



CENTRE DE RADIOLOGIE  
INTERVENTIONNELLE  
ET D'IMAGERIE MÉDICALE  
FRANCEVILLE



CLINIQUE FRANCEVILLE

مصحة فرانس فيل

## REUNION AMCAR

# AVC ISCHEMIQUE PHASE AIGUE

*Casablanca le 28 NOVEMBRE 2019*

*Docteur Alae MRANI*

# ACCIDENT VASCULAIRE CEREBRALE

- Cause : **Handicap - Mortalité 30%**
- **Incidence en Europe** 380-600/100 000

*AHA Heart Disease and Stroke Statistics, 2012*

*European Registers of Stroke, 2009*

*SPKC data, 2013*

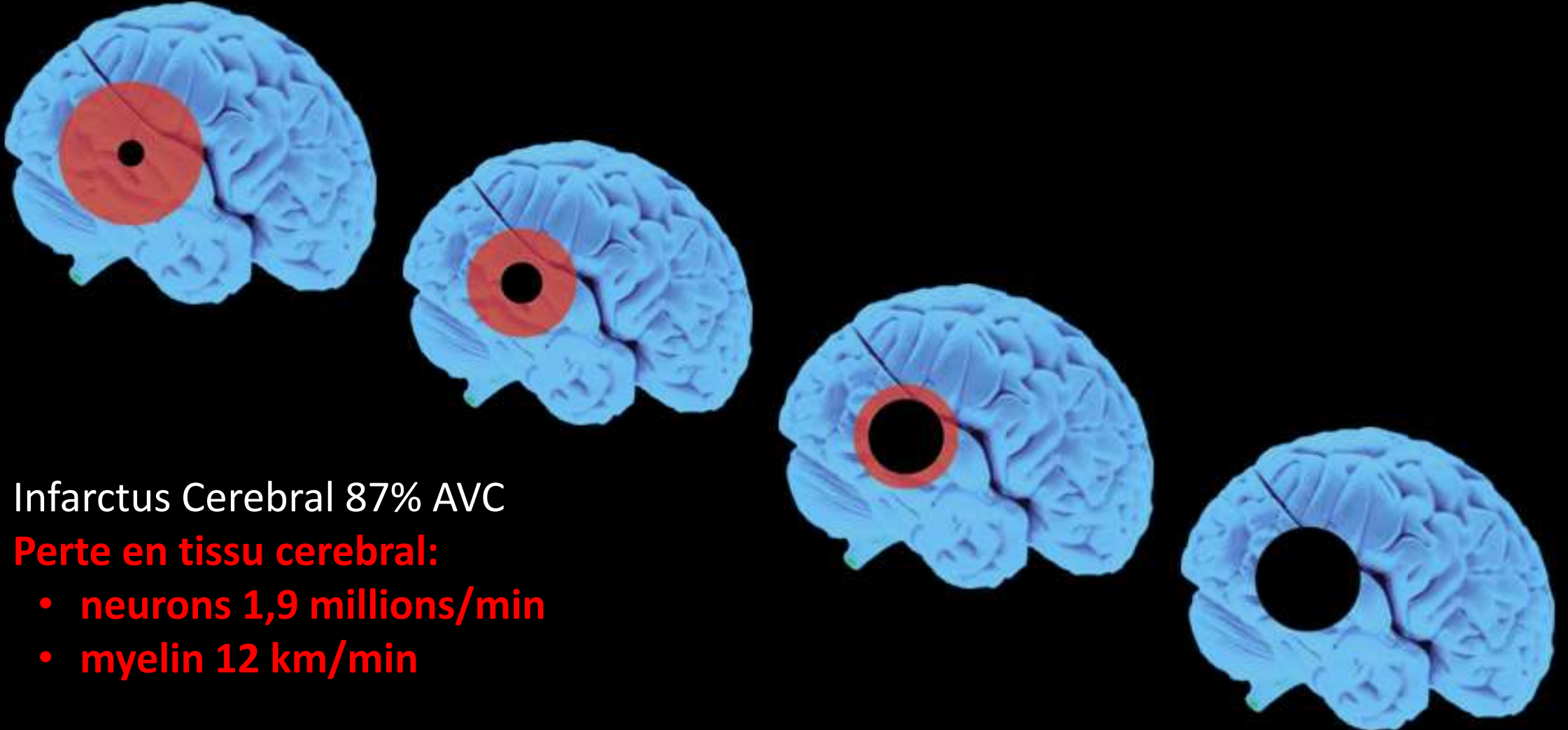
# DIAGNOSTIC POSITIF

- **IMAGERIE**

- Evolution Majeur
- IRM / PERFUSION CEREBRALE : résultats similaires

*Wintermark, 2008; Tacke et al, ECR 2014; AHA/ASA Guidelines for the Early Management of Patients With Acute Ischemic Stroke, 2013*

# PHYSIOPATHOLOGIE



- Infarctus Cerebral 87% AVC
- **Perte en tissu cerebral:**
  - **neurons 1,9 millions/min**
  - **myelin 12 km/min**

# TIME IS BRAIN



# THERAPEUTIQUES

- **Extension de la fenetre thérapeutique: de 3 à 6 h:**
- Quelques patients qui benificie du traitement dans les délai entre 3-4,5 heures (~30%) 6 hours (~ 45%)
- **Selection des thérapeutiques**
  - Thrombolyse en IV marche mieux avec les petites branches perforantes
  - Thrombectomie mecanique : Necessite de l'imagerie vasculaire

*J. Tacke, ECR 2014*

*Latchaw et al. Recommendations for Imaging of Acute Ischemic Stroke: A Scientific Statement From the American Heart Association. // Stroke 2009;40;3646-3678*

# IMAGERIE IDEAL

- ACCESSIBLE
- DISPONIBLE
- REPRODUCTIBLE
- RAPIDE

**IRM / TDM**

# OBJECTIFS IMAGERIES

- Parenchyme cérébrale
- Vaisseaux
- Tissue Viable



# OBJECTIFS IMAGERIES

- Questions:

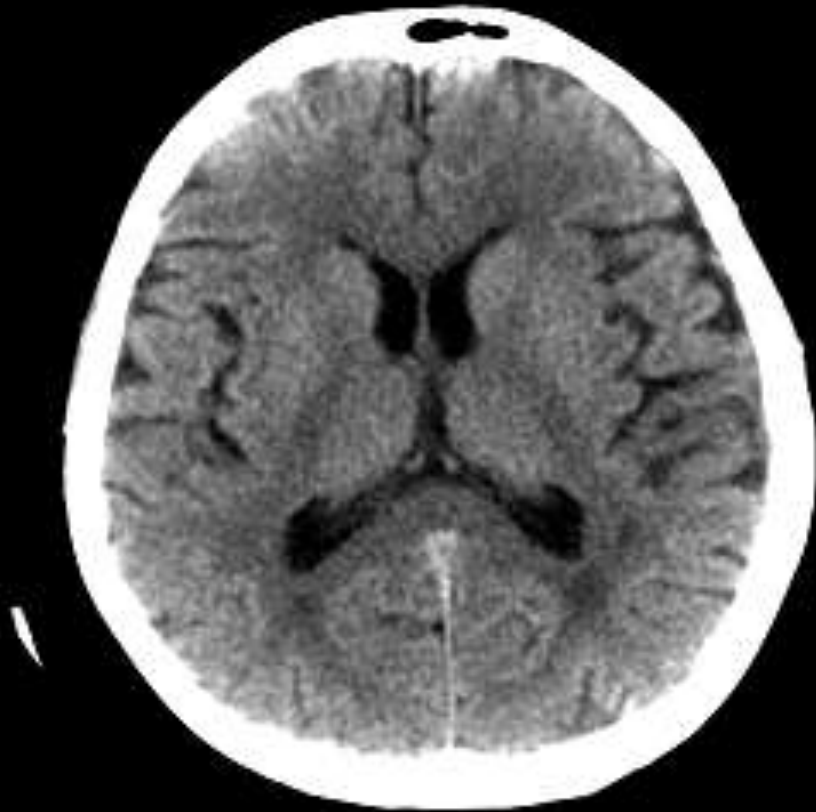
- ✓ Hémorragie ?

- ✓ Thrombus artériel ?

- ✓ La zone d'ischémie: taille zone hypoperfusée ?

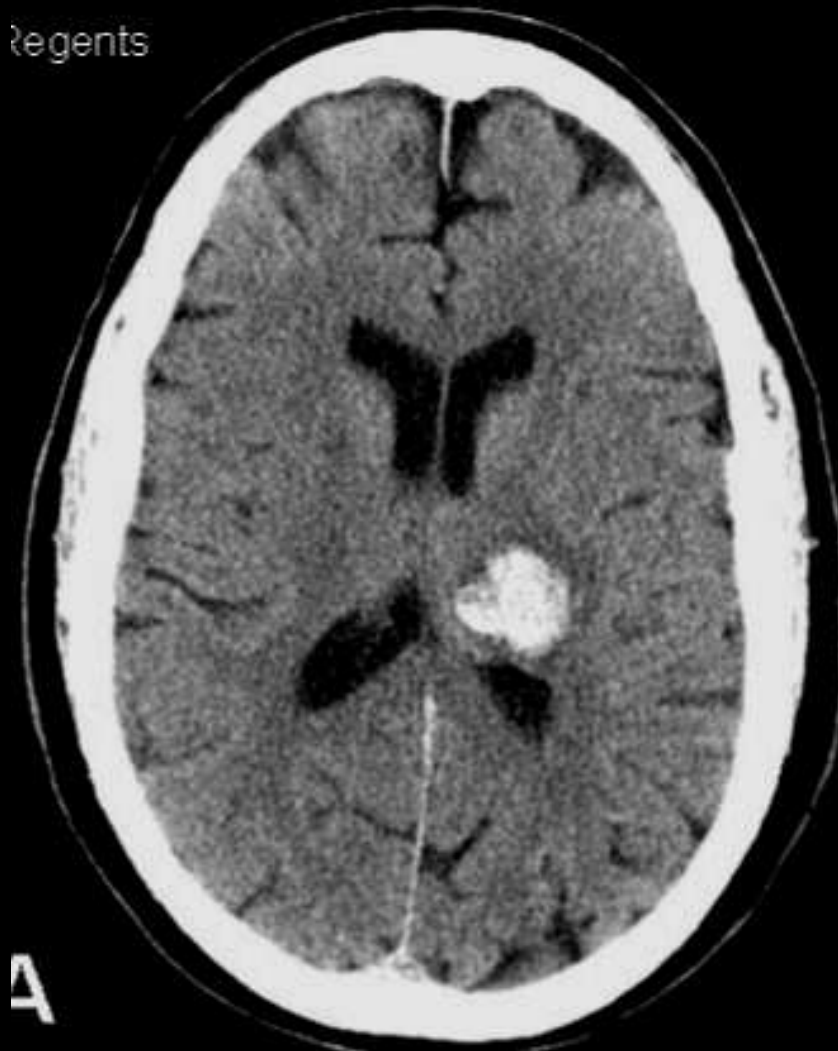
- ✓ La collatéralité ?

