Moyamoya pédiatrique:

analyse statistique de l'IRM de perfusion par marquage de spin artériel (IRM-ASL)

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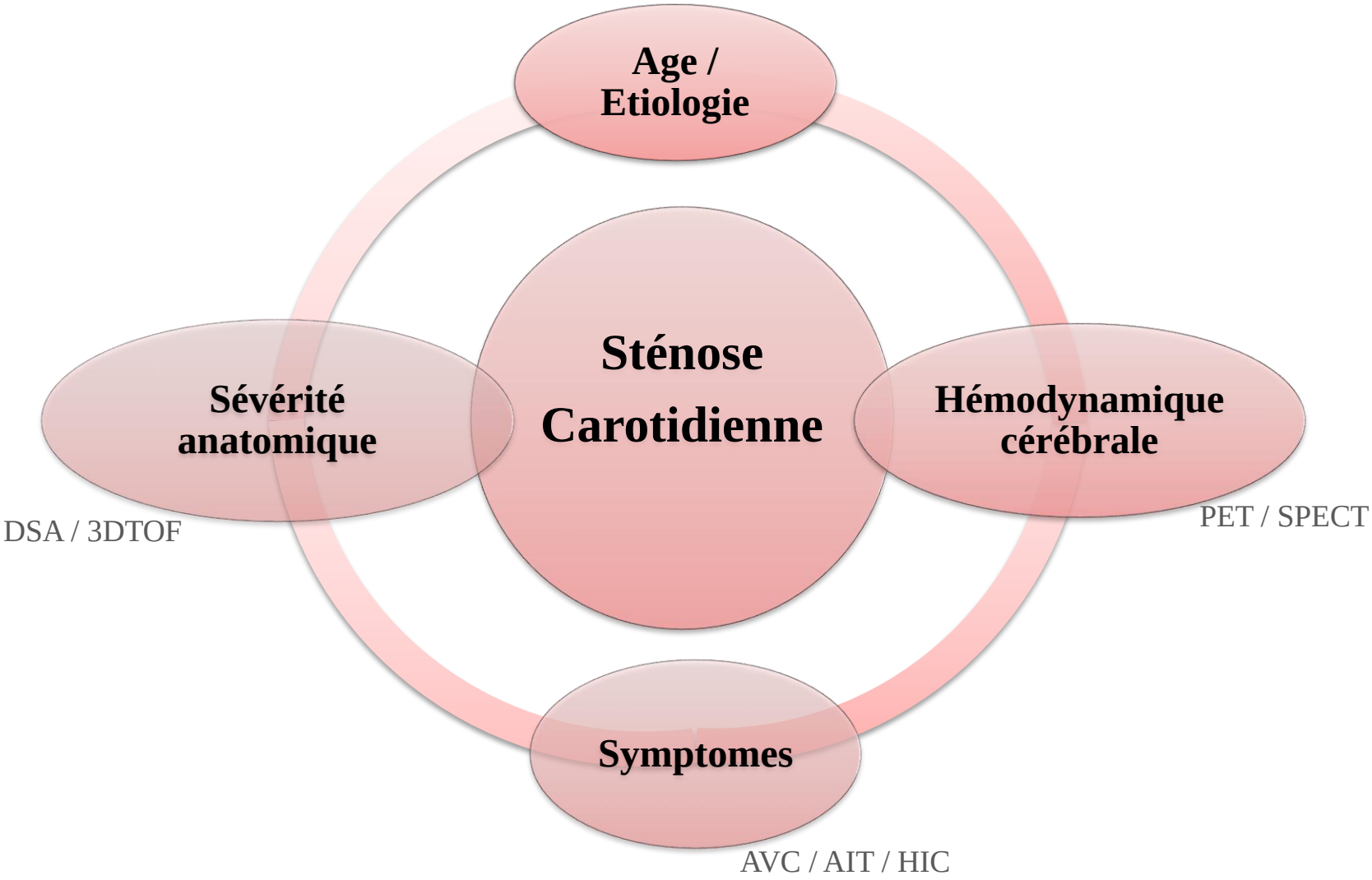
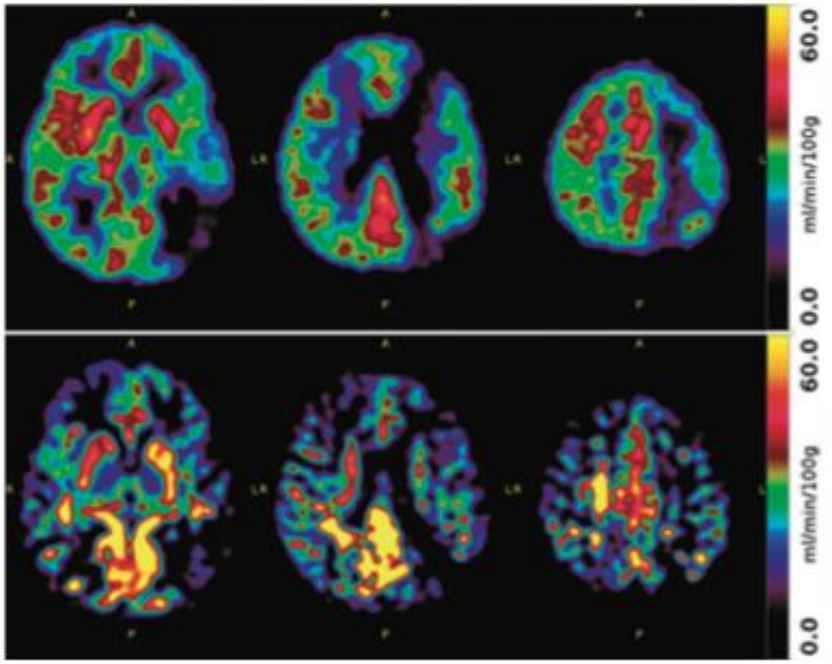
INSERM U1000
T.Blauwblomme, H.Lemaitre, O.Naggara, F.Brunelle, S.Puget, M.Zerah, C.Sainte-Rose, N. Boddaert

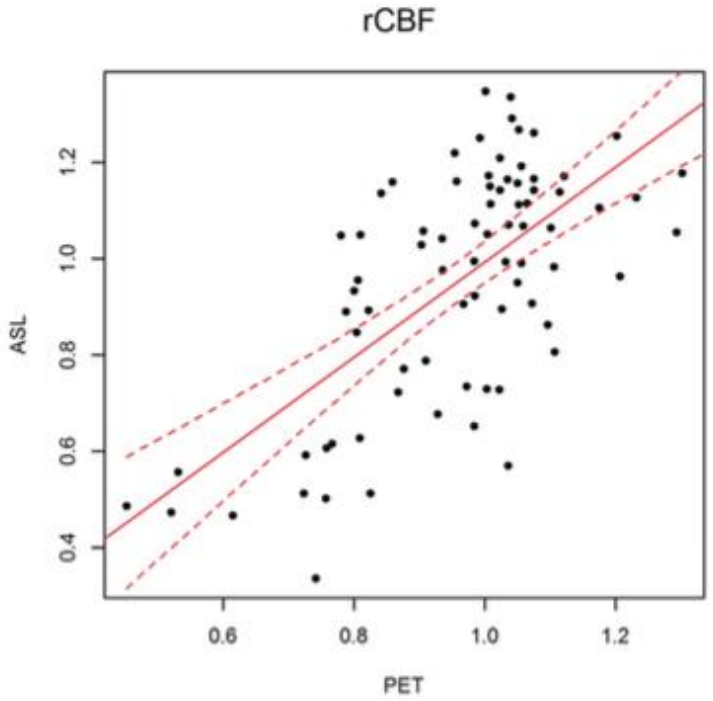
Moyamoya: critères décisionnels



Quantitative Cerebral Perfusion Imaging in Children and Young Adults with Moyamoya Disease: Comparison of Arterial Spin-Labeling–MRI and $H_2[^{15}O]$-PET

R. Goetti, G. Warnock, F.P. Kuhn, R. Guggenberger, R. O'Gorman, A. Buck, N. Khan, and I. Scheer





Bonne corrélation du Débit Sanguin cérébral
mesuré en PET $H_2(^{15}0)$ vs ASL-MRI

AJNR Am J Neuroradiol 2014

L’IRM de perfusion ASL peut-elle offrir une analyse objective du retentissement hémodynamique du Moyamoya?

