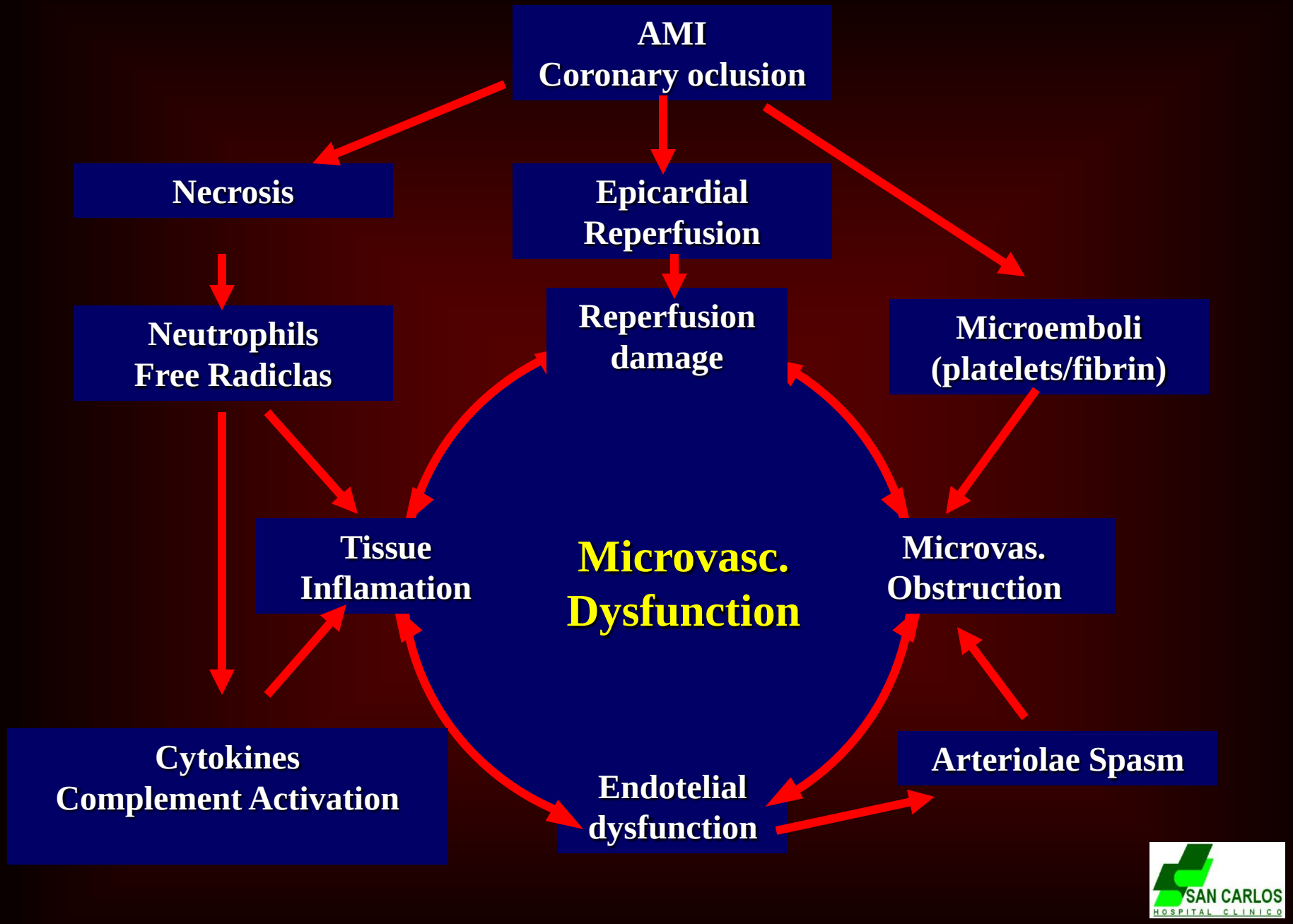
Echo. Laboratory.
University Clinic,
Madrid.
José L. Zamorano.

Contrast Echocardiography in coronary artery disease.


AMI
Coronary oclusion
Necrosis
Epicardial
Reperfusion
Neutrophils
Free Radiclas
Reperfusion
damage
Microemboli
(platelets/fibrin)
Tissue
Inflamation
Microvasc.
Dysfunction
Microvas.
Obstruction
Cytokines
Complement Activation
Endotelial
dysfunction
Arteriolae Spasm
SAN CARLOS
HOSPITAL CLINICO

MCE techniques

SAN CARLOS HOSPITAL CLINICO

Destructive

High M.I.

