Keynote Lecture

Where Does Interventional Cardiologist Fit in Advancing Interventional Treatment of Stroke?

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Disclosure

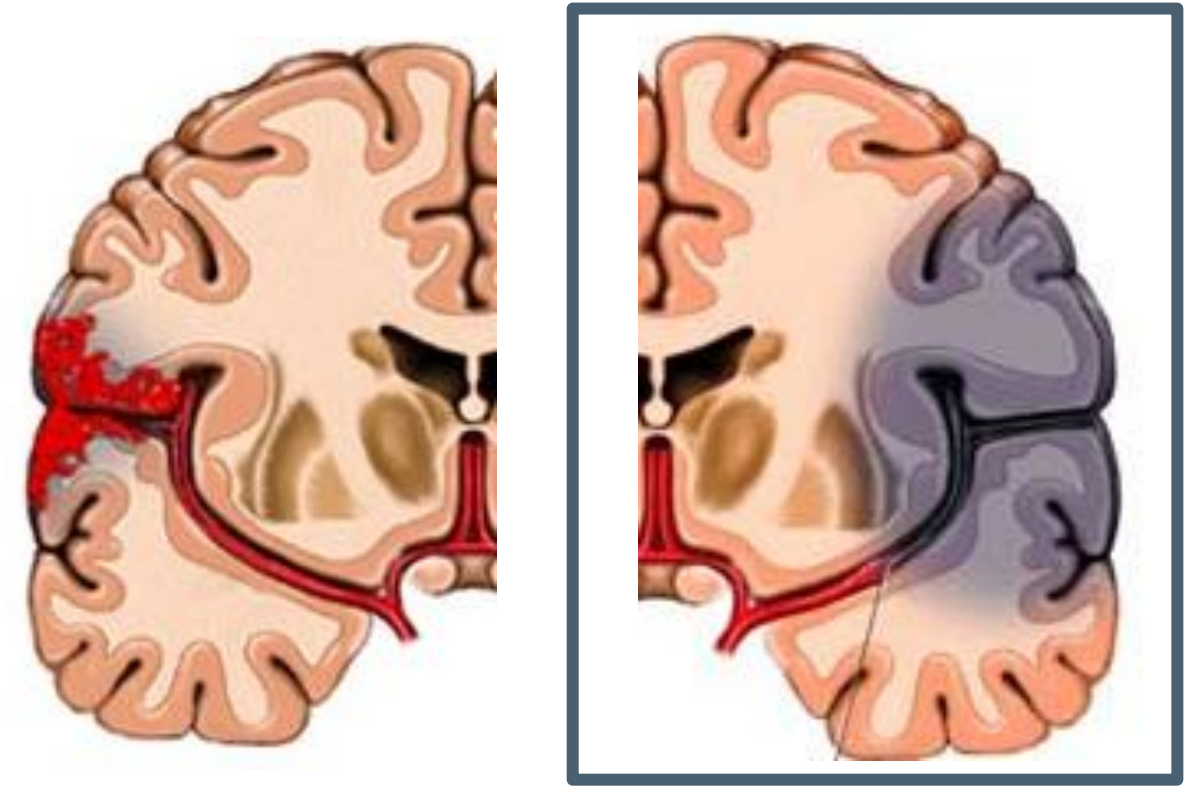
Speaker name: Piotr Musialek
I have the following potential conflicts of interest to report:

- ☑ 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

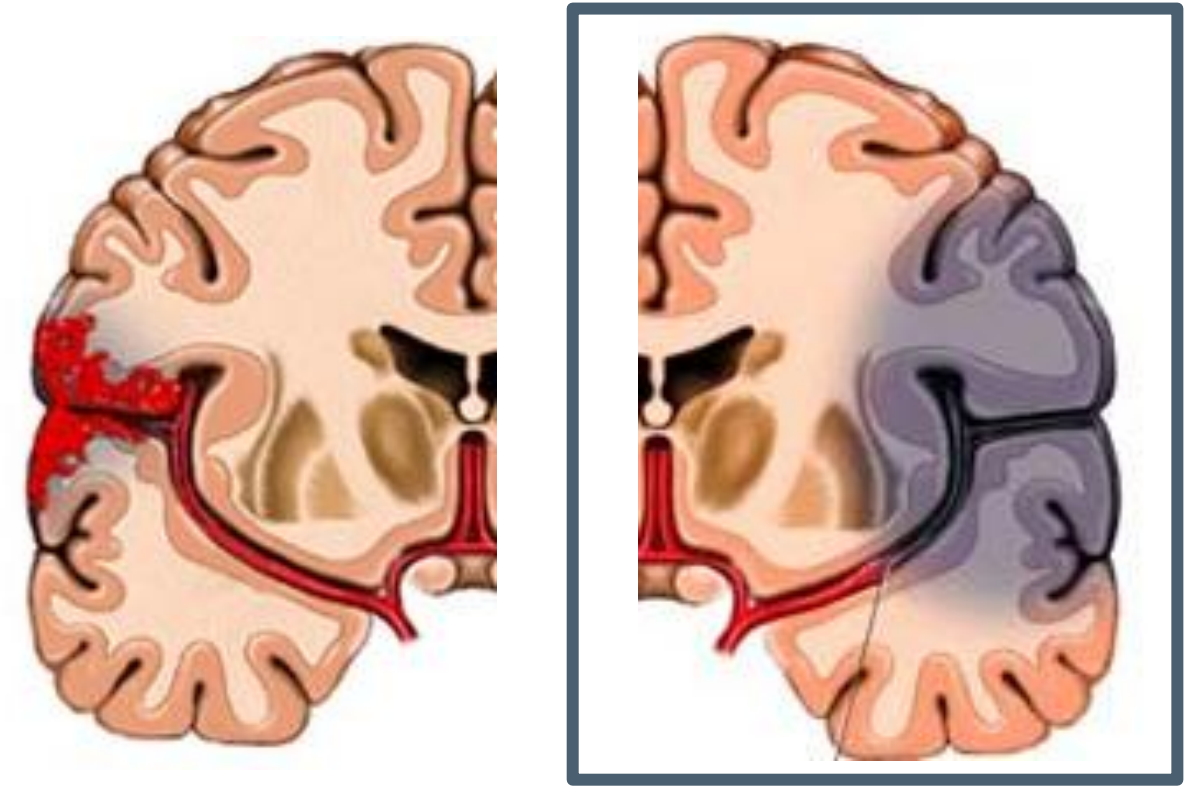
ICs in Stroke

1. **Natural**
2. (can) **Provide** (missing) **Volume**
3. **Progress/Innovation**

Stroke: NOT a Primary Neuronal Disease

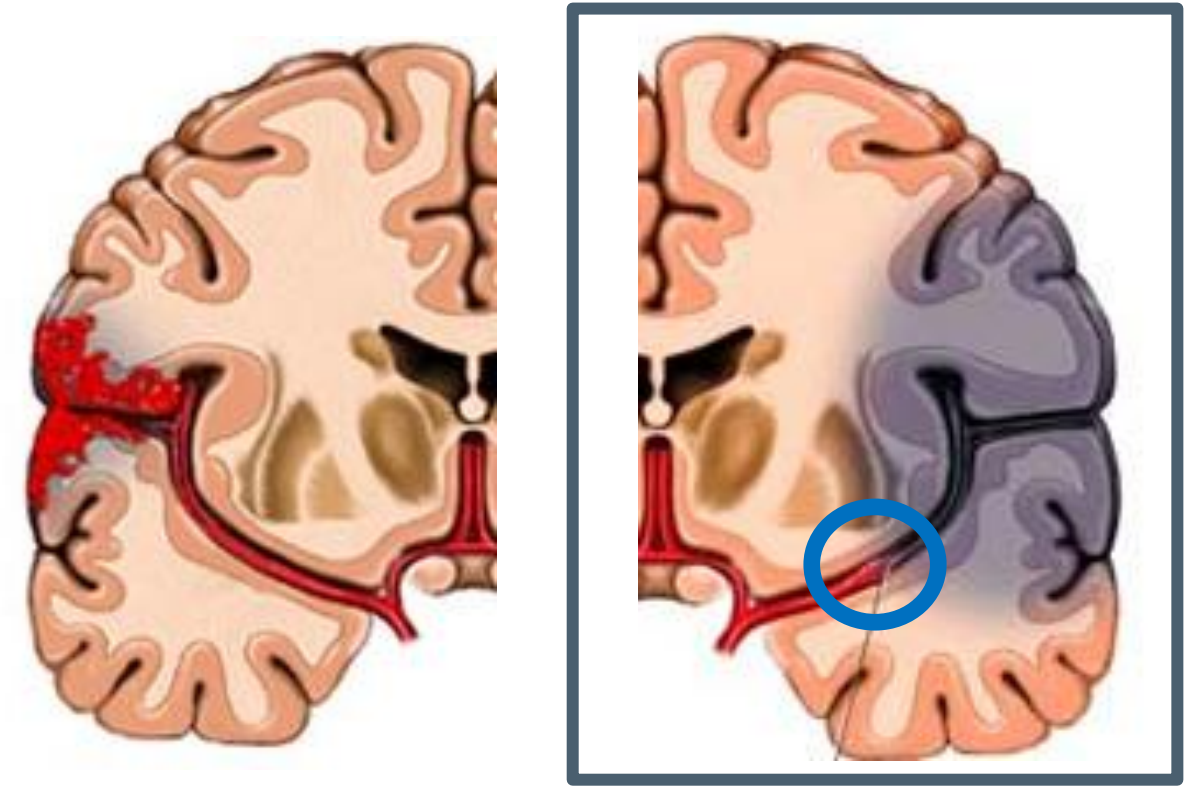


Stroke: NOT a Primary Neuronal Disease



V A S C U L A R DISEASE OF THE BRAIN

Stroke: NOT a Primary Neuronal Disease

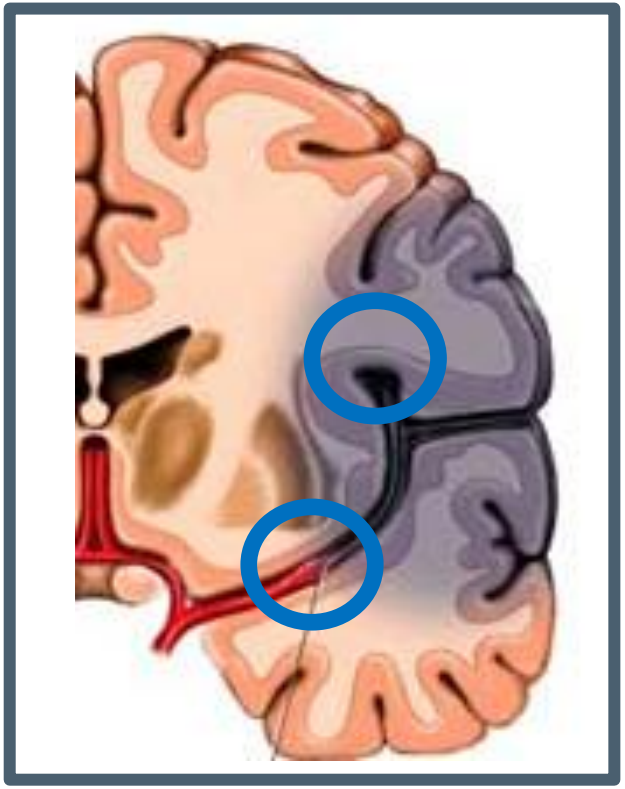


LVO

>15-20%

V A S C U L A R DISEASE OF THE BRAIN

Stroke: NOT a Primary Neuronal Disease



LVO

MeVO

>40-50%

V A S C U L A R DISEASE OF THE BRAIN

Endovascular Stroke Treatment (EST)

