Accidents Vasculaires Cérébraux

Drip and Ship vs Mothership ?

I Sibon

CHU Bordeaux

CAMU 2020 Bordeaux

06/02/2019

Liens d’intérêt

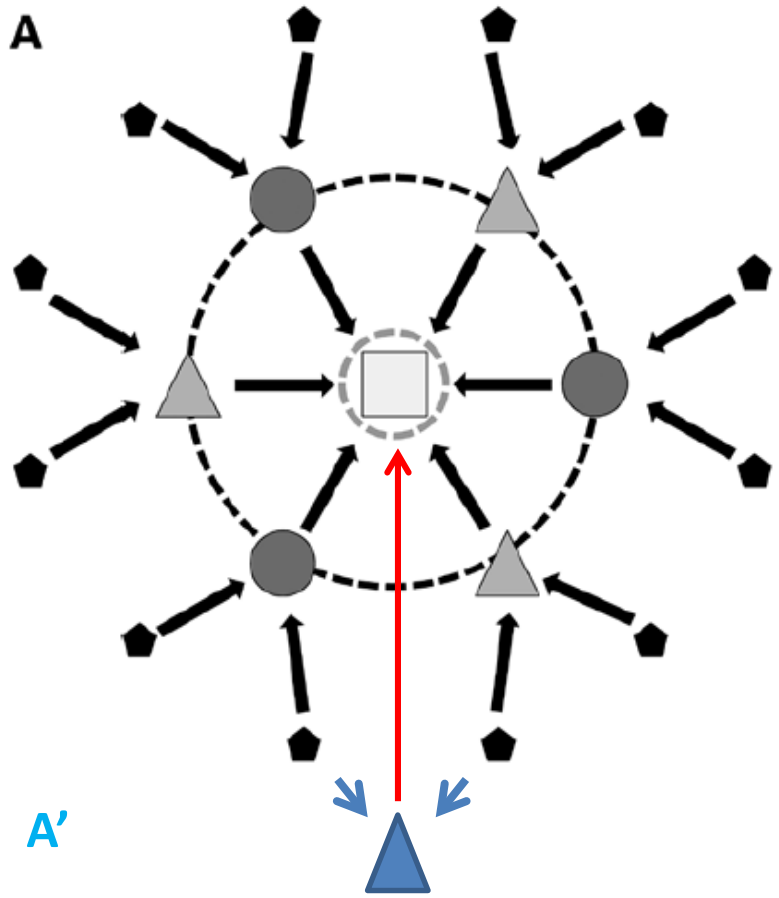
I disclose the following financial relationships:

Advisory board of Medtronic, Bayer, Boehringer Ingelheim, Servier

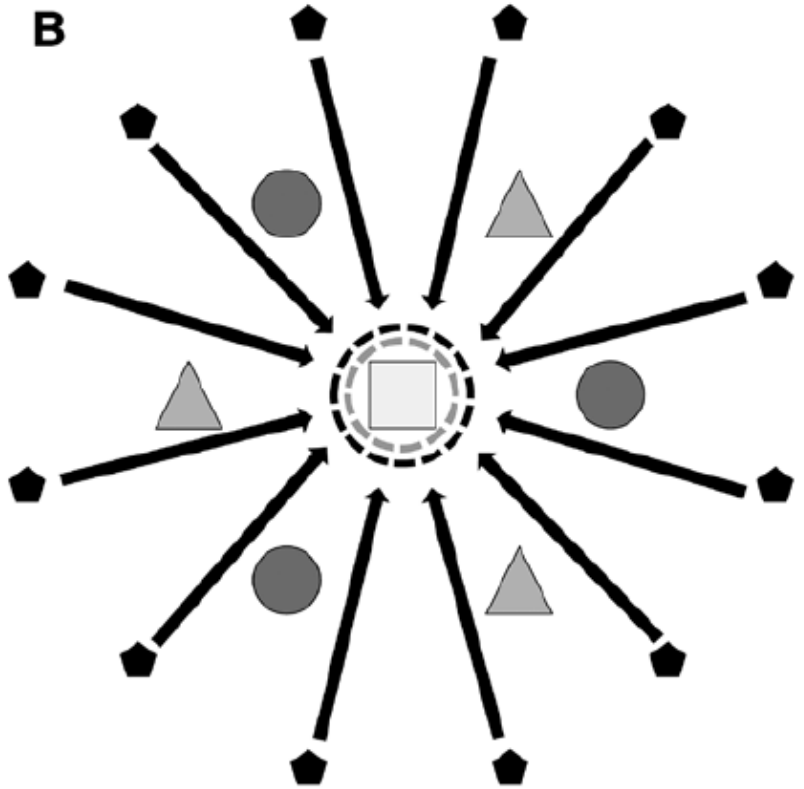
Paid speaker for Boehringer Ingelheim, BMS-Pfizer, Bayer, Astra-Zeneca, Medtronic

Quelle définition ?

Drip and Ship

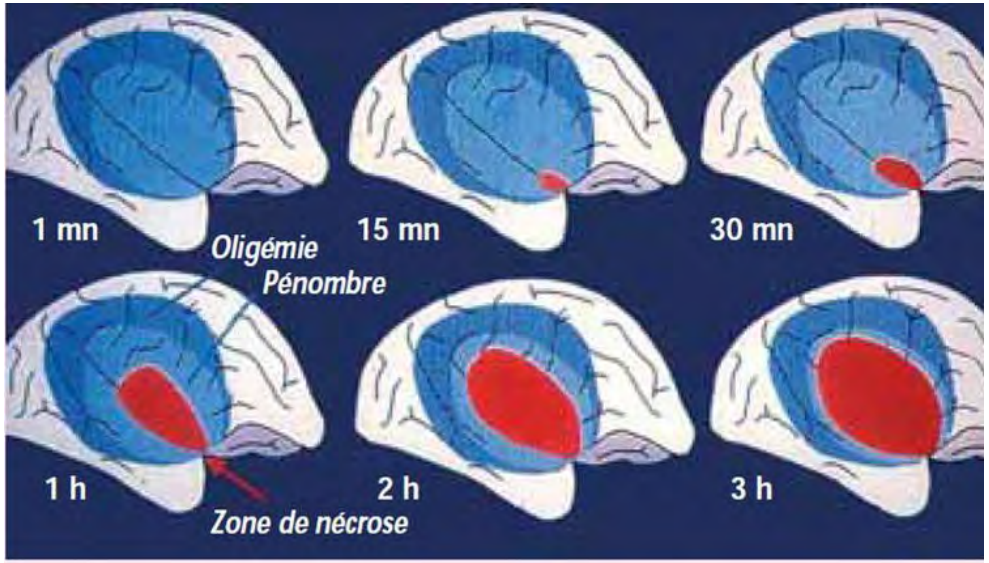


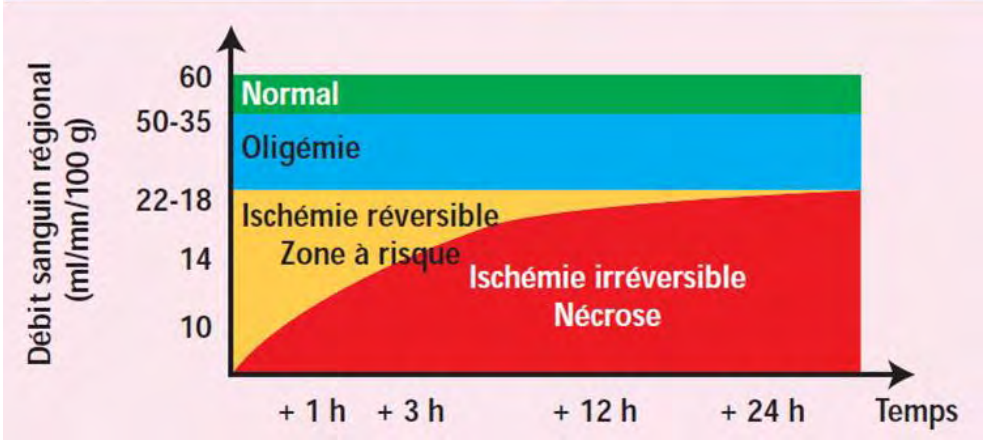
Mothership



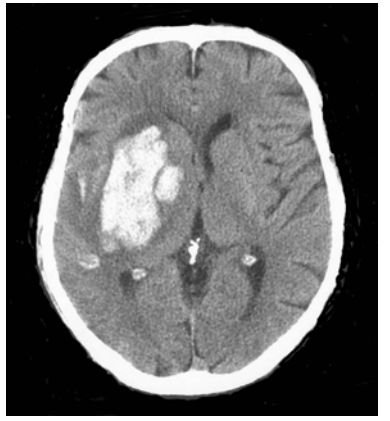
Limiter l'extension...

De la NECROSE ISCHEMIQUE





De l'HEMORRAGIE



Quelles stratégies thérapeutiques de l'infarctus cérébral aigu en 2020 ?

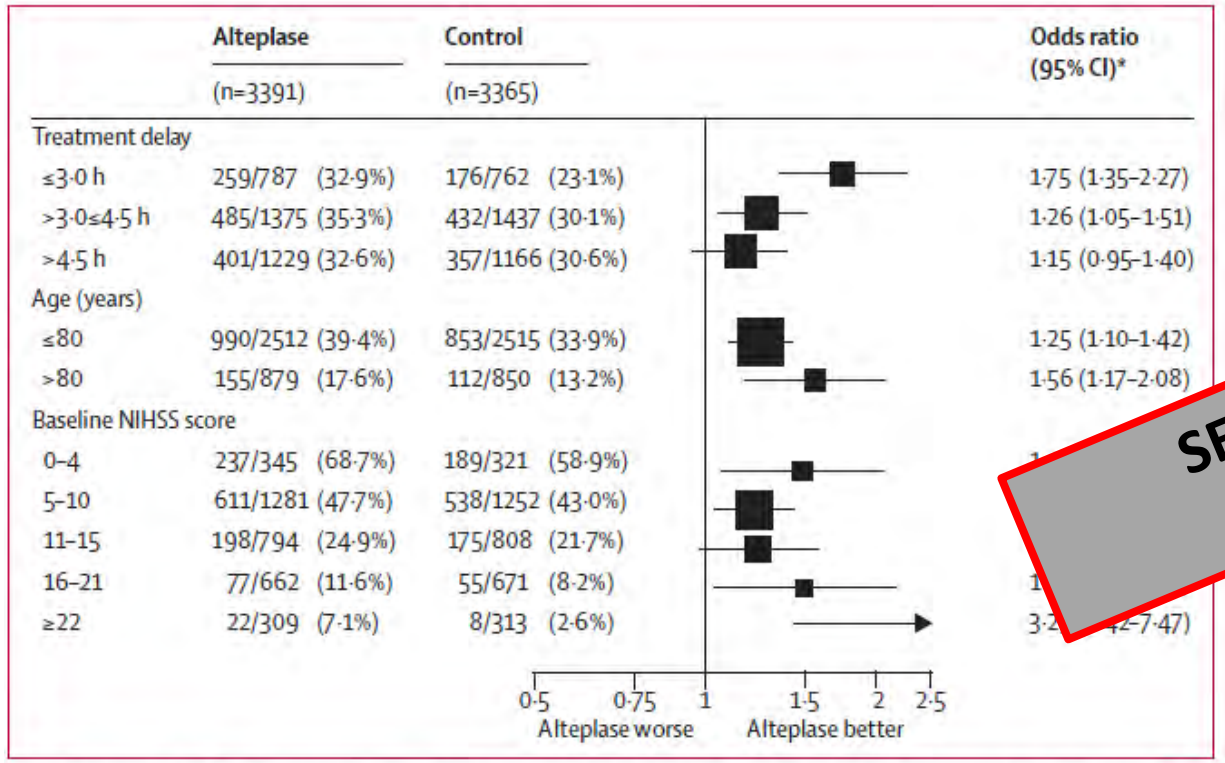
Thrombolyse intraveineuse : Altéplase

2014

Effect of treatment delay, age, and stroke severity on the effects of intravenous thrombolysis with alteplase for acute ischaemic stroke: a meta-analysis of individual patient data from randomised trials

Emberson et al., Lancet 2014

Délai < 4h30



	Alteplase (n=3391)	Control (n=3365)	Odds ratio (95% CI)*
Treatment delay			
≤3·0 h	259/787 (32·9%)	176/762 (23·1%)	1·75 (1·35–2·27)
>3·0≤4·5 h	485/1375 (35·3%)	432/1437 (30·1%)	1·26 (1·05–1·51)
>4·5 h	401/1229 (32·6%)	357/1166 (30·6%)	1·15 (0·95–1·40)
Age (years)			
≤80	990/2512 (39·4%)	853/2515 (33·9%)	1·25 (1·10–1·42)
>80	155/879 (17·6%)	112/850 (13·2%)	1·56 (1·17–2·08)
Baseline NIHSS score			
0–4	237/345 (68·7%)	189/321 (58·9%)	
5–10	611/1281 (47·7%)	538/1252 (43·0%)	
11–15	198/794 (24·9%)	175/808 (21·7%)	
16–21	77/662 (11·6%)	55/671 (8·2%)	
≥22	22/309 (7·1%)	8/313 (2·6%)	3·2 (1·42–7·47)

0·5 0·75 1 1·5 2 2·5
Alteplase worse Alteplase better

Figure 2: Effect of alteplase on good stroke outcome (mRS 0–1), by treatment delay, age, and stroke severity

Bénéfice indépendant de l'âge et du NIHSS.

SELECTION: TDM

Recul des contre-indications:

Handicap pré-AVC,

Troubles cognitifs pré-AVC,

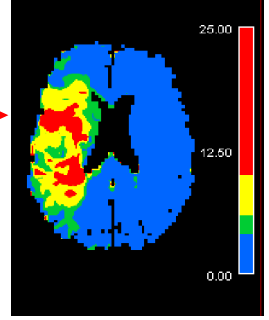
Diabète,

Infarctus cérébral récent,

HTA, Epilepsie,

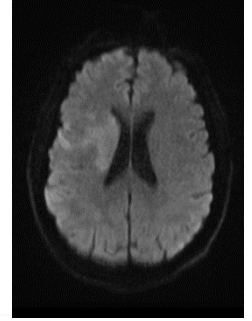
Antiagrégants, Anticoagulants

2019



Extending thrombolysis to 4·5–9 h and wake-up stroke using perfusion imaging: a systematic review and meta-analysis of individual patient data

Campbell et al., Lancet 2019



Délai : **4h30-9h00**

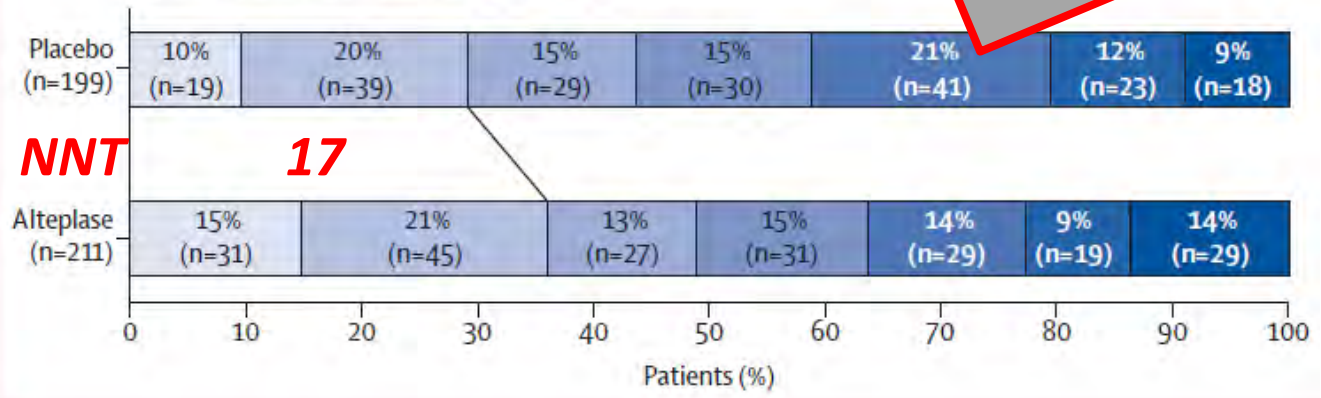
EPITETH // EXTEND // ECASS4/EXTEND
414 patients: 213 Altéplase // 201 Placebo

