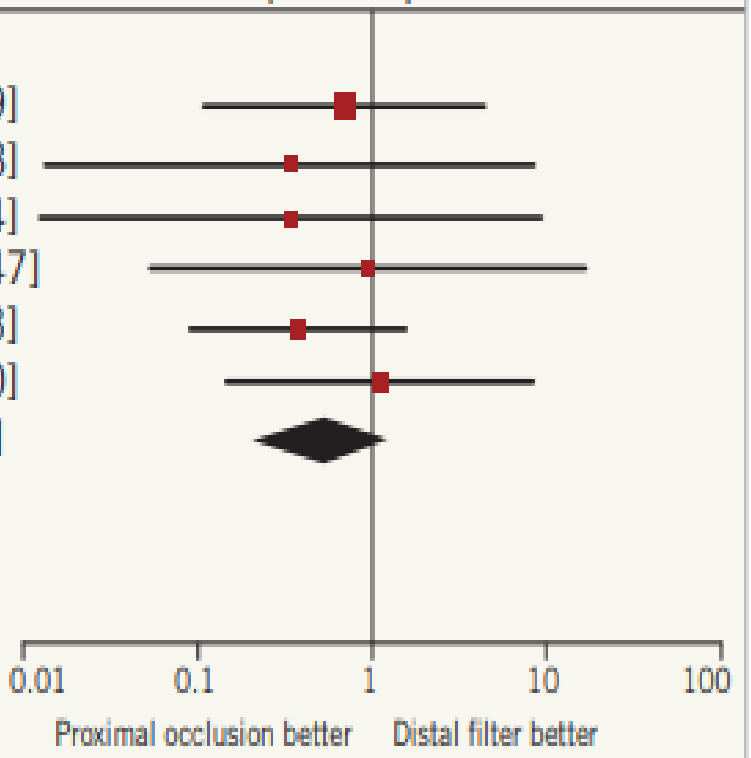
1. Deutsches Herzzentrum München, Technische Universität München, Munich, Germany; 2. DZHK (German Centre for Cardiovascular Research), partner site Munich Heart Alliance, Munich, Germany; 3. Klinische Abteilung für Kardiologie, Universität Graz, Graz, Austria

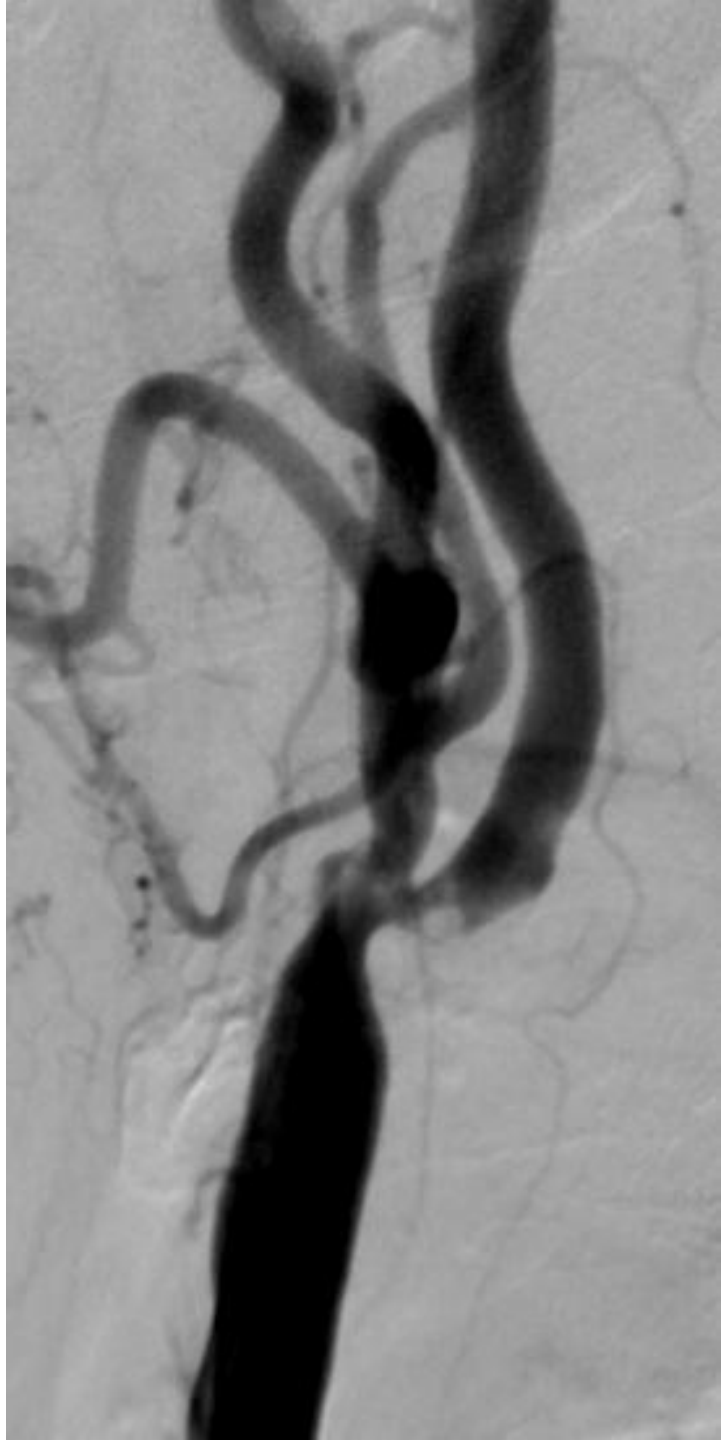
D. Death/CVE

Study or subgroup	Proximal occlusion Events	Total	Distal filter Events	Total	Weight	Odds ratio M-H, Random, 95% CI
1.4.1 Randomised						
Akkaya et al.	2	50	3	50	29.3%	0.65 [0.10, 4.09]
Bijuklic et al.	0	31	1	31	9.4%	0.32 [0.01, 8.23]
Cano et al.	0	30	1	30	9.4%	0.32 [0.01, 8.24]
de Castro-Afonso et al.	1	21	1	19	12.2%	0.90 [0.05, 15.47]
El-Koussy et al.	1	25	2	19	16.0%	0.35 [0.03, 4.23]
Montorsi et al.	2	26	2	27	23.7%	1.04 [0.14, 8.00]
Subtotal (95% CI)		**183**		**176**	**100.0%**	**0.60 [0.22, 1.63]**
Total events	6		10			

Heterogeneity: $Tau^2=0.00$; $Chi^2=0.82$, df=5 (P=0.98); $I^2=0\%$

Test for overall effect: Z=1.00 (P=0.32)





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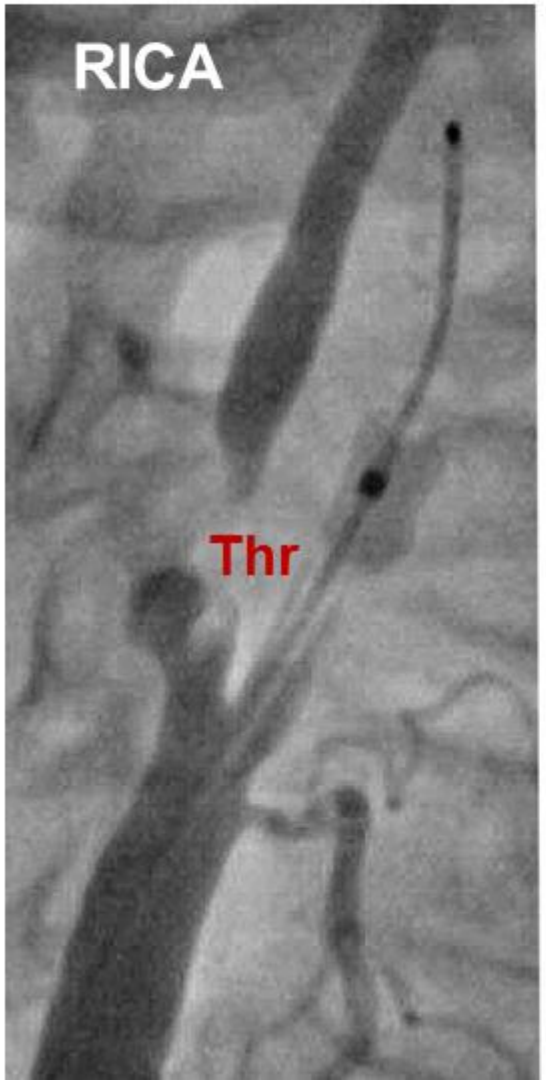
LINC 2025

(hopefully)

NEVER

”randomized”
to Filter vs. Prox EPD
(or unprotected CAS!)

