

Why, How and When to Use Intracoronary Physiology

 **HOSPITAL ITALIANO**
de Buenos Aires



Dr. Alejandro Diego Fernández
Sub Jefe Servicio de Hemodinamia y
Cardiología Intervencionista

Frequency of Stress Testing to Document Ischemia Prior to Elective Percutaneous Coronary Intervention

Grace A. Lin, MD, MAS

R. Adams Dudley, MD, MBA

F. L. Lucas, PhD

David J. Malenka, MD

Eric Vittinghoff, PhD

Rita F. Redberg, MD, MSc

IN THE UNITED STATES, PERCUTANEOUS coronary intervention (PCI) has become a common treatment strategy for patients with stable coronary artery disease (CAD) and such patients now account for the majority of PCIs performed.^{1,2} However, multiple studies have established that some important outcomes for patients with stable CAD (death and risk of future myocardial infarction) do not differ between patients treated with PCI plus optimal medical therapy and patients treated with optimal medical therapy alone.³⁻¹⁰ The addition of PCI does offer quicker relief of angina than medical therapy alone but also carries an increased risk of repeat revascularization, late-stent thrombosis, and a decreased quality of life if performed in patients with minimal symptoms.^{3,11-19}

There also is evidence that PCI reduces ischemia to a greater extent than medical therapy.^{20,21} Reduction of ischemia has been suggested by some cardiologists as a rationale for performing PCI

See also p 1817 and Patient Page.

Context Guidelines call for documenting ischemia in patients with stable coronary artery disease prior to elective percutaneous coronary intervention (PCI).

Objective To determine the frequency and predictors of stress testing prior to elective PCI in a Medicare population.

Design, Setting, and Patients Retrospective, observational cohort study using claims data from a 20% random sample of 2004 Medicare fee-for-service beneficiaries aged 65 years or older who had an elective PCI (N=23 887).

Main Outcome Measures Percentage of patients who underwent stress testing within 90 days prior to elective PCI; variation in stress testing prior to PCI across 306 hospital referral regions; patient, physician, and hospital characteristics that predicted the appropriate use of stress testing prior to elective PCI.

Results In the United States, 44.5% (n=10 629) of patients underwent stress testing within the 90 days prior to elective PCI. There was wide regional variation among the hospital referral regions with stress test rates ranging from 22.1% to 70.6% (national mean, 44.5%; interquartile range, 39.0%-50.9%). Female sex (adjusted odds ratio [AOR], 0.91; 95% confidence interval [CI], 0.86-0.97), age of 85 years or older (AOR, 0.83; 95% CI, 0.72-0.95), a history of congestive heart failure (AOR, 0.85; 95% CI, 0.79-0.92), and prior cardiac catheterization (AOR, 0.45; 95% CI, 0.38-0.54) were associated with a decreased likelihood of prior stress testing. A history of chest pain (AOR, 1.28; 95% CI, 1.09-1.54) and black race (AOR, 1.26; 95% CI, 1.09-1.46) increased the likelihood of stress testing prior to PCI. Patients treated by physicians performing 150 or more PCIs per year were less likely to have stress testing prior to PCI (AOR, 0.84; 95% CI, 0.77-0.93). No hospital characteristics were associated with receipt of stress testing.

Conclusion The majority of Medicare patients with stable coronary artery disease do not have documentation of ischemia by noninvasive testing prior to elective PCI.

JAMA. 2008;300(15):1765-1773

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even in asymptomatic patients.²²⁻²⁴ Given these considerations, guidelines for PCI published jointly by the American College of Cardiology, the American Heart Association, and the Society for Cardiovascular Angiography and Intervention state that for patients with stable angina, any vessels to be dilated must be shown to be "associated with a moderate

Author Affiliations: Divisions of General Internal Medicine (Dr Lin), Epidemiology and Biostatistics (Dr Vittinghoff), and Cardiology (Dr Redberg), and Institute for Health Policy Studies (Dr Dudley), University of California, San Francisco; Center for Outcomes Research and Evaluation, Maine Medical Center, Portland (Dr Lucas); and Division of Cardiology, Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire (Dr Malenka).
Corresponding Author: Rita F. Redberg, MD, MSc, 505 Parnassus Ave, Ste M-1180, School of Medicine, Division of Cardiology, San Francisco, CA 94143 (redberg@medicine.ucsf.edu).

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Low Diagnostic Yield of Elective Coronary Angiography

Manesh R. Patel, M.D., Eric D. Peterson, M.D., M.P.H., David Dai, M.S., J. Matthew Brennan, M.D., Rita F. Redberg, M.D., H. Vernon Anderson, M.D., Ralph G. Brindis, M.D., and Pamela S. Douglas, M.D.

