Journées Francophones d'Imagerie Médicale

Thrombectomy : a European perspective

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Stroke : a pandemic

Worldwide in 2016 :

- More than 13 million strokes
  - 9,5 million ischemic strokes
  - More than 5 million deaths

Global Burden of Disease Study 2016 (GBD 2016)

- 18 million ischemic stroke survivors

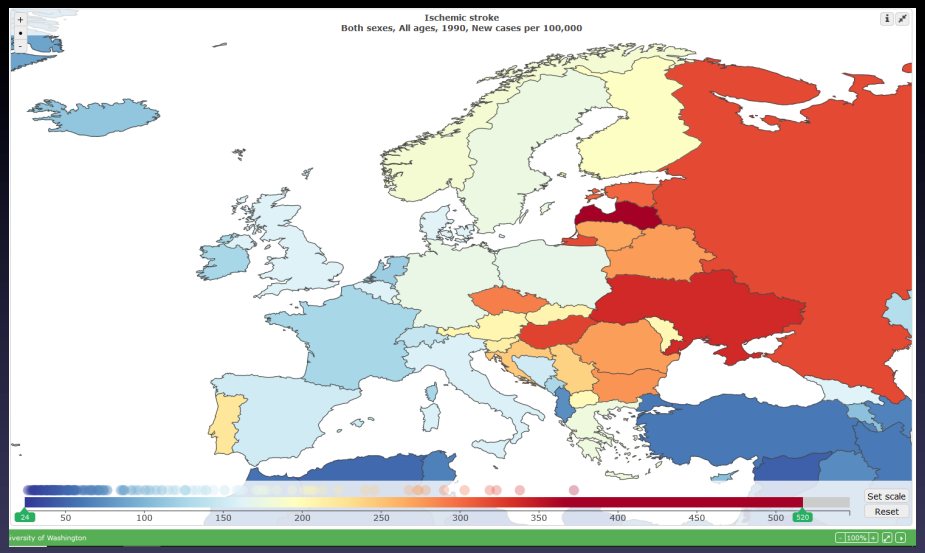
Feigin V.L – Neuroepidemiology 2015

- **Healthcare challenge :**
  - 1st cause of acquired disability in developed countries
  - 3rd most common cause of death in developed countries

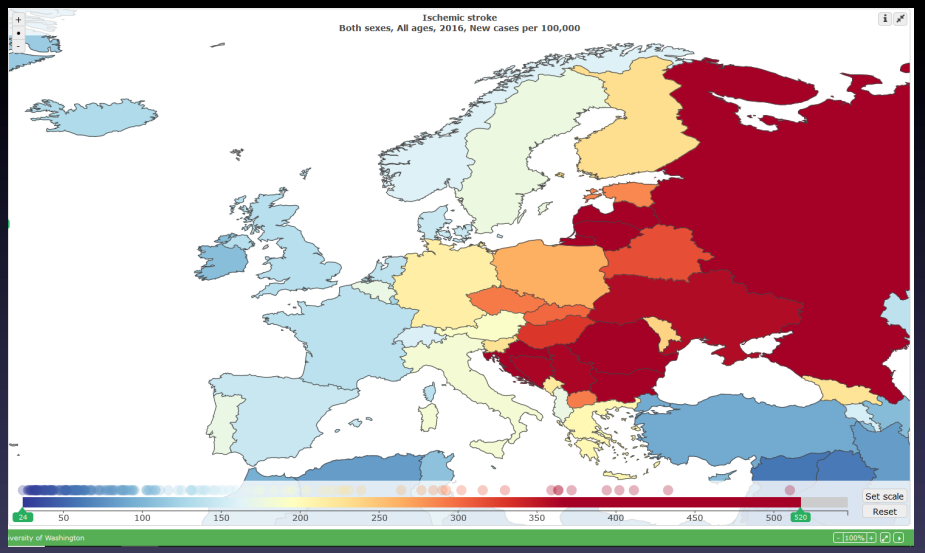
World Health Organnization, 2012

What happened in 26 years

1990

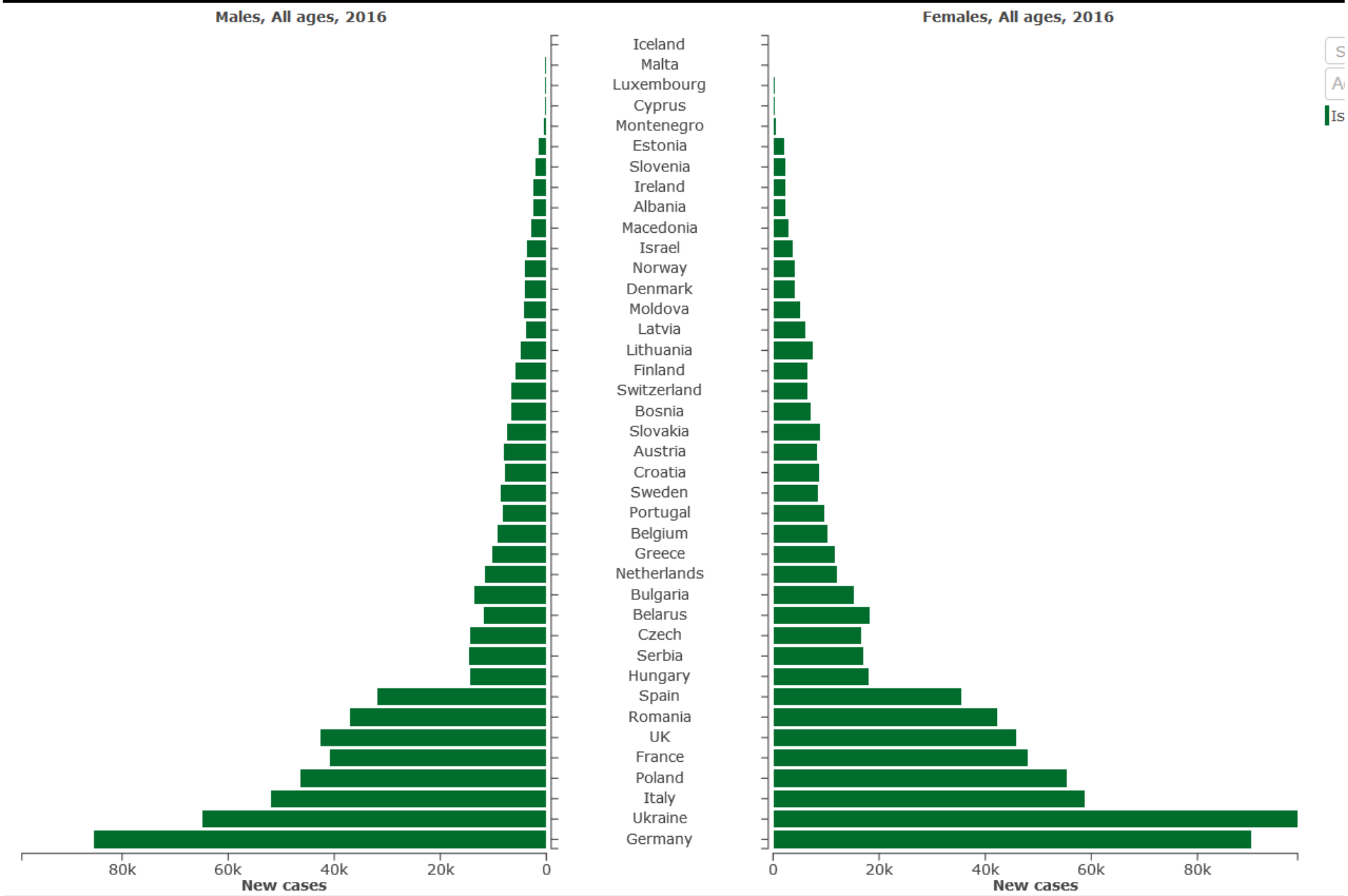


2016

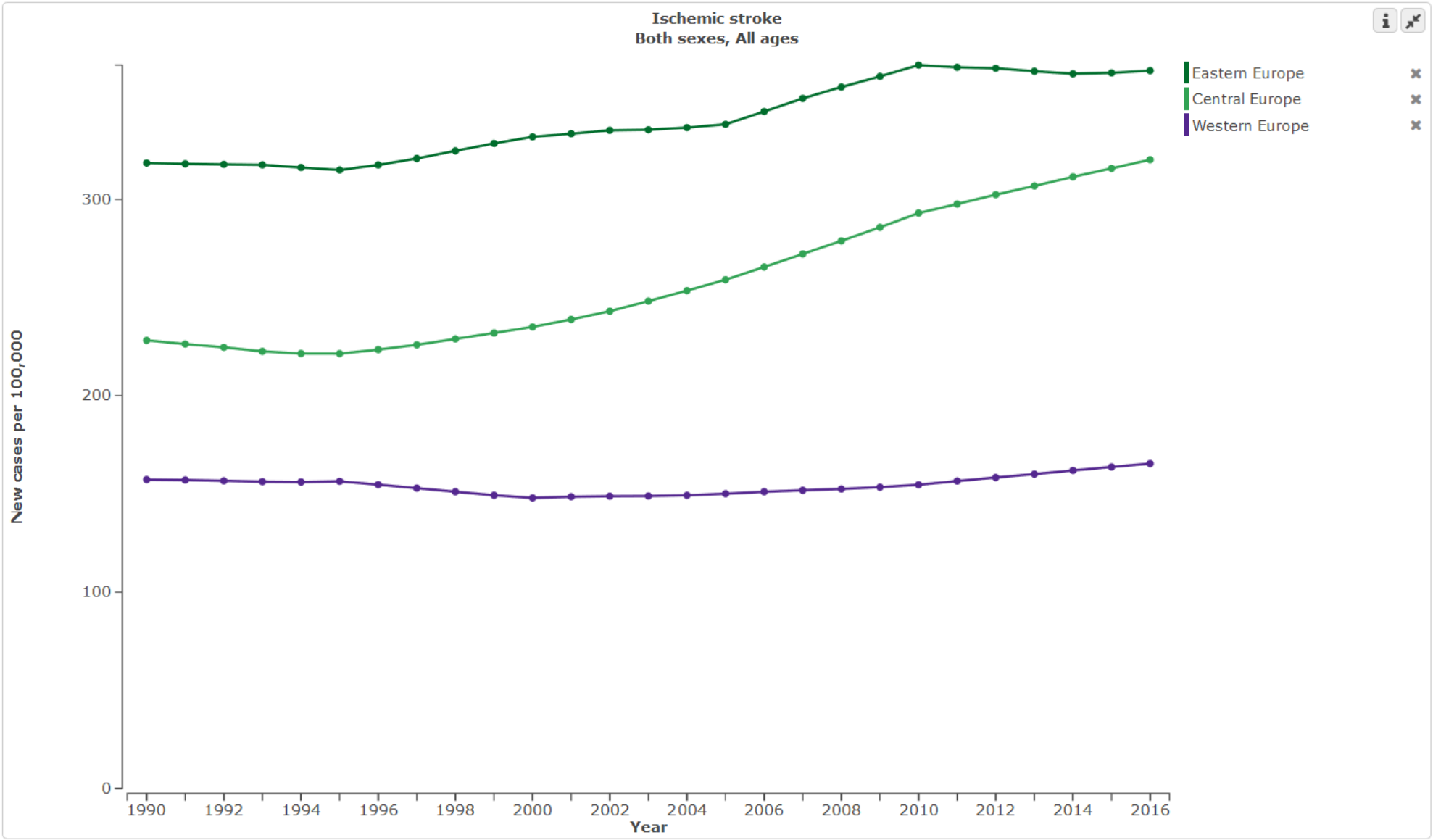


- Global stability of stroke incidence in Western Europe
- Increase in Central and Eastern Europe
- Increase in number of new stroke cases

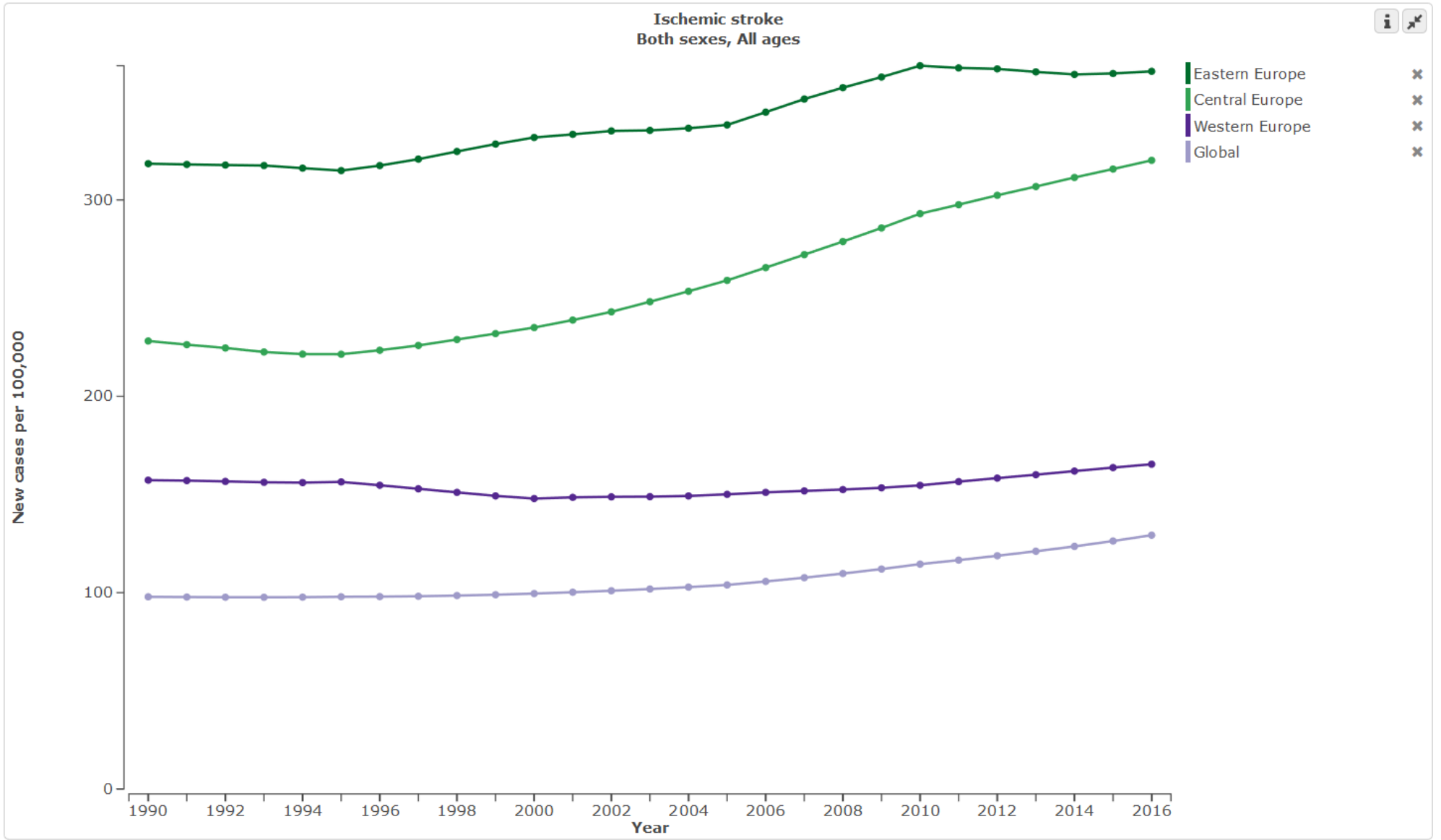
Global Burden of Disease Study 2016 (GBD 2016)


