Place de la FFR dans le SCA

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No potential conflicts of interest to report

FFR AND ACUTE CORONARY SYNDROME
BACKGROUND

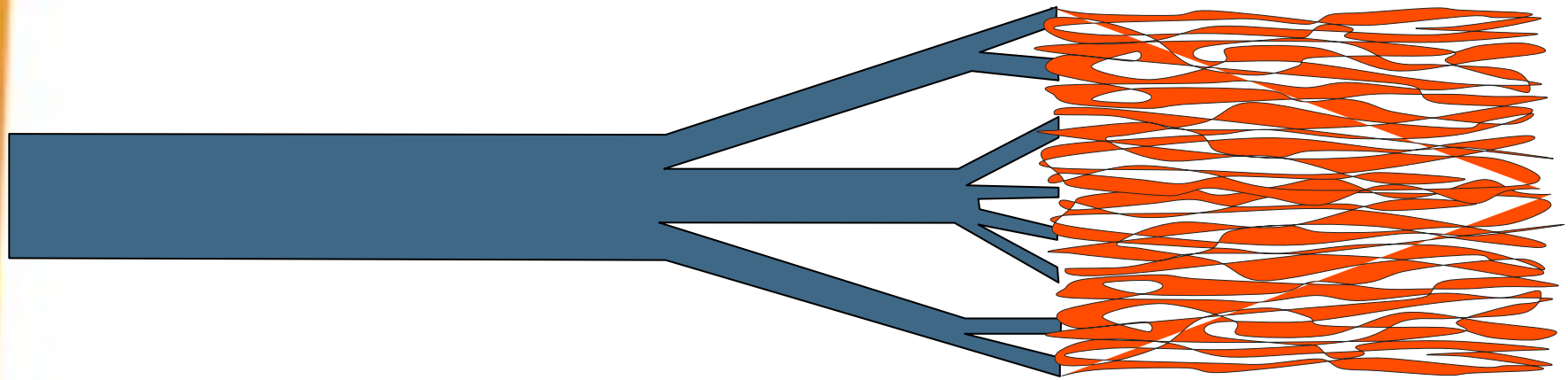
- The use of a FFR to guide revascularization strategy is nowadays supported by **robust outcome clinical data** in patients undergoing **elective PCI**.

- However, doubts remain about **interpretation** and **reliability** of **FFR measurements** to assess **culprit** and **non-culprit arteries** and guide revascularization decisions in patients with **acute coronary syndrome**.

FFR AND MYOCARDIAL MICROVASCULAR FUNCTION

EPICARDIAL = CONDUCTANCE
ARTERIES > 550 µ

MICROVASCULATURE = RESISTANCE
ARTERIES < 550 µ

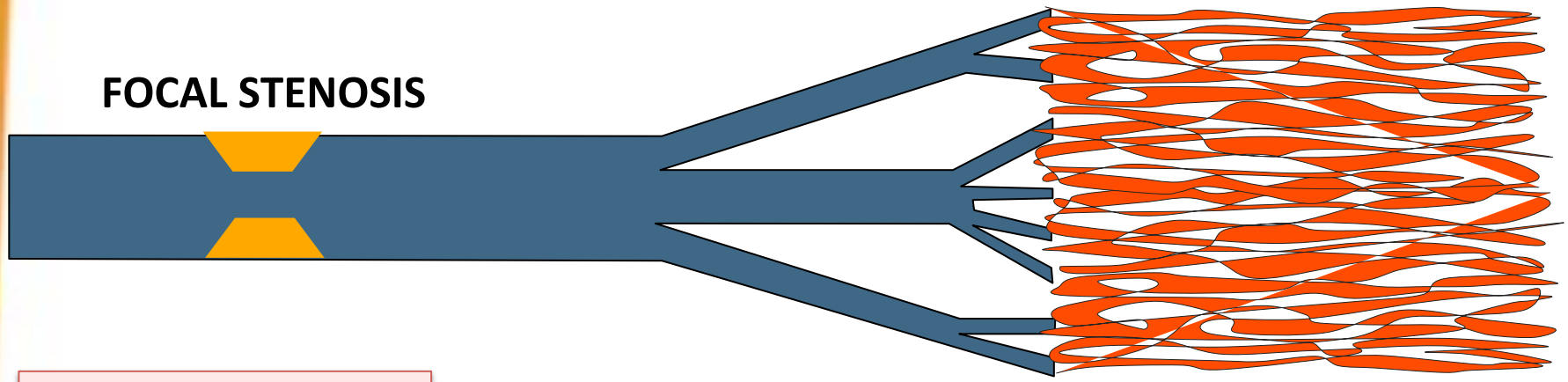


Muller O, De Bruyne B, Oxford Textbook of Interventional Cardiology

FFR AND MYOCARDIAL MICROVASCULAR FUNCTION

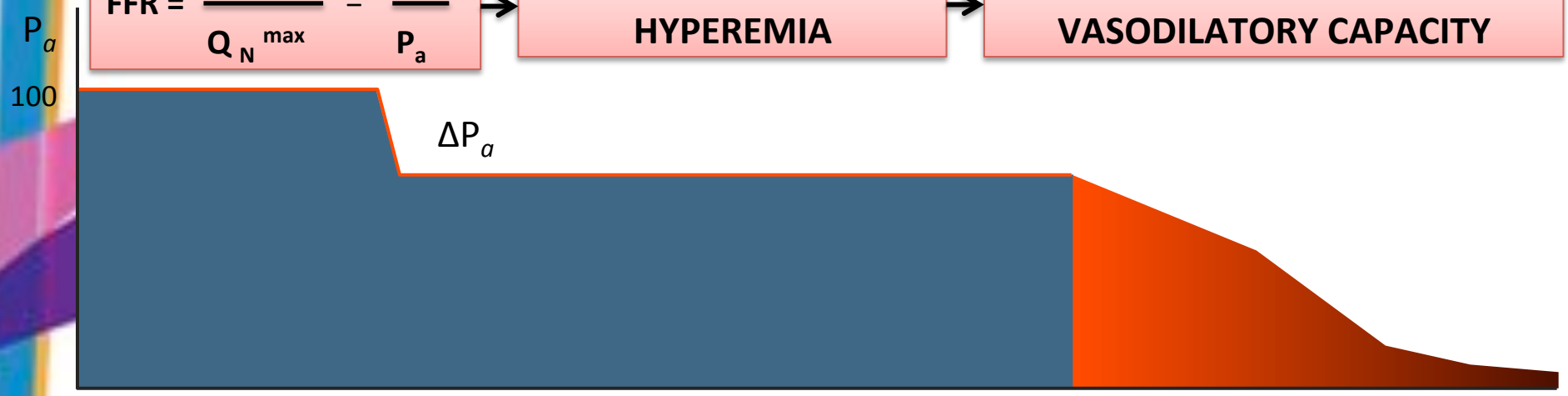
EPICARDIAL = CONDUCTANCE ARTERIES > 550 µ

