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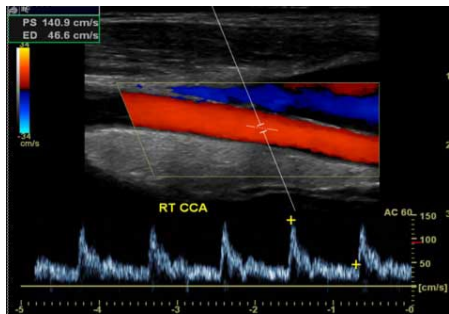
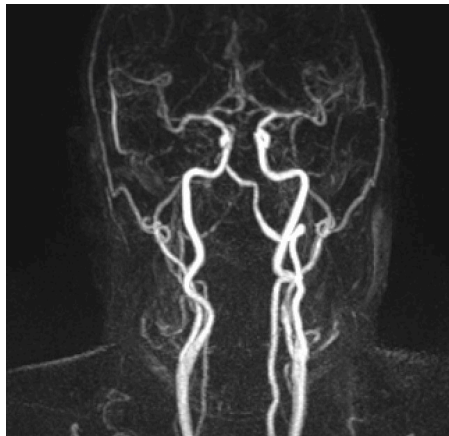
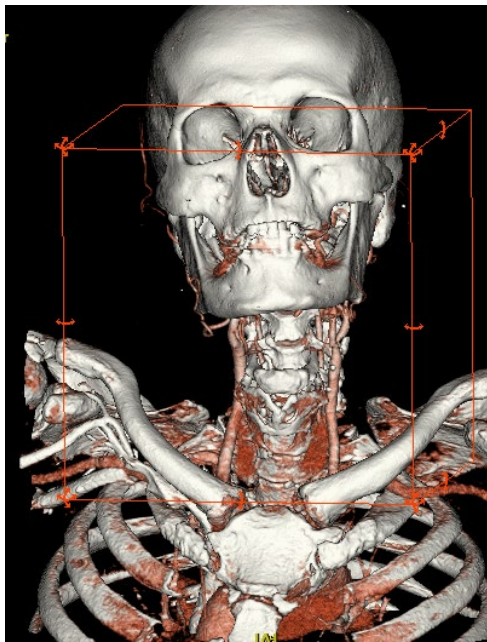
**Hôpitaux  
Universitaires  
de Marseille** | **ap.  
hm**

# Caractérisation de la plaque d'athérome carotidienne en pratique clinique.

Basile Kerleroux, Philippe Dory-Lautrec, Hervé Brunel, Pierre Lehmann, Anthony Reyre, Xavier Carle, Thibault Agripnidis, Sivadji Vingadassalom, Jean-François Hak

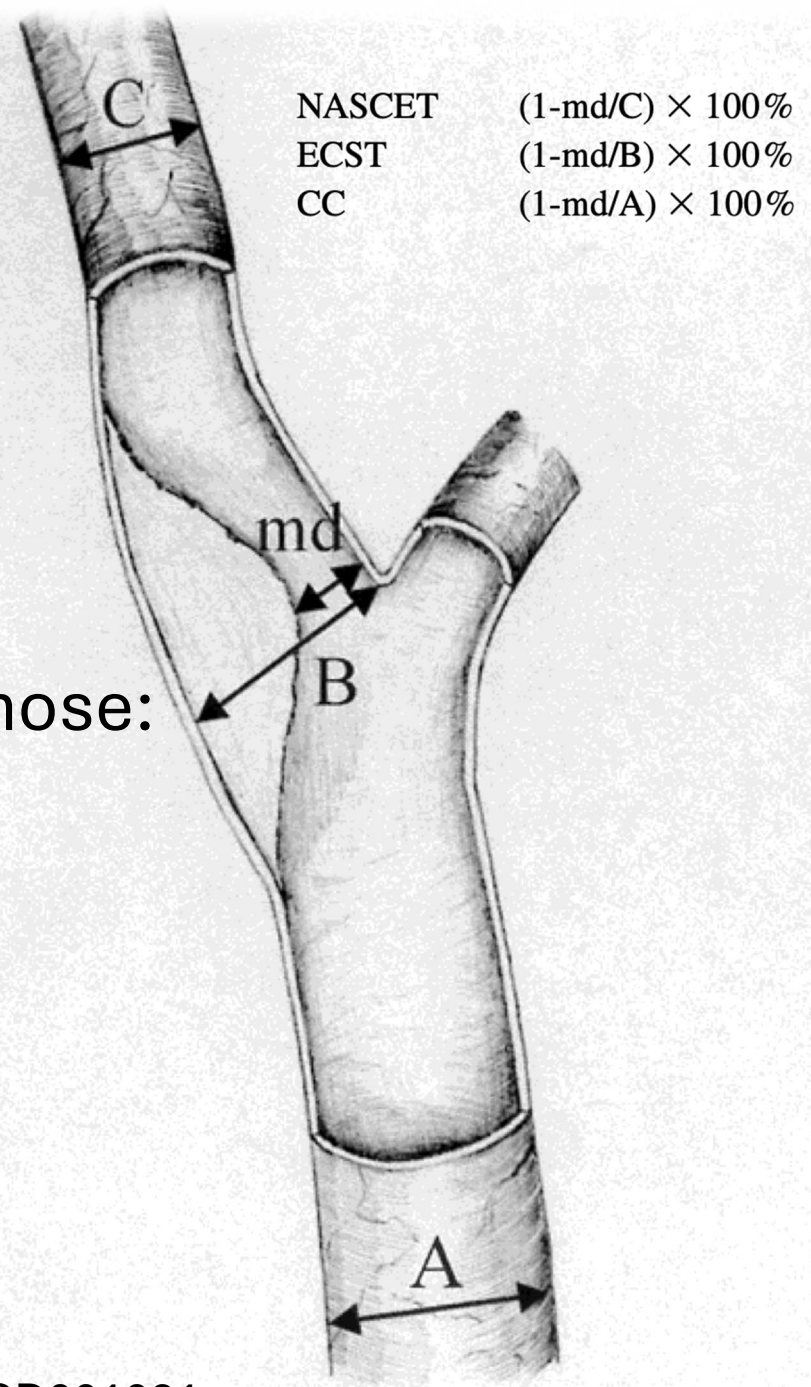


## Imagerie de la Lumière



### • Estimation sténose:

- **NASCET**
- **ECST**
- **CC**



1. I N Staikov et al. J Neurol. 2000 Sep;247(9):681-6.
2. G Kılıçkap et al. Int J Cardiovasc Imaging (2012) 28:1257–1266
3. A Rerkasem et al. Meta-Analysis Cochrane Database Syst Rev. 2020 Sep 12;9:CD001081.



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# Imagerie de la plaque

ORIGINAL RESEARCH

## Carotid Plaque-RADS

### A Novel Stroke Risk Classification System

JACC: CARDIOVASCULAR IMAGING

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Max Wintermark, MD,<sup>e</sup> Mauricio Castillo, MD,<sup>f</sup> Daniel Staub, MD,<sup>g</sup> Stavros K. Kakkos, MD, PhD,<sup>h</sup> Qi Yang, MD, PhD,<sup>i</sup>  
Kosmas I. Paraskevas, MD,<sup>j</sup> Chun Yuan, PhD,<sup>k</sup> Myriam Edjlali, MD, PhD,<sup>l,m</sup> Roberto Sanfilippo, MD,<sup>n</sup>  
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J. Kevin DeMarco, MD,<sup>rr</sup> Seemant Chaturvedi, MD,<sup>ss</sup> Renu Virmani, MD,<sup>tt</sup> Thomas S. Hatsukami, MD,<sup>q</sup>  
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# Imagerie de la plaque

## SIMCA

**Determination of best therapeutic strategy, interventional versus medical therapy alone, for patients with Symptomatic atherosclerotic Mild (<70%) stenosis of internal Carotid Artery to prevent stroke (SIMCA)**

- Sébastien Richard, Benjamin Gory, Francis Guillemin CIC-EC, CIC-IT



## Imagerie de la plaque

### US

Epaisseur (MWT)

Calcifications

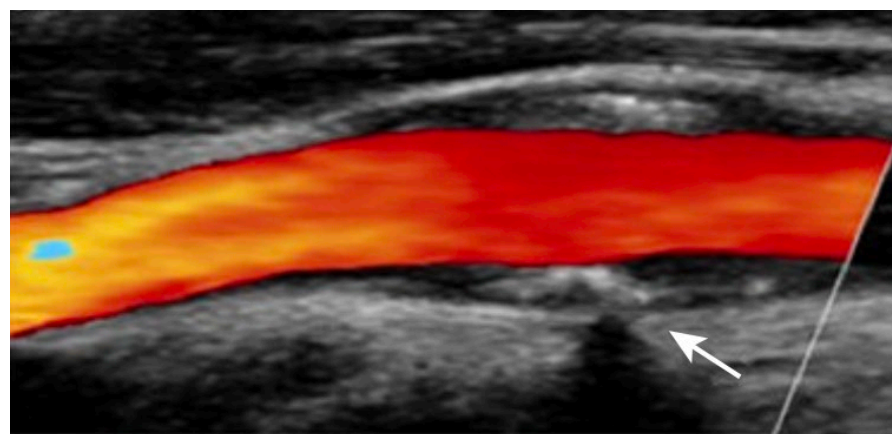
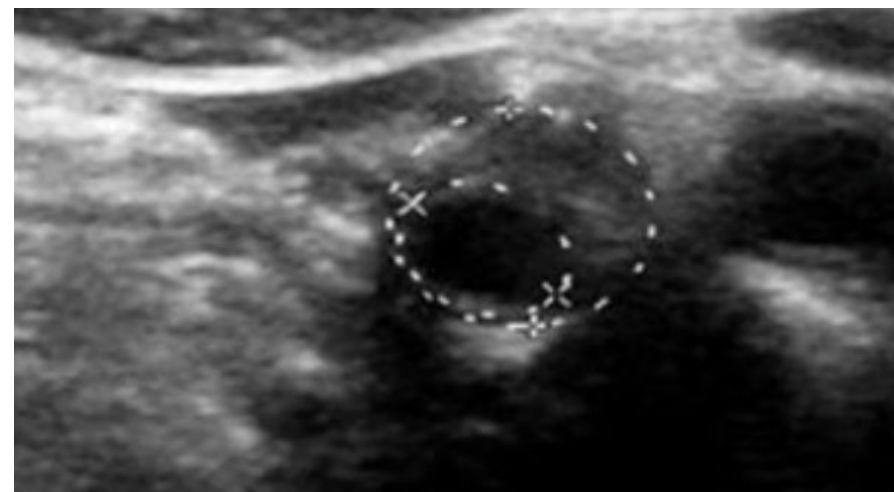
Cœur lipidique

Chape fibreuse

Ulcération

Hémorragie

Thrombus



# Imagerie de la plaque

## Scanner

Epaisseur (MWT)