Today

- An effective treatment that saves BRAINS (and Lives)

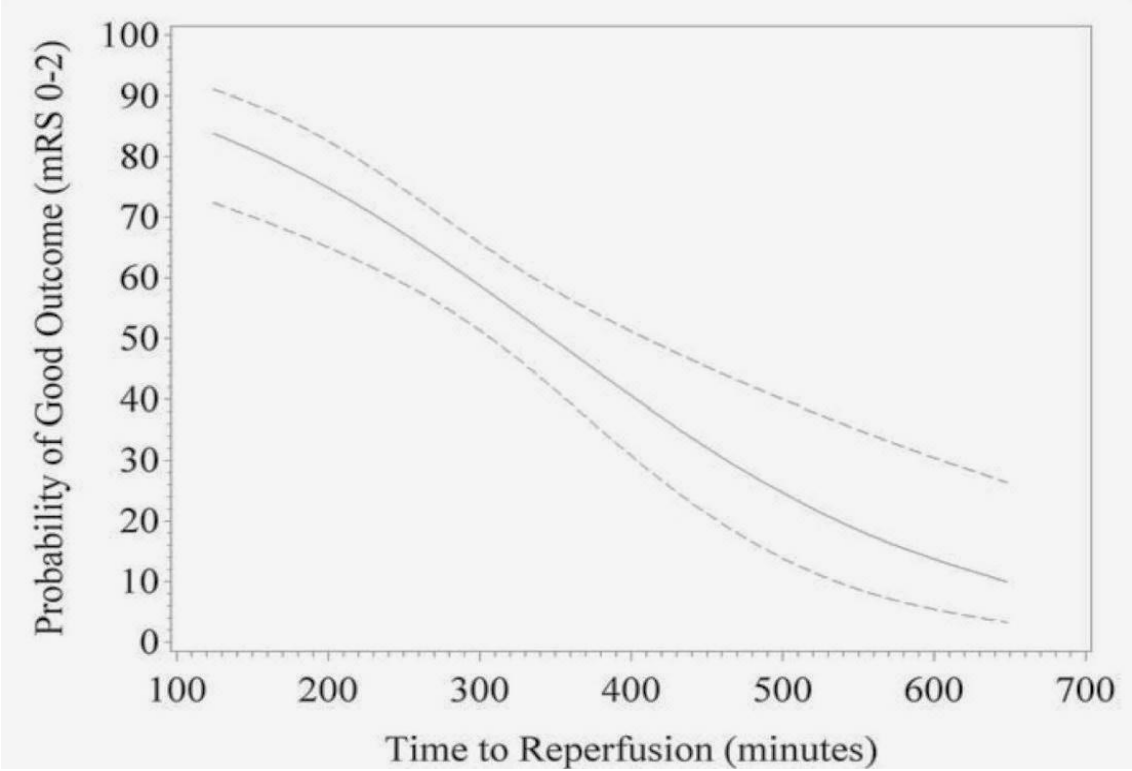
is AVAILABLE

NNT to reduce disability is 2.6!

NNT for functional independence is 5!

Goyal M et al. HERMES collaborators. Lancet. 2016;387:1723-31.

TIME is BRAIN



SWIFT-STAR

EST ≤2h

90% chance of Good clinical outcome

consistent data
SWIFT-PRIME
HERMES,
Jahan JAMA 2019

PERSPECTIVE

L. Nelson Hopkins, MD
David R. Holmes, Jr., MD

Circulation. 2017;135:1188–1190.

Public Health Urgency Created by the Success of Mechanical Thrombectomy Studies in Stroke

A new and different paradigm is needed to optimize outcome for AIS caused by large-vessel occlusion. Patients should be treated at the nearest neuro angiographic suite or cardiac catheterization laboratory to minimize delay.

Endovascular Stroke Treatment (EST)

Today

- An effective treatment that saves BRAINS (and Lives)

  is AVAILABLE

  NNT to reduce disability is 2.6!

  NNT for functional independence is 5!

- Most healthcare systems FAIL to DELIVER

Goyal M et al. HERMES collaborators. Lancet. 2016;387:1723-31.
Asif KS et al. Mechanical Thrombectomy Global Access For Stroke. Circulation. 2023;147:1208-1220.

UNMET Global Need

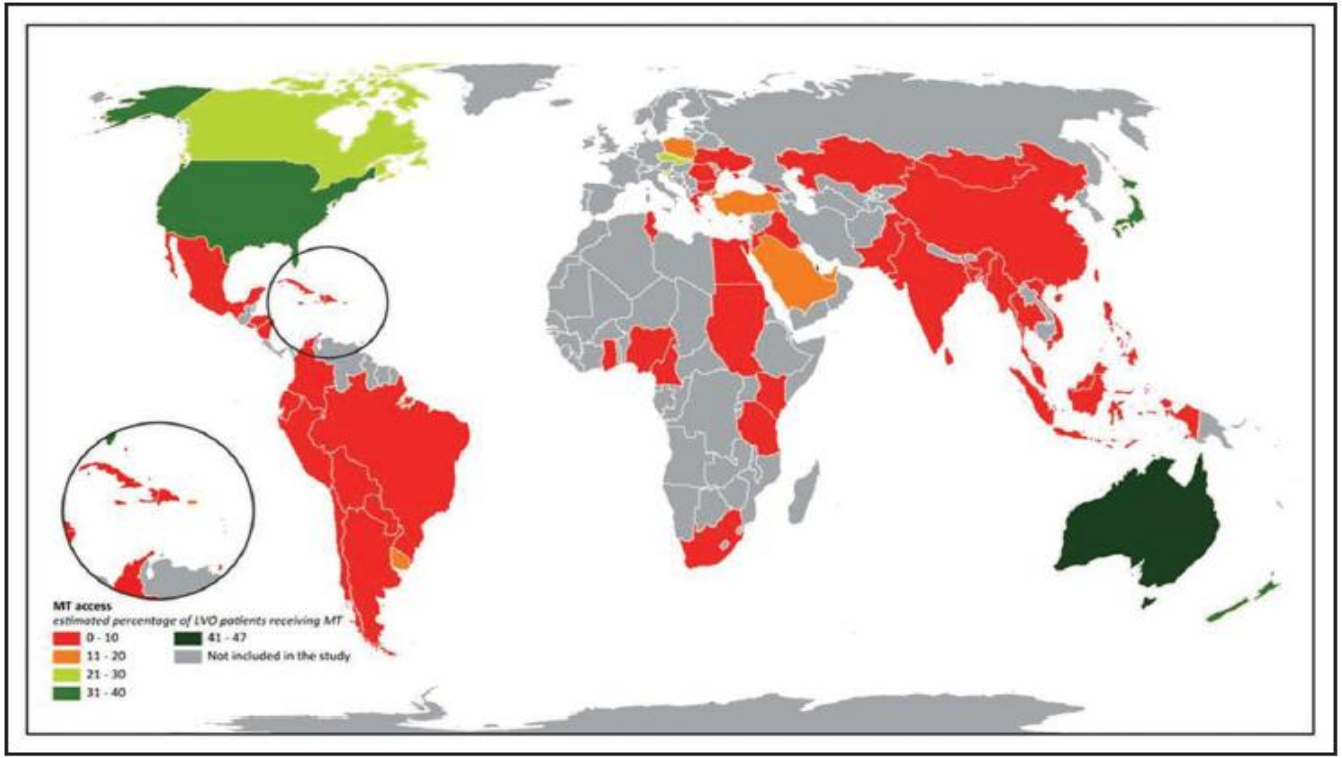


Figure 2. Map of global mechanical thrombectomy access rate.
Estimated percentages of patients with large vessel occlusion (LVO) receiving mechanical thrombectomy (MT) are denoted by color.

Asif KS et al. Mechanical Thrombectomy Global Access For Stroke. Circulation. 2023;147:1208-1220.

PERSPECTIVE

L. Nelson Hopkins, MD
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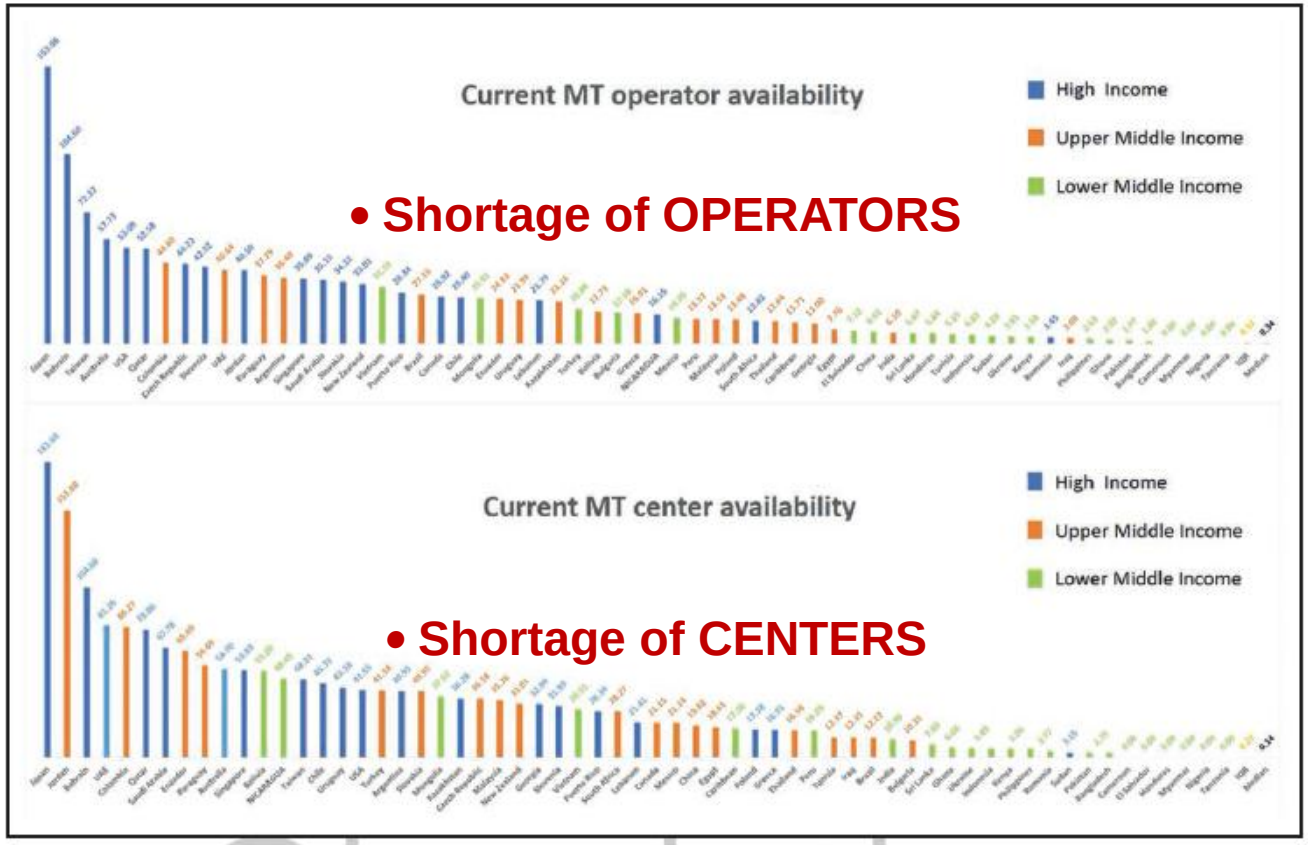
Circulation. 2017;135:1188–1190.

