La QFR ou la FFR 2.0

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Orateur : ADJEDJ Julien

☑ Je déclare les liens d'intérêt potentiels suivants :

- Consultant pour Abbott et Biotronik

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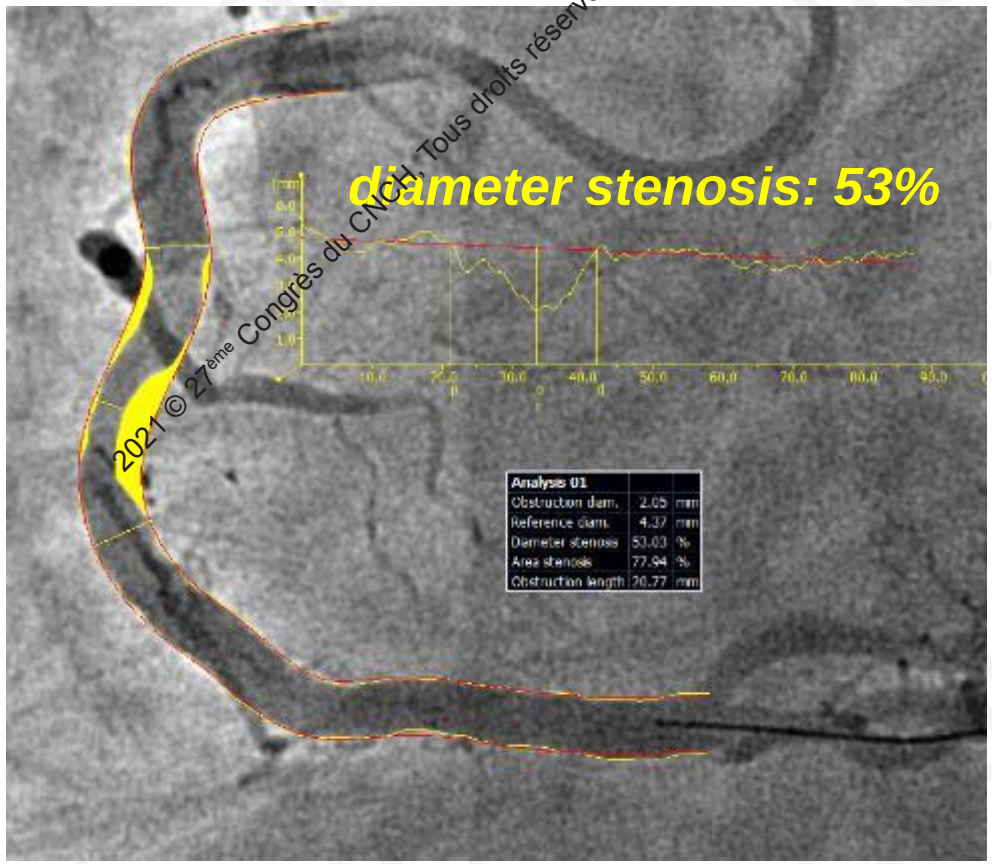
Revascularisation ou non?

Quantitative Coronary Angiography (QCA)



Anatomy: diameter stenosis = 53%

vs.

Physiology: FFR = 0.85


Medis - Medis Suite 4.0.24.2
New session
Series Browser
Training_26 Case26 XA 4 14/06/2017
1 - 1
S4(1) 80
LAO 12, CAU 26
1 - 2
S5(1) 67
RAO 24, CAU 23
2 - 1
S11(1) 75
LAO 43, CAU 2
2 - 2
S12(1) 71
LAO 0, CAU 2
00:00:00.00
Calibrations
Measurements
Annotations
Snapshots
Viewport layouts
Properties
Training_26
M
-
14/06/2017
50 mm
91 %
Frame: 23/80
Series: 4 (1)
Acq. speed: 15 f/s
Cal. fac.: 0.2257 mm/pixel (Isocenter calibration)
LAO 12, CAU 26
Derived
WL 171 131
Frame: 23/67
Series: 5 (1)
Acq. speed: 15 f/s
Cal. fac.: 0.2207 mm/pixel (Isocenter calibration)
RAO 24, CAU 23
WL 182 136
Frame: 23/75
Series: 11 (1)
Acq. speed: 15 f/s
Cal. fac.: 0.2247 mm/pixel (Isocenter calibration)
LAO 43, CAU 2
WL 167 128
55 mm
Cine Alt+Shift
Zooming Ctrl+Shift
Panning Ctrl
Window/Level
Calibration
Distance Measurement D
Area Measurement A
Text Annotation
Snapshot S
Viewport Layout Snapshot
Invert Image Ctrl+I
QFR
Series Browser
Results
Browser
View
Report
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FFR virtuelle

FFR

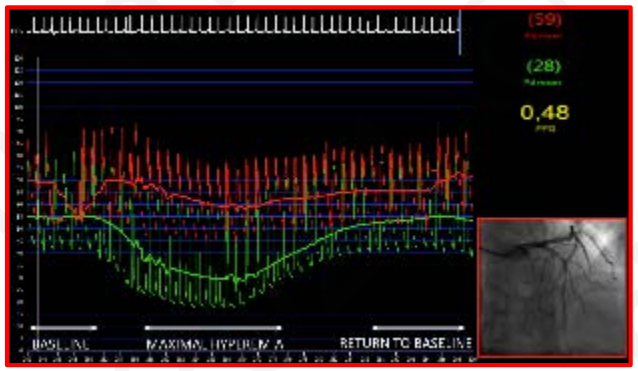
$$FFR = \frac{Q_S^{max}}{Q_N^{max}}$$

FFR virtuelle

$$FFR = \frac{(P_d - P_v)/R_S^{max}}{(P_a - P_v)/R_N^{max}}$$

- *Hyperemie maximale ➔ $R_s = R_N$*
- *P_v <<< P_a et P_d*

$$FFR = \frac{P_d}{P_a}$$



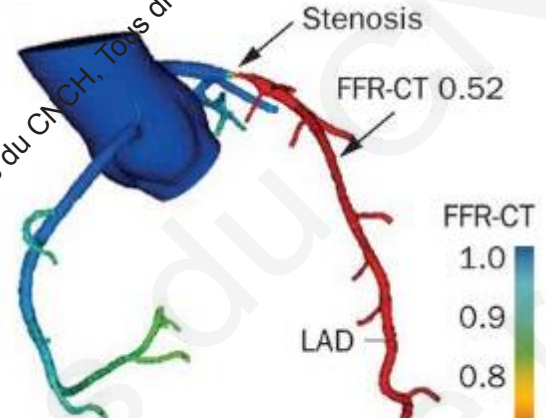
Algorithme

$$\frac{Dv}{Dt} = -\operatorname{grad} V - \frac{1}{\rho}\operatorname{grad} p + \frac{1}{\rho}\operatorname{div}\tau$$