Males, All ages, 2016
Females, All ages, 2016
Iceland
Malta
Luxembourg
Cyprus
Montenegro
Estonia
Slovenia
Ireland
Albania
Macedonia
Israel
Norway
Denmark
Moldova
Latvia
Lithuania
Finland
Switzerland
Bosnia
Slovakia
Austria
Croatia
Sweden
Portugal
Belgium
Greece
Netherlands
Bulgaria
Belarus
Czech
Serbia
Hungary
Spain
Romania
UK
France
Poland
Italy
Ukraine
Germany
80k
60k
40k
20k
0
0
20k
40k
60k
80k
New cases
New cases

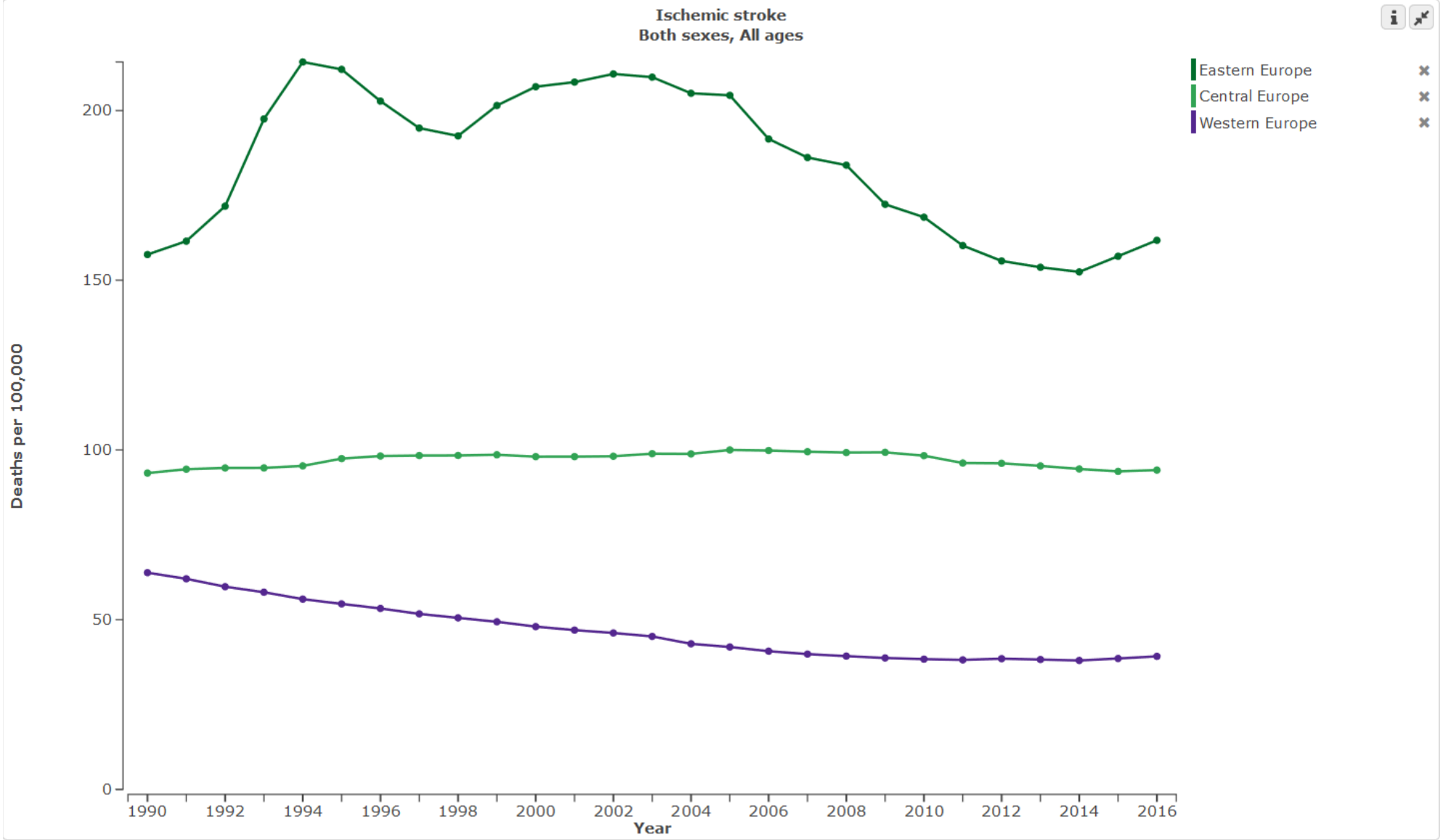
Eastern > Central > Western



But above global incidence !

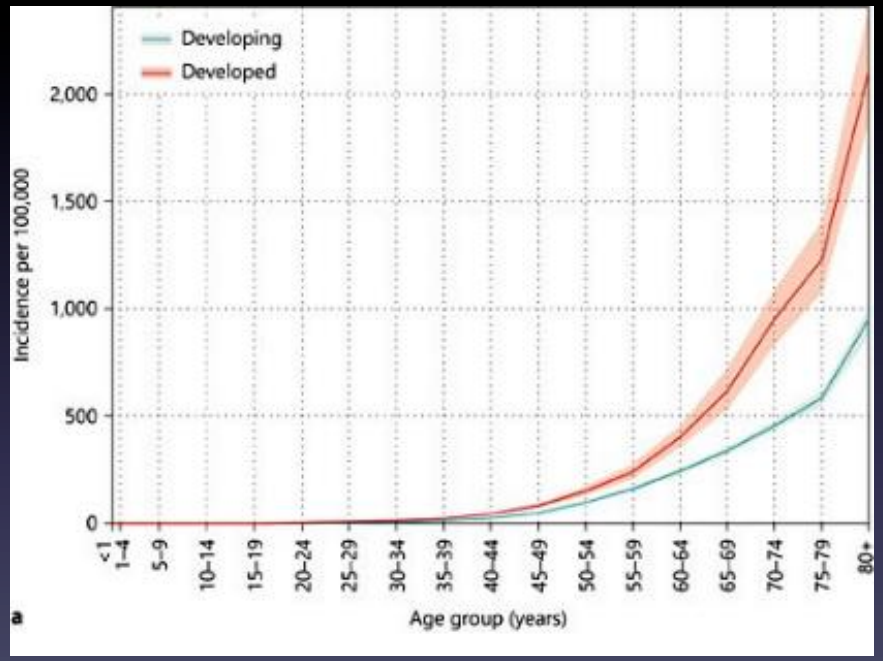


Mortality is decreasing in W.E.

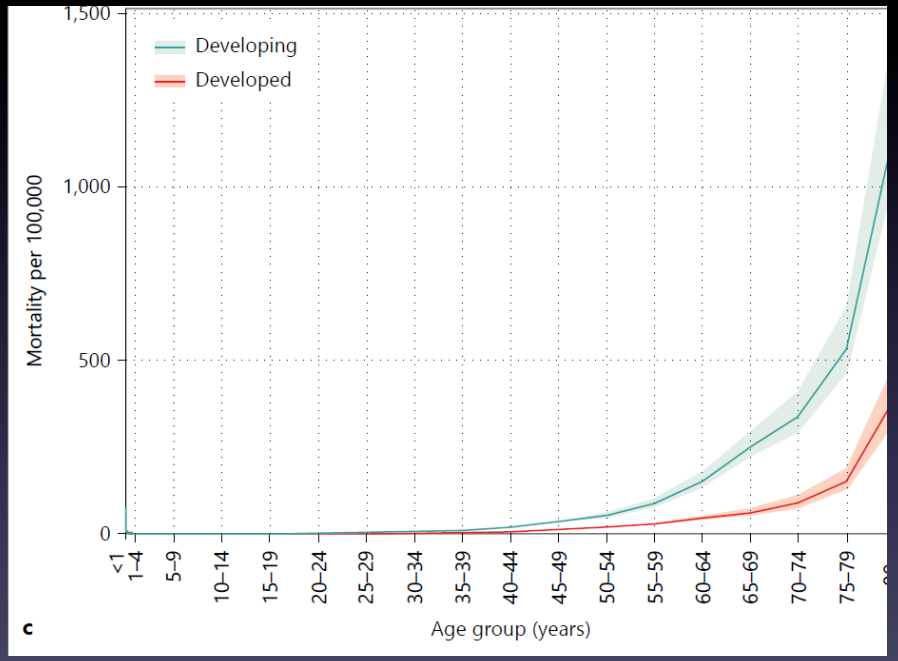


Developed and developing countries

Incidence



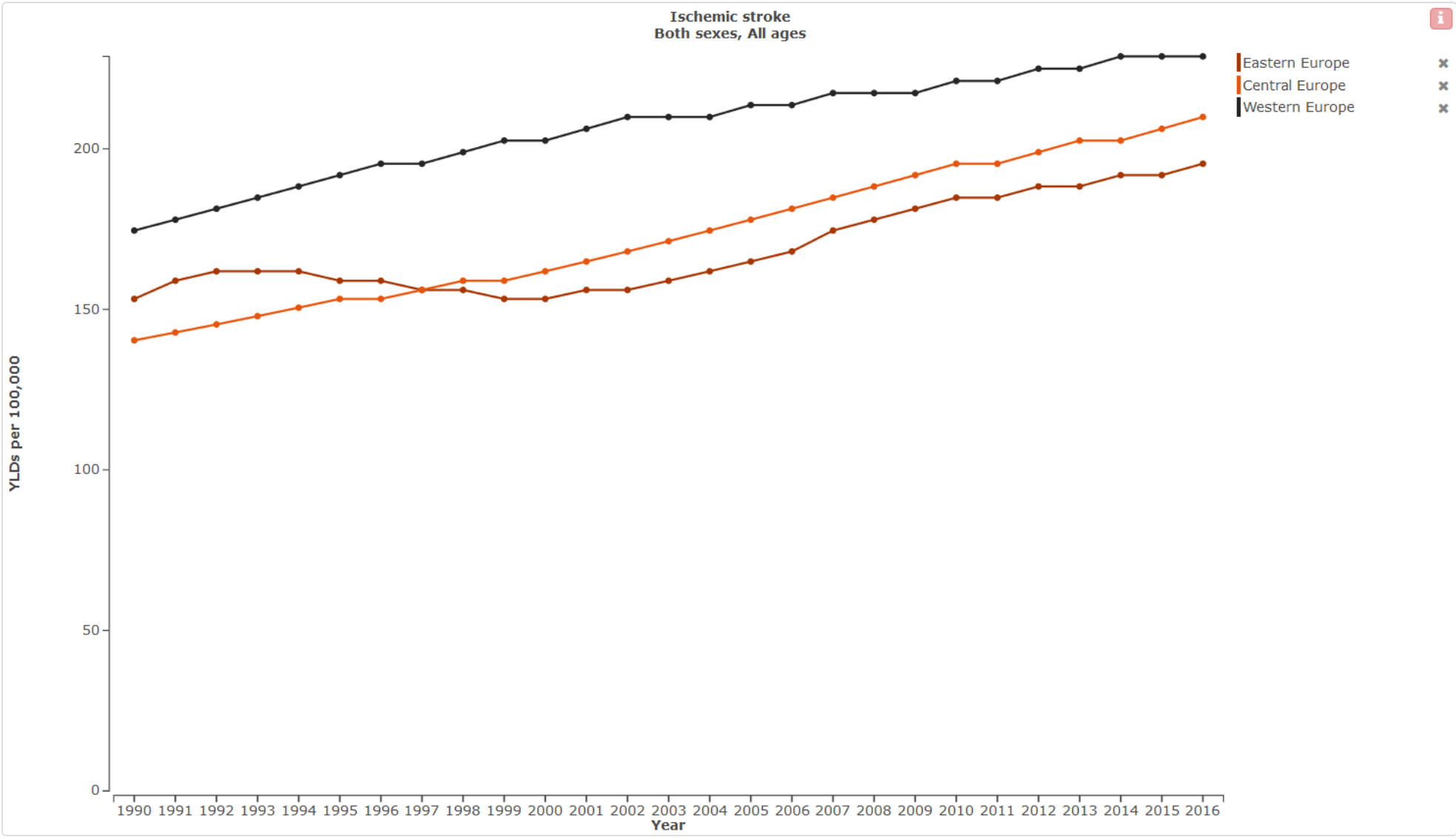
Mortality



Developed countries : more stroke and less mortality = more stroke survivors

Neuroepidemiology 2015;45:161-176 – Feigin V.L

Years lived with a disability



The human cost :

