Curso de Fisiología Coronaria: "Actualización bibliográfica Guía de Presión/Flujo FFR/IFR/cFFR/IMR/RFR"

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20 y 21 de Febrero de 2020

Sumario

1. Antecedentes recientes.
2. Guía de presión en estenosis aórtica grave.
3. Discordancias iFR/FFR: ¿y ahora qué hago?
4. Otros métodos para explorar la “fisiología coronaria”.
5. Otros documentos y conclusiones.

1. Los antecedentes recientes

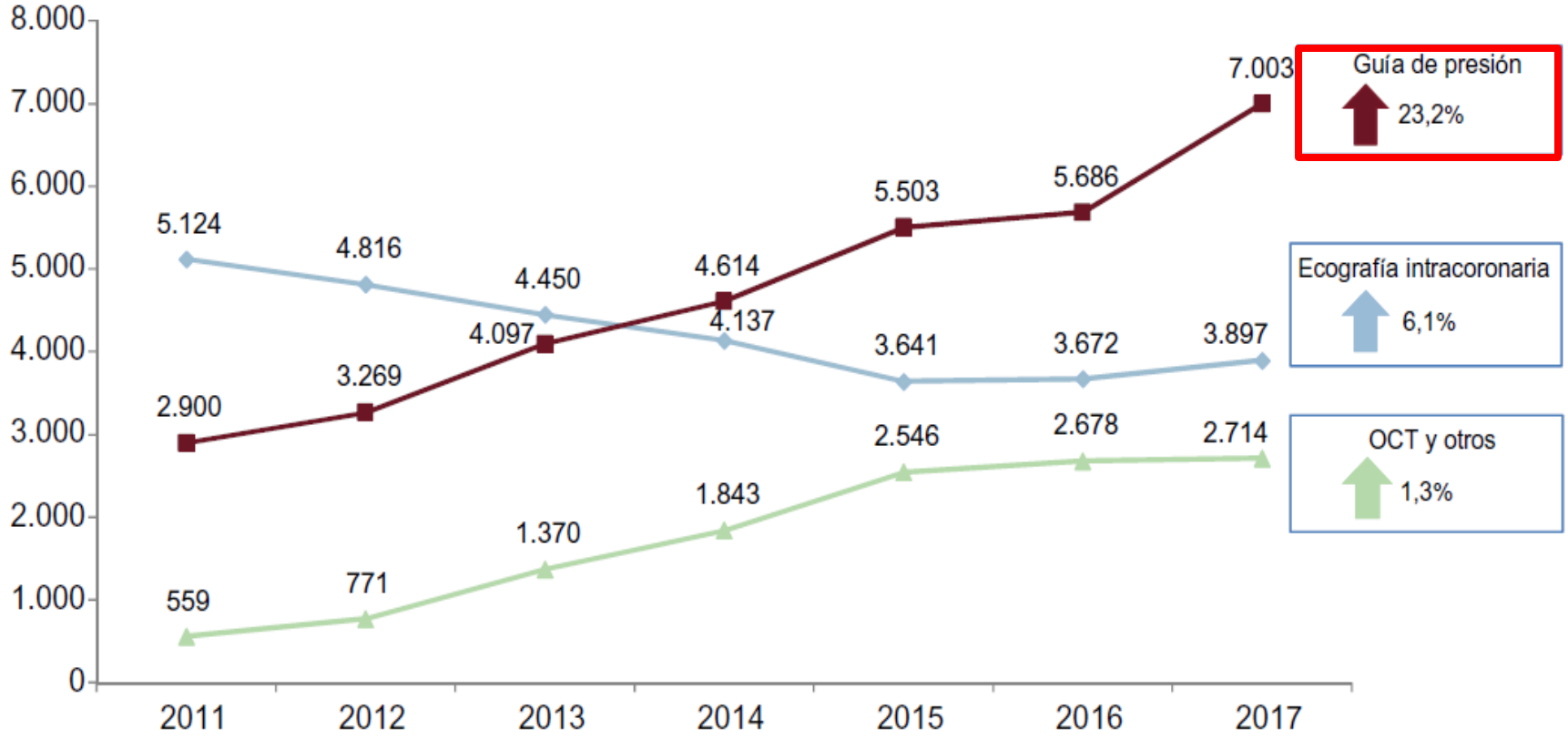


Figura 3. Evolución de las diferentes técnicas de diagnóstico intracoronario. OCT: tomografía de coherencia óptica.

2018 Myoc Revasc Guidelines

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

FFR = fractional flow reserve; iwFR = instantaneous wave-free ratio; IVUS = intravascular ultrasound; PCI = percutaneous coronary intervention.
[a]Class of recommendation.
[b]Level of evidence.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Fractional Flow Reserve–Guided Multivessel Angioplasty in Myocardial Infarction

Pieter C. Smits, M.D., Ph.D., Mohamed Abdel-Wahab, M.D., Franz-Josef Neumann, M.D., Bianca M. Boxma-de Klerk, Ph.D., Ketil Lunde, M.D., Carl E. Schotborgh, M.D., Zsolt Piroth, M.D., David Horak, M.D., Adrian Wlodarczak, M.D., Paul J. Ong, M.D., Rainer Hambrecht, M.D., Oskar Angerås, M.D., Gert Richardt, M.D., Ph.D., and Elmir Omerovic, M.D., for the Compare-Acute Investigators*

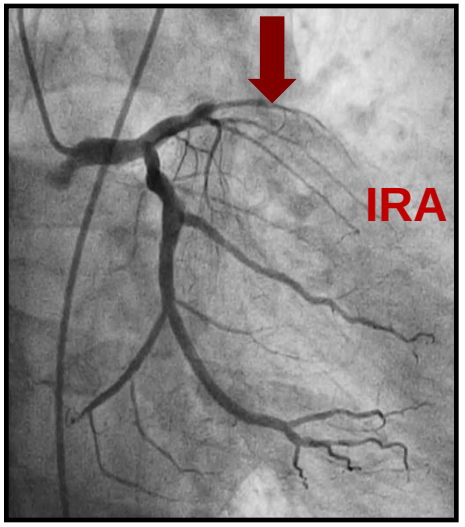
N Engl J Med 2017;376:1234-44.

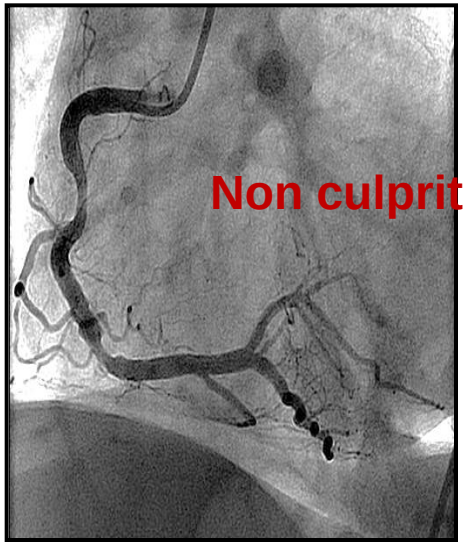
• 885 patients with STEMI and multivessel disease in 24 participating centers in Europe and Asia.

30-50% of STEMI patients have additional stenoses other than the infarct related artery[1,2]

Current guidelines support culprit vessel PCI only

Contemporary studies have, however, suggested ”preventive revascularisation”[3,4]





[1] Jong JA *al.* Coronary Artery disease 2006
[2] Muller DW *et al.* Am Heart J 1991
[3] Wald *et al.* NEJM 2013
[4] Gershlick *et al.* ESC 2014

"The FFR was performed in both groups, but in the latter both the cardiologist and the patient were unaware of the results".

"Clinically indicated revascularizations within 45 days after primary PCI were not counted as events"

En el grupo de FFR esta técnica se empleaba en el contexto agudo de la angioplastia primaria ("Compare-ACUTE")

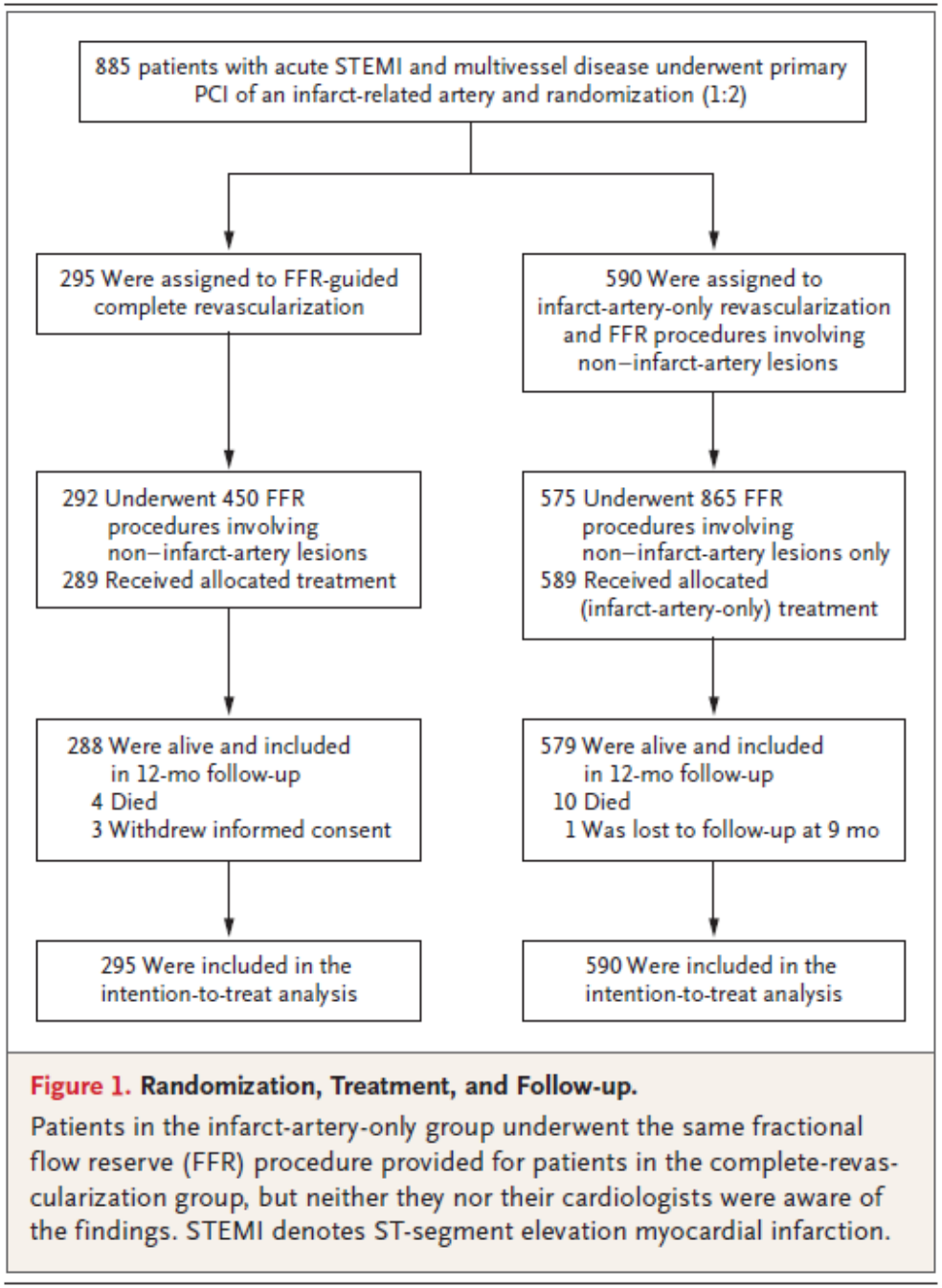
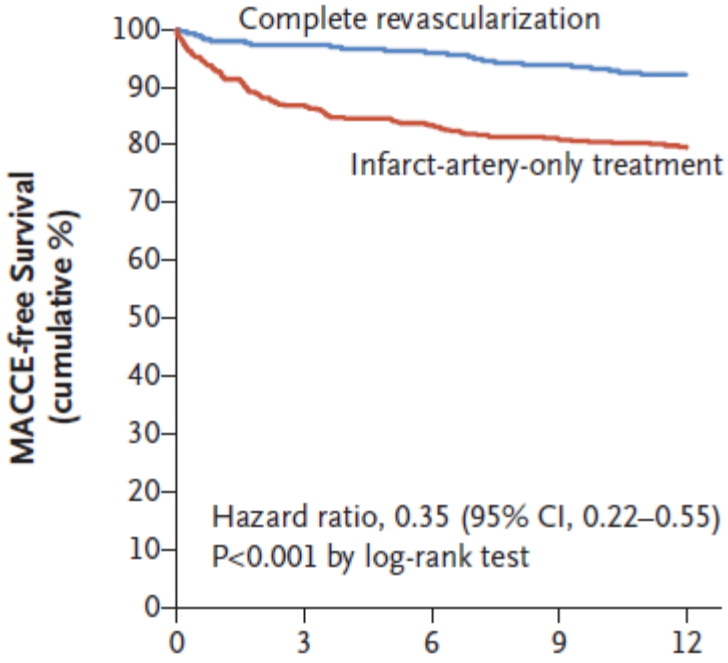


Figure 1. Randomization, Treatment, and Follow-up.

Patients in the infarct-artery-only group underwent the same fractional flow reserve (FFR) procedure provided for patients in the complete-revascularization group, but neither they nor their cardiologists were aware of the findings. STEMI denotes ST-segment elevation myocardial infarction.



No. at Risk

Complete revascularization	295	286	281	264	215
Infarct artery	590	512	492	457	371

Figure 2. Kaplan–Meier Event Curves of the Combined Primary Outcome.

MACCE denotes the composite of all-cause mortality, nonfatal myocardial infarction, any revascularization, and cerebrovascular events.

Table 3. Prespecified Clinical End Points at 1 Year.

End Point	Complete Revascularization (N=295)	Infarct-Artery-Only Treatment (N=590)	Hazard Ratio (95% CI)	P Value
	number (percent)			
Primary				
MACCE*	23 (7.8)	121 (20.5)	0.35 (0.22–0.55)	<0.001
Death from any cause	4 (1.4)	10 (1.7)	0.80 (0.25–2.56)	0.70
Cardiac event	3 (1.0)	6 (1.0)	1.00 (0.25–4.01)	1.00
Myocardial infarction	7 (2.4)	28 (4.7)	0.50 (0.22–1.13)	0.10
Spontaneous event	5 (1.7)	17 (2.9)	0.59 (0.22–1.59)	0.29
Periprocedural event	2 (0.7)	11 (1.9)	0.36 (0.08–1.64)	0.19
Revascularization	18 (6.1)	103 (17.5)	0.32 (0.20–0.54)	<0.001
PCI	15 (5.1)	98 (16.6)	0.37 (0.24–0.57)	<0.001
Coronary-artery bypass graft	3 (1.0)	5 (0.8)	1.20 (0.29–5.02)	0.80
Cerebrovascular event	0	4 (0.7)	NA	NA
Secondary				
NACE (any first event)	25 (8.5)	174 (29.5)	0.25 (0.16–0.38)	<0.001
Death from any cause) or myocardial infarction	11 (3.7)	38 (6.4)	0.57 (0.29–1.12)	0.10
Major bleeding	3 (1.0)	8 (1.4)	0.75 (0.20–2.84)	0.67
Any bleeding				
At 12 mo	9 (3.1)	28 (4.7)	0.64 (0.30–1.36)	0.25
At 48 hr	5 (1.7)	8 (1.4)	1.25 (0.41–3.83)	0.69
Hospitalization for heart failure, unstable angina, or chest pain	13 (4.4)	47 (8.0)	0.54 (0.29–0.99)	0.04
Any revascularization†	19 (6.4)	161 (27.3)	0.47 (0.29–0.76)	0.002
Stent thrombosis	2 (0.7)	1 (0.2)	0.58 (0.12–2.80)	0.50

Cardiac Catheterization

Fractional Flow Reserve–Guided Complete Revascularization Improves the Prognosis in Patients With ST-Segment–Elevation Myocardial Infarction and Severe Nonculprit Disease

A DANAMI 3-PRIMULTI Substudy (Primary PCI in Patients With ST-Elevation Myocardial Infarction and Multivessel Disease: Treatment of Culprit Lesion Only or Complete Revascularization)

Jacob Lønborg, MD, PhD; Thomas Engstrøm, MD, PhD, DMSci; Henning Kelbæk, MD, DMSci; Steffen Helqvist, MD, DMSci; Lene Kløvgaard, RN; Lene Holmvang, MD, DMSci; Frants Pedersen, MD, PhD; Erik Jørgensen, MD; Kari Saunamäki, MD, DMSci; Peter Clemmensen, MD, DMSci; Ole De Backer, MD, PhD; Jan Ravkilde, MD; Hans-Henrik Tilsted, MD, PhD; Anton Boel Villadsen, MD; Jens Aarøe, MD; Svend Eggert Jensen, MD; Bent Raungaard, MD; Lars Køber, MD, DMSci; Dan Eik Høfsten, MD, PhD; for the DANAMI 3-PRIMULTI Investigators

Circ Cardiovasc Interv. 2017 Apr;10(4).

Table 1. Baseline Clinical, Angiographic, and Procedural Characteristics for Patients According to 2- or 3-Vessel Disease and Assigned Treatment

	2-Vessel Disease (n=430)		3-Vessel Disease (n=197)		
	Infarct-Related Artery Only (n=213)	FFR-Guided Complete Revascularization (n=217)	Infarct-Related Artery Only (n=100)	FFR-Guided Complete Revascularization (n=97)	*P* Value*
Median age (range, y)	63 (34–89)	64 (39–94)	62 (38–92)	63 (37–88)	0.39
Men	173 (81%)	176 (81%)	82 (82%)	75 (77%)	0.83
Current smoker	105 (49%)	114 (53%)	46 (46%)	47 (47%)	0.72
Diabetes mellitus	26 (12%)	17 (8%)	16 (16%)	12 (12%)	0.17
Hypertension	95 (45%)	86 (40%)	51 (51%)	44 (45%)	0.29
Previous myocardial infarction	18 (9%)	5 (10%)	9 (9%)	7 (7%)	0.36
Anterior infarct location	75 (36%)	71 (33%)	39 (39%)	34 (35%)	0.76
Proximal noninfarct-related stenosis	47 (22%)	48 (22%)	39 (39%)	42 (43%)	<0.001†
Noninfarct-related stenosis ≥90%	39 (18%)	61 (28%)	51 (51%)	51 (53%)	<0.001†
PCI					
Arteries treated per patient					<0.001‡
0	1 (1)	2 (1)	0 (0)	2 (2)	
1	210 (98)	114 (53)	96 (96)	24 (25)	
2	2 (1)	101 (46)	3 (3)	44 (45)	
3	0 (0)	0 (0)	1 (1)	27 (28)	
Implanted stents (n)	1 (1–1)	2 (1–3)	1 (1–2)	3 (2–4)	<0.001‡
Average stented diameter, mm	3.5 (2.9–3.5)	3.0 (2.75–3.5)	3.5 (2.75–3.5)	3.0 (2.7–3.4)	0.022§

Table 2. Event Rate of the Primary Composite End Point According to Number of Diseased Vessels, Lesion Location, and Diameter of the Noninfarct-Related Stenosis

	Infarct-Related Artery Only	FFR-Guided Complete Revascularization	Hazard Ratio (95% Confidence Interval)	*P* Value	*P* for Interaction
Number of diseased vessels					0.046
2-Vessel disease (n=430)	36 (17%)	28 (13%)	0.77 (0.47–1.26)	0.29	
3-Vessel disease (n=197)	32 (32%)	12 (12%)	0.33 (0.17–0.64)	0.001	
Severity of the noninfarct related stenosis*					0.06
<90% (n=425)	39 (18%)	25 (12%)	0.72 (0.44–1.19)	0.21	
≥90% (n=202)	29 (32%)	15 (13%)	0.32 (0.18–0.62)	0.001	
Location of the noninfarct-related stenosis					0.59
Distal (n=451)	53 (23%)	32 (14%)	0.60 (0.39–0.93)	0.023	
Proximal (n=176)	15 (17%)	8 (9%)	0.45 (0.19–1.05)	0.07	

DEFINE FLAIR

Functional Lesion Assessment of Intermediate stenosis to guide Revascularization

ACC.17

66th Annual Scientific Session & Expo

iFR vs FFR for guiding coronary revascularization – DEFINE-FLAIR

Justin E Davies, MD, PhD on behalf of the DEFINE-FLAIR investigators

Hammersmith Hospital,

Imperial College London

WASHINGTON, DC

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MARCH 17 – 19, 2017

Imperial College London

This article was published on March 18, 2017, at NEJM.org

Principal hypothesis

iFR is ***non-inferior*** to FFR for major adverse cardiac events (MACE) at 1 year in patients undergoing physiological-guided revascularization.