M, 52y, Right Hemisph. Stroke 5 days before



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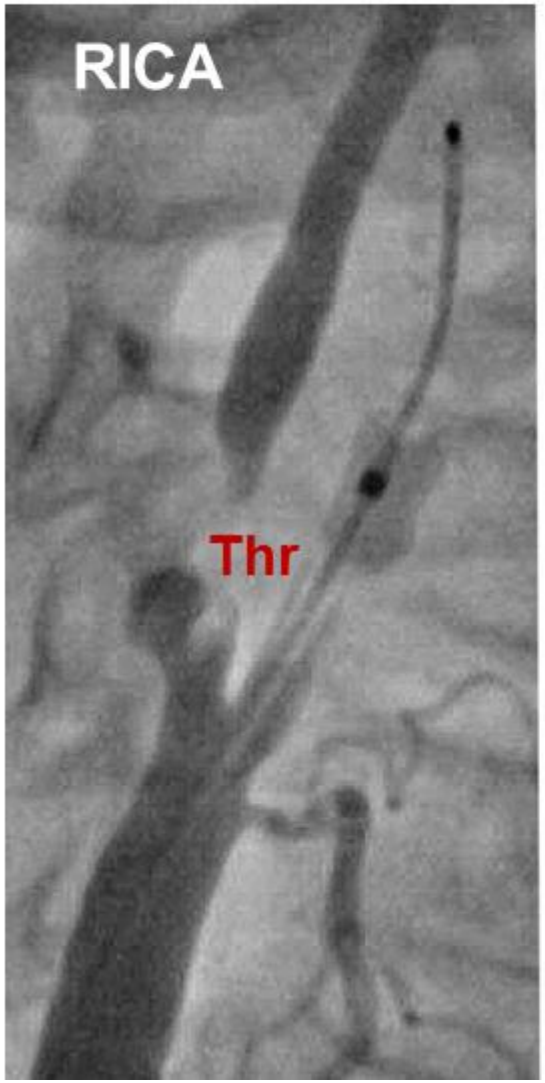

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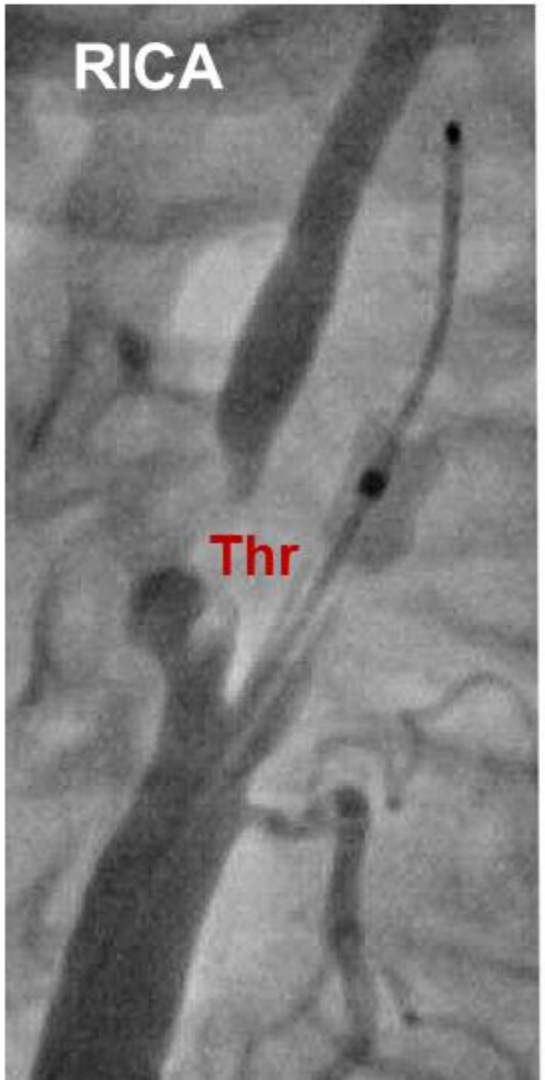
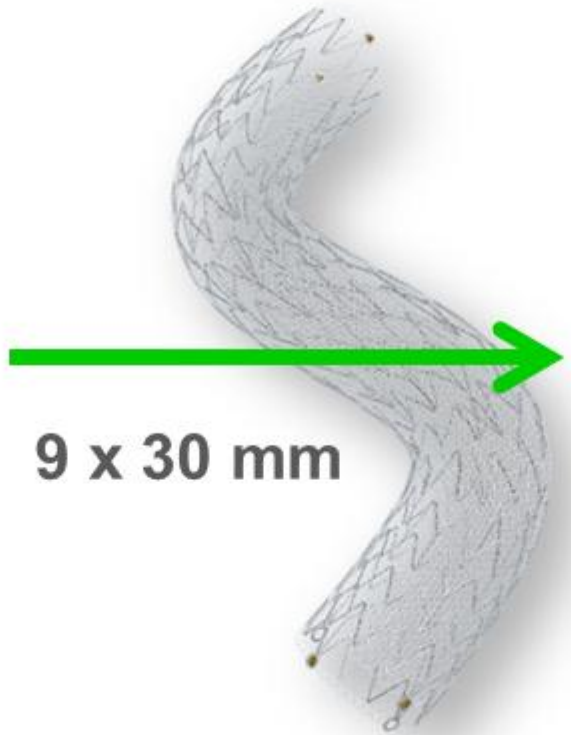
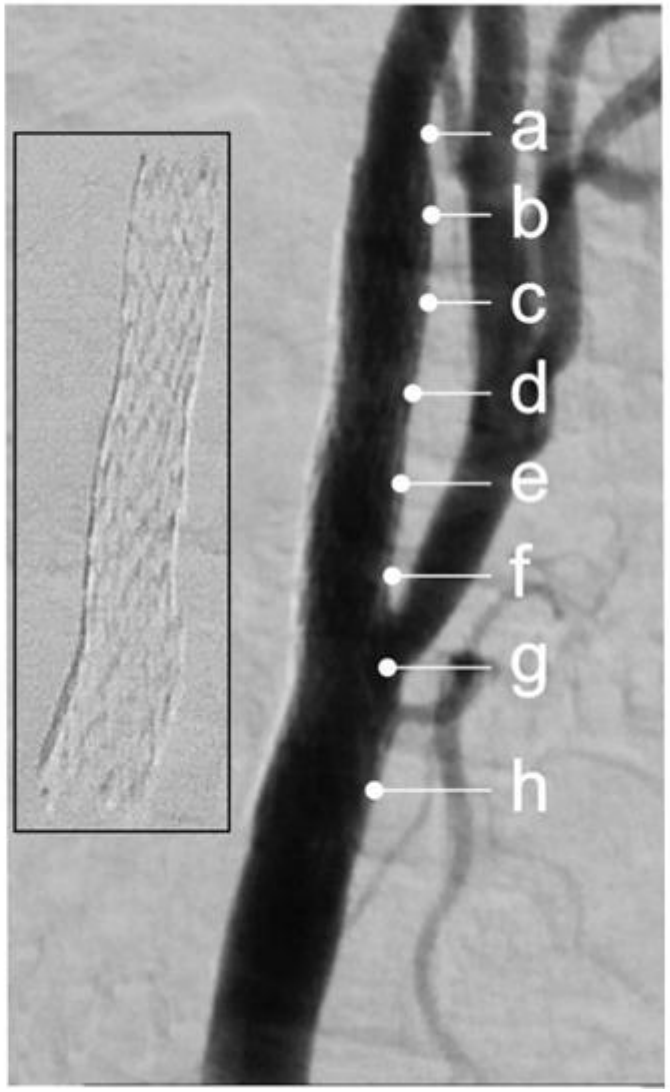
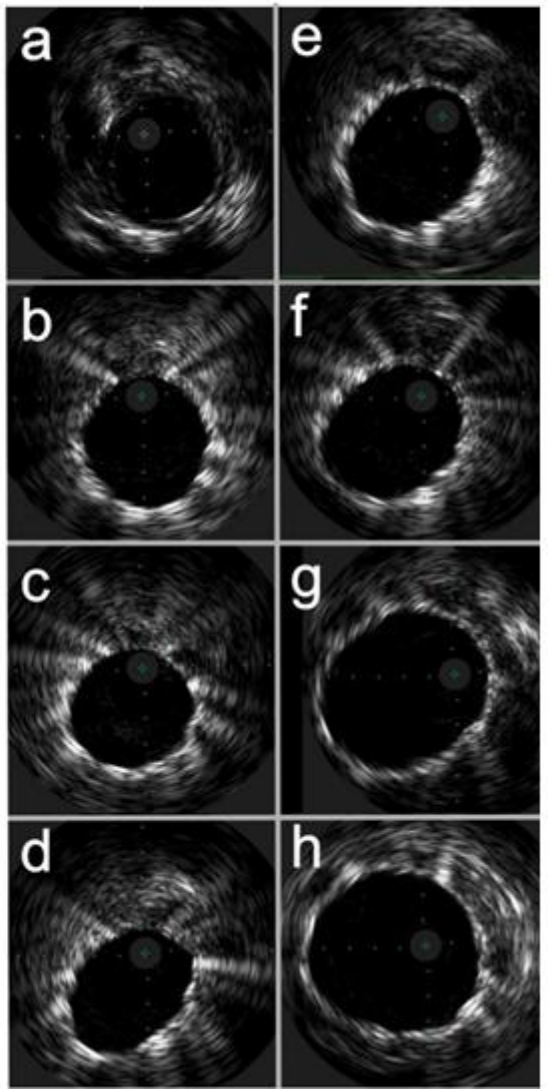
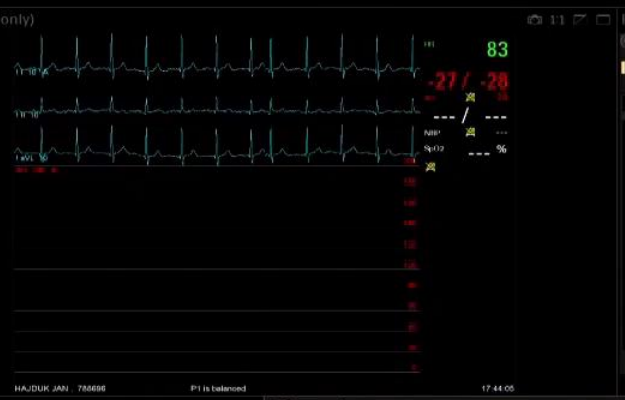