West – East gradient

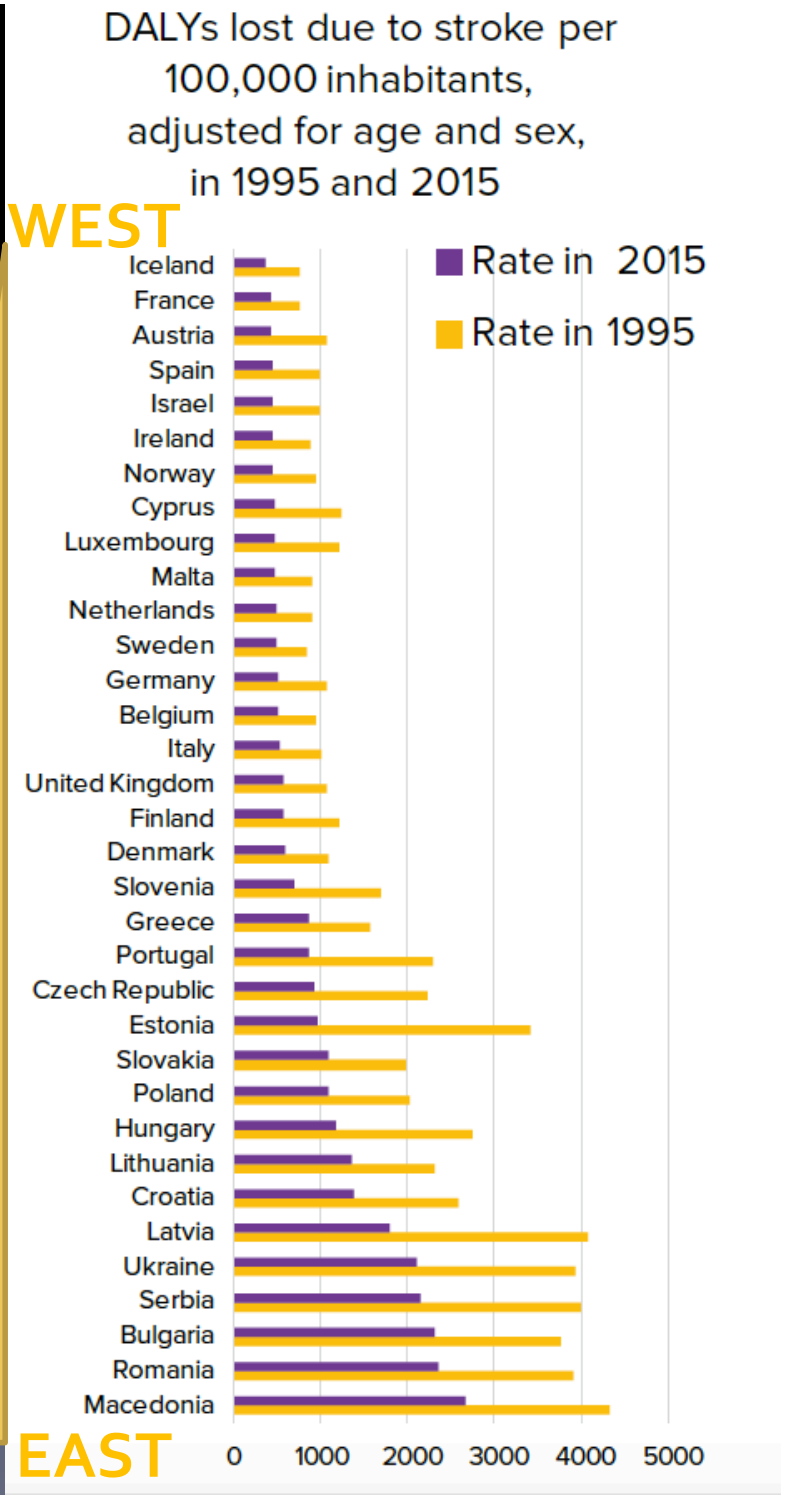
Systematic analysis for the Global Burden of Disease Study 2015. Lancet, 2016

The economical cost :

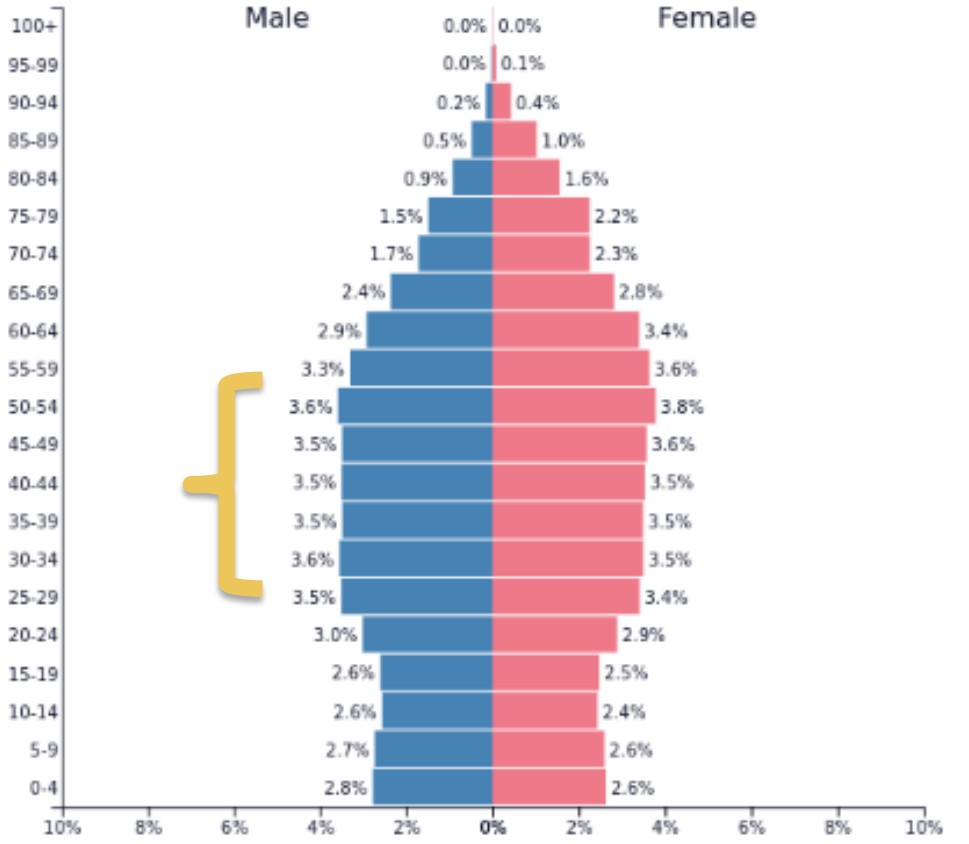
	€ thousands	% of total
Direct healthcare costs	€ 20,058,318	44%
Productivity loss due to mortality	€ 5,440,593	12%
Productivity loss due to morbidity	€ 3,983,874	9%
Informal care costs	€ 15,855,181	35%
Total	**€ 45,337,965**	

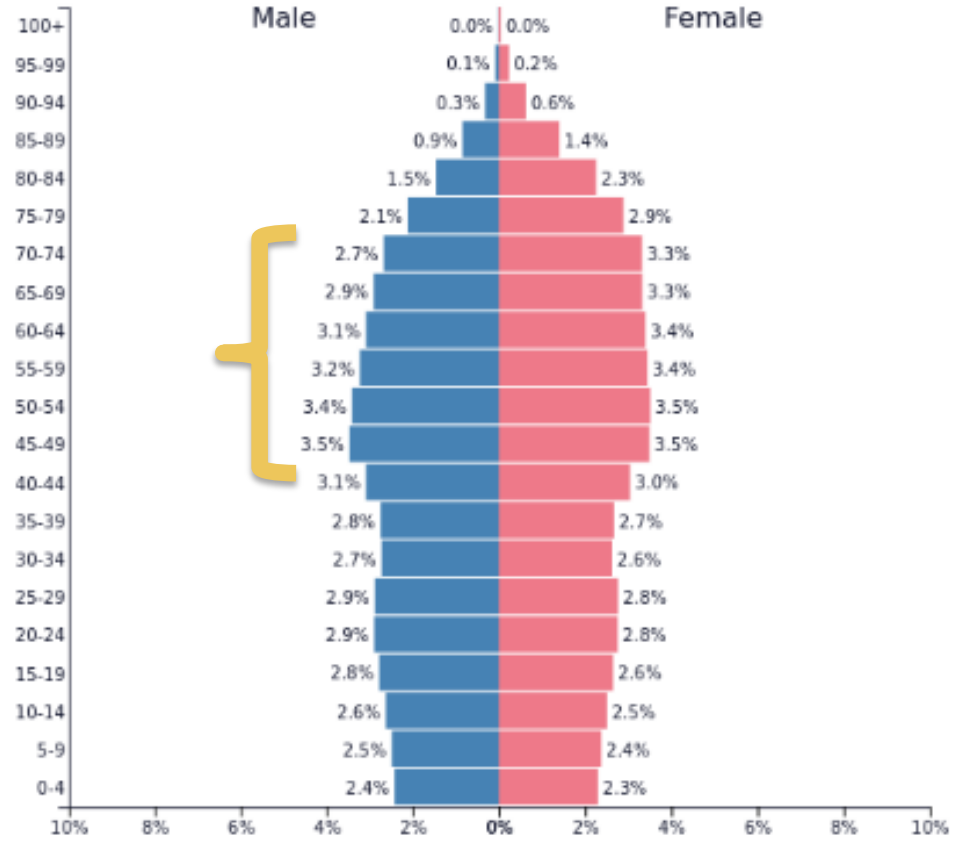
Stroke E.U. 2015 :
45 billions euros
20 billions euros direct to healthcare

European cardiovascular disease statistics 2017
SAFE : The Burden of Stroke in Europe



Aging population



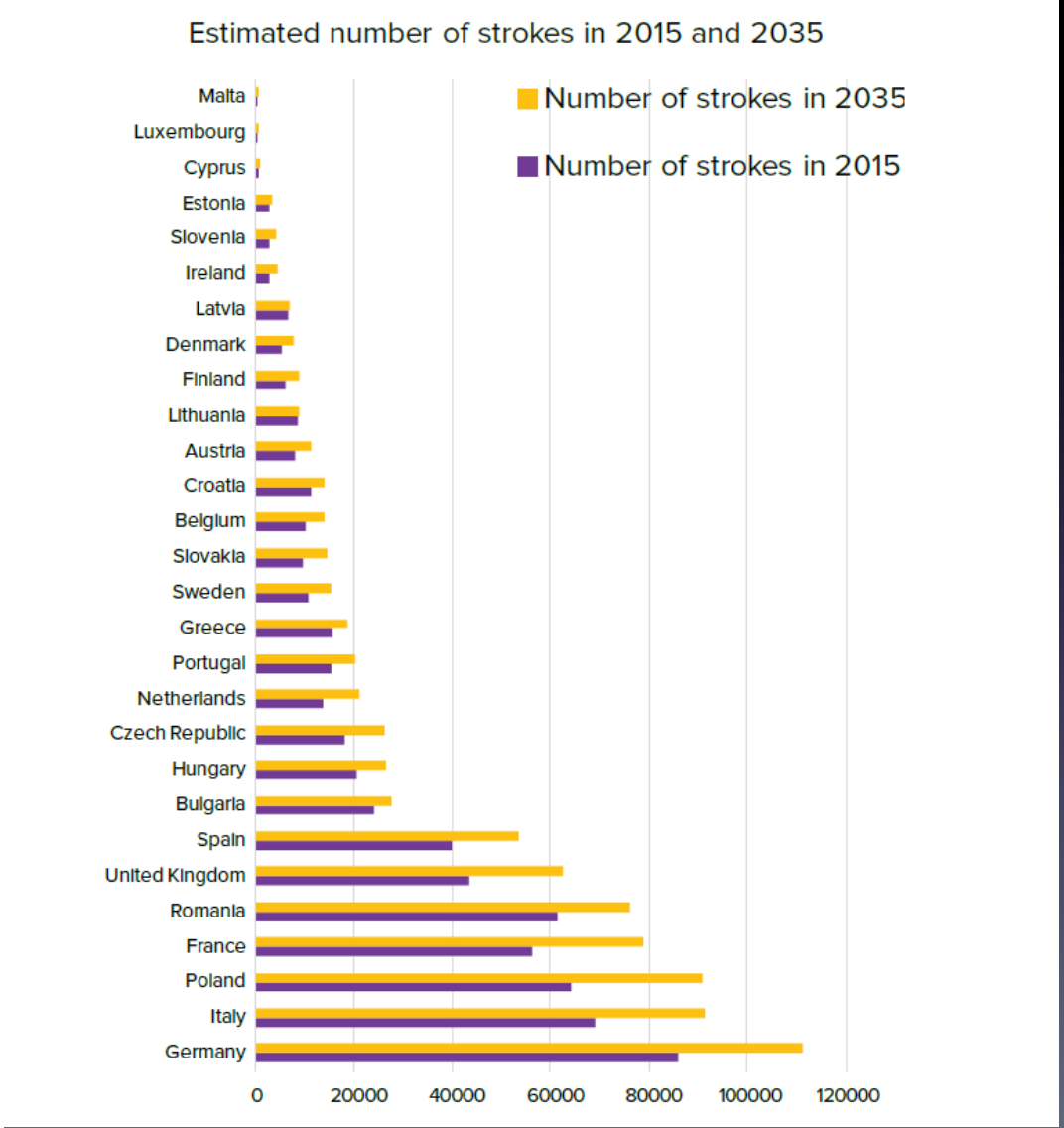


2015

2035

Previsions in Europe

Estimated number of stroke events in 2015 and 2035 in EU member states



2015

- 1,8 M. strokes
- 3 700 000 stroke survivors

2035

- 3 M. strokes
- 4 630 000 stroke survivors

SAFE : The Burden of Stroke in Europe

Treat ?

Yes !

But how?

Treatment before 2015

Number of patients to treat for one functional independent patient :

Intravenous thrombolysis

2015 : the paradigm shift

The NEW ENGLAND

The NEW ENGLAND JOURNAL of MEDICINE

7 randomised controlled trials :

Thombectomy + I.V. tpa > I.V. tpa

Ster

THE LANCET

J Neurol Neurosurg Psychiatry. 2017 Jan;88(1):38-44. doi: 10.1136/jnnp-2016-314117. Epub 2016 Oct 18.

Endovascular therapy for acute ischaemic stroke: the Pragmatic Ischaemic Stroke Thrombectomy Evaluation (PISTE) randomised, controlled trial.