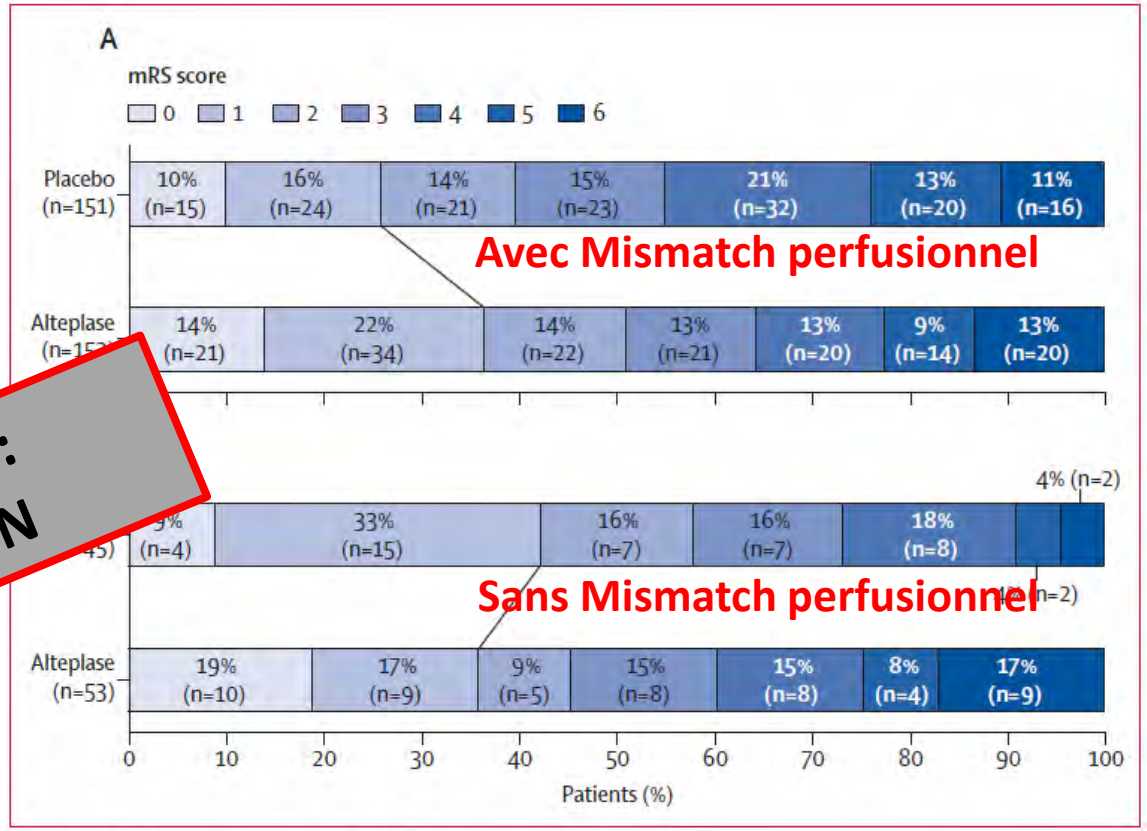
Analyse imagerie de perfusion

Ratio mismatch **> 1,2**
Volume infarctus **< 70cc**
Différence Infarctus/hypoperfusion **> 1**

Logiciel dédié

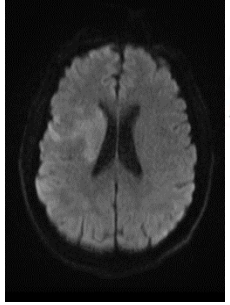
SELECTION: PERFUSION





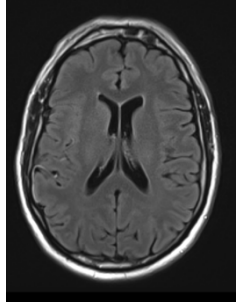
mRs ≤ 2 à 3 mois
NNT = 20

2018



MRI-Guided Thrombolysis for Stroke with Unknown Time of Onset

Thomalla et al, NEJM 2018
Wake-up Study



Heure de début indéterminée
Délai depuis constat des symptômes < 4h30

Mismatch FLAIR – Diffusion

Non éligible à la thrombectomie

Altéplase vs Placebo: 800 patients

Objectif principal: mRS 0-1 à j90

SELECTION: IRM

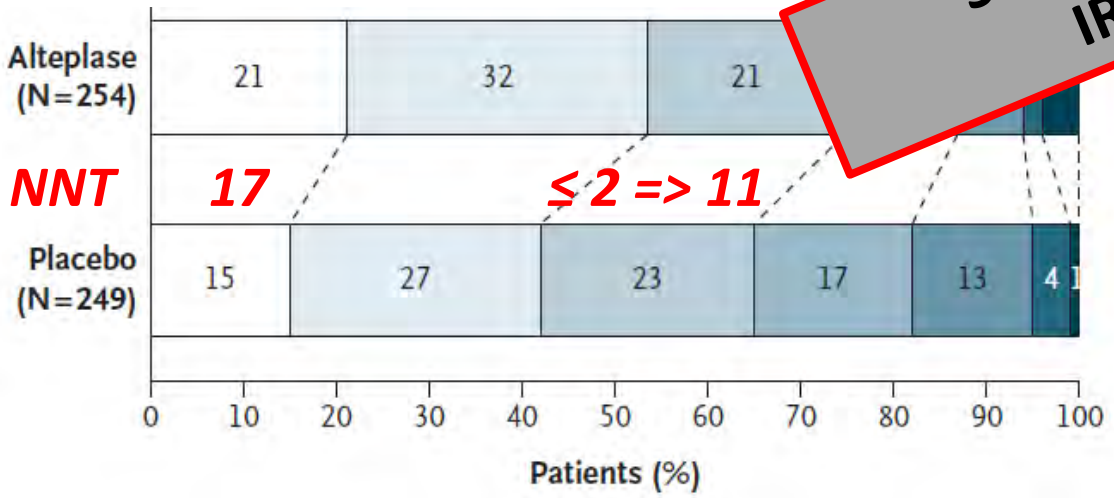
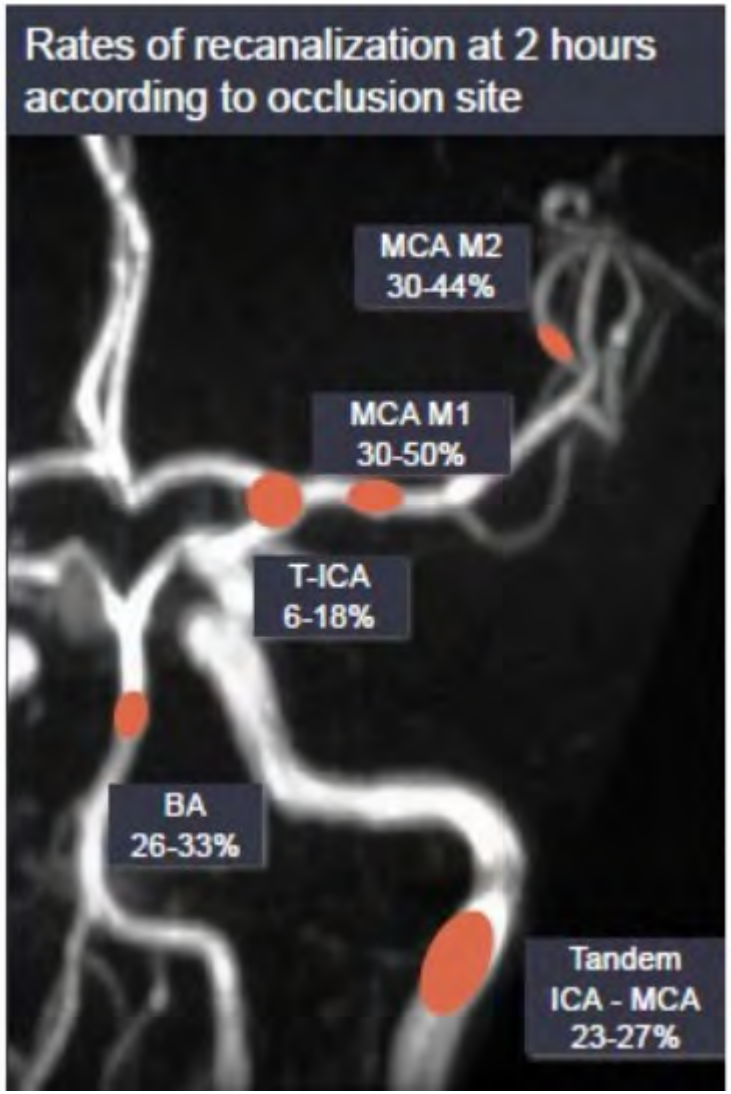
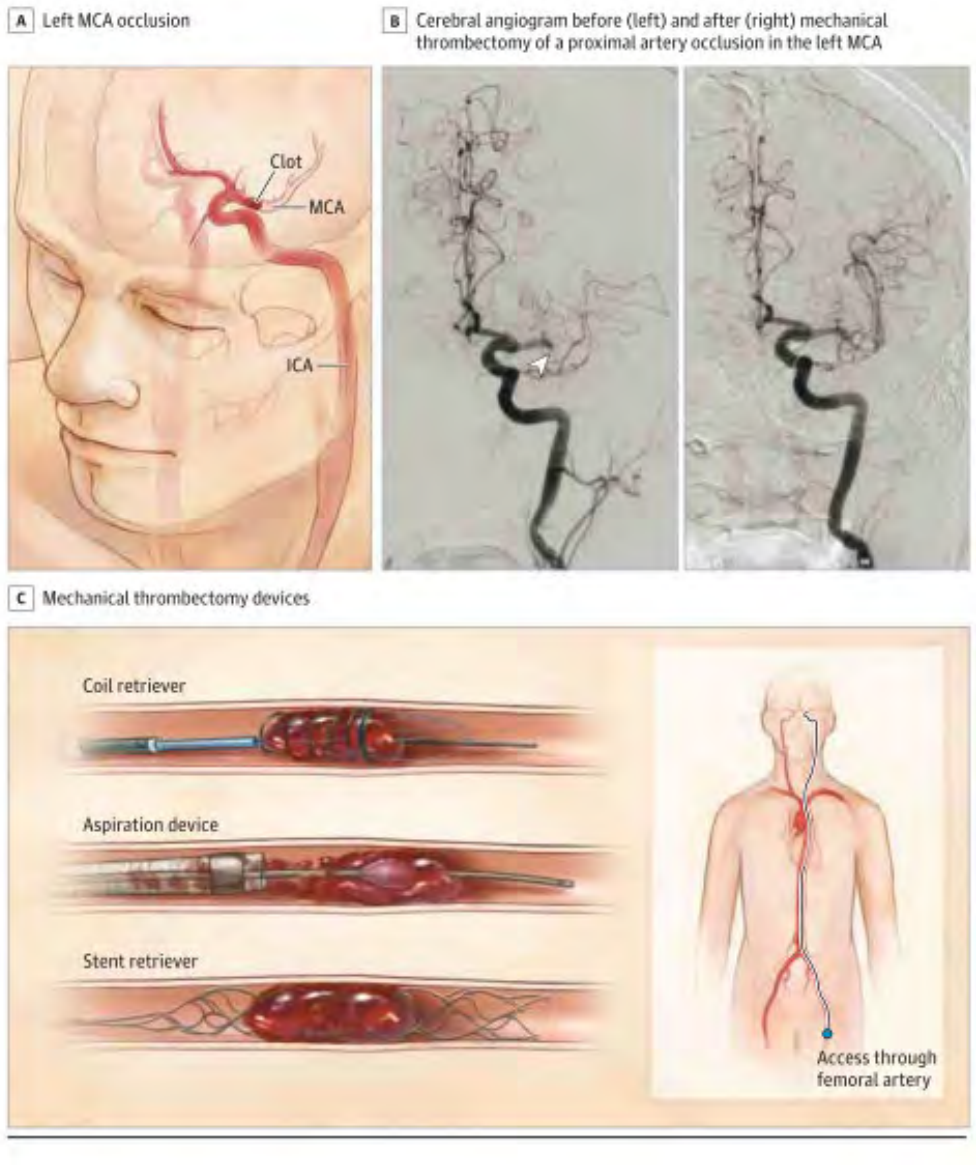


Table 2. Primary and Secondary Efficacy Outcomes (Intention-to-Treat Population).*

Outcome	Alteplase Group (N=254)	Placebo Group (N=249)	Effect Variable	Adjusted Value (95% CI)†	P Value
Primary efficacy end point					
Favorable outcome at 90 days — no./total no. (%)‡	131/246 (53.3)	102/244 (41.8)	Odds ratio	1.61 (1.09 to 2.36)	0.02
Secondary efficacy end points					
Median score on modified Rankin scale at 90 days (IQR)§	1 (1–3)	2 (1–3)	Common odds ratio	1.62 (1.17 to 2.23)	0.003¶
Correlation between treatment response at 90 days and deficit level at baseline — total no. (%)‖	72/246 (29.3)	44/244 (18.0)	Odds ratio	1.88 (1.22 to 2.89)	0.004¶
[illegible] 90 days**			Odds ratio	1.47 (1.07 to 2.04)	0.02¶
[illegible]ession [illegible]ys (IQR)††	6.0 (2.0–11.0)	7.0 (2.0–14.0)	Mean difference ($\log_e$)	−0.04 (−0.22 to 0.15)	0.69¶
[illegible]e on EQ-5D at 90 days‡‡	1.9±2.1	2.4±2.4	Mean difference	−0.52 (−0.88 to −0.16)	0.004¶
Score on visual analog scale on EQ-5D at 90 days§§	72.6±19.7)	64.9±23.8	Mean difference	7.64 (3.75 to 11.51)	<0.001¶
Median infarct volume at 22–36 hr (IQR) — ml ¶¶	3.0 (0.8–17.7)	3.3 (1.1–16.6)	Mean difference ($\log_e$)	−0.16 (−0.47 to 0.15)	0.32¶
Secondary					
Symptomatic intracranial hemorrhage					
As defined in SITS-MOST‡	5 (2.0)	1 (0.4)		4.95 (0.57–42.87)	0.15

Réduire les échecs du tpa: La thrombectomie mécanique





TICI 2b-3
> 80 %

2015

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 1, 2015 VOL. 372 NO. 1

A Randomized Trial of Intraarterial Treatment for Acute Ischemic Stroke

Berkhemer et et al., NEJM 2015
MR CLEAN

Délai **< 6h**

Occlusion proximale circulation antérieure

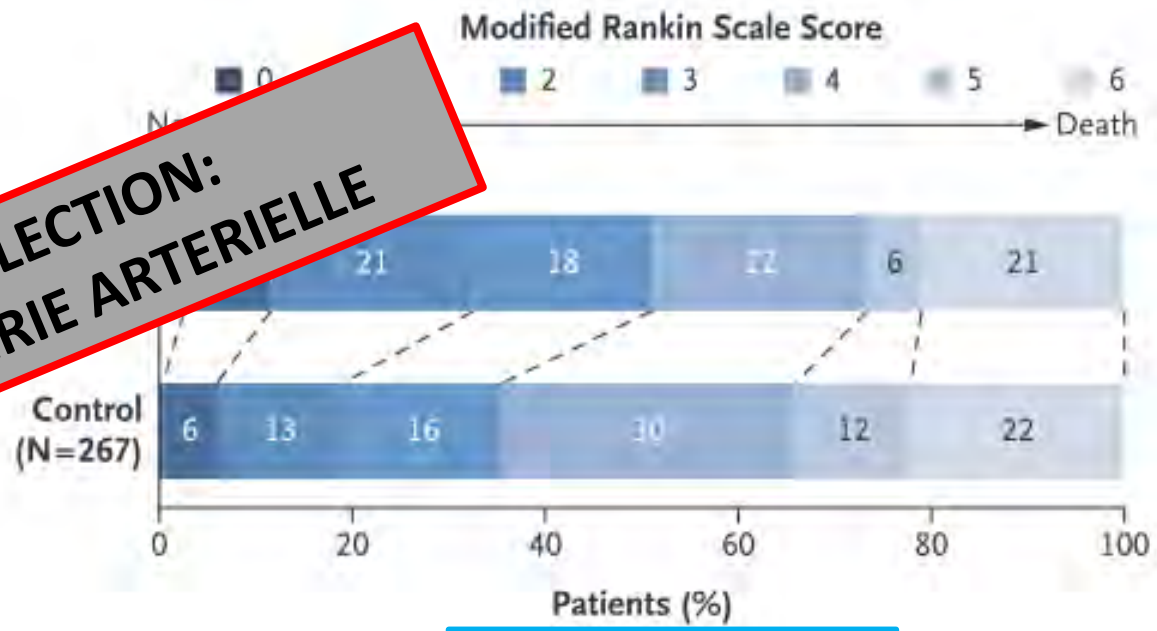
500 patients:
Meilleur traitement médical vs
Meilleur traitement médical + Thromb
mécanique