Table 1. Baseline Characteristics of the Patients.*

Characteristic	iFR Group (N=1242)	FFR Group (N=1250)
Age — yr	65.5±10.8	65.2±10.6
Sex — no. (%)		
Female	280 (22.5)	321 (25.7)
Male	962 (77.5)	929 (74.3)
Disease type — no. (%)†		
STEMI	49 (3.9)	42 (3.4)
Acute coronary syndrome	186 (15.0)	184 (14.7)
Stable disease	986 (79.4)	1012 (81.0)
Diabetes — no. (%)		
Non–insulin dependent	288 (23.2)	282 (22.6)
Insulin dependent	94 (7.6)	94 (7.5)
Smoking status — no. (%)		
Former smoker	461 (37.1)	443 (35.4)
Current smoker	243 (19.6)	262 (21.0)
Hypertension — no. (%)	873 (70.3)	884 (70.7)
Hypercholesterolemia — no. (%)	794 (63.9)	792 (63.4)
Previous myocardial infarction — no. (%)	358 (28.8)	376 (30.1)
Previous percutaneous coronary intervention — no. (%)	489 (39.4)	527 (42.2)
Previous heart condition — no. (%)	489 (39.4)	530 (42.4)
Congestive heart failure — no. (%)	77 (6.2)	67 (5.4)

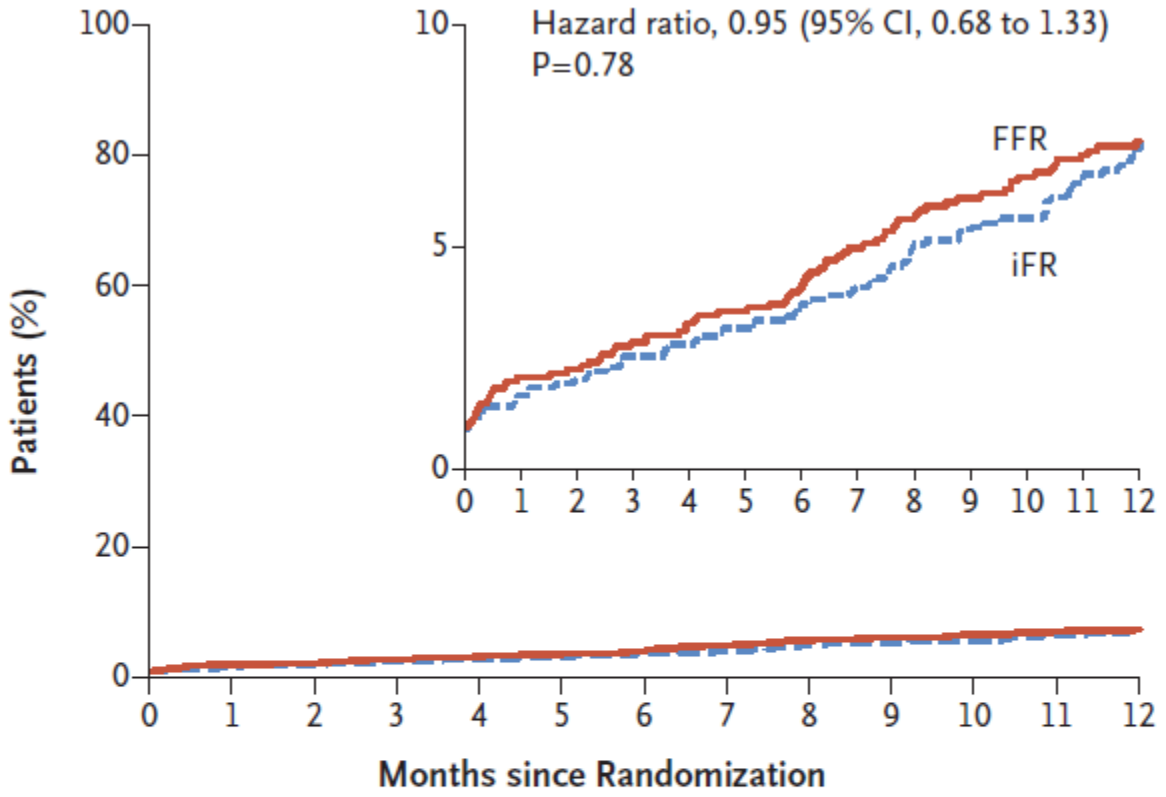


Figure 2. Cumulative Risk of the Primary End Point.

Shown is the cumulative risk of the composite of death from any cause, nonfatal myocardial infarction, or unplanned revascularization at 1 year. The inset shows the same data on an enlarged y axis.

Table 3. Outcomes for Difference in Risk at 1 Year.*

Outcome	iFR Group	FFR Group	Difference in Risk		P Value
	no./total no. (%)		*percentage points (95% CI)*	*percentage points (99% CI)*	
Primary end point: death from any cause, nonfatal myocardial infarction, or unplanned revascularization	78/1148 (6.8)	83/1182 (7.0)	−0.2 (−2.3 to 1.8)†	−0.2 (−2.9 to 2.5)	0.83
Unplanned revascularization	46/1147 (4.0)	63/1181 (5.3)	−1.3 (−3.0 to 0.4)	−1.3 (−3.1 to 1.9)	0.13
Nonfatal myocardial infarction	31/1148 (2.7)	28/1180 (2.4)	0.3 (−1.0 to 1.6)	0.3 (−1.4 to 2.0)	0.62
Death from cardiovascular causes	7/1147 (0.6)	4/1179 (0.3)	0.3 (−0.3 to 0.8)	0.3 (−0.5 to 1.0)	0.34
Death from noncardiovascular causes	15/1147 (1.3)	9/1179 (0.8)	0.5 (−0.3 to 1.4)	0.5 (−0.5 to 1.6)	0.19
Death from any cause	22/1147 (1.9)	13/1179 (1.1)	0.8 (−0.2 to 1.8)	0.8 (−0.5 to 2.1)	0.11

* Patients who had a myocardial infarction or an unplanned revascularization before withdrawing from the study were included in the analyses.
† For the primary end point, the upper limit of the 95% confidence interval was 1.8 percentage points, which was within the prespecified non-inferiority margin of 3.4 percentage points.

Y con menos efectos indeseables mediados por adenosina y un ahorro promedio de 4.5 minutos por paciente!

The NEW ENGLAND JOURNAL of MEDICINE

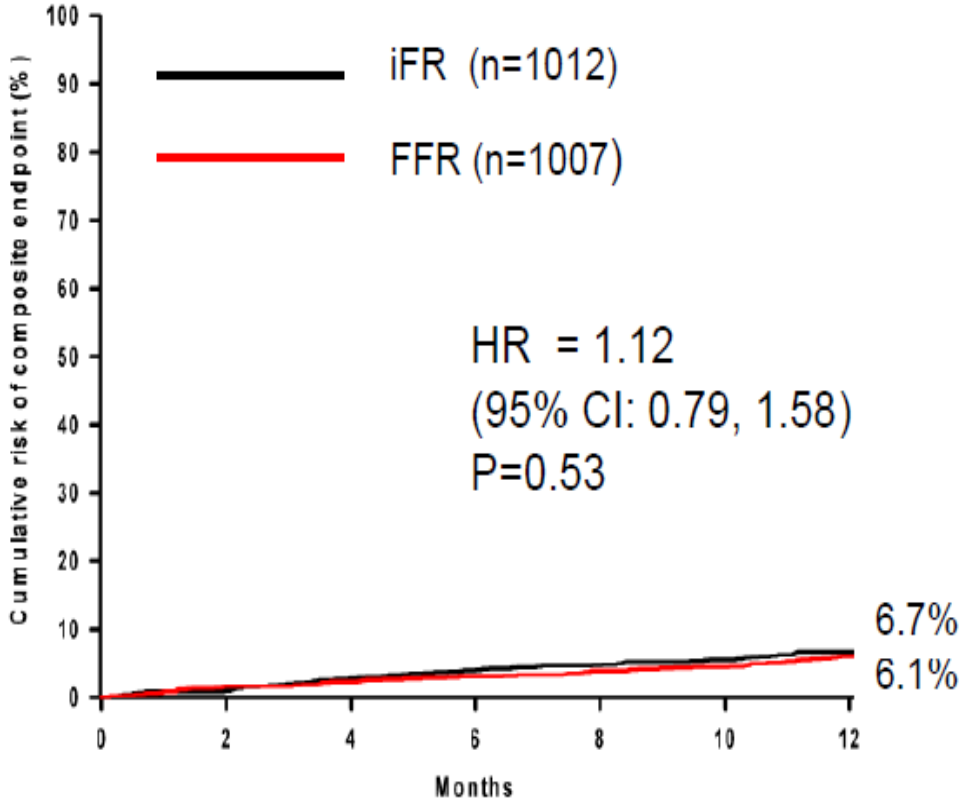
ORIGINAL ARTICLE

Instantaneous Wave-free Ratio versus Fractional Flow Reserve to Guide PCI

M. Götberg, E.H. Christiansen, I.J. Gudmundsdottir, L. Sandhall, M. Danielewicz, L. Jakobsen, S.-E. Olsson, P. Öhagen, H. Olsson, E. Omerovic, F. Calais, P. Lindroos, M. Maeng, T. Tödt, D. Venetsanos, S.K. James, A. Kåregren, M. Nilsson, J. Carlsson, D. Hauer, J. Jensen, A.-C. Karlsson, G. Panayi, D. Erlinge, and O. Fröbert, for the iFR-SWEDEHEART Investigators*

This article was published on March 18, 2017, at NEJM.org.

Primary Endpoint at 12 months
(Death, MI, Unplanned revascularization)



No. at Risk

iFR	1012	1002	984	971	963	956	944
FFR	1007	990	984	976	968	961	946

Beneficios de FFR en lesiones estables: más allá de reducir el TVR?

- Meta-analisis de FAME2, DANAMI-PRIMULTI3 y COMPARE-ACUTE (n=2400).

Table I **Clinical events: primary and secondary endpoints**

	Estimated cumulative incidence at 5 years		Hazard ratio (95% CI)	*P*-value
	FFR-guided PCI	Medical therapy		
Cardiac death or MI[a]	10.7% (8.4–13.6%)	16.4% (13.3–20.1%)	0.72 (0.54–0.96)	0.02
Death or MI	13.9% (11.2–17.2%)	19.4% (16.0–23.4%)	0.76 (0.59–0.99)	0.04
MI	8.5% (6.5–11.1%)	13.4% (10.7–16.8%)	0.70 (0.51–0.97)	0.03
Cardiac death	3.2% (2.1–5.1%)	3.0% (1.9–4.8%)	1.04 (0.58–1.78)	0.89
All-cause mortality	7.0% (5.2–9.6%)	6.5% (4.7–8.9%)	1.03 (0.69–1.54)	0.89

[a]Pre-specified primary outcome. FFR-guided PCI ($N = 1056$) and medical therapy ($N = 1344$).
CI, confidence interval; FFR, fractional flow reserve; MI, myocardial infarction; PCI, percutaneous coronary intervention.

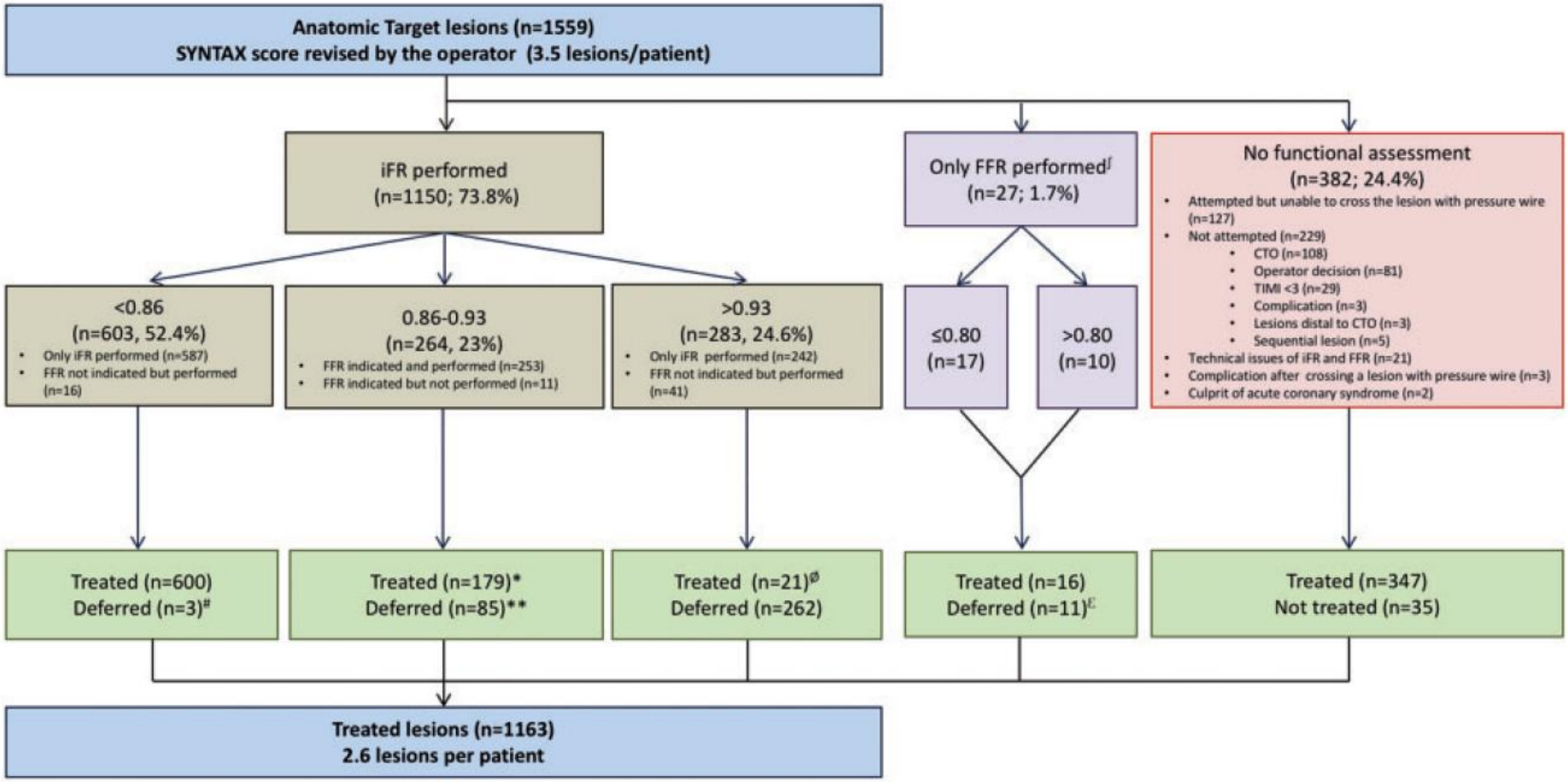
European Heart Journal (2019) 40, 180–186

La “estrategia Syntax II” incluye la evaluación de la fisiología coronaria

SYNTAX II: Utilizing contemporary PCI tools and Techniques produces CABG-like outcomes

The SYNTAX II Trial evaluated patients with three-vessel disease; the PCI treatment algorithm included updated techniques and technologies: Physiological Assessment, IVUS Guidance, Complete Revascularization Techniques and Contemporary Technology-including the SYNERGY™ BP Stent*.

Escaned J. Heart Journal (2017) 38, 3124–3134



Deferred despite positive FFR
*In 166 lesions, FFR was ≤0.80. In 3 lesions FFR was >0.80 but the lesion was treated. In 10 lesions, the lesion was treated without additional FFR.
**In 84 lesions, FFR was >0.80. In 1 lesion, FFR was not performed but iFR >0.89.
[Ø] In 19 lesions, FFR was ≤0.80. Two lesions were treated with iFR >0.89.
[J] iFR was not performed due to technical issue (e.g. wire dysfunction, ECG not recorded, Console dysfunction)
[£] In 10 lesions FFR>0.80 and in 1 FFR<0.80

Escaned J. Heart Journal (2017) 38, 3124–3134

Table 3 One year clinical outcomes between SYNTAX II cohort and the equipoise-derived SYNTAX-I PCI

Outcome	SYNTAX II ($n = 454$)	SYNTAX I PCI arm ($n = 315$)	Hazard ratio (95% CI)	*P*-value
MACCE, % (*n*)	10.6% (47)	17.4% (54)	0.58 (0.39–0.85)	0.006
All-cause death, stroke and any MI, % (*n*)	3.8% (17)	6.4% (20)	0.58 (0.30–1.10)	0.09
All-cause death, % (*n*)	2.0% (9)	2.9% (9)	0.69 (0.27–1.73)	0.43
Cardiac death, % (*n*)	1.1% (5)	2.6% (8)	—	0.13
Vascular death, % (*n*)	0.2% (1)	0.0% (0)	—	0.41
Non-cardiovascular death, % (*n*)	0.7% (3)	0.3% (1)	—	0.52
Stroke, % (*n*)	0.4% (2)	0.7% (2)	0.69 (0.10–4.89)	0.71
Ischaemic, % (*n*)	0.4% (2)	0.3% (1)	—	0.79
Haemorrhagic, % (*n*)	0.2% (1)	0.3% (1)	—	0.80
Any MI, % (*n*)	1.4% (6)	4.8% (15)	0.27 (0.11–0.70)	0.007
Periprocedural MI, % (*n*)	0.2% (1)	3.8% (12)	—	<0.001
Spontaneous MI, % (*n*)	1.1% (5)	1.0% (3)	—	0.880
Any revascularization, % (*n*)	8.2% (36)	13.7% (42)	0.57 (0.37–0.90)	0.015
CABG, % (*n*)	0.7% (3)	1.6% (5)	—	0.21
PCI, % (*n*)	7.5% (33)	12.5% (38)	—	0.022
Definite stent thrombosis, % (*n*)	0.7% (3)	2.6% (8)	0.26 (0.07–0.97)	0.045
Acute, % (*n*)	0.2% (1)	1.6% (5)	—	0.40
Sub-acute, % (*n*)	0.0% (0)	1.6% (5)	—	0.007
Late, % (*n*)	0.5% (2)	1.0% (3)	—	0.37
Probable stent thrombosis, % (*n*)	0.2% (1)	NA	—	

Escaned J. Heart Journal (2017) 38, 3124–3134

La Guía de Presión Noviembre 2018

INFORMES, ESTUDIOS E INVESTIGACIÓN

INFORMES DE EVALUACIÓN DE TECNOLOGÍAS SANITARIAS

GOBIERNO DE ESPAÑA
MINISTERIO DE SANIDAD, CONSUMO Y BIENESTAR SOCIAL

RED ESPAÑOLA DE AGENCIAS DE EVALUACIÓN DE TECNOLOGÍAS Y PRESTACIONES DEL SISTEMA NACIONAL DE SALUD

Comunidad de Madrid
Dirección General de infraestructuras Sanitarias
CONSEJERÍA DE SANIDAD

Toma de decisiones en lesiones intermedias -FFR-

1. Si bien la estrategia de utilizar FFR no mostró diferencias en la mortalidad por todas las causas ni durante la hospitalización ni en el seguimiento, si hubo una reducción significativa en IM tanto en la hospitalización/ seguimiento.

2. Idéntico resultado para MACE.
3. Menos necesidad de implante de stents durante hospitalización pero mayor durante el seguimiento.
4. No datos en lesiones intermedias de tronco.

