



# Rôle des biomarqueurs dans la prise en charge des patients avec syndrome coronarien aigu en 2021

Dr Stéphane Fournier, MD  
PD/MER  
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Service de Cardiologie, CHUV





# Rôle de la **troponine** dans la prise en charge des patients avec syndrome coronarien aigu en 2021

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# La « famille SCA » et ses guidelines

Angor Instable

NSTEMI

STEMI

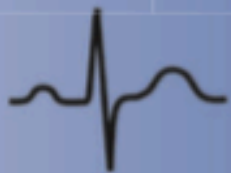
**« NSTEMI-ACS »**

**STEMI**

Guidelines 2020

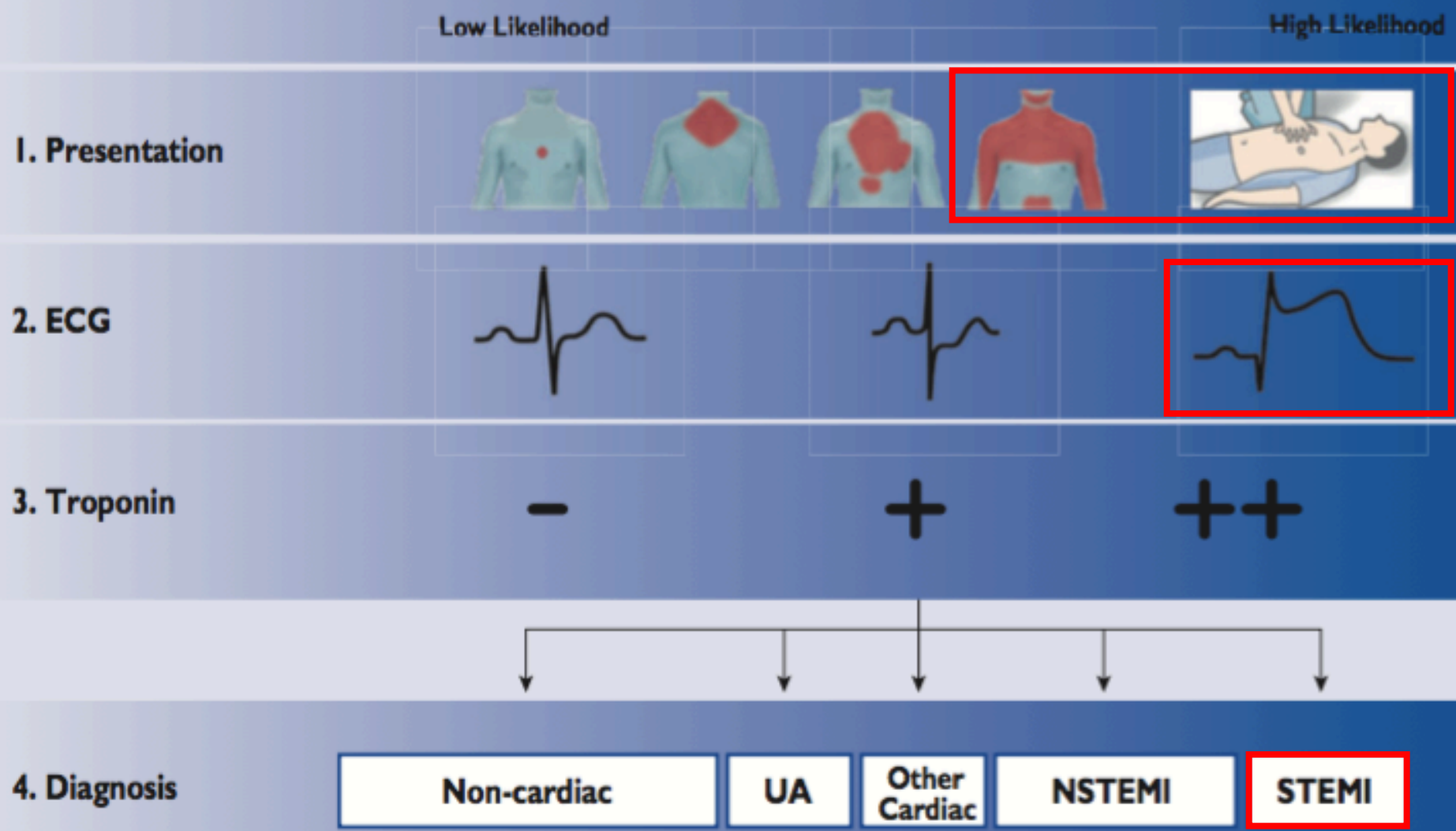
Guidelines 2017

<https://www.escardio.org/Guidelines/Clinical-Practice-Guidelines>

|                 | Low Likelihood                                                                     |    |               |        | High Likelihood                                                                     |
|-----------------|------------------------------------------------------------------------------------|----|---------------|--------|-------------------------------------------------------------------------------------|
| 1. Presentation |  |    |               |        |  |
| 2. ECG          |  |    |               |        |  |
| 3. Troponin     | -                                                                                  |    |               |        | ++                                                                                  |
| 4. Diagnosis    | <div> <div></div> <div></div> <div></div> <div></div> <div></div> </div>           |    |               |        |                                                                                     |
|                 | Non-cardiac                                                                        | UA | Other Cardiac | NSTEMI | STEMI                                                                               |

STEMI = ST-elevation myocardial infarction; NSTEMI = non-ST-elevation myocardial infarction; UA = unstable angina.





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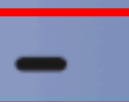
|                 | Low Likelihood                                                                     |                                                                                     |               | High Likelihood                                                                     |       |
|-----------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------|-------|
| 1. Presentation |  |  |               |  |       |
| 2. ECG          |  |  |               |  |       |
| 3. Troponin     | -                                                                                  | +                                                                                   |               | ++                                                                                  |       |
| 4. Diagnosis    | Non-cardiac                                                                        | UA                                                                                  | Other Cardiac | NSTEMI                                                                              | STEMI |

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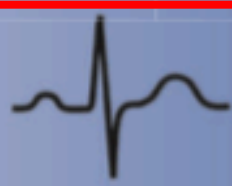
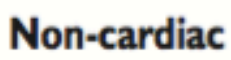
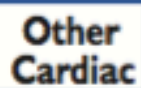
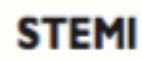


|                 | Low Likelihood                                                                     |                                                                                     |               | High Likelihood                                                                     |       |
|-----------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------|-------|
| 1. Presentation |  |  |               |  |       |
| 2. ECG          |  |  |               |  |       |
| 3. Troponin     | -                                                                                  | +                                                                                   |               | ++                                                                                  |       |
| 4. Diagnosis    | Non-cardiac                                                                        | UA                                                                                  | Other Cardiac | NSTEMI                                                                              | STEMI |

STEMI = ST-elevation myocardial infarction; NSTEMI = non-ST-elevation myocardial infarction; UA = unstable angina.

|                 | Low Likelihood                                                                      |                                                                                     |                                                                                     | High Likelihood                                                                     |       |
|-----------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------|
| 1. Presentation |   |  |                                                                                     |  |       |
| 2. ECG          |   |                                                                                     |  |  |       |
| 3. Troponin     |  |                                                                                     |  |  |       |
| 4. Diagnosis    | Non-cardiac                                                                         | UA                                                                                  | Other Cardiac                                                                       | NSTEMI                                                                              | STEMI |

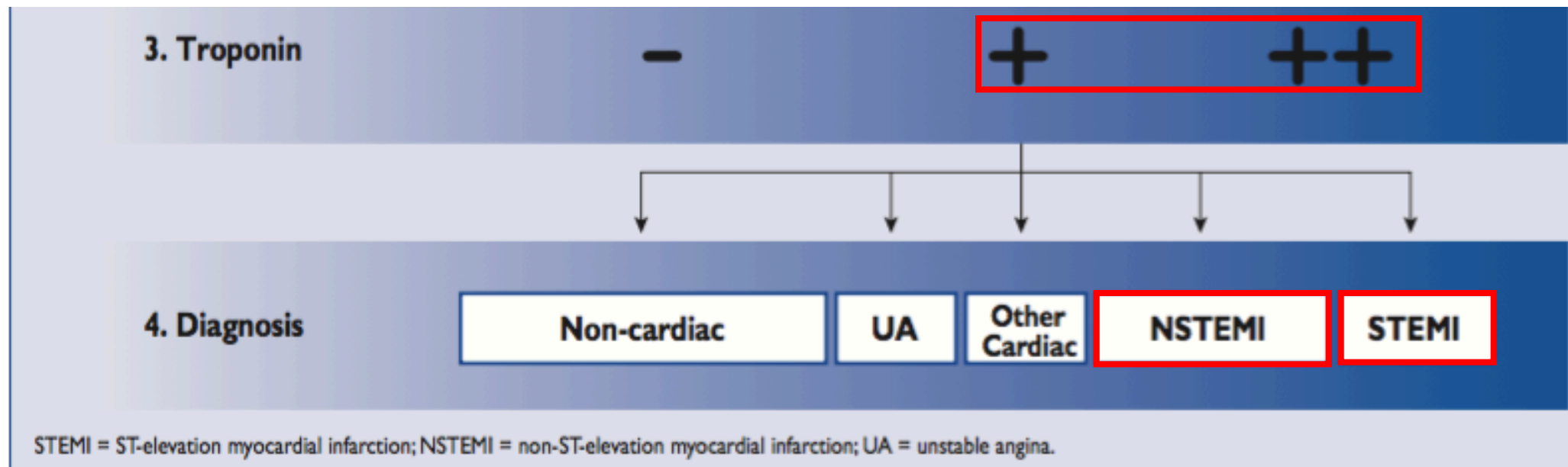
STEMI = ST-elevation myocardial infarction; NSTEMI = non-ST-elevation myocardial infarction; UA = unstable angina.