Calcifications

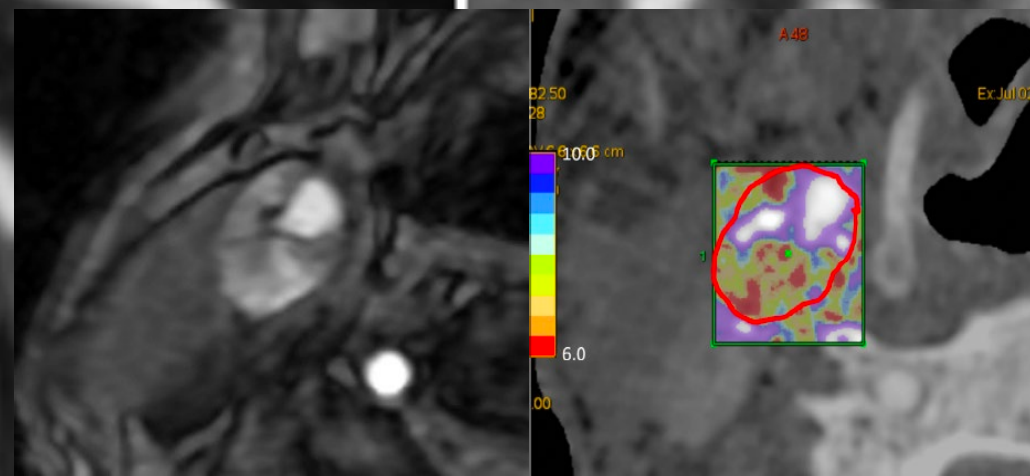
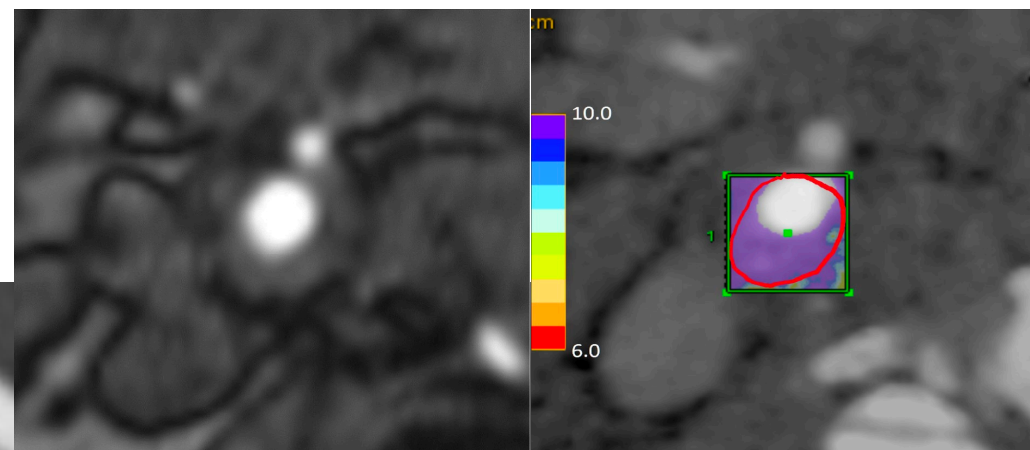
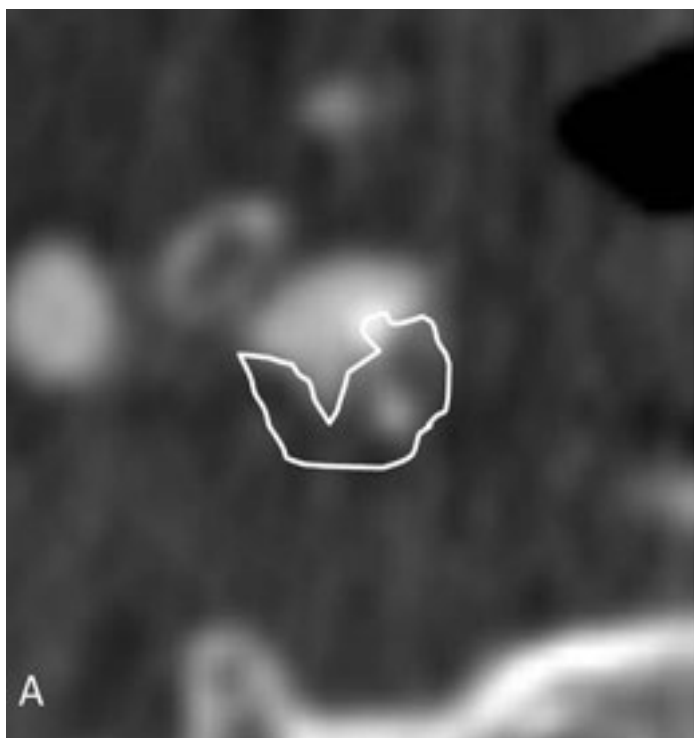
Cœur lipidique

Chape fibreuse

Ulcération

Hémorragie

Thrombus



1. Brinjikji W et al. J Neurosurg. 2016 Jan

2. Shinohara Y et al. J Stroke Cerebrovasc Dis. 2017 Jul;26

# Imagerie de la plaque

## IRM

Epaisseur (MWT)

Calcifications

Cœur lipidique

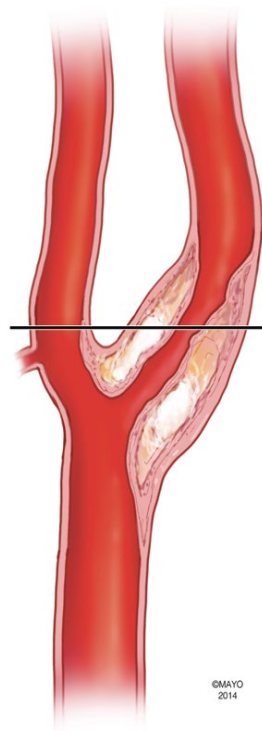
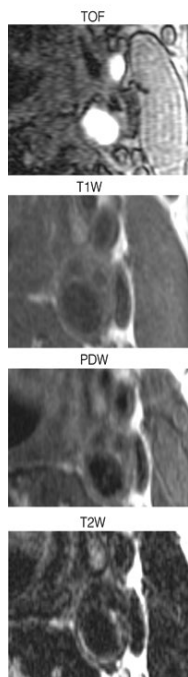
Chape fibreuse

Ulcération

Hémorragie

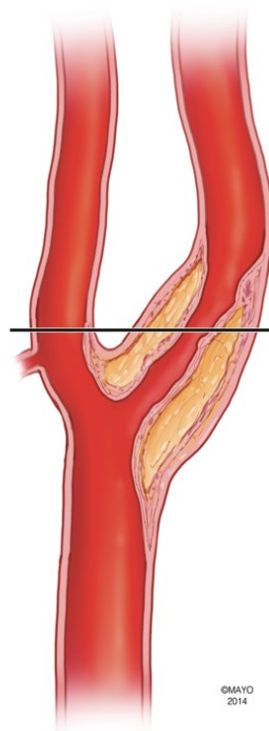
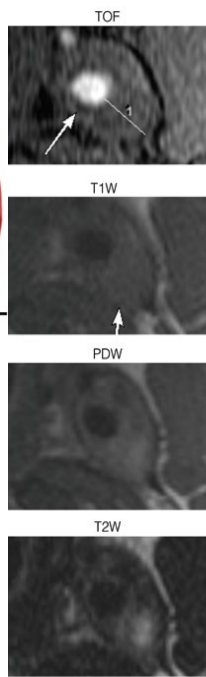
Thrombus

Calcified plaque



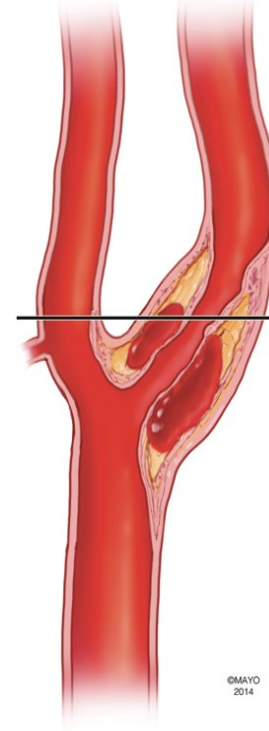
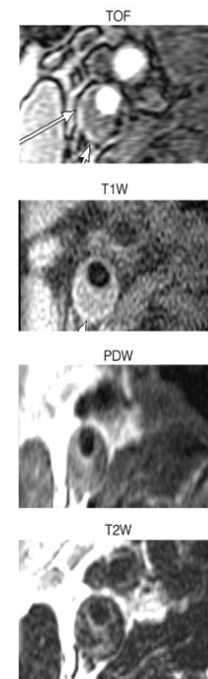
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Lipid Rich Necrotic Core



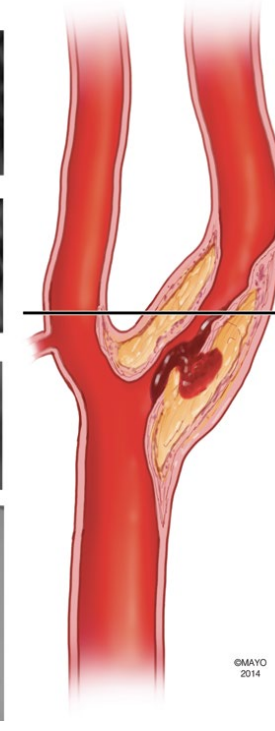
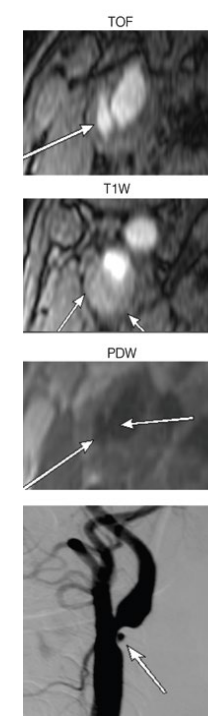
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Hemorrhagic plaque



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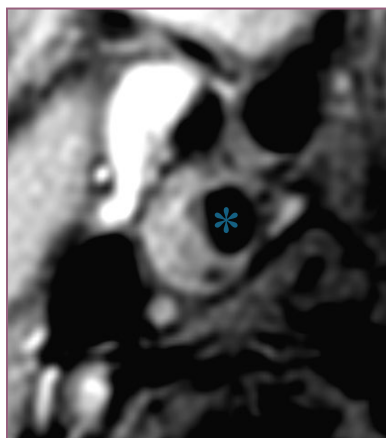
Ruptured plaque



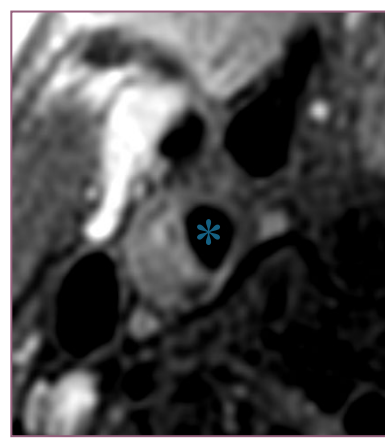
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## Imagerie de la plaque

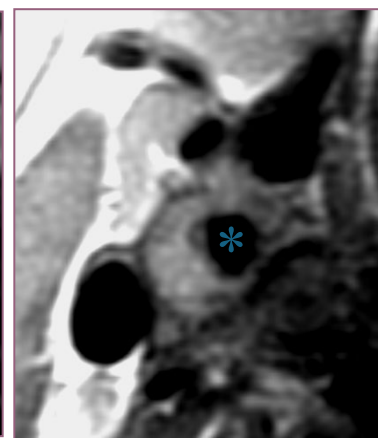
**IRM** Imagerie multiparamétrique



PD



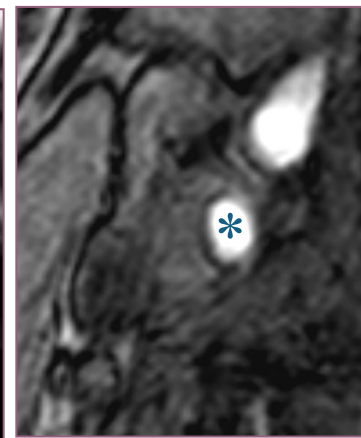
T2



T1

**BLACK BLOOD**

Resolution :  $300 \times 300 \mu\text{m}$  ( $\times 2-3 \text{ mm}$ )