Public Health Urgency Created by the Success of Mechanical Thrombectomy Studies in Stroke

Training of interventional cardiologists should be individualized but meet a well-defined bar, and it should be based on the cardiologist's interest, experience, skill set, local multidisciplinary capabilities, and institutional commitment to collaboration. We envision stroke intervention performed successfully and efficiently by appropriately trained physicians from different specialties who are skilled in navigating and opening small arteries. Cardiologists and interested interventional radiologists must join in AIS treatment, and turf issues must not be allowed to interfere with the overarching public health benefits. Many barriers must be overcome

Nick Hopkins 1943–2024

Most healthcare systems FAIL to DELIVER



Asif KS et al. Mechanical Thrombectomy Global Access For Stroke. Circulation. 2023;147:1208-1220.

INRs

- mostly treat YOUNG
- mostly OCCLUDE (aneurysms)
- mostly TF

ICs

- mostly treat ELDERLY
- mostly OPEN (arteries)
- mostly TR

INRs "vs." ICs

INRs ~~"vs."~~ ICs

INRs AND ICs

INRs AND ICs

COLLABORATION

INRs AND ICs

COLLABORATION

TRANSFER OF SKILLS

(when working TOGETHER)

NEUROPROTECTION

NEUROPROTECTION

¼ - ⅓ STROKES

involve

Carotid Artery Stenosis

NEUROPROTECTION

¼ – ⅓ STROKES

involve

Carotid Artery Stenosis

ICs have experience in NEUROPROTECTED CAS (incl. Proximal Cerebral Protection)

Cerebral Artery ≠ Coronary Artery

Cerebral Artery ≠ Coronary Artery

EST ≠ pPCI

	Acute Myocardial Infarction	Acute Ischemic Stroke
Arterial wall composition	Typical three-layer wall Less prone to arterial rupture	Thinner and more fragile vessel wall Media and adventitia only one-third as thick as extracranial vessels of the same size Unsuitable for high-pressure balloon angioplasty or Balloon-expandable stent implantation
Causes of acute arterial occlusion	Ruptured atherosclerotic plaque and in situ thrombus	Distal embolus (most common) or local atherosclerotic plaque
Pathophysiology	Acute ischemia is caused by an acute arterial occlusion. The sooner the artery is reopened, the more ischemic tissue is saved, with less necrosis.	Acute ischemia is caused by acute arterial occlusion. The sooner the artery is reopened, the more tissue at the penumbra is saved, with less volume of ischemic core.
Interventional cardiologists in the workflow	Interventional cardiologists take a central position in the decisions.	Thrombectomy is an "appendix" to the stroke workflow. Neurologists command the workflow and decide for MT. Interventional cardiologists integrate the stroke team.
Examination that triggers the urgent percutaneous procedure	ECG showing ST-segment elevation	CT angiography showing LVO (after evaluation of standard CT images along with assessment of cerebral perfusion)
Knowledge of vascular anatomy before the procedure	ECG is used to guess the culprit artery Arterial anatomy is known only during the catheterization	CT angiography reveals the culprit vessel, the level of occlusion, the extent of occlusion. The carotid and aortic arch anatomy are usually known before the catheterization. This information aids in choosing the most appropriate materials and techniques beforehand.
Primary goals of recanalization	Recanalization as soon as possible ("time is muscle") Angiographic TIMI flow grade 3 result	Recanalization as soon as possible ("time is brain") Angiographic TICI grade 3 result
Techniques for arterial recanalization	Thrombus aspiration and balloon expandable stents.	Thrombus aspiration and/or stent retrievers; stent implantation is avoided
Anatomic and technical conditions for interventions	Coronary arteries move all the time, which increases the difficulty of the procedure (beating heart).	Cerebral arteries do not move, facilitating interventions and allowing the use of some techniques as a "roadmap." Interventional cardiologists must deeply dive into the study of cerebral vascular anatomy and acquire the same 3D comprehension of neurovascular anatomy as they have of coronary arteries.
Differences in the importance of small branches	Losing small branches (such as small side branches) generally does not affect the overall patient outcome.	Losing small branches (i.e., lenticulostriate branches, anterior choroidal artery) can cause a severe functional impact on the patient's life.
Backup surgical team	Cardiac surgeons are rarely contacted.	Neurosurgeons are rarely needed for MT complications but for complications observed with the use of thrombolytic agents.

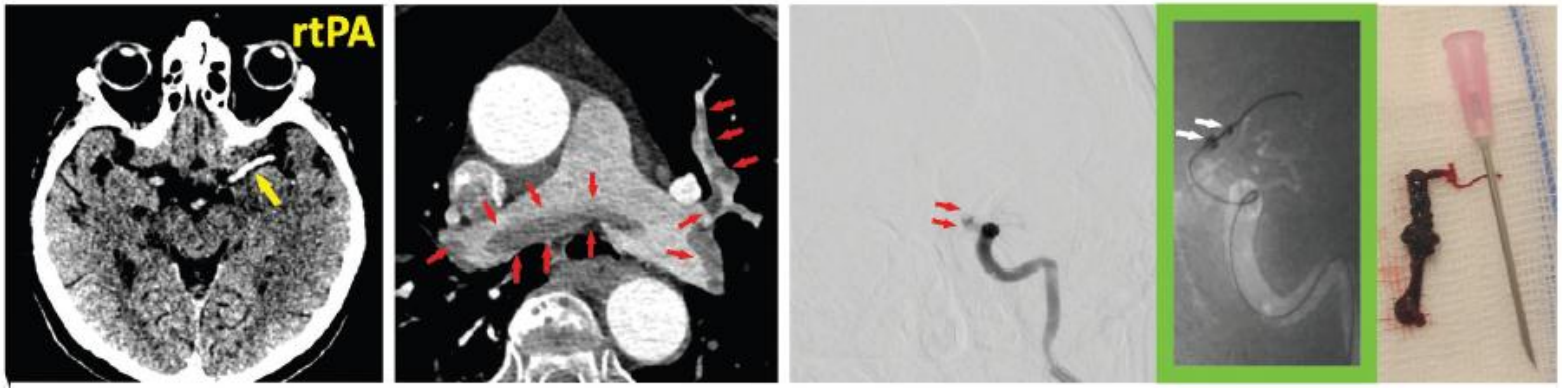
With humble awareness of these (and other) differences…

CARDIOLOGY CAN

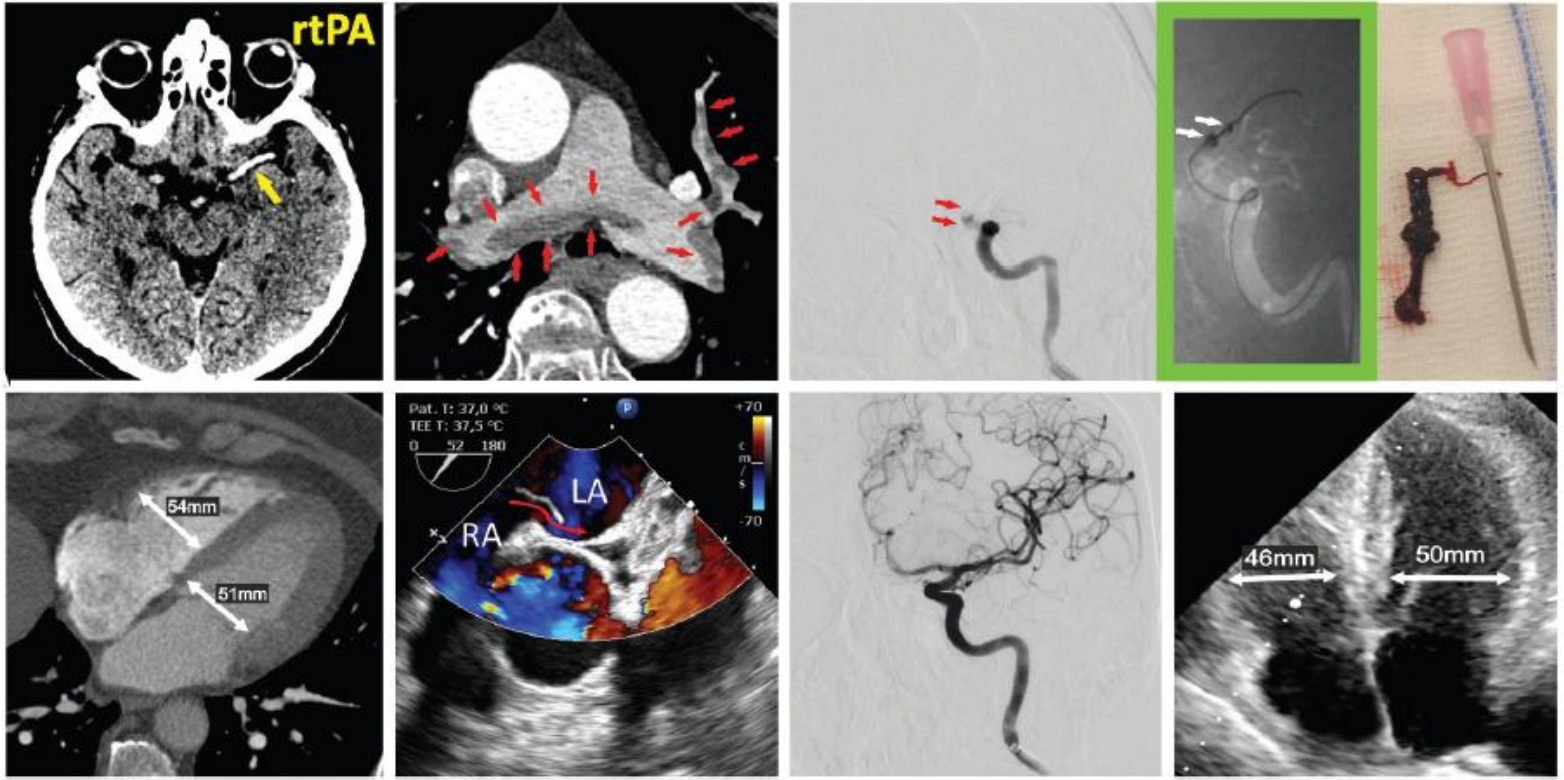
With humble awareness of these (and other) differences…