Absence de limite d'âge ou NIHSS
Imagerie Conventionnelle,

Critères de jugement principal
Pronostic fonctionnel

SELECTION:
IMAGERIE ARTERIELLE

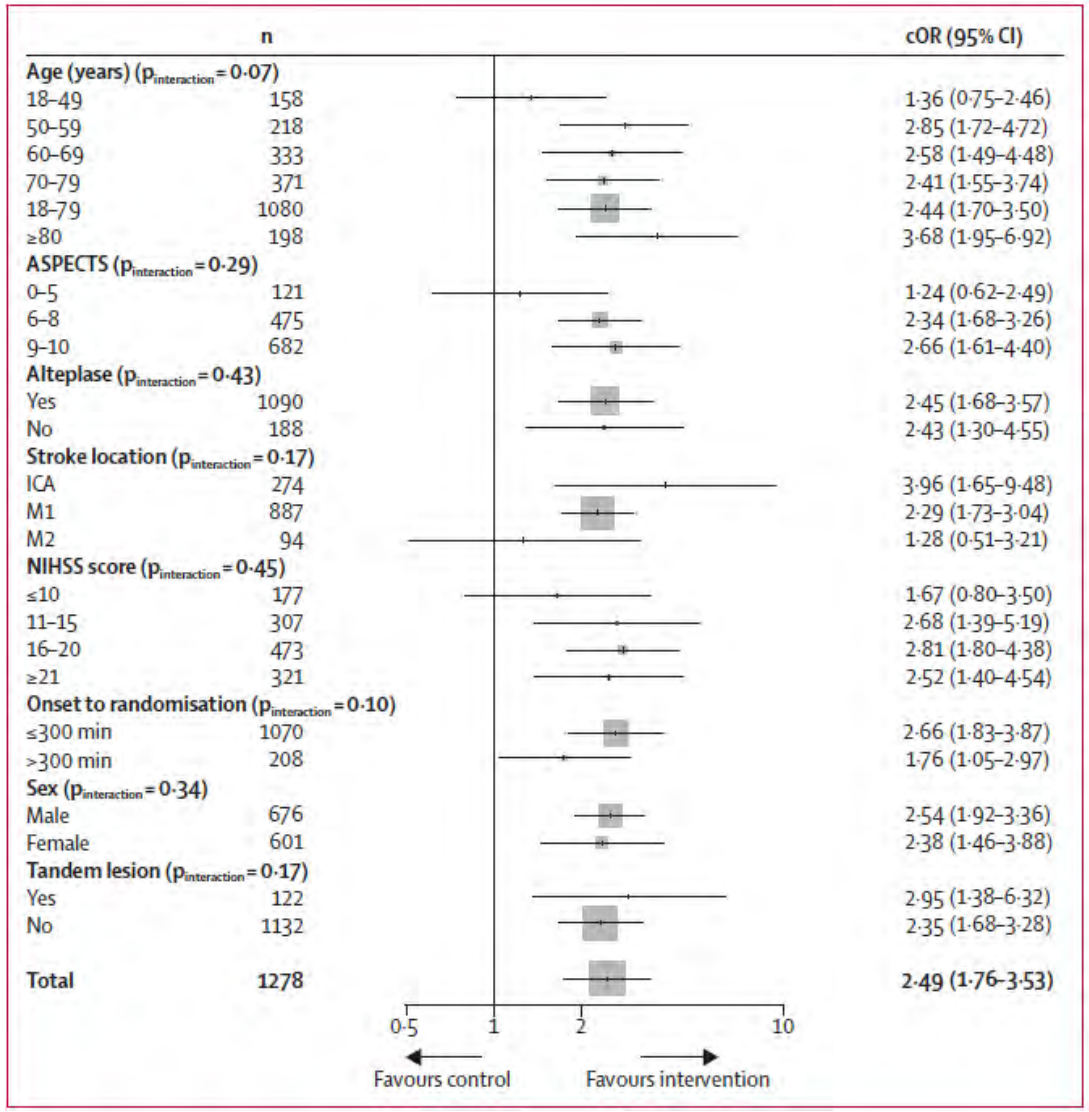
NIHSS moyen à l'admission: 17

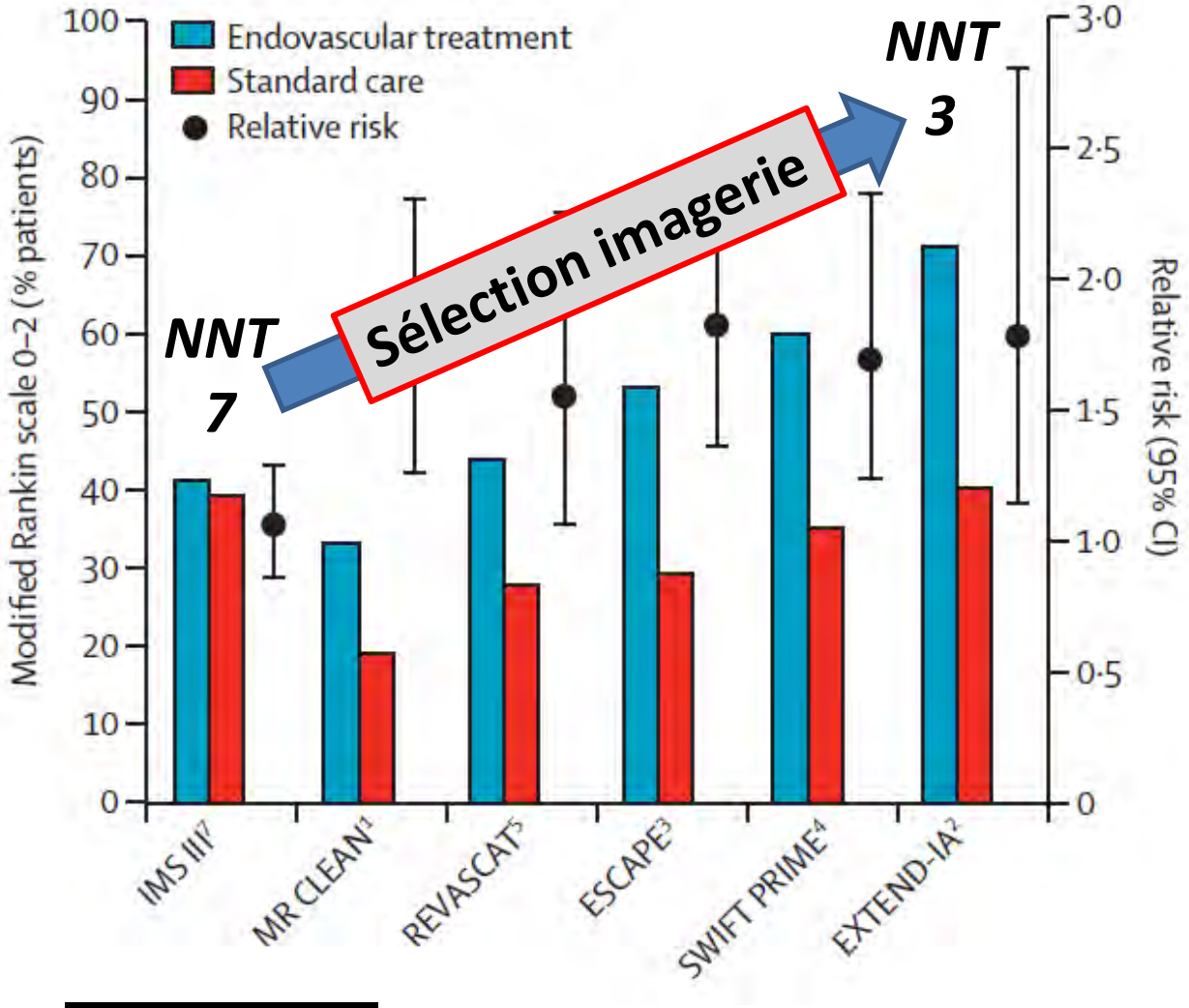


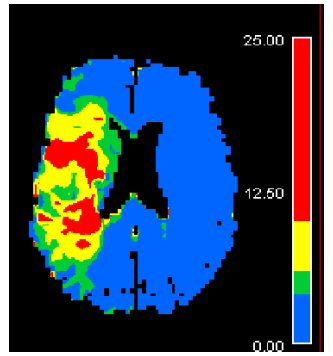
mRs ≤ 2 à 3 mois
NNT = 7

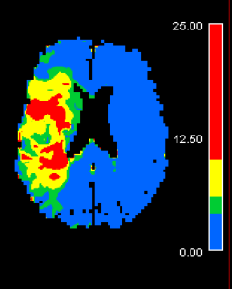
Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials

Goyal et al., Lancet 2016



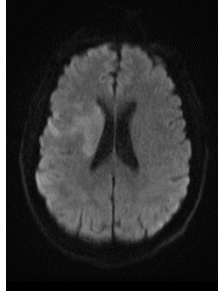






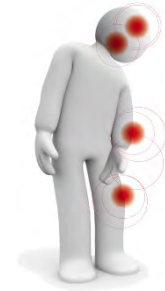
Thrombectomy for Stroke at 6 to 16 Hours with Selection by Perfusion Imaging

Albers et al., NEJM 2018
DEFUSE-3



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

Nogueira et al., NEJM 2018
DAWN

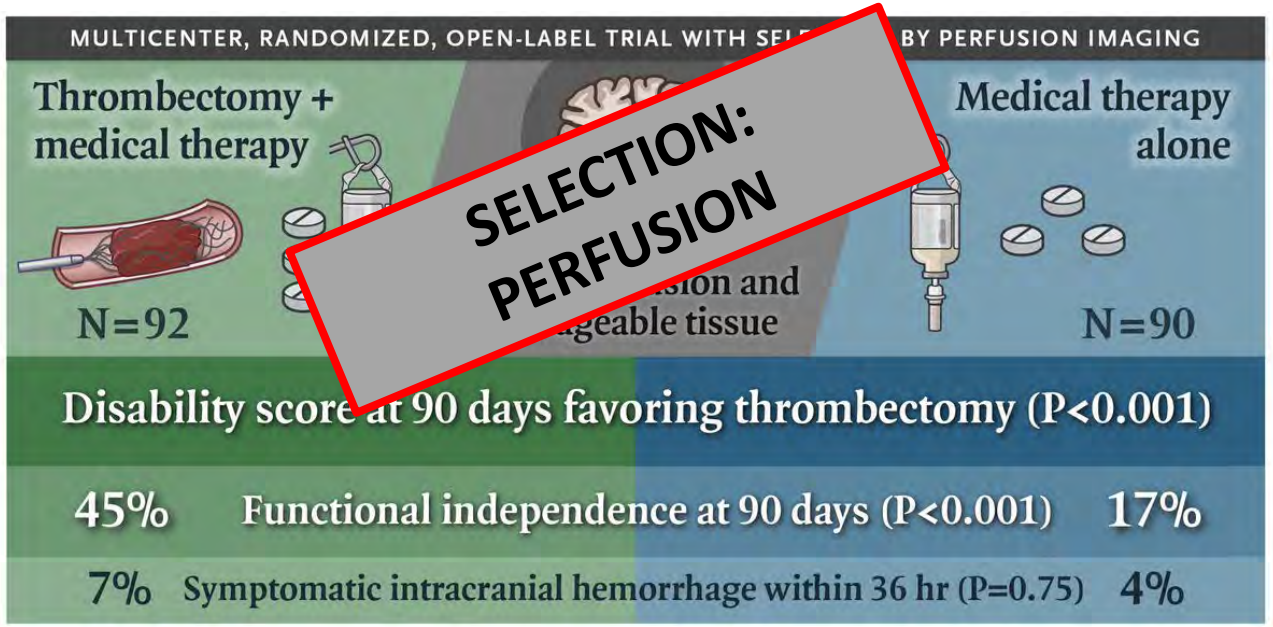


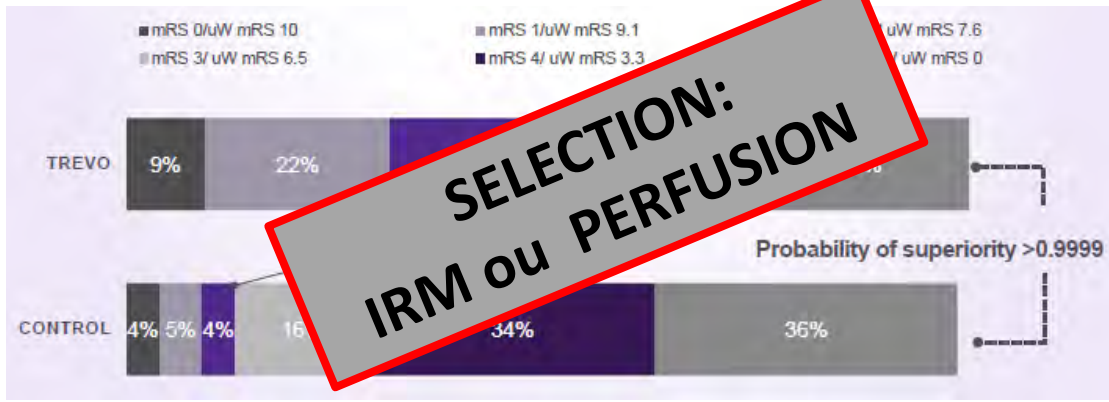
Age: 18-90
NIHSS > 5
Pre-stroke
mRS 0-1

Vol lésionnel ≤70cc
Ratio mismatch ≥1.8
Vol mismatch ≥ 15cc

Age: > 18
NIHSS > 9
Pre-stroke
mRS 0-1

Combinaison
Age (< ou > 80)
NIHSS (10 // 20)
Volume (21 // 31 //51 cc)