Time of flight

**WHITE BLOOD**

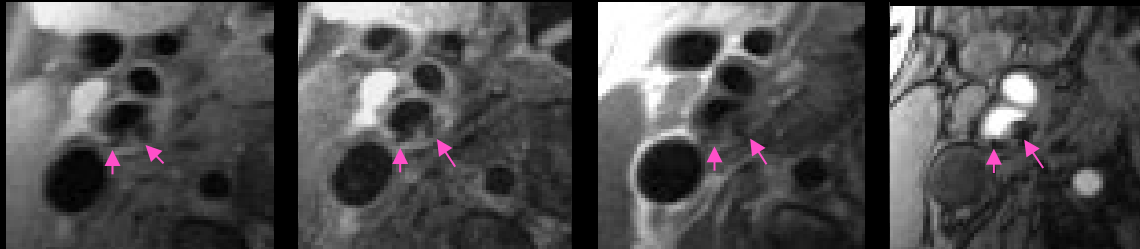
**1.5 < 3T**



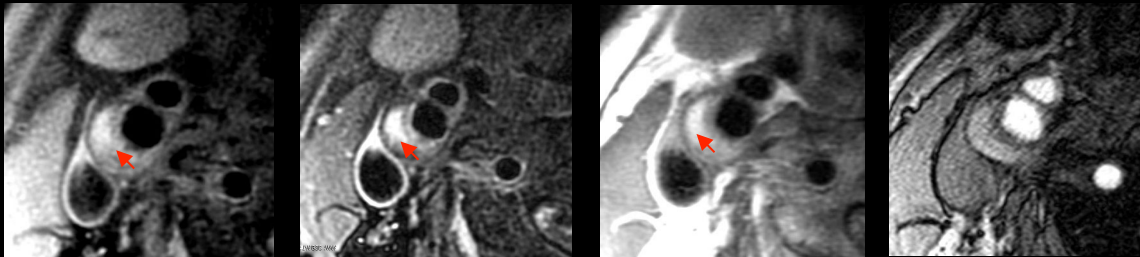


# Imagerie multiparamétrique

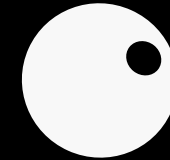
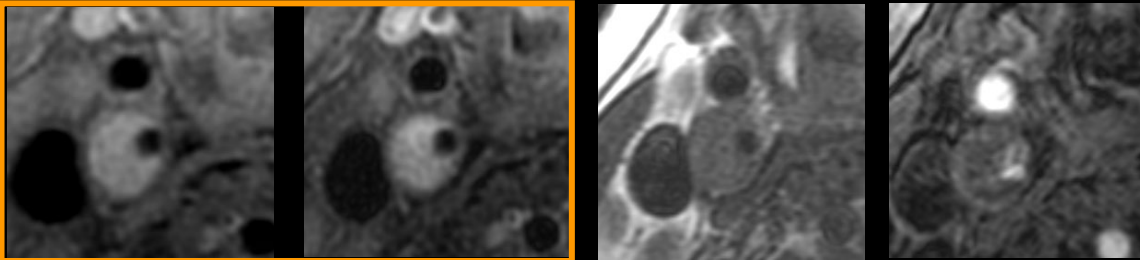
Calcium



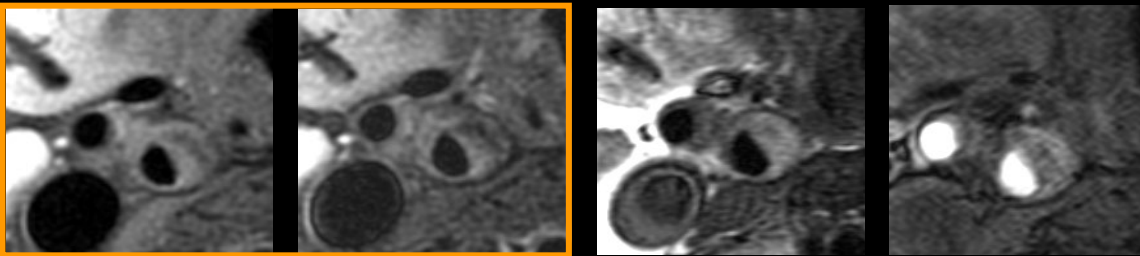
Hemorrhage



Fibrous



Lipid core



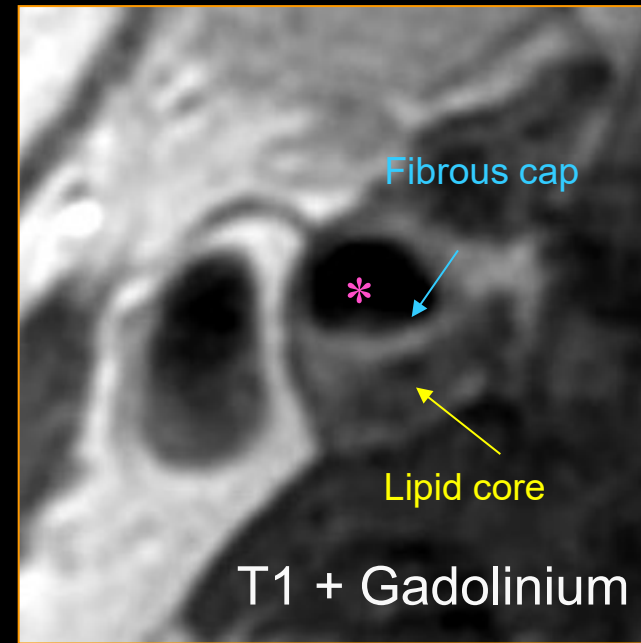
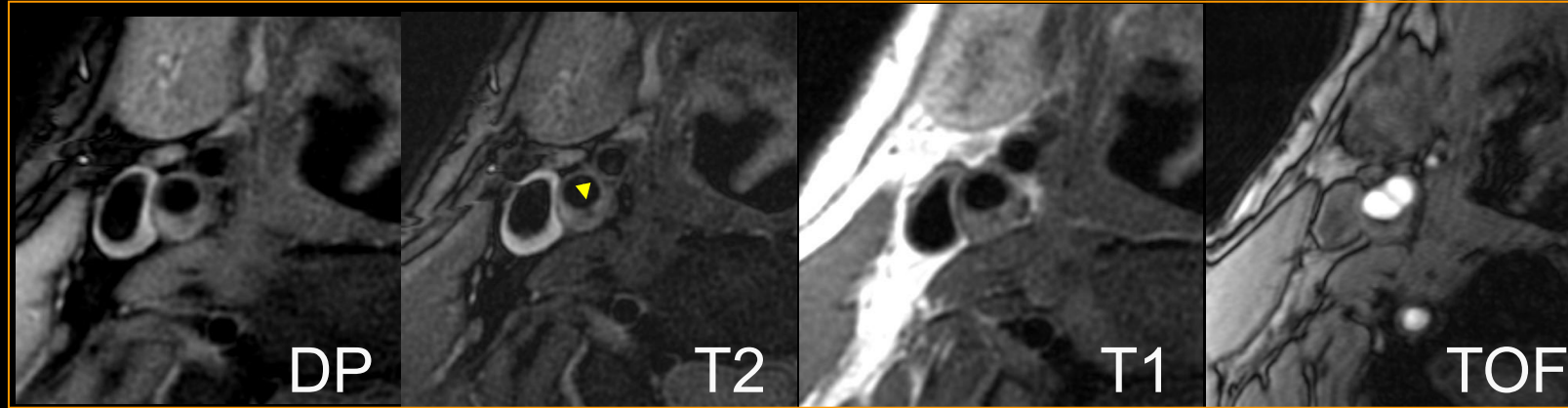
PDw

T2w

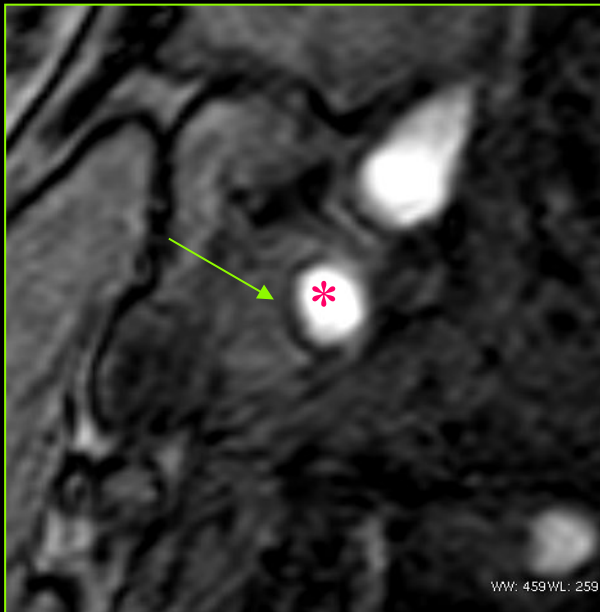
T1w

TOF

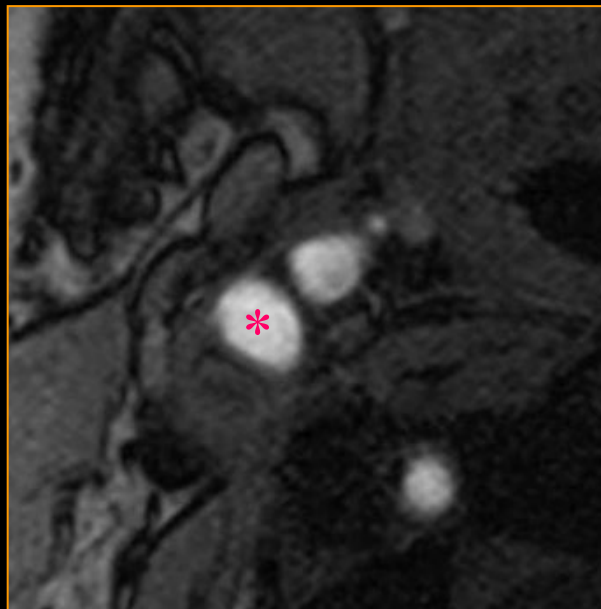
# La chape fibreuse



# La chape fibreuse



Continuous Thick



Not visible = Thin



RUPTURED



	Symptomatic.	Asymptom.	% Sympt	OR for Symptomatic
<b>Thick</b>	1	10	9	1
<b>Thin</b>	6	6	50	10
<b>RUPTURED</b>	21	9	70	23

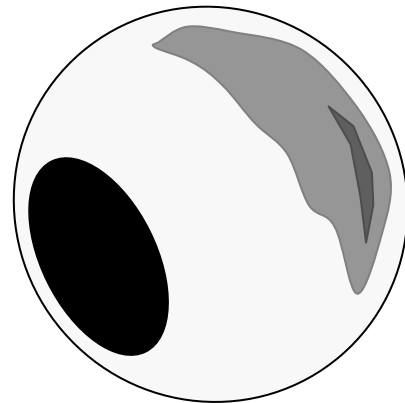
## Imagerie de la plaque

### IRM

### Plaque Stable vs Instable

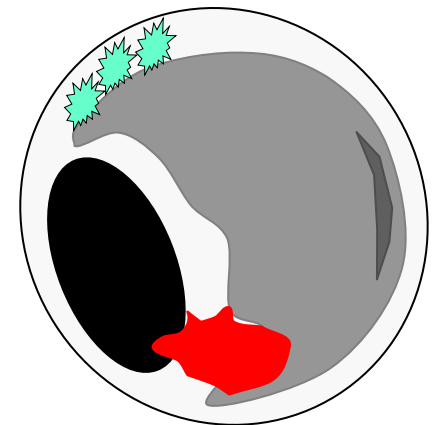
- **Stable :**

- Chape fibreuse: épaisse
- Coeur lipidique: petit



- **Instable :**

- Chape fibreuse: fine ou rompue
- Coeur lipidique: Large
- Hémorragie
- Ulcération





## Imagerie de la plaque

### IRM

### Plaque Stable vs Instable

#### Asymptomatic stenoses (50-79%)<sup>1</sup>

##### Hémorragie

OR=5.2 (1.6–17.3)

##### Thin or ruptured Chape fibreuse

OR=17 (2.2–132)

##### Max plaque thickness

OR= 1.6

#### Symptomatic stenoses (30-69%)<sup>2</sup>

##### Hémorragie

OR=9.8 (1.3 - 75)

