

Urgences Neurovasculaires



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Plan

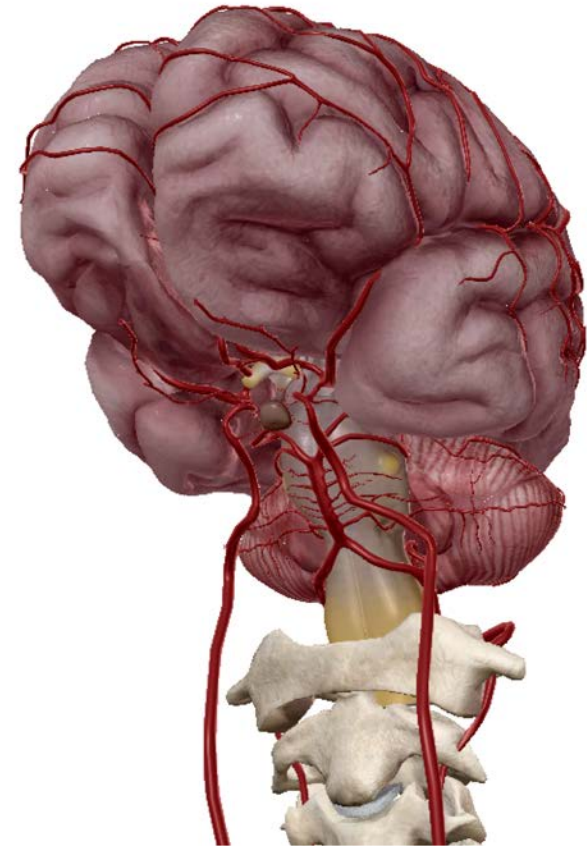
Urgence vitale ou fonctionnelle

Filière NRI & neuro anesthésie réa

- AVC ischémique
- AVC hémorragique
- Objectifs de « réanimation »
- Actualité:

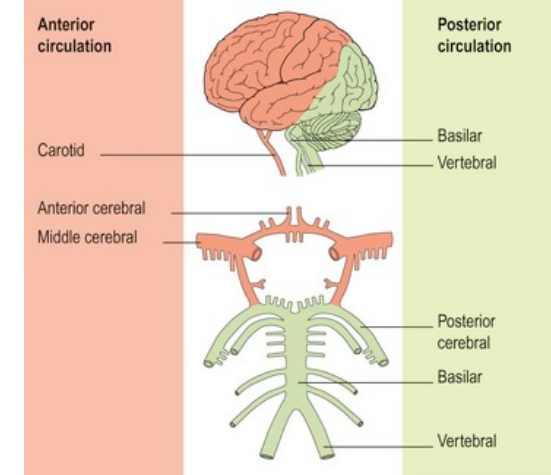
diagnostique

Traitements précoces



Urgences ischémiques - AVCi

- Circulation antérieure / post
- Heure de début <4.5h-24H réveil
- Mismatch volume > 10 ml
- Occlusion proximale
- Mineur : NIHSS score < 5
- Majeur : NIHSS>22-25; ASPECT<7
- Prise d'anticogulant (INR>1.7; NACO<48h)



Guideline

European Stroke Organisation (ESO) guidelines on intravenous thrombolysis for acute ischaemic stroke

Eivind Berge^{1,*}, William Whiteley^{2,*}, Heinrich Audebert³, Gian Marco De Marchis⁴, Ana Catarina Fonseca⁵, Chiara Padiglioni⁶, Natalia Pérez de la Ossa⁷, Daniel Strbian⁸, Georgios Tsivgoulis^{9,10} and Guillaume Turc^{11,12,13}

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Guidelines

European Stroke Organisation (ESO) – European Society for Minimally Invasive Neurological Therapy (ESMINT) Guidelines on Mechanical Thrombectomy in Acute Ischaemic Stroke Endorsed by Stroke Alliance for Europe (SAFE)

Guillaume Turc^{1,2,3,4}, Pervinder Bhogal⁵, Urs Fischer⁶, Pooja Khatri⁷, Kyriakos Lobotesis⁸, Mikael Mazighi^{3,9,10,11}, Peter D. Schellinger¹², Danilo Toni¹³, Joost de Vries¹⁴, Philip White¹⁵, and Jens Fiehler¹⁶

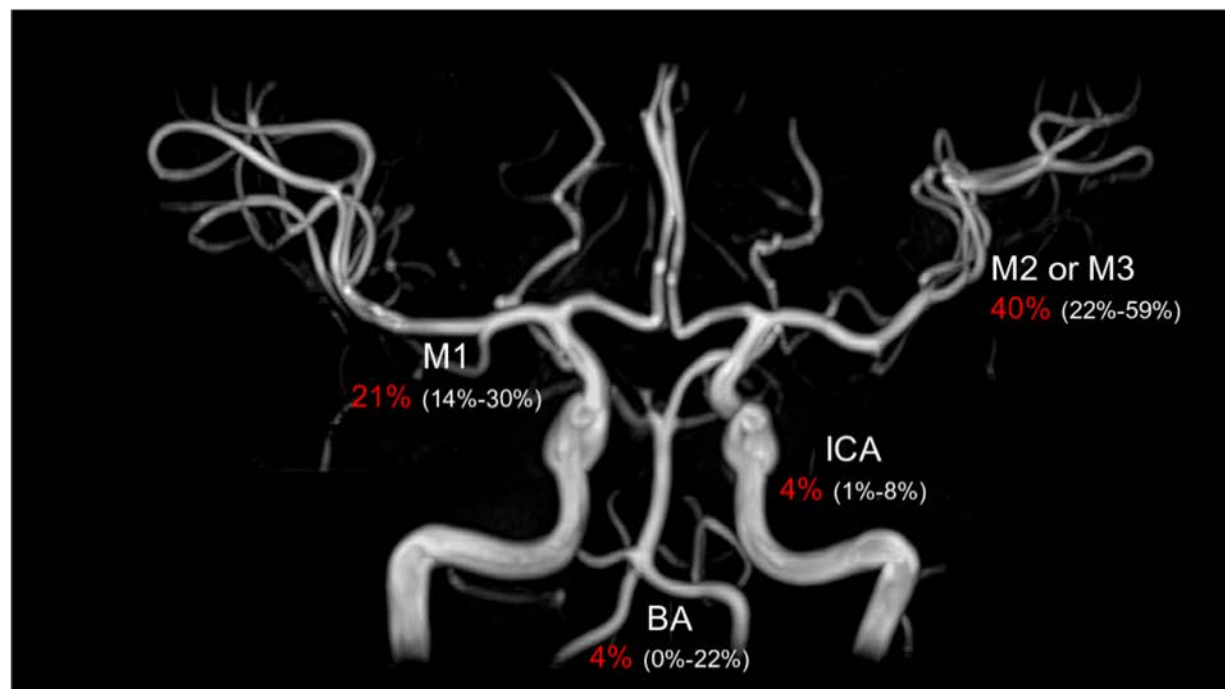
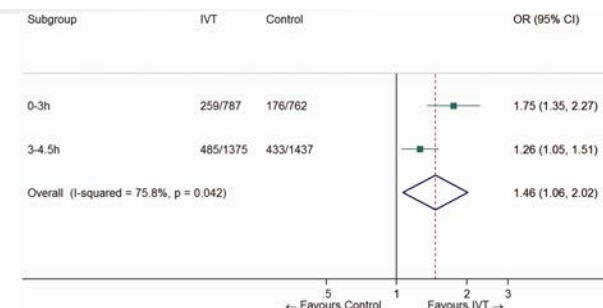
Recommandations actuelles - thrombolyse

For patients with acute ischaemic stroke of
<4.5 h duration, we recommend intra-
venous thrombolysis with alteplase.

Quality of evidence: **High** ⊕⊕⊕⊕

Strength of recommendation: **Strong** ↑↑

NINDS 1995
ECAS 2008



Seners et al Stroke 2016

Guillaume TURC, Paris, France

Thrombolyse >4.5h- mismatch

For patients with acute ischaemic stroke of 4.5–9 h duration (known onset time), and with no brain imaging other than plain CT, we recommend no intravenous thrombolysis.

Quality of evidence: **Moderate** ⊕⊕⊕

Strength of recommendation: **Strong** ↓↓

For patients with ischaemic stroke of 4.5–9 h duration (known onset time) and with CT or MRI core/perfusion mismatch*, and for whom mechanical thrombectomy is either not indicated or not planned, we recommend intravenous thrombolysis with alteplase.

Quality of evidence: **Low** ⊕⊕

Strength of recommendation: **Strong** ↑↑

*In the individual participant data meta-analysis by Campbell et al.,³⁴ core/perfusion mismatch was assessed with an automated processing software and defined as follows:

- Infarct core** volume < 70 ml
- and Critically hypoperfused† volume/ Infarct core** volume > 1.2
- and Mismatch volume > 10 ml
- ** rCBF < 30% (CT perfusion) or ADC < 620 μm²/s (Diffusion MRI)
- † Tmax > 6 s (perfusion CT or perfusion MRI)