Symptom

Mechanical thrombectomy after intravenous alteplase versus alteplase alone after stroke (THRACE): a randomised controlled trial

Treatment after 2017

Intravenous thrombolysis

NNT **7** **14**

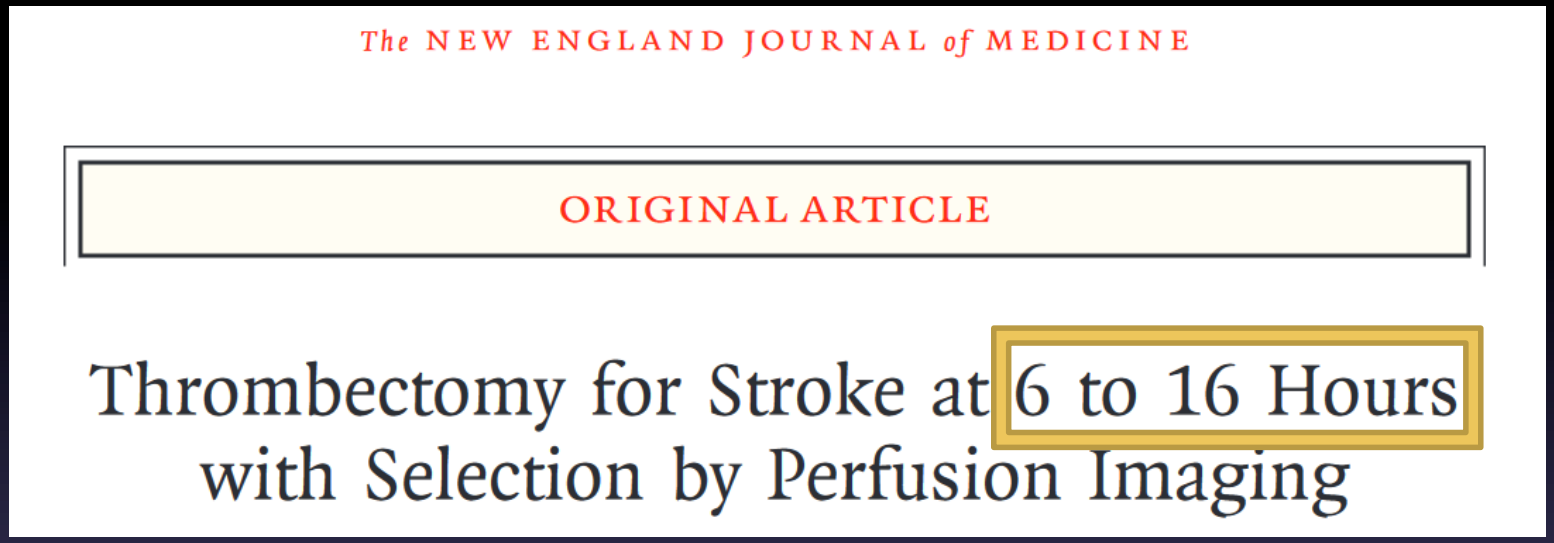
Mechanical Thrombectomy

Recommendations

- Ischemic stroke
- large vessel occlusion
- Up to 6 hours after symptoms onset

  +/- IV thrombolysis within the first 4,5 hours

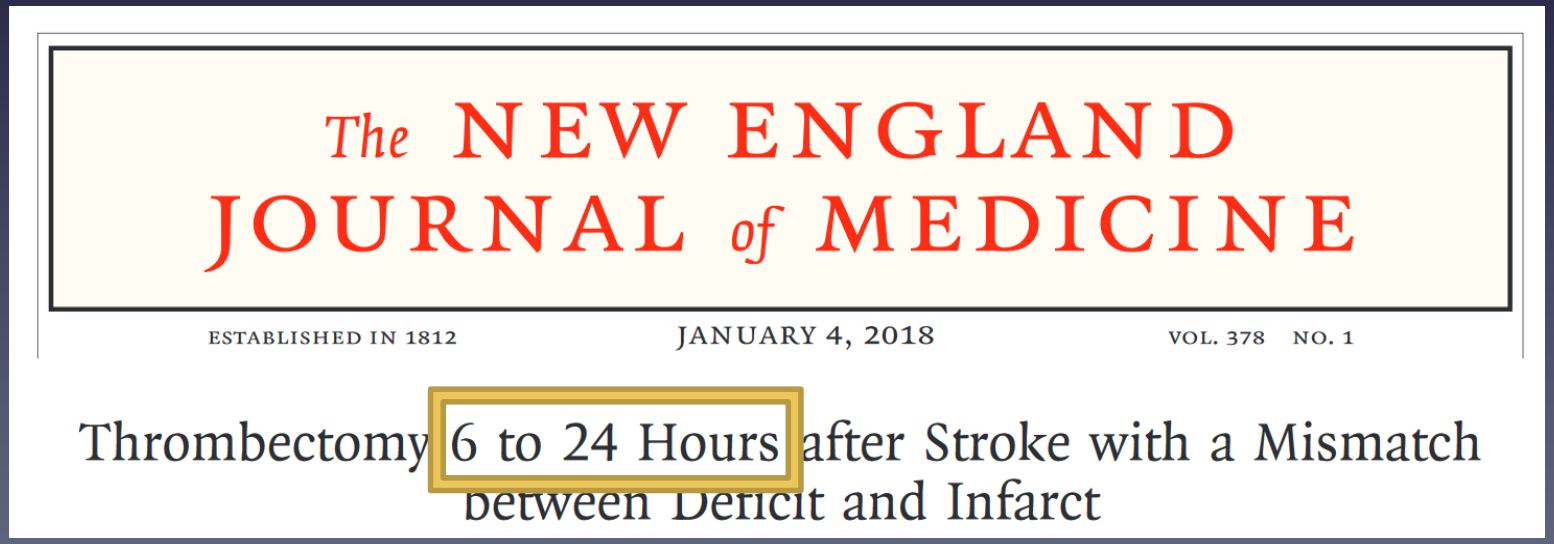
Beyond the 6 hours window



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Thrombectomy for Stroke at 6 to 16 Hours with Selection by Perfusion Imaging



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 4, 2018 VOL. 378 NO. 1

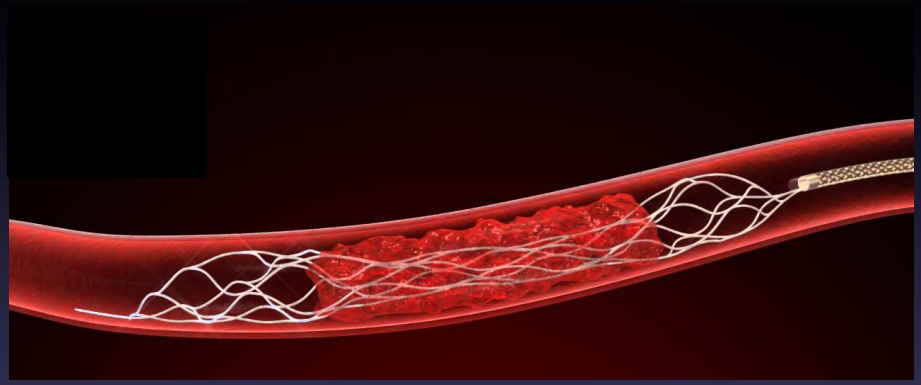
Thrombectomy 6 to 24 Hours after Stroke with a Mismatch between Deficit and Infarct

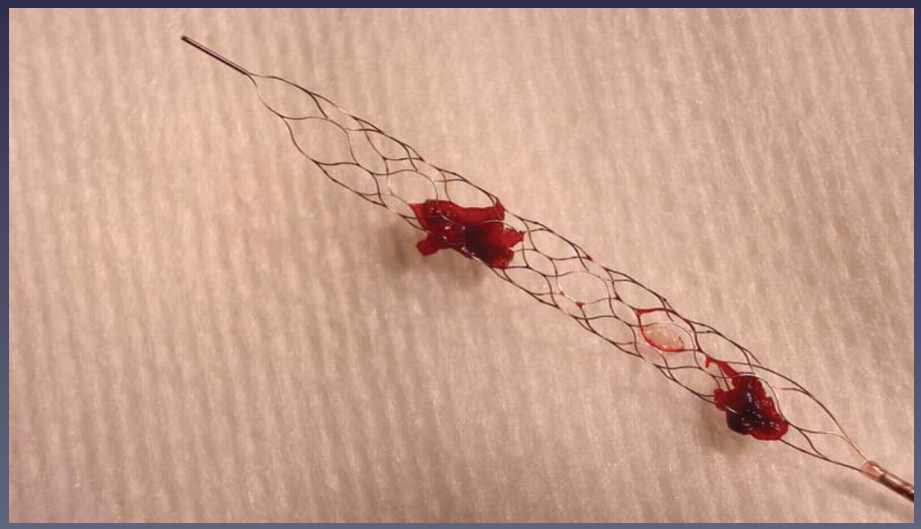
How to do it

- Biplane Angio suite
- Anesthesia : local or general
- Vascular access :
  - Arterial puncture (femoral, carotid or brachial)
  - Catheterism of supra aortic vessels
  - Angriography
  - Clot access using a micro-catheter

How to remove the clot?