<sup>1</sup>Takaya, Stroke 2006 ; <sup>2</sup>Altaf, J Vasc Surg 2008



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ORIGINAL RESEARCH

## Carotid Plaque-RADS

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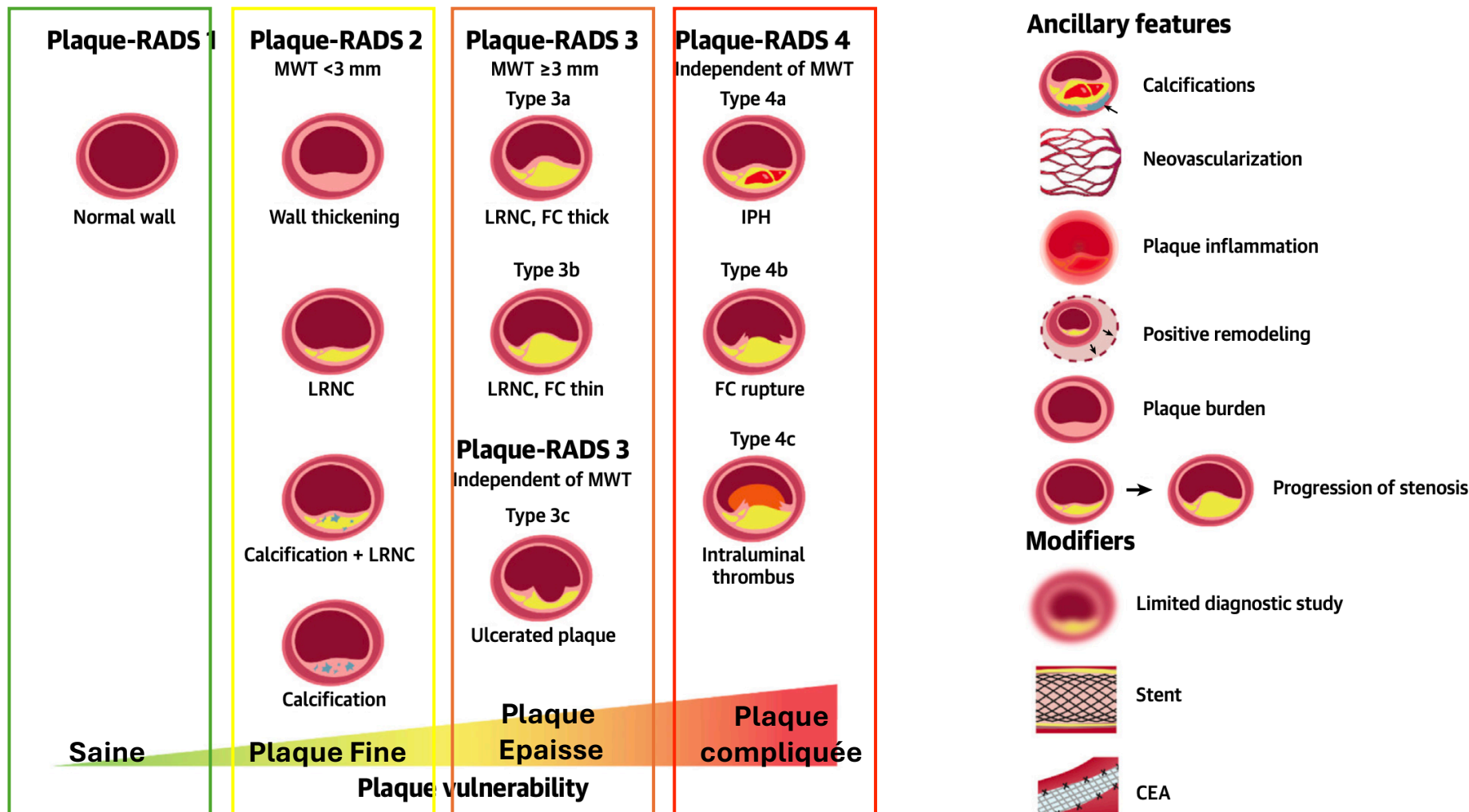
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# Carotid Plaque-RADS

A Novel Stroke Risk Classification System

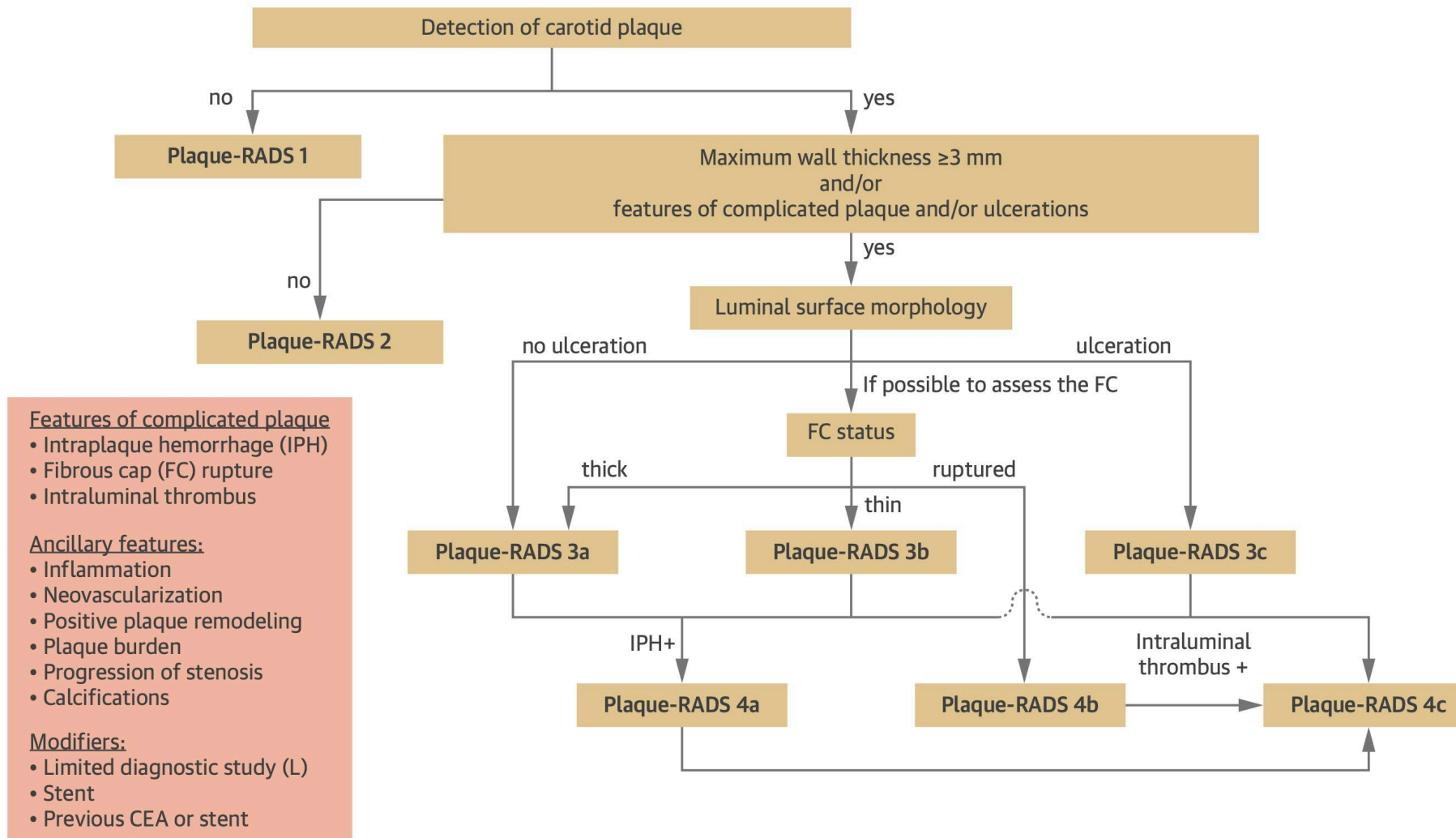
## CENTRAL ILLUSTRATION Schematic Representation of the Different Plaque-RADS Categories 1 to 4



## Carotid Plaque-RADS

### A Novel Stroke Risk Classification System

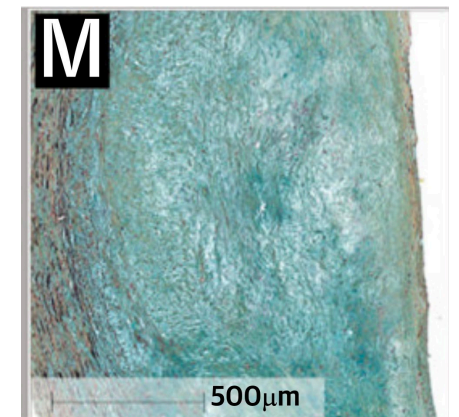
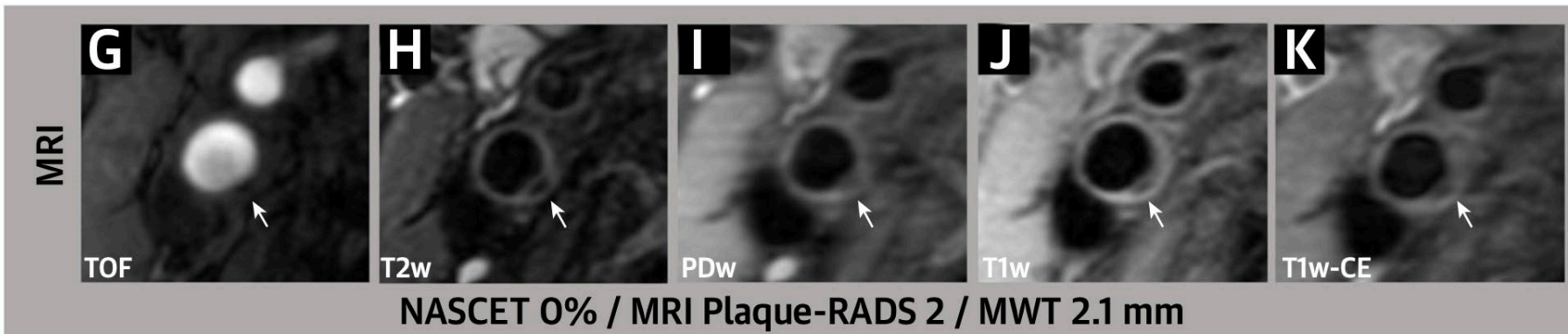
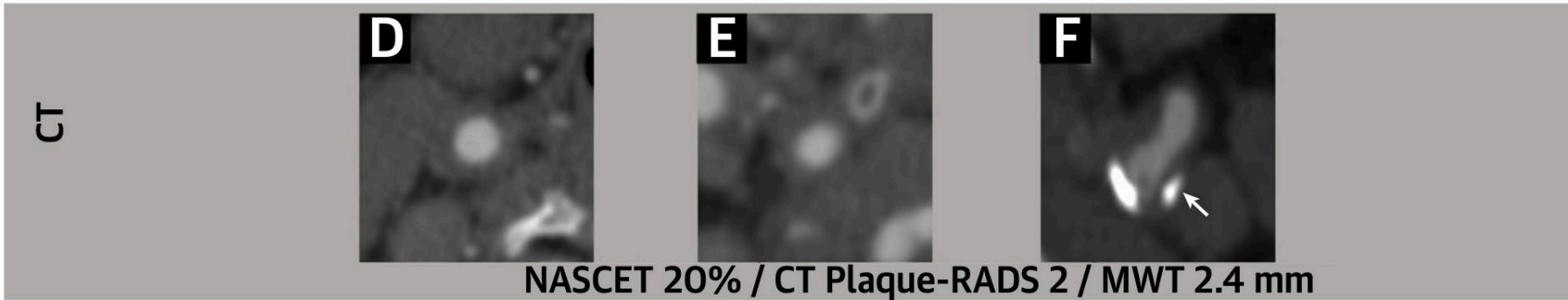
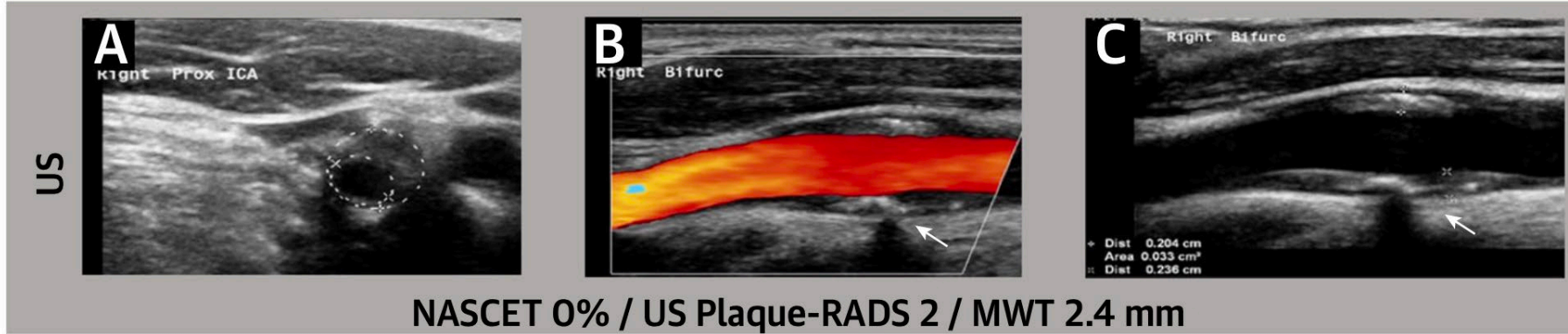
**FIGURE 1** Step-by-Step Flowchart to Classify Carotid Atherosclerotic Plaques Into the Different Plaque-RADS Categories