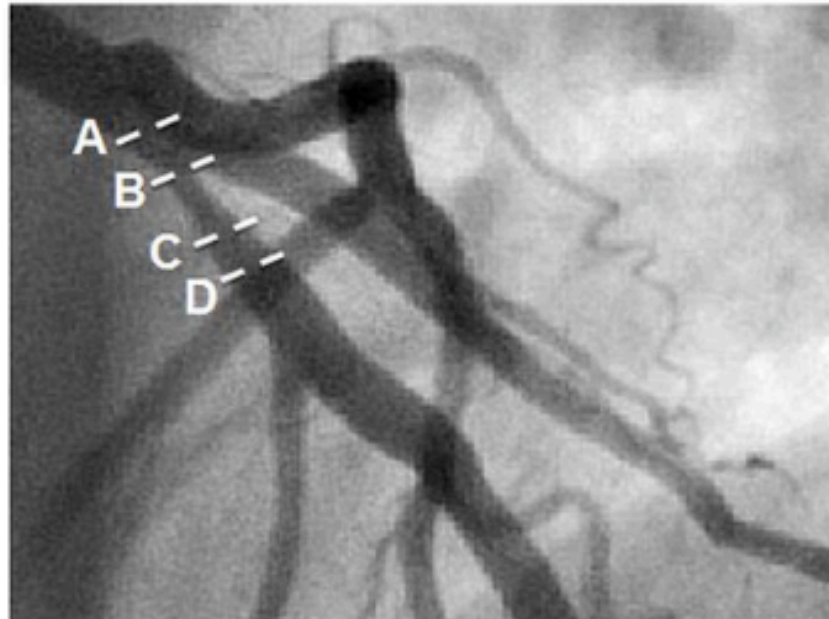
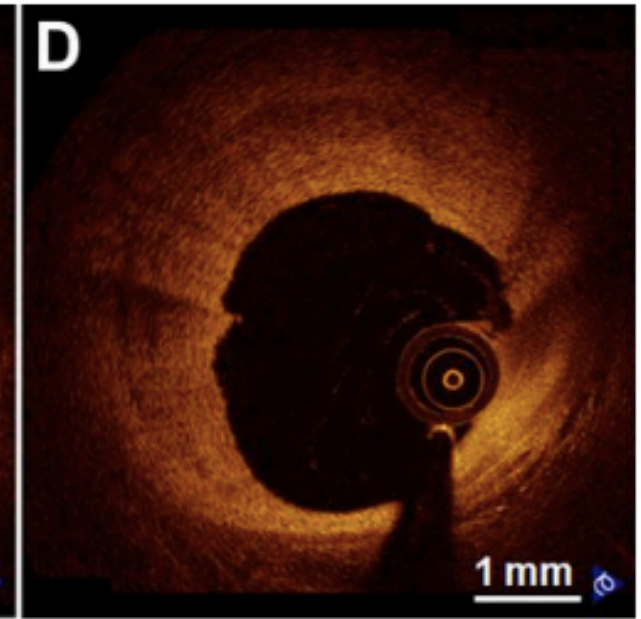
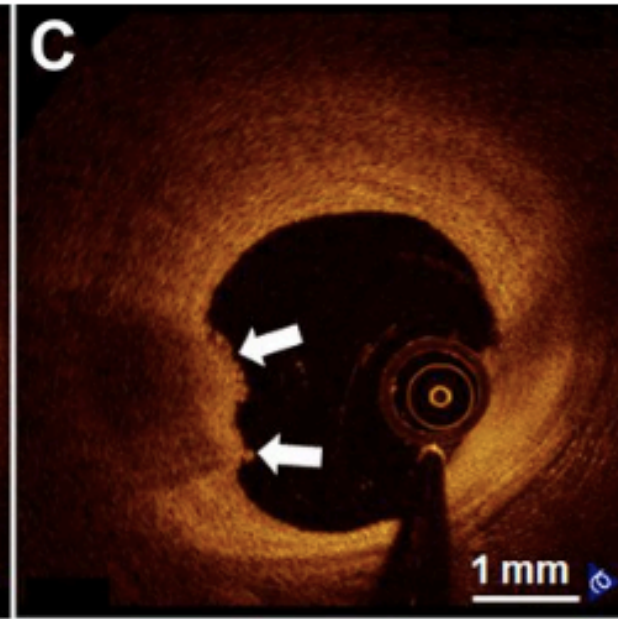
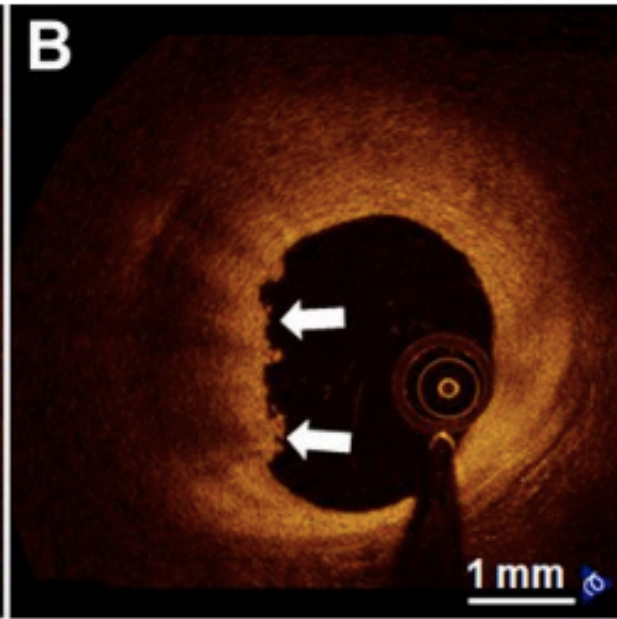
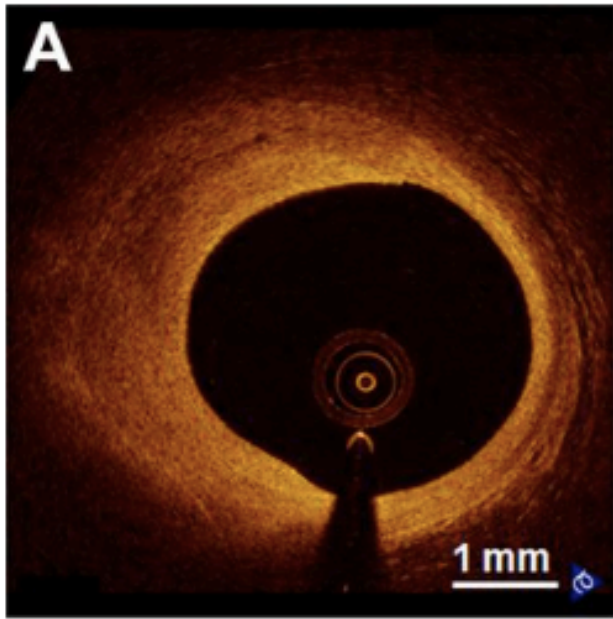
|                 | Low Likelihood                                                                       |                                                                                     |  | High Likelihood                                                                       |                                                                                       |                                                                                       |                                                                                       |
|-----------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1. Presentation |    |  |  |                                                                                       |    |                                                                                       |                                                                                       |
| 2. ECG          |    |                                                                                     |  |    |    |                                                                                       |                                                                                       |
| 3. Troponin     |   |                                                                                     |  |    |    |                                                                                       |                                                                                       |
| 4. Diagnosis    |  |                                                                                     |  |  |  |  |  |

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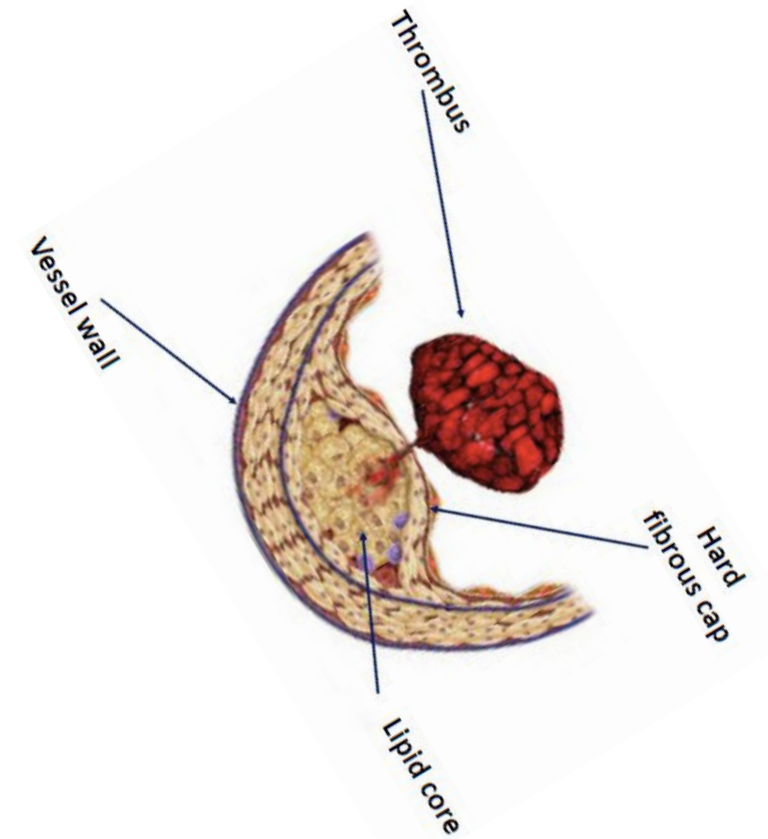
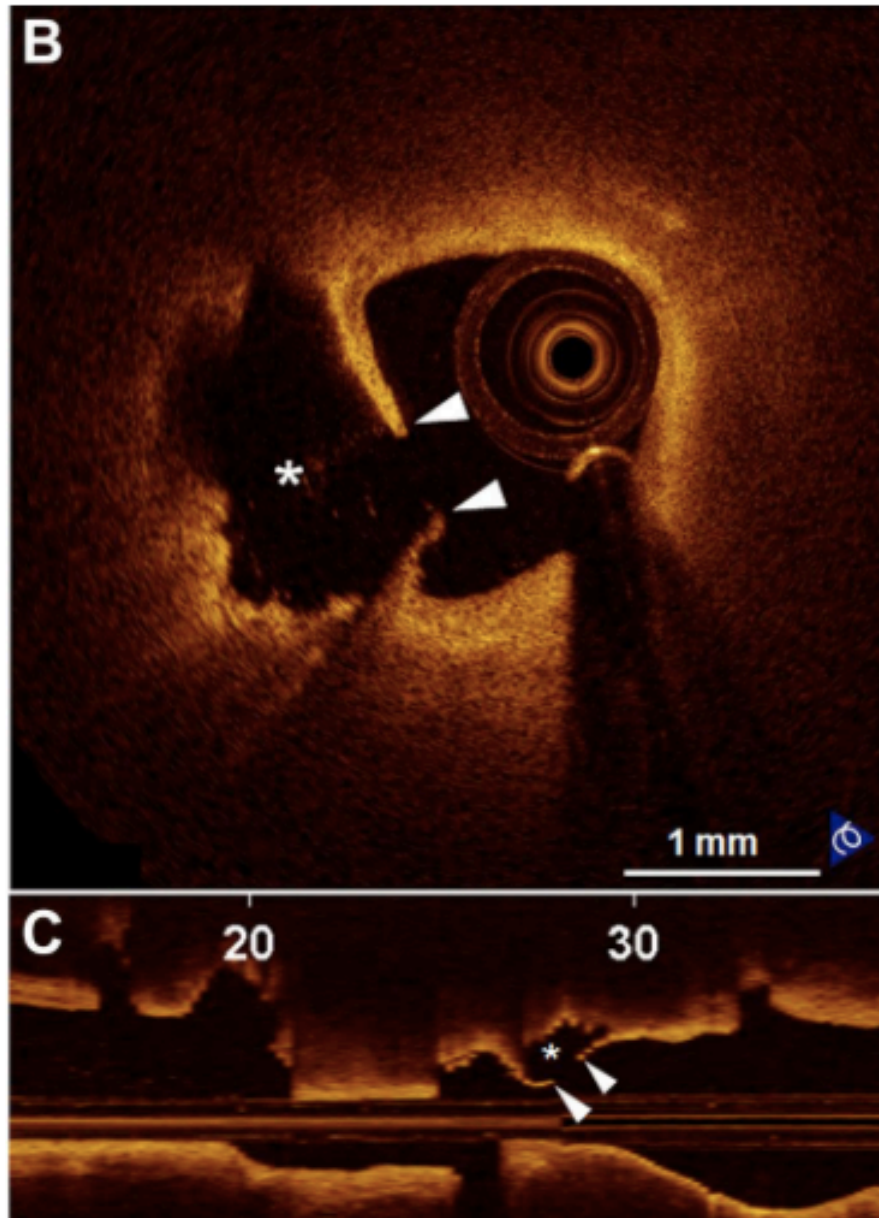
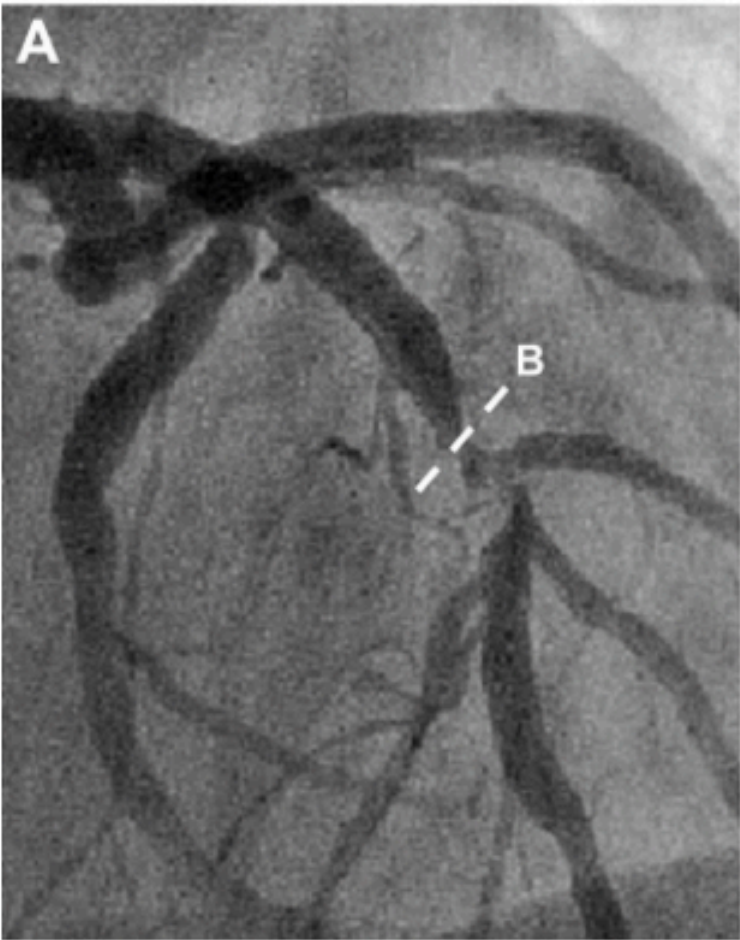
Le terme « **infarctus du myocarde** » doit être utilisé en cas d'évidence de nécrose coronarienne (**troponines élevées**) dans un contexte compatible avec de l'ischémie.





