PHYSIODAY

JOURNÉES DE PHYSIOLOGIE
EN CARDIOLOGIE INTERVENTIONNELLE

ARNAULT TZANCK
SAINT-LAURENT-DU-VAR

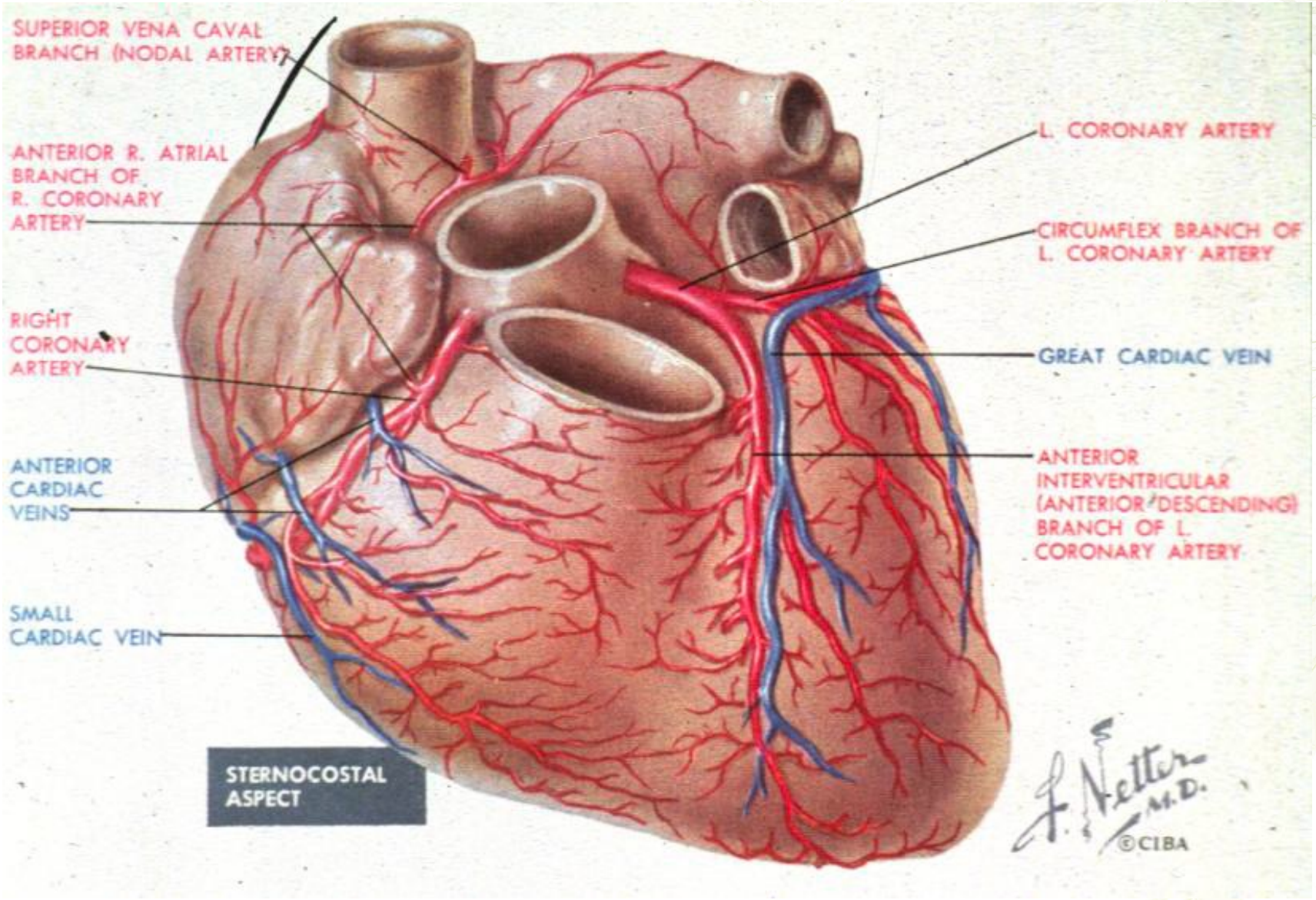
Focus sur la physiologie coronaire

Julien Adjedj

5&6 AVRIL 2024

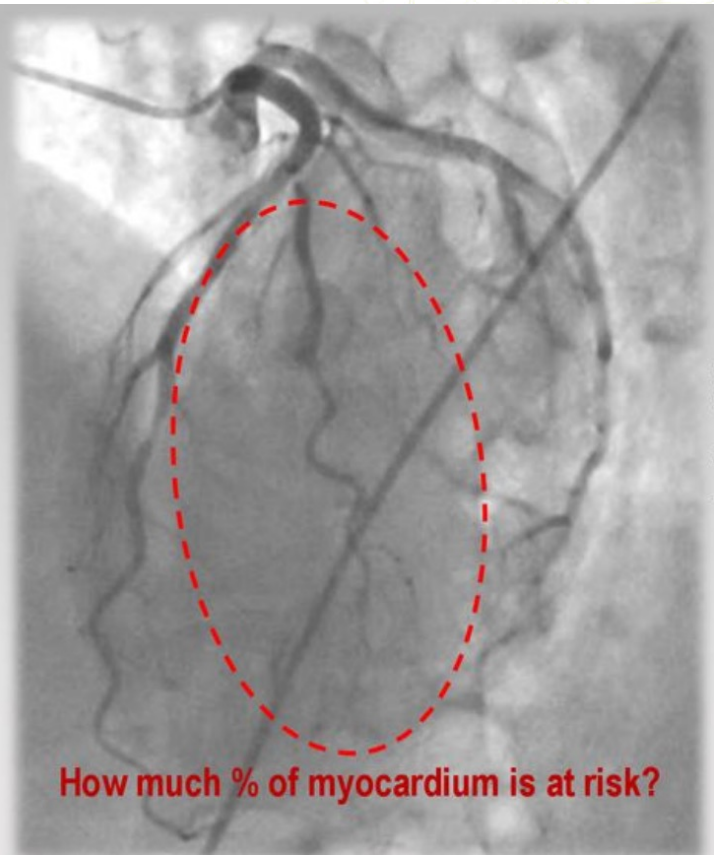
HÔTEL SHERATON · NICE

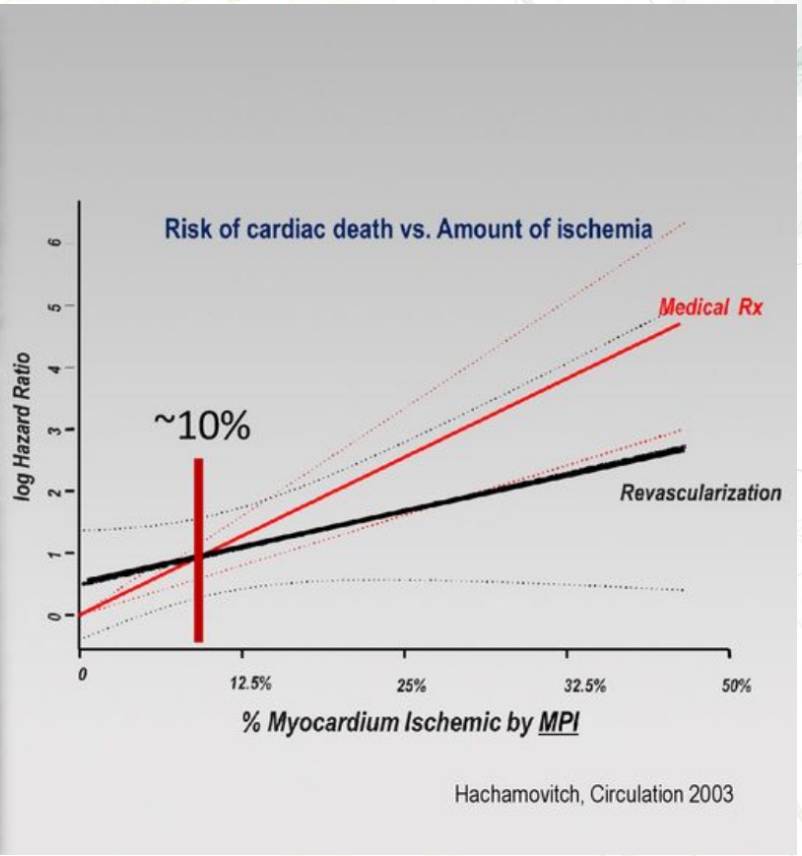
Introduction



Anatomie & physiologie

Corrélation entre la taille de l'artère et la masse myocardique qui en dépend



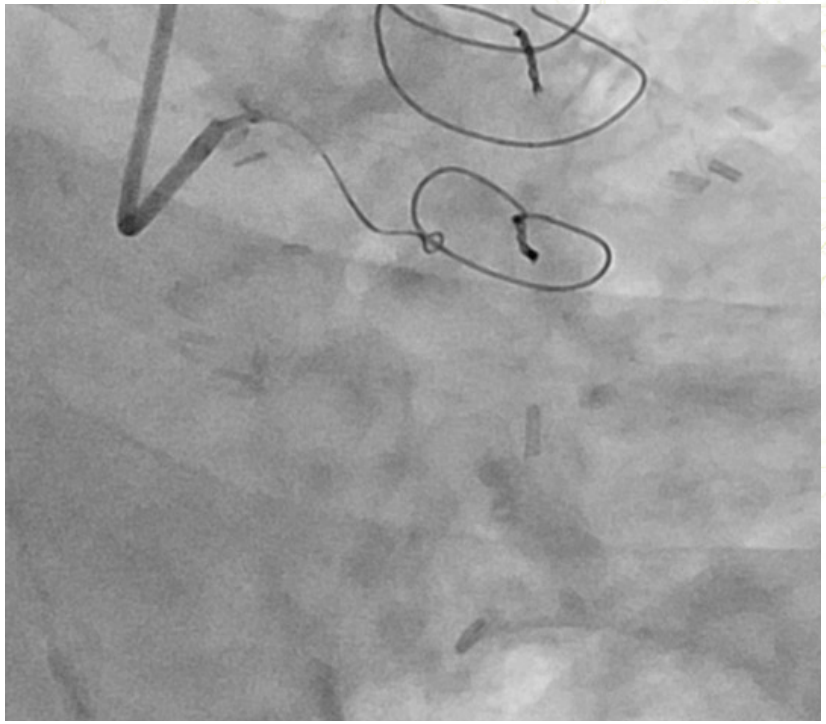


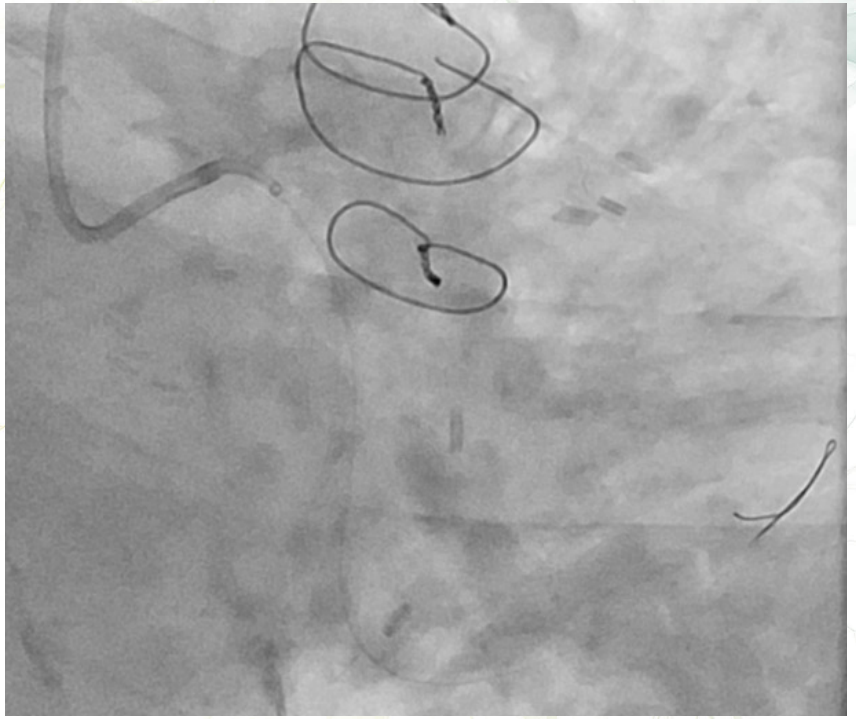
< 2 mm de diamètre de référence
<10% perfusion myocardique

Longueur du vaisseau >80 mm

Anatomie & physiologie

Corrélation entre la taille de l'artère et la masse myocardique qui en dépend





