



ADMISSION DIRECTE EN SALLE D'ANGIOGRAPHIE

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CONFLITS D'INTÉRÊTS



- Investigateur principal de l'étude DIRECT ANGIO (NCT 03969511)

CT Stroke Imaging

NCT

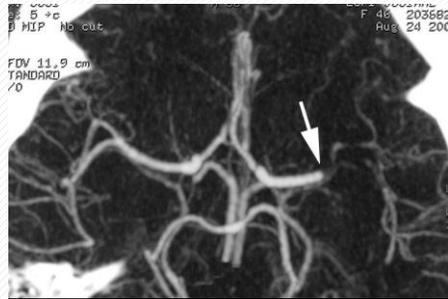
Hemorrhage



Hemorrhage

CTA

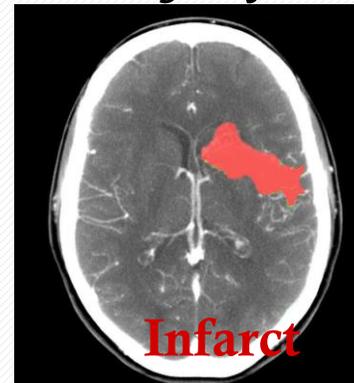
Vessel
Status



Large Vessel
Occlusions

PCT

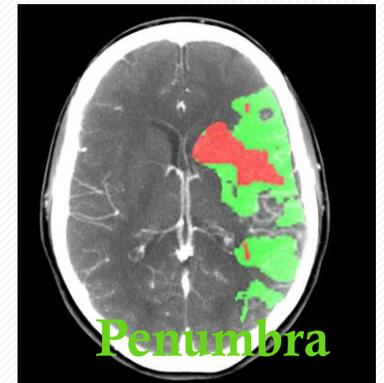
Ischemic
Injury



Infarct Core

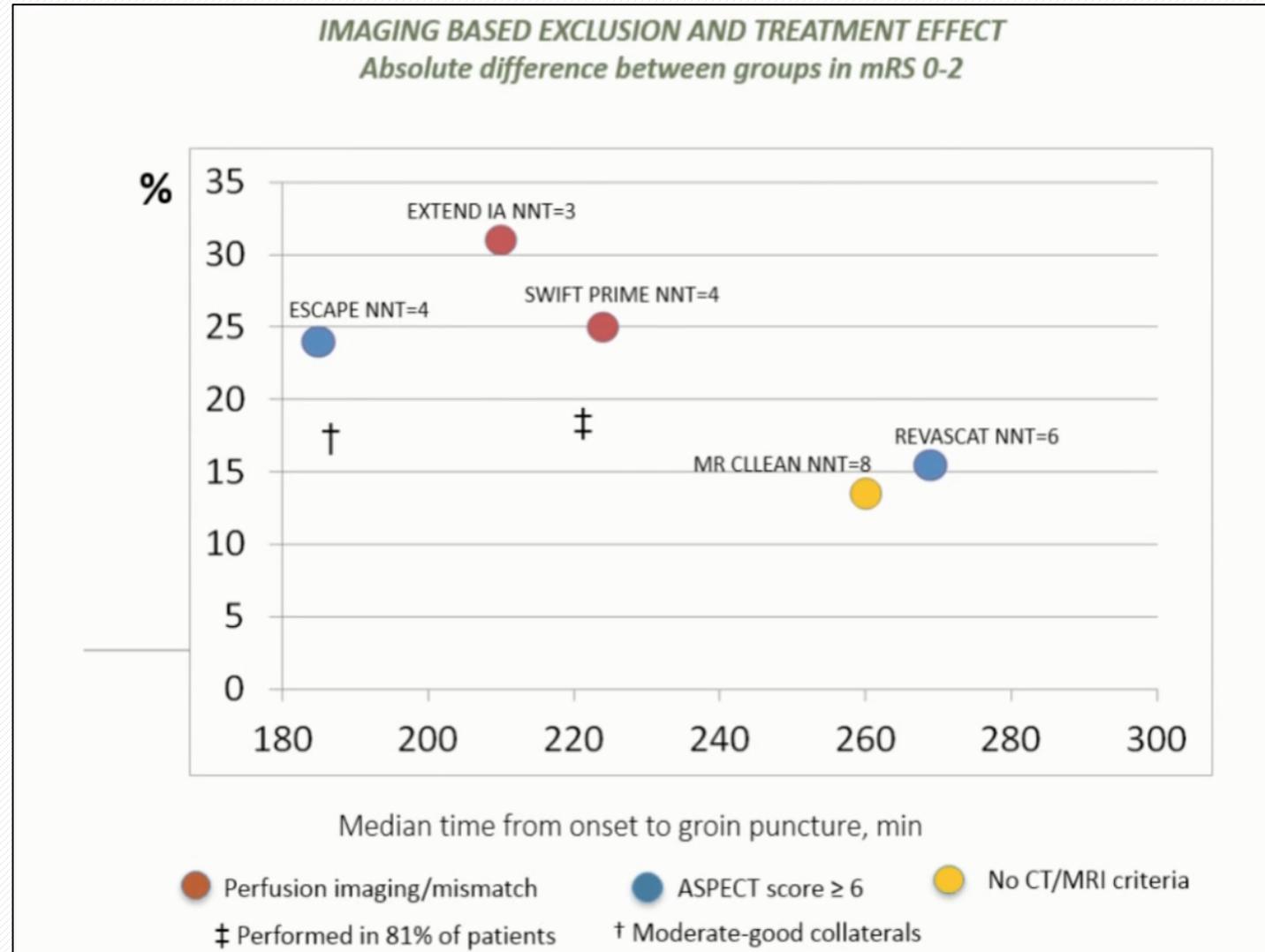
PCT

Perfusion
Status



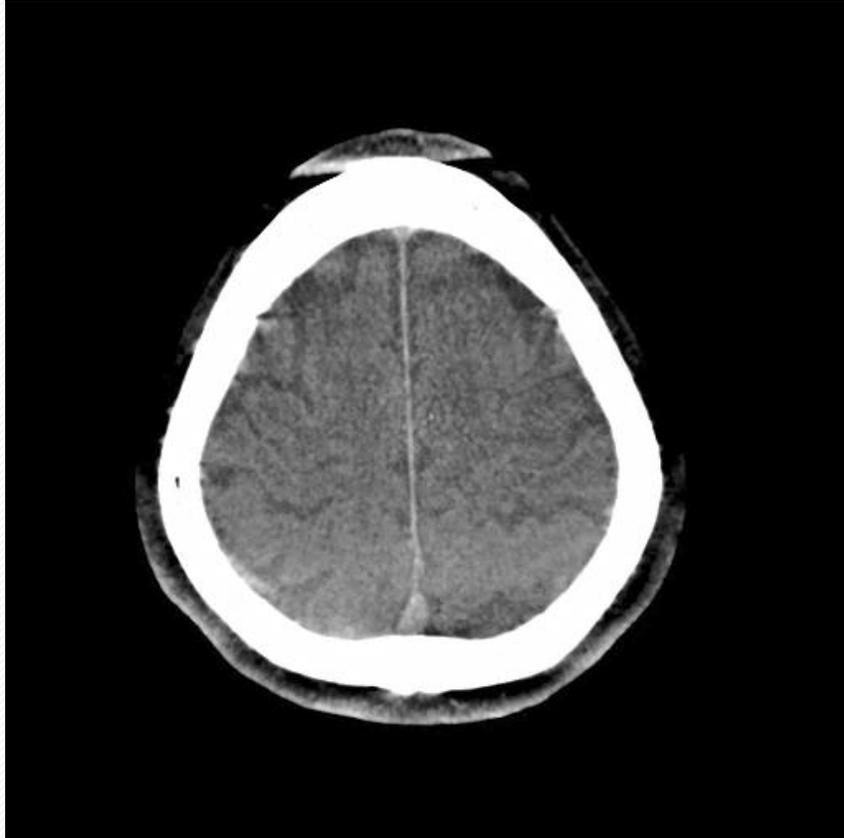
Mismatch

Pas d'imagerie cérébrale avancée dans les 6 premières heures!