MICROVASCULATURE = RESISTANCE ARTERIES < 550 µ



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

→ MAXIMAL CORONARY HYPEREMIA → PRESERVED MICROCIRCULATION VASODILATORY CAPACITY



Muller O, De Bruyne B, Oxford Textbook of Interventional Cardiology

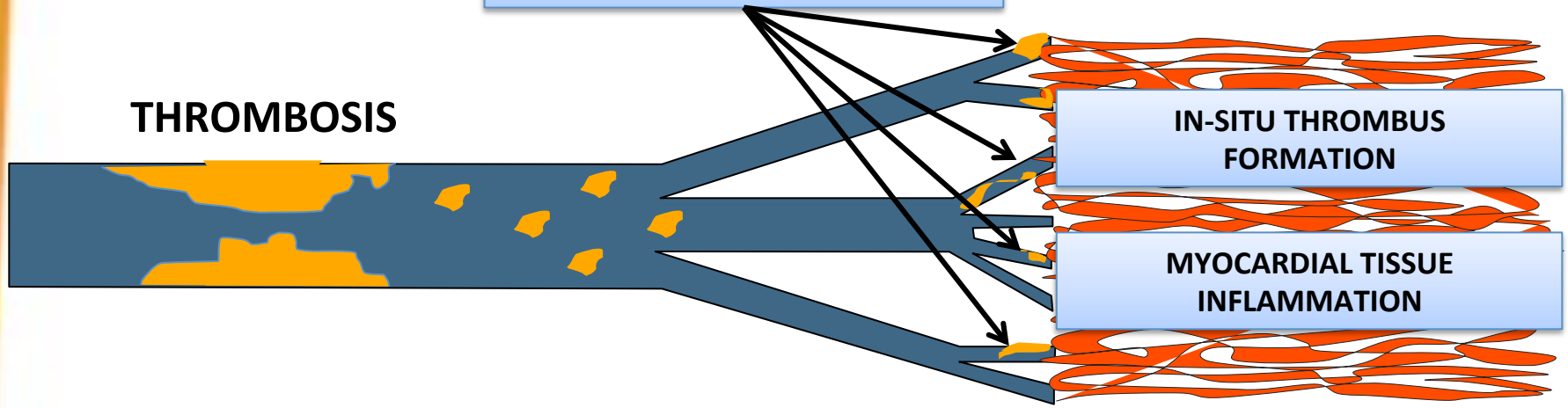
FFR AND MYOCARDIAL MICROVASCULAR FUNCTION

EPICARDIAL = CONDUCTANCE ARTERIES > 550 µ

DISTAL EMBOLIZATION

MICROVASCULATURE = RESISTANCE ARTERIES < 550 µ

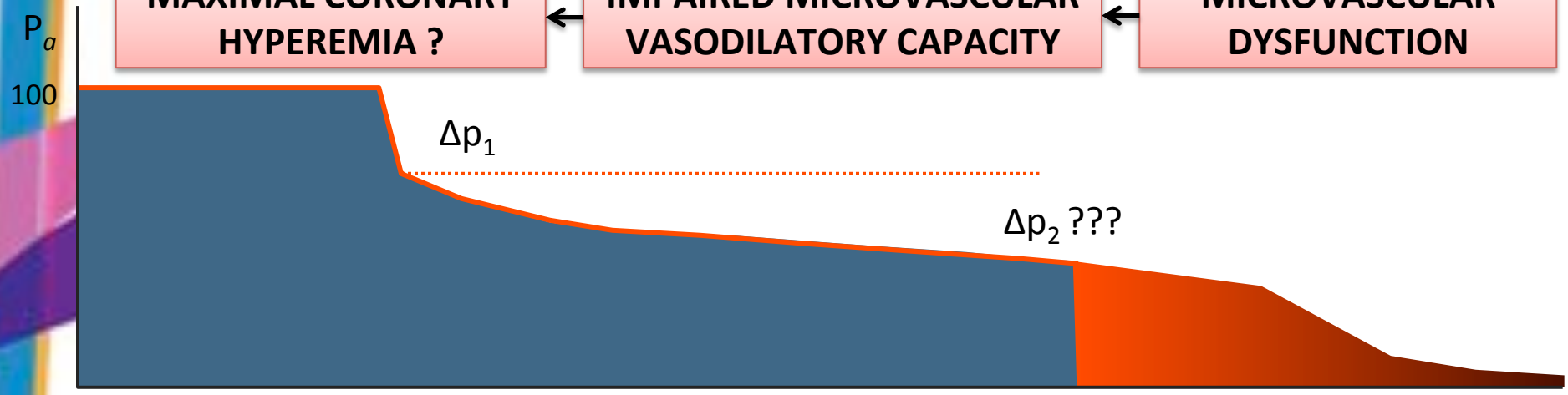
THROMBOSIS



IN-SITU THROMBUS FORMATION

MYOCARDIAL TISSUE INFLAMMATION

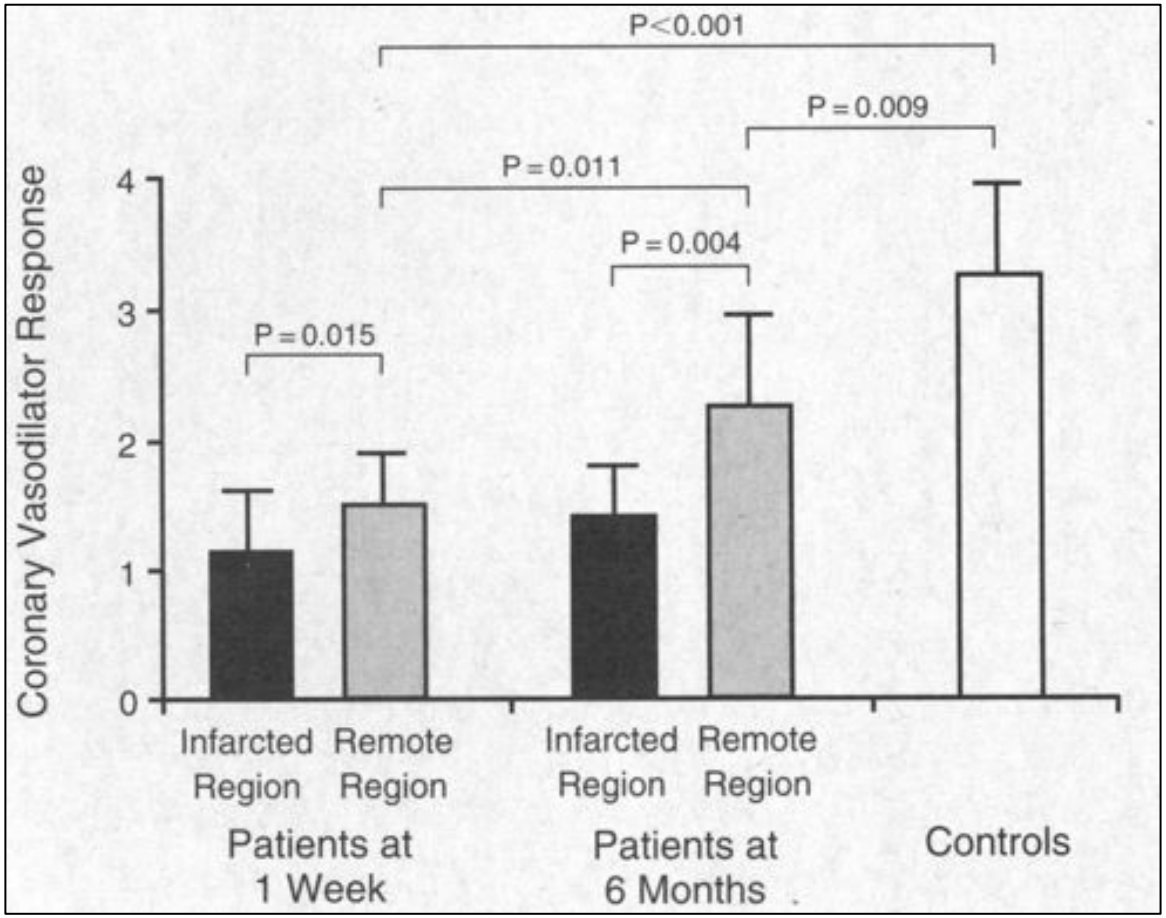
MICROVASCULAR DYSFUNCTION → **IMPAIRED MICROVASCULAR VASODILATORY CAPACITY** → **MAXIMAL CORONARY HYPEREMIA ?**