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DOI: 10.1111/joic.12551

ORIGINAL INVESTIGATION

WILEY Journal Of Interventional Cardiology

Network meta-analysis comparing iFR versus FFR versus coronary angiography to drive coronary revascularization

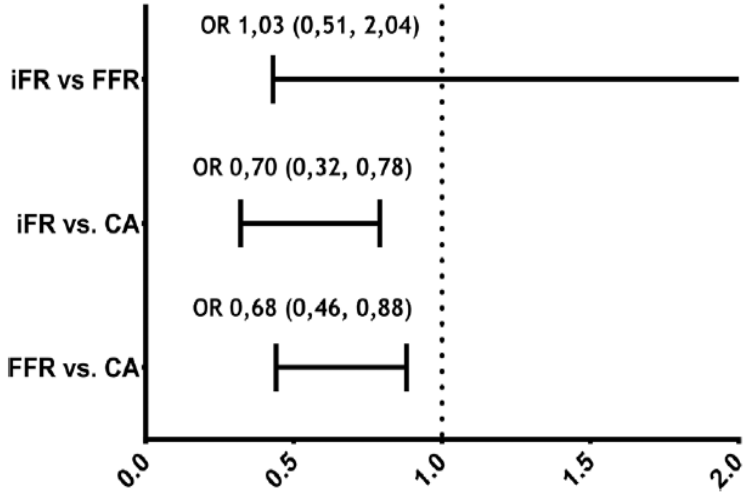

FIGURE 4 Network meta-analysis for TVR

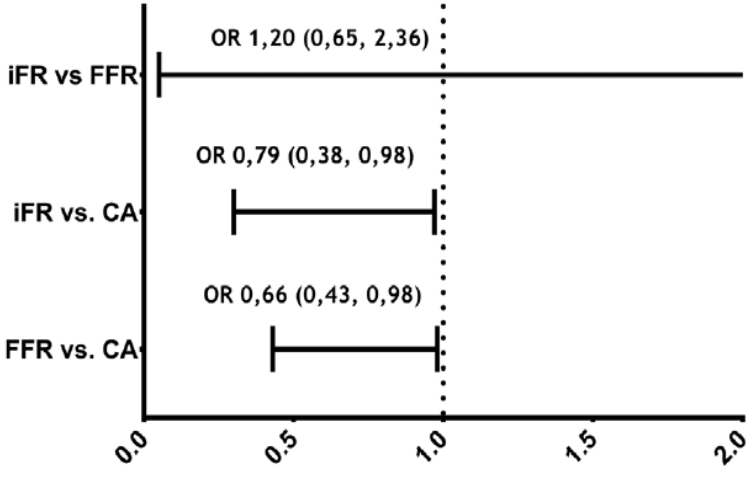

FIGURE 5 Network meta-analysis for MI for only stable patients

2. FFR en estenosis aórtica severa ¿es fiable?

Revascularización en la EAo severa

Tratamiento de la enfermedad arterial coronaria de pacientes con valvulopatías

Recomendaciones	Clase[a]	Nivel[b]
Diagnóstico de enfermedad arterial coronaria		
Se recomienda la coronariografía[c] antes de la cirugía valvular en pacientes con valvulopatía grave y cualquiera de los siguientes factores: • Historia de enfermedad cardiovascular • Sospecha de isquemia miocárdica[d] • Disfunción sistólica del VI • Varones mayores de 40 años y mujeres posmenopáusicas • Uno o más factores de riesgo cardiovascular	I	C
La coronariografía está recomendada para evaluar la insuficiencia mitral secundaria de moderada a grave	I	C
Debe considerarse la angio-TC como alternativa a la coronariografía antes de la cirugía valvular en pacientes con valvulopatía grave y baja probabilidad de EAC o para los que la coronariografía convencional no es técnicamente factible o se asocia con alto riesgo	IIa	C
Indicaciones para la revascularización miocárdica		
Se recomienda la CABG para pacientes con una indicación primaria de cirugía aórtica/mitral y de estenosis coronaria ≥ 70% del diámetro[e]	I	C
Debe considerarse la CABG para pacientes con una indicación primaria de cirugía valvular aórtica/mitral y una estenosis coronaria ≥ 50-70% del diámetro	IIa	C
Debe considerarse la ICP para pacientes con una indicación primaria para TAVI y estenosis coronaria > 70% del diámetro en segmentos proximales	IIa	C
Debe considerarse la ICP para pacientes con una indicación primaria de intervención percutánea de válvula mitral y estenosis coronaria > 70% del diámetro en segmentos proximales	IIa	C

Cortesía Dr. López-Palop

Rev Esp Cardiol. 2018;71(2):110.e1-e47

Artículo especial

Guía ESC/EACTS 2017 sobre el tratamiento de las valvulopatías

Grupo de Trabajo de la Sociedad Europea de Cardiología (ESC) y la *European Association for Cardio-Thoracic Surgery* (EACTS) sobre el tratamiento de las valvulopatías

del Grupo de Trabajo: Helmut Baumgartner* (coordinador de la ESC) (Alemania), ordinador de la EACTS) (Alemania), Jeroen J. Bax (Países Bajos), Michele De Bonis[b] Hamm (Alemania), Per Johan Holm (Suecia), Bernard Iung (Francia), Patrizio Lancellotti uel Lansac[b] (Francia), Daniel Rodríguez Muñoz (España), Raphael Rosenhek (Austria), ecia), Pilar Tornos Mas (España), Alec Vahanian (Francia), Thomas Walther[c] (Alemania), ino Unido), Stephan Windecker (Suiza) y José Luis Zamorano (España)

Rev Esp Cardiol. 2019;72(1):73.e1-e76

Artículo especial

Guía ESC/EACTS 2018 sobre revascularización miocárdica

Grupo de Trabajo de la Sociedad Europea de Cardiología (ESC) y la *European Association for Cardio-Thoracic Surgery* (EACTS) sobre revascularización miocárdica

Desarrollada con la colaboración especial de la *European Association for Percutaneous Cardiovascular Interventions* (EAPCI)

Autores/miembros del Grupo de Trabajo: Franz-Josef Neumann* (coordinador de la ESC) (Alemania), Miguel Sousa-Uva** (coordinador de la EACTS) (Portugal), Anders Ahlsson[a] (Suecia), Fernando Alfonso (España), Adrian P. Banning (Reino Unido), Umberto Benedetto[a] (Reino Unido), Robert A. Byrne (Alemania), Jean-Philippe Collet (Francia), Volkmar Falk[a] (Alemania), Stuart J. Head[a] (Países Bajos), Peter Jüni (Canadá), Adnan Kastrati (Alemania), Akos Koller (Hungría), Steen D. Kristensen (Dinamarca), Josef Niebauer (Austria), Dimitrios J. Richter (Grecia), Petar M. Seferović[a] (Serbia), Dirk Sibbing (Alemania), Giulio G. Stefanini (Italia), Stephan Windecker (Suiza), Rashmi Yadav[a] (Reino Unido) y Michael O. Zembala[a] (Polonia)

11.1. Indicación primaria para las intervenciones valvulares

La revascularización miocárdica de los pacientes sometidos a una intervención valvular primaria quirúrgica o transcatéter se trata en la guía ESC/EACTS 2014 dedicada a este tema. Después de revisar la literatura publicada con posterioridad, este grupo de trabajo respalda las recomendaciones de la edición de 2014 y no ha encontrado nueva evidencia que justifique una actualización importante. Las recomendaciones se incluyen a continuación para facilitar su consulta. Cabe destacar que la evidencia disponible sobre la evaluación funcional invasiva de la EC (mediante RFF o iFR) de los pacientes con estenosis aórtica grave se limita a un escaso número de estudios observacionales a pequeña escala. Esos estudios respaldan la viabilidad de estas técnicas en este contexto[302-304]. No obstante, no hay suficientes pruebas para apoyar la evaluación funcional invasiva de las lesiones coronarias en pacientes con estenosis aórtica, especialmente si se tienen en cuenta las alteraciones hemodinámicas asociadas con la presencia de dicha entidad. Por todo ello, este grupo de trabajo mantiene el consenso de que las indicaciones para la revascularización miocárdica deben estar basadas en la evaluación angiográfica de la EC, siguiendo las recomendaciones de la guía ESC/EACTS 2014 sobre revascularización miocárdica y la guía ESC/EACTS 2017 sobre el diagnóstico y tratamiento de las valvulopatías[305].

Rev Esp Cardiol. 2018;71:110.e1-e47.

Rev Esp Cardiol. 2019;72:73.e1-e76.

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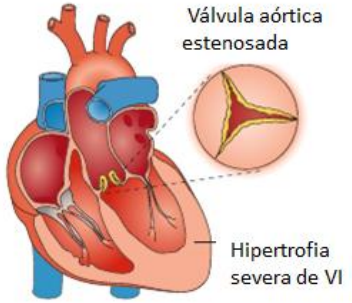

Aumento masa miocárdica
Disminución presión sistólica

Disminución presión de perfusión → Disminución COMPENSATORIA de resistencias → **Mantenimiento-Aumento flujo en reposo**

CFR

HIPEREMIA:

Aumento postcarga
Hipertrofia
Compresión extravascular → Aumento PATOLÓGICO de resistencias → **Disminución de flujo máximo en hiperemia**

Cortesía Dr. López-Palop

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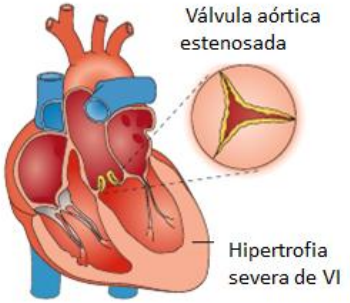

Aumento masa miocárdica
Disminución presión sistólica

Disminución presión de perfusión → Disminución COMPENSATORIA de resistencias → **Mantenimiento-Aumento flujo en reposo** → **↓iFR**

HIPEREMIA:

Aumento postcarga
Hipertrofia
Compresión extravascular → Aumento PATOLÓGICO de resistencias → **Disminución de flujo máximo en hiperemia** → **↑FFR**

Cortesía Dr. López-Palop

Correlación de iFR y FFR con isquemia miocárdica (isótopos) en **ESTENOSIS AÓRTICA**

N= 78 pacientes (116 vasos)

JACC: CARDIOVASCULAR INTERVENTIONS VOL. 11, NO. 20, 2018
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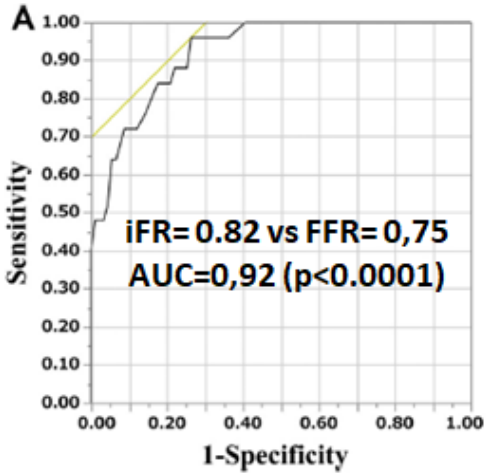
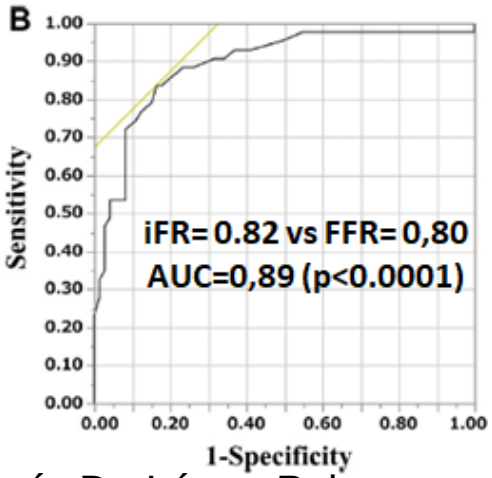
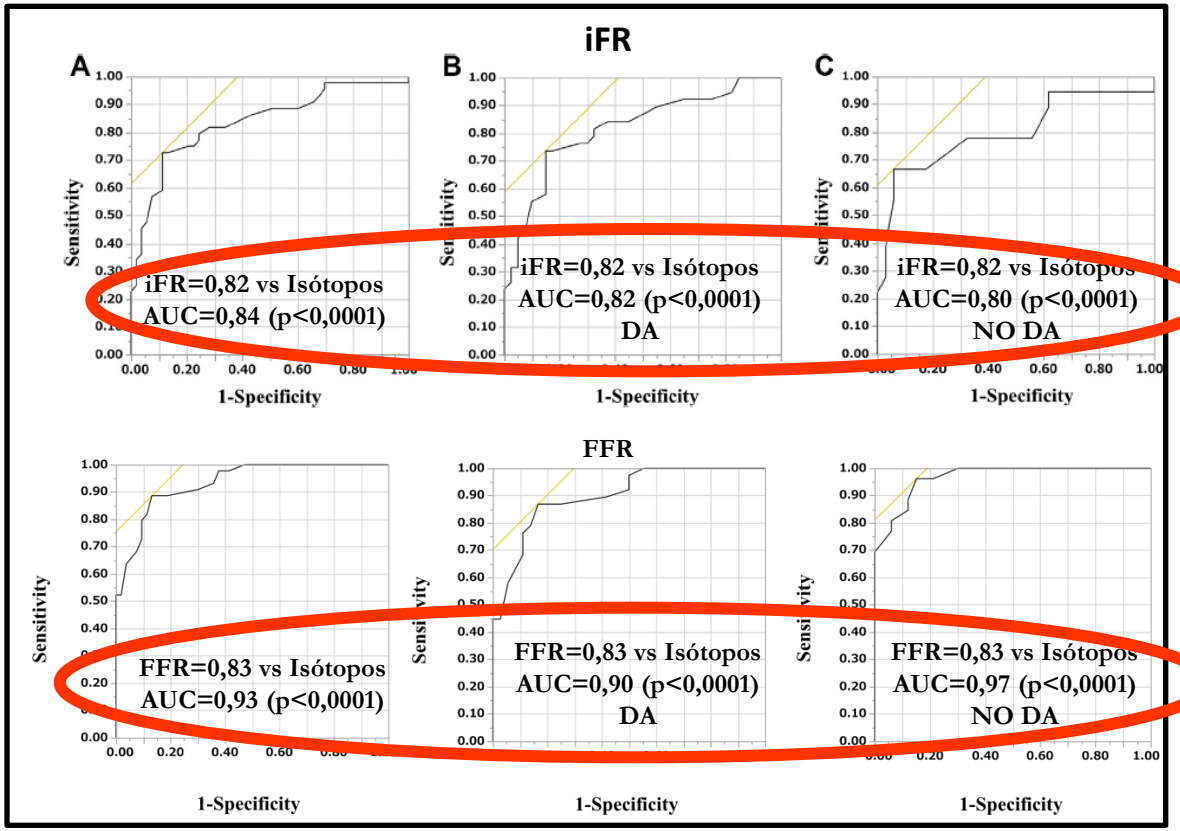
Instantaneous Wave-Free Ratio for the Assessment of Intermediate Coronary Artery Stenosis in Patients With Severe Aortic Valve Stenosis

Comparison With Myocardial Perfusion Scintigraphy

Futoshi Yamanaka, MD,[a] Koki Shishido, MD,[a] Tomoki Ochiai, MD,[a] Noriaki Moriyama, MD,[a] Kazumasa Yamazaki, MD,[b] Ayumu Sugitani,[c] Tomoyuki Tani, MD,[b] Kazuki Tobita, MD,[a] Shingo Mizuno, MD,[a] Yutaka Tanaka, MD, PhD,[a] Masato Murakami, MD, PhD,[a] Saeko Takahashi, MD,[a] Seiji Yamazaki, MD,[b] Shigeru Saito, MD[a,b]





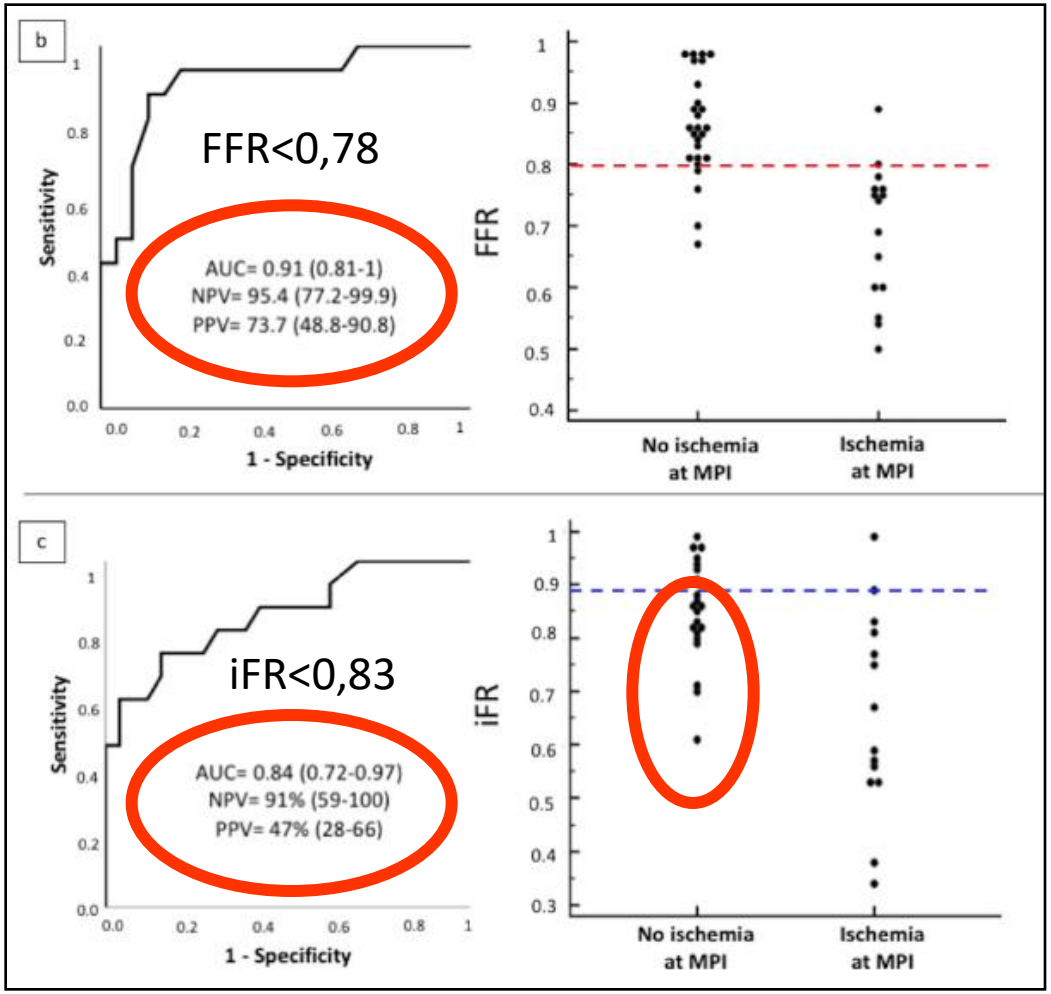


Cortesía Dr. López-Palop

J Am Coll Cardiol Intv.2018;11:2032–40

Correlación de iFR y FFR con isquemia miocárdica (SPECT) en **ESTENOSIS AÓRTICA**

N= 28 pacientes (41 lesiones >50%)



Contents lists available at ScienceDirect

International Journal of Cardiology

journal homepage: www.elsevier.com/locate/ijcard

Short communication

Correlation between intracoronary physiology and myocardial perfusion imaging in patients with severe aortic stenosis

Roberto Scarsini [a,b], Rosaria Cantone [a], Gabriele Venturi [a], Giovanni Luigi De Maria [b], Andrea Variola [a,c], Paolo Braggio [c], Mattia Lunardi [a], Gabriele Pesarini [a], Marco Ferdeghini [c], Anna Piccoli [b,e], Mauro Feola [d], Rajesh K. Kharbanda [b], Adrian P. Banning [b], Flavio Ribichini [a,*]

[a] Division of Cardiology, Department of Medicine, University of Verona, Verona, Italy
[b] Oxford Heart Centre, Oxford University Hospitals, NHS Trust, Oxford, United Kingdom
[c] Division of Nuclear Cardiology, Department of Nuclear Medicine, University of Verona, Verona, Italy
[d] Division of Cardiology, Ospedale Mondovì, Cuneo, Italy
[e] Biomolecular Medicine PhD Program, University of Verona, Verona, Italy

Clinical, echocardiographic and angiographic data.

Variable	Overall	No ischemia at MPI	Ischemia at MPI	p-Value
Patients n.	28(100)	13(46)	15(54)	
Age, years	82(79–88)	82(80–87)	79(76–89)	0.85
Sex female, %	14(50)	5(38)	9(60)	0.045
BMI, kg/m^2	27(24–30)	28(25–30)	25(24–28)	0.079
Hypertension, %	25(89)	10(77)	15(100)	0.085
Diabetes, %	13(46)	7(54)	6(40)	0.23
Dyslipidemia, %	17(61)	7(54)	10(67)	0.75
CKD, %	14(50)	8(62)	6(40)	0.69
AF, %	9(32)	6(46)	3(20)	0.4
Angina (CCS > 1)	6(21)	2(15)	4(27)	0.56
Medical therapy				
Beta-blockers	14(50)	5(38)	9(60)	0.39
Ca channels blocker	16(57)	6(46)	10(67)	0.55
ACEi/ARB	6(21)	3(23)	3(20)	0.64
				0.09
				0.68
				0.13
				0.25
				0.11
				0.02
				0.24
				0.26
LAD, %	21(51)	10(39)	11(73)	0.16
DS%	55(47–68)	51(45–51)	70(58–76)	0.001
Lesion length, mm	14.1 (10.0–18.9)	13.5 (8.9–17.2)	16.0 (10.0–24.0)	0.16
Reference diameter, mm	3.10 (2.80–3.50)	3.00 (2.78–3.48)	3.12 (2.80–3.60)	0.89
MLD, mm	1.36 (1.05–1.78)	1.57 (1.31–1.83)	1.13 (0.68–1.49)	0.14
FFR	0.81 (0.74–0.88)	0.86 (0.81–0.94)	0.74 (0.60–0.76)	<0.001
iFR	0.82 (0.68–0.91)	0.86 (0.80–0.93)	0.63 (0.53–0.81)	0.001

FFR: BUENA (MEJOR QUE iFR) CAPACIDAD PREDICTIVA DE ISQUEMIA (SPECT)

Int J Cardiol.2019;292:162-165

Comparación correlación (concordancia) FFR-iFR en ESTENOSIS AÓRTICA y ANGINA ESTABLE

N= 167 angina estable
N=85 estenosis aórtica

International Journal of Cardiology 243 (2017) 40–46

Contents lists available at ScienceDirect

International Journal of Cardiology

journal homepage: www.elsevier.com/locate/ijcard

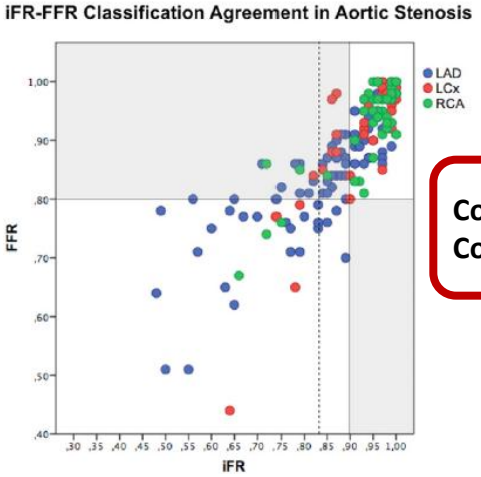
Coronary physiology in patients with severe aortic stenosis: Comparison between fractional flow reserve and instantaneous wave-free ratio☆

Roberto Scarsini [a], Gabriele Pesarini [a], Carlo Zivelonghi [a], Anna Piccoli [a], Valeria Ferrero [a], Mattia Lunardi [a], Marco Barbierato [b], Francesco Caprioglio [b], Corrado Vassanelli [a], Flavio Ribichini [a,*]

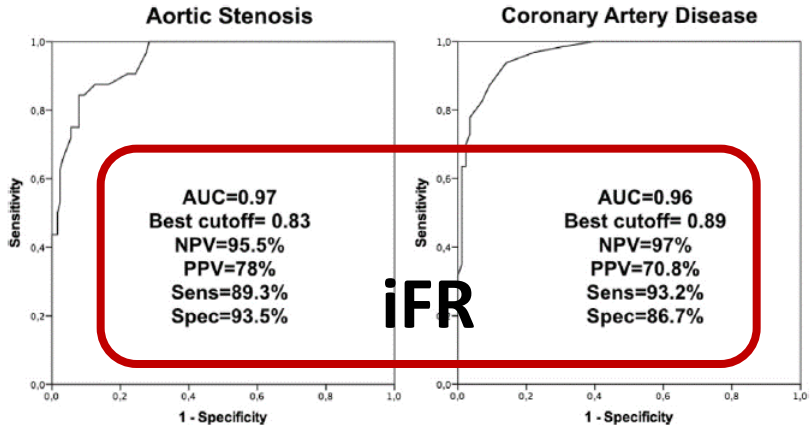
Clinical and angiographic characteristics of the studied cohorts.