METHODES

- Etude
- Principes de l'IRM ASL
- Analyse de groupe
- Analyse individuelle

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Etude

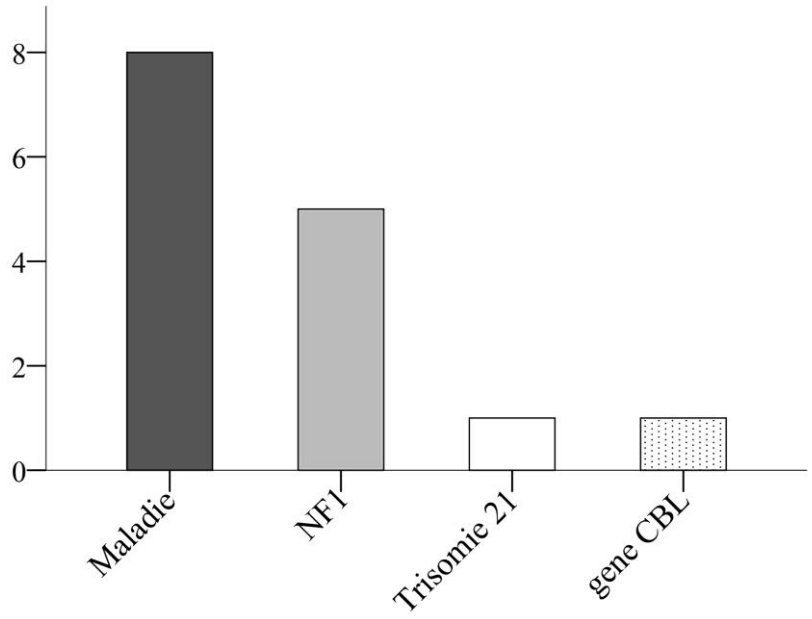
Prospective mono centrique

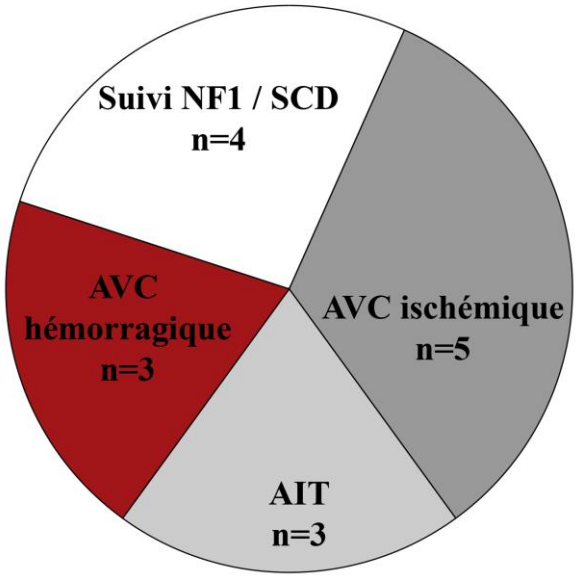
Période: 2011-2013

Revascularisation indirecte (trous de trépans)

Effectif:

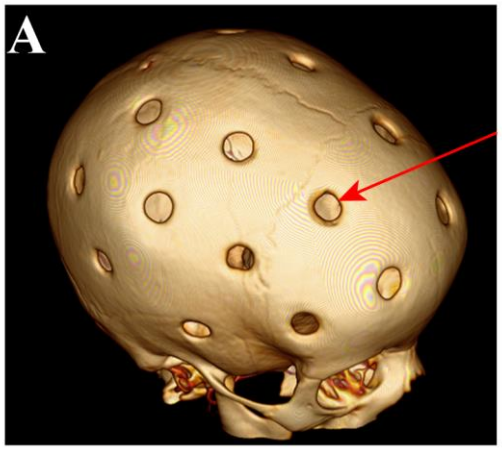
- N=15
- M/F ratio=2
- Age: 7 ans
- Symptômes:
  - Déficit neurologique: 6/15
  - Retard de développement: 5/15

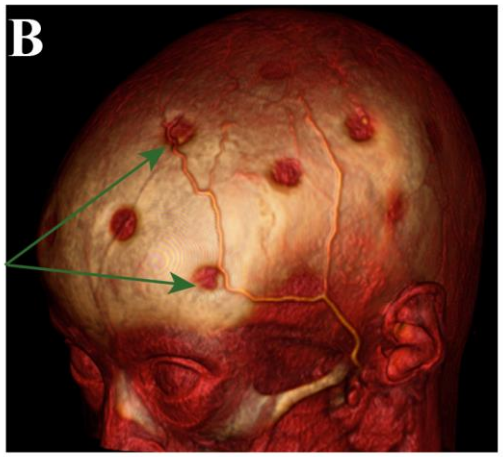


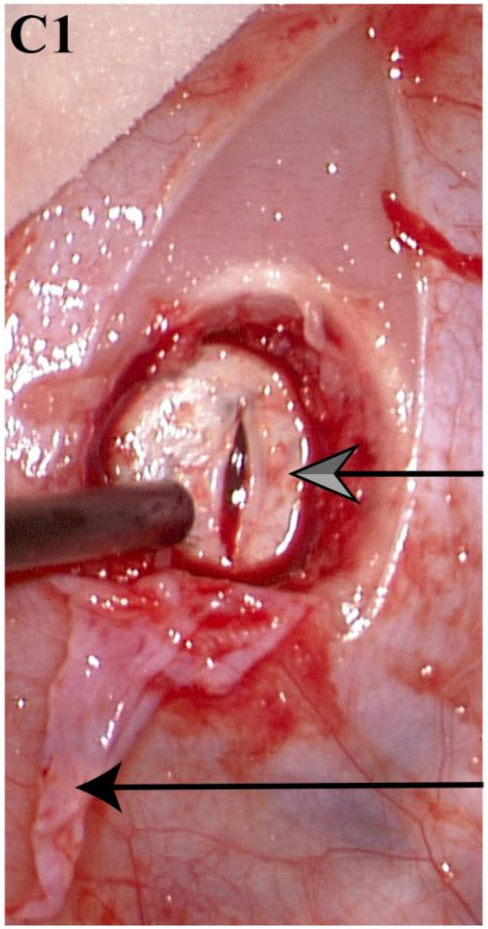


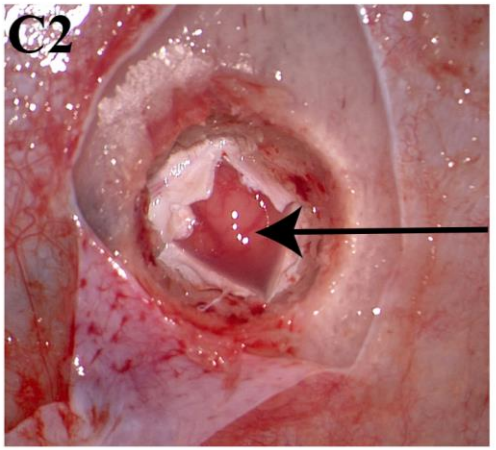
CHIRURGIE:

