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2016

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Is digital angiography (QCA) still a useful tool in the clinical practice?

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Potential conflicts of interest

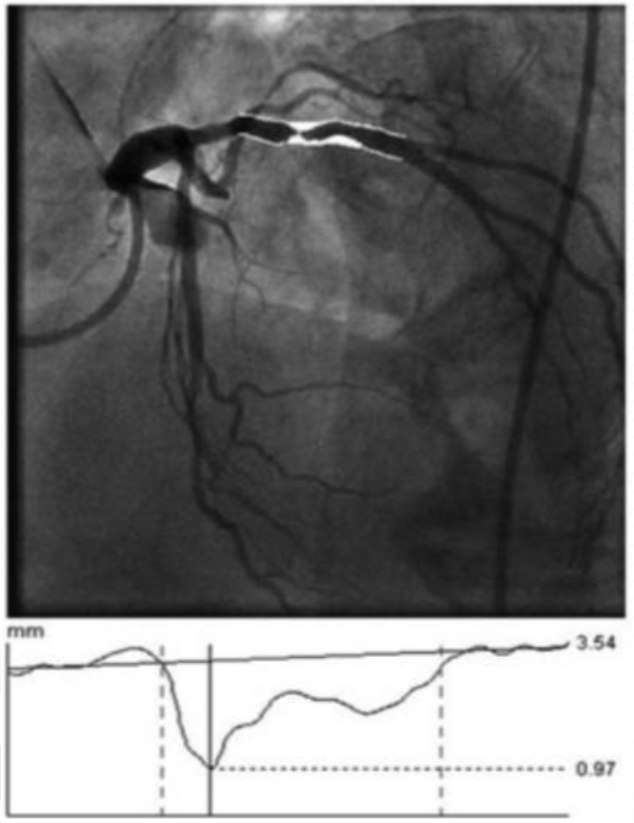
Speaker's name: Ricardo Cavalcante e Silva

☑ I do not have any potential conflict of interest

Introduction

- **Coronary angiography**, despite its inherent invasiveness and need for contrast media and radiographic exposure, **is still the gold standard** in diagnostic and therapeutic management of CAD.

- QCA was born in late 1970s with the groups from Leiden and Rotterdam – Johan H. C. Reiber and Patrick W. Serruys



QCA vs. Visual Assessment

Comparison of Clinical Interpretation with Visual Assessment and Quantitative Coronary Angiography in Patients Undergoing Percutaneous Coronary Intervention in Contemporary Practice: The Assessing Angiography (A2) Project

Brahmajee K. Nallamothu, John A. Spertus, Alexandra J. Lansky, David J. Cohen, Philip G. Jones, Faraz Kureshi, Gregory J. Dehmer, Joseph P. Drozda, Jr., Mary Norine Walsh, John E. Brush, Jr., Gerald C. Koenig, Thad F. Waites, D. Scott Gantt, George Kichura, Richard A. Chazal, Peter K. O'Brien, C. Michael Valentine, John S. Rumsfeld, Johan H.C. Reiber, Joann G. Elmore, Richard A. Krumholz, W. Douglas Weaver and Harlan M. Krumholz

7 US sites; 175 patients; PCI of 228 lesions.
CathPCI Registry of the NCDR
Comparison of QCA and visual assessment

Nallamothu et al. Circulation, 2013

QCA vs. Visual Assessment

- The mean difference in %DS between the clinical interpretation and QCA was +8.2% ± 8.4% (P<0.001)
- Of all lesions considered 70% or greater by clinical assessment, 26.3% were measured at less than 70%
- Physicians tended to over estimate lesion severity compared to QCA.
- Almost all treated lesions were > 70% by clinical interpretation, while approximately a quarter were < 70% by QCA

Nallamothu et al. Circulation, 2013

Main parameters obtained with QCA

Parameter	Unit of Measurement	Usual Range	Meaning
Acute gain	Millimeter (mm)	0–4.0 mm	Postprocedural MLD – preprocedural MLD
Binary restenosis (BR)	Presence or absence	Yes or no	DS >50% at follow-up coronary angiography in the treated coronary segment
Diameter stenosis (DS)	Percentage (%)	0–100%	(RVD-MLD)/RVD
Late loss (LL)	mm	–0.10 to 3.00 mm	Postprocedural MLD – MLD at follow-up
Lesion length	mm	0–60.0 mm	Length of the stenosis as measured by 2 points where the coronary margins change direction, creating a shoulder between the angiographically normal subsegment and the diseased subsegment
Minimal luminal diameter (MLD)	mm	0–6.00 mm	The smallest lumen diameter in the segment of interest
Reference vessel diameter (RVD)	mm	1.5–6.0 mm	The averaged diameter of the coronary assumed without atherosclerotic disease

Journal of Interventional Cardiology
Vol. 22, No. 6, 2009

Nevertheless, as experience of operators evolved, QCA was no longer being used online to guide stent selection and implantation.