< 2 mm de diamètre de référence
<10% perfusion myocardique

Longueur du vaisseau >80 mm

The Coronary Circulation

Epicardial Arteries

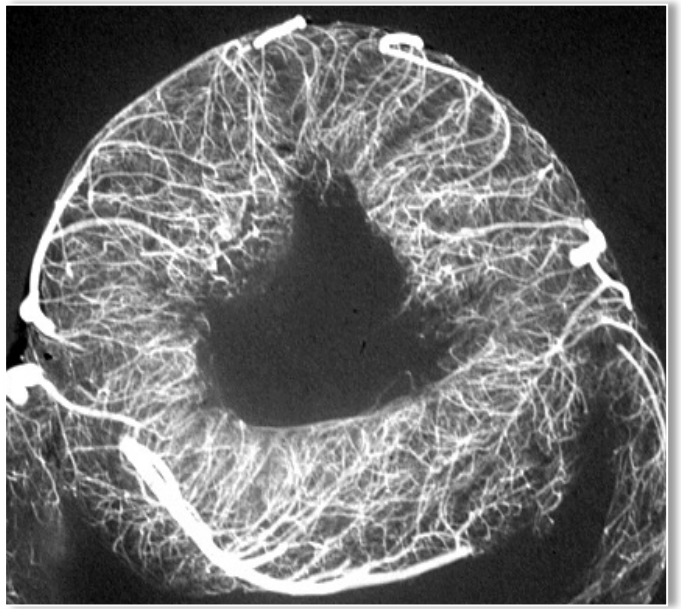
Small Arteries

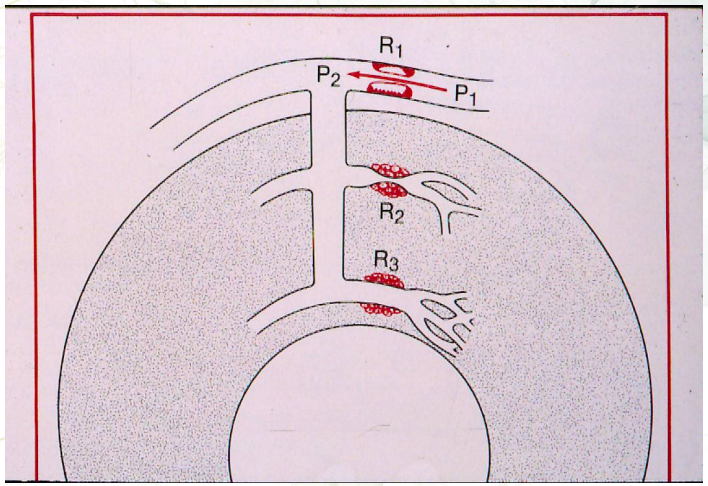
Intermediate Arterioles

Small Arterioles

Capillaries

Veins





The Coronary Circulation

ARNAULT TZANCK
SAINT-LAURENT-DU-VAR

Epicardial Arteries

Small Arteries

Intermediate Arterioles

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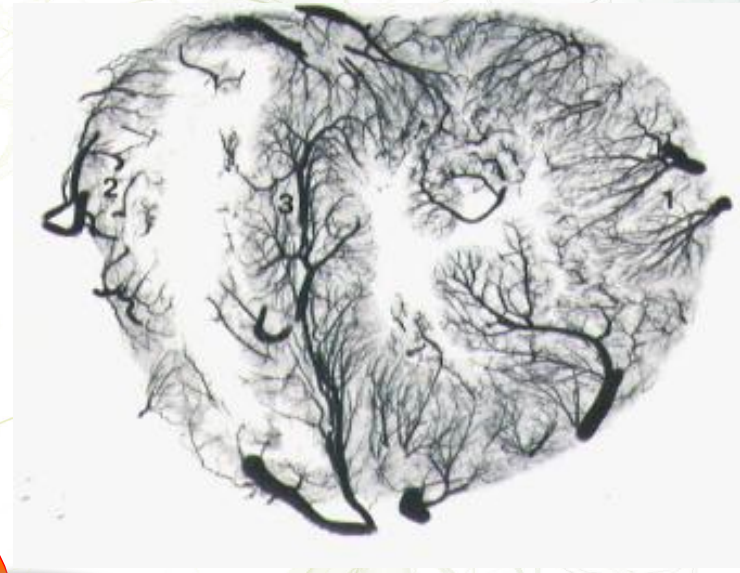
Capillaries



LARGE ARTERIES
➢ 400 µm
Conductance or
Epicardial Arteries

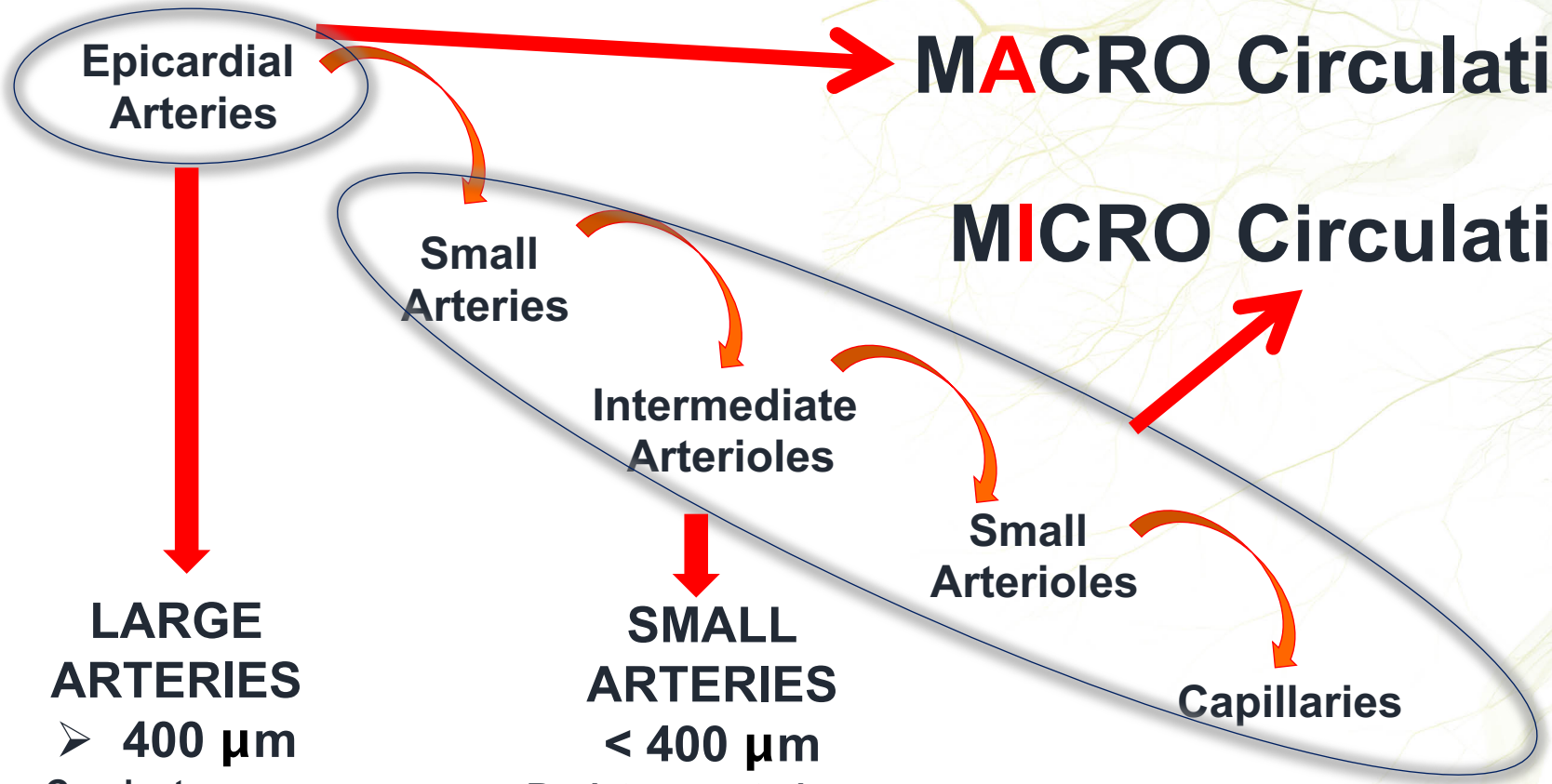
SMALL ARTERIES
< 400 µm
Resistance arteries or
Microvasculature