- Stent retriever

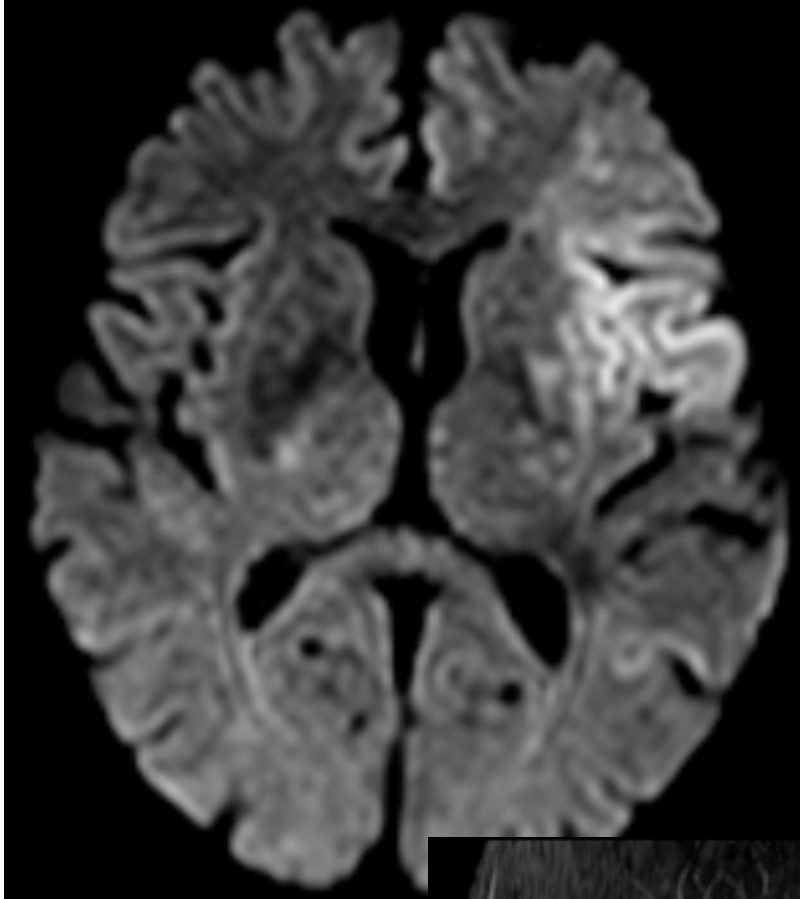


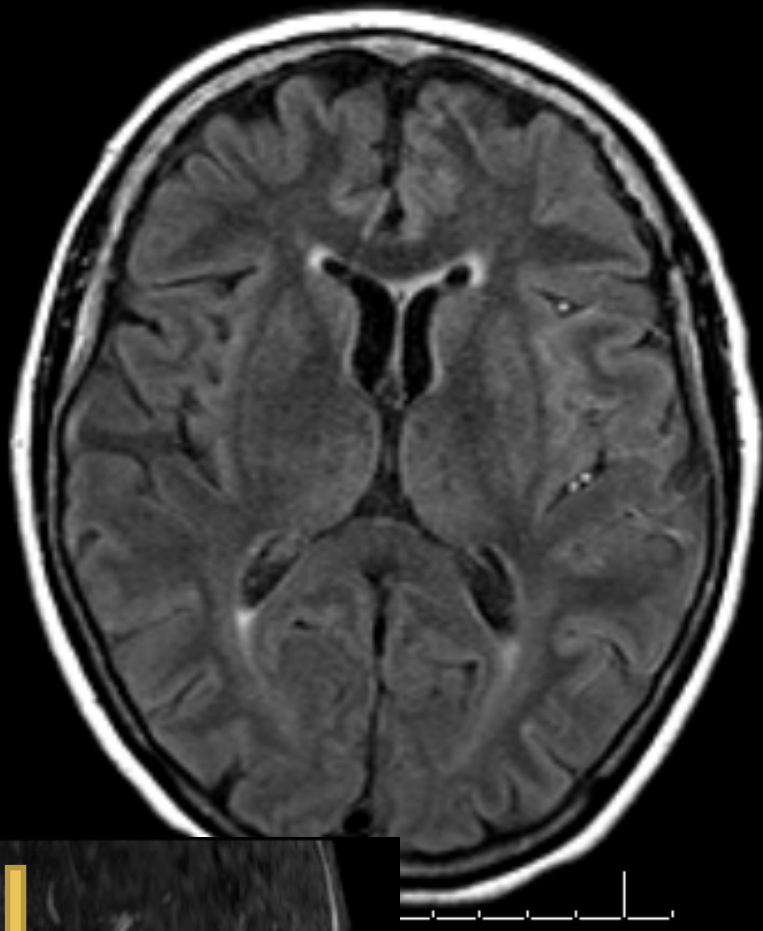


- Aspiration

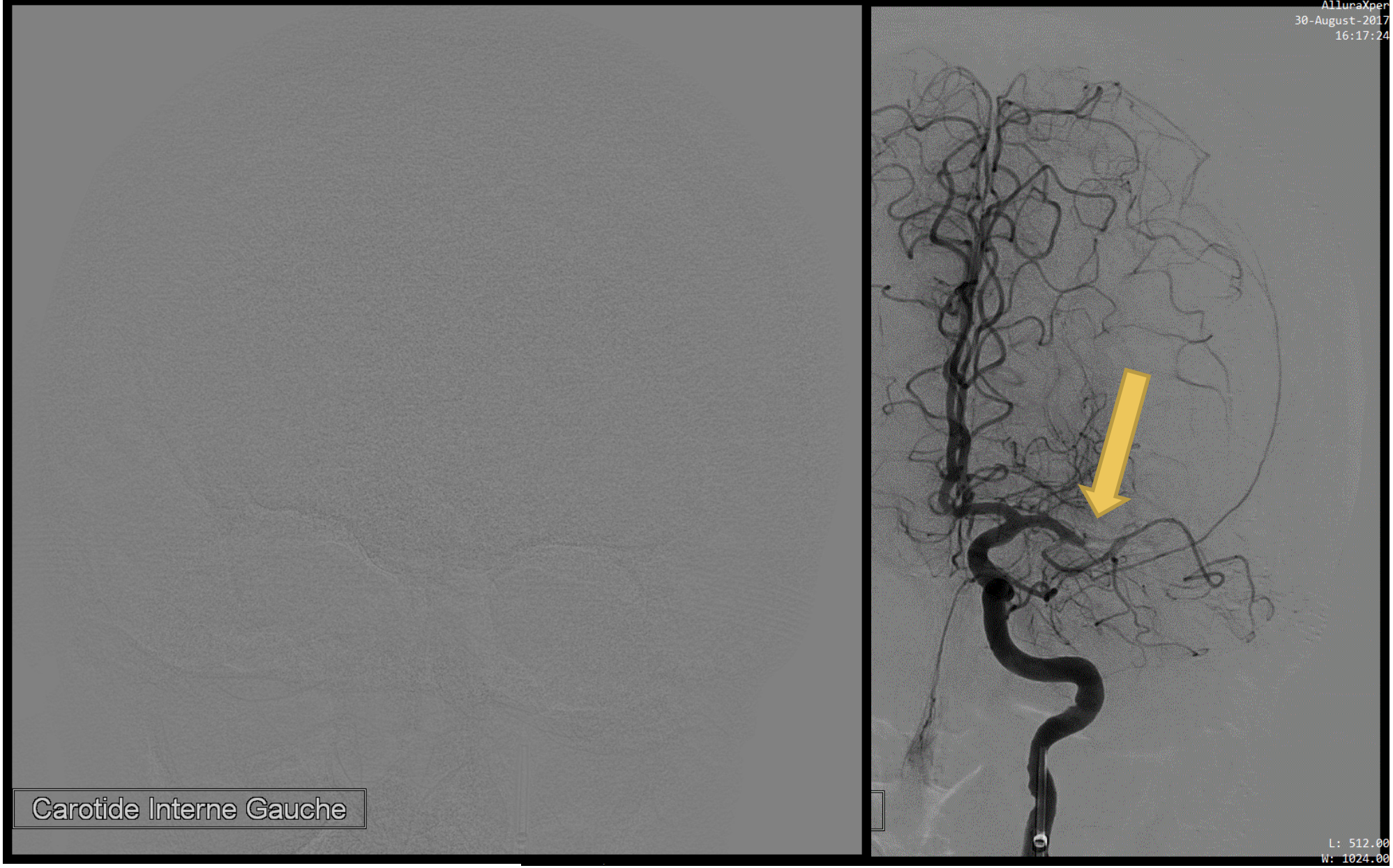
- Aspiration + stent

Stroke and vessel occlusion

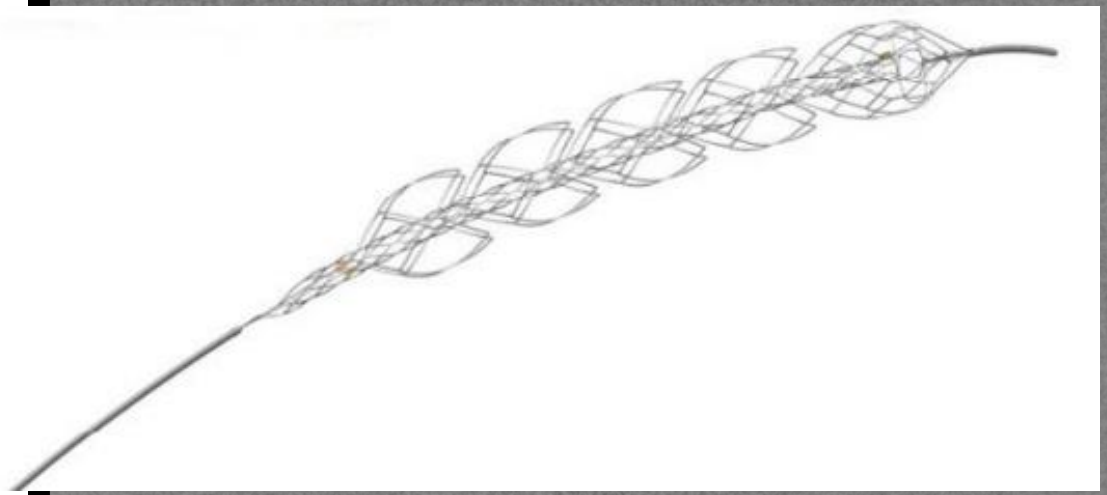




Left MCA M1 occlusion

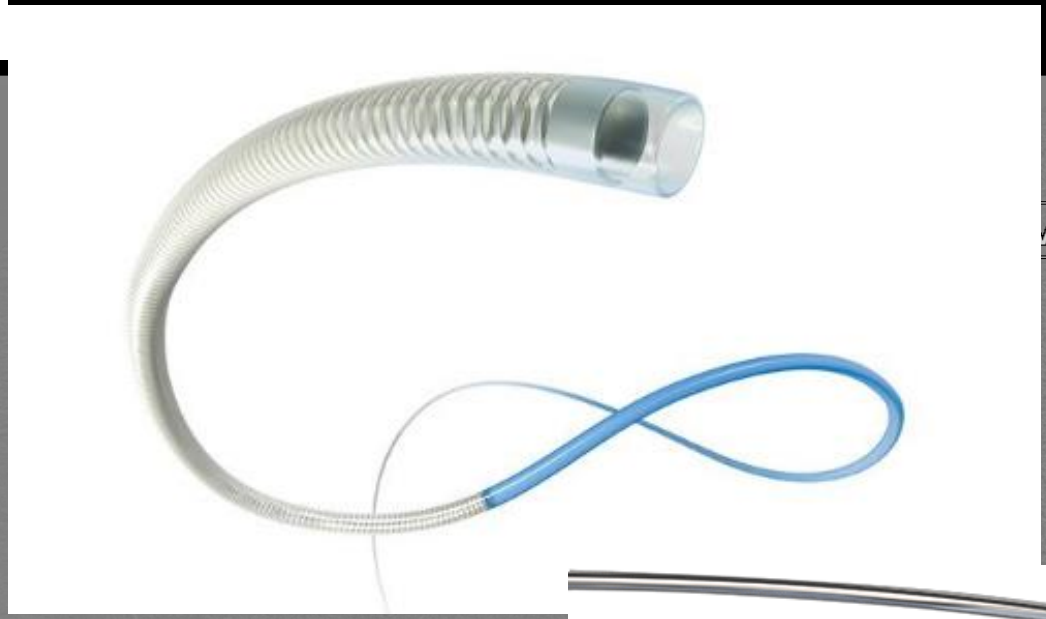


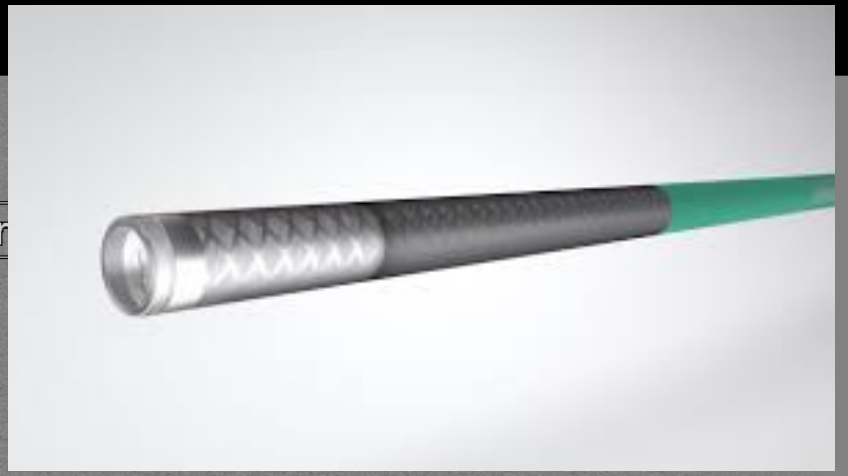
Stent retriever



Recanalization

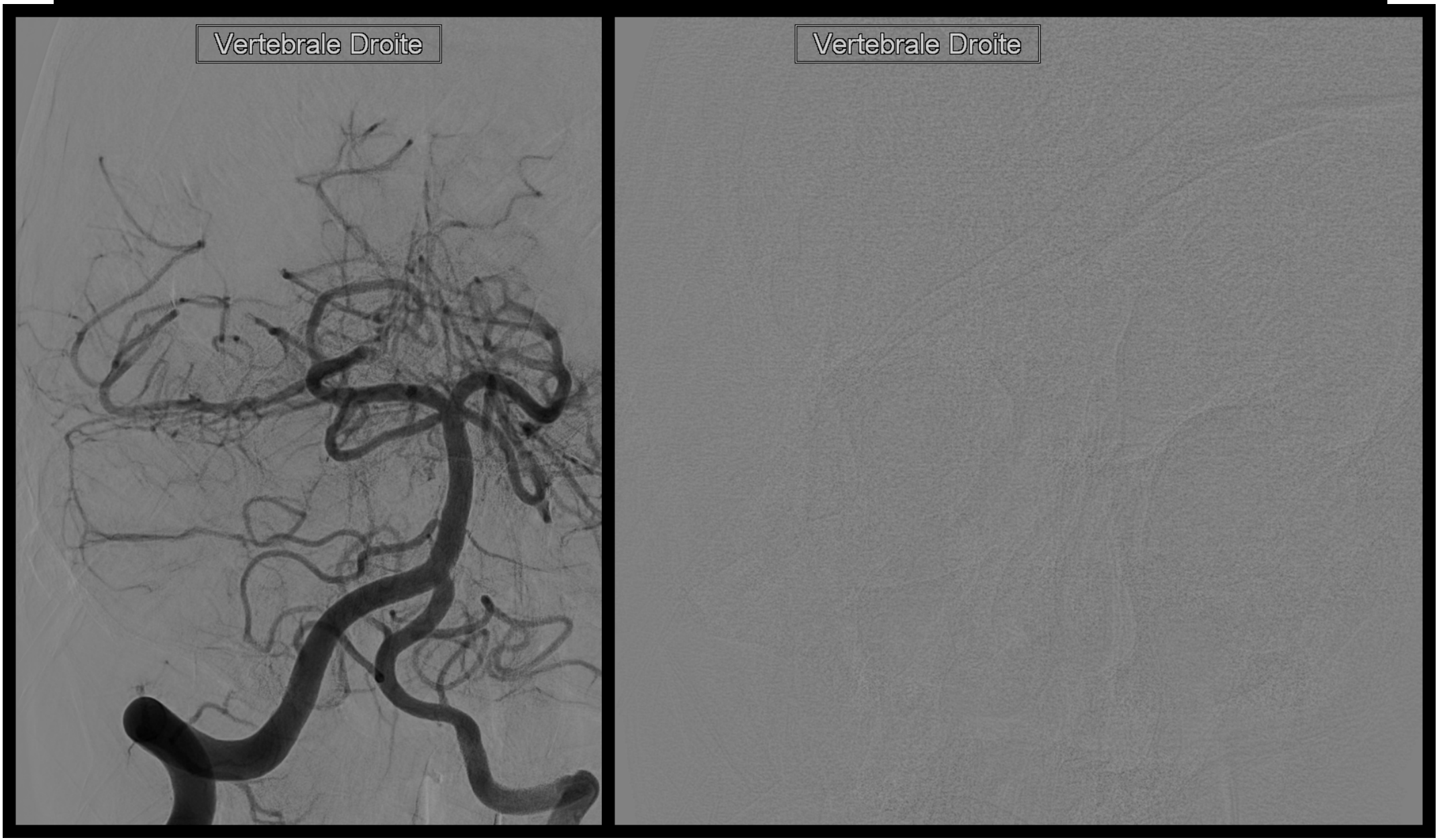
