Conoscere e Curare il Cuore 2015

TRATTIAMO L'ISCHEMIA, NON LA STENOSI CORONARICA: LA FRACTIONAL FLOW RESERVE (FFR)

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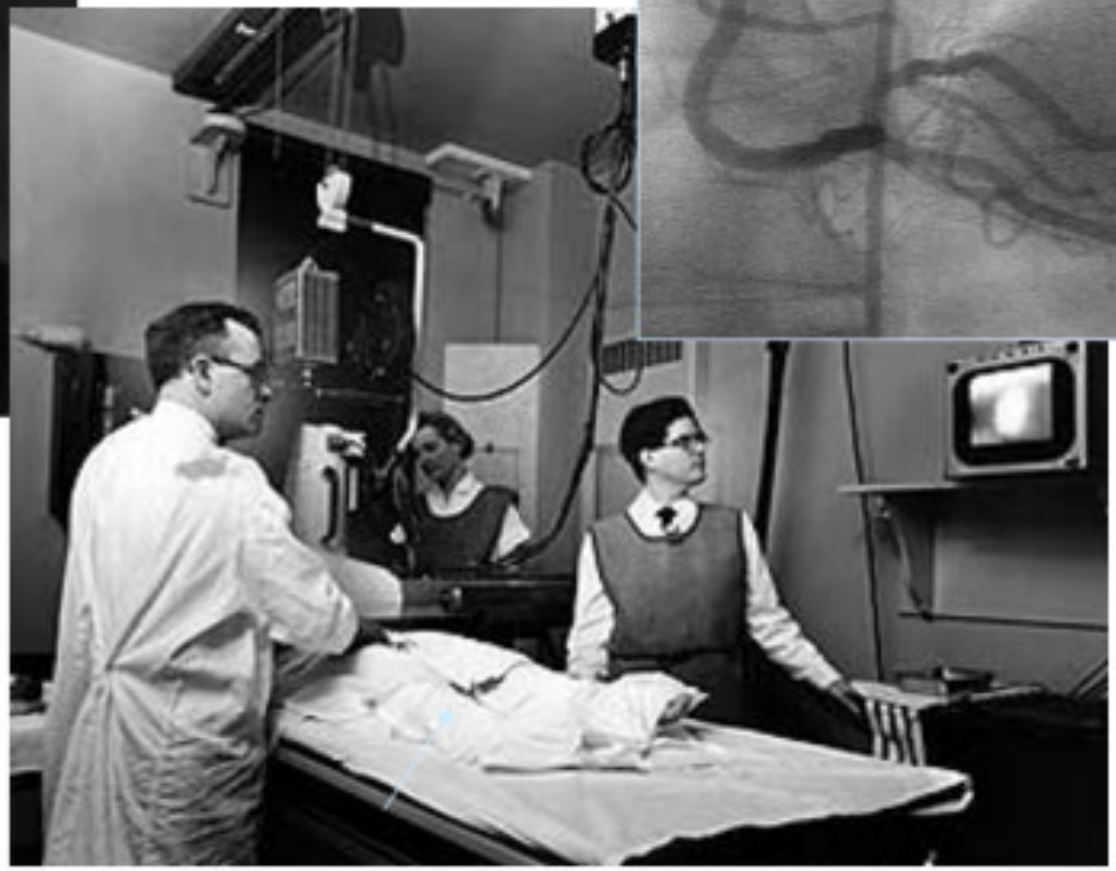
…sono voce di uno che grida nel deserto…
Giovanni I 23-24

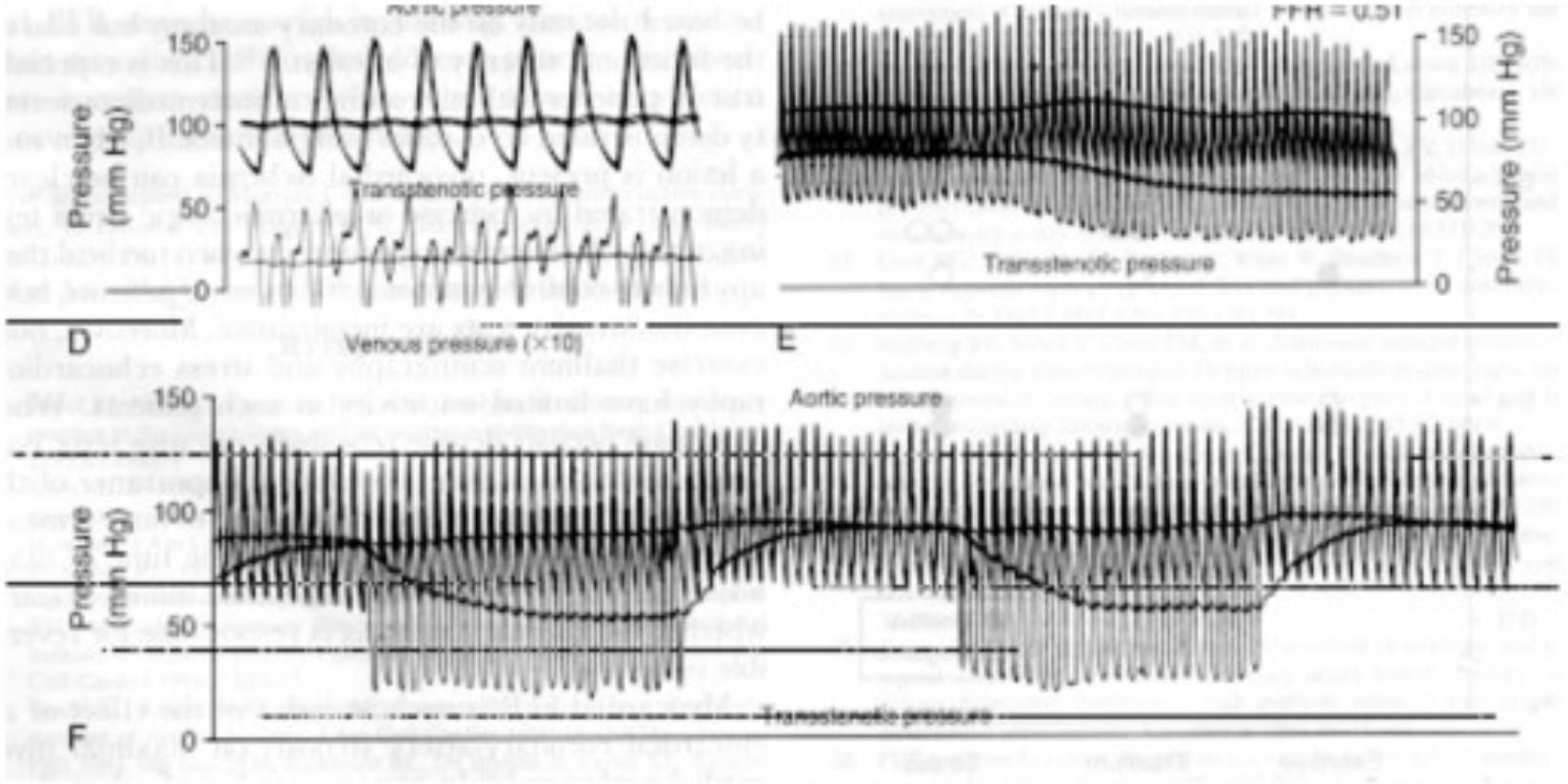
Coronary angiography

Mason Sones



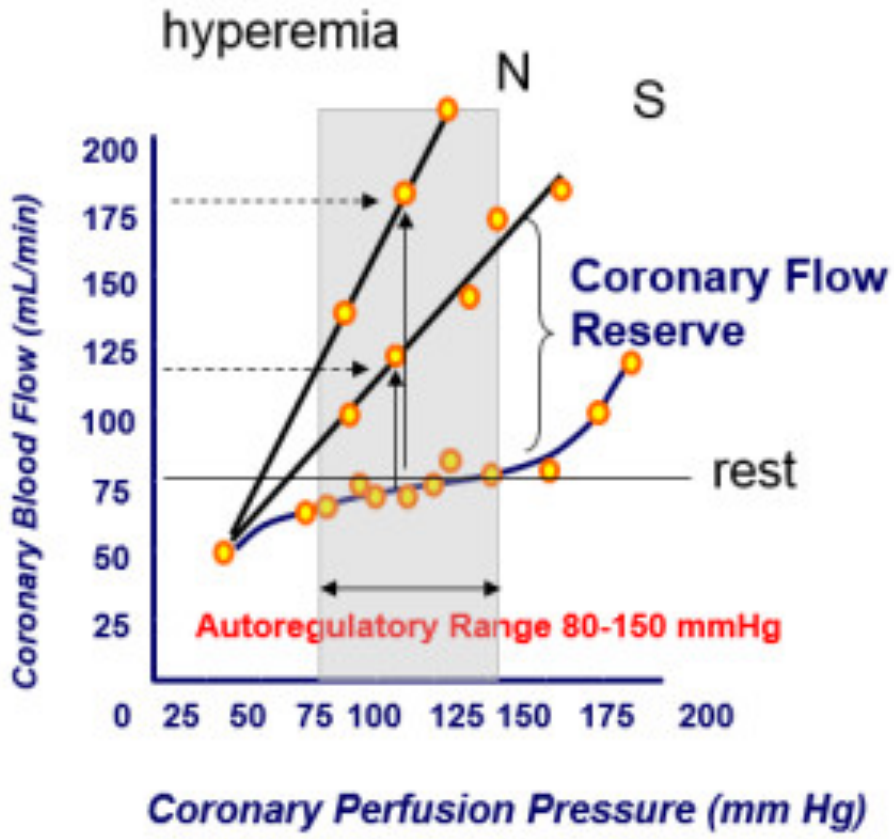
Cleveland Clinic 1958

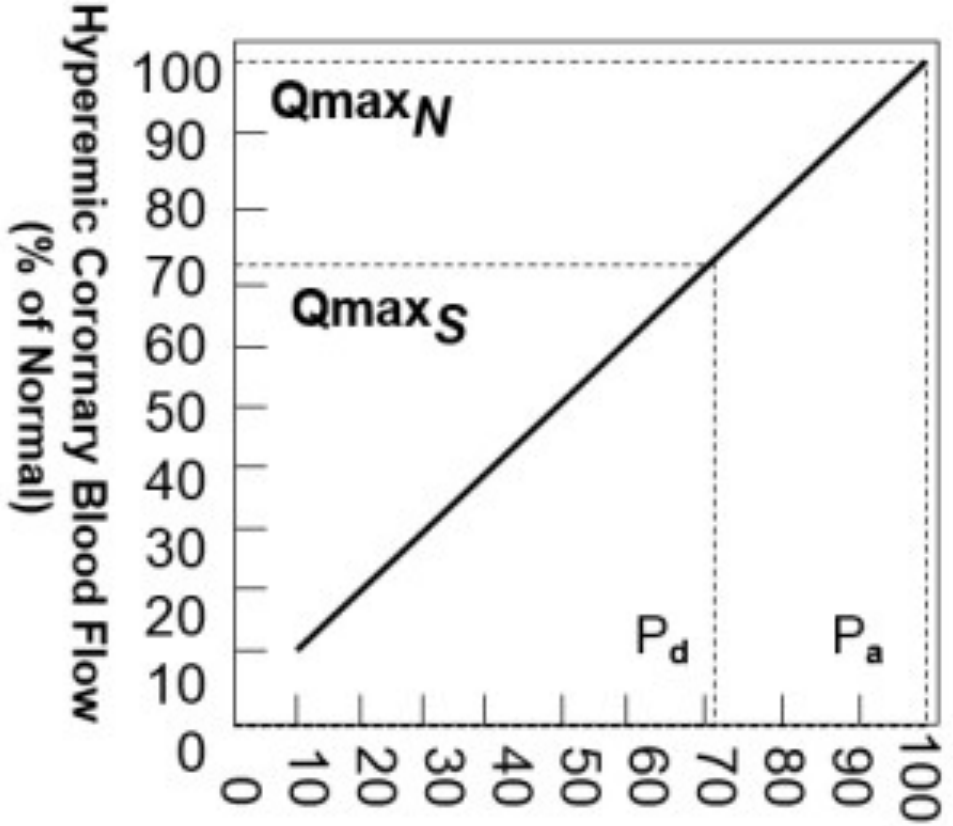
Intracoronary Pressure-wire Fractional Flow Reserve (FFR)



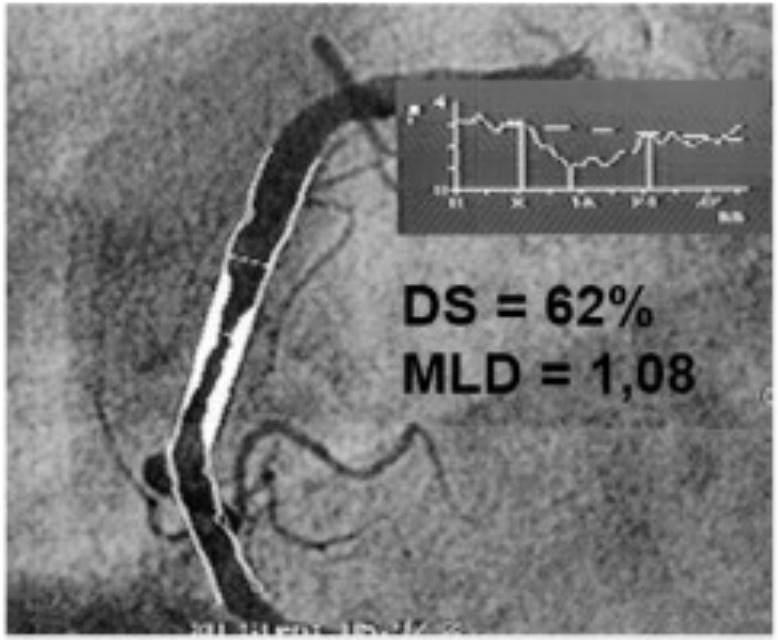
Pijls NH et Al. J.A.C.C. 1995; 26 : 328

Misurazioni intracoronariche di Flusso/Pressione come surrogato della dimostrazione di ischemia miocardica