Transport

Regulation

Exchanges

The Coronary Circulation



Physiologie coronaire

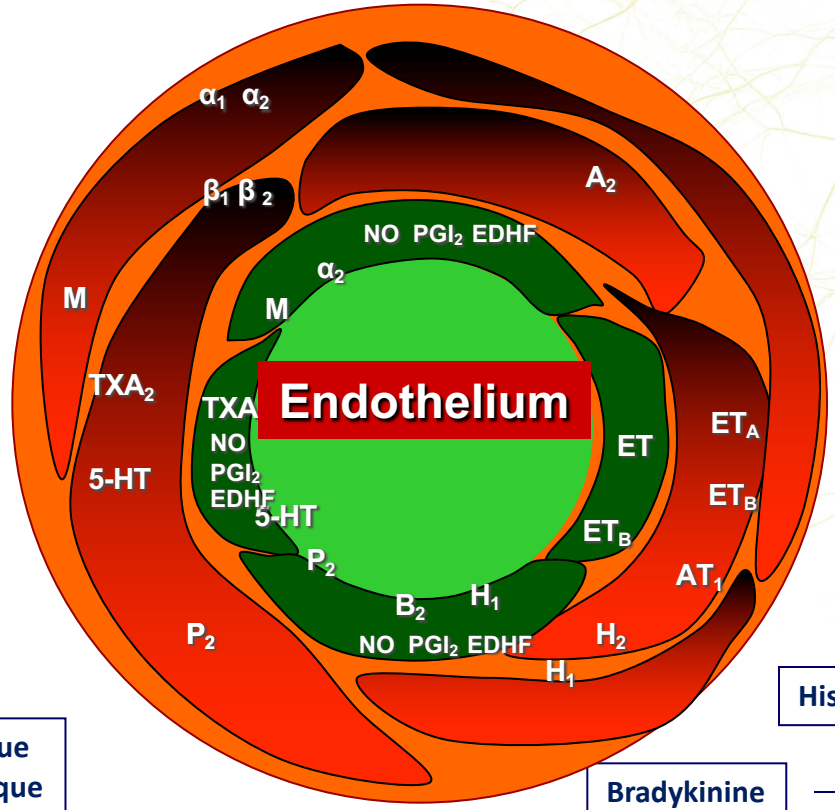
Controle du debit coronaire

facteurs Neuro-hormonaux

- Noradrenaline
  Adrenaline
- Acethylcholine

Facteurs metaboliques

- adenosine
- PO_2
- PCO_2, H^+, K^+



Facteurs physiques

- Pression arterielle
  Pression coronaire
  RAP, PTDVG, $P_{f=0}$
- Compression systolique
  Compression diastolique

Factors Endo et paracrine

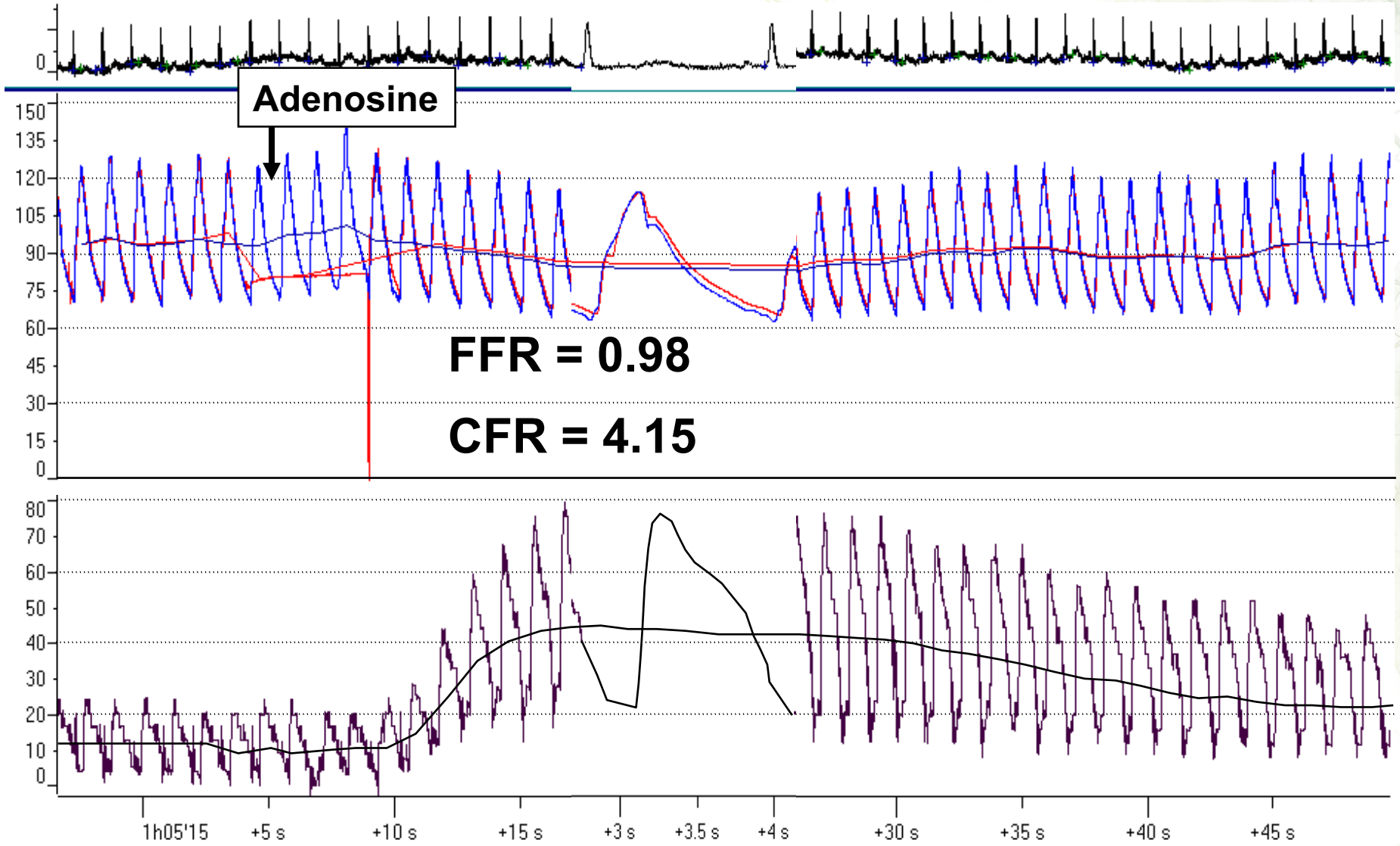
- Angiotensine II
- Histamine
- Bradykinine