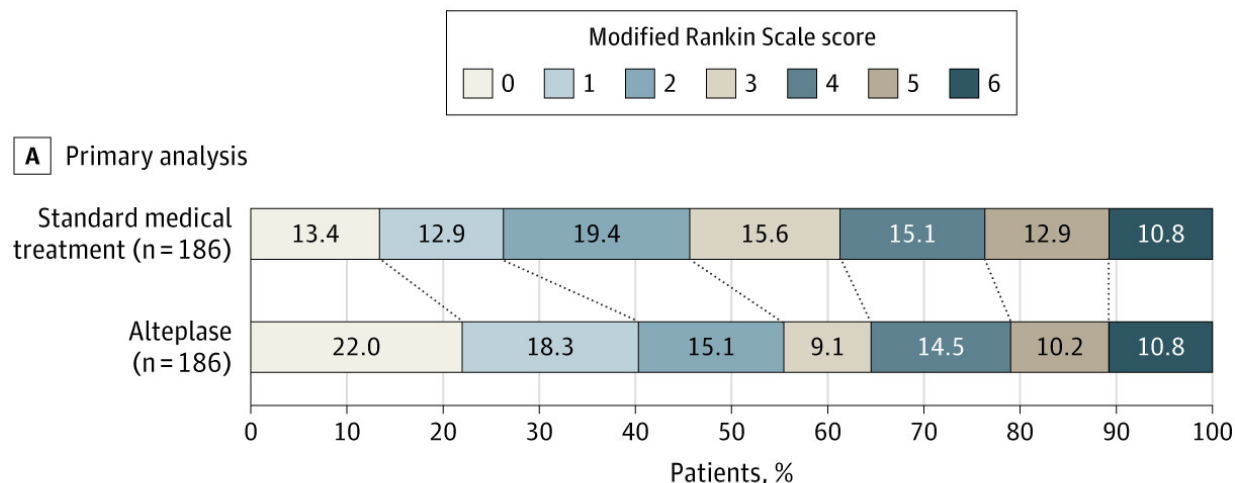
HOPE - 2025

Circulation ant
4.5-24h



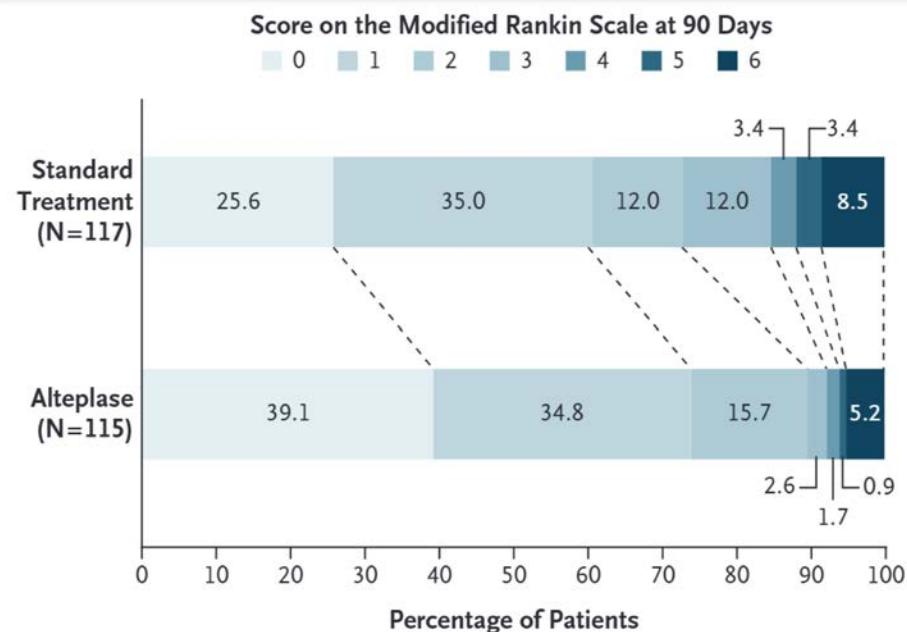
EXPECTS - 2025

Circulation post
4.5-24h



0.5% HIP

3.8% HIP



0.9% HIP

1.7% HIP

Tenecteplase (0.25 mg/kg) vs alteplase (0.9 mg/kg)

For patients with acute ischaemic stroke of <4.5 h duration and not eligible for thrombectomy, we suggest intravenous thrombolysis with alteplase over intravenous thrombolysis with tenecteplase. Please see paragraph 5.2 for patients eligible for mechanical thrombectomy.

Quality of evidence: **Low** ⊕⊕

Strength of recommendation: **Weak** †?

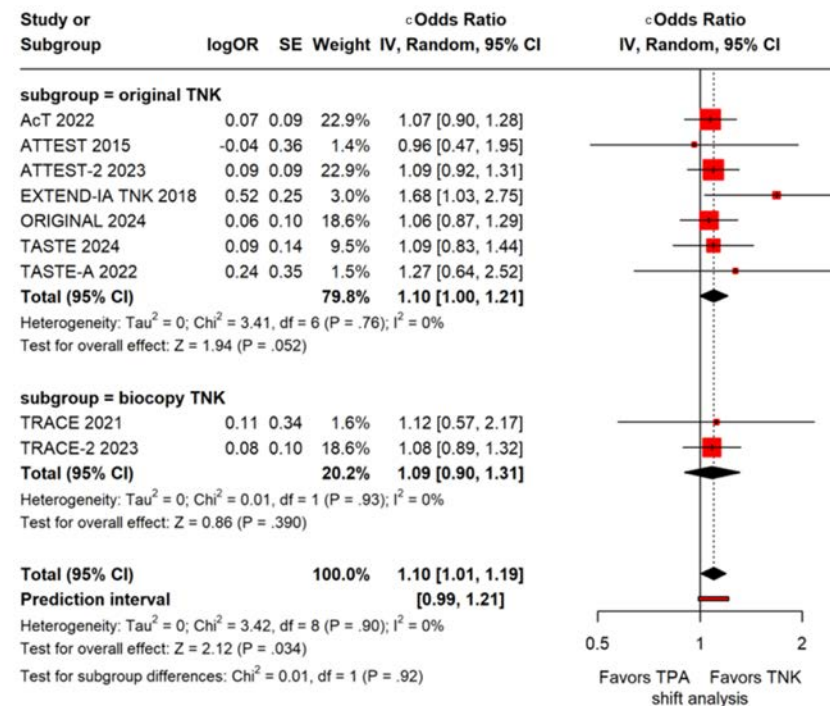
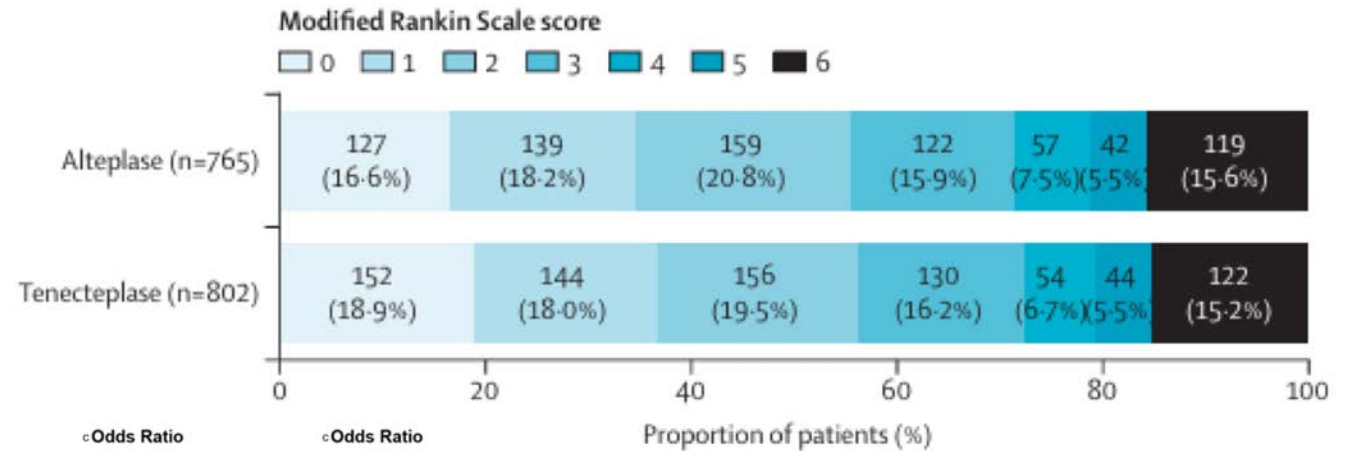


AcT - 2022

For patients with acute ischaemic stroke of < 4.5 h duration and with large vessel occlusion who are candidates for mechanical thrombectomy and for whom intravenous thrombolysis is considered before thrombectomy, we suggest intravenous thrombolysis with tenecteplase 0.25 mg/kg over intravenous thrombolysis with alteplase 0.9 mg/kg.

Quality of evidence: **Low** ⊕⊕

Strength of recommendation: **Weak** †?



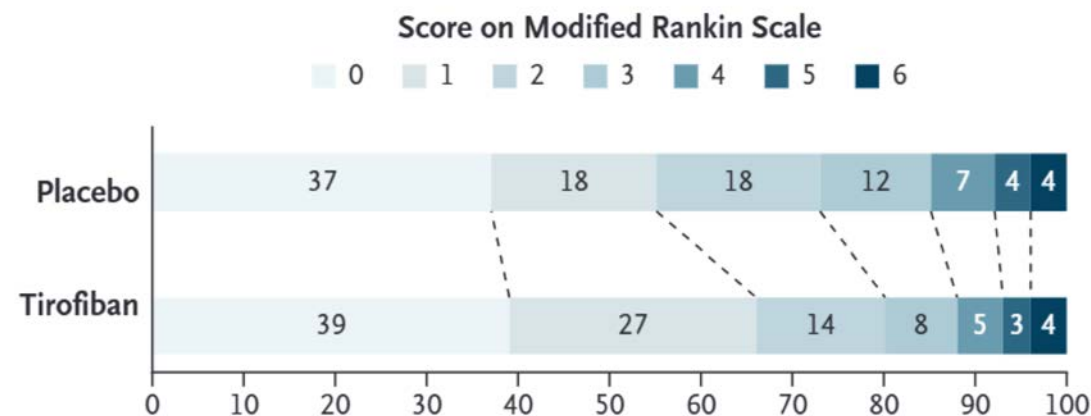
Palaiodimou et al, Neurology 2024

Antithrombotic

For patients with acute ischaemic stroke of <4.5 h duration, we recommend no antithrombotic drugs within 24 h of intravenous thrombolysis over antithrombotic drugs as an adjunct therapy to intravenous thrombolysis with alteplase.