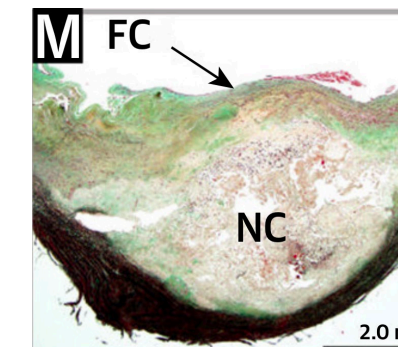
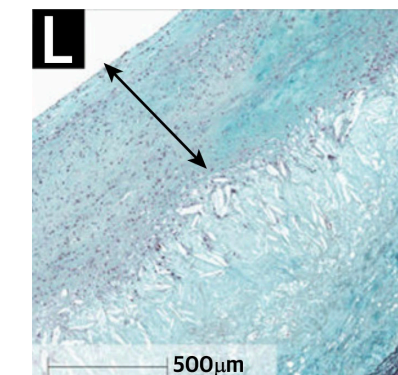
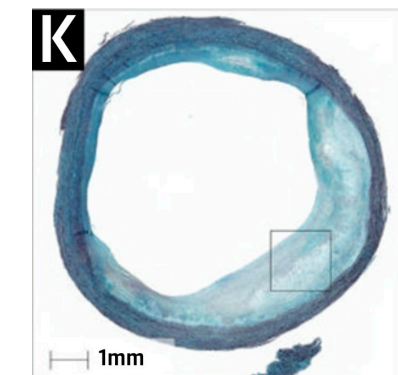
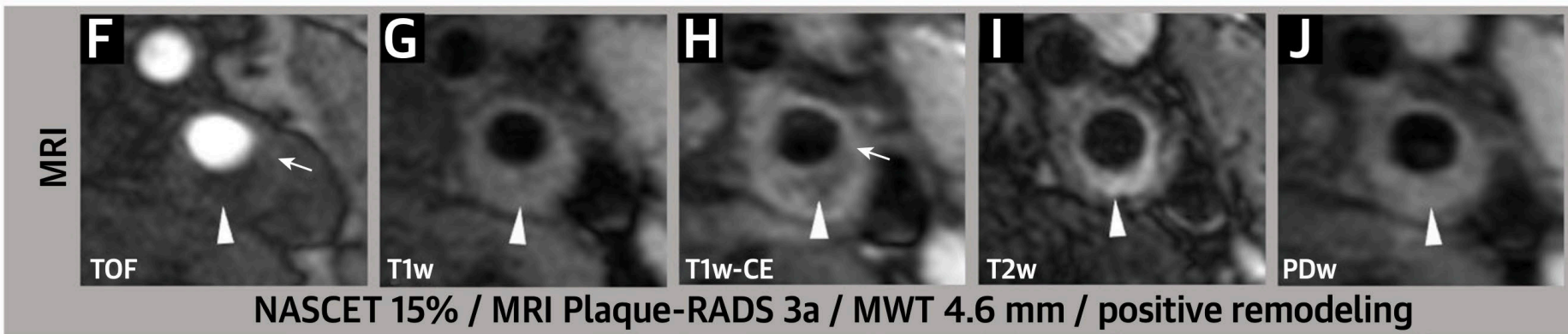
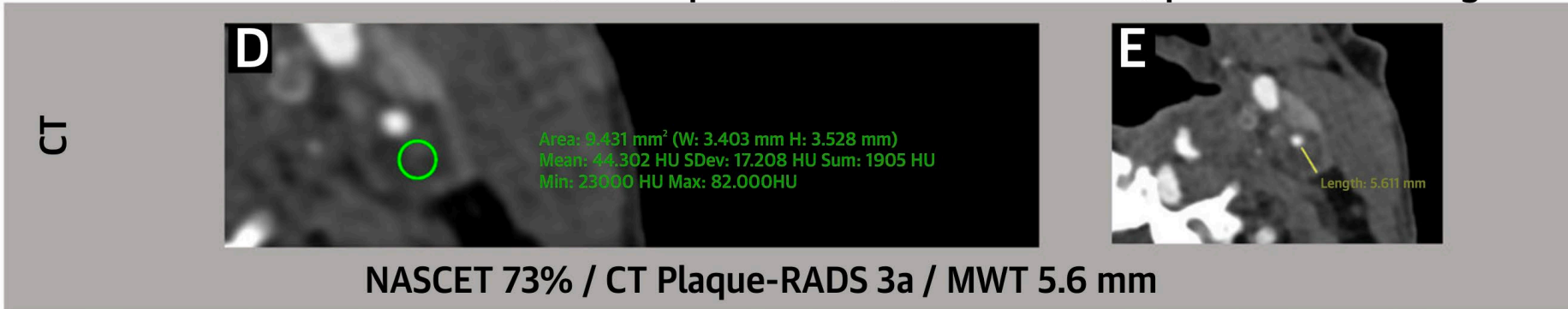
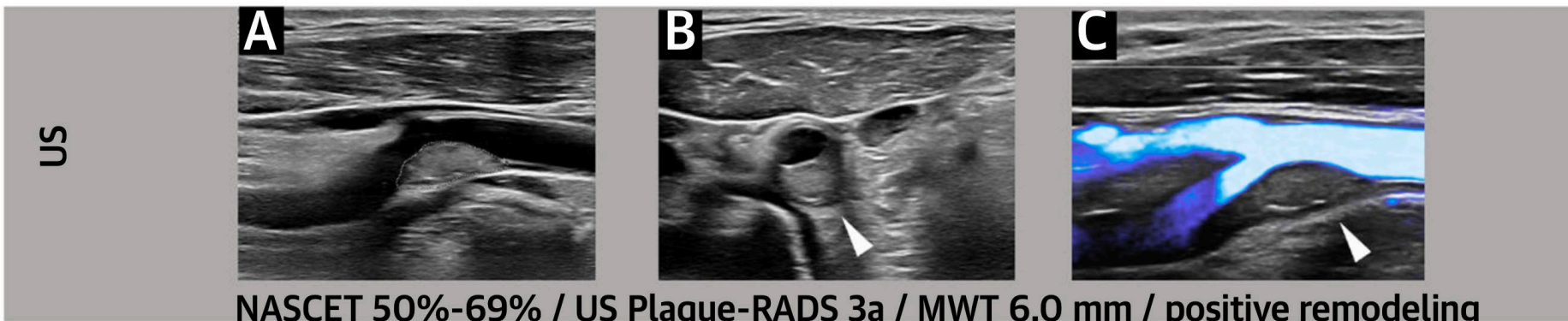
# Carotid Plaque-RADS

A Novel Stroke Risk Classification System



# Carotid Plaque-RADS

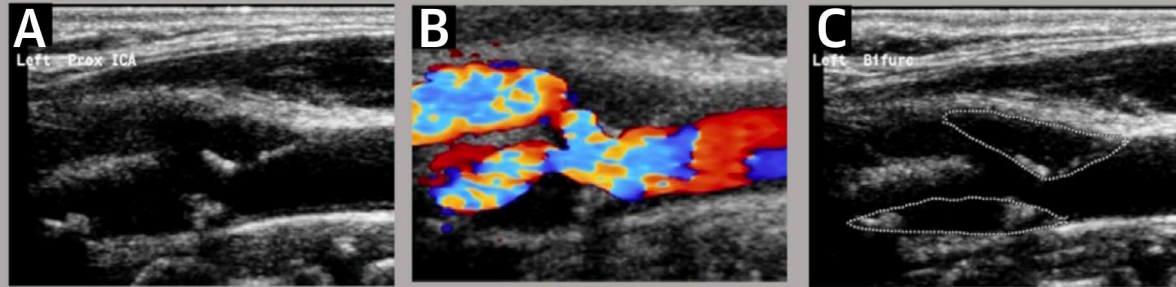
A Novel Stroke Risk Classification System



# Carotid Plaque-RADS

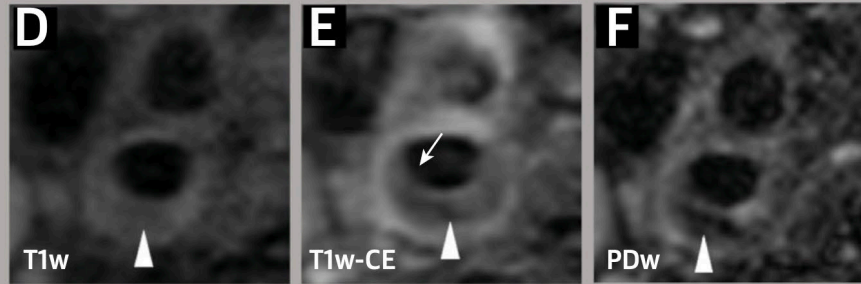
A Novel Stroke Risk Classification System

US



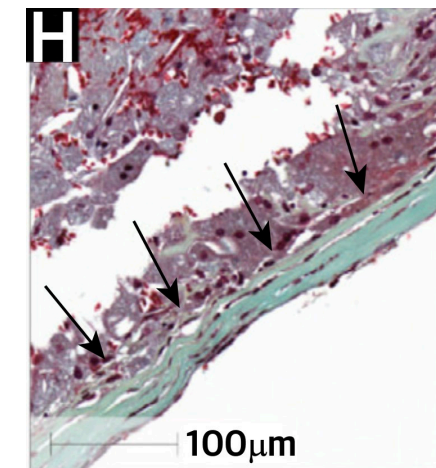
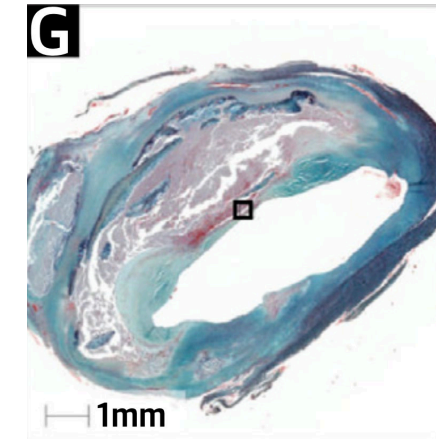
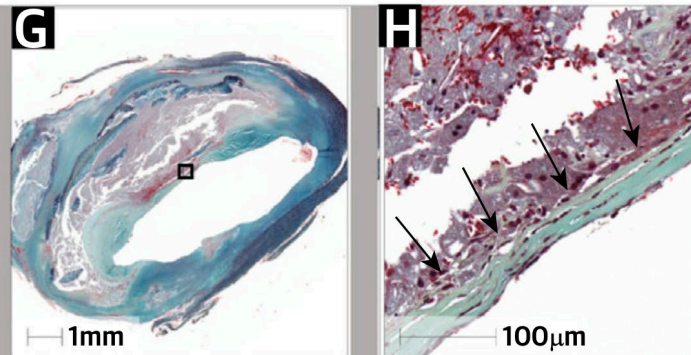
NASCET 25% / US Plaque-RADS 3b / MWT 3.6 mm