About Pressure, Flow, Resistance, and Vessel Size



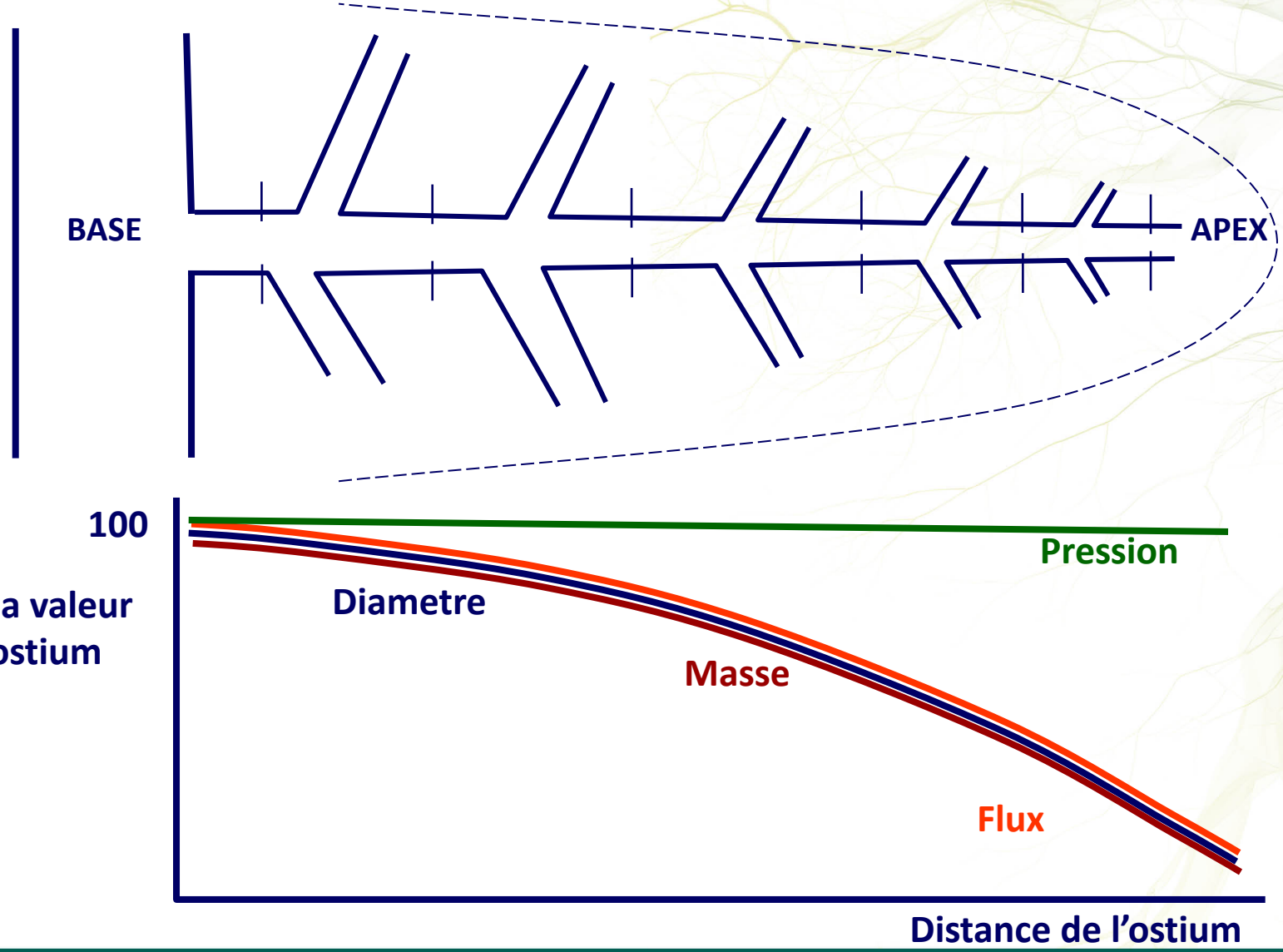
	Tree Shrew	Human	Blue Whale
Body Mass [kg]	0.005	70	100,000
Heart Weight [kg] (~M^1)	$3.3x10^{-5}$	0.46	660
Stroke Volume [ml] (~M^1)	0.0033	46	66,000
Heart Rate[s^{-1}] (~$M^{-1/4}$)	11 (>600 bpm)	1	0.16 (<10 bpm)
Cardiac Output [L/min] (~$M^{3/4}$)	0.003	5	1000
Radius of Aorta [cm] (~$M^{3/8}$)	0.02	1	15
Mean Aortic Velocity [cm/sec] (~M^0)	10	10	10
Mean Aortic Pressure [mmHg] (~M^0)	100	100	100
Mean Aortic Reynold's No. (~$M^{3/8}$)	15	530	8080 (turbulent!)
Mean Aortic Shear Stress [dynes/cm^2] (~$M^{-3/8}$)	180	5	0.3