Variable	CAD	AS	p-Value
Demographic data			
Number of patients	167	85	
Age, years	79.8 ± 9.5	80.2 ± 7	0.72
Gender male, %	50	45.8	0.61
BMI	26.4 ± 6.2	25.3 ± 5.1	0.16
Dyslipidemia, %	85.3	89.4	0.47
Hypertension, %	86.3	82.3	0.51
Smoke, %	68.3	54	0.04
Diabetes mellitus, %	35.7	48.2	0.08
Peripheral vascular disease, %	8.3	9.4	0.95
LV ejection fraction, %	48.7 ± 12.5	51.1 ± 14	0.18
Angiographic characteristics			
Number of lesions	290	179	
Lesion length, mm	13.3 ± 7	12.7 ± 6	0.11
D-Ref, mm	2.7 ± 0.7	2.9 ± 0.5	<0,001
MLD, mm	1.18 ± 0.4	1.42 ± 0.5	<0.001
DS, %	59.9 ± 10.8	52.7 ± 11	<0.001
Mean FFR ratio	0.82 ± 0.11	0.87 ± 0.09	0.001
Mean iFR ratio	0.84 ± 0.14	0.88 ± 0.11	0.001

BMI, body mass index; MLD, minimal lumen diameter; D-Ref, vessel diameter; DS, diameter stenosis.



Concordancia iFR=0,89, FFR=0,80: 76,3%
Concordancia iFR=0,83, FFR=0,80: 91,3%



Cortesía Dr. López-Palop

***Int J Cardiol*.2017;243:40-45**

27 pacientes con Eao tratados con TAVI.
Medición de flujo y presión coronaria antes y después de TAVI versus 28 sin EAo

Coronary Physiologic Assessment and Imaging

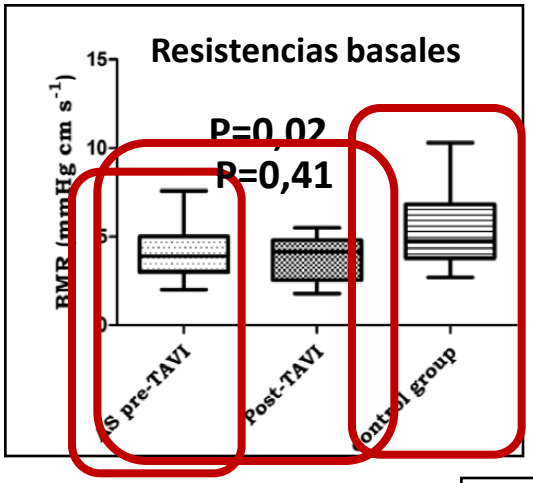
Impact of Aortic Valve Stenosis on Coronary Hemodynamics and the Instantaneous Effect of Transcatheter Aortic Valve Implantation

Esther M.A. Wiegerinck, MD; Tim P. van de Hoef, MD, PhD; M. Cristina Rolandi, PhD; ZeYie Yong, MD, PhD; Floortje van Kesteren, MD; Karel T. Koch, MD, PhD; Marije M. Vis, MD, PhD; Bas A.J.M. de Mol, MD, PhD; Jan J. Piek, MD, PhD; Jan Baan Jr, MD, PhD

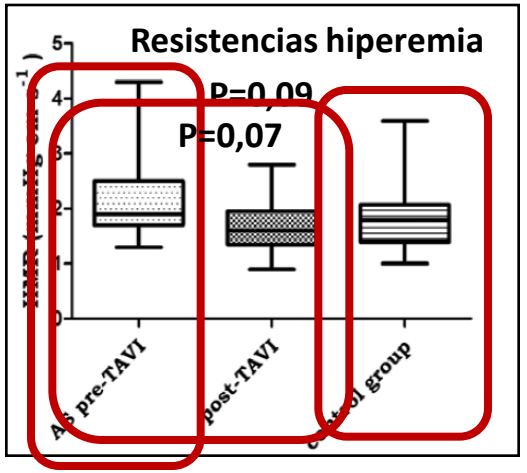
Table 1. Baseline Clinical Characteristics

	Total (n=55)	AS-Patients (n=27)	Control (n=28)	*P* Value
Patients				
Age, y	72±8	82±8	63±5	<0.001
BMI, kg/m²	27.6±5.6	28.67±4.74	26.62±2.76	0.070
Male sex	30 (54.5)	10 (37.0)	20 (71.4)	0.007
NYHA class ≥3	33 (60.0)	13 (48.1)	19 (67.9)	0.093
History				
Hypertension	28 (50.9)	17 (63.0)	11 (39.3)	0.180
Diabetes mellitus	10 (18.2)	2 (7.4)	8 (28.6)	0.078
Hypercholesterolemia	22 (40.0)	3 (11.1)	21 (75.0)	<0.001
Prior MI	4 (7.3)	2 (7.4)	2 (7.1)	1.00
Prior PCI	49 (89.1)	3 (11.1)	3 (10.7)	1.00
CABG	0 (0)	0 (0)	0 (0)	
Medication				
ACE-inhibitor	14 (25.5)	9 (33.3)	4 (14.3)	0.227
Statines	30 (54.5)	11 (40.7)	19 (67.9)	0.010
B-blocker	36 (65.5)	10 (37.0)	26 (92.9)	<0.001

	Preprocedure	Postprocedure	*P* Value
Aortic valve area, cm²	0.78±0.17	1.86±0.79	<0.001
EOAI	0.42±0.09	1.1±0.35	<0.001
AVPG max, mm Hg	67.3±23.9	17.1±8.6	<0.001
AVPG mean, mm Hg	42.8±15.3	9.0±5.6	<0.001



Resistencias reposo en EAo>basal



Circ Cardiovasc Interv. 2015;8:e002443

27 pacientes con Eao tratados con TAVI.
Medición de flujo y presión coronaria antes y después de TAVI versus 28 sin EAo

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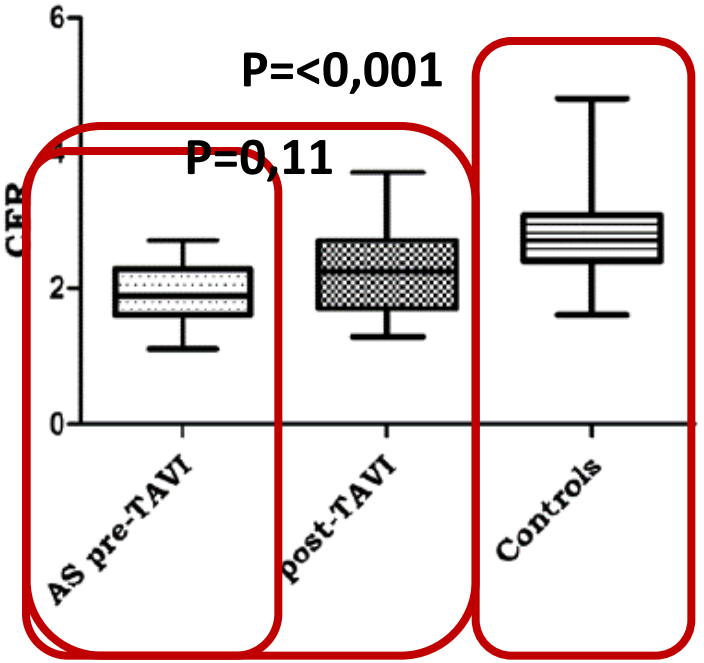
Table 4. Pre-TAVI Versus Post-TAVI

	Pre-TAVI	Post-TAVI	*P* Value
Baseline			
HR	68±11	72±11	0.001
Pd	91±14	91±14	0.914
Pa	93±14	94±15	0.768
PdPa	0.99±0,03	0.97±0.04	0.103
bMR	4.16±1.48	3.96±1.29	0.413
APV	24.4±8.6	25.5±9.0	0.401
Hyperemia			
HR	70±12	75±15	0.006
Pd	86±12	85±15	0.915
Pa	88±13	90±15	0.471
PdPa	0.97±0.05	0.95±0.06	0.042
hMR	2,10±0.69	1.83±0.58	0.072
APV	44.5±14.5	51.1±18.1	0.027
CFR	1.90±0.46	2.10±0.65	0.113
VAR	2.06±1.22	2.13±1.05	0.768
VAR%	47.0±15.5	51.1±15.0	0.241

FFR



Cortesía Dr. López-Palop

***Circ Cardiovasc Interv*. 2015;8:e002443**

8 pacientes con EAo tratados con TAVI.
Medición de flujo antes, después de TAVI y al año

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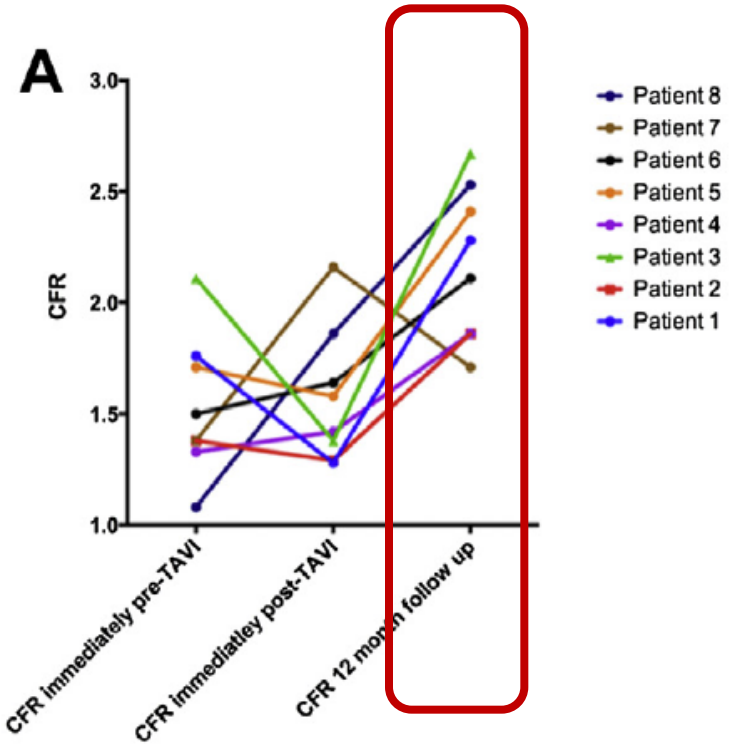
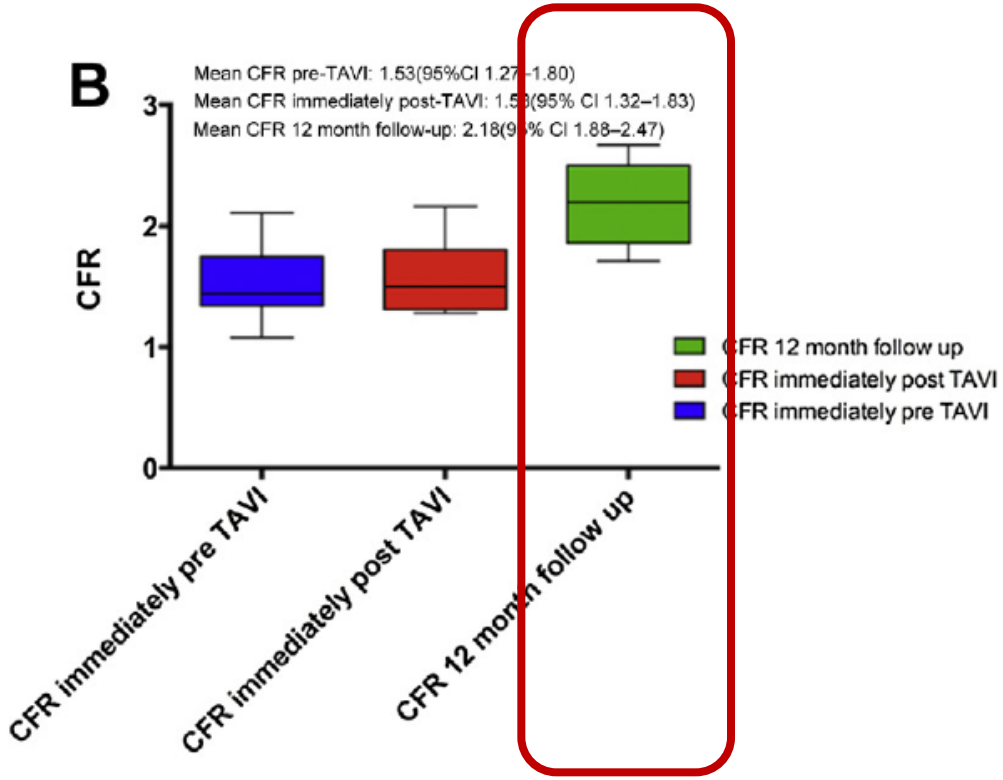
CORRESPONDENCE

Research Correspondence

Invasively Assessed Coronary Flow Dynamics Improve Following Relief of Aortic Stenosis With Transcatheter Aortic Valve Implantation





Cortesía Dr. López-Palop

J Am Coll Cardiol.2014;63:1808-9

133 lesiones en 54 pacientes estudiadas con FFR antes e INMEDIATAMENTE después de TAVI

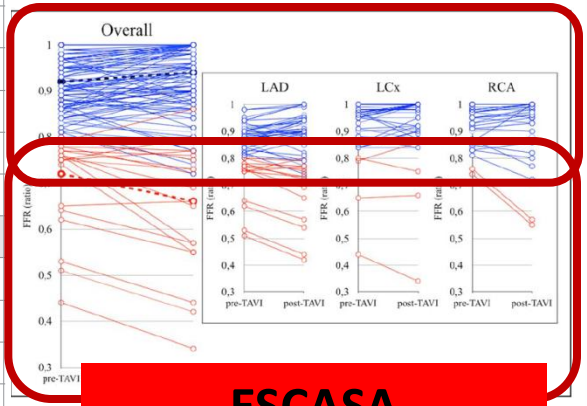
Coronary Physiologic Assessment and Imaging

Functional Assessment of Coronary Artery Disease in Patients Undergoing Transcatheter Aortic Valve Implantation

Influence of Pressure Overload on the Evaluation of Lesions Severity

Gabriele Pesarini, MD; Roberto Scarsini, MD; Carlo Zivelonghi, MD; Anna Piccoli, MD; Alessia Gambaro, MD; Leonardo Gottin, MD; Andrea Rossi, MD; Valeria Ferrero, MD; Corrado Vassanelli, MD; Flavio Ribichini, MD

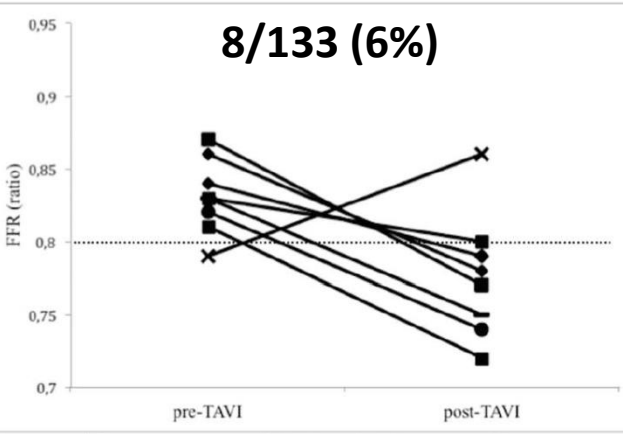
Variable	
Demographic data	
Number of patients	54
Age, y	80±7.2
Sex male, %	41
Dyslipidemia, %	87
Hypertension, %	80
Smoke, %	48
Diabetes mellitus, %	47
Ejection fraction, %	56±14
Angiographic characteristics	
Number of lesions	133
Lesion length, mm	12±6
D-Ref, mm	2.9±0.8
MLD, mm	1.8±0.6
DS, %	40±19.7
Mean FFR ratio	0.89±0.07



ESCASA RELEVANCIA CLÍNICA EN LAS MODIFICACIONES DEL VALOR DE FFR

Subset of Patients at Baseline	Number of Lesions	Pre-TAVI	Post-TAVI
LAD			
FFR≤0.8	15	0.72±0.12	0.69±0.13
FFR>0.8	41	0.88±0.12	0.89±0.13
Coronary segment other than LAD			
FFR≤0.8	6	0.69±0.12	0.62±0.14
FFR>0.8	71	0.94±0.12	0.95±0.13

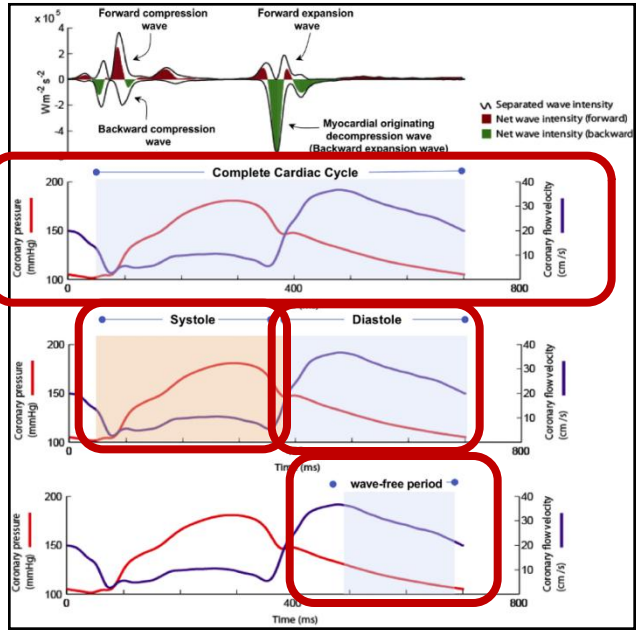
8/133 (6%)



Coronary Lesion	Coronary segment	%DS at QCA	FFR pre-TAVI	FFR post-TAVI
•1	Proximal LAD	43	0,84	0,79
■2	Proximal RCA	47	0,87	0,77
•3	Proximal LAD	51	0,86	0,78
■4	Mid RCA	63	0,81	0,72
■5	Proximal RCA	53	0,83	0,8
•6	Mid LAD	59	0,82	0,74
×7	Proximal LCx	55	0,79	0,86
-8	Proximal LAD	54	0,83	0,75

Circ Cardiovasc Interv. 2016;9:e004088

Estudio de presión y flujo con guía "combo" en 30 lesiones de 28 pacientes con EAo severa antes e inmediatamente después de TAVI. Análisis por fases del ciclo cardiaco



NO CAMBIOS EN DIÁSTOLE (iFR)

CAMBIOS EN SÍSTOLE QUE AFECTAN A TODO EL CICLO (FFR)

TABLE 4 Summary of Coronary Hemodynamic Variables at Rest and During Hyperemia Before and After Transcatheter Aortic Valve Replacement