398,978 patients

59.0% with a POSITIVE stress test did NOT have

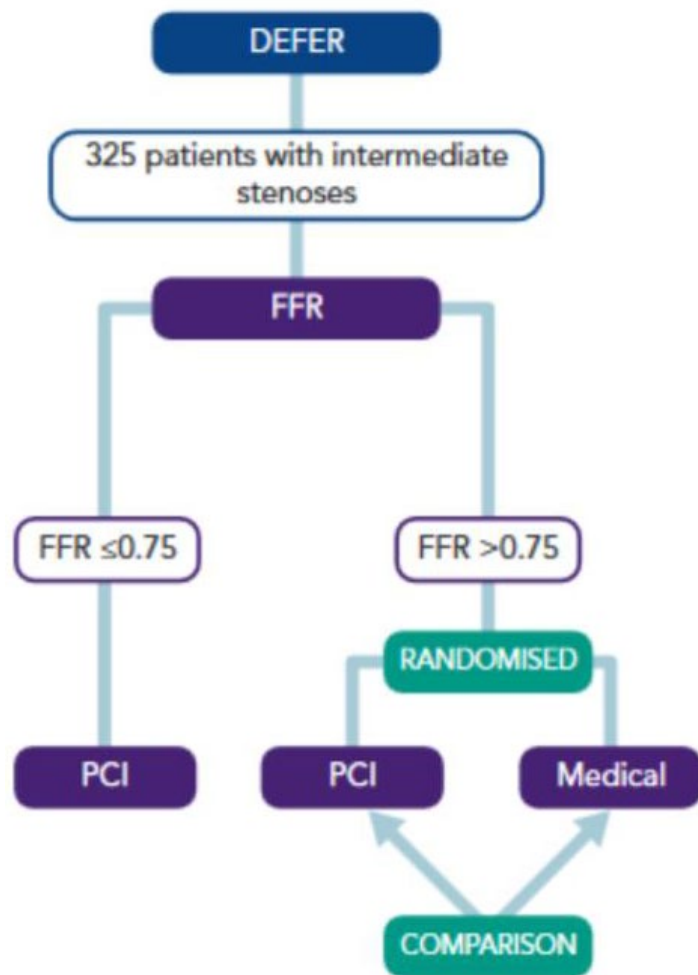
obstructive coronary artery disease



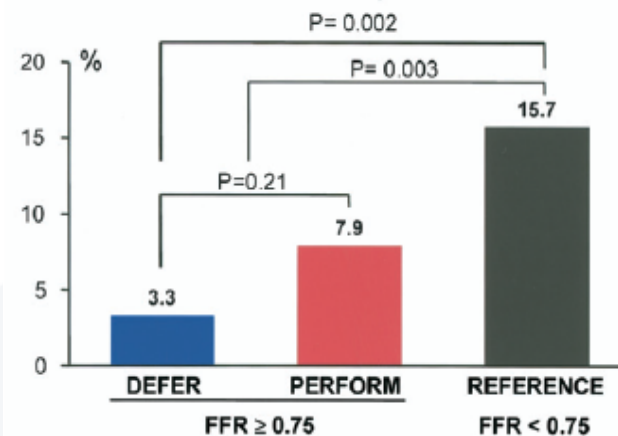
Economic benefits of fractional flow reserve utilization on intermediate lesions and its clinical impact after one year-follow up

Tabla 1. Características Basales	n = 151
Edad (media +-DS)	69,2(±11,1)
Sexo Masculino	60.9%
Factores de riesgo cardiovascular	
- Hipertensión	74%
- Diabetes	26%
- Dislipemia	62%
- Tabaquismo actual	14%
Antecedentes coronarios	
- Enfermedad coronaria conocida	45.3%
- Angioplastia previa	33.3%
- CRM previa	4.6%
Otros	
- Cirugía cardiovascular distinta a CRM	2.6%
- Enfermedad vascular extracoronaria	21.3%
- Anticoagulación	7.3%
- Internado	67.3%
- Apremio positivo	42% (SPECT 73.4% - EcoStress 7.8% Angio TC 9.3%, Ergometria 9.3%)

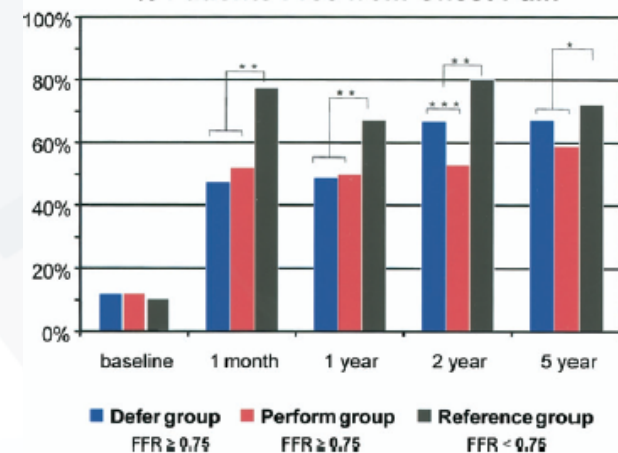
DEFER



Cardiac Death and Acute MI after 5 Years



% Patients Free from Chest Pain



DEFER

Results 15-year follow-up

All cumulative events

	Any death	Any MI	Any revascularization
Defer	30	2	60
Perform	28	13	53
Reference	52	19	86

