

AER 2019



AER

ACTUALITÉS EN RÉANIMATION

25^{ème} AER : 19 & 20 novembre 2020

AVC ISCHÉMIQUE GRAVE: STRATÉGIE DE REVASCULARISATION

Service de Neuroradiologie Interventionnelle
Fondation Ophtalmologique de Rothschild
Paris

MIKAEL MAZIGHI

Unité de Soins Intensifs NeuroVasculaire
Hôpital Lariboisière
Paris

INSERM U 1148: Laboratory of Vascular Biology Translational Science
Paris

Liens d'intérêts

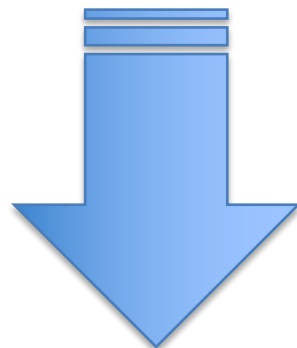
- Bourses¹, présentations², consultant³, congrès⁴, autres⁵:
 - Fondation AVC¹
 - Fondation Avenir¹
 - Boehringer^{3,4}
 - Medtronic^{2,4}
 - Acticor³
 - Amgen²

**European Stroke Organisation
(ESO) – European Society for
Minimally Invasive Neurological Therapy
(ESMINT) guidelines on mechanical
thrombectomy in acute ischaemic stroke**

European Stroke Journal
0(0) 1–47
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SAGE

Endorsed by Stroke Alliance for Europe (SAFE)

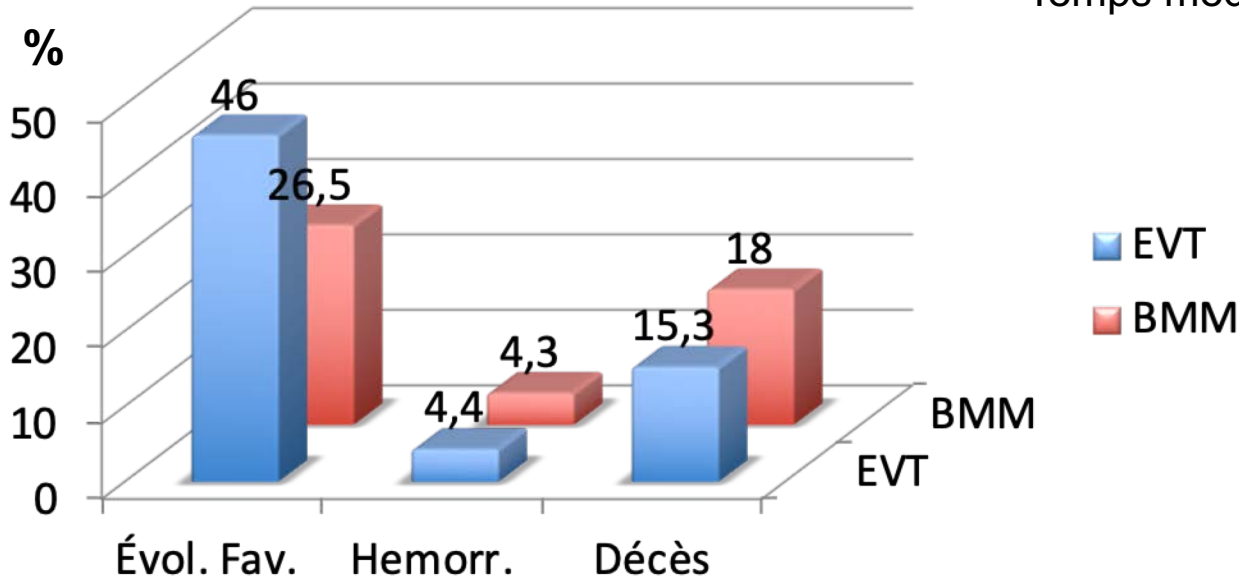
AVC ischémique+ Occlusion Artérielle Proximale



ALTEPLASE IV+ THROMBECTOMIE

THROMBECTOMIE À LA PHASE AIGUE

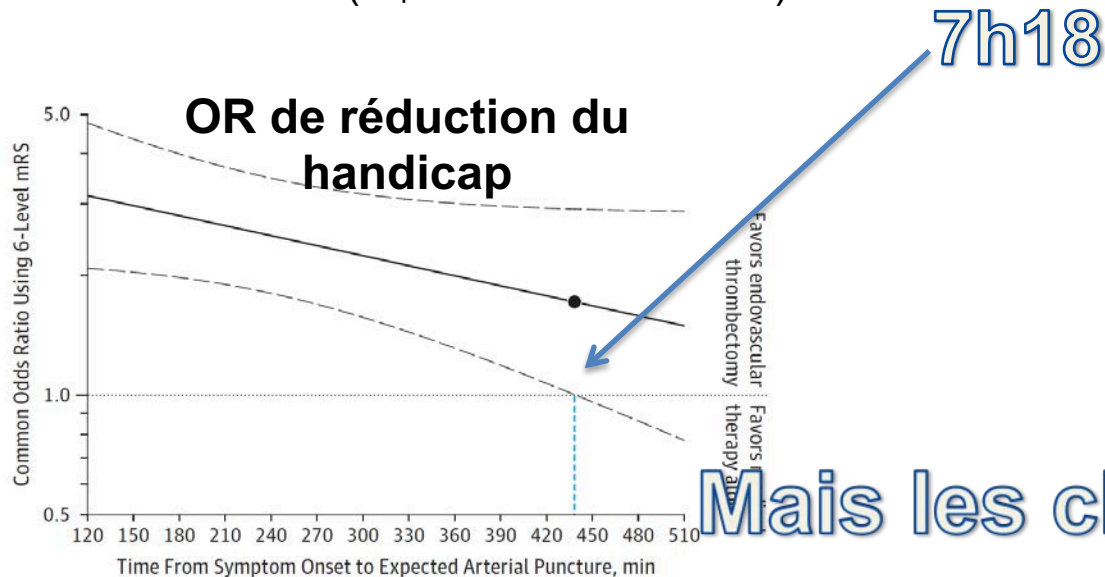
- 1287 patients (634 thrombectomie, 653 controles)
- Réduction handicap OR 2.49 (95% CI 1.76–3.53; p<0.0001)
 - **NNT: 2.6**
- Temps médian de reperfusion : 3 h 16 min



MR CLEAN
REVASCAT
SWIFT PRIME
ESCAPE
EXTEND IA

FENÊTRE THÉRAPEUTIQUE : 6 HEURES...

- >80% patients traités dans les 6 h
- SWIFT PRIME, EXTEND-IA, MR Clean: 6h
- REVASCAT: 8h (22 patients -21.4%- traités \geq 6 h)
- ESCAPE: 12h (49 patients -15.5%- traités \geq 6 h)



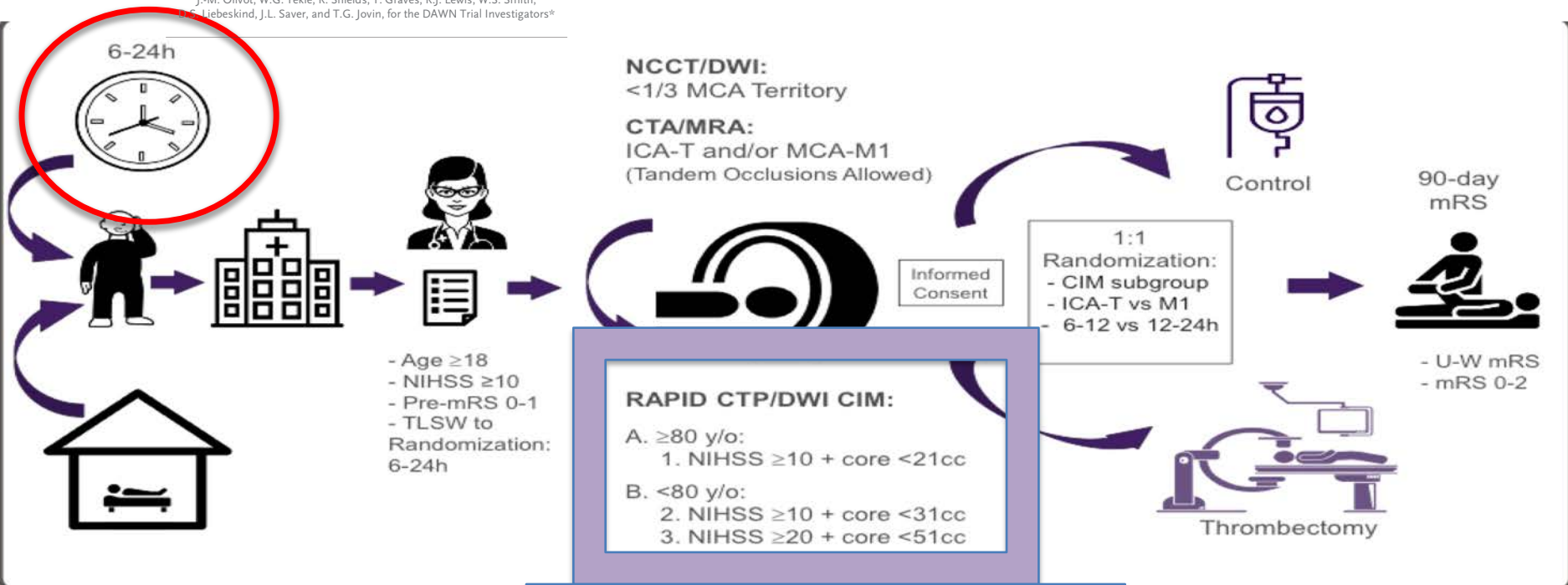
Mais les choses changent...