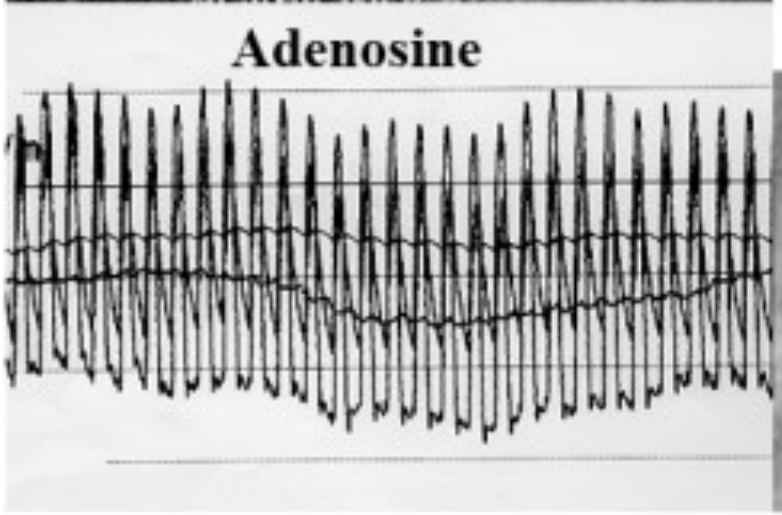


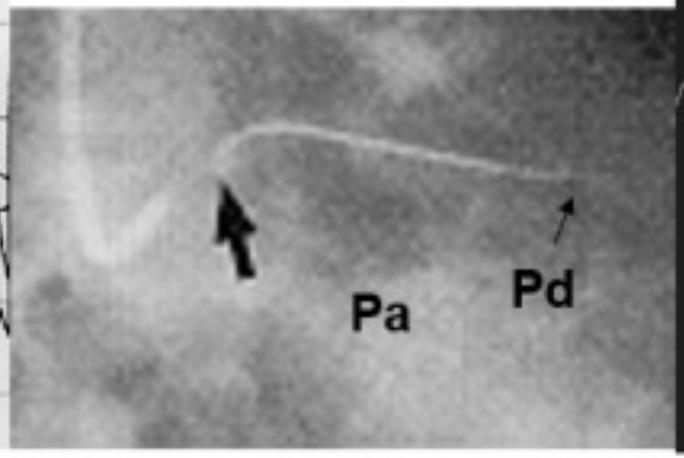
Intracoronary Pressure Measuremens

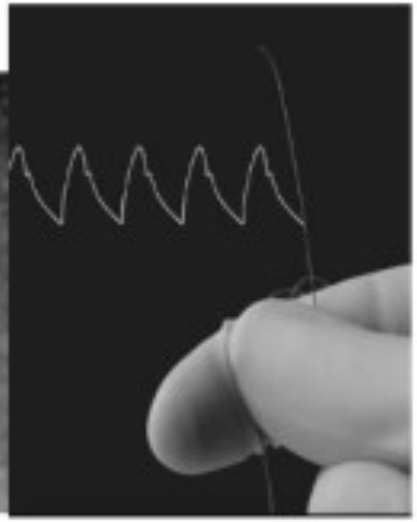


$$FFR\ cor = \frac{Qst}{QN} = \frac{Pd - Pw}{Pa - Pw}$$

$$FFR\ cor = \frac{Pd}{Pa}$$







Pijls NH et Al. N.Engl.J.Med. 1996

FFR: cut-off

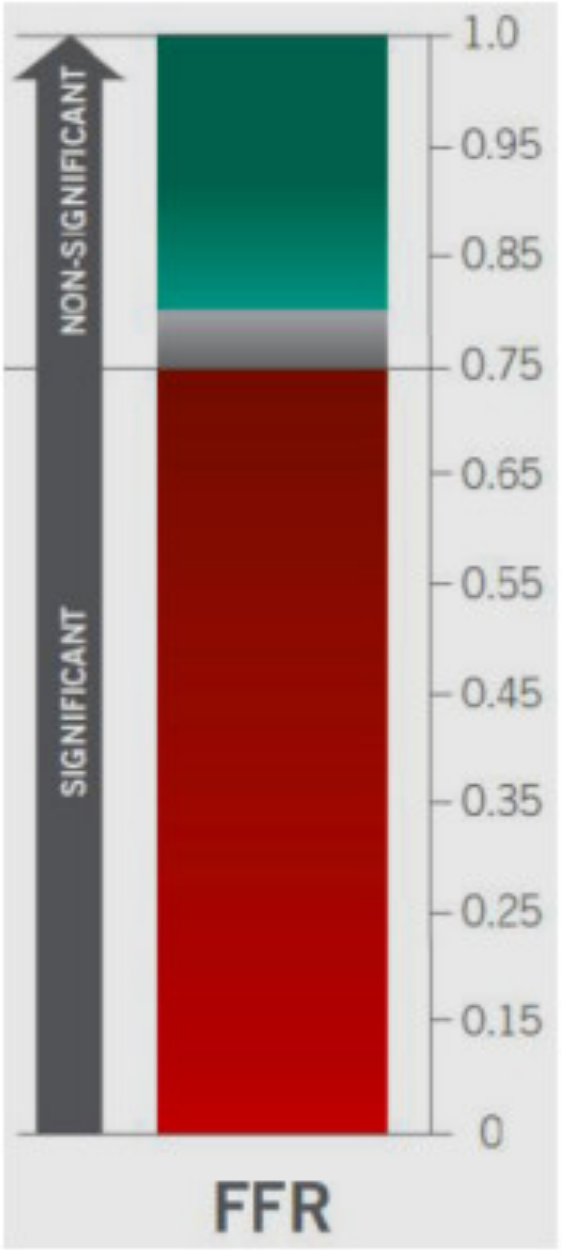
FFR = 1.00 arteria normale

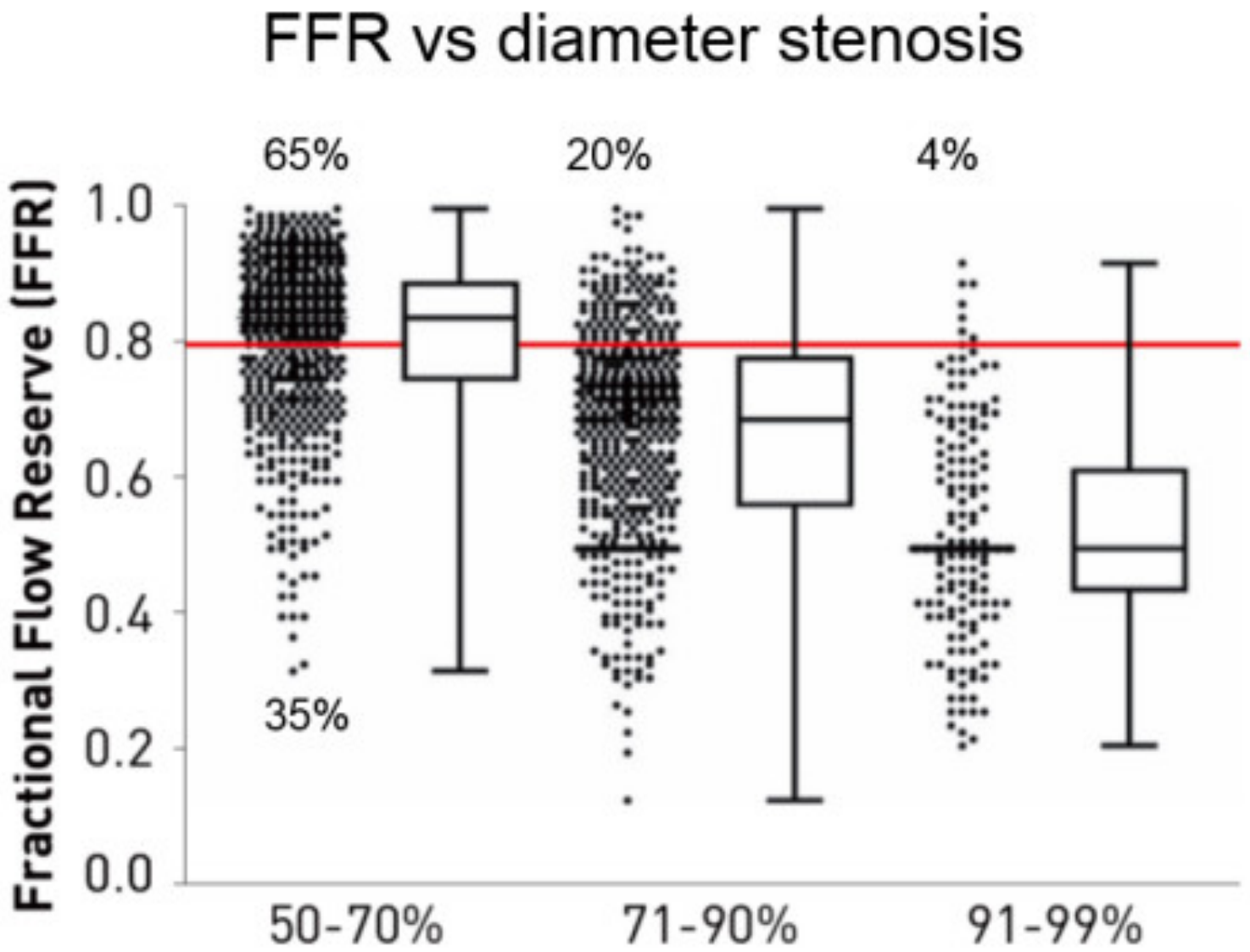
FFR > 0.75 ischemia poco probabile
sensibilità 85%

FFR < 0.75 ischemia
specificità 100%

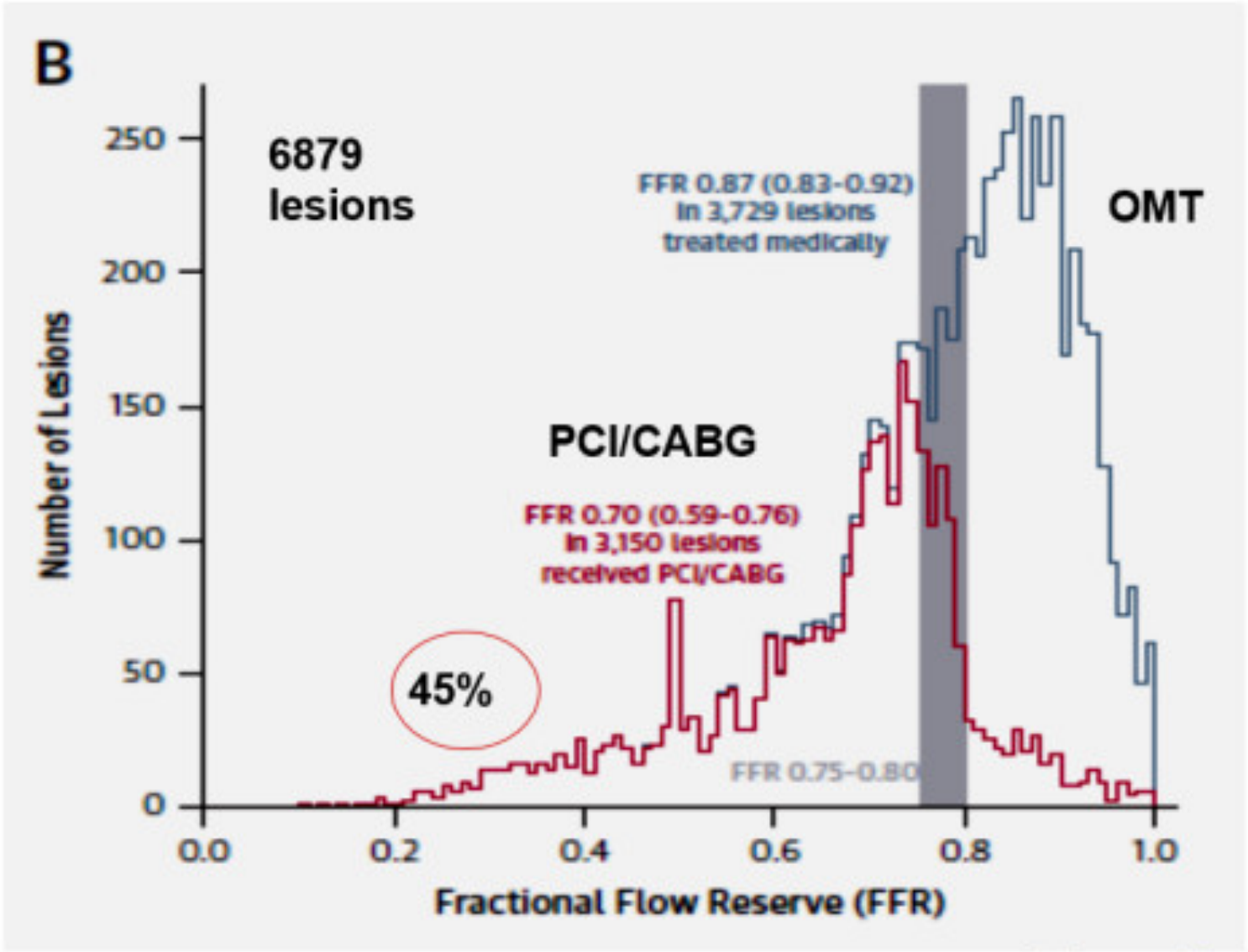
- Una FFR 0.90 equivale al 90% del massimo fusso coronarico
- Un cambiamento da FFR 0.50 a FFR 0.90 post PTCA significa un incremento dal 50% al 90% del normale massimo flusso

Pijls *et al;* The New England Journal of Medicine 1996



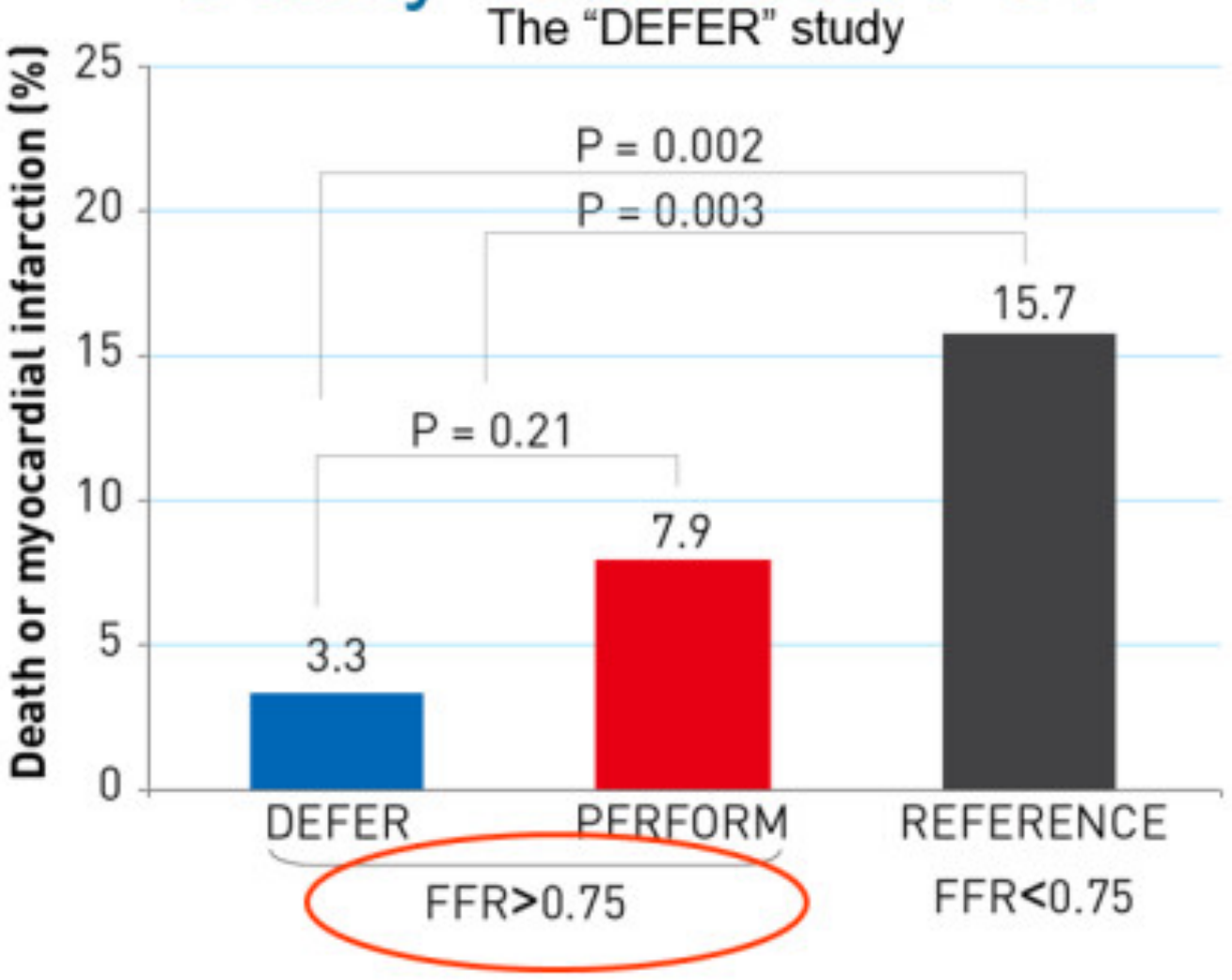

FFR vs diameter stenosis
65%
20%
4%
35%
Fractional Flow Reserve (FFR)
1.0
0.8
0.6
0.4
0.2
0.0
50-70%
71-90%
91-99%

A metanalysis of FFR clinical studies



Johnson NP et al JACC 2014

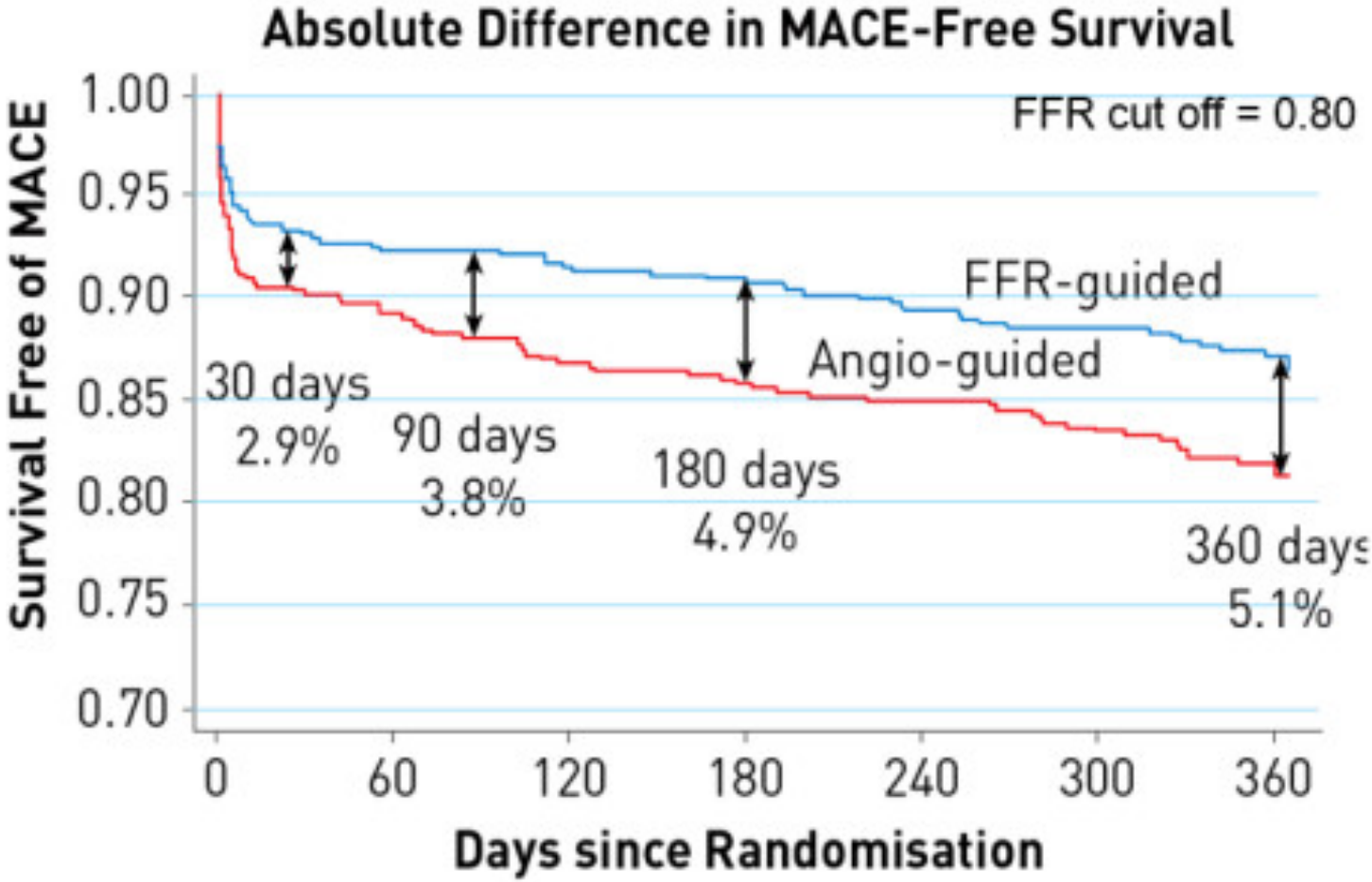
FFR and clinical outcome
Safety of deferral PCI