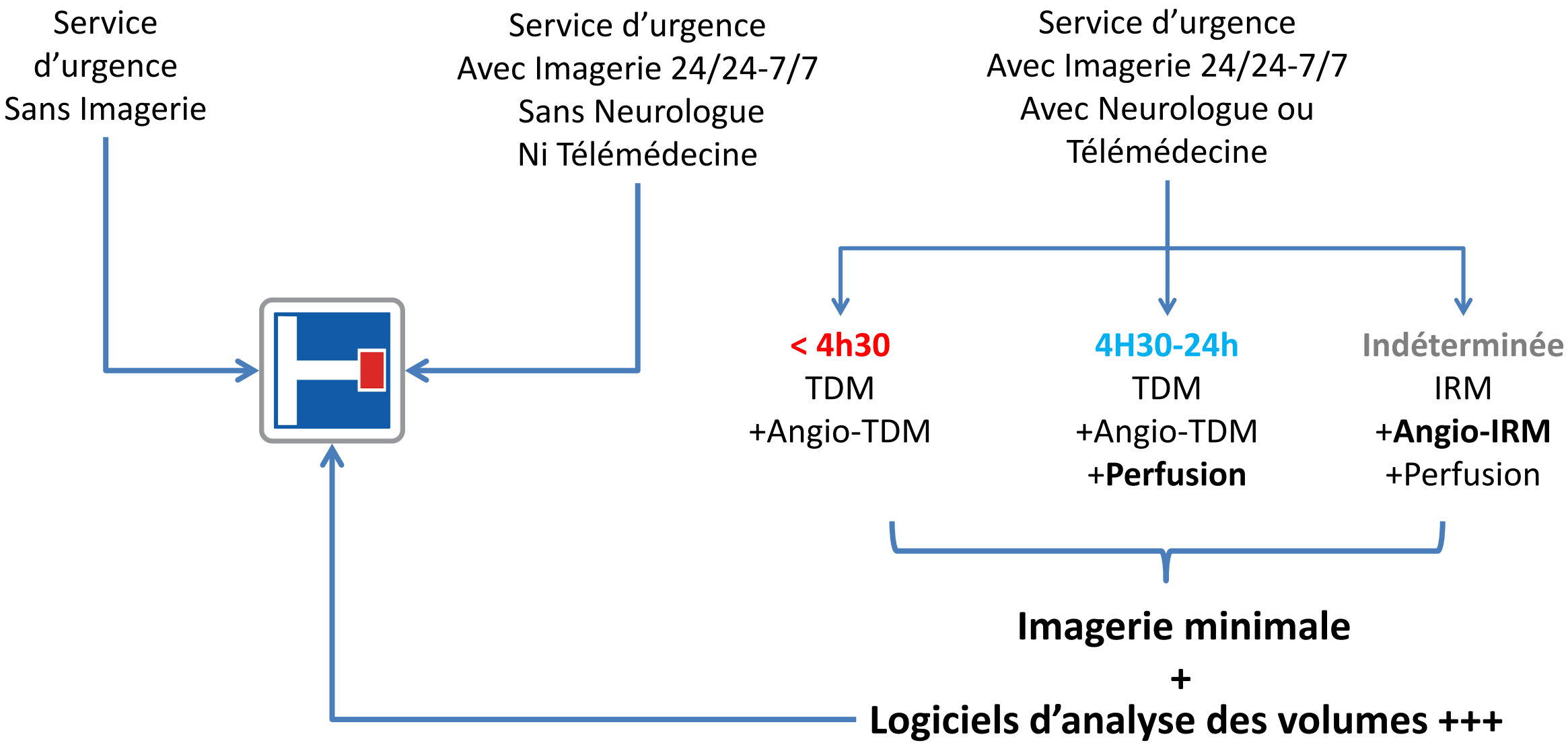
NNT = 3,6

73 % de réduction du risque relatif de handicap

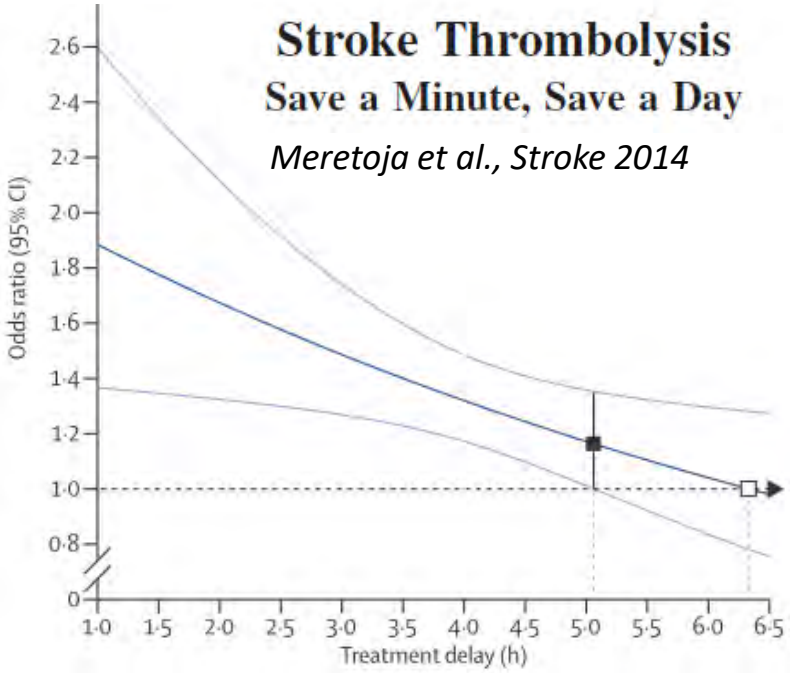
mRs ≤ 2 à 3 mois
NNT = 2

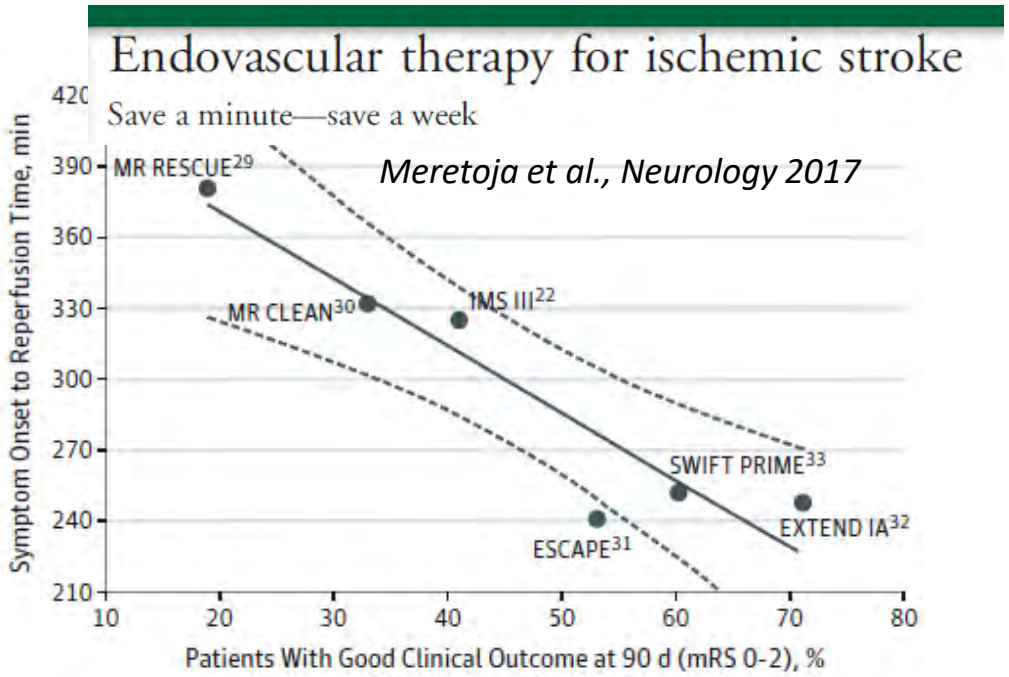
Quel est le centre de proximité adapté en fonction du délai écoulé depuis le début des symptômes ?

Bien identifier le centre de proximité



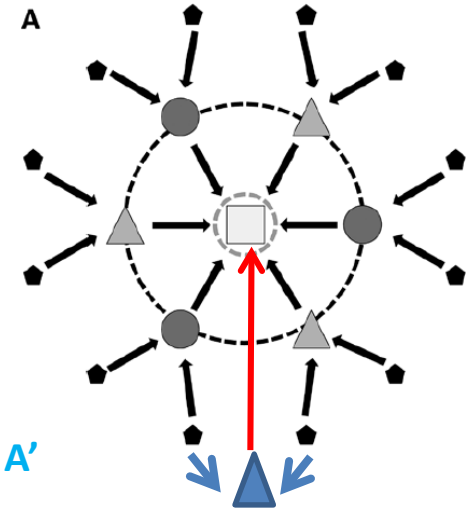
Une révolution des pratiques ?

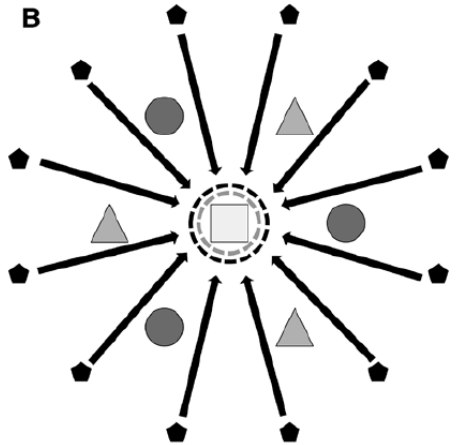




Drip and Ship

Mothership

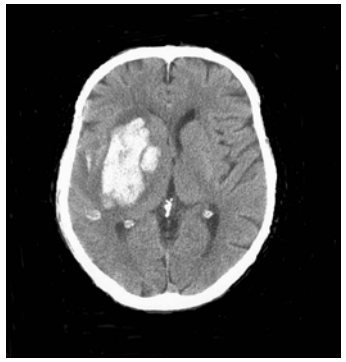


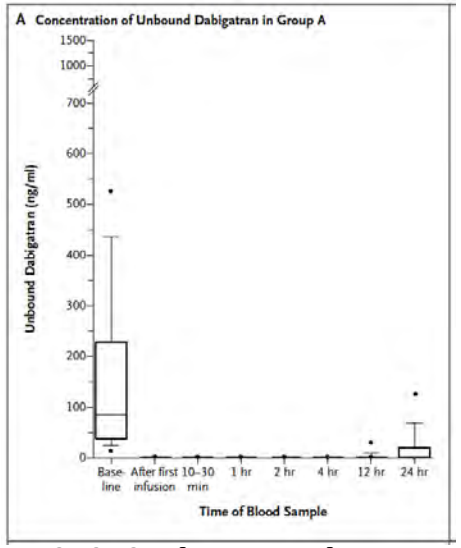


	Neurons Lost	Synapses Lost	Myelinated Fibers Lost	Accelerated Aging
Per Stroke	1.2 billion	8.3 trillion	7140 km/4470 miles	36 y
Per Hour	120 million	830 billion	714 km/447 miles	3.6 y
Per Minute	1.9 million	14 billion	12 km/7.5 miles	3.1 wk
Per Second	32 000	230 million	200 meters/218 yards	8.7 h

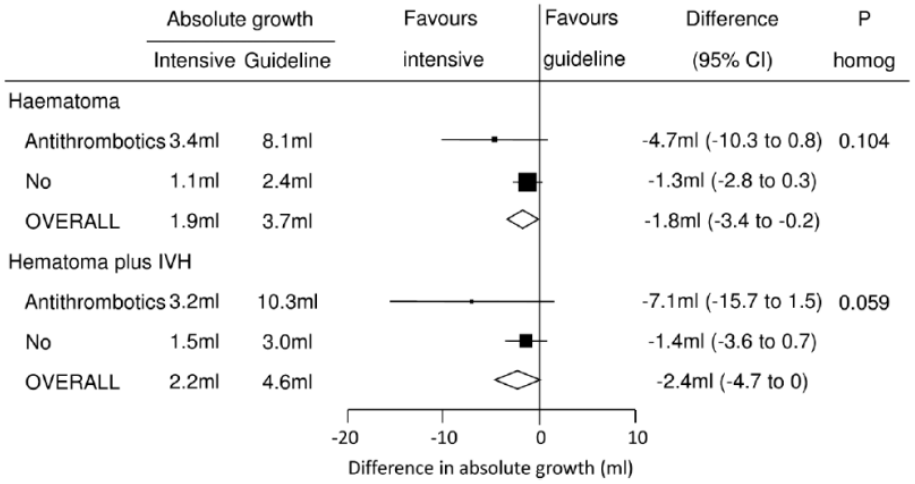
Qu'attendre du Drip ?

- **Evaluation de l'état neurologique et des comorbidités**
  - Quelques mauvaises surprises: ...non évaluation Négligence, HLH, Ataxie…
  - Autonomie antérieure
- **Confirmation du diagnostic d'infarctus cérébral**
- **Prise en charge précoce des autres pathologies**

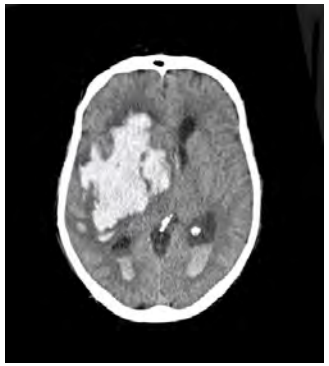




Réversion hypocoagulabilité iatrogène



< 140/90 mmHg dans l'heure



Song et al., JNNP 2016;

Les risques du drip ?

- **Non identification des candidats à la TM**
  - Examens d'imagerie non réalisés (angio-TSA)
  - Examens d'imagerie non interprétés
  - Critères cliniques méconnus
  - Censure trop sévère…*la perfusion…le rankin…*
  - **Absence de discussion neurologue / neuroradioradiologue**

2/3 des causes de non transfert pour TM en Aquitaine

- **Perte de temps et inéligibilité future…**
  - Les procédures intrahospitalières
  - La thrombolyse
  - Les transports inter-hospitaliers

2h en moyenne…

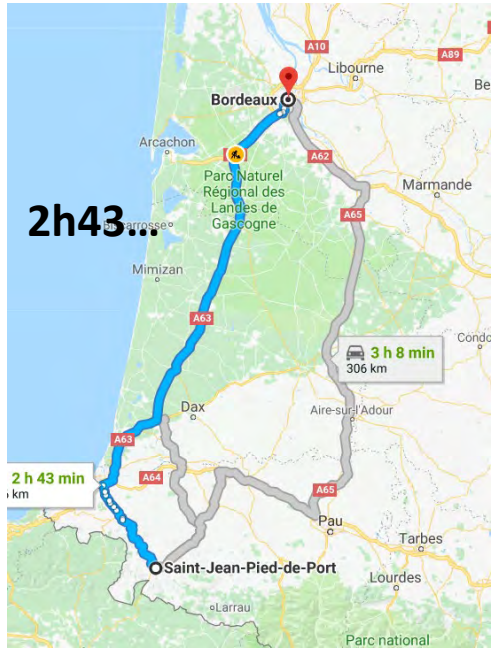
1/3 des causes de non transfert pour TM en Aquitaine

- **Perte du bénéfice de la thrombolyse sur l'acte de TM ?**
  - Demi-vie courte du tpa: ***« La demi-vie plasmatique est de 4 à 5 minutes, ainsi, après 20 minutes, moins de 10 % de la valeur initiale sont encore présents dans le plasma »***
  - Thrombus plus ancien => extraction plus difficile ?

Pour 1 heure de délai:
9,5% de réduction de probabilité d'un bon pronostic fonctionnel

Mothership pour tous ?

Des distances incompatibles



Quelles différences acceptables ?

10 min pour patient sous AO ?

15/30 min si éligible à TLY ?

30/60 min si non-éligible TLY ?

Endovascular Clot Retrieval Therapy
Implications for the Organization of Stroke Systems of Care in North America

Smith and Schwamm., Stroke 2015

from the Get With The Guidelines registry, 25% of patients present within 3 hours and 36% present within 8 hours.[13] Therefore, extending the bypass criterion from 0 to 3 hours up to 6 to 12 hours could potentially increase the number of EMS bypass cases ≥50%, with increased case volume at PSCs and CSCs. If bypass is extended to PSCs, such that these patients are taken only to CSCs, the increase in case volume at the CSCs could be substantial and potentially detrimental. To mitigate these effects, it is reasonable to exclude from thrombectomy-based triage patients with preexisting disability who are unlikely to benefit, such as those with modified prestroke Rankin score of >2. Certain communities may benefit from alternative strategies, such as mobile stroke units, or use of telemedicine-enabled vascular neurology consultation into the EMS vehicle.

Quelle bénéfice ?

Des risques de saturation…

Des retours compliqués…

Patients trop sévères

Places non-disponibles

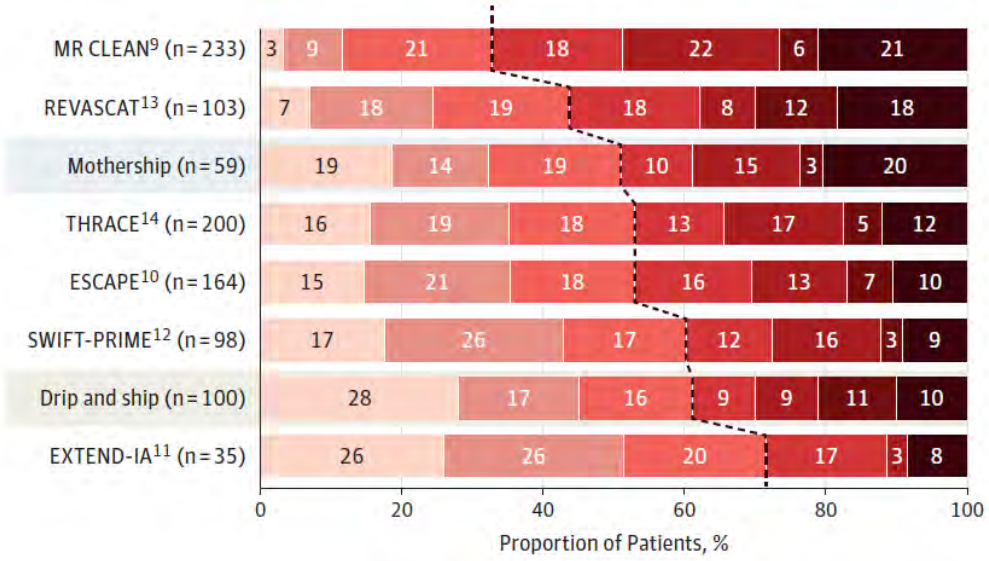
Refus des familles

Une solution évidente ?