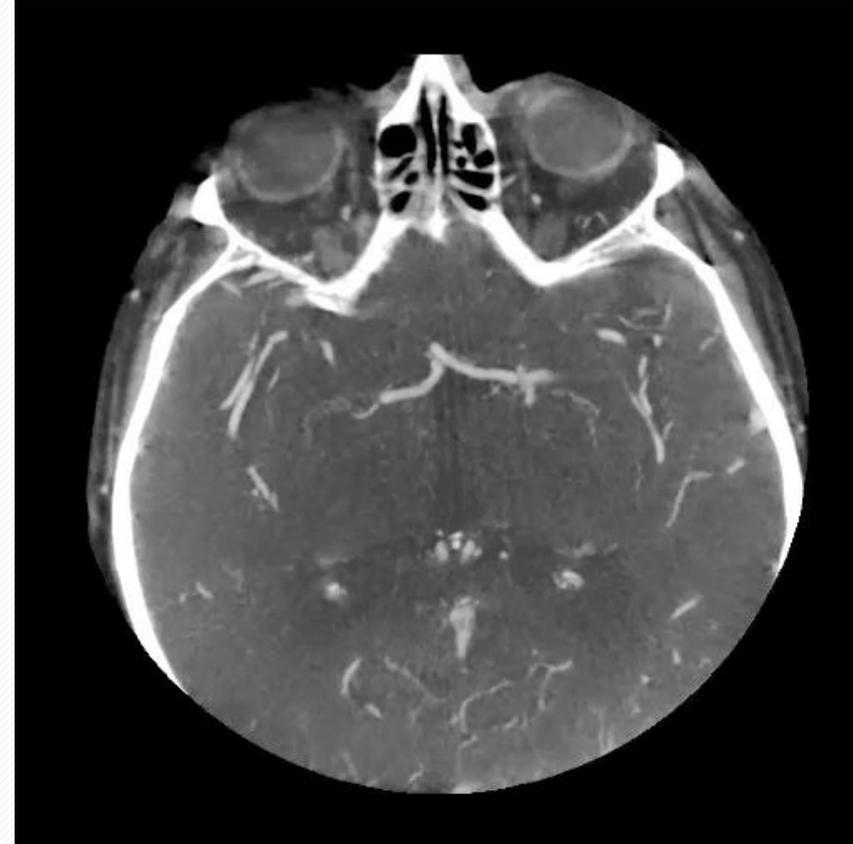
IMAGERIE EN SALLE D'ANGIOGRAPHIE

Non contrast 3DCT HD to rule out hemorrhage



- Optimized for soft tissue visualization
- 13 sec acquisition

IV 3DCT HD to find the occlusion



- Optimized for arterial acquisition
- 7 sec acquisition

Éliminer l'hémorragie sur le CT-FD

Étude internationale sur 12 centres évaluant la non-infériorité du scanner flat-panel vs scanner conventionnel pour la détection d'une hémorragie cérébrale

Patients avec NIHSS ≥ 7 dans les 24h dernière fois vu normal

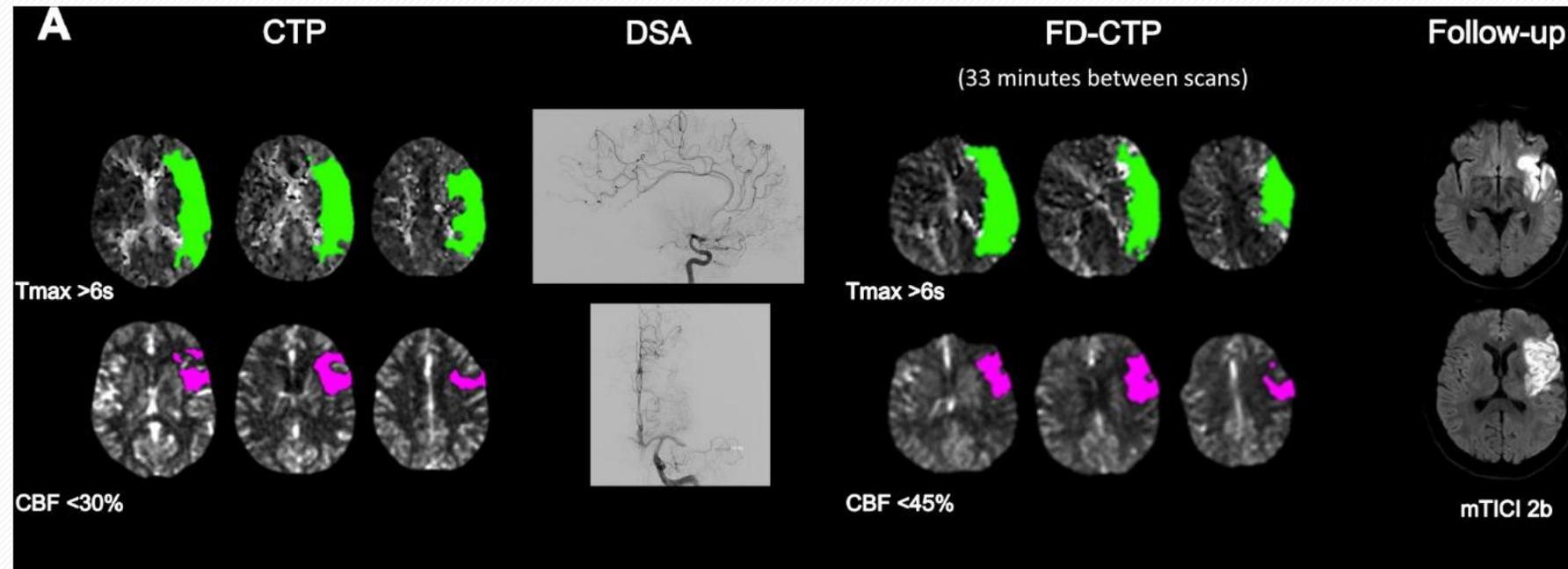
syngo DynaCT Sine Spin
initial imaging before treatment



MDCT follow-up
one day later



Evaluation of time-resolved whole brain flat panel detector perfusion imaging using RAPID ANGIO in patients with acute stroke: comparison with CT perfusion imaging



Bonne corrélation entre le FD-CTP et CTP conventionnel
Possibilité de FD-CTP avant et après thrombectomie

ORIGINAL ARTICLE

Endovascular Therapy for Acute Stroke with a Large Ischemic Region

Critères d'inclusion:

- Age ≥18 ans
- NIHSS ≥6
- mRS pre AVC 0-1
- Occlusion ICA ou M1 (tandem possible)
- ASPECTS 3-5 en IRM ou scanner
- Délai ≤6h ou 6-24h si FLAIR négatif
- Thrombectomie <60min. après randomisation

• Critère de jugement principal: 90-d mRS 0-3

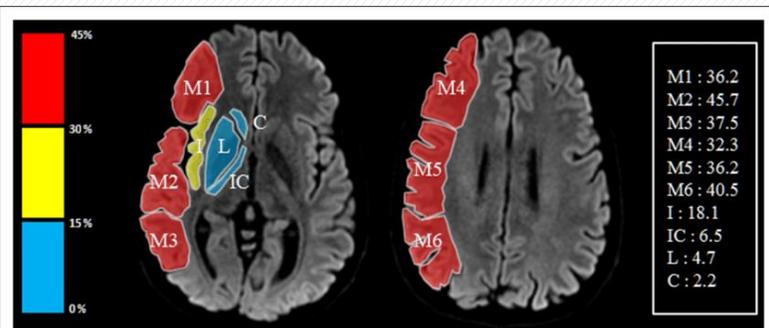
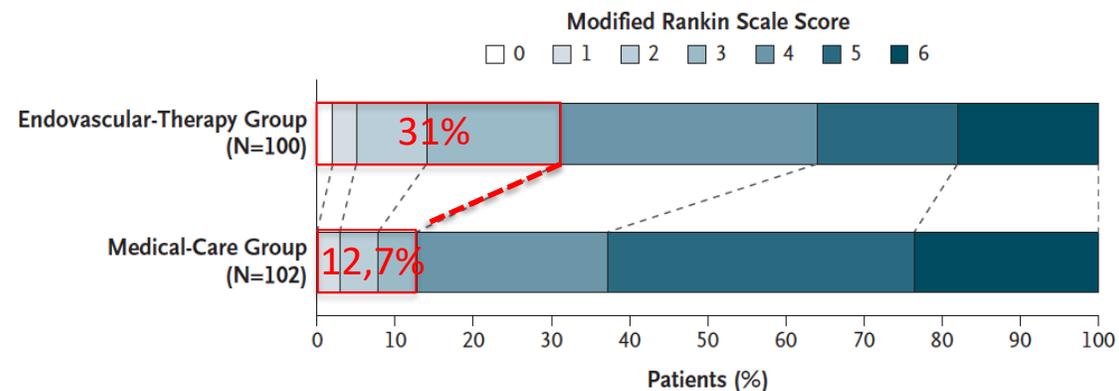


Table 1. Demographic and Clinical Characteristics of the Patients at Baseline.*

Variable	Endovascular-Therapy Group (N=101)	Medical-Care Group (N=102)
Age — yr	76.6±10.0	75.7±10.2
Male sex — no. (%)	55 (54.5)	58 (56.9)
Median modified Rankin scale score before stroke (IQR)†	0 (0–1)	0 (0–1)
Median NIHSS score at baseline (IQR)‡	22 (18–26)	22 (17–26)
Occlusion site — no. (%)§		
Internal carotid artery	47 (46.5)	49 (48.0)
M1 segment	74 (73.3)	70 (68.6)
M2 segment	0	3 (2.9)
Tandem lesion of internal carotid artery and M1 segment of the middle cerebral artery	20 (19.8)	20 (19.6)
Patients with an ASPECTS value based on MRI — no.	88	87
Patients with an ASPECTS value based on CT — no.	13	15
Median infarction volume (IQR) — ml	94 (66–152)	110 (74–140)
Intravenous rt-PA use — no. (%)	27 (26.7)	29 (28.4)