**NSTEMI avec  
érosion de  
plaque et  
thrombis**





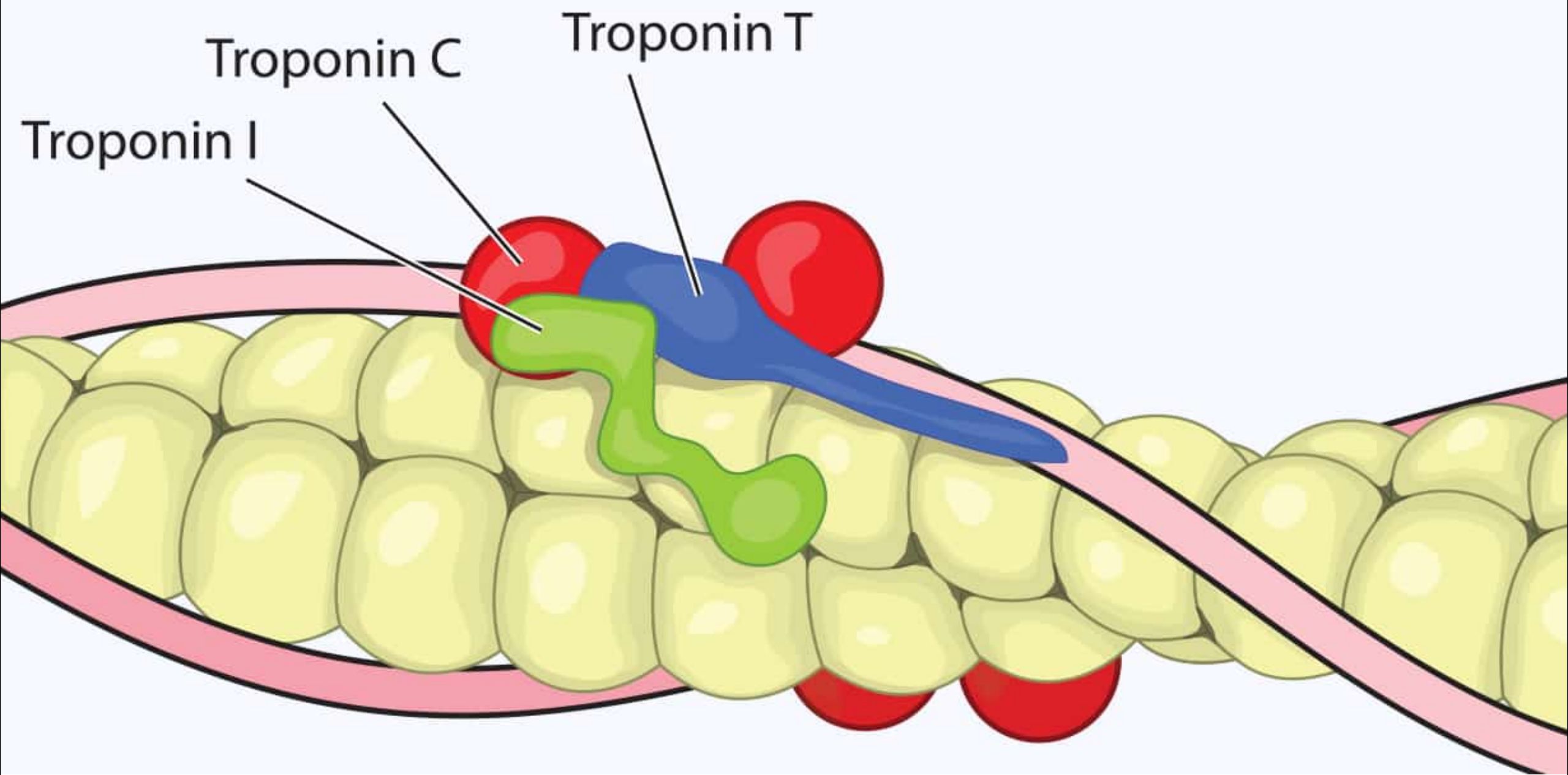
**STEMI avec rupture de plaque et thrombus.**

Jia et al, JACC 2013



# Les troponines

D'après les définitions précédentes, un patient avec angor instable ou NSTEMI peut présenter un ECG normal. Dès lors, le laboratoire peut nous aider à faire la part des choses.



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D'après les définitions précédentes, un patient avec angor instable ou NSTEMI peut présenter un ECG normal. Dès lors, le laboratoire peut nous aider à faire la part des choses.



## Les troponines **ultra-sensibles**

D'après les définitions précédentes, un patient avec angor instable ou NSTEMI peut présenter un ECG normal. Dès lors, le laboratoire peut nous aider à faire la part des choses.

### **Compared with standard cardiac troponin assays, hs-cTn assays:**

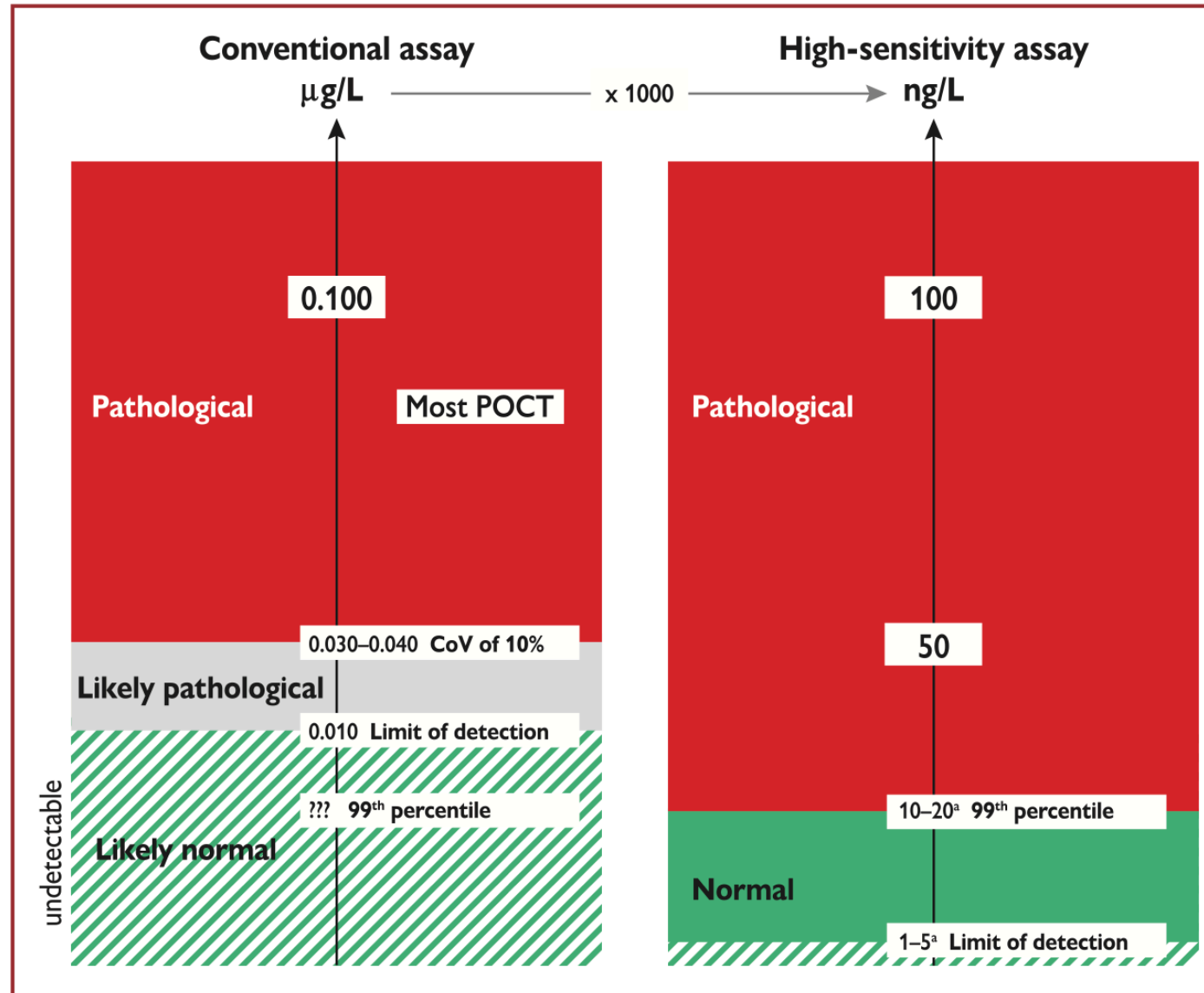
- Have higher NPV for AMI.
- Reduce the 'troponin-blind' interval leading to earlier detection of AMI.
- Result in ~4% absolute and ~20% relative increases in the detection of type 1 MI and a corresponding decrease in the diagnosis of unstable angina.
- Are associated with a 2-fold increase in the detection of type 2 MI.

### **Levels of hs-cTn should be interpreted as quantitative markers of cardiomyocyte damage (i.e. the higher the level, the greater the likelihood of MI):**

- Elevations beyond 5-fold the upper reference limit have high (>90%) PPV for acute type 1 MI.
- Elevations up to 3-fold the upper reference limit have only limited (50–60%) PPV for AMI and may be associated with a broad spectrum of conditions.
- It is common to detect circulating levels of cardiac troponin in healthy individuals.

### **Rising and/or falling cardiac troponin levels differentiate acute (as in MI) from chronic cardiomyocyte damage (the more pronounced the change, the higher the likelihood of AMI).**

AMI = acute myocardial infarction; hs-cTn = high-sensitivity cardiac troponin; MI = myocardial infarction; NPV = negative predictive value; PPV = positive predictive value.

