iFR, Goodbye Adenosine?

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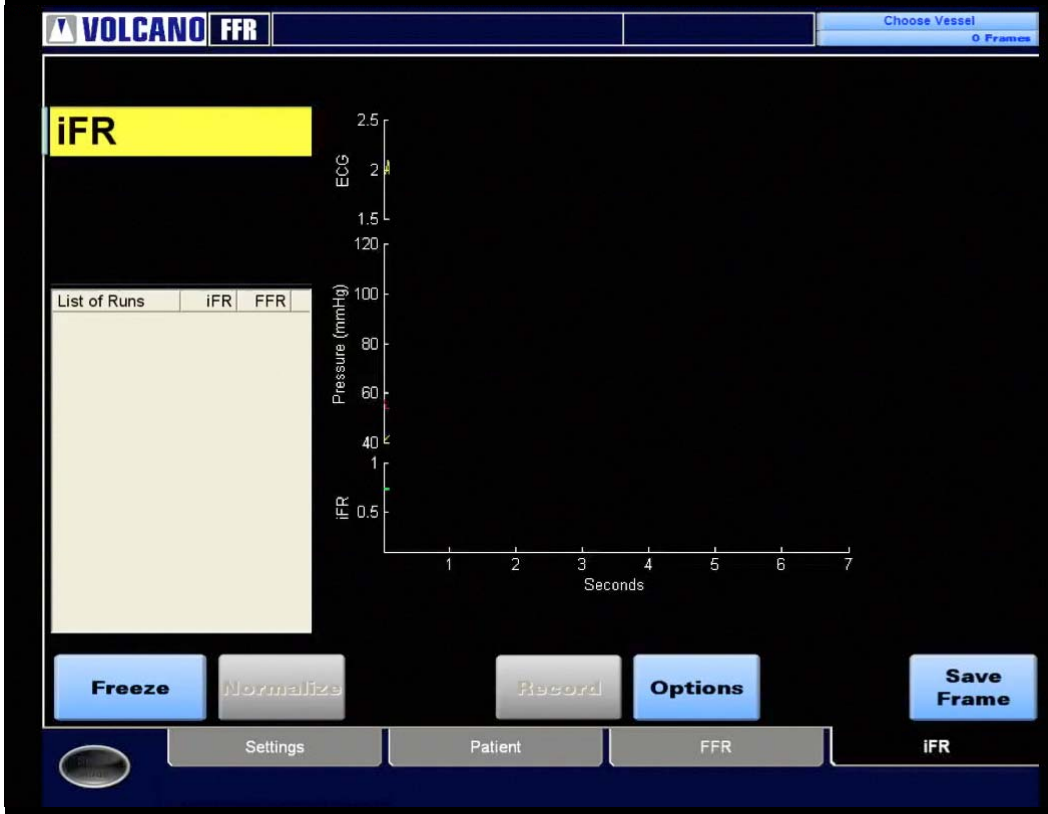
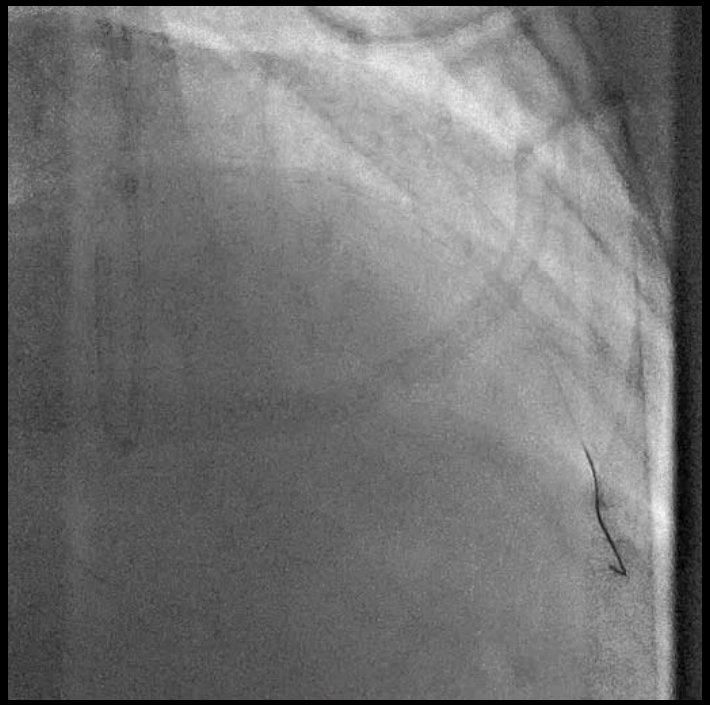
ANGIOPLASTY SUMMIT
TCTAP 2012