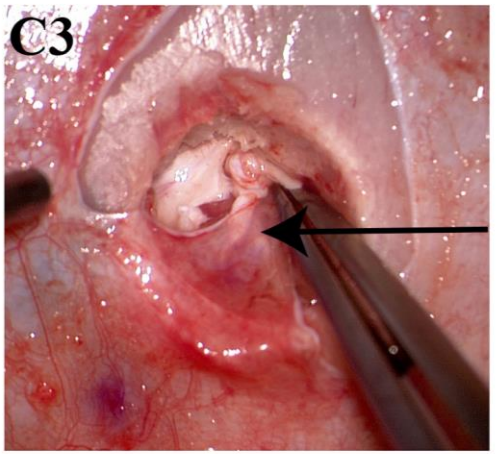
Revascularisation indirecte, trous de trépans multiples











PROCEDURE BILATERALE	62%
N MOYEN DE TROUS	10 / Hemisphere

METHODES

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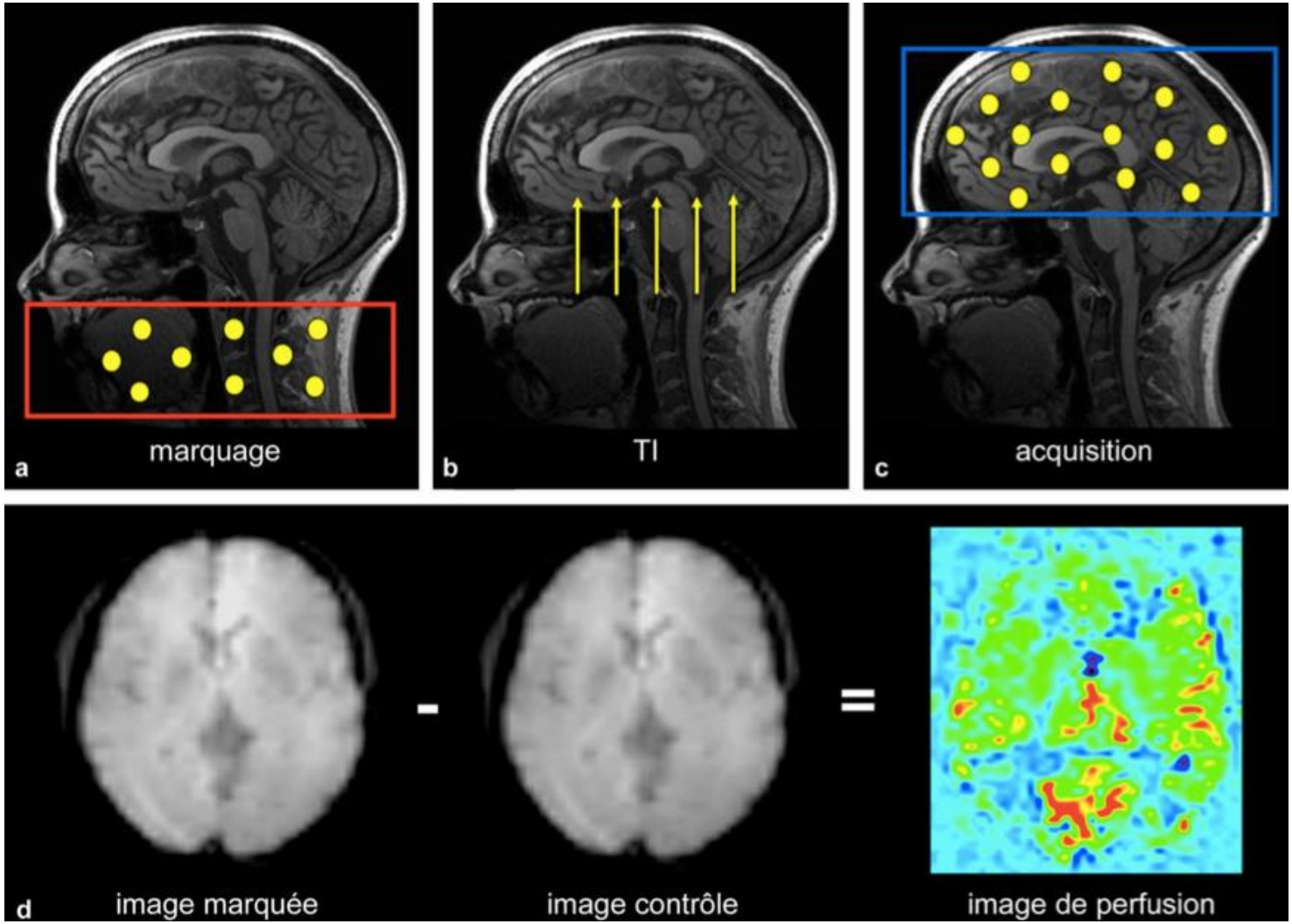
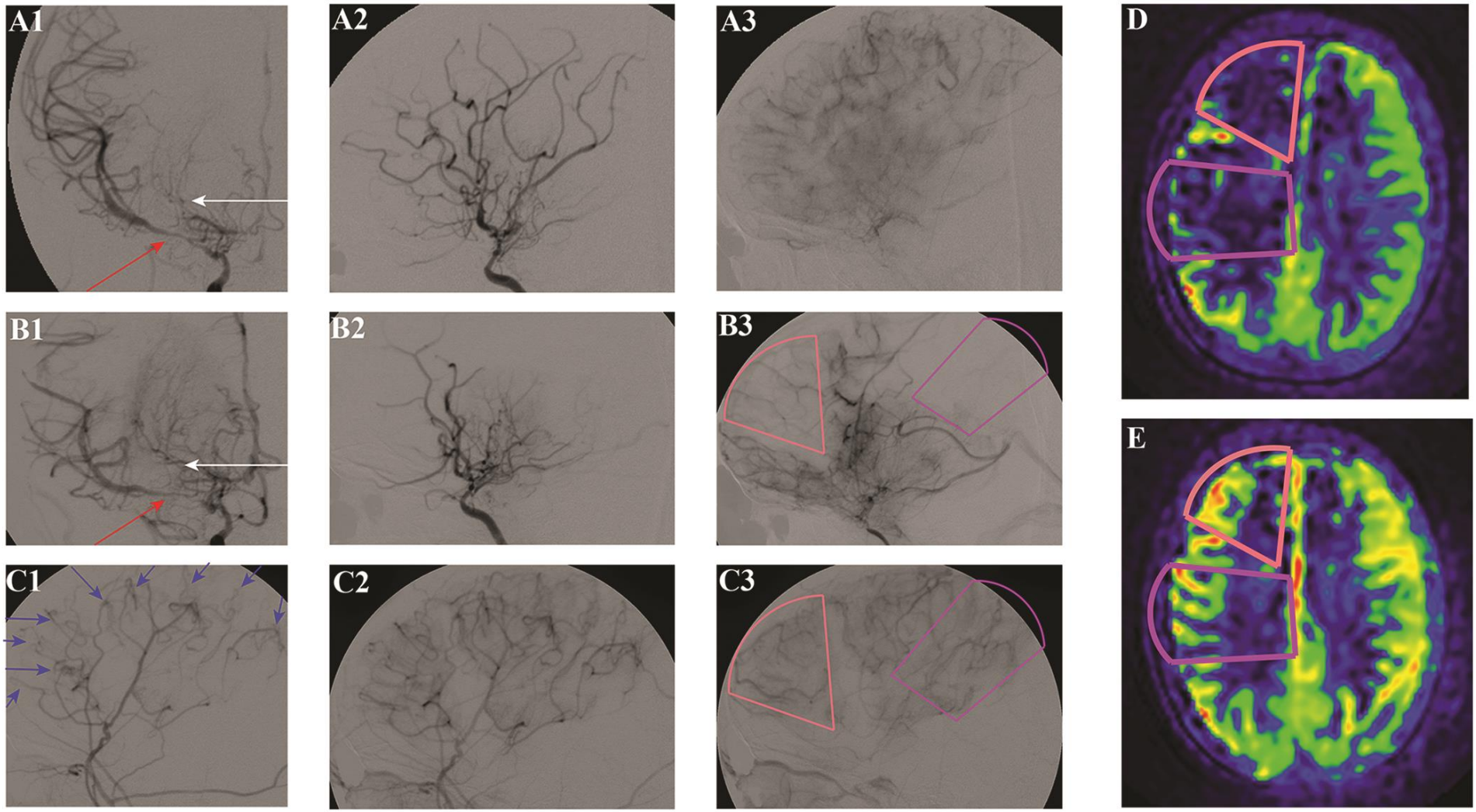
ASL-MRI: Principes