	Resting			Hyperemia		
	Pre-TAVR	Post-TAVR	p Value	Pre-TAVR	Post-TAVR	p Value
Whole-cycle variables						
Flow velocity (cm/s)	22.13 ± 10.3	24.84 ± 12.5	0.10	33.44 ± 13.4	40.33 ± 17.4	0.004*
Microvascular resistance (mm Hg · cm · s^{-1})	4.20 ± 1.9	4.14 ± 2.1	0.81	2.42 ± 0.9	2.14 ± 0.9	0.03*
Aortic pressure (mm Hg)	85.85 ± 18.9	92.40 ± 1859	0.04*	82.99 ± 18.0	88.44 ± 17.1	0.13
Systolic variables						
Flow velocity (cm/s)	16.48 ± 9.4	21.05 ± 13.1	0.004*	27.67 ± 12.1	34.15 ± 17.5	0.01*
Microvascular resistance (mm Hg · cm · s^{-1})	7.54 ± 3.8	6.60 ± 3.5	0.17	3.73 ± 1.6	3.45 ± 1.5	0.12
Aortic pressure (mm Hg)	101.46 ± 22.4	112.11 ± 24.	0.02*	98.87 ± 22.7	110.55 ± 20.7	0.008*
Wave-free variables						
Flow velocity (cm/s)	29.78 ± 14.9	30.81 ± 19.6	0.31	44.01 ± 20.6	42.52 ± 18.4	0.87
Microvascular resistance (mm Hg · cm · s^{-1})	2.59 ± 1.5	3.02 ± 1.6	0.02*	1.53 ± 0.8	1.49 ± 0.6	0.52
Aortic pressure (mm Hg)	73.05 ± 15.1	76.41 ± 16.8	0.17	70.13 ± 16.3	70.69 ± 15.0	0.64
Diastolic variables						
Flow velocity (cm/s)	31.67 ± 15.4	33.33 ± 18.6	0.36	46.03 ± 20.5	45.94 ± 18.1	0.92
Microvascular resistance (mm Hg · cm · s^{-1})	2.65 ± 1.5	2.62 ± 1.3	0.92	1.50 ± 0.8	1.47 ± 0.6	0.63
Aortic pressure (mm Hg)	76.76 ± 16.6	78.13 ± 17.0	0.33	71.69 ± 14.9	74.02 ± 15.3	0.34

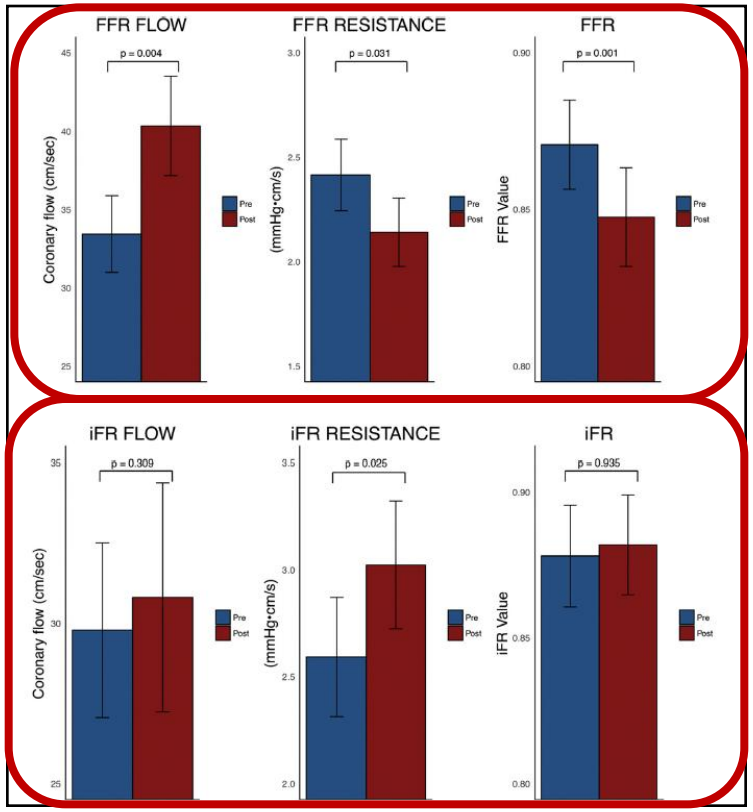
JACC: CARDIOVASCULAR INTERVENTIONS VOL. 11, NO. 20, 2018

FOCUS ON CORONARY PHYSIOLOGY ASSESSMENT IN SPECIAL COHORTS

Coronary Hemodynamics in Patients With Severe Aortic Stenosis and Coronary Artery Disease Undergoing Transcatheter Aortic Valve Replacement

Implications for Clinical Indices of Coronary Stenosis Severity

Yousif Ahmad, BMBS,[a] Matthias Götberg, MD, PhD,[b] Christopher Cook, MBBS,[a] James P. Howard, MBBCh,[a] Iqbal Malik, MBBS, PhD,[c] Ghada Mikhail, MBBS, PhD,[c] Angela Frame, MSc,[c] Ricardo Petraco, MD, PhD,[a] Christopher Rajkumar, MBBS,[a] Ozan Demir, MBBS,[c] Juan F. Iglesias, MD,[d] Ravinay Bhindi, MBBS, PhD,[a] Sasha Koul, MD, PhD,[b] Nearchos Hadjiloizou, MBBS, PhD,[c] Robert Gerber, MD,[a] Punit Ramrakha, MD,[c] Neil Ruparelia, MBBS, DPhil,[a] Nilesh Sutaria, MBChB, MD,[c] Gajen Kanagaratnayagam, MBBS, PhD,[c] Ben Ariff, MBBS, PhD,[c] Michael Fertleman, MBBCh,[c] Jon Anderson, MBChB,[c] Andrew Chukwuemeka, MBBS, MD,[c] Darrel Francis, MBBCh, MD,[a] Jamil Mayet, MBChB, MD,[a] Patrick Serruys, MD, PhD,[a] Justin Davies, MBBS, PhD,[a] Sayan Sen, MBBS, PhD[a]



J Am Coll Cardiol Intv.2018;11:2019–31

Medición en los 3 vasos de 66 pacientes con EAo severa sintomática de iFR, FFR antes e inmediatamente después de TAVI (mismo procedimiento)

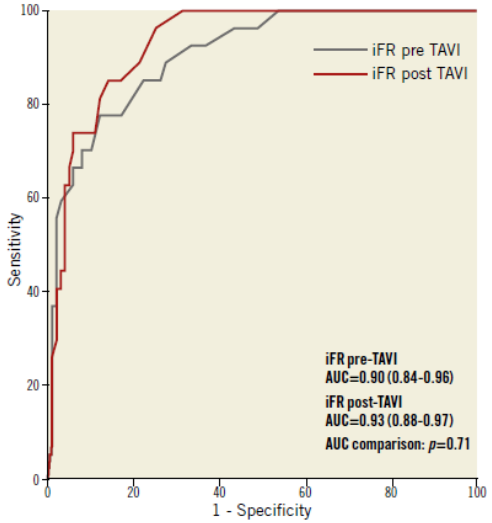
Physiologic evaluation of coronary lesions using instantaneous wave-free ratio (iFR) in patients with severe aortic stenosis undergoing transcatheter aortic valve implantation

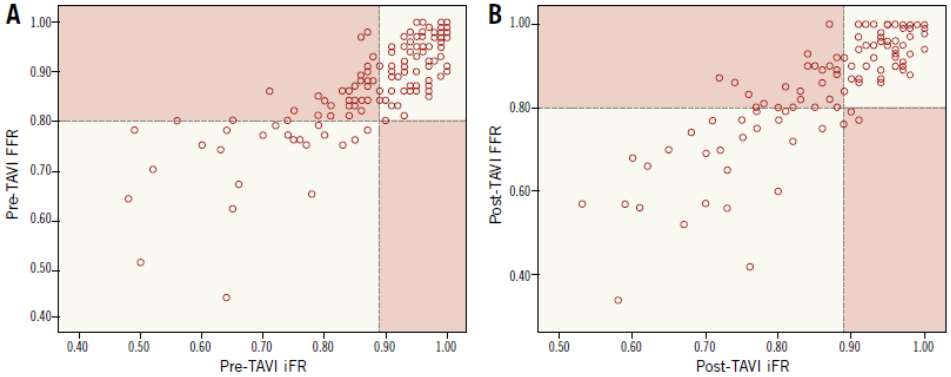
Roberto Scarsini[1], MD; Gabriele Pesarini[1], MD; Carlo Zivelonghi[1], MD; Anna Piccoli[1], MD; Valeria Ferrero[1], MD; Mattia Lunardi[1], MD; Leonardo Gottin[2], MD; Claudia Zanetti[1], MD; Giuseppe Faggian[3], MD; Flavio Ribichini[1]*, MD

1. Division of Cardiology, Department of Medicine, University of Verona, Verona, Italy; 2. Division of Anaesthesiology, Department of Surgery, University of Verona, Verona, Italy; 3. Division of Cardiac Surgery, Department of Surgery, University of Verona, Verona, Italy

Variable	Overall population	iFR pre post-TAVI concordance	iFR pre post-TAVI discordance	*p*-value
Demographic data				
Number of patients	66	48	18	–
Age, years	80±7	83±6	79±5	0.02
Sex, male, %	45.1	17 (41%)	7 (41%)	0.96
Dyslipidaemia, %	81	18 (43%)	9 (53%)	0.57
Hypertension, %	79.3	41 (98%)	16 (94%)	0.5
Smoking, %	47.3	20 (47%)	8 (47%)	0.9
Diabetes mellitus, %	49.7	9 (21%)	4 (24%)	0.99
Ejection fraction, %	52±10	53±14	50±12	0.48
S-creatinine, mg/dL	1.2±1	1.3±1	1±0.2	0.31
AV mean gradient pre TAVI, mmHg	45±16	45±12	44±22	0.85
AV mean gradient post TAVI, mmHg	10±4	10±4	12±5	0.31
Angiographic characteristics				
Number of lesions	145	124	21	–
Lesion length, mm	11.8±6	12±6	11±8	0.35
D-ref, mm	2.9±0.8	2.9±0.6	2.9±0.5	0.89
MLD, mm	1.8±0.5	1.8±0.7	1.7±0.6	0.72
%DS	45±13.8	41.4±19.5	41±19.4	0.93
Mean iFR ratio	0.89±0.12	0.89±0.12	0.89±0.02	0.84
Mean FFR ratio	0.88±0.09	0.88±0.12	0.88±0.06	0.99

%DS: percent diameter stenosis; D-ref: reference diameter; FFR: fractional flow reserve; MLD: minimal lumen diameter





0.89 cut-off*	Sensitivity	Specificity	PPV	NPV
iFR pre TAVI	96.3 (81.3-99.9)	72.5 (63.4-80.2)	44.1 (31.1-57.6)	98.9 (93.8-99.9)
iFR post TAVI	94.3 (80.8-99.3)	78.2 (68.9-85.2)	60.1 (45.9-73.0)	97.5 (91.4-99.7)

*for predicting FFR ≤0.80; NPV: negative predictive value; PPV: positive predictive value

EuroIntervention 2018;13:1512-1519

Medición en los 3 vasos de 66 pacientes con EAo severa sintomática de iFR, FFR antes e inmediatamente después de TAVI (mismo procedimiento)

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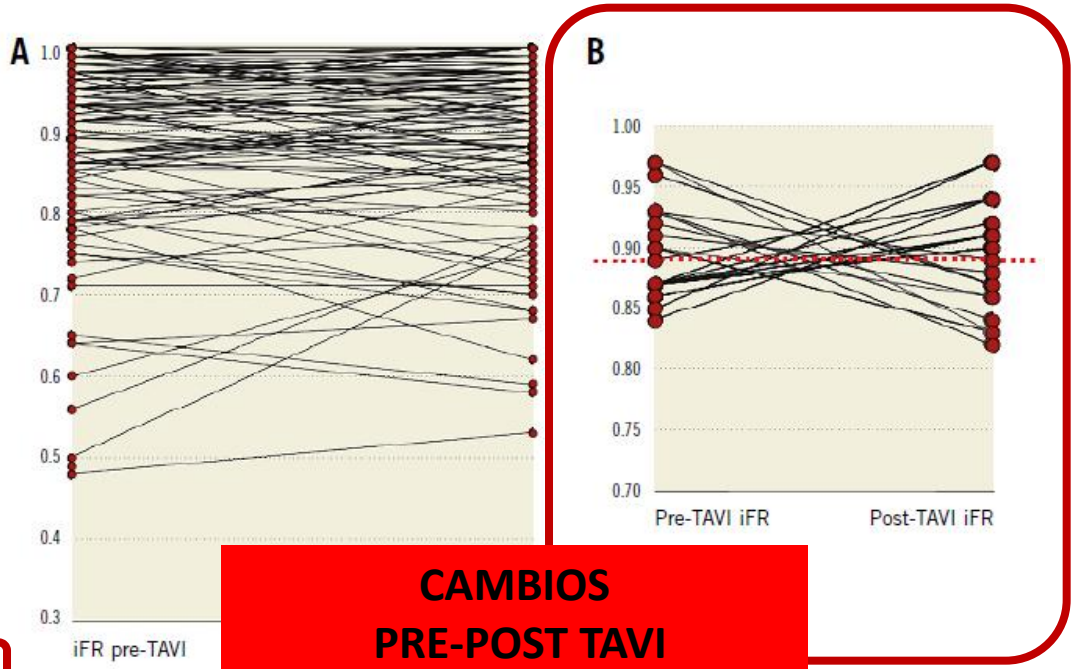
Mean FFR ratio	0.88±0.09	0.88±0.12	0.88±0.06	0.99

%DS: percent diameter stenosis; D-ref: reference diameter; FFR: fractional flow reserve; MLD: minimal lumen diameter

Higher iFR variation before and after TAVI was associated with higher baseline mean aortic gradient (r=0.274, p=0.009) and with a higher transaortic gradient drop after valve replacement (r=0.494, p<0.0001).



CAMBIOS PRE-POST TAVI "ERRÁTICOS" EN iFR

EuroIntervention 2018;13:1512-1519

NOTION 3 (NCT03058627):

EAo severa + Enf. Coronaria

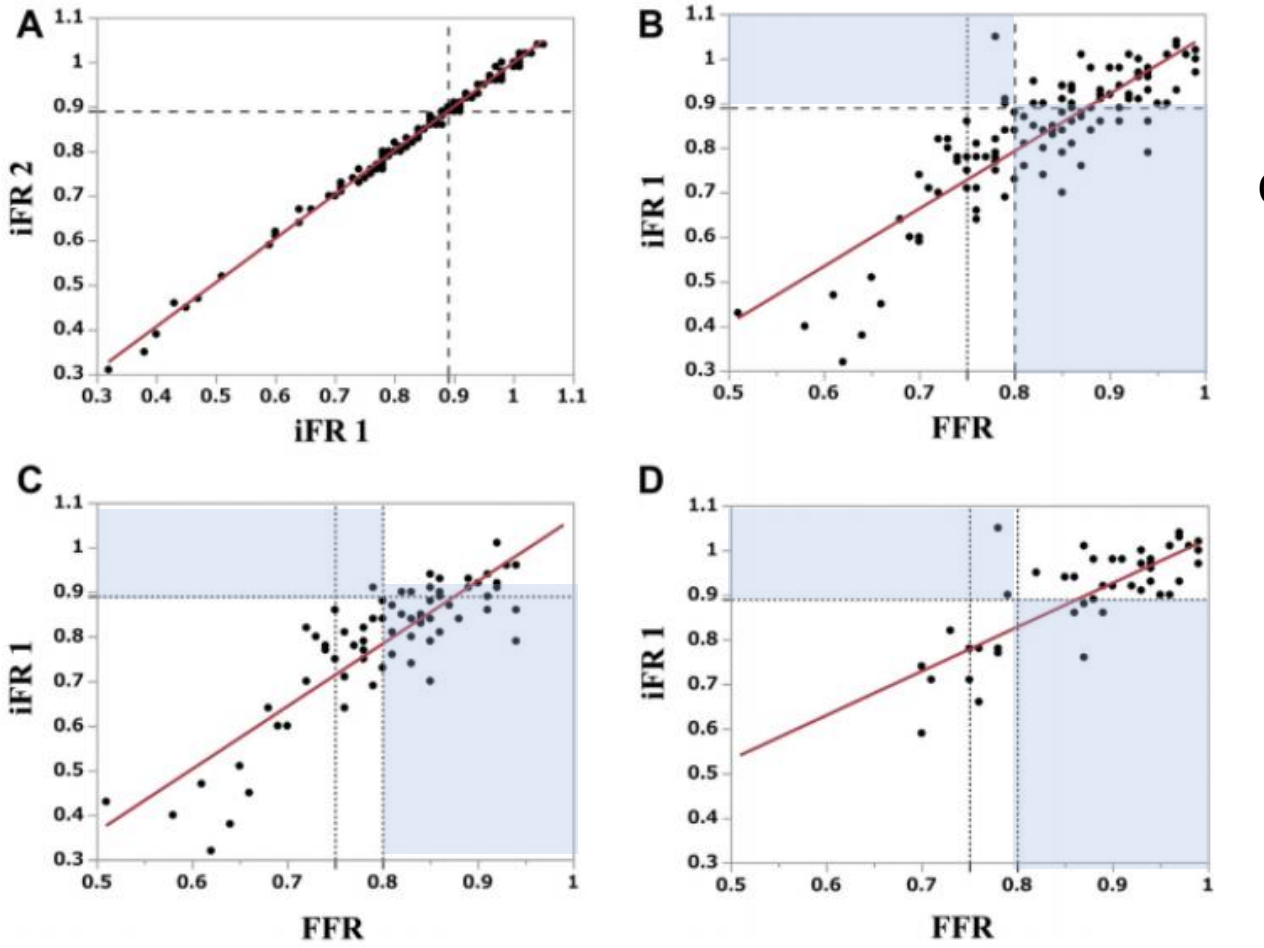
- TAVI + ICP guiada por FFR
- vs
- TAVI

FAITAVI (NCT03360591):

EAo severa + Enf. Coronaria

- TAVI + ICP guiada por FFR
- vs
- TAVI + ICP guiada por ANGIO

Cortesía Dr. López-Palop



Overall

LAD

No-LAD

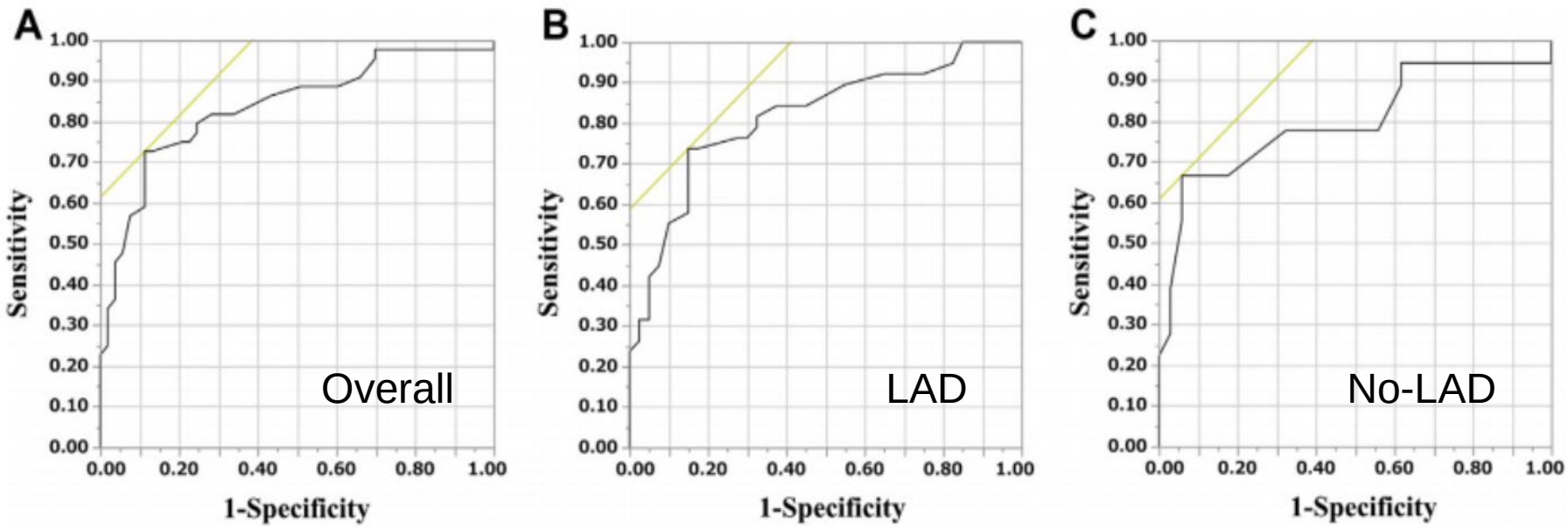
Two iFR measurements were performed (iFR 1 and iFR 2). **(A)** The correlation of iFR 1 with iFR 2 demonstrates high reproducibility ($R = 0.997$; $p < 0.0001$). **(B)** The correlation of iFR 1 with FFR demonstrates good agreement ($R = 0.854$; $p < 0.0001$). **(C, D)** The correlation of iFR 1 with FFR in left anterior descending artery and non-left anterior descending artery lesions demonstrates good agreement. **(C)** $R = 0.861$; 95% confidence interval: 0.785-0.911; $p < 0.0001$. **(D)** $R = 0.794$; 95% confidence interval: 0.652-0.882; $p < 0.0001$. Abbreviations as in Figure 2.

J Am Coll Cardiol Intv 2018;11:2032–40

Cortesía Dr. López-Palop

iFR

FIGURE 5 Receiver Operating Characteristic Curves for Indicating Radioisotope Scintigraphy Findings of Ischemia



(A) The optimal instantaneous wave-free ratio cutoff value for a positive indicating scintigraphy finding was 0.82 (area under the curve: 0.84; $p < 0.0001$). **(B, C)** The optimal instantaneous wave-free ratio cutoff value for indicating a positive myocardial ischemia was 0.82 in both left anterior descending artery and non-left anterior descending artery lesions. **(B)** Area under the curve: 0.82; $p < 0.0001$. **(C)** Area under the curve: 0.80; $p = 0.0001$.