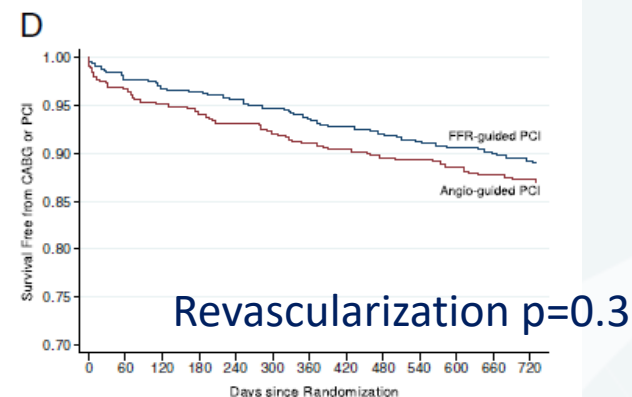
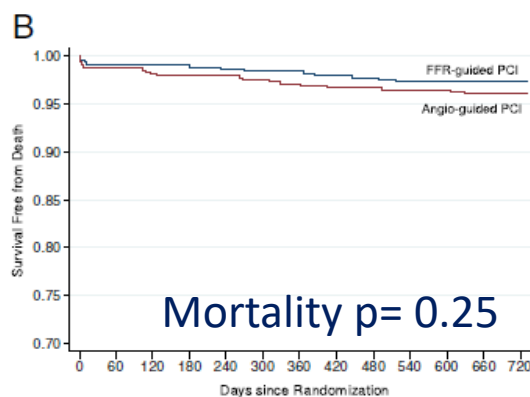
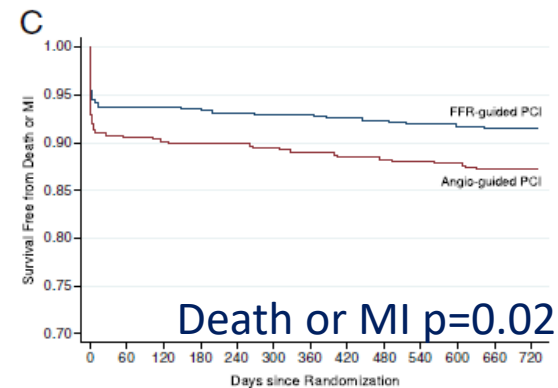
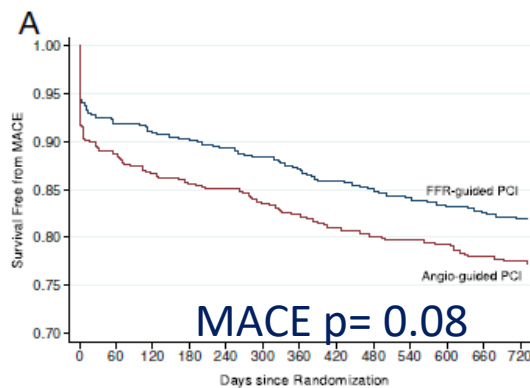
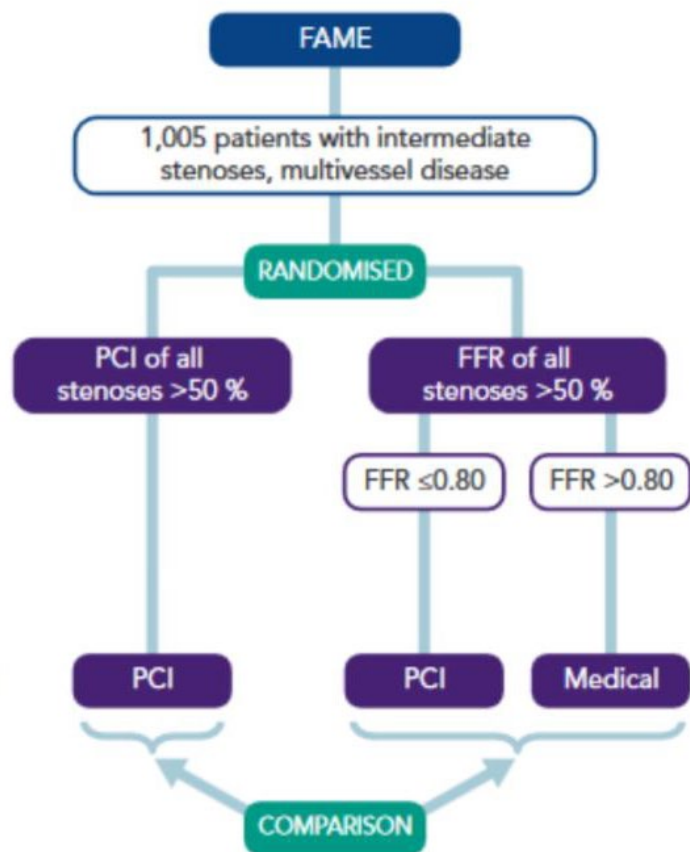
NS