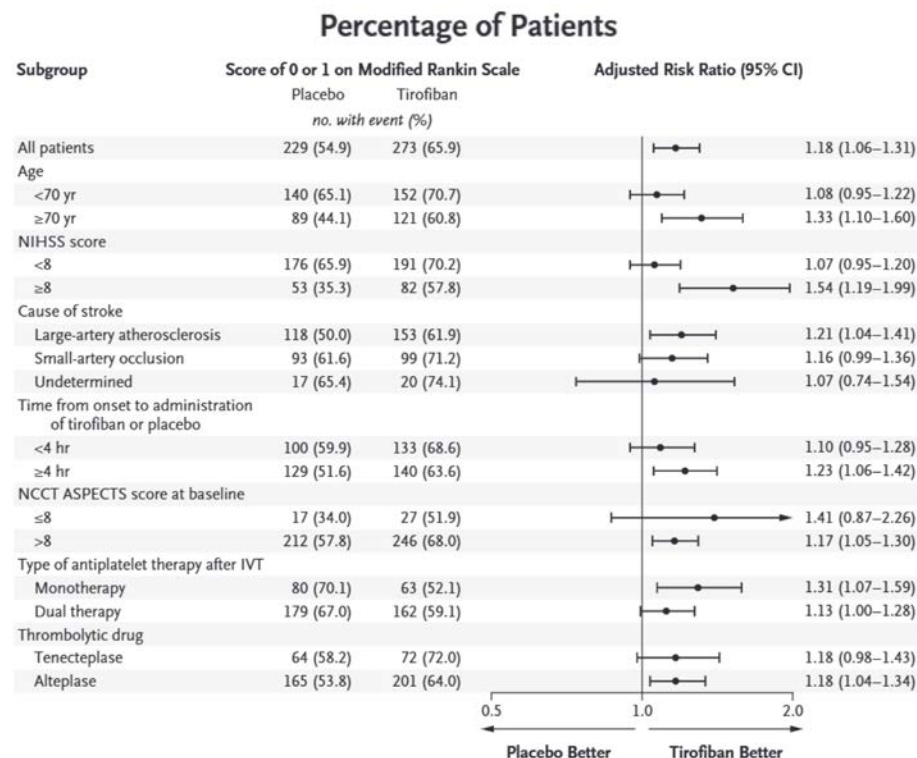
Quality of evidence: **Low** ⊕⊕

Strength of recommendation: **Strong** ↓↓



1.7% HIP

0% HIP



ASSET-IT 2025 (tirofiban)
 Alteplase, tenecteplase (~25%)
 Circulation antérieure et post (~5%)

NIHSS 6 (5-9) – bas
PAS de thrombectomie

Recommandations actuelles- thrombectomie

In adults with anterior circulation LVO-related acute ischaemic stroke presenting within 6 hours after symptom onset, we recommend MT plus BMM, including IVT whenever indicated, over BMM alone to improve functional outcome.

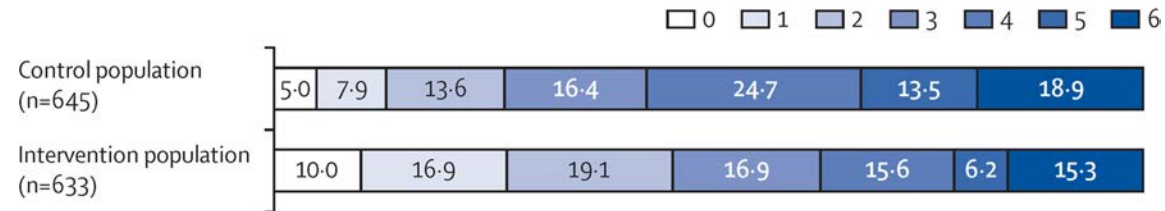
Quality of evidence: High ⊕⊕⊕⊕

Strength of recommendation: Strong ↑↑

MR CLEAN, EXTEND IA, ESCAPE, SWIFT-PRIME, REVASCAT (n=1287)

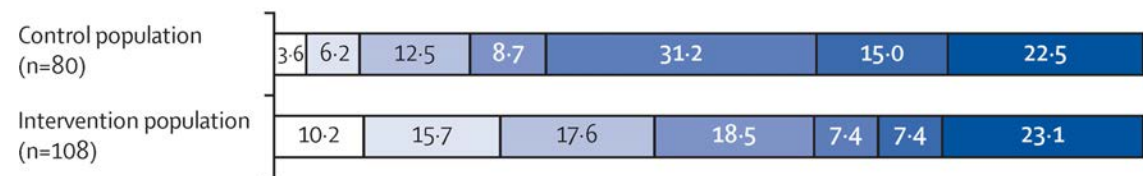
NNT=5 pour mRS≤2

A Overall

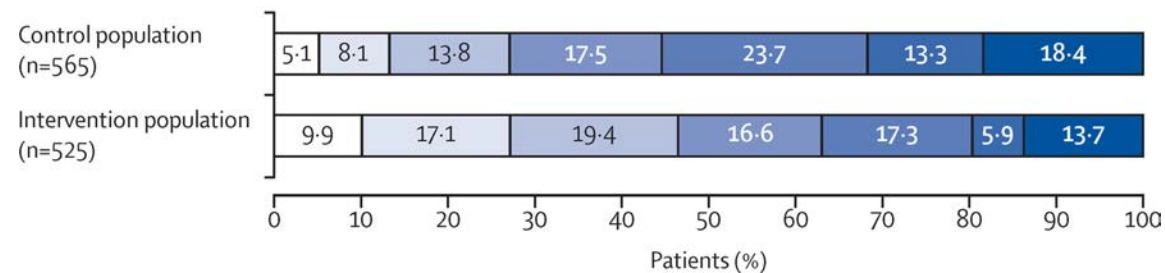


B

Ineligible for alteplase



Received alteplase



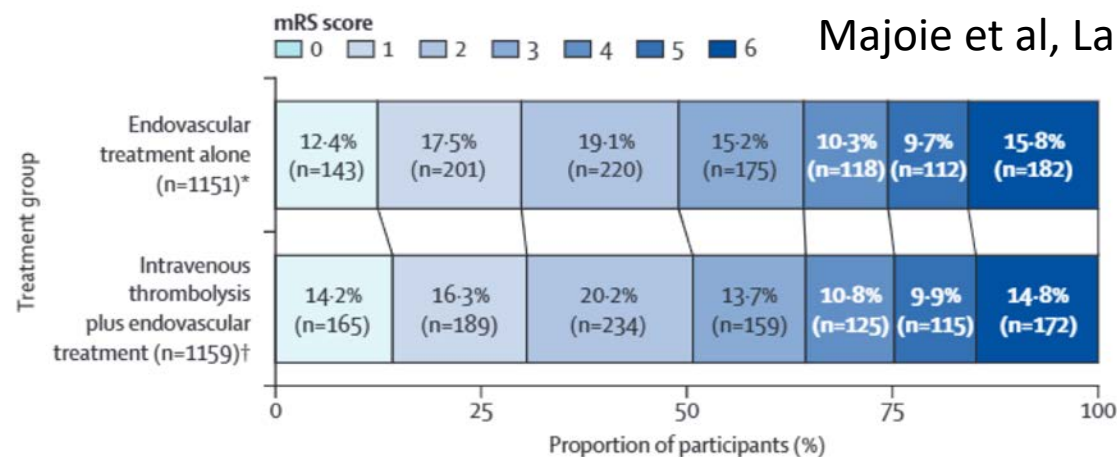
Thrombectomie + IVT ?

- In LVO-related ischaemic stroke patients eligible for both treatments, we recommend IVT plus MT over MT alone. Both treatments should be performed as early as possible after hospital arrival. MT should not prevent the initiation of IVT, and IVT should not delay MT.

Quality of evidence: Very low ⊕, Strength of recommendation: Strong ↑↑

- In LVO-related ischaemic stroke patients not eligible for IVT, we recommend MT as standalone treatment.

Quality of evidence: Low ⊕⊕, Strength of recommendation: Strong ↑↑



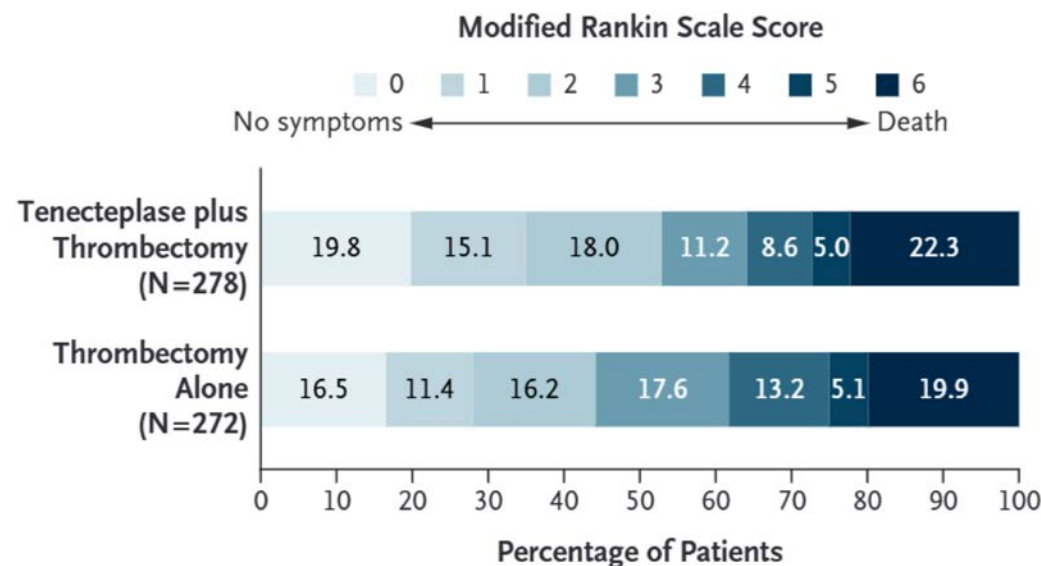
Majoie et al, Lancet 2023

4.3% HIP

5.4% HIP

DIRECT-MT, DEVT, SKIP, MR CLEAN NO IV, SWIFT-DIRECT, DIRECT-SAFE

BRIDGE-TNK - 2025



8.5% HIP

6.7% HIP

Thrombectomie >6h

In adults with anterior circulation LVO-related acute ischaemic stroke presenting between 6 and 24 hours from time last known well and fulfilling the selection criteria of DEFUSE-3* or DAWN**, we recommend MT plus BMM over BMM alone to improve functional outcome.