CARDIOLOGY CAN

First-pass effect



Tekieli et al. *Pol Heart J* 2021



Cardiology cathlab-managed acute ischemic stroke in a 74-year-old man with massive pulmonary embolism and **PFO**

Tekieli et al. *Pol Heart J* 2021

CARDIAC CAUSES OF STROKE

CARDIAC CAUSES OF STROKE

INTEGRATED CARE

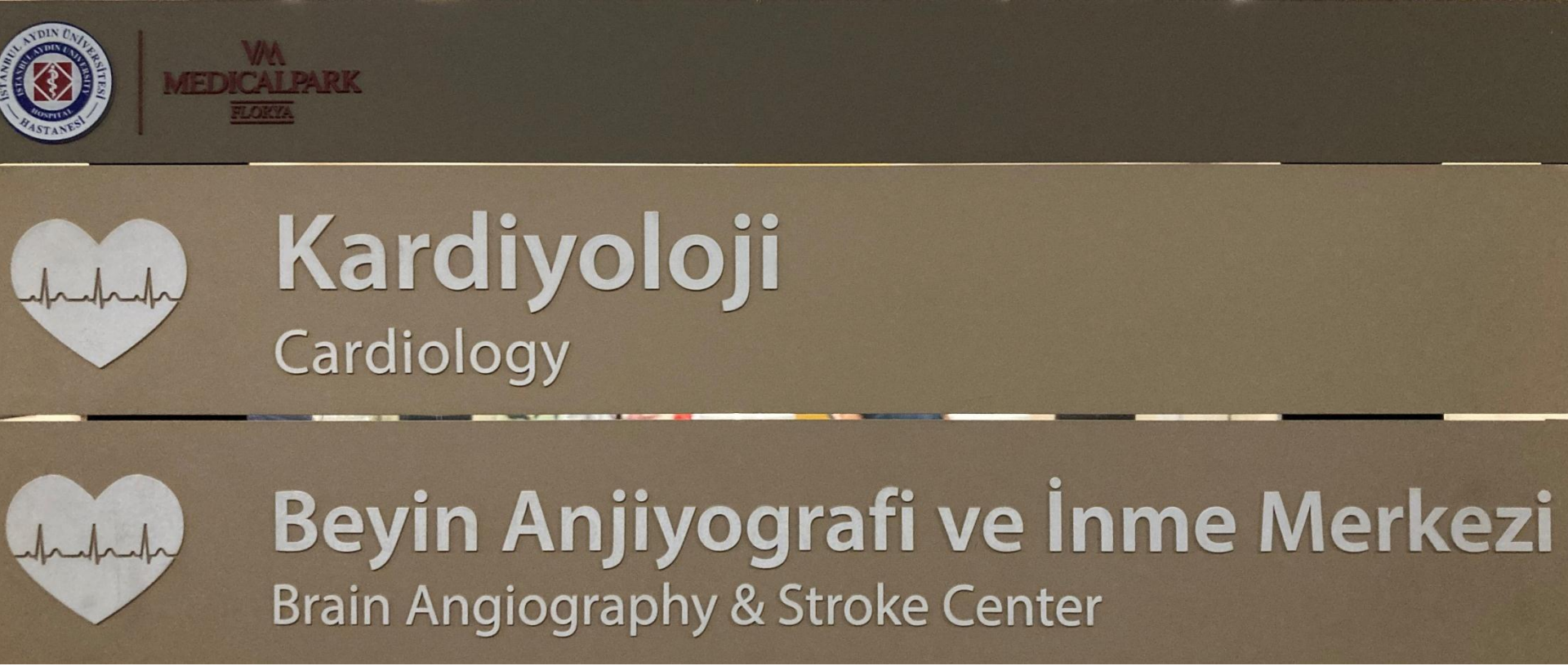
ESC European Society of Cardiology

European Heart Journal (2022) **43**, 2442–2460
https://doi.org/10.1093/eurheartj/ehac245

SPECIAL ARTICLE

Integrated care for optimizing the management of stroke and associated heart disease: a position paper of the European Society of Cardiology Council on Stroke

Gregory Y. H. Lip [1,2,3,4]*†, Deirdre A. Lane[1,2], Radosław Lenarczyk[3], Giuseppe Boriani [5], Wolfram Doehner [6], Laura A. Benjamin[7], Marc Fisher[8], Deborah Lowe[9], Ralph L. Sacco[10], Renate Schnabel[11], Caroline Watkins[12], George Ntaios [13], and Tatjana Potpara [4,14]†


İSTANBUL AYDIN ÜNİVERSİTESİ
HASTANESİ
MEDICALPARK
FLORYA
Kardiyoloji
Cardiology
Beyin Anjiyografi ve İnme Merkezi
Brain Angiography & Stroke Center

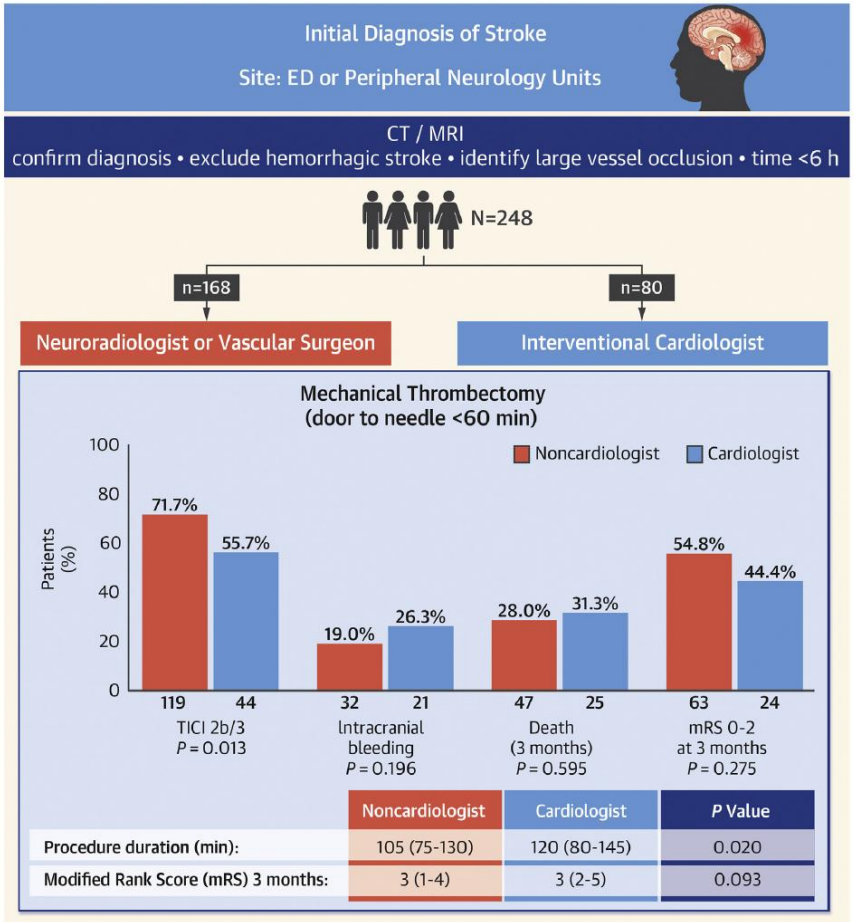
İSTANBUL AYDIN ÜNİVERSİTESİ HASTANESİ

VM MEDICALPARK FLORYA

Kardiyoloji
Cardiology

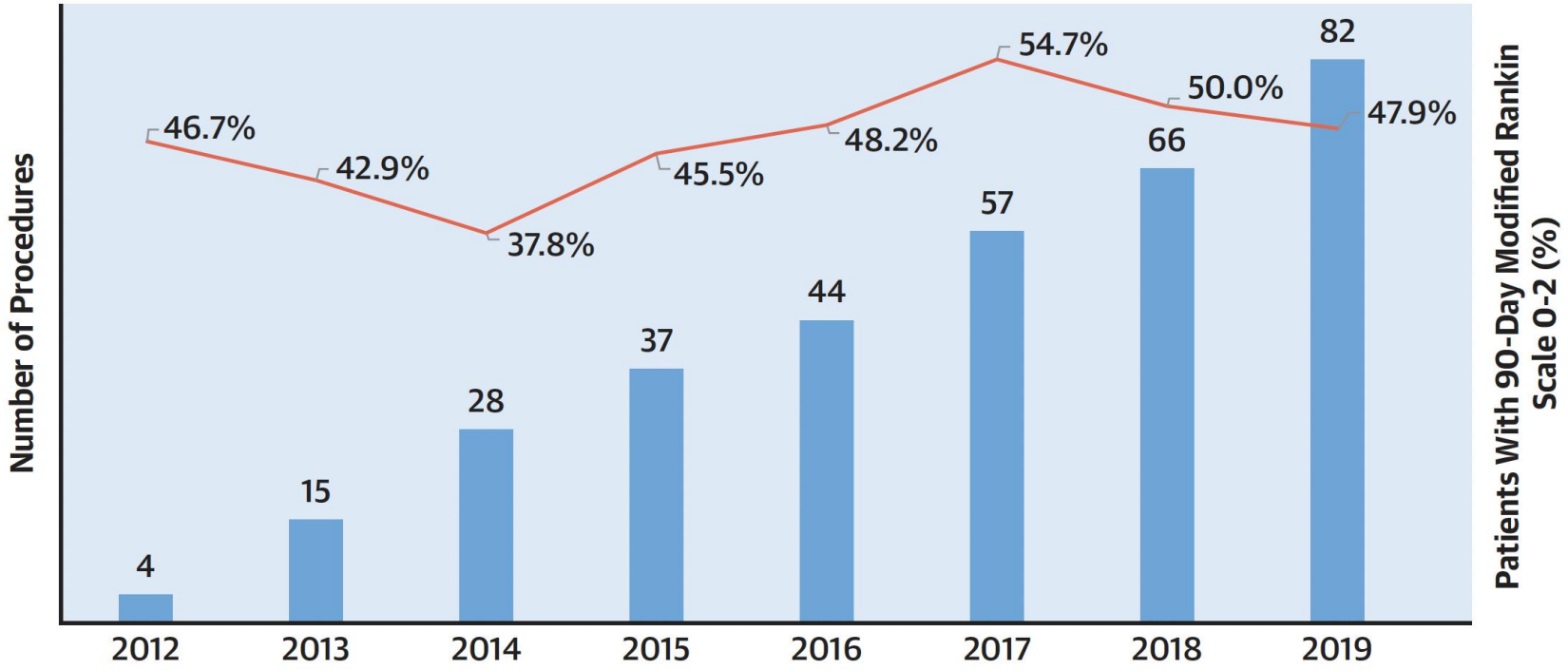
Beyin Anjiyografi ve İnme Merkezi
Brain Angiography & Stroke Center

CENTRAL ILLUSTRATION Mechanical Thrombectomy Performed by Interventional Cardiologists: Study Design and Key Results



	Noncardiologist	Cardiologist	*P* Value
Procedure duration (min):	105 (75-130)	120 (80-145)	0.020
Modified Rank Score (mRS) 3 months:	3 (1-4)	3 (2-5)	0.093

Wita, K. et al. J Am Coll Cardiol Intv. 2022;15(5):550–558.