Pression & Flux avec coronaires noramales



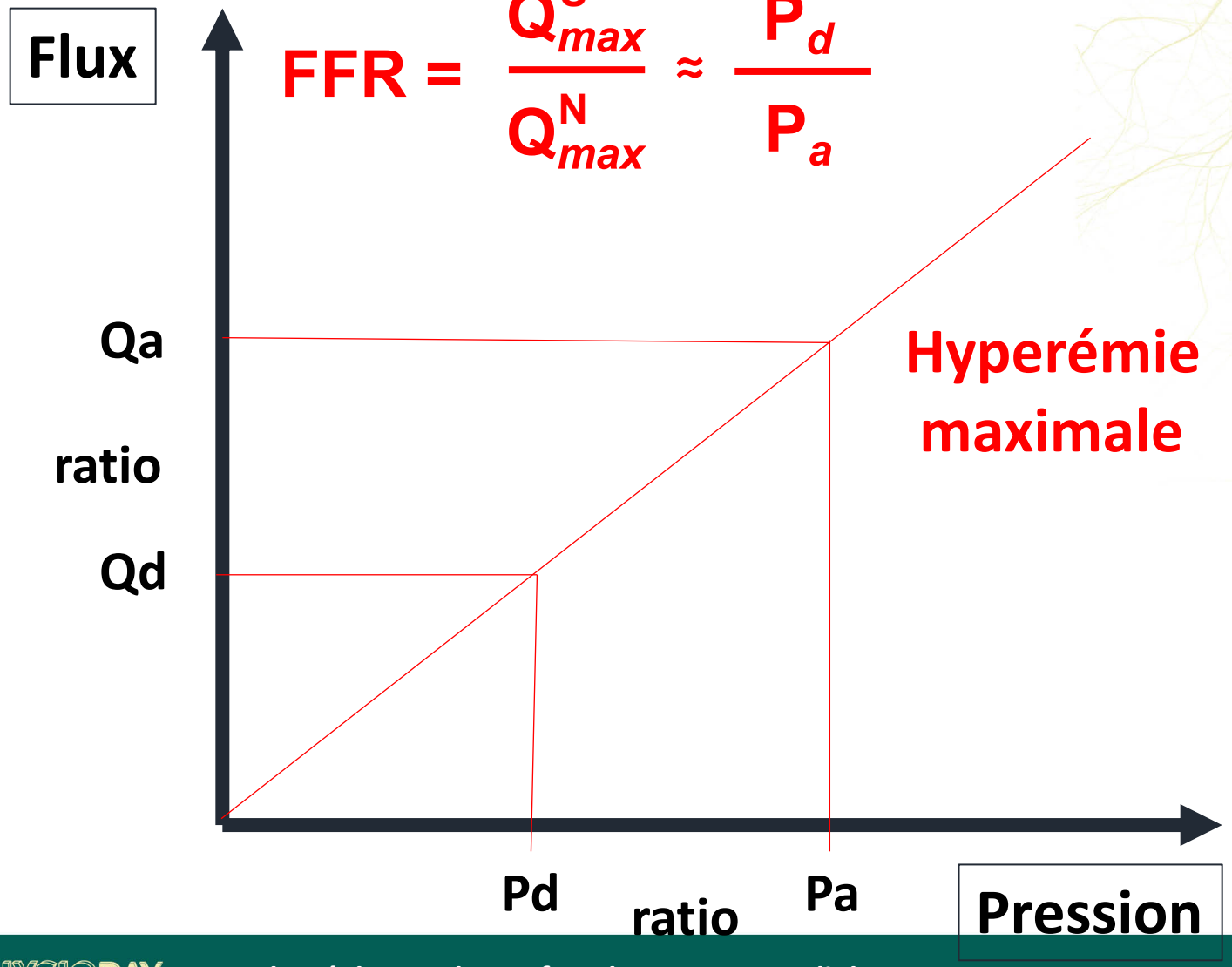
Physiologie coronaire

Relation Pression, Flux, Resistance et vaisseaux



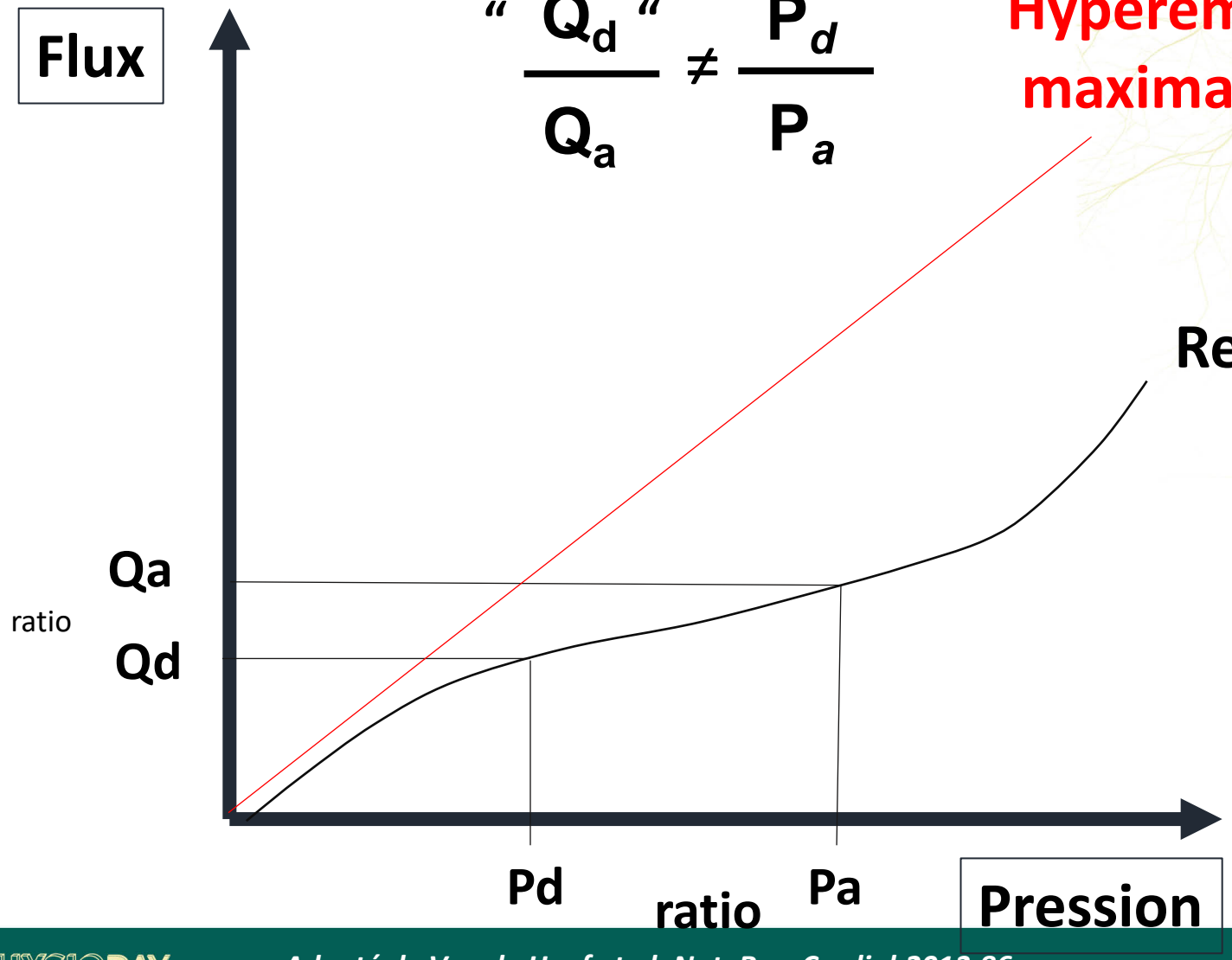
FFR et indices de repos

$$FFR = \frac{Q^{S}_{max}}{Q^{N}_{max}} \approx \frac{P_d}{P_a}$$

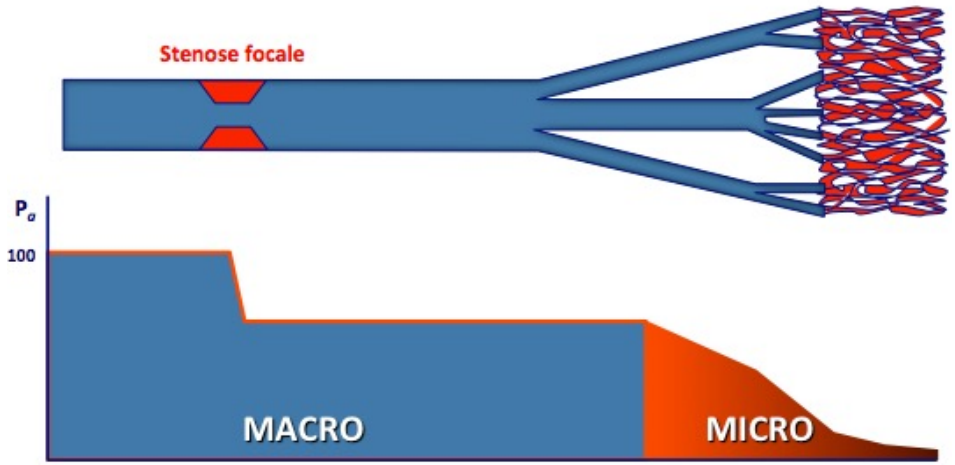


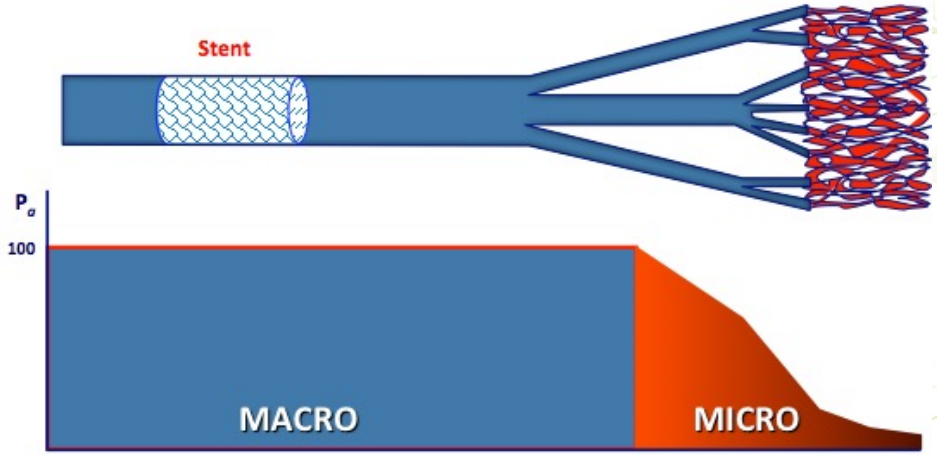
FFR et indices de repos

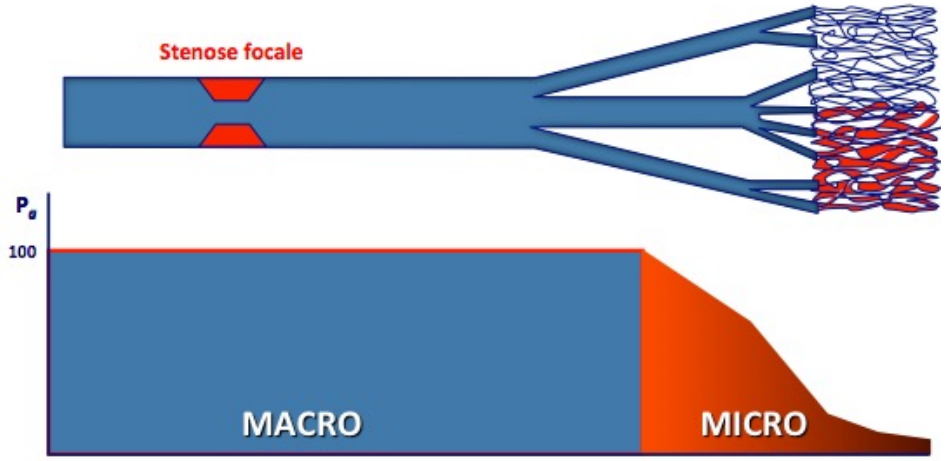
$$\text{“}\frac{Q_d}{Q_a}\text{“} \neq \frac{P_d}{P_a}$$