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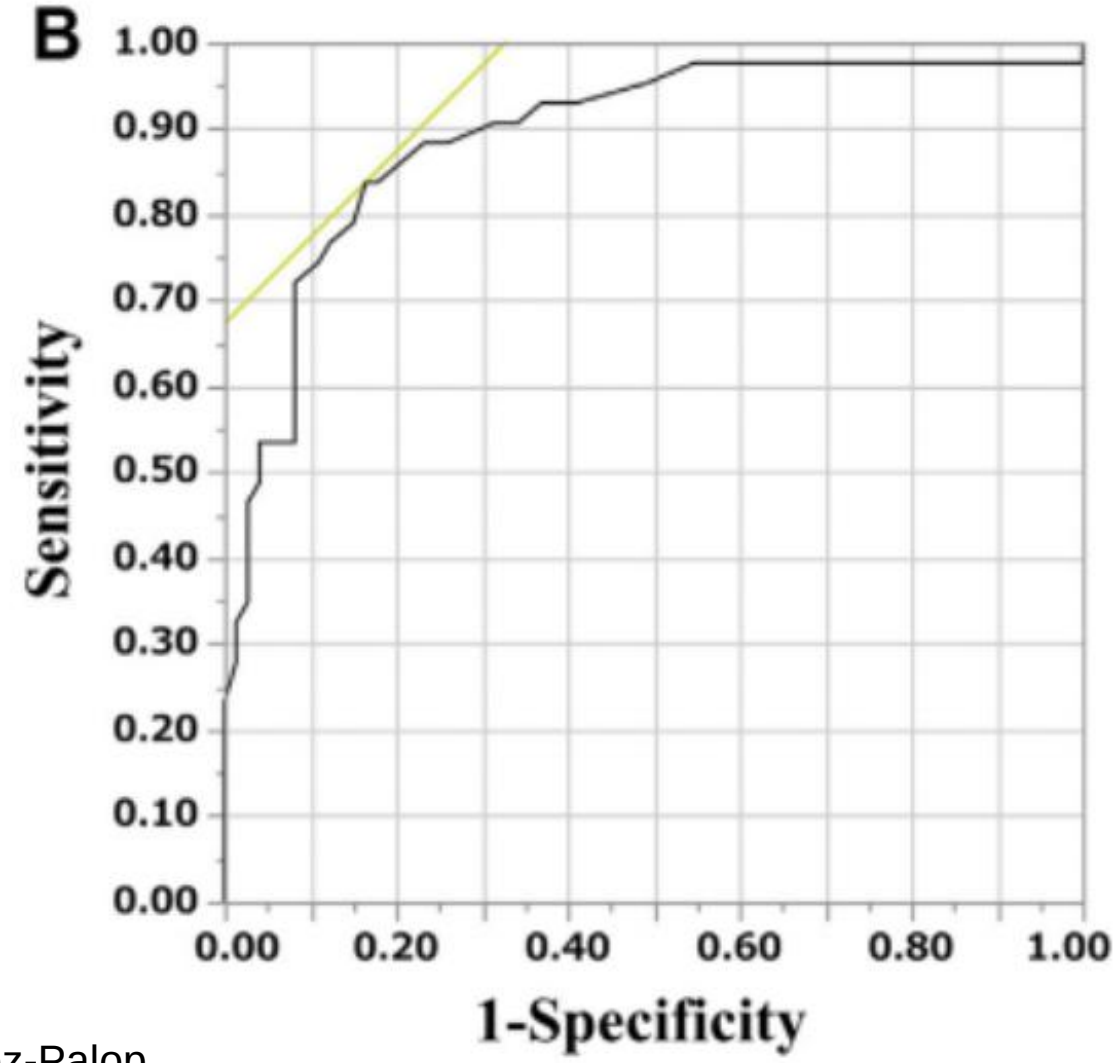
J Am Coll Cardiol Intv 2018;11:2032–40

iFr optimal cutoff (AS) 0.82

n=95



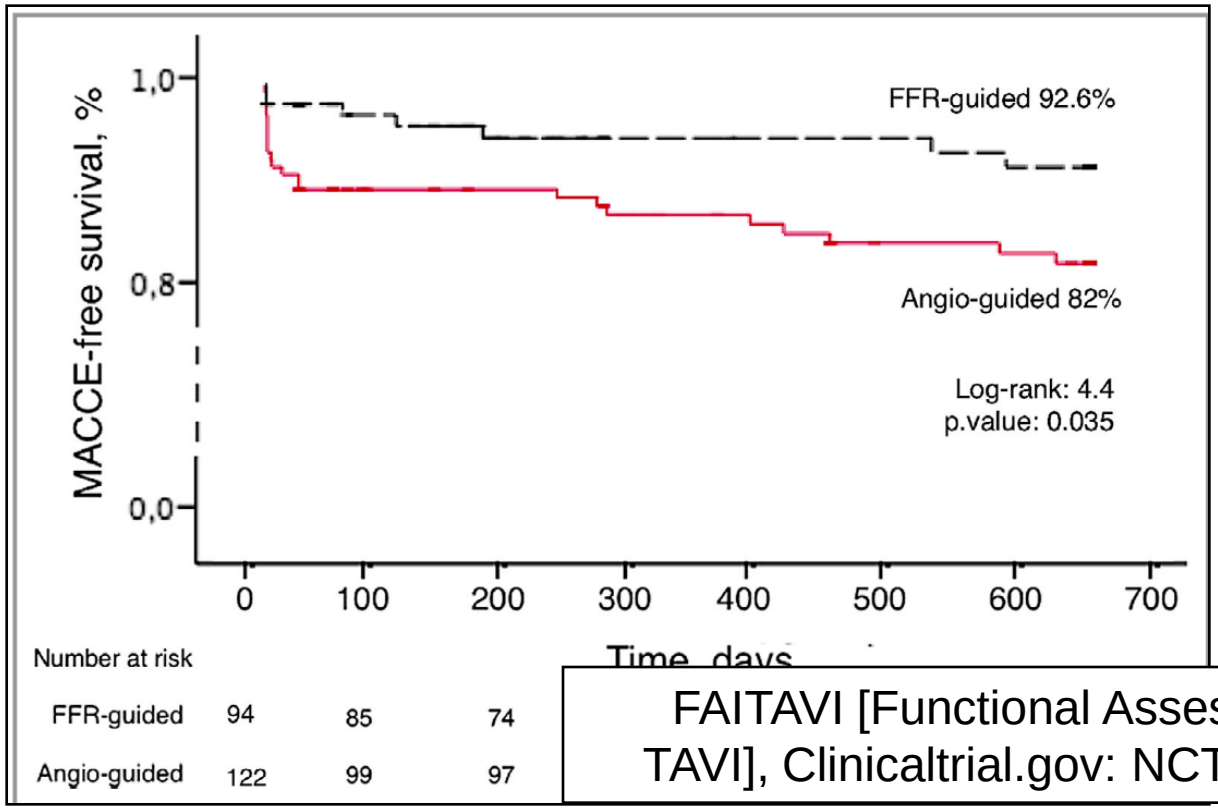
Cortesía Dr. López-Palop

Physiological Versus Angiographic Guidance for Myocardial Revascularization in Patients Undergoing Transcatheter Aortic Valve Implantation

J Am Heart Assoc. 2019;8:e012618 (August 2019)

Background—Management of coronary artery disease in patients undergoing transcatheter aortic valve implantation is uncertain. Fractional flow reserve (FFR) has never been clinically validated in aortic stenosis. The study aim was to analyze the clinical outcome of FFR-guided revascularization in patients undergoing transcatheter aortic valve implantation.

n=216



FAITAVI [Functional Assessment in TAVI], Clinicaltrial.gov: NCT03360591

J Am Heart Assoc. 2019;8:e012618 (August 2019)

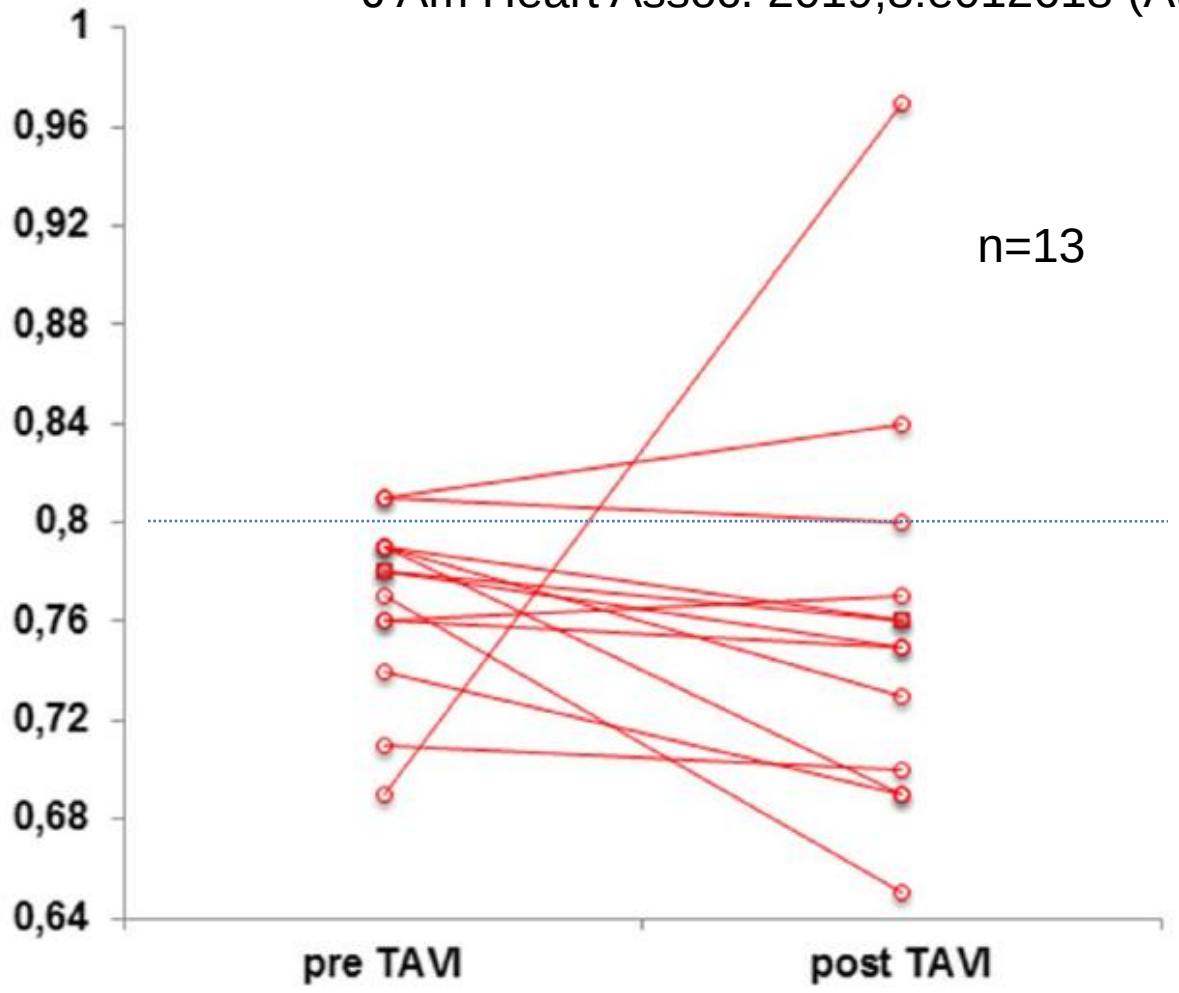


Fig. 3 Comparison of FFR values before and after successful TAVI. On comparing the FFR values of these 13 lesions before and after TAVI, there was no significant difference (0.77 ± 0.04 pre-TAVI vs. 0.76 ± 0.08 post-TAVI; $p = 0.11$)

Valoración de lesiones intermedias en pacientes con estenosis aórtica grave

Dr. Ramón López Palop

Hospital Clínico Universitario Virgen de la Arrixaca. MURCIA

3. Discordancias iFR/FFR: ¿y ahora qué hago?

TCT 2018 Poster (n=608 stenosis)

Inconsistencies between positive results of iFR and FFR are age dependent

BACKGROUND

AIM

METHODS

RESULTS

CONCLUSION

CONCLUSION

Older patients are more likely to have positive iFR and negative FFR, whereas young patients have more chances to present negative iFR and positive FFR, which is also associated with higher vessel obstruction. One of the probable causes of this observation may be different coronary reactivity to adenosine in different age subgroups.

Vive la difference: Factors and mechanisms predicting discrepancy between iFR and FFR

Morton J. Kern MD, MSCAI, FAHA, FACC |

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Key Points

- FFR/iFR is discordant in 15–20% of cases, at times causing confusion about revascularization decisions.
- The CONTRAST substudy identifies lesion location, lesion severity, and bradycardia as major predictors for FFR/iFR discordance, with age a minor predictor.
- Each of these predictors can be explained physiologically through the mechanisms related to resting and hyperemic pressure loss across different patterns of atherosclerotic stenoses.
- A logical approach to using both resting and hyperemic pressure ratios is proposed.

Catheter Cardiovasc Interv. 2019 Sep 1;94(3):364-366

$$\Delta P = f.Q + s.Q^2$$

f. = friction coefficient

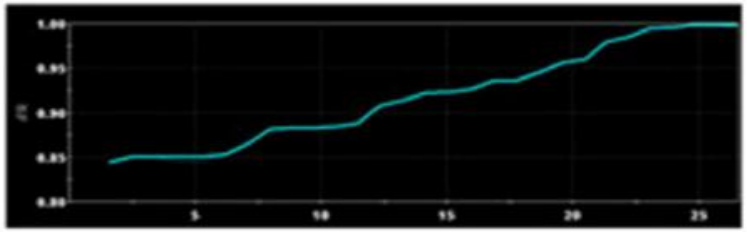
s. = separation coefficient

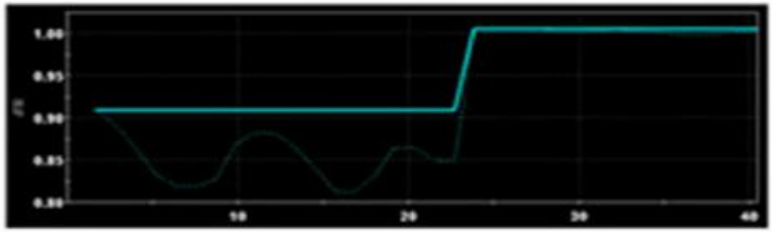
Moderate Gradient at Rest

Mild Increase at Hyperemia

Small Gradient at Rest

Large Increase at Hyperemia





FFR 0.82 iFR 0.85

FFR 0.79 iFR 0.91

FFR-/iFR+ in Diffuse disease

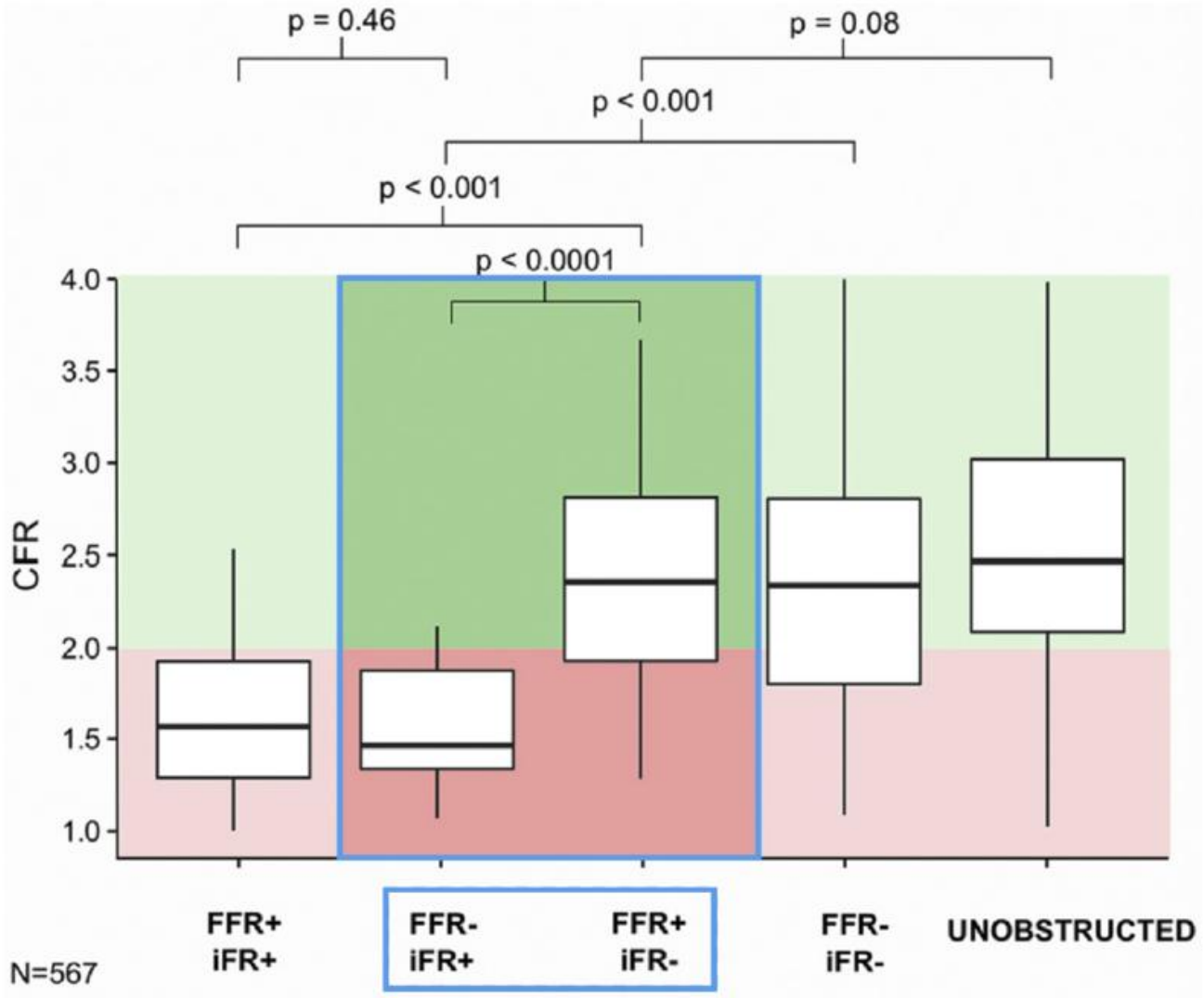
FFR+/iFR- in Focal disease

+ edad

+ LM or proximal LAD

Bradycardia and/or beta-blockade decreases resting diastolic flow and makes iFR less likely to be positive than FFR.

FIGURE 1 Relationship Between Pressure Indexes and Coronary Flow Reserve



JACC Cardiovasc Interv. 2019 Oct 28;12(20):2032-2034.

Should operators be using both resting and hyperemic indices?

- Most of the time the answer is no, one may often suffice.
- We advocate first using a nonhyperemic pressure ratio (NHPR, e.g., iFR, RFR) if available, or if not, resting Pd/Pa.

- If abnormal and, importantly, *if trusted*, proceed.
- If the NHPR is borderline or for some reason questioned, confirm with contrast or adenosine FFR.

- For the discordant results, consider the mechanisms in play for the specific patient.

Catheter Cardiovasc Interv. 2019 Sep 1;94(3):364-366

4. Otros métodos para explorar la fisiología coronaria:

- la reserva de flujo coronario (CFR), ¿qué explora?
- Valoración de la microcirculación. Otros métodos.