OPTIMA Trial NCT04234854


83
-27 / -28
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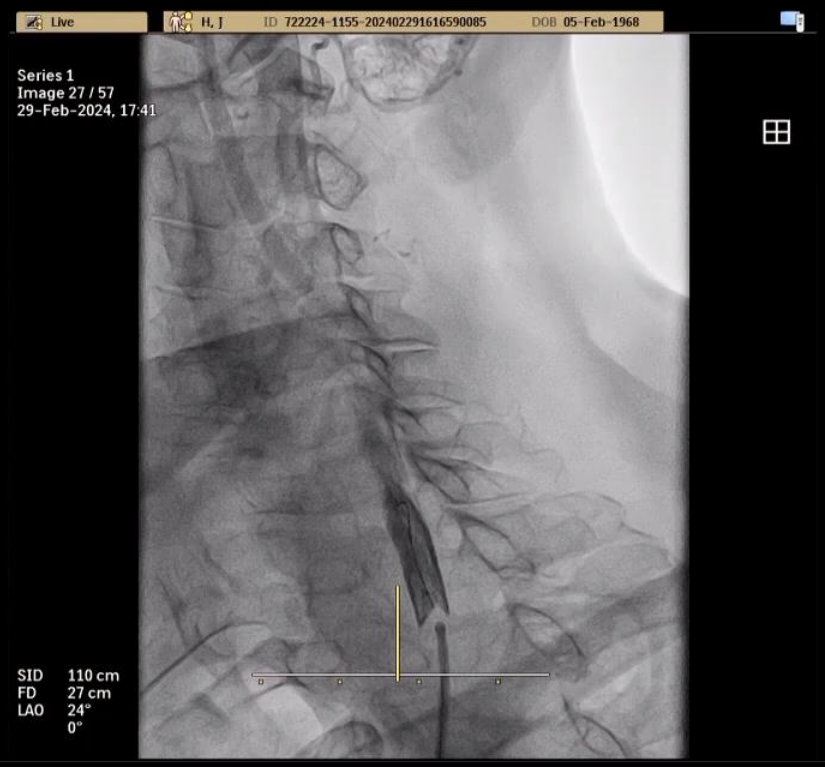
Review
PHILIPS


67 kV
425 mA
5 ms
LAO 24°
0°
SID 110 cm
FD 27 cm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LAO 24°
0°


Reference 1
Reference 1
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DOB 05-Feb-1968


1 cm
15 fps
6.25
504 min
24.1 mGy
24.1 mGy
3.13 Gy cm²
3.7 min
41


Live X-ray
Live
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DOB Unknown
Reference 1
Series
Image
27-Feb
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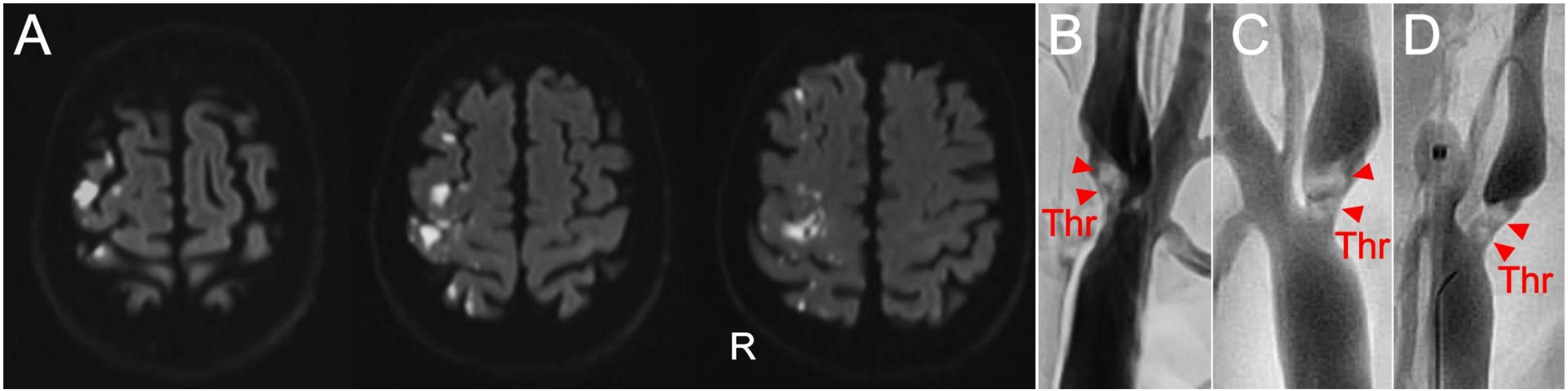
FD
RAO
64 kV
292 mA
4 ms
RAO 36°
CRAN 2°
SID 119 cm
FD 27 cm
Reduced Image Size. Align to portrait or landscape.
Coronary
7.5 fps
Low 6.25
Time Left 18 h
K 6.36 mGy
K Rate 16.2 mGy/min
Total K 236 mGy
DAP 29.6 Gy·cm²
Total Fluoro 13.2 min
11:22
69
49 / 46
97 %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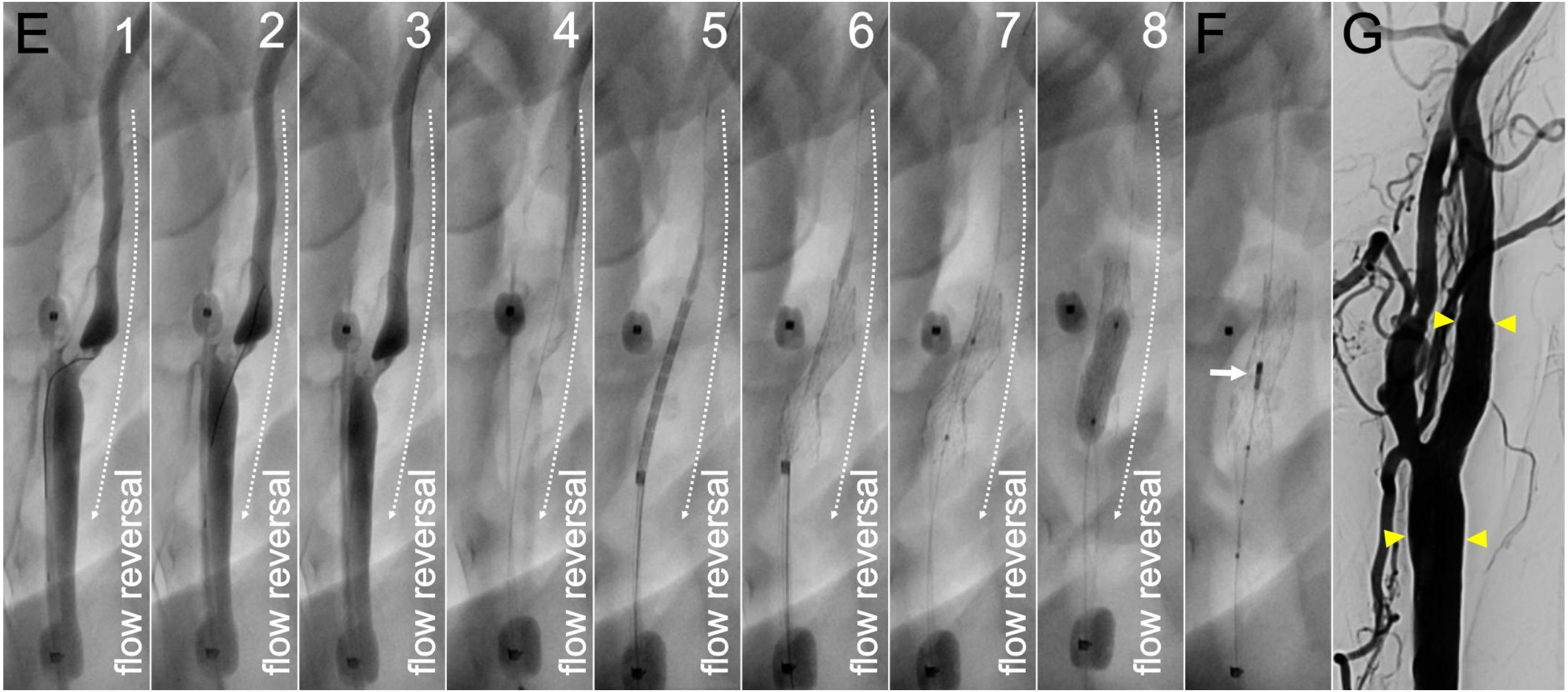