MRI



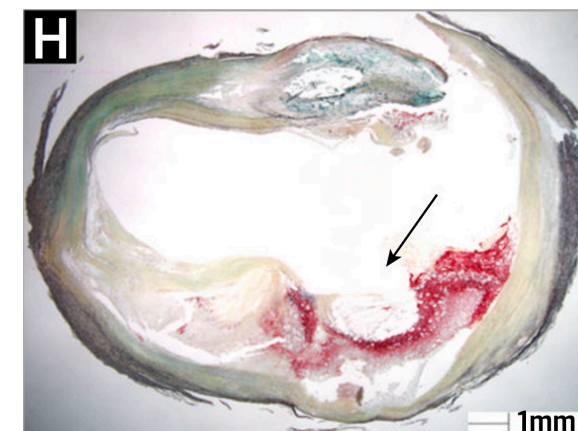
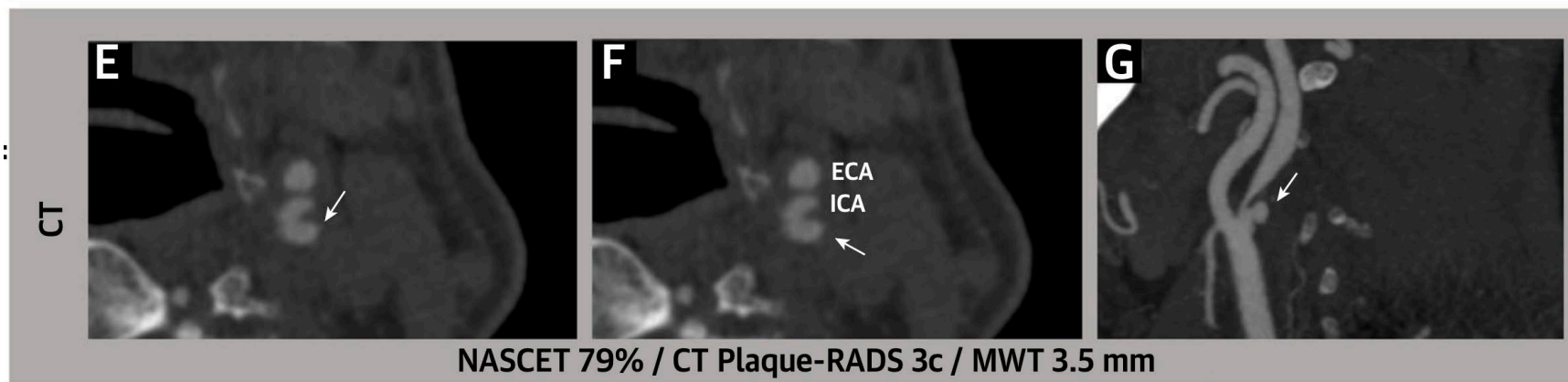
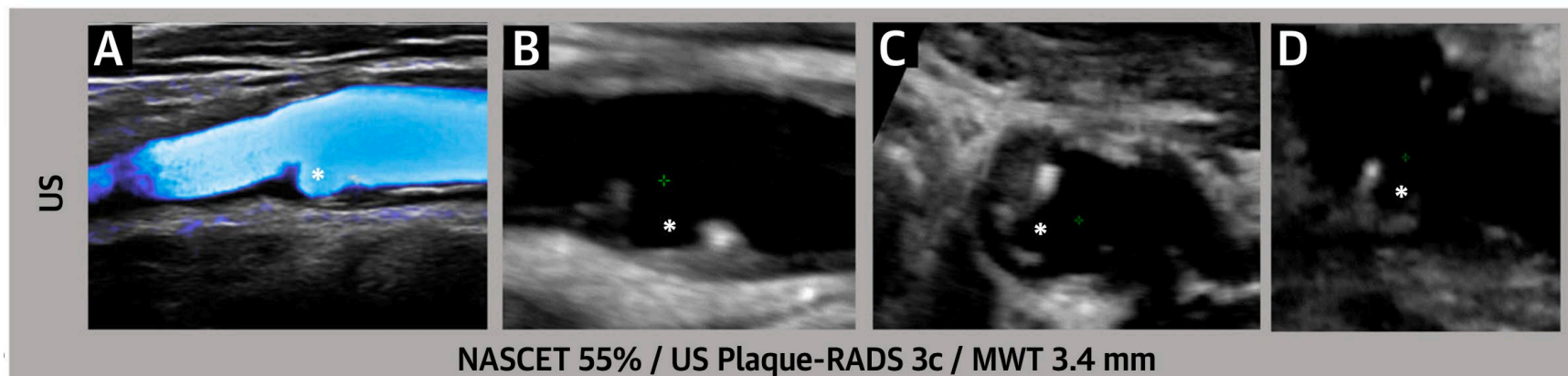
NASCET 40% / MRI Plaque-RADS 3b / MWT 3.8 mm / positive remodeling

Histology



## Carotid Plaque-RADS

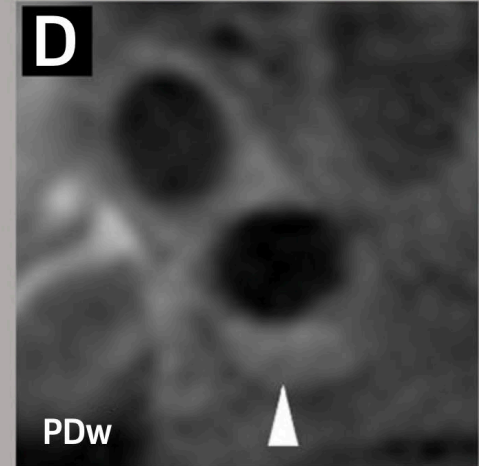
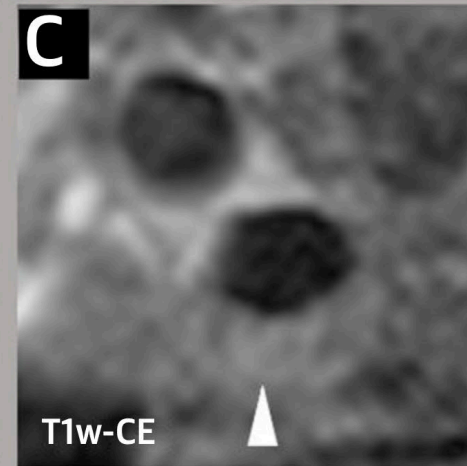
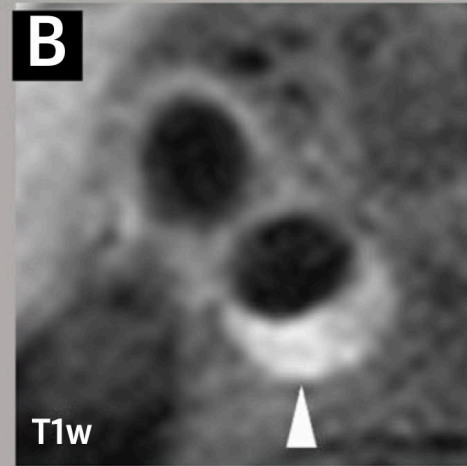
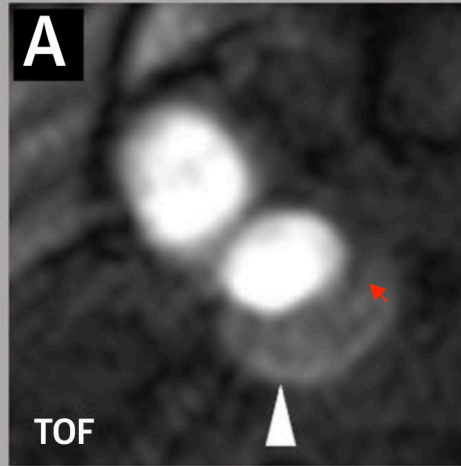
A Novel Stroke Risk Classification System



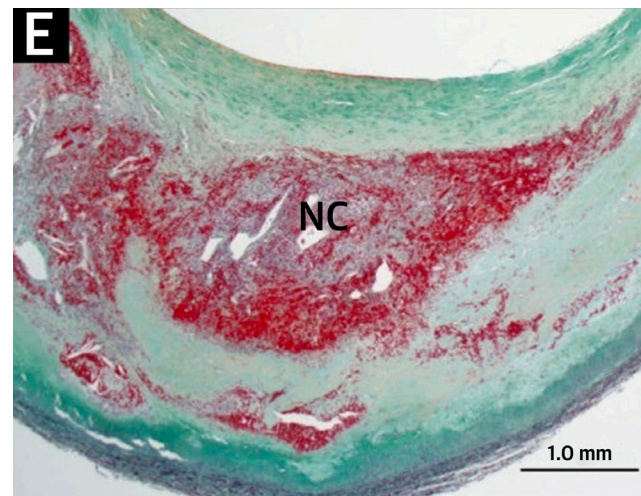
## Carotid Plaque-RADS

A Novel Stroke Risk Classification System

MRI



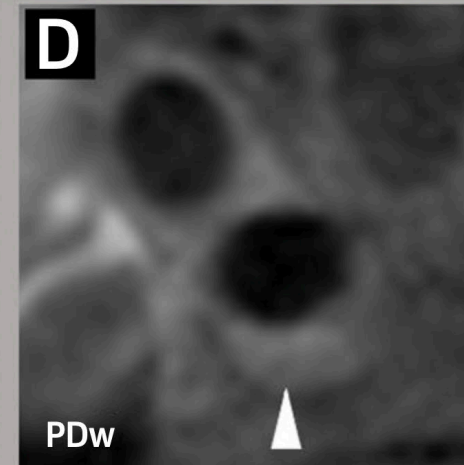
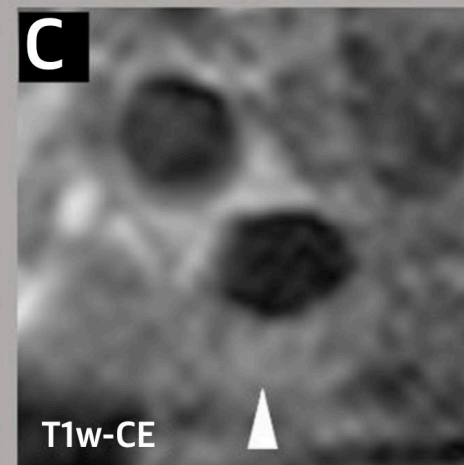
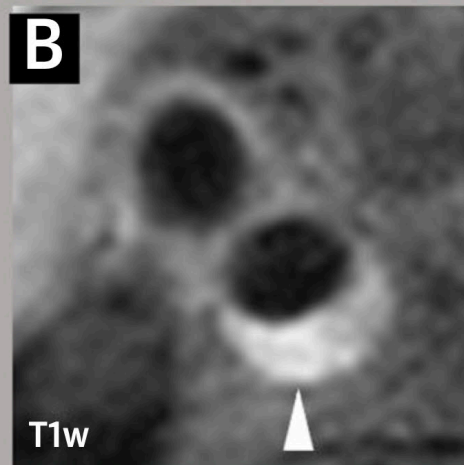
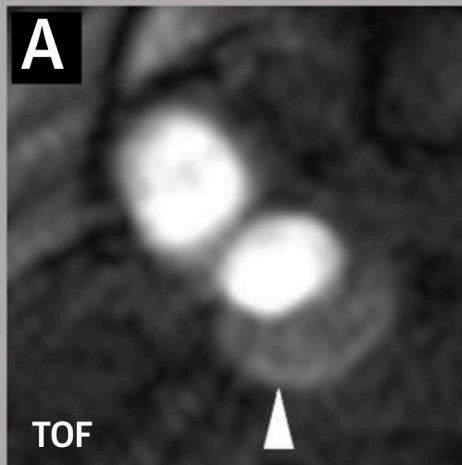
NASCET 0% / MRI Plaque-RADS 4a / MWT 3.5 mm / positive remodeling