Quality of evidence: Moderate ⊕⊕⊕

Strength of recommendation: Strong ↑↑

MR CLEAN LATE

Median NIHSS 10 (6–17) – IVT 5%

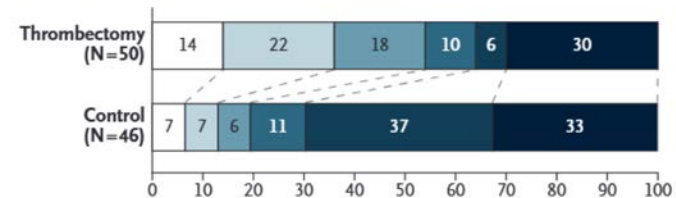
<1/3 territoire ACM

Collatéralité

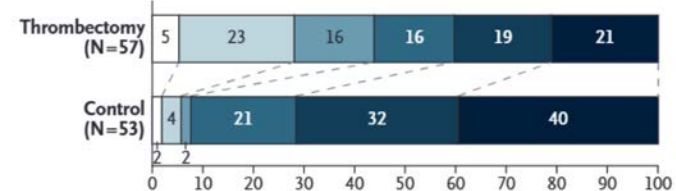


DAWN - DEFUSE-3 2018

Last Known to Be Well 6 to 12 Hr before Randomization

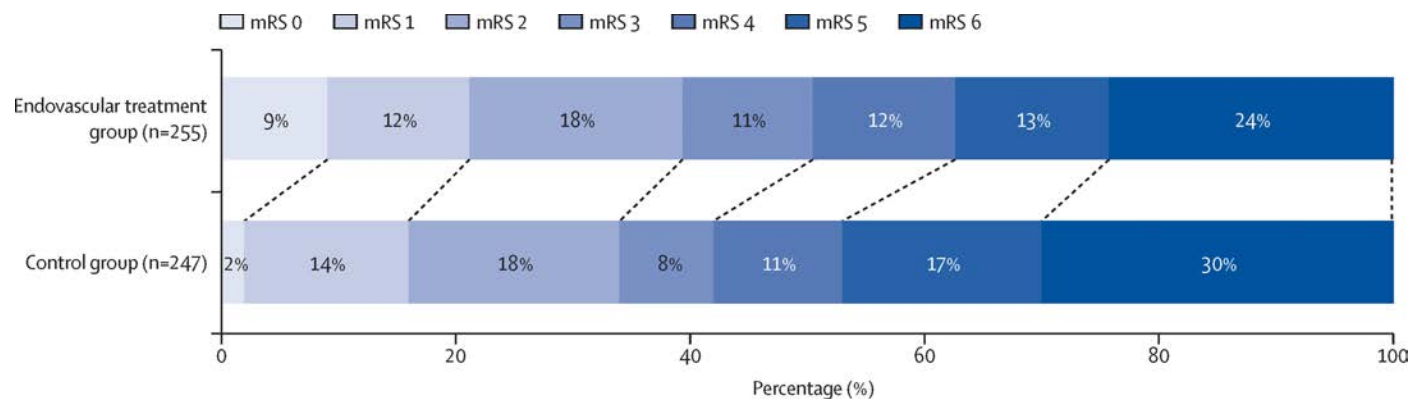


Last Known to Be Well >12 to 24 Hr before Randomization



Percent of Patients
Score on Modified Rankin Scale

0 1 2 3 4 5 6



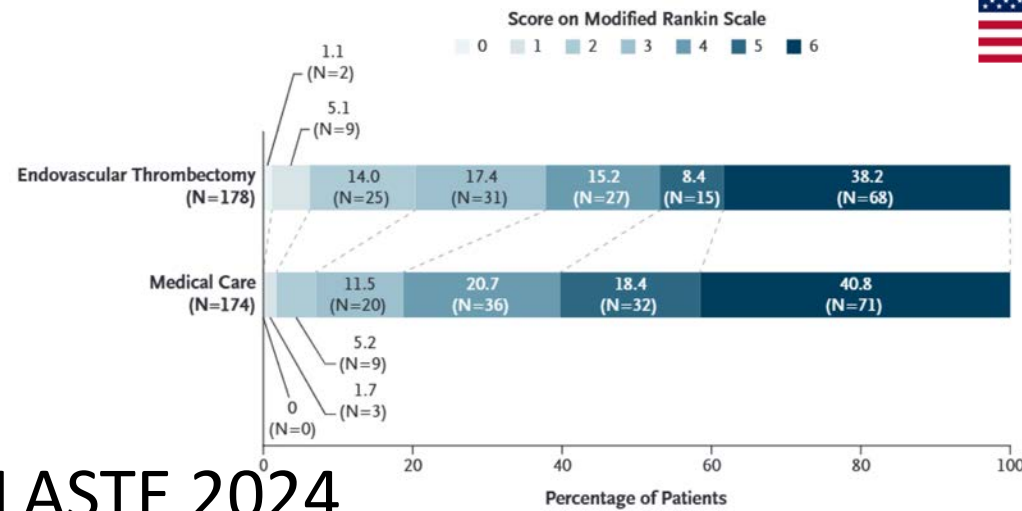
Olthuis et al, Lancet 2023

AVC large

- We recommend that anterior circulation stroke patients with extensive infarct core (e.g. ASPECTS <6 on non-contrast CT scan or core volume >70 ml or >100 ml) be included in RCTs comparing mechanical thrombectomy plus best medical management versus best medical management alone.

Quality of evidence: Very Low ⊕, Strength of recommendation: -

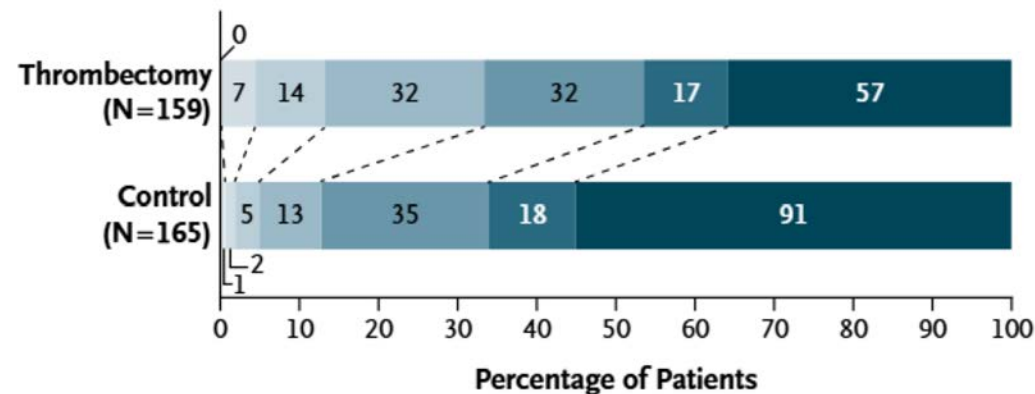
• ASPECT<5 -- NIHSS median ~20 SELECT2 2023



0,6 % HIP

1,1 % HIP

LASTE 2024



3.2 % HIP

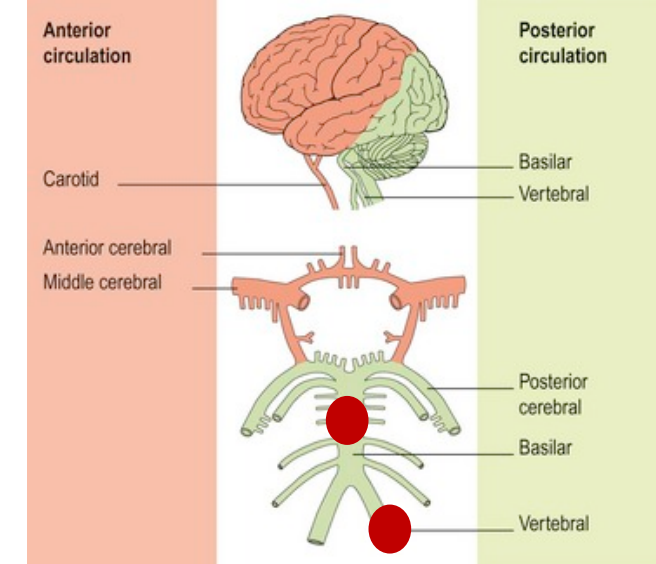
2.5 % HIP

Subgroup	Control no. of patients	Thrombectomy no. of patients	Generalized Odds Ratio (95% CI)
Overall	165	159	1.63 (1.29-2.06)
Age			
≤70 yr	64	64	2.03 (1.36-3.03)
>70 yr	101	95	1.44 (1.08-1.90)
Sex			
Female	77	77	1.54 (1.10-2.15)
Male	88	82	1.72 (1.24-2.39)
Intravenous thrombolysis therapy			
No	107	104	1.69 (1.27-2.25)
Yes	58	55	1.52 (1.01-2.28)
Baseline NIHSS score			
<20	57	62	1.80 (1.20-2.69)
≥20	108	97	1.53 (1.15-2.03)
Baseline ASPECTS value			
≤2	95	86	1.77 (1.30-2.41)
≥3	70	73	1.47 (1.02-2.09)
Baseline infarct volume			
<100 ml	35	34	1.44 (0.85-2.45)
100-150 ml	58	64	1.77 (1.20-2.60)
>150 ml	72	61	1.58 (1.11-2.23)
Occlusion of intracranial segment of ICA			
No	91	90	1.55 (1.12-2.13)
Yes	74	69	1.79 (1.27-2.51)
Time from symptom onset to randomization			
<4.5 hr	86	78	1.69 (1.21-2.36)
4.5 to 6.5 hr	79	81	1.59 (1.14-2.21)
Directly admitted to thrombectomy-capable center			
Yes	71	70	1.66 (1.17-2.34)
No	94	89	1.61 (1.17-2.20)
Qualifying imaging method			
Computed tomography	25	28	1.34 (0.78-2.30)
Magnetic resonance imaging	140	131	1.71 (1.32-2.21)