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

R.G. Nogueira, A.P. Jadhav, D.C. Haussen, A. Bonafe, R.F. Budzik, P. Bhuva, D.R. Yavagal, M. Ribo, C. Cognard, R.A. Hanel, C.A. Sila, A.E. Hassan, M. Millan, E.I. Levy, P. Mitchell, M. Chen, J.D. English, Q.A. Shah, F.L. Silver, V.M. Pereira, B.P. Mehta, B.W. Baxter, M.G. Abraham, P. Cardona, E. Veznedaroglu, F.R. Hellinger, L. Feng, J.F. Kirmani, D.K. Lopes, B.T. Jankowitz, M.R. Frankel, V. Costalat, N.A. Vora, A.J. Yoo, A.M. Malik, A.J. Furlan, M. Rubiera, A. Aghaebrahim, J.-M. Olivrot, W.G. Tekle, R. Shields, T. Graves, R.J. Lewis, W.S. Smith, P.S. Liebeskind, J.L. Saver, and T.G. Jovin, for the DAWN Trial Investigators*

This article was published on November 11, 2017, at NEJM.org.



SELECTION EN IMAGERIE

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

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63% AVC
réveil

47% AVC
réveil

POPULATION
TRÈS
SÉLECTIONNÉE

| | THROMBECTOMIE N=107 | CONTRÔLE N=99 | Treatment benefit (95% CI) |
|-------------------------|------------------------|------------------|----------------------------------|
| mRS pondéré à 3 mois | 5.5 ± 3.8 | 3.4 ± 3.1 | 2.1 (1.20, 3.12) |
| AUTONOMIE À 3 MOIS | 48.6% | 13.1% | 35.5% (23.9%, 47.0%) |

Évolution
Favorable

NNT: 2

PAS D'EFFET
SUR LA
MORTALITÉ

ORIGINAL ARTICLE

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

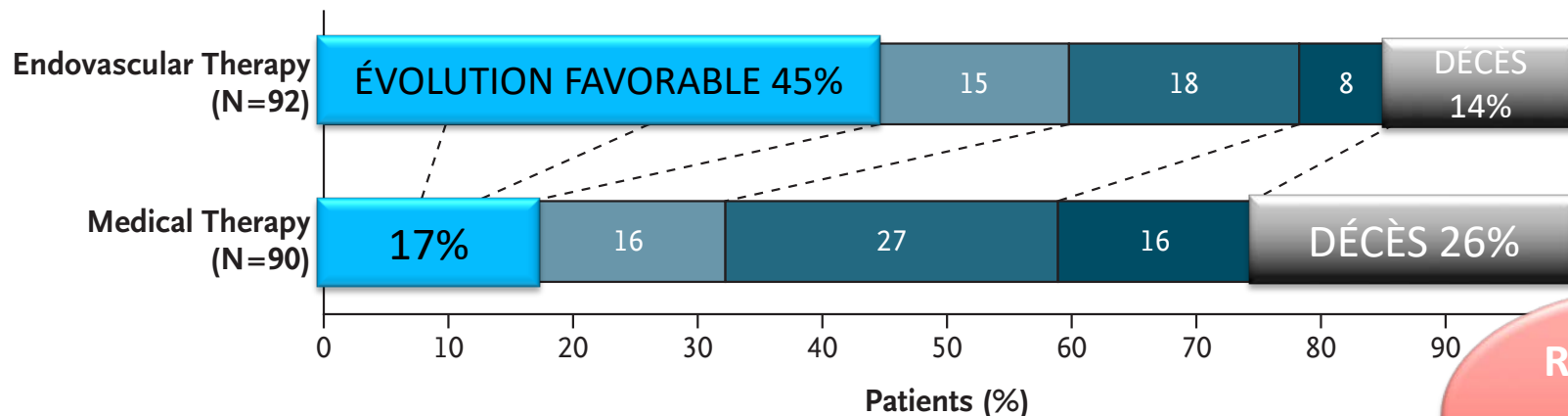
G.W. Albers, M.P. Marks, S. Kemp, S. Christensen, J.P. Tsai, S. Ortega-Gutierrez, R.A. McTaggart, M.T. Torbey, M. Kim-Tenser, T. Leslie-Mazwi, A. Sarraj, S.E. Kasner, S.A. Ansari, S.D. Yeatts, S. Hamilton, M. Mlynash, J.J. Heit, G. Zaharchuk, S. Kim, J. Carrozzella, Y.Y. Palesch, A.M. Demchuk, R. Bammer, P.W. Lavori, J.P. Broderick, and M.G. Lansberg, for the DEFUSE 3 Investigators*

This article was published on January 24, 2018, at NEJM.org.

AVC vol < 70 cc,
vol pénombre/AVC > 1.8

Score on Modified Rankin Scale

0 1 2 3 4 5 6



RÉDUCTION DE LA MORTALITÉ

AHA/ASA Guideline

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

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Reviewed for evidence-based integrity and endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons

In selected patients with AIS within 6 to 16 hours of last known normal who have LVO in the anterior circulation and meet other DAWN or DEFUSE 3 eligibility criteria, mechanical thrombectomy is recommended.

I

A

In selected patients with AIS within 6 to 24 hours of last known normal who have LVO in the anterior circulation and meet other DAWN eligibility criteria, mechanical thrombectomy is reasonable.

IIa

B-R

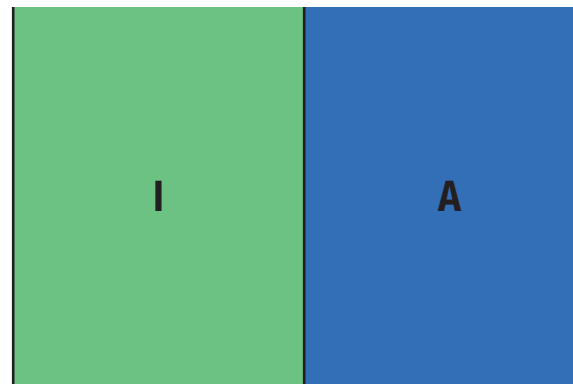
AHA/ASA Guideline

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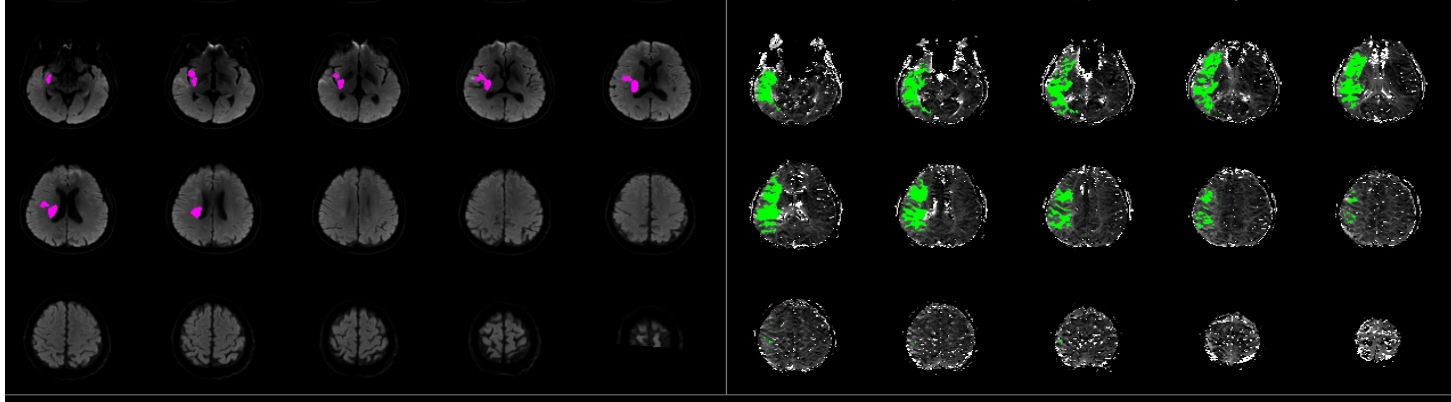
In selected patients with AIS within **6 to 24 hours** of last known normal who have **LVO in the anterior circulation**, obtaining **CTP, DW-MRI, or MRI perfusion** is recommended to aid in patient selection for mechanical thrombectomy, but only when imaging and other eligibility criteria from RCTs showing benefit are being strictly applied in selecting patients for mechanical thrombectomy.