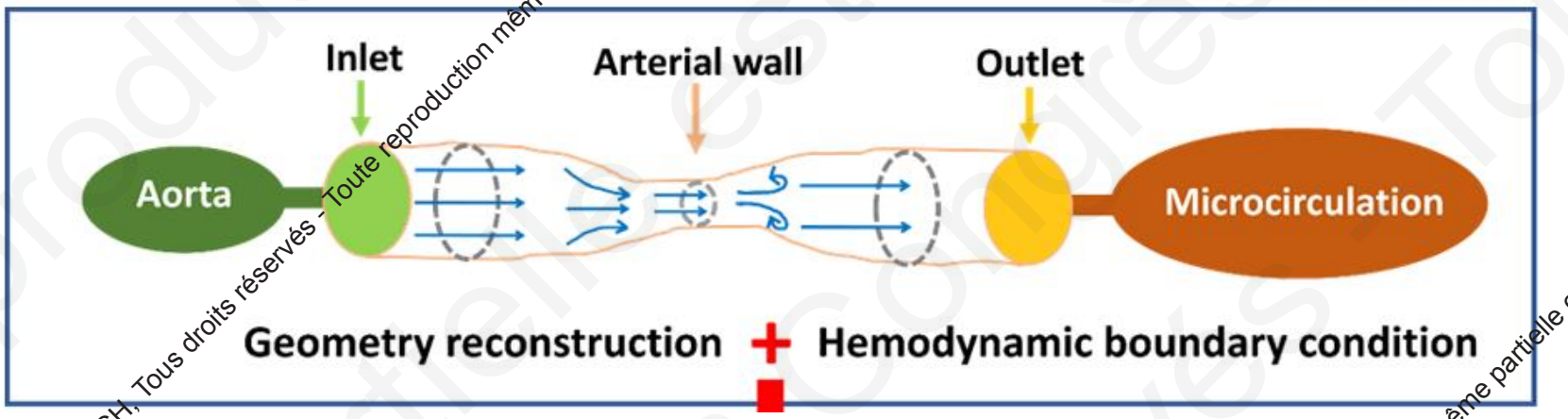
$$\tau_{ik} = \mu\left(\frac{\partial v_i}{\partial x_k} + \frac{\partial v_k}{\partial x_i} - \frac{2}{3}\delta_{ik}\frac{\partial v_s}{\partial x_s}\right) + \mu_\vartheta \delta_{ik}\frac{\partial v_s}{\partial x_s}$$

+

Reconstruction 3D du vaisseau



FFR virtuelles: principes



Adjedj et al. PCR-EAPCI Textbook 2019

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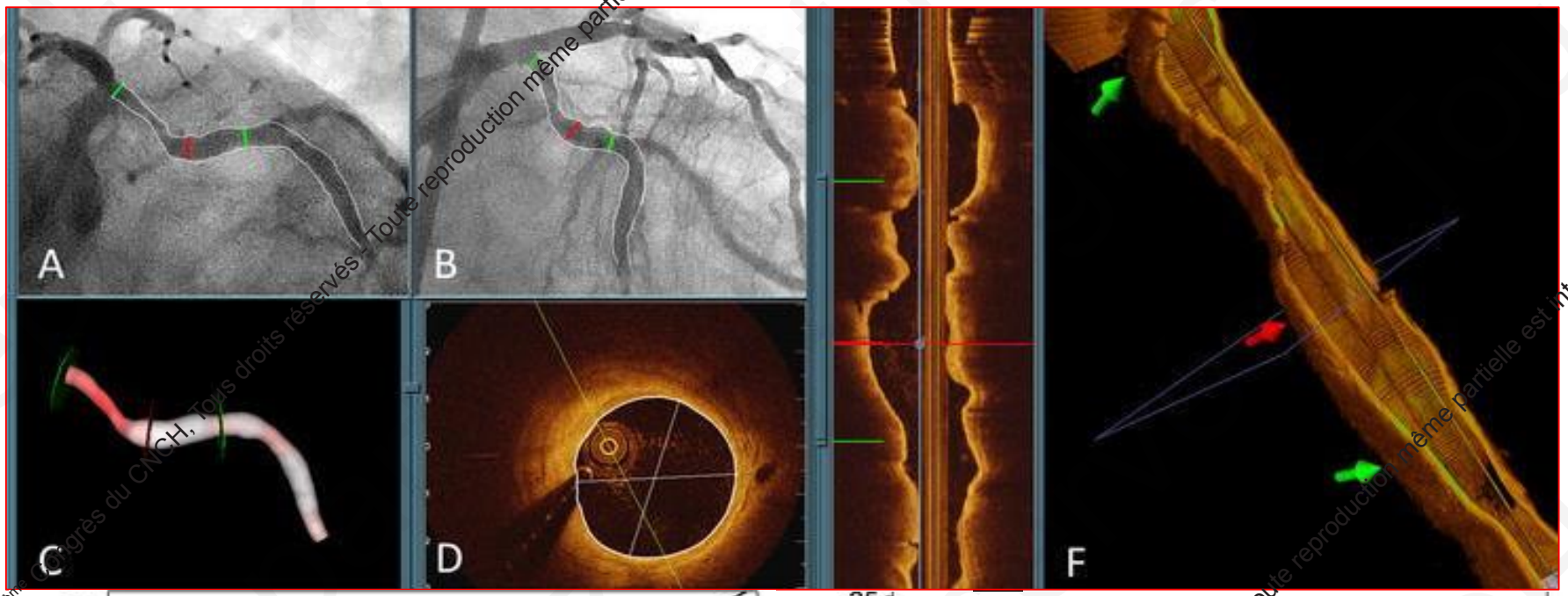
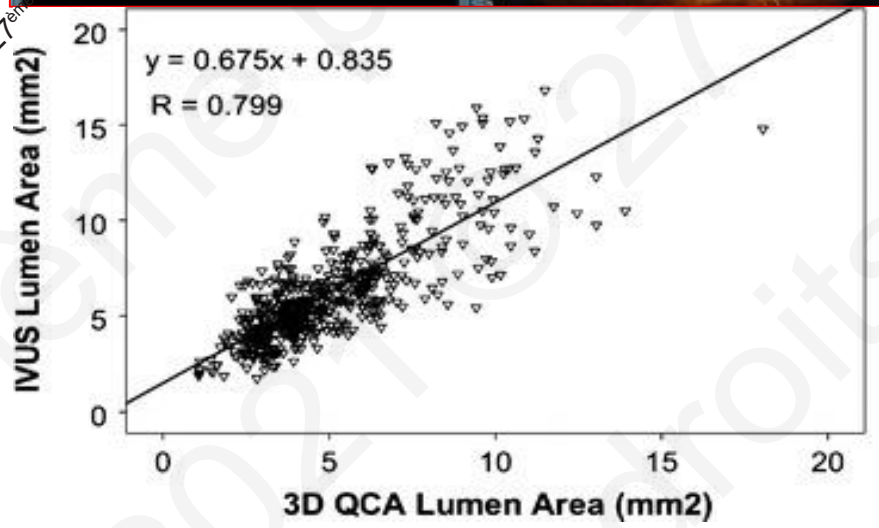
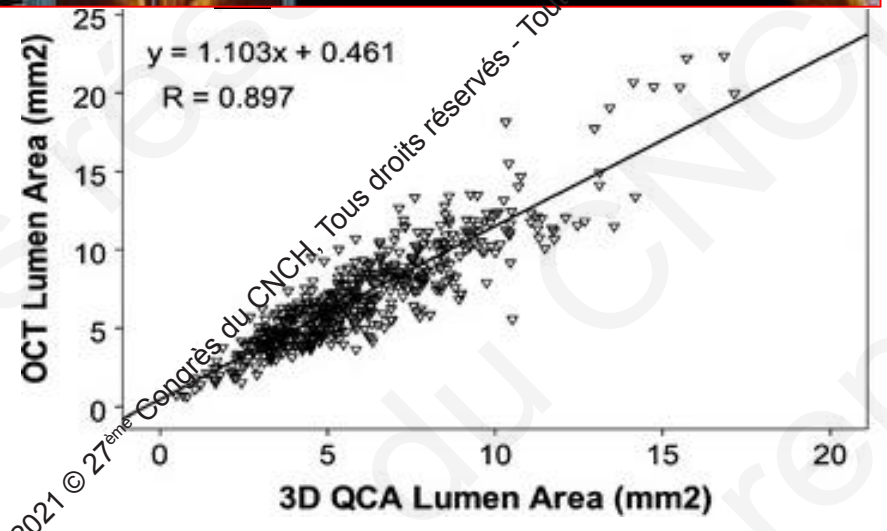
Corrélation 3D QCA et imagerie endocoronaire