Non destructive

Preserve bubbles

Real-time

Low M.I.

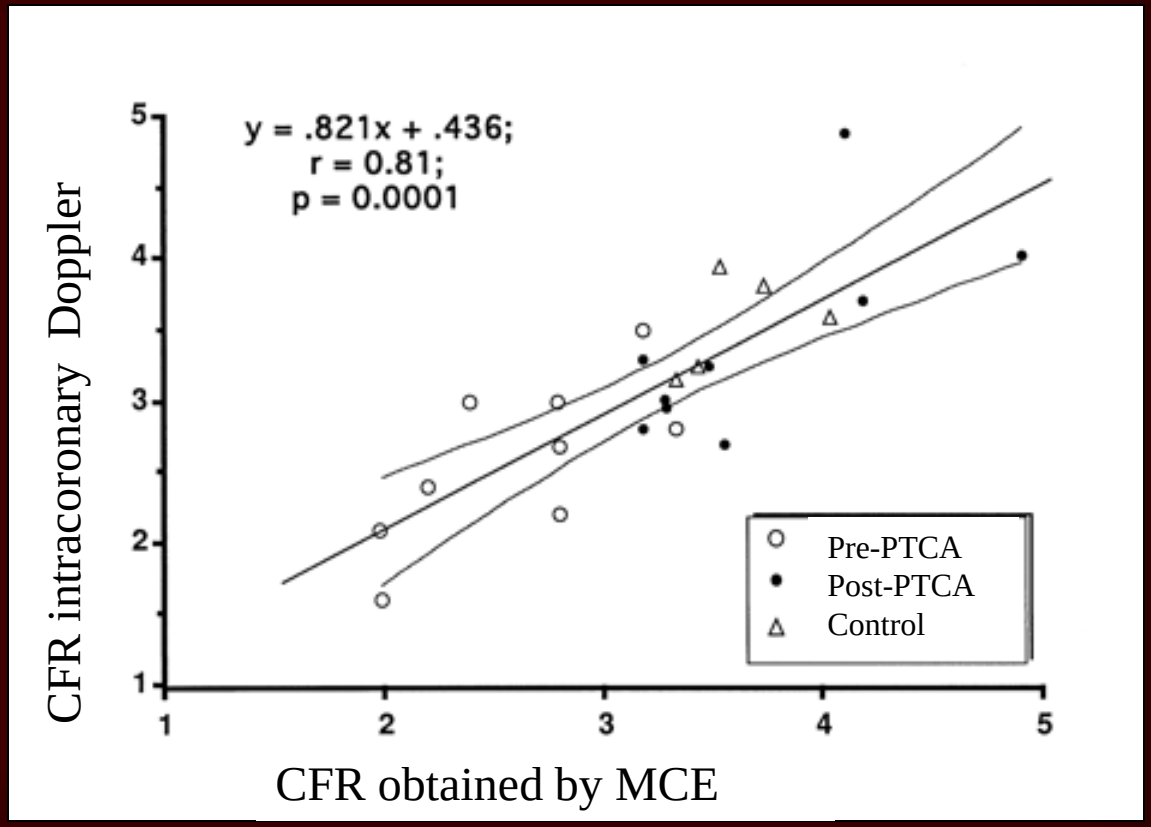
Detection of CAD by MCE

- Coronary flow reserve
- Myocardial blood volume- Coronary microcirculation
- Combining Function & Perfusion

Improvement of Subendocardial Myocardial Perfusion After Percutaneous Transluminal Coronary Angioplasty

A Myocardial Contrast Echocardiography Study With Correlation Between Myocardial Contrast Reserve and Doppler Coronary Reserve