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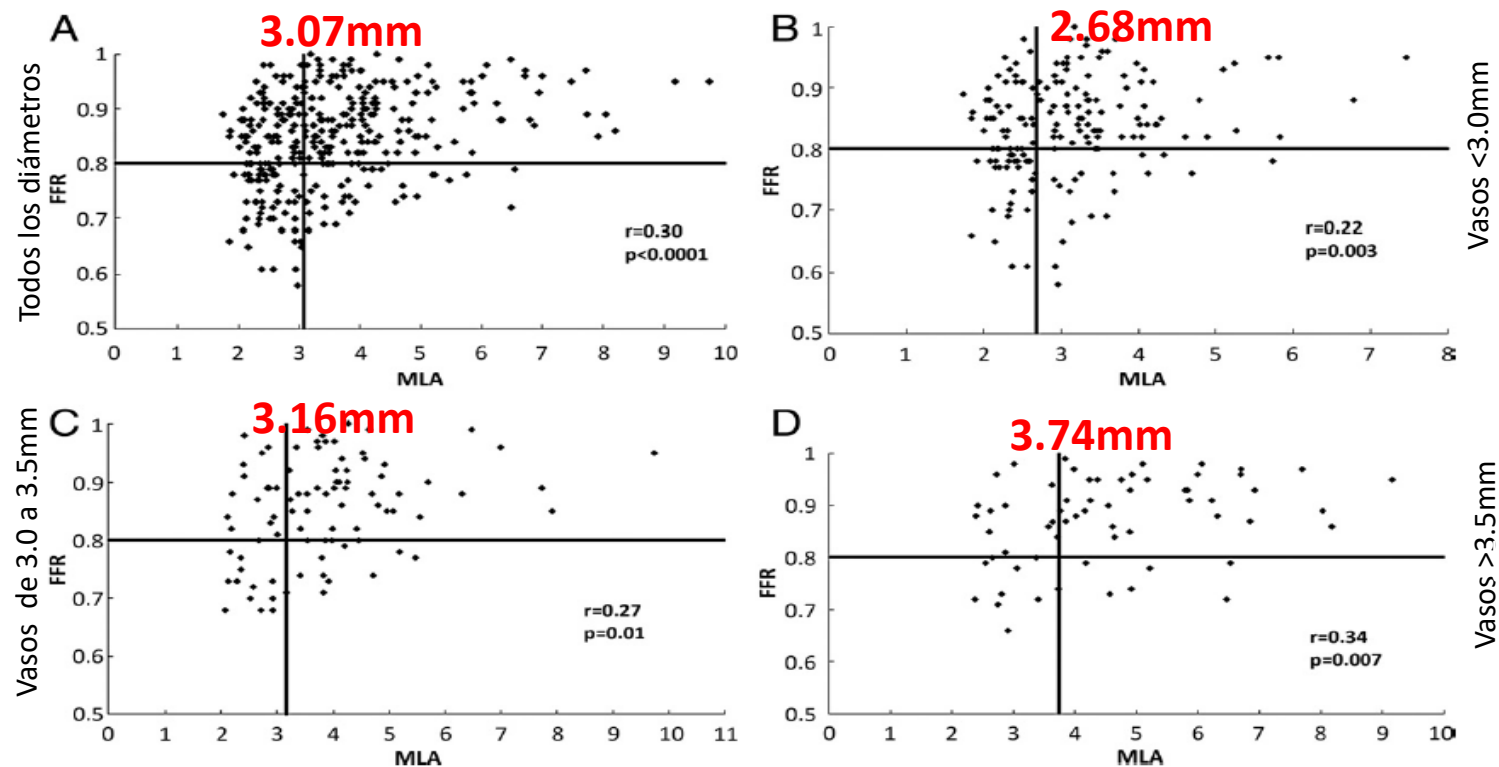
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* $p < 0.02$

FAME

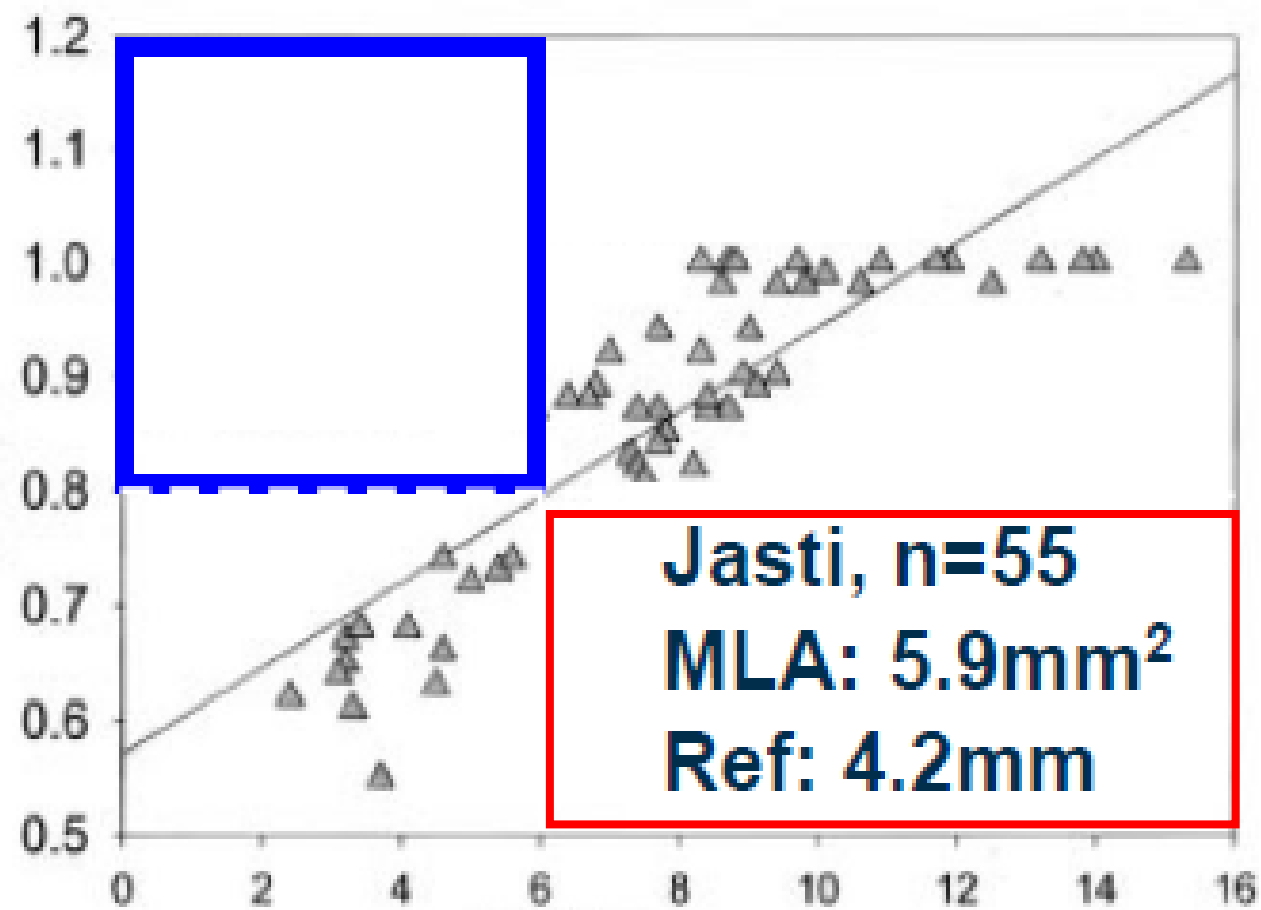


What about endovascular imaging



LMCA

FFR



ACC/AHA/SCAI CLINICAL PRACTICE GUIDELINE

2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

4.3. Use of Coronary Physiology to Guide Revascularization With PCI

Recommendations for the Use of Coronary Physiology to Guide Revascularization With PCI
Referenced studies that support the recommendations are summarized in Online Data Supplement 5.