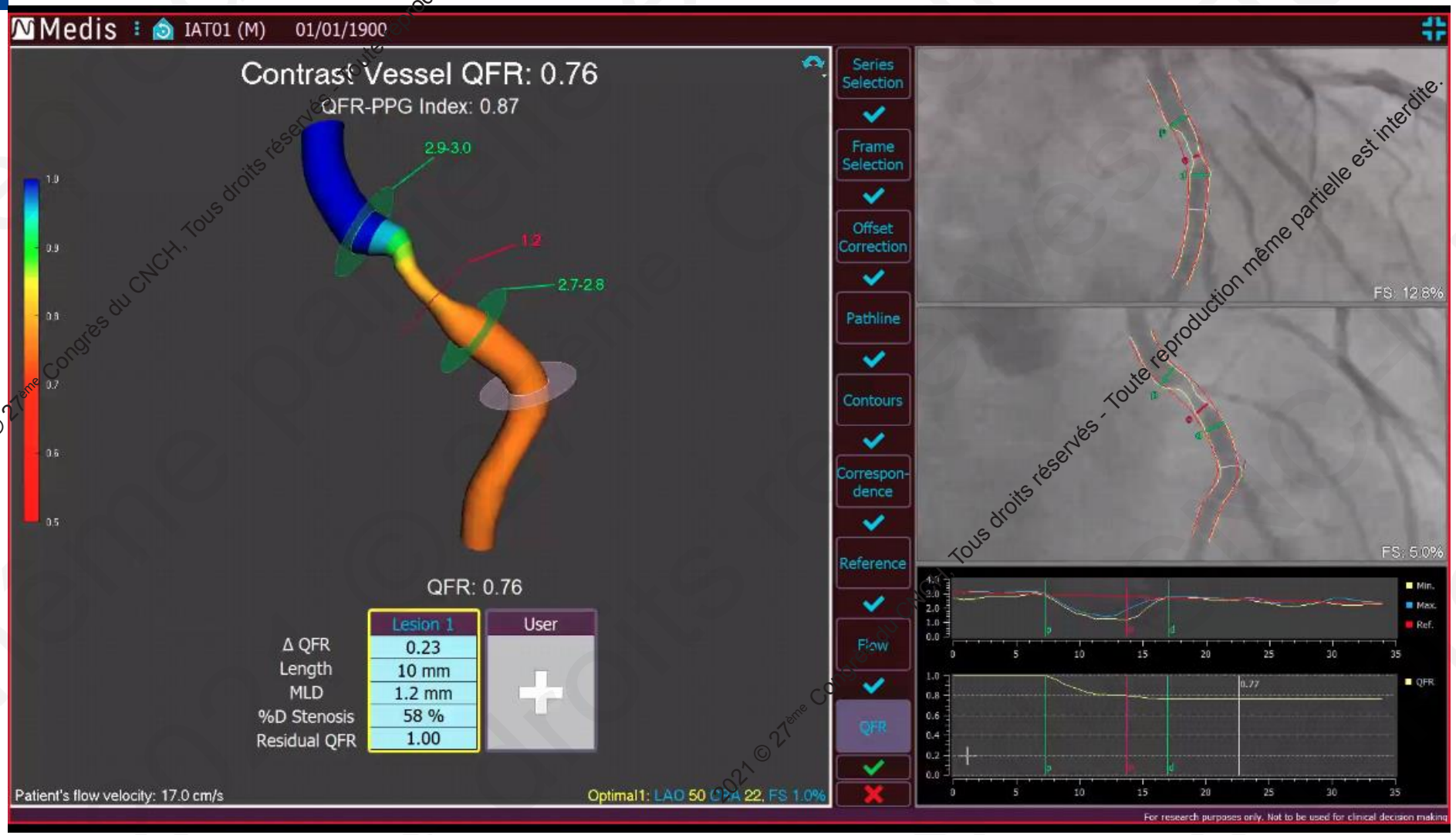






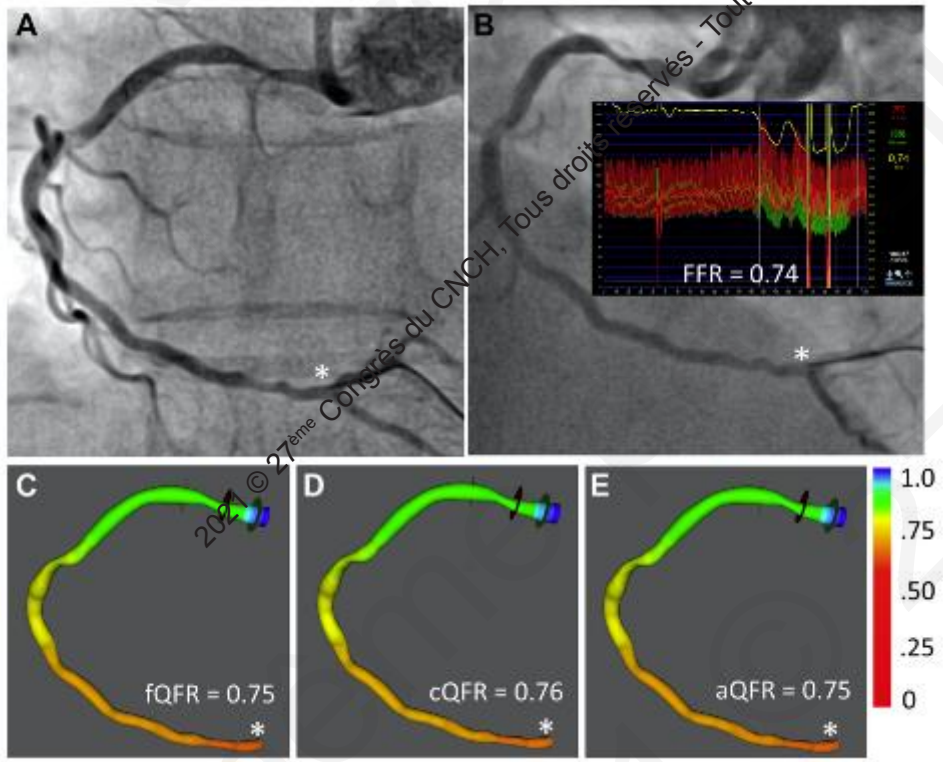
Tu et al. Int J Cardiovasc Imaging 2012.