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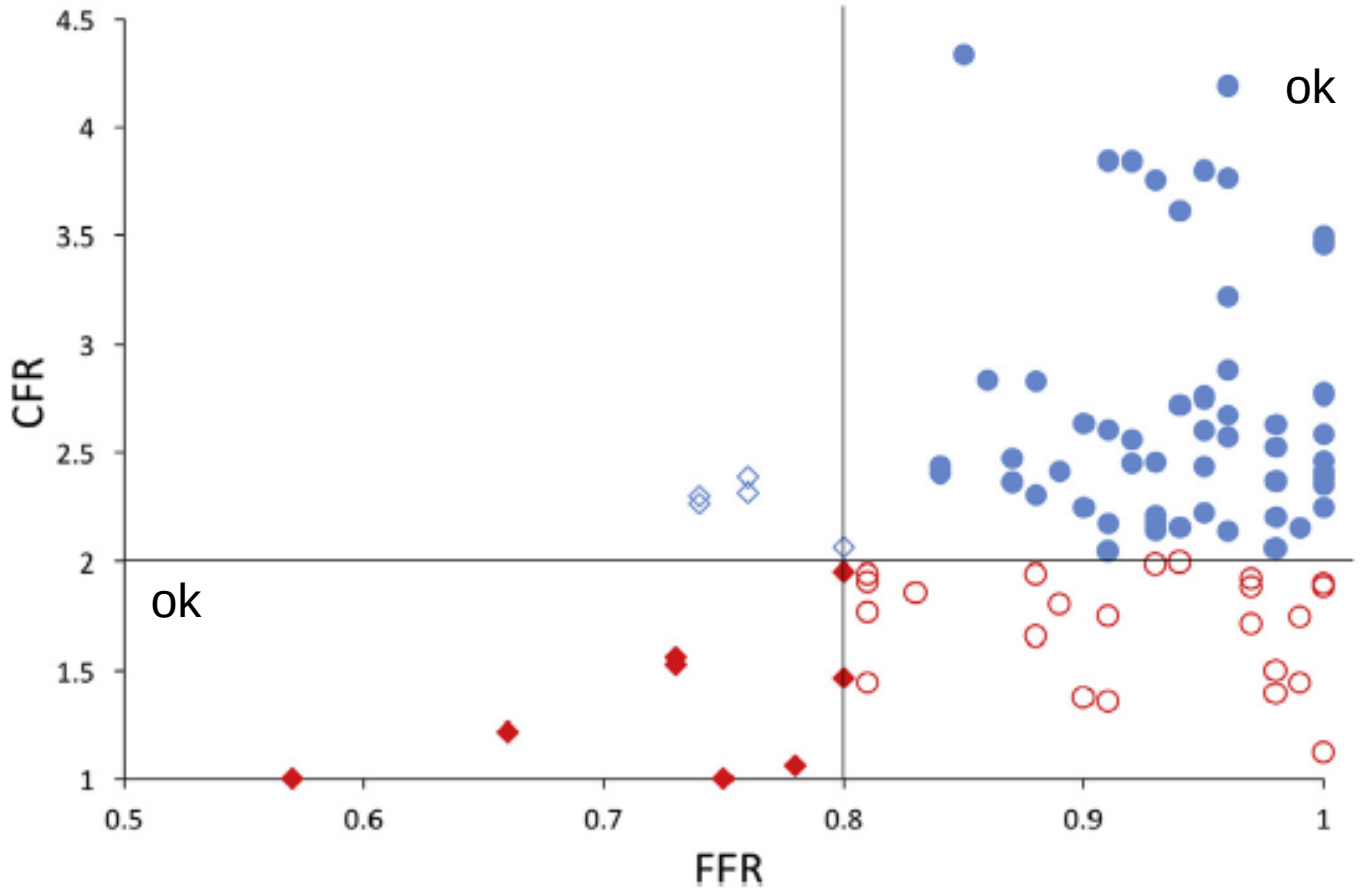
http://dx.doi.org/10.1016/j.jcin.2017.03.006

Discordance Between Fractional Flow Reserve and Coronary Flow Reserve

Insights From Intracoronary Imaging and Physiological Assessment

Sung Gyun Ahn, MD, PhD,[a,b] Jon Suh, MD, PhD,[b,c] Olivia Y. Hung, MD, PhD,[a] Hee Su Lee, BS,[a] Yasir H. Bouchi, BS,[a] Wenjie Zeng, MD, MPH,[a] Rounak Gandhi, MBBS,[a] Parham Eshtehardi, MD,[a] Bill D. Gogas, MD, PhD,[a] Habib Samady, MD[a]

FIGURE 1 Scatterplot of Fractional Flow Reserve and Coronary Flow Reserve



Among 94 study patients, 64 (68%) had concordant fractional flow reserve (FFR) and coronary flow reserve (CFR) findings, while 30 (32%) had discordant FFR and CFR.

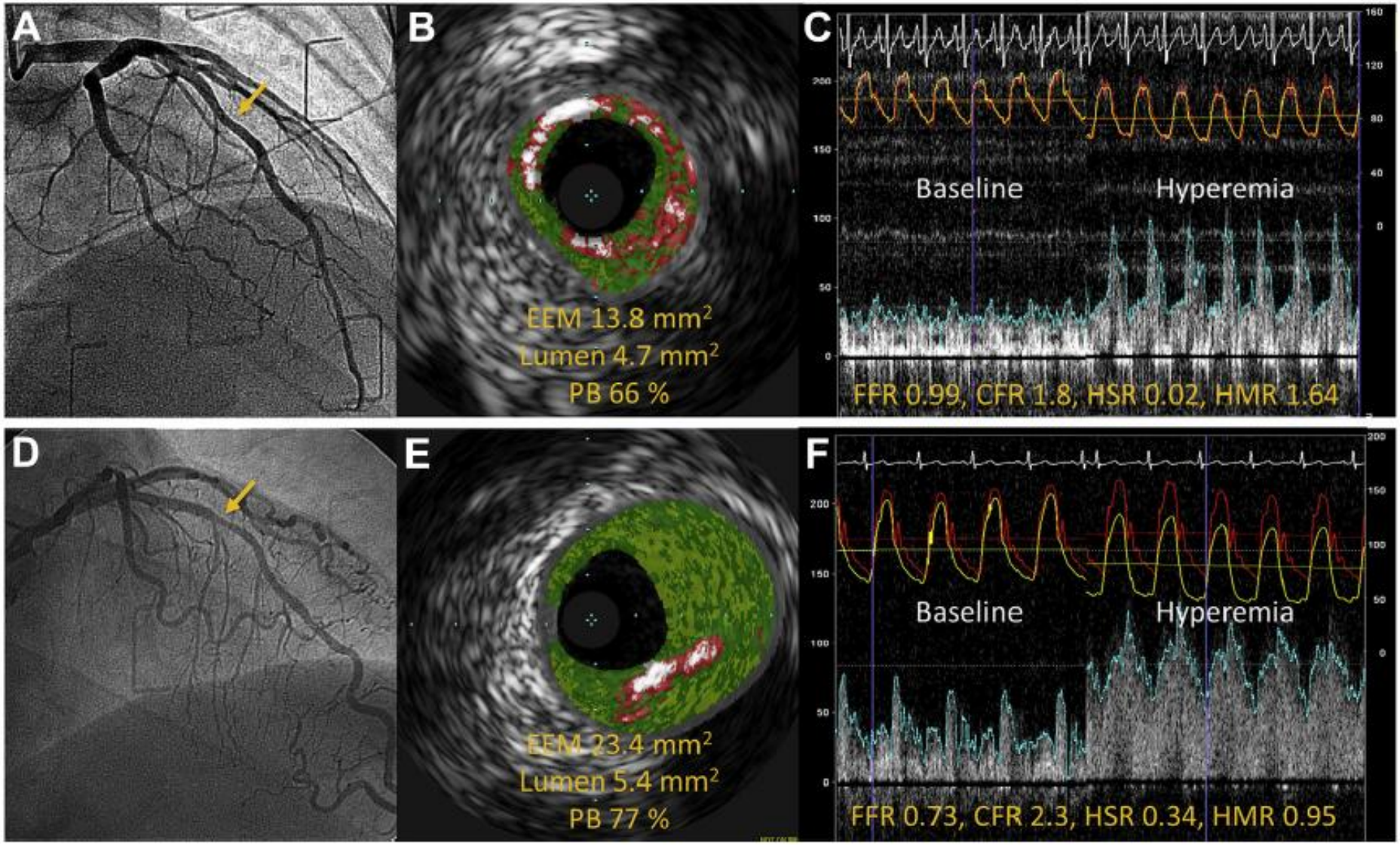
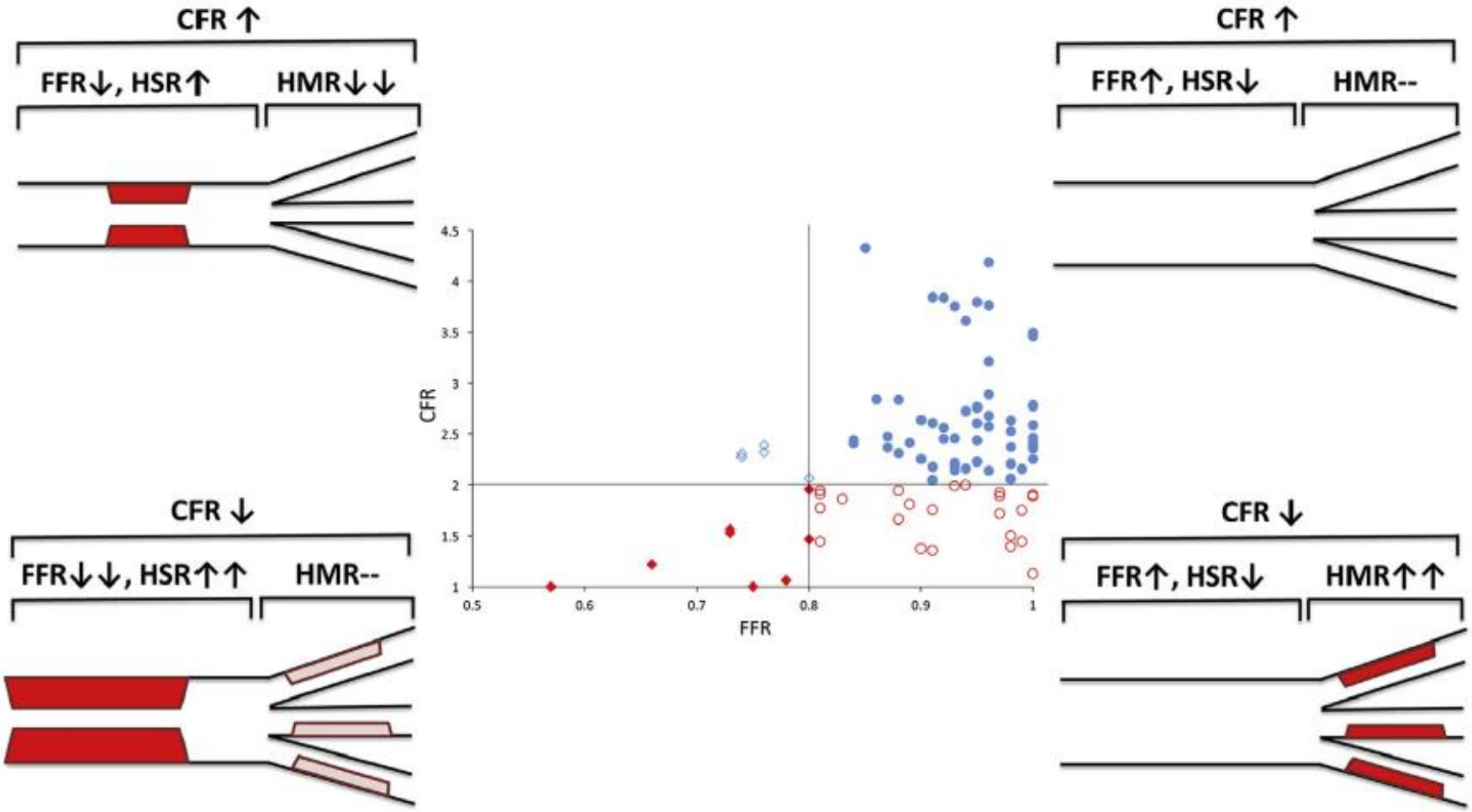

A
B
EEM 13.8 mm²
Lumen 4.7 mm²
PB 66 %
C
Baseline
Hyperemia
FFR 0.99, CFR 1.8, HSR 0.02, HMR 1.64
D
E
EEM 23.4 mm²
Lumen 5.4 mm²
PB 77 %
F
Baseline
Hyperemia
FFR 0.73, CFR 2.3, HSR 0.34, HMR 0.95

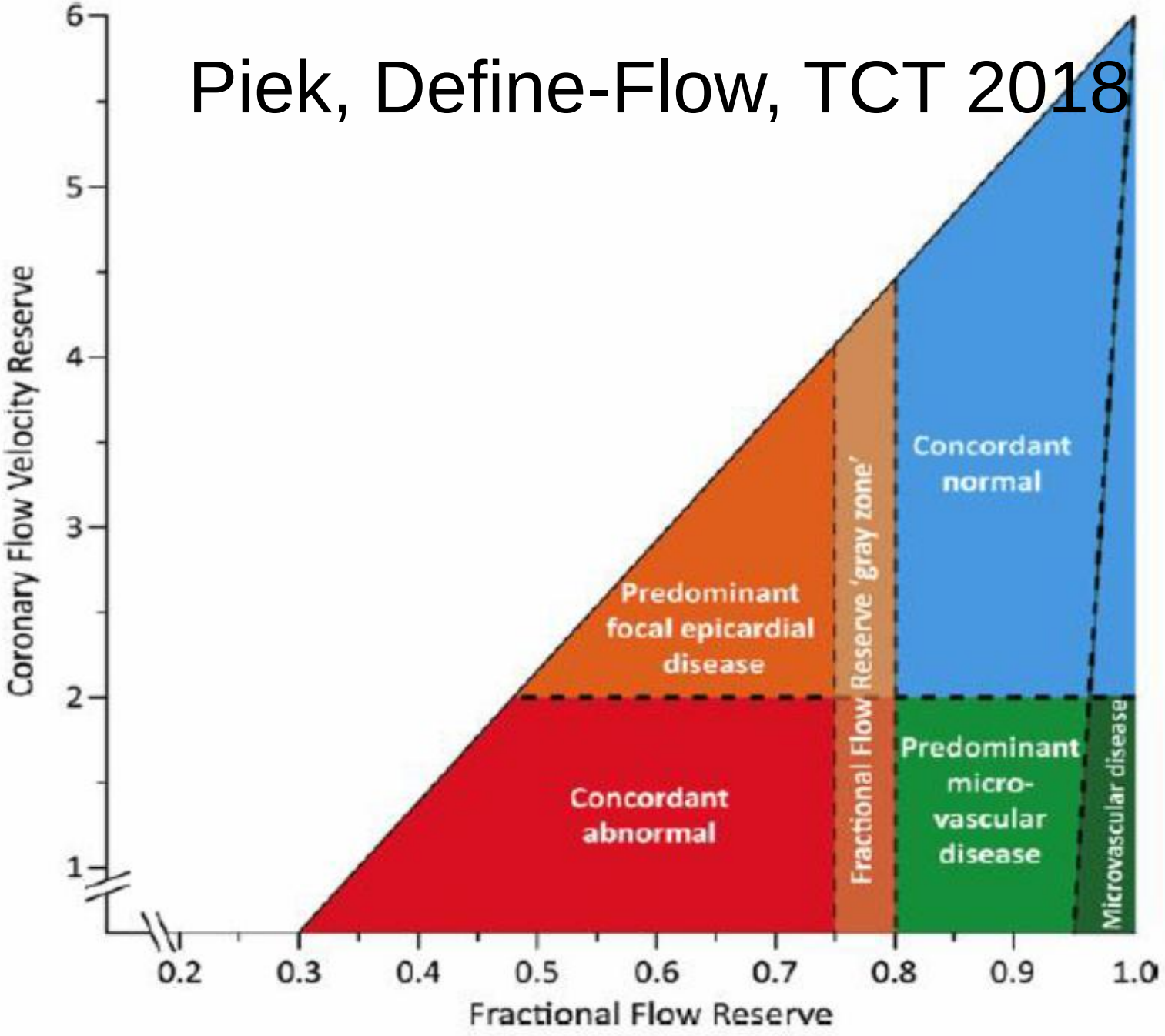
FIGURE 3 Illustration of Plausible Anatomic and Physiological Explanation for FFR-CFR Discordance Between Fractional Flow Reserve and Coronary Flow Reserve



CONCLUSIONS

Preserved FFR and reduced CFR was related to increased microvascular resistance, while diminished FFR and preserved CFR showed moderately increased stenosis resistance with well-preserved microvascular function. The extent of atherosclerotic burden assessed by IVUS did not explain the discordance between FFR and CFR in this cohort. Variability of microvascular vasodilatory capacity is likely an important mechanism of discordance between FFR and CFR.

Piek, Define-Flow, TCT 2018

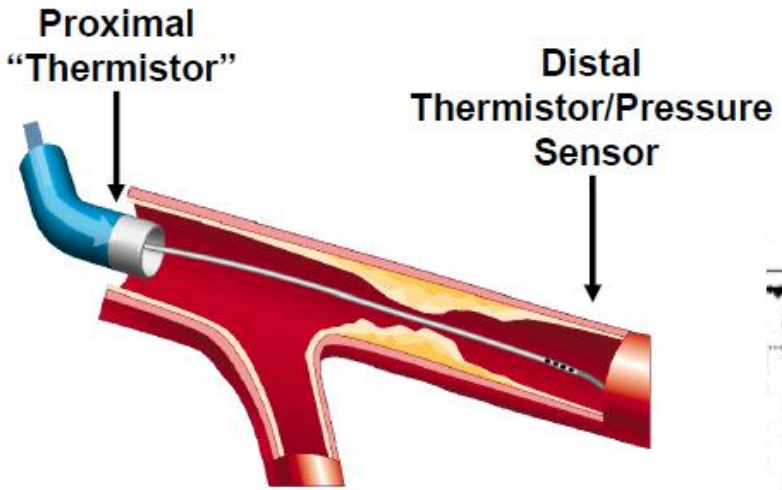


Nuevos (otros) métodos para explorar la microcirculación

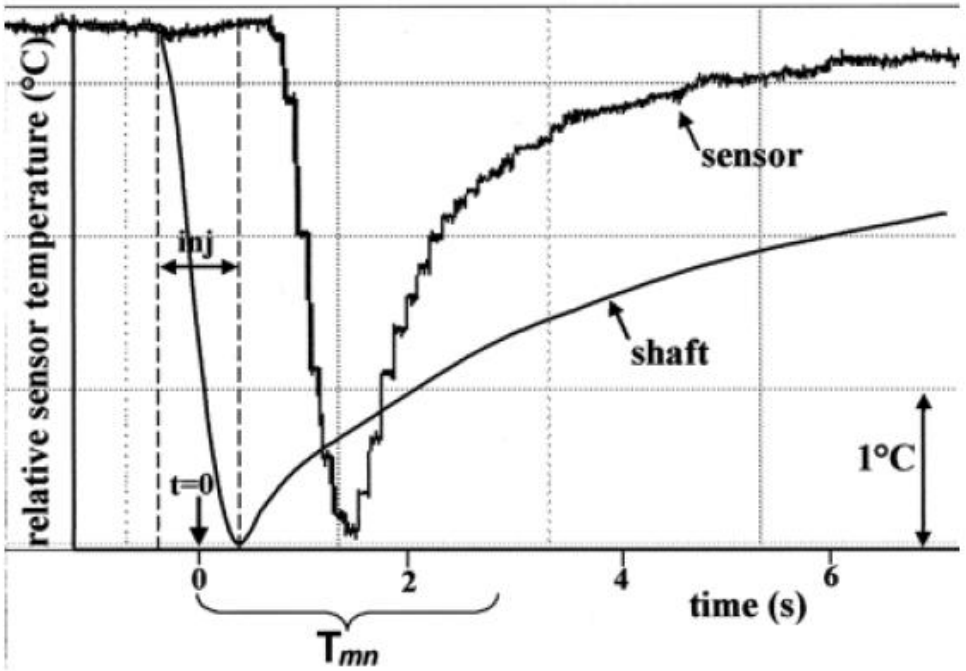
Index of Microvascular resistance (IMR)
Pitfalls

- Indirect (via thermodilution) measure of resistance
- May be effected by collateral circulation
- Accuracy of measurements may be dependent on thermistor position

Estimation of Coronary Flow



Calculation of mean transit time



De Bruyne, et al. Circulation 2002;104:2003

Derivation of IMR:

- Resistance = Δ Pressure / Flow
- Δ Pressure = P_d-P_v Flow $\cong$ 1 / T_{mn}
- IMR = P_d-P_v / (1 / T_{mn})
- **IMR = P_d x T_{mn}** ***at maximal hyperemia…***

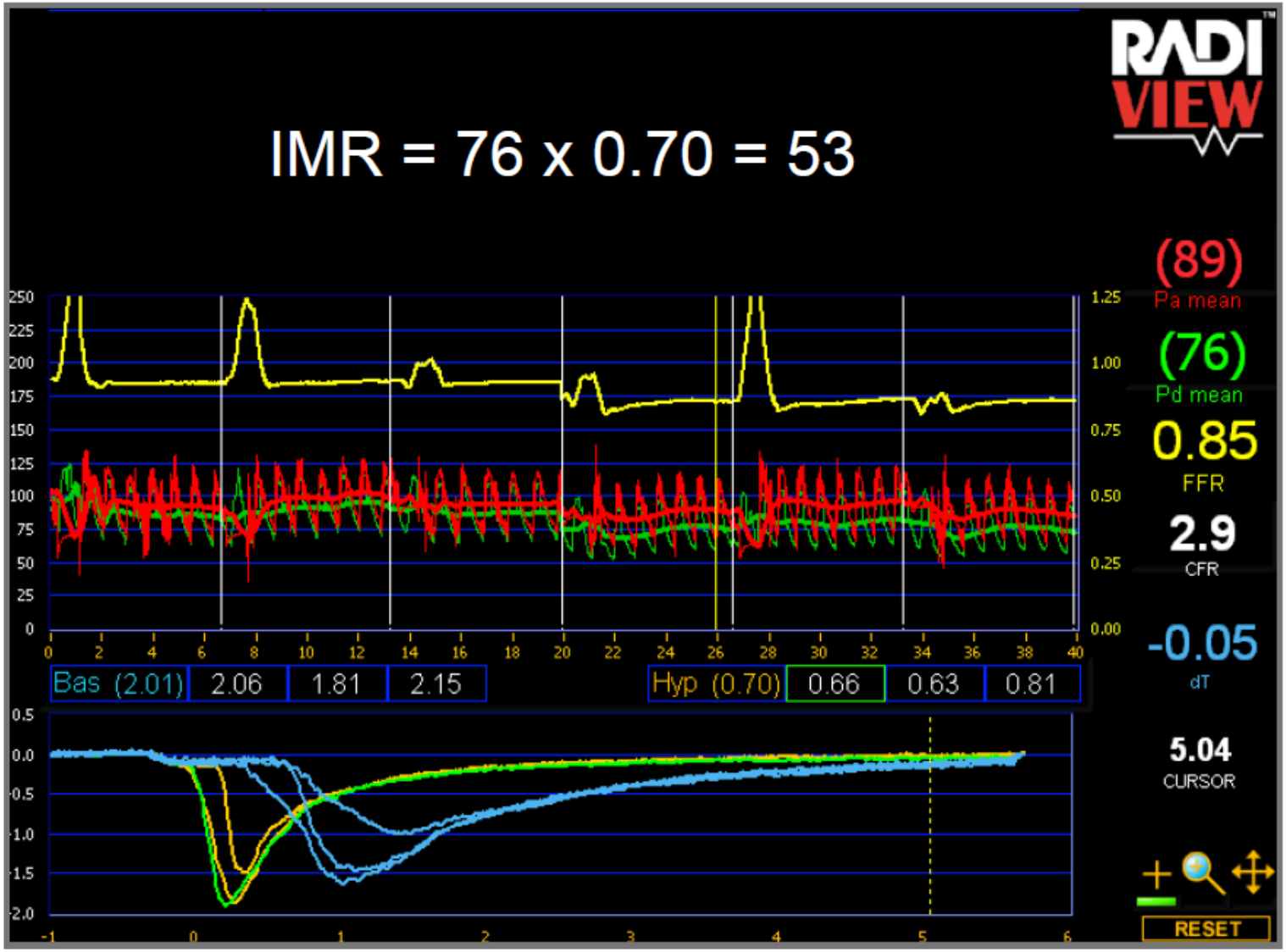
Circulation 2003;107:3129-3132.