Raoult, Journal de Radiologie, 2011


A1
A2
A3
D
B1
B2
B3
E
C1
C2
C3

METHODES

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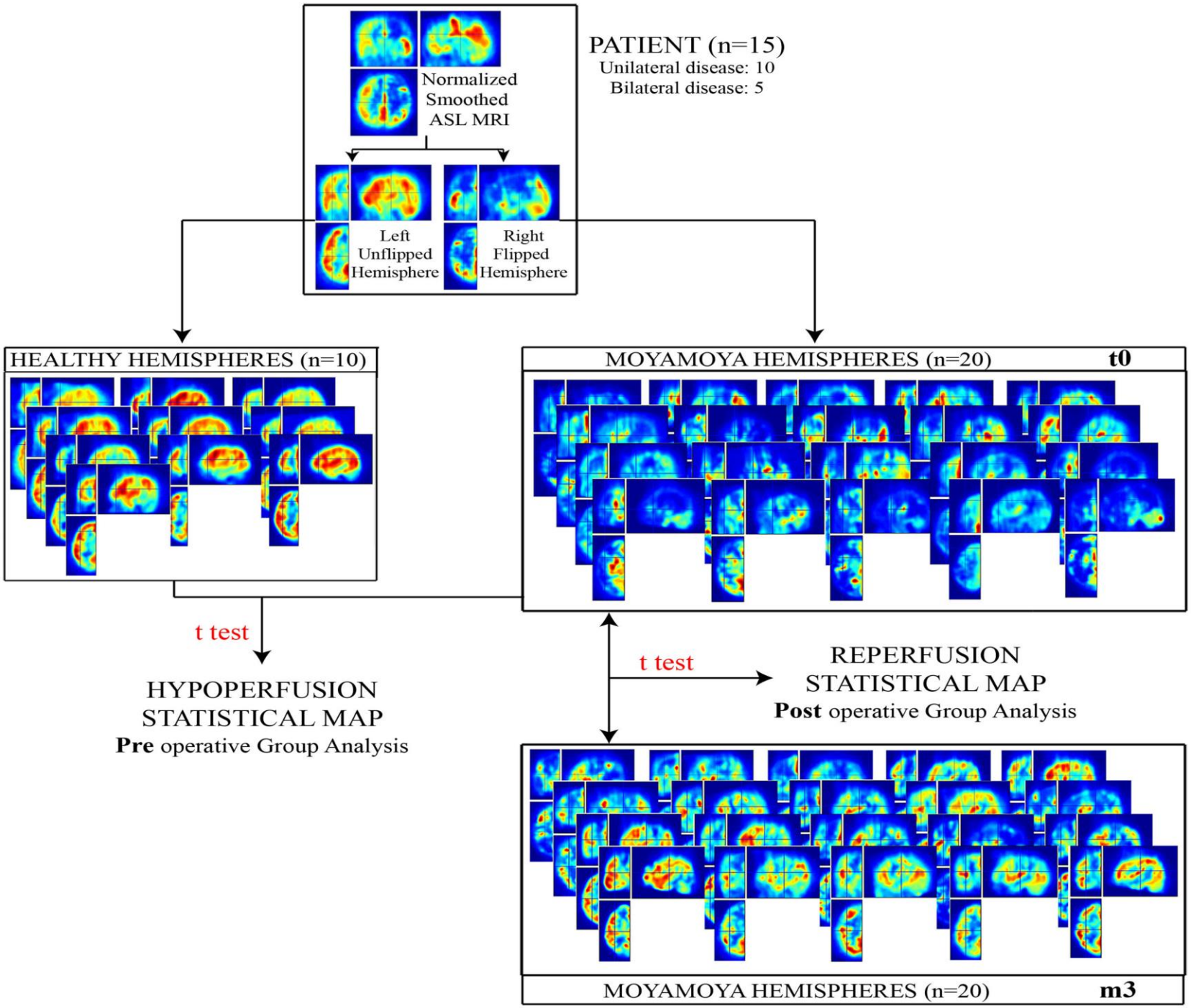
PATIENT (n=15)
Unilateral disease: 10
Bilateral disease: 5
Normalized
Smoothed
ASL MRI
Left
Unflipped
Hemisphere
Right
Flipped
Hemisphere
HEALTHY HEMISPHERES (n=10)
MOYAMOYA HEMISPHERES (n=20)
t0
t test
HYPOPERFUSION
STATISTICAL MAP
Pre operative Group Analysis
t test
REPERFUSION
STATISTICAL MAP
Post operative Group Analysis
MOYAMOYA HEMISPHERES (n=20)
m3

