ARNAULT TZANCK
SAINT-LAURENT DU VAR

Perfusion et cathétérisme coronaire: les bons outils

Julien Adjedj

Orateur : ADJEDJ Julien

☑ Je déclare les liens d'intérêt potentiels suivants :

- Consultant pour Abbott et Biotronik

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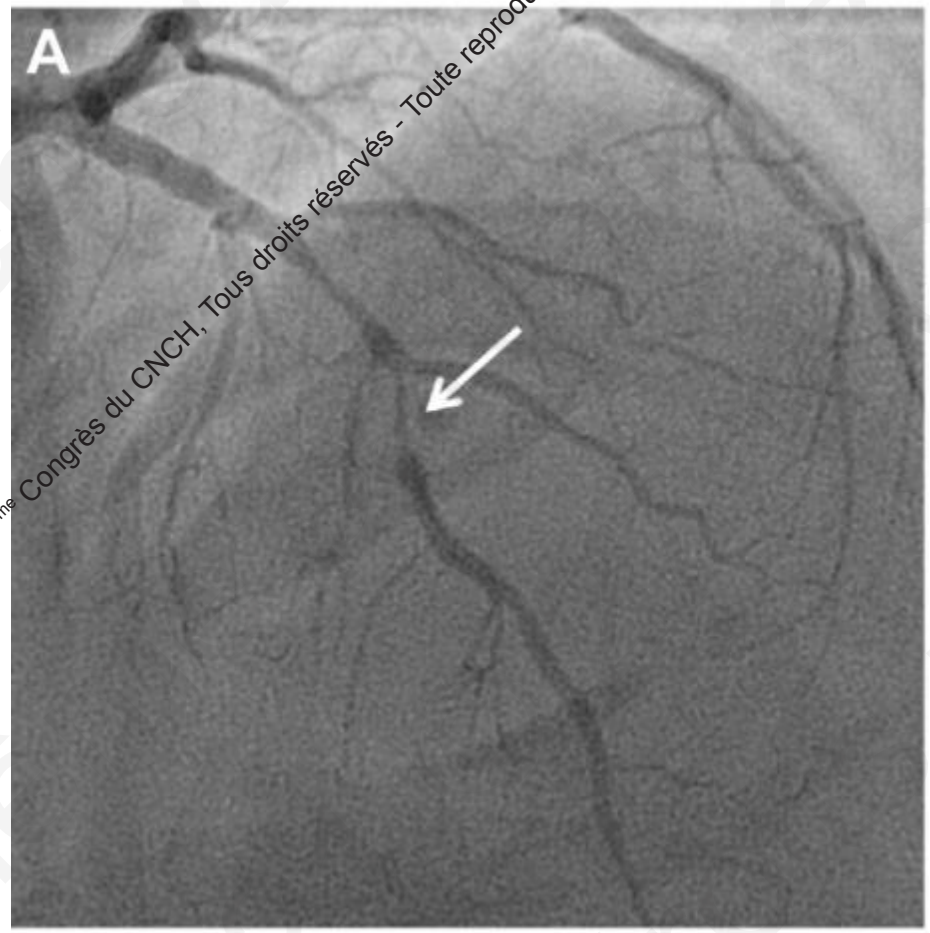
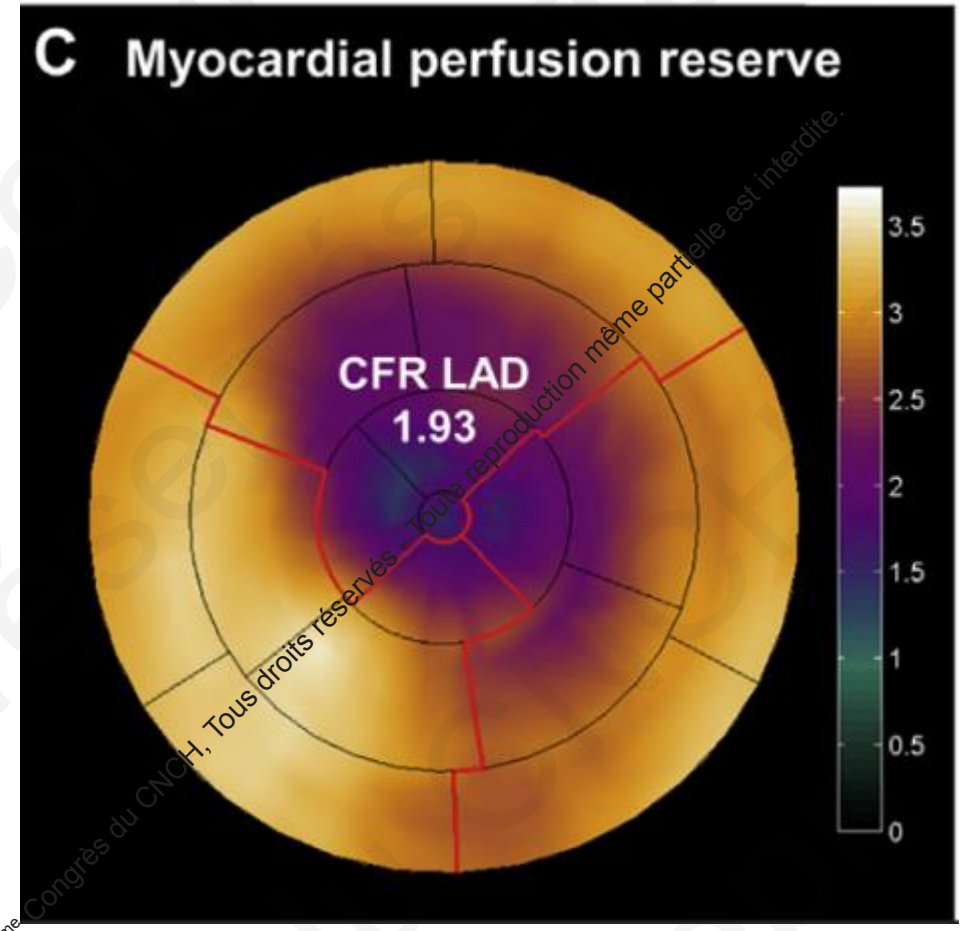
Introduction