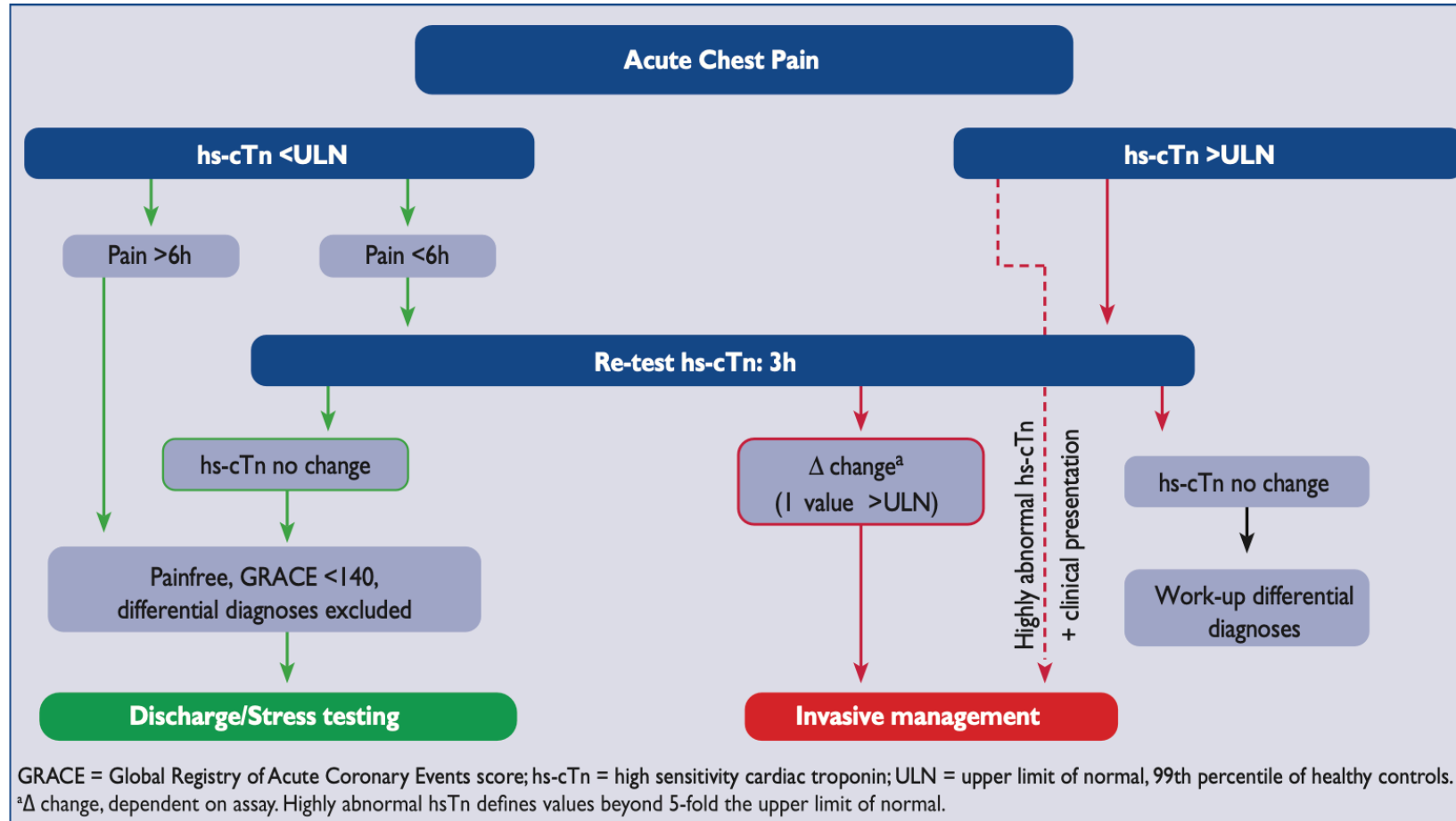




# **Troponines et course contre le temps**

# **Troponines et (mauvaise) course contre le temps**

# Troponines et (mauvaise) course contre le temps

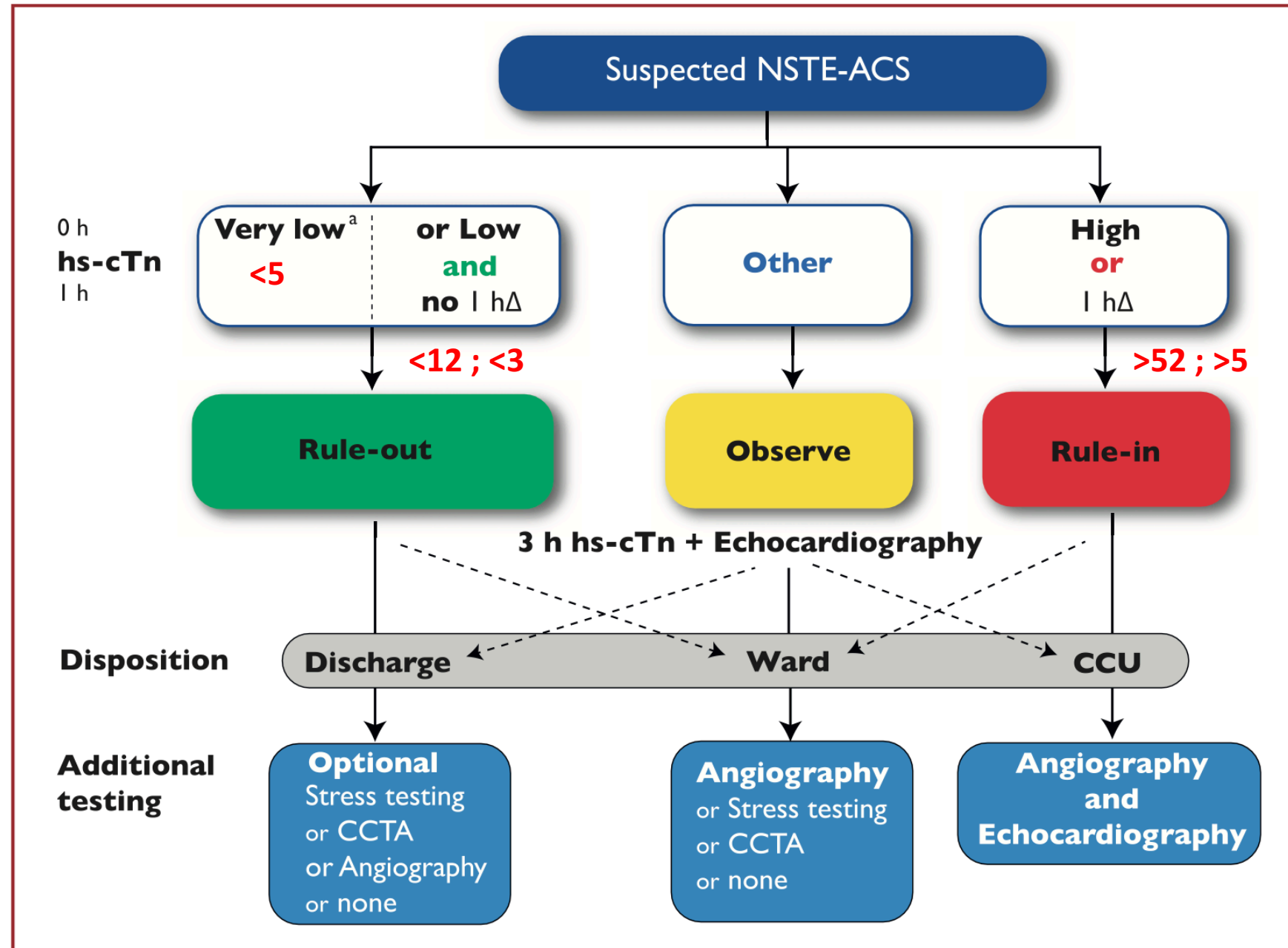


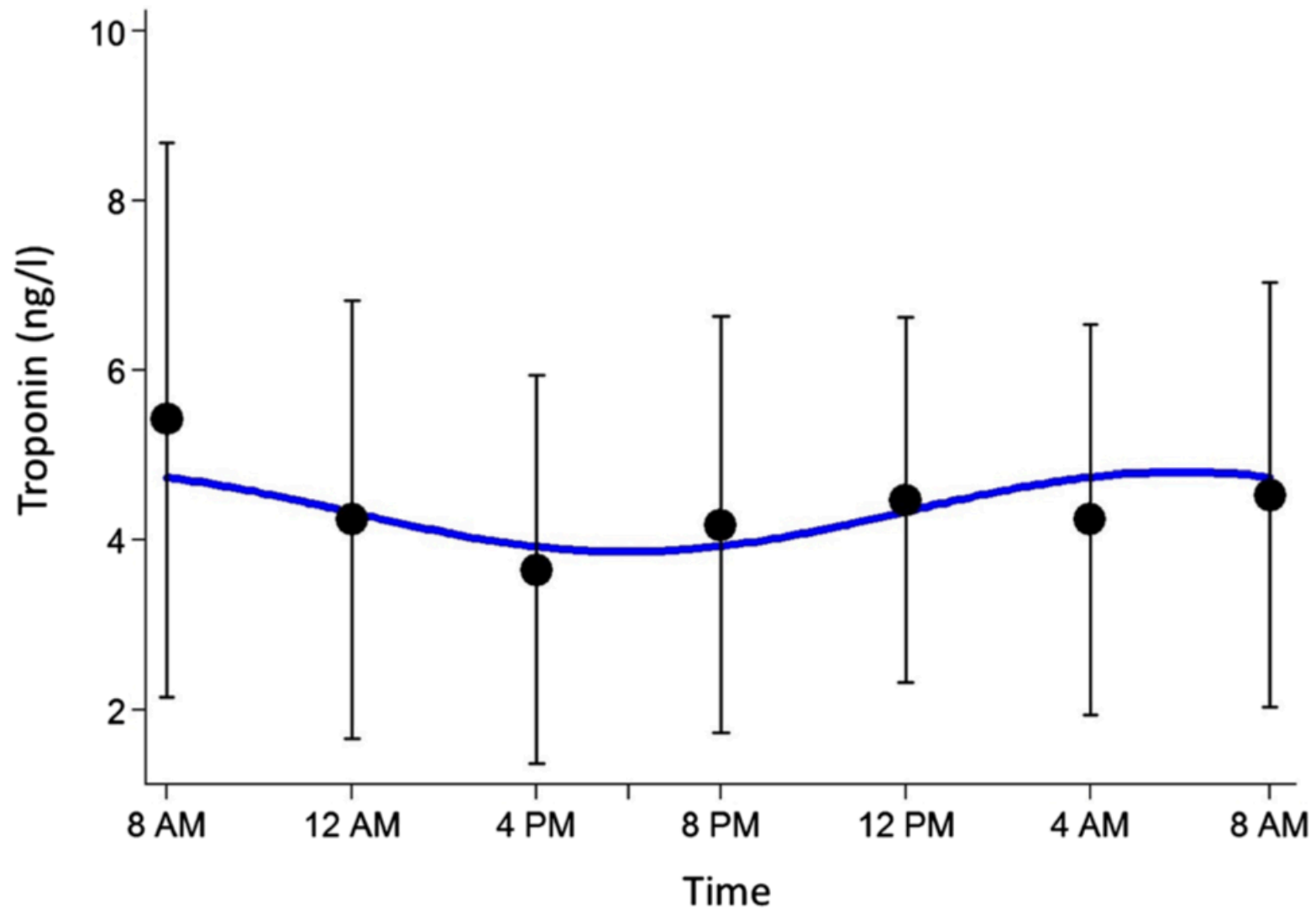
2015 : 0-3h



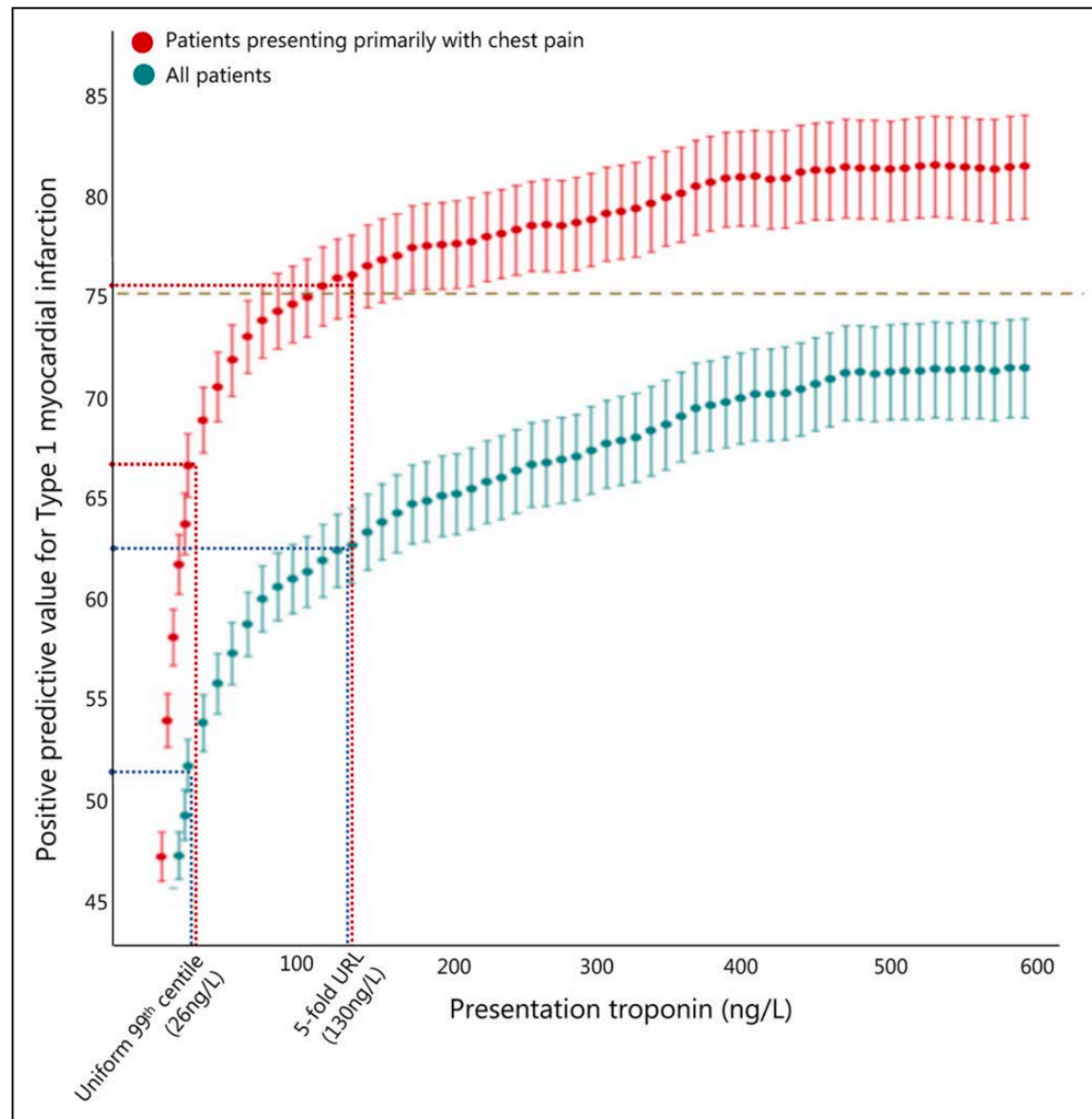


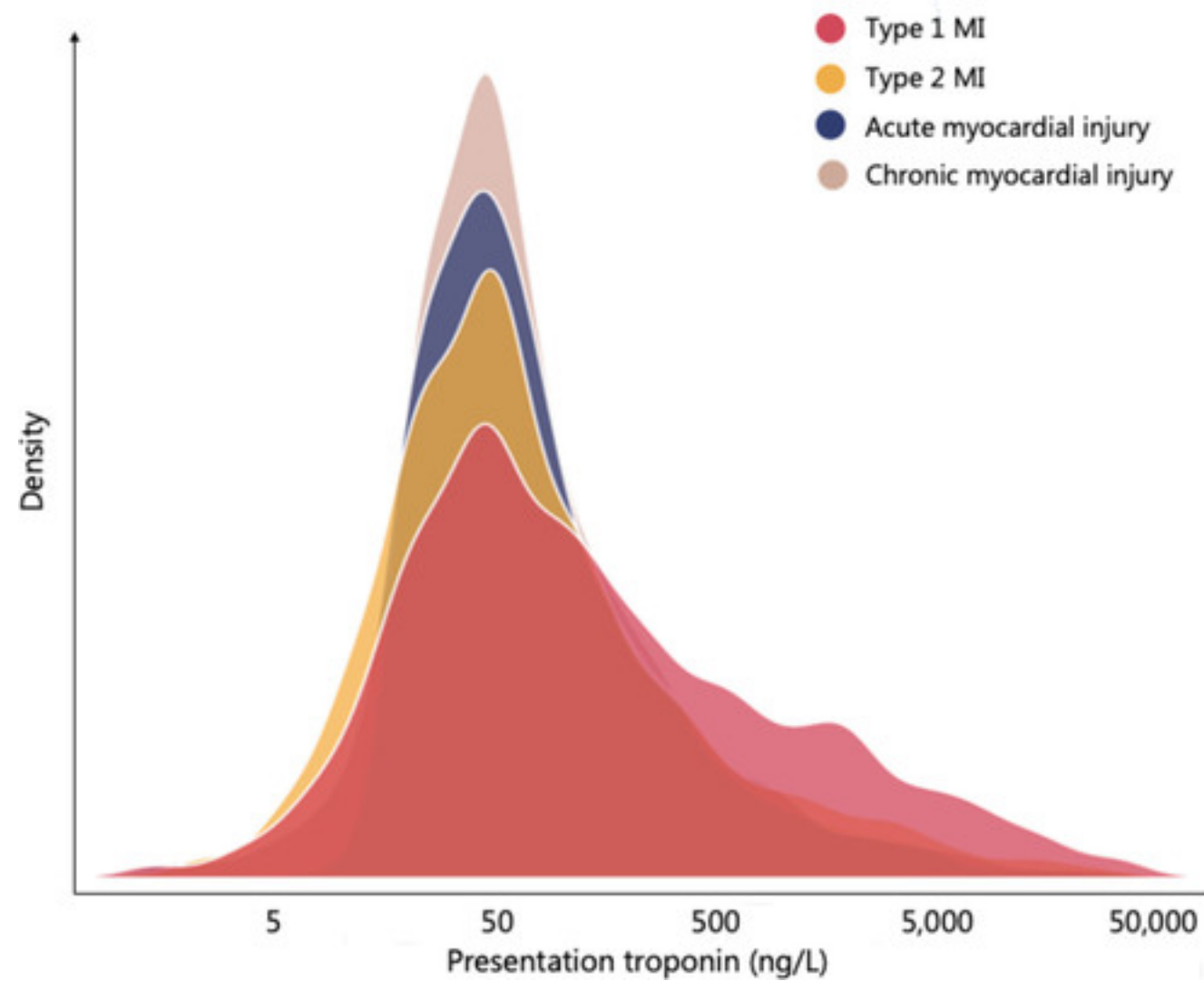
| <b>0 h/1 h algorithm</b>                | <b>Very low</b> | <b>Low</b> | <b>No 1hΔ</b> | <b>High</b> | <b>1hΔ</b> |
|-----------------------------------------|-----------------|------------|---------------|-------------|------------|
| hs-cTn T (Elecsys; Roche)               | <5              | <12        | <3            | ≥52         | ≥5         |
| hs-cTn I (Architect; Abbott)            | <4              | <5         | <2            | ≥64         | ≥6         |
| hs-cTn I (Centaur; Siemens)             | <3              | <6         | <3            | ≥120        | ≥12        |
| hs-cTn I (Access; Beckman Coulter)      | <4              | <5         | <4            | ≥50         | ≥15        |
| hs-cTn I (Clarity; Singulex)            | <1              | <2         | <1            | ≥30         | ≥6         |
| hs-cTn I (Vitros; Clinical Diagnostics) | <1              | <2         | <1            | ≥40         | ≥4         |