New applications for online QCA

- Bioresorbable Scaffold sizing using QCA-Dmax

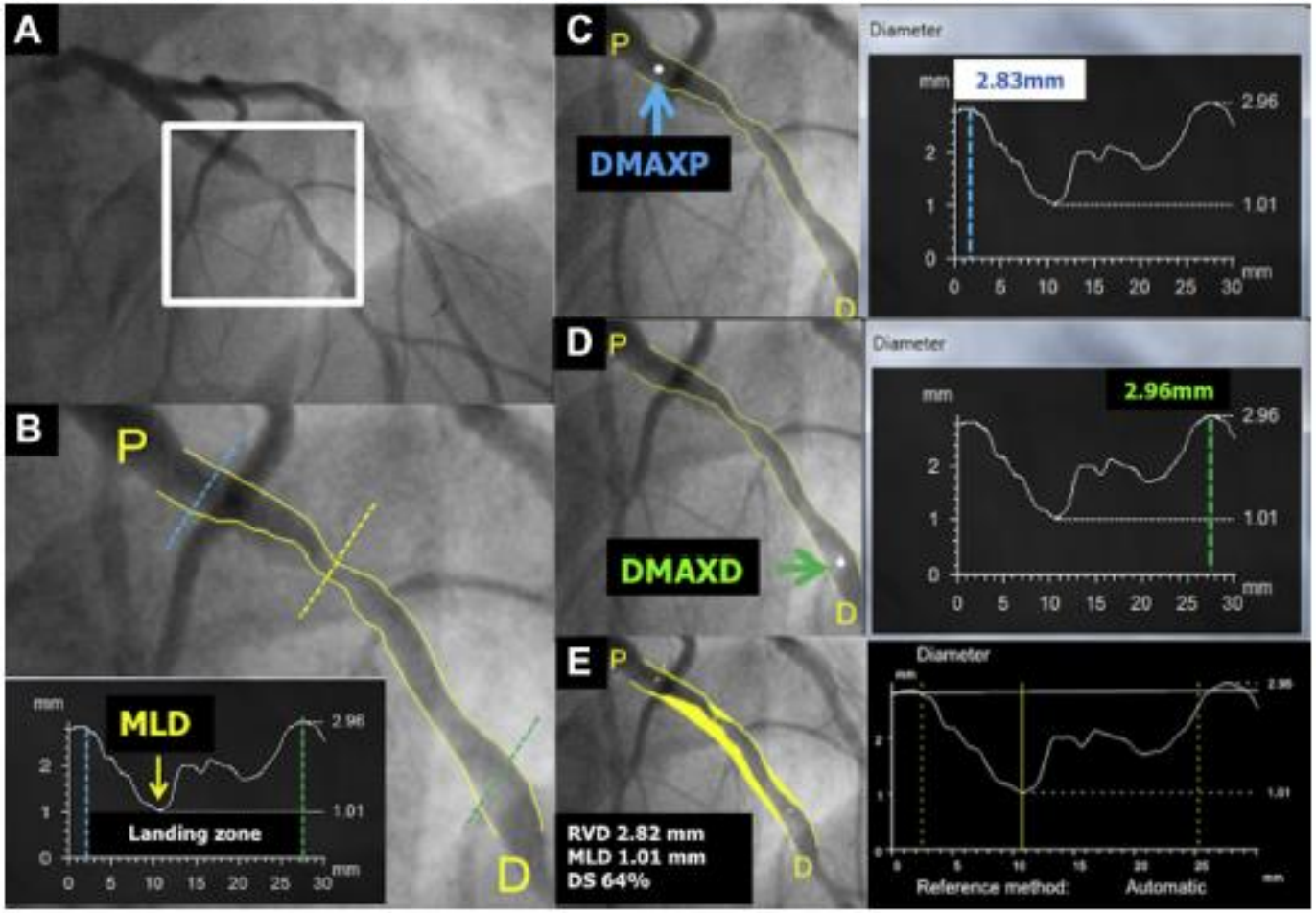
- Image-based virtual FFR derived from QCA