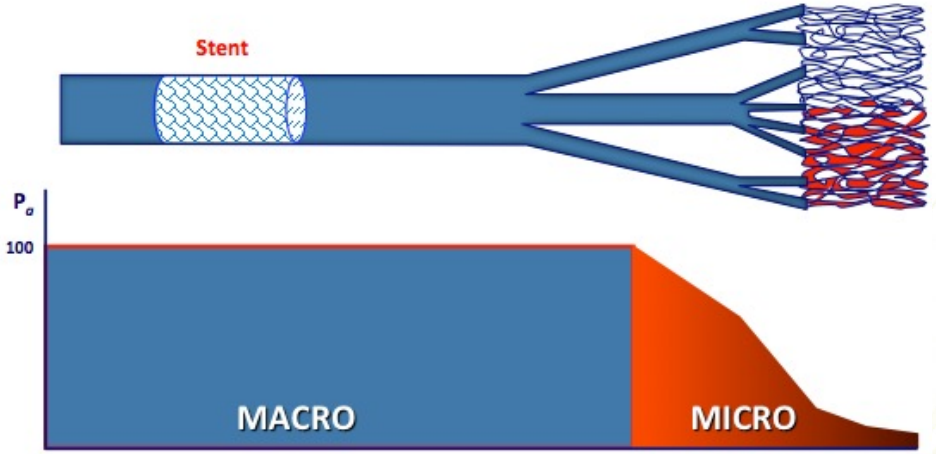


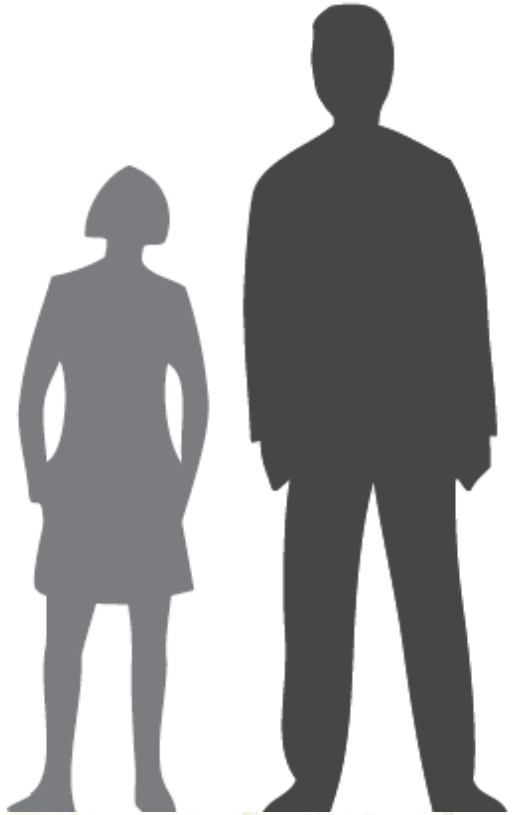
FFR en principe



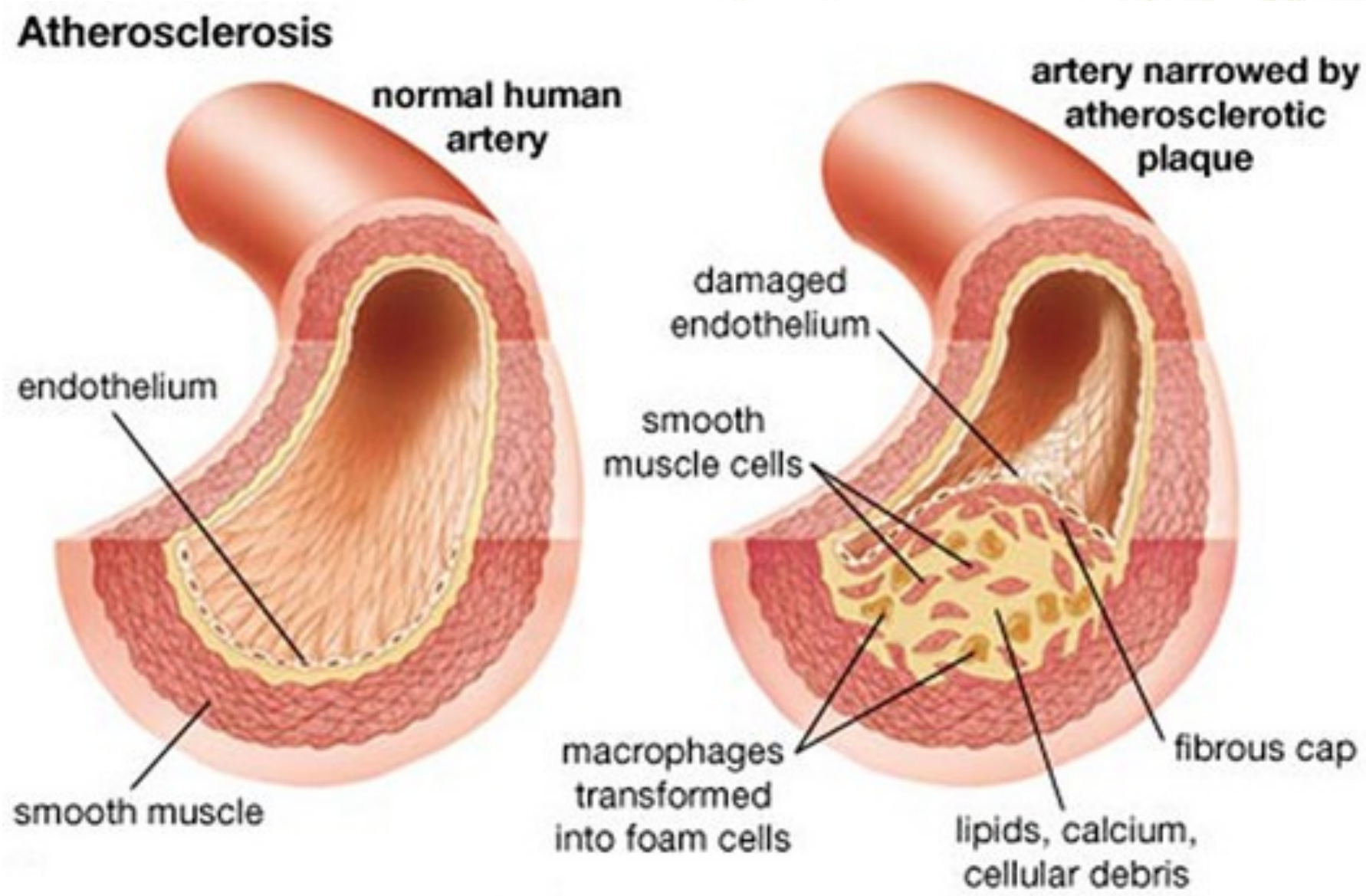




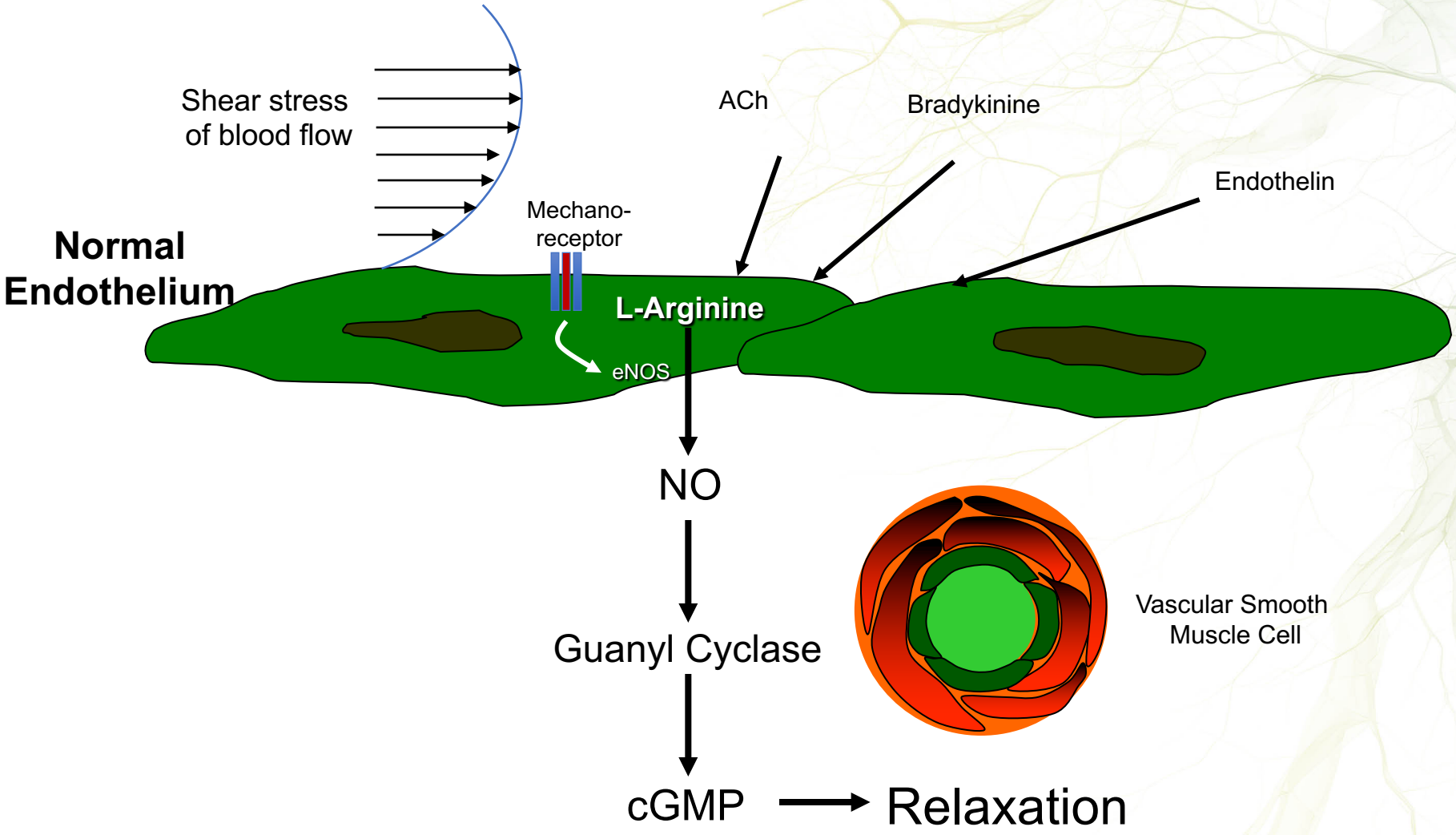




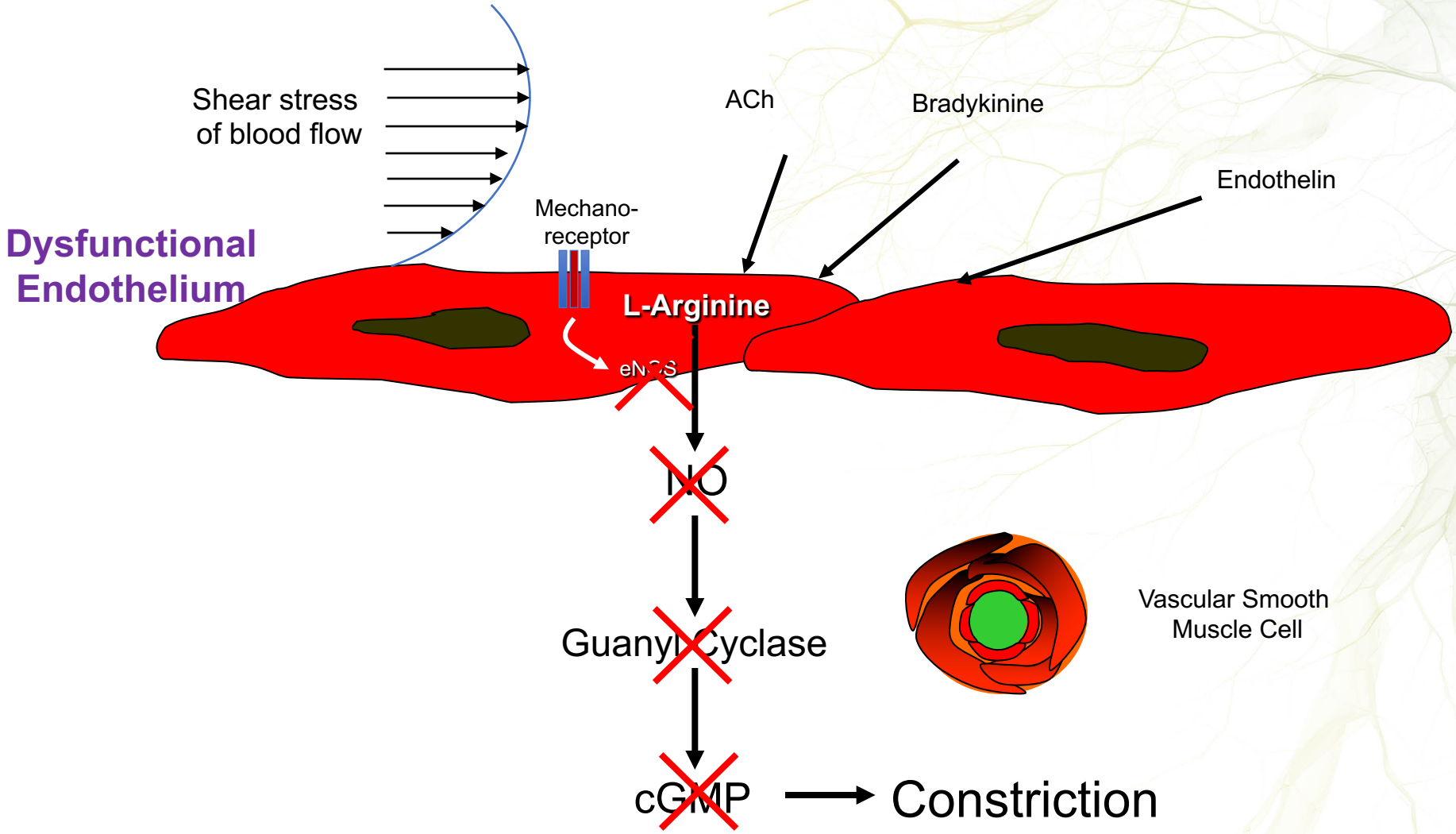
Endothelium



Endothelial Control of vascular tone