| hs-cTn I (Pathfast; LSI Medience)       | <3              | <4         | <3            | ≥90         | ≥20        |
| hs-cTn I (TriageTrue; Quidel)           | <4              | <5         | <3            | ≥60         | ≥8         |
| <b>0 h/2 h algorithm</b>                | <b>Very low</b> | <b>Low</b> | <b>No 2hΔ</b> | <b>High</b> | <b>2hΔ</b> |
| hs-cTn T (Elecsys; Roche)               | <5              | <14        | <4            | ≥52         | ≥10        |
| hs-cTn I (Architect; Abbott)            | <4              | <6         | <2            | ≥64         | ≥15        |
| hs-cTn I (Centaur; Siemens)             | <3              | <8         | <7            | ≥120        | ≥20        |
| hs-cTn I (Access; Beckman Coulter)      | <4              | <5         | <5            | ≥50         | ≥20        |
| hs-cTn I (Clarity; Singulex)            | <1              | TBD        | TBD           | ≥30         | TBD        |
| hs-cTn I (Vitros; Clinical Diagnostics) | <1              | TBD        | TBD           | ≥40         | TBD        |
| hs-cTn I (Pathfast; LSI Medience)       | <3              | TBD        | TBD           | ≥90         | TBD        |
| hs-cTn I (TriageTrue; Quidel)           | <4              | TBD        | TBD           | ≥60         | TBD        |

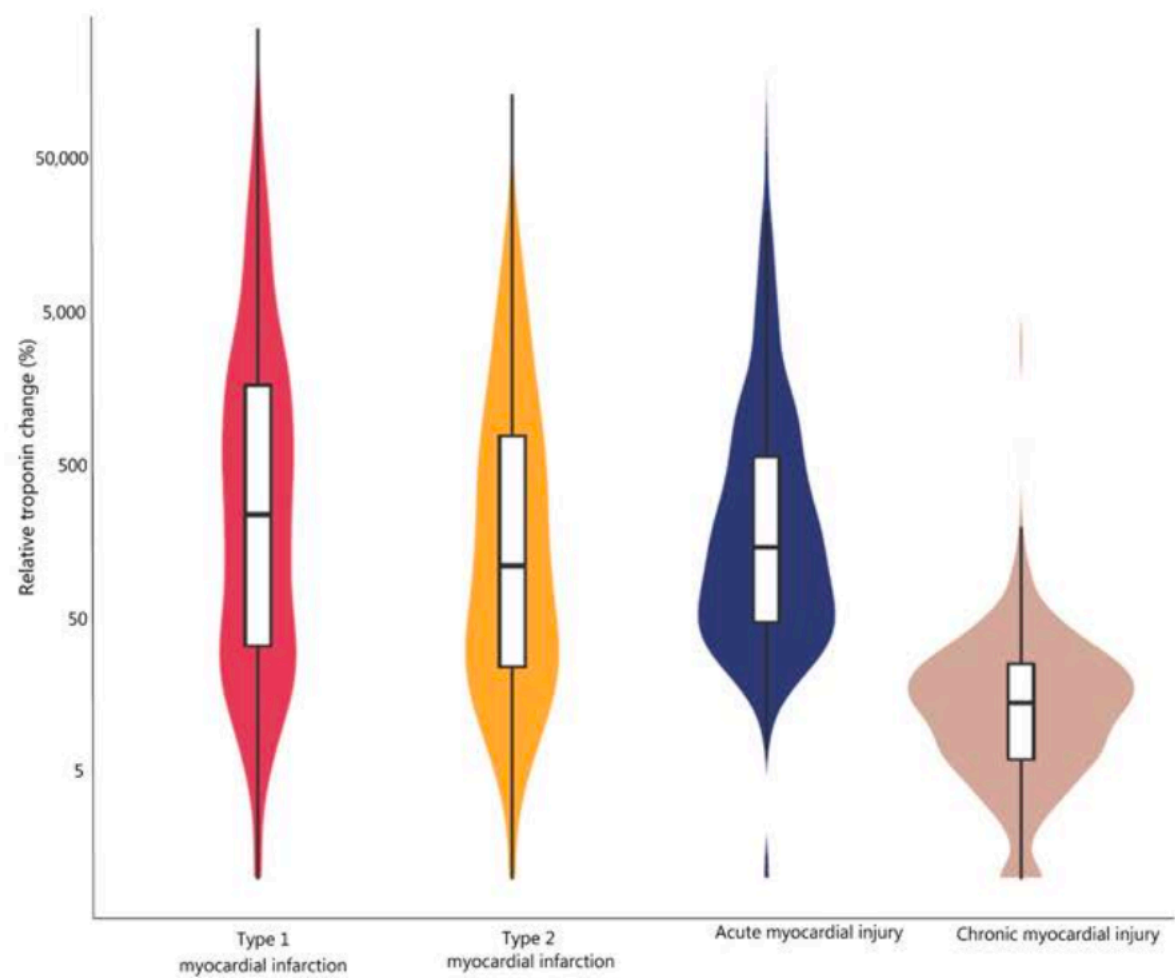
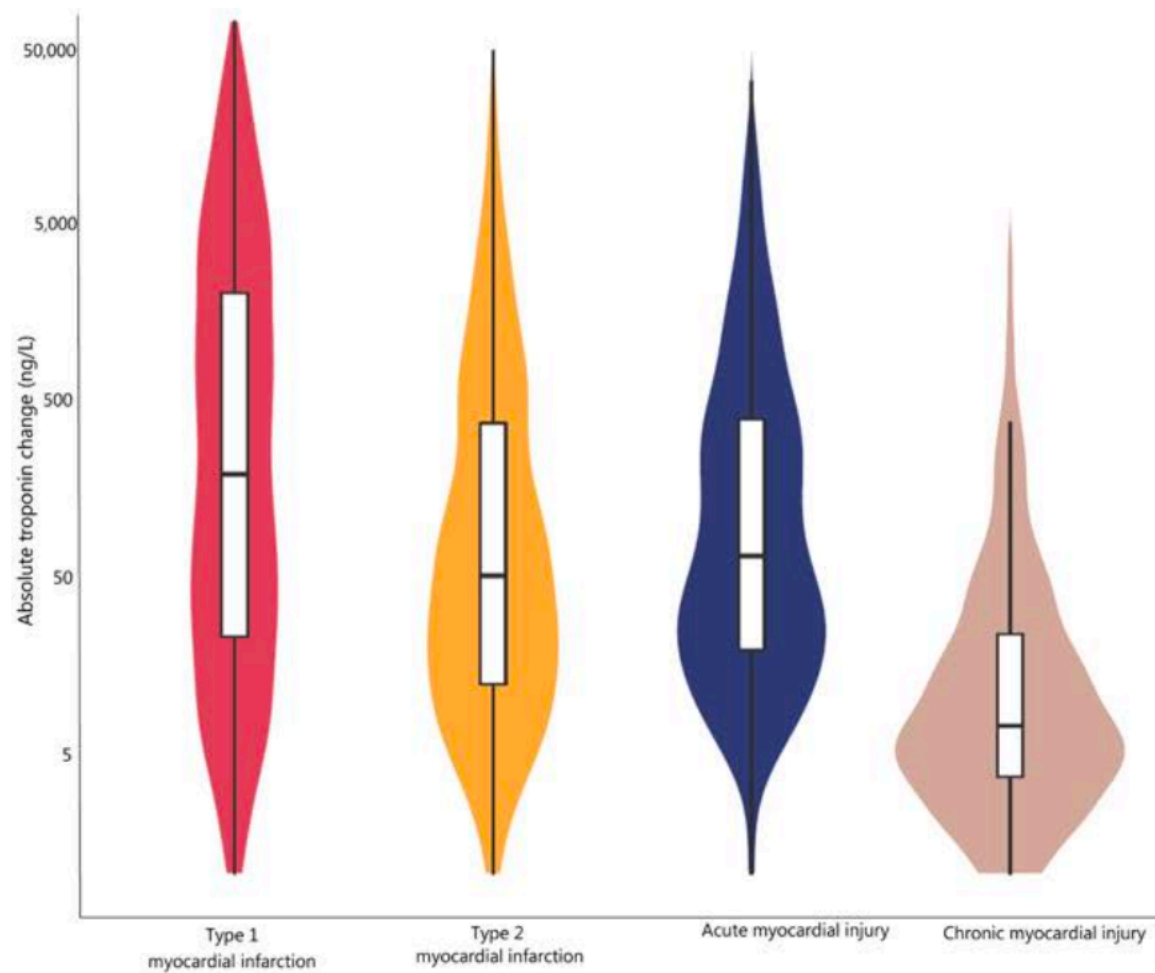








