

The top banner features a dark teal background on the left with the 'PHYSIO DAY' logo in a light yellow, outlined font. The right side of the banner shows a stylized, light green and yellow graphic of a human head and neck with a network of lines representing blood vessels or nerves.

PHYSIO DAY

JOURNÉES DE PHYSIOLOGIE
EN CARDIOLOGIE INTERVENTIONNELLE

Principes de la FFR virtuelle

Benoit GUILLON
CHRU J.Minjoz- Besançon

5 & 6 AVRIL 2024

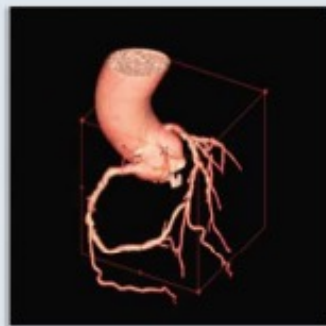
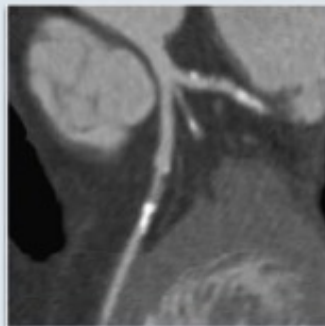
HÔTEL SHERATON · NICE



STEP 1

1

**Image
acquisition and
3D model
construction**



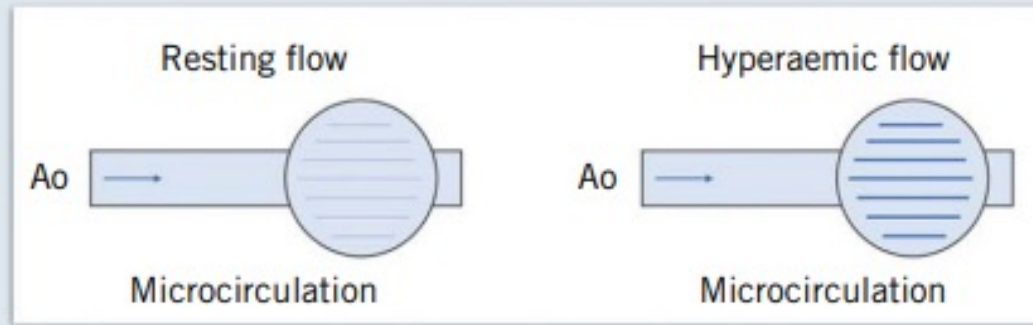
CT scan
Orthogonal angiographic views DICOM



STEP 2

2

Boundary conditions specification



Influenced by cardiac cycle, extravascular compression and intrinsic microvascular resistance.

Mostly assumed

Inlet : Aortic pressure

Outlet: Microvascular resistance, Pv



STEP 3



Computational Fluid Dynamics (CFD), Navier-Stokes Equation

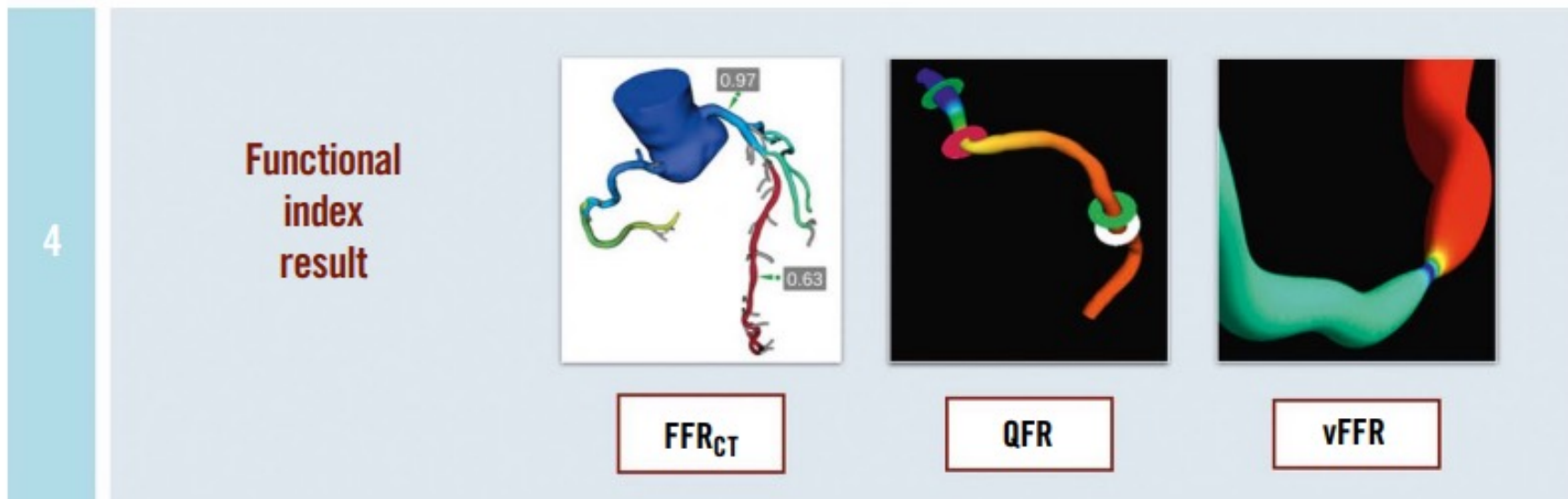
=> Simplified equation

Blood density and viscosity are assumed in large arteries

Blood flow velocity use TIMI frame count



STEP 4





	User display	Projections needed	Pressure sensor	Microcirculation	Side branches	Available data
QFR		2	No	Yes	No	
CAAS vFFR		2	No	No	No	
caFFR		2	Yes	Yes	No	
FFR angio		3	Yes	No	Yes	
μQFR		1	No	Yes	Yes	