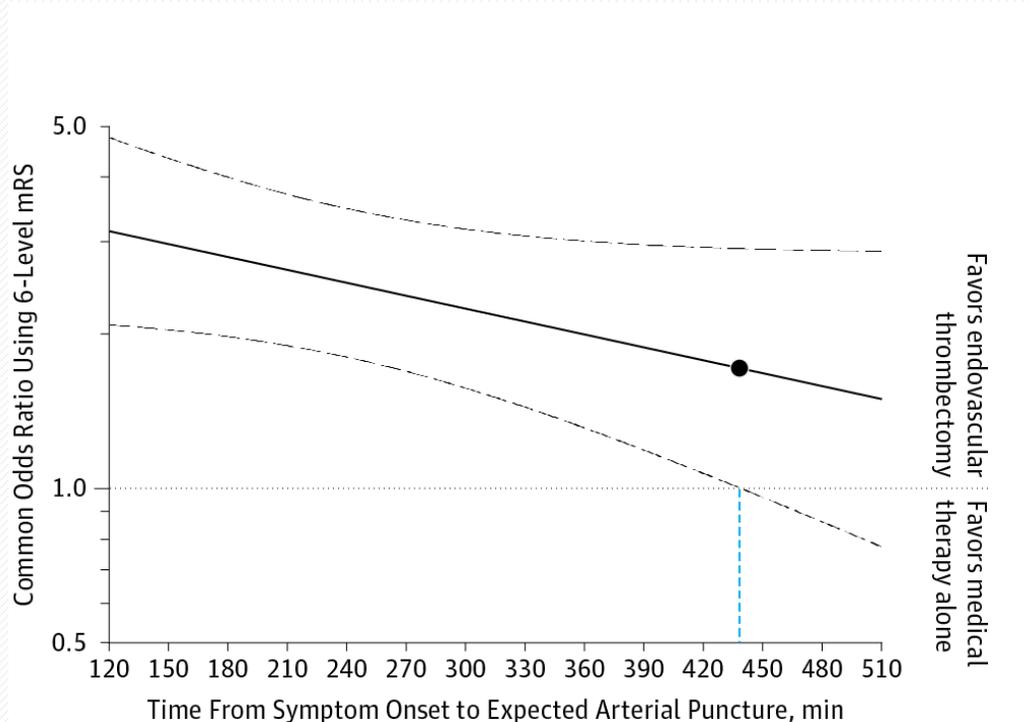


Modified Rankin Scale Score at 90 Days

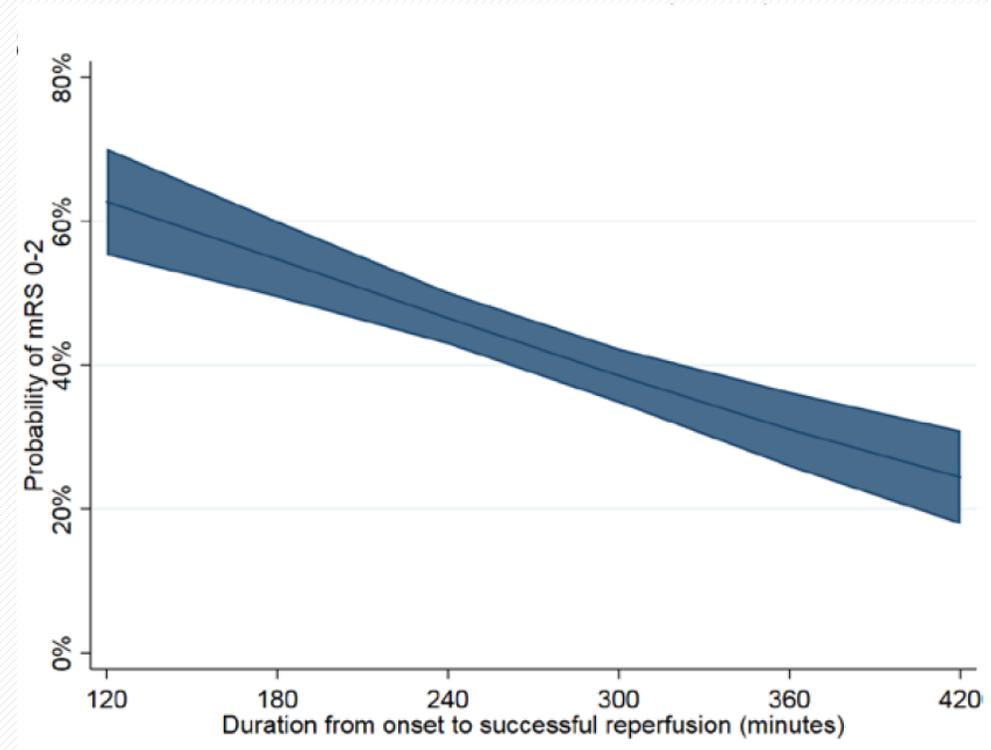
	0	1	2	3	4	5	6
Endovascular-therapy group — no. (%)	2 (2.0)	3 (3.0)	9 (9.0)	17 (17.0)	33 (33.0)	18 (18.0)	18 (18.0)
Medical-care group — no. (%)	0	3 (2.9)	5 (4.9)	5 (4.9)	25 (24.5)	40 (39.2)	24 (23.5)

RR=2.43 (95%CI, 1.35-4.37); P=0.002

CHAQUE MINUTE COMPTE!



Diminution de la probabilité d'une bonne évolution de 5% par heure supplémentaire du délai début des symptômes-reperfusion



Diminution du taux de 90-d mRS 0-2 de 8% par heure supplémentaire du délai début des symptômes-reperfusion



Penumbral imaging and functional outcome in patients with anterior circulation ischaemic stroke treated with endovascular thrombectomy versus medical therapy: a meta-analysis of individual patient-level data

Bruce CV Campbell, Charles B LM Majoie, Gregory W Albers, Bijoy K Menon, Nawaf Yassi, Gagan Sharma, Wim H van Zwam, Robert J van Oostenbrugge, Andrew M Demchuk, Francis Guillemin, Philip White, Antoni Davalos, Aad van der Lugt, Kenneth S Butcher, Aboubakar Cherfi, Henk A Marquering, Geoffrey Goud, Juan M Macho Fernández, Jeremy Madigan, Catherine Oppenheim, Geoffrey A Donnan, Yvo B W E M Roos, Jai Shankar, Hester Lingsma, Alain Bonafé, Hélène Raoult, María Hernández-Pérez, Aditya Bharatha, Reza Jahan, Olav Jansen, Sébastien Richard, Elad I Levy, Olvert A Berkhemer, Marc Soudant, Lucia Aja, Stephen M Davis, Timo Krings, Marie Tisserand, Luis San Román, Alejandro Tomasello, Debbie Beumer, Scott Brown, David S Liebeskind, Serge Brocard*, Keith W Muir*, Diederik W J Dippel*, Mayank Goyal*, Jeffrey L Saver*, Tudor G Jovin*, Michael D Hill*, Peter J Mitchell*, for the HERMES collaborators

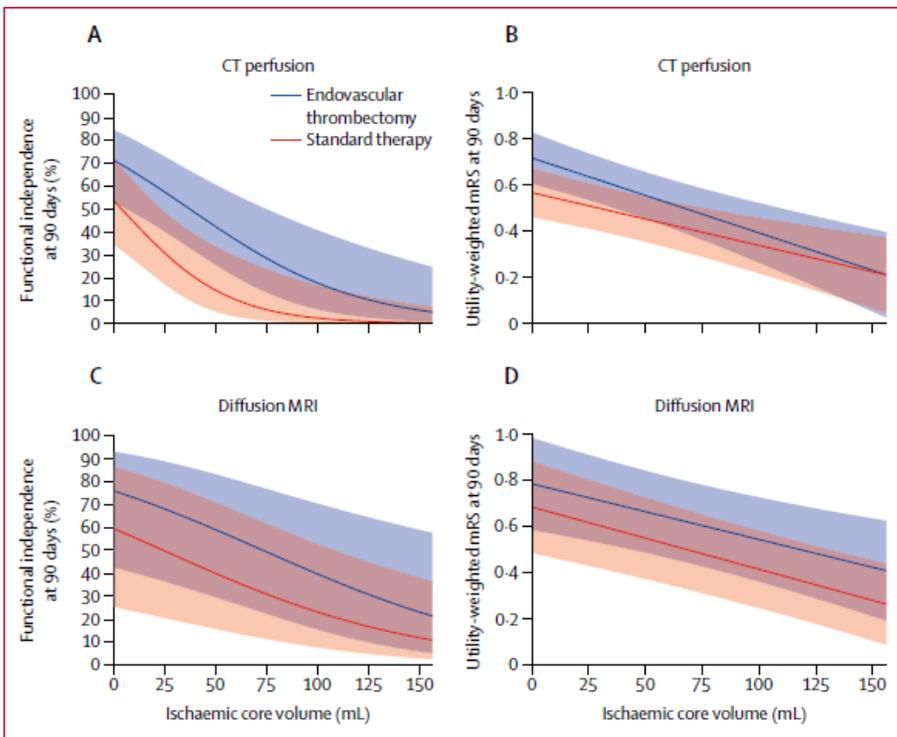


Figure 1: Association of ischaemic core volume with functional outcome

B.C.V. Campbell. Lancet Neurol 2019.