COR	LOE	Recommendations
1	A	1. In patients with angina or an anginal equivalent, undocumented ischemia, and angiographically intermediate stenoses, the use of fractional flow reserve (FFR) or instantaneous wave-free ratio (iFR) is recommended to guide the decision to proceed with PCI. ¹⁻⁶
3: No benefit	B-R	2. In stable patients with angiographically intermediate stenoses and FFR >0.80 or iFR >0.89, PCI should not be performed. ⁷⁻¹⁰

2018 ESC/EACTS Guidelines on myocardial revascularization

The Task Force on myocardial revascularization of the European Society of Cardiology (ESC) and European Association for Cardio-Thoracic Surgery (EACTS)

Recommendations on functional testing and intravascular imaging for lesion assessment

Recommendations	Class ^a	Level ^b
When evidence of ischaemia is not available, FFR or iwFR are recommended to assess the haemodynamic relevance of intermediate-grade stenosis. ^{15,17,18,39}	I	A
FFR-guided PCI should be considered in patients with multivessel disease undergoing PCI. ^{29,31}	IIa	B
IVUS should be considered to assess the severity of unprotected left main lesions. ³⁵⁻³⁷	IIa	B

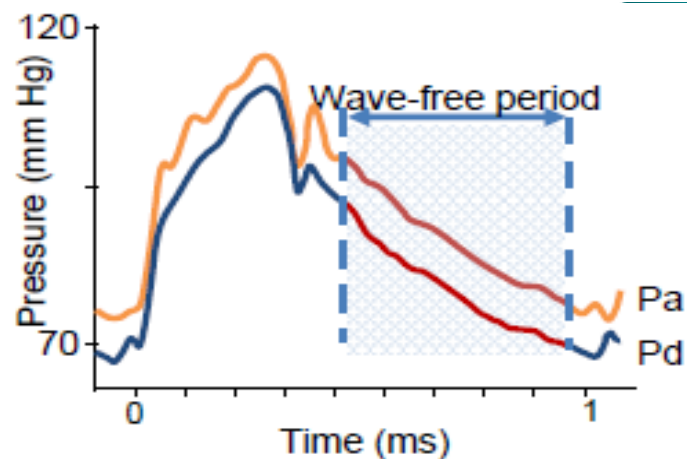
© ESC 2018

How

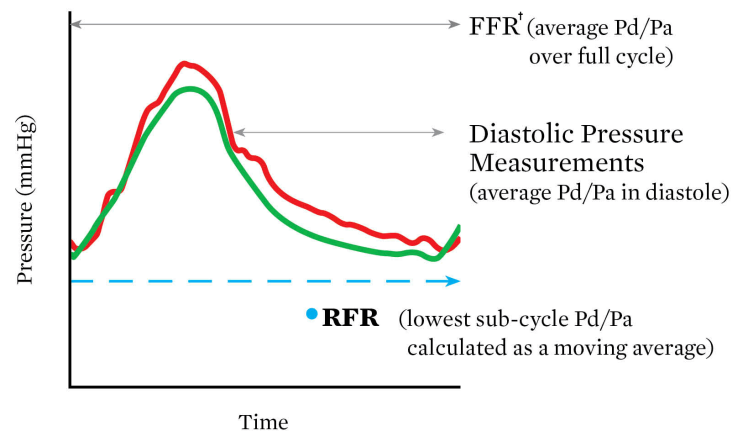
- Flush the wire with saline in the case ✓
- Keep the case flat and connect to console ✓
- Pressure transducer zero ✓
- Advance wire into coronary artery with transducer at the tip of guide catheter ✓
- DON'T FORGUE TO REMOVE THE NEEDLE INTRODUCER ✓
- Flush system with saline ✓
- Equalize pressure transducer with aortic pressure ✓
- Advance wire to distal to disease ✓
- DON'T FORGUE TO REMOVE THE NEEDLE INTRODUCER ✓