Basilar artery occlusion



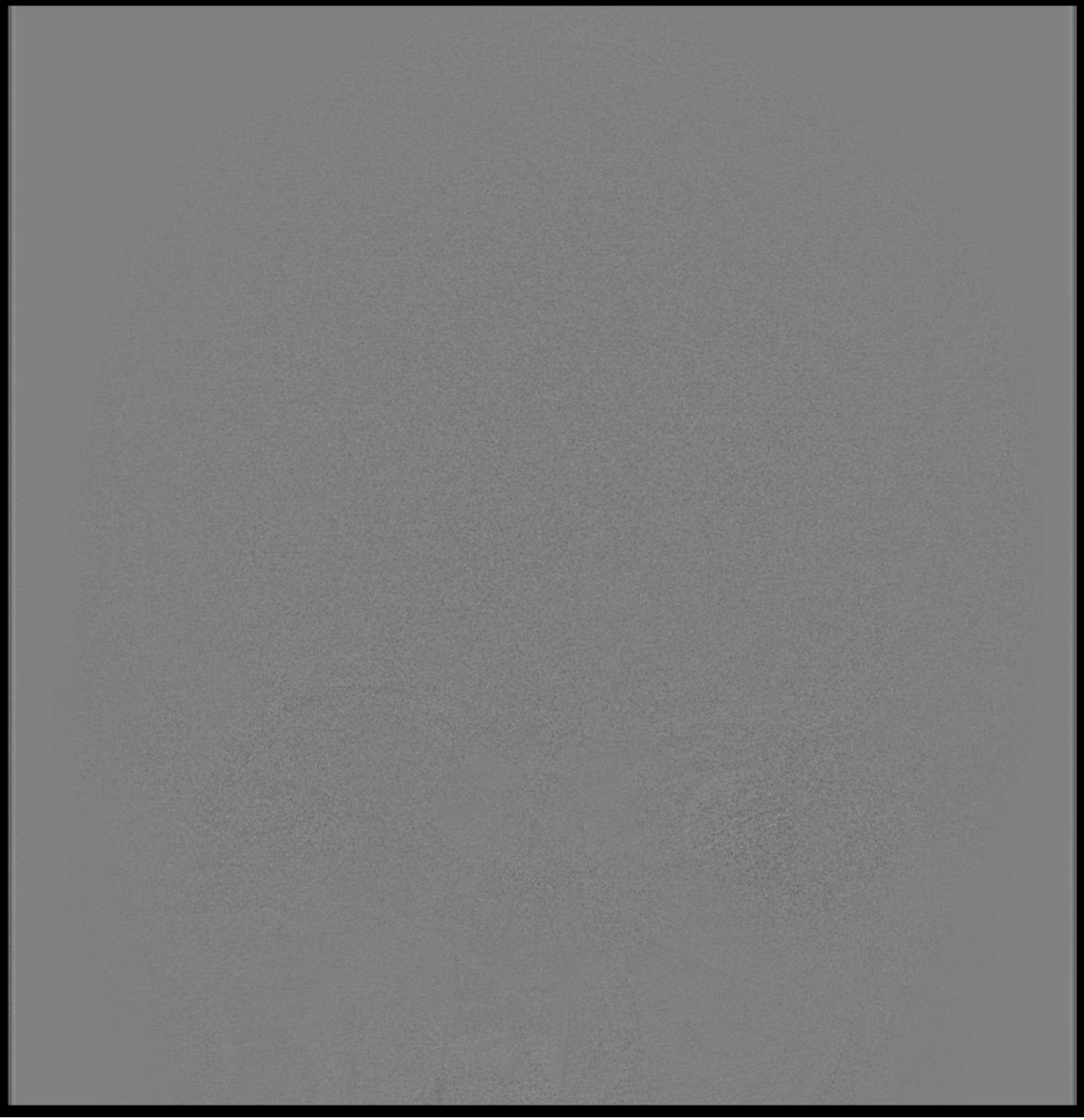


Aspiration cat

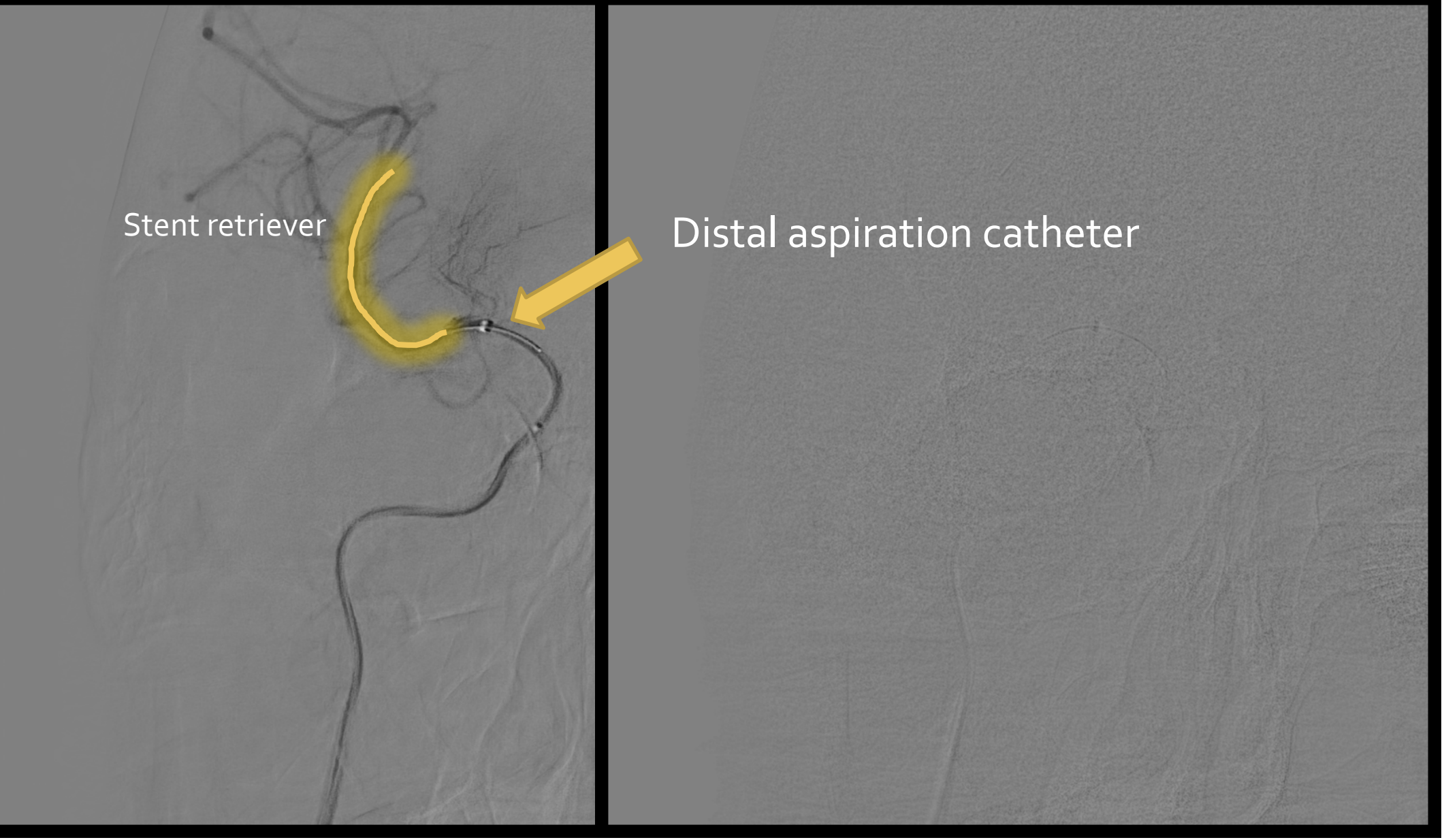
Recanalization



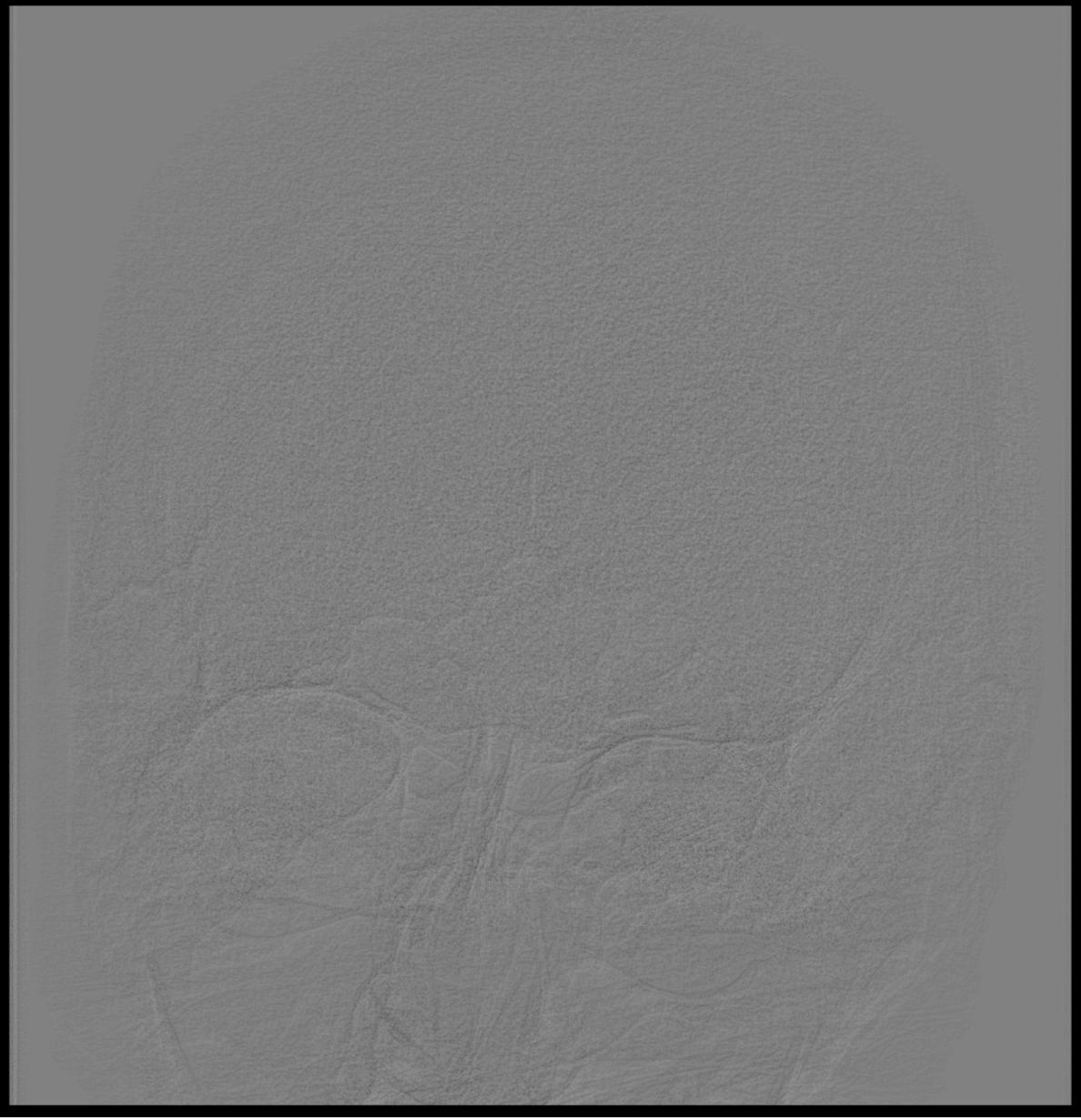
Right MCA M1 occlusion



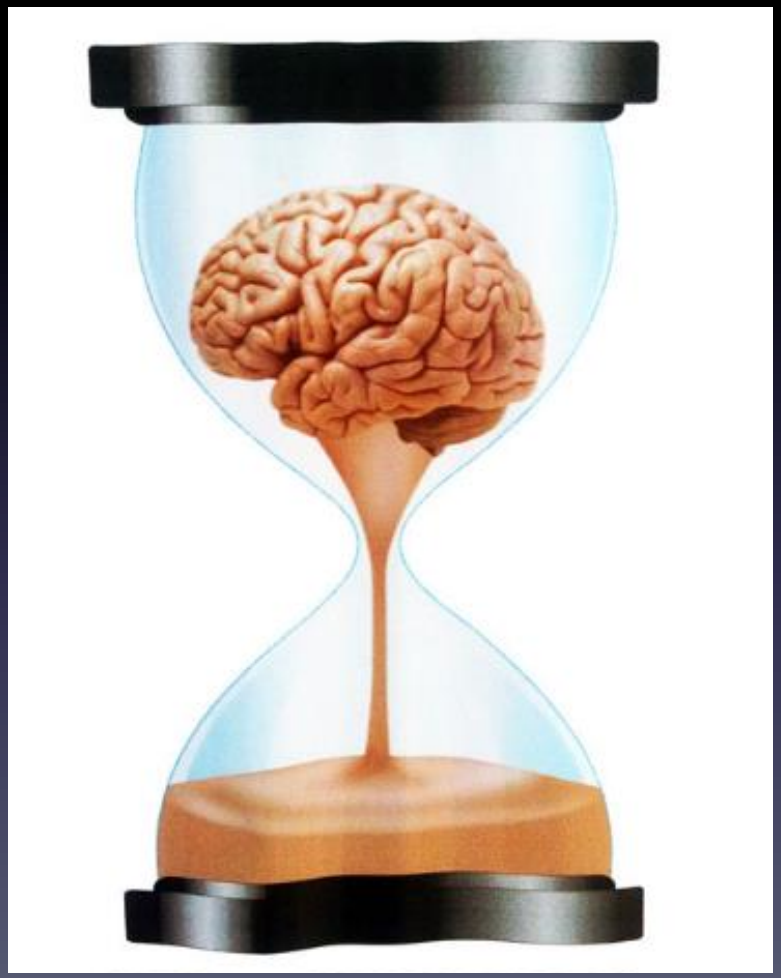
Stent retriever and aspiration



Recanalization



Treat?



where ?

Time is brain !

Time

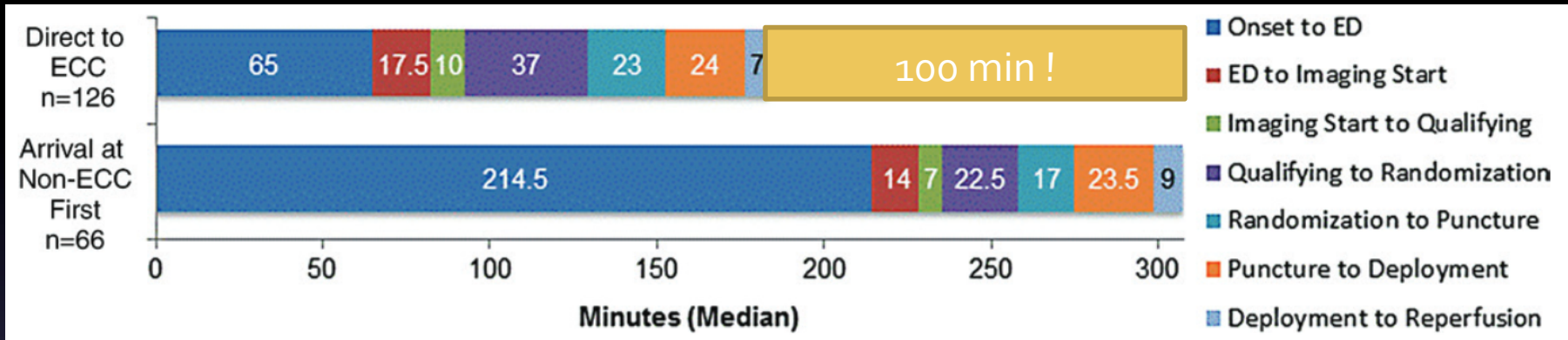
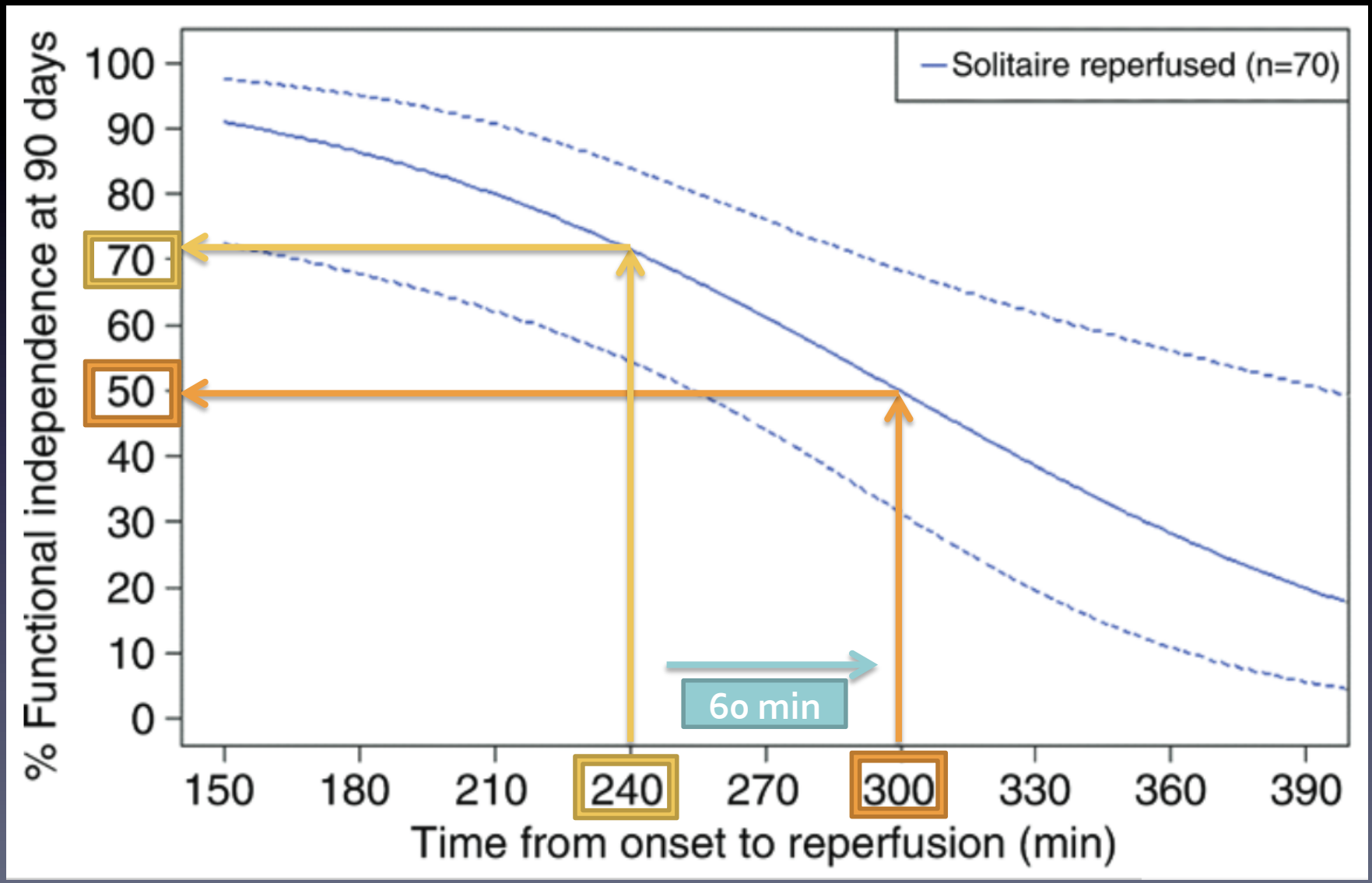