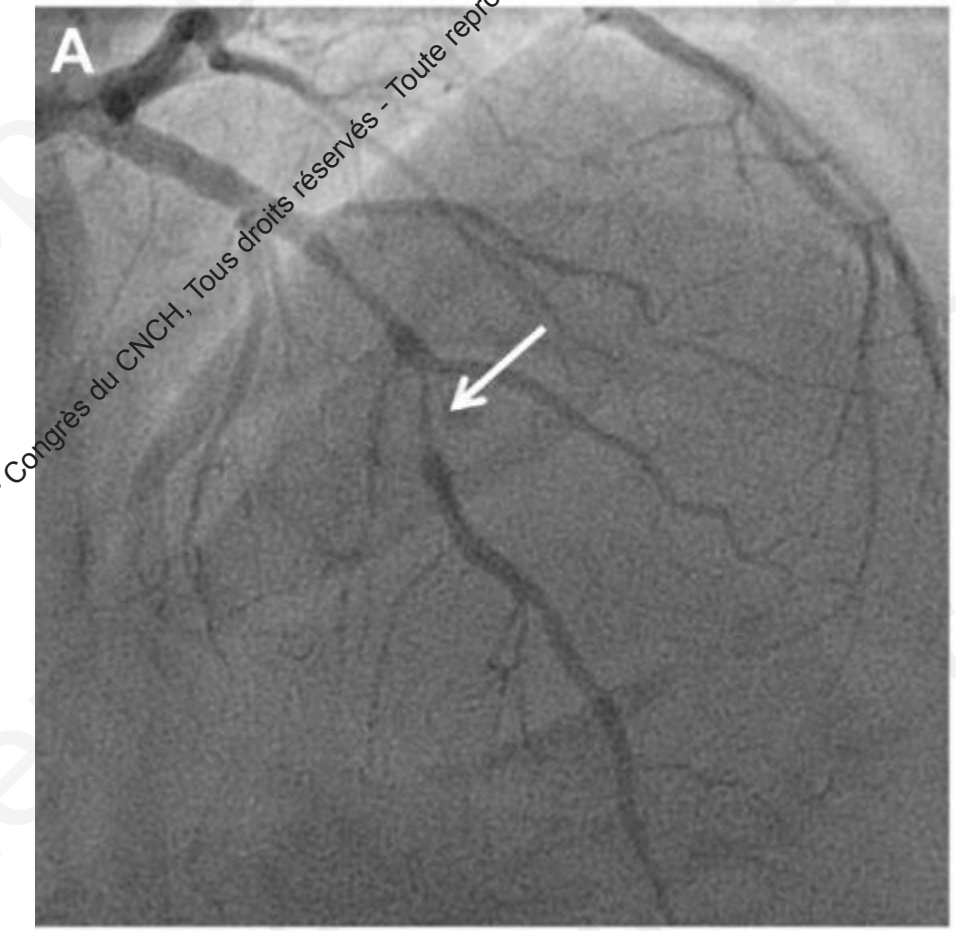


Everaars et al. JACC int 2018

Introduction

FFR

Flux



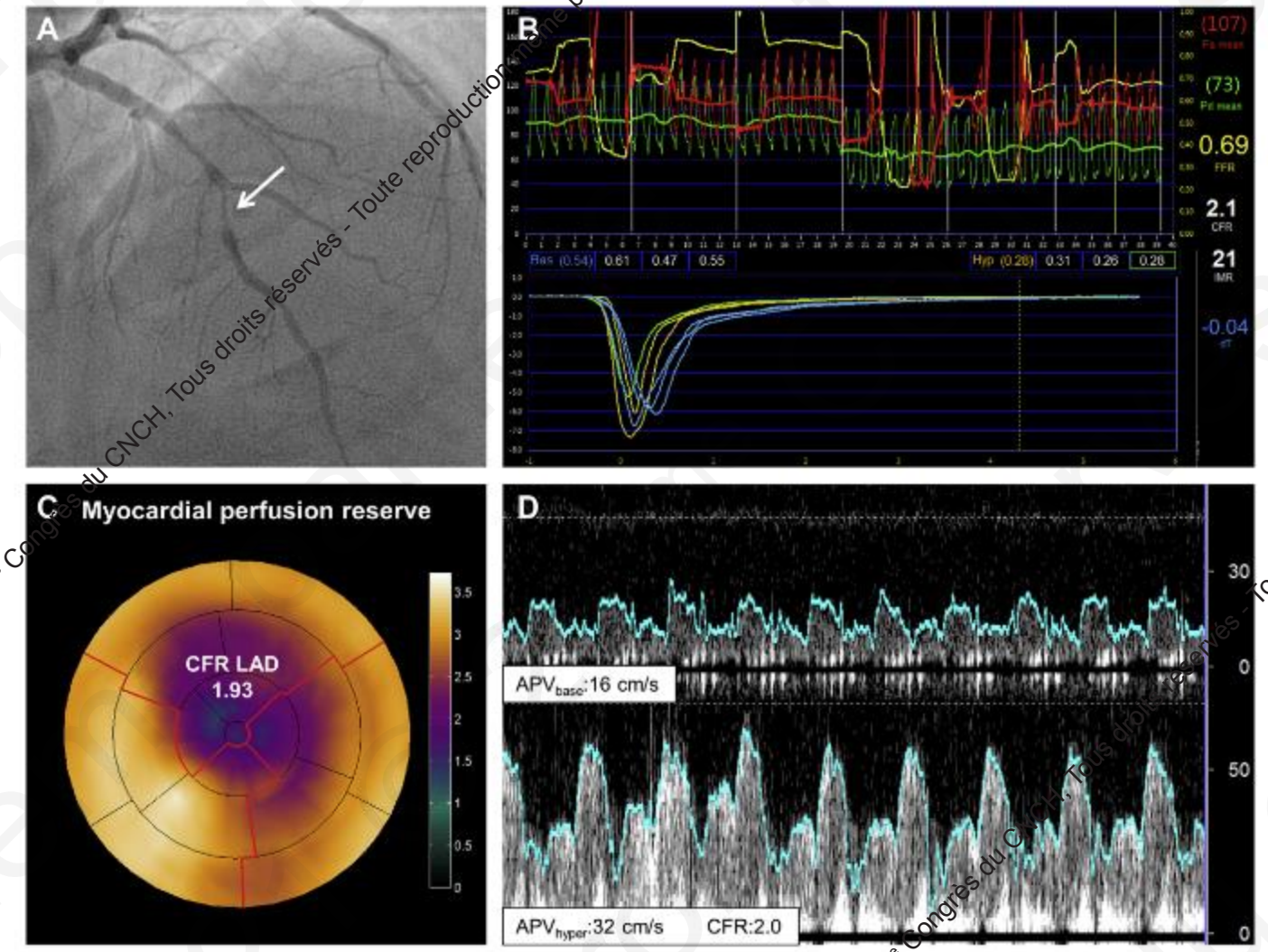
Reserve coronaire

Resistances

Everaars et al. JACC int 2018

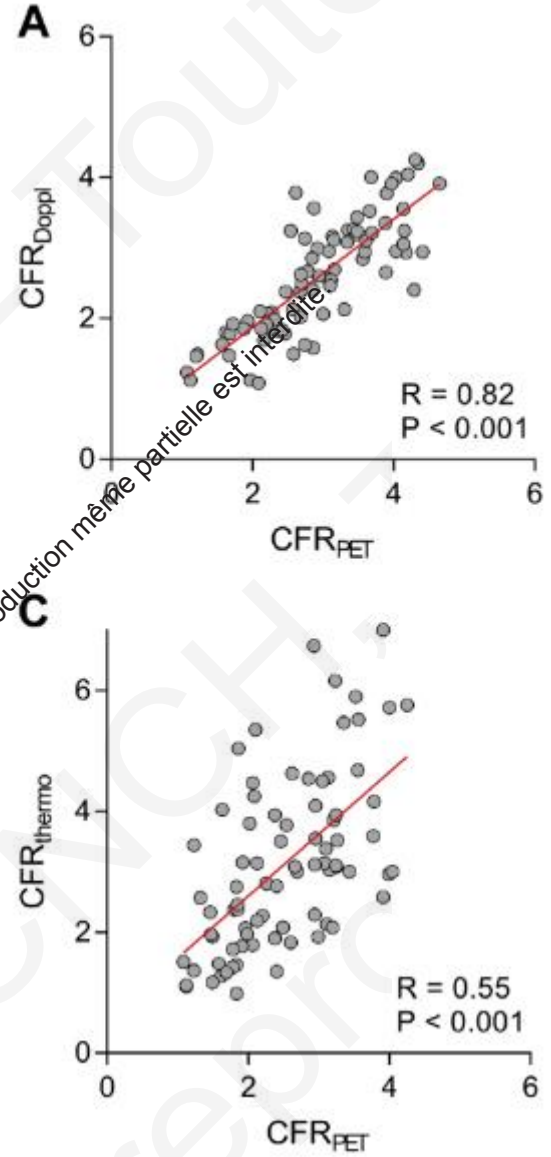
Introduction

FIGURE 1 Case Example of Agreement Between Positron Emission Tomography Imaging and Invasive Measurements



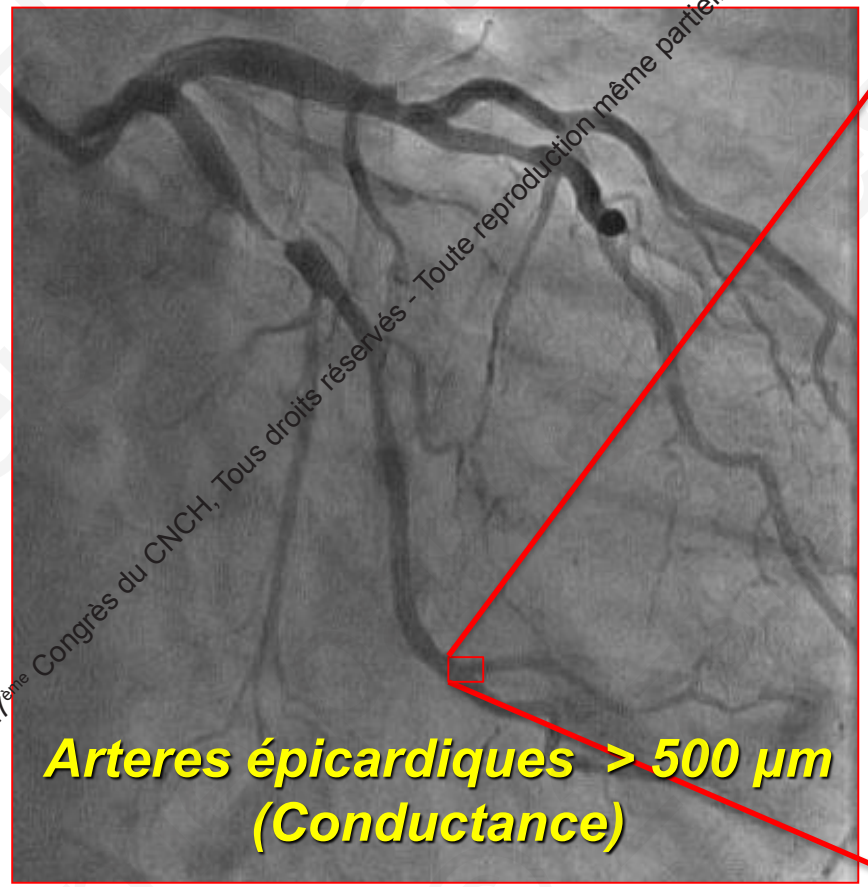
Coronary angiography **(A)** shows a lesion in the left anterior descending artery **(arrow)**, which is confirmed as hemodynamically significant by fractional flow reserve **(in yellow, B)**. Thermodilution **(B)**, positron emission tomography **(C)**, and Doppler flow velocity **(D)** all demonstrate a diminished coronary flow reserve of approximately 2.0. APV_{base} = baseline average peak velocity; APV_{hyper} = hyperemic average peak velocity; CFR = coronary flow reserve; LAD = left anterior descending artery.