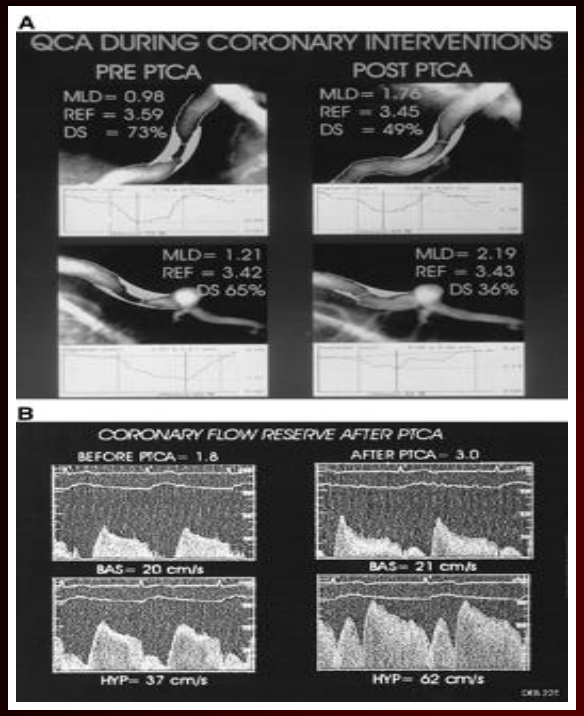
Hervé Perchet, MD; Patrick Dupouy, MD; Anne-Marie Duval-Moulin, MD; Luc Hittinger, MD, PhD; Gabriel Pelle, PhD; Philippe Brun, MD; Alain Castaigne, MD; Herbert Geschwind, MD; Jean-Luc Dubois-Randé, MD, PhD



SAN CARLOS HOSPITAL CLINICO

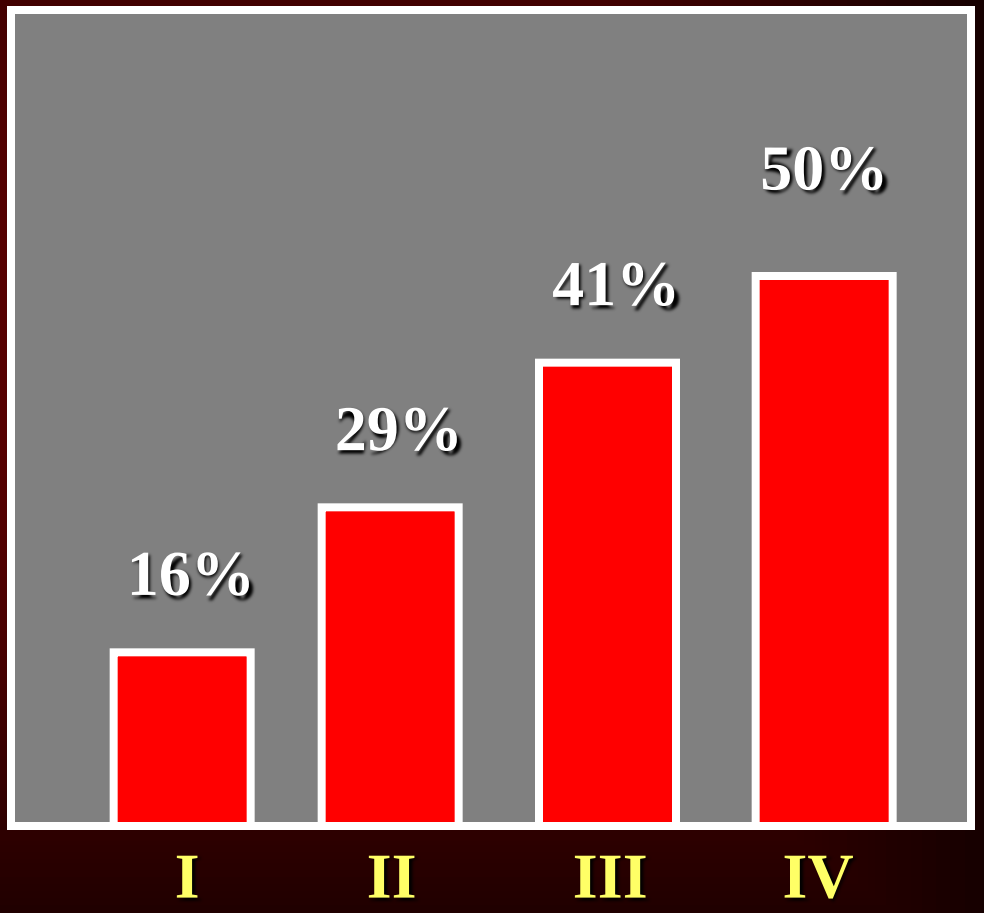
Circulation **1995;91:1419-1426.**

DEBATE Study



	%St.	CFR
I	≤35%	>2,5
II	≤35%	≤2,5
III	>35%	>2,5
IV	>35%	≤2,5

6 month restenosis



Serruys et al. Circulation 1997;96:3369

Assessment of blood volume.