Adapted from: Muller O, De Bruyne B, Oxford Textbook of Interventional Cardiology

MICROCIRCULATION VASODILATORY CAPACITY IN ACS

13 PATIENTS, 1VD AFTER THROMBOLYSIS FOR STEMI, BASELINE AND STRESS REGIONAL MYOCARDIAL BLOOD FLOW ASSESSED BY PET STUDY IN IRA AND REMOTE MYOCARDIAL REGION AT 1 WEEK AND 6 MONTHS



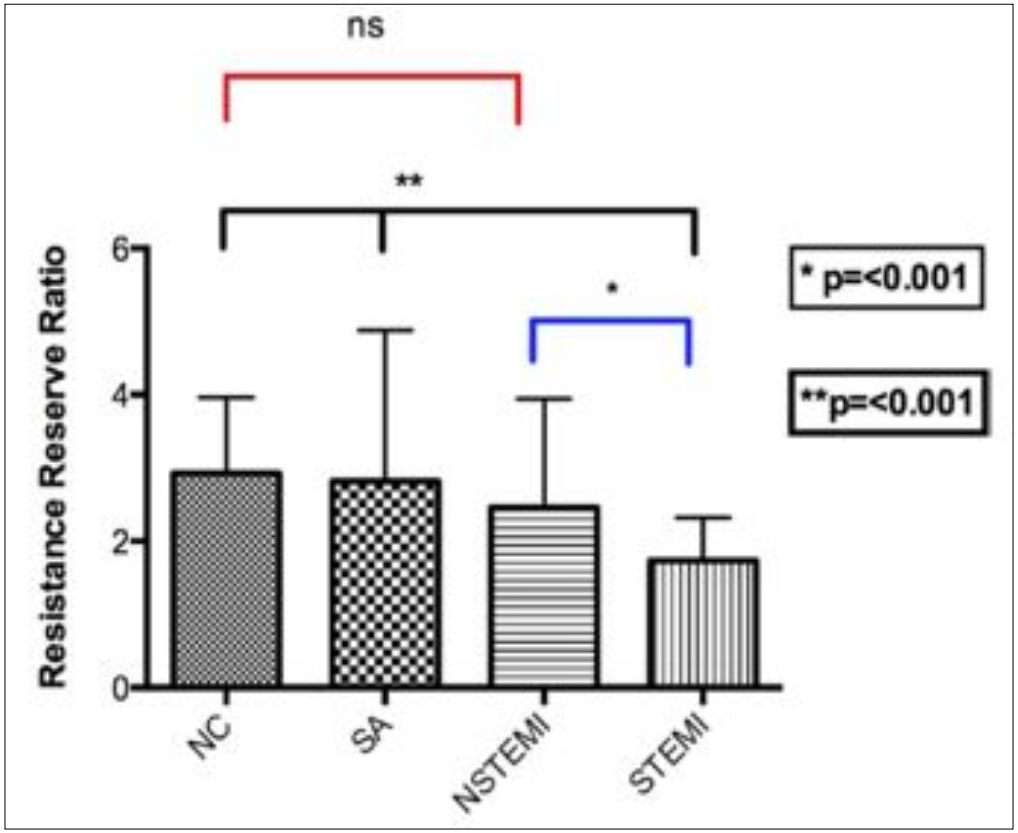
Uren NG, N Engl J Med 1994

MICROCIRCULATION VASODILATORY CAPACITY IN ACS
STEMI vs. NSTEMI

140 PATIENTS WITH 1VD, PCI FOR STABLE ANGINA (N=50), NSTEMI (N=50, 4.2 DAYS) OR STEMI (N=40, 0.1 DAY). IMR, FFR AND CFR BEFORE PCI IN CULPRIT AND NON-CULPRIT ARTERIES

RESISTANCE RESERVE RATIO (RRR) = BASELINE RESISTANCE INDEX / INDEX OF MICROVASCULAR RESISTANCE (IMR)