N=98 vaisseaux

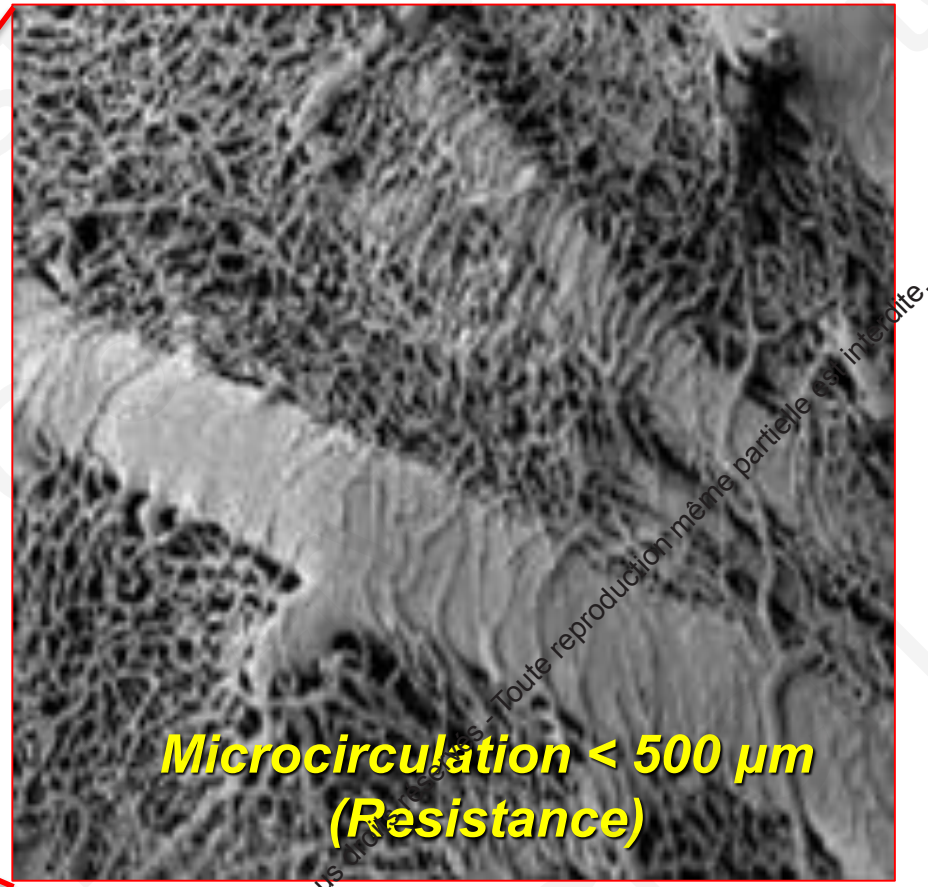


Everaars et al. JACC int 2018

Perfusion coronaire

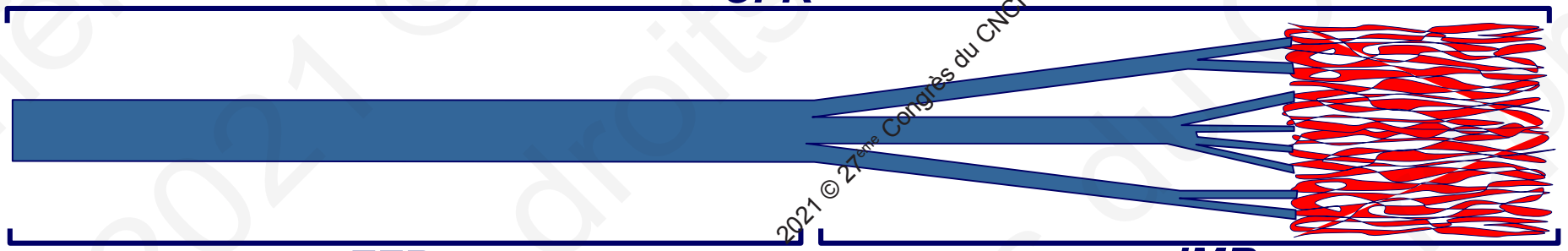


Arteres épicardiques > 500 µm
(Conductance)



Microcirculation < 500 µm
(Resistance)

Pries et al. 2015 Eur Heart J 36(45): 3134-3146



Evaluation invasive de la perfusion coronaire

1. Fractional Flow Reserve (FFR)
2. Coronary Flow Reserve (CFR)
3. Index Microvascular Resistance (IMR)
4. Absolute Microvascular Resistance (MRR)

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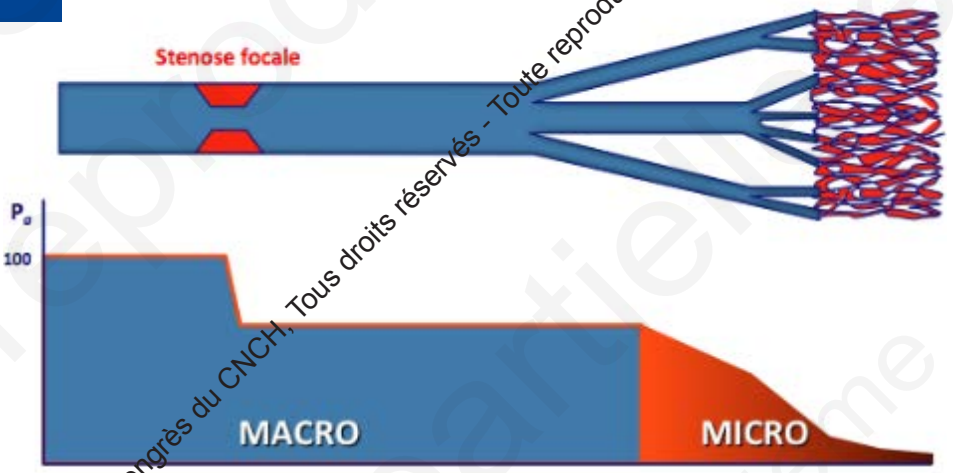
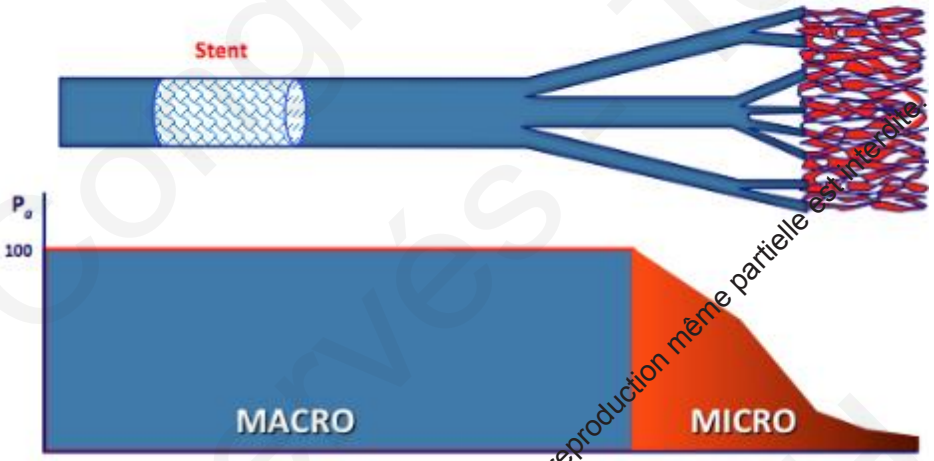
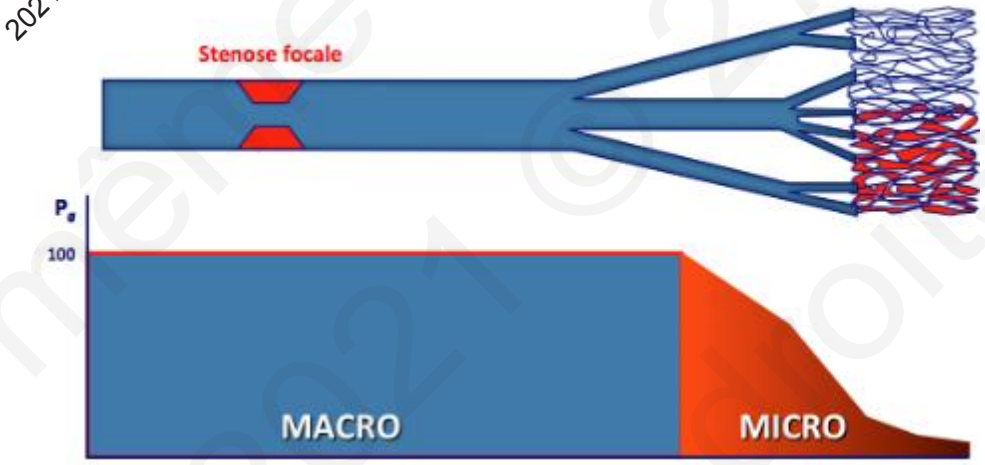
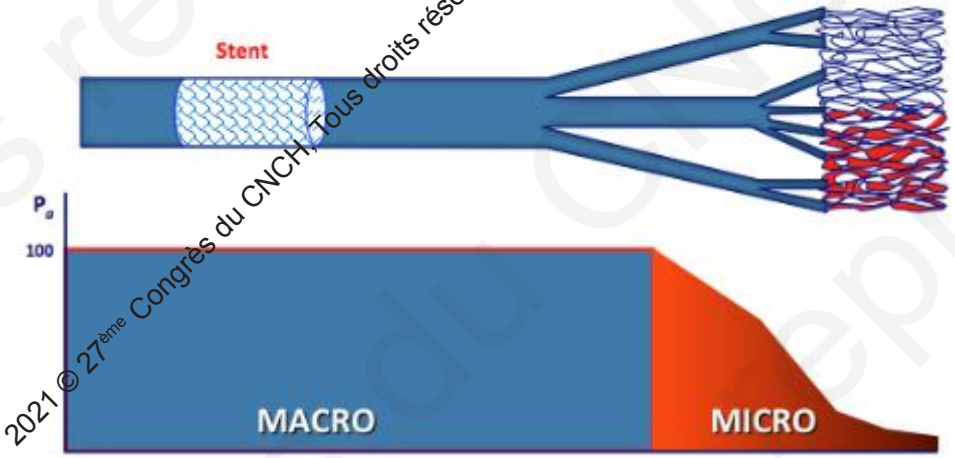
1. FFR en principe