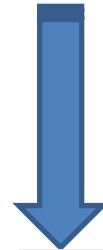
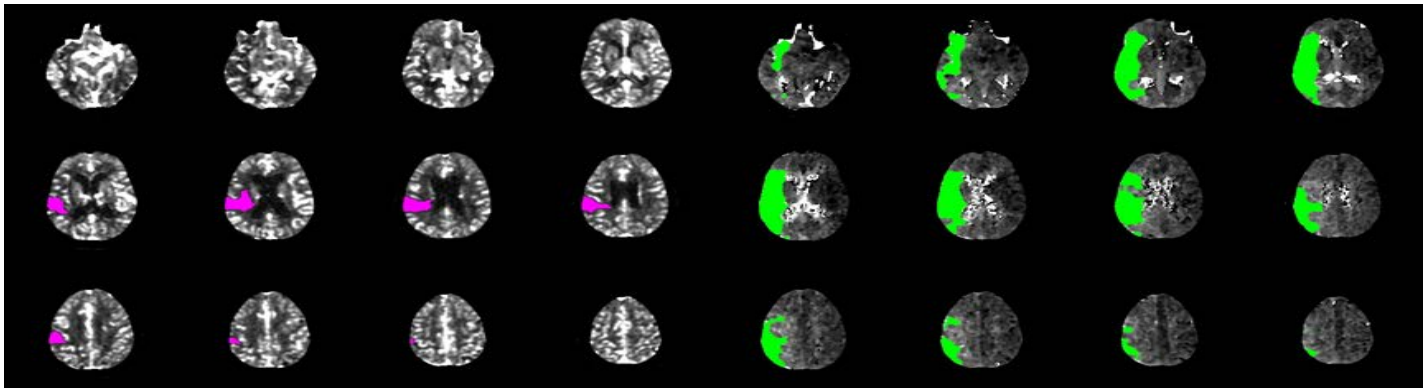
IMAGERIE de Perfusion

IRM

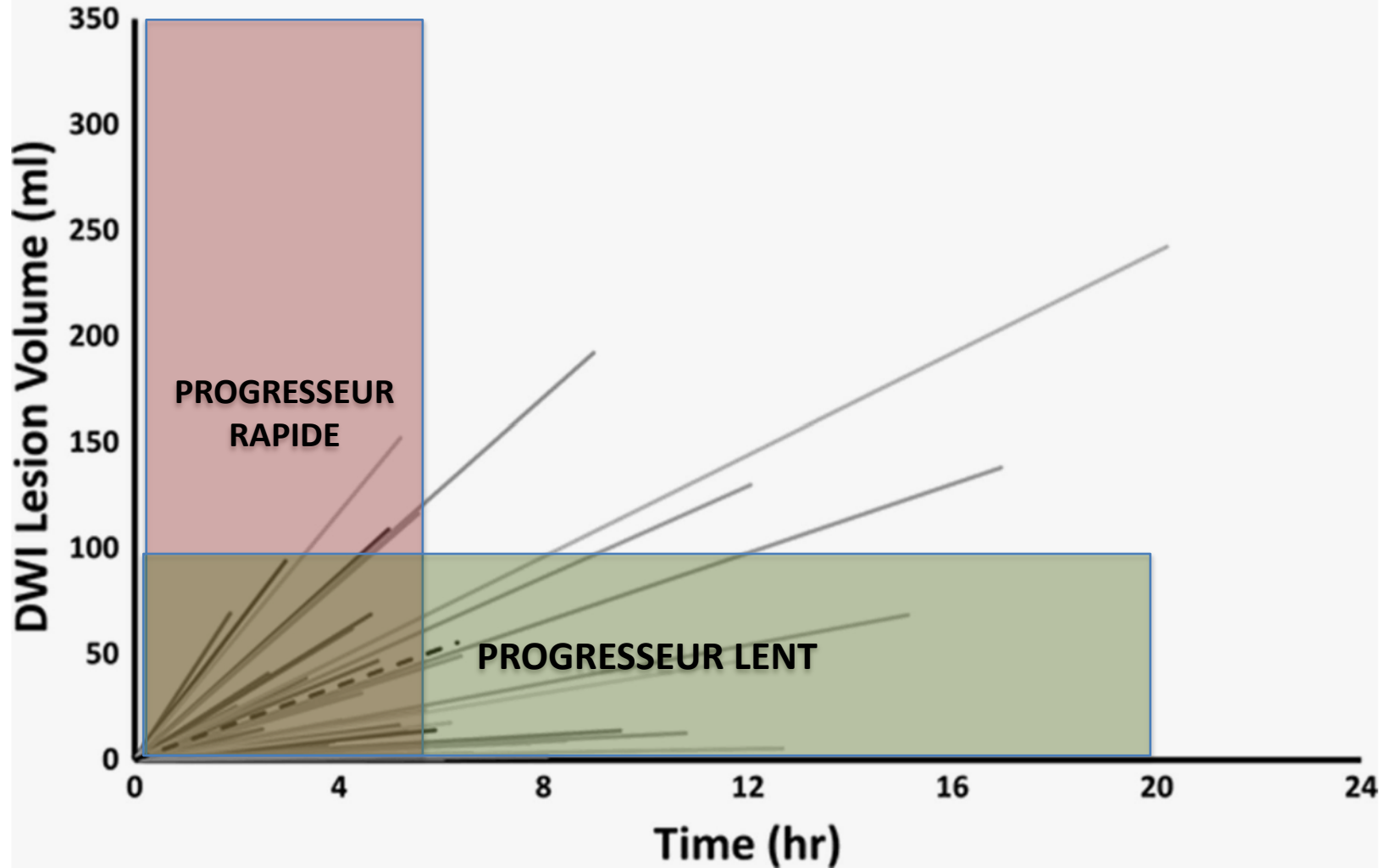
LOGICIEL ISCHEMAVIEW : RAPID™



Scanner



Linear Model of Infarct Growth



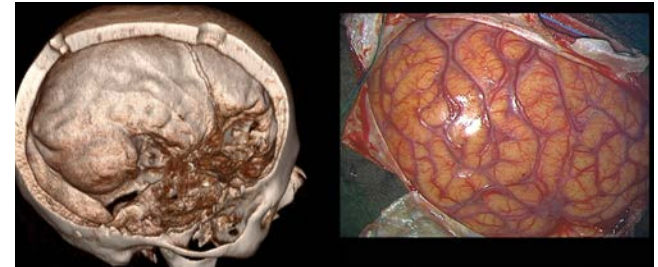
THROMBECTOMIE ET CRANIECTOMIE

- Enquête nationale US
- 519 320 patients avec AVC
 - 2012-2014 (92 320) versus 2015-2016 (129 340)
- Craniectomie 9.5% des patients œdème malin (n=33 530)
 - SSR (65%)
 - Mortalité (23%)

**THROMBECTOMIE
RÉDUIT DE 43% LE
NOMBRE DE
CRANIECTOMIE**
OR: 0.7; 95% CI, 0.6-0.9)

**THROMBECTOMIE
DE 3,4% à 9,8%**

**CRANIECTOMIE DE
11,4% à 4,8%**

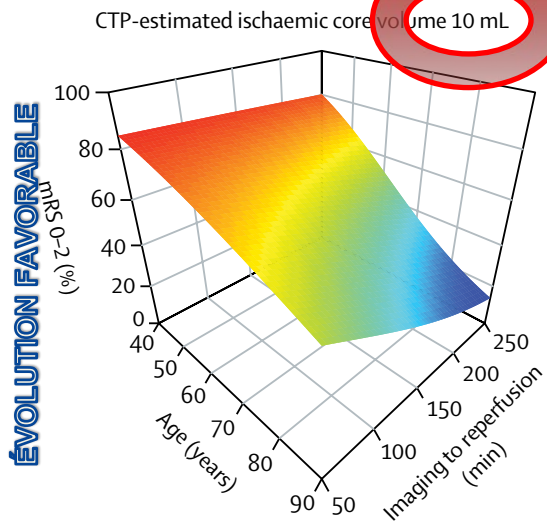


Penumbra imaging and functional outcome in patients with anterior circulation ischaemic stroke treated with endovascular thrombectomy versus medical therapy: a meta-analysis of individual patient-level data