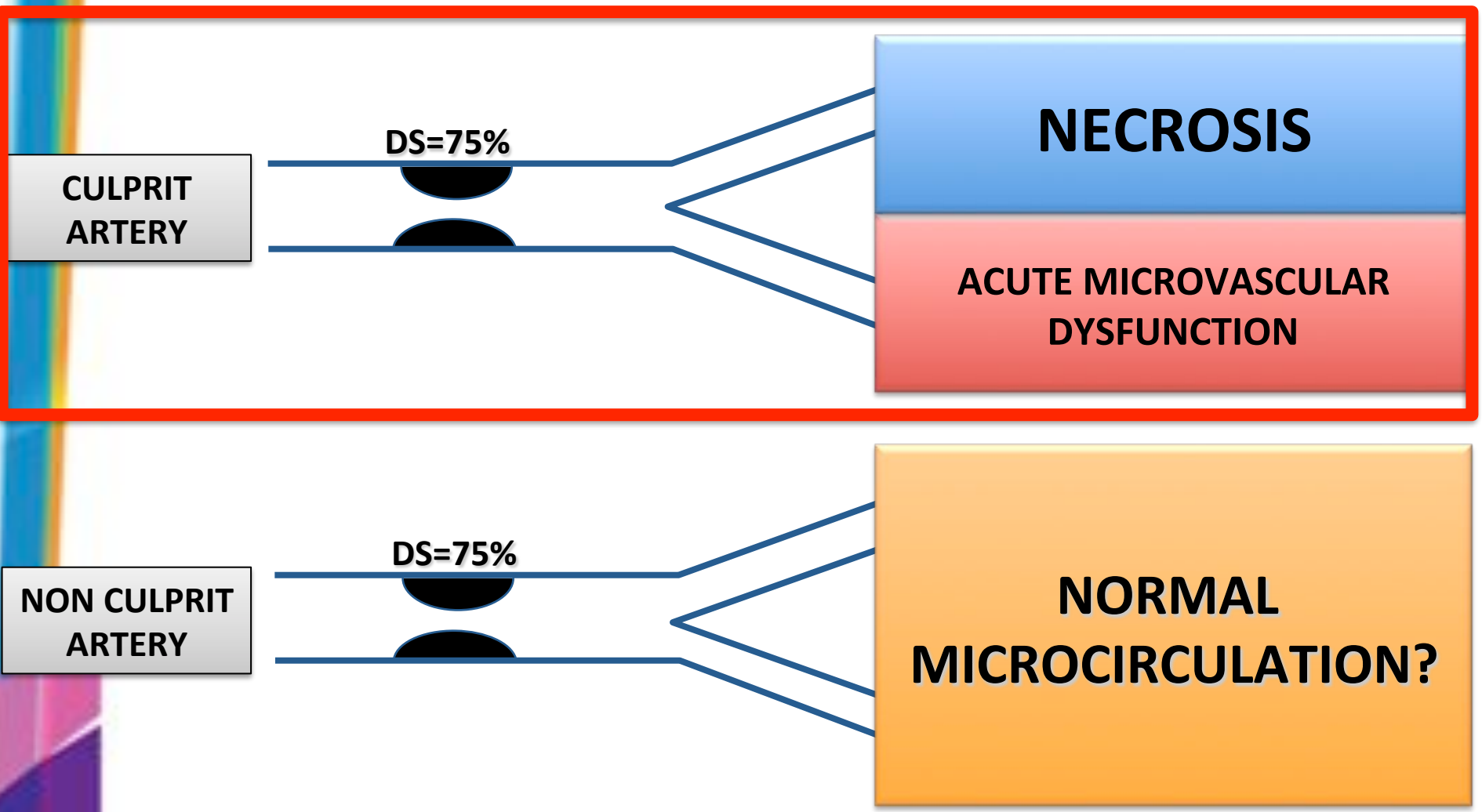
MEDIAN RESISTANCE RESERVE RATIO ACROSS PATIENT SUBGROUPS



Layland J, Circ Cardiovasc Interv. 2013

FFR AND ACUTE CORONARY SYNDROME

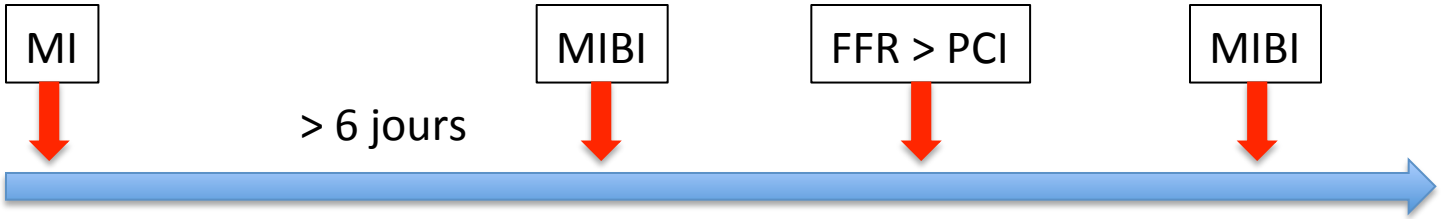
ACUTE MYOCARDIAL INFARCTION



RELIABILTY AND CLINICAL BENEFIT OF FFR MEASUREMENTS IN CULPRIT AND NON CULPRIT ARTERY?

FFR AFTER RECENT MI
CULPRIT ARTERY

57 patients



De Bruyne B, Circulation 2001

FFR AFTER RECENT MI

CULPRIT ARTERY

57 PATIENTS, **RECENT MI (≥6 DAYS**, MEAN: 20 DAYS, 60% STEMI),
BASELINE SPECT MYOCARDIAL PERFUSION IMAGING AND FFR OF IRA BEFORE AND AFTER PCI

RELATIONSHIP BETWEEN FFR AND SPECT IMAGING BEFORE AND AFTER PCI AMONG PATIENTS WITH TRULY POSITIVE AND TRULY NEGATIVE SPECT IMAGING