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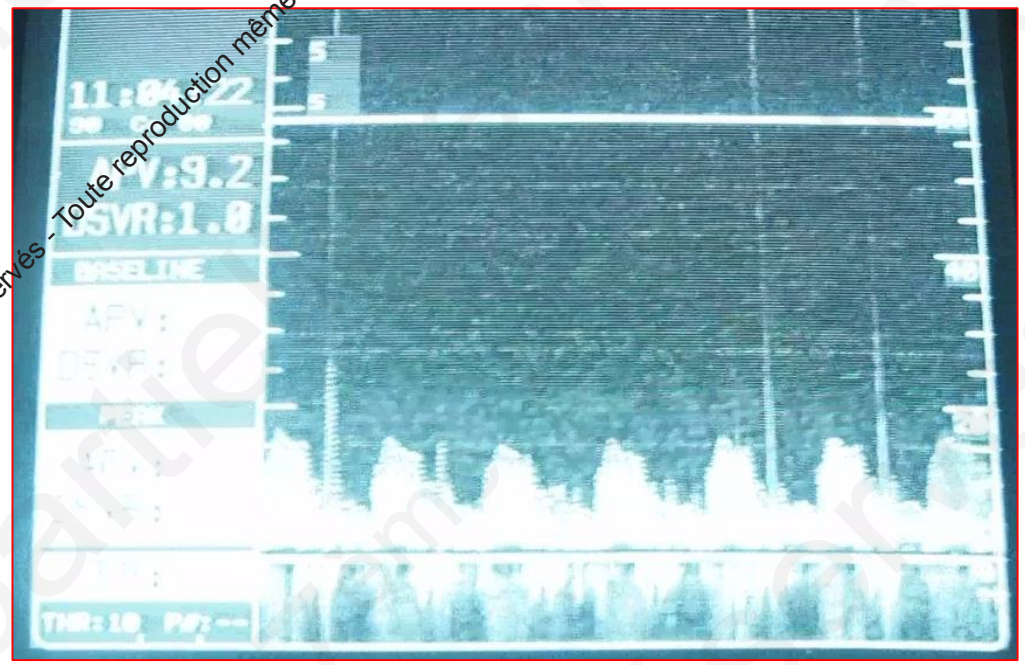
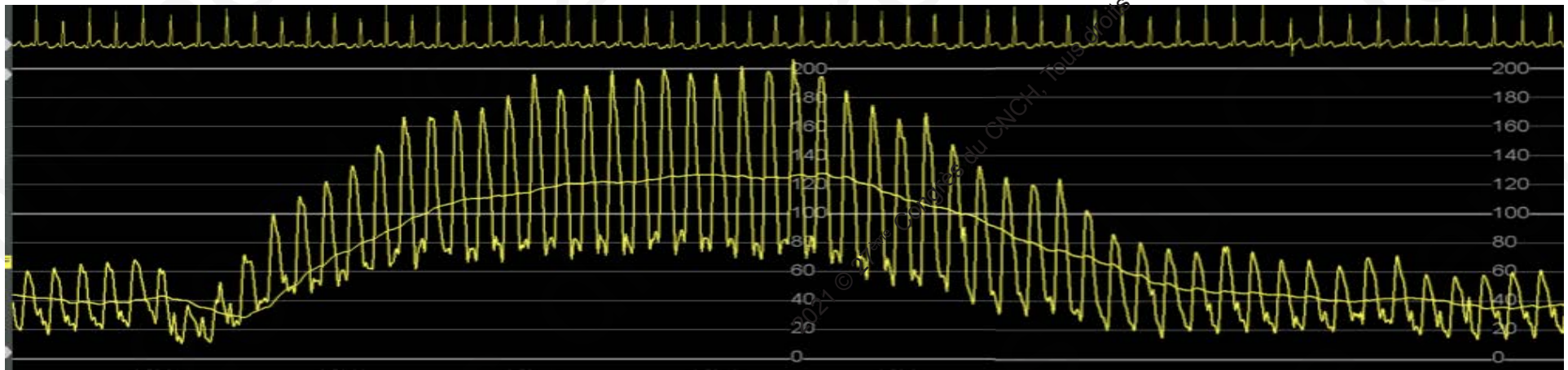
2. Coronary Flow Reserve (CFR)

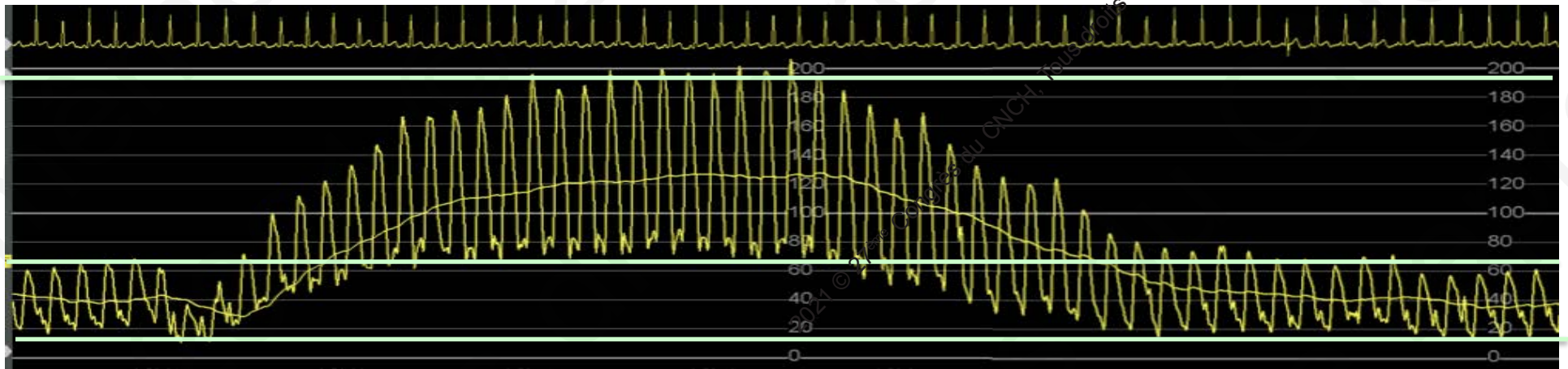




2. Coronary Flow Reserve (CFR)

CFR n'est PAS adapté pour l'évaluation de la microcirculation

1. Non specifique de la microcirculation
2. Dependant des parametres hemodynamiques
3. Operateur dependant +++
4. Definition du seuil normal/ischemique imprecise
5. Depend des valeurs de flux de repos



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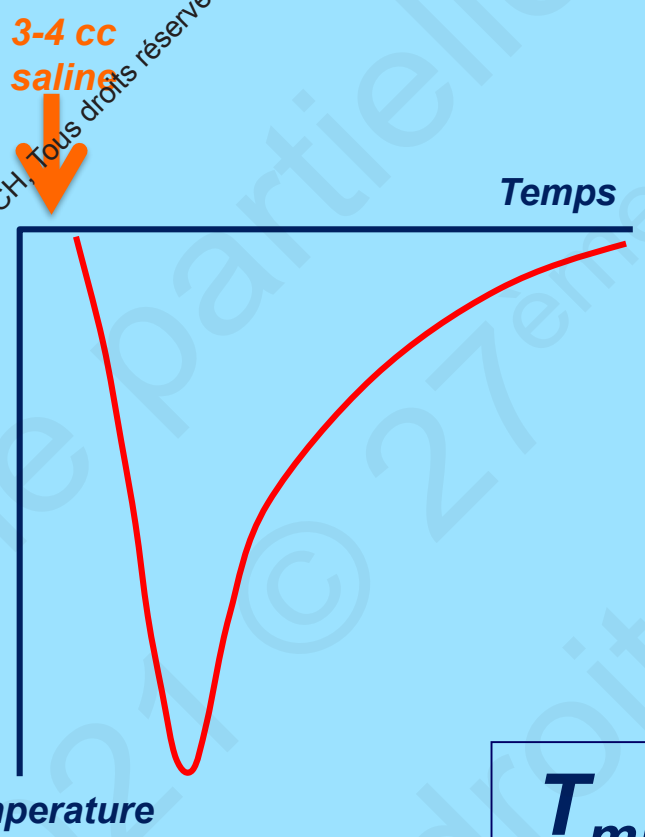
3. Index of Microvascular Resistance (IMR)