Relation Between Bioresorbable Scaffold Sizing Using QCA-Dmax and Clinical Outcomes at 1 Year in 1,232 Patients From 3 Study Cohorts (ABSORB Cohort B, ABSORB EXTEND, and ABSORB II)

- Measurement of maximum proximal and distal reference vessel diameters (Dmax)
- Difference between Dmax and scaffold nominal size
  - Scaffold oversize vs. non-oversize groups

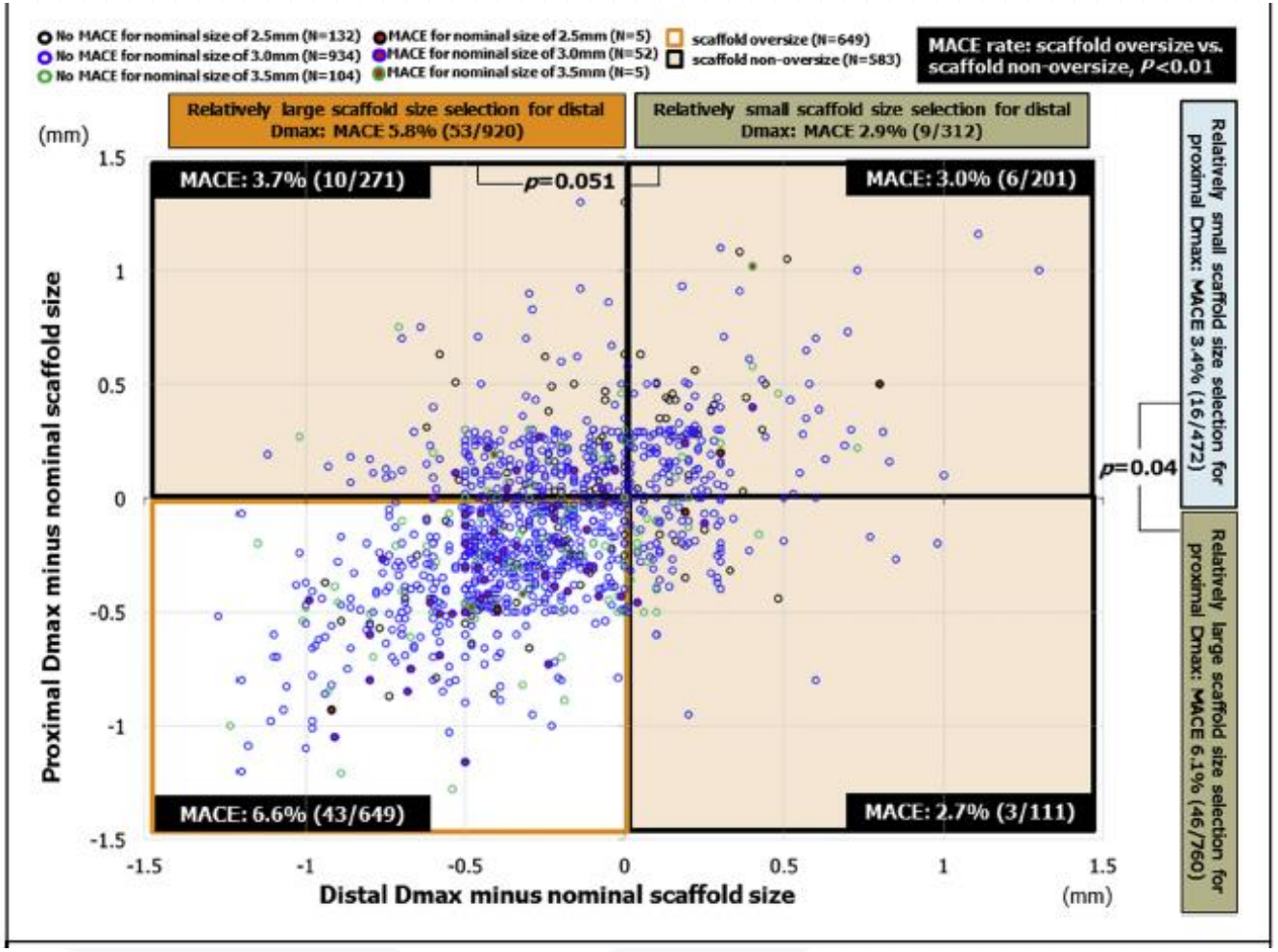
Ishibashi Y, Serruys PW, et al. JACC Intv, 2015; 8(13):1715-26