iFR: A vision of simplified physiological assessment in the catheter lab

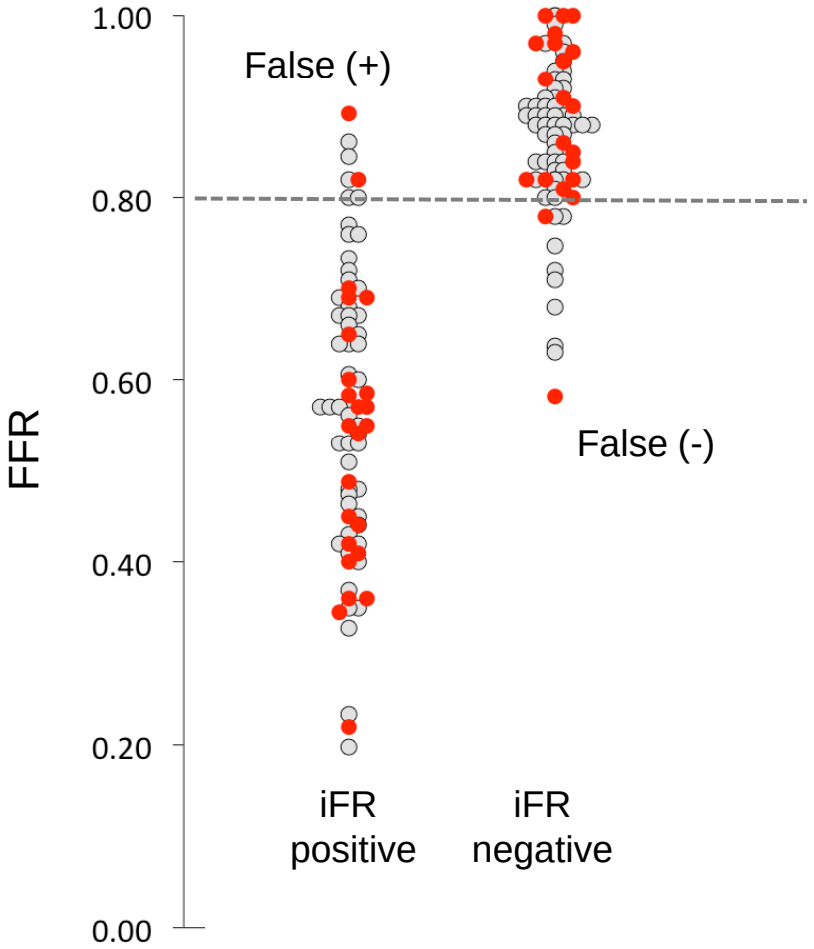


- Conventional pressure wire techniques
- 5 beats
- No hyperaemia



ADVISE study TCT San Francisco 2012

Results of ADVISE
Comparison with current gold standard



Left coronary artery

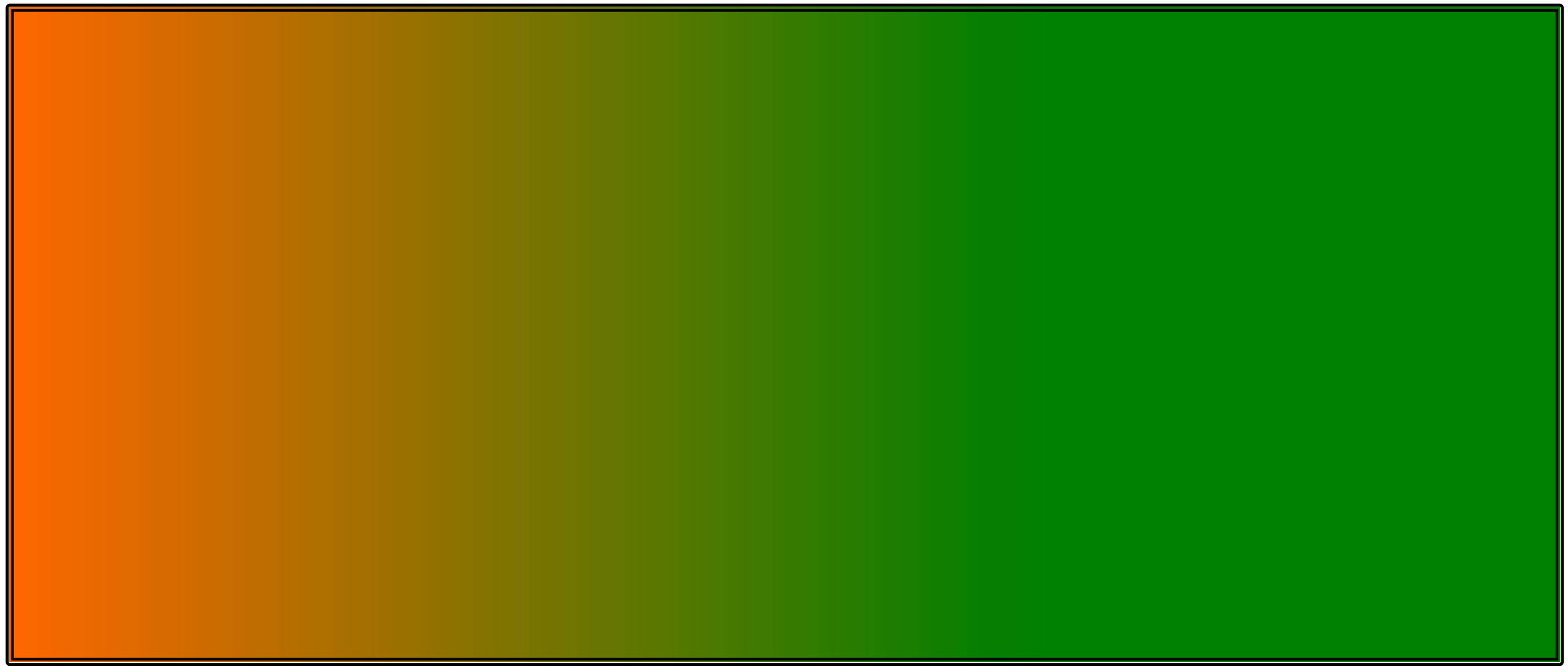
Right coronary artery

Diagnostic accuracy	88%
(+) predictive value	91%
(-) predictive value	85%
Sensitivity	85%
Specificity	91%