	MIBI + n = 40	MIBI - n = 40
FFR≥0.75 n = 45	5	40
FFR<0.75 n = 35	35	0

Concordance = 94%

κ = 0.87; P<0.0001

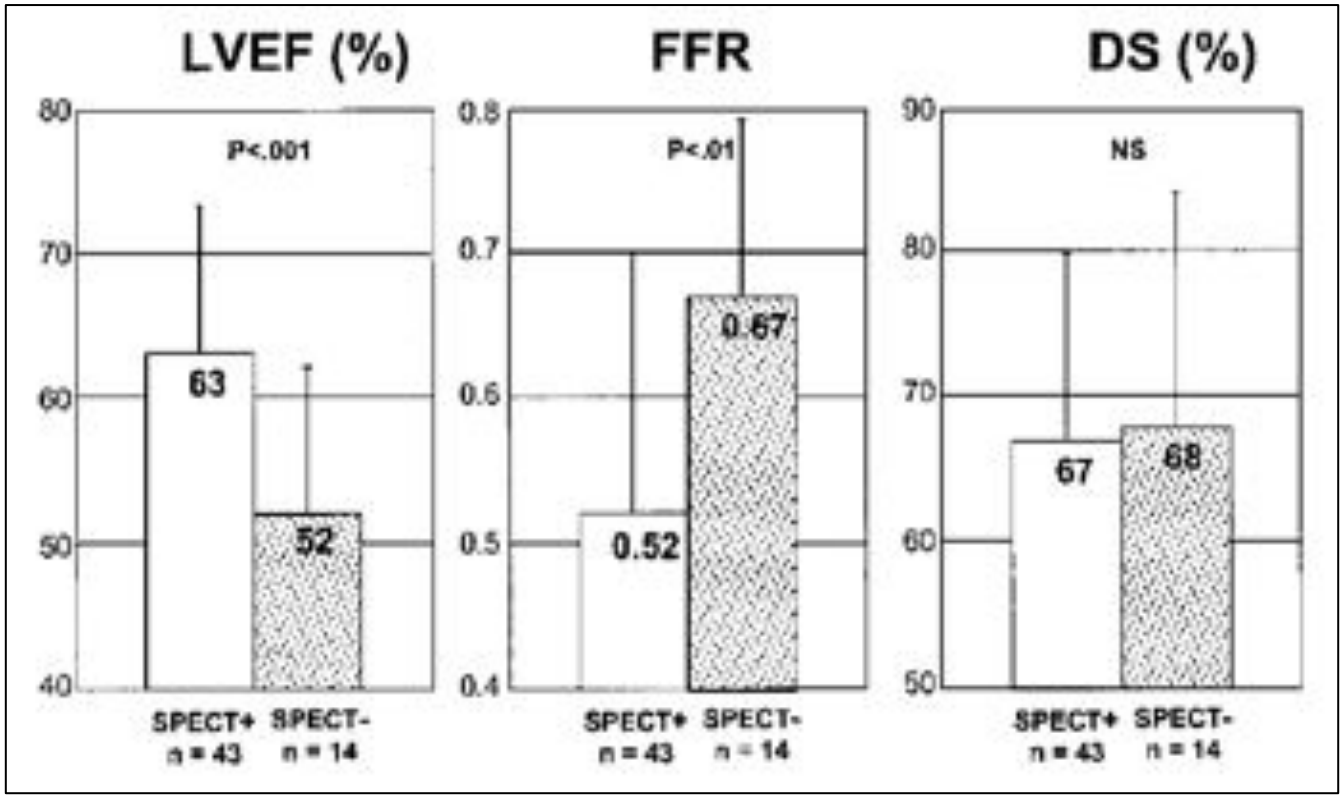
De Bruyne B, Circulation 2001

FFR AFTER RECENT MI

CULPRIT ARTERY

57 PATIENTS, **RECENT MI (≥6 DAYS**, MEAN: 20 DAYS, 60% STEMI),
BASELINE SPECT IMAGING AND FFR OF IRA BEFORE AND AFTER PCI