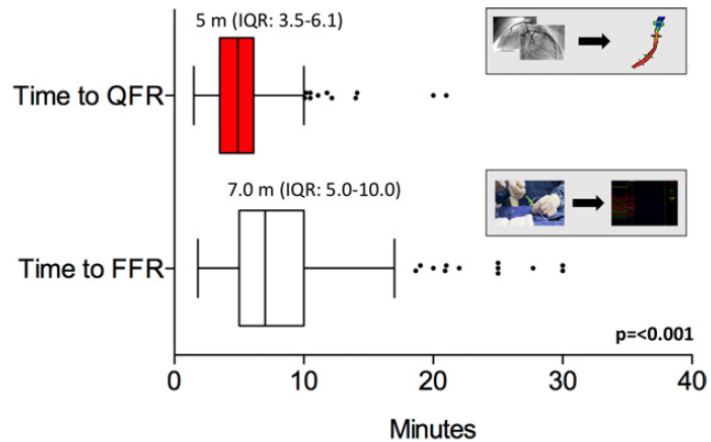
Current Angio-derived FFR

Faria et al, EuroIntervention 2023



Hallmarks

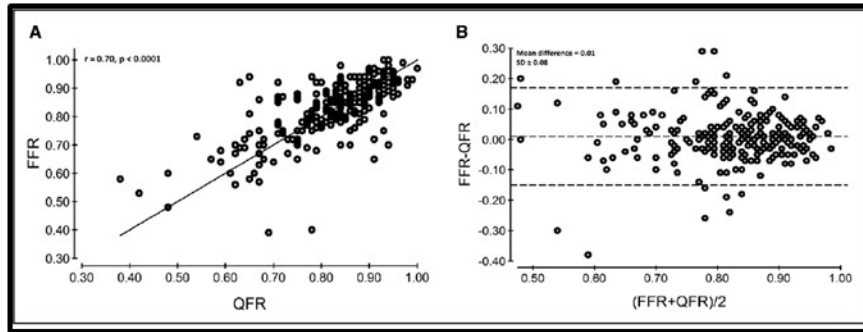
- Invasive angiography based
- Pressure-wire free
- Hyperhemia free
- Short time duration
- 3-D computation from angiographic views (2 at least) MEDIS Netherland
- Estimation of coronary flow velocity (eCFV) by frame count analysis



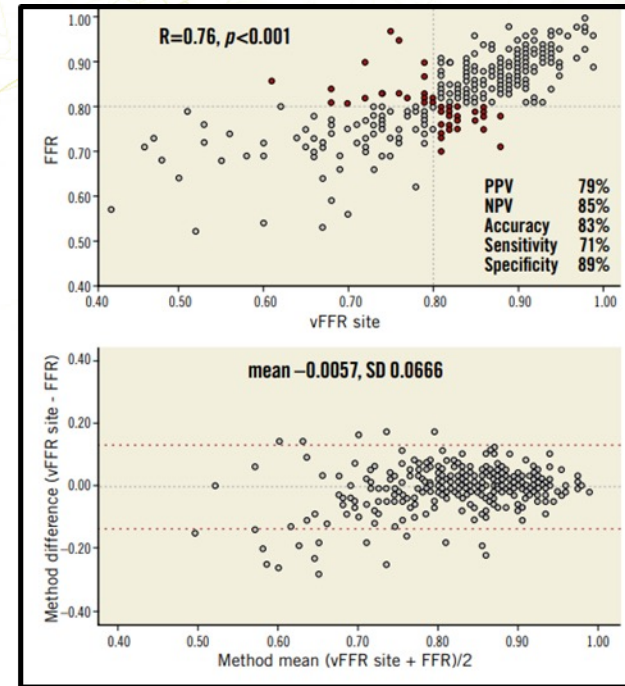
Favor II study,
Westra et al, J Am Heart Association, 2018



Correlation with FFR



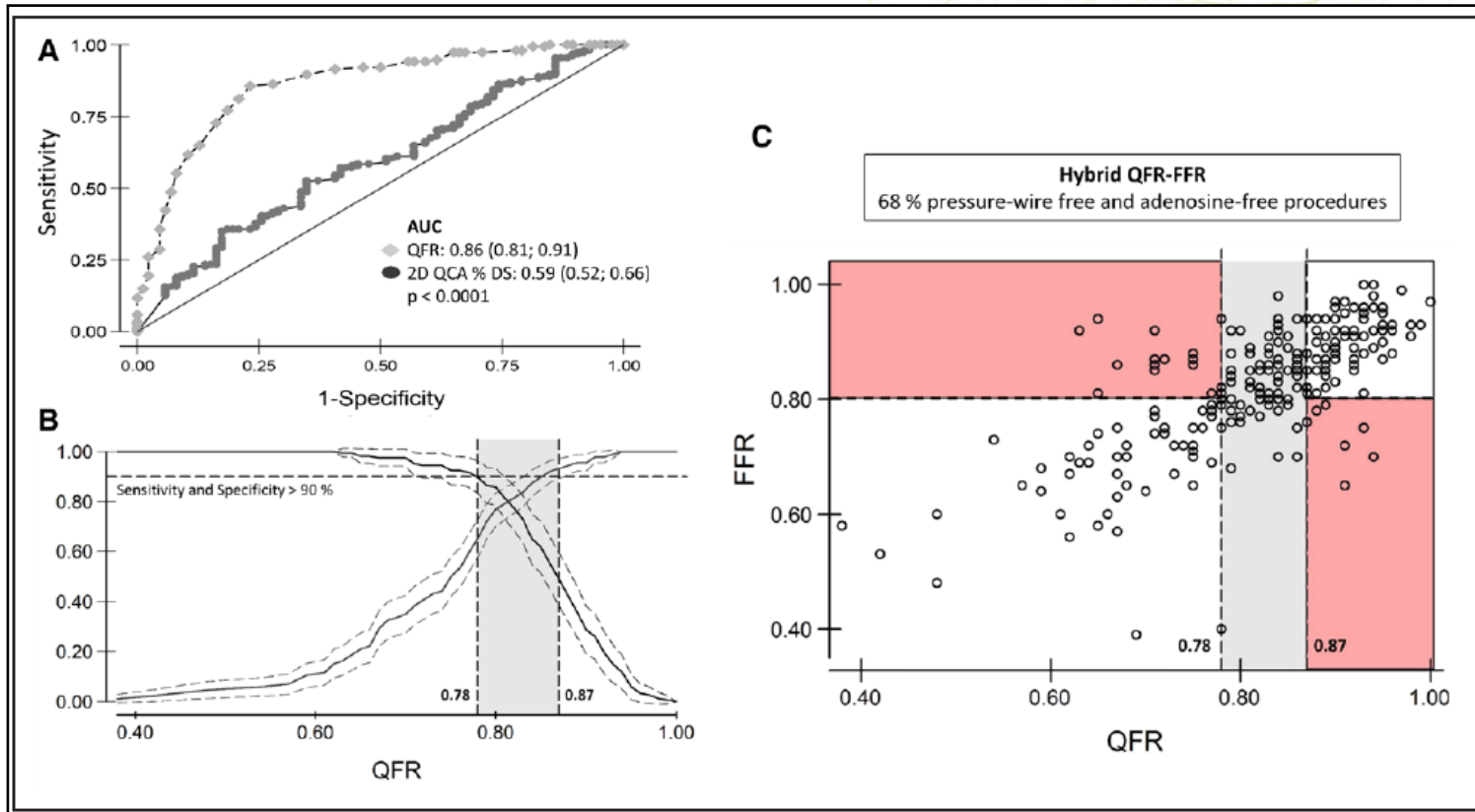
Wifi 2 study,
Westra et al, Circ Cardiovasc Imaging 2018