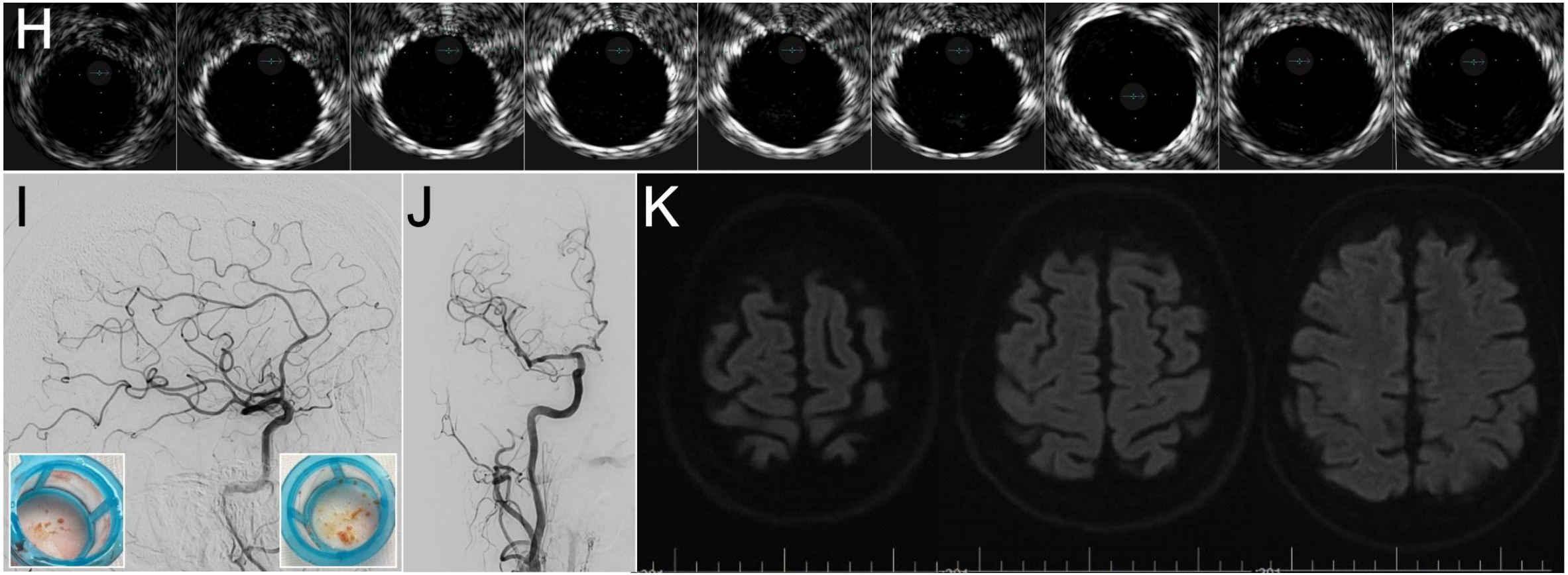

ZERO CAS- related cerebral lesions

Tandem STROKE Interventions: **Proximal Protection !**

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Table V. Predictors of bad clinical outcome (mRS > 2) at 90 days

Univariate	Multivariate
GP IIb/IIIa inhibitor IA bolus + IV infusion OR = 23.8 (5.3–94.5), $p < 0.001$	NIHSS > 20 OR = 14.7 (2.1–78.2), $p = 0.006$
ASPECT < 8 OR = 11.2 (3.2–38.9), $p < 0.001$	GP IIb/IIIa inhibitor IA bolus + IV infusion OR = 13.9 (5.1–84.5), $p < 0.001$
NIHSS > 20 OR = 8.3 (2.4–32.6), $p < 0.001$	ASPECT < 8 OR = 12.8 (2.0–81.6), $p = 0.007$
Tandem lesion OR 6.1 (1.8–20.8), $p = 0.004$	
Postdilatation balloon < 5 mm or absent* OR = 4.6 (1.2–17.6), $p = 0.020$	
Peri-procedural DAPT initiation OR = 0.77 (0.41–0.92), $p = 0.006$	
Balloon catheter use for cerebral protection OR = 0.68 (0.21–0.89), $p = 0.003$	

*95% CIs are provided in parentheses. *Study device postdilatation was not performed in 3 (4%) cases.*

Adv Interv Cardiol 2024; 20, 2 (76): 172–193
DOI: https://doi.org/10.5114/aic.2024.140963

Mono-Balloon Catheter:
A note of Caution

L Tekieli et al. 2025 (at review)

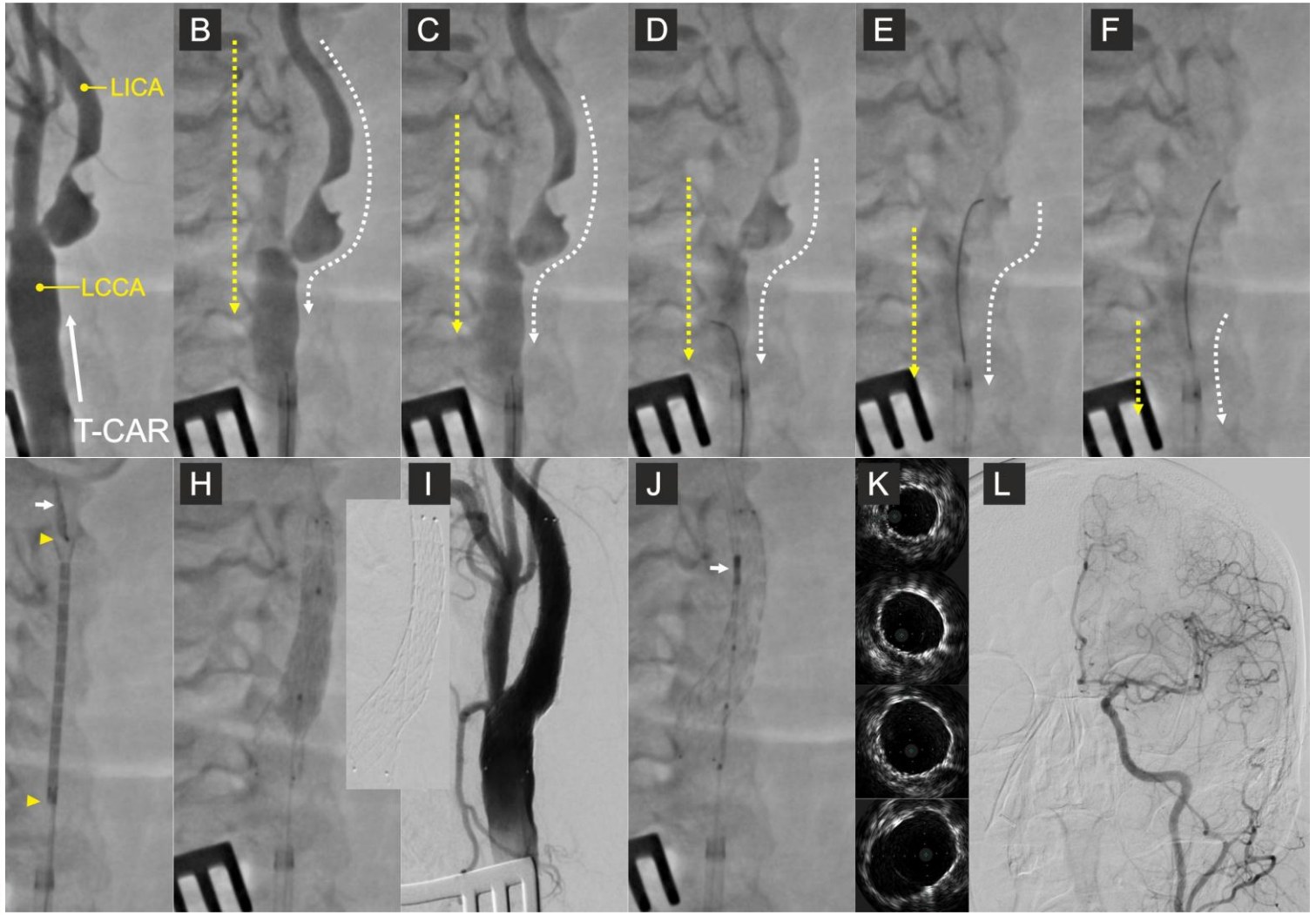
ECA Exclusion: (Likely) Irrelevant with ”Dynamic” Flow Reversal…