- **Similar result to SPECT in the detection of fixed or non-fixed defects***
  - **Sensibility: 92%**
  - **Specificity: 84%**
- **Pitfalls: Lateral resolution.**
  - **Suggestions:**
    - **Different views**
    - **Education and training. Know your bubble....**

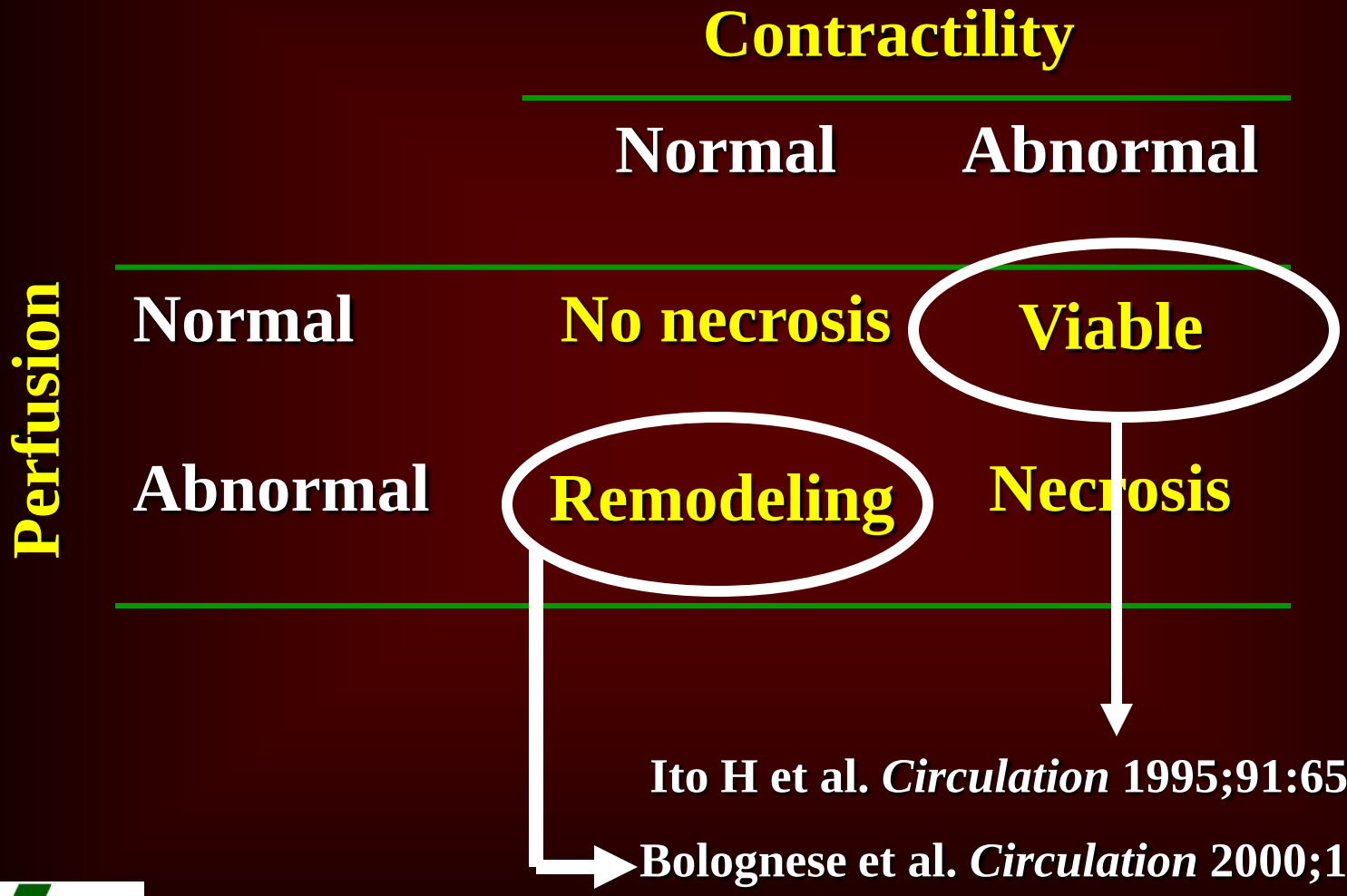
Kaul. Circulation 1997;96:785-792

Detection CAD

- **117 patients**
- **Dobutamine stress.**
- **Comparison with Q angiography :**
  - **MCE**
  - **Echo (WMA)**
- **Results:**
  - **Sensibility MCE > Echo**
  - **Agreement between segments:**
    - **MCE: 83%**
    - **Echo: 72%**
- **17 segments with defects (MCE) but normal WMA**

Porter. JACC 2001;37:748-53

Concordance between contractility and perfusion.