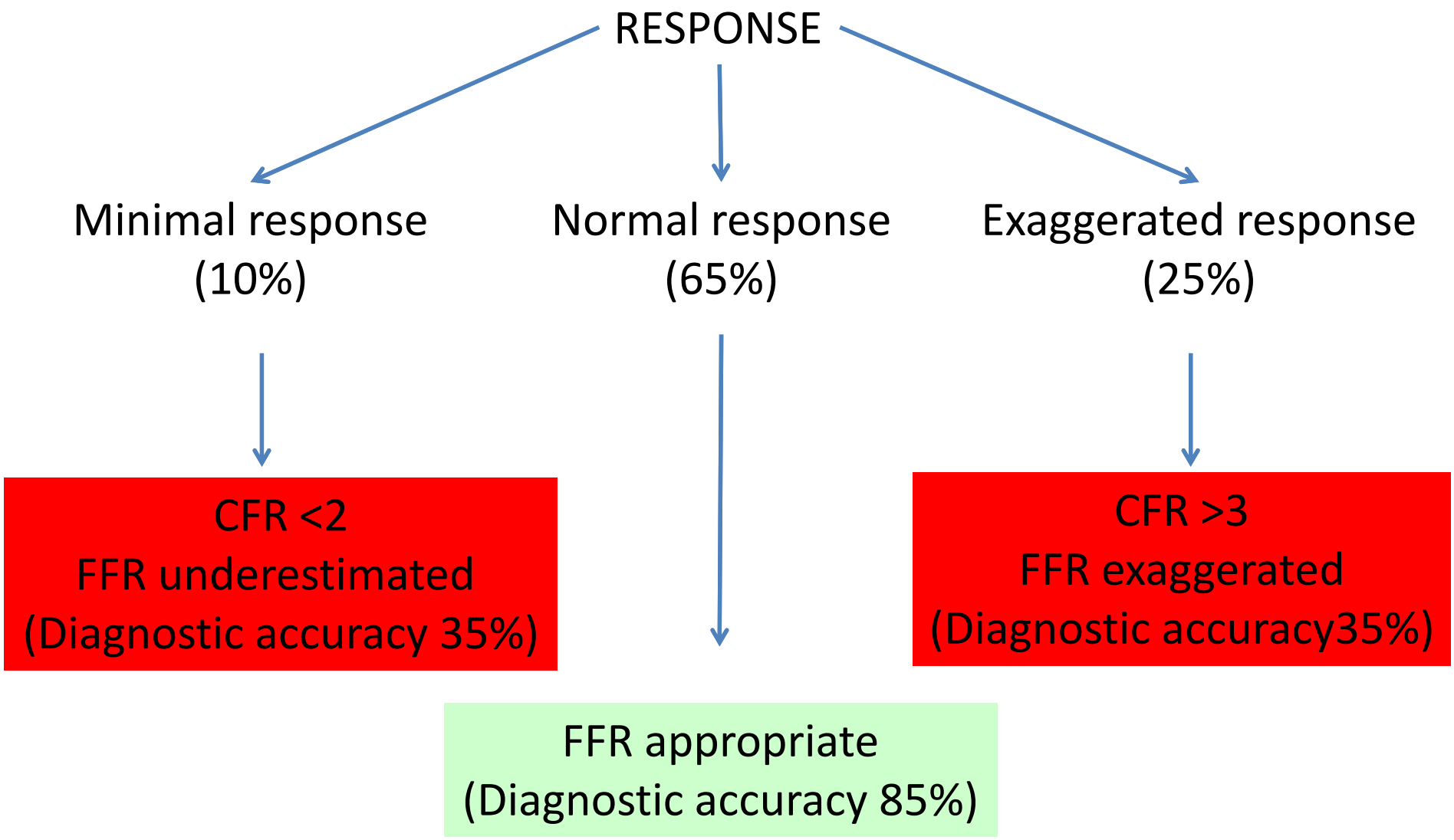
ADVISE study TCT 2011

J Am Coll Cardiol. 2012 Apr 10;59(15):1392-402

Evolution of physiological stenosis evolution

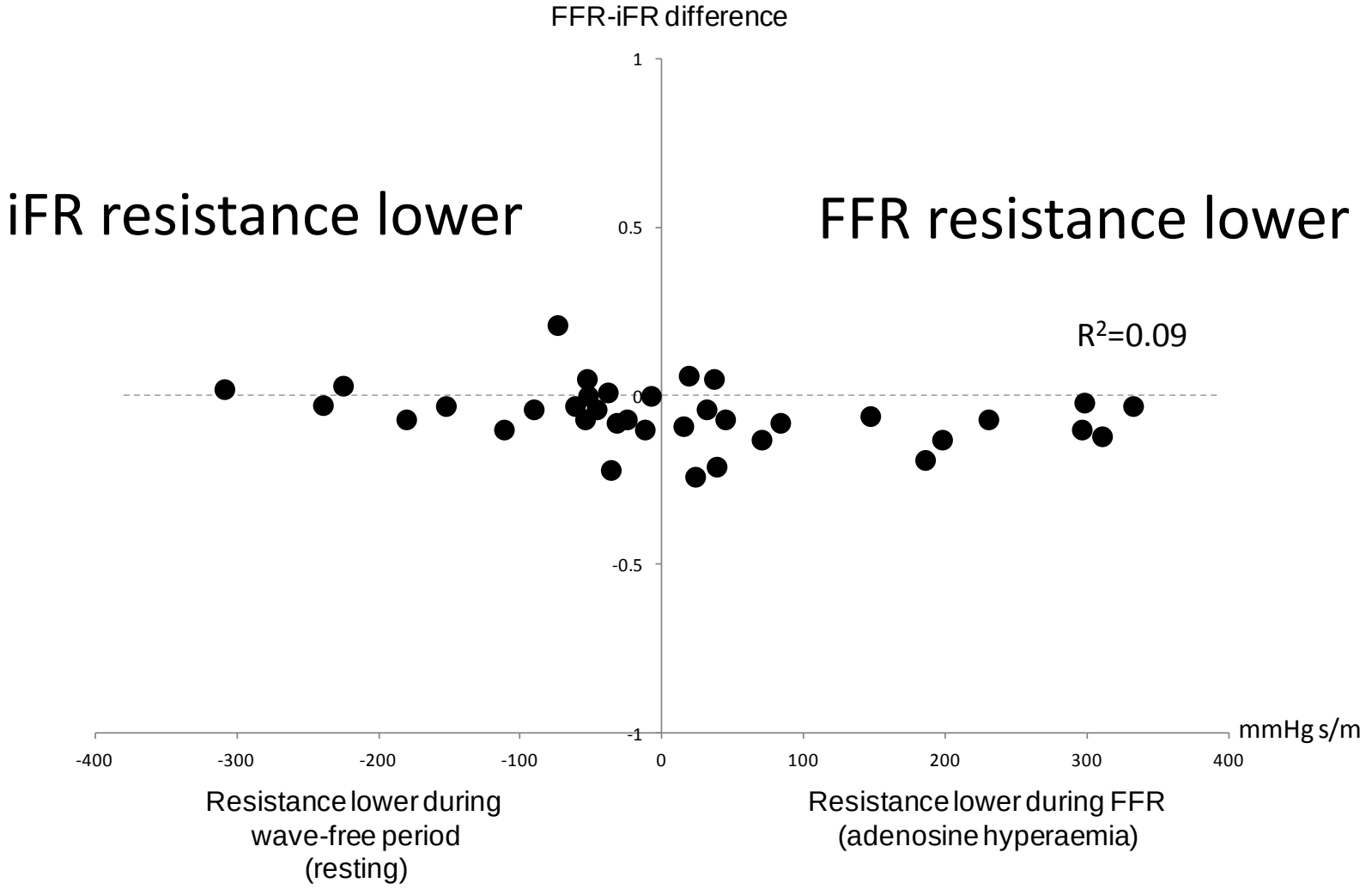


ADENOSINE index ***require*** a response!



Meuwissen, Siebes et al. *Circulation*. 2001; 103:184 –187
Meuwissen, Siebes, Spaan. *Circulation* 2002, 106:441-446

Resistance is sometimes lower ***at rest*** than after adenosine hyperaemia

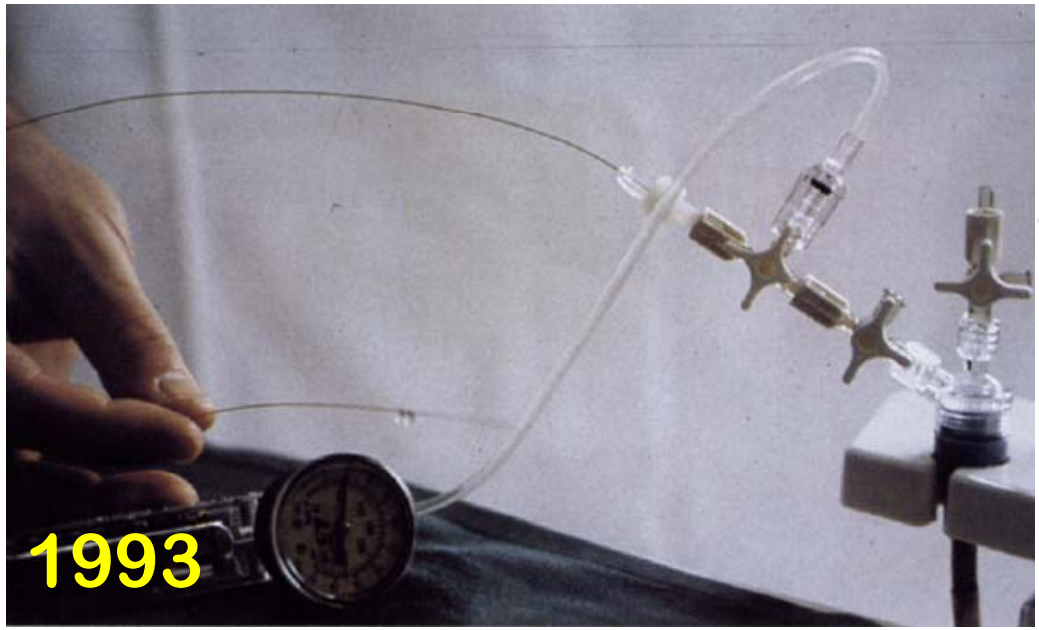


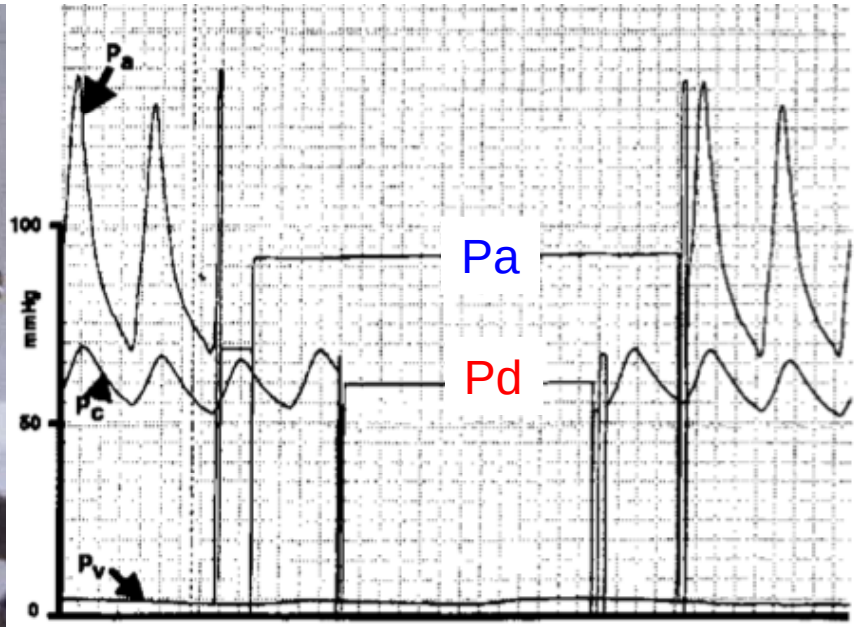
ADVISE study

Sen S, Escaned J, Davies JE et al. (*In press)*

Why give adenosine?

Why do we use mean pressures to calculate FFR?



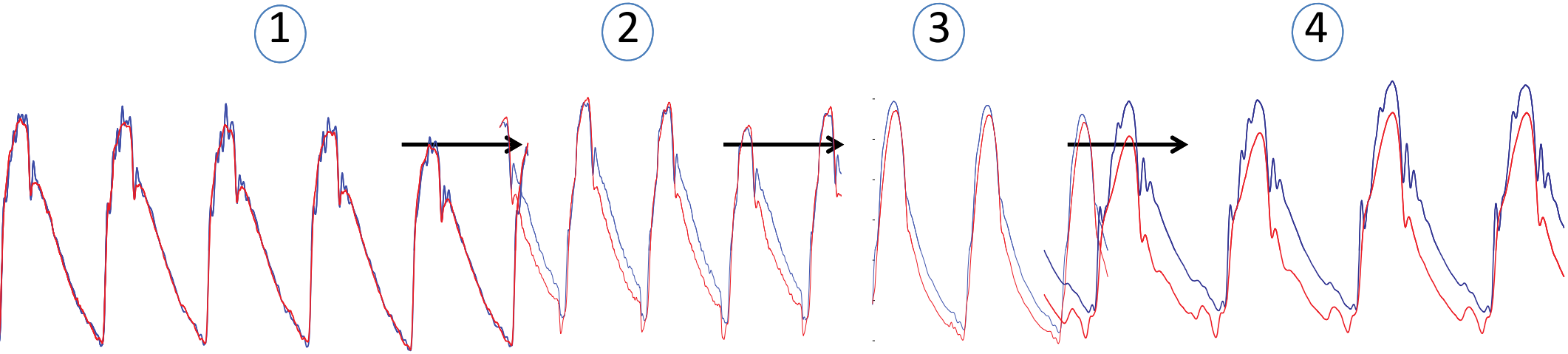


FFR was developed in the early 90´s using a fluid-filled 0.015” hollow guide wire connected to a conventional pressure transducer. Average coronary pressures were used to overcome the limitation of a damped Pd signal.