Endothelial Control of vascular tone



Pont myocardique

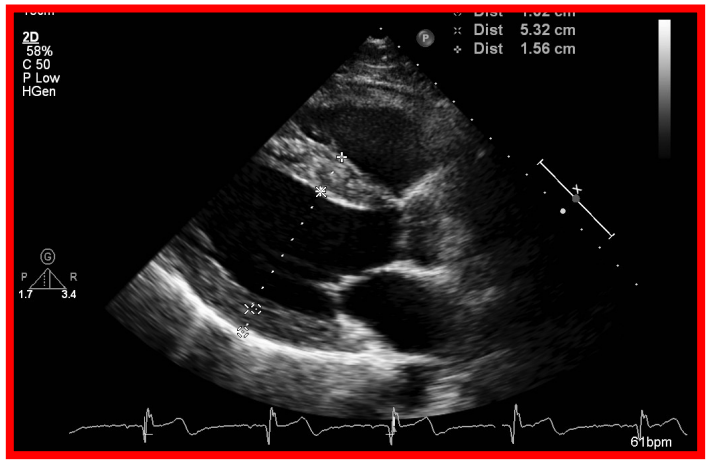
Patient de 43 ans

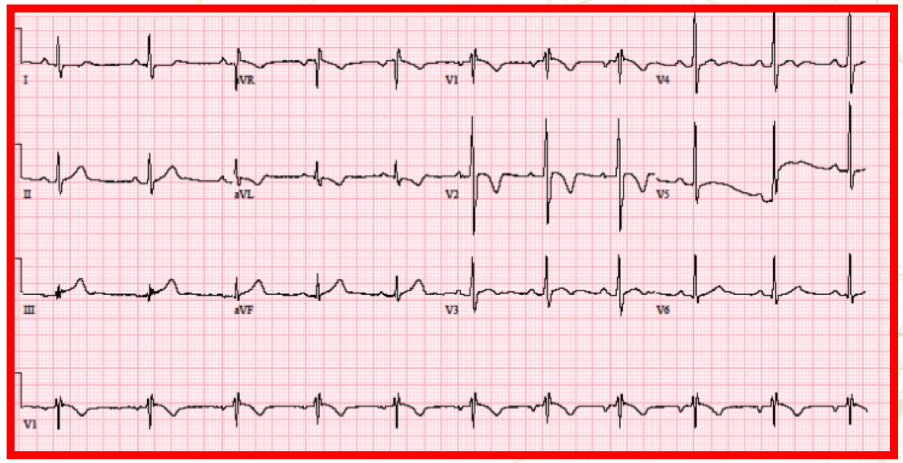
- **Tres actif, IMC 26**
- **Syncope apres 10 minutes de velo avec trauma facial et amnesie retrograde**