JACC 2007;49:2105-11

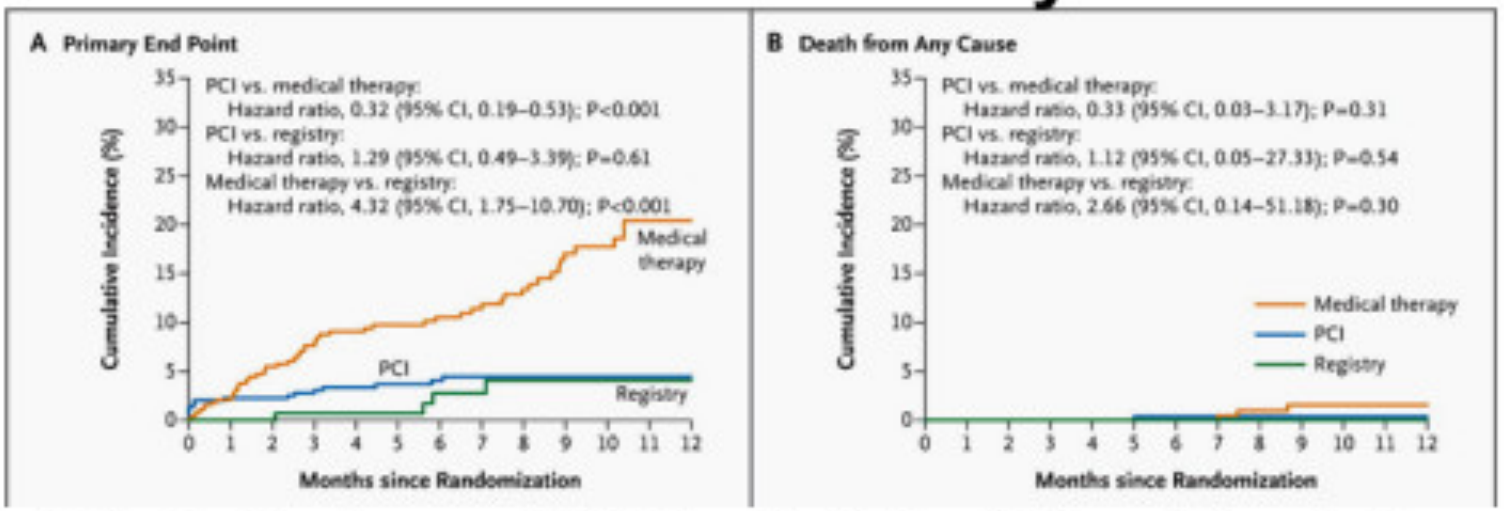
Performing vs Deferring Coronary Angioplasty In MVD patients based on FFR evaluation

The "FAME" Study

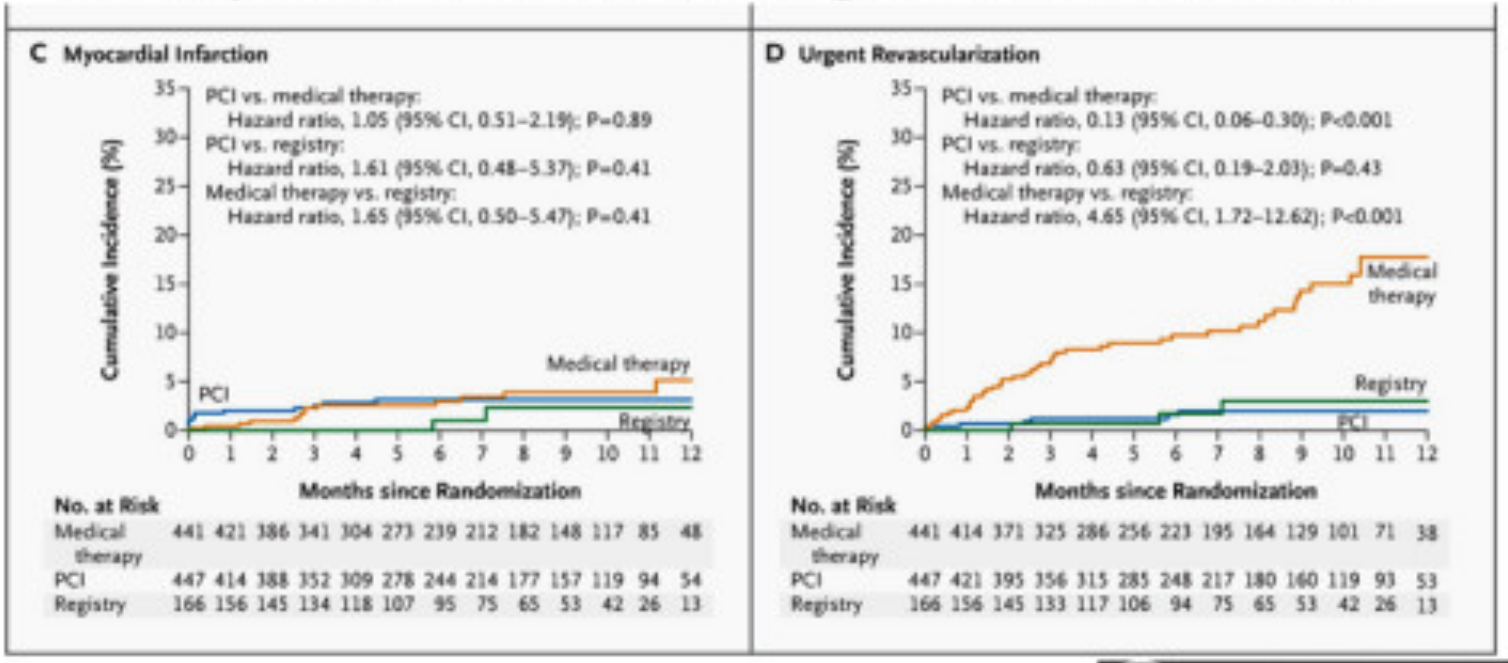


Tonino P. N Eng J Med 2009

FAME II Study



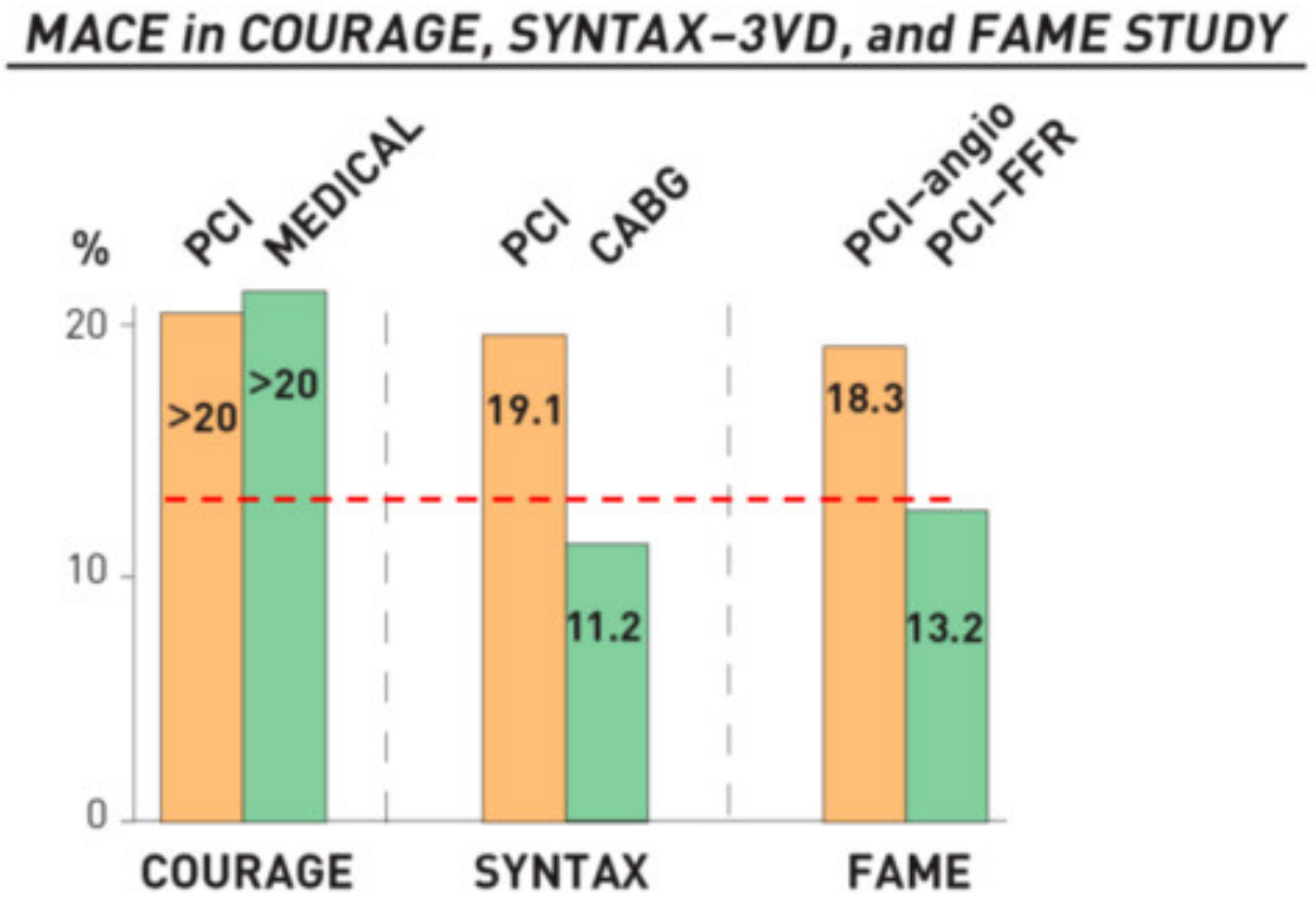
Study halted in January 2012 due to 86% relative risk reduction for hospital readmission with urgent revascularization



De Bruyne B et al. N Engl J Med 2012. DOI: 10.1056/NEJMoa1205361

The NEW ENGLAND JOURNAL of MEDICINE

FFR-guided PCI and outcome



European Guidelines

Table 33 Recommendations for specific percutaneous coronary intervention devices and pharmacotherapy

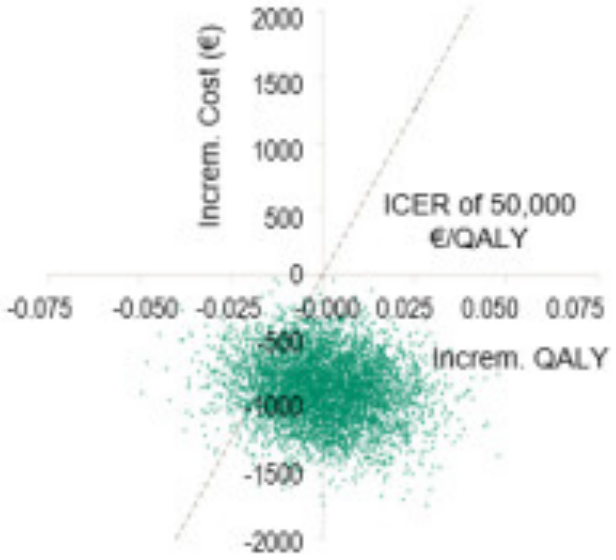
FFR-guided PCI is recommended for decision of ischemia-related lesion(s) when objective evidence of vessel-related ischemia not available	**Class I**	**Level A**	**Ref 15,28**

[1] Wijns, et al., *Eur Heart J (2010) 31(20): 2501-2555*

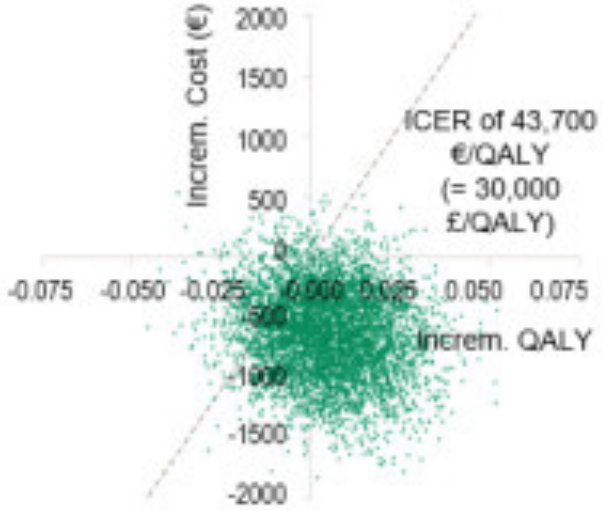
Class I	Evidence and/or general agreement that a given treatment or procedure is benefical, Usefull, effective
Level A	Data derived from multiple randomized clinical trials or meta-analysis

Cost-Effectiveness of FFR vs. Angio guided PCI

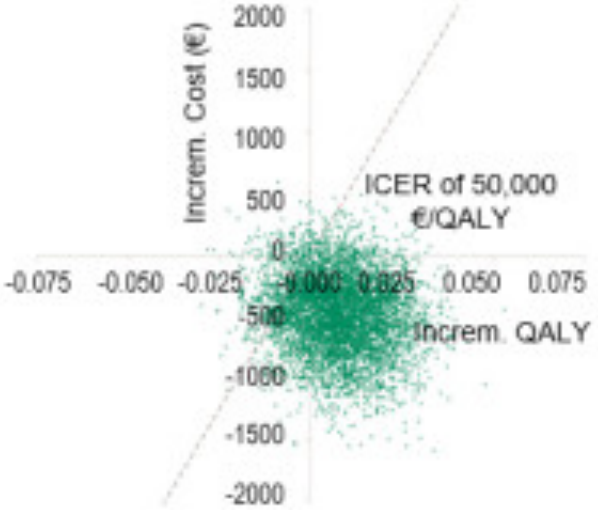
France



UK



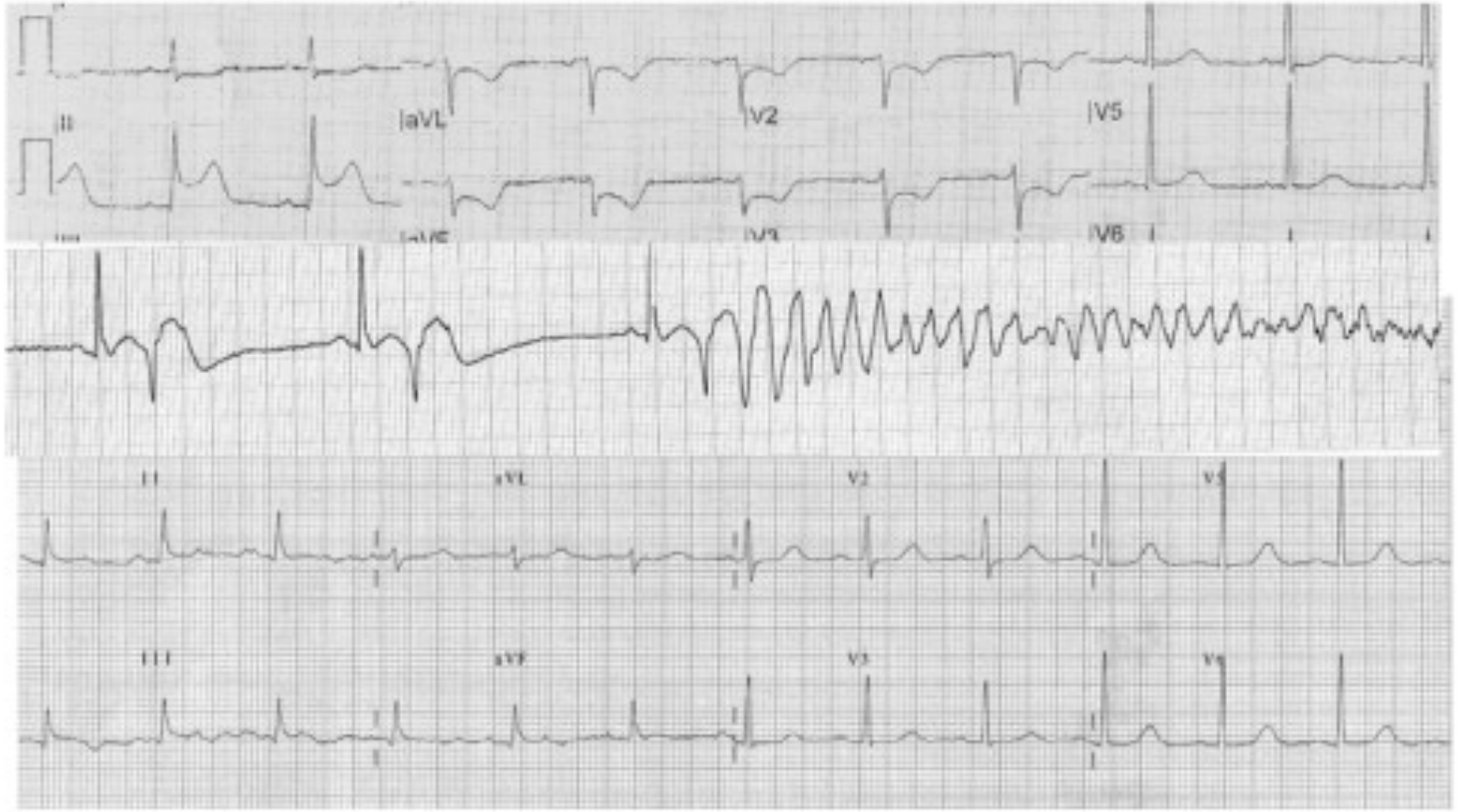
Italy

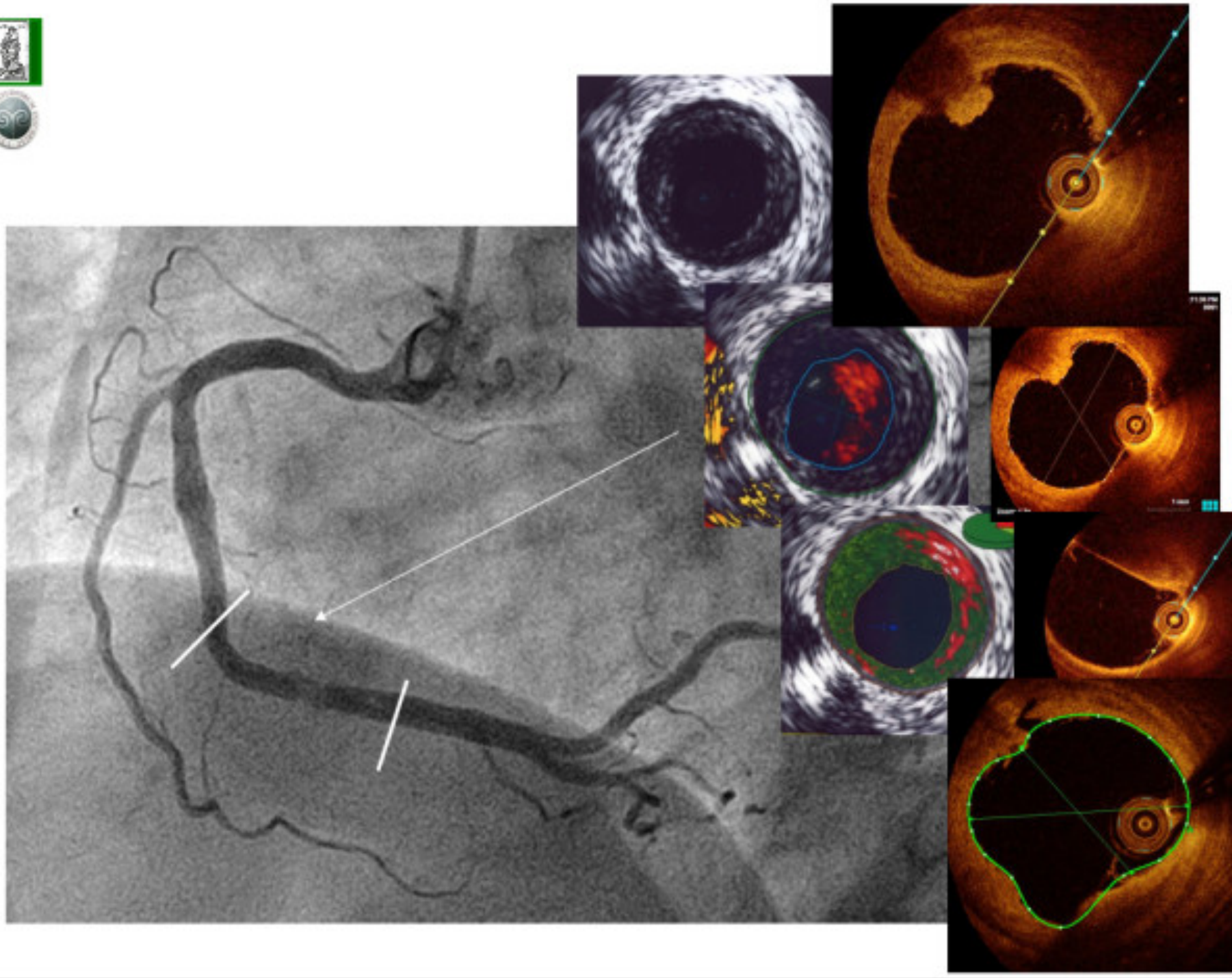


	France	UK	Italy
'Dominant':	52%	63%	65%
Cost effective:	90%	90%	86%
Cost savings:	≈900 €/pat.	≈600 £/pat.	≈ 300 €/pat.