Sulženko, J. et al. J Am Coll Cardiol Intv. 2021;14(7):785-92.

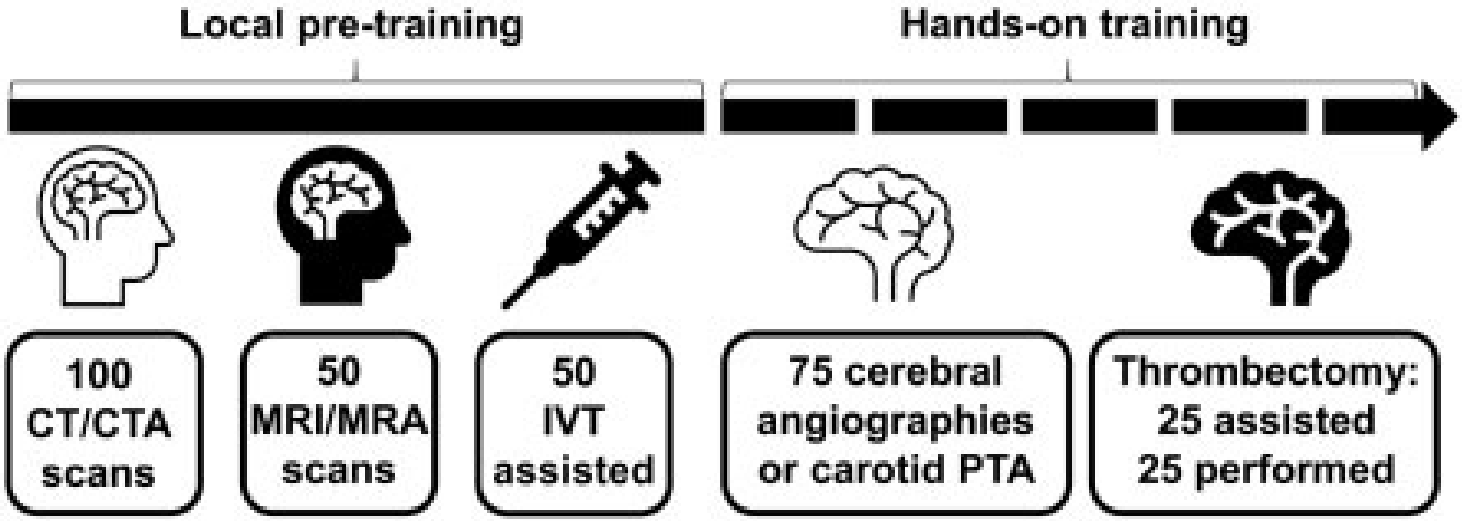
Stable clinical outcomes when acute stroke thrombectomy program is started in experienced cardiology cath lab in close cooperation with neurologists and radiologists.

TRAINING

ESC European Society of Cardiology
European Heart Journal (2021) 42, 298–307
doi:10.1093/eurheartj/ehaa833

SPECIAL ARTICLE

Interdisciplinary management of acute ischaemic stroke: Current evidence training requirements for endovascular stroke treatment: Position Paper from the ESC Council on Stroke and the European Association for Percutaneous Cardiovascular Interventions with the support of the European Board of Neurointervention



Interdisciplinary management of acute ischaemic stroke – current evidence on training requirements for endovascular stroke treatment. Position Paper from the ESC Council on Stroke and the European Association for Percutaneous Cardiovascular Interventions with the support of the European Board of Neurointervention: A step forward

Adv Interv Cardiol 2021; 17, 3 (65): 245–250
DOI: https://doi.org/10.5114/aic.2021.109832

Piotr Musialek[1], Rafal Nizankowski[2], L. Nelson Hopkins[3], Antonio Micari[4], Carlos Alejandro Alvarez[5], Dimitrios N. Nikas[6], Zoltán Ruzsa[7], Anna Luisa Kühn[8], Ivo Petrov[9], Maria Politi[10], Sanjay Pillai[11], Panagiotis Papanagiotou[10,12], Klaus Mathias[13], Horst Sievert[14,15], Iris Q. Grunwald[16]

In contrast to elective procedures, MT is a procedure that cannot be "arranged" for training in a desired time and location. Operator experience in CAS en route to MT should be recognized and result in a shorter pathway to becoming certified in MT [19, 33]. In light of recent evidence showing no excess complications in MTs performed by cardiologists (and those with CAS experience in particular) [34–37]) the presently suggested unrealistic "first operator" MT delivery requirements including 50 prior MTs [22] should be replaced or suspended.

WORLD FEDERATION FOR INTERVENTIONAL STROKE TREATMENT
WIST

Simulator Training

WORLD FEDERATION FOR INTERVENTIONAL STROKE TREATMENT
WIST

Simulator Training

Human Stroke Model

WORLD FEDERATION FOR INTERVENTIONAL STROKE TREATMENT

WIST

Simulator Training

Human Stroke Model

Team Training

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Guidelines

World Federation for Interventional Stroke Treatment (WIST) multispecialty training guidelines for endovascular stroke intervention

Iris Q. Grunwald[1,2,3], Klaus Mathias[4], Stefan Bertog[3,5], Kenneth V. Snyder[6], Horst Sievert[3], Adnan Siddiqui[6], Piotr Musialek[7], Marius Hornung[3,8], Panagiotes Papanagiotou[9,10], Simone Comelli[11], Sanjay Pillai[1], Helen Routledge[12], Rafal T. Nizankowski[13], Ian Ewart[14], Klaus Fassbender[15], Anna L. Kühn[16], Carlos A. Alvarez[17], Bagrat Alekyan[18], Dimitry Skrypnik[19], Maria Politi[9], Lukasz Tekieli[7], Thomas Haldis[20], Shailesh Gaikwad[21], John Graeme Houston[2], Helen Donald-Simpson[2], Paul Guyler[14], Ivo Petrov[22], Christine Roffe[23], Mark Abelson[24], David Hargroves[25], Sunithi Mani[26], Anna Podlasek[2,27], Adam Witkowski[28], Kolja Sievert[3], Krzysztof Pawlowski[29], Artur Dziadkiewicz[30], Nelson L. Hopkins[6]

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Cardiovascular Revascularization Medicine

World Federation for Interventional Stroke Treatment (WIST) Multispecialty Training Guidelines for Endovascular Stroke Intervention

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Cardiovascular Revascularization Medicine 53 (2023) 67–72

Guidelines

World Federation for Interventional Stroke Treatment (WIST) multispecialty training guidelines for endovascular stroke intervention

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World Federation for Interventional Stroke Treatment (WIST) Multispecialty Training Guidelines for Endovascular Stroke Intervention

Iris Q. Grunwald [a,b,c,*,**], Klaus Mathias [d], Stefan Bertog [c,e], Kenneth V. Snyder [f,g,h,i], Horst Sievert [c], Adnan Siddiqui [f,g,h,i], Piotr Musialek [j], Marius Hornung [c,k], Panagiotes Papanagiotou [l,m], Simone Comelli [n], Sanjay Pillai [a], Helen Routledge [o], Rafal T. Nizankowski [p], Ian Ewart [q], Klaus Fassbender [r], Anna L. Kühn [s], Carlos A. Alvarez [t], Bagrat Alekyan [u], Dmitry Skrypnik [v], Maria Politi [l], Lukasz Tekieli [j], Thomas Haldis [w], Shailesh Gaikwad [x], John Graeme Houston [b], Helen Donald-Simpson [b], Paul Guyler [q], Ivo Petrov [y], Christine Roffe [z], Mark Abelson [aa], David Hargroves [ab], Sunithi Mani [ac], Anna Podlasek [b,ad], Adam Witkowski [ae], ...ja Sievert [c], Krzysztof Pawlowski [af], Artur Dziadkiewicz [ag], Nelson L. Hopkins [f,g,h,i]

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WORLD FEDERATION FOR INTERVENTIONAL STROKE TREATMENT
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Cardiovascular Revascularization Medicine 53 (2023) 67–72