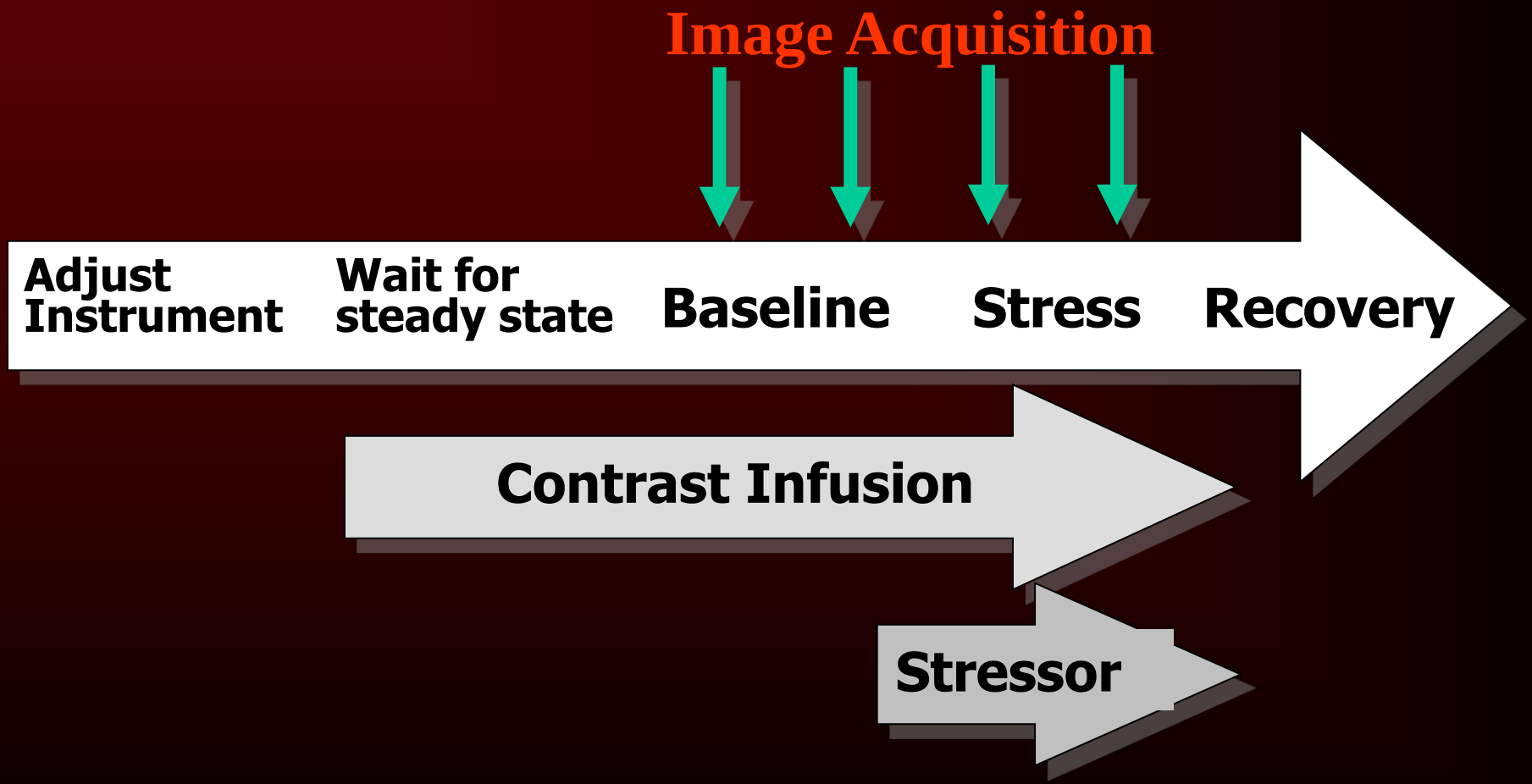
Ito H et al. *Circulation* 1995;91:656-662.