# ISCHEMIE



# HEMORRAGIE

Regents



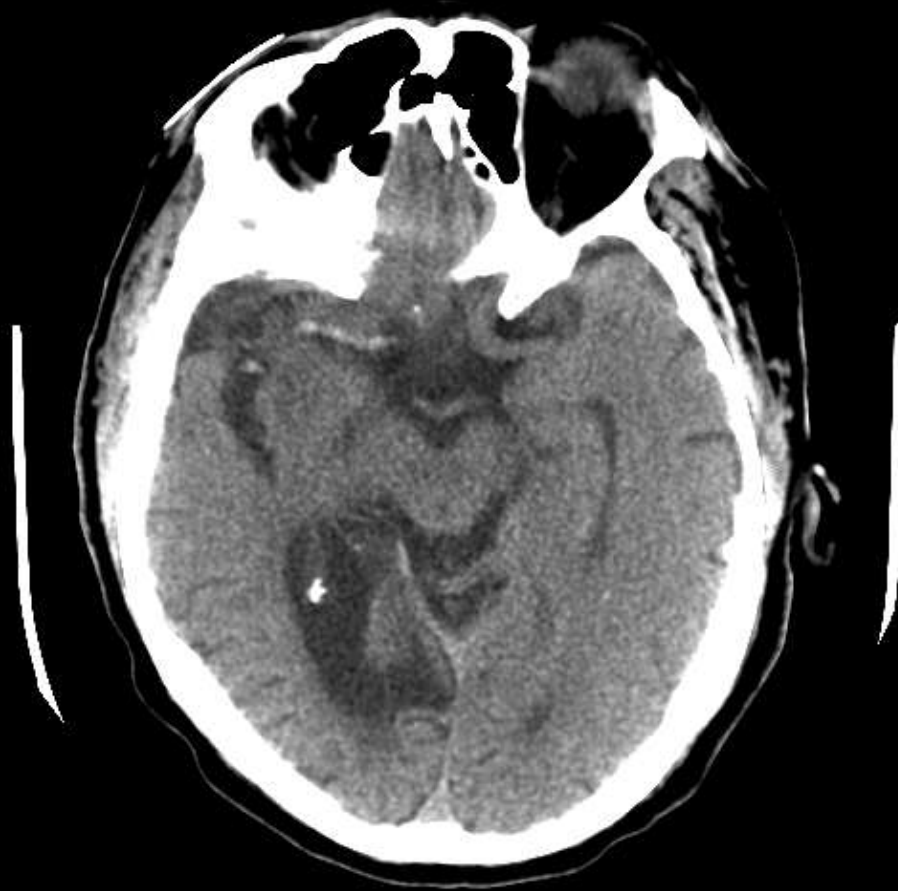
A

# PREMIERS SIGNES CT AVC ISCHEMIQUE



RUBAN INSULAIRE

# PREMIERS SIGNES CT AVC ISCHEMIQUE



ARTERE HYPERDENSE

# PREMIERS SIGNES CT AVC ISCHEMIQUE



OEDEME CEREBRAL

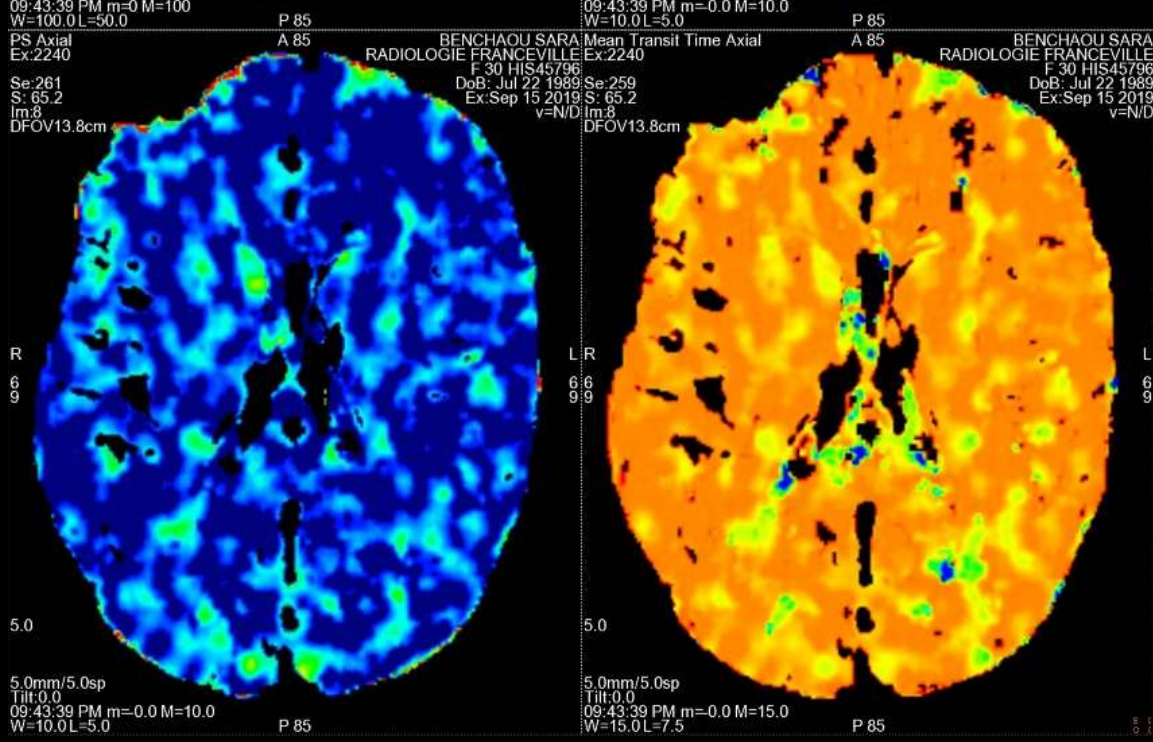
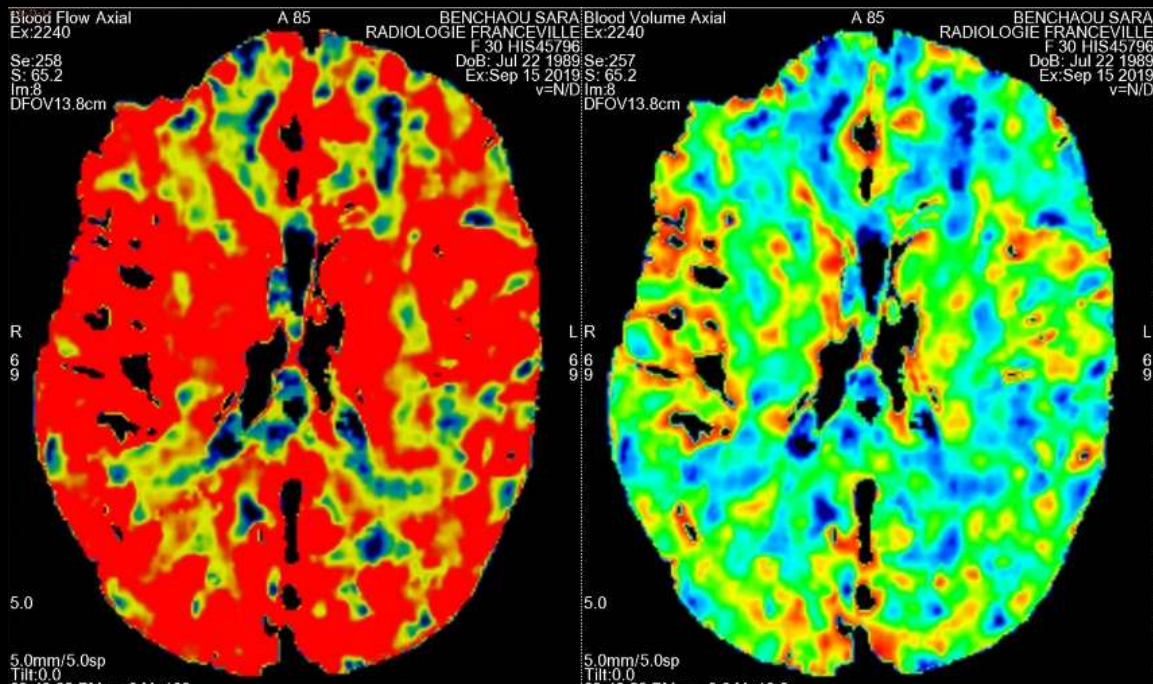
# PERFUSION CT