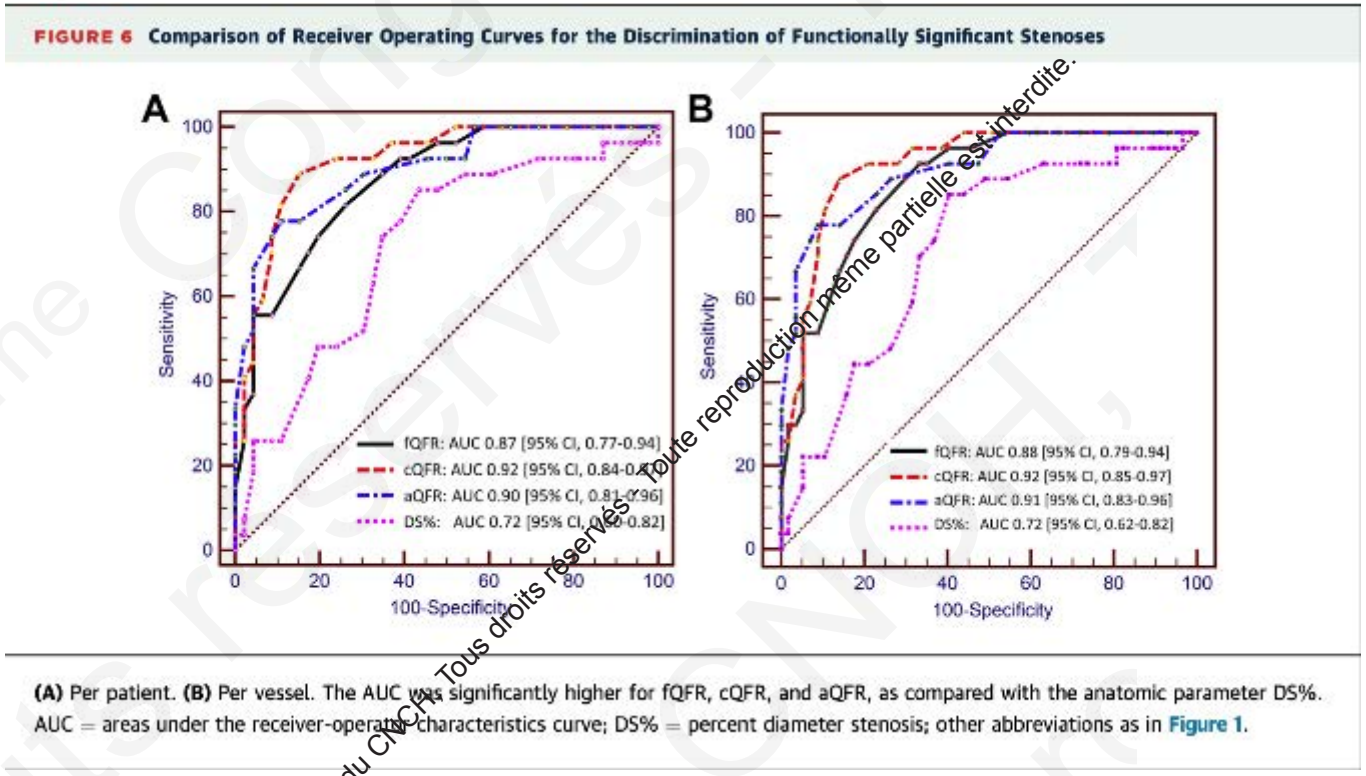
Vue d'ensemble



Etudes clinique: la saga FAVOR

FAVOR I: QFR sans adenosine n=78

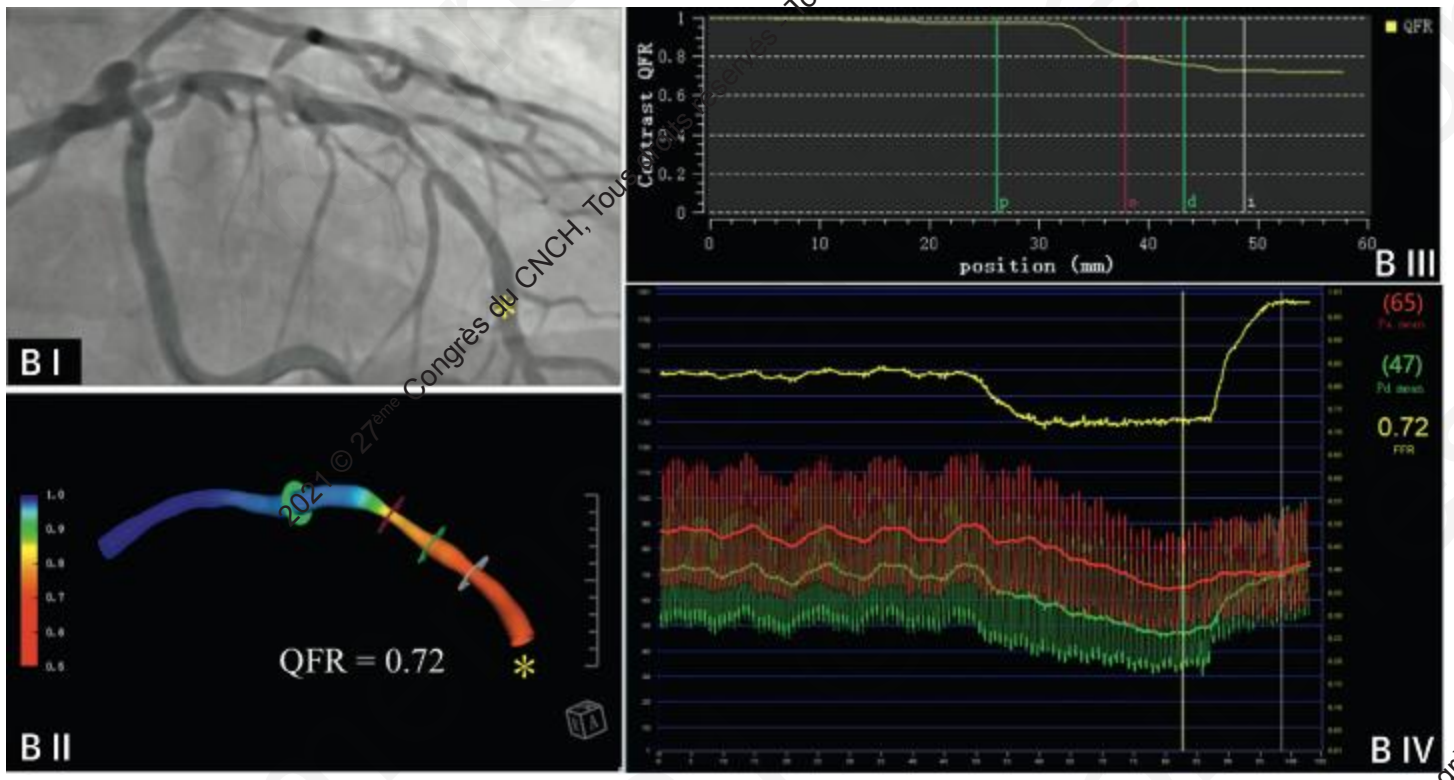


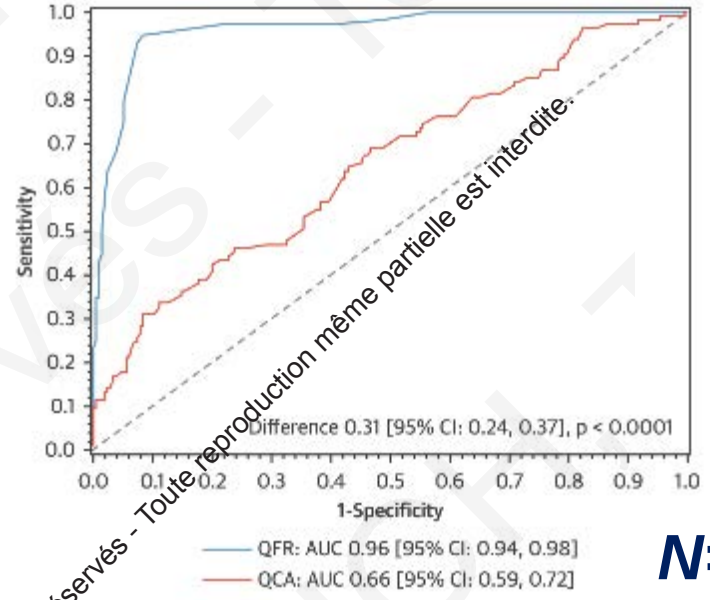


The International Multicenter FAVOR Pilot Study: Tu, S., et al. (2016). JACC Cardiovasc Interv 9(19): 2024-2035.