METHODES

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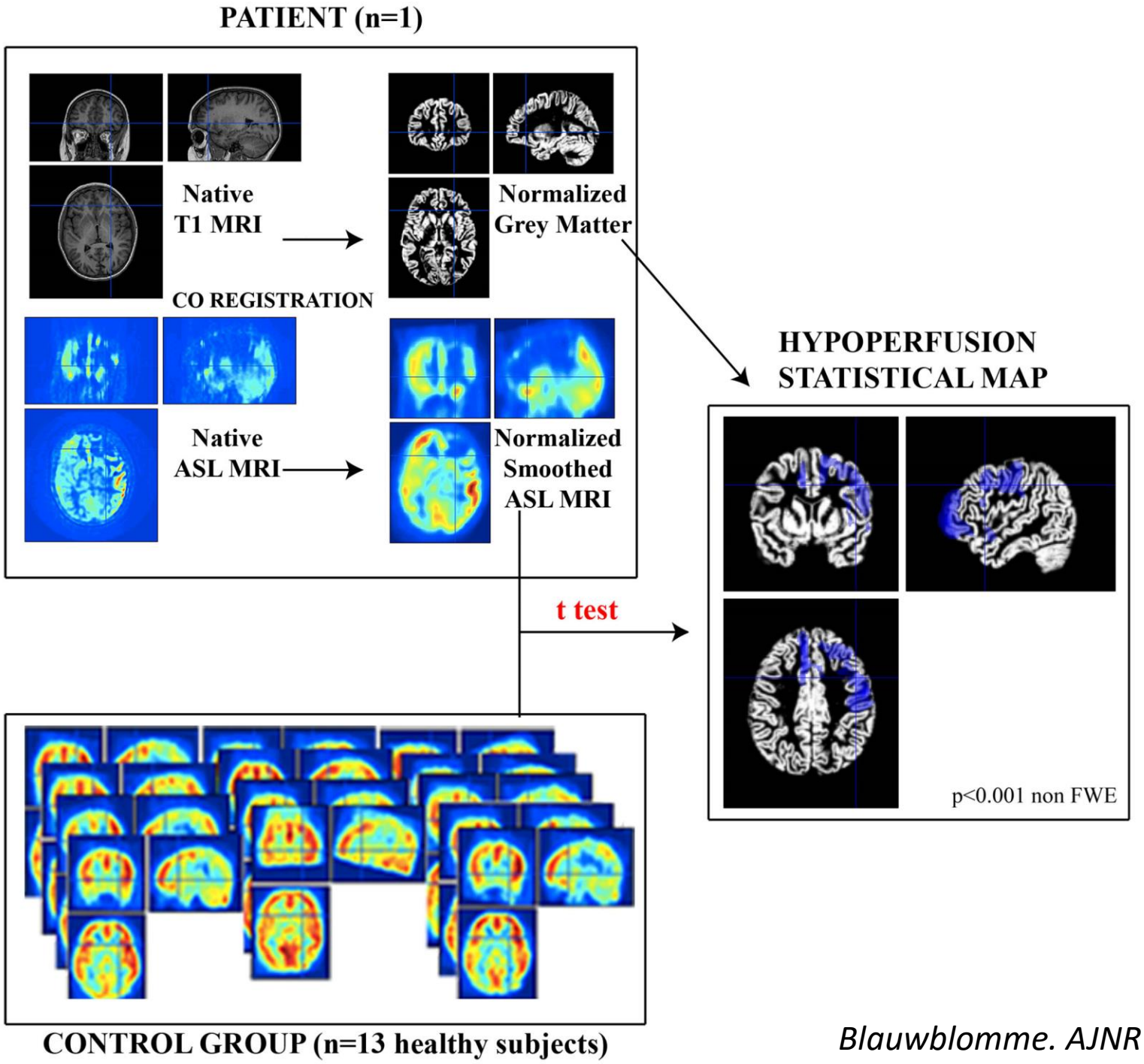
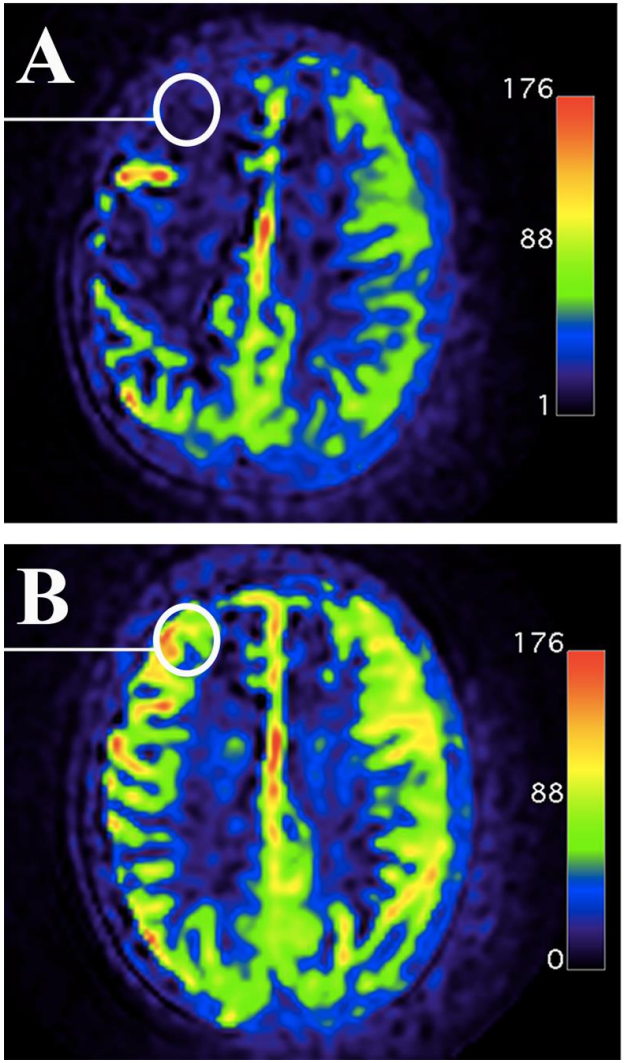