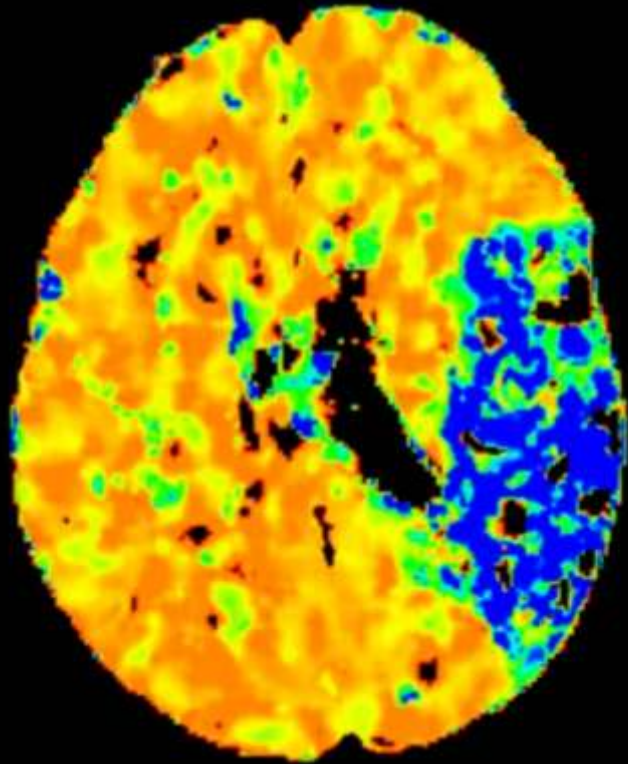
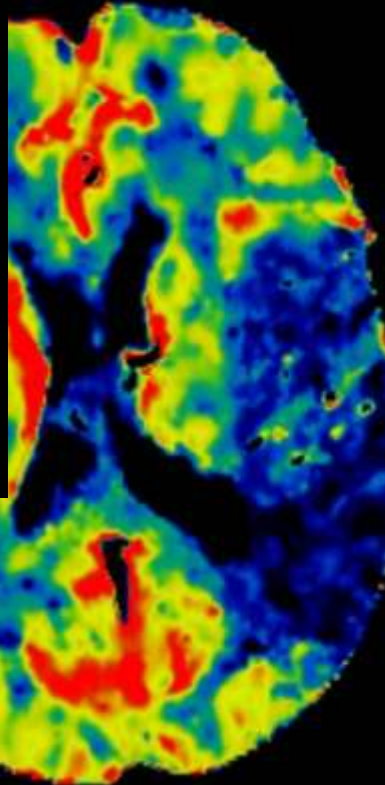
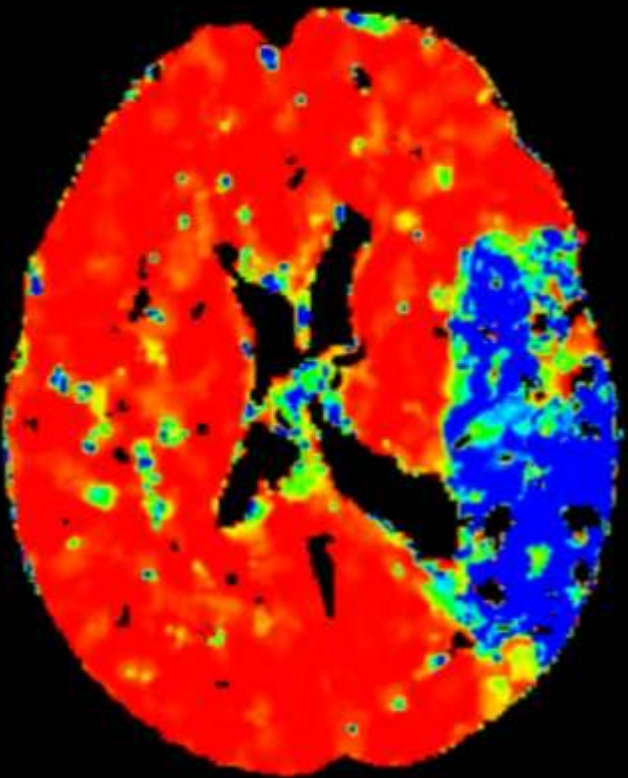
- Rehaussement vasculaire = vascularisation du tissu cerebral
- Protocole: premier passage sans IV
  - ✓ contraste (40 ml-5 ml/sec),
  - ✓ Graphic = prise de contraste dynamique/tps
  - ✓ Artères et les veines
  - ✓ Angio-TSA

# PERFUSION CT

- Quantification:
  - ✓ *CBF* (cerebral blood flow) ml/min/100 g
  - ✓ *CBV* (cerebral blood volume) mL/100 g
  - ✓ *MTT* (mean transit time) sec







Elaissaoui Faouzya  
1634

n

HFS  
n : SCANNER ...  
Crane sans IV

RADIOLOGIE FRANCEVILLE  
**Précédent 1**

**17/04/2019 12:...**

GE MEDICAL SYSTEMS Revo...  
120kV, 14mAs  
SC :320,00 mm  
100% Pixel  
Résolution d'origine  
DFOV 25,0 x 25,0 cm  
LT 1,25 mm  
Visionneuse