FAST 2 study,
Masdjedi et al, EuroIntervention 2022



Grey Zone 0.78-0.87

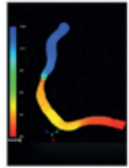


Wifi 2 study,
Westra et al, Circ Cardiovasc Imaging 2018



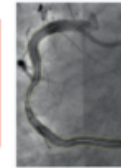
CENTRAL ILLUSTRATION 2-Year Outcomes From the FAVOR III China Trial

3,825 patients with at least 1 lesion with DS% of 50%-90% in a coronary artery with at least a 2.5 mm RVD by visual assessment



Quantitative Flow Ratio-Guided Group
N = 1,913

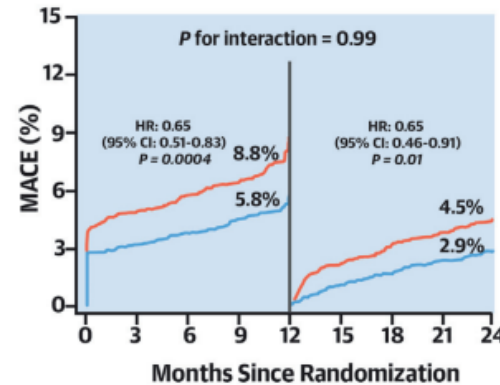
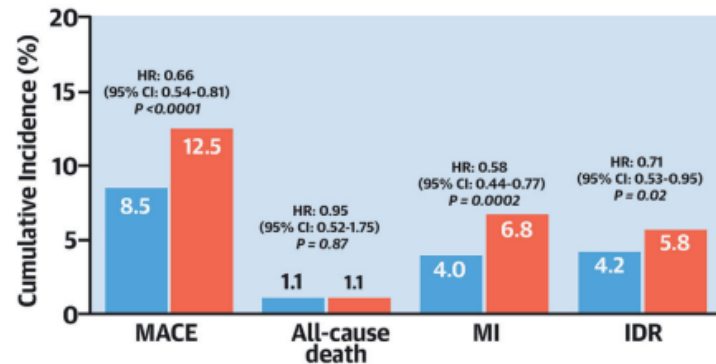
Angiography-Guided Group
N = 1,912



PCI= 90,5% vs 99.1% p<0.0001

2-Year Clinical Outcomes

Landmark Analysis

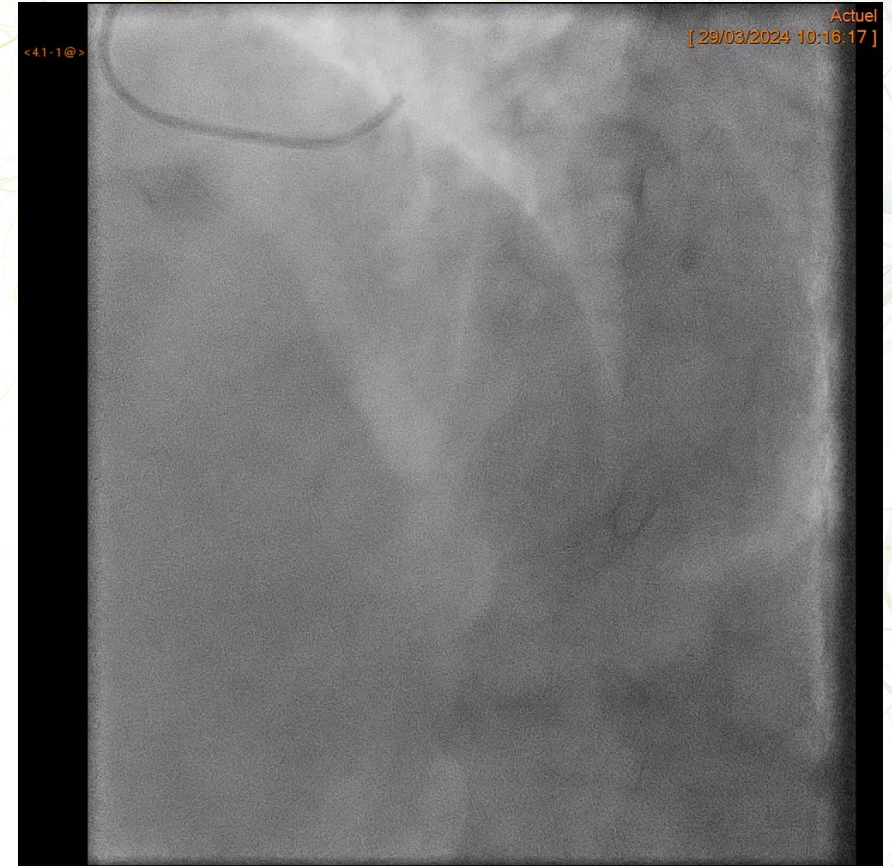
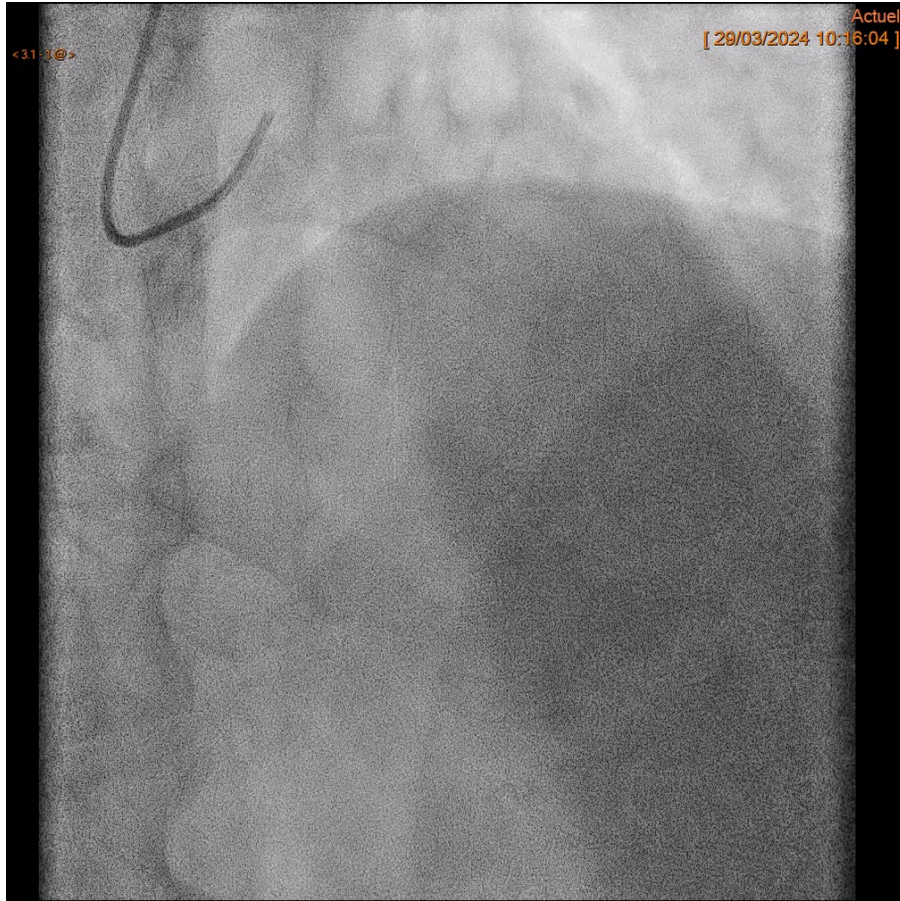


Song L, et al. J Am Coll Cardiol. 2022;80(22):2089-2101.