Two Paradigms for Endovascular Thrombectomy After Intravenous Thrombolysis for Acute Ischemic Stroke

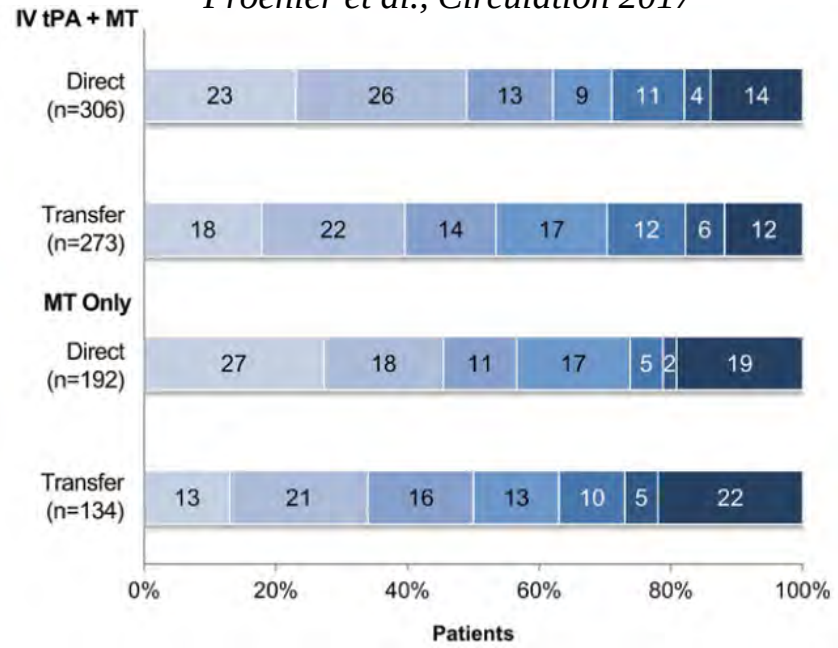
Gaspard Gerschenfeld, MD, MSc; Ioan-Paul Muresan, MD; Raphael Blanc, MD, MSc; Michael Obadia, MD, MSc; Marie Abrivard, MSc; Michel Piotin, MD, PhD; Sonia Alamowitch, MD

Gerschenfeld et al., JAMA neurol 2017;



Interhospital Transfer Before Thrombectomy Is Associated With Delayed Treatment and Worse Outcome in the STRATIS Registry (Systematic Evaluation of Patients Treated With Neurothrombectomy Devices for Acute Ischemic Stroke)

Froehler et al., Circulation 2017



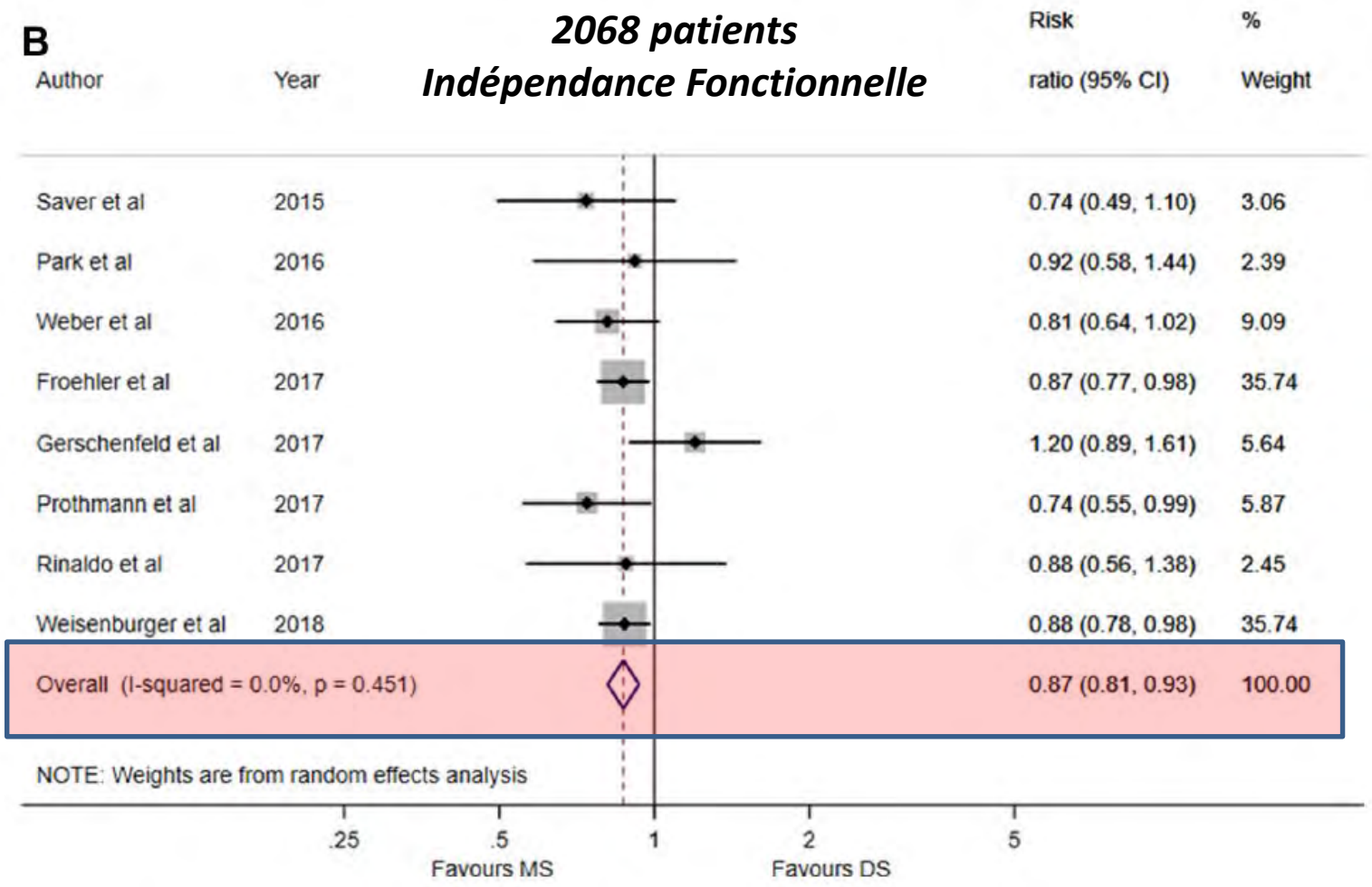
Absence de différence

Bénéfice du mothership

Mothership versus drip and ship for thrombectomy in patients who had an acute stroke: a systematic review and meta-analysis

Ismail et al. J Neurointerv Surg 2019

2068 patients
Indépendance Fonctionnelle



Reperfusion:
uRR 1,05 CI95% 0,95-1,15

Hémorragies:
uRR 1,37 CI95% 0,91-2,06

Mortalité:
uRR 1,00 CI95% 0,84-1,19

De nombreux biais...
Distance < 20 Miles....

Direct Admission vs. Secondary Transfer to a Comprehensive Stroke Center for Thrombectomy

Retrospective Analysis of a Regional Stroke Registry with 2797 Patients

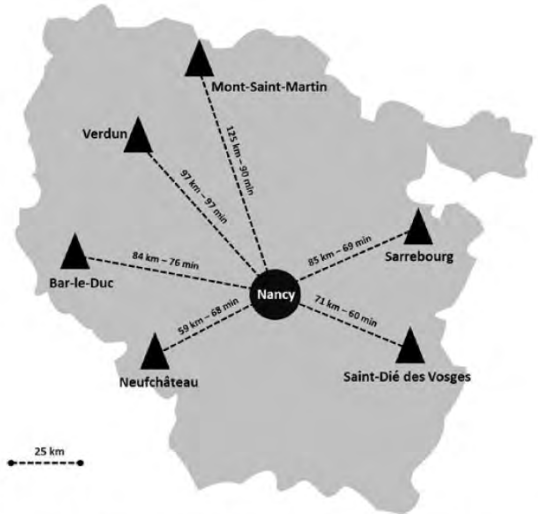
Seker et al., Clin Neuroradiol 2019

Table 1 Patient characteristics

	Total ($n=2797$)	Direct admission ($n=1657$)	Secondary transfer ($n=1140$)	*P* value
Age, years, mean (SD)	71.7 (13.3)	71.8 (13.4)	71.4 (13.2)	0.378
Female, n (%)	1343 (48)	815 (49.2)	528 (46.3)	0.146
Comorbidities, n (%)				
Diabetes	544 (19.4)	321 (19.4)	223 (19.6)	0.940
Hypertension	2084 (74.5)	1263 (76.2)	821 (72.0)	0.014
Atrial fibrillation	1203 (43.0)	667 (40.3)	536 (47.0)	<0.001
Previous stroke	381 (13.6)	241 (14.5)	140 (12.3)	0.097
Hypercholesterolemia	882 (31.5)	608 (36.7)	274 (24.0)	<0.001
Time from onset to admission at CSC, min, median (IQR)	164 (75–334)	102 (56–180)	210 (161–360)	<0.001
Premorbid mRS, median (IQR)	0 (0–0)	0 (0–0)	0 (0–1)	0.148
Baseline NIHSS, median (IQR)	14 (8–19)	13 (7–18)	15 (10–20)	<0.001
Intravenous thrombolysis, n (%)	1573 (56.2)	1026 (61.9)	547 (48.0)	<0.001
Intracranial hemorrhage, n (%)	239 (8.5)	154 (9.3)	85 (7.5)	0.101
Good outcome, n (%)	1051 (37.6)	699 (42.2)	352 (30.9)	<0.001
Discharge mRS, median (IQR)	3 (2–5)	3 (1–5)	4 (2–5)	<0.001
mRS shift, median (IQR)	3 (1–5)	3 (1–4)	4 (2–5)	<0.001
Hospital mortality, n (%)	571 (20.4)	294 (17.7)	277 (24.3)	<0.001

Outcome of patients with large vessel occlusion stroke after first admission in telestroke spoke versus comprehensive stroke center

Kaminsky et al. J Neurointerv Surg 2019



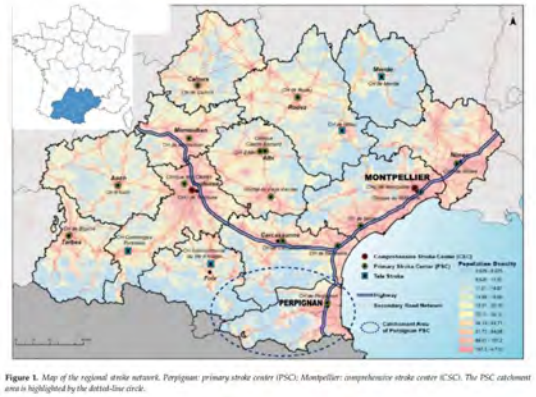
N = 207 (132 vs 75)

Moins de thrombolyse
Plus de thrombectomie

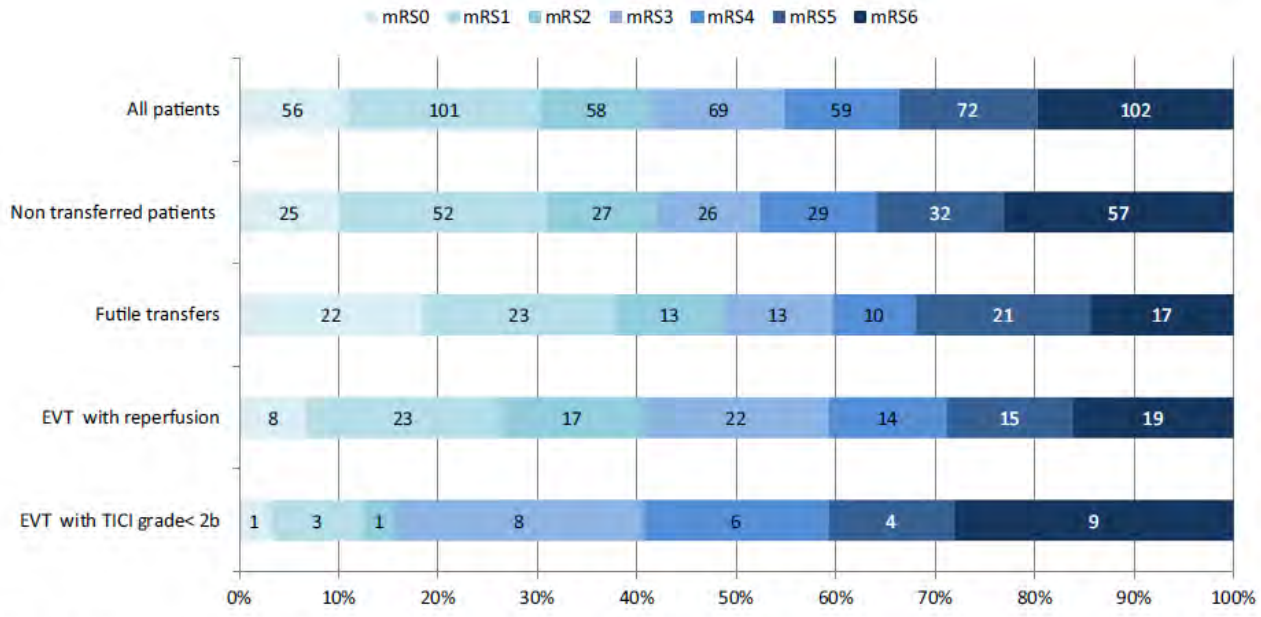
Absence de différence fonctionnelle
Malgré
Réduction délai 100 min

Mechanical Recanalization after Transfer from a Distant Primary Stroke Center: Effectiveness and Future Directions

Farouil et al. J Stroke CVD 2019

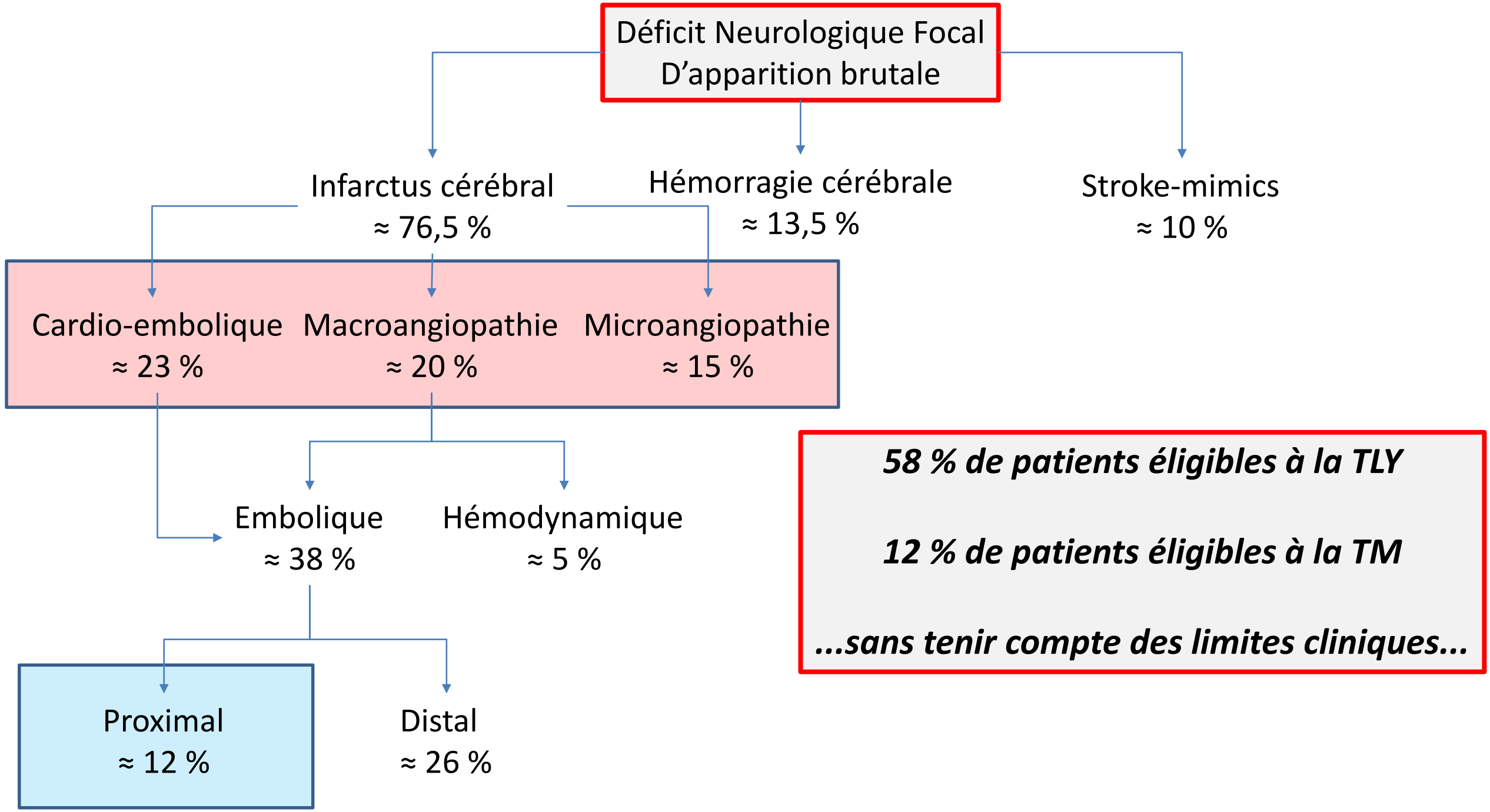


N = 529



Absence de bénéfice du transfert secondaire pour TM...

Quels outils de décision ?


Déficit Neurologique Focal
D'apparition brutale
Infarctus cérébral
≈ 76,5 %
Hémorragie cérébrale
≈ 13,5 %
Stroke-mimics
≈ 10 %
Cardio-embolique
≈ 23 %
Macroangiopathie
≈ 20 %
Microangiopathie
≈ 15 %
Embolique
≈ 38 %
Hémodynamique
≈ 5 %
Proximal
≈ 12 %
Distal
≈ 26 %
58 % de patients éligibles à la TLY
12 % de patients éligibles à la TM
...sans tenir compte des limites cliniques...