Neuro evaluation normale: EEG, CT & IRM cerebrale

ECG, ETT, EE, IRM et EEP

ETT: 15 mm septum interventricular pas d'obstruction au repos





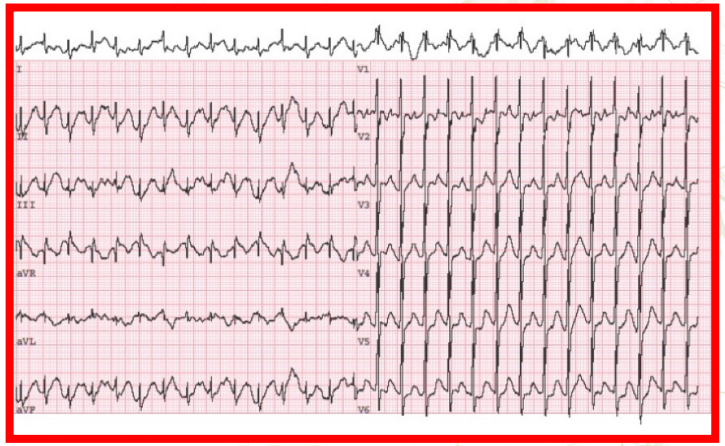
Cyclo-ergometrie test: 300W

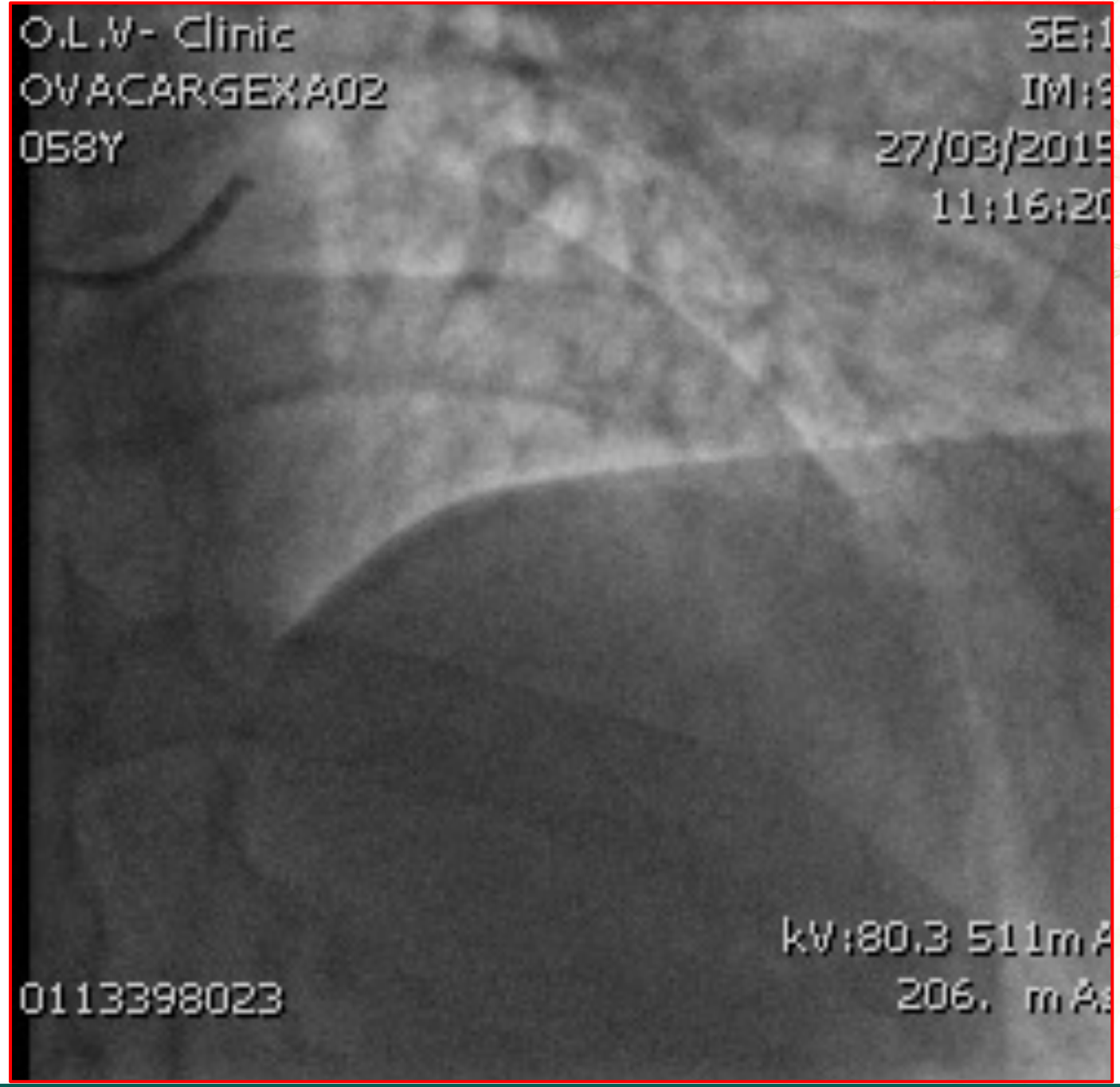
Max FC 176, 99 % FMT

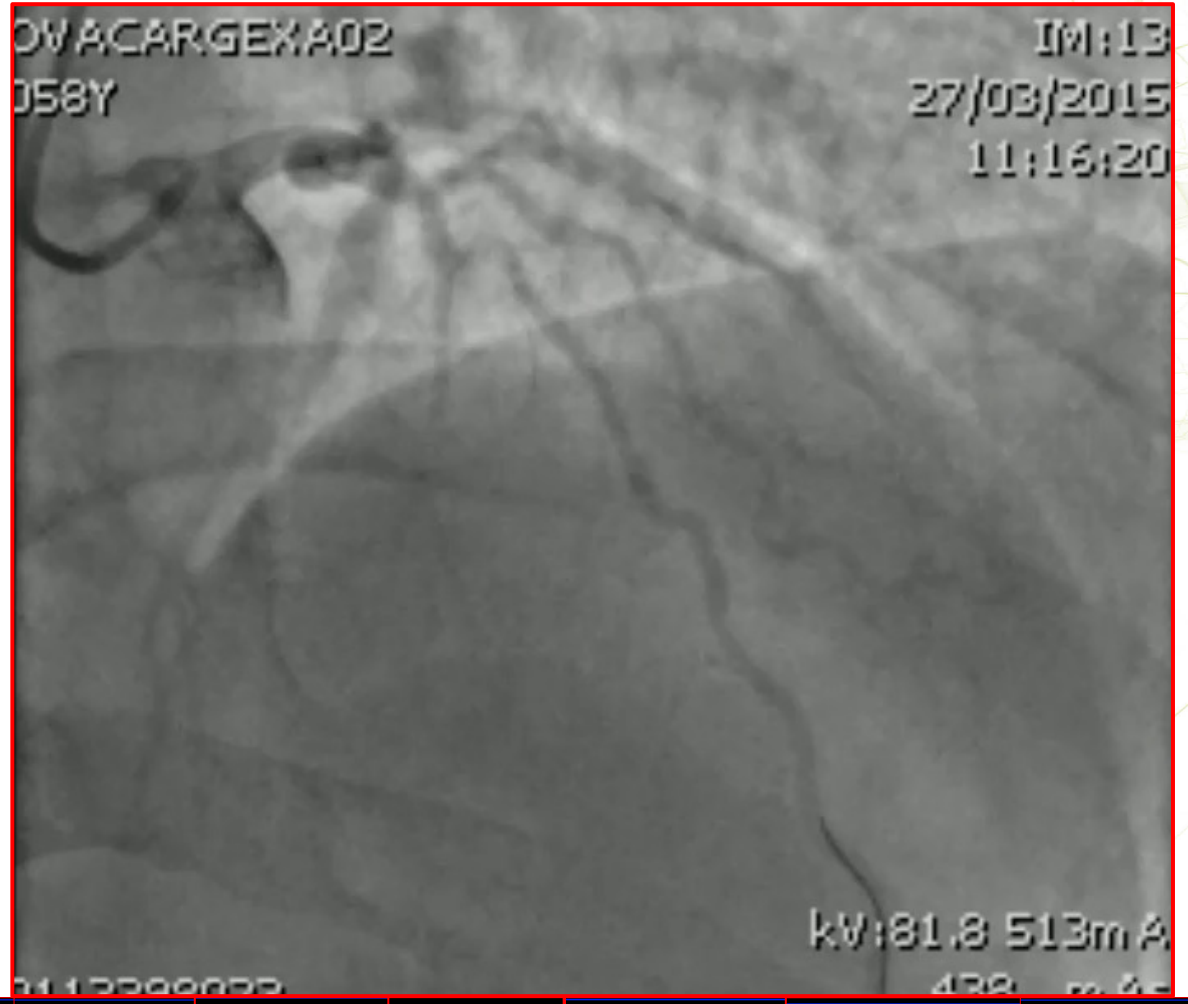
Pas de symptome

Exercise stop due à la fatigue au maximum de l'effort

Pseudonormalization des ondes T apres negativation




O.L.V- Clinic
OVACARGEXA02
058Y
0113398023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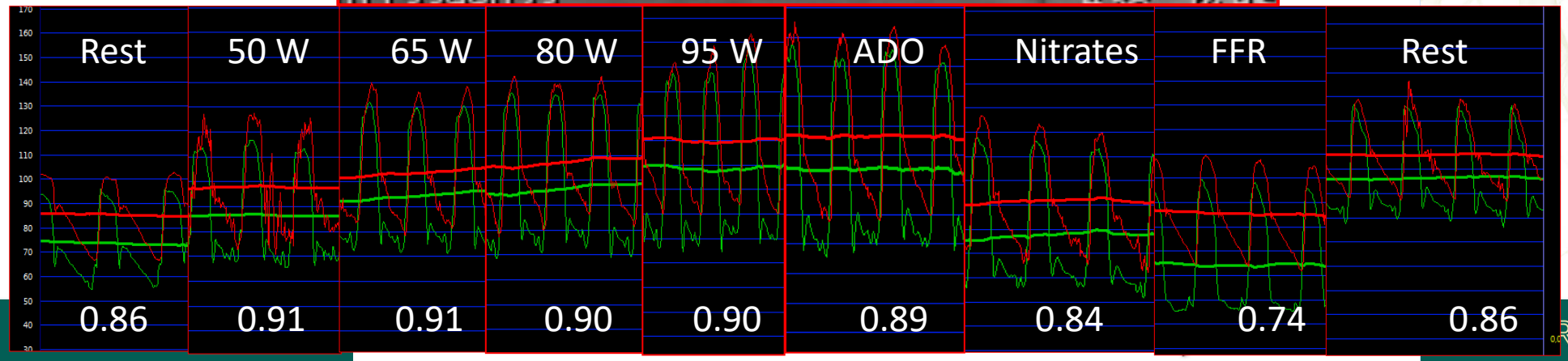
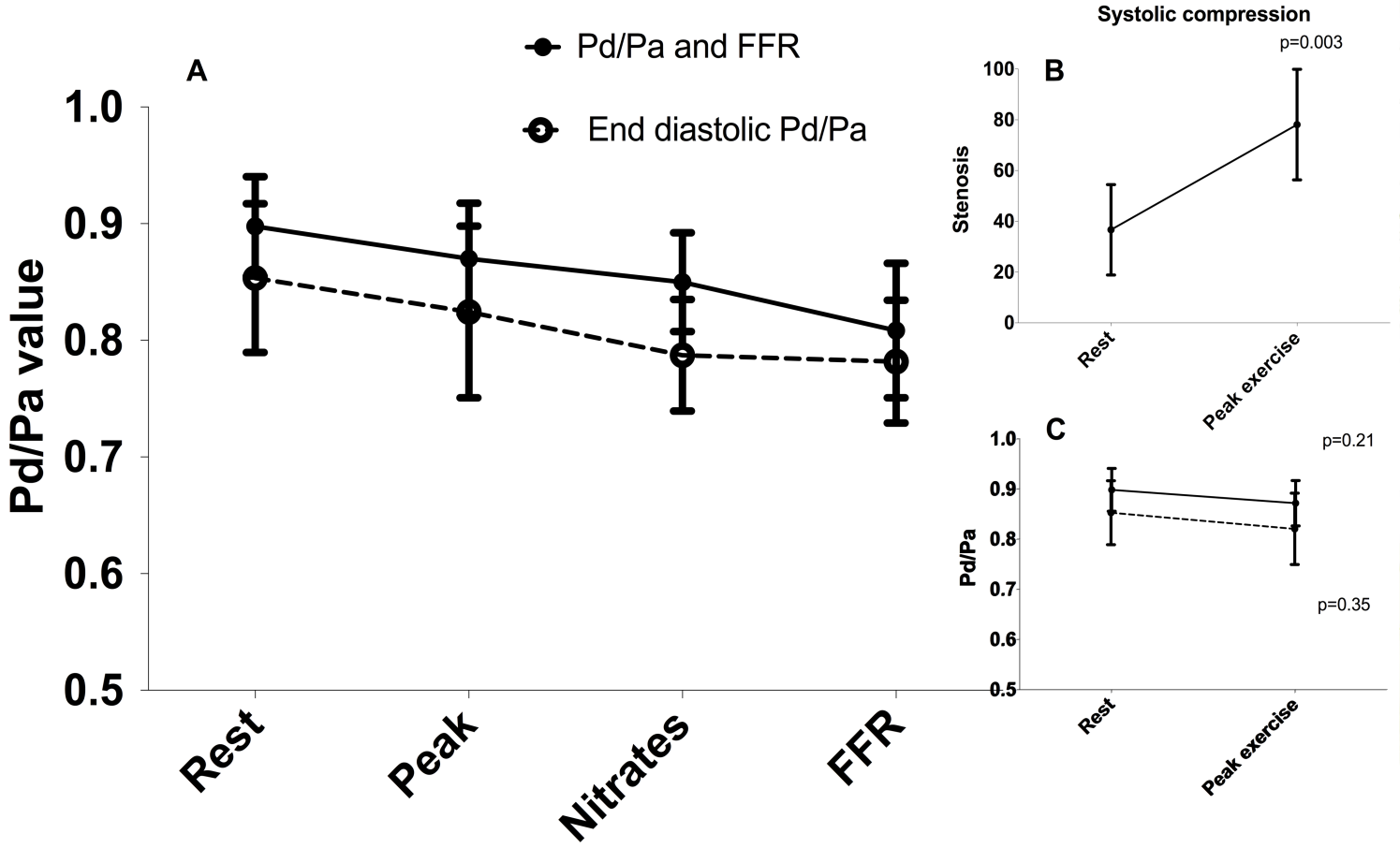
27/03/2015
11:16:20
kV:81.8 513mA


Rest
50 W
65 W
80 W
95 W
ADO
Nitrates
FFR
Rest
0.86
0.91
0.91
0.90
0.90
0.89
0.84
0.74
0.86

Résultat chez 9 patients



Merci @ vous

Cardio&vous

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