Clinical outcomes: FAVOR III



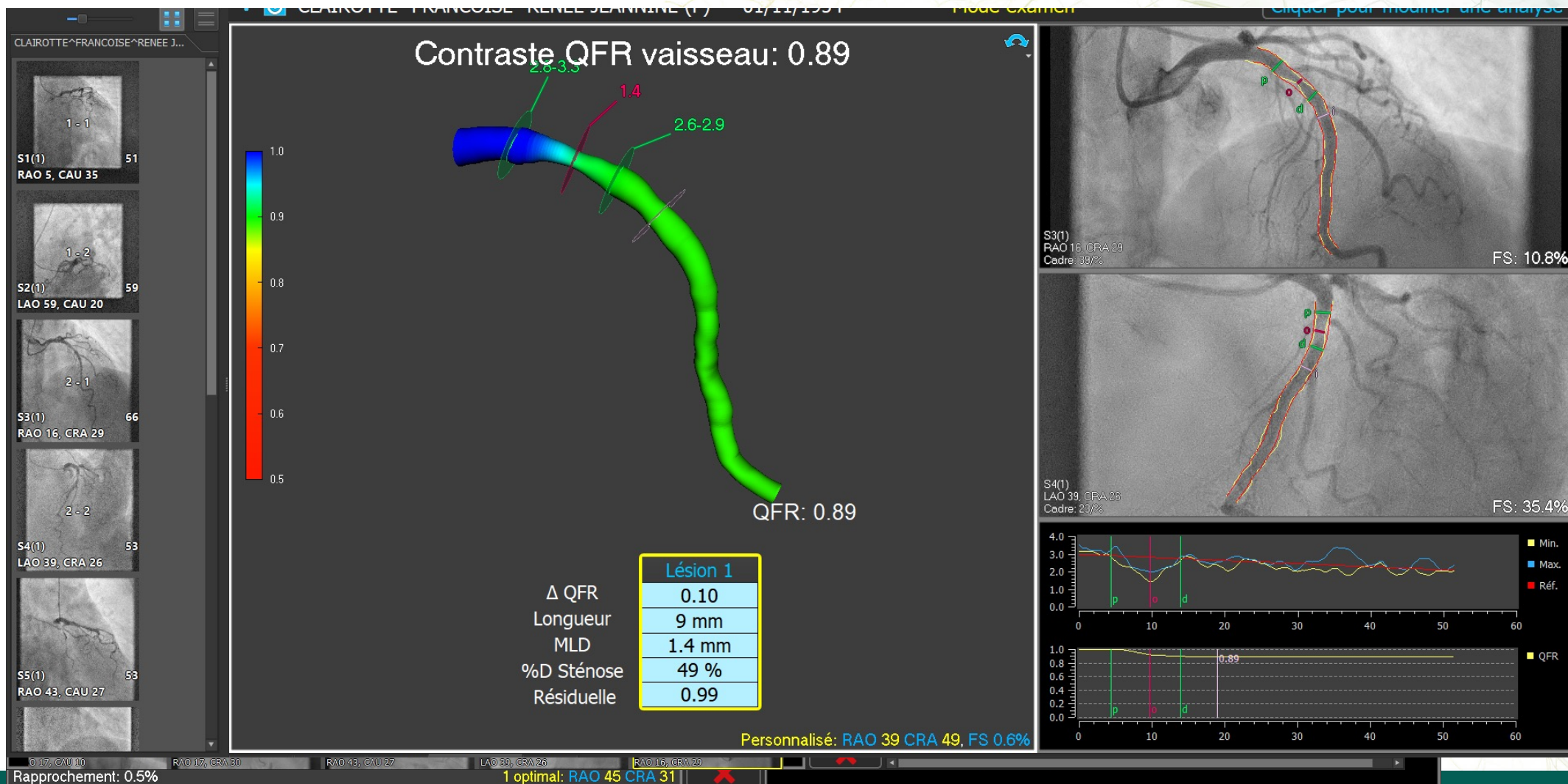
Clinical case: QFR Process





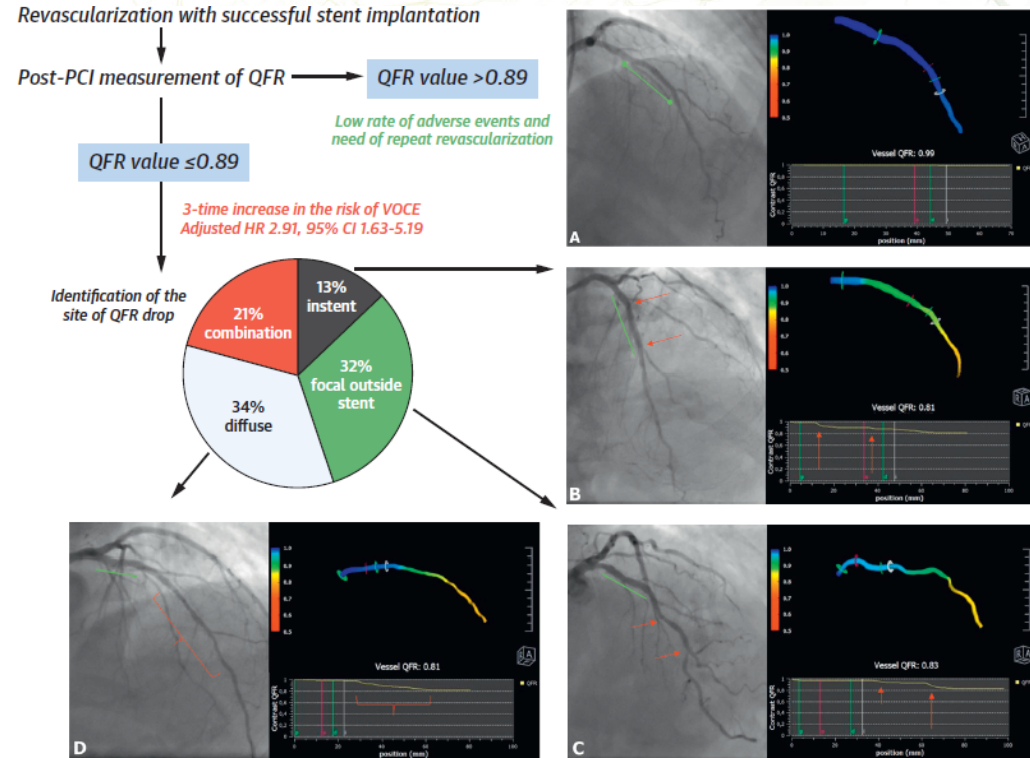
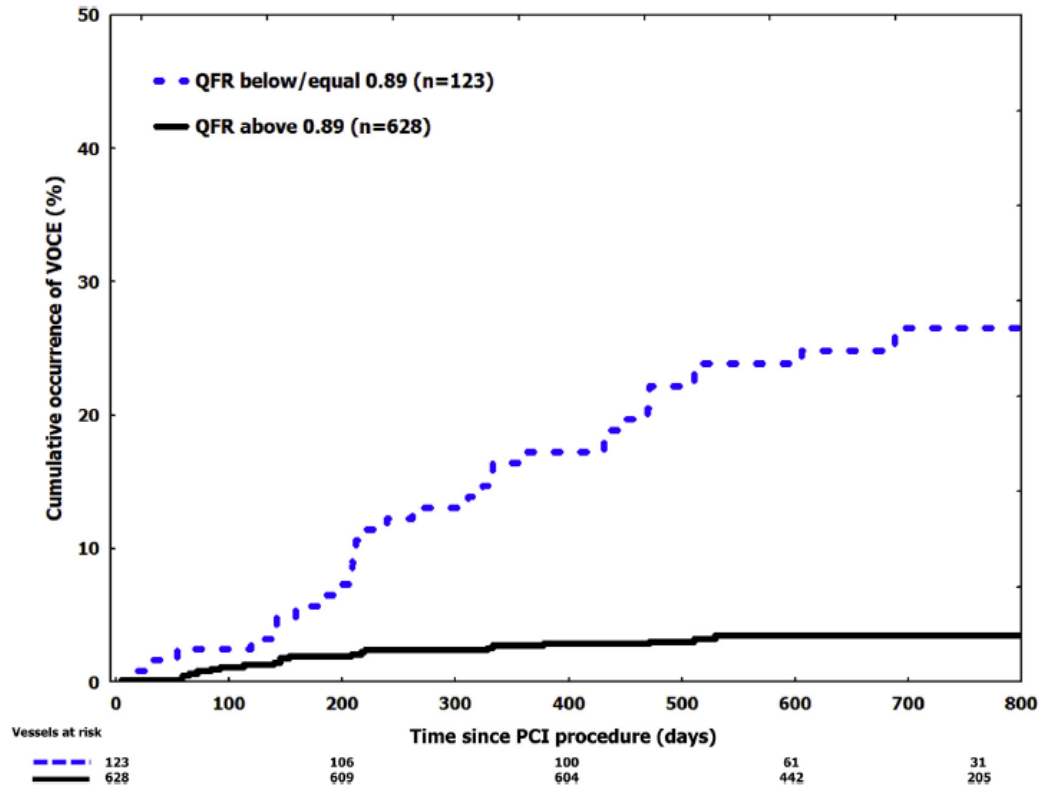
Clinical case: QFR Process