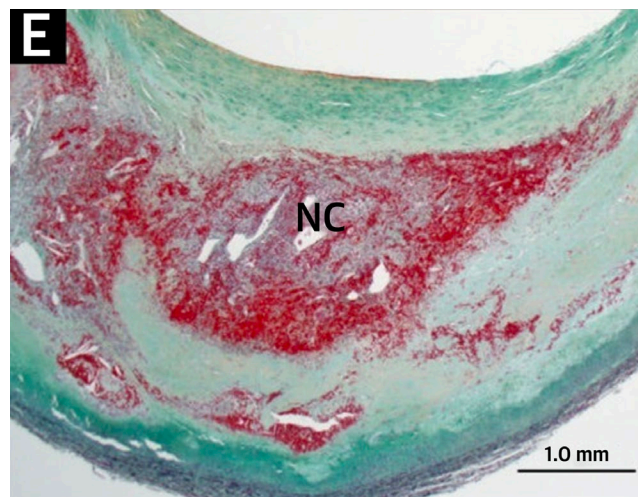
## Carotid Plaque-RADS

A Novel Stroke Risk Classification System

MRI



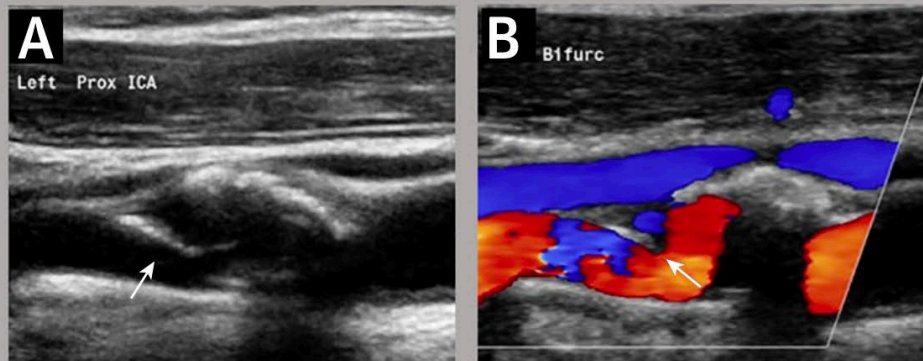
NASCET 0% / MRI Plaque-RADS 4a / MWT 3.5 mm / positive remodeling



## Carotid Plaque-RADS

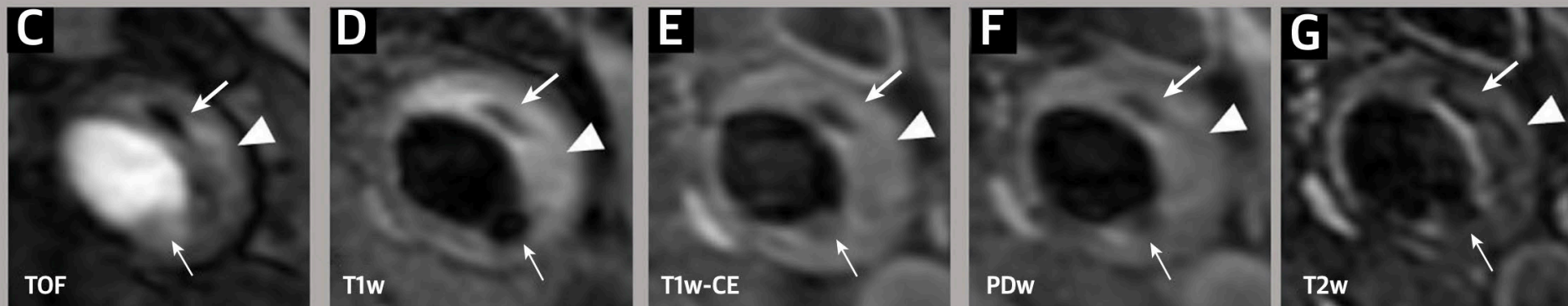
A Novel Stroke Risk Classification System

US

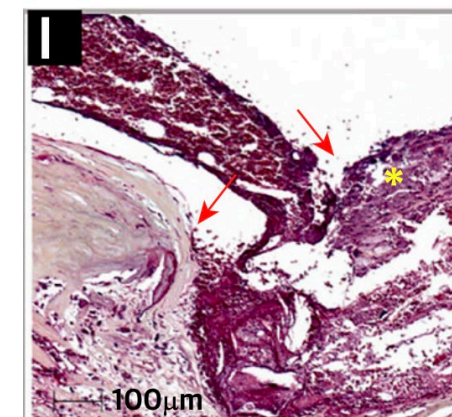


NASCET 54% / US Plaque-RADS 4b / MWT 4 mm

MRI

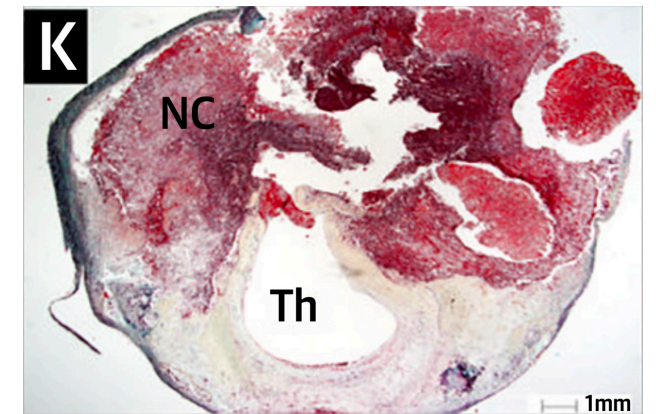
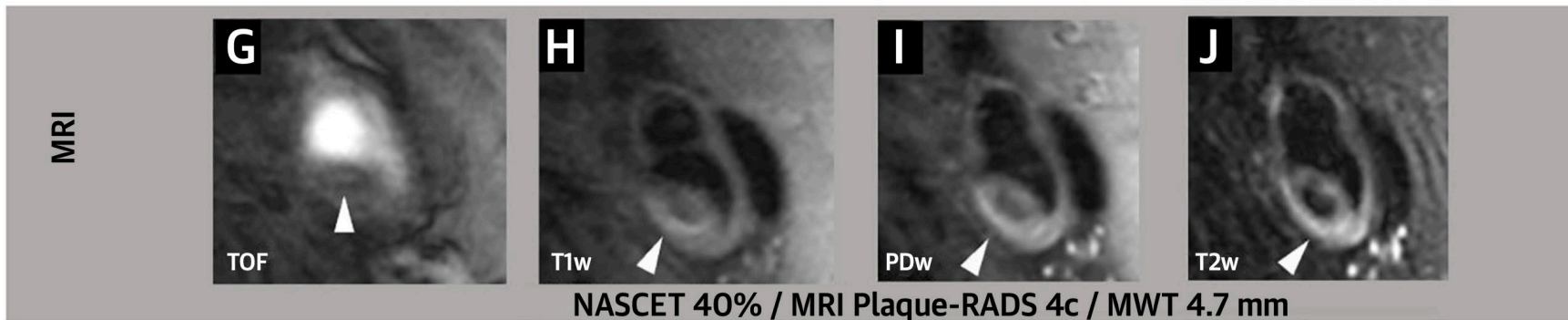
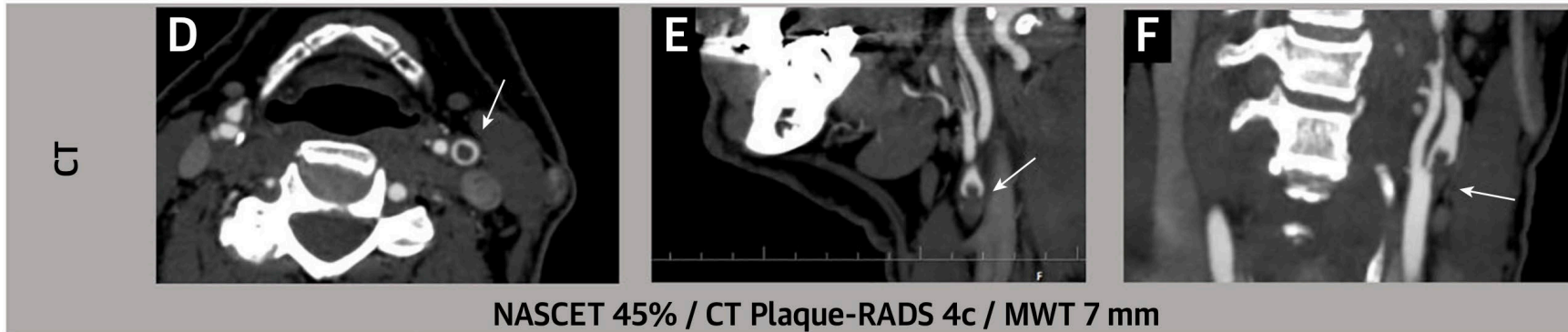
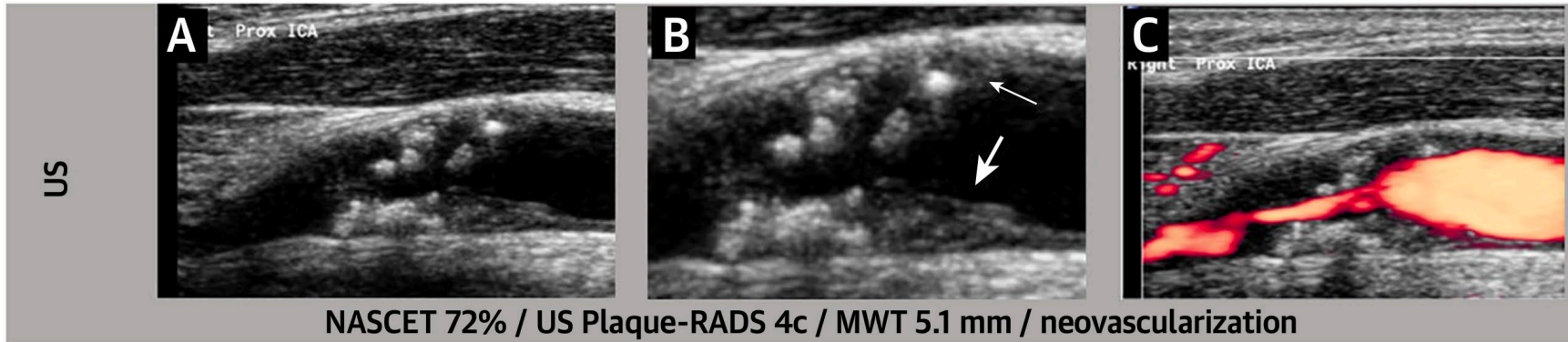