Indicateur Théorique de la dilution



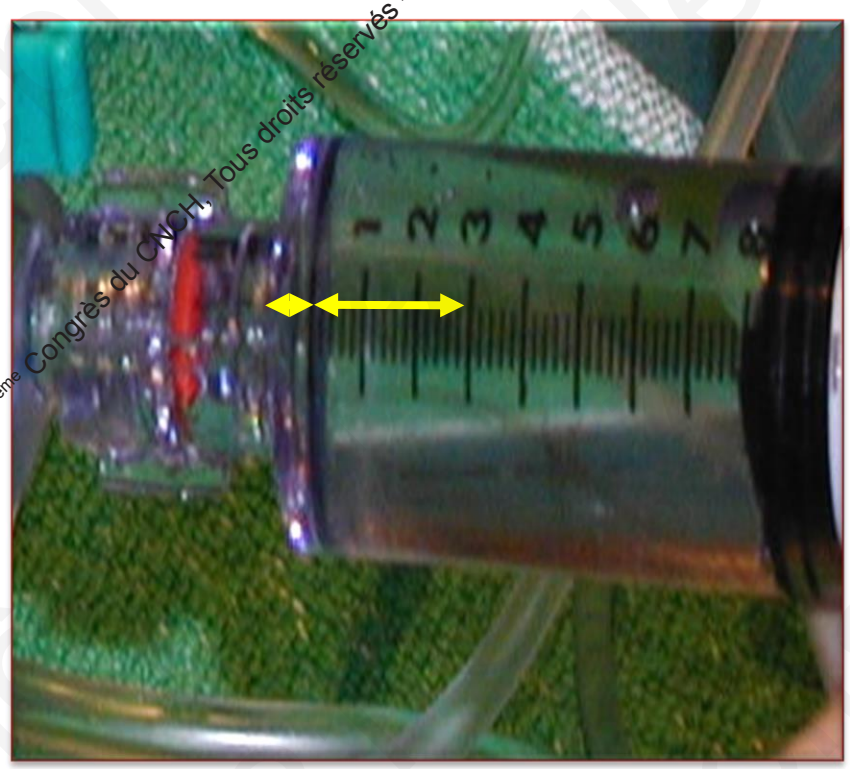
$$F = \frac{V}{T_{mn}}$$

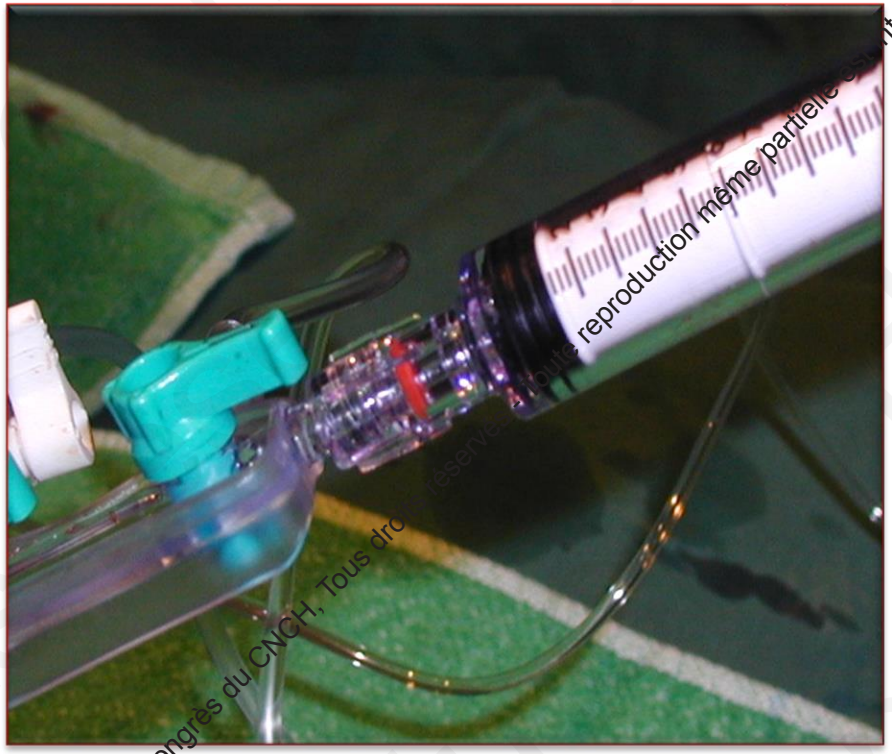
$$T_{mn}\ (s) = \frac{V_{(mL)}}{F_{(mL/s)}}$$

T_{mn} (s) = un indice de flux

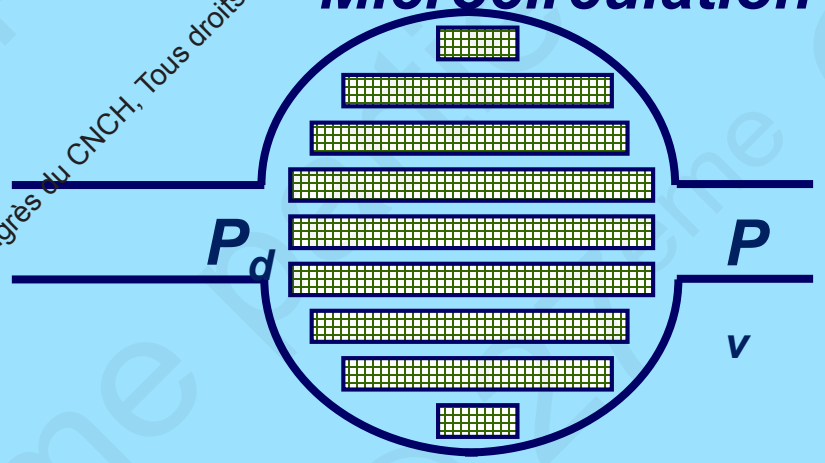
3. Index of Microvascular Resistance (IMR)

Injection en bolus de 3-4 mL de solution saline à température ambiante





3. Index of Microvascular Resistance (IMR)



$$R = \frac{P_d - P_v}{F}$$

(1) $F \approx 1 / T_{mn}$
(2) $P_v \approx 0$ mm Hg

$$IMR = \frac{P_d}{1 / T_{mn}}$$

$$IMR = P_d \cdot T_{mn}$$

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3. Index of Microvascular Resistance (IMR)

Pressurewire® Abbott + Coroventis

Evaluation invasive de la perfusion coronaire

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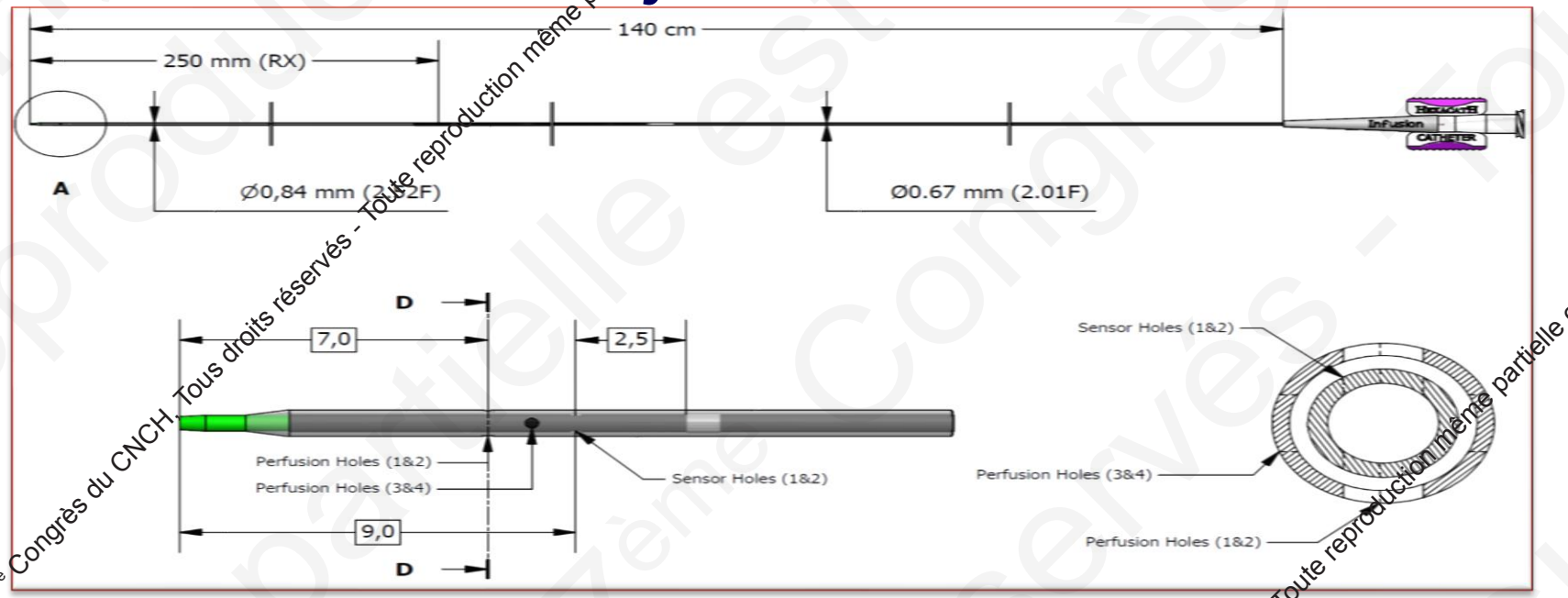
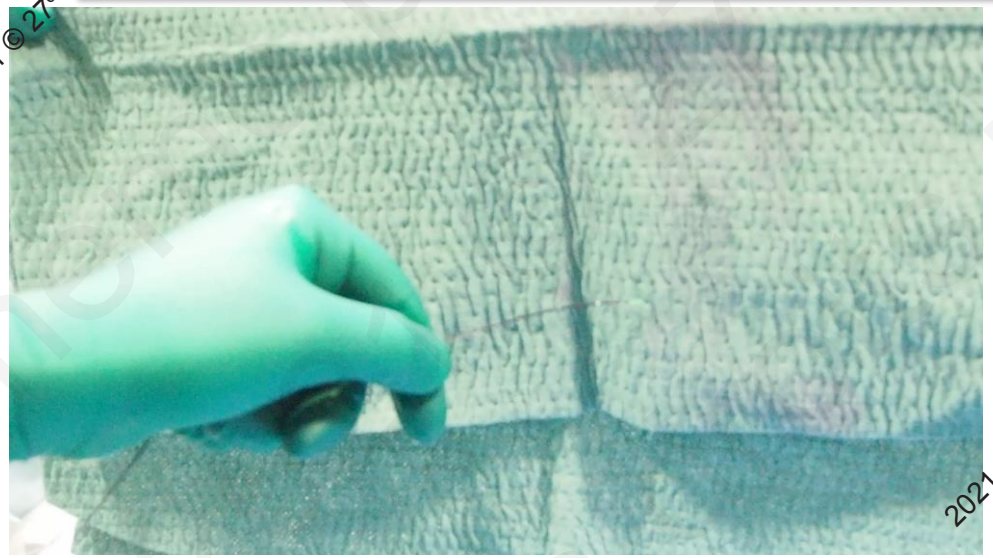
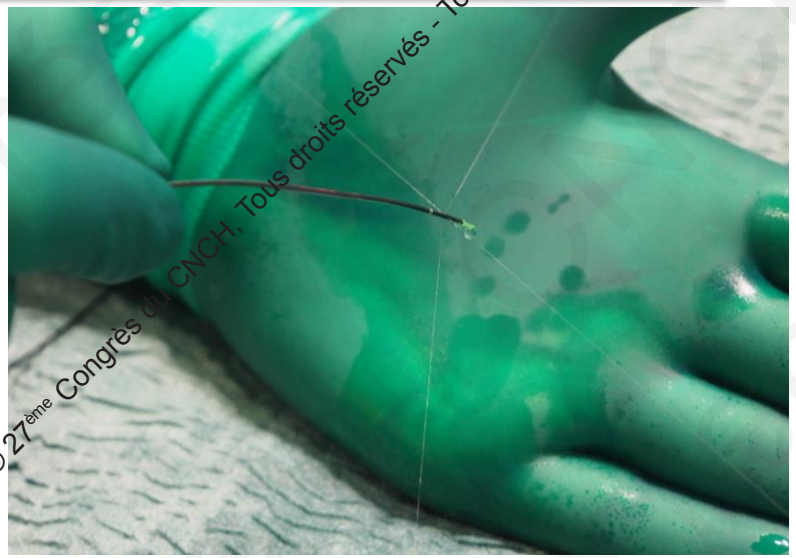
4. Absolute Coronary Blood Flow