RELATIONSHIP BETWEEN LVEF, FFR AND DS WITH SPECT IMAGING

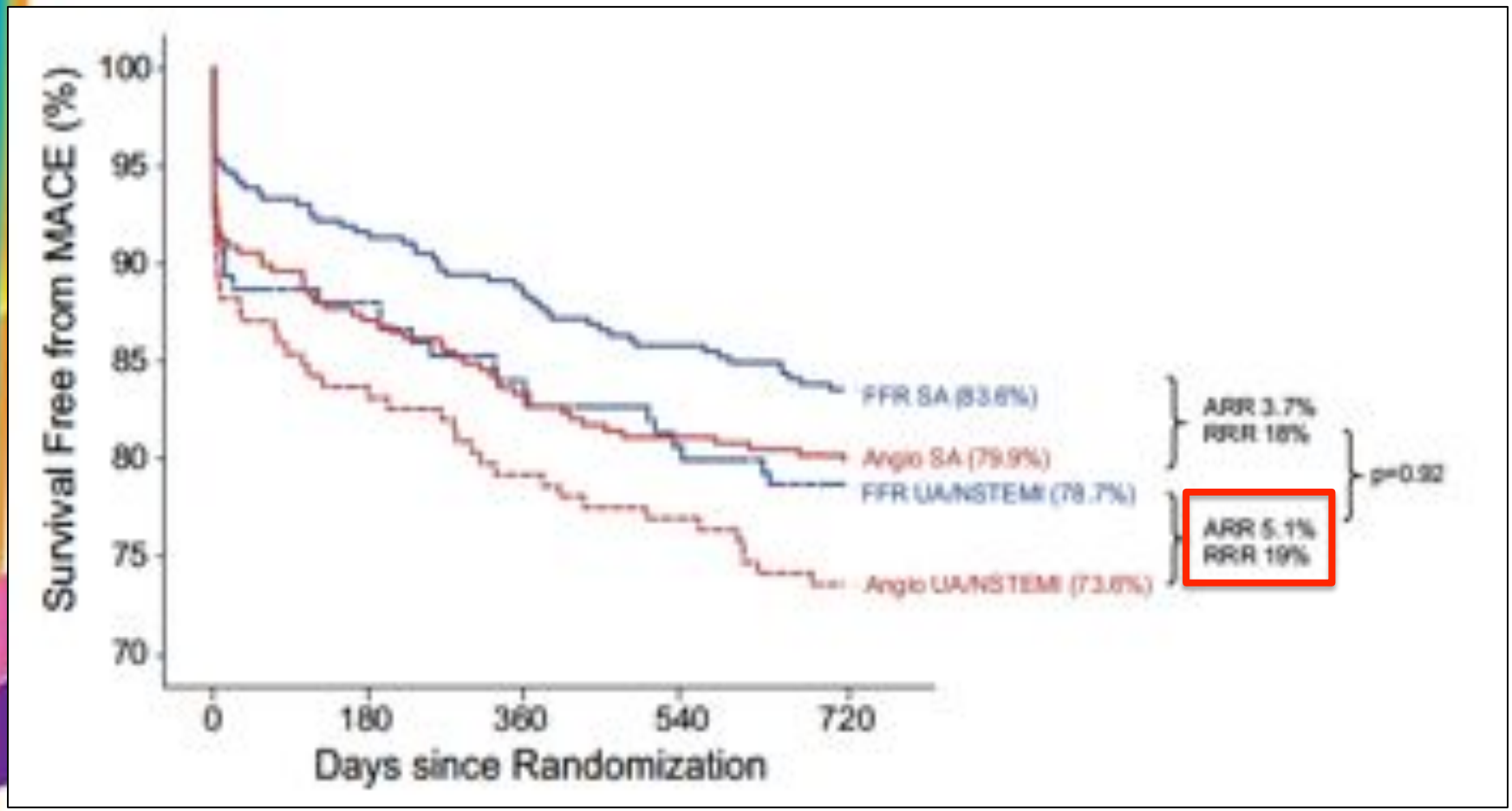


FOR A SIMILAR DEGREE OF STENOSIS, THE VALUE OF FFR DEPENDS ON THE **MASS OF VIABLE MYOCARDIUM**

De Bruyne B, Circulation 2001

FFR IN ACUTE CORONARY SYNDROME
SUBANALYSIS OF THE FAME TRIAL

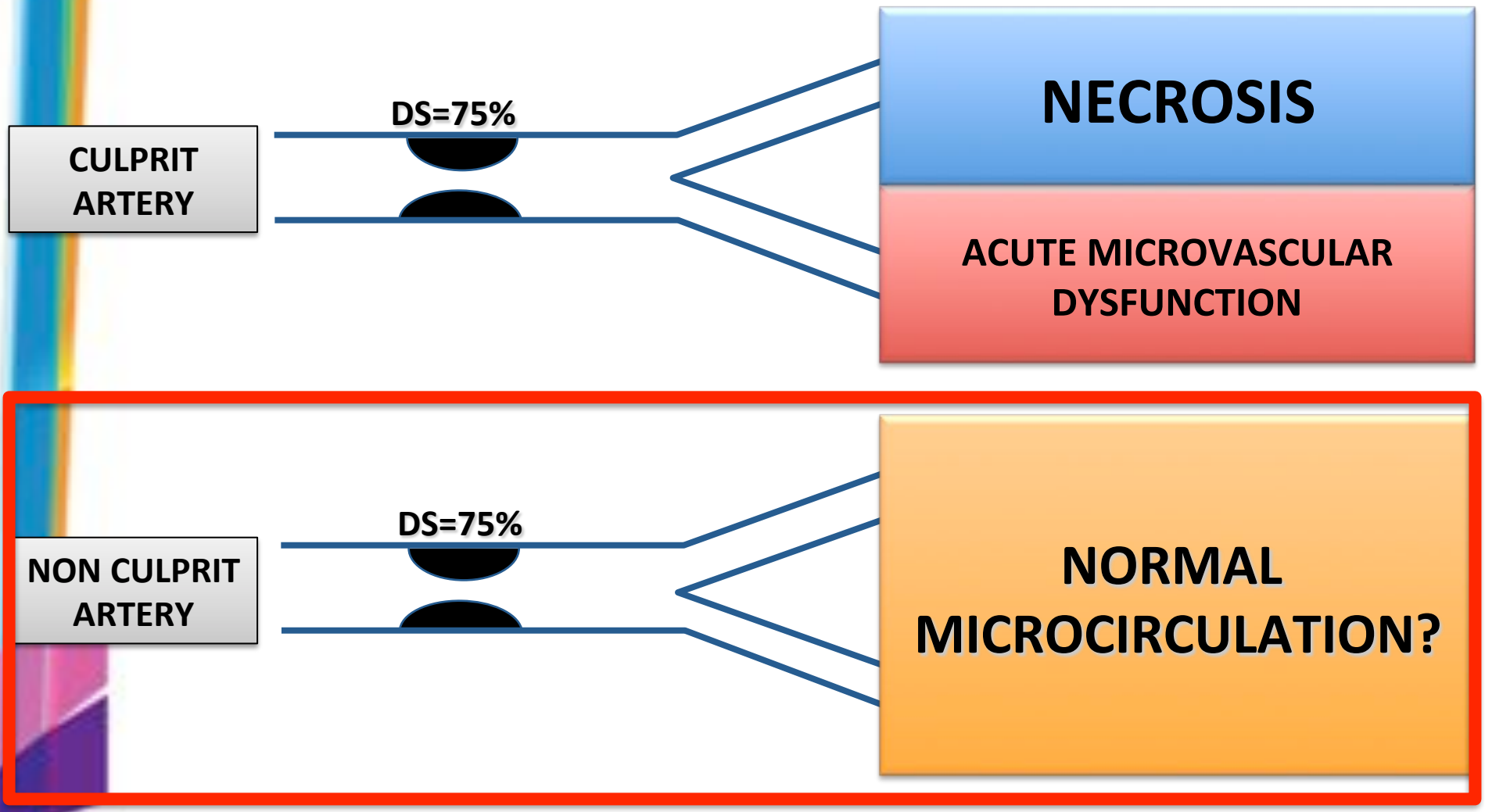
328 PATIENTS WITH UA / NSTEMI (POSITIVE TROPONIN, PEAK CREATINE KINASE <1'000 IU)
AND MULTIVESSEL CORONARY ARTERY DISEASE