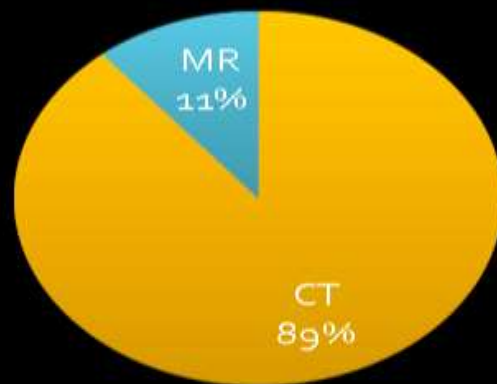


P

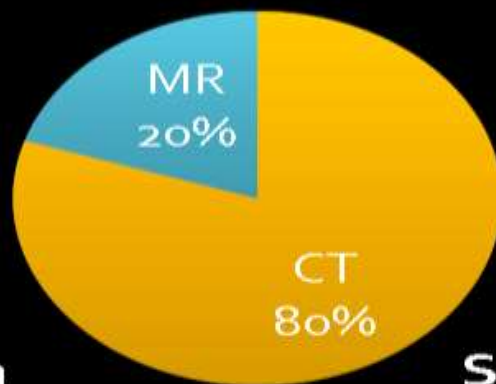
C 40  
L 80

# MRI vs. CT

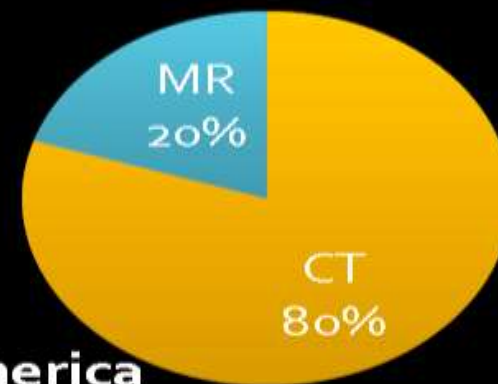
**Australia**



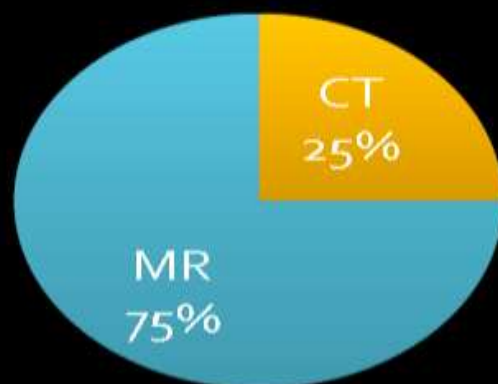
**North America**



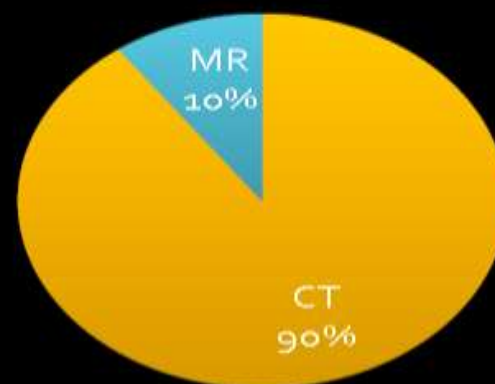
**Europe**

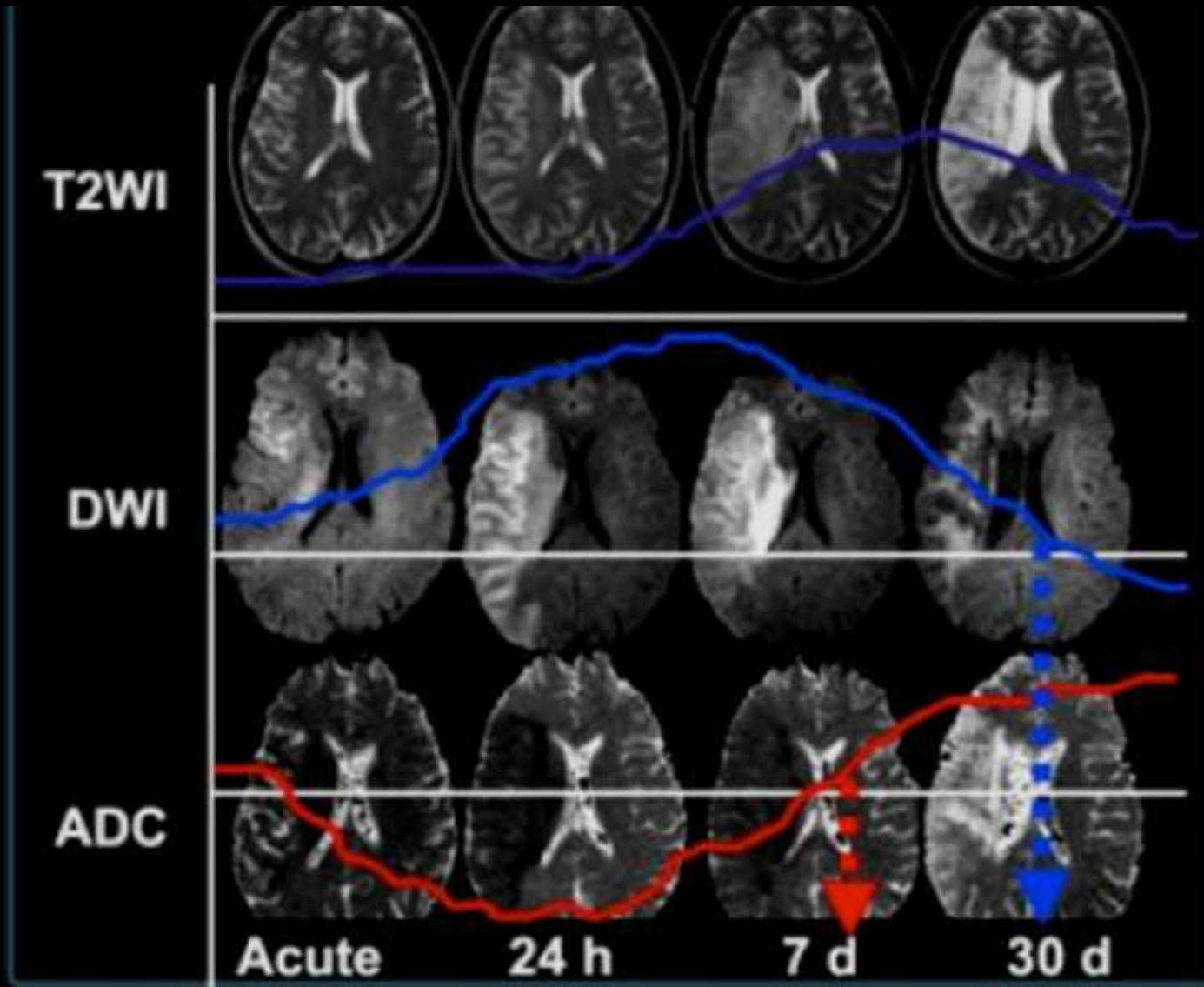


**Asia**



**South America**





IRM

# INTERET DE L'IRM



Journal of Neuroradiology  
Volume 46, Issue 2, March 2019, Page 76



100-130-C2408

## Le T2 mapping : une méthode quantitative fiable de datation des AVC en phase aiguë ?

T. Duchaussoy<sup>a,\*</sup>, J.-F. Budzik<sup>a</sup>, L. Norberciak<sup>b</sup>, M. Pasquini<sup>c</sup>, L. Colas<sup>a</sup>, S. Verclytte<sup>a</sup>

100-130-C2408

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<sup>a</sup> Service d'imagerie, groupement des hôpitaux de l'institut Catholique de Lille, hôpital Saint-Philibert, rue du Grand But, BP 249, 59462 LOMME CEDEX, France

<sup>b</sup> Service de Biostatistiques, Groupement des Hôpitaux de l'Institut Catholique de Lille, France

<sup>c</sup> Service de Neurologie, Groupement des Hôpitaux de l'Institut Catholique de Lille, France

\* Auteur correspondant

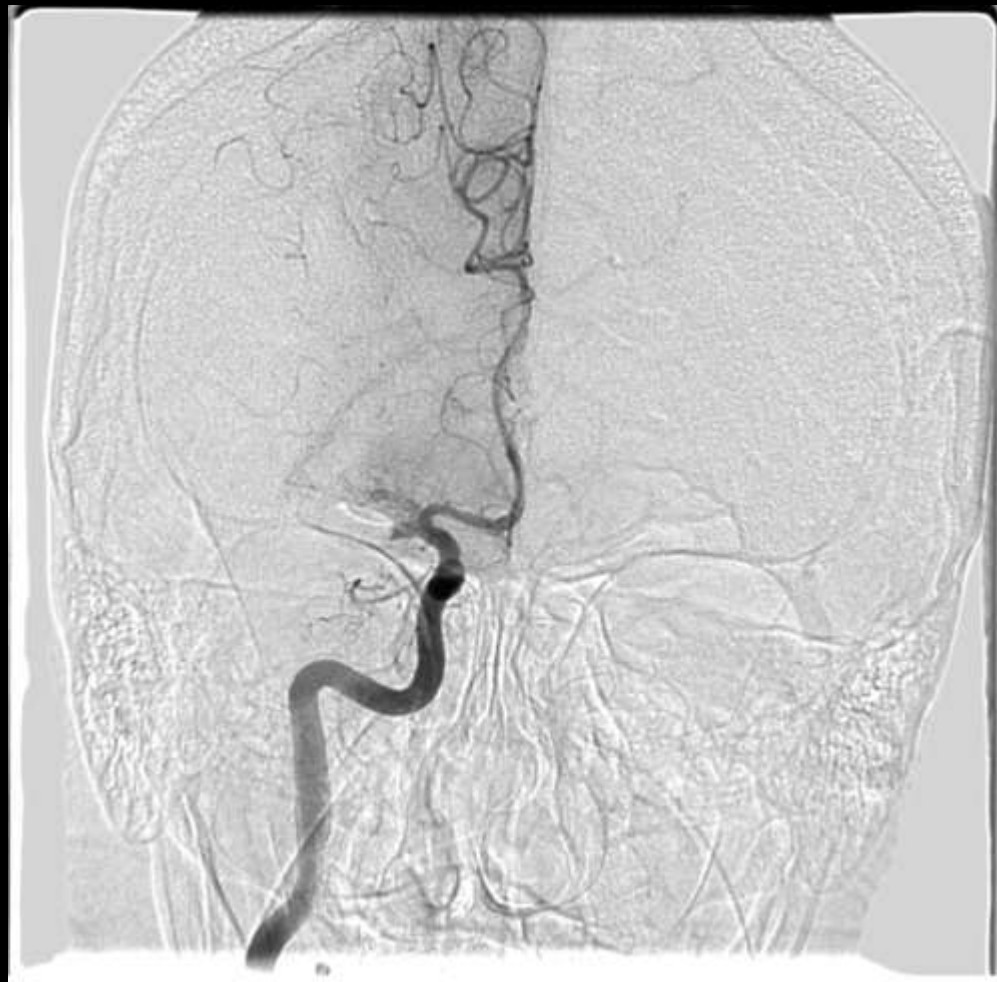
# APPLICATIONS CLINIQUES

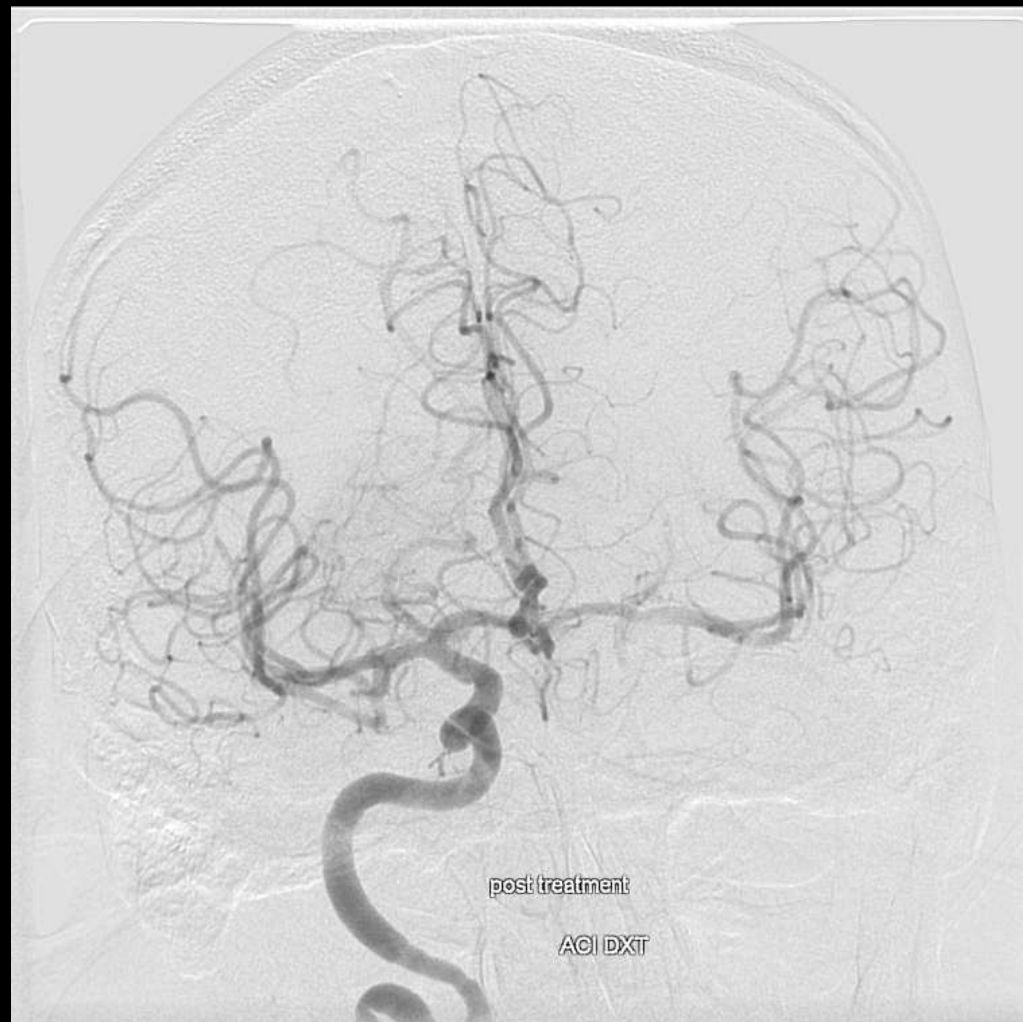
- Homme
  - 49 ans
  - Territoire de l'ACM
  - NIHSS : 17
- Femme
  - 59 ans
  - Territoire ACM
  - NIHSS : 15