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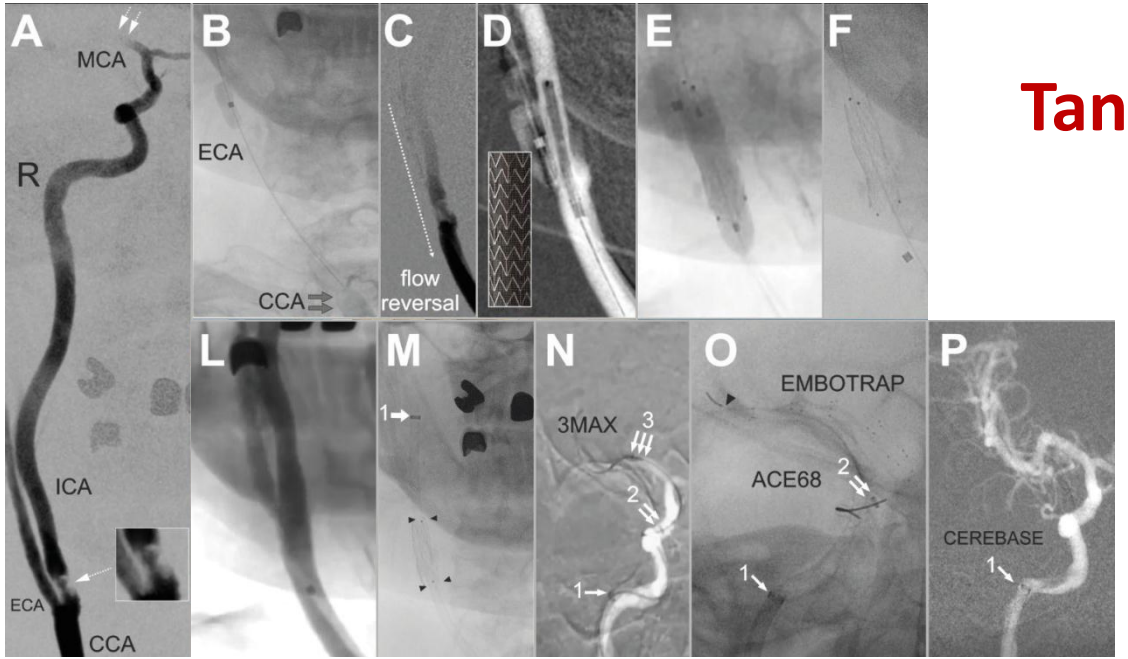
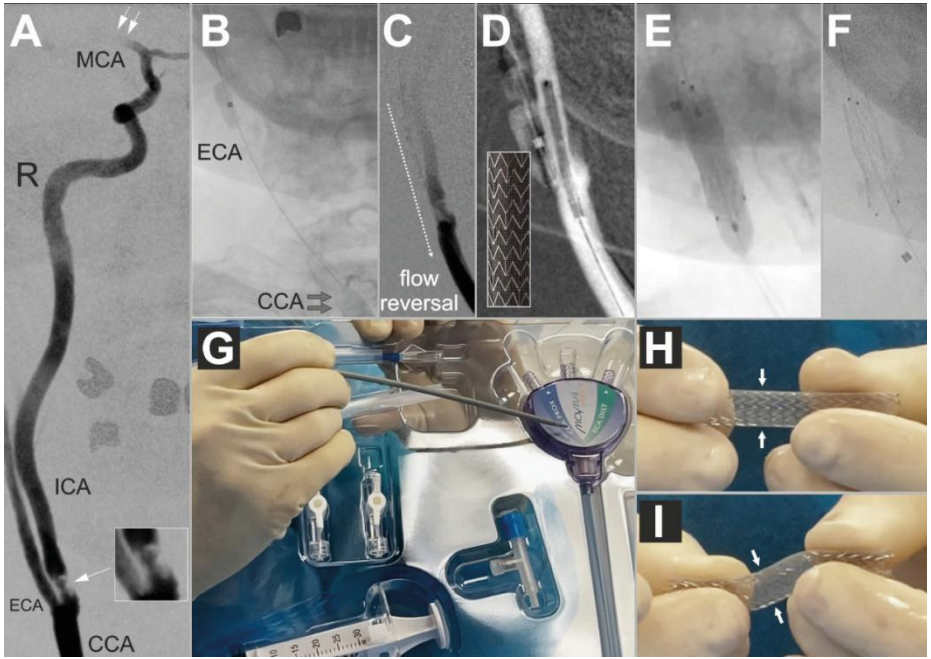
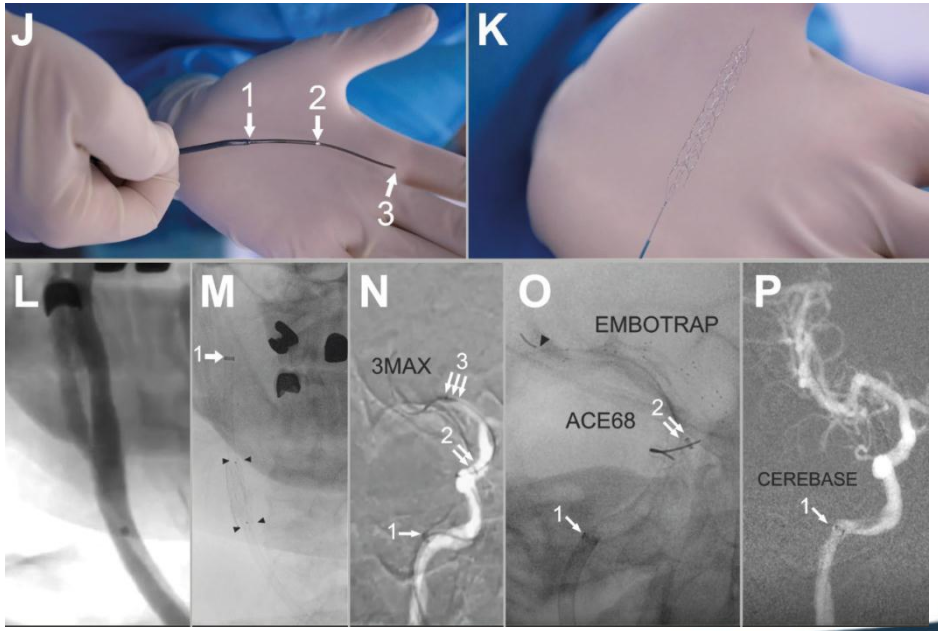


Tandem stroke ’live’ case

Advancing Training

Tandem stroke ’live’ case





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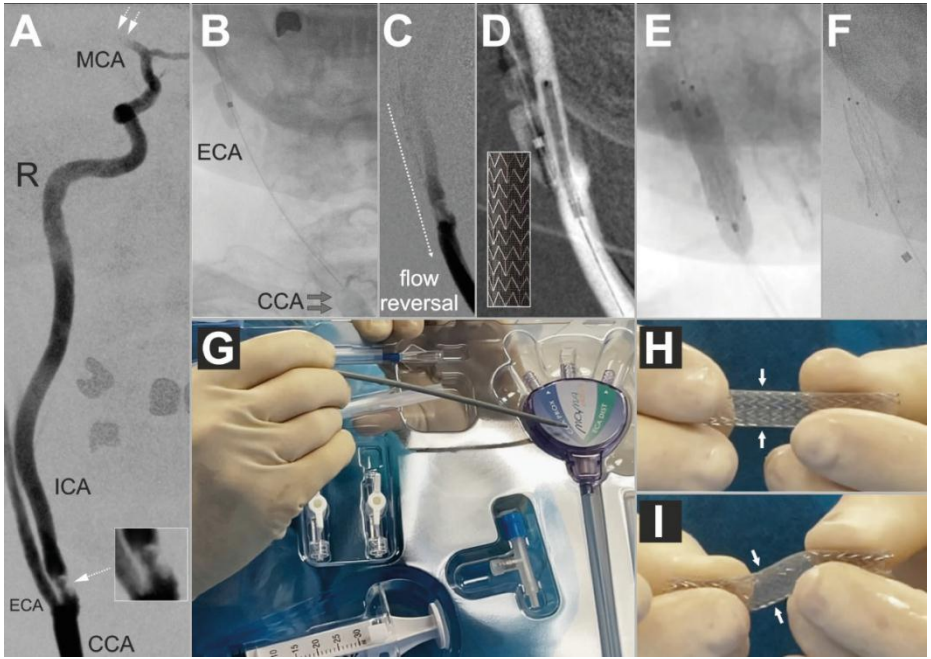

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FLASHLIGHT

Endovascular treatment of tandem lesions in a novel cadaveric stroke model

Iris Q. Grunwald[1,2]*, MD, PhD; Lukasz Tekieli[3,4], MD, PhD; Anna Podlasek[1,2,5], MD, PhD; Helen Donald-Simpson[1,2], PhD; Stephanie Clark[2]; Chloe Voutsas[2]; Sanjay Pillai[2,6], MD, PhD; Graeme Houston[1,2], MD, PhD; Magdalena Knapik[3,7], MD; Leah White[2]; Pamela Barr[2]; Andreas Melzer[8,9], PhD; Piotr Musialek[3], MD, DPhil

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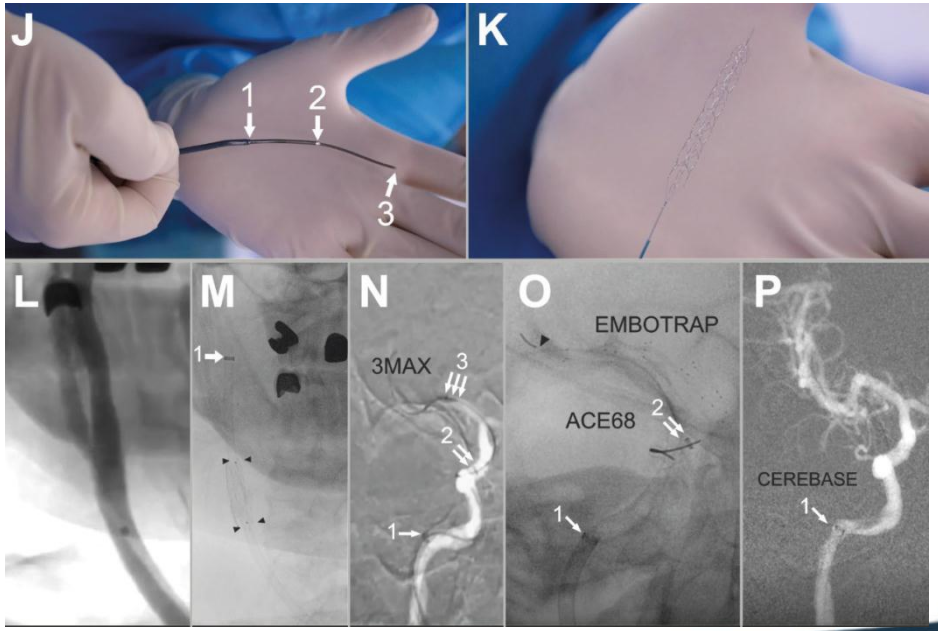

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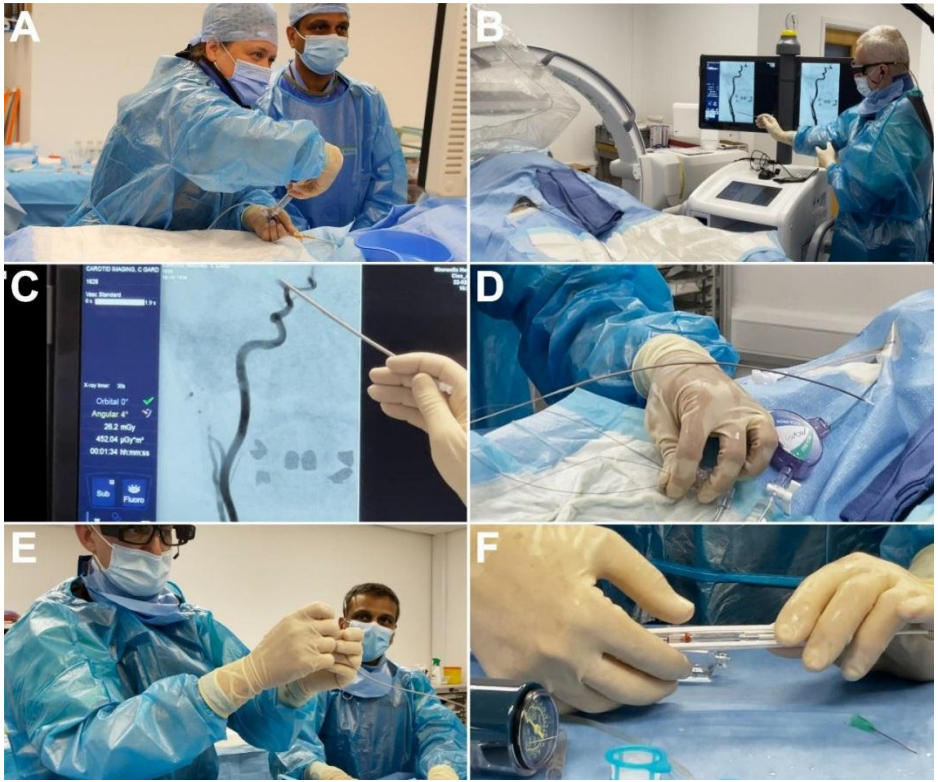

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**Corresponding author: University of Dundee, World Federation for Interventional Stroke Treatment (WIST), Nethergate, Dundee, DD1 4HN, Scotland, United Kingdom. E-mail: igrunwald001@dundee.ac.uk*

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Advancing New Interventional Techniques