Interhospital Transfers for Endovascular Therapy for Acute Ischemic Stroke

Nationally Representative Data

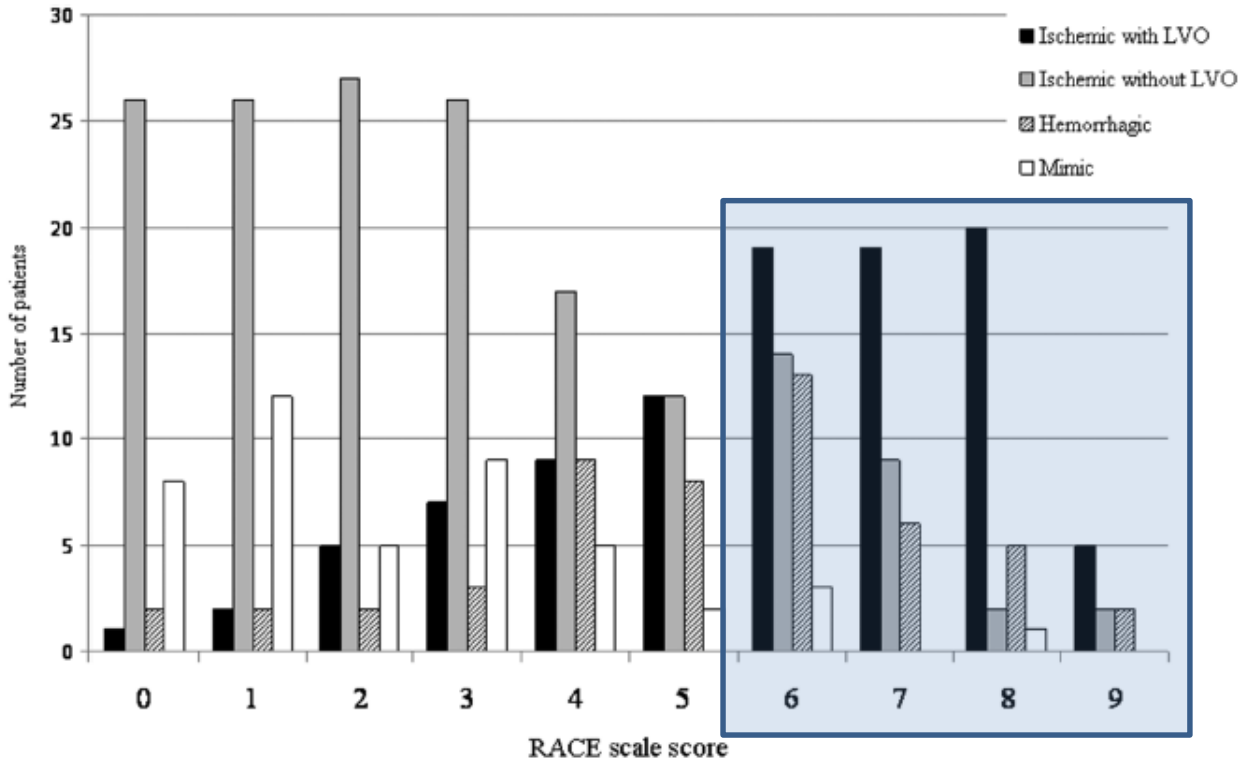
Stein et al., Stroke 2019

2,6 %

Variables at Index Admission	No Endovascular Therapy Received		Endovascular Therapy Received		*P* Value for Difference
	Weighted Frequency*	Percent (95% CI of Percent)	Weighted Frequency*	Percent (95% CI of Percent)	
Total	874 229	100.0	23 121	100.0	…
Mean age, y	…	70.7 (70.5–70.8)	…	69.1 (68.6–69.5)	<0.0001
Female	445 039	50.9 (50.7–51.1)	11 650	50.4 (49.4–51.4)	0.3312
Tobacco use	321 239	36.7 (36.2–37.3)	7560	32.7 (31.5–33.9)	<0.0001
Diabetes mellitus	328 449	37.6 (37.2–37.9)	6348	27.5 (26.5–28.5)	<0.0001
Hypertension	585 364	67 (66.6–67.3)	15 362	66.4 (65.3–67.6)	0.357
Hyperlipidemia	512 739	58.7 (58.1–59.2)	12 116	52.4 (50.4–54.4)	<0.0001
Atrial fibrillation/flutter	220 055	25.2 (24.9–25.4)	11 177	48.3 (46.9–49.8)	<0.0001
Received intravenous thrombolysis	68 426	7.8 (7.6–8)	6934	30 (28.3–31.7)	<0.0001
Length of stay, d	…	5.6 (5.5–5.7)	…	9.8 (9.4–10.1)	<0.0001
Total charges ($)	…	53 225 (51 957–54 493)	…	184 986 (176 643–193 329)	<0.0001

Prédire la présence d'un thrombus proximal ?

Sévérité clinique



Clinical prediction tool	Parameters assessed
National Institutes of Health Stroke Scale (NIHSS)	
Cincinnati Pre-hospital Stroke Severity Scale (CPSSS) (37)	• Conjugate gaze deviation • Questions and commands • Arm weakness
Los Angeles Motor Scale (LAMS) (38)	• Facial droop • Arm drift • Grip strength
Rapid Arterial Occlusion Evaluation (RACE) (39)	• Facial palsy • Arm motor function • Leg motor function • Head and gaze deviation • Aphasia • Agnosia
3-item Stroke Scale (3-item SS) (40)	• Consciousness • Gaze and head deviation • Hemiparesis
Field Assessment Stroke Triage for Emergency Destination (FAST-ED) (41)	• Facial palsy • Arm weakness • Speech changes • Eye deviation • Extinction/neglect
Stroke Vision, Aphasia, Neglect (VAN) (42)	• Arm weakness • Visual disturbance • Aphasia • Neglect
Conveniently-Grasped Field Assessment Stroke Triage (CG-FAST) (43)	• LOC questions • Gaze • Facial palsy • Arm weakness • Speech problems

Accuracy of Prediction Instruments for Diagnosing Large Vessel Occlusion in Individuals With Suspected Stroke

A Systematic Review for the 2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke

Smith et al., Stroke 2018

Introduction—Endovascular thrombectomy is a highly efficacious treatment for large vessel occlusion (LVO). LVO prediction instruments, based on stroke signs and symptoms, have been proposed to identify stroke patients with LVO for rapid transport to endovascular thrombectomy–capable hospitals. This evidence review committee was commissioned by the American Heart Association/American Stroke Association to systematically review evidence for the accuracy of LVO prediction instruments.

Methods—Medline, Embase, and Cochrane databases were searched on October 27, 2016. Study quality was assessed with the Quality Assessment of Diagnostic Accuracy-2 tool.

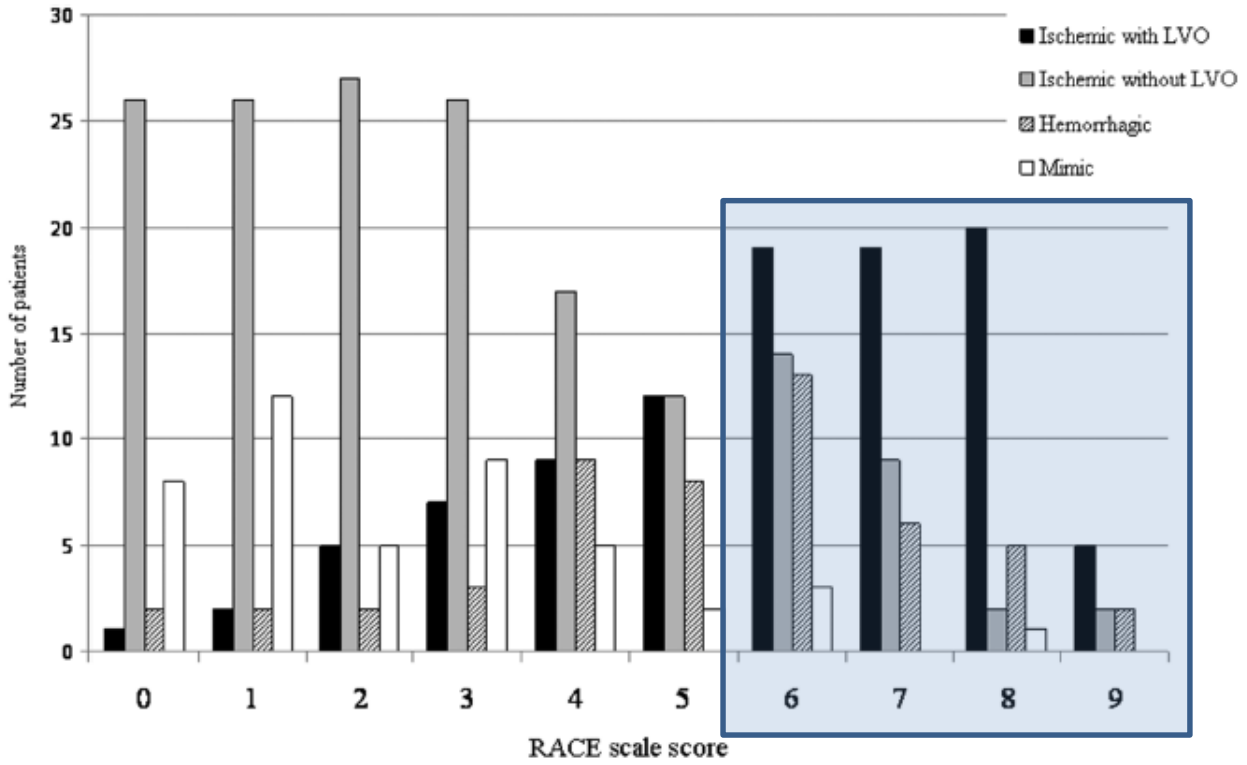
Results—Thirty-six relevant studies were identified. Most studies (21 of 36) recruited patients with ischemic stroke, with few studies in the prehospital setting (4 of 36) and in populations that included hemorrhagic stroke or stroke mimics (12 of 36). The most frequently studied prediction instrument was the National Institutes of Health Stroke Scale. Most studies had either some risk of bias or unclear risk of bias. Reported discrimination of LVO mostly ranged from 0.70 to 0.85, as measured by the C statistic. In meta-analysis, sensitivity was as high as 87% and specificity was as high as 90%, but no threshold on any instruments predicted LVO with both high sensitivity and specificity. With a positive LVO prediction test, the probability of LVO could be 50% to 60% (depending on the LVO prevalence in the population), but the probability of LVO with a negative test could still be ≥10%.

Conclusions—No scale predicted LVO with both high sensitivity and high specificity. Systems that use LVO prediction instruments for triage will miss some patients with LVO and milder stroke. More prospective studies are needed to assess the accuracy of LVO prediction instruments in the prehospital setting in all patients with suspected stroke, including patients with hemorrhagic stroke and stroke mimics. **(*Stroke*. 2018;49:e111-e122. DOI: 10.1161/STR.0000000000000160.)**

Absence de score reproductible, sensible et spécifique

Prédire la présence d'un thrombus proximal ?

Sévérité clinique



RACE > 5 + FA + TAS < 170 mmHg ?

Specific Factors to Predict Large-Vessel Occlusion in Acute Stroke Patients

	LVO (n = 56)	Non-LVO (n = 140)	*P* Value
Age, mean (SD), y	71.1 (15.0)	67.7 (14.7)	.15
Female sex	20 (35.7%)	53 (37.9%)	.78
Sudden onset	38 (67.9%)	97 (69.3%)	.85
Medical history			
Stroke	12 (21.4%)	34 (24.3%)	.67
Af	32 (57.1%)	15 (10.7%)	<.0001
Heart failure	9 (16.1%)	5 (3.6%)	.0021
Hypertension	35 (62.5%)	91 (64.3%)	.74
Hyperlipidemia	16 (28.6%)	21 (15%)	.03
Diabetes	9 (16.1%)	28 (20%)	.53
CKD	8 (14.3%)	10 (7.1%)	.12
Dialysis	2 (3.6%)	3 (2.1%)	.57
Habit			
Smoking	24 (42.9%)	45 (32.1%)	.16
Alcohol	15 (26.8%)	28 (20%)	.30
Family history of stroke	5 (8.9%)	12 (8.6%)	.94
Medication			
Anticoagulant	10 (17.9%)	6 (4.3%)	.002
Antiplatelet	11 (19.6%)	25 (17.9%)	.77
Statin	7 (12.5%)	9 (6.4%)	.16
NIHSS item, median, IQR	23 (15.25-28)	18.5 (12-29.75)	.55
Level of consciousness	1 (0-2)	1 (0-2)	.11
Questions	2 (1-2)	2 (0-2)	.74
Commands	1 (0-2)	1.5 (0-2)	.25
Gaze	1 (1-2)	1 (0-2)	.64
Visual fields	2 (0-2)	1 (0-2)	.18
Facial palsy	2 (1-2)	1 (1-2)	.03
Motor arm left	2 (0-4)	2 (0-4)	.90
Right	2 (0-3.75)	2 (0-4)	.12
Motor leg left	2 (1-4)	2 (0-4)	.23
Right	2 (0-4)	2 (0-4)	.50
Ataxia	0 (0-0)	0 (0-0)	.12
Sensory	1 (1-2)	2 (0-2)	.19
Language	2 (1-3)	2 (0-3)	.20
Dysarthria	2 (1-2)	2 (1-2)	.33
Extinction or inattention	2 (1-2)	2 (0-2)	.07
Blood pressure			
SBP, mean (SD), mm Hg	153.7 (5.4)	179.8 (3.4)	<.0001
SBP ≤170 mm Hg	44 (78.6%)	61 (43.6%)	<.0001
DBP, mean (SD), mm Hg	87.0 (3.8)	94.5 (2.3)	.09

Télémédecine pré-hospitalière?

Optimisation
Orientation

Clinical Evaluation of a Microwave-Based Device for Detection of Traumatic Intracranial Hemorrhage

Ljungqvist et al., J Neurotrauma 2017

FIG. 1. The Strokefinder MD100 device (Medfield Diagnostics AB, Gothenburg, Sweden). Reprinted with permission.

Visioconférence embarquée

Yperzeele et al., Plos one 2014

OPTIC-AVC

The VITAL study and overall pooled analysis with the VIPS non-invasive stroke detection device

Kellner et al., J Neurointerv Surg 2018

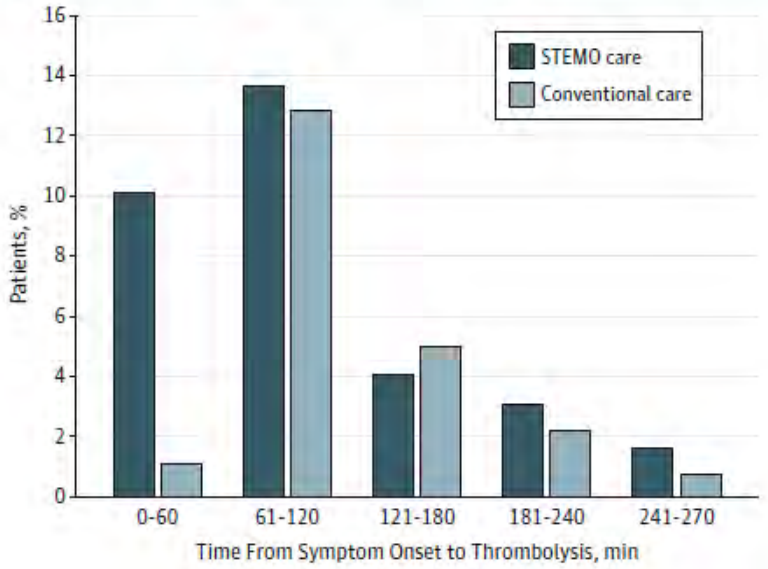
Visualiser le thrombus en pré-hospitalier ?

Mobile Stroke Team

Diagnostic,
Traitement,
Orientation

Trip and Treat

Figure 2. Thrombolysis Rates in 60-Minute Intervals



	Conventional care (n=353)	STEMO care (n=305)	p value
Primary outcome			
3-month mRS score 0–1	166 (47%)	161 (53%)	0·14
Secondary outcomes			
3-month mRS score 0–3	260 (74%)	253 (83%)	0·004
3-month mortality	37 (10%)	17 (6%)	0·022
3-month mRS score			0·10*
0	106 (30%)	85 (28%)	..
1	60 (17%)	76 (25%)	..
2	55 (16%)	32 (10%)	..
3	39 (11%)	60 (20%)	..
4	37 (10%)	22 (7%)	..
5	19 (5%)	13 (4%)	..
6	37 (10%)	17 (6%)	..
Safety outcomes			
Symptomatic intracranial haemorrhage†	17 (5%)	9 (3%)	0·27
7-day mortality‡	14 (4%)	7 (2%)	0·23

Ebinger et al. JAMA 2015; Kunz et al., Lancet Neurol 2016

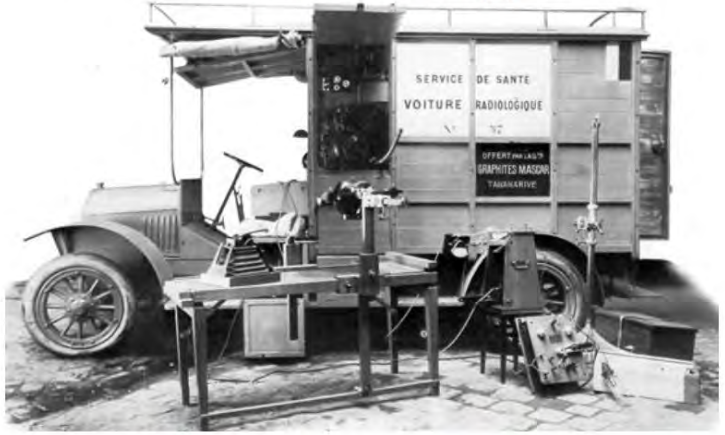
Mobile stroke units for prehospital thrombolysis, triage, and beyond: benefits and challenges

Fassbender et al., Lancet Neurol 2017

En France…

Etude ASPHALT

Acute Stroke: Prehospital versus in-HospitAL initiation of Recanalization Therapy



Centre hospitalier Sainte-Anne

ASSISTANCE PUBLIQUE HÔPITAUX DE PARIS

SAMU de PARIS

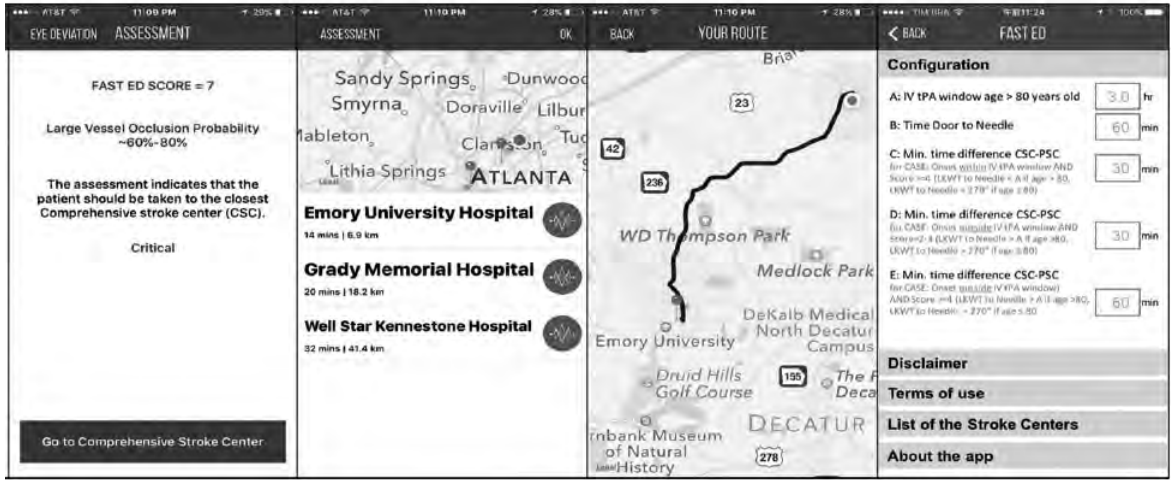
Université de Paris

Modélisation ?