LAD FFR 0.87





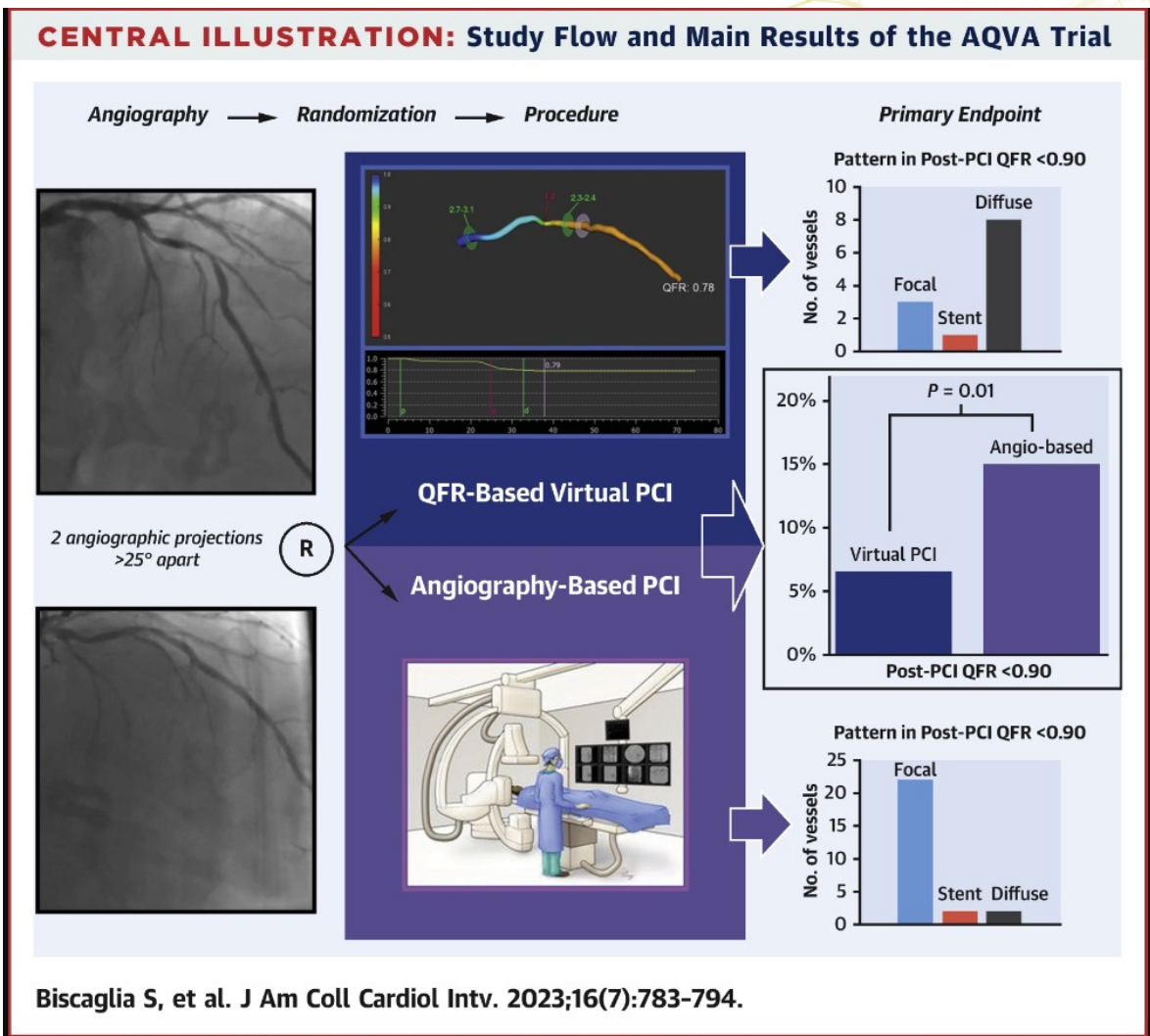
Pronostic impact of QFR post-PCI



Biscaglia et al, J Am Coll Cardiol Intv; 2019