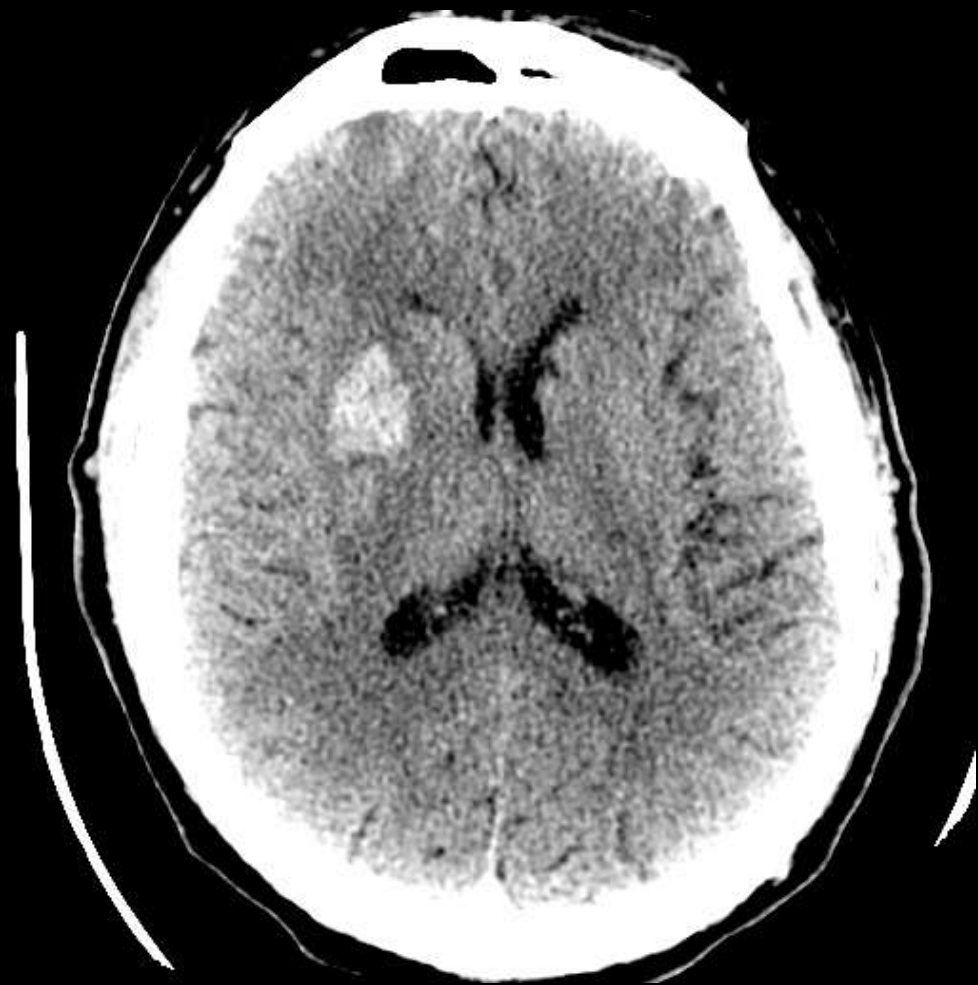
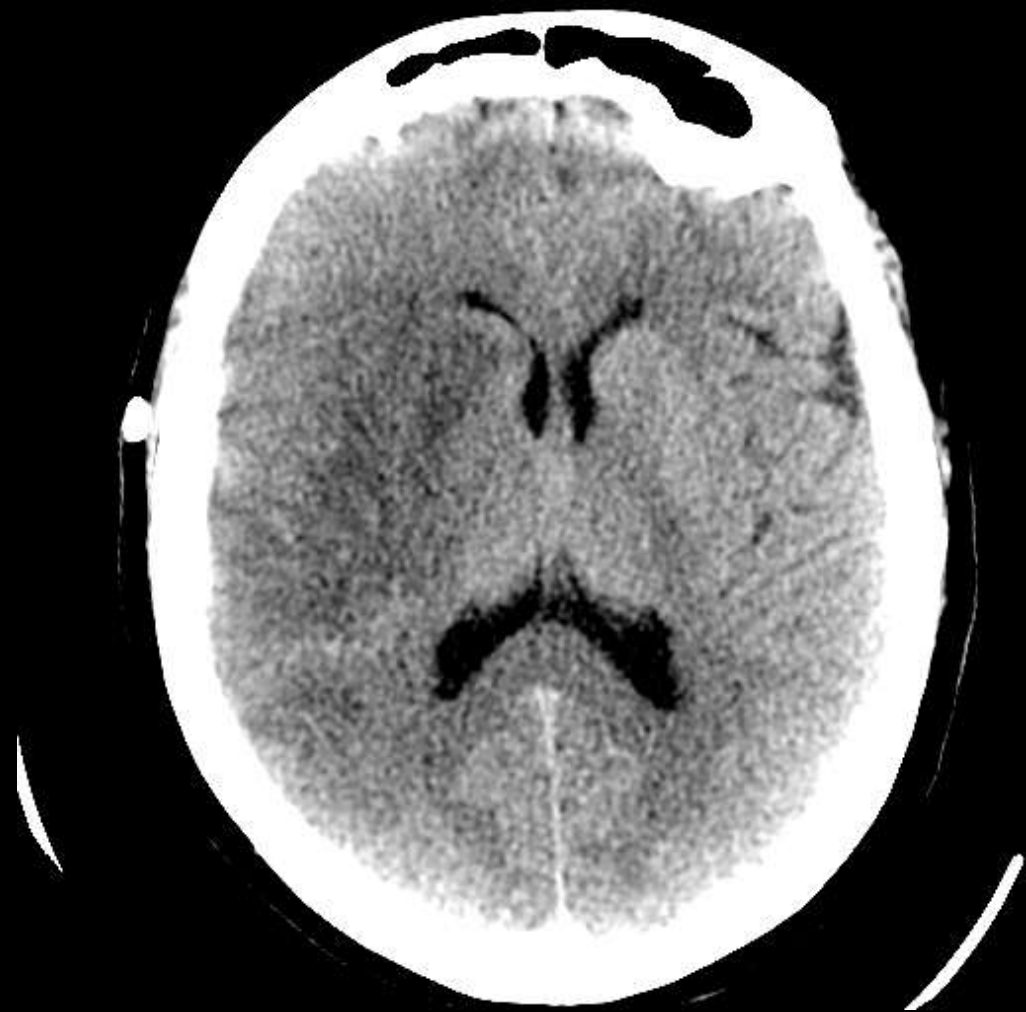


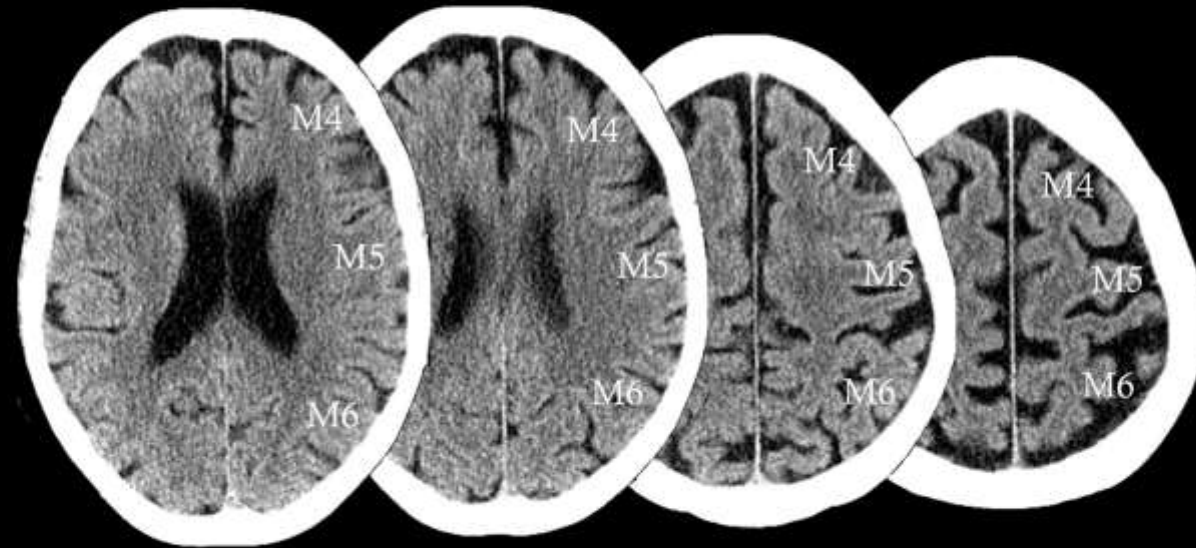
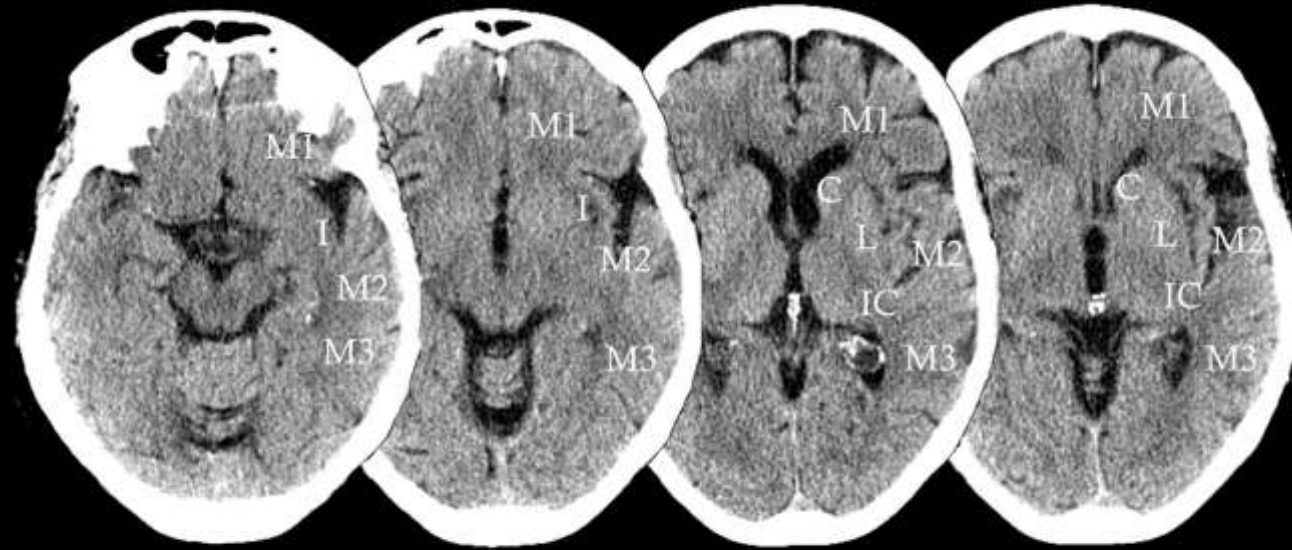












ASPECTS 10 NORMAL

# CRITERES DE SELECTIONS

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

William J. Powers, Alejandro A. Rabinstein, Teri Ackerson, Opeolu M. Adeoye, Nicholas C. Bambakidis, Kyra Becker, José Biller, Michael Brown, Bart M. Demaerschalk, Brian Hoh, Edward C. Jauch, Chelsea S. Kidwell, Thabele M. Leslie-Mazwi, Bruce Ovbiagele, Phillip A. Scott, Kevin N. Sheth, Andrew M. Southerland, Deborah V. Summers, David L. Tirschwell, on behalf of the American Heart Association Stroke Council