- Sévérité Clinique
- Comorbidités/ Anticoagulation
- Délai symptômes-alerte
- Délai Alerte-Arrivée transporteur
- Temps de transport domicile – centres (PSC –CSC)

The FAST-ED App: A Smartphone Platform for the Field Triage of Patients With Stroke

Nogueira et al., Stroke 2017



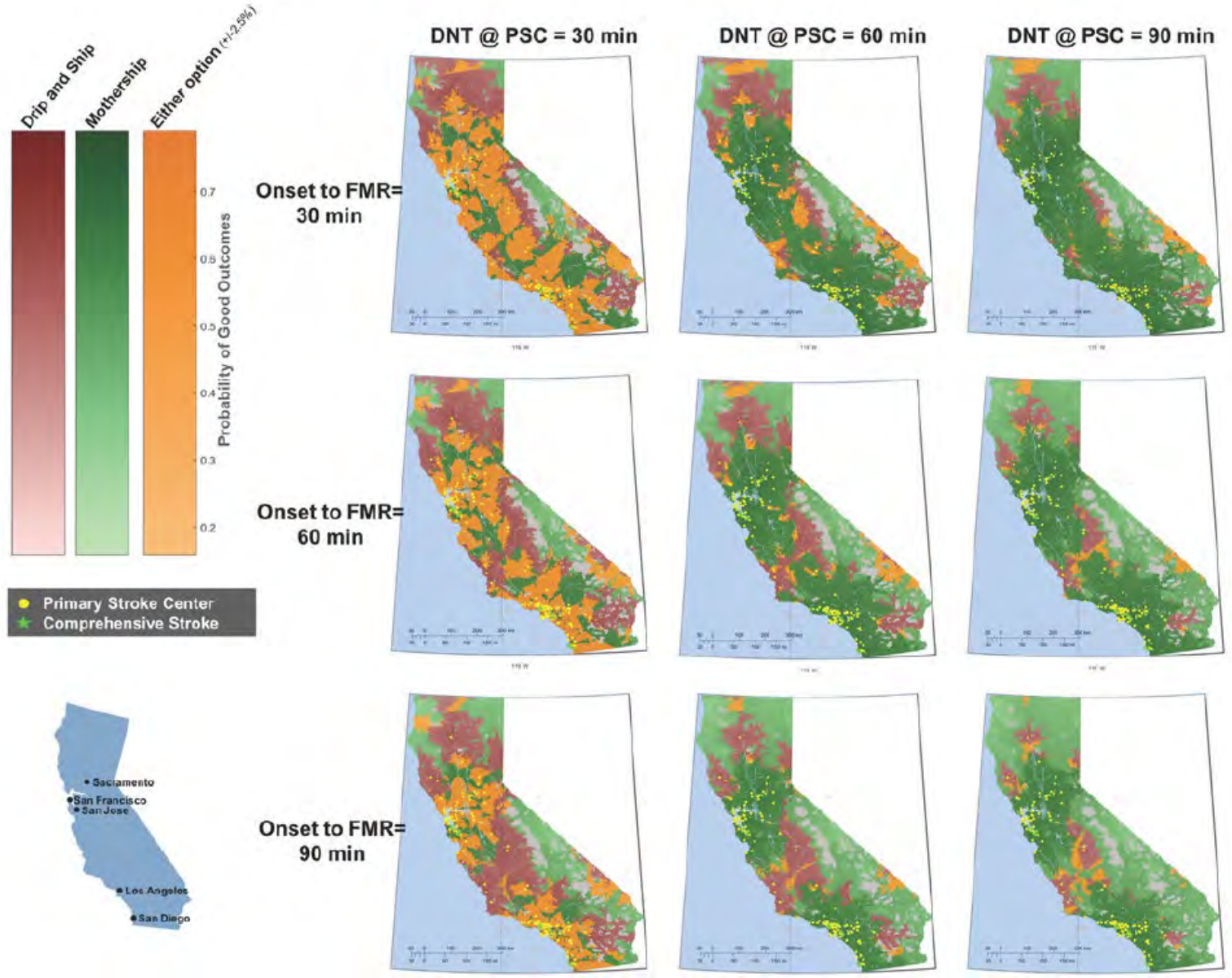
Modélisation ?

- Sévérité Clinique
- Comorbidités/ Anticoagulation
- Délai symptômes-alerte
- Délai Alerte-Arrivée transporteur
- Temps de transport domicile – centres (PSC –CSC)
- Door to Needle
- Door in Door Out
- Temps de transport PSC- CSC
- Taux d’occupation CSC
- Délai Admission –Ponction du CSC

Drip ‘n Ship Versus Mothership for Endovascular Treatment

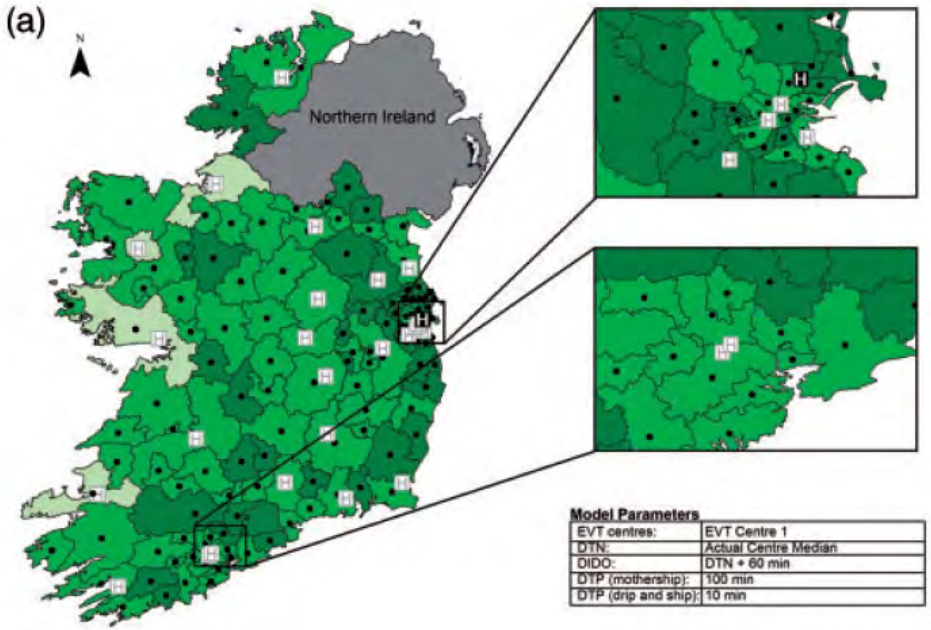
Modeling the Best Transportation Options for Optimal Outcomes

Matthew et al., Stroke 2017

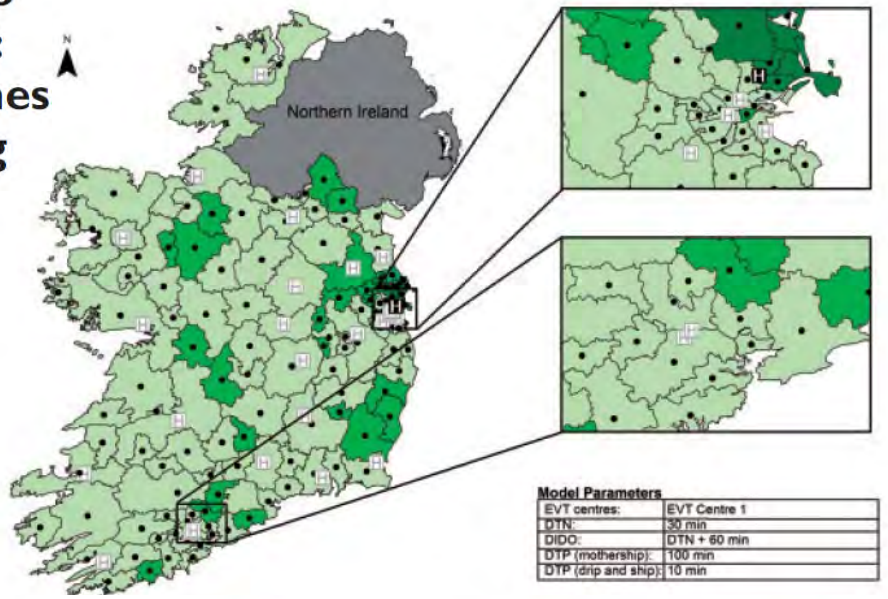


Drip and ship versus direct to endovascular thrombectomy: The impact of treatment times on transport decision-making

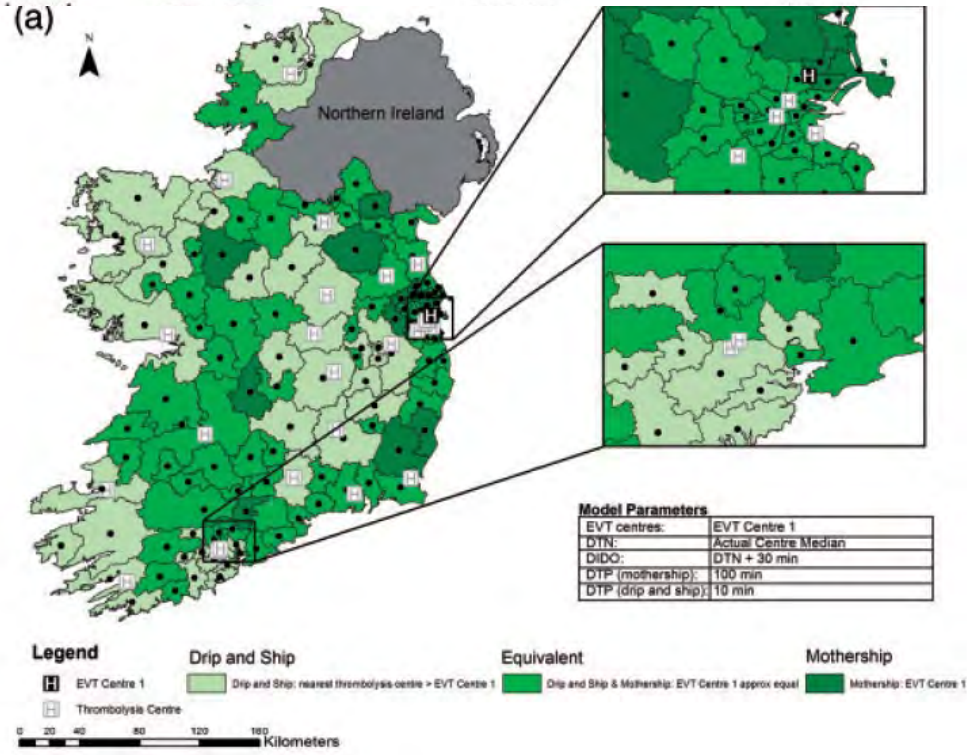
Holodinsky et al., Eur Stroke J 2018



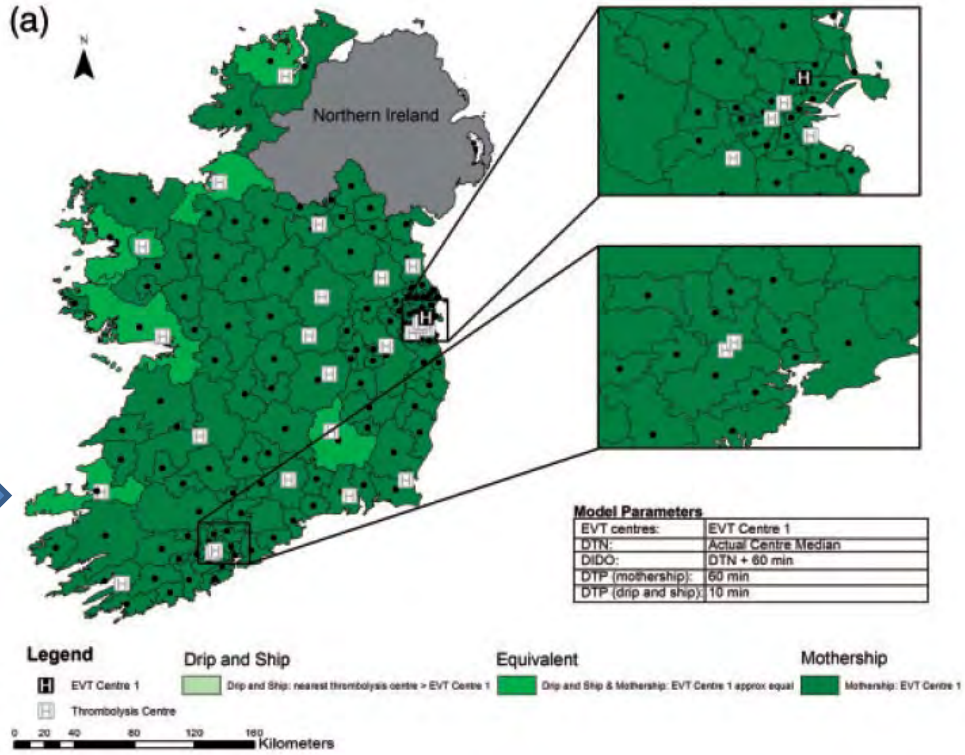
Réduction
Door to needle
30 min



Réduction
Door in door out
30 min



Réduction
Door to puncture
40 min



JAMA Neurology | Original Investigation

Association of a Primary Stroke Center Protocol for Suspected Stroke by Large-Vessel Occlusion With Efficiency of Care and Patient Outcomes

Ryan A. McTaggart, MD; Shadi Yaghi, MD; Shawna M. Cutting, MD, MS; Morgan Hemendinger; Grayson L. Baird, PhD; Richard A. Haas, MD; Karen L. Furie, MD, MPH; Mahesh V. Jayaraman, MD