CASO 1

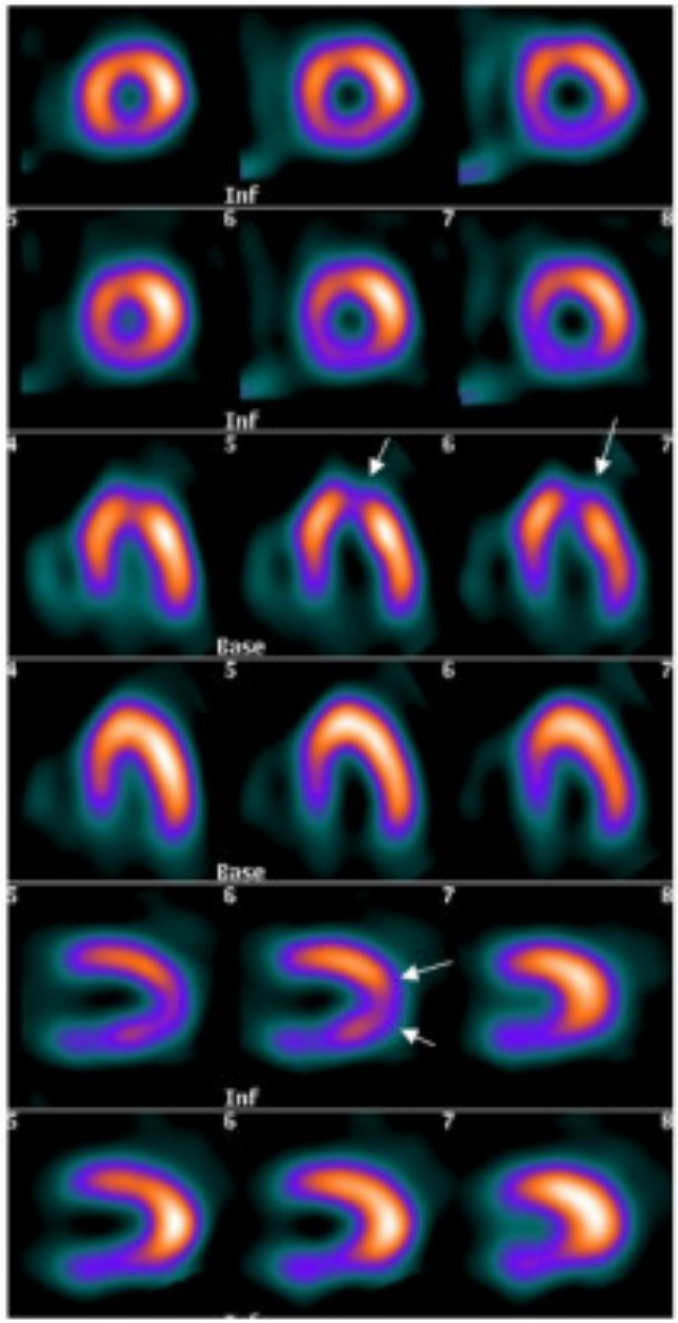
- 57 years old female
- No prior history of CAD
- Inferior STEMI



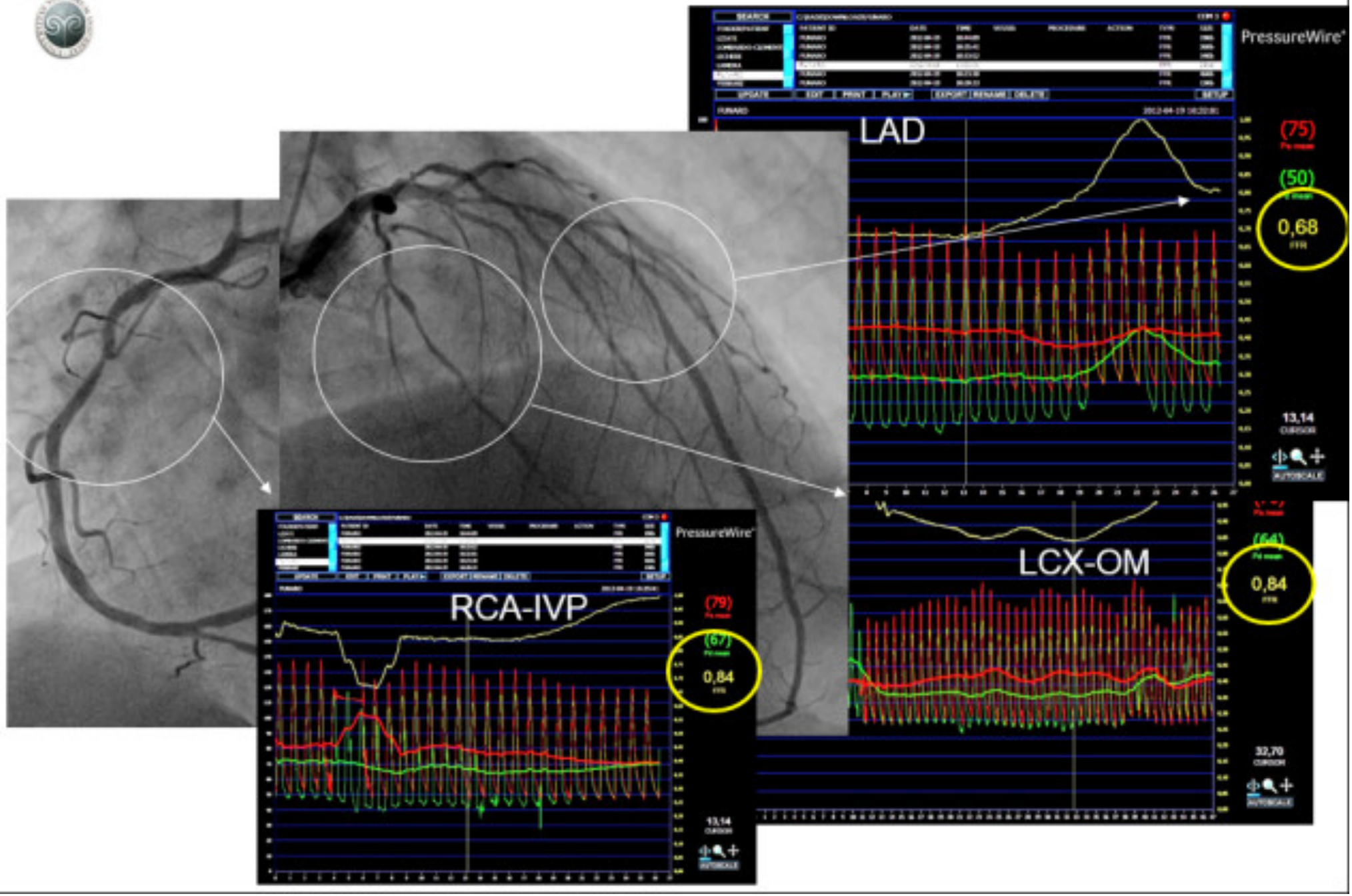


CASO 2

- F.R. maschio 73 anni
- Fumatore
- lipercolesterolemia
- Ridotta tolleranza glucidica
- Vasculopatia periferica (claudicatio 100 m)
- Occlusione silente ICA sin e stenosi subcritica ICA Dx
- Da ottobre 2011angina mista
- 99mTc Tetrofosmin SPECT-dipiridamolo



“Functional” Sintax Score= 11



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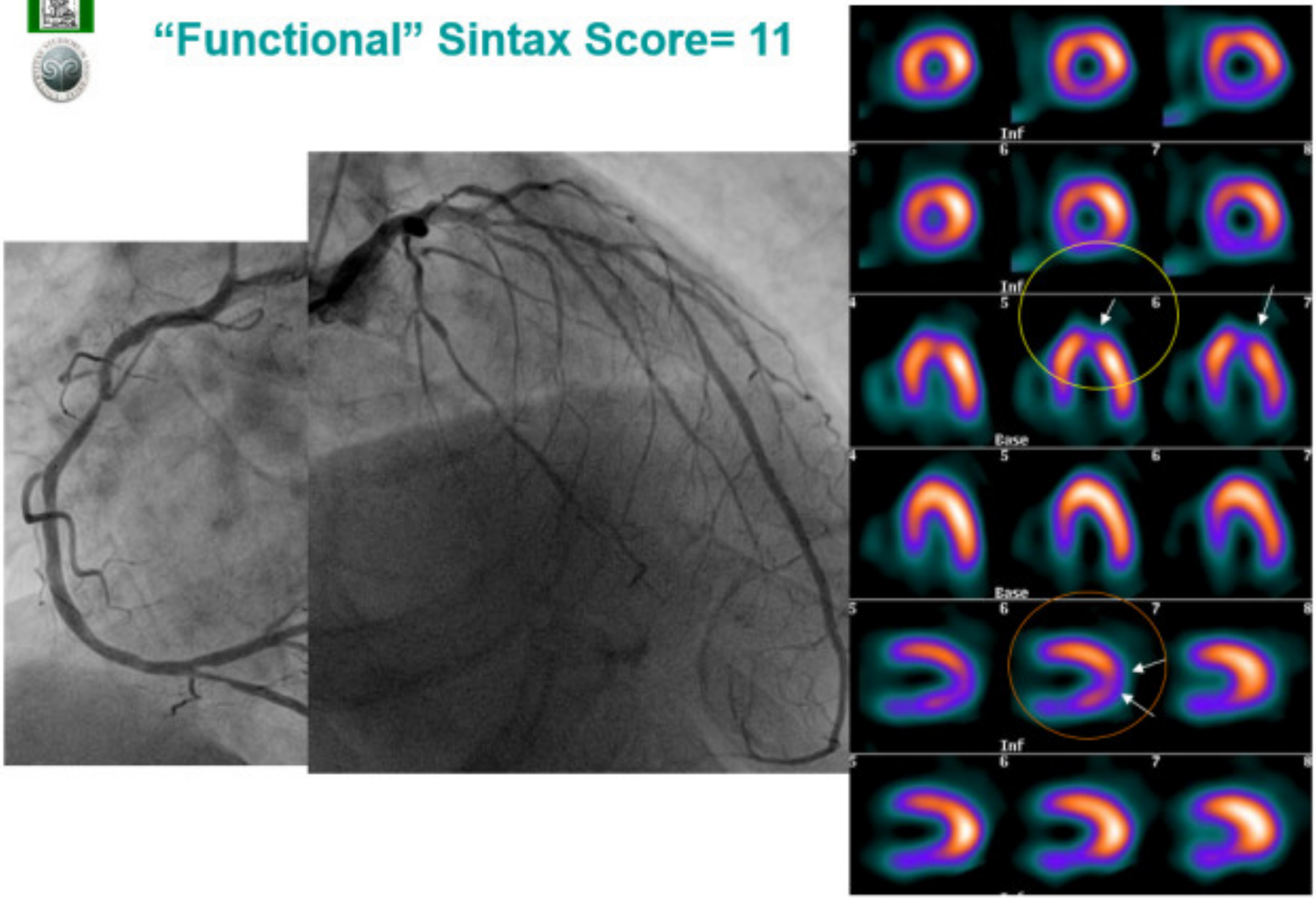
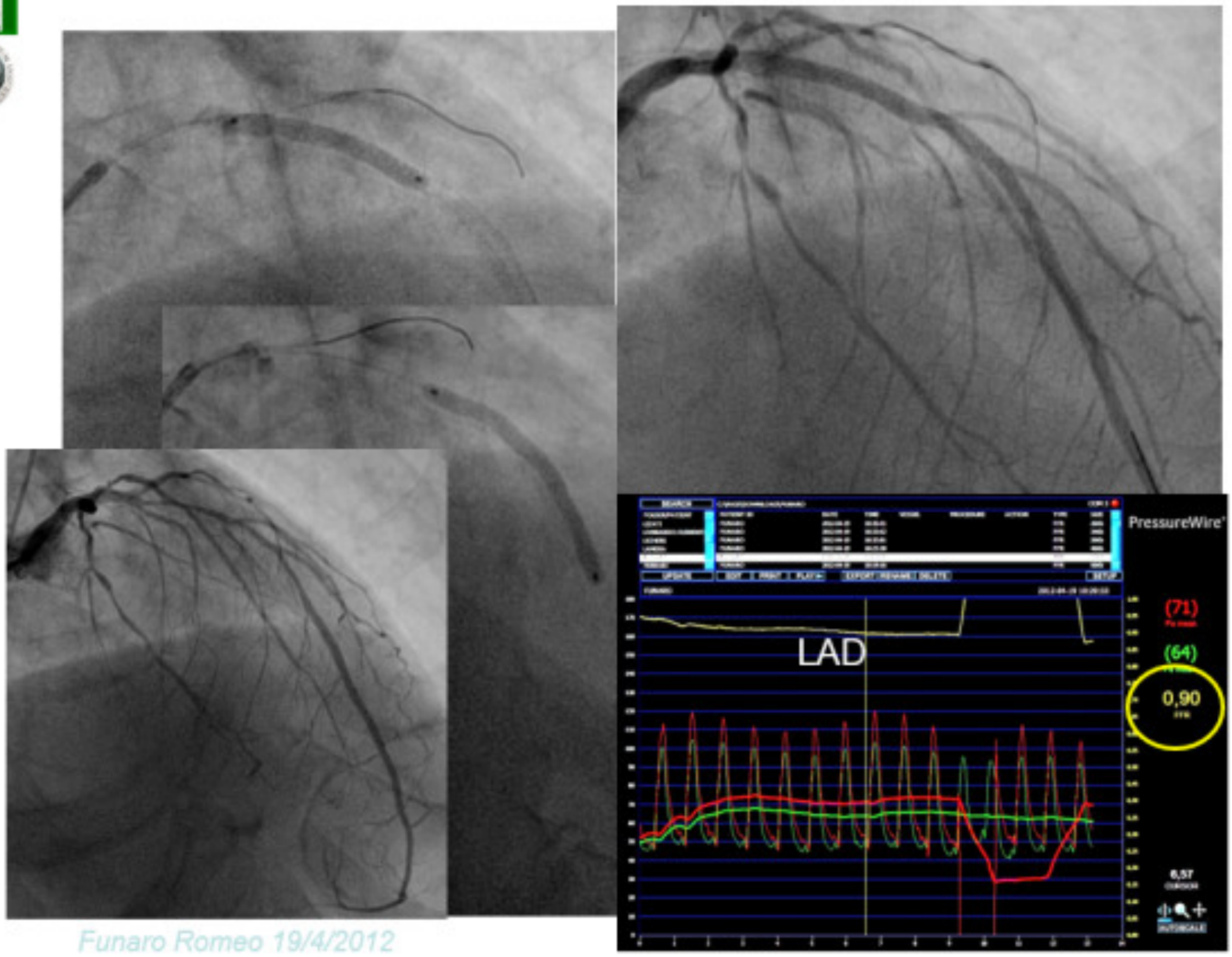
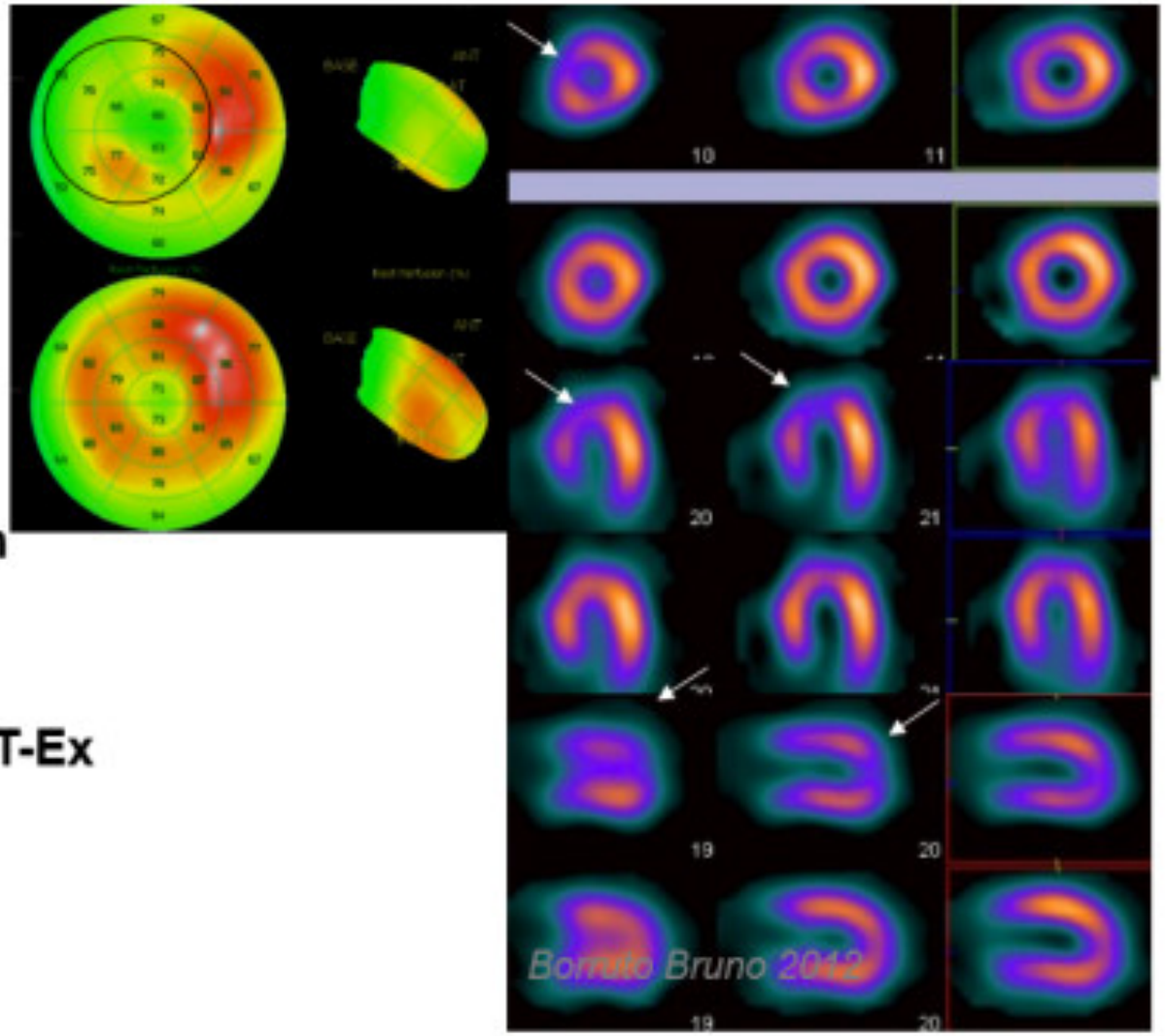