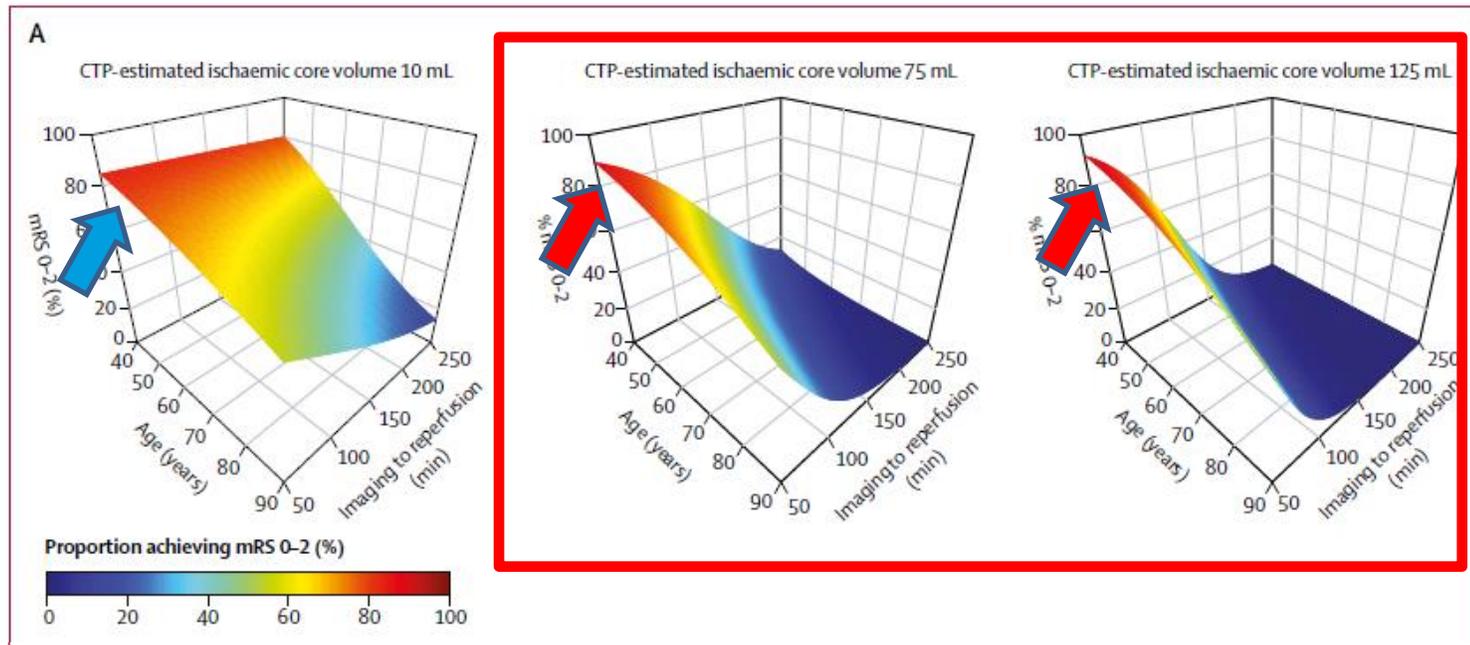


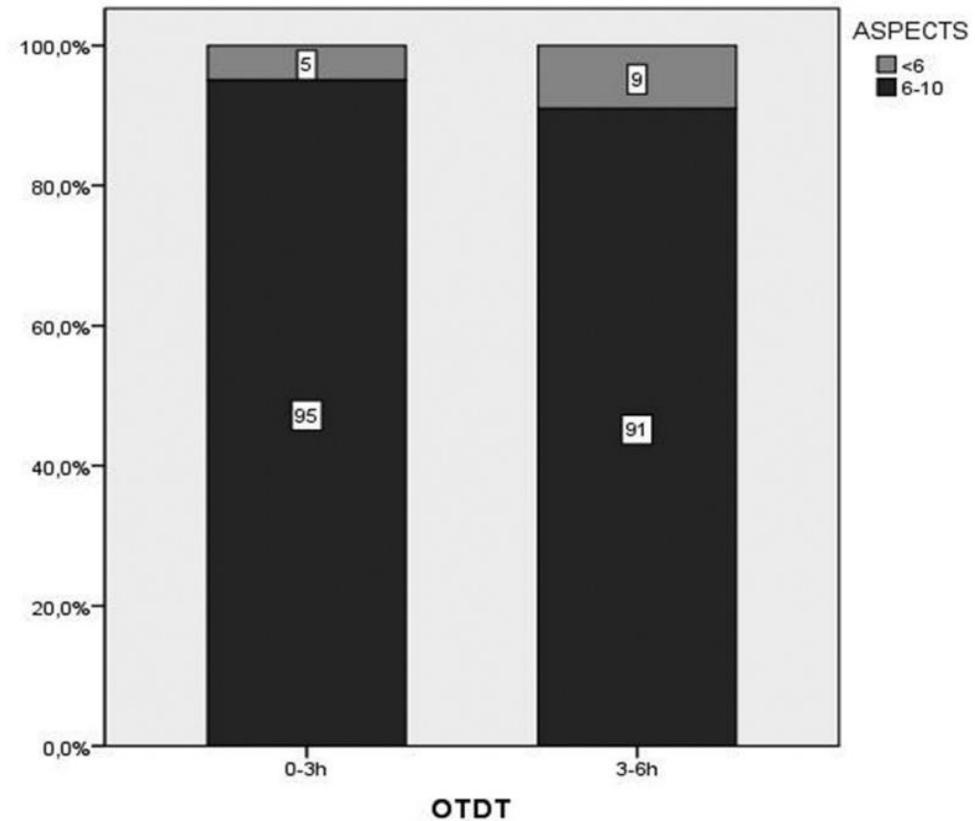
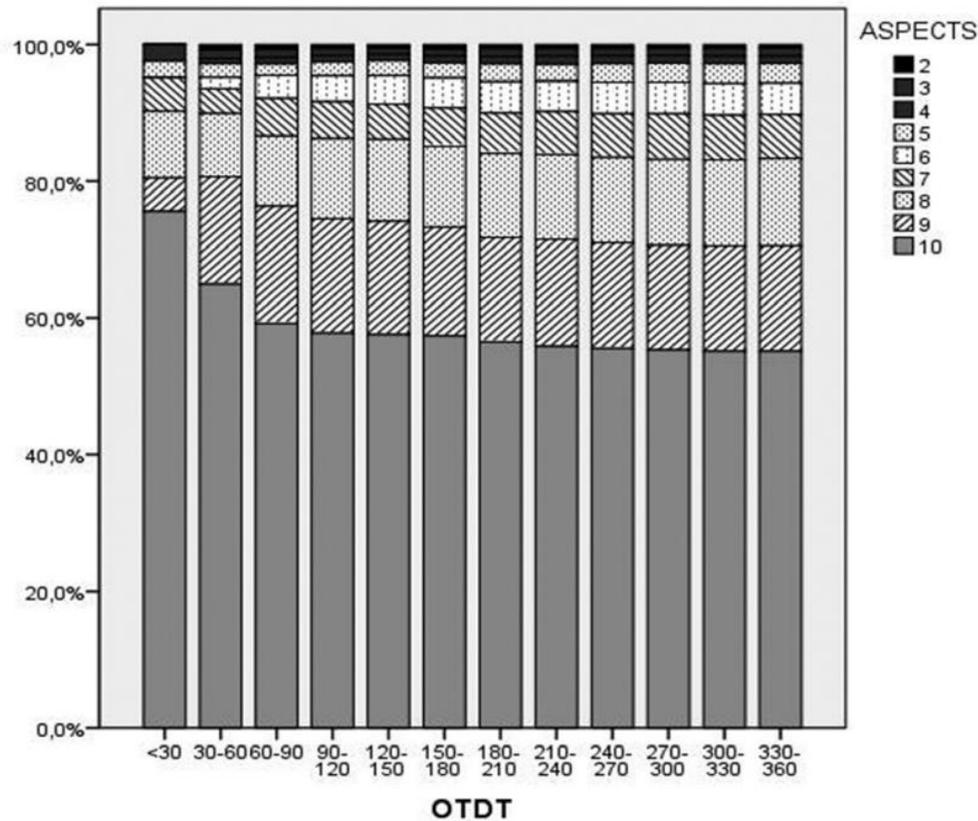
Figure 3: Effect of ischaemic core volume estimated by CT perfusion, age, and imaging-to-reperfusion time on functional outcome in the 186 patients with more than 50% endovascular reperfusion
90-day functional outcome dichotomised at mRS 0-2 (functional independence; A) and mRS 0-3 (B). mRS=modified Rankin Scale.

186 patients inclus dans HERMES avec reperfusion >50%

Predictors of Endovascular Treatment Among Stroke Codes Activated Within 6 Hours From Symptom Onset

Manuel Requena, MD; Natalia Pérez de la Ossa, MD, PhD; Sonia Abilleira, MD, PhD;
 Pere Cardona, MD; Xabier Urrea, MD, PhD; Joan Martí-Fabregas, MD, PhD;
 Anna Rodríguez-Campello, MD; Sandra Boned, MD; Marta Rubiera, MD, PhD;
 Alejandro Tomasello, MD; Carlos A. Molina, MD, PhD; Marc Ribo, MD, PhD;
 for Catalan Stroke Code and Reperfusion Consortium

Alerte AVC sur 18 mois en Catalogne
 Parmi 3944 alertes, 2778 (70%) admis <6h



Diminution du taux de ASPECTS 10 avec le délai symptômes-admission (0-3h, 73.2% vs 3-6h, 57.1%: P<0.01) mais pas du taux de ASPECTS ≥6 et reste >90% jusqu'à 6 heures (0-3h, 95.05% vs. 3-6h, 91.0%: P=0.503).