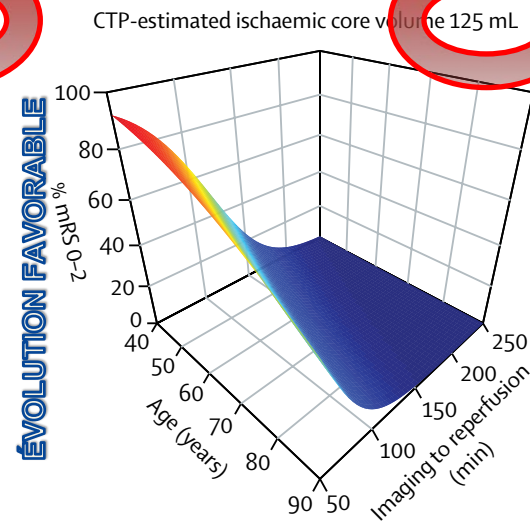
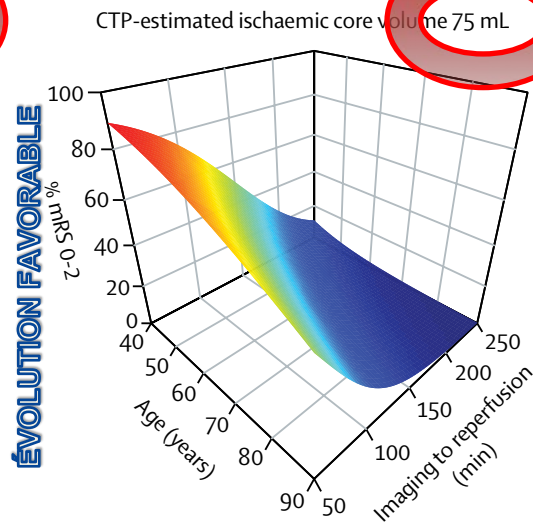
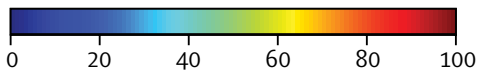
Lancet Neurol 2018

IMPACT DU VOLUME

Bruce CV Campbell, Charles B L M 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 Dávalos, Aad van der Lugt, Kenneth S Butcher, Aboubaker Cherif, Henk A Marquering, Geoffrey Cloud, 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 Tomasella, Debbie Beumer, Scott Brown, David S Liebeskind, Serge Bracad*, 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



Proportion achieving mRS 0-2 (%)



1764 patients

99% imagerie dans les 6 heures

➤ Augmentation du volume associée au pronostic

Expert opinion

Expert opinion on mechanical thrombectomy in patients with low ASPECTS or large infarct volume

If inclusion of the patient in a dedicated randomised controlled trial is not possible, we suggest that treatment with mechanical thrombectomy may be reasonable on an individual basis in selected cases with ASPECTS <6 or core volume >70 mL (11/11 experts agree). Patient selection criteria might include age, severity and type of neurological impairment, time since symptom onset, location of the ischaemic lesion on plain CT scanner or MRI and results of advanced imaging, notably perfusion-core mismatch.

Guideline

**European Stroke Organisation
(ESO) – European Society for
Minimally Invasive Neurological Therapy
(ESMINT) guidelines on mechanical
thrombectomy in acute ischaemic stroke**

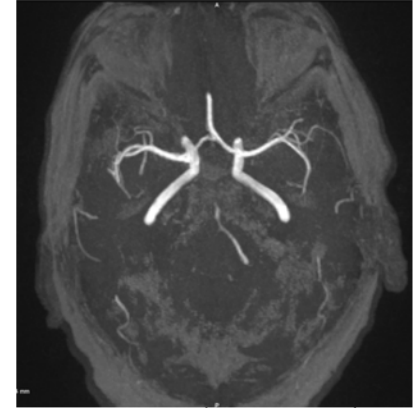
Endorsed by Stroke Alliance for Europe (SAFE)

**EUROPEAN
STROKE JOURNAL**

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2021
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SAGE

LA TOPOGRAPHIE DE L'OCCLUSION ARTÉRIELLE

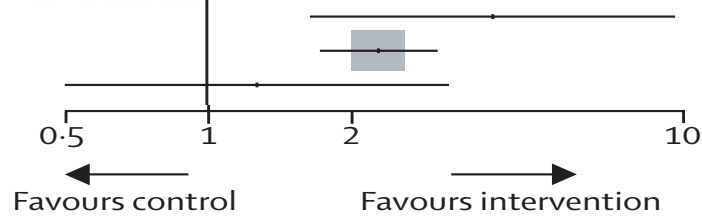
- Artères carotide et cérébrale moyenne
- Pas de patients avec occlusion TB



EFFET DU TRAITEMENT SUR LE HANDICAP À 3 MOIS

Stroke location ($p_{\text{interaction}} = 0.17$)

| | |
|-----|-----|
| ICA | 274 |
| M1 | 887 |
| M2 | 94 |



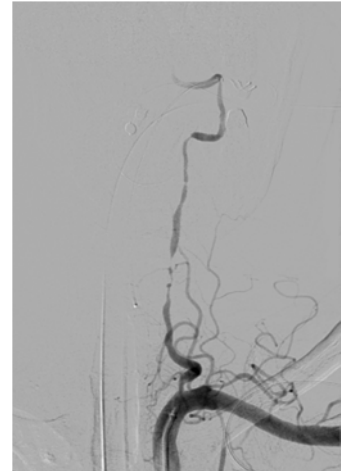
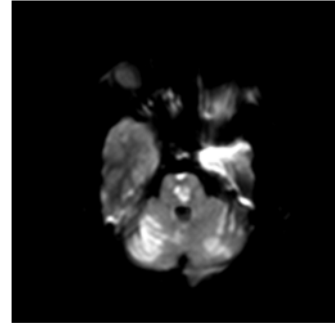
3.96 (1.65-9.48)
2.29 (1.73-3.04)
1.28 (0.51-3.21)

L'ARTÈRE BASILAIRE EST UNE AUTRE HISTOIRE...

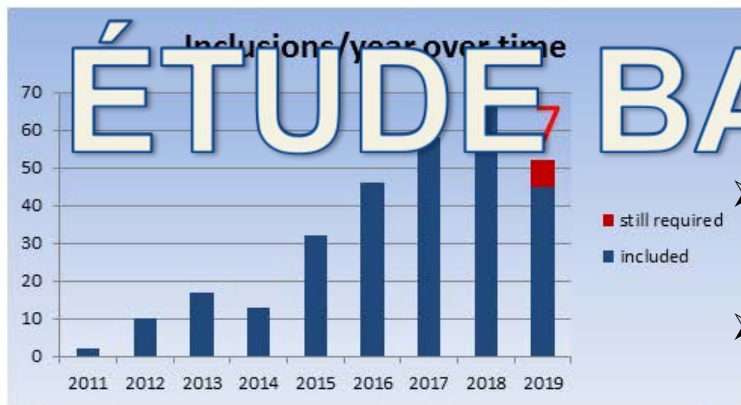
ÉTUDE BEST

(Basilar artery occlusion Endovascular intervention versus Standard medical Treatment)

- Étude chinoise: Occlusion Artère Basilaire, <8 heures
 - **ARRÊTÉE PRÉMATURÉMENT**: 131 patients (“crossovers”+++)
sur 344 prévus
 - 14/ 65 patients bras contrôle (22%) ont reçu un traitement endovasculaire
 - 3/66 patients un traitement médical
 - Pas de différence en intention de traiter entre les deux groupes
 - Analyse per-protocole: meilleur pronostic en cas de traitement endovasculaire