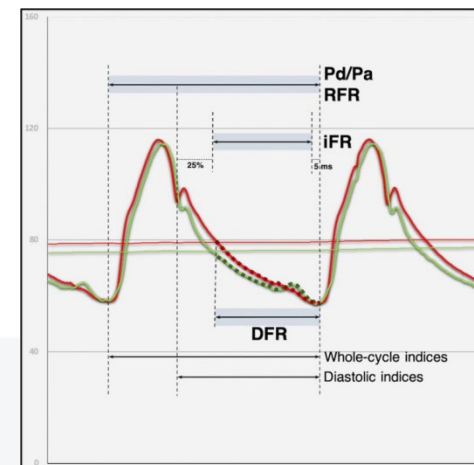
iFR – RFR - DFR



Instantaneous Wave-Free Ratio

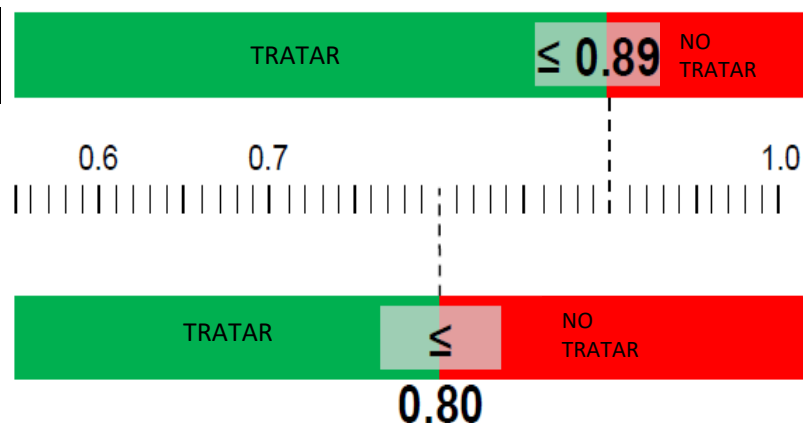


Resting Full-cycle Ratio



Diastolic Wave-Free Ratio

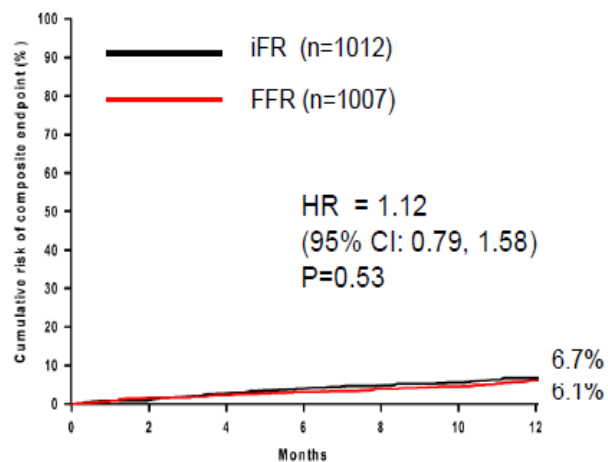
iFR-RFR-DFR



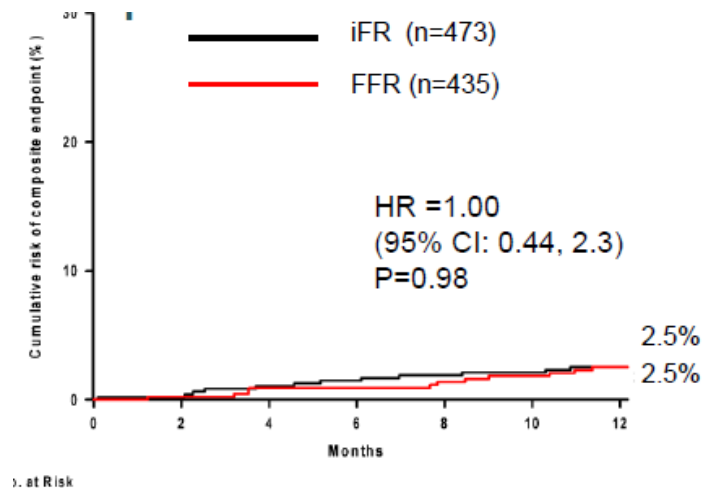
iFR-SWEDEHEART

n=2037

Death – MI – Revascularization



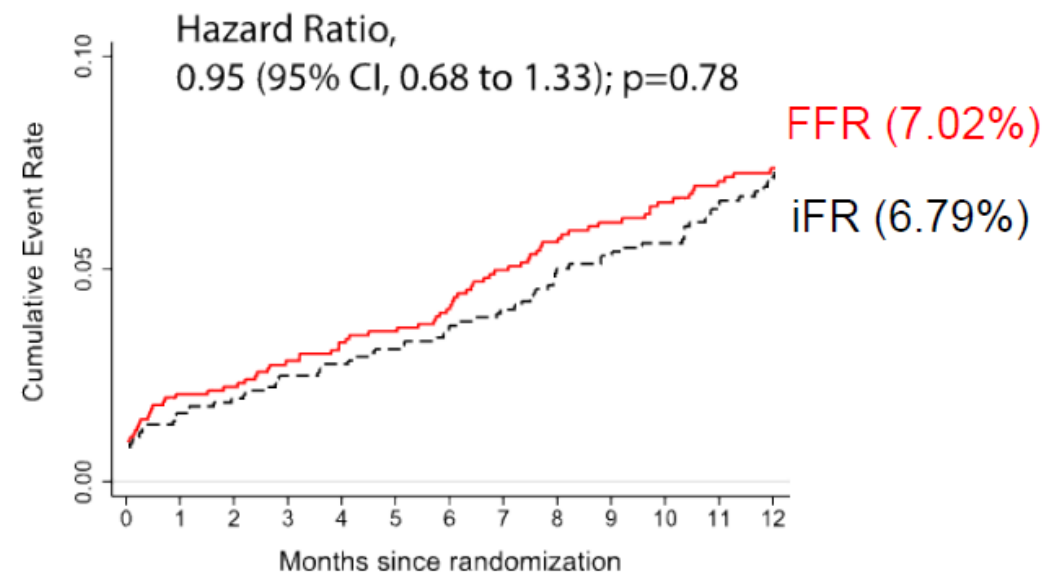
Revascularization in Medical treatment group



N Engl J Med 2017;376:1813-23.