Patients avec LVO Dans le bras TIV seule

Rapid TIV Administration Improves Functional Outcomes in Patients With Stroke due to Large Vessel Occlusions Meta-Analysis of the Noninterventional Arm From the HERMES Collaboration

Mayank Goyal, MD; Mohammed Almekhlafi, MD, MSc; Diederik W. Dippel, MD;
Bruce C.V. Campbell, MD, PhD; Keith Muir, MD; Andrew M. Demchuk, MD; Serge Bracad, MD;
Antoni Davalos, MD; Francis Guillemin, PhD; Tudor G. Jovin, MD; Bijoy K. Menon, MD, MSc; Peter J.
Mitchell, MD; Scott Brown, PhD; Philip White, MD; Charles B.L.M. Majoie, MD, PhD;
Jeffrey L. Saver, MD; Michael D. Hill, MD, MSc, FRCPC; for the HERMES Collaborators

Stroke 2019

-délai médian admission-TIV:
38 min.

mRS 0-2

Door to TT
30-60 min vs. < 30 min
1 mRS 0-2 pour 5 patients tt

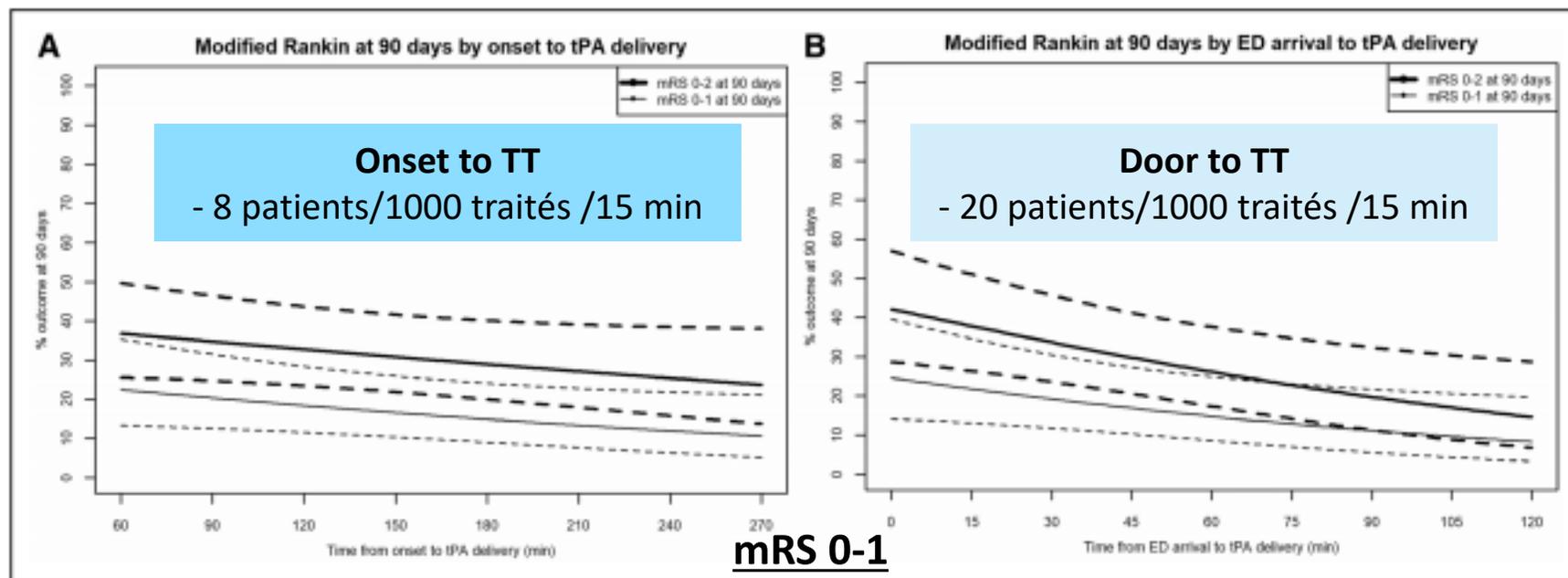
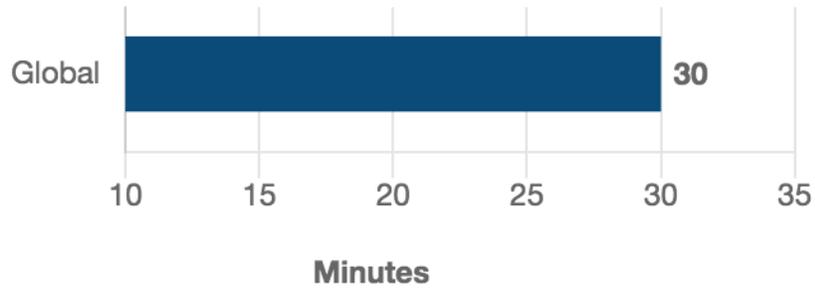
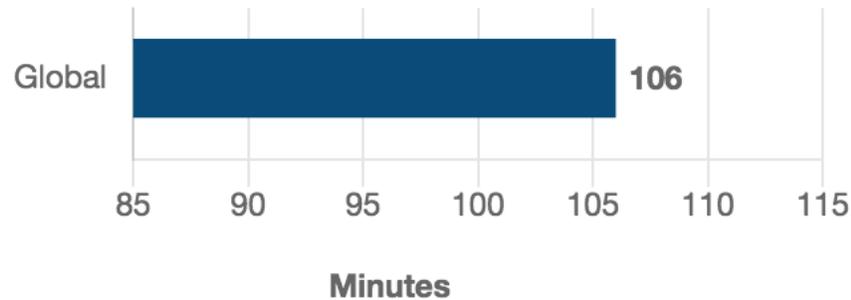


Figure 1. Relationship between onset-to-treatment time (A) and door-to-treatment time (B) with alteplase and the proportion of patients with 90-d functional independence (modified Rankin Scale [mRS], 0–2 in black) and 90-d excellent functional recovery (mRS, 0–1 in red). Curves are adjusted for age, sex, National Institutes of Health Stroke Scale, Alberta Stroke Program Early CT Score, and occlusion location. Curves have a different breadth along the time axis (abscissa), which attenuates the relative steepness of the slope of emergency department (ED)-arrival-to-tPA (tissue-type plasminogen activator)-delivery curve. A 15-min delay in start of alteplase from stroke onset was associated with 8 fewer of 1000 patients with LVO achieving excellent (mRS, 0–1) outcome at 90 d, but the loss of benefit is steeper with a 15-min delay in start of alteplase from ED arrival associated with 20 fewer of 1000 patients with LVO achieving excellent (mRS, 0–1) outcome at 90 d.

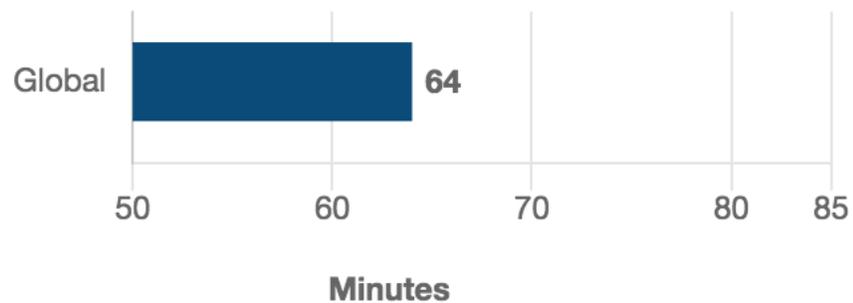
Délais intra-hospitaliers en France en 2022