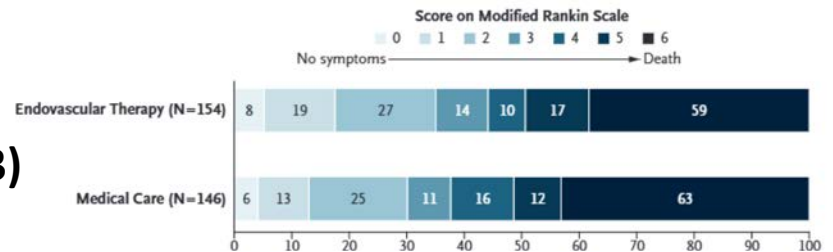
Circulation post



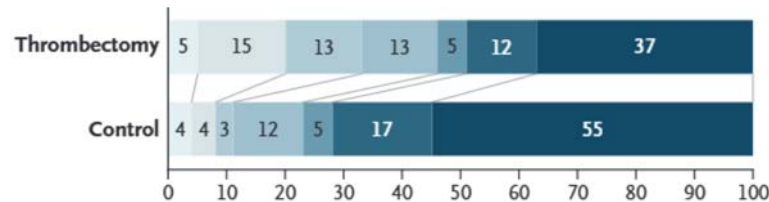
- 2015-2021: TTT incertain
 - 2021-223: BASICS BAOUCHE ATTENTION
- IVT: 30-70%; PC-ASPECT med 8-9, NIHSS median 20-25
- Sousgroupe: **NIHSS<10** EVT ++ ; **/!\ ASPECT<6**



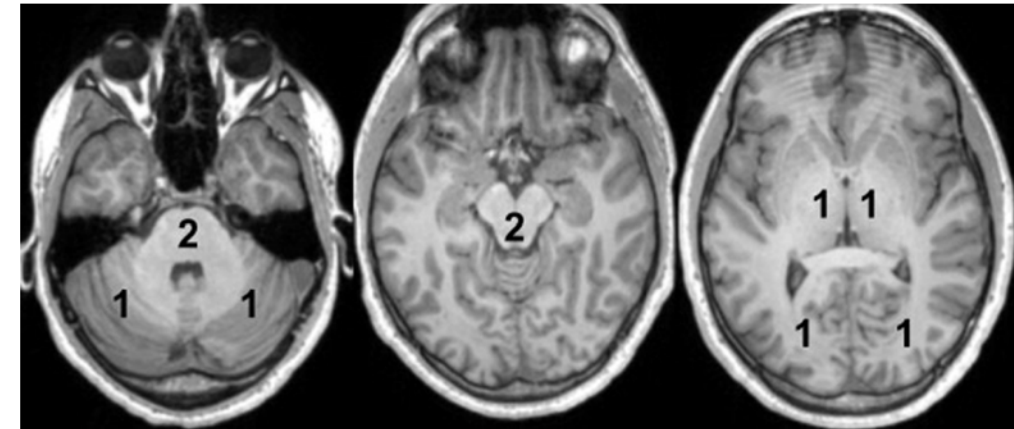
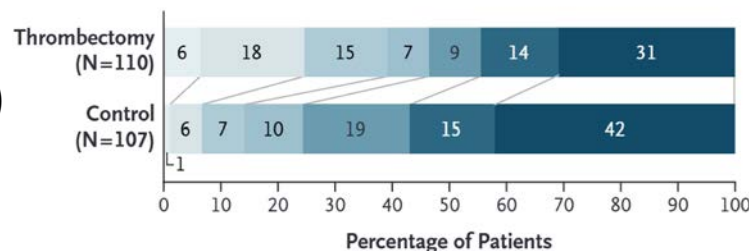
2h (1.4-3.3)



5.1h (3.6-7.2)



11.6h (8.5-14.34)



Position et hémodynamique ?



ZODIAC – 2025 JAMMA Neurol
 N=45 0° vs n=47 30°

For patients with acute ischaemic stroke of <4.5 h duration, and with persistently increased systolic blood pressure >185 mmHg or diastolic blood pressure >110 mm Hg even after blood pressure lowering treatment, we suggest no intravenous thrombolysis.

Quality of evidence: **Very low** ⊕

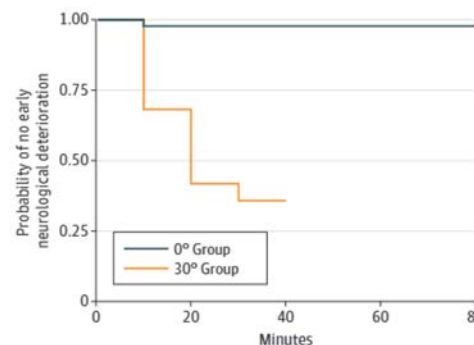
Strength of recommendation: **Strong** ↓↓

For patients with acute ischaemic stroke of <4.5 h duration, and with systolic blood pressure >185 mm Hg or diastolic blood pressure >110 mm Hg, which has subsequently been lowered to <185 and <110 mm Hg, we recommend intravenous thrombolysis with alteplase.

Quality of evidence: **Low** ⊕⊕

Strength of recommendation: **Strong** ↑↑

A Patients worsening ≥2 points on the NIHSS



B Patients worsening ≥4 points on the NIHSS

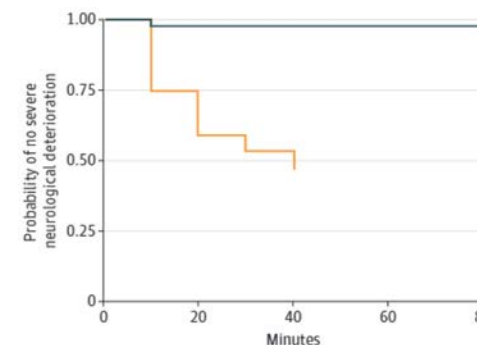


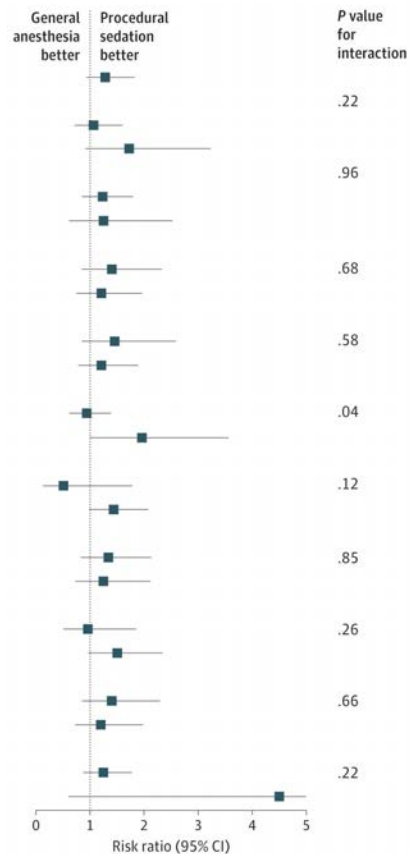
Table 2. Primary and Safety Outcomes

Outcome	Cohort 0° (n = 45)	30° (n = 47)	Unadjusted HR/OR (95% CI)	P value
Primary outcome				
Early neurological deterioration [≥2 points worsening from NIHSS score at time 0], No. of events (person-time in minutes)	1 (1230)	26 (850)	34.40 (4.65-254.37)	<.001
Safety outcomes				
Severe neurological deterioration [≥4 points worsening from NIHSS score at time 0], No. of events (person-time in minutes)	1 (1230)	20 (940)	23.57 (3.16-175.99)	.002
Hospital acquired pneumonia, No./total No. (%)	0	0	NA	NA
Death at discharge/day 7, No./total No. (%)	1/45 (2.22)	1/47 (2.13)	0.96 (0.05-15.78)	.98
90 d All-cause mortality, No./total No. (%)	2/45 (4.44)	10/46 (21.74)	5.81 (1.20-28.22)	.03
Postdischarge stroke, No./total No. (%)	1/45 (2.22)	0	NA	.49
Symptomatic intracerebral hemorrhage, No./total No. (%)	0	1/47 (2.13)	NA	>.99
Prespecified exploratory outcomes, No./total No. (%)				
Improvement at 24 h	39/45 (86.67)	28/47 (59.57)	0.24 (0.08-0.68)	.01
Improvement at discharge/day 7	39/45 (86.67)	31/47 (65.96)	0.32 (0.11-0.92)	.03
90-d mRS 0-1	24/45 (53.33)	21/46 (45.65)	0.74 (0.32-1.68)	.46
90-d mRS 0-2	31/45 (68.89)	26/46 (56.52)	0.59 (0.25-1.39)	.22
90-d mRS, median (IQR)	1 (1-4)	2 (1-5)	1.85 (0.89-3.89)	.10
UW-mRS, mean (SD)	0.71 (0.34)	0.57 (0.42)	NA	.09