# 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

- All patients with suspected acute stroke should receive brain imaging evaluation on arrival in the hospital - **Noncontrast CT (NCCT)** - to make decisions about acute management (Level 1, A).
- Systems should be established so that brain imaging studies can be performed within **20 minutes** of arrival in the ED in at least 50% of patients who may be candidates for IV alteplase and/or mechanical thrombectomy (Level 1)
- For patients who otherwise meet criteria for EVT, a noninvasive intracranial vascular study is recommended during the initial imaging evaluation of the acute stroke patient, but should not delay IV alteplase if indicated. For patients who qualify for IV alteplase according to guidelines from professional medical societies, initiating IV alteplase before noninvasive vascular imaging is recommended (Level 1, A)
- It may be reasonable to incorporate collateral flow status into clinical decision making in some candidates to determine eligibility for mechanical thrombectomy (MR CLEAN, IMS III) (Level 2B)

## 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

- Patients should receive **mechanical thrombectomy** with a stent retriever if they meet all the following criteria (Level 1, A)
  - (1) prestroke MRS score of 0 to 1;
  - (2) occlusion of the ICA or MCA segment 1 (M1);
  - (3) age  $\geq 18$  years;
  - (4) NIHSS score of  $\geq 6$ ;
  - (5) ASPECTS of  $\geq 6$ ;
  - (6) treatment can be initiated  $< 6$  hours from onset
- occlusion of the MCA segment (M2) or (M3) , ACA, ACP, AB (Level 2B).
- occlusion of ICA and MCA M1, prestroke mRS score  $> 1$ , ASPECTS  $< 6$ , or NIHSS score  $< 6$ , treatment can be initiated  $< 6$  hours from onset (Level 2b)

ORIGINAL ARTICLE [FREE PREVIEW](#)

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

Raul G. Nogueira, M.D., Ashutosh P. Jadhav, M.D., Ph.D., Diogo C. Haussen, M.D., Alain Bonafe, M.D., Ronald F. Budzik, M.D., Parita Bhuva, M.D., Dileep R. Yavagal, M.D., Marc Ribo, M.D., Christophe Cognard, M.D., Ricardo A. Hanel, M.D., Cathy A. Sila, M.D., Ameer E. Hassan, D.O., [et al.](#), for the DAWN Trial Investigators\*

ORIGINAL ARTICLE [FREE PREVIEW](#)

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

Gregory W. Albers, M.D., Michael P. Marks, M.D., Stephanie Kemp, B.S., Soren Christensen, Ph.D., Jenny P. Tsai, M.D., Santiago Ortega-Gutierrez, M.D., Ryan A. McTaggart, M.D., Michel T. Torbey, M.D., May Kim-Tenser, M.D., Thabele Leslie-Mazwi, M.D., Amrou Sarraj, M.D., Scott E. Kasner, M.D., [et al.](#), for the DEFUSE 3 Investigators\*



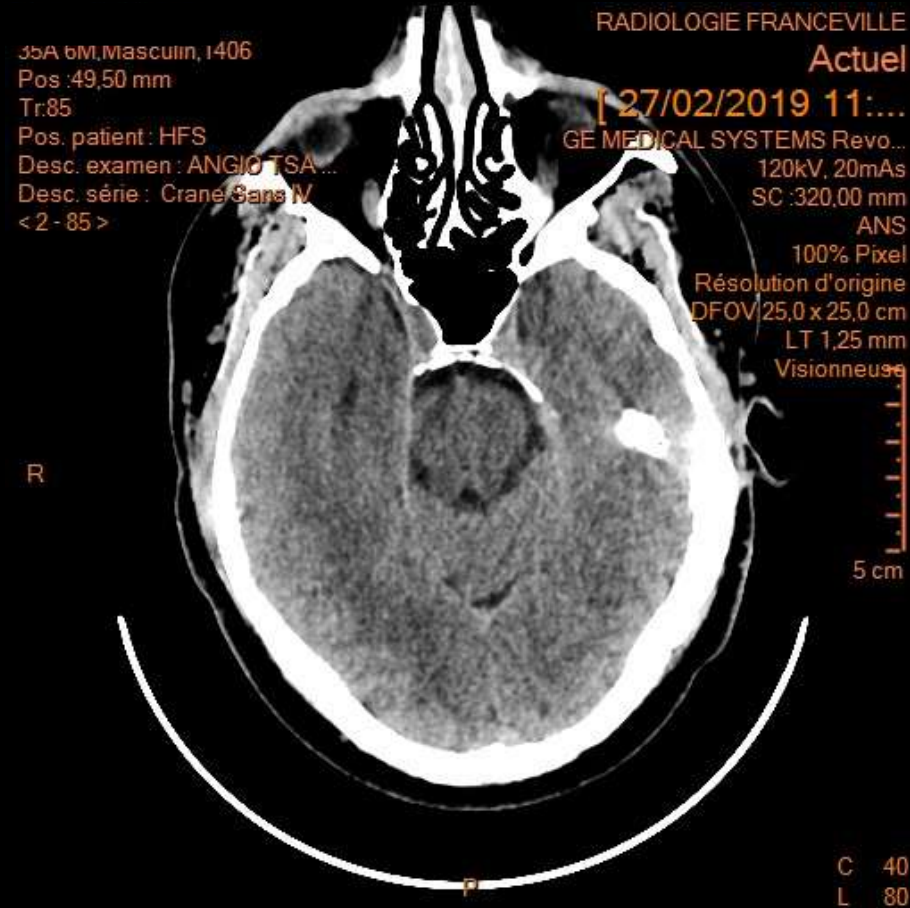
# THROMBECTOMIE MECANIQUE

- **AHA/ASA Guidelines 2018**
  - ✓ Up to 16 hours (Level 1A) DEFUSE 3
  - ✓ Up to 24 hours (Level 2a) DAWN
- **DEFUSE 3 or DAWN Criteria:**
  - ✓ DAWN - mismatch between the severity of the clinical deficit and the infarct volume ( $<1/3$ )
  - ✓ Group A:  $\geq 80$  years of age, had a National Institutes of Health Stroke Scale (NIHSS) score of  $\geq 10$ , and had an infarct volume of  $< 21$  ml
  - ✓ Group B:  $< 80$  years of age, had a NIHSS score of  $\geq 10$ , and had an infarct volume of  $< 31$  ml
  - ✓ Group C:  $< 80$  years of age, had a NIHSS score of  $\geq 20$ , and had an infarct volume of 31 to  $< 51$  ml
- DEFUSE 3 - Target Mismatch Profile on CT perfusion or MRI (ischemic core volume is  $< 70$  ml, mismatch ratio is  $\geq 1.8$  and mismatch volume\* is  $\geq 15$  ml)

# CAS CLINIQUE

- HOMME
- 35 ans
- Hémiplégie gauche
- NHISS à 15
- Reception à H2 en Radiologie

# TDM



RADIOLOGIE FRANCEVILLE

Actuel

[ 27/02/2019 11:...

GE MEDICAL SYSTEMS Revo...

120kV, 19mAs

SC :320,00 mm

ANS

100% Pixel

Résolution d'origine

DFOV 25,0 x 25,0 cm

LT 1,25 mm

Visionneuse



R

C 40

L 80

RADIOLOGIE FRANCEVILLE

Actuel

[ 27/02/2019 11:...

GE MEDICAL SYSTEMS Revo...

120kV, 19mAs

SC :320,00 mm

ANS

100% Pixel

Résolution d'origine

DFOV 25,0 x 25,0 cm

LT 1,25 mm

Visionneuse



R

C 40

L 80

35A 6M,Masculin,1406

Pos :65,75 mm

Tr:111

Pos. patient : HFS

Desc. examen : ANGIO TSA...

Desc. série : Crane Sans IV

<2 - 111 >

R

35A 6M,Masculin,1406

Pos :79,50 mm

Tr:133

Pos. patient : HFS

Desc. examen : ANGIO TSA...

Desc. série : Crane Sans IV

<2 - 133 >

R

C 40

L 80



35A 6M,Masculin,1406

Pos :88,88 mm

Tr:148

Pos. patient : HFS

Desc. examen : ANGIO TSA...

Desc. série : Crane Sans IV

< 2 - 148 >

Actuel

[ 27/02/2019 11:...

GE MEDICAL SYSTEMS Revo...

120kV, 19mAs

SC :320,00 mm

ANS

100% Pixel

Résolution d'origine

DFOV 25,0 x 25,0 cm

LT 1,25 mm

Visionneuse

5 cm

R

C 40

L 80



35A 6M,Masculin,1406

Pos :90,75 mm

Tr:151

Pos. patient : HFS

Desc. examen : ANGIO TSA...

Desc. série : Crane Sans IV

< 2 - 151 >

Actuel

[ 27/02/2019 11:...

GE MEDICAL SYSTEMS Revo...