L Tekieli et al. 2025 (at review)

ECA Exclusion: (Likely) **Irrelevant** with ”Dynamic” Flow Reversal…

TCAR

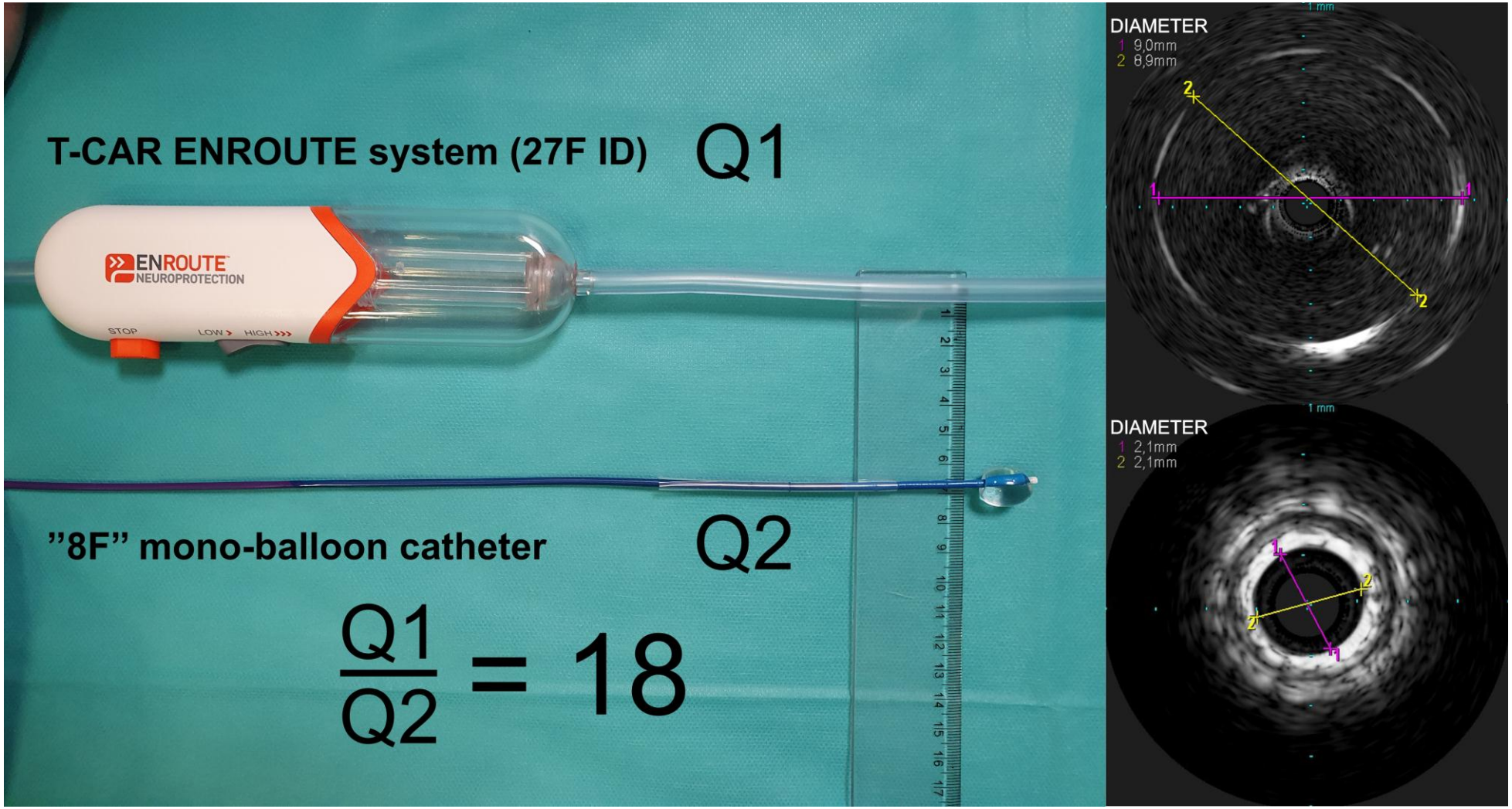
- efficient capture & removal of ***intra***-procedural debris



L Tekieli et al. 2025 (at review)

Pooled data:

ECA Exclusion: (Likely) Irrelevant with ”Dynamic” Flow Reversal…



L Tekieli et al. 2025 (at review)

Inappropriate EPD use
(wrong device and/or wrong use)

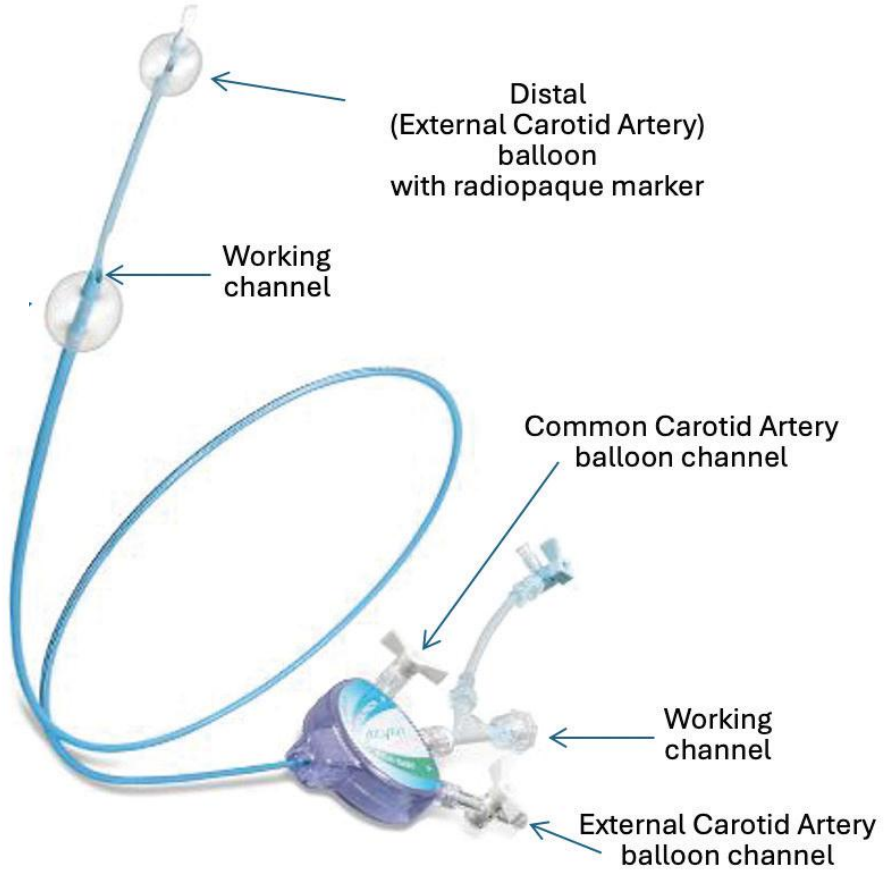
Inappropriate EPD use
(wrong device and/or wrong use)