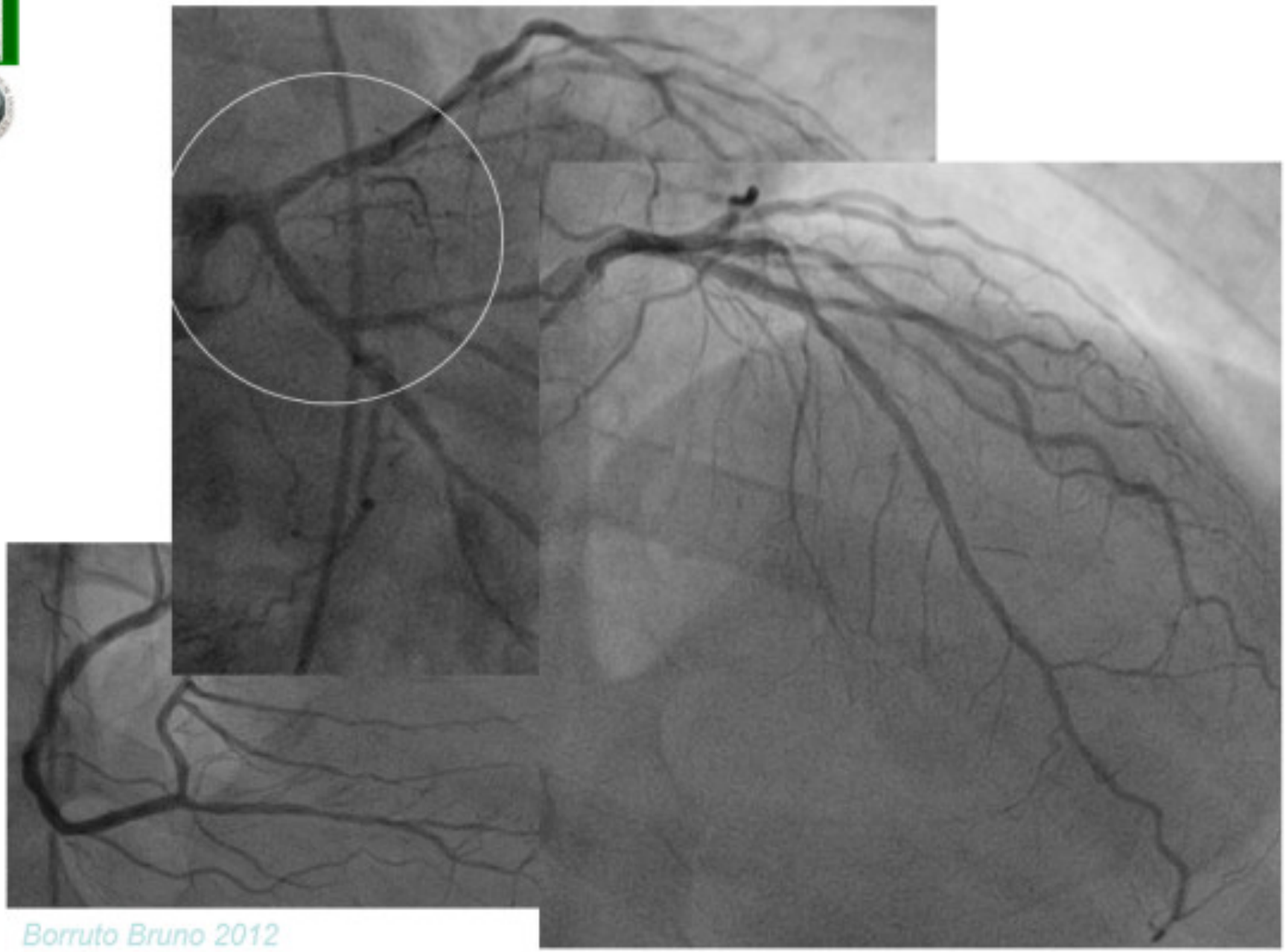


Funaro Romeo 19/4/2012

CASO 3

- B.B. maschio 61 anni
- Ipertensione Arteriosa
- Ipercolesterolemia
- Precordialgie atipiche
- ECG: T neg V2-V3
- Ex-ECG (2/4/12) 100W non diagnostico (sotto-ST ascendente 1mm)
- 99mTc Tetrofosmin SPECT-Ex




Borruto Bruno 2012

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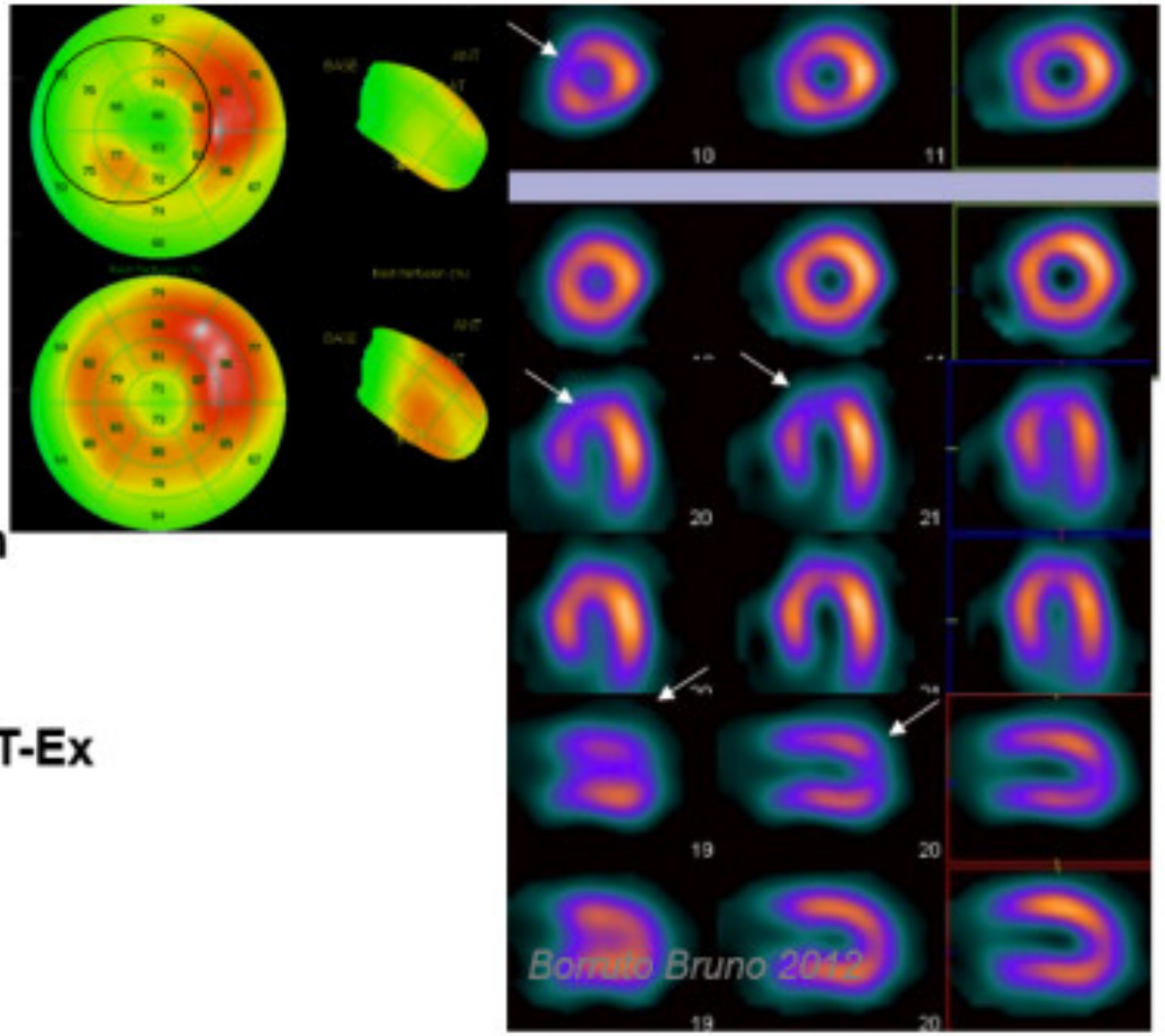
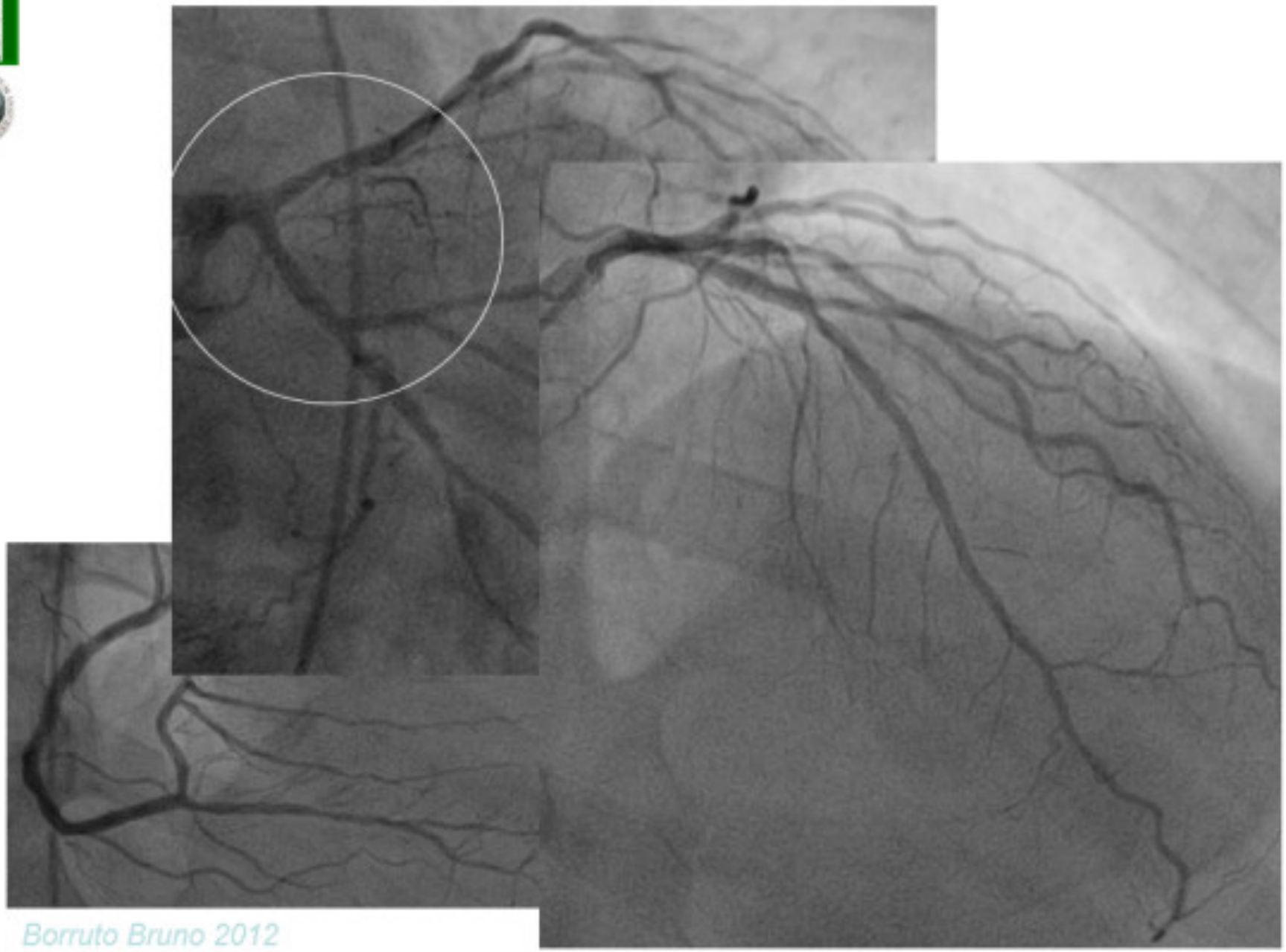
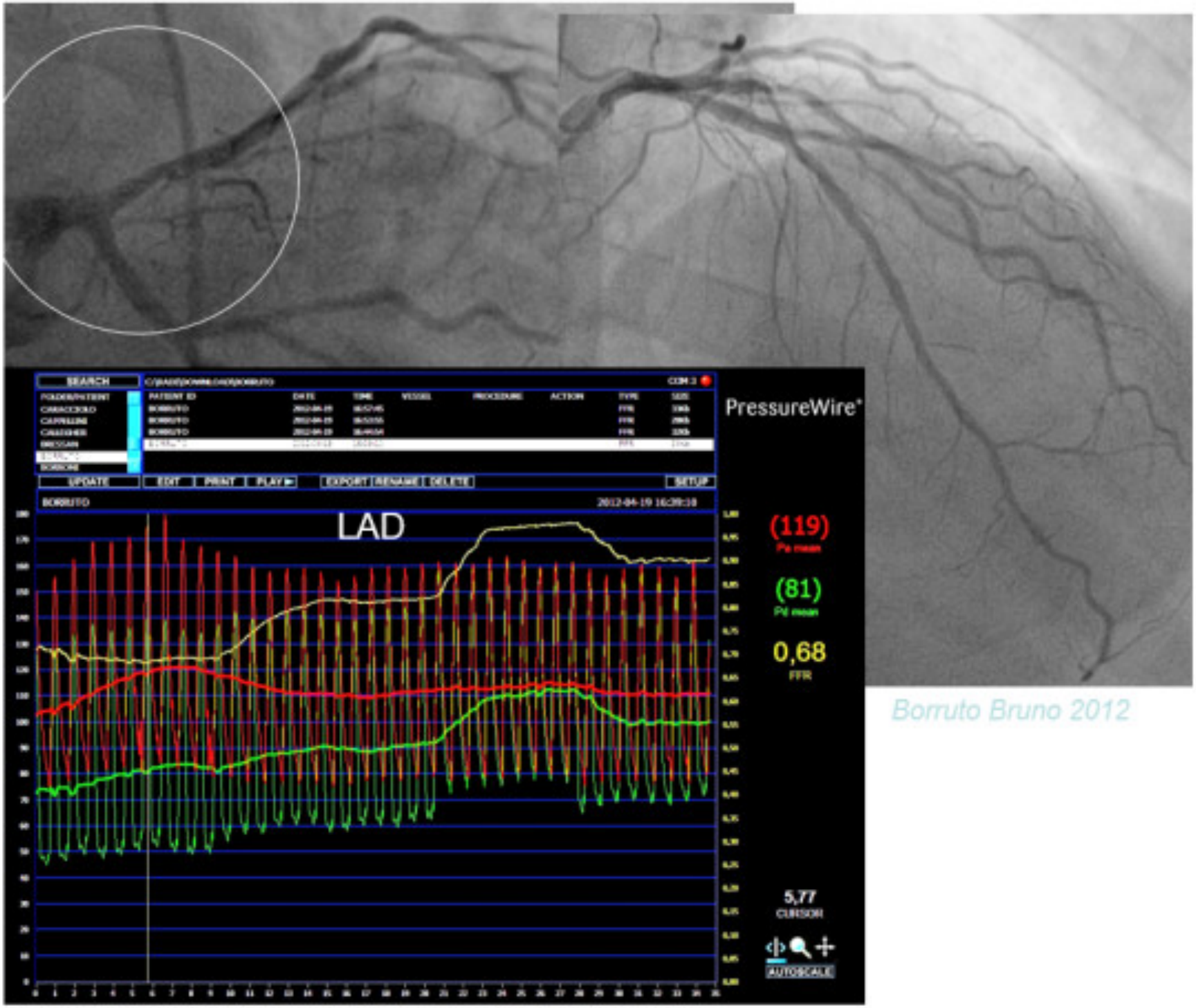
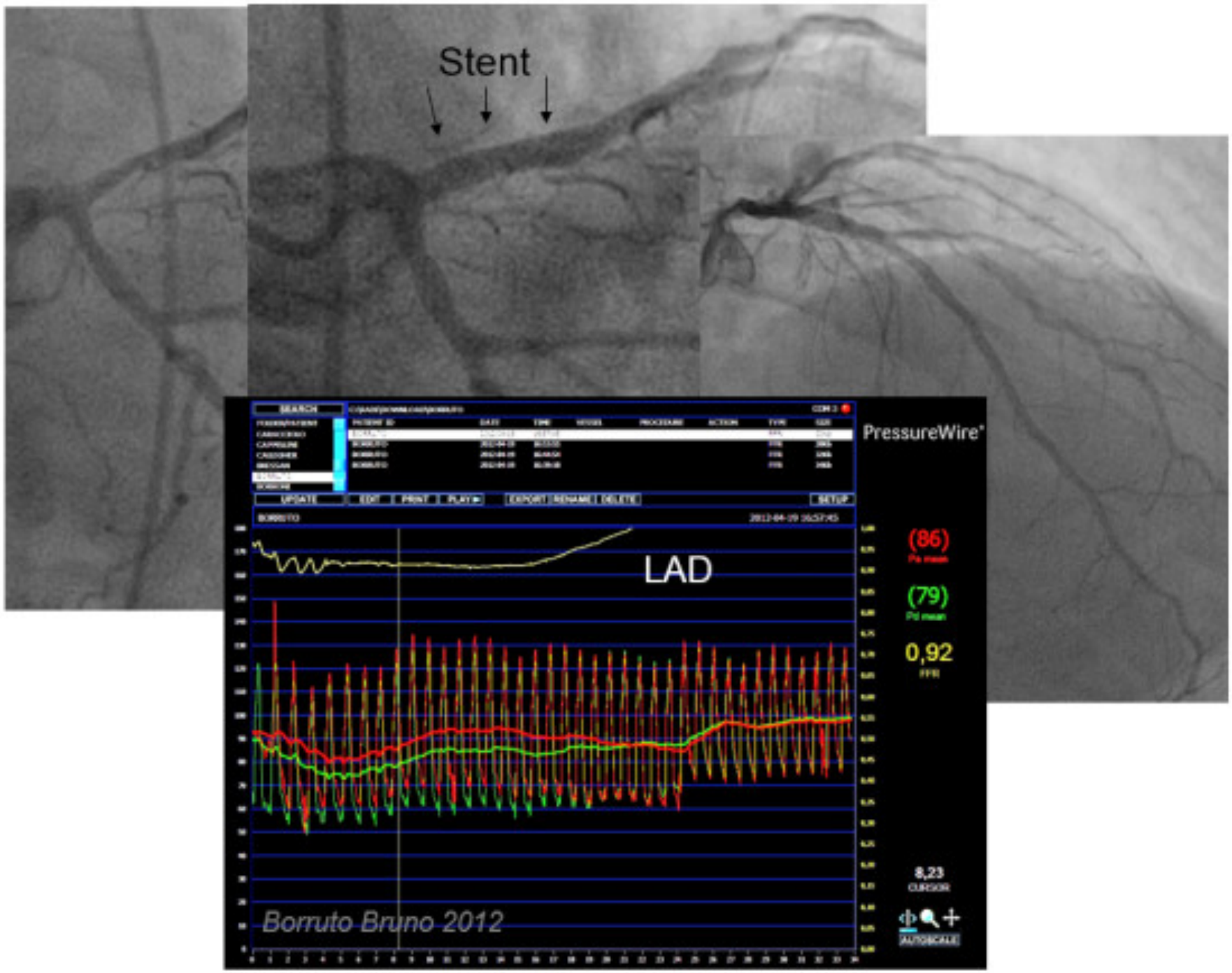