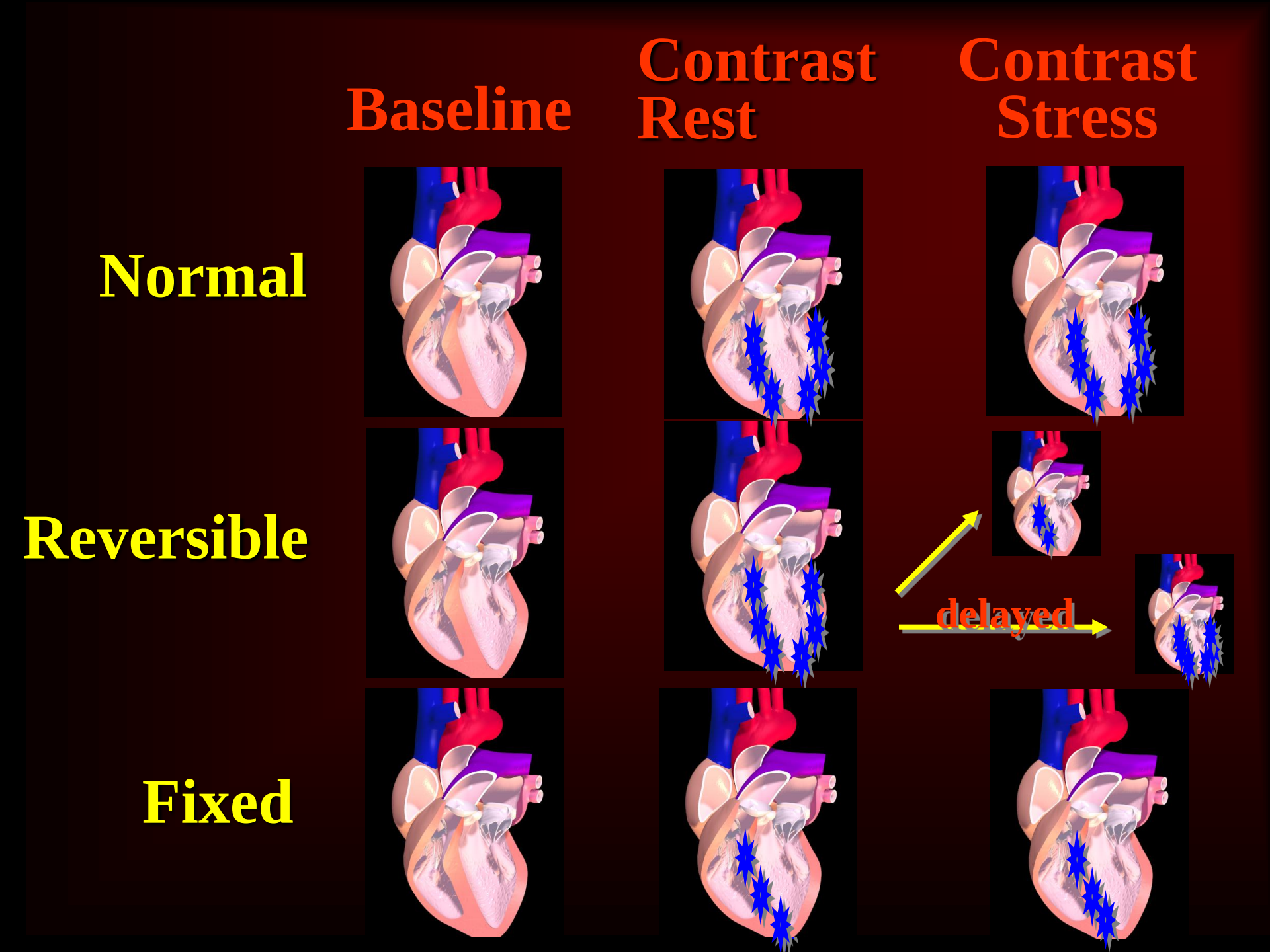
Bolognese et al. *Circulation* 2000;102:II748.