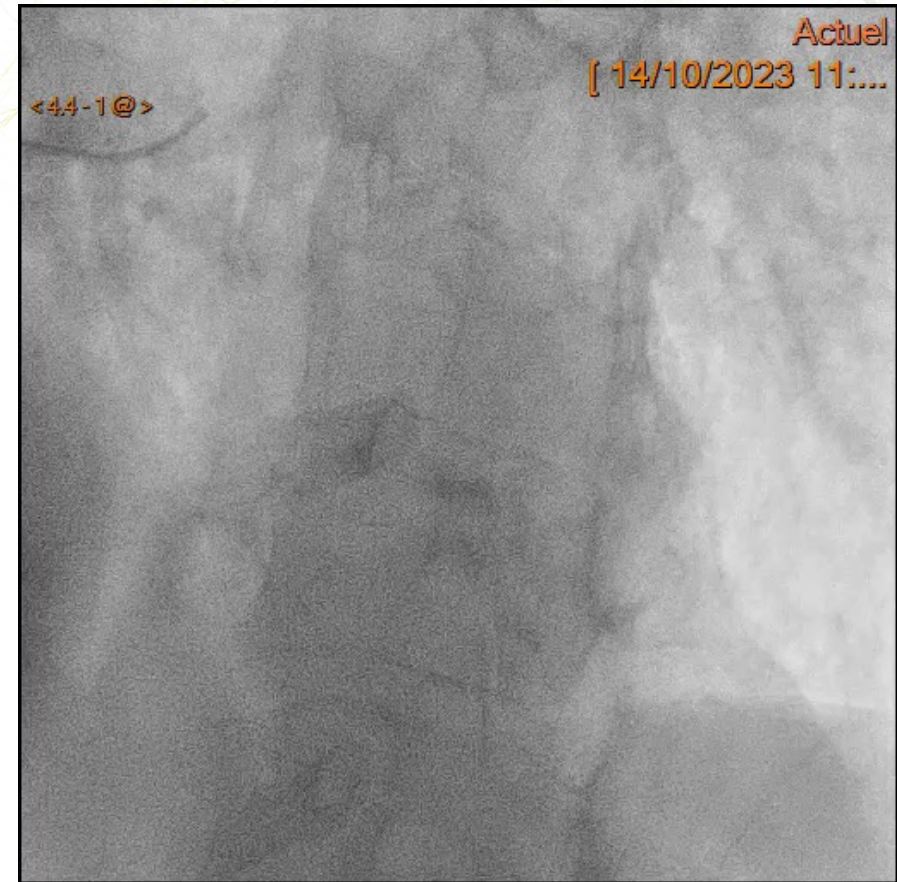
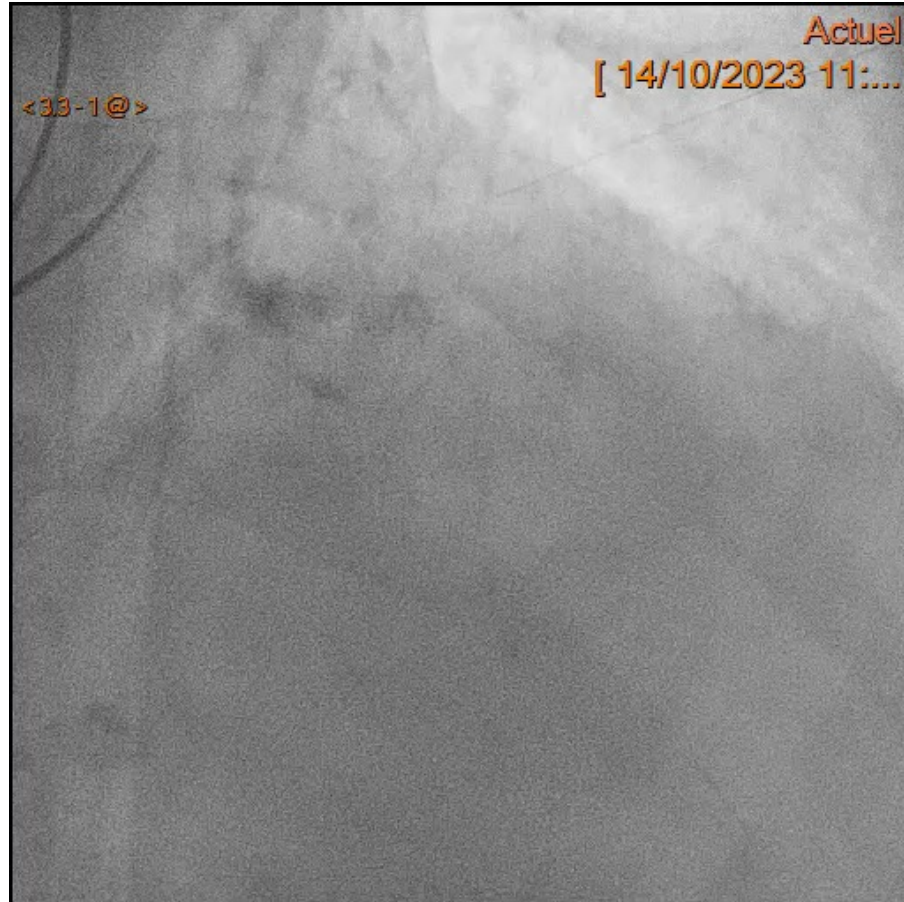
QFR guided PCI improves QFR post PCI