QCA Dmax assessment



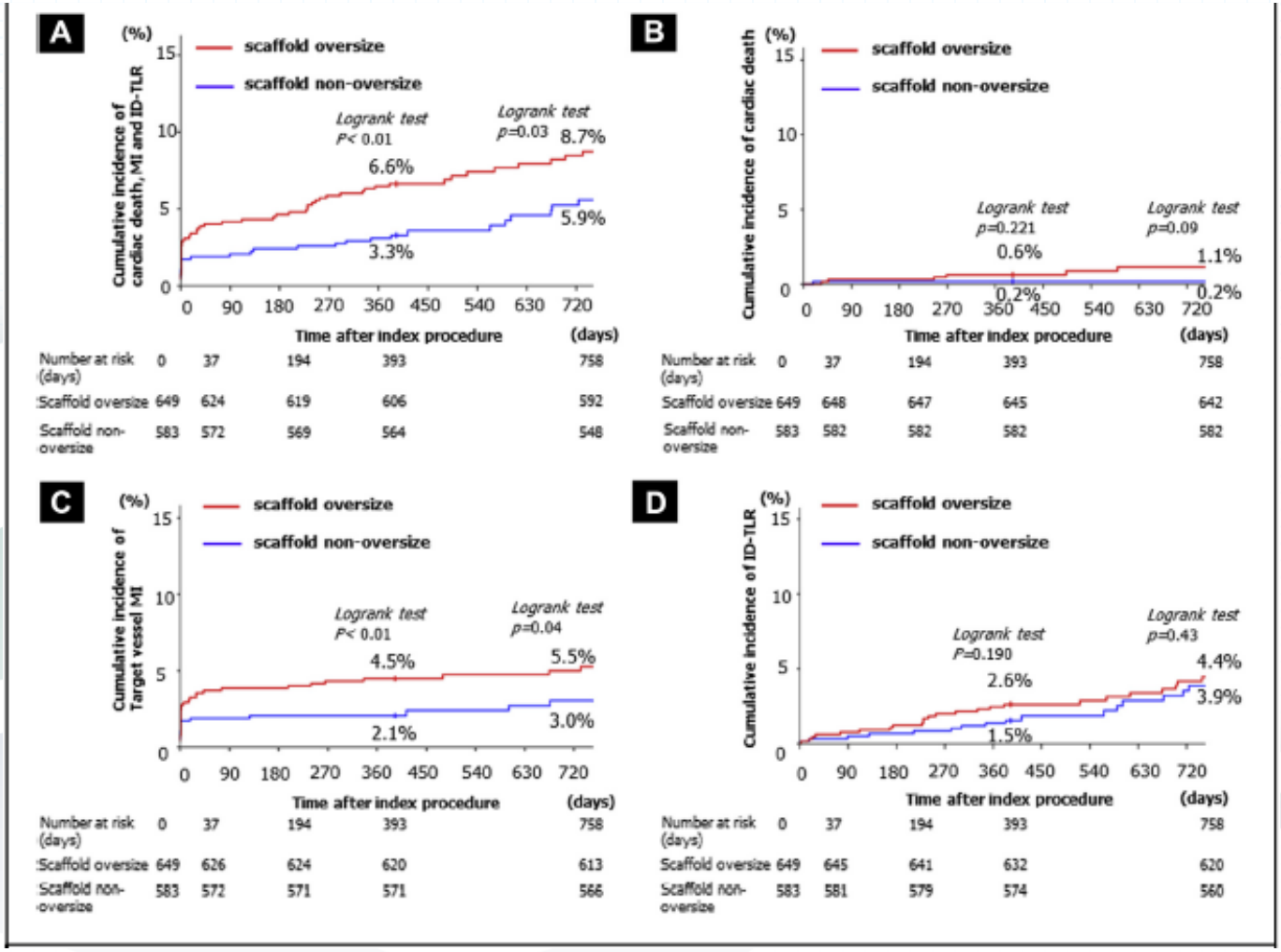
Ishibashi Y, Serruys PW, et al. JACC Intv, 2015; 8(13):1715-26