Figure 2: Graph of time intervals in patients treated within the same institution (an ECC) versus those who were transferred from another facility after receiving intravenous tPA therapy. *Deployment* = device deployment, *puncture* = groin puncture, *qualifying* = qualifying image acquisition.

275 vs 179,5 min to reperfusion

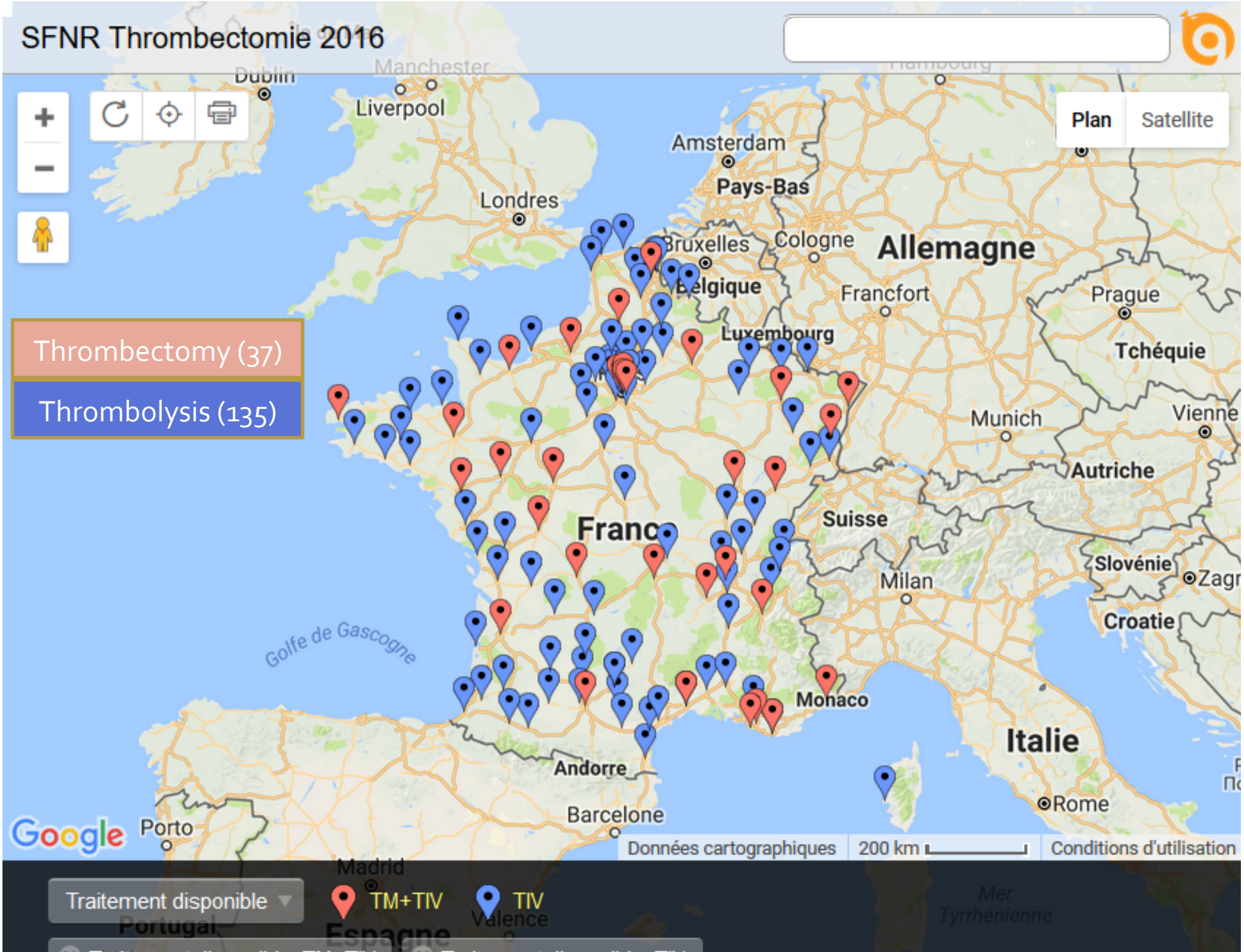
Goyal, Radiology. 2016 Jun;279(3):888-97

Impact of Time



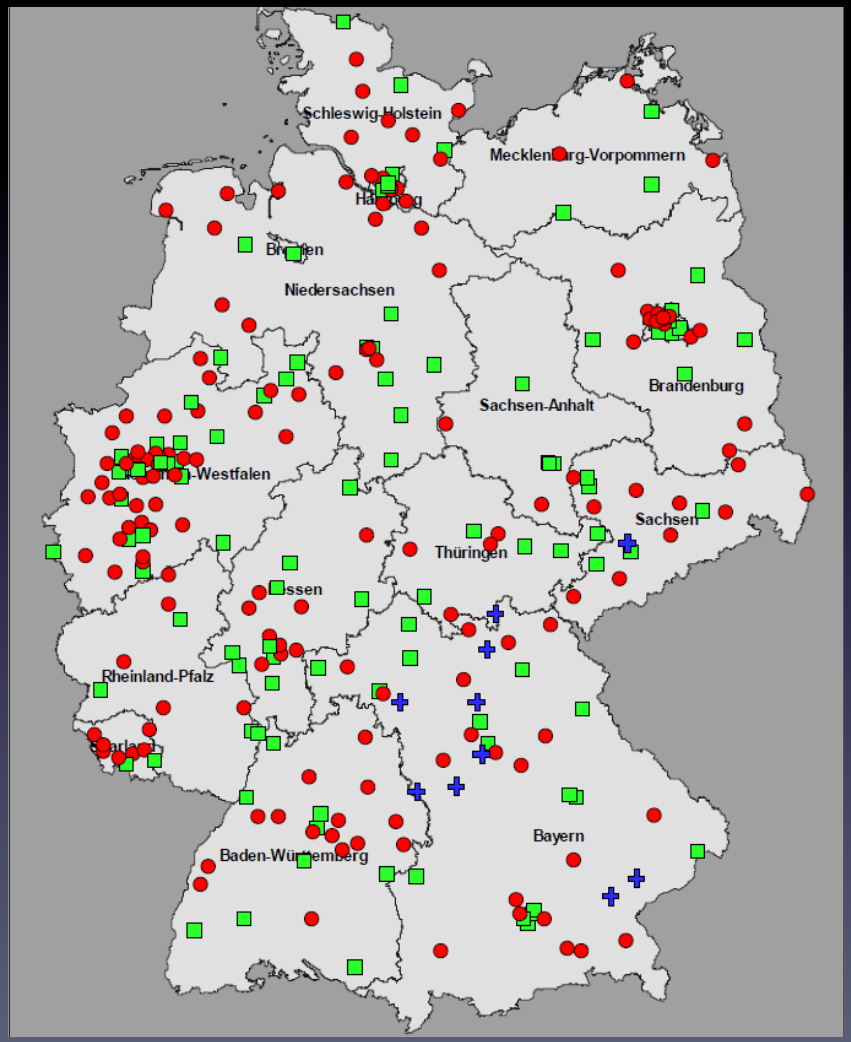
Where ?

- Time is brain
- Need for a stroke ready proximity network
- To get the patient to the right center fast


SFNR Thrombectomie 2016
Thrombectomy (37)
Thrombolysis (135)
Plan
Satellite
Traitement disponible
TM+TIV
TIV
Données cartographiques
200 km
Conditions d'utilisation
Google
Dublin
Manchester
Liverpool
Amsterdam
Pays-Bas
Londres
Bruxelles
Belgique
Cologne
Allemagne
Francfort
Prague
Tchéquie
Luxembourg
Munich
Vienne
Autriche
Suisse
France
Slovénie
Milan
Croatie
Golfe de Gascogne
Monaco
Italie
Andorre
Barcelone
Rome
Porto
Madrid
Portugal
Espagne
Valence
Mer Tyrrhénienne

German Stroke Units (279)

The German stroke network



- Regionale Stroke Unit
- Überregionale Stroke Unit
- Telemedizinisch vernetzte Stroke Unit

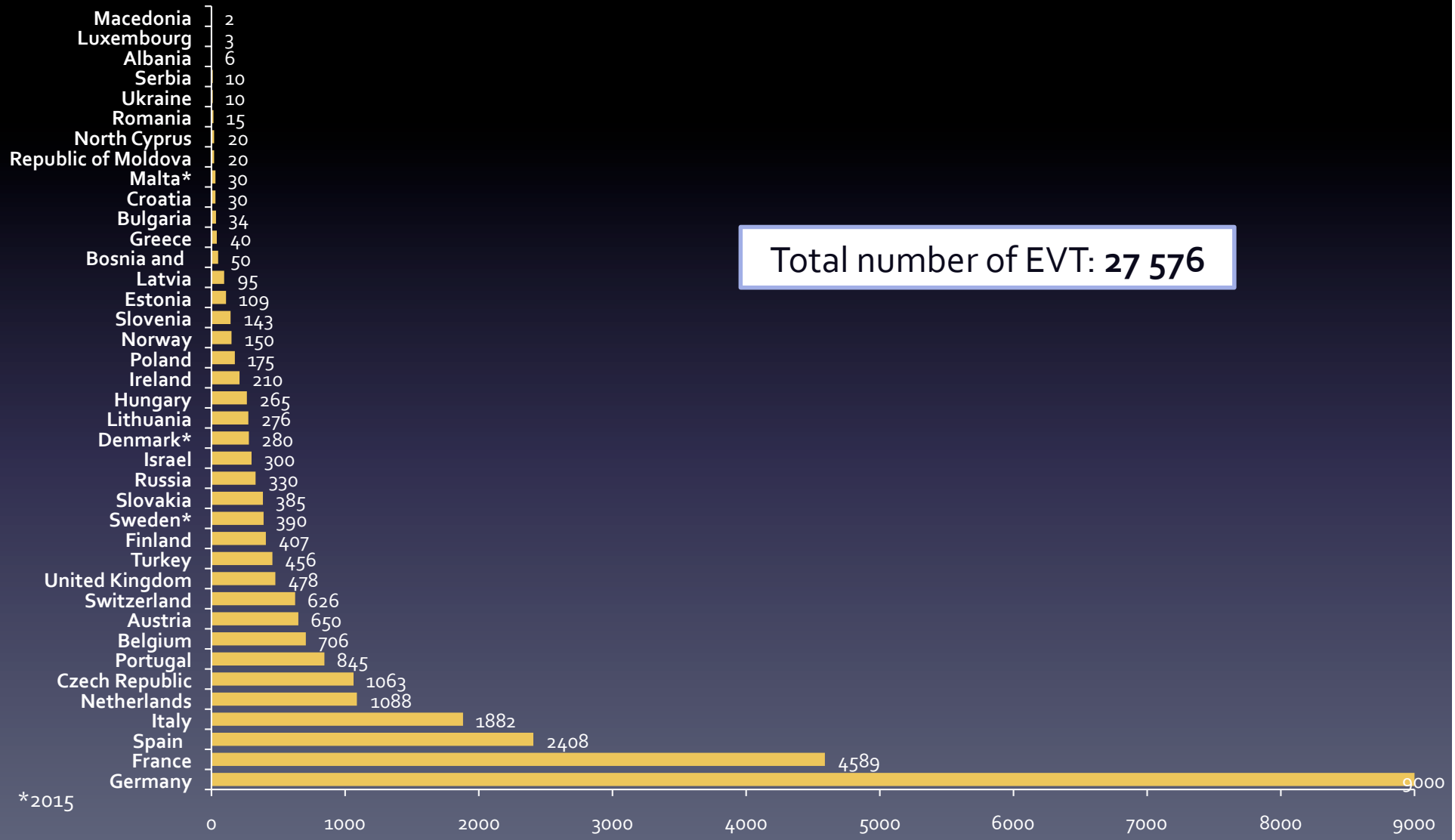
279 Stroke Units

- 162 regional Stroke Units (58%)
- 107 transregional Stroke Centers w/ thrombectomy (38%)
- 10 Tele-Stroke Units (4%)