Replenishment Curve: Determinants

- Myocardial blood flow velocity and volume
- Hemodynamic parameters
- Number of bursts
- Dose of contrast agent
- Injection modality

MCE. Stress echo. Recommendations

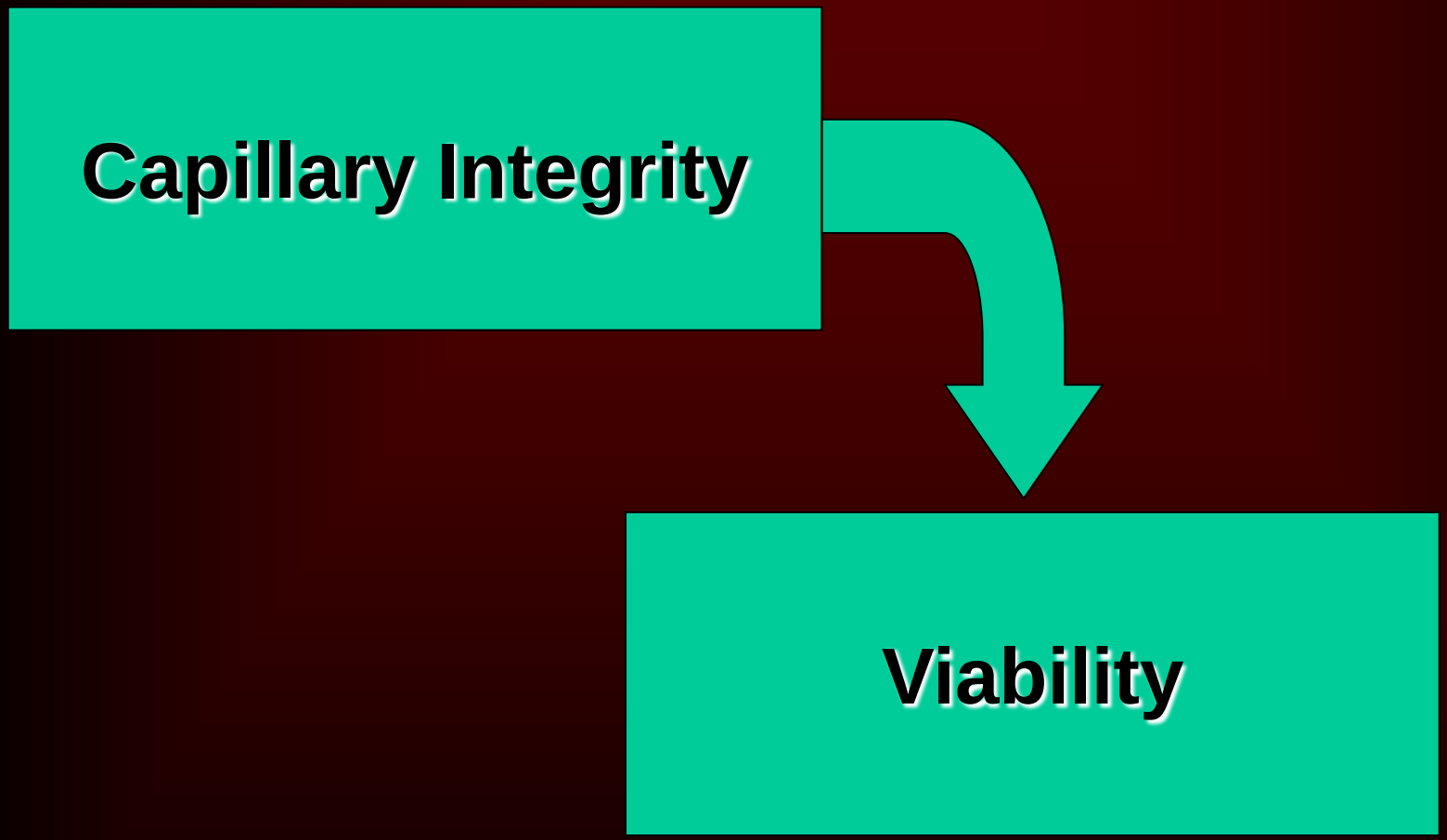



Baseline
Contrast Rest
Contrast Stress
Normal
Reversible
Fixed
delayed

Interpretating rest contrast studies.