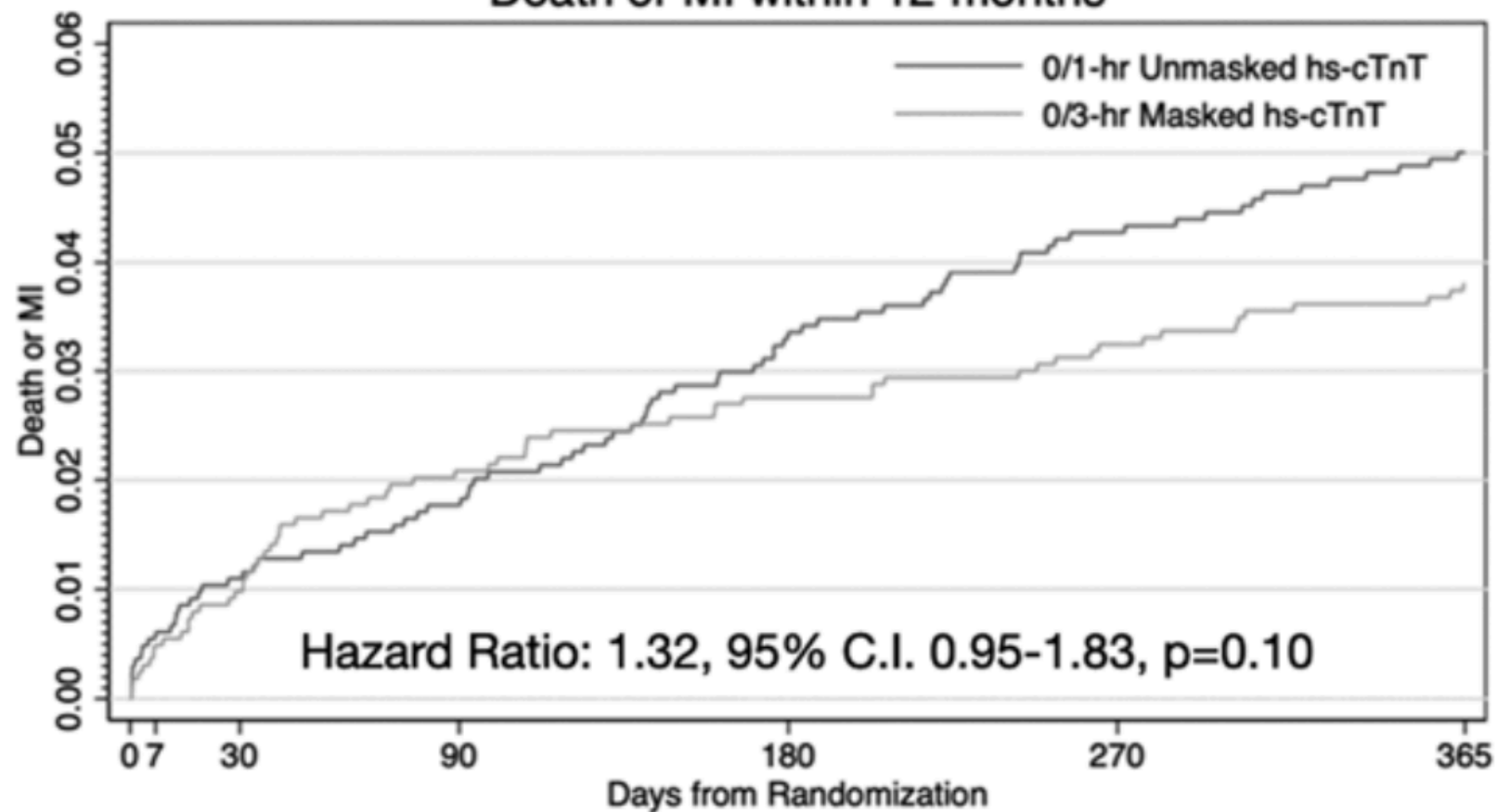




*«Although we observed important differences in the kinetics, cardiac troponin concentrations at presentation are insufficient to distinguish type 1 myocardial infarction from other causes of myocardial injury or infarction in practice. Clinical context may be more helpful than any rule-in threshold for guiding initial triage and management decisions.»*



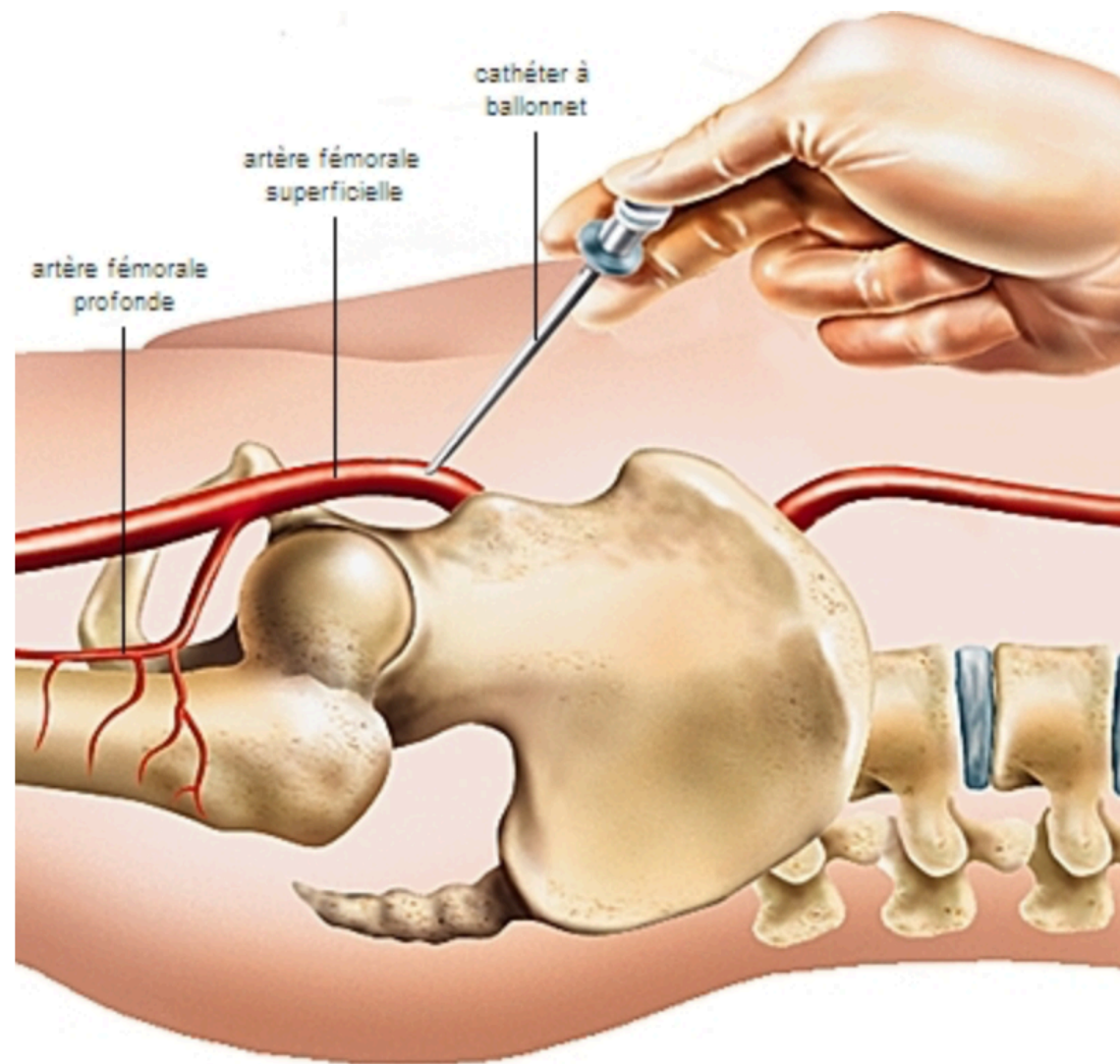
## Death or MI within 12-months



| Number at risk    |      |      |      |      |      |      |  |
|-------------------|------|------|------|------|------|------|--|
| 0/3-hour masked   | 1638 | 1620 | 1609 | 1583 | 1568 | 1556 |  |
| 0/1-hour unmasked | 1632 | 1616 | 1598 | 1587 | 1579 | 1570 |  |

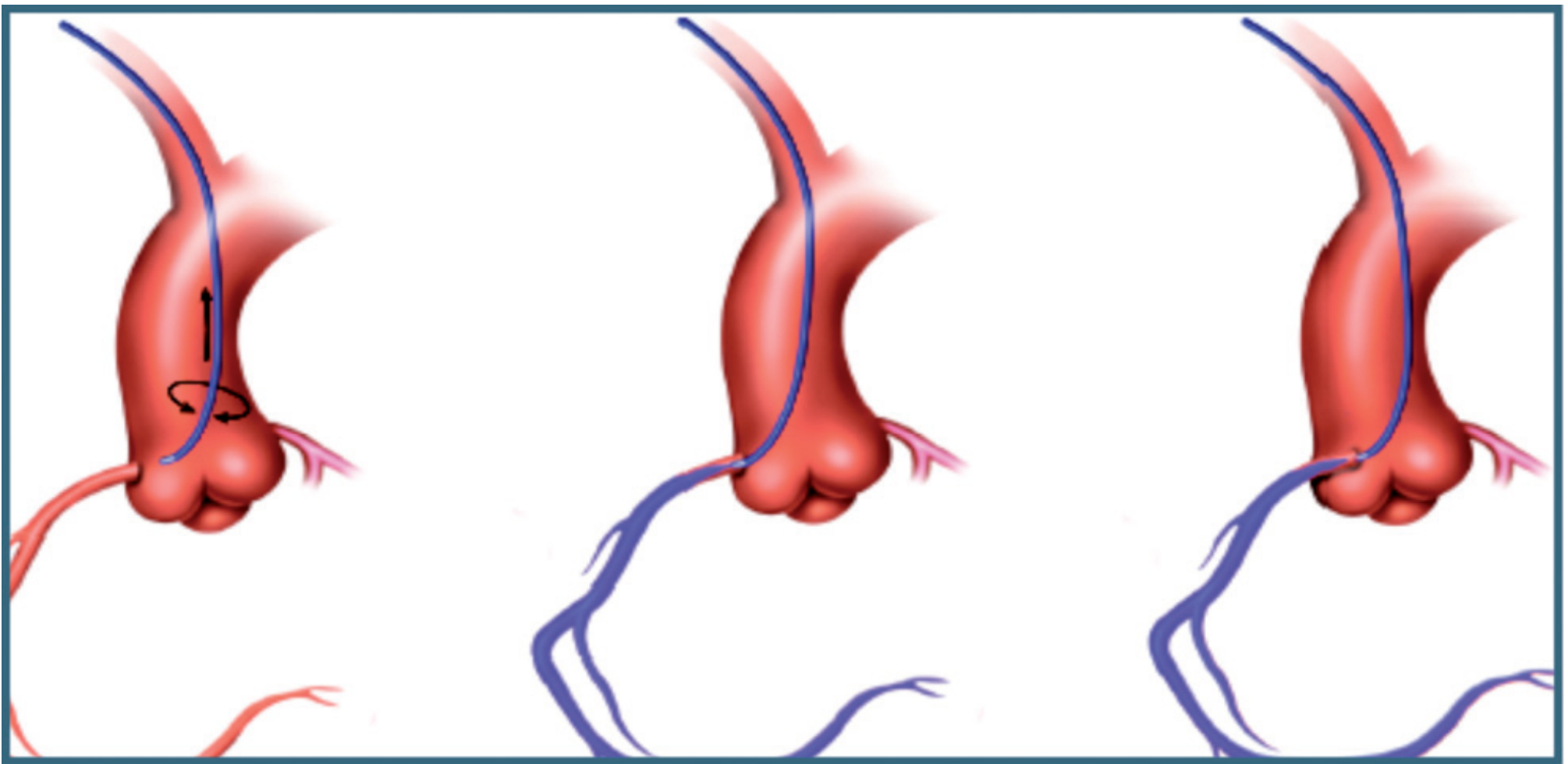
*«Changes in practice associated with the implementation of this protocol may be associated with an increase in death and myocardial infarction among those with newly identified troponin elevations»*