Délai Admission (Centre UNV+NRI) - Imagerie



Délai Admission (Centre UNV+NRI) – Ponction fémorale



Délai Admission (Centre UNV+NRI) - Thrombolyse

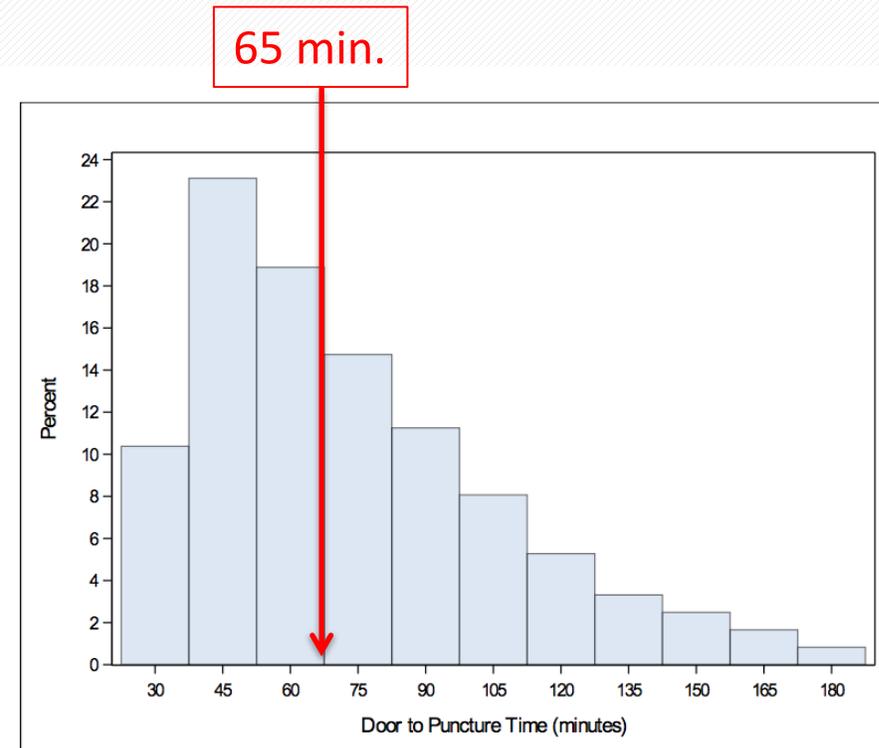
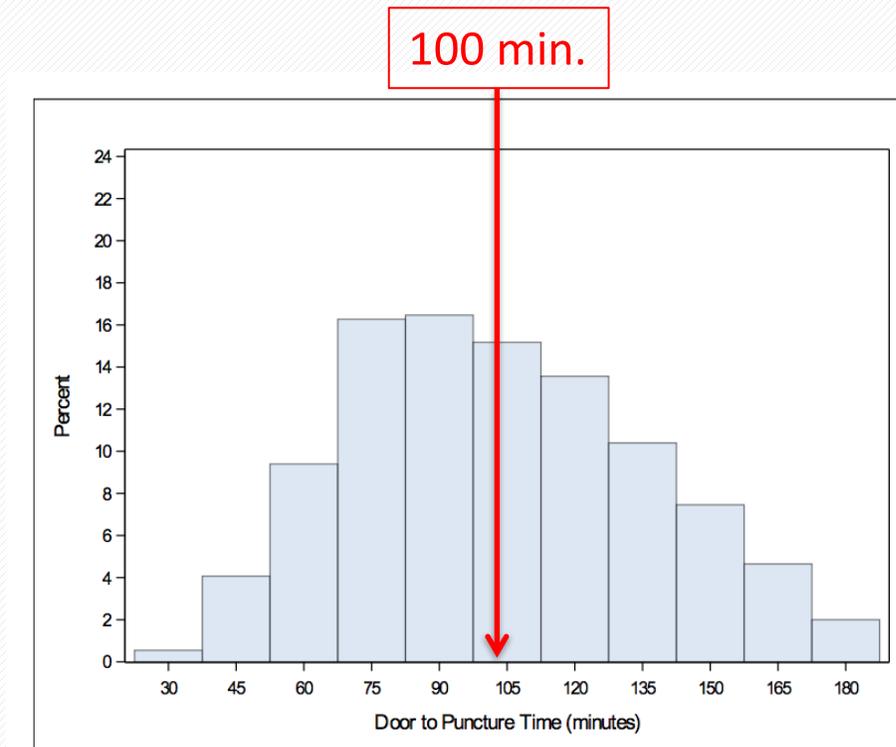
En France, le délai médian entre l'admission et la reperfusion est de 2,5 heures

Délais intra-hospitalier aux USA

Registre national US de Janvier 2015-Décembre 2016

6756 patients avec occlusion proximale traité par TM

Délai <8h



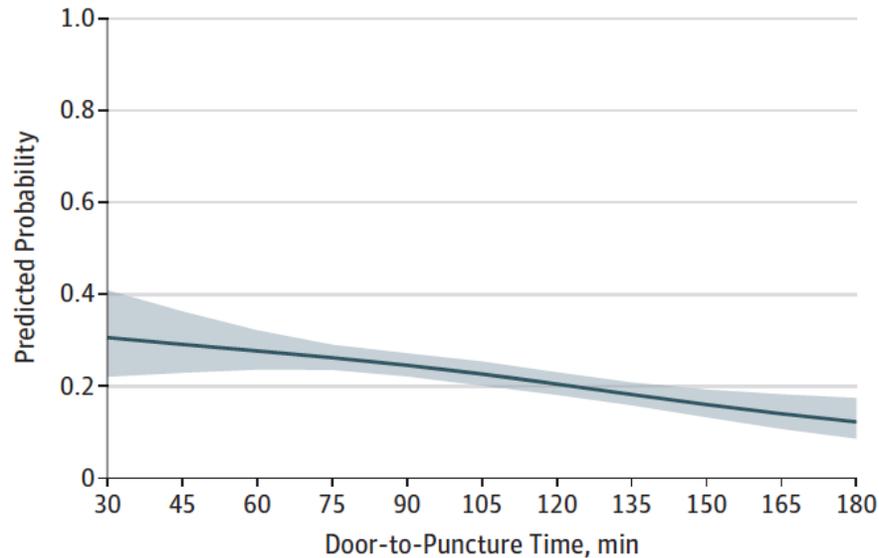
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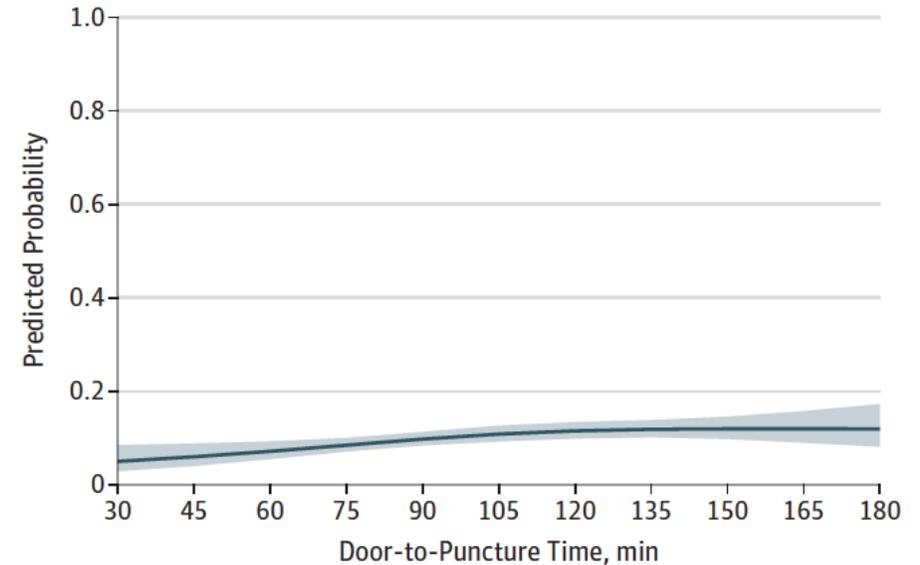
Délai <8h

C Discharge (modified Rankin Scale [mRS], 0-2) by time from emergency department arrival to arterial puncture



No. of events	1	19	64	117	125	80	68	48	35	21	7
No. of patients	11	85	229	400	401	379	323	253	171	107	42

E Mortality by time from emergency department arrival to arterial puncture



No. of events	1	11	23	45	64	59	63	44	29	18	10
No. of patients	17	123	283	498	505	467	413	316	227	143	59

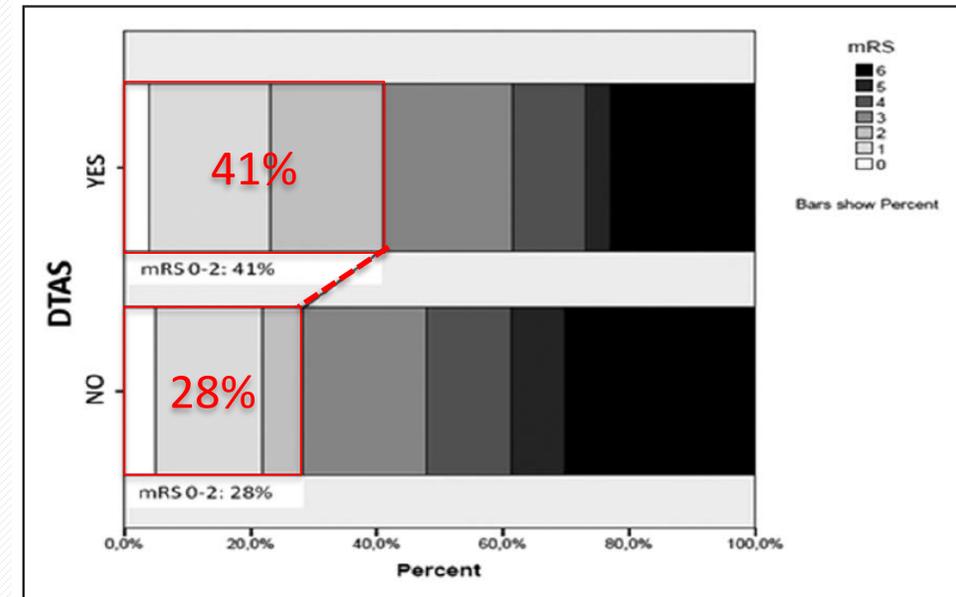
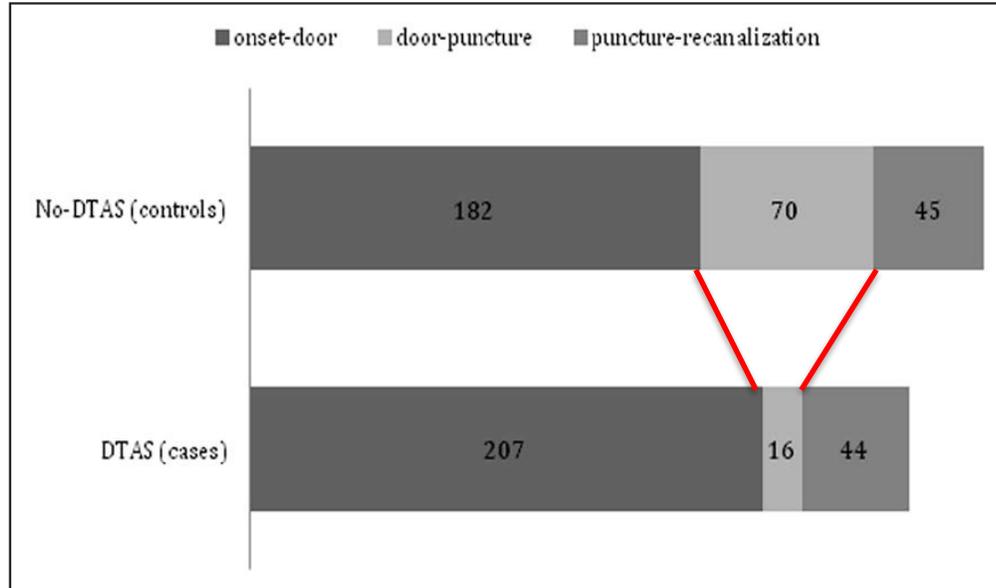
Pour 1000 patients traités, chaque 15 minutes de réduction du délai admission-ponction est associé avec 22 (95% CI, 7-37) patients de plus autonomes et 15 (95%CI, 4-26) patients de moins décédés à la sortie de l'hôpital