QFR implementation

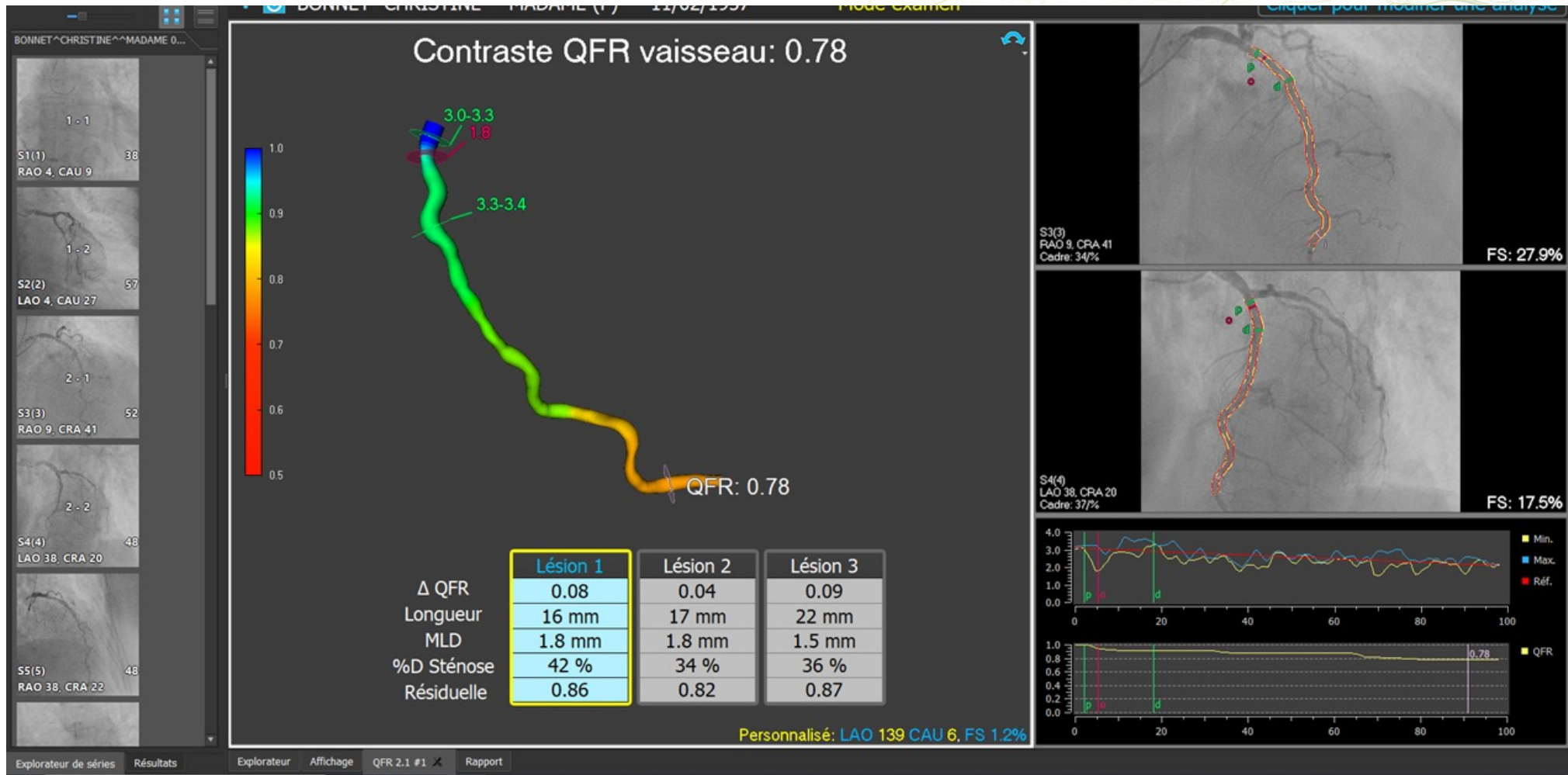
Serial stenosis on LAD FFR 0.79





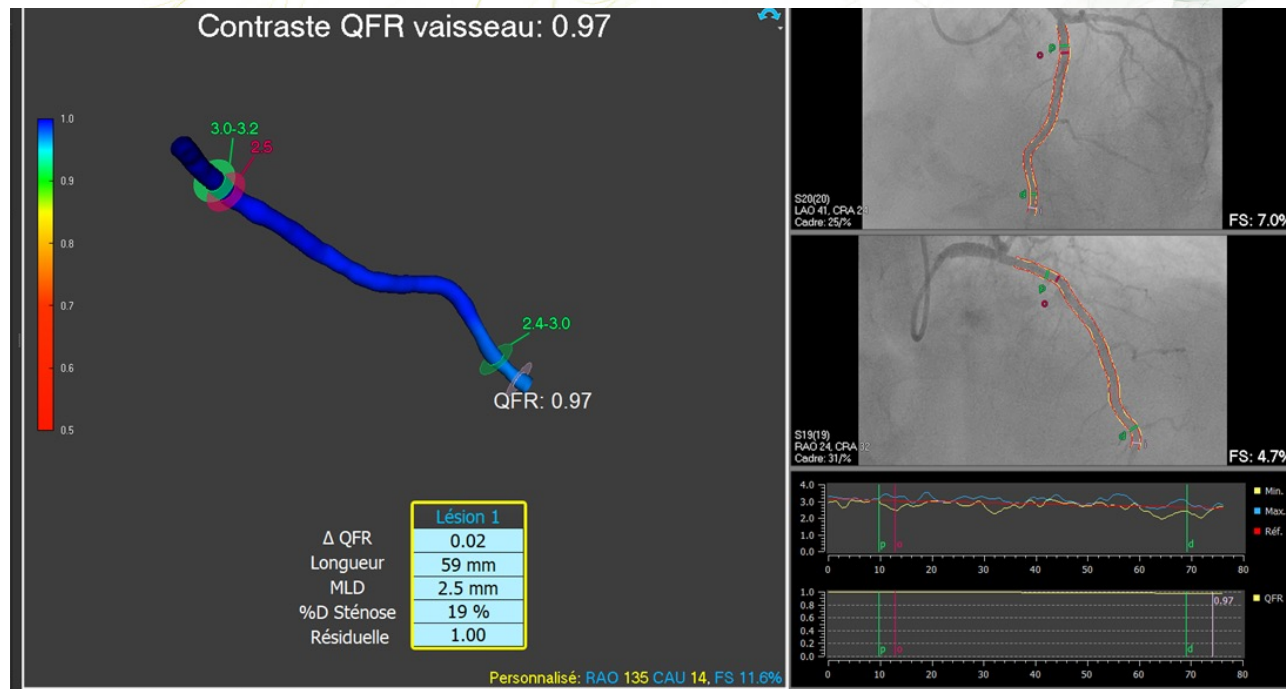
Serial stenosis on LAD

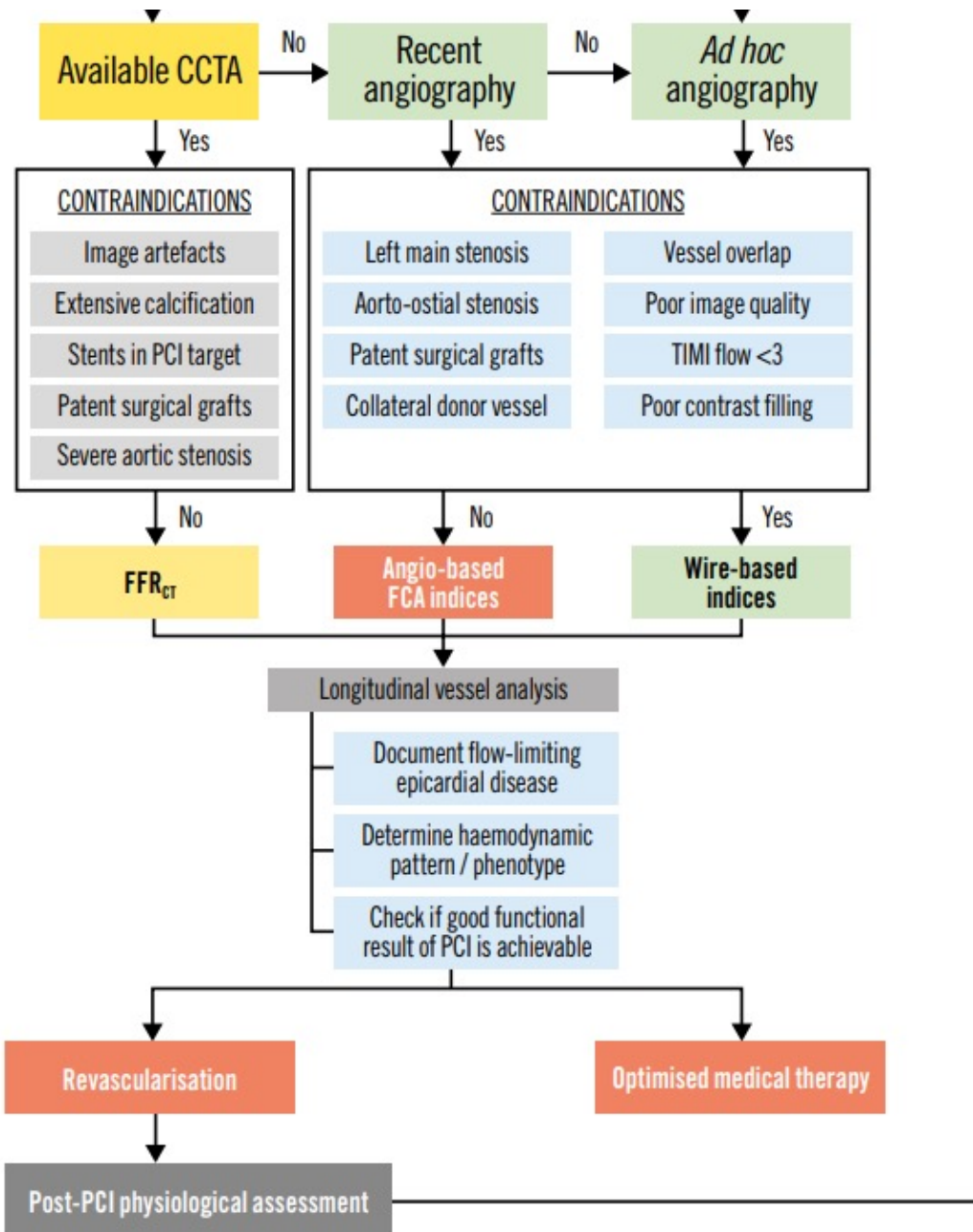
PCI planning to anticipate post-PCI result