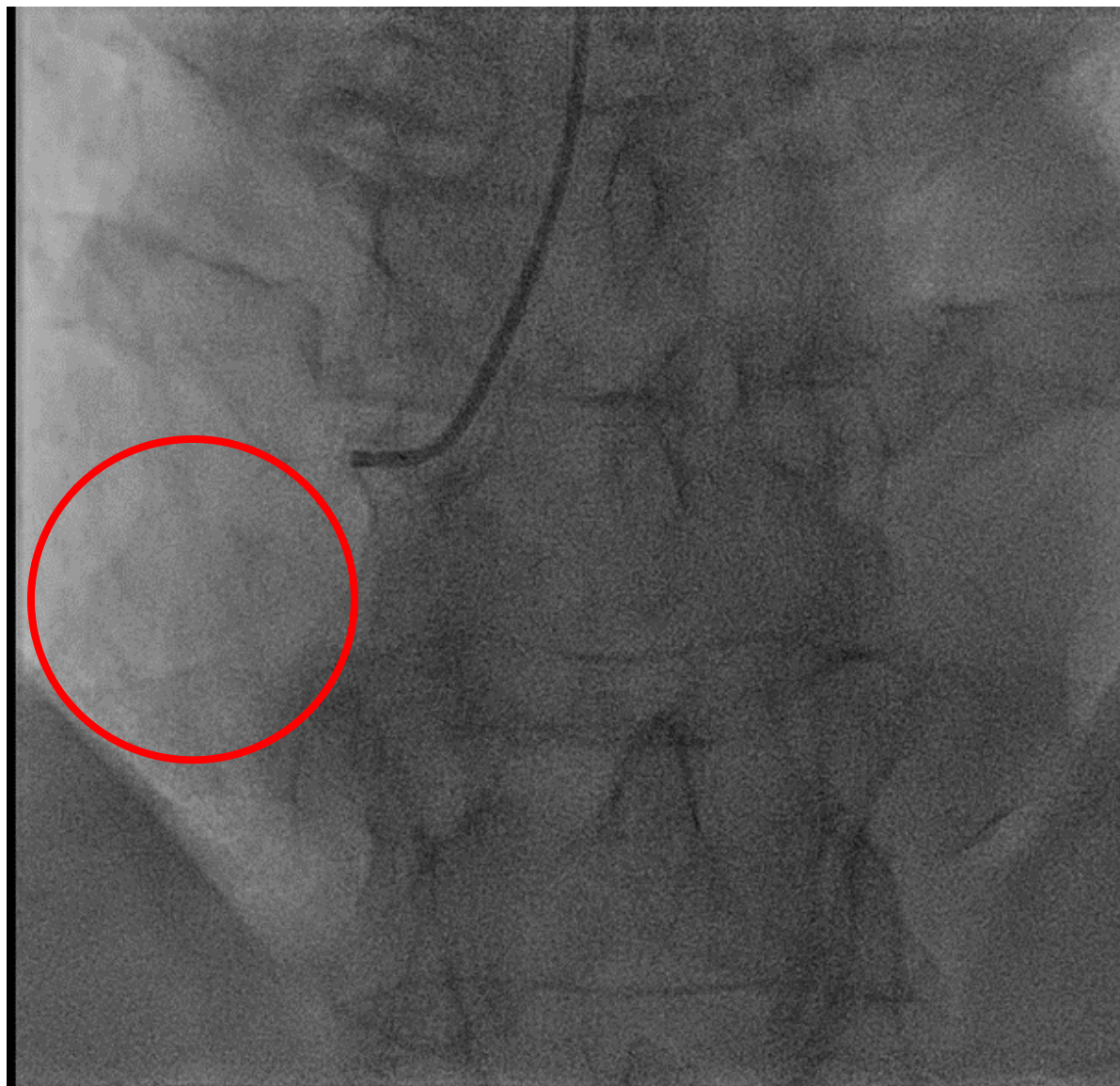
*Si les troponines sont positives...*

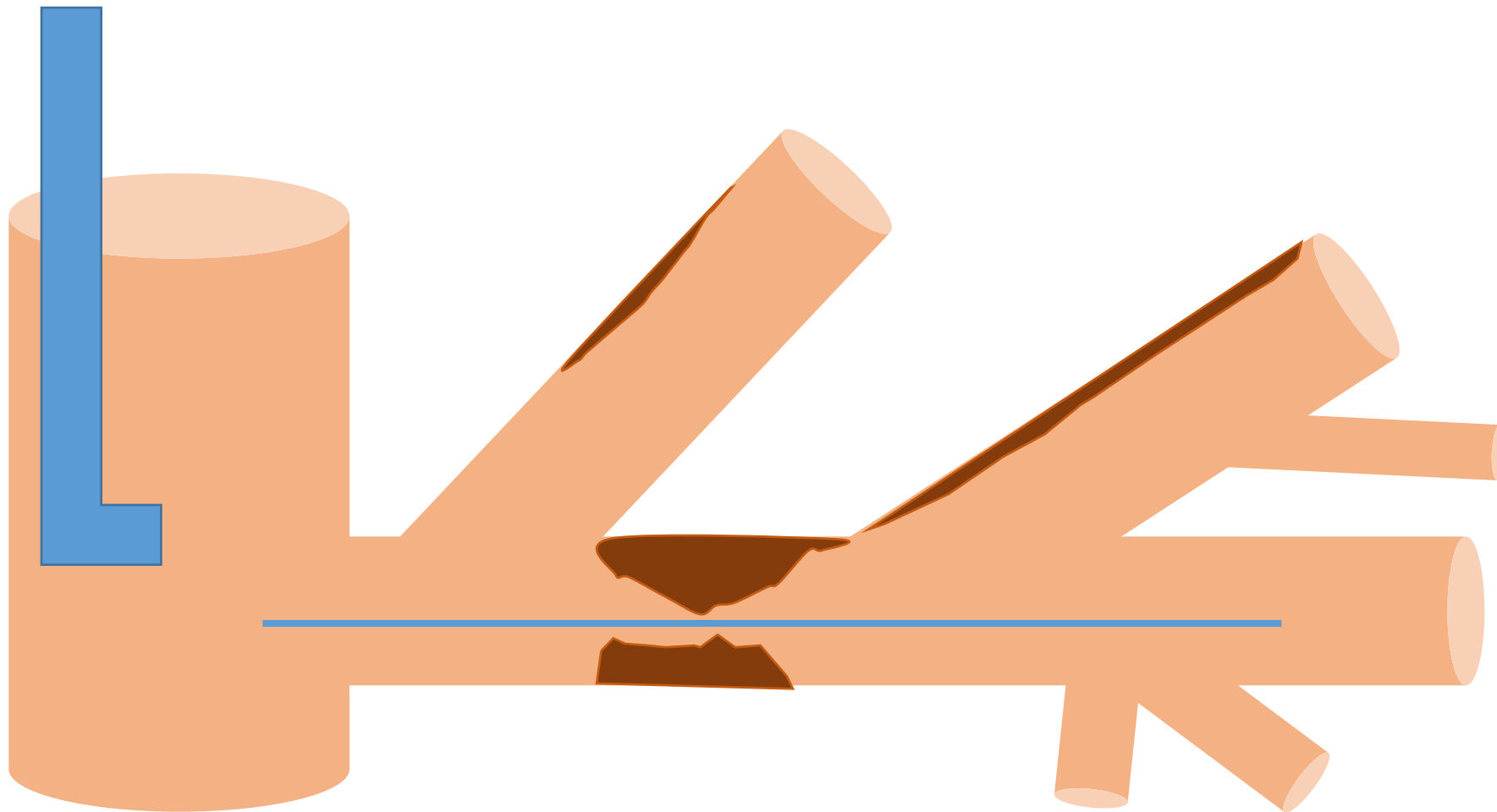




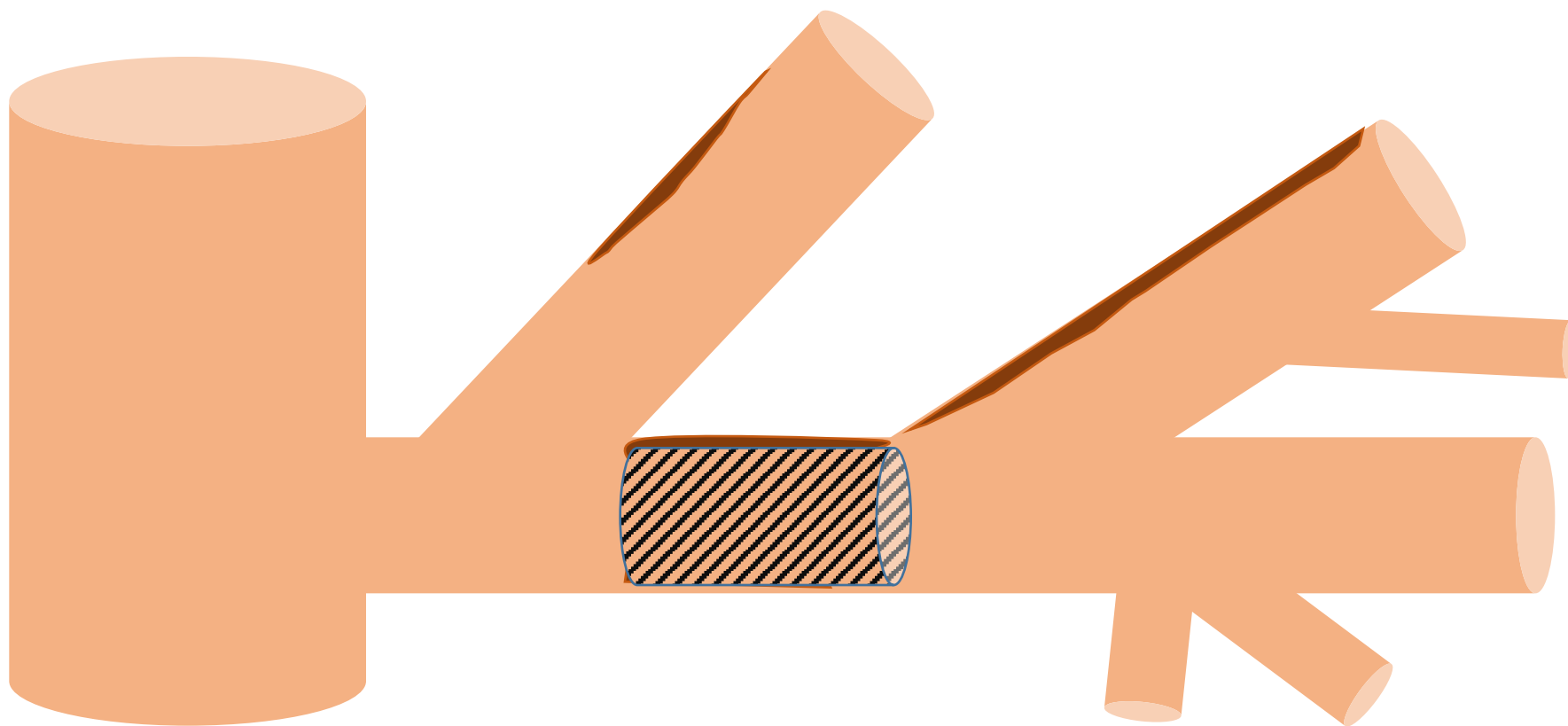




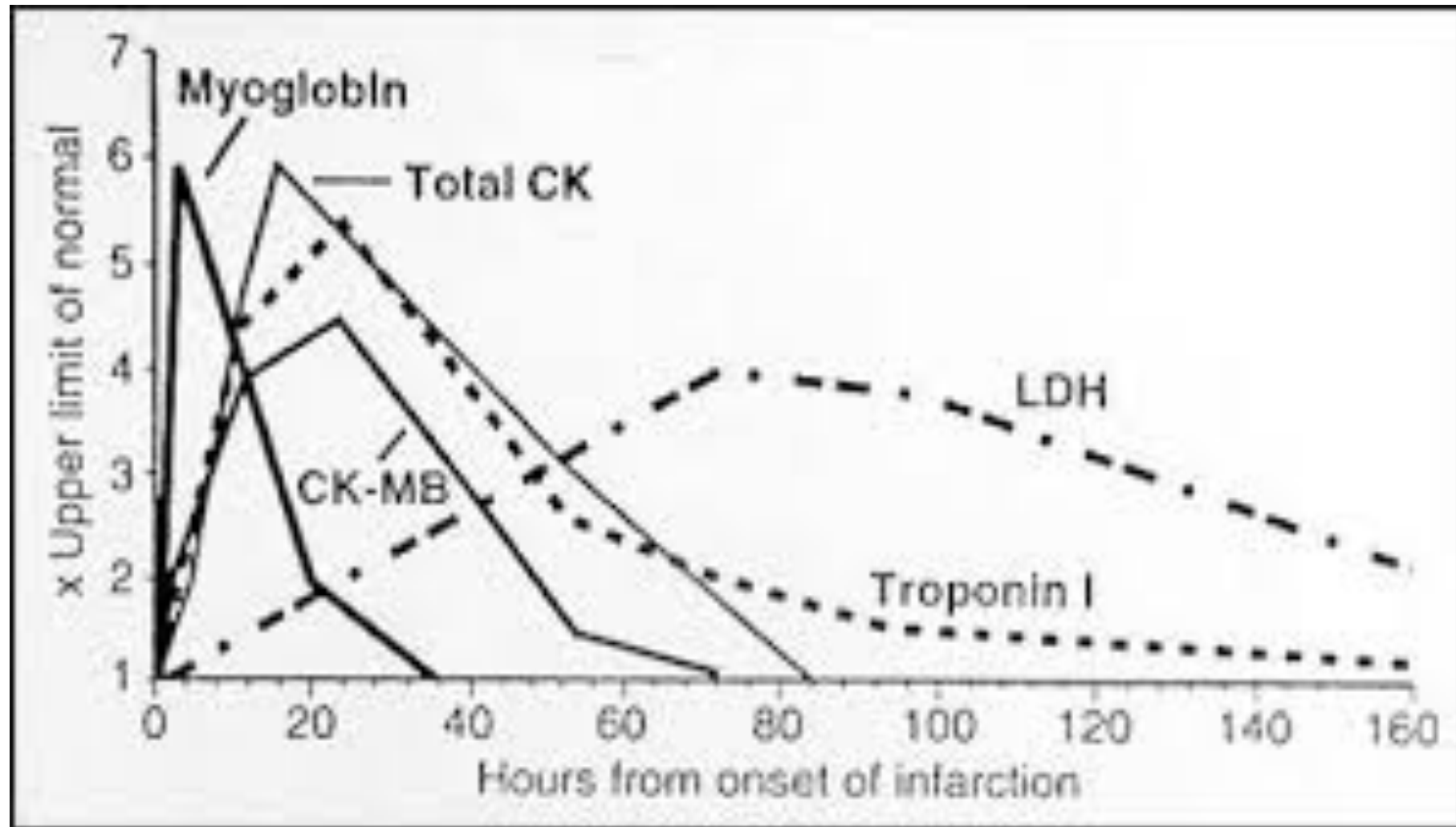












*Si les troponines sont positives...  
.... Mais que la coronarographie est négative*

# Diagnostic différentiel du SCA

| Cardiac                                          | Pulmonary              | Vascular                    | Gastro-intestinal             | Orthopaedic                 | Other             |
|--------------------------------------------------|------------------------|-----------------------------|-------------------------------|-----------------------------|-------------------|
| Myopericarditis<br>Cardiomyopathies <sup>2</sup> | Pulmonary embolism     | Aortic dissection           | Oesophagitis, reflux or spasm | Musculoskeletal disorders   | Anxiety disorders |
| Tachyarrhythmias                                 | (Tension)-Pneumothorax | Symptomatic aortic aneurysm | Peptic ulcer, gastritis       | Chest trauma                | Herpes zoster     |
| Acute heart failure                              | Bronchitis, pneumonia  | Stroke                      | Pancreatitis                  | Muscle injury/ inflammation | Anaemia           |
| Hypertensive emergencies                         | Pleuritis              |                             | Cholecystitis                 | Costochondritis             |                   |
| Aortic valve stenosis                            |                        |                             |                               | Cervical spine pathologies  |                   |
| Tako-Tsubo cardiomyopathy                        |                        |                             |                               |                             |                   |
| Coronary spasm                                   |                        |                             |                               |                             |                   |
| Cardiac trauma                                   |                        |                             |                               |                             |                   |

*Un cas particulier...*

## Anamnèse

Patient de 56 ans connu pour DM type 2 NIR, maladie de Paget et une myo-péricardite d'origine indéterminée en 07.2020 avec FEVG 55%, consulte pour douleurs thoraciques d'une durée de 30 minutes environ au repos suite à un accès de toux hier soir.  
Il rapporte avoir une légère toux non productive depuis lundi le 20.09.21 et mal de gorge depuis hier soir. Notion d'une légère céphalée occipitale lundi aussi sans autre symptôme associé.

Le reste de l'anamnèse par système est sans particularité, notamment:

Pas d'EF ni frissons

Pas de palpitations, pas de lipothymie/syncope, pas d'orthopnée ni dyspnée paroxystique nocturne.

Pas de dyspnée au repos/à l'effort, pas d'expectorations

Pas d'odynodyspagie, pas d'otalgie ni baisse de l'ouïe.

Pas de douleurs abdominales ni diarrhées, pas de nausées/vomissements

Pas de troubles urinaires.

Pas de vertiges, troubles sensitivomoteurs

Pas d'agénosie/anosmie, pas de myalgies ni arthralgies.

### Status vaccination SARS-COV-2:

A jour, 2ème dose en mai 2021 (Pfizer).

### Allergie:

Pas d'allergies connues.

## Traitement habituel (y. c. médecines complémentaires)

Jardiance Met 5 mg/850mg 2x/j