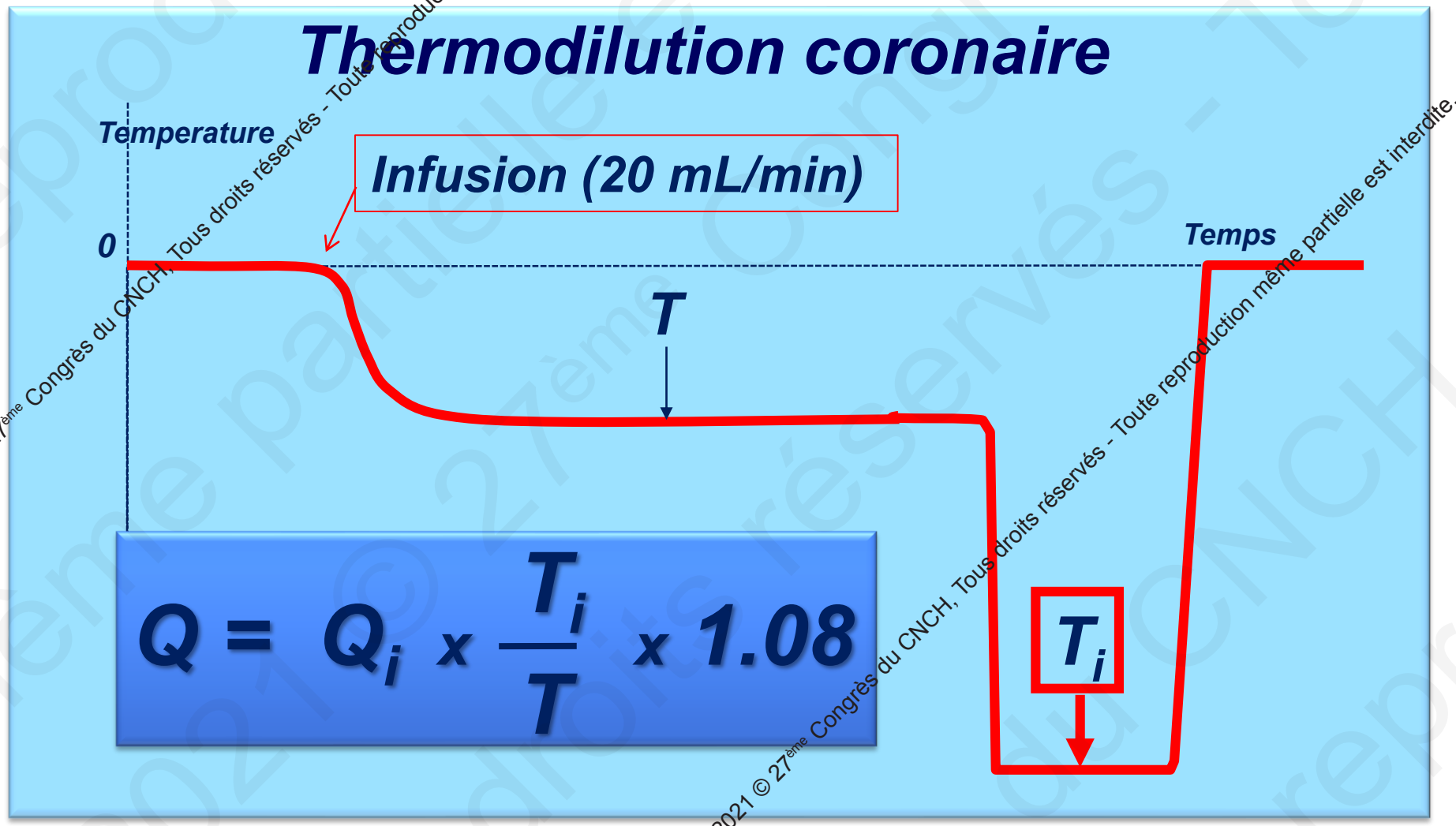
Rayflow® Catheter







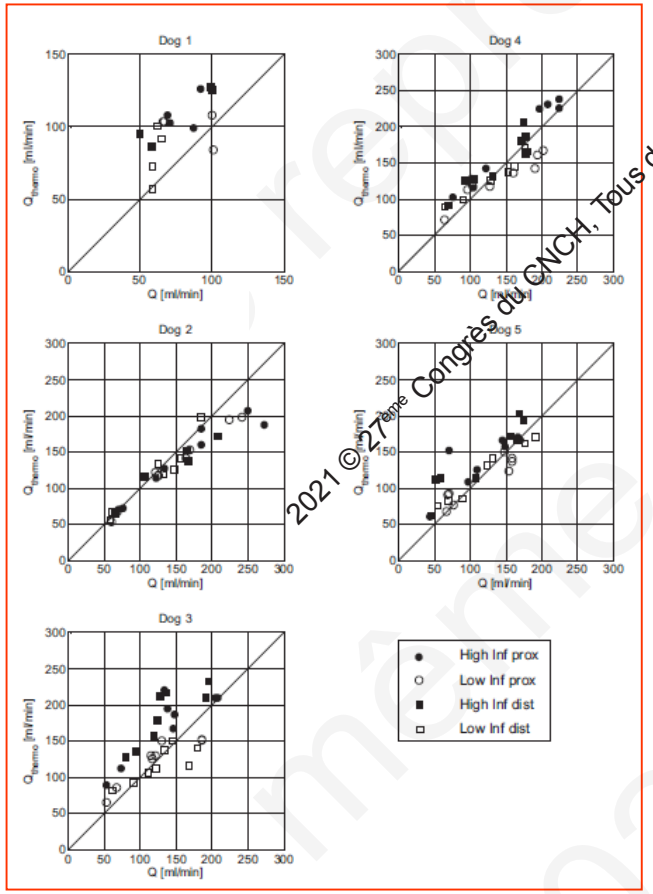
4. Absolute Coronary Flow



Aarnoudse W et al J Am Coll Cardiol 2007;50:2294

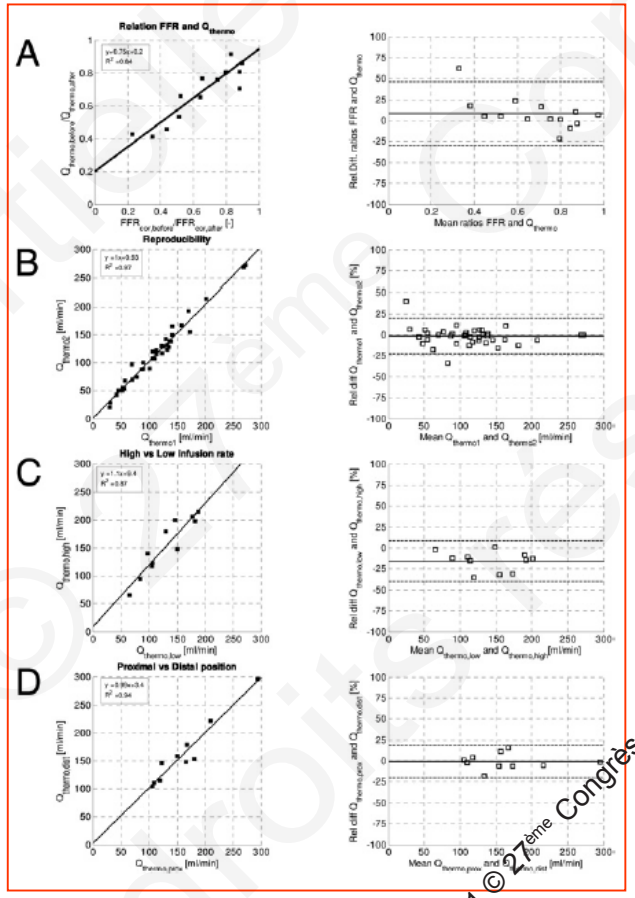
4.Etudes de validation

Chien

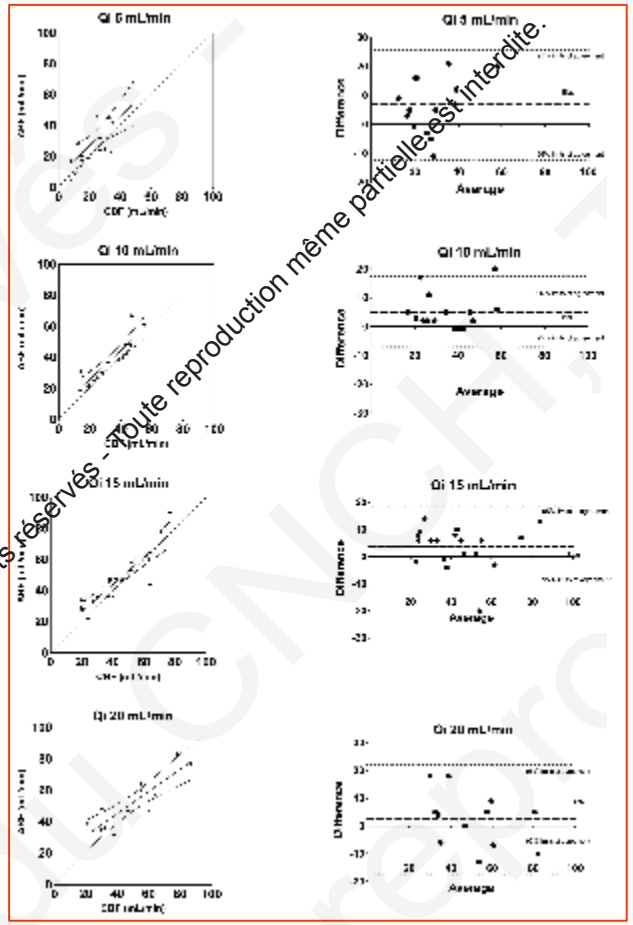


Aarnoudse et al JACC 2007

Humain



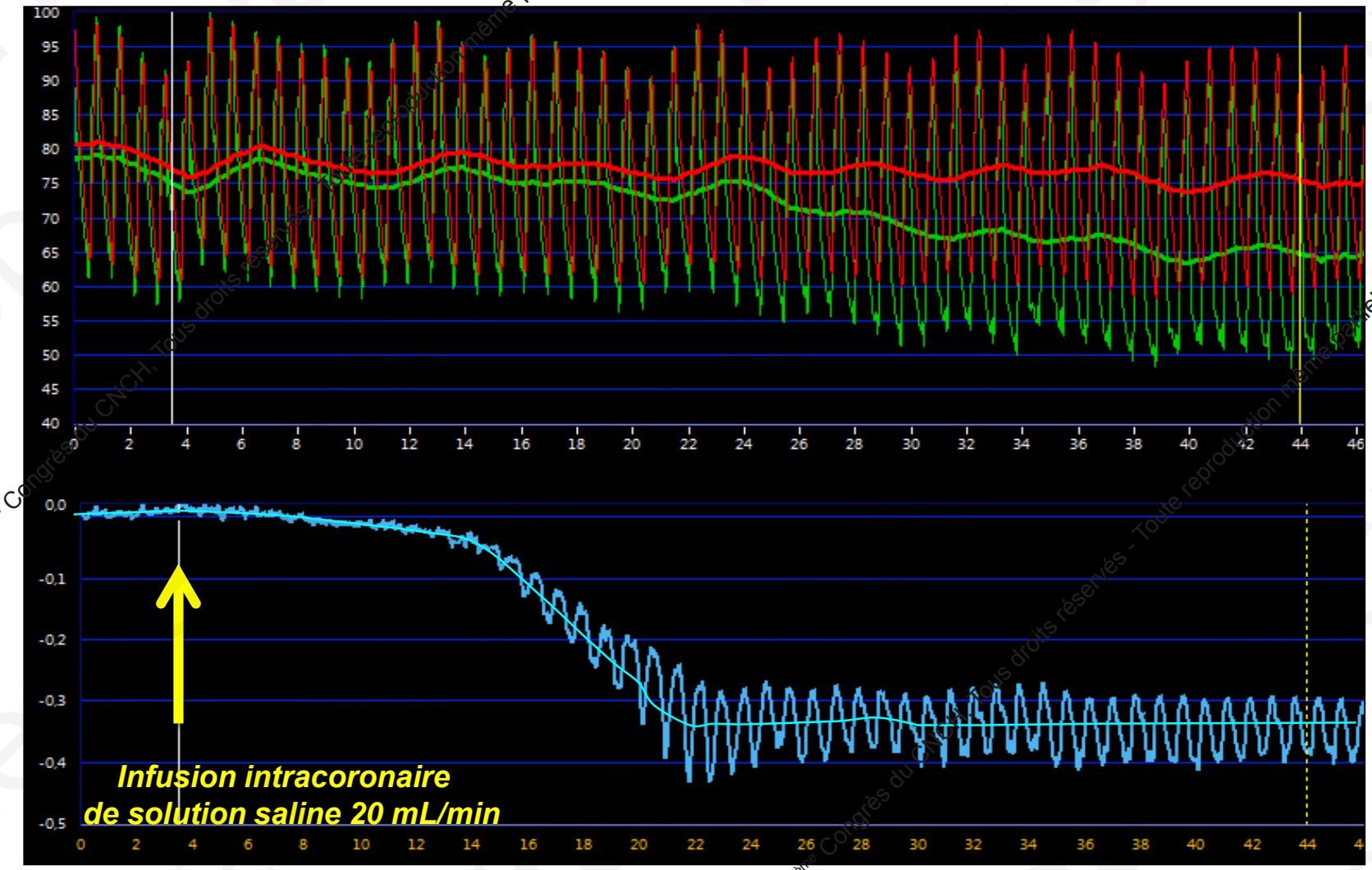
Cochon



Adjedj et al CCI 2021