“The main disadvantage of this fluid-filled system is its inability to measure phasic pressure” “With this fluid-filled guide wire, systolic and diastolic gradients cannot be distinguished”

De Bruyne et al. JACC 1993; 22:119-26

Changes in Pd &Pa with increasing stenosis severity

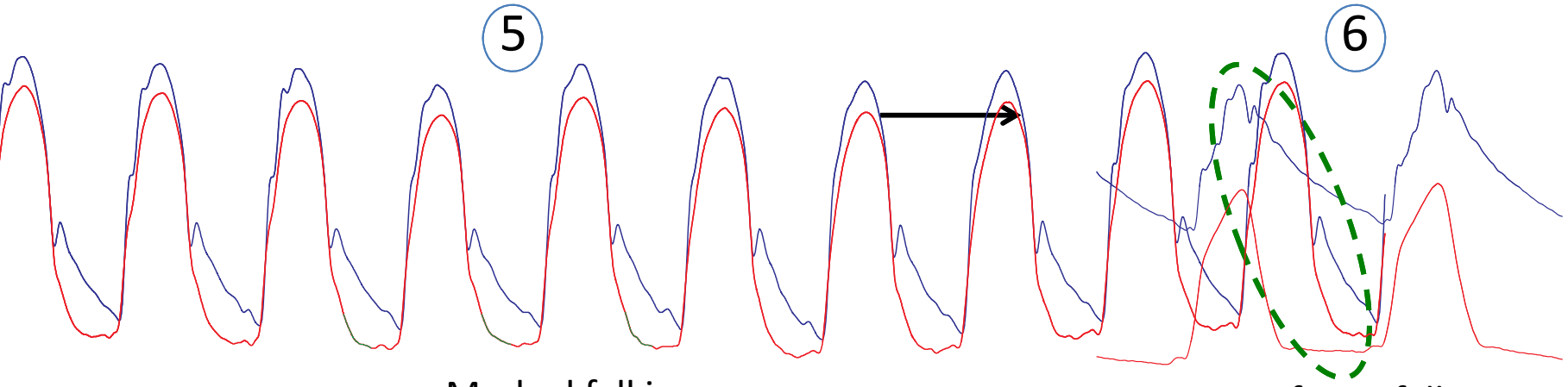


No systolic or diastolic gradient

Mild diastolic gradient

Appearance of systolic gradient

Widening of systolic and diastolic gradient



Marked fall in diastolic gradient

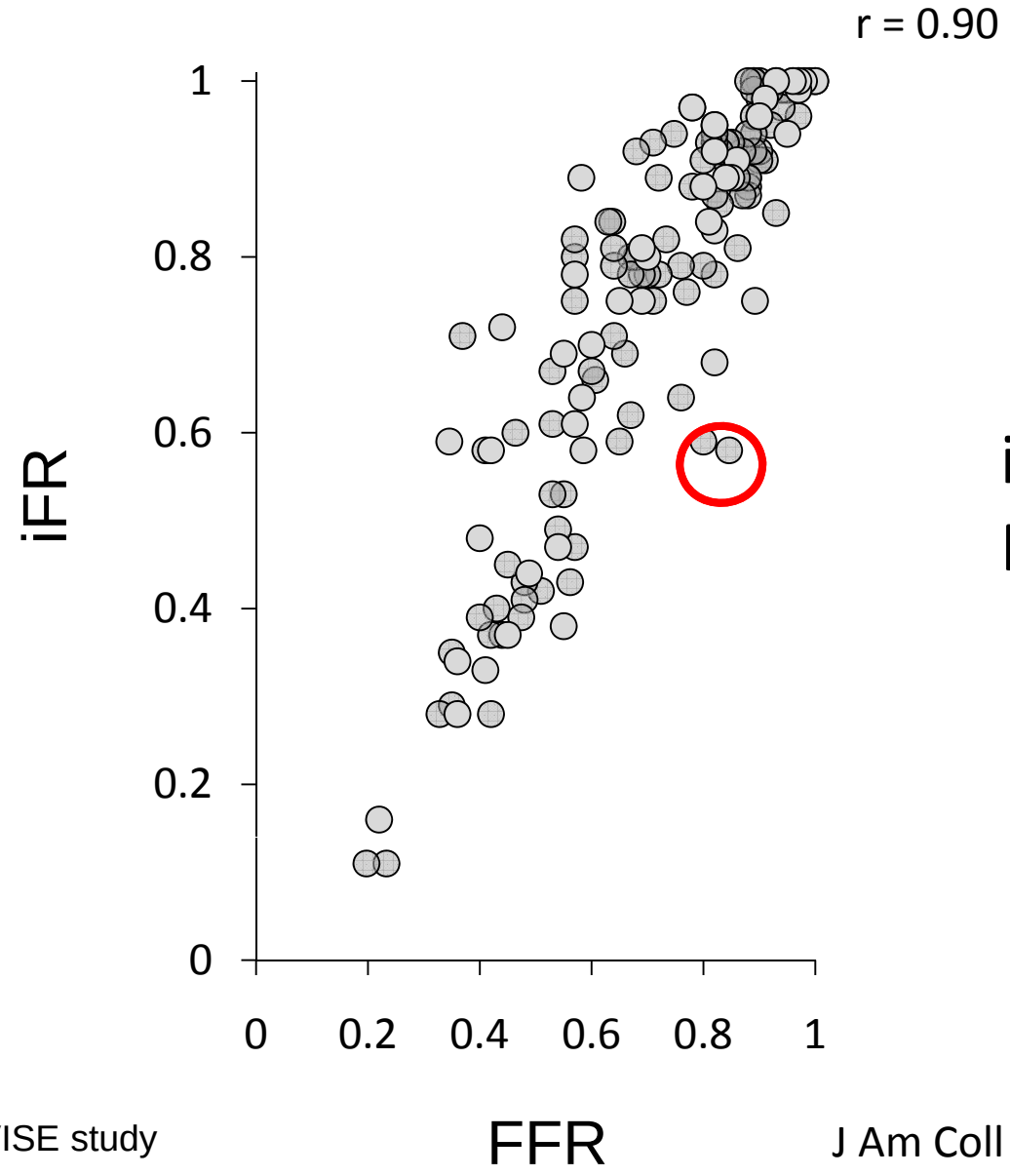
Significant fall in systolic and diastolic gradient

When iFR and FFR disagree what's going on?