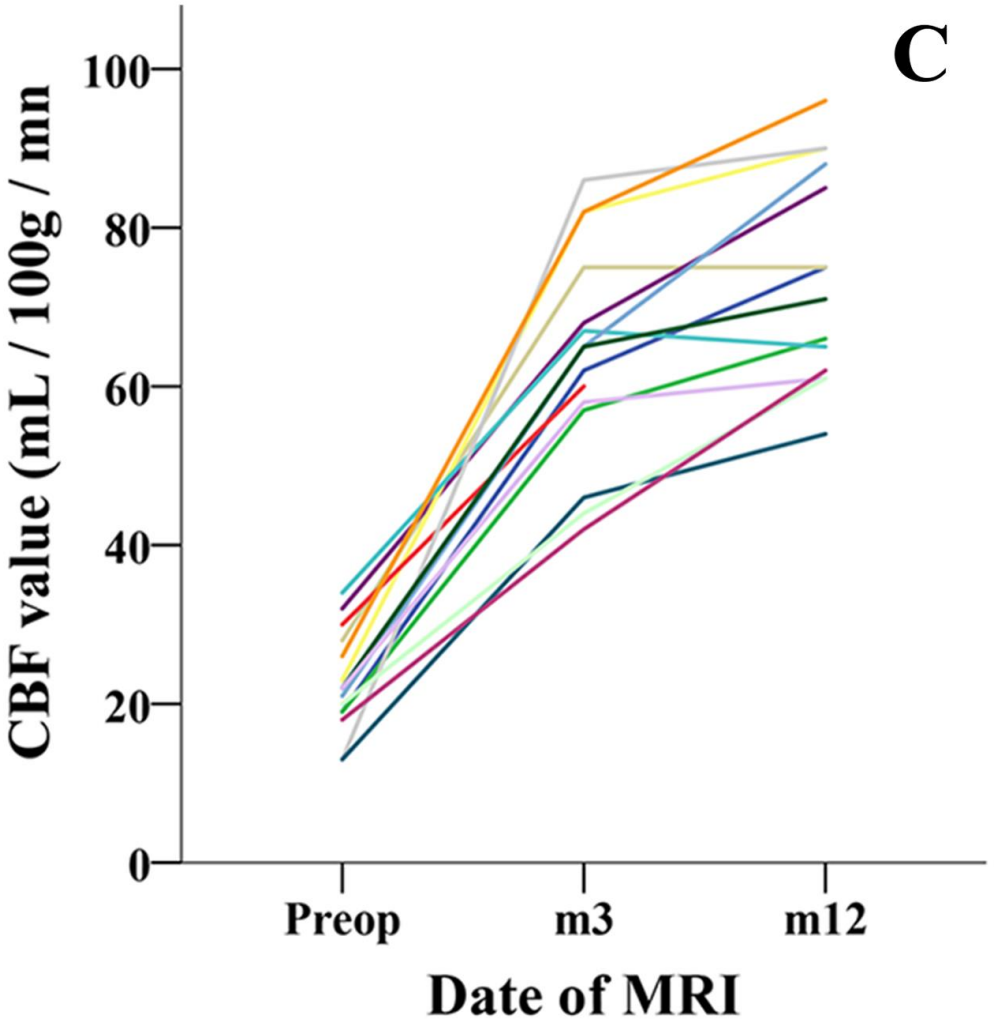
Blauwblomme. AJNR 2015

RESULTATS

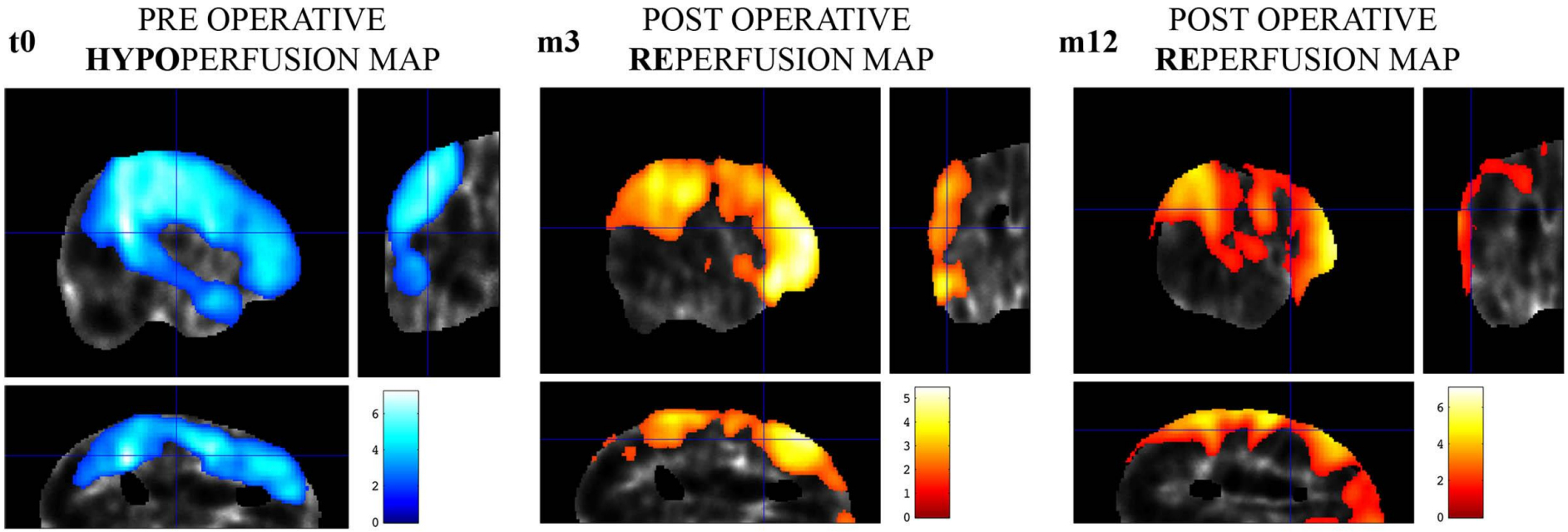
- Analyse de groupe
- Analyse Individuelle
    . Succès
    . Echec
    . Evolution controlatérale