Type d'anesthésie

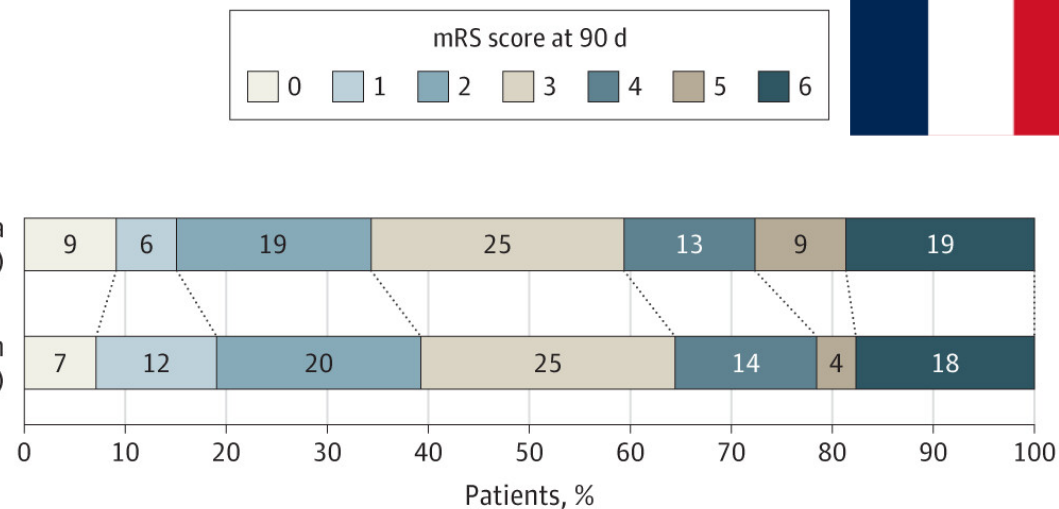
AMETIS JAMMA Neurol 2023

Characteristic	Patients, No.	Functional independence and absence of any major periprocedural complication, % General anesthesia	Procedural sedation	Risk ratio for functional independence and absence of any major periprocedural complication (95% CI)
Overall	273	28.2	36.2	1.29 (0.91-1.82)
Baseline NIHSS score				
≤15	135	40.0	42.9	1.13 (0.57-2.23)
>15	138	17.1	29.4	1.72 (0.91-3.23)
Intravenous thrombolysis				
Yes	132	41.9	51.4	1.23 (0.85-1.78)
No	141	16.4	20.6	1.25 (0.62-2.51)
Thrombectomy delay >6 h or wake-up/unwitnessed stroke				
Yes	112	29.8	41.8	1.40 (0.85-2.32)
No	161	26.9	32.5	1.21 (0.75-1.95)
Wake-up or unwitnessed stroke				
Yes	86	30.4	45.0	1.48 (0.85-2.58)
No	187	27.0	32.7	1.21 (0.78-1.89)
Age, y				
≤70	100	52.1	48.1	0.93 (0.62-1.37)
>70	173	14.9	29.1	1.95 (1.01-3.55)
Tandem lesion				
Yes	46	26.1	13.0	0.50 (0.14-1.76)
No	216	29.5	42.3	1.43 (0.99-2.07)
Sex				
Male	131	30.8	40.9	1.33 (0.83-2.12)
Female	142	25.7	31.9	1.24 (0.74-2.10)
ASPECTS score				
<8	103	26.8	25.5	0.95 (0.50-1.83)
8-10	150	29.6	44.3	1.50 (0.97-2.32)
Left occlusion stroke				
Yes	140	27.3	37.8	1.39 (0.85-2.27)
No	133	29.0	34.4	1.19 (0.72-1.96)
Site of occlusion				
Middle cerebral artery	227	31.6	39.1	1.24 (0.87-1.76)
Internal carotid artery	46	5.6	25.0	4.50 (0.60-33.58)



General anesthesia
(n = 135)

Procedural sedation
(n = 138)



Outcome	No. (%)		Standardized difference (95% CI)		
	General anesthesia (n = 135)	Procedural sedation (n = 138)	Absolute difference	Relative risk	P value
Clinically important events					
Hypotension ^l	118 (87.4)	62 (44.9)	-42 (-52 to -32)	0.51 (0.42 to 0.63)	<.001
Hypoxemia ^m	7 (5.2)	13 (9.4)	4 (-2 to 10)	1.82 (0.75 to 4.41)	.19
Severe hypoxemia ⁿ	3 (2.2)	4 (2.9)	0 (-3 to 4)	1.30 (0.30 to 5.72)	.72
Aspiration	1 (0.7)	3 (2.2)	1 (-1 to 4)	2.93 (0.31 to 27.86)	.32
Conversion to general anesthesia	NA	15 (10.9)	NA	NA	NA

Urgences hémorragiques – HSA et HIP

Puy nature reviews disease prim 2023

- Diagnostique positif:

TDM et IRM même sensibilité

- Etiologique: 70% secondaires <70a

TDM injecté (Se74%, Sp91%); IRM TOF

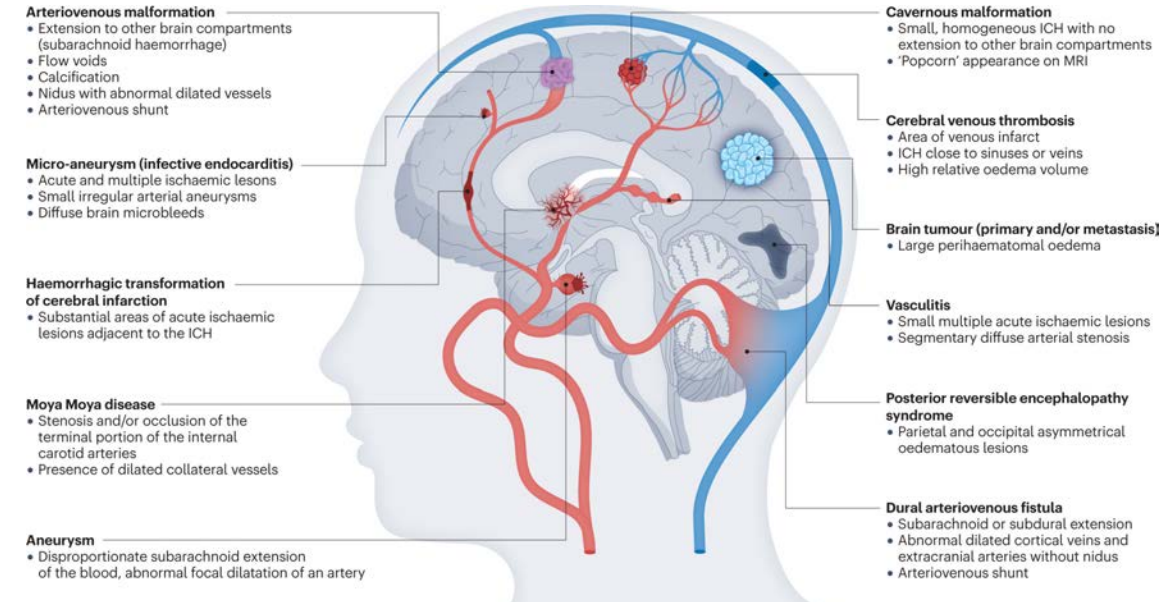
Temps veineux

Artériographie:

HIV, HSA, cause TDM/IRM

Lobaire <70a

Profond <45a – 45-70a sans HTA



Stroke

AHA/ASA GUIDELINE

2022 Guideline for the Management of Patients With Spontaneous Intracerebral Hemorrhage: A Guideline From the American Heart Association/American Stroke Association

AHA/ASA GUIDELINE

2023 Guideline for the Management of Patients With Aneurysmal Subarachnoid Hemorrhage: A Guideline From the American Heart Association/American Stroke Association

Resaignement précoce

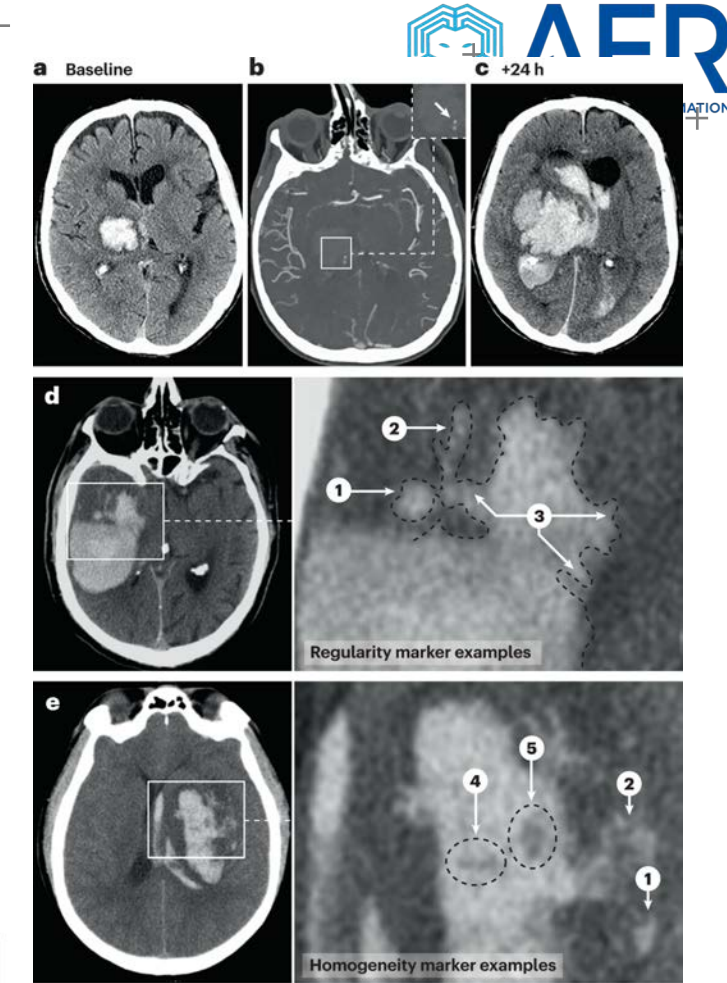
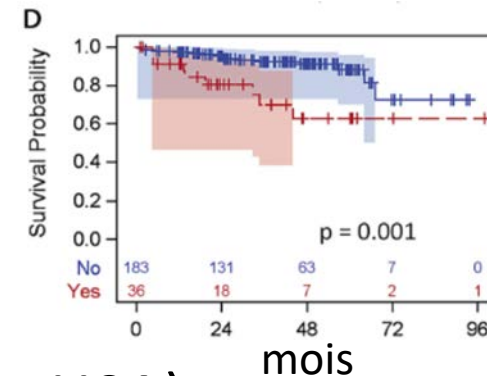
- HIP spontané: augmentation max <3h
Spot sign (après 6h – pseudo-anévrisme?)
hétérogénéité ?

Reverser les anticoagulants

- HSA anévrismale: ttt <24h
- Fistules: 35% dans 2sem (Maciejewski JCM 2025)

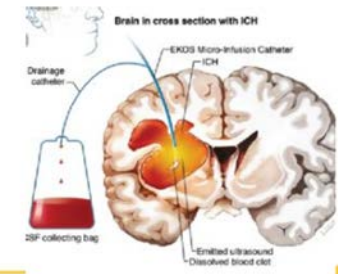
- MAV: ~4%/an (Darsault J neurosurg 2025)
- Cavernomes: ~30%/5ans selon loc
(Salman NIHR 2025)

- **Acide tranexamique**: inefficace (HIP ou HSA)



nature reviews disease prim 2023
major ICH

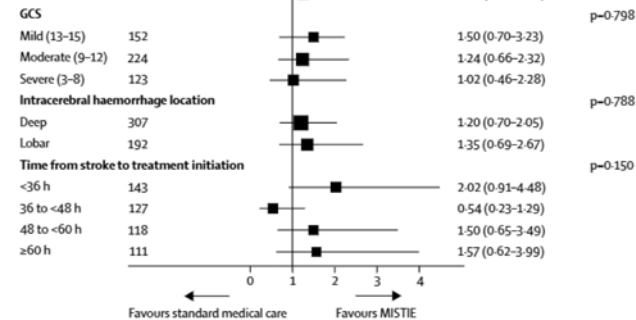
HIP & Traitement chirurgical



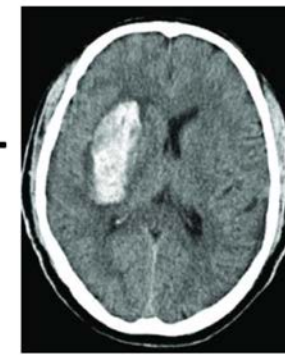
MISTIE III 2019 – STICH 2013



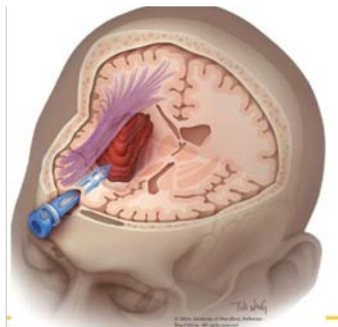
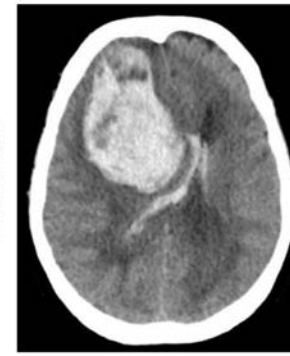
neg
GCS?
timing?
localistaion?