120kV, 18mAs

SC :320,00 mm

ANS

100% Pixel

Résolution d'origine

DFOV 25,0 x 25,0 cm

LT 1,25 mm

Visionneuse

5 cm

R

C 40

L 80



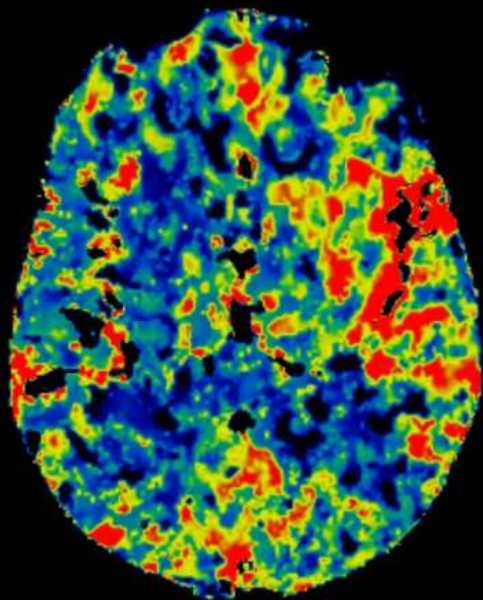
# **SCANNER CEREBRALE DANS LES LIMITES DE LA NORMALE**

# PERFUSION CT

Blood Flow Axial  
Ex:1406  
Se:458  
S: 84.0  
Im:8  
DFOV28.0cm

A 184

RADIOLOGIE FRANCEVILLE  
M 35-1406  
DoB: Aug 21 1983  
Ex:Feb 27 2019  
v=N/D



L  
1  
4  
0

5.0

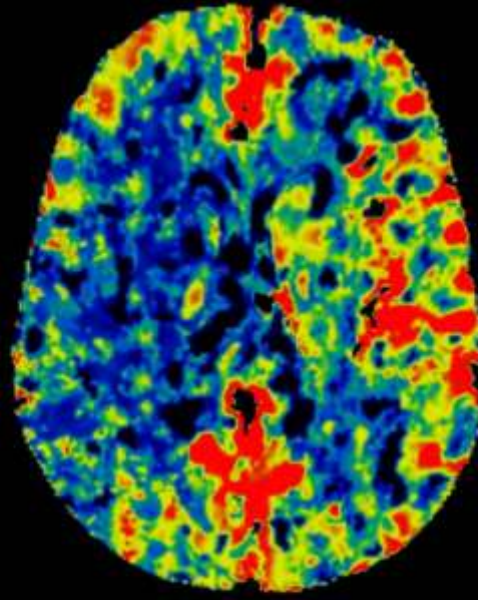
5.0mm/5.0sp  
Tilt:0.0  
11:25:08 AM m=0 M=100  
W=100.0L=50.0

P 211

Blood Flow Axial  
Ex:1406  
Se:458  
S: 94.0  
Im:10  
DFOV28.0cm

A 184

RADIOLOGIE FRANCEVILLE  
M 35-1406  
DoB: Aug 21 1983  
Ex:Feb 27 2019  
v=N/D



L  
1  
4  
0

5.0

5.0mm/5.0sp  
Tilt:0.0  
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W=100.0L=50.0

P 211

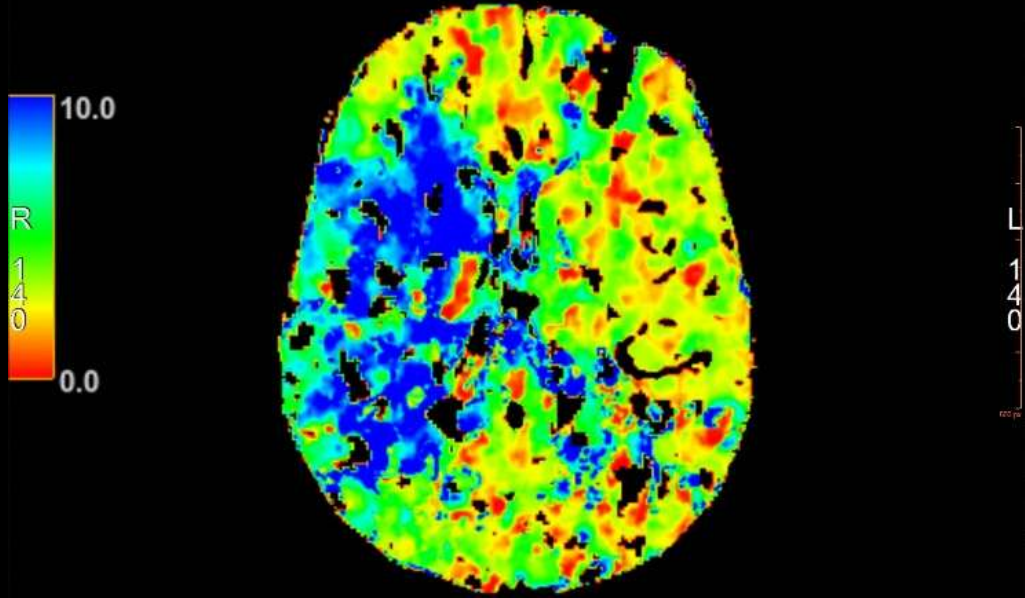
CBF



TMax Axial  
Ex:1406  
Se:462  
S: 89.0  
Im:9  
DFOV28.0cm

A 184

K  
RADIOLOGIE FRANCEVILLE  
M 35-1406  
DoB: Aug 21 1983  
Ex:Feb 27 2019  
v=N/D



5.0

5.0mm/5.0sp  
Tilt:0.0  
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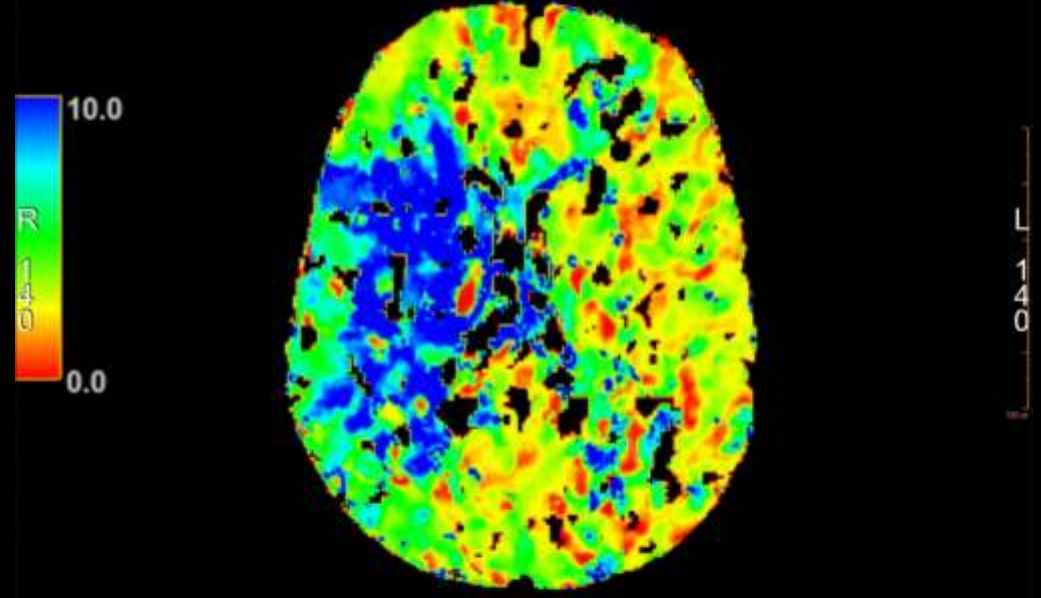
P 211

MTT

TMax Axial  
Ex:1406  
Se:462  
S: 94.0  
Im:10  
DFOV28.0cm

A 184

M  
RADIOLOGIE FRANCEVILLE  
M 35-1406  
DoB: Aug 21 1983  
Ex:Feb 27 2019  
v=N/D



5.0

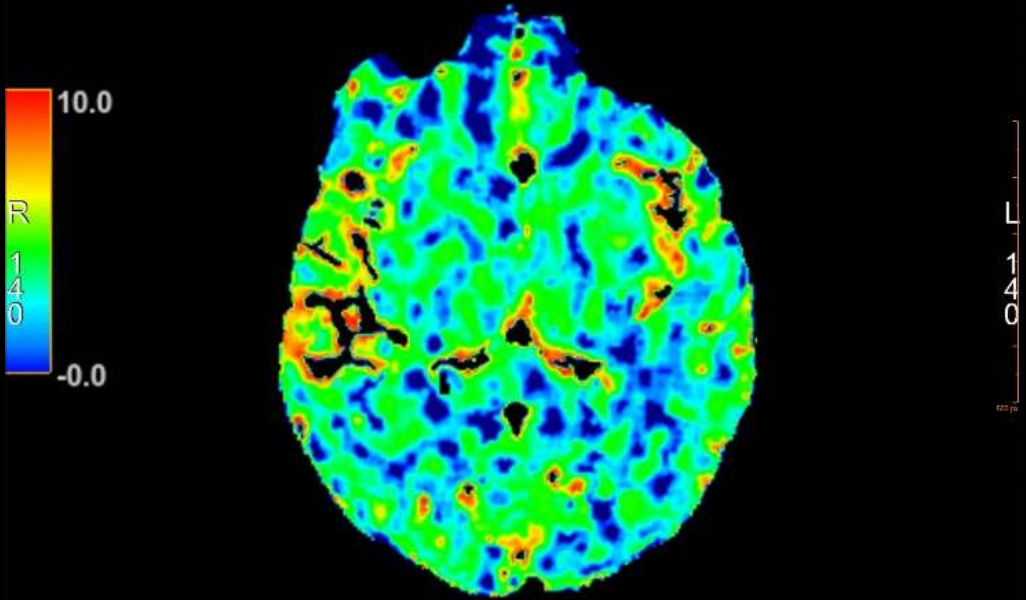
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W=10.0L=5.0

P 211

Blood Volume Axial  
Ex:1406  
Se:457  
S: 79.0  
Im:7  
DFOV28.0cm

A 184

K  
RADIOLOGIE FRANCEVILLE  
M 35-1406  
DoB: Aug 21 1983  
Ex:Feb 27 2019  
v=N/D



5.0

5.0mm/5.0sp  
Tilt:0.0  
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W=10.0L=5.0