can CAUSE Stroke

Proximal Embolic Protection

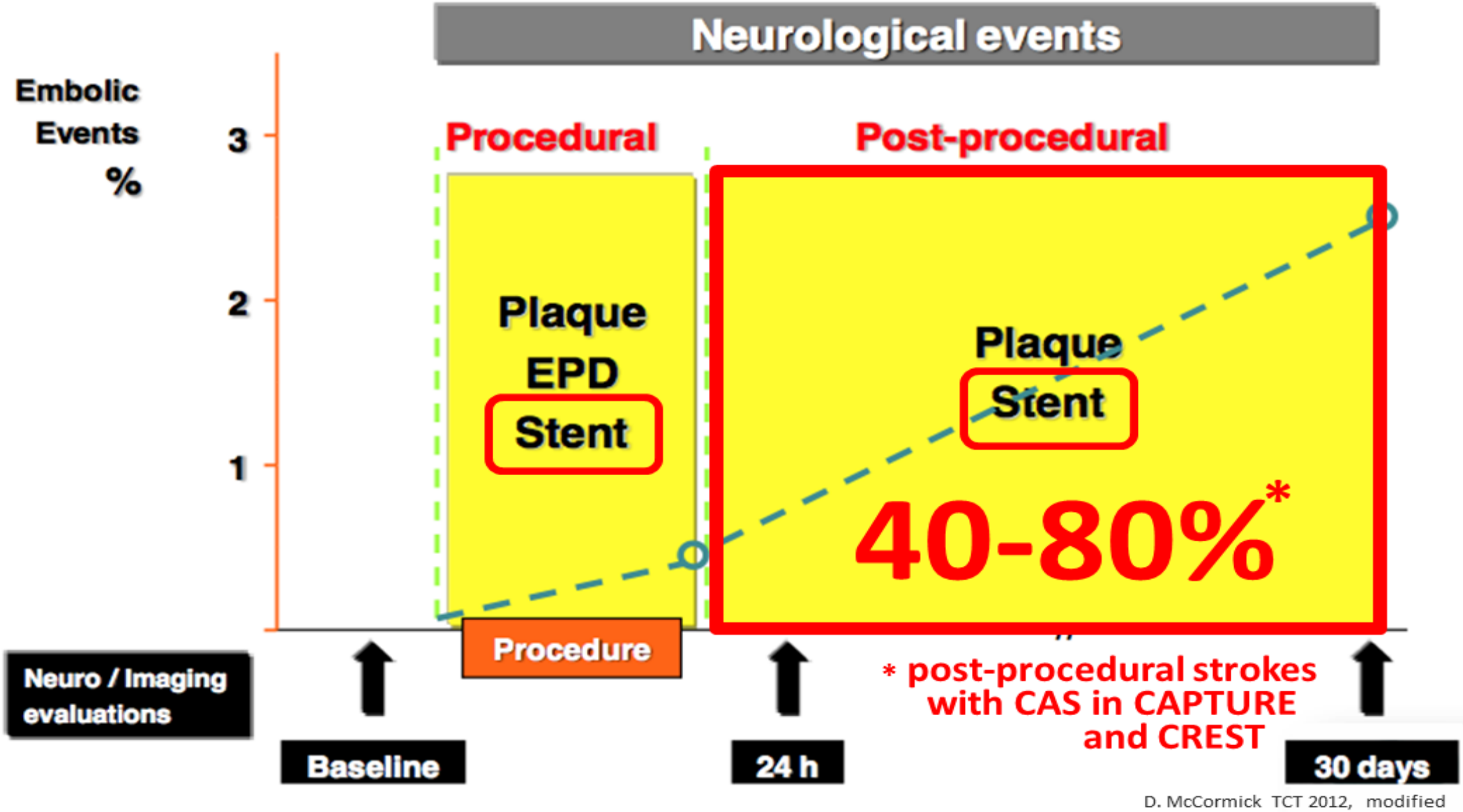
With the Mo.Ma Ultra Device: A "Must Know How" for Competent Carotid Artery Stenting

Simulator–based operator training



- **Know HOW** (to exert/use Prox EPD)
- **REVERSE** (rather than ’just’ arrest flow)
- Pair with **ANTI-EMBOLIC STENT**
- (OPTIMIZE the STENT, observe IFUs… heparin… ACT>250s, etc.)

Timing of Neuro-Embolic Events in CAS

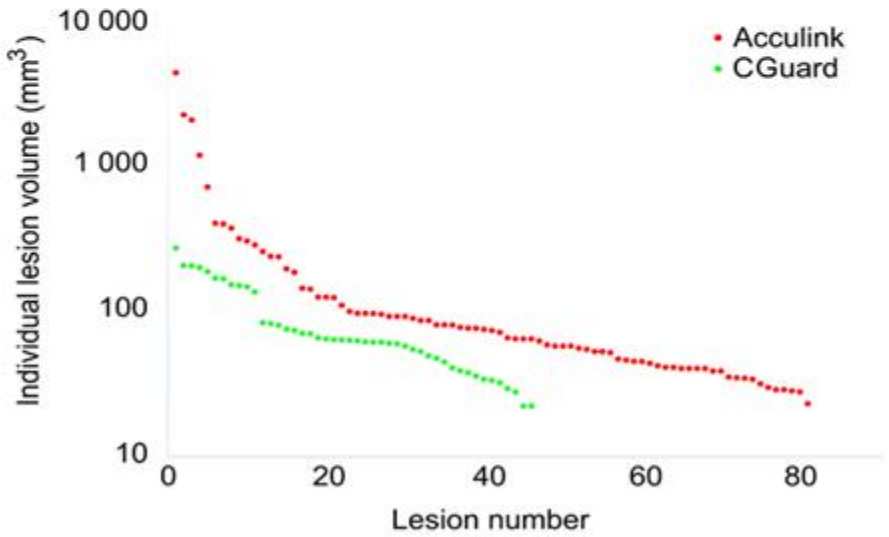


D. McCormick TCT 2012, modified

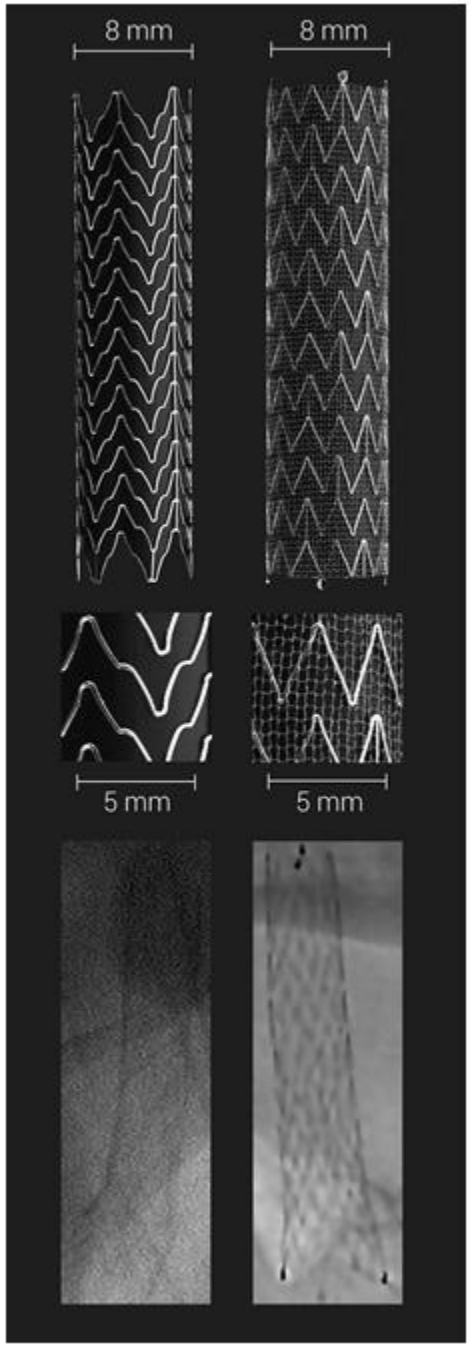
Neuro-Protective
Carotid Stent System

Randomized Controlled Trial

DW-MRI Embolism
raw data



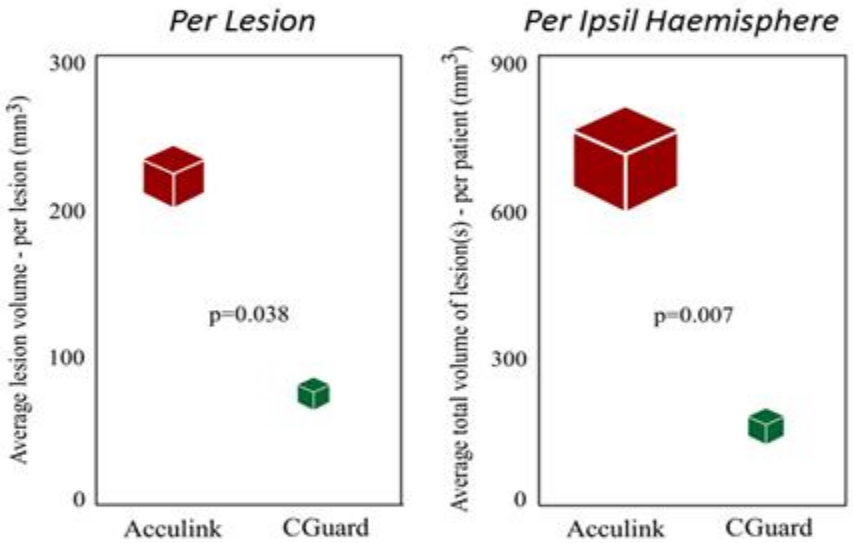
JACC: CARDIOVASCULAR INTERVENTIONS VOL. 14, NO. 21, 2021
NOVEMBER 8, 2021:2377–2387



Level 1 Evidence

Embolic Load to the Brain
PROFOUND REDUCTION
Acculink (CREST study device)