Direct Transfer to Angio-Suite to Reduce Workflow Times and Increase Favorable Clinical Outcome

A Case-Control Study

Beatriz Mendez, MD; Manuel Requena, MD; Ana Aires, MD; Nuno Martins, MD;
Sandra Boned, MD; Marta Rubiera, MD, PhD; Alejandro Tomasello, MD; Pilar Coscojuela, MD;
Marián Muchada, MD, PhD; David Rodríguez-Luna, MD, PhD; Noelia Rodríguez-Villatoro, MD;
Jesús Juega, MD; Jorge Pagola, MD, PhD; Carlos A. Molina, MD, PhD; Marc Ribó, MD, PhD

- Étude cas témoin
- 79 admission directe vs. 145 admission conventionnelle
- Indication admission directe:
 - Déficit < 6h
 - RACE Score ≥ 4



Direct Transfer to Angio-Suite Versus Computed Tomography–Transit in Patients Receiving Mechanical Thrombectomy

A Randomized Trial

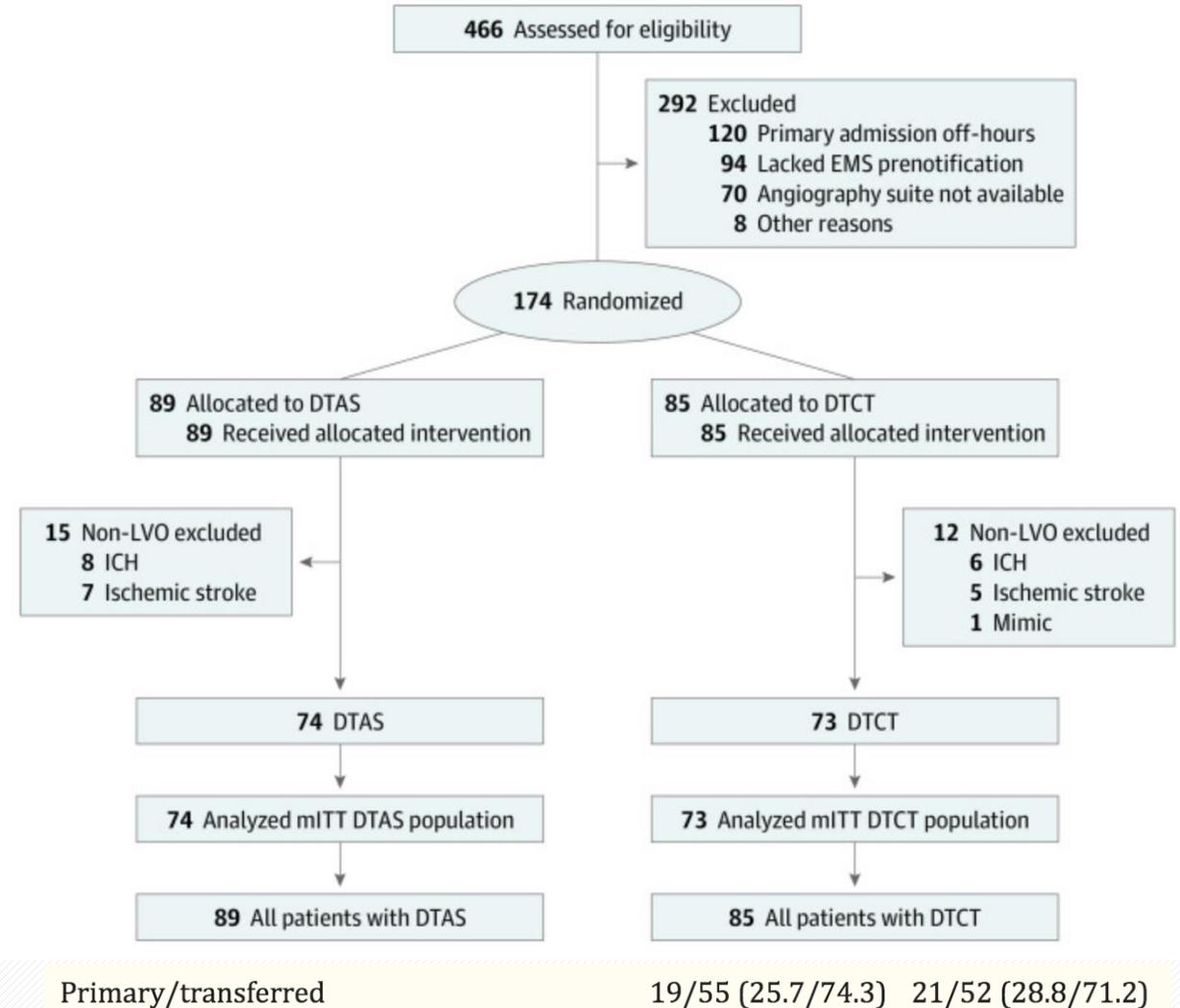
Time Metrics, min	Overall		CT Transit		DTAS		P Value
	n=60		n=34		n=26		
	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	
Hospital admission to stroke imaging	15 (8–22)	15 (14)	12 (7–18)	12 (13)	21 (15–25)	21 (14)	0.007*
Stroke imaging to groin puncture	24 (18–30)	24 (9)	26 (23–32)	27 (8)	19 (15–23)	20 (8)	0.001*
Hospital admission to groin puncture	40 (31–47)	40 (15)	40 (31–48)	39 (13)	41 (30–48)	41 (17)	0.607*
Stroke imaging to first intracranial reperfusion	47 (37–59)	50 (22)	49 (40–59)	53 (24)	40 (36–58)	48 (20)	0.382*
Groin puncture to first intracranial reperfusion	23 (13–33)	26 (21)	21 (11–33)	25 (23)	24 (15–33)	28 (24)	0.617*
Stroke imaging to final angiographic results	57 (49–84)	72 (39)	59 (51–78)	68 (31)	57 (45–92)	77 (47)	0.390*
Hospital admission to final angiographic results	79 (63–96)	88 (39)	78 (58–92)	77 (47)	80 (66–118)	98 (47)	0.067*

Direct to Angiography Suite Without Stopping for Computed Tomography Imaging for Patients With Acute Stroke

A Randomized Clinical Trial

○ Etude ANGIOCAT

- Étude randomisée monocentrique
- Inclusion:
 - ▶ Alerte AVC avec score RACE >4 et
 - ▶ Admission <6h
- Sur 466 patients, 174 suspicions LVO
- 89 DTAS vs 85 conventionnel



Direct to Angiography Suite Without Stopping for Computed Tomography Imaging for Patients With Acute Stroke