Case 1

- Angiographic very severe lesion
- Chest pain on minimal exertion
- Positive exercise tolerance test

Close relationship between iFR and FFR



iFR = 0.57

FFR = 0.81

ADVISE study

J Am Coll Cardiol. 2012 Apr 10;59(15):1392-402

CASE 1

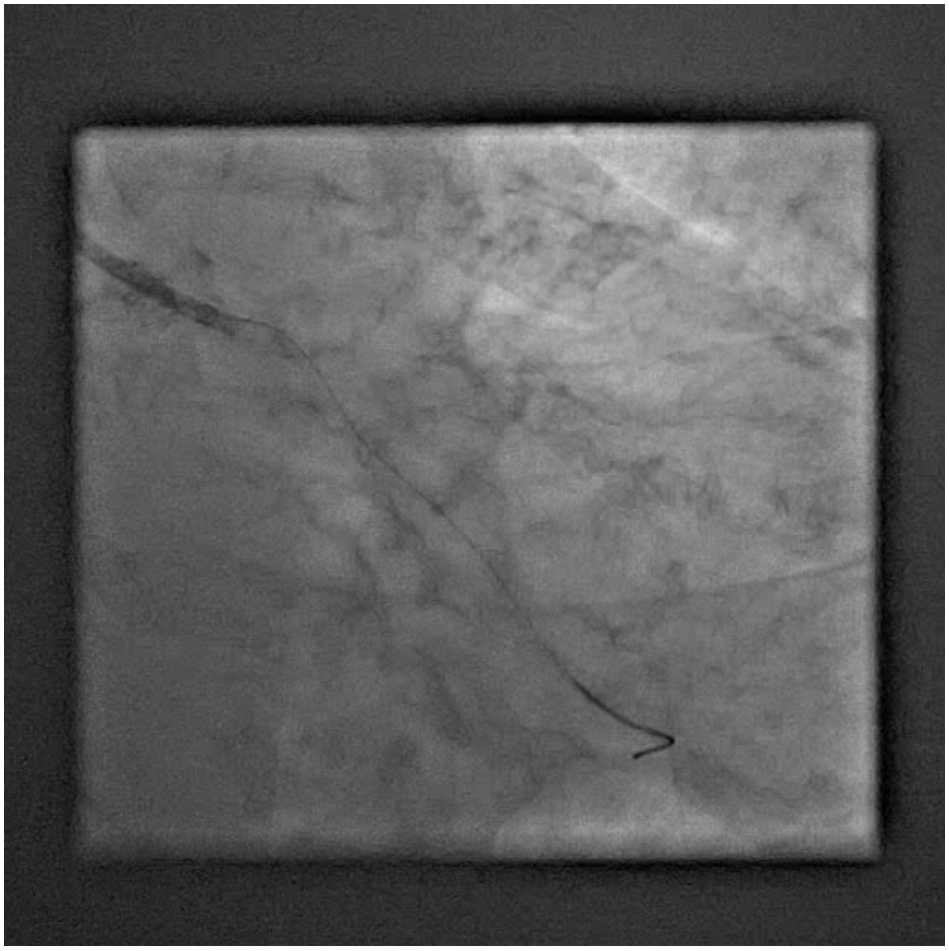
Angiographically severe 1st obtuse marginal branch

Conventional pressure wire assessment

Resting baseline

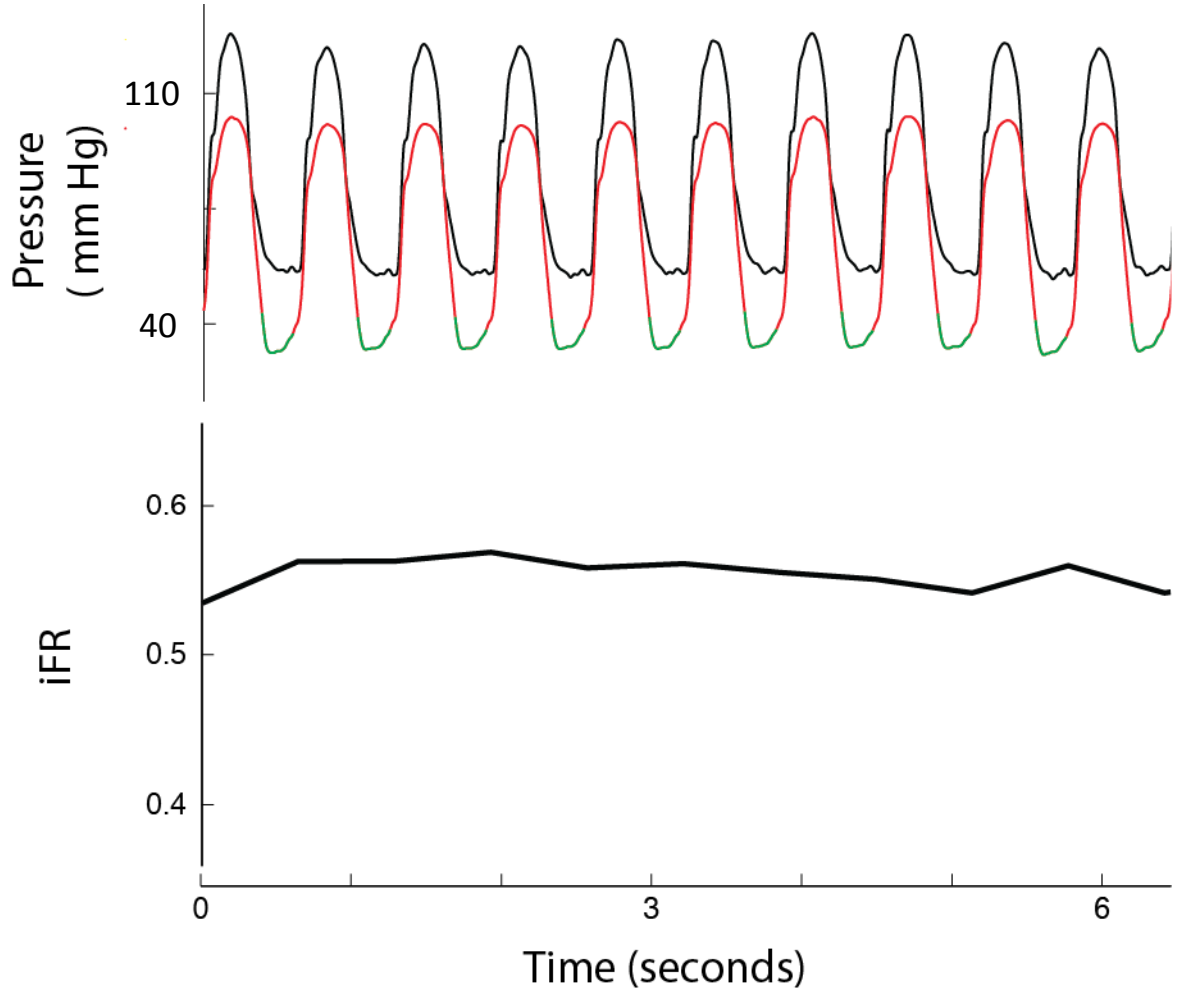
↓

FFR assessment with IV adenosine (140 mcg/kg/min)



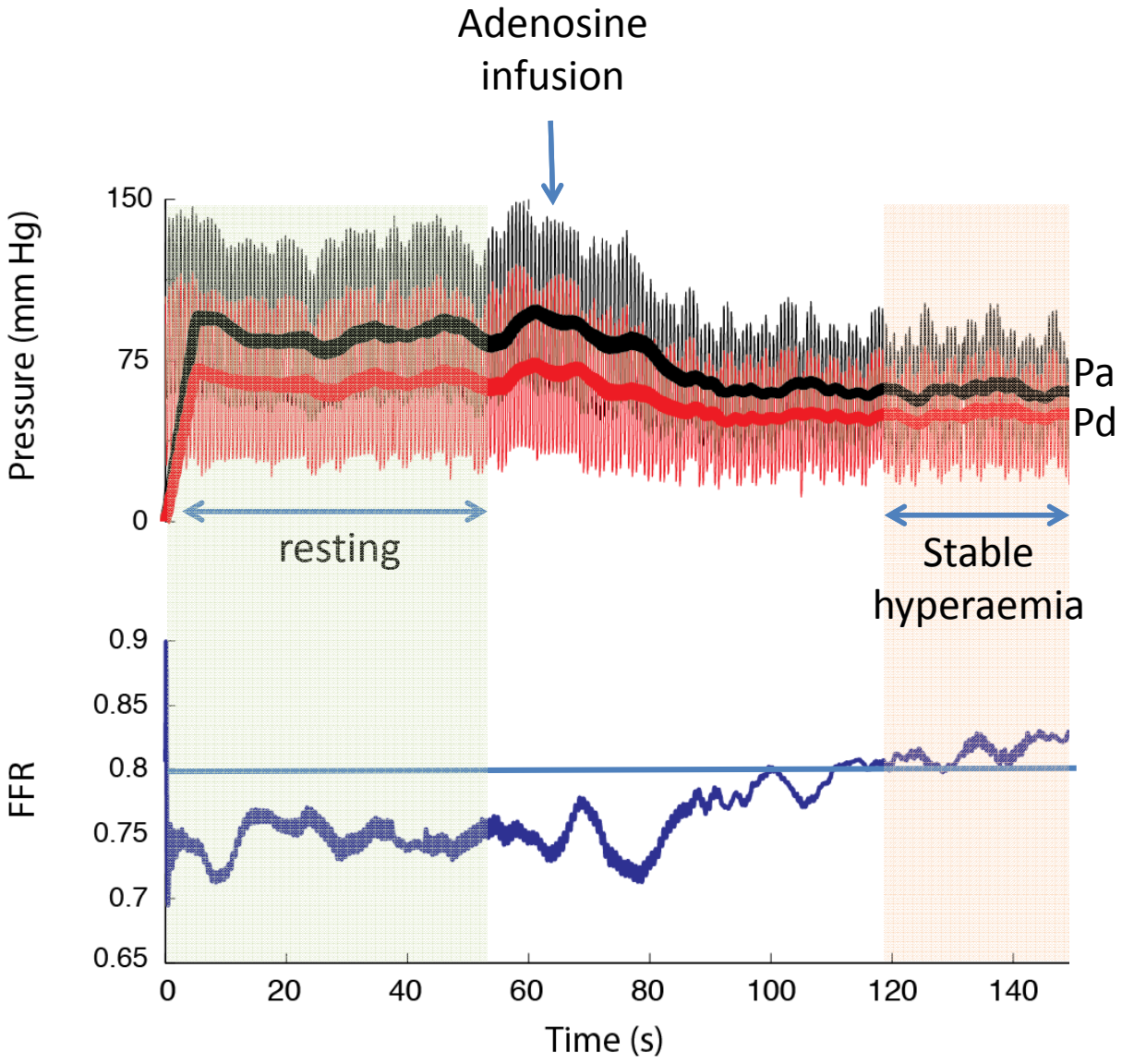
Measurement of iFR: very significant lesion!