4. Absolute Coronary Blood Flow

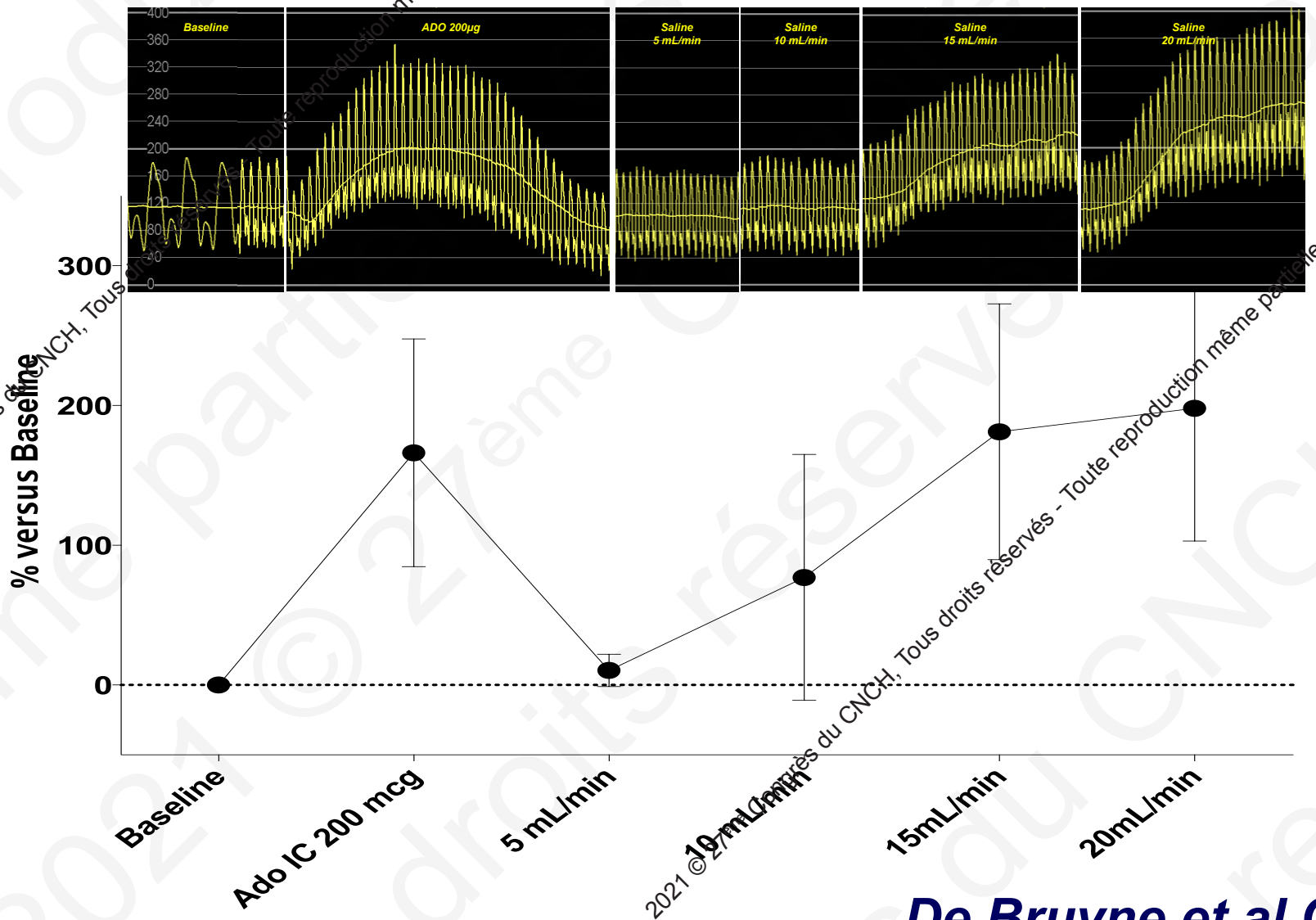
La question de l'hyperémie



➔ *la perfusion de solution saline induit elle une hyperémie ?*

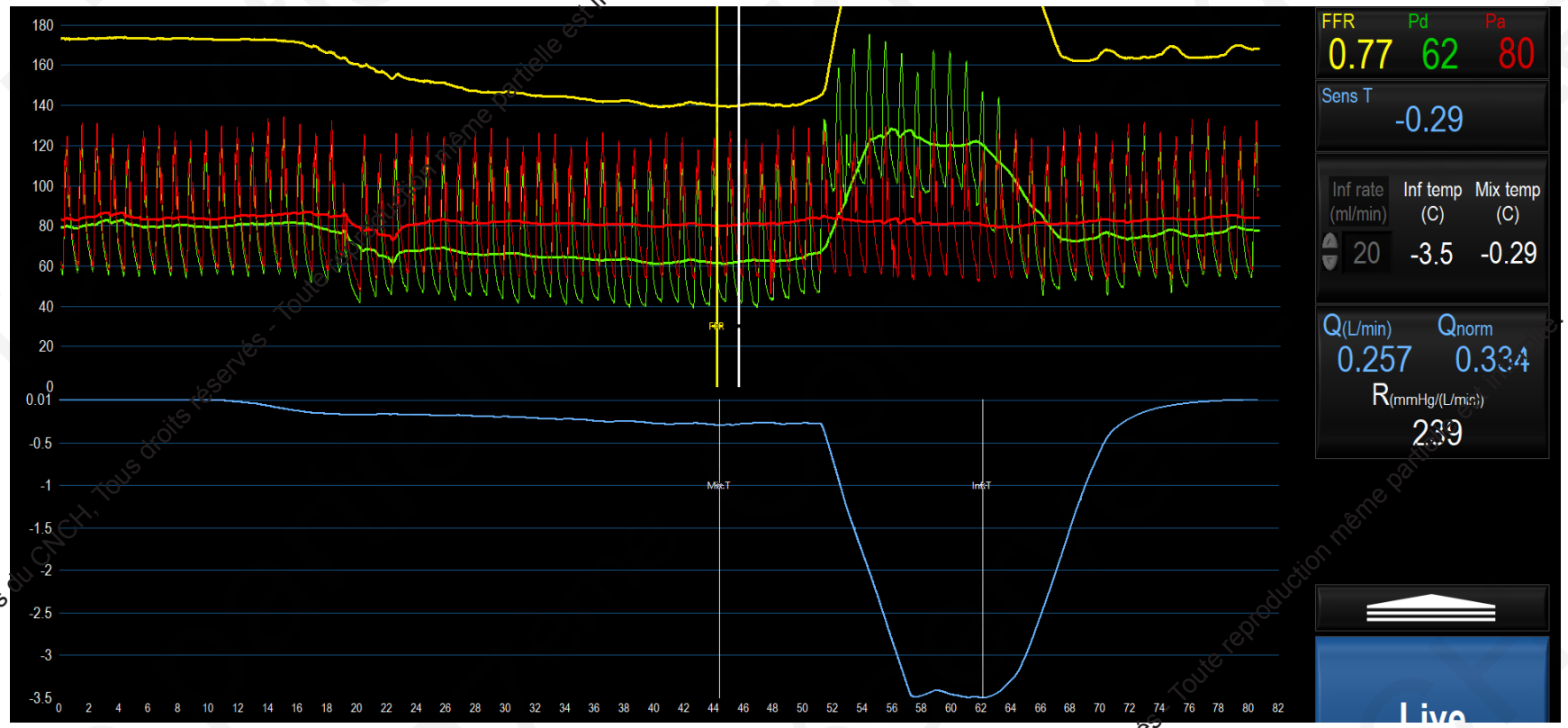
4. Absolute Coronary Flow

Doppler Flow Velocity Measurements of the Effect of Saline Infusion

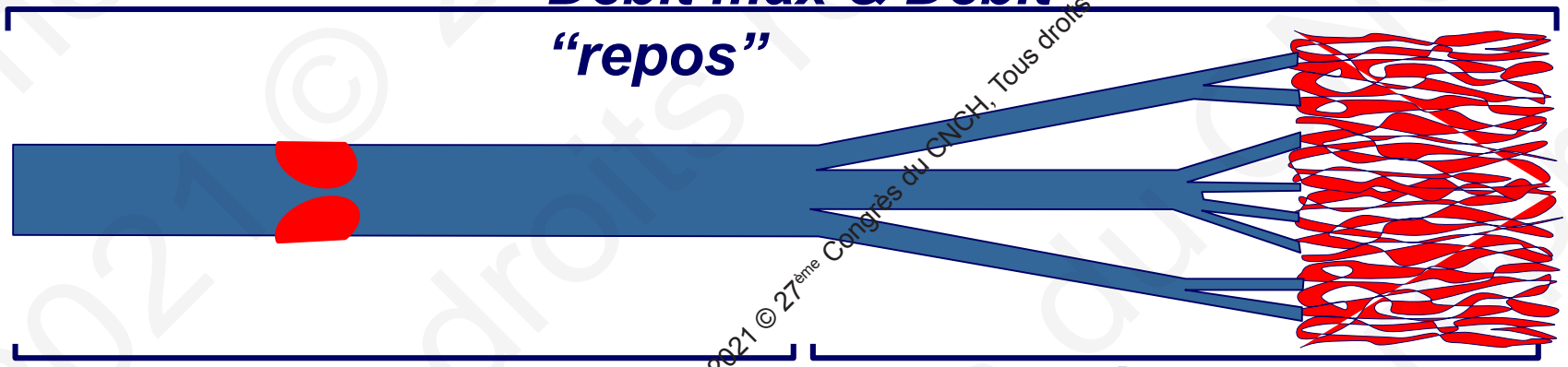


De Bruyne et al Circ int 2017

4. Flux absolu et resistances



Débit max & Débit "repos"