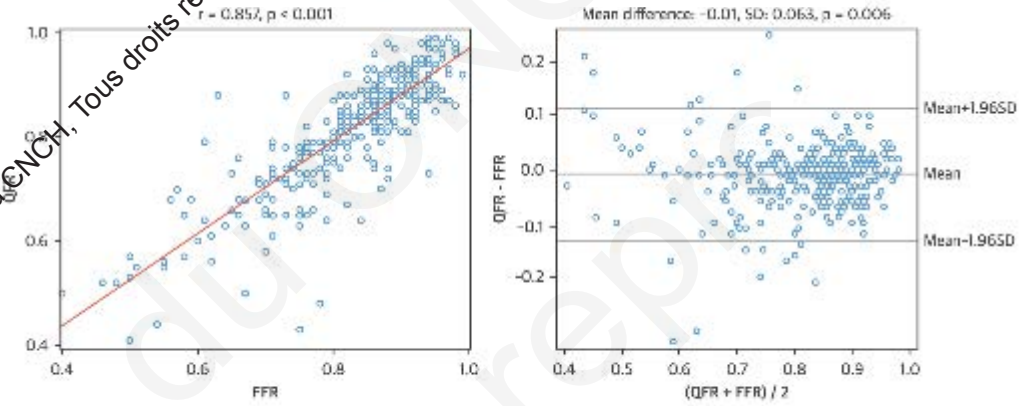
Etudes clinique: la saga FAVOR

FAVOR II China: QFR correlation avec FFR





N=308

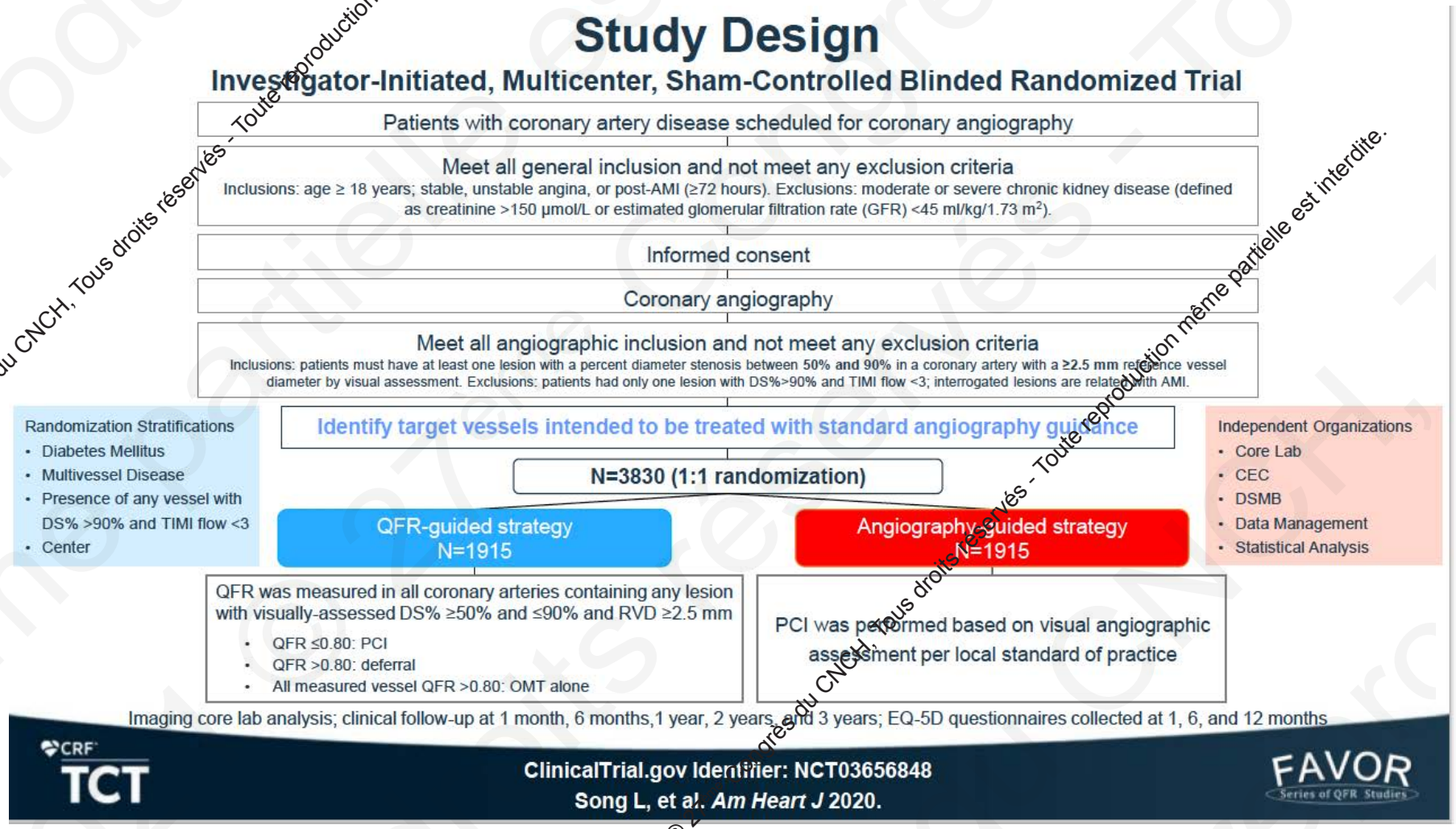


QFR demonstrated good correlation and agreements with FFR. Abbreviations as in Figure 1.

FAVOR II: Xu, B., et al. (2017). J Am Coll Cardiol 70(25): 3077-3087.

Etudes clinique: la saga FAVOR

FAVOR III China: QFR versus angioguided PCI



FAVOR III: Xu, B., et al. Lancet 2021.

Etudes clinique: la saga FAVOR

FAVOR III China: QFR versus angioguided PCI

Key Procedural Results

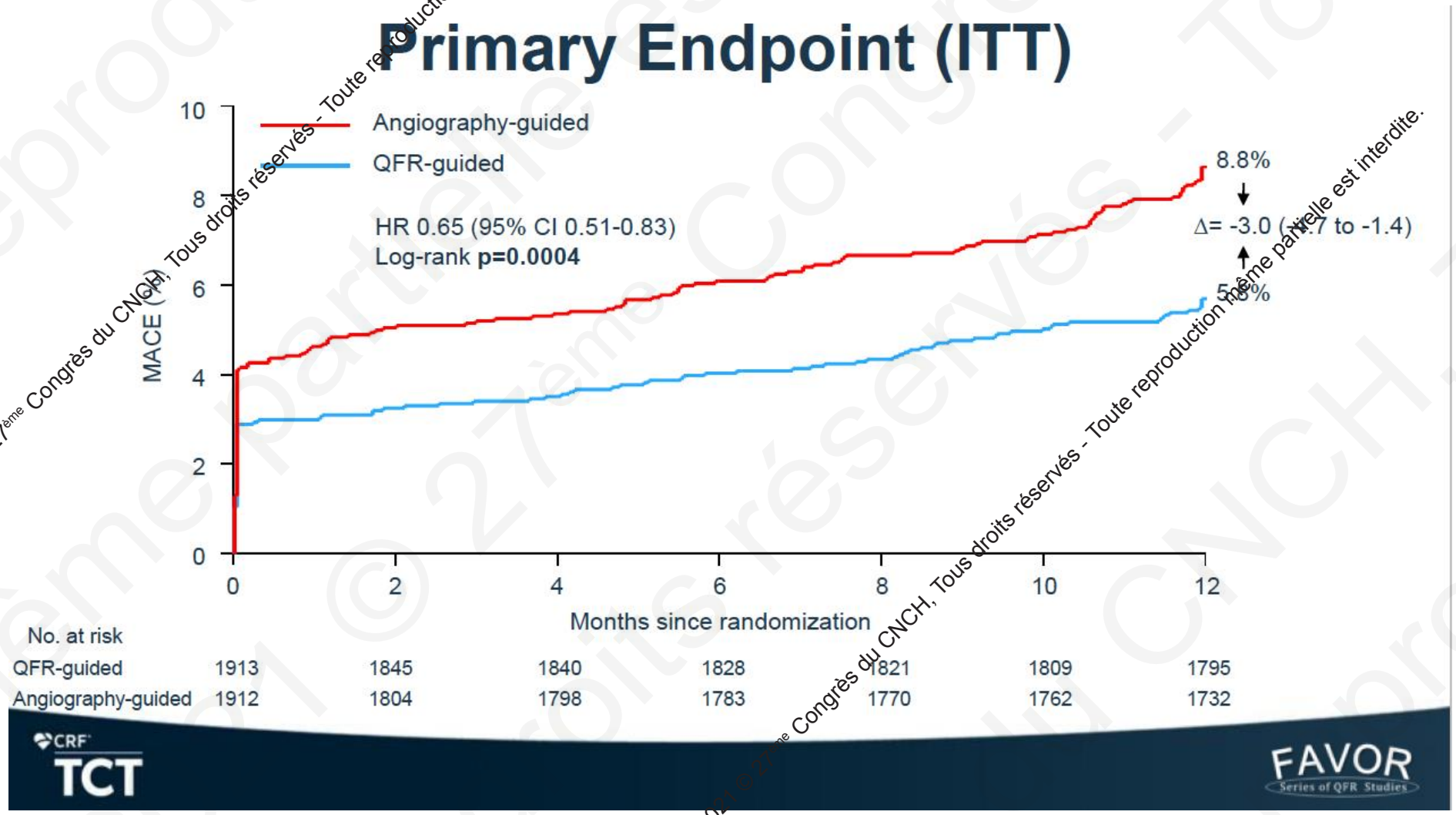
	QFR-guided group (N=1913)	Angiography-guided group (N=1912)	p value
PCI performed	90.5%	99.1%	**<0.0001**
Number of stents placed per patient	1.45 ± 1.02	1.58 ± 0.97	**<0.0001**
Use of intravascular imaging	6.2%	6.3%	0.89
Contrast medium used per patient, ml	163.0 ± 75.6	169.7 ± 74.2	**0.0060**
Fluoroscopy time, min	14.1 ± 8.0	14.9 ± 7.4	**0.0013**
Procedure time, min	53.7 ± 30.4	59.4 ± 30.4	**<0.0001**
Adjusted procedure time, min	44.6 ± 28.8	49.5 ± 30.2	**<0.0001**
PCI lesion success	99.0%	99.3%	0.38
Residual anatomic SYNTAX score	2.4 ± 3.6	2.4 ± 4.0	0.49
Residual functional SYNTAX score	0.7 ± 2.3	1.0 ± 2.8	**<0.0001**
Residual functional SYNTAX score=0	88.1%	82.2%	**<0.0001**