		Contractility	
		Normal	Abnormal
Perfusion	Normal	higher dxt confidence	scar vs stunning hibernating
	Abnormal	Artefact ?	higher dxt confidence

Viability



Reason for Discrepancies in Identifying Myocardial Viability by Thallium-201 Redistribution, Magnetic Resonance Imaging, and *Dobutamine* Echocardiography

José Zamorano, MD, Juan Delgado, MD, Carlos Almería, MD, Raúl Moreno, MD, Miguel Angel Gómez Sánchez, MD, José Luis Rodrigo, MD, Cristina Fernández, MD, Joaquin Ferreiros, MD, Juan José Rufilanchas, MD, and Luis Sánchez-Harguindey, MD

Dobutamine echocardiography (DE), magnetic resonance imaging (MRI), and thallium redistribution (TS) are used to assess cardiac viability. However, these modalities sometimes yield contradictory results. Our aim was to establish the degrees of agreement among DE, MRI, and TS in identifying myocardial viability and to analyze the minimum critical mass of live (viable) cells required for each test to identify viability. A prospective study was done in which DE, MRI, and TS were consecutively performed in 10 ischemic patients scheduled for heart transplantation. The explanted heart was analyzed to quantify the amount of live cells per segment. The pathologic data were compared with the test results to analyze the minimum mass of viable cells required by each technique to identify viability. Mean age was 58 ± 8 years (8 men). The mean ejection fraction was 0.27 ± 0.04. Seven patients had severe cardiac failure (New York Heart Association functional class IV) and 6 patients had refractory angina. A total of 150 cardiac segments were analyzed. Among the 150 segments, 107 (71.3%) showed some degree of myocardial necrosis. Mean total area, mean fatty area, and mean necrotic area per segment were 2.53 ± 0.7, 0.13 ± 0.2, and 0.55±0.5 cm^2, respectively. As expected, a higher amount of necrotic tissue was found in nonviable segments. From the 150 segments, DE identified 90 as viable and 60 as nonviable. These data were similar to that of MRI (98 viable and 52 nonviable). A higher proportion of viable segments was found by TS (117 viable vs 33 nonviable). The concordance between DE and TS was only moderate (κ 0.49). The agreement between MRI and TS also showed moderate concordance (κ 0.56). The highest agreement was found between DE and MRI (κ 0.73). Thus, discrepancies in assessing viability by DE, MRI, and TS may be due to differences in the minimum critical mass of live myocytes required by each technique to diagnose viability. Thallium requires a lesser amount of live tissue than DE or MRI to detect viability; also, its maximum diagnostic efficiency is obtained with lesser amounts of live tissue on each segment. These considerations should be taken into account when these diagnostic tests are used for the detection of viability before revascularization procedures. ©2002 by Excerpta Medica, Inc.

(Am J Cardiol 2002;90:455–459)

Zamorano J. Am J Cardiol 2002. Zamorano J. Am Heart J 2001.

Identification of Stunned Myocardium With Parametric Imaging-Based, Quantitative Myocardial Contrast Echocardiography After Acute Myocardial Infarction

Viviana Serra, MD, Leopoldo Perez de Isla, MD, Maria Perez Ferro, MD, Jose Luis Rodrigo, MD, Carlos Almeria, MD, Antonio Fernandez-Ortiz, MD, Juan Carlos Garcia-Rubira, MD, Jose Zamorano, MD*, and Carlos Macaya, MD

Microvascular integrity demonstrated by myocardial contrast echocardiography (MCE) predicts functional recovery after an acute myocardial infarction (AMI). Recently, parametric imaging-based quantitative MCE has been developed. Our aim was to assess the usefulness of parametric imaging-based quantitative MCE parameters to predict the functional recovery of akinetic segments after primary percutaneous transluminal coronary angioplasty (PTCA). Fifty-three consecutive patients with a first AMI were enrolled. They underwent primary PTCA. Standard echocardiography and real-time MCE were performed. Qualitative analysis and parametric imaging-based quantitative parameters were measured offline by different blinded investigators. Dobutamine stress echocardiography was performed 1 month later. A new standard echocardiogram to assess the functional status of the akinetic segments and coronary angiography to evaluate the presence of restenosis at the level of the culprit lesion were performed 6 months later. The mean patient age was 62.9 ± 14 years, and 42 were men (79%); 170 segments were akinetic. Of these, 105 (62%) recovered their function. The best parameter to predict functional recovery was the myocardial blood flow velocity (β). These results were better than those obtained using dobutamine stress echocardiography and qualitative MCE to predict functional recovery. In conclusion, parametric imaging-based quantitative MCE is an accurate diagnostic tool to detect stunned myocardium after AMI. Its diagnostic accuracy in predicting the functional recovery of akinetic segments after primary PTCA is better than the accuracy of dobutamine stress echocardiography and qualitative MCE. © 2005 Elsevier Inc. All rights reserved. (Am J Cardiol 2005;96:167–172)

E
C
H
O

1.Diagnosis.
2.Prognosis.
3.Guiding therapy.