Borruto Bruno 2012



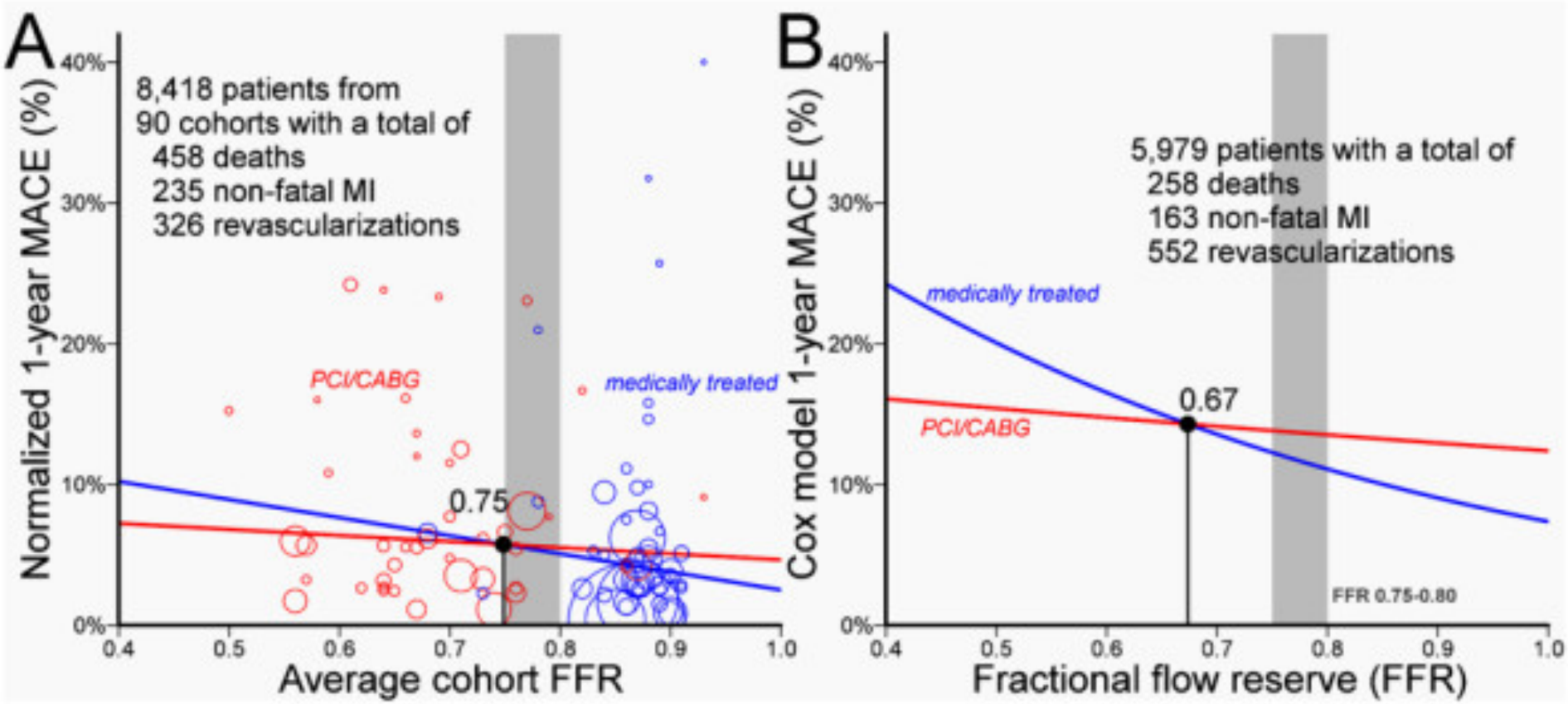
Borruto Bruno 2012


Stent
LAD
PressureWire
(86)
(79)
0,92
8,23
Borruto Bruno 2012

Linking physiologic severity to clinical outcomes
A metanalysis of FFR clinical studies

Study level meta-regression analysis

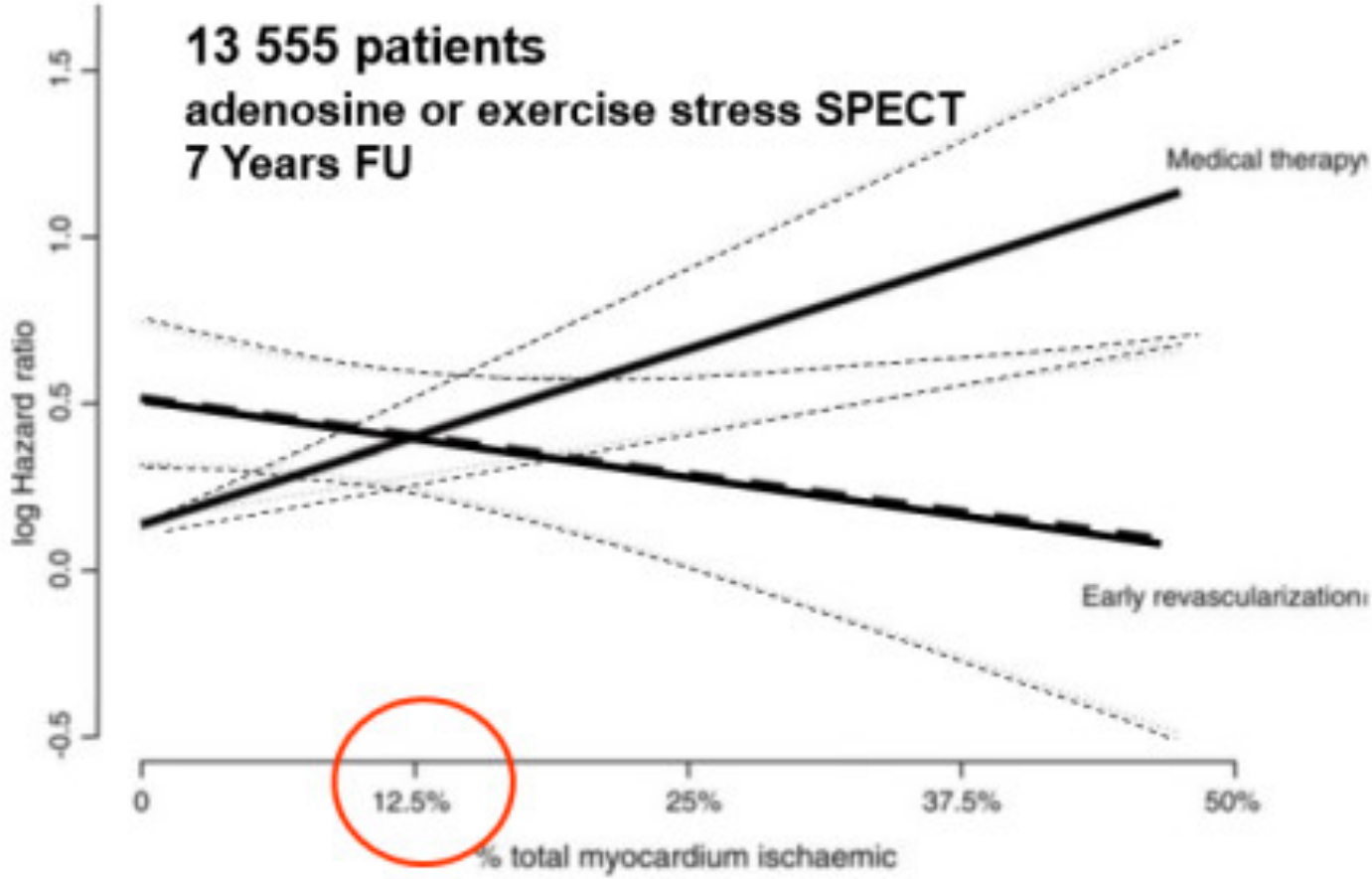
Patient level Cox model analysis

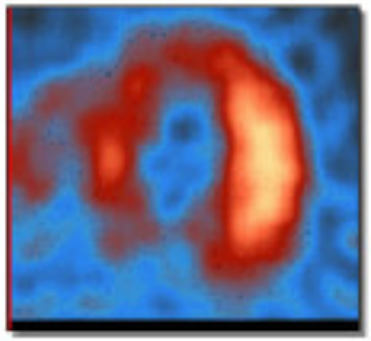


NP.Johnson et al. JACC 2014

La presenza e l'estensione di ischemia predicono la prognosi e il beneficio delle procedure di «rivascolarizzazione» coronarica

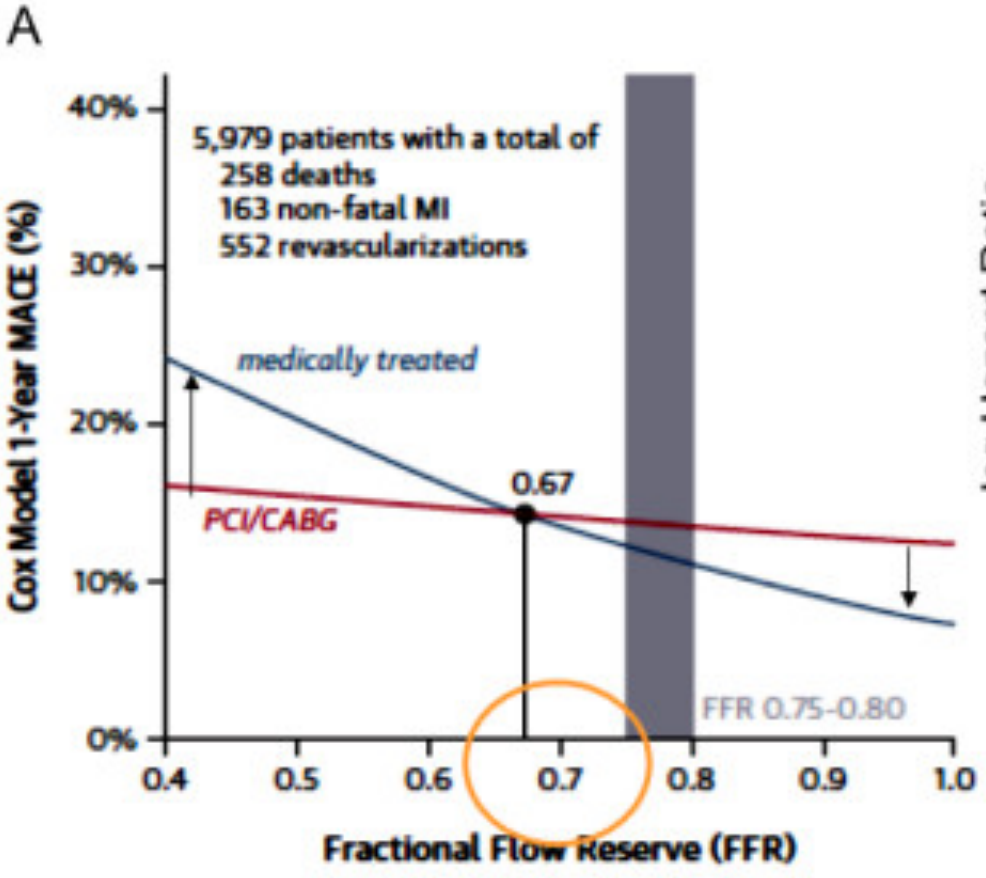
Log hazard ratio for revascularization vs. medical therapy as a function of % ischaemic myocardium

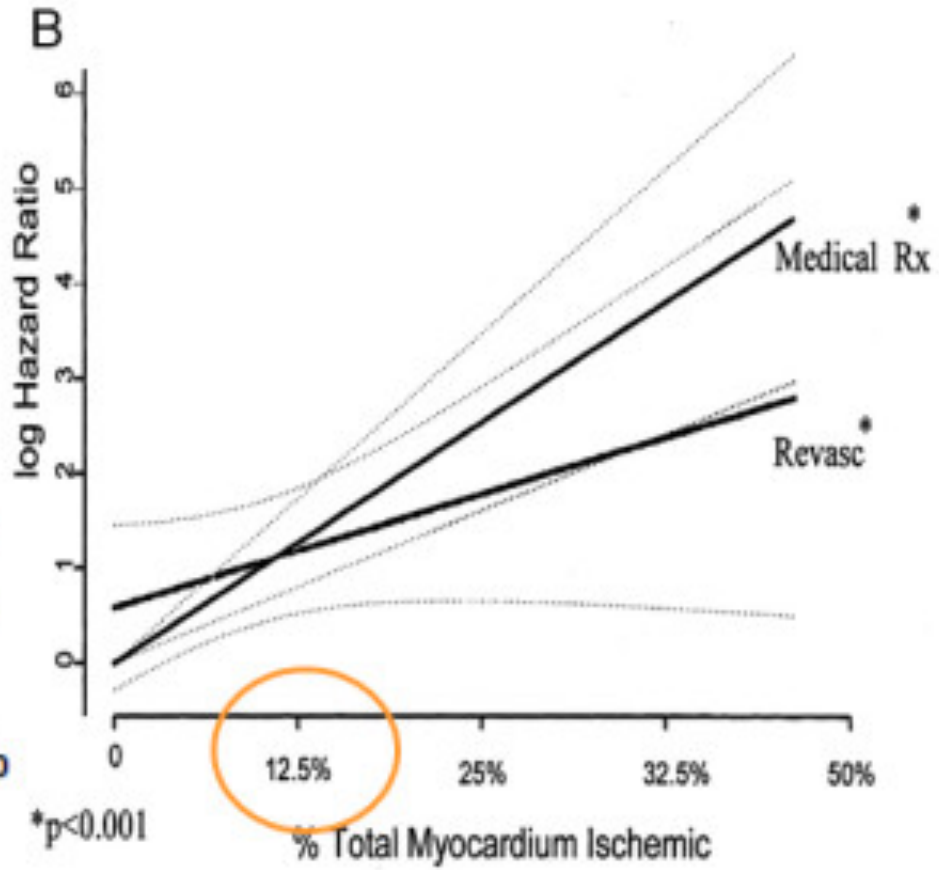




Hachamovitch R et al. Eur Heart J 2011;32:1012-1024

Prognostic value of fractional flow reserve (FFR): linking physiologic severity to clinical outcomes
A metanalysis of FFR clinical studies