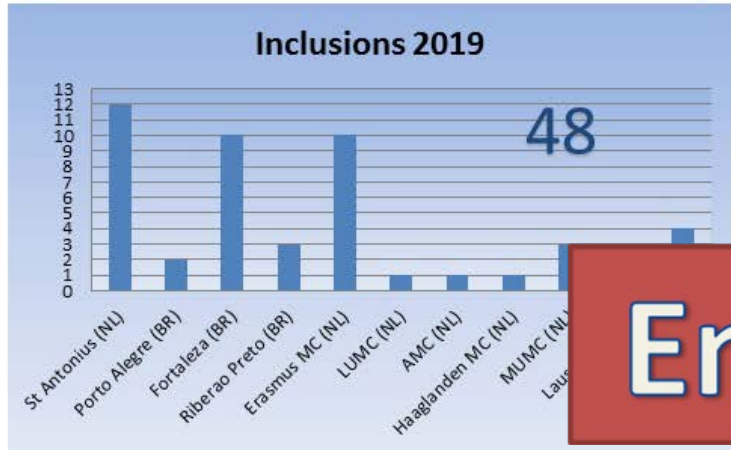
293 Total Inclusions



- Occlusion artère basilaire, <6 heures
- Traitement med vs endovasculaire

BASICS Trial

Efficacy of additional IA treatment in acute basilar artery occlusion



En cours

www.basicstrial.com

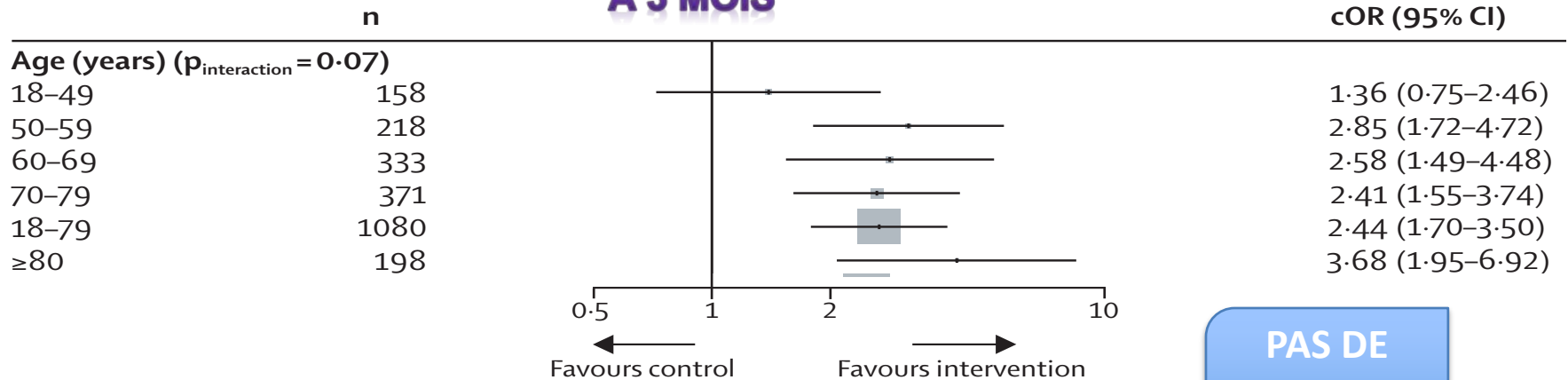
Lucianne Langezaal
Coordinating investigator
Tel: 0031 612302463

Wouter Schonewille
Principal investigator

basics-trial@antoniusziekenhuis.nl

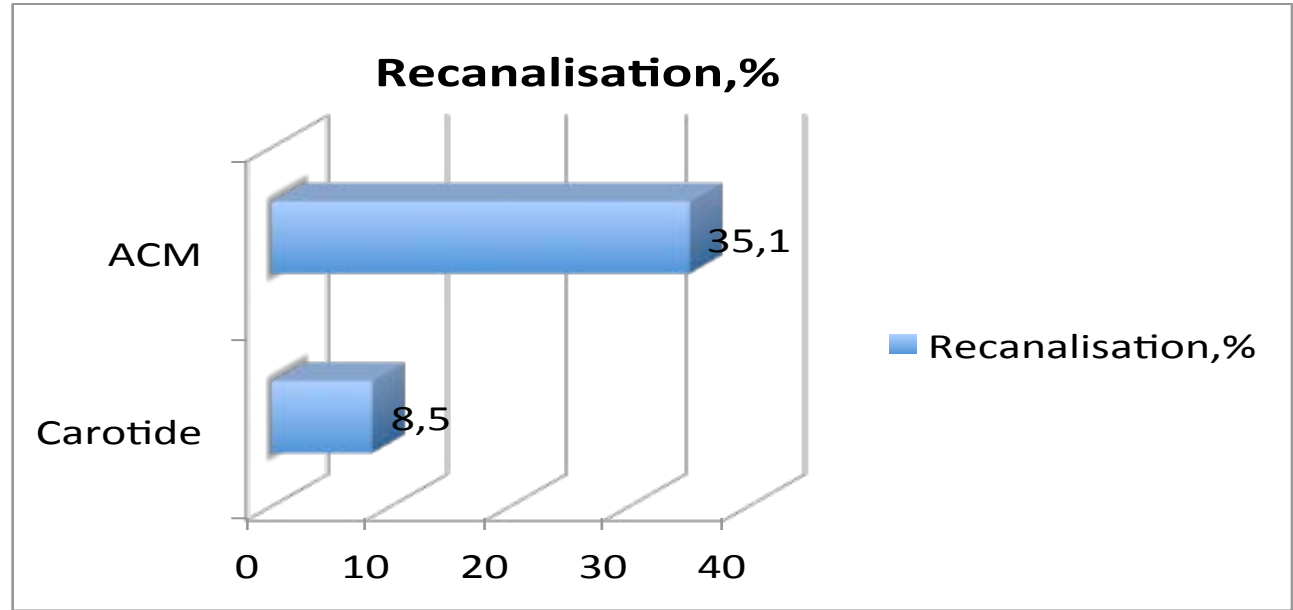
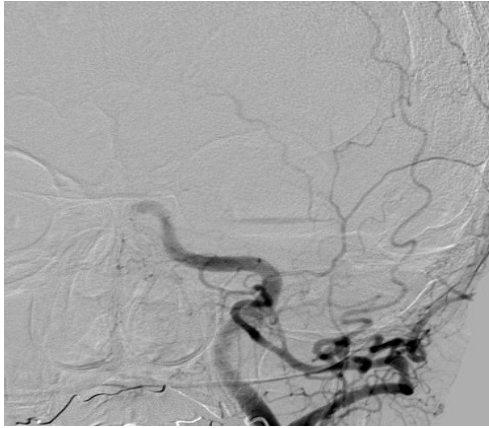
LA QUESTION DE L'ÂGE?

EFFET DU TRAITEMENT SUR LE HANDICAP À 3 MOIS



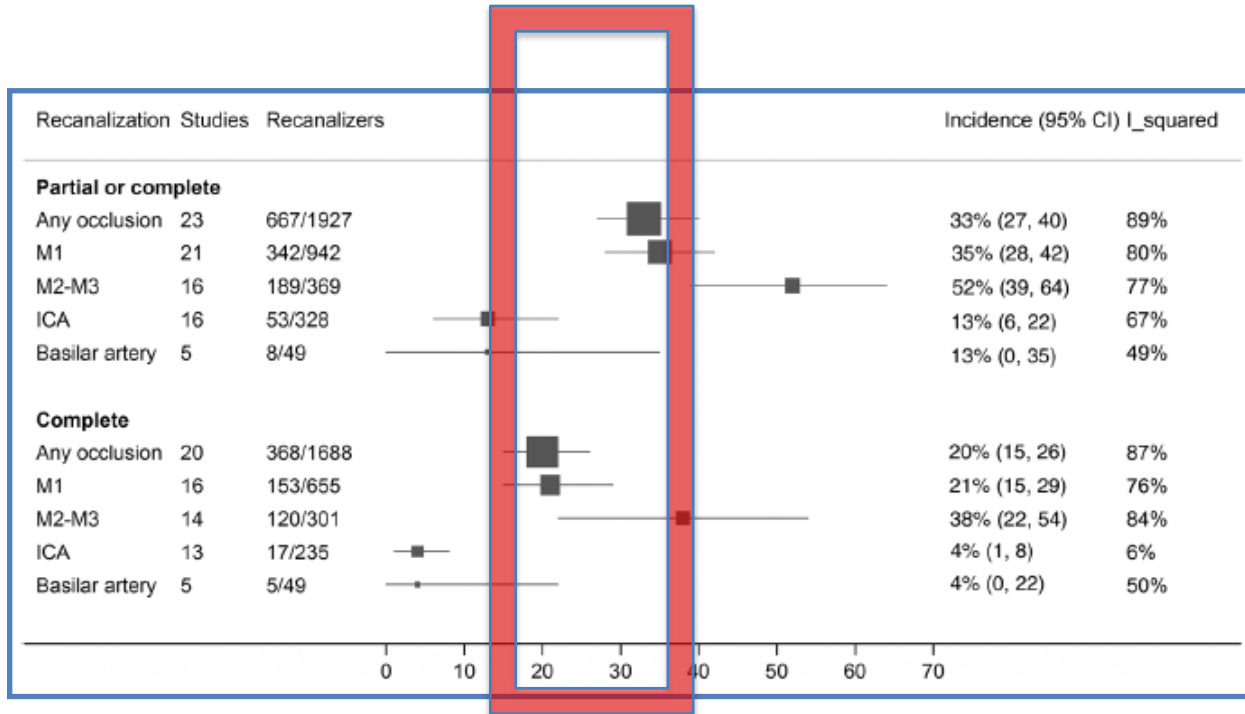
PAS DE
LIMITE
D'ÂGE

LA FIN DE L'ALTEPLASE IV?