A Randomized Clinical Trial

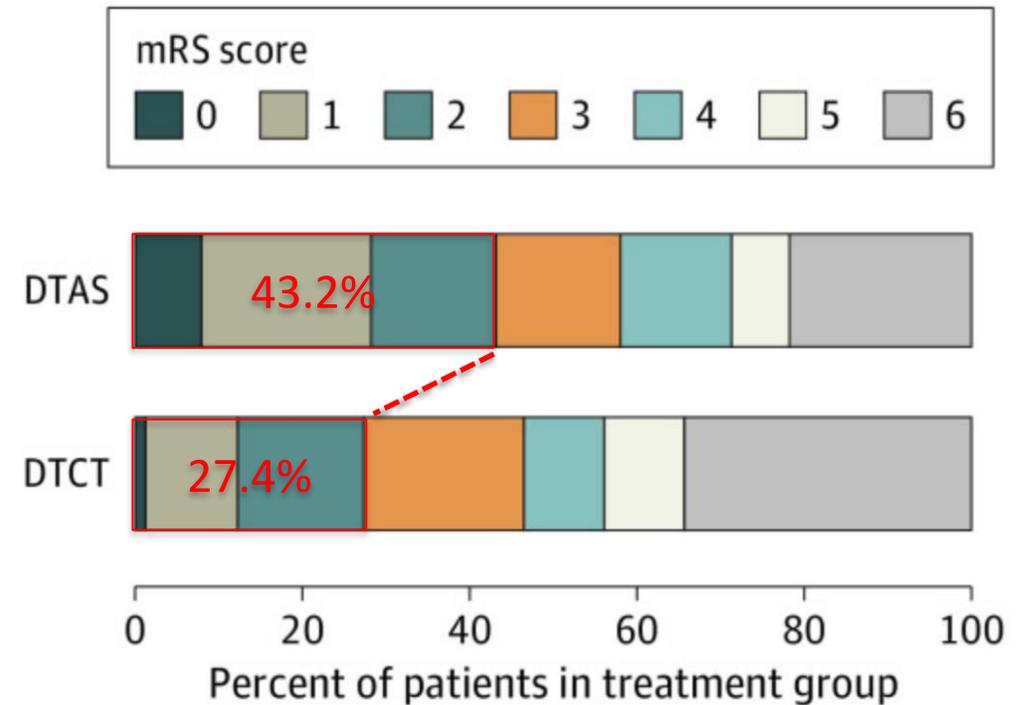
Critère de jugement principal:

Shift mRS: adjusted common OR of improvement of 1 point on the mRS 2.2 (P=.009)

Median door-puncture 18 vs. 42 min.

Median door-reperfusion 57 vs. 84 min.

sICH 1.2% vs 3.8%





ÉTUDE DIRECT-ANGIO



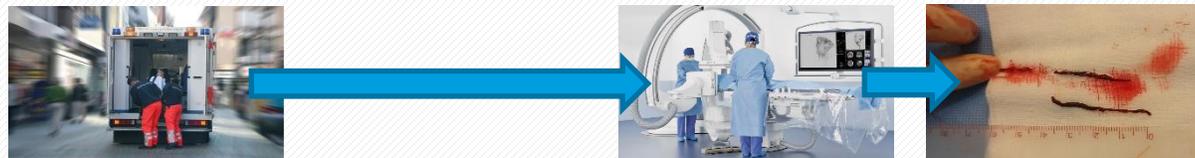
ETUDE DIRECT ANGIO

Design: Compare two admission strategies:

1. Conventional admission (MRI/CT diagnostic room)



2. Direct admission in thrombectomy room



Decreased time

CARACTÉRISTIQUES DE L'ÉTUDE

○ Type d'étude:

- ▶ Etude **prospective, multicentrique, ouverte, randomisée en 2 bras parallèles**, avec **évaluation indépendante, centralisée** et en **aveugle du critère de jugement principal** et avec une **analyse médico-économique** (analyse en termes de coûts évités)

○ Durées:

- ▶ Durée des inclusions: 48 mois
- ▶ Durée du suivi: 12 mois \pm 30 jours
- ▶ Durée totale: 60 mois \pm 30 jours

○ Nombre de patients prévus :

- ▶ **208 patients**

○ 2 groupes de patients

(rando stratifiée sur délai arrivée $<2h30$ ou $\geq 2h30$)

Groupe contrôle

Patients admis au service d'imagerie puis secondairement transférés en salle de thrombectomie (prise en charge conventionnelle)

Groupe expérimental

Patients admis directement en salle de thrombectomie

OBJECTIFS ET CRITÈRES D'INCLUSION

○ Objectif principal:

- ▶ **Comparer le taux de patients autonomes à 3 mois (± 15 jours)** entre la stratégie d'admission directe en salle de thrombectomie par rapport à l'admission conventionnelle chez des patients présentant une suspicion d'infarctus cérébral sévère par occlusion d'une artère de large calibre de la circulation antérieure.

○ Critères d'inclusion:

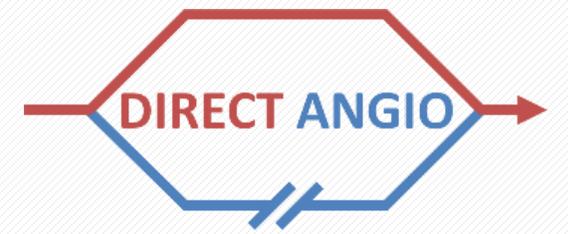
- ▶ $18 \leq \text{âge} \leq 85$ ans
- ▶ mRS 0-2 avant AVC
- ▶ Admission primaire dans le centre participant ≤ 5 heures du début des symptômes
- ▶ Déficit neurologique aigu et sévère définit par :

- Déficit moteur unilatéral défini par un **score total ≥ 5**
 - Paralysie faciale (item 4 du score NIHSS de 0 à 2)
 - Membres supérieurs (item 5 du score NIHSS de 0 à 4)
 - Membres inférieurs (item 6 du score NIHSS de 0 à 4)

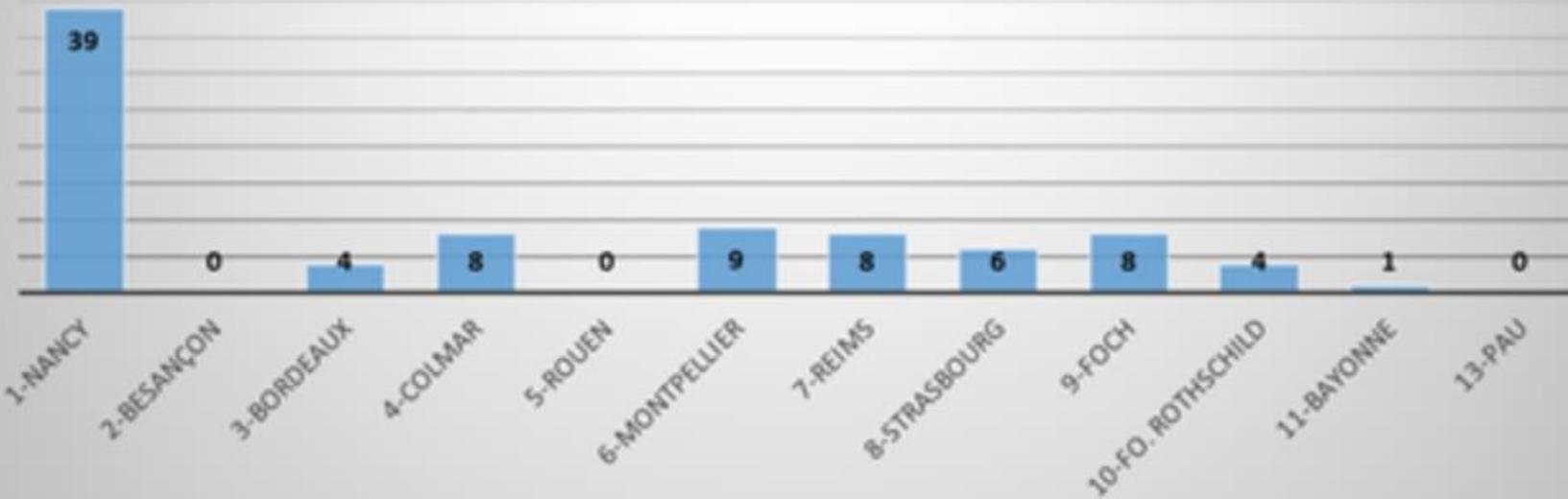
ET

- Signe d'atteinte corticale définie par **score total ≥ 1**
 - Langage (item 9 du score NIHSS de 0 à 3)
 - Négligence (item 11 du score NIHSS de 0 à 2)
- ▶ Disponibilité de la salle de thrombectomie et de l'équipe au moment de la randomisation

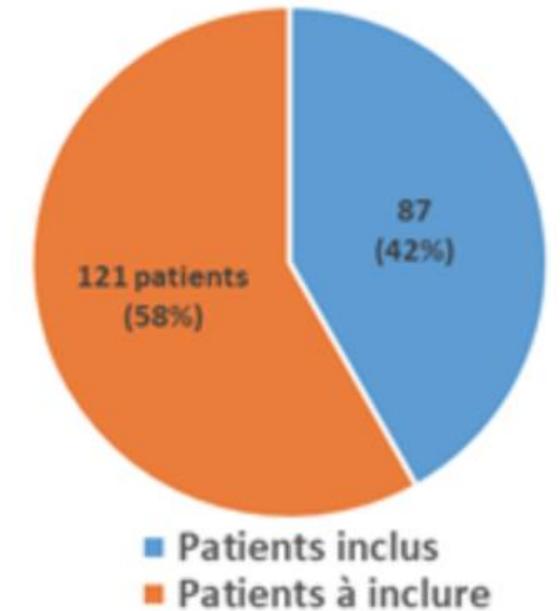
Inclusions au 15.09.2022



Inclusions par centre (centres ouverts)



Inclusions totales



Etude WE-TRUST



Critères d'inclusion:

- Age ≥ 18 ans
- NIHSS ≥ 10
- mRS pre AVC 0-2
- **Admission primaire** dans les 6 heures depuis la dernière fois vu normal
- **Transfert** inter-hospitalier

Critère de jugement principal:

Distribution mRS à 90 jours