Courtesy of the Deutsche Schlagenfall Gesellshaft

ESO ESMINT EAN SAFE survey on stroke care in Europe

Absolute number of endovascular treatments (EVT) in 2016

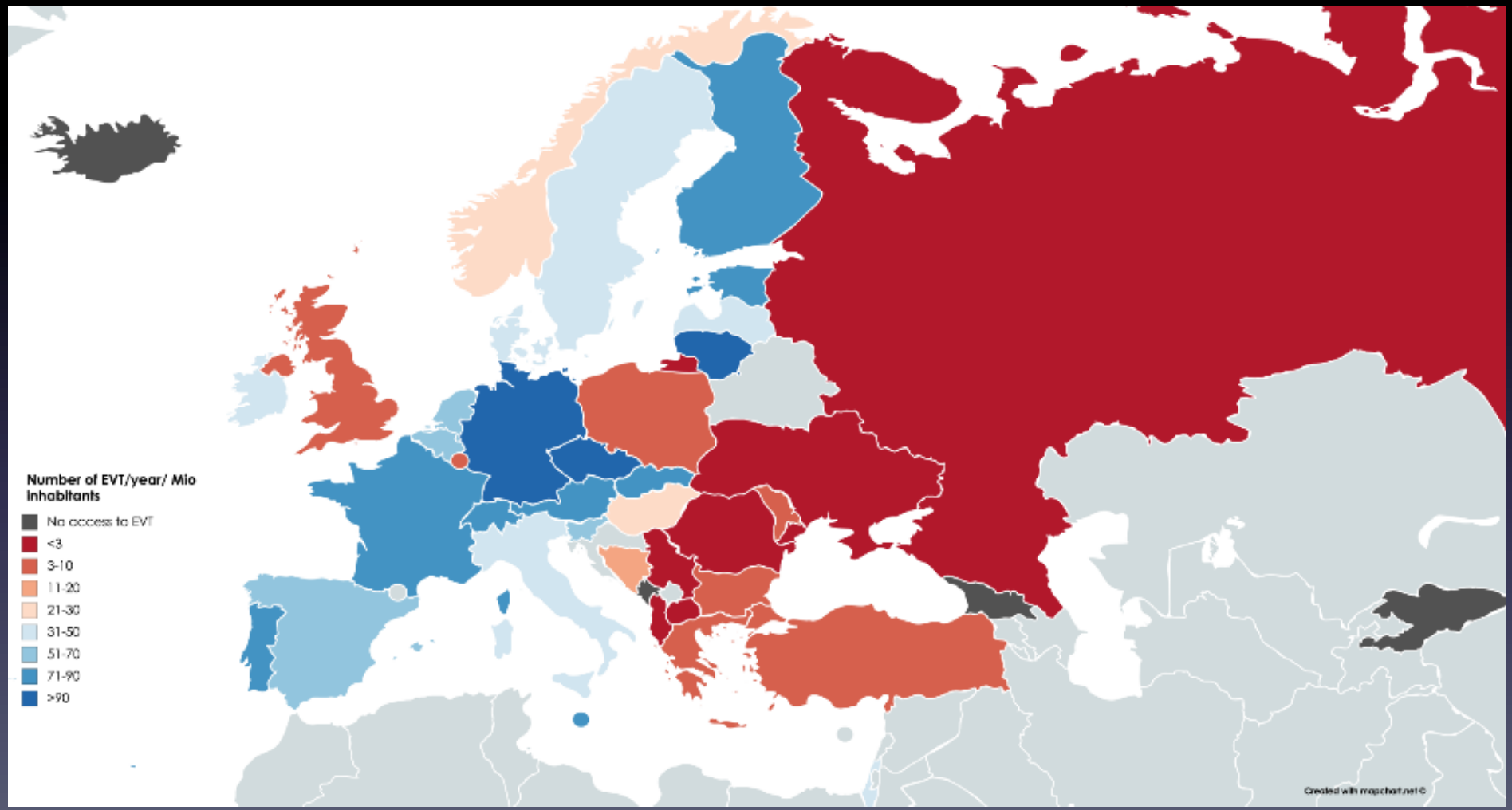


Total number of EVT: **27 576**

Courtesy of Pr. Turjman on behalf of ESMINT

ESO ESMINT EAN SAFE survey on stroke care in Europe

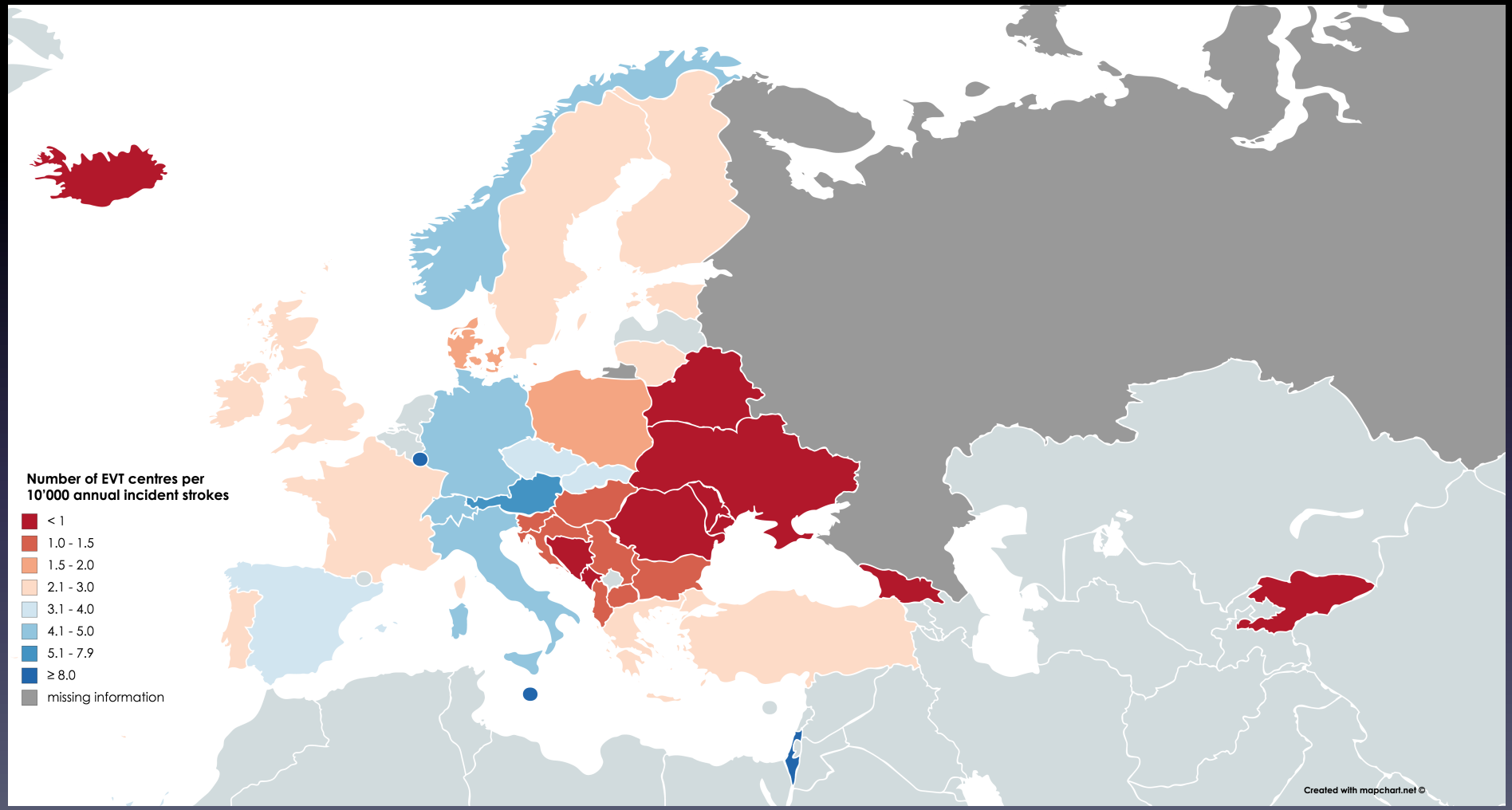
Number of EVT per year / 1 Mio inhabitants



Courtesy of Pr. Turjman on behalf of ESMINT

ESO ESMINT EAN SAFE survey on stroke care in Europe

Number of EVT centres per 10'000 annual incident strokes



Courtesy of Pr. Turjman on behalf of ESMINT

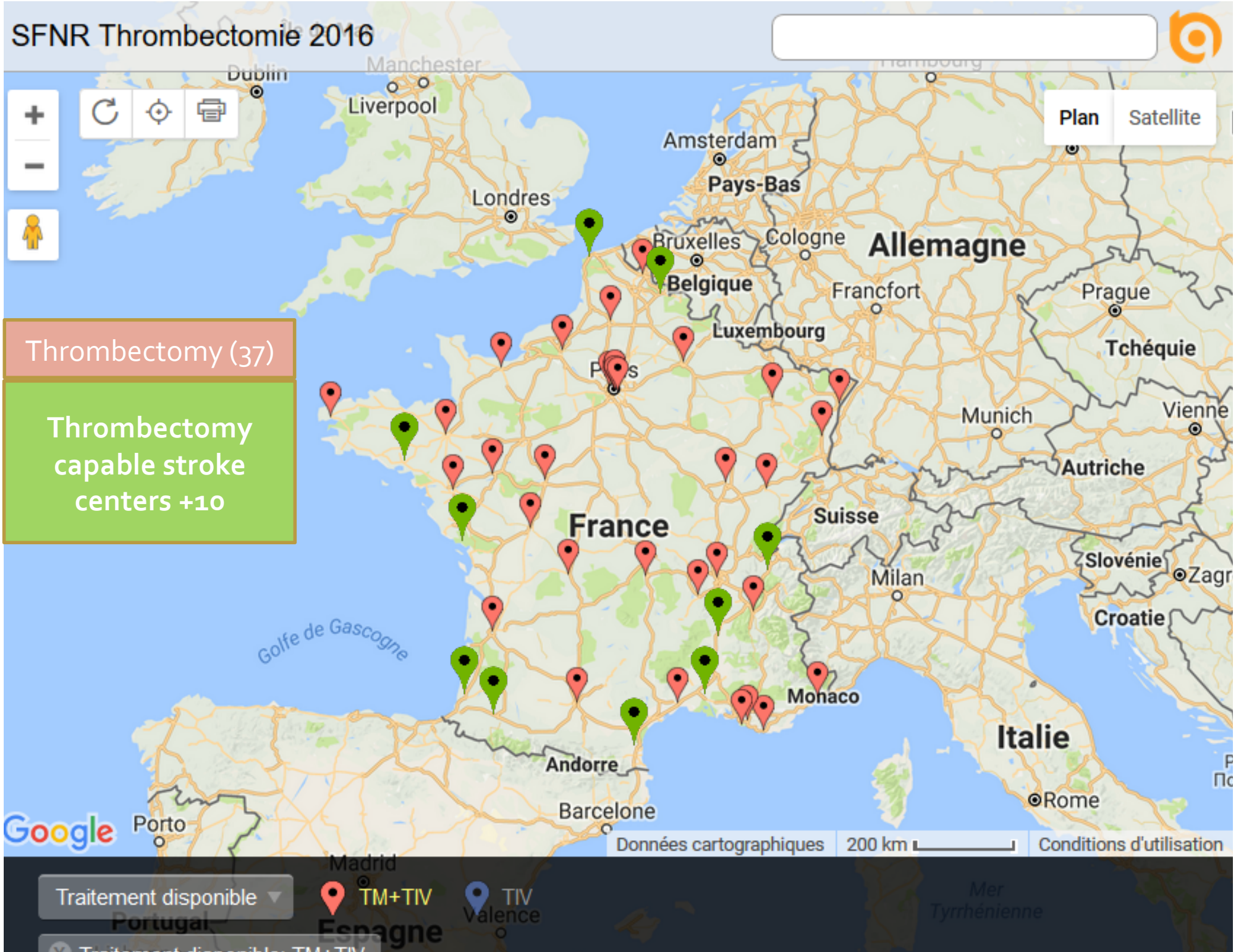
Estimation of thrombectomies

Ischemic strokes in 2016	
Studies :	Eligibility
REVASCAT (New England 2015)	4%
Campbell (Lancet neurol.2015)	10%
Vanacker (Stroke 2016)	17%
El Tawil (Europ Stroke j 2016)	15%
Soderqvist (Karolinska Nat. Base 2013)	6%
Eligible thrombectomies	**10,4%**

- In 2016 in Europe, **192 614** strokes were estimated eligible to mechanical thrombectomy

Solutions

- Train more interventionalists
- Open new centers vs centralization
- Optimize the stroke network :
  - Tele-stroke
  - Pre-hospital triage
  - Fast transportation


SFNR Thrombectomie 2016
Thrombectomy (37)
Thrombectomy capable stroke centers +10
Plan
Satellite
Dublin
Manchester
Liverpool
Amsterdam
Pays-Bas
Londres
Bruxelles
Cologne
Allemagne
Belgique
Francfort
Prague
Luxembourg
Tchéquie
Munich
Vienne
Autriche
France
Suisse
Slovénie
Milan
Croatie
Golfe de Gascogne
Monaco
Italie
Andorre
Barcelone
Rome
Porto
Madrid
Portugal
Espagne
Valence
Mer Tyrrhénienne
Google
Données cartographiques
200 km
Conditions d'utilisation
Traitement disponible
TM+TIV
TIV

We need more interventionalists !

Neuroradio-interventionalist

- Comprehensive stroke centers
  - Mechanical thrombectomies
  - Intra cranial aneurysm
  - Cerebral arterio-venous fistulas and malformations
- Large volume of MT
- NRI + thrombectomy

We need more interventionalists !

Neuroradio-interventionalists

- Comprehensive stroke centers
  - Mechanical thrombectomies
  - Intra cranial aneurysm
  - Cerebral arterio-venous fistulas and malformations
- Large volume of MT
- NRI + thrombectomy

Radiological interventionalists

- Thrombectomy-capable stroke centers (stroke units)
- Medium volume of MT
- Need for body vascular interventionist + thrombectomy

The German Model

- DeGIR/DGNR formation :
  - Level 1 : basic interventional radiology
  - Level 2 : specialized training interventional radio.
    - With A – F modules representing different fields

The German Model

Table I. DeGIR/DGNR certification including number of procedures.

Curriculum	Indication area	Number of procedures for level 2
DeGIR/DGNR	Vascular recanalization and reconstruction (non-neurovascular) (aorta, peripheral, haemodialysis shunts) (Module A)	150
	Vascular embolization procedures (Module B)	100
	Miscellaneous procedures including vascular foreign body removal, TIPSS, venous access (Module C)	100
	Minimally invasive tumour therapy including tumour embolization, chemoembolization and SIRT (Module D)	100
	Neurovascular revascularization including carotid and stroke (Module E)	100 (including at least 30 extracranial and at least 30 intracranial procedures)
	Neurovascular embolization (aneurysms, malformations, AV fistula) (Module F)	100 (including at least 50 intracranial procedures)

One true solution

Thank you !