DEFINE-FLAIR

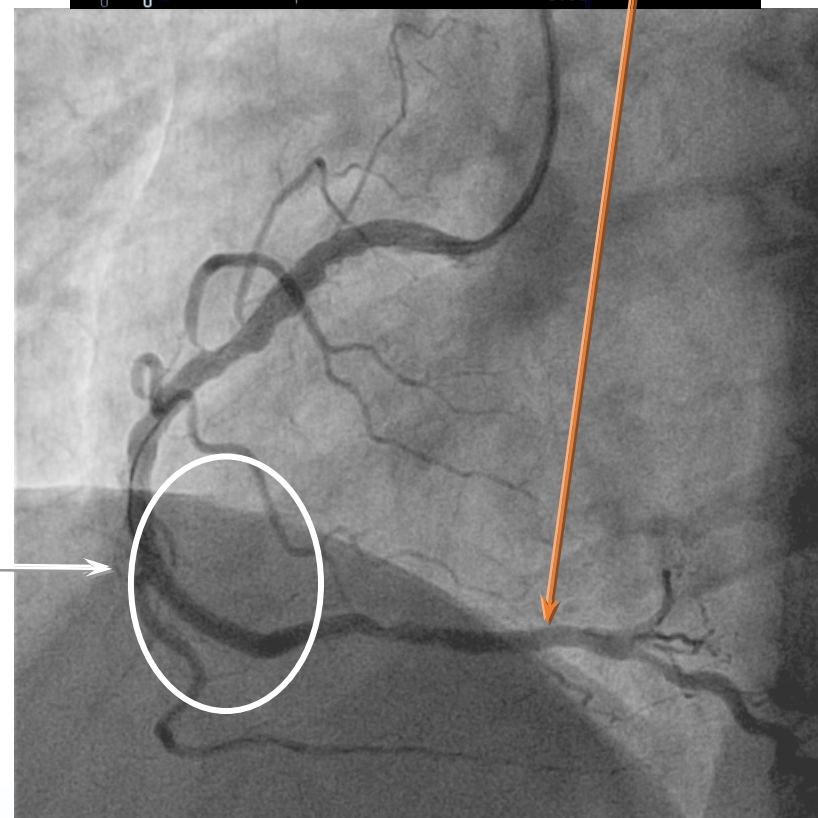
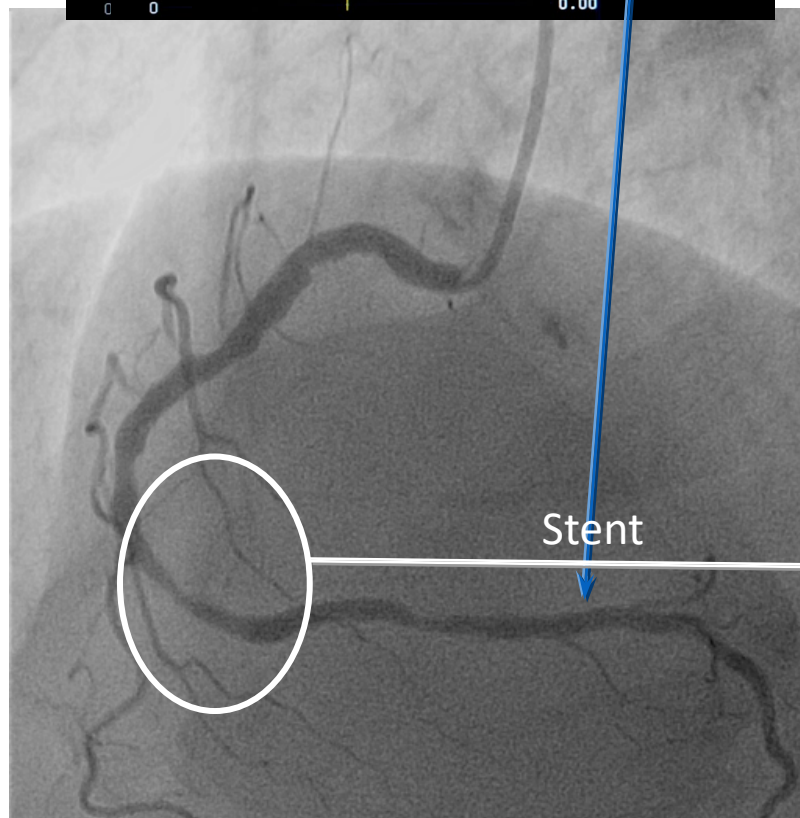
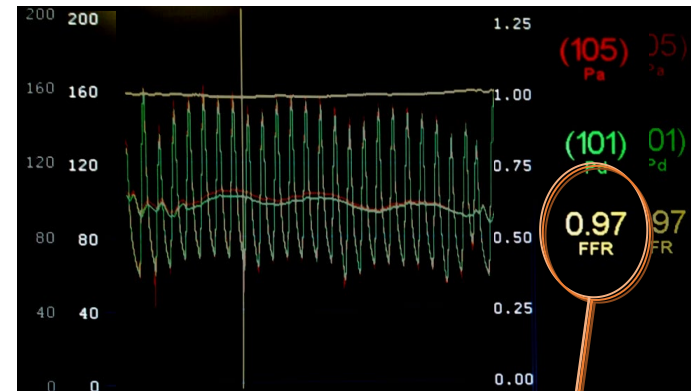
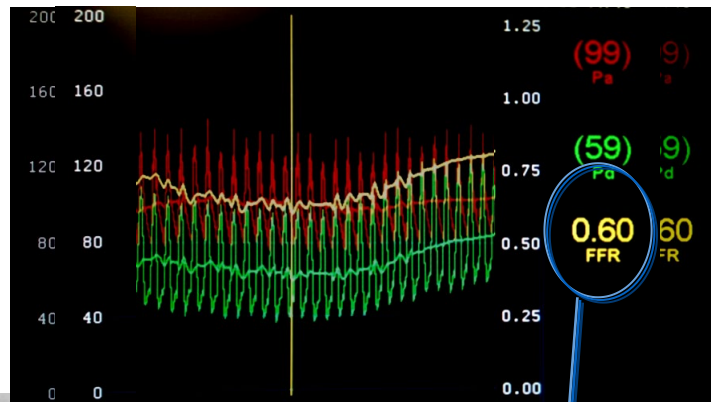
n=2492