CASE 1



iFR = 0.57

CASE 1



Resting Pd/Pa = 0.74

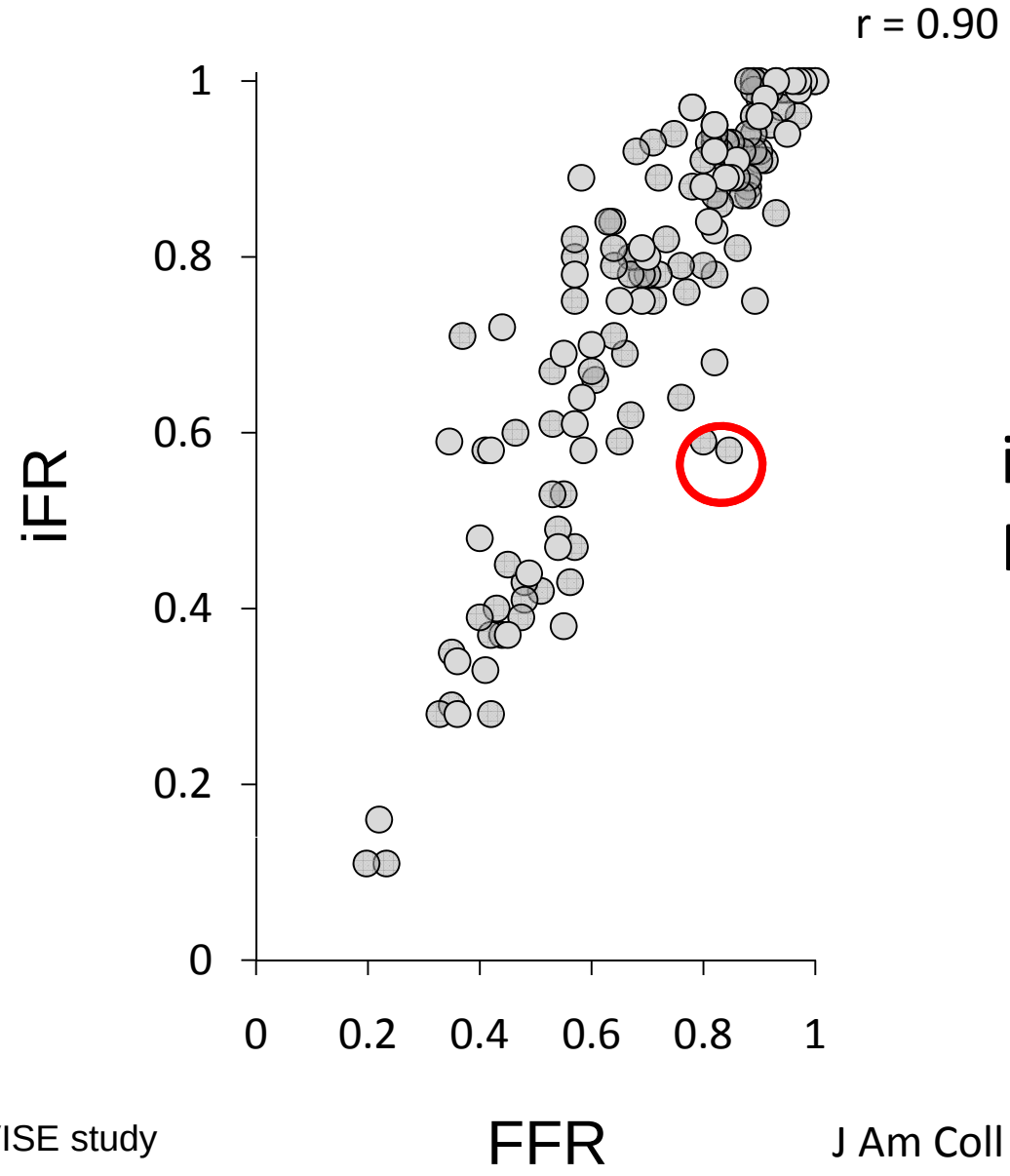
iFR = 0.57

FFR = 0.81

Siebes M, Spaan J, Piek J. et al. Circulation 2005, 111:76-82

Siebes M, Spaan K, Piek J. et al. Am J Physiol Heart Circ Physiol 285:H2194-H2200, 2003

Close relationship between iFR and FFR



iFR = 0.57

FFR = 0.81

ADVISE study

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When iFR and FFR disagree what's going on?