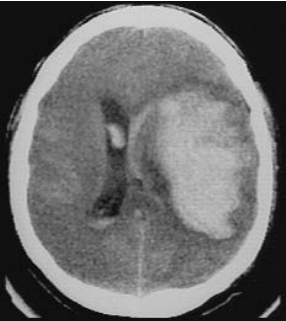
LA FIN DE L'ALTEPLASE IV?

✧ Recanaliseurs précoces après tPA: 20-30%



Prédicteurs de résistance À L'ALTEPLASE

- ✧ Occlusion proximale
- ✧ NIHSS élevé
- ✧ Thrombus étendu
- ✧ Collatéralité pauvre



LA FIN DE L'ALTEPLASE IV?

Lancet 2014; 384: 1929-35

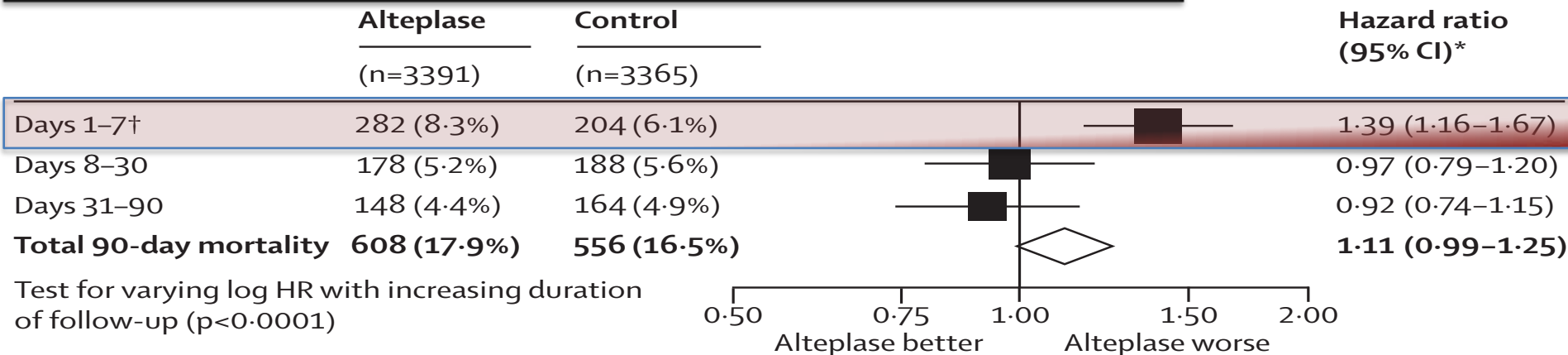
Published Online
 August 6, 2014
[http://dx.doi.org/10.1016/S0140-6736\(14\)60584-5](http://dx.doi.org/10.1016/S0140-6736(14)60584-5)
 See Online/Comment
<http://dx.doi.org/10.1016/>

Articles

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



Surmortalité la première semaine



LA TENECTÉPLASE ARRIVE...

RECANALISATION AVANT THROMBECTOMIE

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

APRIL 26, 2018

VOL. 378 NO. 17

Tenecteplase versus Alteplase before Thrombectomy for Ischemic Stroke

B.C.V. Campbell, P.J. Mitchell, L. Churilov, N. Yassi, T.J. Kleinig, R.J. Dowling, B. Yan, S.J. Bush, H.M. Dewey, V. Thijs, R. Scroop, M. Simpson, M. Brooks, H. Asadi, T.Y. Wu, D.G. Shah, T. Wijeratne, T. Ang, F. Miteff, C.R. Levi, E. Rodrigues, H. Zhao, P. Salvaris, C. Garcia-Esperon, P. Bailey, H. Rice, L. de Villiers, H. Brown, K. Redmond, D. Leggett, J.N. Fink, W. Collecute, A.A. Wong, C. Muller, A. Coulthard, K. Mitchell, J. Clouston, K. Mahady, D. Field, H. Ma, T.G. Phan, W. Chong, R.V. Chandra, L.-A. Slater, M. Krause, T.J. Harrington, K.C. Faulder, B.S. Steinfors, C.F. Bladin, G. Sharma, P.M. Desmond, M.W. Parsons, G.A. Donnan, and S.M. Davis, for the EXTEND-IA TNK Investigators*

| Outcome | (N = 101) | (N = 101) | Effect Size (95% CI) | P Value |
|--|-----------|-----------|----------------------|---------|
| Primary efficacy outcome | | | | |
| Substantial reperfusion at initial angiographic assessment — no. (%)* | 22 (22) | 10 (10) | | |
| Difference — percentage points | | | 12 (2–21) | 0.002 |
| Adjusted odds ratio | | | 2.6 (1.1–5.9) | 0.02 |
| Secondary outcomes | | | | |
| Score on the modified Rankin scale at 90 days† | | | | |
| Median score (IQR) on ordinal analysis‡ | 2 (0–3) | 3 (1–4) | 1.7 (1.0–2.8) | 0.04 |
| Functionally independent outcome — no. (%)§ | 65 (64) | 52 (51) | | |
| Adjusted incidence ratio | | | 1.2 (1.0–1.5) | 0.06 |

0,25 mg/kg

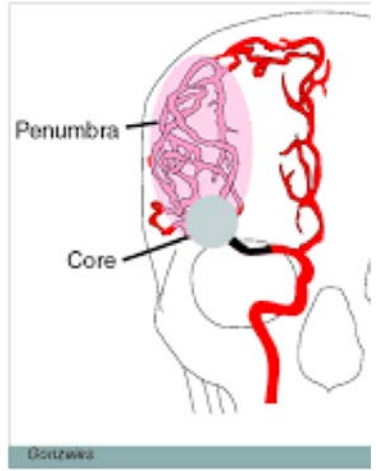
L'ENJEU DE L'ANESTHÉSIE...



Awake
(conscious)



Anesthetized
(unconscious)



AG OU SÉDATION CONSCIENTE?

- **Anesthésie Générale délétère?**
 - MRCLEAN et EXTEND-IA: un tiers des patients
 - REVASCAT et ESCAPE: <10%
- **Biais?**
 - Perfusion cérébrale interrompue?
 - Pneumopathie?
 - AVC sévère?



Guidelines

European Recommendations on Organisation of Interventional Care in Acute Stroke (EROICAS)

Jens Fiehler¹, Christophe Cognard², Mauro Gallitelli³, Olav Jansen⁴, Adam Kobayashi⁵, Heinrich P Mattle⁶, Keith W Muir⁷, Mikael Mazighi⁸, Karl Schaller⁹ and Peter D Schellinger¹⁰

Effect of Conscious Sedation vs General Anesthesia on Early Neurological Improvement Among Patients With Ischemic Stroke Undergoing Endovascular Thrombectomy

A Randomized Clinical Trial

SIESTA

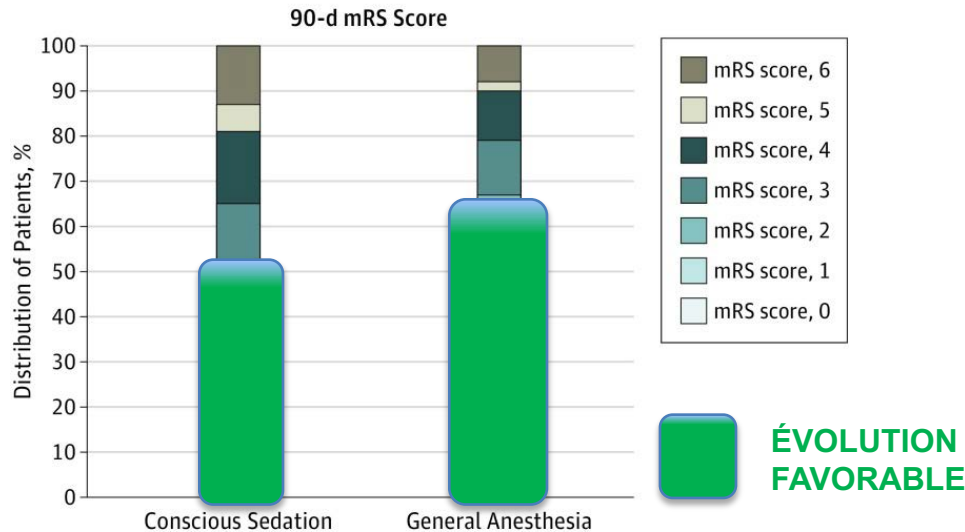
Critère de jugement PRINCIPAL:
ÉVOLUTION NEUROLOGIQUE H24