Sels JW, JACC Cardiovasc Interv. 2011

FFR AND ACUTE CORONARY SYNDROME

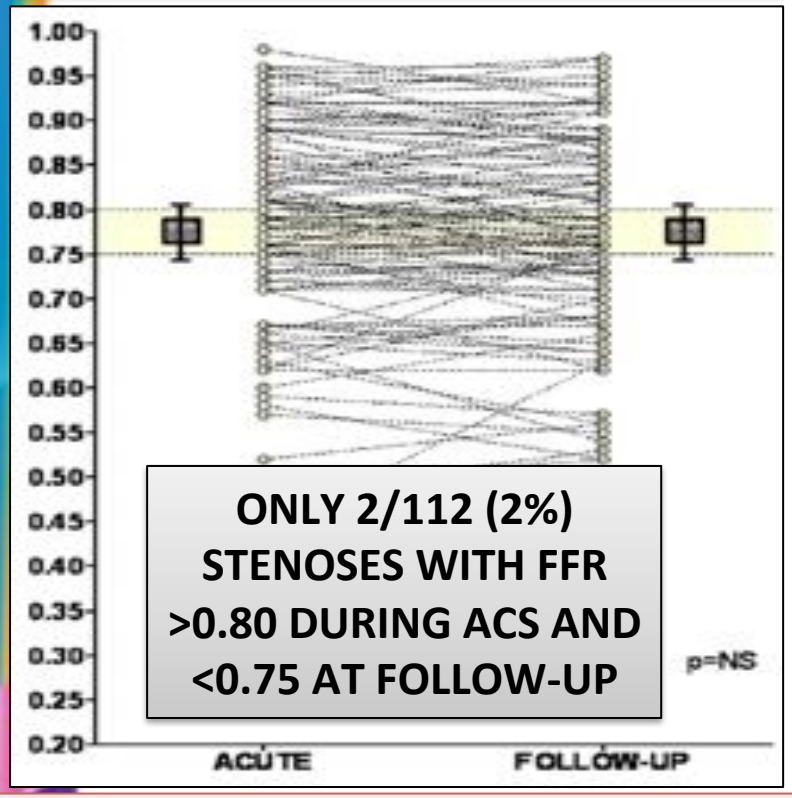
ACUTE MYOCARDIAL INFARCTION



FFR DURING ACUTE MI
NON-CULPRIT ARTERY

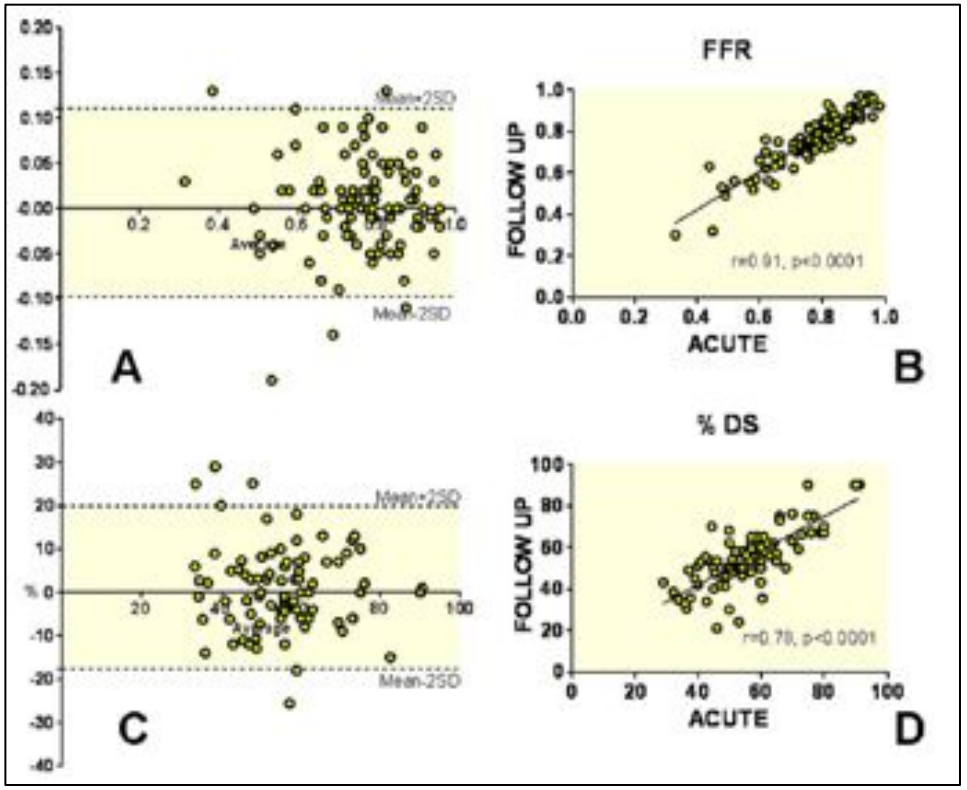
101 PATIENTS WITH ACS (STEMI 74%, NSTEMI 26%), FFR OF 112 NON-CULPRIT STENOSES AT DAY 0 AND 35 ± 4

FFR OF NONCULPRIT ARTERY STENOSES DURING ACUTE PHASE AND FOLLOW-UP



ONLY 2/112 (2%) STENOSES WITH FFR >0.80 DURING ACS AND <0.75 AT FOLLOW-UP

CORRELATION FOR FFR AND DIAMETER STENOSIS (%) DURING ACUTE PHASE AND FOLLOW-UP



FFR MEASUREMENTS IN NON-CULPRIT ARTERIES DURING ACS:

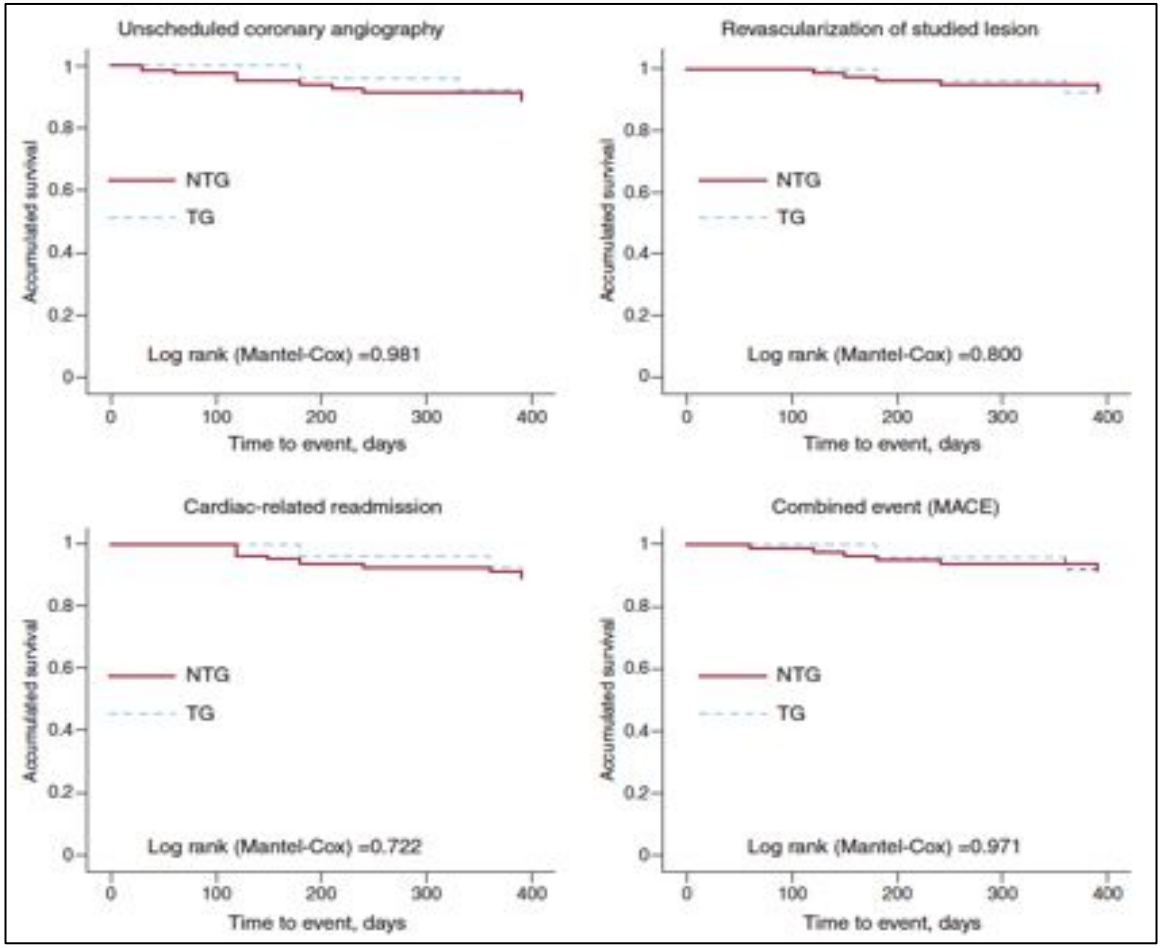
- ARE **RELIABLE** FOR EVALUATING SEVERITY OF NONCULPRIT STENOSES DURING PRIMARY PCI
- MAY **IMPROVE RISK STRATIFICATION** AND **HASTEN CLINICAL DECISION-MAKING** ABOUT THE NEED FOR ADDITIONAL MYOCARDIAL REVASCULARIZATION AFTER ACUTE MI