ASL MRI: Quantitative approach



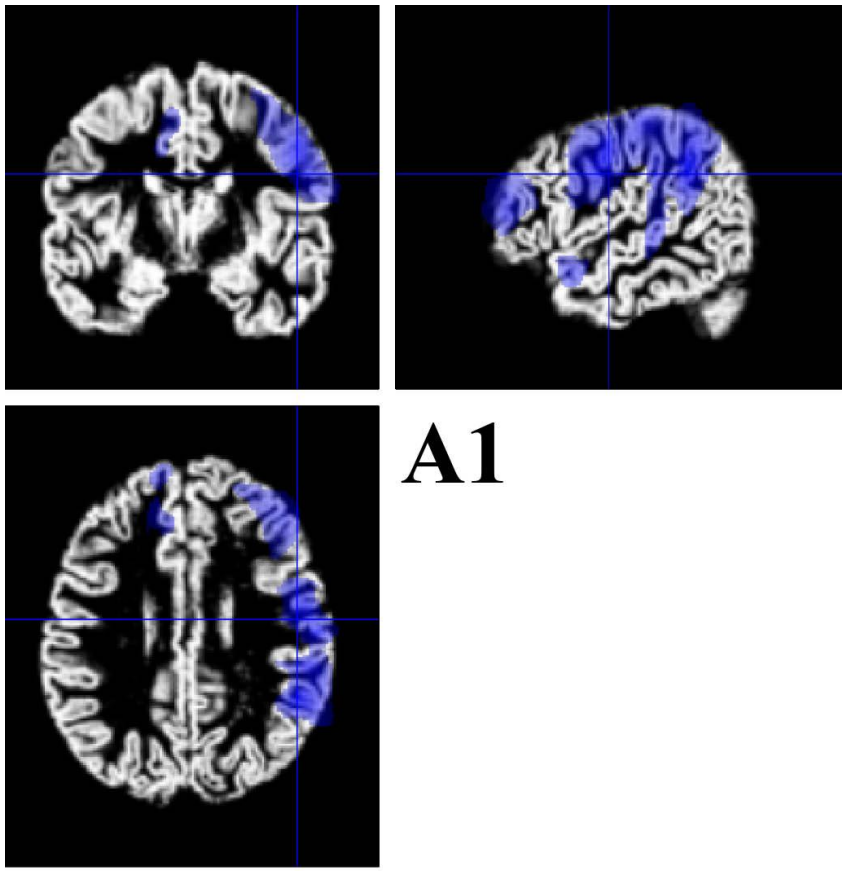


Carte de perfusion statistique: analyse de groupe

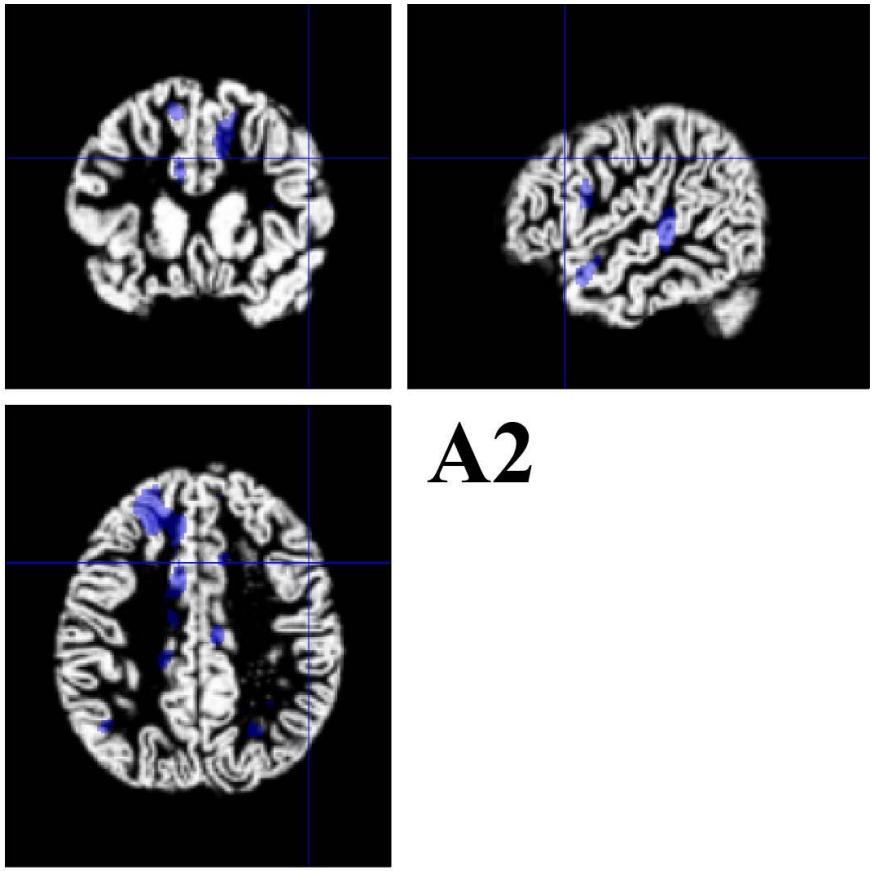


P<0.001, non FWE corrected

Analyse individuelle:
Succès de revascularisation



A1

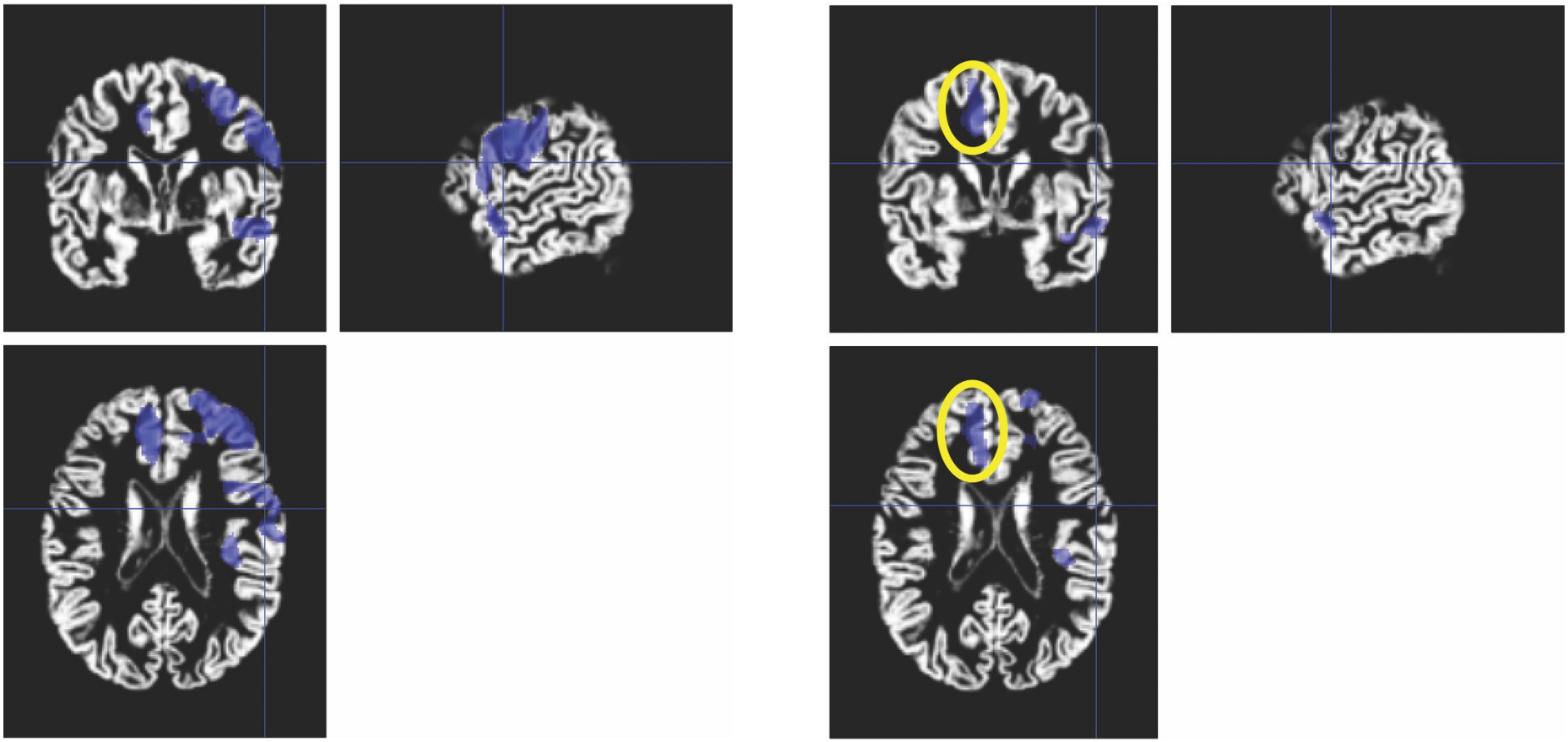


A2

PREOP **POSTOP**

P<0.001, non FWE corrected

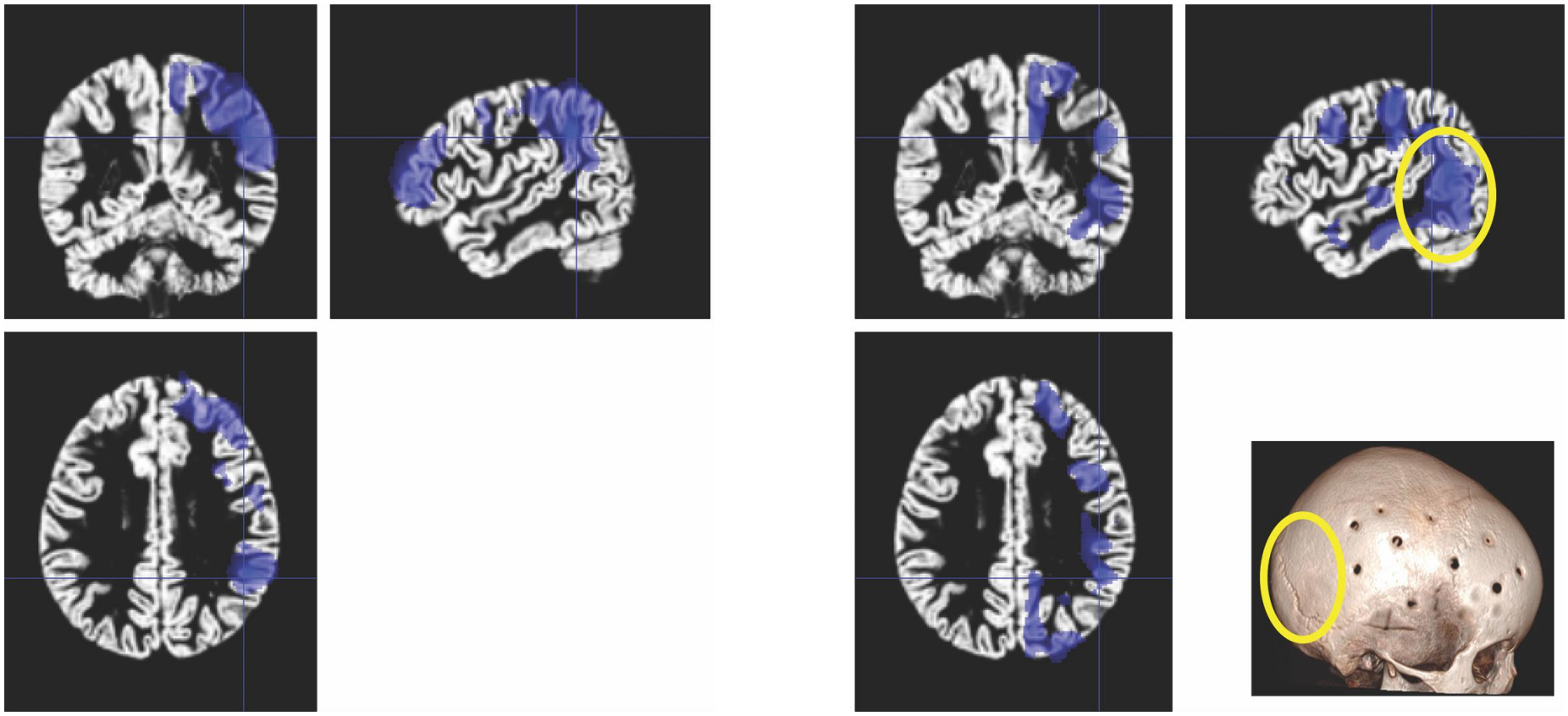
Analyse individuelle:
Evolution controlatérale



PREOP **POSTOP**

P<0.001, non FWE corrected

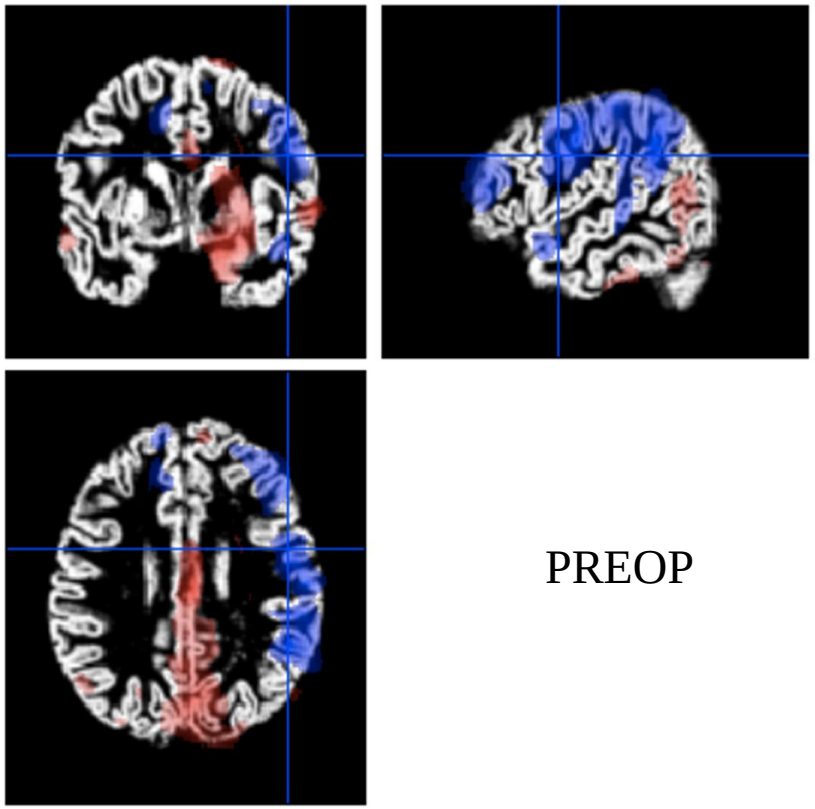
Analyse individuelle
Echec de revascularisation