Connaitre et optimiser les délais pré/intra/inter-hospitaliers

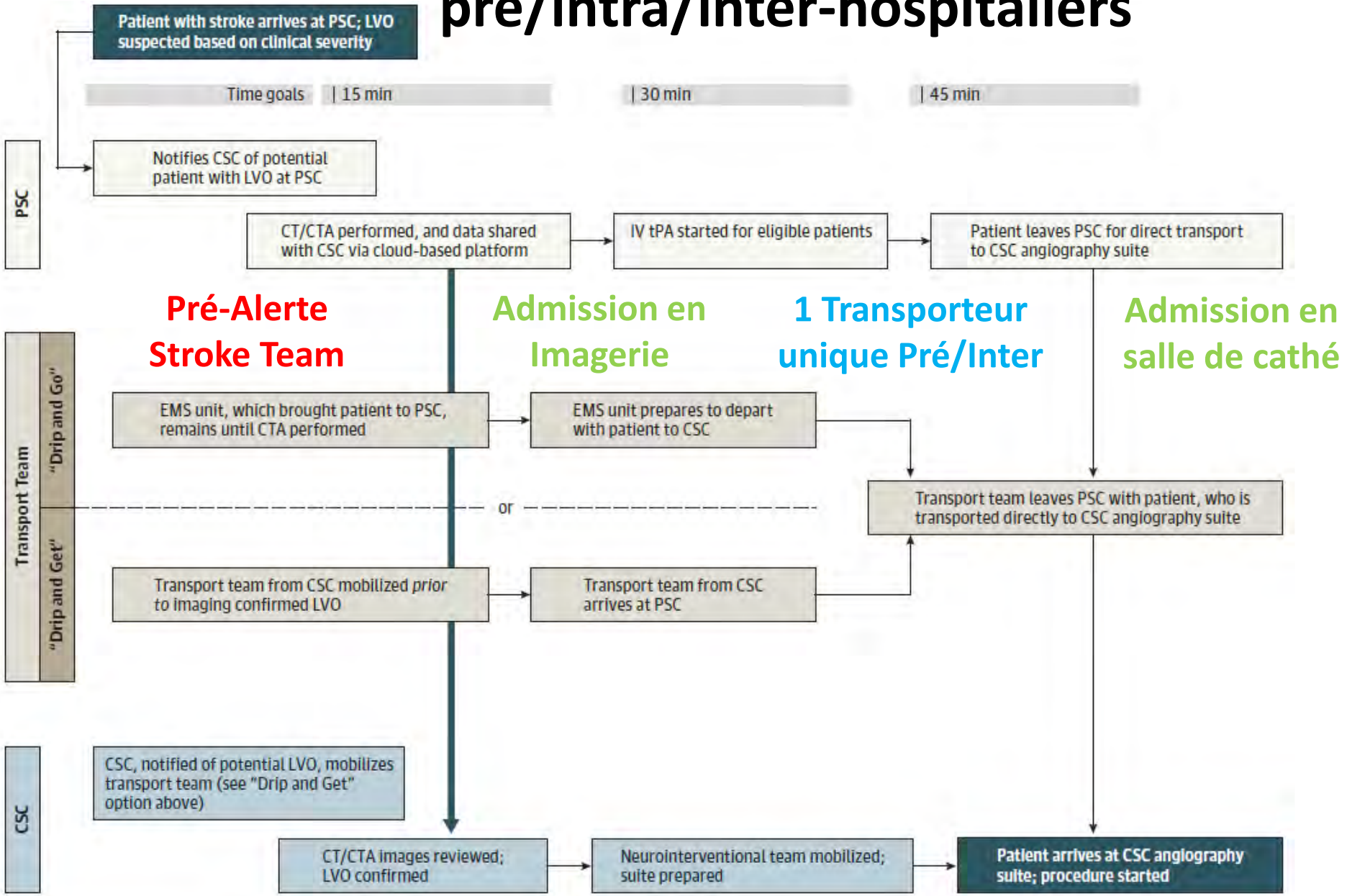
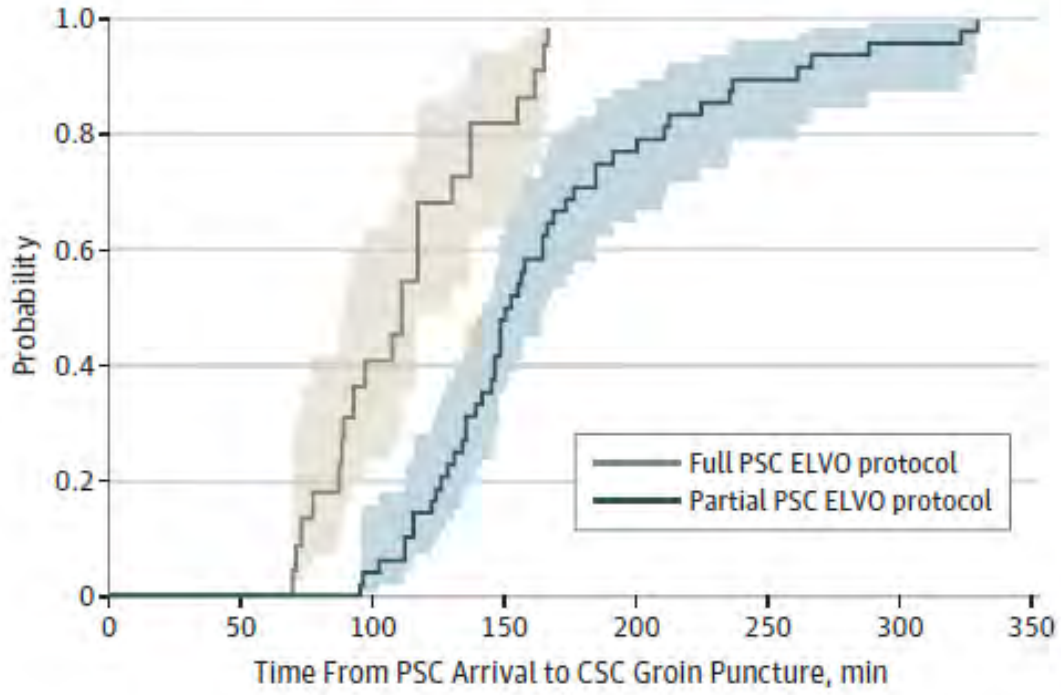
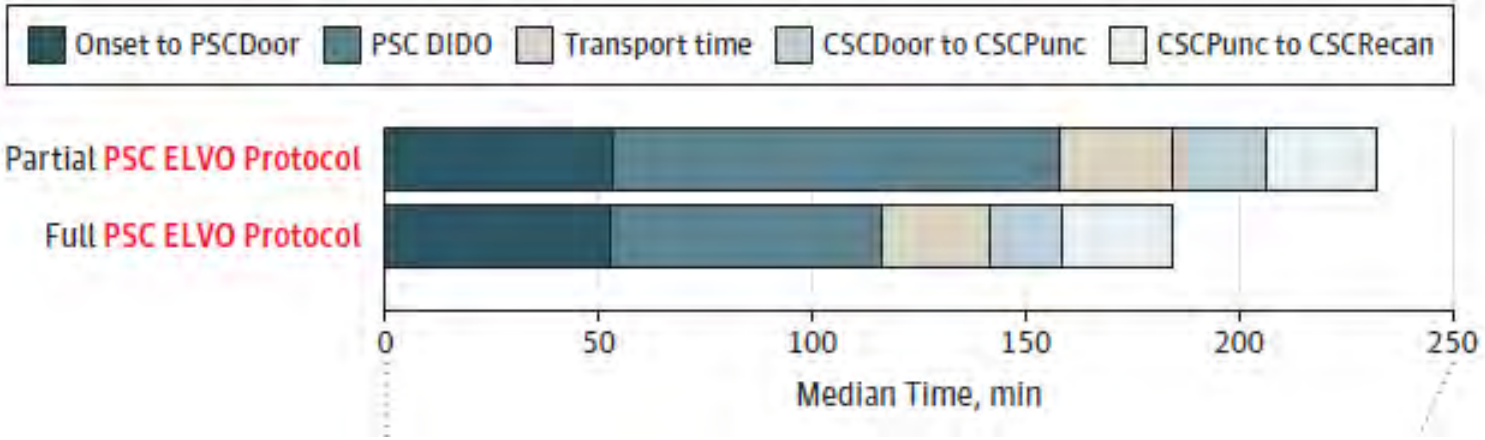


Figure 2. Primary Stroke Center (PSC) Emergent Large-Vessel Occlusion (ELVO) Protocol Efficiency From PSC Arrival to Comprehensive Stroke Center (CSC) Groin Puncture





Deux fois plus de pronostic favorable à 3 mois !!!

50% vs 25%

Objectifs:

Door-In-Door-Out (DIDO)

< 30 MINUTES ?

...

< 60 MINUTES ?

McTaggart et al., JAMA Neurol 2017

PUB !!!

ALERT'AVC APP

Pour suivre en temps réel l'alerte AVC

PROCÉDURE ALERTE AVC

Délai Admission-Traitements

UNITÉ NEURO-VASCULAIRE

Thrombolyse

Thrombectomie

RÉGULATION MÉDICALE
Samu ou Brigade des Sapeurs pompiers

Historique Médical
Début des symptomes
CI à la thrombolyse
Gravité de l'AVC

L'appli qui va améliorer le parcours de prise en charge des victimes d'AVC

L'unité neurovasculaire (IAO, neuro/ neuroradio/anesthésiste...) est informée en temps réel du délai d'arrivée de l'Alerte AVC

PUSH

Pour plus d'informations :
Dr. Caroline Arquizan, CHU Montpellier
Dr. Bertrand Lapergue, Hôpital Foch
Développé par Karl Cosse
Directrice App. : Émilie Besnard
Promoteur : Hôpital FOCH

Disponible dès 2020 sur les stores. Gratuite et sécurisée, l'appli ALERT'AVC

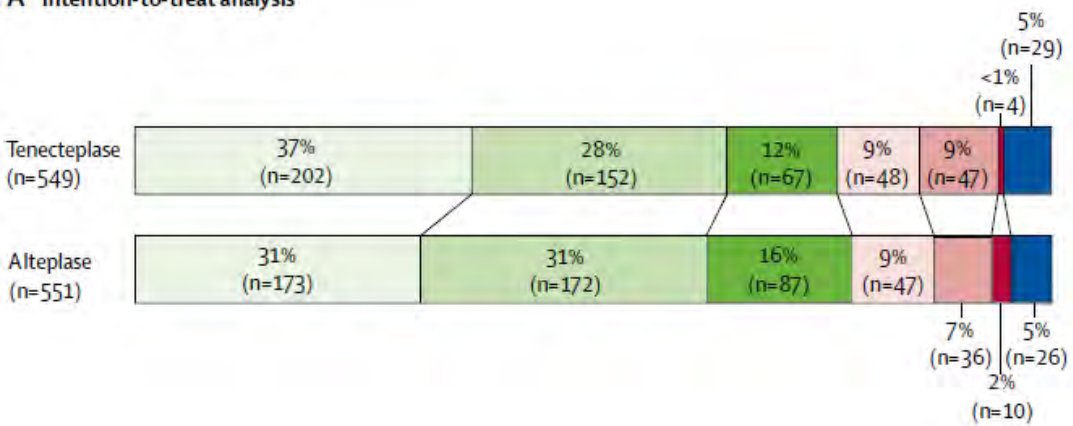
HOPITAL FOCH

Ténectéplase...histoire en marche

Tenecteplase versus alteplase for management of acute ischaemic stroke (NOR-TEST): a phase 3, randomised, open-label, blinded endpoint trial *0,4 mg/Kg*

	Tenecteplase 549	Alteplase 551	Odds ratio (95% CI)	p value
Intention-to-treat analysis				
Primary outcome				
mRS score 0–1 at 3 months	354/549 (64%)	345/551 (63%)	1·08 (0·84–1·38)	0·52
Secondary outcomes				
Any ICH at 24–48 h*	47/549 (9%)	50/551 (9%)	0·94 (0·60–1·45)	0·82†
Symptomatic ICH at 24–48 h‡	15/549 (3%)	13/551 (2%)	1·16 (0·51–2·68)	0·70†
Major clinical improvement at 24 h§	229/549 (42%)	214/551 (39%)	1·12 (0·89–1·43)	0·97
Ordinal shift analysis of mRS at 3 months	NA/549	NA/551	1·12 (0·91–1·39)	0·28
Death within 3 months	29/549 (5%)	26/551 (5%)	1·12 (0·63–2·02)	0·68†

A Intention-to-treat analysis



Logallo et al., Lancet Neurol 2017

Tenecteplase versus Alteplase before Thrombectomy for Ischemic Stroke

EXTEND-IA-TNK *0,25 mg/Kg*

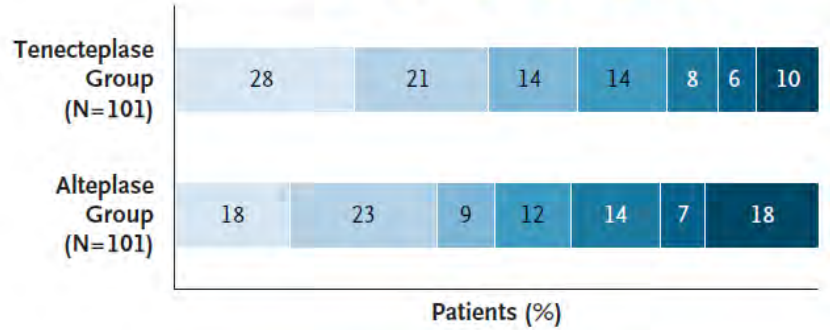
Reperfusion > 50%:

TNK: 22%

Rt-PA: 10%

Supériorité: P = 0.03

mRS:



OR :1.7; 95% CI, 1.0 to 2.8; P = 0.04

HICs

TNK = 1% = rt-PA

Campbell et al., NEJM 2018

Médicaliser le transport Inter-Hospitalier ?

Complications During Inter-Hospital Transfer of Patients with Acute Ischemic Stroke for Endovascular Therapy

Sablot et al., Prehosp Emerg Care 2019

26,9% de complications

Which Patients Require Physician-Led Inter-Hospital Transport in View of Endovascular Therapy?

Leibinger et al., Cer Vasc Dis 2019

4,3% de complications majeures

Type of complication	$n^{\dagger}$ (%†); ($n^{\dagger\dagger}$ [%††])
MCs requiring an emergency medical doctor intervention	11 (4.3)
Respiratory distress requiring mechanical ventilation at departure	8 (3.1)
Respiratory distress requiring mechanical ventilation during transfer	1 (0.4)
Haemodynamic instability	2 (0.8)
Minor complications	57 (22.6)
Vomit with inhalation	7 (2.8); (6 [2.4])
Vomit without inhalation	6 (2.4)

AVC de Fosse Postérieure

NIHSS > 22

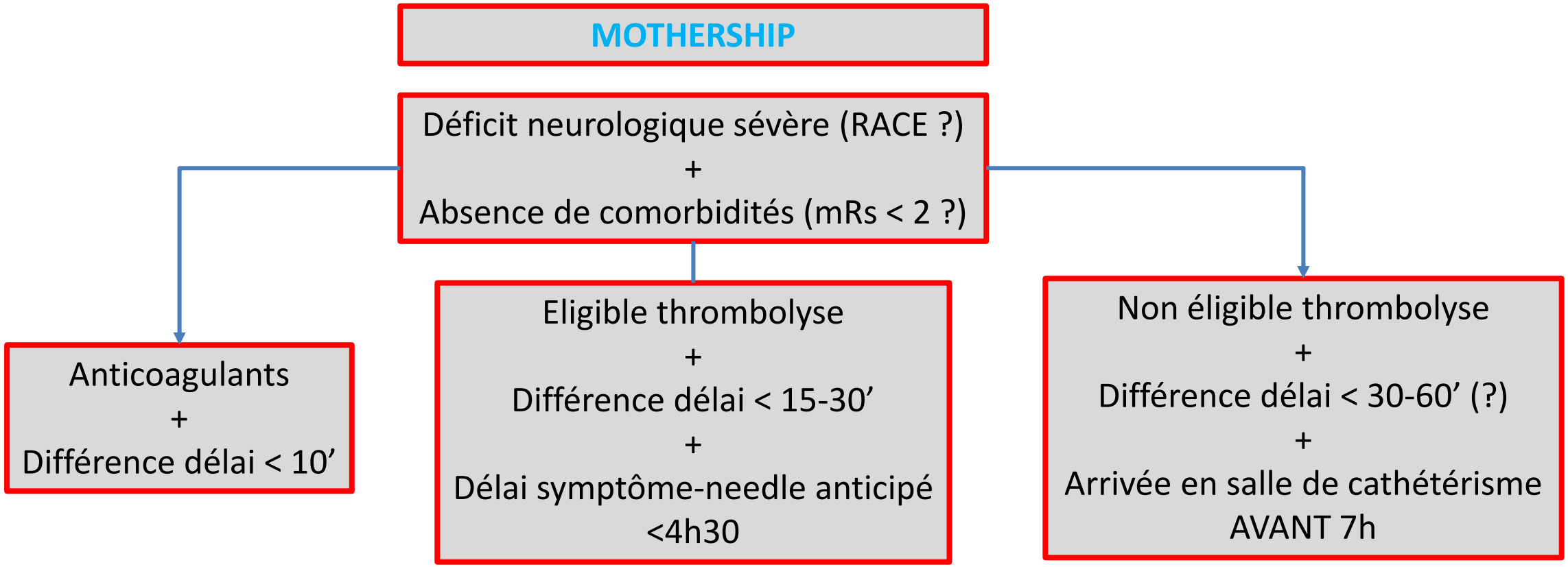
→ **MEDICALISATION**

En pratique...

Importance de l'évaluationpré-hospitalière ++

Identification du centre de proximité « personalisée »

Connaissance des délais pré et intra-hospitaliers



Organiser, Protocoliser et Randomiser…

NEWSLETTER N°01- NOVEMBRE 2019

PRESTO-F

CHU CAEN NORMANDIE

ÉVALUATION MÉDICO-ÉCONOMIQUE D'UNE STRATÉGIE PRÉ HOSPITALIÈRE D'ADRESSAGE DIRECT VERS UN CENTRE DE RECOURS AVEC NEURORADIOLOGIE INTERVENTIONNELLE DANS LA PRISE EN CHARGE DE L'AVC AIGU.

PROGRAMME DE RECHERCHE MÉDICO-ECONOMIQUE

CHU CAEN NORMANDIE · UNIVERSITÉ CAEN NORMANDIE · Inserm · PhIND · sfnv Société Française Neuro-Vasculaire · RÉPUBLIQUE FRANÇAISE