TCT FAVOR Series of QFR Studies

FAVOR III: Xu, B., et al. Lancet 2021.

Etudes clinique: la saga FAVOR

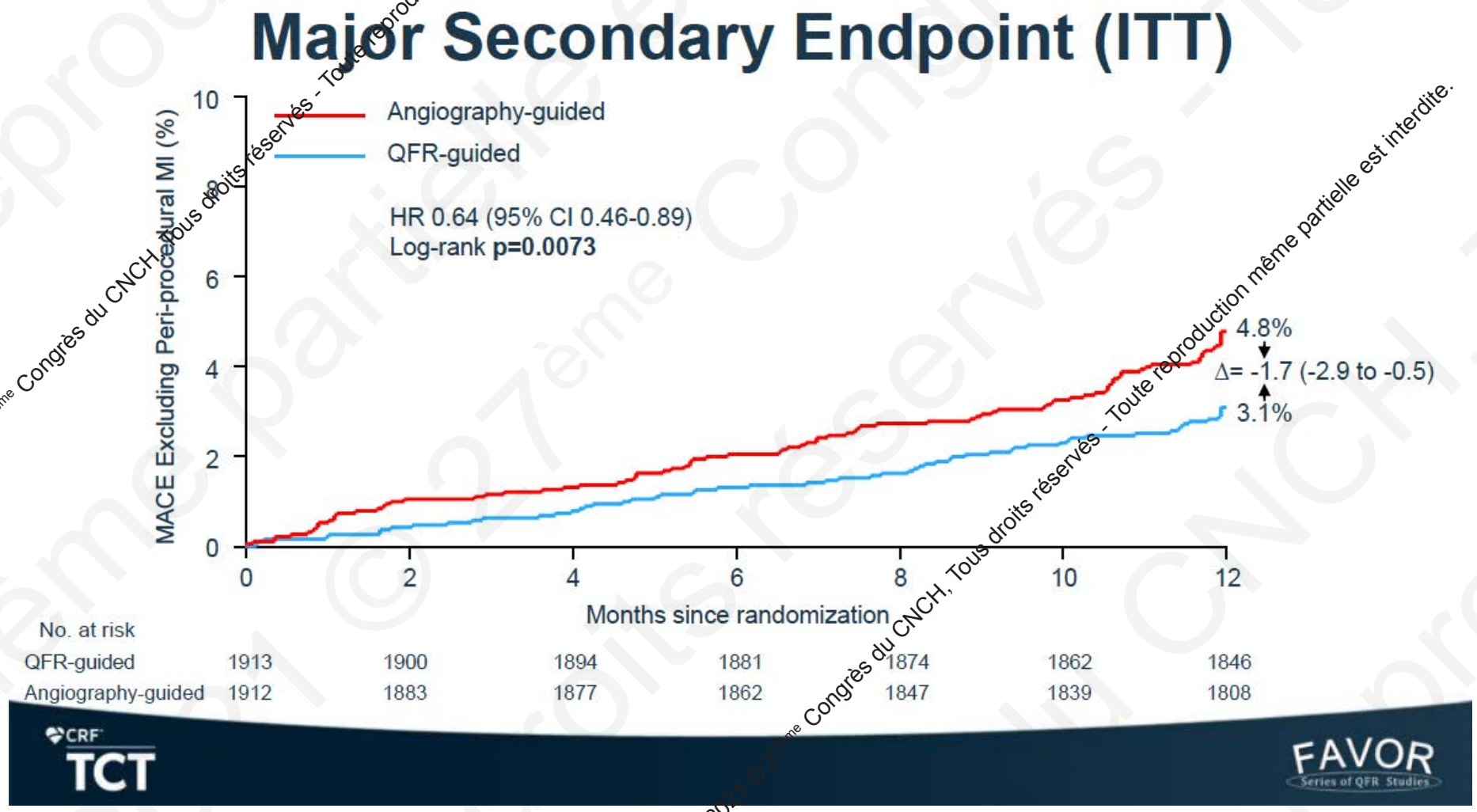
FAVOR III China: QFR versus angioguided PCI



FAVOR III: Xu, B., et al. Lancet 2021.