Distribution of the difference between Dmax and nominal scaffold



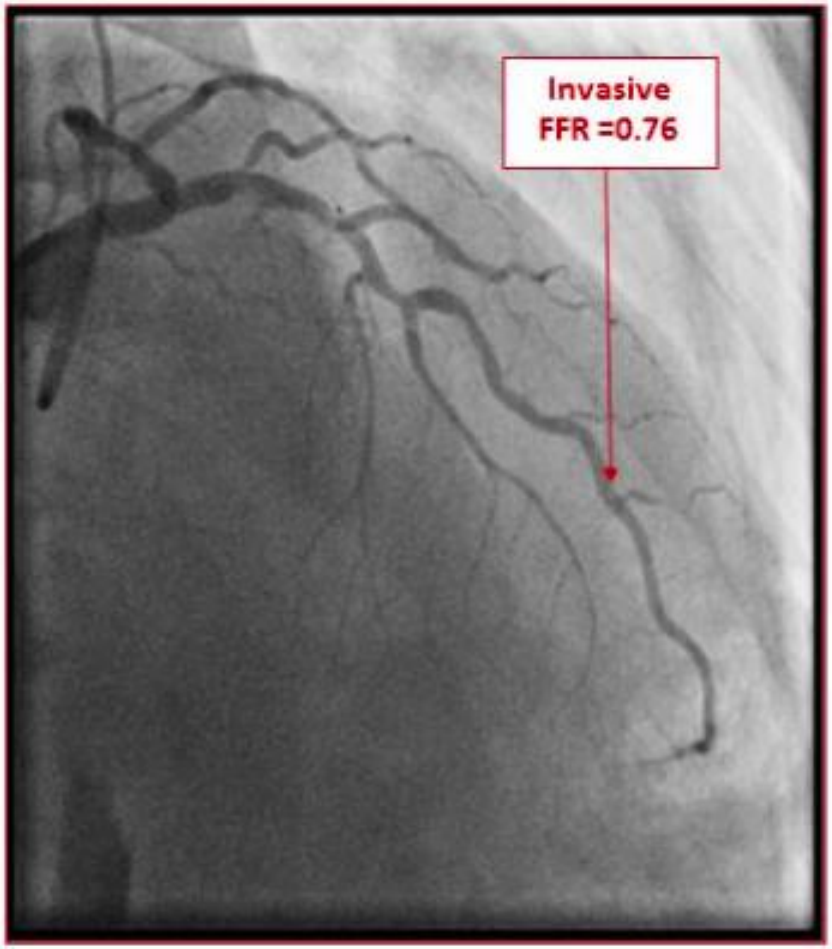
Ishibashi Y, Serruys PW, et al. JACC Intv, 2015; 8(13):1715-26

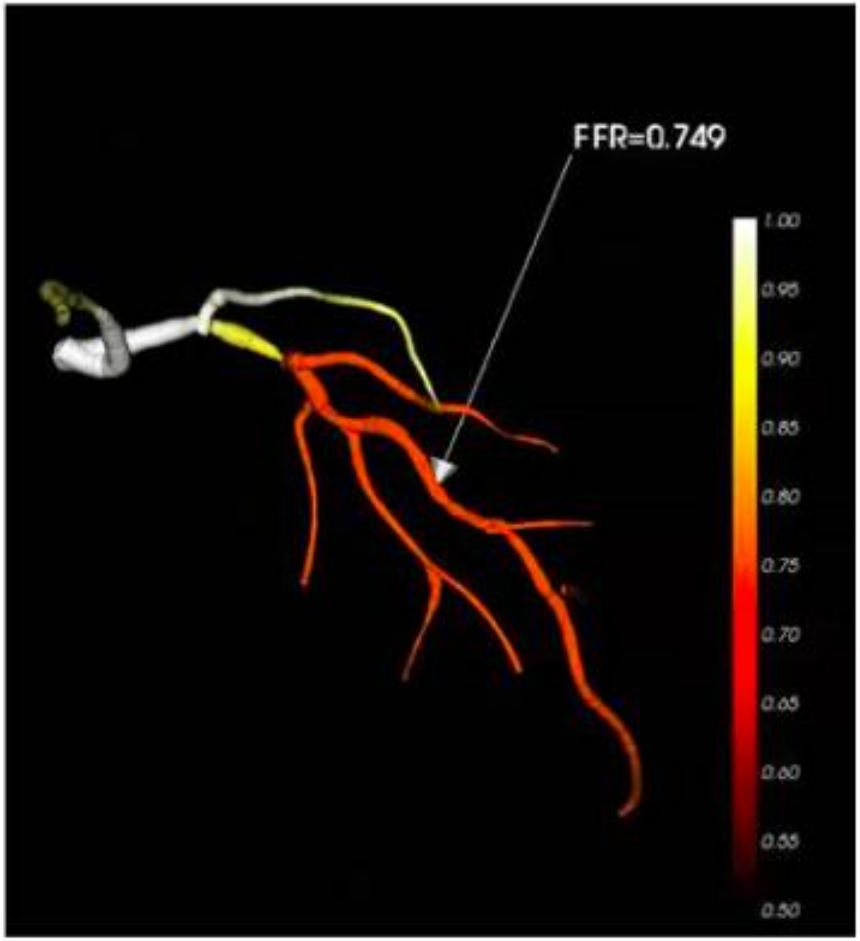
Time-to-event curves of MACE and it's components