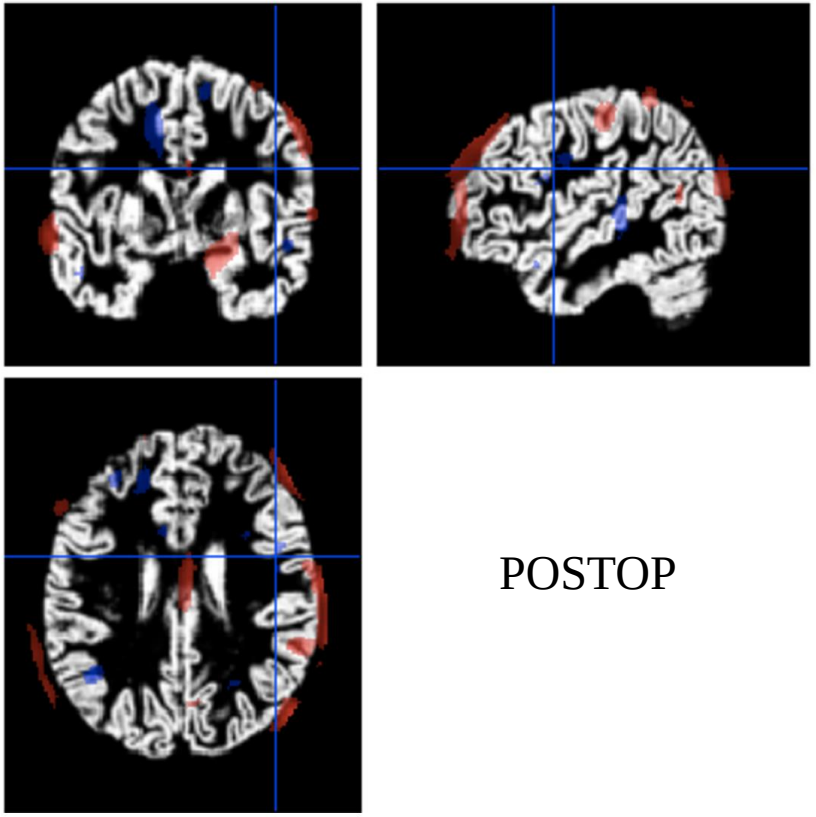
PREOP **POSTOP**

P<0.001, non FWE corrected

Analyse individuelle
Présentation hémorragique



PREOP



POSTOP

Hypo perfusion préop corticale
Hyper perfusion préop GG de la Base

disparait après chirurgie
↘ après chirurgie

CONCLUSION

IRM ASL

- Non invasive
- Reproductible / Quantification DSC

Approche statistique

- Objective
- Observateur indépendant

Analyse de groupe

- Valide la technique chirurgicale
- Facteurs prédictifs (analyse multi variée)

Analyse individuelle

- Indication opératoire
- Suivi post opératoire