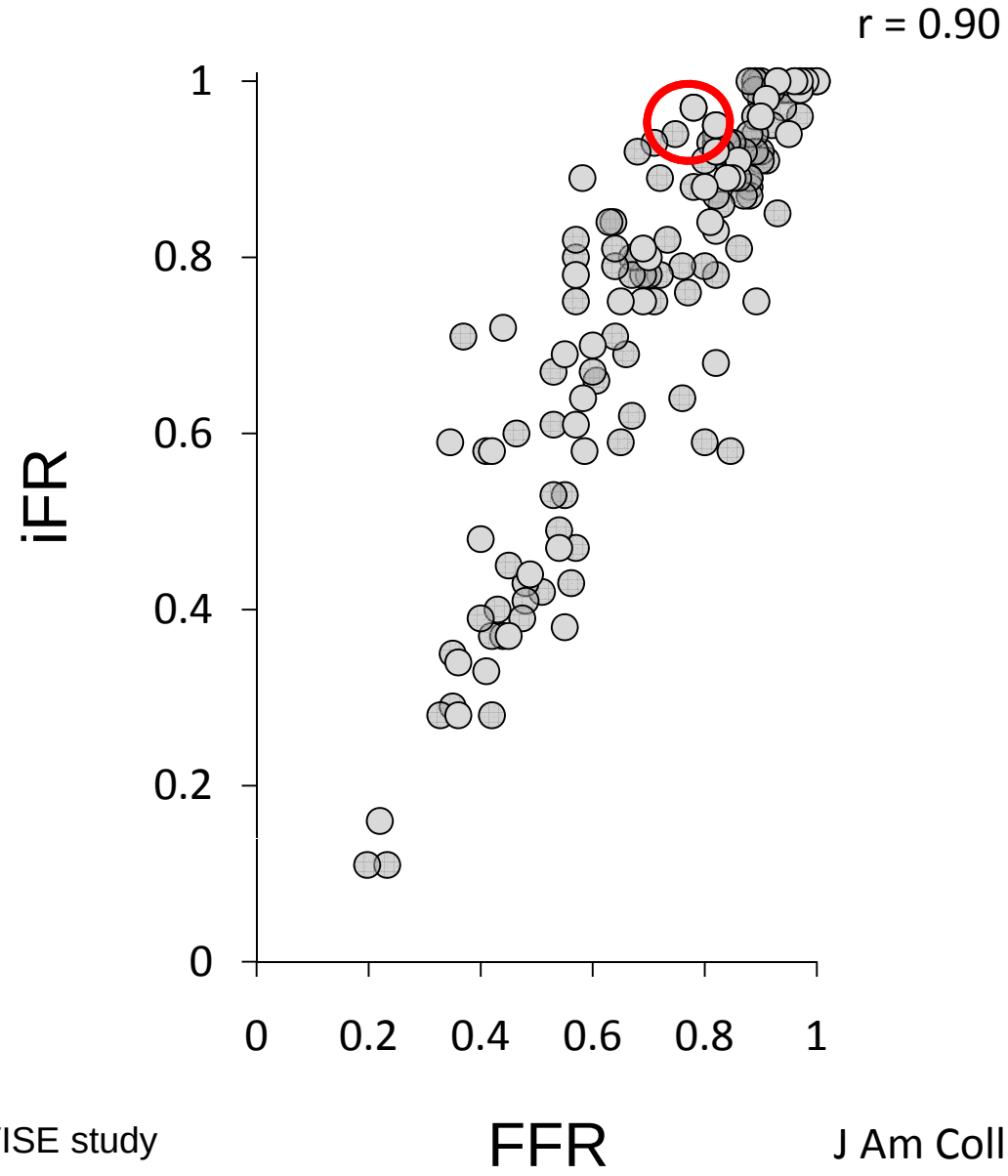
Case 2

- 40 year old
- Angiographic intermediate lesion
- Atypical chest pain
- Inconclusive exercise tolerance test

FFR = 0.79

iFR = 0.95
CFR = 3.5 (abnormal <2)
HSR = 0.24 (abnormal >0.8)

Close relationship between iFR and FFR



Regression coefficient
y=1.022x + 0.03

ADVISE study

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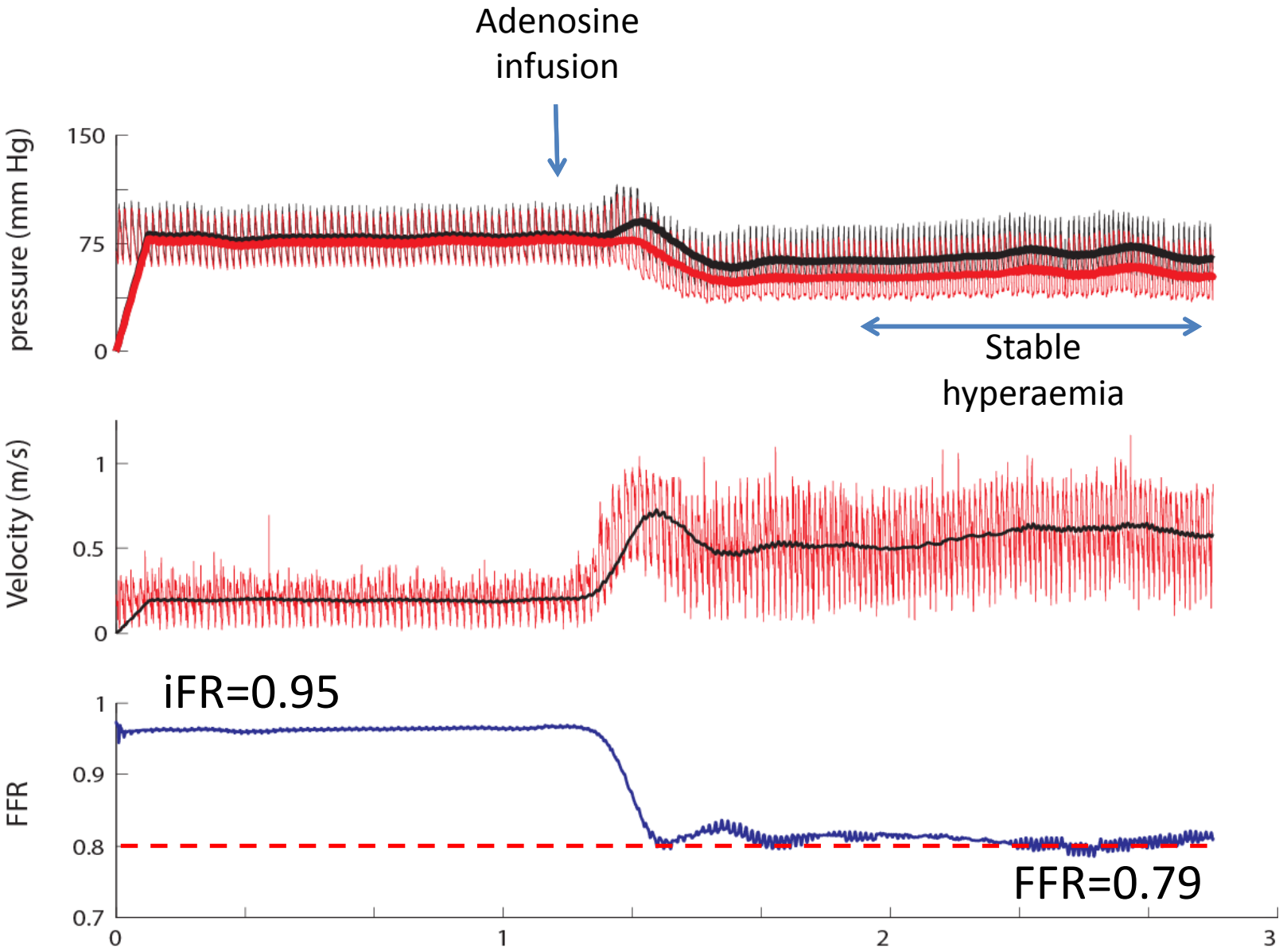

Adenosine
infusion
pressure (mm Hg)
150
75
0
Stable
hyperaemia
Velocity (m/s)
1
0.5
0
iFR=0.95
FFR
1
0.9
0.8
0.7
FFR=0.79
0
1
2
3