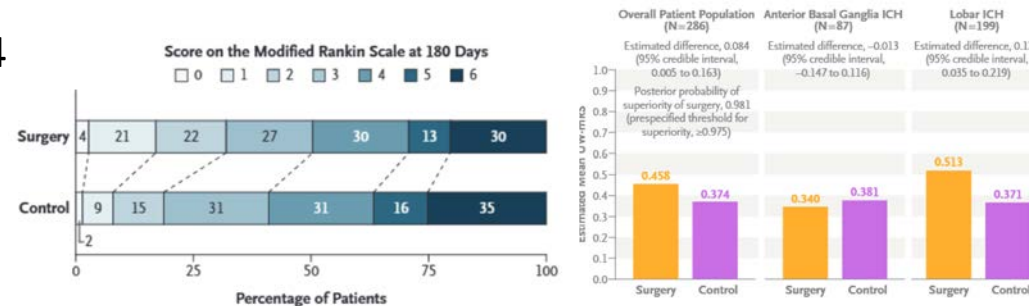
Deep



Lobar



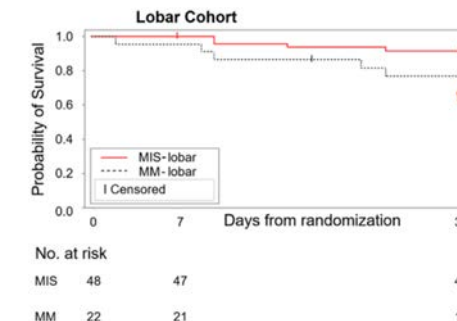
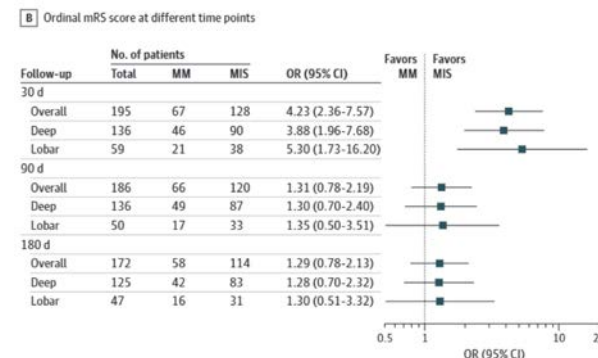
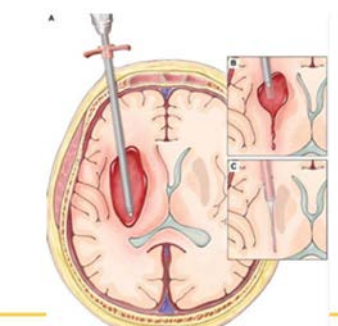
ENRICH – 2024
83% GCS>8



Recommendations for MIS Evacuation of ICH
Referenced studies that support recommendations are summarized in Supplements 55 and 56.

COR	LOE	Recommendations
2a	B-R	1. For patients with supratentorial ICH of >20- to 30-mL volume with GCS scores in the moderate range (5–12), minimally invasive hematoma evacuation with endoscopic or stereotactic aspiration with or without thrombolytic use can be useful to reduce mortality compared with medical management alone. ³⁷⁹⁻³⁸⁸
2b	B-R	2. For patients with supratentorial ICH of >20- to 30-mL volume with GCS scores in the moderate range (5–12) being considered for hematoma evacuation, it may be reasonable to select minimally invasive hematoma evacuation over conventional craniotomy to improve functional outcomes. ^{382,383,385-387,389,390}
2b	B-R	3. For patients with supratentorial ICH of >20- to 30-mL volume with GCS scores in the moderate range (5–12), the effectiveness of minimally invasive hematoma evacuation with endoscopic or stereotactic aspiration with or without thrombolytic use to improve functional outcomes is uncertain. ^{379-385,387,388}

MIND – 2025
50% GCS>13



Objectifs en réanimation- PAS

Recommendations for Acute BP Lowering (Continued)		
COR	LOE	Recommendations
2b	B-R	3. In patients with spontaneous ICH of mild to moderate severity presenting with SBP between 150 and 220 mmHg, acute lowering of SBP to a target of 140 mmHg with the goal of maintaining in the range of 130 to 150 mmHg is safe and may be reasonable for improving functional outcomes. ^{138,141-147}
2b	C-LD	4. In patients with spontaneous ICH presenting with large or severe ICH or those requiring surgical decompression, the safety and efficacy of intensive BP lowering are not well established. ¹⁴⁸
3: Harm	B-R	5. In patients with spontaneous ICH of mild to moderate severity presenting with SBP >150 mmHg, acute lowering of SBP to <130 mmHg is potentially harmful. ^{146,149,150}

HIP:

INTERACT2 2013 (<140mmHg vs <180mmHg)

ATACH-II 2016 (110-140mmHg vs 140-180mmHg)

➔ Non significatif

!/ PAS>220mmhg exclu des essais

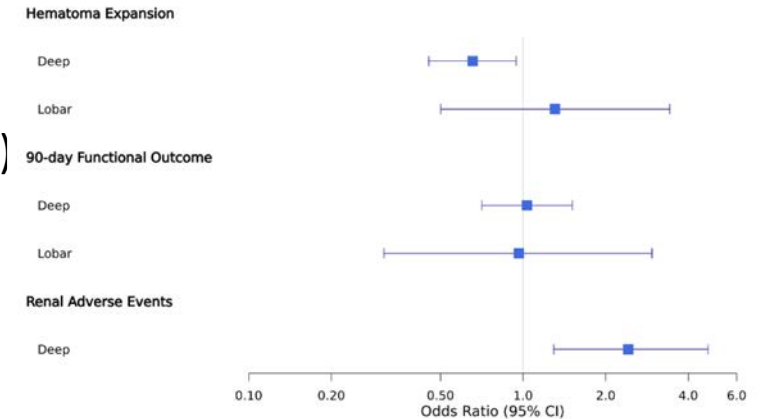
Baisse rapide de PAS -> mauvais outcome

(wang IJS 2022)

HSA

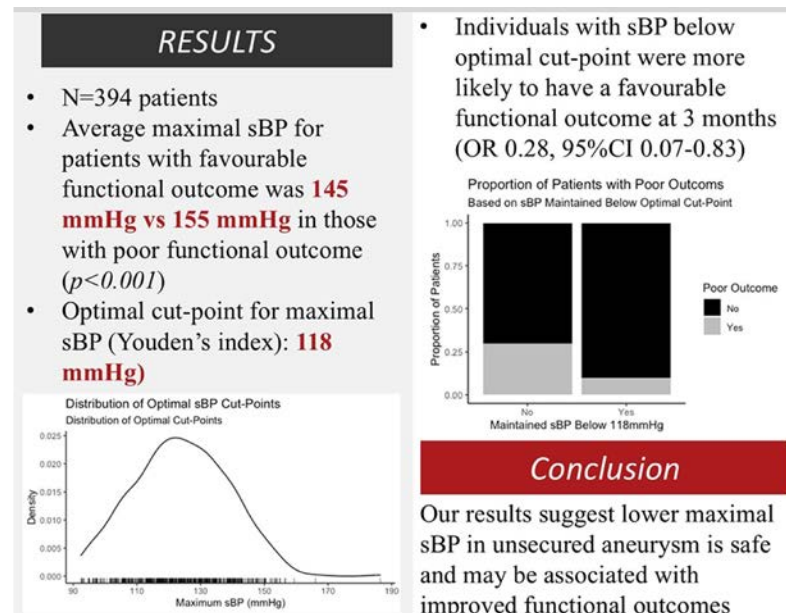
observational series.⁹⁴ Previous guidelines have suggested keeping the systolic BP <160 mmHg¹² or <180 mmHg.⁹⁵ Although these parameters may be