Novel Large-Diameter Controlled-Expansion Stentriever, Embolic-Prevention Stent and Flow Reversal in Large-Thrombus-Burden ICA Proximal Occlusion Stroke

Lukasz Tekieli, MD, PhD,[a,b,c] Krzysztof Banaszkiewicz, MD, PhD,[c,d] Zbigniew Moczulski, MD,[c,e] Małgorzata Urbańczyk-Zawadzka, MD,[c,e] Piotr Musialek, MD, DPhil[b,c]

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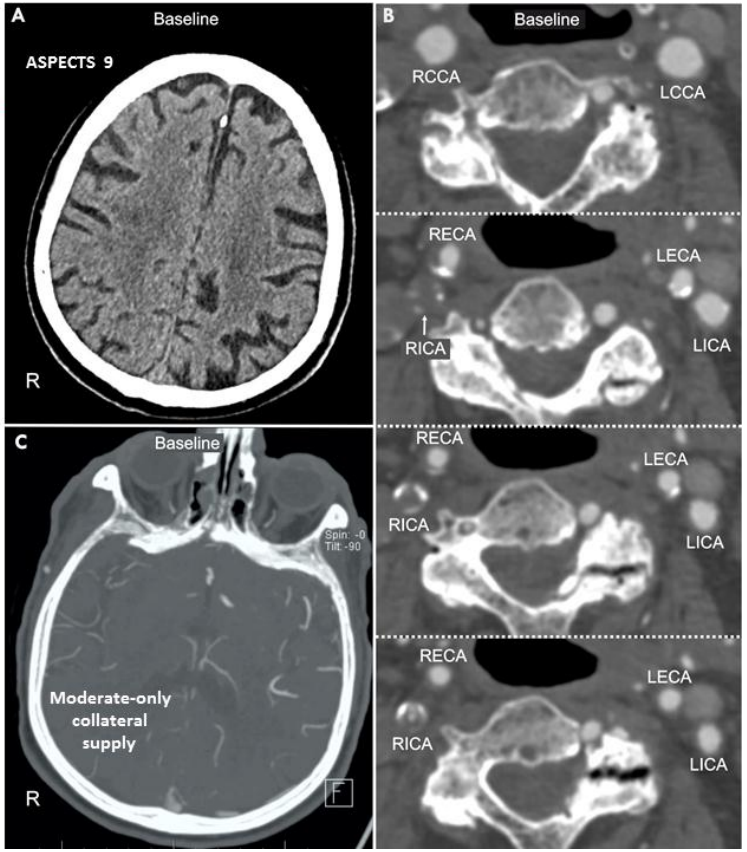
VOL. 14, NO. 21, 2021



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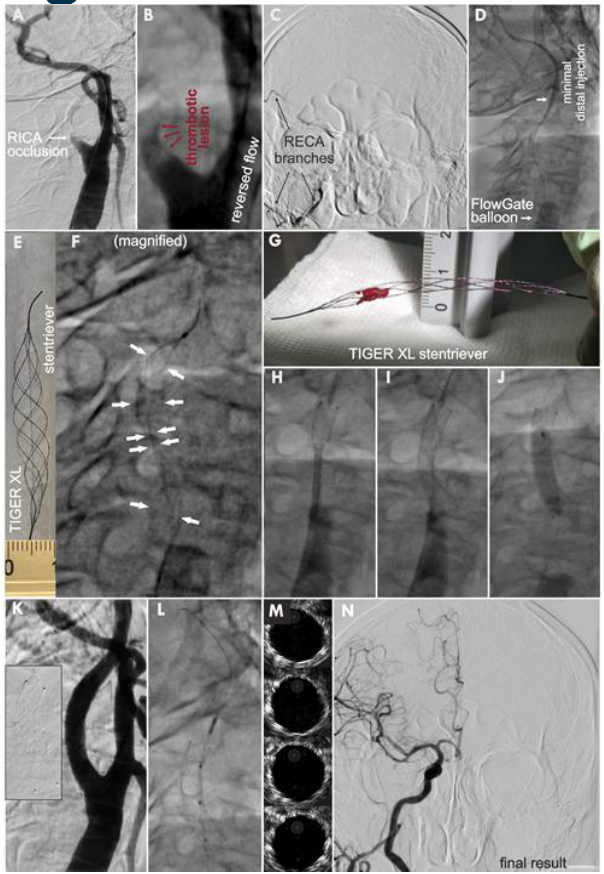
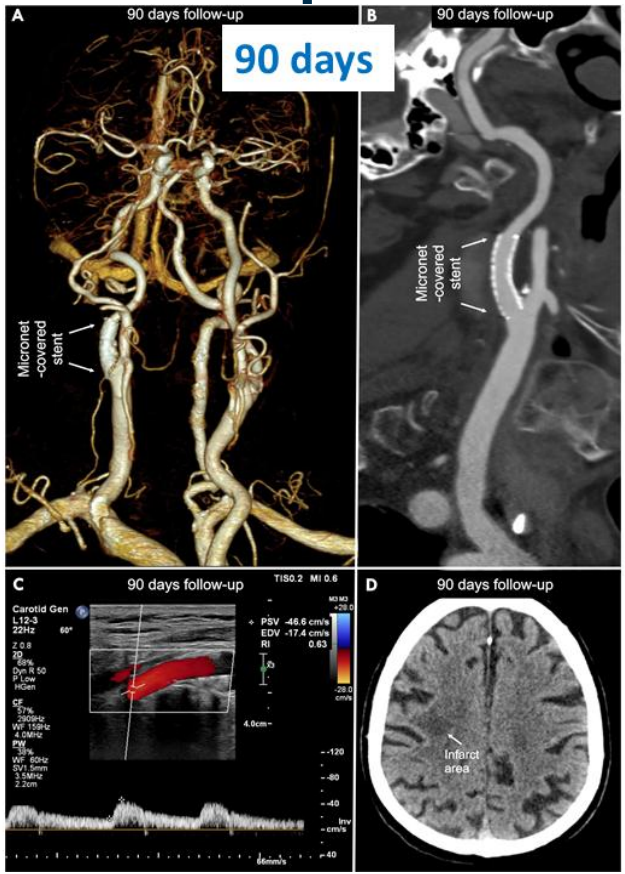




CLINICALLY
and
ANATOMICALLY

EFECTIVE

ENDOVASCULAR
RECONSTRUCTION

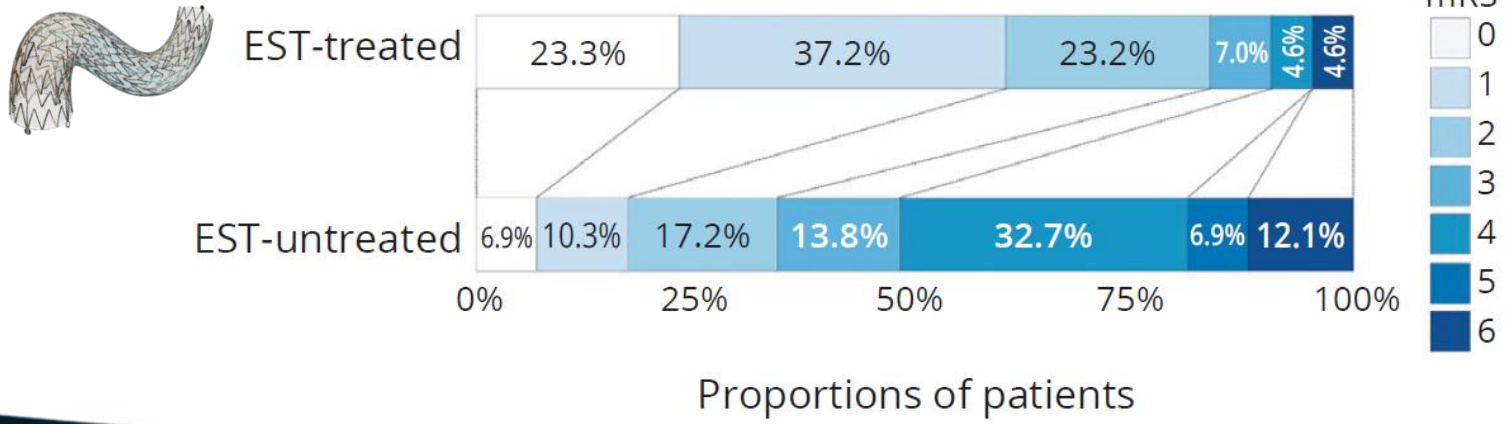
JACC Intv 2021

Advancing Knowledge in Carotid-Related Stroke Management

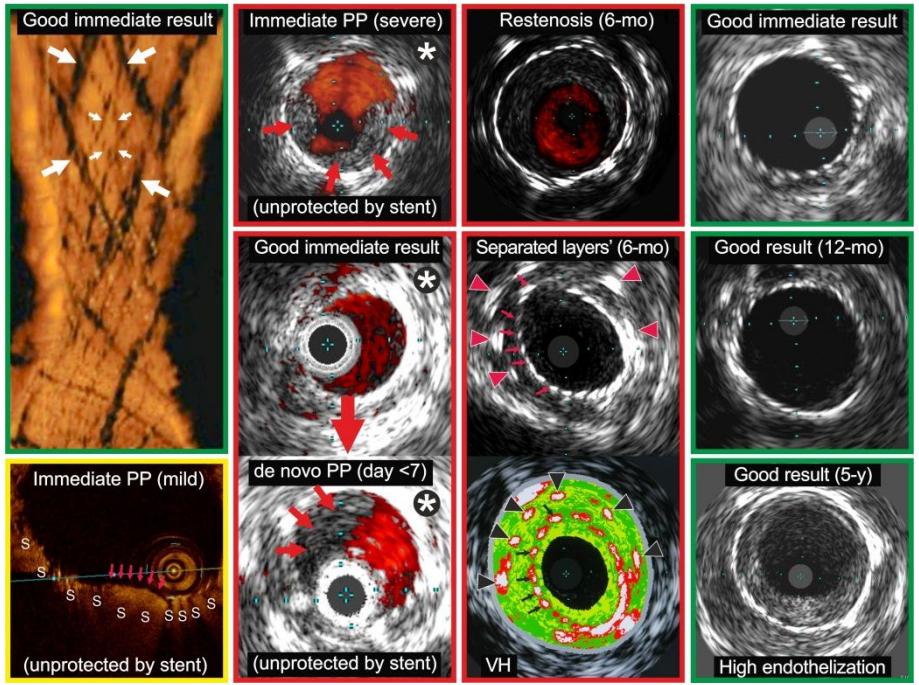
The Journal of Cardiovascular Surgery 2024 June;65(3):231-48
DOI:10.23736/S0021-9509.24.13093-5