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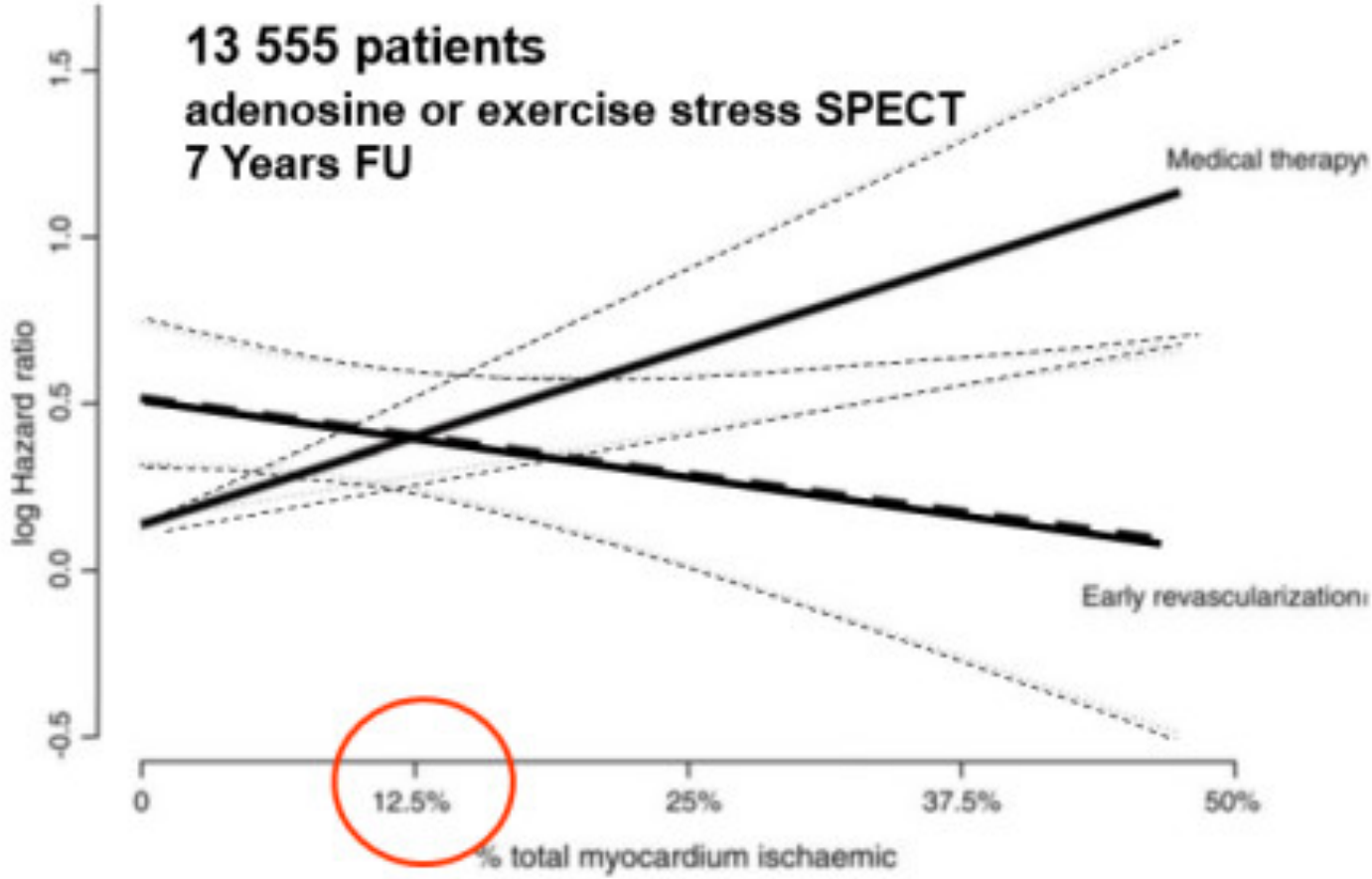

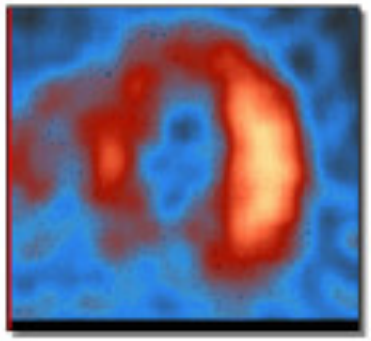

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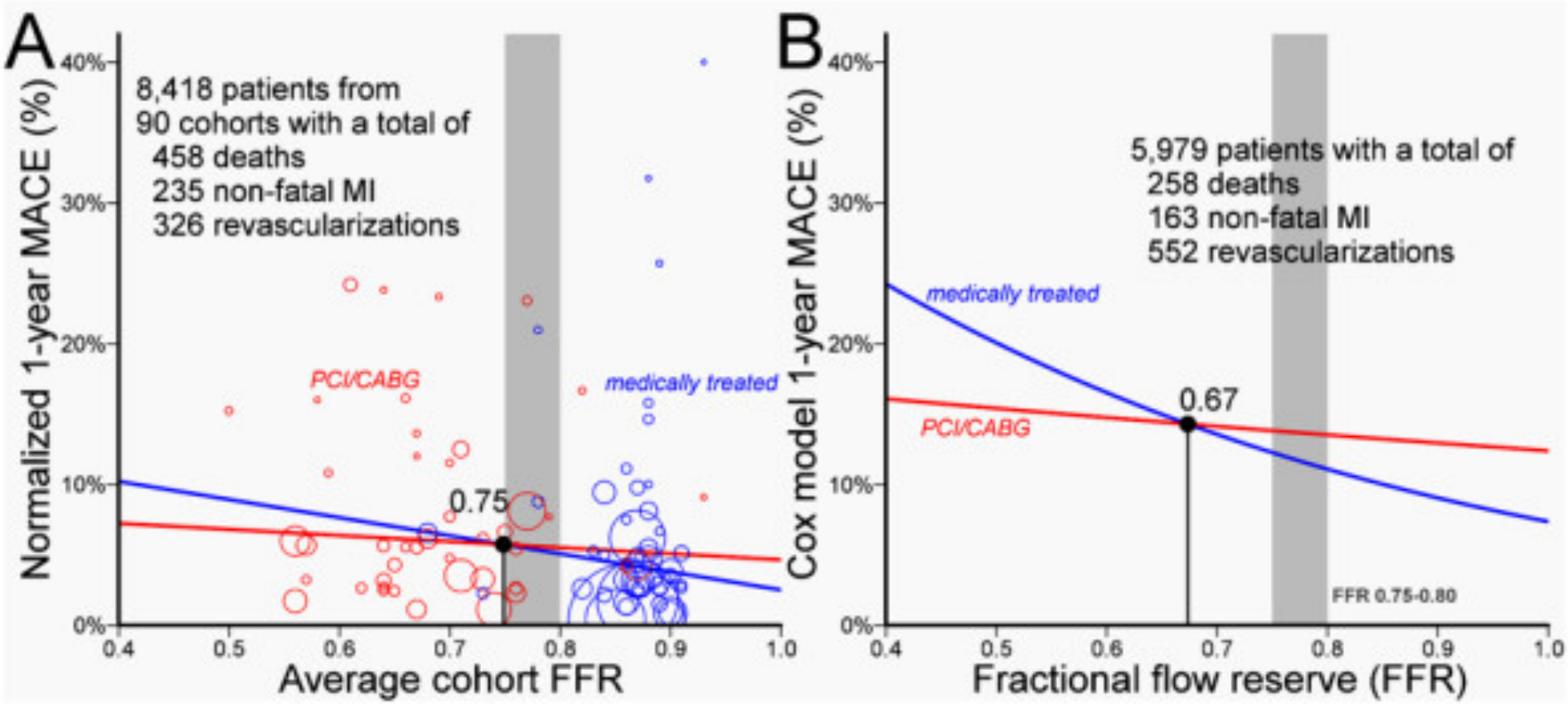

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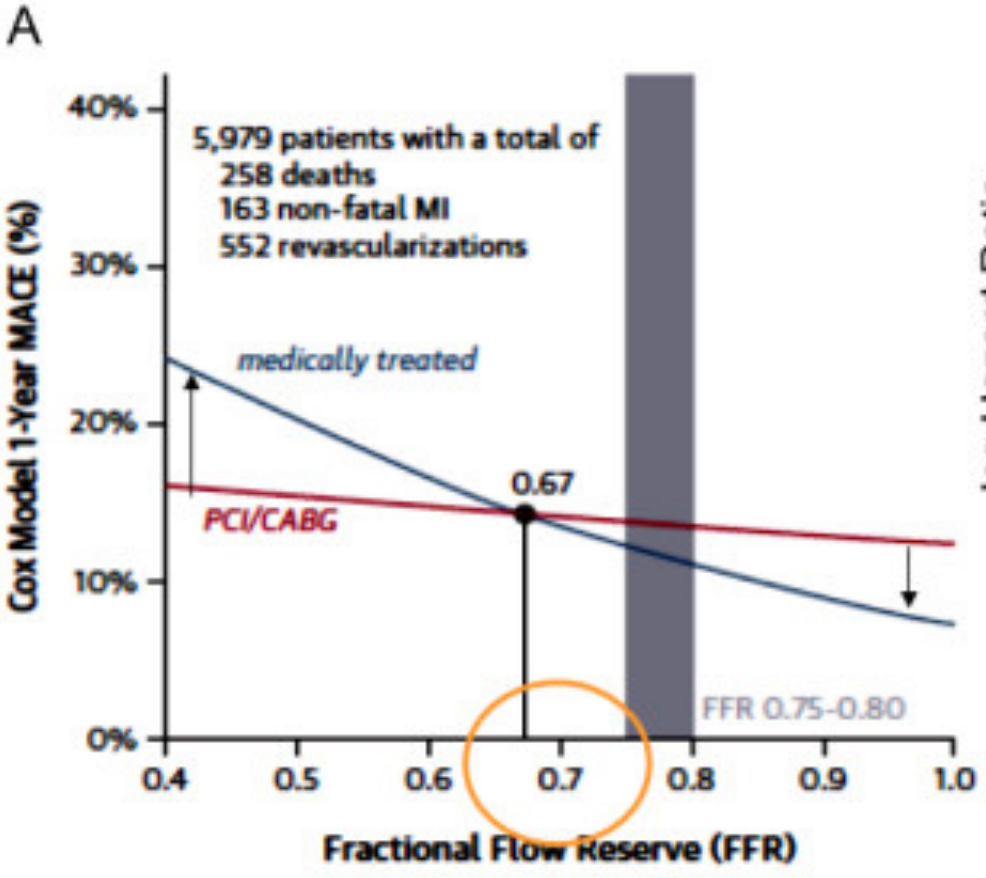
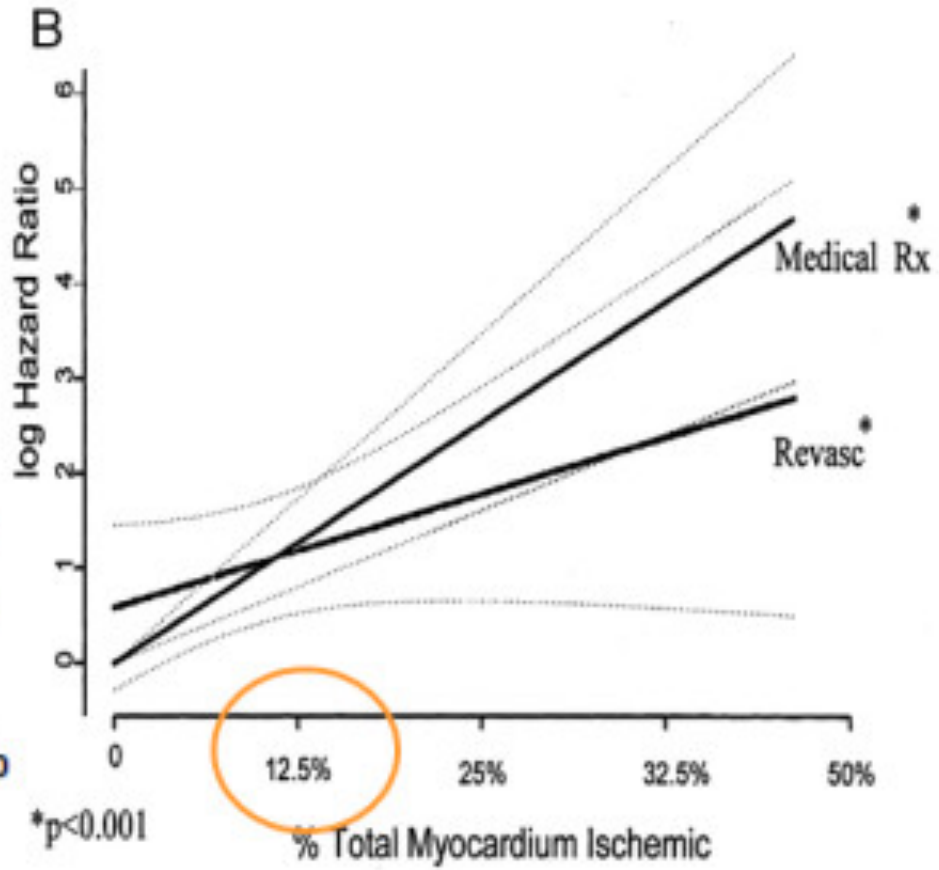
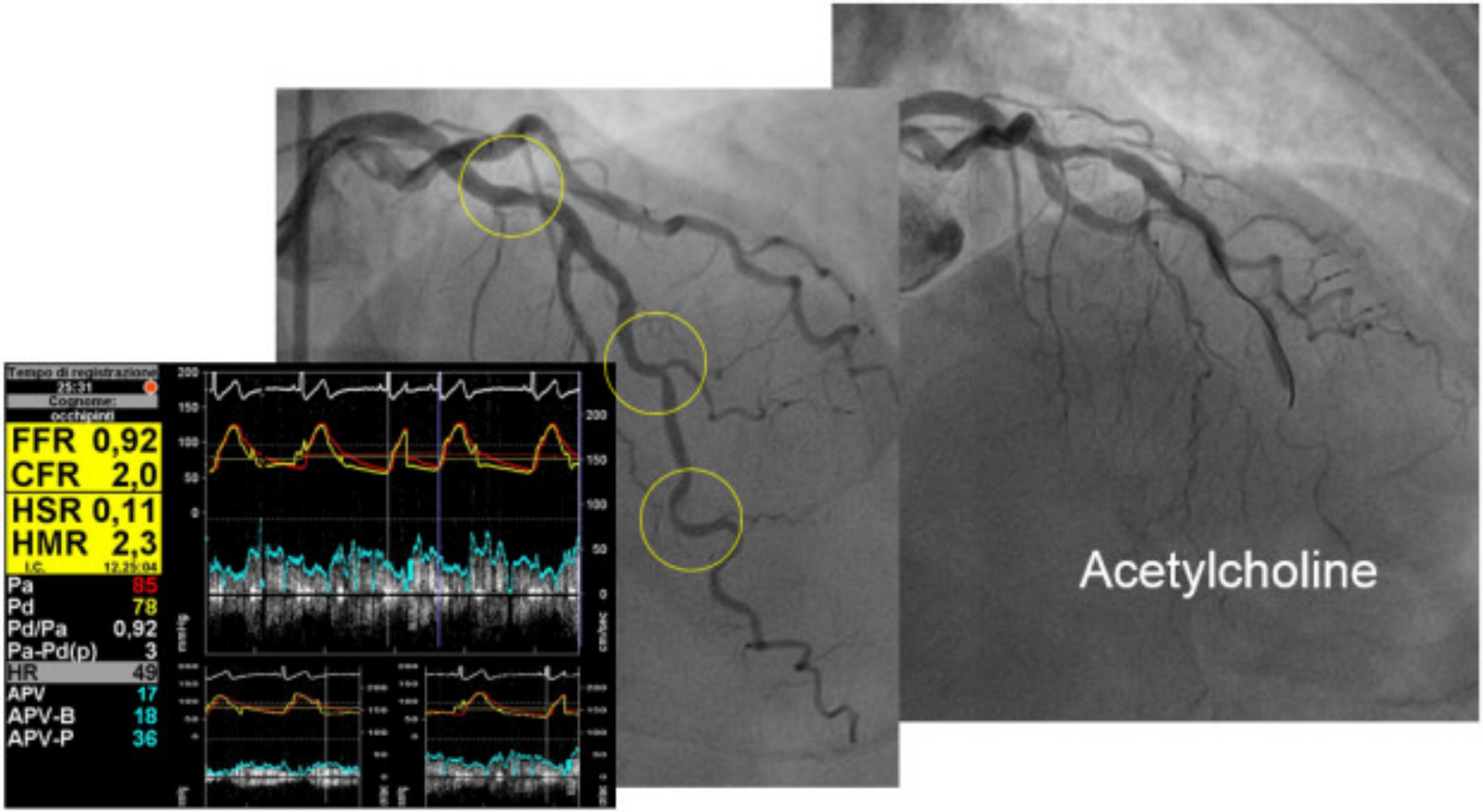