Ishibashi Y, Serruys PW, et al. JACC Intv, 2015; 8(13):1715-26

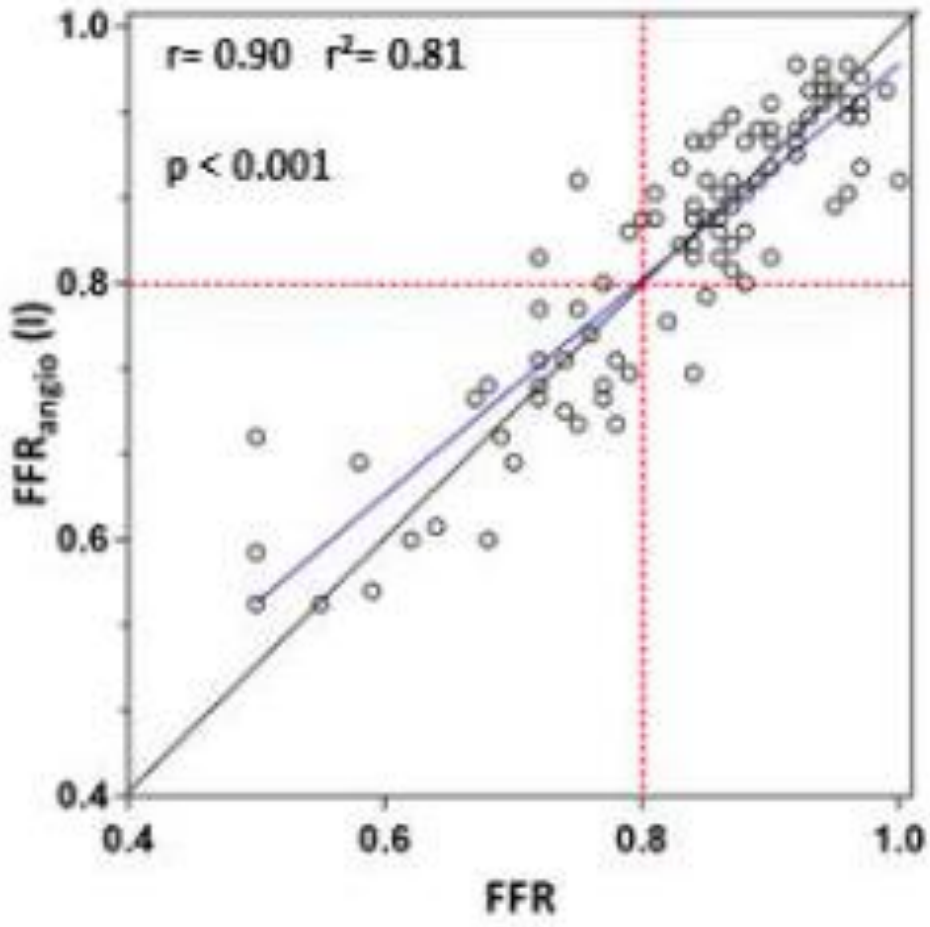
FFR_{angio} is a novel image-based technology which allows an almost real time non-invasive assessment of FFR





Pellicano M, et al. EuroPCR, 2016

FFR_{angio} vs. invasive FFR



Pellicano M, et al. EuroPCR, 2016

Conclusions

- QCA will continue to be an useful tool in clinical practice, to:
  - Guide appropriate vessel sizing for bioresorbable scaffold implantation
  - Provide the basis for non-invasive FFR_{angio} functional assessment