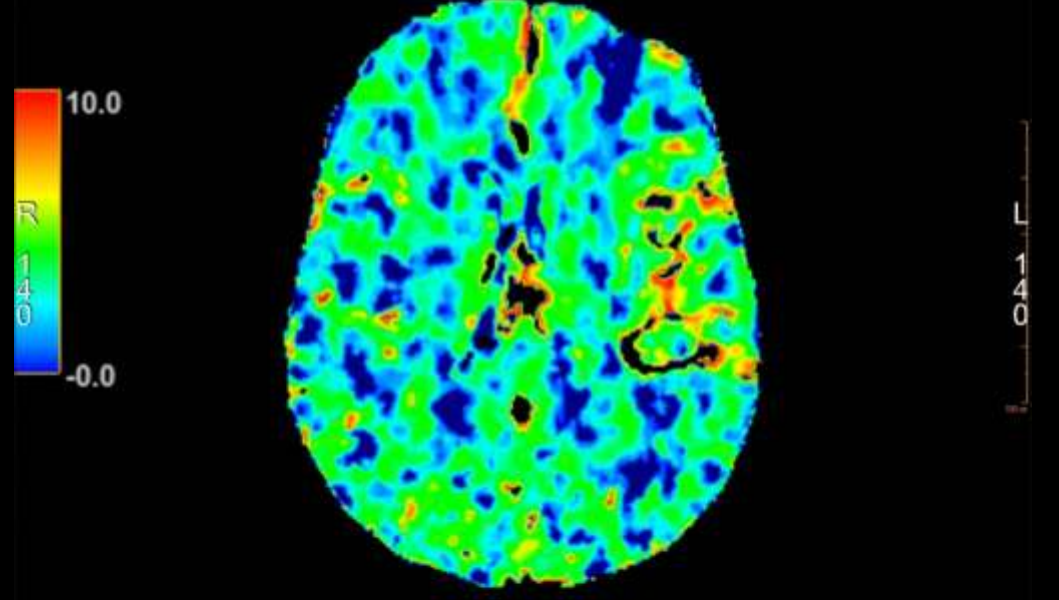
P 211

CBV

Blood Volume Axial  
Ex:1406  
Se:457  
S: 89.0  
Im:9  
DFOV28.0cm

A 184

K  
RADIOLOGIE FRANCEVILLE  
M 35-1406  
DoB: Aug 21 1983  
Ex:Feb 27 2019  
v=N/D



5.0

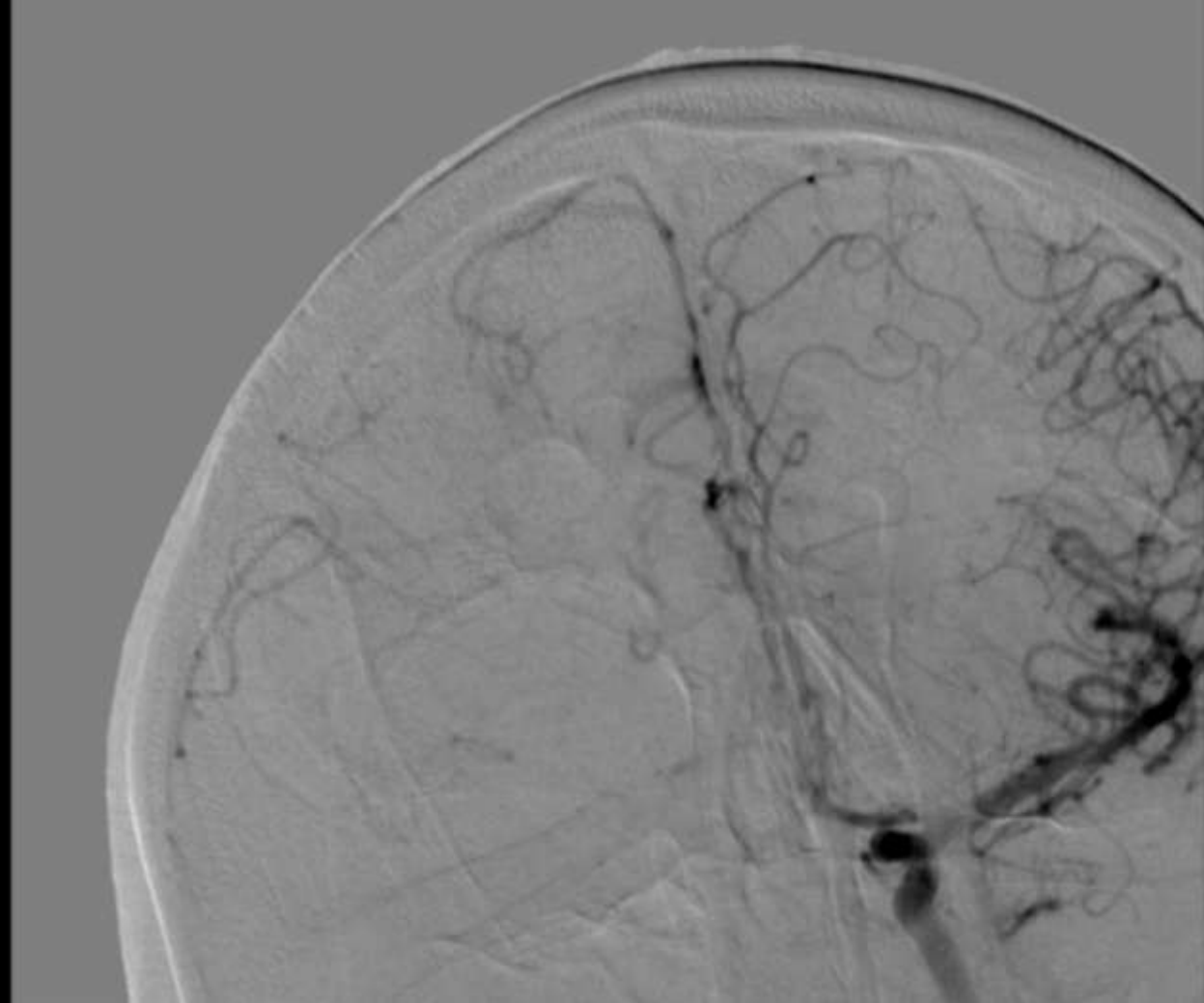
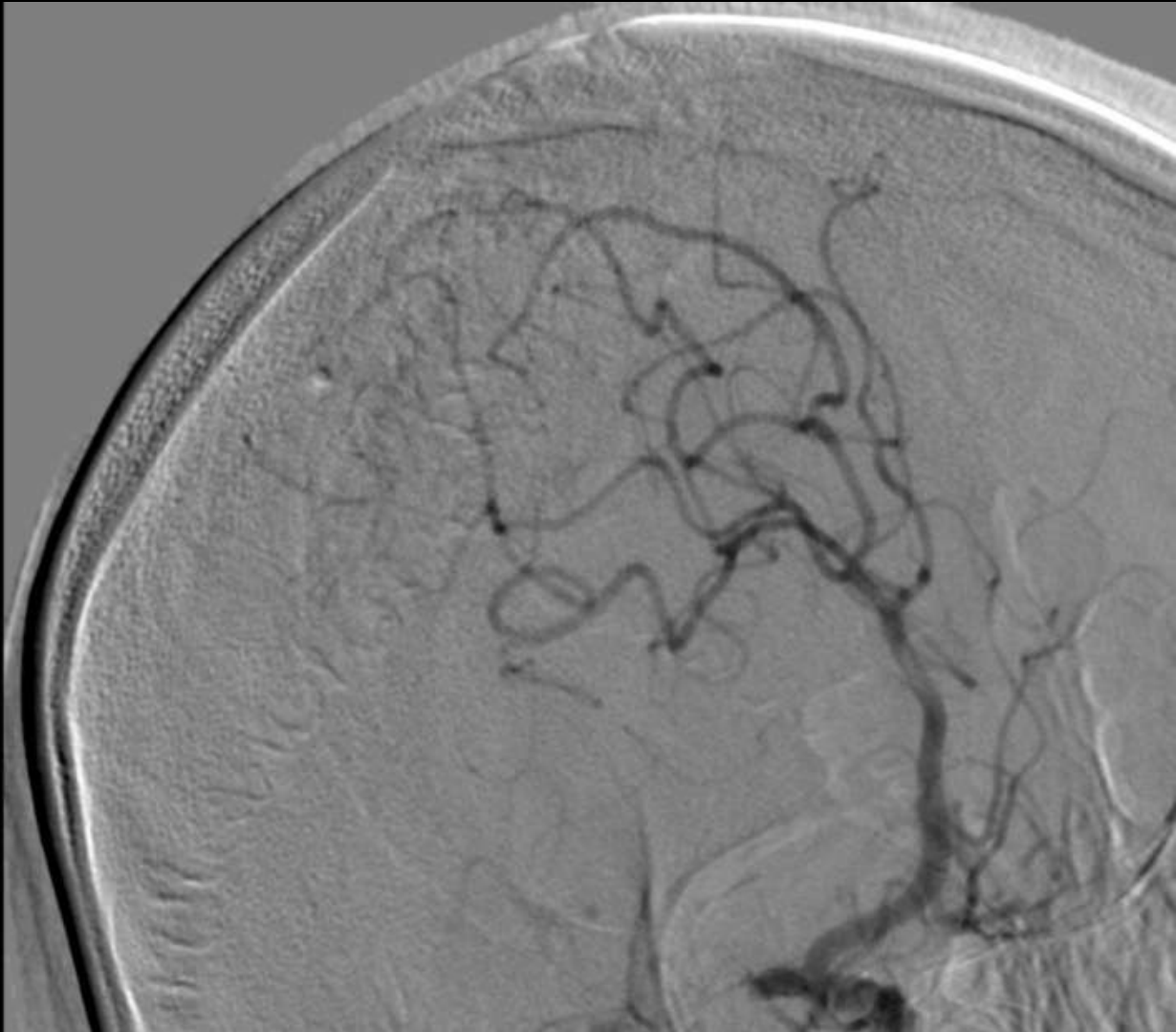
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Tilt:0.0  
11:25:08 AM m=-0.0 M=10.0  
W=10.0L=5.0

P 211

CAT

- **THROMBOLYSE EN IV : 3H**

# ARTERIOGRAPHIE CEREBRALE





← Good Choice  
Bad Choice →

**DECISION**

**PAS DE THROMBECTOMIE  
MÉCANIQUE**

# CONTRÔLE CT

35A 6M,Masculin,1406  
Pos :64,75 mm  
Tr:143  
Pos. patient : HFS  
Desc. examen : SCANNER...  
Desc. série : Crane sans IV  
<2 - 143 >

RADIOLOGIE FRANCEVILLE

Plus récent

01/03/2019 10:...

GE MEDICAL SYSTEMS Revo...

120kV, 18mAs

SC :320,00 mm

ANS

100% Pixel

Résolution d'origine

DFOV 25,0 x 25,0 cm

LT 1,25 mm

Visionneuse

5 cm

C 40

L 80

35A 6M,Masculin,1406  
Pos :72,25 mm  
Tr:155  
Pos. patient : HFS  
Desc. examen : SCANNER...  
Desc. série : Crane sans IV  
<2 - 155 >

RADIOLOGIE FRANCEVILLE

Plus récent

01/03/2019 10:...

GE MEDICAL SYSTEMS Revo...

120kV, 18mAs

SC :320,00 mm

ANS

100% Pixel

Résolution d'origine

DFOV 25,0 x 25,0 cm

LT 1,25 mm

Visionneuse

5 cm

C 40

L 80