QFR post-PCI Serial stenosis PCI



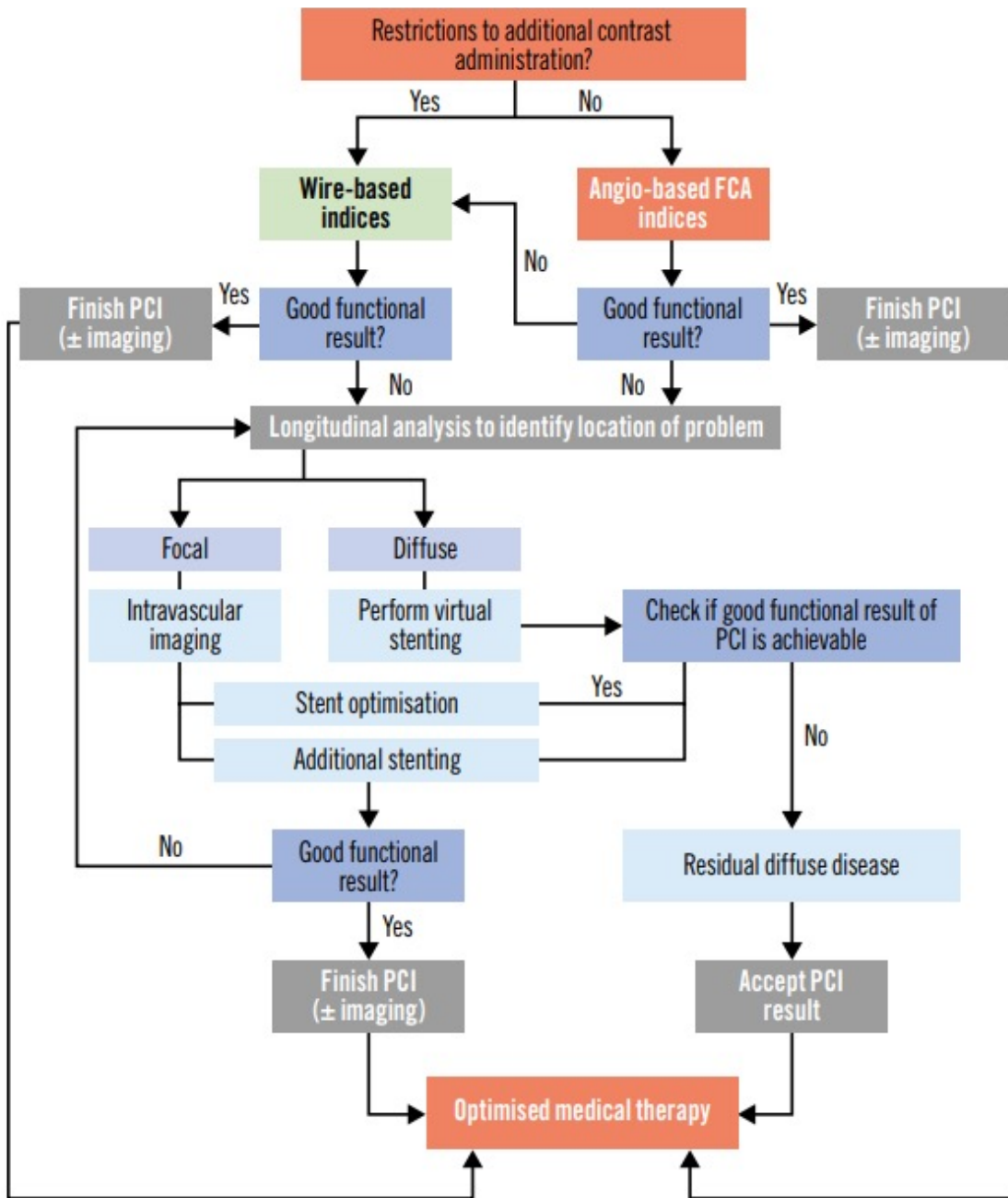


Conclusion: Pre-PCI assesment

Faria et al, EuroIntervention 2023



Conclusion: Post-PCI assesment



Faria et al, EuroIntervention 2023