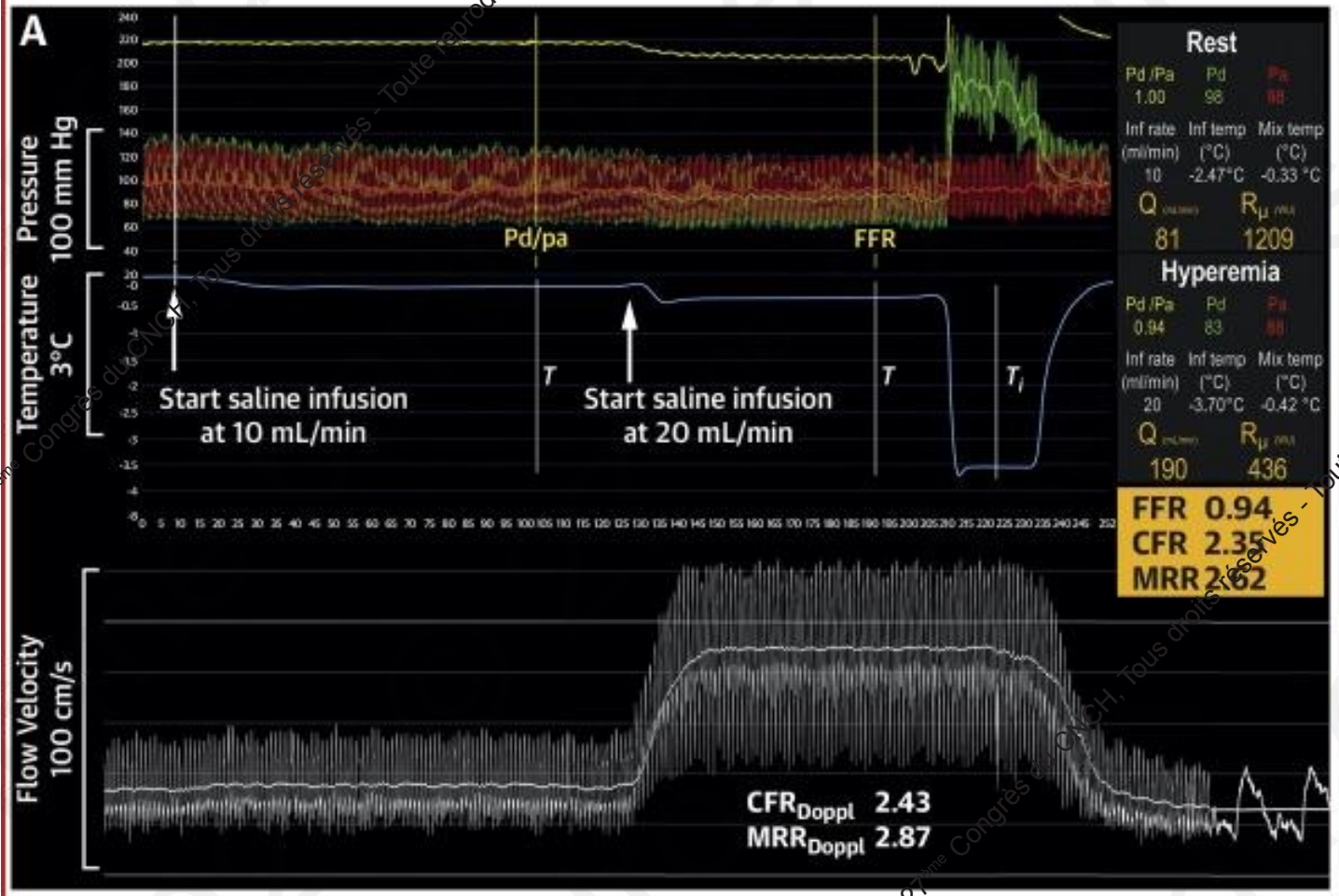


FFR

Résistances

4. Microvascular Resistance Reserve

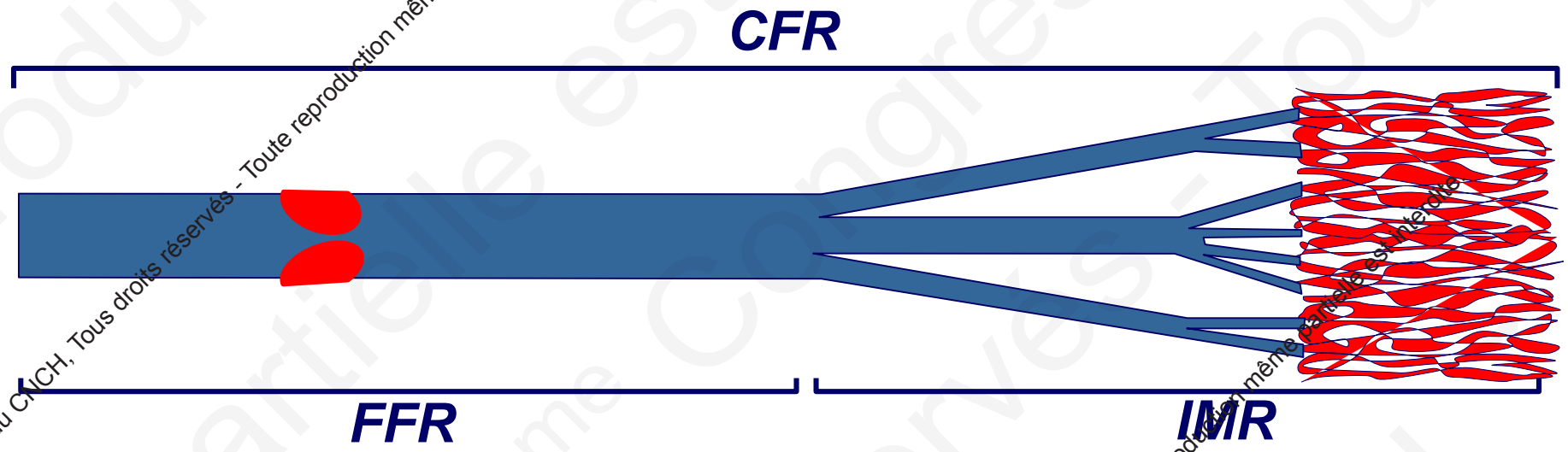
CENTRAL ILLUSTRATION: Simultaneous Registration of Pressures, Temperature, and Flow Velocity in the Right Coronary Artery



De Bruyne, B. et al. J Am Coll Cardiol. 2021;78(15):1541-1549.

Conclusion les bon outils

Pressurewire + Coroventis



Pressurewire + Rayflow + Coroventis