BASELINE

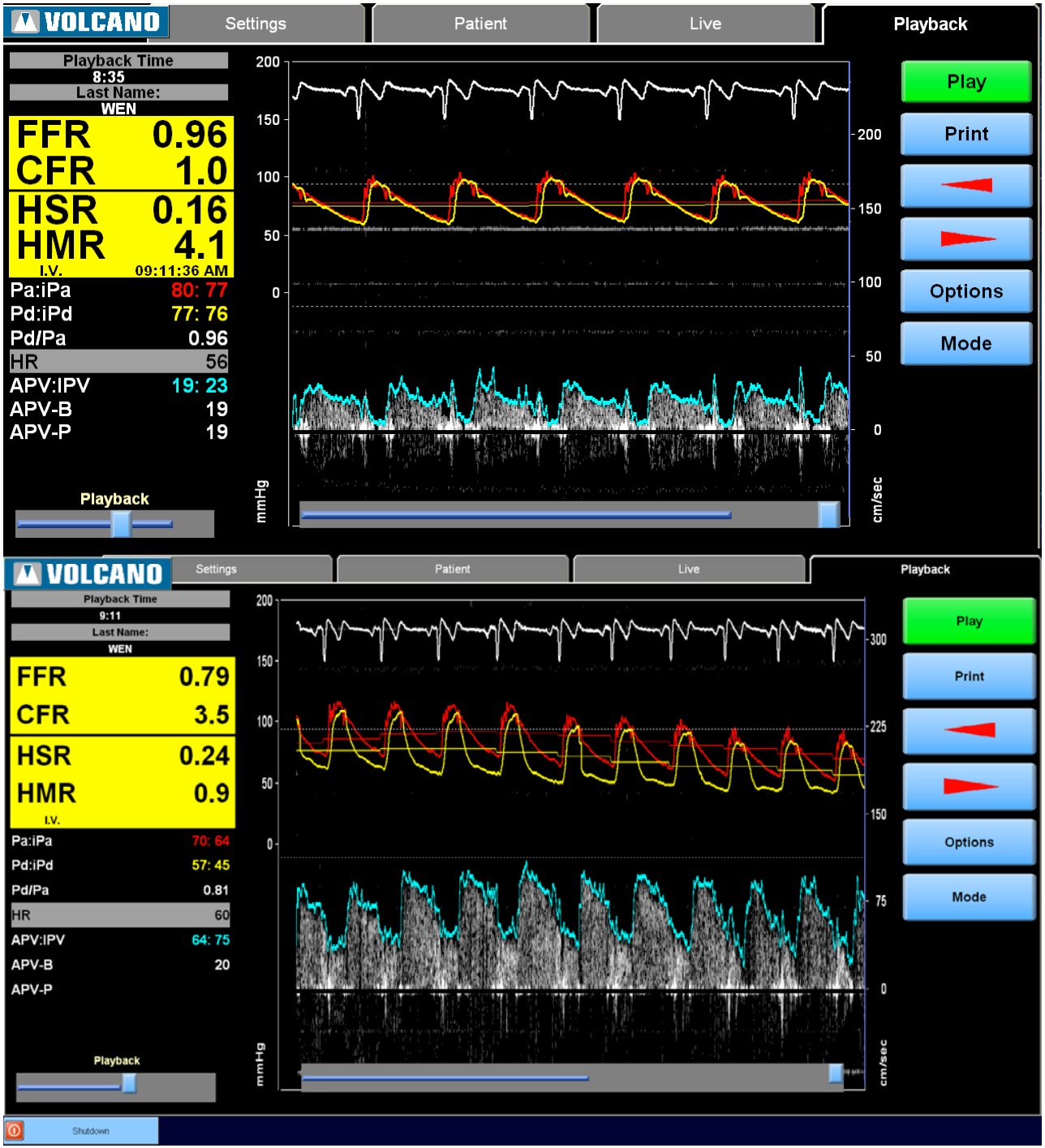
iFR normal

HYPERAEMIA

HSR normal

CFR normal

FFR abnormal



Cardiac Imaging

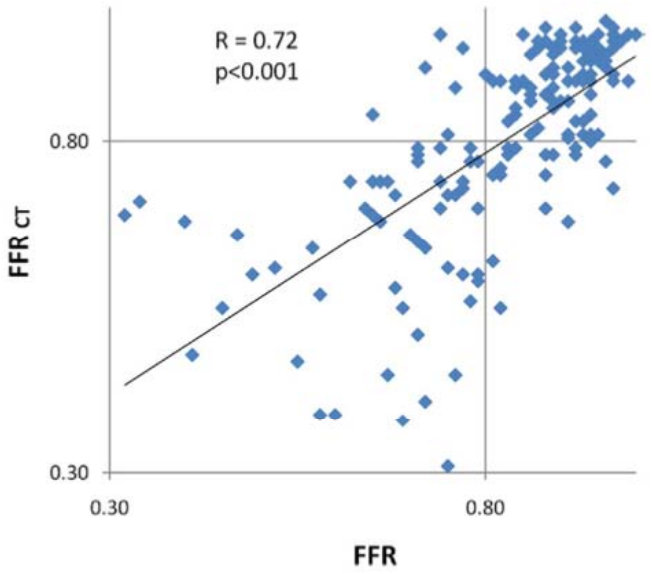
Diagnosis of Ischemia-Causing Coronary Stenoses by Noninvasive Fractional Flow Reserve Computed From Coronary Computed Tomographic Angiograms

Results From the Prospective Multicenter DISCOVER-FLOW (Diagnosis of Ischemia-Causing Stenoses Obtained Via Noninvasive Fractional Flow Reserve) Study

Bon-Kwon Koo, MD, PHD,* Andrejs Erglis, MD, PHD,† Joon-Hyung Doh, MD, PHD,‡ David V. Daniels, MD,§ Sanda Jegere, MD,‖ Hyo-Soo Kim, MD, PHD,* Allison Dunning, MD,¶ Tony DeFrance, MD,# Alexandra Lansky, MD,** Jonathan Leipsic, BSC, MD,†† James K. Min, MD‡‡

Seoul and Goyang, South Korea; Riga, Latvia; Palo Alto, San Francisco, and Los Angeles, California; New York, New York; New Haven, Connecticut; and Vancouver, British Columbia, Canada

HeartFlow

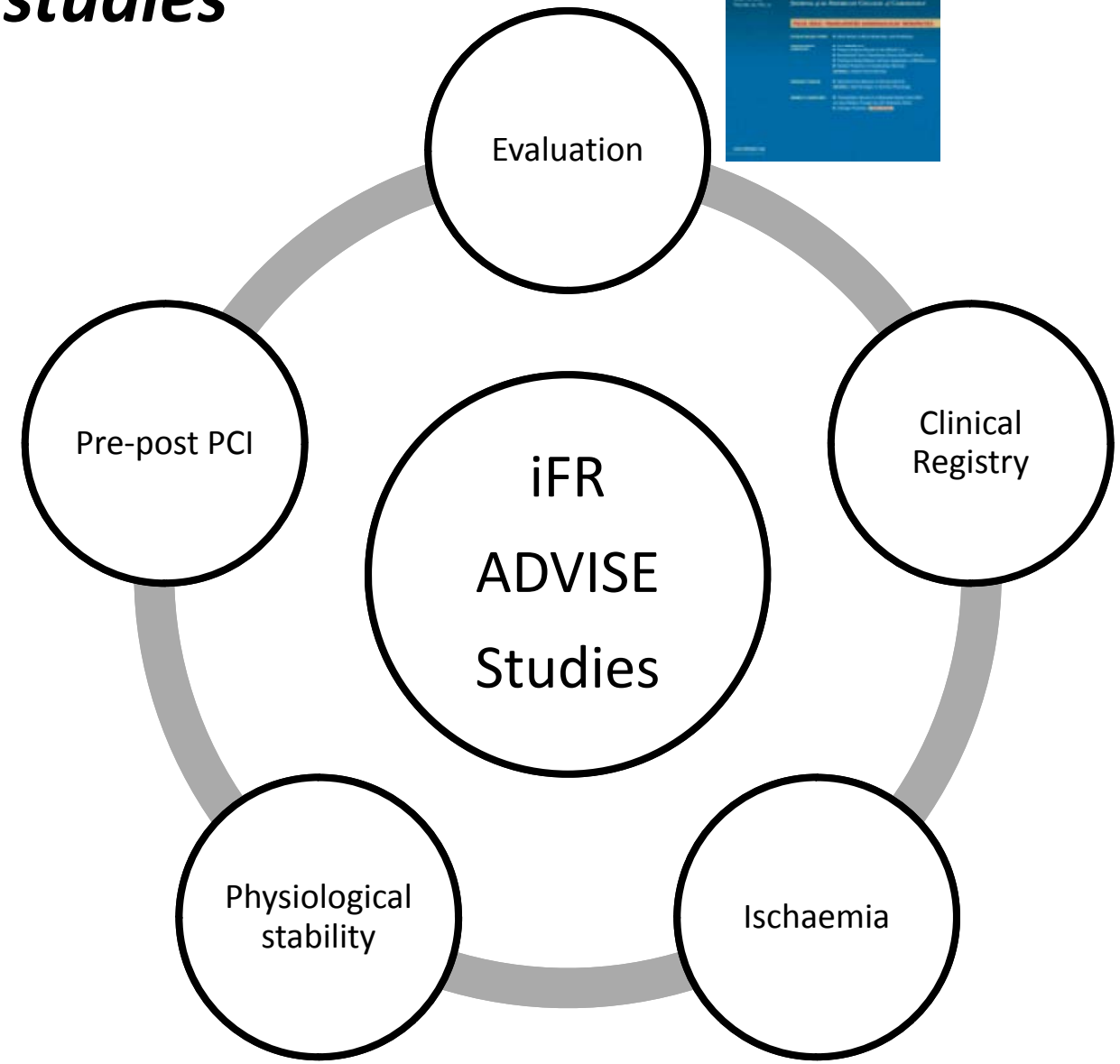


Are the differences we see due to erroneous CT-FFR measurements?

Or identification of the 35% of times when FFR is less certain?

iFR, Goodbye Adenosine?

ADVISE ***studies***



EuroPCR

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ADVISE investigators

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