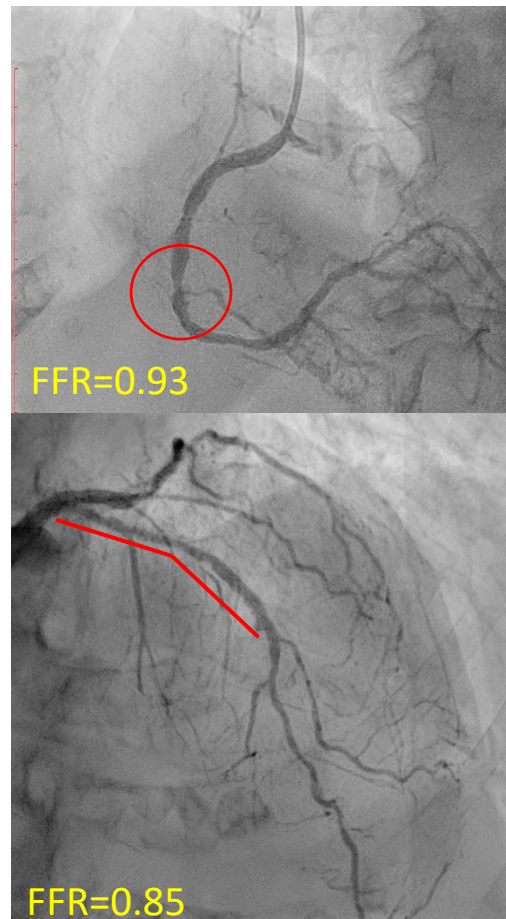
N Engl J Med 2017;376:1824-34.

When





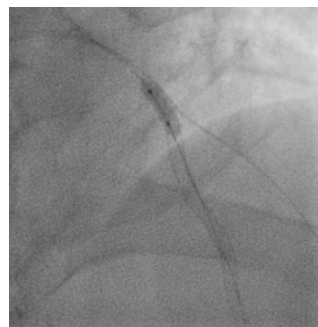
- 85 years old woman
- Hypertension
- Type II DM
- Dyslipidemia
- Overweight
- Angina



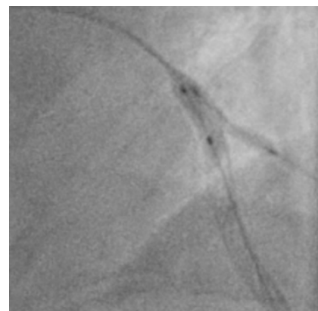
LAD provisional stent



Distal LAD: Zotarolimus DES 2.5x38 mm
Prox LAD: Zotarolimus DES 2.75x38 mm



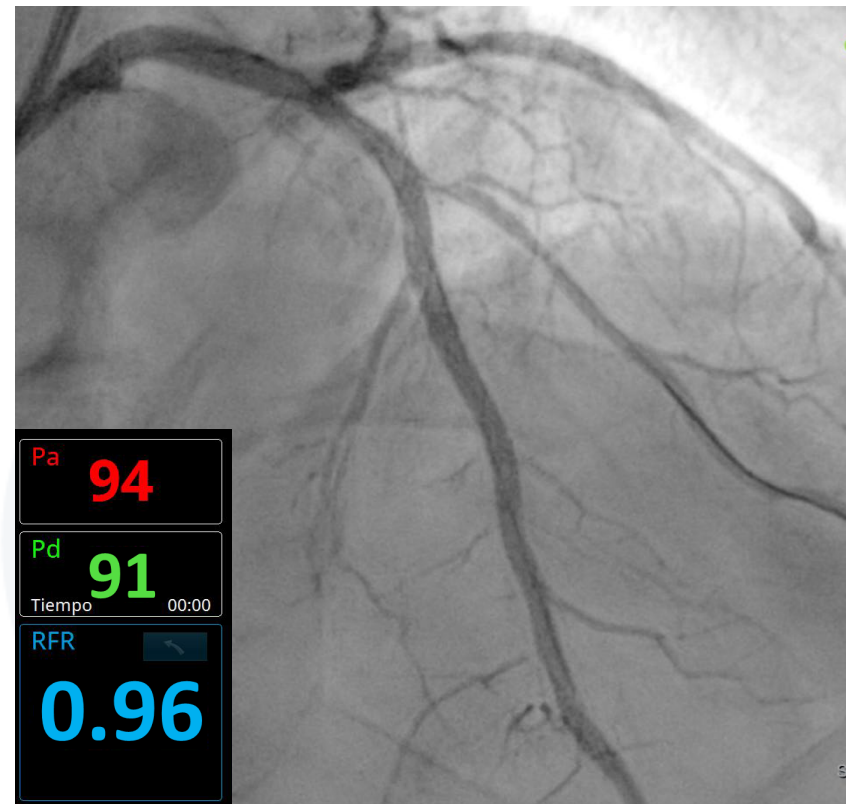
POT



Kissing



Final POT



When

- In stable patients for assessment of intermediate or ambiguous lesions
- In unstable patients, for assessment of intermediate or ambiguous lesions in the non-culprit vessels
- As a guide for the treatment of diffuse coronary artery disease
- Evaluation of PCI result
- Ostial side branch compromise (Jailed Branch)
- Assessment of angina without obstructive disease in the epicardial coronary arteries (CFR)



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