MicroNet-Covered Stent - CGuard

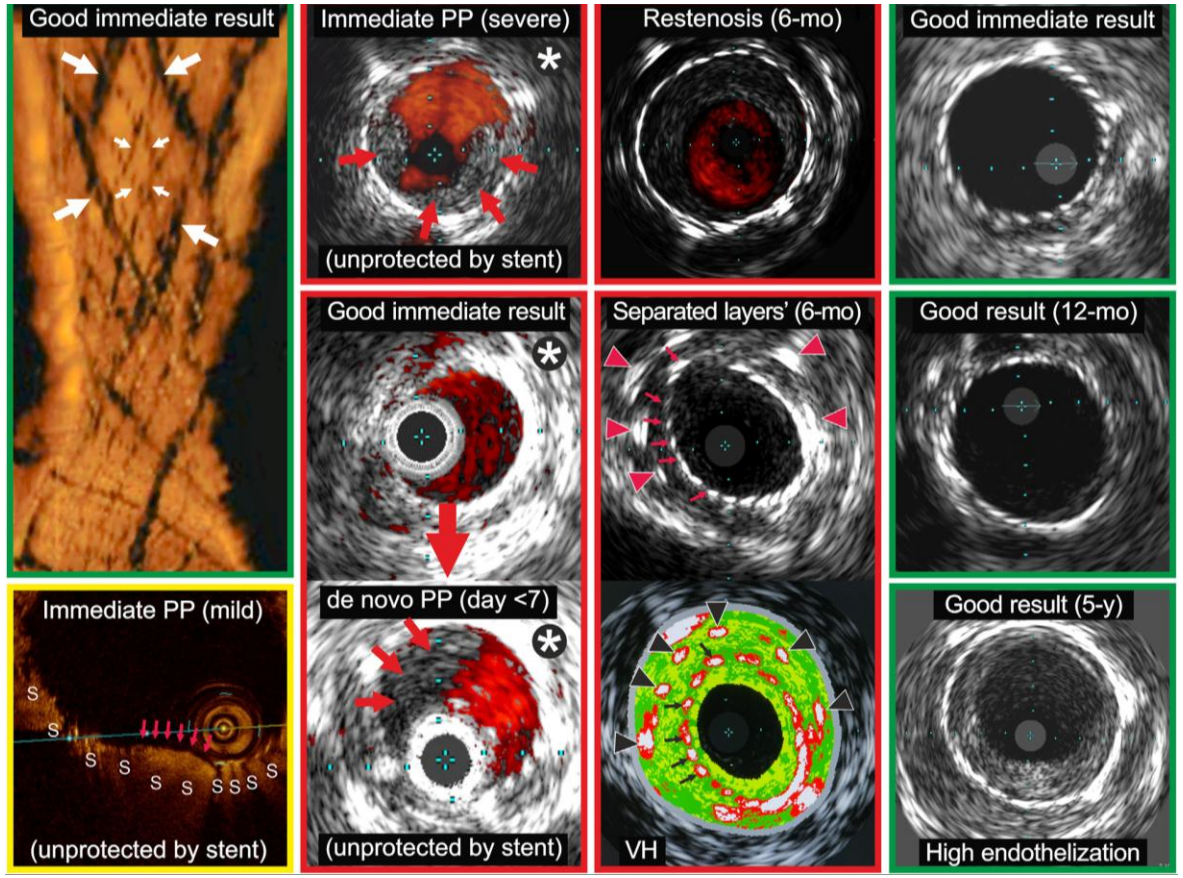


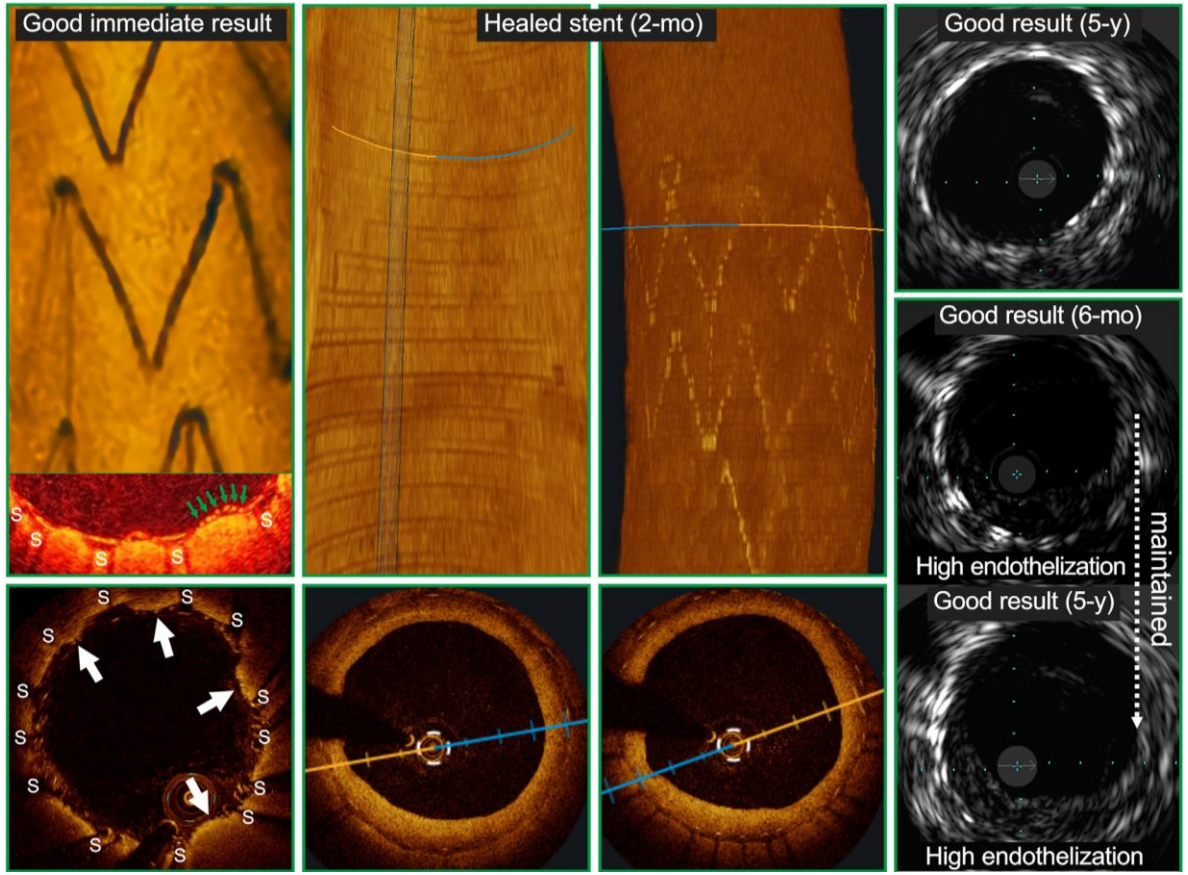
Blinded CoreLab independent anaysis

CGuard
MicroNET-Covered Stent

JSCAI
The official journal of the Society for Cardiovascular Angiography & Interventions