Table 3. Primary and Secondary Outcome Results

| Variable | General Anesthesia (n = 73) | Conscious Sedation (n = 77) | Difference (95% CI) | P Value ^a |
|---|--------------------------------|--------------------------------|---------------------|----------------------|
| Primary Outcome | | | | |
| Change in NIHSS ^b , mean (95% CI) | -3.2 (-5.6 to -0.8) | -3.6 (-5.5 to -1.7) | -0.4 (-3.4 to 2.7) | .82 ^c |
| Change in NIHSS, median (IQR) | -5.0 (-10.0 to 2.0) | -4.0 (-10 to 2.0) | | |
| NIHSS after 24 h, mean (SD) | 13.6 (11.1) | 13.6 (9.0) | 0.0 (-3.3 to 3.3) | >.99 ^d |
| Secondary Outcomes | | | | |

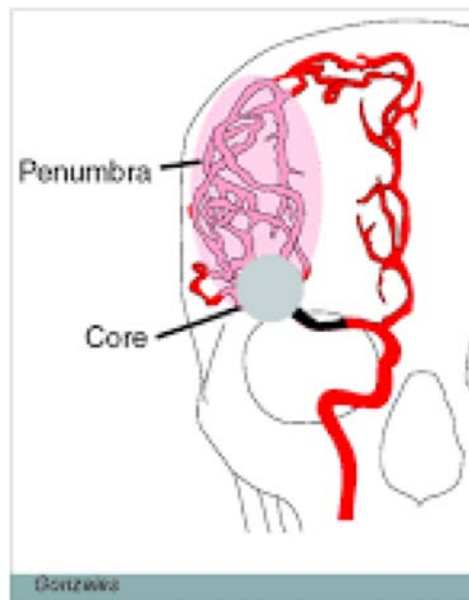
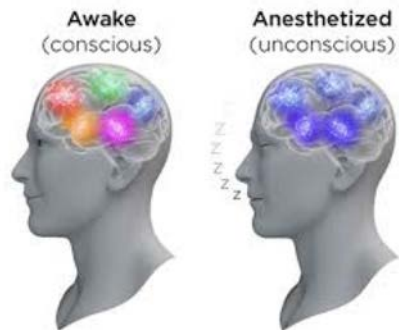
L'AG FAIT MIEUX?

CRITÈRES DE JUGEMENT



| Outcome | General Anesthesia (n = 65) | Conscious Sedation (n = 63) | PValue |
|--|--------------------------------|--------------------------------|--------|
| Successful reperfusion (mTICI 2b-3), No. (%) | 50 (76.9) | 38 (60.3) | .04 |
| Acute infarct volume, median (IQR), mL | 10.5 (2.4-23.6) | 13.3 (5.2-31.1) | .26 |
| Final infarct volume, median (IQR), mL | 22.3 (8.1-64.5) | 38.0 (16.7-128.0) | .04 |
| Infarct volume growth, median (IQR), mL | 8.2 (2.2-38.6) | 19.4 (2.4-79.0) | .10 |
| 90-d mRS score, median (IQR) | 2 (1-3) | 2 (1-4) | .04 |
| NIHSS score in 24 h, median (IQR) | 6 (3-14) | 10 (2-19) | .19 |
| Change in NIHSS score after 24 h, median (IQR) | -10 (-14 to -5) | -7 (-13 to 0) | .11 |

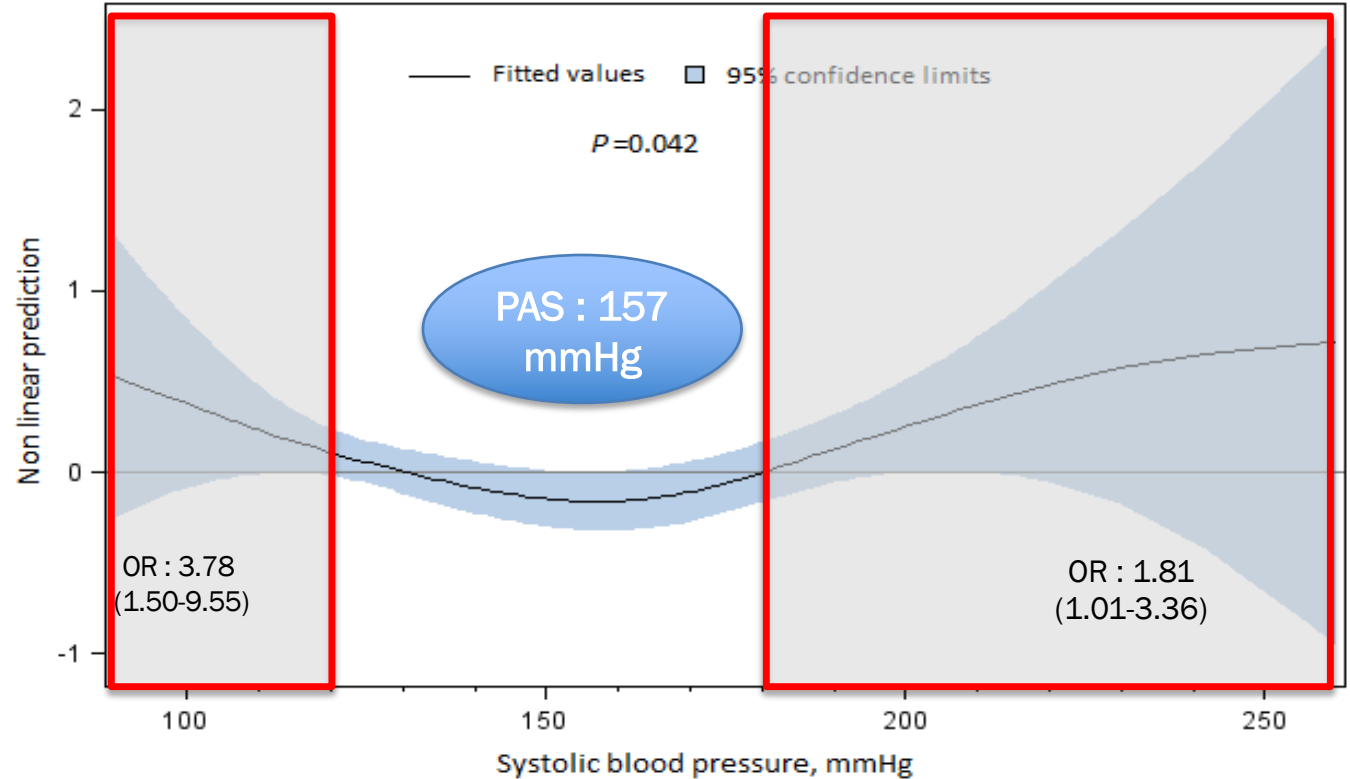
QUID DE LA PRESSION ARTÉRIELLE...



PRESSION ARTÉRIELLE ET MORTALITÉ

1332 pts

- AVC circulation antérieure
- Registre ETIS



ANESTHÉSIE GÉNÉRALE ASSOCIÉE À LA CHUTE DE LA PRESSION ARTÉRIELLE...