NASCET 41% / MRI Plaque-RADS 4b / MWT 5.1 mm / positive remodeling



**Carotid Plaque-RADS**

A Novel Stroke Risk Classification System







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**26 & 27 septembre  
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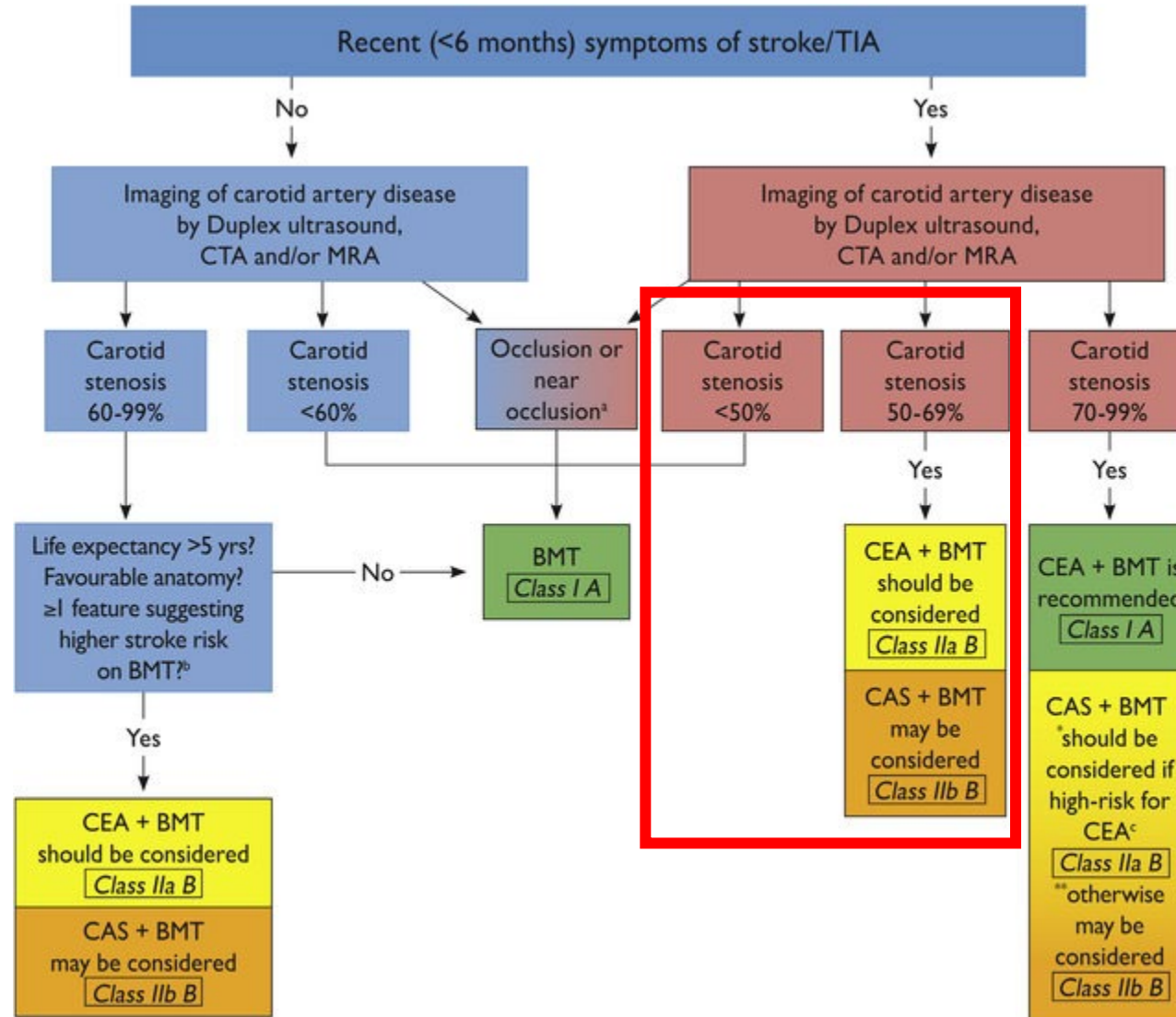


# SIMCA

**Determination of best therapeutic strategy, interventional versus medical therapy alone, for patients with Symptomatic atherosclerotic Mild (<70%) stenosis of internal Carotid Artery to prevent stroke (SIMCA)**

**Sébastien Richard, Benjamin Gory, Francis Guillemin CIC-EC, CIC-IT**







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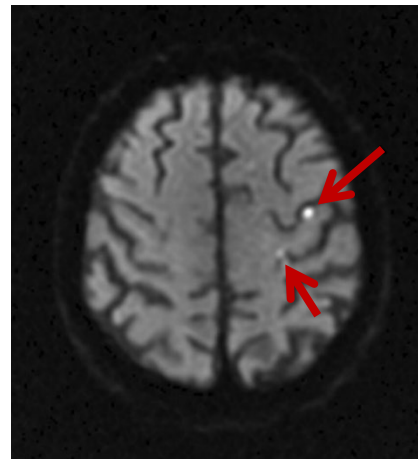
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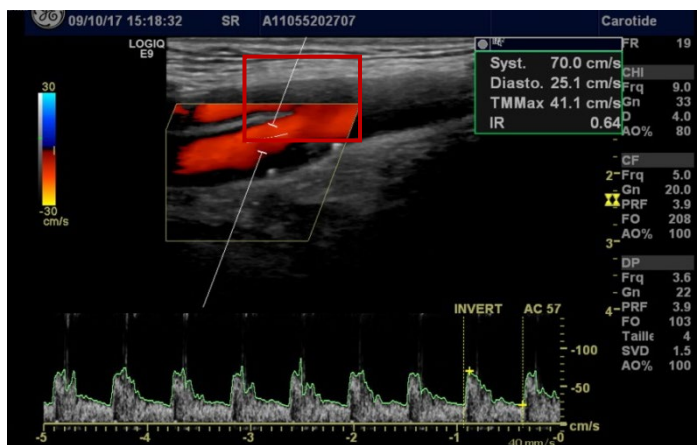
**2024**

## INCLUSION CRITERIA

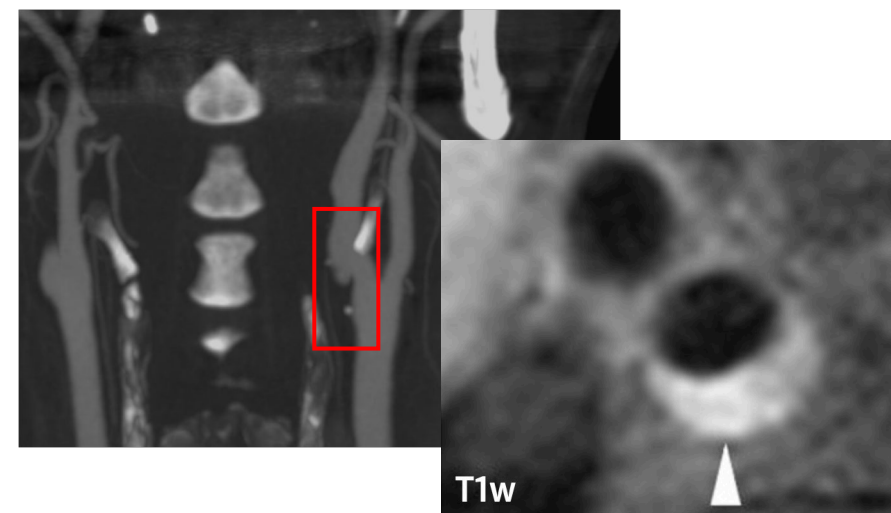


**SYMPTOMATIC**

**ATHEROSCLEROTIC STENOSIS 50-69%**



**30-49% + MARKER OF HIGH RISK EMBOLIC**





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## MAIN OBJECTIVE

### ISSUE 1

- **Chez les patients présentant une sténose athéroscléreuse (non serrée <70%) symptomatique de l'artère carotide interne**
- **Déterminer si l'intervention (endartériectomie ou pose de stent) + BMT vs BMT seul**
- **Réduit significativement l'incidence de l'AVC ipsilatéral**

## MAIN OUTCOME

### ISSUE 3

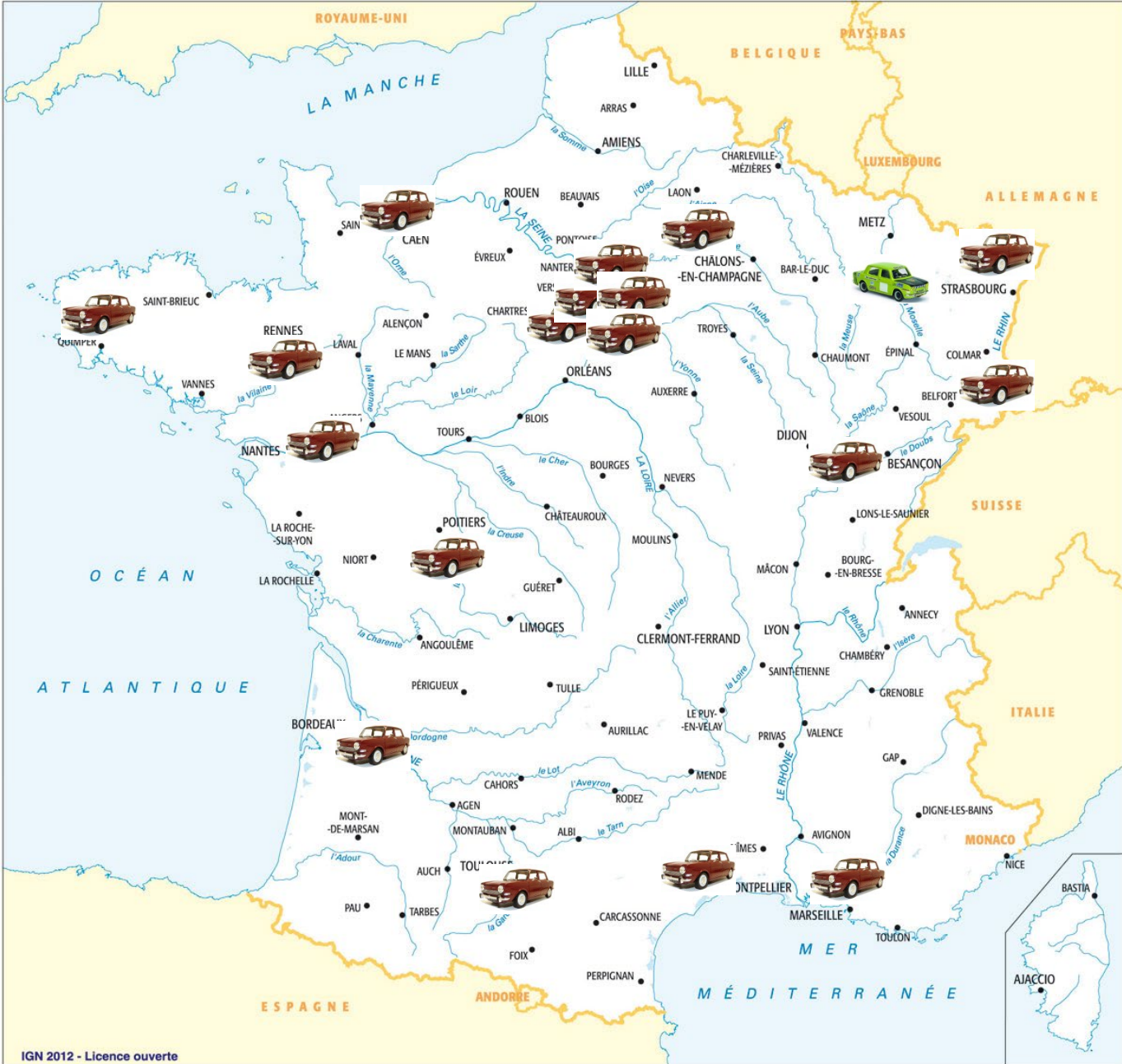
- **AVC ou décès pendant la phase péri-procédurale (30 jours après l'intervention),  
OU**
- **AVC ipsilatéral à la sténose durant le suivi à long terme (5 ans)."**

# CENTER S

**N=26  
centers**

**Inclusion: 4 years  
1440 patients**

**STROKE  
LINK**





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hm**

# Merci pour votre attention

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**Neuroradiologie**  
Hopital de la Timone