Eagles Neurosurgery 2025



Tuozzo NCC 2025

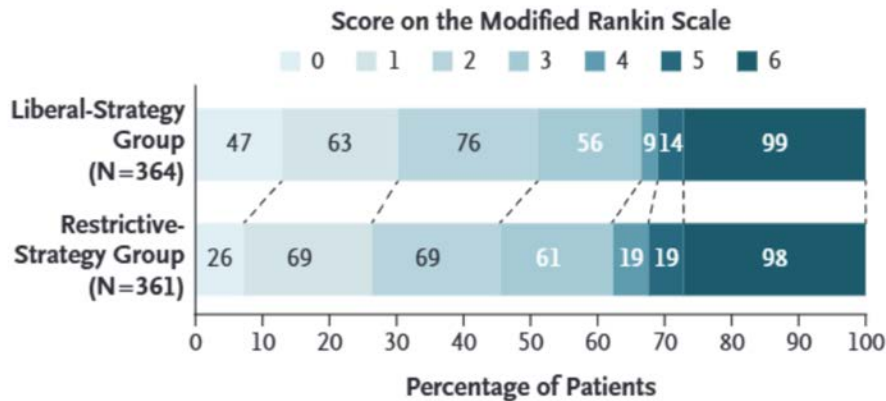
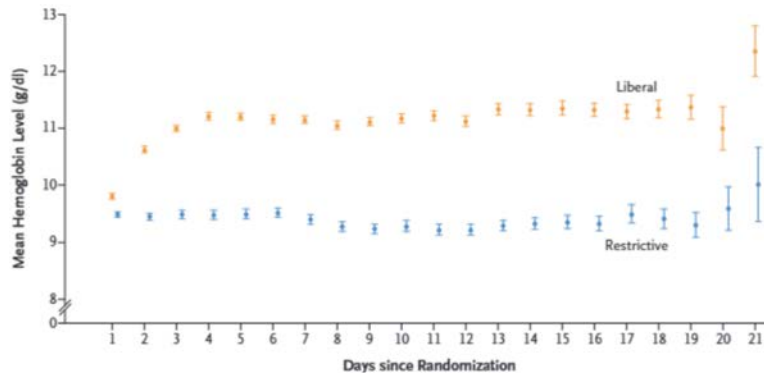
Recommendations for Medical Measures to Prevent Rebleeding After aSAH		
Referenced studies that support recommendations are summarized in online CR Supplement 4.		
COR	LOE	Recommendations
1	C-EO	1. In patients with aSAH and unsecured aneurysm, frequent blood pressure (BP) monitoring and BP control with short-acting medication(s) is recommended to avoid severe hypotension, hypertension, and BP variability.
1	C-EO	2. In patients with aSAH who are receiving anticoagulants, emergency anticoagulation reversal with appropriate reversal agents should be performed to prevent rebleeding.
3: No benefit	A	3. In patients with aSAH, routine use of anti-fibrinolytic therapy is not useful to improve functional outcome. ⁹⁵⁻⁹⁷



Transfusion ?



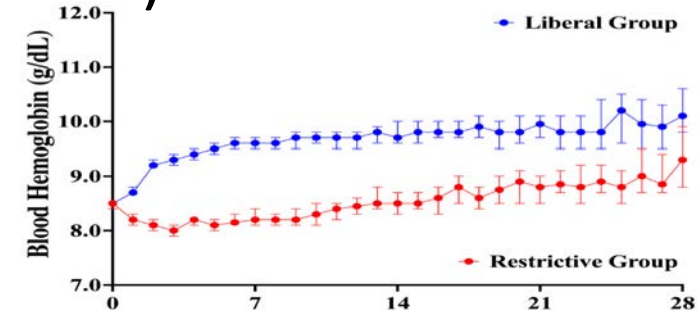
SAHARA – 8 vs 10 g/dl



TRAIN – TC (61%) HSA (21%) HIP (18%)

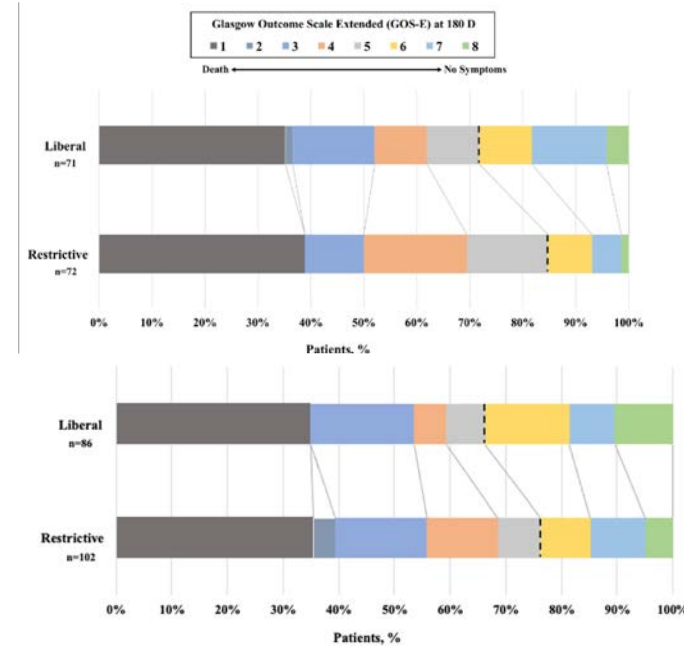
GCS admission 7 (4-11) mGCS 5-6 25%

7 vs 9g/dl



HIP: NS

HSA: NS



Filières NRI

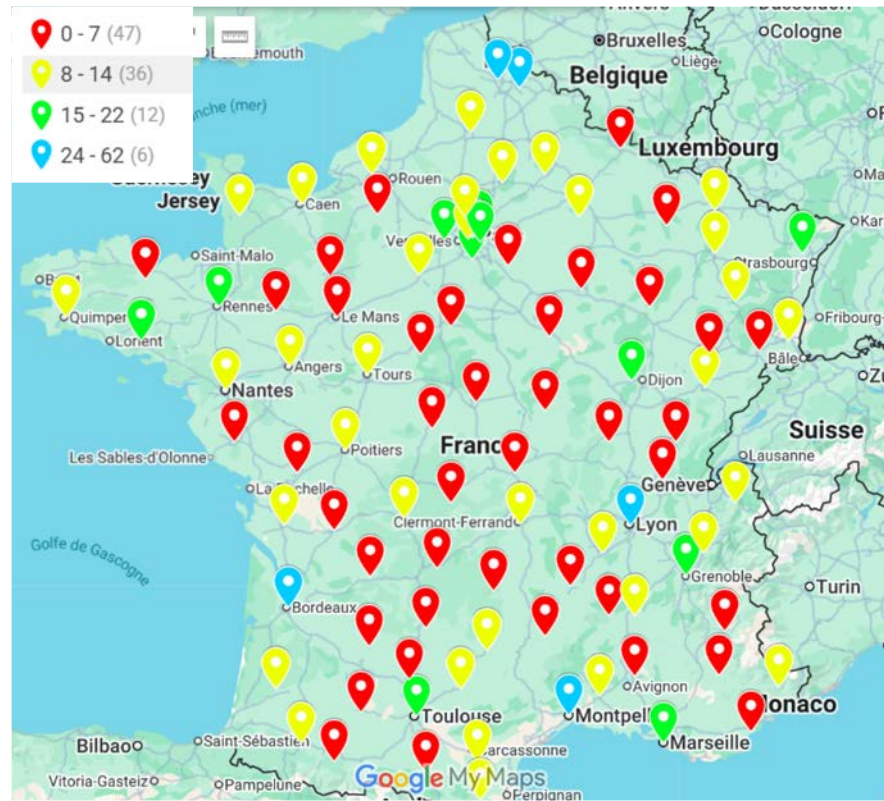
NRI

Nb thrombec (SFNRI)



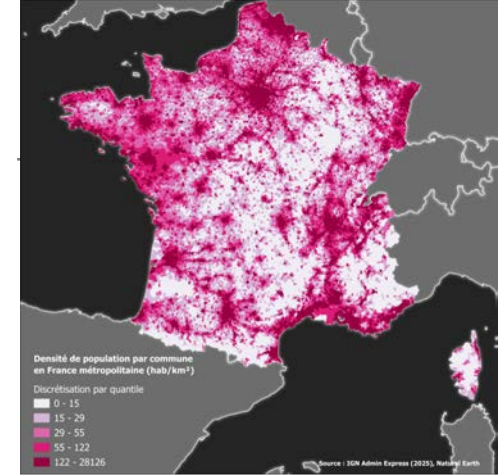
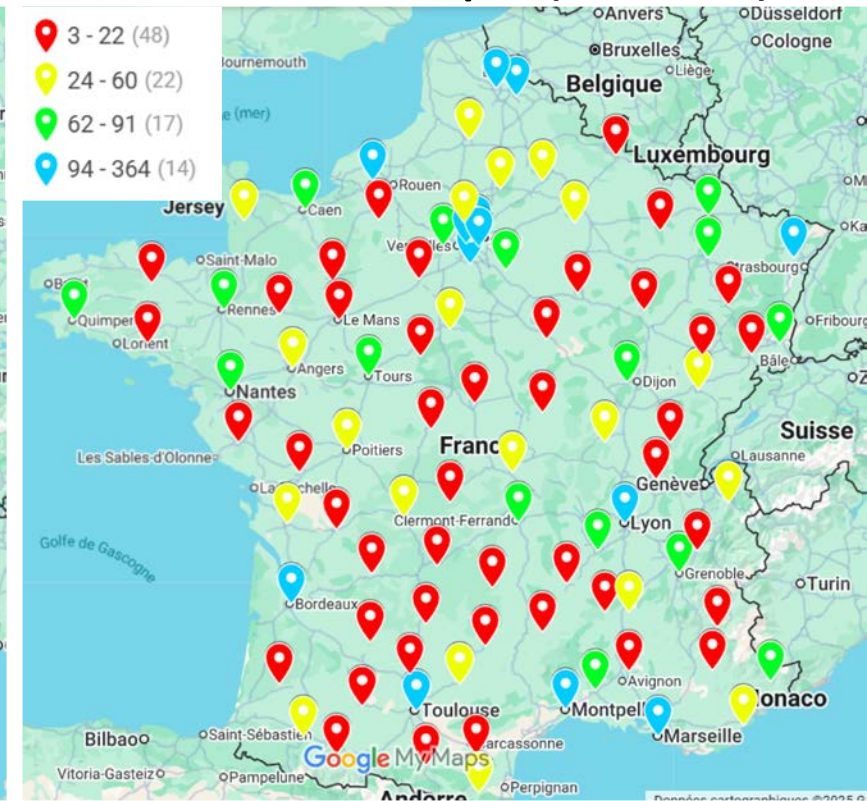
UNV

Nb lits/dept (DRESS)



Rea adulte

Nb lits/dept (DRESS)



Conclusion & perspective

- AVCi<4.5h Tenecteplase 0.25 mg/kg ou Alteplase 0.9 mg/kg
 - AVCi >4.5 -> Mismatch ?
 - ETV
 - Occlusion distale (ACP, M2-3-4, A2), AVC mineur ?
 - Position 0° avant EVT
-
- 70% HIP <70a étiologie vasculaire
 - HSA et fistule -> risque hémorragique précoce
 - Traitement chirurgical mini-invasif HIP lobaires 30-100ml GCS>8 ?
 - Hb>8g/dl; PAS individualisée

=> Organisation des filières