Ntalianis A, JACC Cardiovasc Interv. 2010

FFR DURING ACUTE MI
NON-CULPRIT ARTERY AND OUTCOME

107 PATIENTS WITH ACS (NSTEMI 90%, STEMI 10%), 100% PCI OF IRA, FFR IN ANGIOGRAPHICALLY INTERMEDIATE NON-CULPRIT ARTERY, TREATED (FFR <0.75, 24%) vs. DEFERRED (FFR ≥0.75, 76%) PATIENTS, 1-YEAR FOLLOW-UP

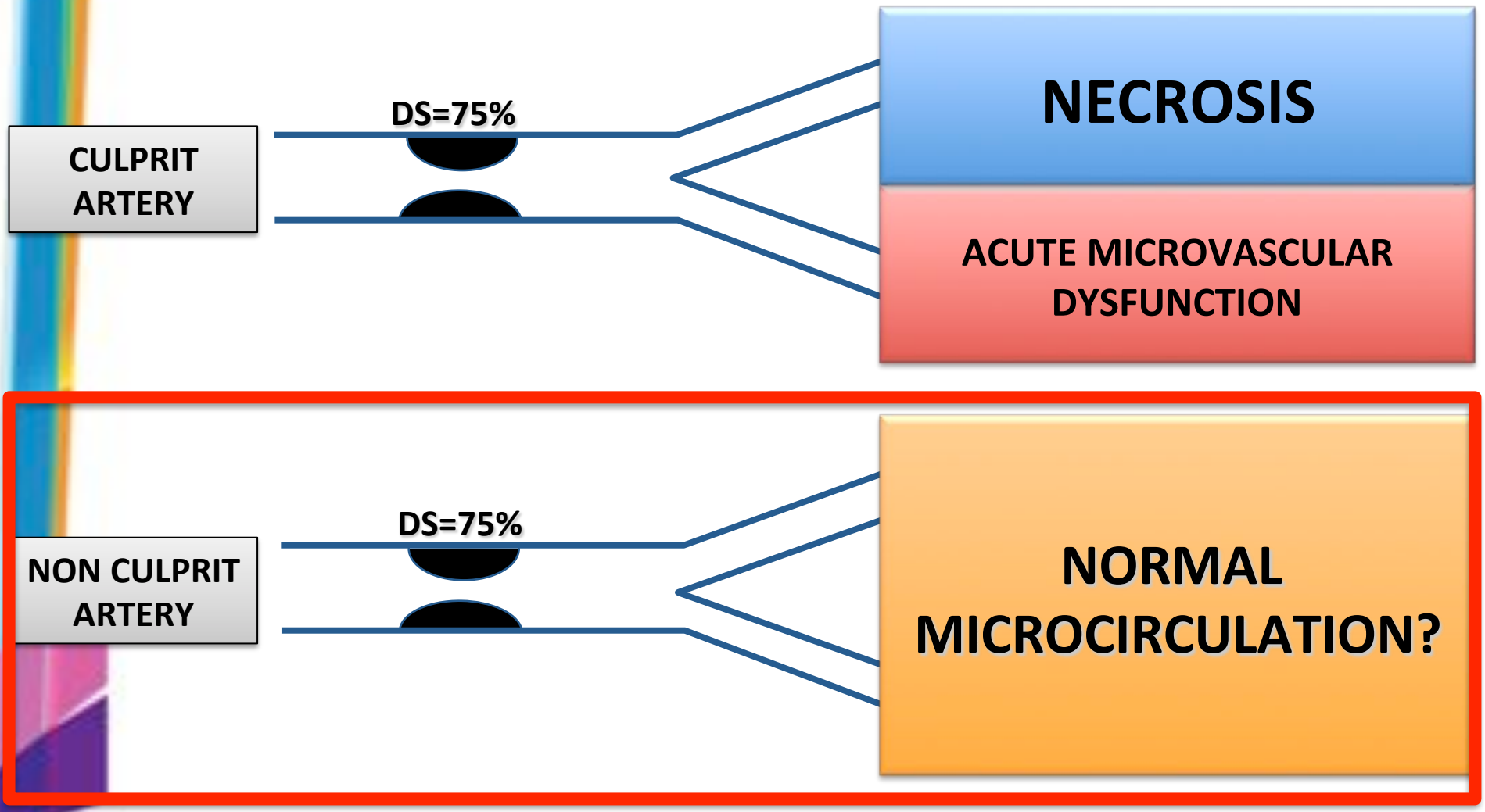
KAPLAN-MEIER SURVIVAL CURVES



Lopez-Palop R, Rev Esp Cardiol 2012

FFR AND ACUTE CORONARY SYNDROME

ACUTE MYOCARDIAL INFARCTION



FAMOUS - NSTEMI

COMPARE Acute

And others…

COMPLETE

(NTC 01740479)

- Primary rescue/convalescent PCI within 72h
- Culprit only vs staged complete
- Non-culprit lesions
  - ≥ 2.5mm
  - ≥ 70%DS
  - ≥ 50%DS plus FFR ≤ 0.80
- ASA/Ticagrelor
- Death/MI
- Started Dec 2012
- Estimated completion 2018

PRIMULTI

(NCT01960933)

- STEMI patients with MVD (n=600)
- Randomized to no additional PCI or full revascularisation with FFR guidance
- Only lesions with DS ≥ 50% can be randomized
- All randomized lesions with DS 50-90% evaluated by FFR
- PCI if FFR ≤ 0.80
- Lesions with DS ≥90% are treated without prior FFR
- ALL NON CULPRITS STAGED DURING INDEX ADMISSION i.e. NOT PRAMI STRATEGY
- Started May 2011
- Estimated Completion for PEP February 2014

FFR AND ACUTE CORONARY SYNDROME
CONCLUSIONS

- The use of FFR remains a **valuable tool** to guide revascularization strategy in **patients with ACS**, both in the **culprit and non-culprit arteries**.
- However, FFR may be **unreliable** and **should not** be used to assess **culprit lesions** during **STEMI**.
- After **recent MI (>4-6 days)**, **FFR is reliable** to assess residual ischemia of **culprit lesions**, depends on the **mass of viable myocardium** and **may predict LV recovery**.
- In patients with **ACS**, FFR is **reliable** to assess **non-culprit lesions**, may **improve early risk stratification** of patients and **hasten clinical decision-making** about the need for additional myocardial revascularization.

FIN