Johnson NP et al JACC 2014

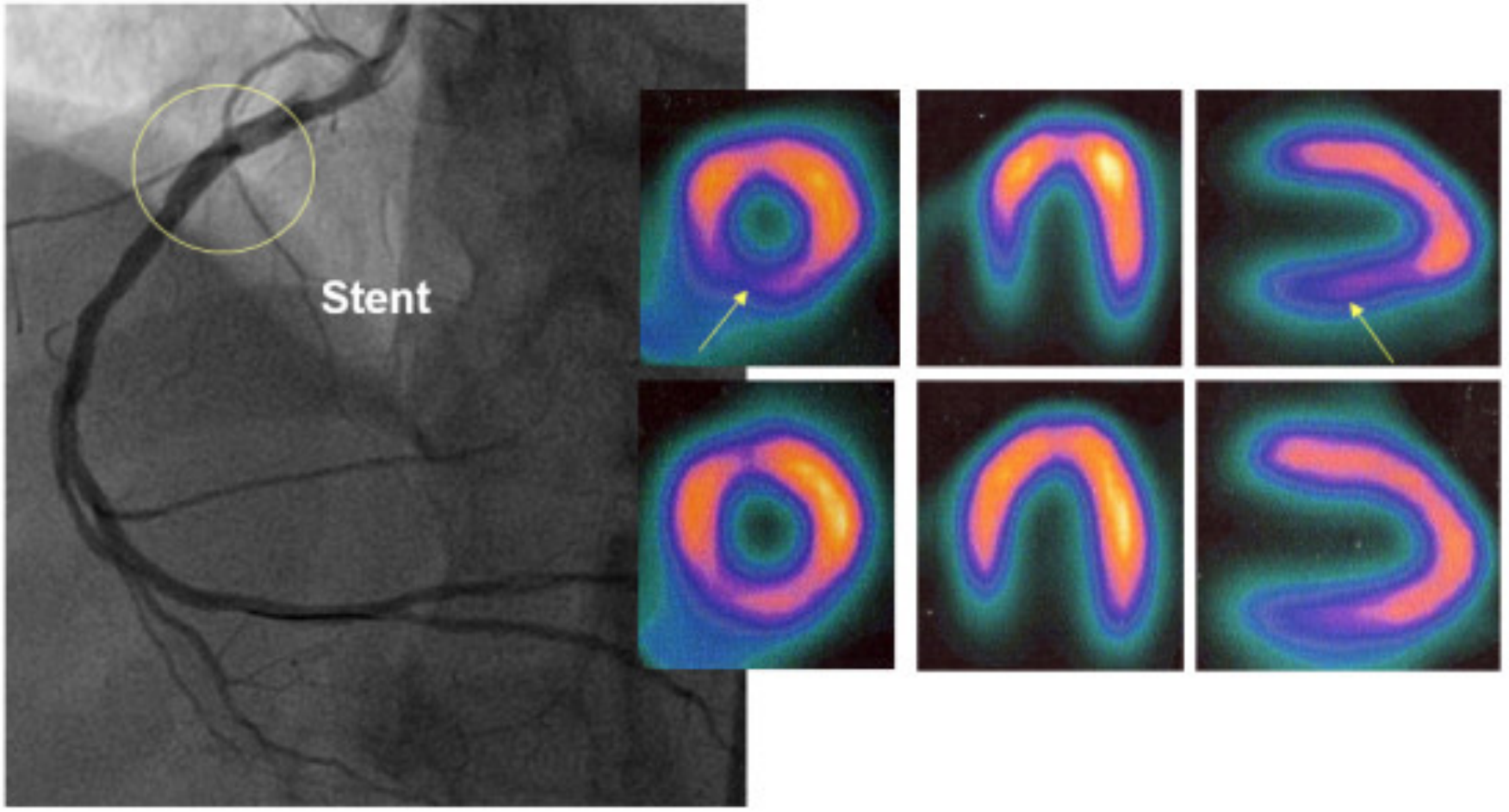
Hachamovitch R et al Circulation 2003

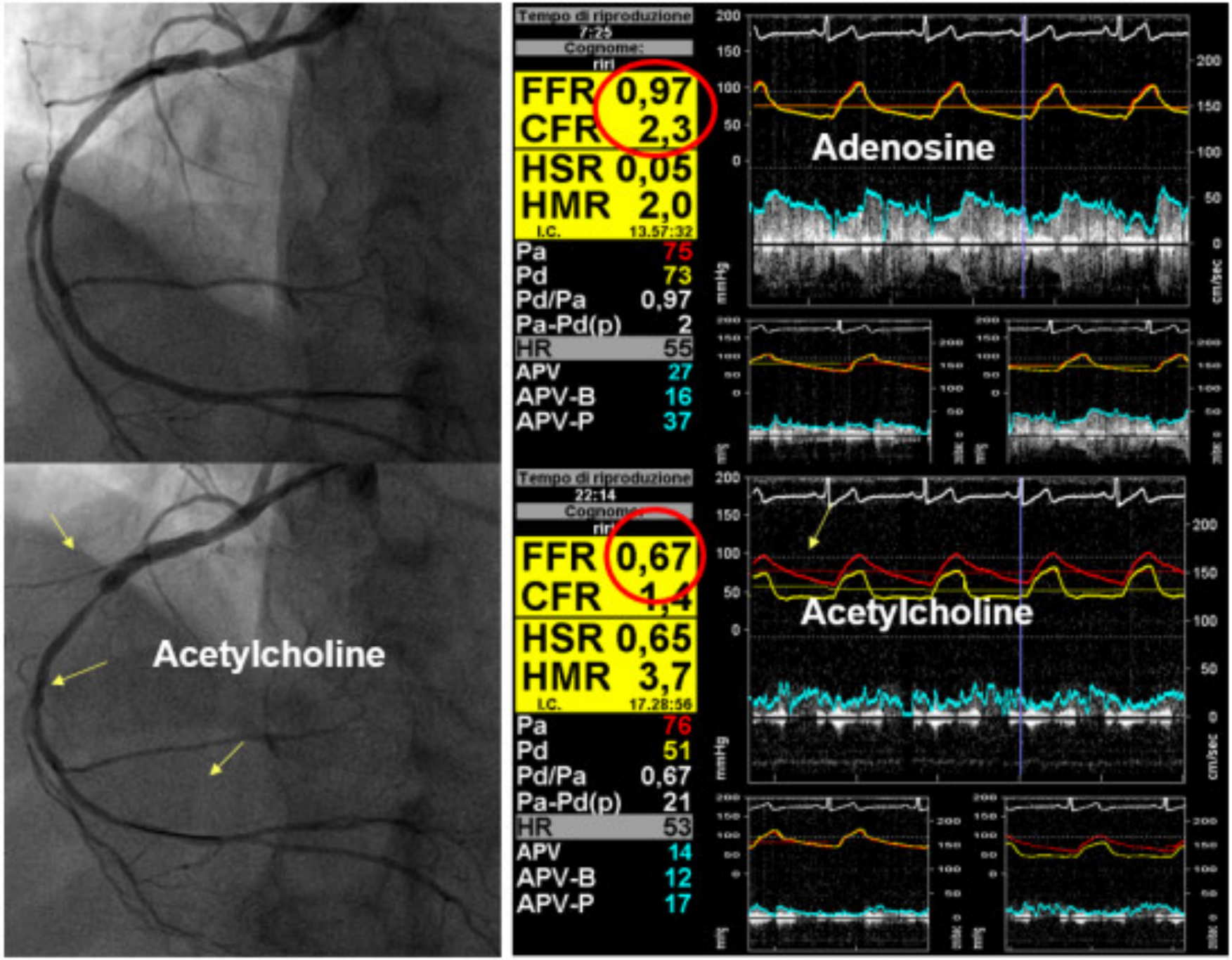
Non obstructive coronary atherosclerosis and endothelium mediated vasomotor dysfunction



- R. A. 46 yod male
- Prior PCI RCA (DES) after mixed angina

  Recurrent Ex chest pain with“positive” Ex MPI




Acetylcholine
Tempo di riproduzione
7:25
Cognome:
riri
FFR 0,97
CFR 2,3
HSR 0,05
HMR 2,0
I.C. 13.57:32
Pa 75
Pd 73
Pd/Pa 0,97
Pa-Pd(p) 2
HR 55
APV 27
APV-B 16
APV-P 37
Adenosine
Tempo di riproduzione
22:14
FFR 0,67
CFR 1,4
HSR 0,65
HMR 3,7
I.C. 17.28:56
Pa 76
Pd 51
Pd/Pa 0,67
Pa-Pd(p) 21
HR 53
APV 14
APV-B 12
APV-P 17
Acetylcholine
mmHg
cm/sec

Conclusioni

Stenosi coronarica ed Ischemia

- **Anche se l'ostruzione dei vasi epicardici è la più comune conseguenza dell'evoluzione dell'aterosclerosi coronarica non esiste una relazione univoca e lineare tra grado di ostruzione (stenosi) coronarica e gravità ed estensione di ischemia**
- **L'ischemia miocardica può essere determinata dal concorso di fattori diversi quali:**
  - **Disfunzione vasomotoria**
  - **Disfunzione microcircolatoria**
  - **Aterotrombosi e rottura di placca**
  - **Aumento metabolismo miocardico**
  - **……**

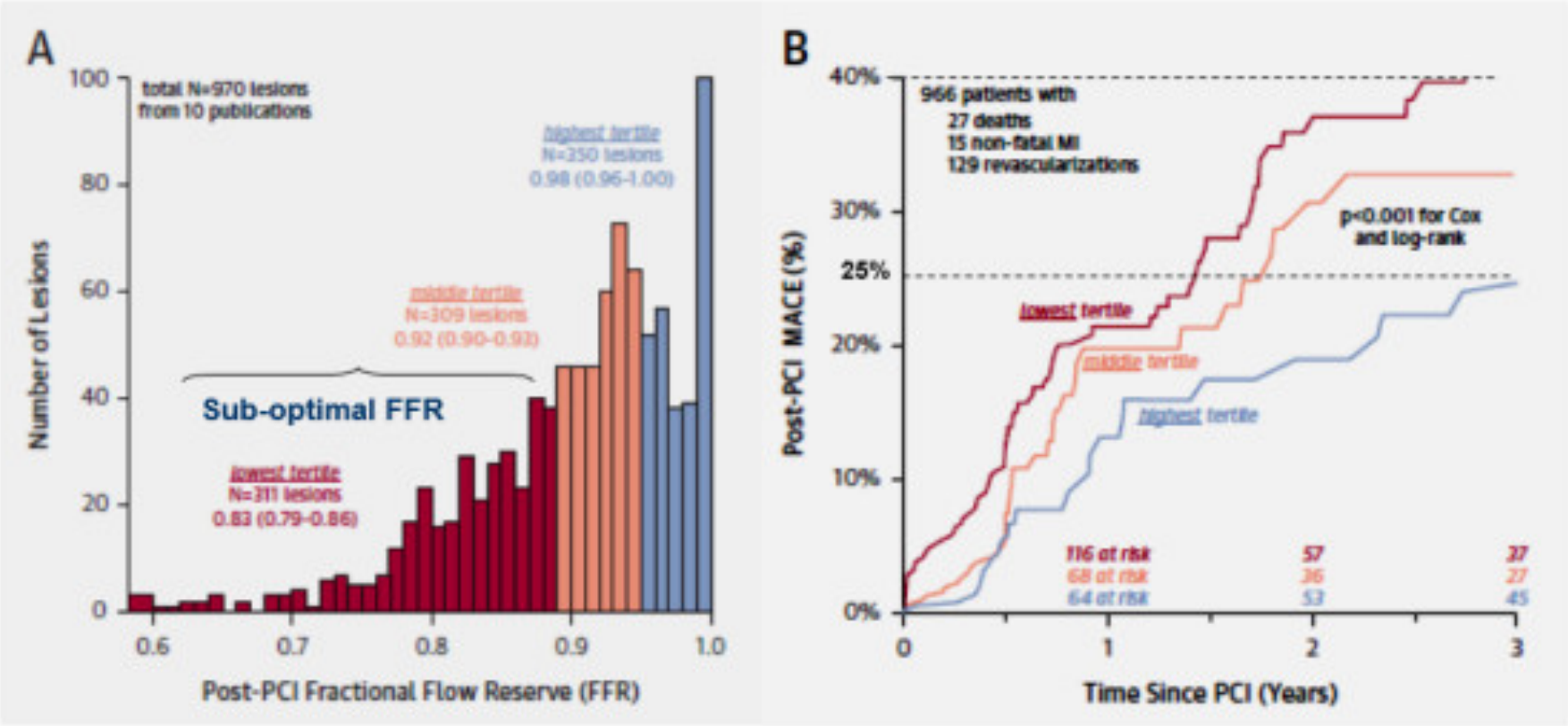
Conclusioni

Stenosi coronarica ed Ischemia

- **La presenza e la gravità dell'ischemia sono importanti determinanti prognostici**
- **La valutazione emodinamica e funzionale in sala di cateterismo consente di**
  - **identificare le stenosi funzionalmente critiche che richiedono un trattamento**
  - **Guidare ed ottimizzare la procedura di angioplastica e stenting**
  - **Comprendere i meccanismi di ischemia non dipendenti dalla stenosi coronarica**

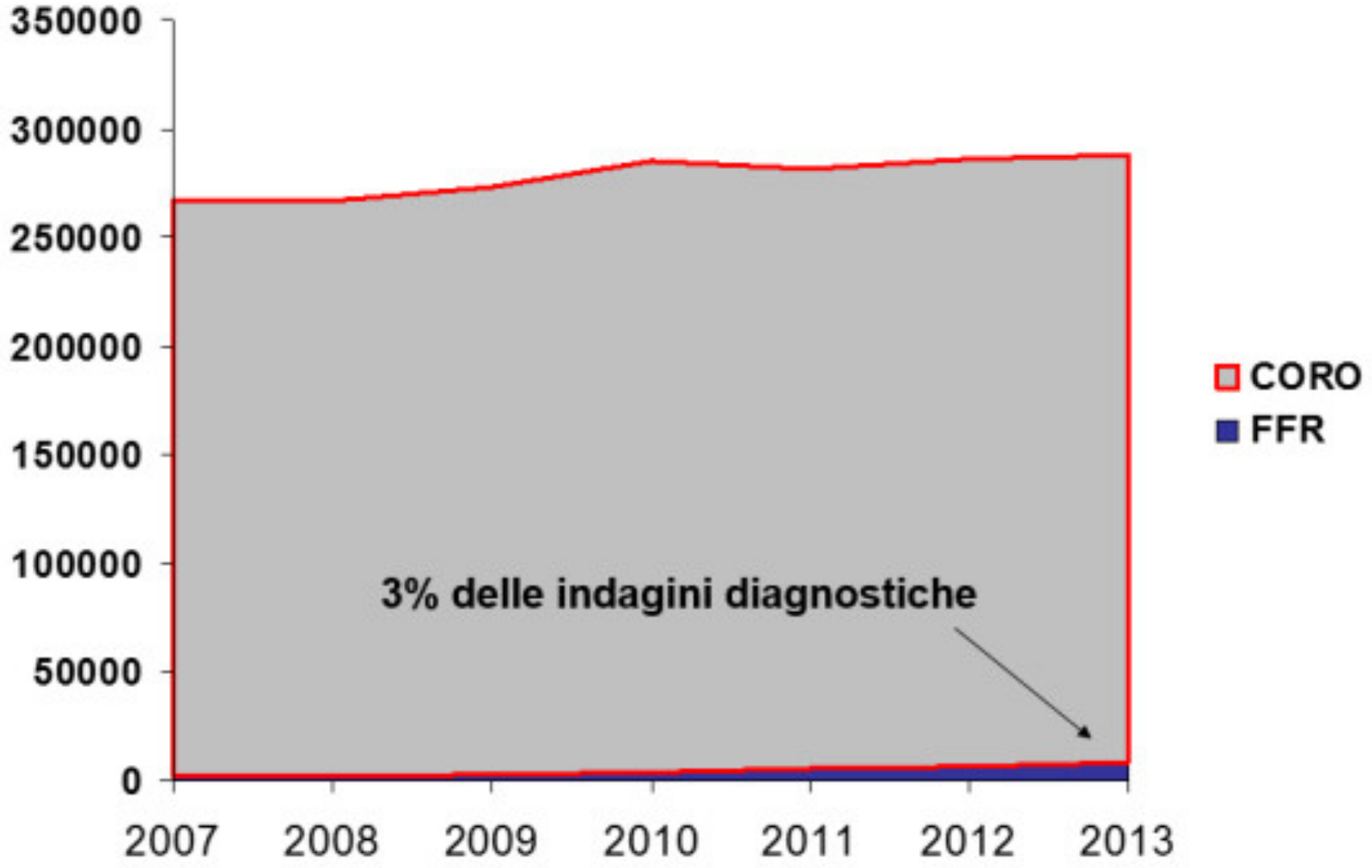
Prognostic Value of Fractional Flow Reserve

Linking Physiologic Severity to Clinical Outcomes



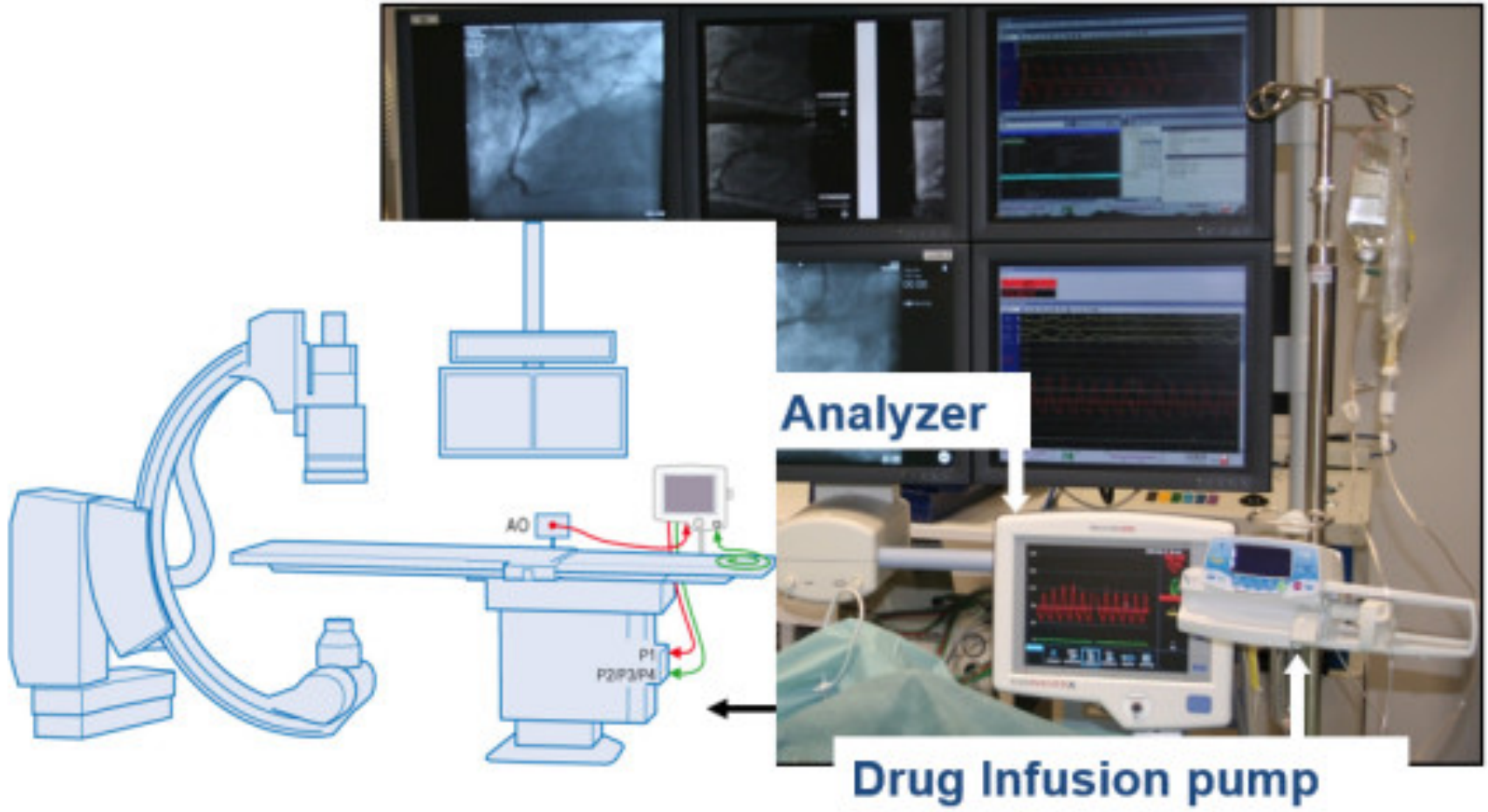
Johnson NP et al JACC 2014

Società Italiana
di Cardiologia Invasiva



Dati Attività Laboratori di Emodinamica 2013

“take-home message”



…richiedete al vostro «emodinamista» di fiducia la valutazione funzionale delle stenosi e della malattia coronarica !!