Carotid Antiembolic ("Mesh") Stents: Not Created Equal

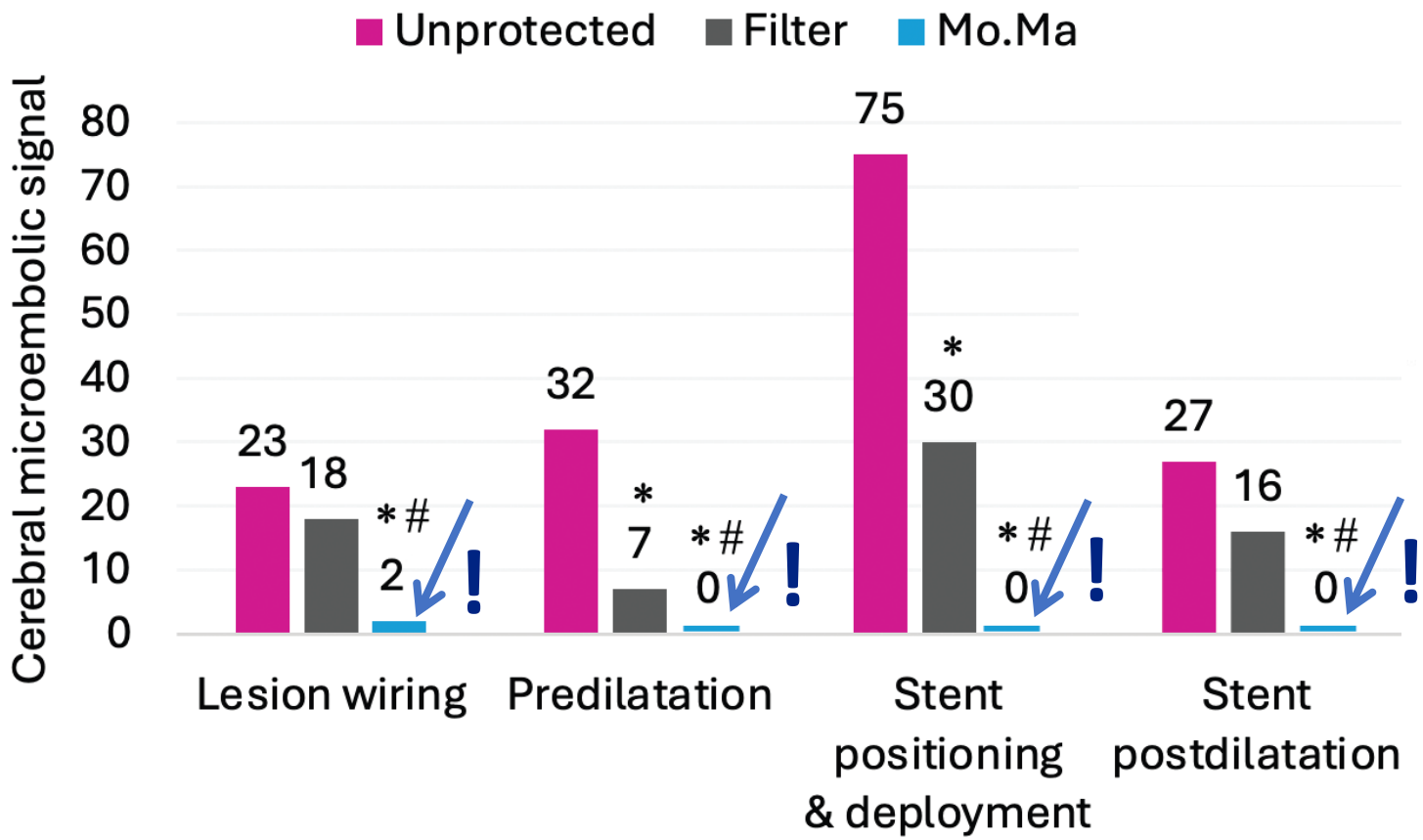


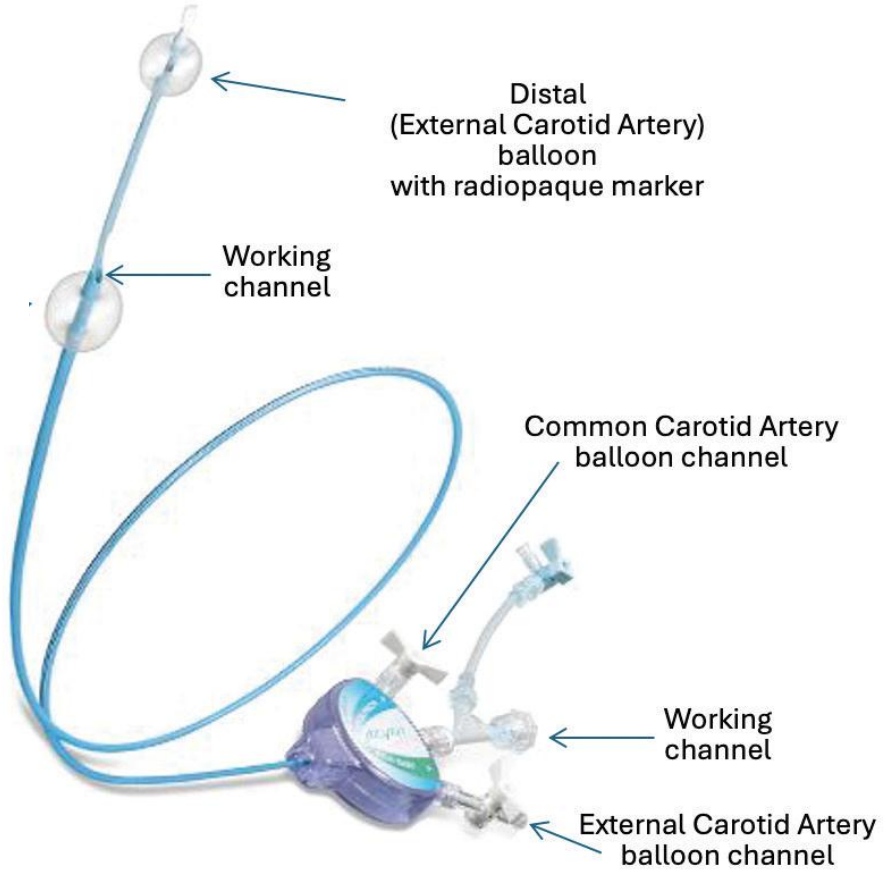


Journal of the Society for Cardiovascular Angiography & Interventions 3 (2024) 102429

Proximal Embolic Protection

With the Mo.Ma Ultra Device: A "Must Know How" for Competent Carotid Artery Stenting





Improving carotid artery stenting to match carotid endarterectomy: a task accomplished

Piotr Musialek[1,2]*, MD, DPhil; Kosmas I. Paraskevas[3], MD, PhD; Gary S. Roubin[4], MD, PhD

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There are no scientific reasons today that the carotid artery should remain the last artery in the body "reserved" for preferential open surgery. Today, physicians, and more importantly patients[2], do have a choice of treatment mode.

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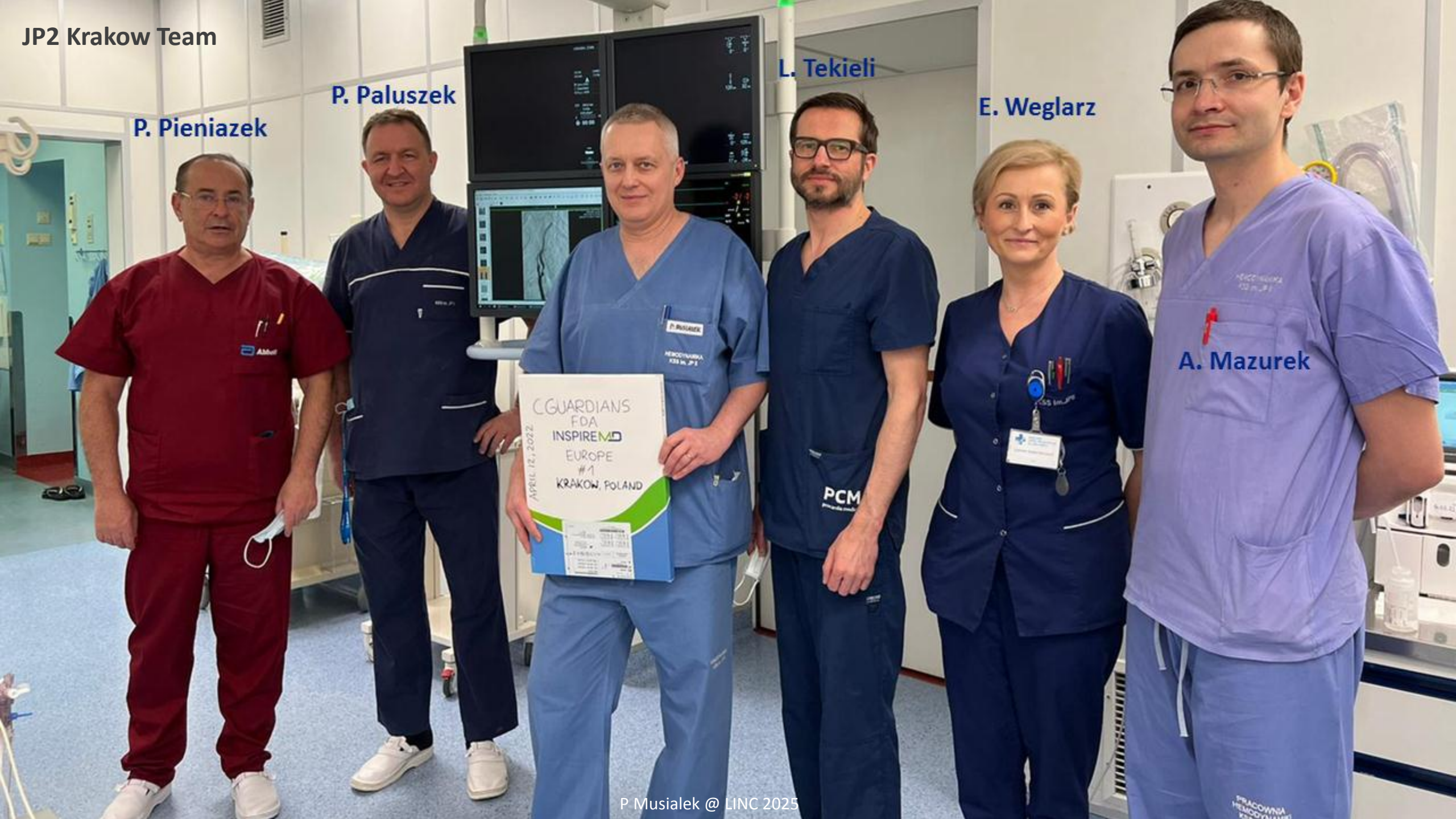
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Proximal Embolic Protection

a *must-know-how* for

competent carotid stenting

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