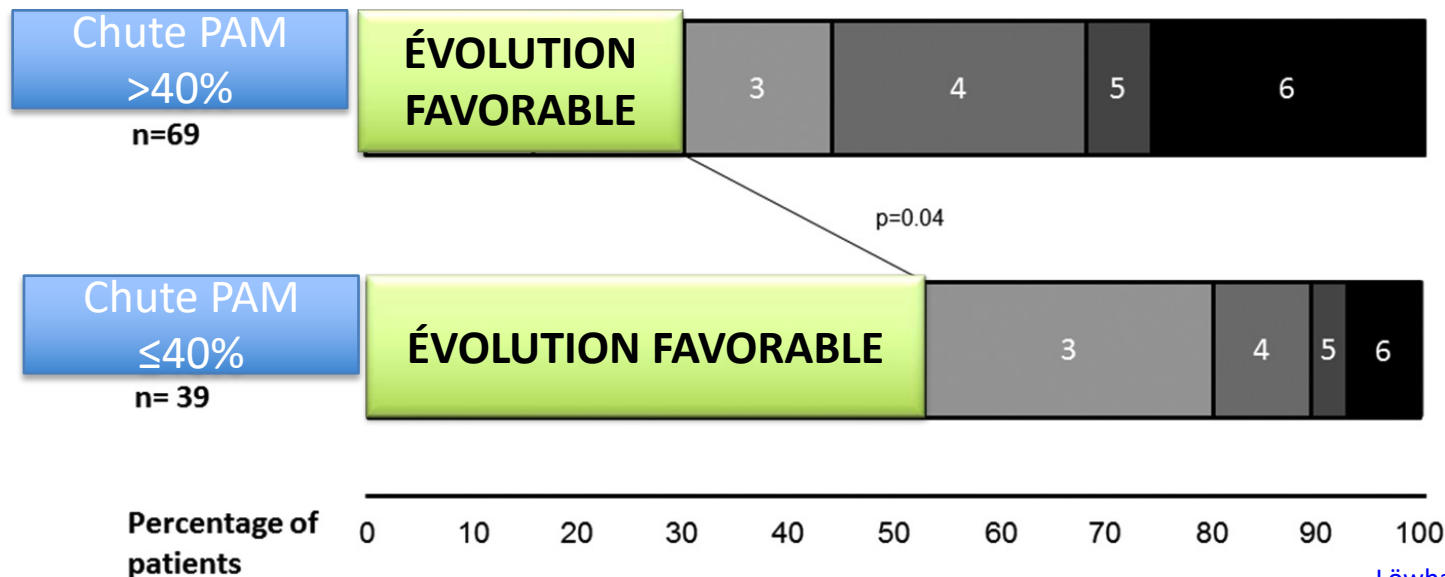
Table 1. Baseline Patient Characteristics and Postintervention Destination

| | General Anesthesia (n = 48) | Local Anesthesia (n = 48) | P Value |
|-------------------------|--------------------------------|------------------------------|---------|
| Demographics | | | |
| Age in years (mean, SD) | 63 (14) | 62 (15) | 0.72 |
| Male Sex (% , n) | 58% (28) | 81% (39) | 0.03 |
| Clinical (% , n) | | | |
| NIHSS (median, IQR) | 19.5 (9) | 16 (9.5) | 0.03 |
| Physiological | | | |
| Glucose (mm) (mean, SD) | 8.0 (1.9) | 7.2 (1.9) | 0.04 |
| Minimum SBP (mmHg) | 104 (17) | 137 (20) | <0.001 |
| Minimum DBP (mmHg) | 76 (11) | 56 (10) | <0.001 |
| Maximum SBP (mmHg) | 165 (24) | 162 (27) | 0.50 |
| Maximum DBP (mmHg) | 91 (20) | 91 (12) | 0.92 |
| Minimum MAP (mmHg) | 72 (15) | 96 (15) | <0.001 |
| Maximum MAP (mmHg) | 116 (14) | 114 (14) | 0.69 |

Hypotension During Endovascular Treatment of Ischemic Stroke Is a Risk Factor for Poor Neurological Outcome

Pia Löwhagen Hendén, MD; Alexandros Rentzos, MD; Jan-Erik Karlsson, MD, PhD;
Lars Rosengren, MD, PhD; Henrik Sundeman, MD, PhD; Björn Reinsfelt, MD, PhD;
Sven-Erik Ricksten, MD, PhD

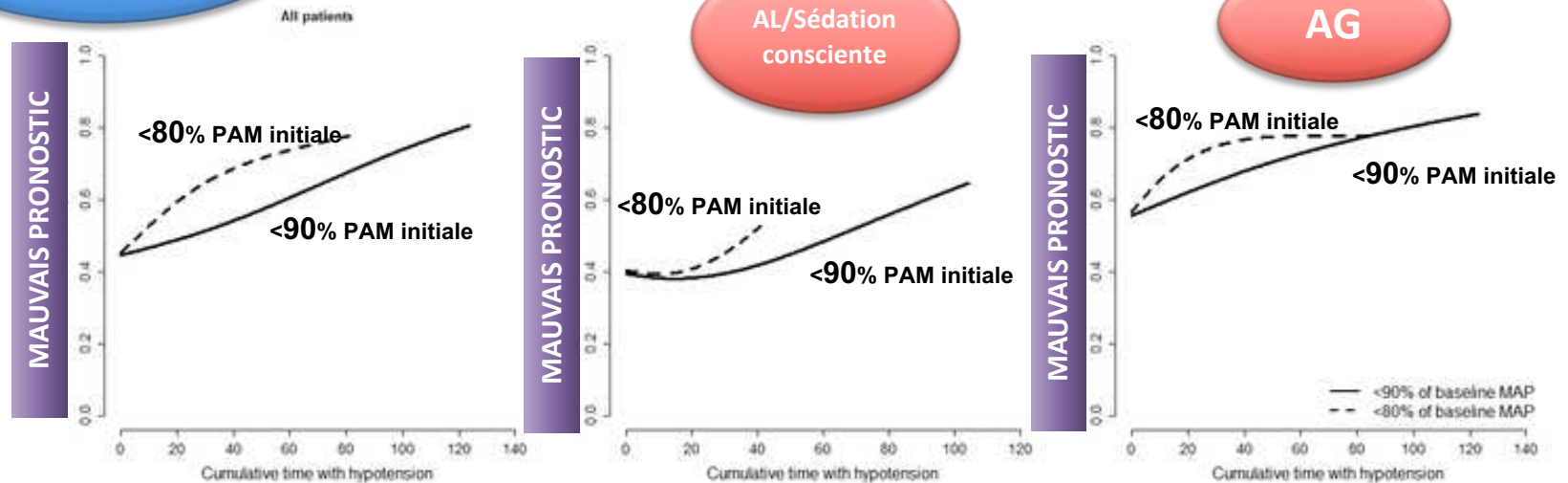
IMPACT DES CHUTES DE PRESSION ARTÉRIELLE sur le PRONOSTIC



TEMPS PASSÉ SOUS 90% de la PA INITIALE

371 patients
AG 42%

OR mauvais pronostic / 10 min sous 90% PAM initiale 1.11 (95% CI 1.02 to 1.21)





2. Patients who have elevated BP and are otherwise eligible for treatment with IV alteplase should have their BP carefully lowered so that their systolic BP is <185 mmHg and their diastolic BP is <110 mmHg before IV fibrinolytic therapy is initiated.

I

B-NR

The RCTs of IV alteplase required the BP to be <185 mmHg systolic and <110 mmHg diastolic before treatment and <180/105 mmHg for the first 24 hours after treatment. Options to treat arterial hypertension in patients with AIS who are candidates for acute reperfusion therapy are given in Table 5. Some observational studies suggest that the risk of hemorrhage after administration of alteplase is greater in patients with higher BPs^{126–132} and in patients with more BP variability.¹³³ The exact BP at which the risk of hemorrhage after thrombolysis increases is unknown. It is thus reasonable to target the BPs used in the RCTs of IV thrombolysis.

3. Until additional data become available, in patients for whom intra-arterial therapy is planned and who have not received IV thrombolytic therapy, it is reasonable to maintain BP ≤185/110 mmHg before the procedure.

IIa

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Of the 6 RCTs that each independently demonstrated clinical benefit of mechanical thrombectomy with stent retrievers when performed <6 hours from stroke onset, 5 (REVASCAT, SWIFT PRIME, EXTEND-IA, THRACE, and MR CLEAN^{102–104,106,107}) had eligibility exclusions for BP >185/110 mmHg. The sixth, ESCAPE,¹⁰⁵ had no BP eligibility exclusion. DAWN also used an exclusion for BP >185/110 mmHg.¹⁰⁸ RCT data for optimal BP management approaches in this setting are not available. Because the vast majority of patients enrolled in these RCTs had preprocedural BP managed below 185/110 mmHg, it is reasonable to use this level as a guideline.

4. The usefulness of drug-induced hypertension in patients with AIS is not well established.

IIb

C-LD

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

A Guideline for Healthcare Professionals From the American Heart
Association/American Stroke Association

APRÈS
THÉRAPEUTIQUE
DE REPERFUSION

BP should be maintained <180/105 mm Hg for at least the first 24 hours after IV alteplase treatment.

The usefulness of drug-induced hypertension in patients with AIS is not well established.

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C-LD

L'ESSENTIEL

- Traitement de référence: Alteplase IV+ Thrombectomie
- Augmentation de la fenêtre thérapeutique jusqu'à 24 heures (imagerie de perfusion+++)
- Gestion de la pression artérielle à définir
- Les prochaines étapes?
 - Thrombectomie sans alteplase
 - Nouveaux anti-thrombotiques
 - Évaluation de cibles de pression artérielle