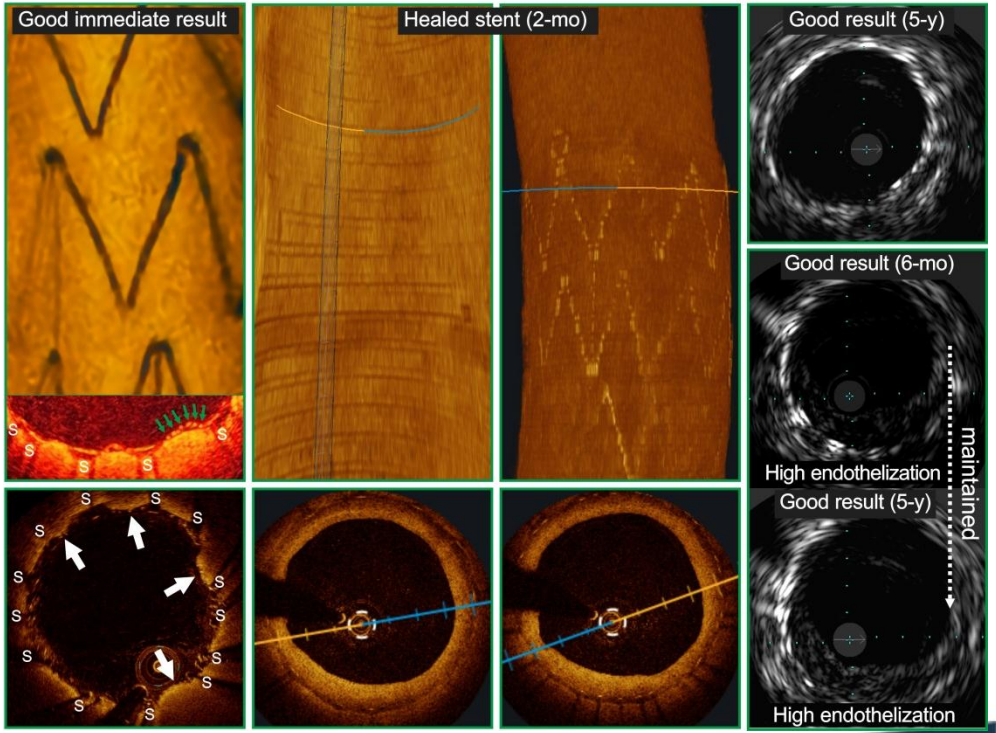
ORIGINAL ARTICLE
NOVEL DATA IN CAROTID-RELATED STROKE TREATMENT AND PREVENTION

Outcomes in acute carotid-related stroke eligible for mechanical reperfusion: SAFEGUARD-STROKE Registry



Intravascular Imaging-Guiding in New Therapeutic Strategies





P Musialek, L Tekieli, T Umemoto ***JSCAI*** 2024 (in press)

2024

Initating and Coordinating Multi-Specialty Trials in Stroke

A multi-center study of the MicroNET-covered stent in consecutive patients with acute carotid-related stroke: SAFEGUARD-STROKE*

Lukasz Tekieli[1,2,3], Andrej Afanasjev[4], Maciej Mazgaj[5], Vladimir Borodetsky[6], Kolja Sievert[7], Zoltan Ruzsa[8], Magdalena Knapik[2,9], Audrius Širvinskas[4], Adam Mazurek[1,2], Karolina Dzierwa[10], Thomas Sanczuk[11], Valerija Mosenko[12], Malgorzata Urbanczyk-Zawadzka[13], Mariusz Trystula[14], Piotr Paluszek[1,14], Lukasz Wiewiorka[13], Justyna Stefaniak[15], Piotr Pieniazek[2,3,14], Inga Slautaitė[16], Tomasz Kwiatkowski[14], Artūras Mackevičius[17], Michael Teitcher[18], Horst Sievert[7], Iris Q. Grunwald[19,20], Piotr Musialek[1,2]

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[19]Division of Imaging Science and Technology, School of Medicine, University of Dundee, Dundee, Scotland, United Kingdom
[20]University of Dundee Chair of Neuroradiology and Ninewells Hospital Department of Radiology, Dundee, Scotland, United Kingdom

*Acute Stroke of CArotid Artery Bifurcation Origin Treated With Use oF the MicronEt-covered CGUARD Stent – **SAFEGUARD-STROKE** (NCT05195658)

Adv Interv Cardiol 2024; 20, 2 (76): 172–193

Commentary: A multi-center study of the MicroNET-covered stent in consecutive patients with acute carotid-related stroke: SAFEGUARD-STROKE

Jaims Lim[1,2], Vinay Jaikumar[1,2], Tyler A. Scullen[1,2], Adnan H. Siddiqui[1,2,3,4,5]

[1]Department of Neurosurgery, Jacobs School of Medicine and Biomedical Sciences, University at Buffalo, Buffalo, New York, USA
[2]Department of Neurosurgery, Gates Vascular Institute at Kaleida Health, Buffalo, New York, USA
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Adv Interv Cardiol 2024; 20, 3 (77): 245–247
DOI: https://doi.org/10.5114/aic.2024.142327

MicroNET-covered stent (CGuard) routine use in acute carotid-related stroke – SAFEGUARD-STROKE Study: response to the Buffalo Group commentary

Lukasz Tekieli[1,2,3], Maciej Mazgaj[4], Zoltan Ruzsa[5], Bogdan Janus[6], Piotr Paluszek[7], Horst Sievert[8], Iris Q. Grunwald[9,10,11], Piotr Musialek[1,2]

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[8]CardioVascular Center Frankfurt (CVC), Sankt Katharinen Hospital, Frankfurt, Germany
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DOI: https://doi.org/10.5114/aic.2024.143686

Multi-Center Study of the MicroNET-Covered Stent in Consecutive Patients with Acute Carotid-Related Stroke: SAFEGUARD-STROKE

Tuesday October 29, 2024

Moderated Abstracts 3:00 pm

Lukasz Tekieli, Andrey Afanasiev, Maciej Mazgaj, Vladimir Borodetsky, Kolja Sievert,
Zoltan Ruzsa, [illegible] Karolina Dzierwa,
Thomas Sanczuk, Valerija Mosenko, Malgorzata Urbanczyk-Zawadzka, Mariusz Trystula,
Piotr Paluszek, [illegible], Inga Slautaitė,
Tomasz Kwiatkowski, Artūras Mackevičius, Michael Teitcher, Horst Sievert,
Iris Q Grunwald, Piotr Musialek

Krakow/**Poland,** Vilnius/**Lithuania,** Jerusalem/**Israel,** Frankfurt/**Germany,**
Szeged-Budapest/**Hungary,** Lublin/**Poland,** Dundee/**Scotland UK**

Acute Stroke of CArotid Artery Bifurcation Origin Treated With Use oF the MicronEt-covered CGUARD Stent SAFEGUARD-STROKE (NCT05195658)

ICs in Stroke

1. **Natural**
2. (can) **Provide** (missing) **Volume**
3. **Progress/Innovation**

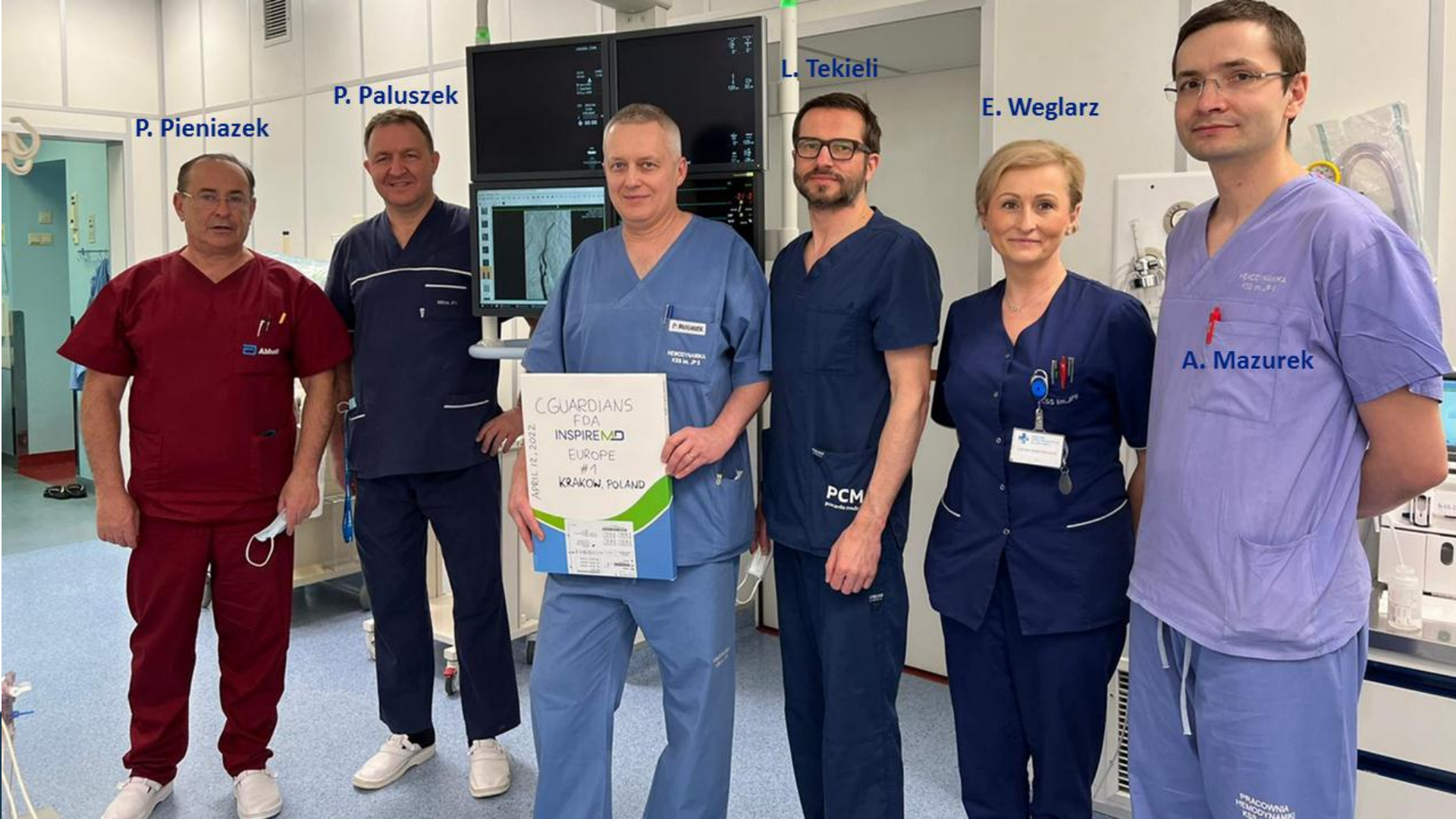
RESPECT

COLLABORATION

Training! – Training!! – Training!!!

WORLD FEDERATION FOR INTERVENTIONAL STROKE TREATMENT
WIST

Neuroradiology KoL
PI - 1st Aspiration Thrombectomy Trial


P. Pieniazek
P. Paluszek
L. Tekieli
E. Weglarz
A. Mazurek
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#1
KRAKOW, POLAND
APRIL 12, 2022

Keynote Lecture

Where Does Interventional Cardiologist Fit in Advancing Interventional Treatment of Stroke?

Piotr Musialek

Jagiellonian University Dept. of Cardiac & Vascular Diseases
St. John Paul II Hospital, Krakow, Poland