Etudes clinique: la saga FAVOR

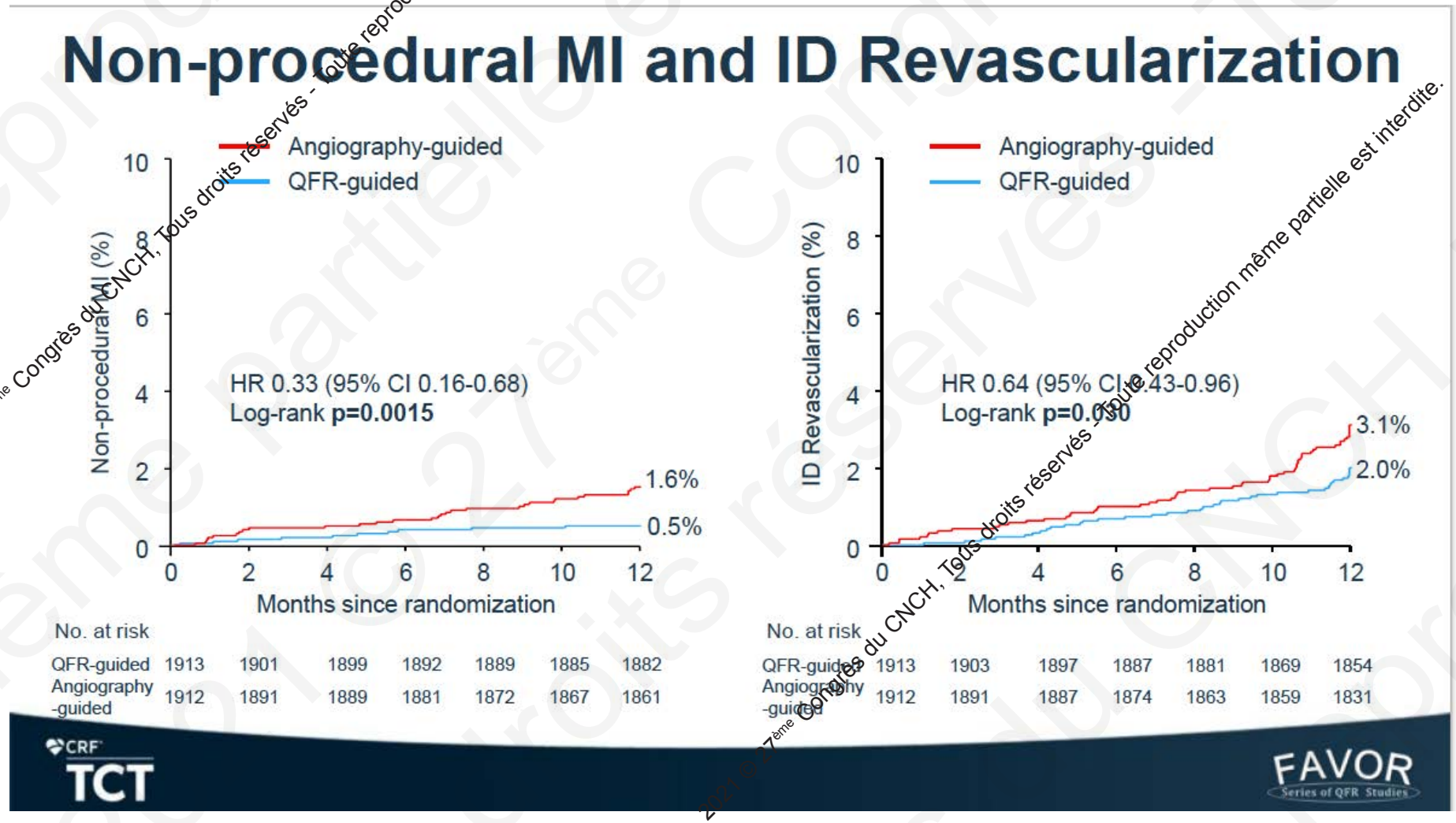
FAVOR III China: QFR versus angioguided PCI



FAVOR III: Xu, B., et al. Lancet 2021.

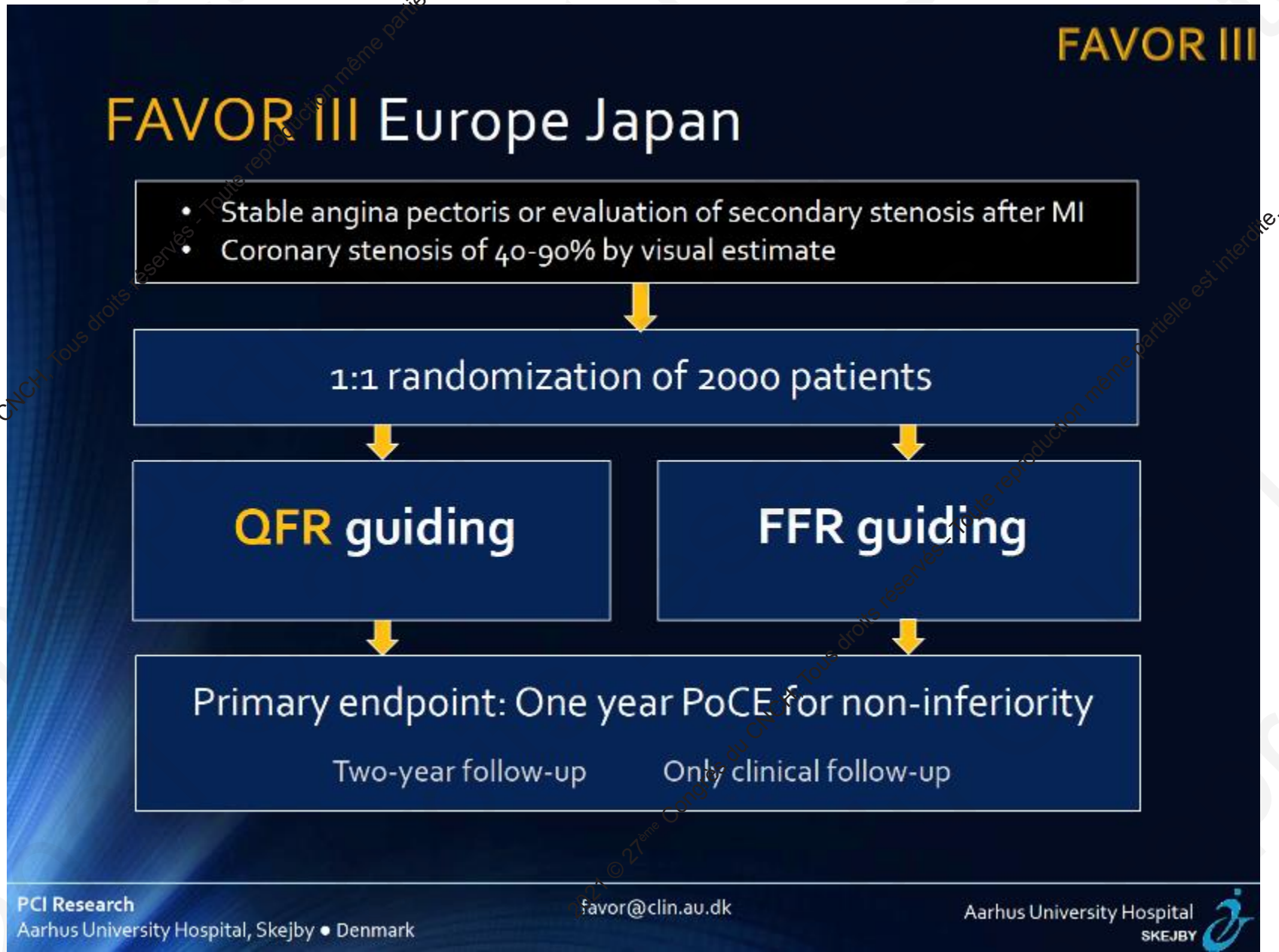
Etudes clinique: la saga FAVOR

FAVOR III China: QFR versus angioguided PCI



FAVOR III: Xu, B., et al. Lancet 2021.

Etudes clinique: la saga FAVOR



Conclusion

- *QFR → FFR 2.0*
- *Etude simplifiée de la physiologie coronaire*
- *Outil plus largement disponible (rétrospectif, dématérialisé)*
- *Données cliniques convaincantes*
- *Outil complémentaire et de plus en plus indispensable au coté de la FFR*

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