Diamicron MR 60 mg 2x/j

Aspirine cardio 100 mg 1x/j

Beloc Zok 25 mg, 0.5 cpr 1x/j

Nexium 40 mg 1x/j

Dafalgan 1 g en R

Condrosulf 800

Calcimagon D3 forte

Fastum gel

Accu-check (aviva)

## Antécédents médico-chirurgicaux (commentaires)

- Myo-péricardite d'origine indéterminée en 07.2020
- Diabète de type 2 diagnostiqué en 2011, avec HbA1c le 18.07.2020 à 8.5%.
- Maladie de Paget.
- Dépression traitée.
- Arthrose.



## Chimie / générale

23.09.21

23.09.21

23.09.21

10:08

07:13

05:13

2109232395...

2109230984...

2109230230...

Réception labo

☐

23.09

23.09

23.09

11:00

07:23

05:50

No bon demande

☐

8102092476

8102092106

8102092047

## Sang

Sodium sg

☐

(135 - 145) mmol/l

140  $\Delta$ 

Potassium sg

☐

(3.5 - 4.6) mmol/l

4.2  $\Delta$ 

Urée sg

☐

(2.9 - 7.7) mmol/l

3.5  $\Delta$ 

Créatinine (Jaffé) sg

☐(62 - 106)  $\mu$ mol/l49  $\Delta$  L

eGFR (CKD-EPI Créatinine)

☐ml/min/1.73m<sup>2</sup>>90  $\Delta$ 

CRP (Prot. C Réact.) sg

☐

&lt; 10 mg/l

6  $\Delta$ 

Cholestérol Total sg

☐

(www.gsla.ch) mmol/l

Cholestérol-HDL sg

☐

(www.gsla.ch) mmol/l

Cholestérol non-HDL

☐

(www.gsla.ch) mmol/l

Triglycérides sg

☐

(www.gsla.ch) mmol/l

Cholestérol-LDL Calculé sg

☐

(www.gsla.ch) mmol/l

Cholestérol-LDL Mesuré sg

☐

(www.gsla.ch)

Commentaire :

☐

Troponine T hs sg

☐

&lt; 14 ng/l

64  $\Delta$  H57  $\Delta$  H49  $\Delta$  H

## Chimie / générale

23.09.21  
10:0823.09.21  
07:1323.09.21  
05:13

2109232395...

2109230984...

2109230230...

Réception labo ☐23.09  
11:0023.09  
07:2323.09  
05:50No bon demande ☐

8102092476

8102092106

8102092047

## Sang

Sodium sg ☐ (135 - 145) mmol/l140 <sup>Δ</sup>Potassium sg ☐ (3.5 - 4.6) mmol/l4.2 <sup>▲</sup> <sup>Δ</sup>Urée sg ☐ (2.9 - 7.7) mmol/l3.5 <sup>Δ</sup>Créatinine (Jaffé) sg ☐ (62 - 106) μmol/l49 <sup>Δ</sup> <sub>L</sub>eGFR (CKD-EPI Créatinine) ☐ ml/min/1.73m<sup>2</sup>>90 <sup>Δ</sup>CRP (Prot. C Réact.) sg ☐ (< 10) mg/l6 <sup>Δ</sup>Cholestérol Total sg ☐ (www.gsla.ch) mmol/lCholestérol-HDL sg ☐ (www.gsla.ch) mmol/lCholestérol non-HDL ☐ (www.gsla.ch) mmol/lTriglycérides sg ☐ (www.gsla.ch) mmol/lCholestérol-LDL Calculé sg ☐ (www.gsla.ch) mmol/lCholestérol-LDL Mesuré sg ☐ (www.gsla.ch)Commentaire : ☐Troponine T hs sg ☐ (< 14) ng/l64 <sup>Δ</sup> <sub>H</sub>57 <sup>Δ</sup> <sub>H</sub>49 <sup>▲</sup> <sup>Δ</sup> <sub>H</sub>Troponine i hs sg ☐ (< 26) ng/l<3 <sup>Δ</sup><3 <sup>Δ</sup>CK sg ☐ (25 - 190) U/l

Original Investigation

# Elevated Cardiac Troponin T in Patients With Skeletal Myopathies

Johannes Schmid MD <sup>a, b</sup>  , Laura Liesinger MS <sup>c, d</sup>, Ruth Birner-Gruenberger MS, PhD <sup>c, d</sup>, Tatjana Stojakovic MD <sup>e</sup>, Hubert Scharnagl PhD <sup>e</sup>, Benjamin Dieplinger MD <sup>f</sup>, Martin Asslaber MD <sup>c</sup>, Roman Radl MD <sup>g</sup>, Meinrad Beer MD <sup>h</sup>, Malgorzata Polacin MD <sup>h</sup>, Johannes Mair MD <sup>i</sup>, Dieter Szolar MD <sup>b</sup>, Andrea Berghold MS, PhD <sup>j</sup>, Stefan Quasthoff MD <sup>k</sup>, Josepha S. Binder MD <sup>a</sup>, Peter P. Rainer MD, PhD <sup>a</sup>  

*«Measured cTnT concentrations were chronically elevated in the majority of patients with skeletal myopathies, whereas cTnI elevation was rare. Our data indicate that cross-reaction of the cTnT immunoassay with skeletal muscle troponin isoforms was the likely cause.»*

Merci