IMR: *Normal Value*

An IMR < 25 is considered normal

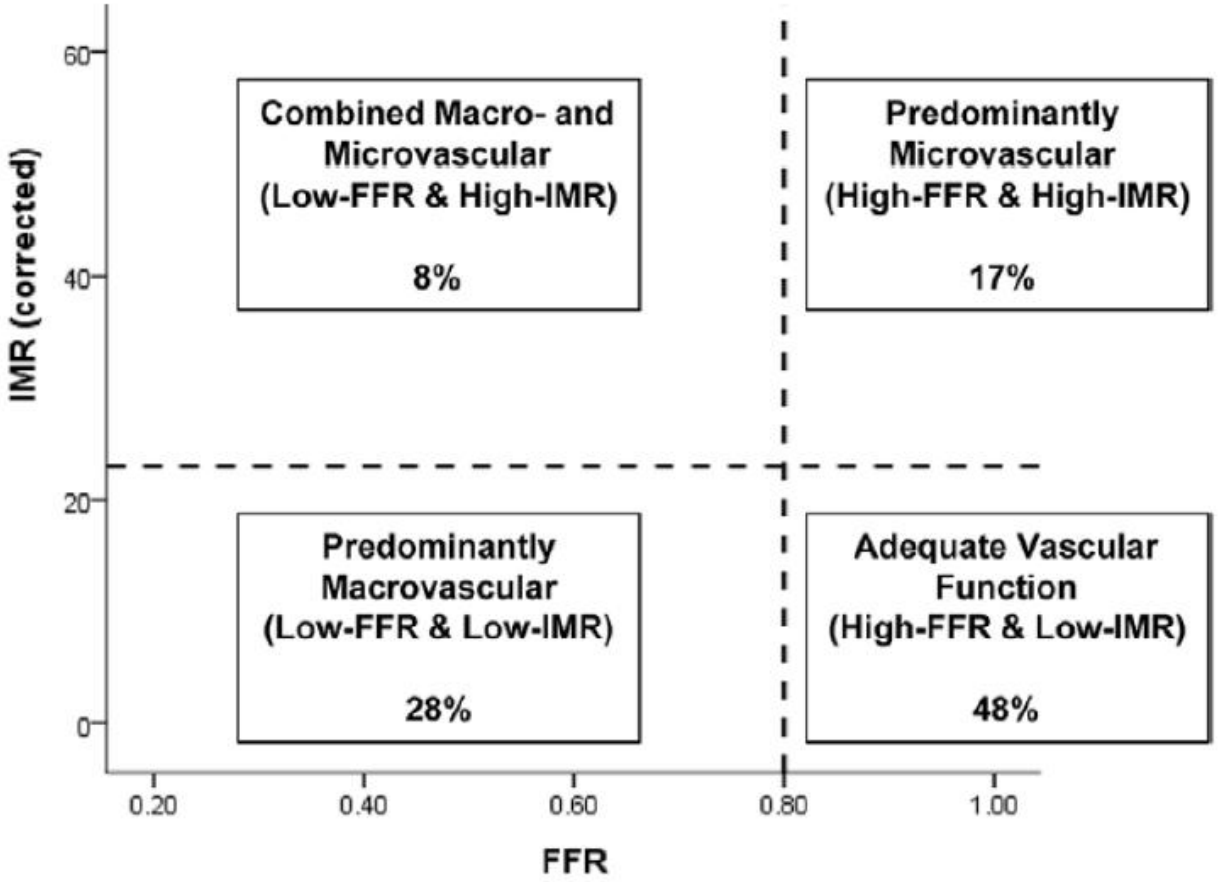
- The mean IMR measured in 15 subjects (22 arteries) without any evidence of atherosclerosis and no/minimal risk factors was 19±5.
- The mean IMR measured in 18 subjects with normal stress tests and normal coronary angiography was 18.9±5.6.
- The mean IMR in 20 subjects with no CAD or risk factors was 14.0 with all values <23.

Melikian, et al. Eurointervention 2010;5:939-945.
Luo, et al. Circ Cardiovasc Interv 2014;7:43-48.
Solberg, et al. Eurointervention 2014;9:1069-75


IMR = 76 x 0.70 = 53
RADI VIEW
(89)
Pa mean
(76)
Pd mean
0.85
FFR
2.9
CFR
-0.05
dT
5.04
CURSOR
RESET
Bas (2.01) 2.06 1.81 2.15
Hyp (0.70) 0.66 0.63 0.81

Microvascular Function in Stable CAD

1,096 patients with CAD had IMR and FFR measured.



Lee JM, et al. Circ Cardiovasc Interv 2015;8:e002857.

Predictive Value of IMR post PCI

Two Year Follow-up in 543 stable patients with IMR measured at PCI

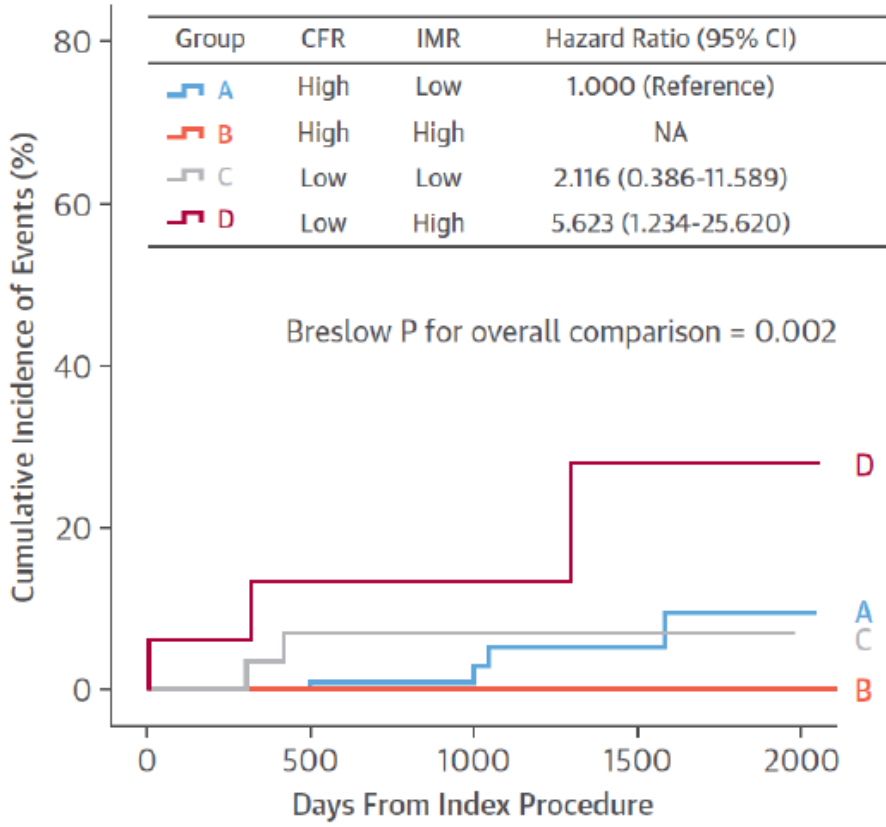
	High IMR (n=140)	Low IMR (n=403)	P value
MACE	63 (45%)	124 (31%)	0.002
Death	2 (1%)	11 (3%)	0.39
Myocardial Infarction	45 (32%)	76 (19%)	0.001
Spontaneous MI	4 (3%)	4 (1%)	0.12
Periprocedural MI	42 (30%)	72 (18%)	0.002
Any Revascularization	24 (17%)	56 (14%)	0.35

Nishi T, et al. ACC 2018.

Importance of the Microcirculation

In 313 patients with FFR>0.80, those with low CFR and high IMR (microvascular dysfunction) had significantly higher rate of death, MI, or revascularization.

Group	CFR	IMR	Hazard Ratio (95% CI)	P value
A	High	Low	1.000 (Reference)	NA
B	High	High	NA	NA
C	Low	Low	2.116 (0.386-11.589)	0.388
D	Low	High	5.623 (1.234-25.620)	0.026

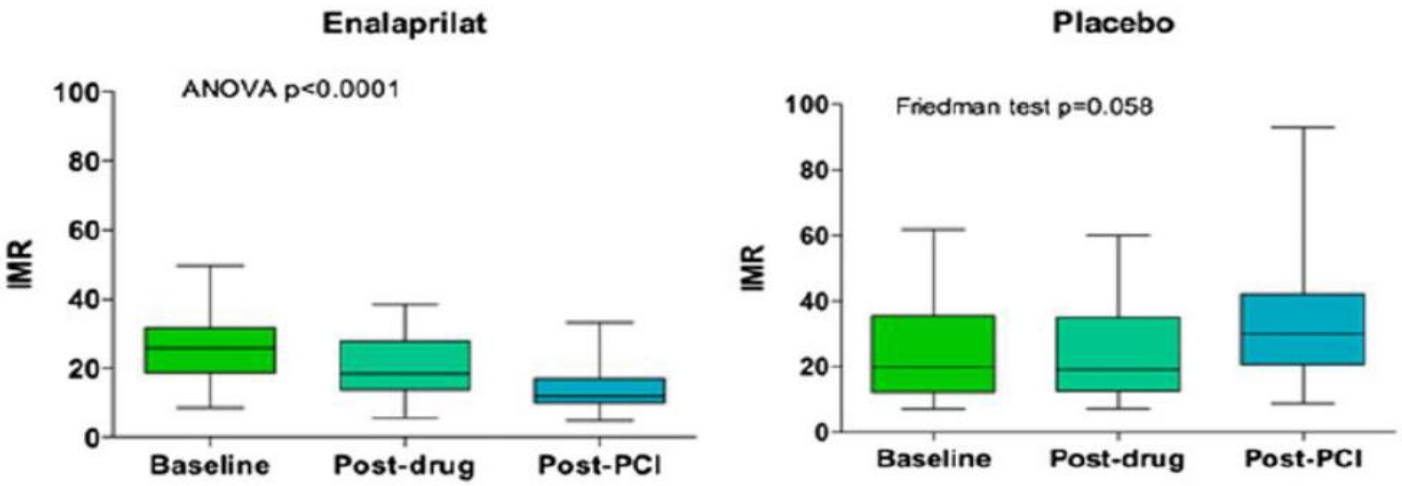


Lee JM, et al. J Am Coll Cardiol 2016;67:1158-69.

Tratamiento (impacto en IMR)

Effects of ACE I on the Microvasculature

Randomized comparison of IC enalaprilat vs. placebo in 40 patients peri-PCI

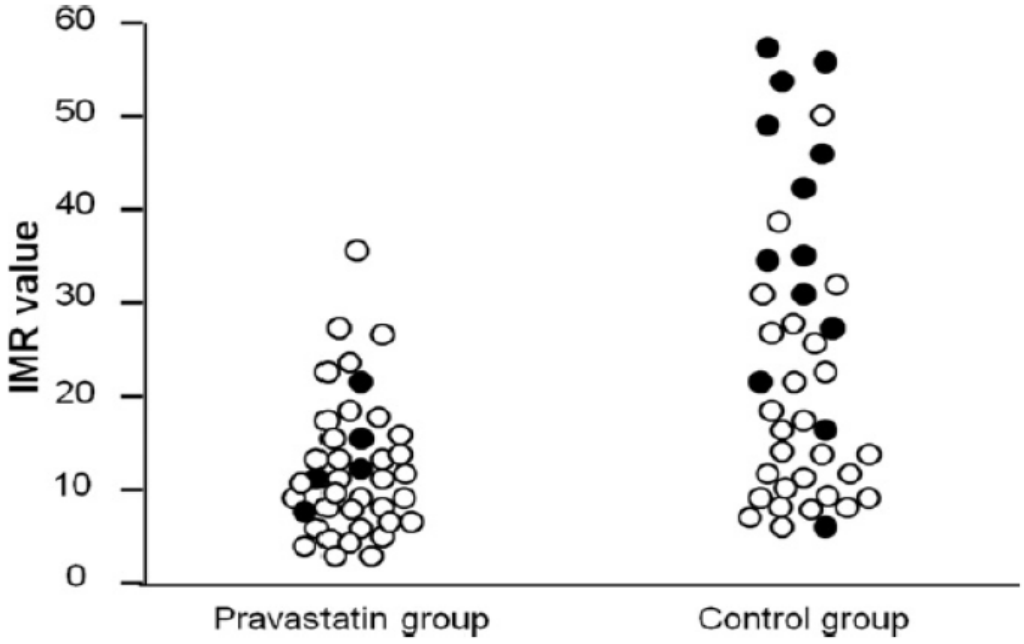


Mangiacapra F, et al. J Am Coll Cardiol 2013;61:615-21.

Tratamiento (impacto en IMR)

Statins and the Microvasculature

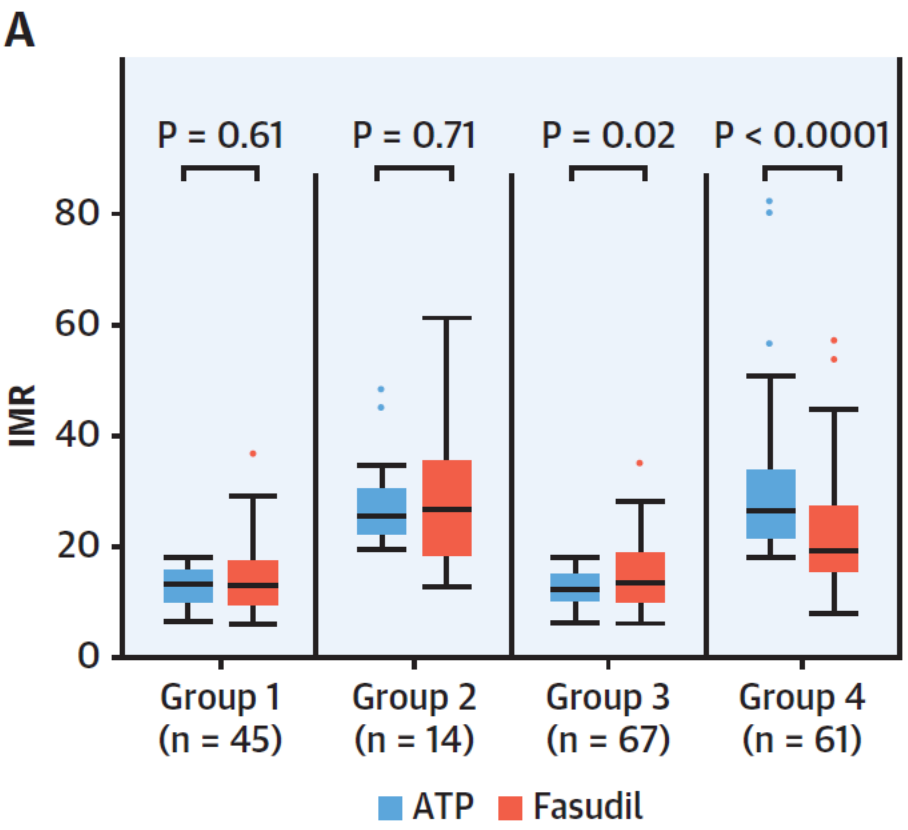
IMR measured after PCI in 80 patients randomized to either 1 month pretreatment with pravastatin or placebo

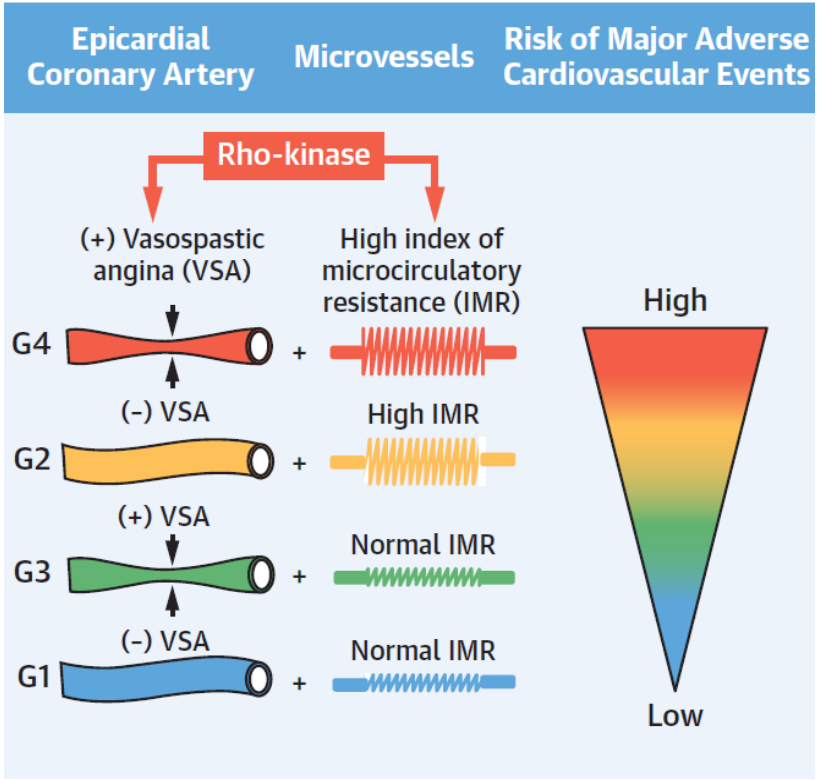


Fujii, et al. J Am Coll Cardiol Intv 2011; 4:513-20.

Tratamiento: Fasudil (inhib rho kinasa)

FIGURE 6 Changes in IMR in Response to Rho-Kinase Inhibition by Fasudil





J Am Coll Cardiol 2019;74:2350-60

5. Otros estudios de interés y conclusiones:

-Alternativas al FFR/iFR: cFFR (FFRangio), RFR, FFR, tbFFR

- Guía de presión en CABG.

-Gradiente de presión tras revascularización: ¿importa?

-Patrones de aterosclerosis basados en gradiente de presión en retirada.

- El “corregistro”

-Informe de evaluación de nuevas tecnologías de 2018.

6.1 FFR tras infusión de salino

Circulation:
Cardiovascular Interventions

ORIGINAL ARTICLE

Saline-Induced Coronary Hyperemia

Mechanisms and Effects on Left Ventricular Function

Bernard De Bruyne, Julien Adjedj, Panagiotis Xaplanteris, Angela Ferrara, Yujing Mo, Martin Penicka, Vincent Floré, Mariano Pellicano, Gabor Toth, Emanuele Barbato, Dirk J. Duncker, Nico H.J. Pijls

DOI https://doi.org/10.1161/CIRCINTERVENTIONS.116.004719
Circulation: Cardiovascular Interventions. 2017;10:e004719
Originally published April 11, 2017

Abstract

Background—During thermodilution-based assessment of volumetric coronary blood flow, we observed that intracoronary infusion of saline increased coronary flow. This study aims to quantify the extent and unravel the mechanisms of saline-induced hyperemia.

Methods and Results—Thirty-three patients were studied; in 24 patients, intracoronary Doppler flow velocity measurements were performed at rest, after intracoronary adenosine, and during increasing infusion rates of saline at room temperature through a dedicated catheter with 4 lateral side holes. In 9 patients, global longitudinal strain and flow propagation velocity were assessed by transthoracic echocardiography during a prolonged intracoronary saline infusion. Taking adenosine-induced maximal hyperemia as reference, intracoronary infusion of saline at rates of 5, 10, 15, and 20 mL/min induced 6%, 46%, 111%, and 112% of maximal hyperemia, respectively. There was a close agreement of maximal saline- and adenosine-induced coronary flow reserve (intraclass correlation coefficient, 0.922; $P<0.001$). The same infusion rates given through 1 end hole (n=6) or in the contralateral artery (n=6) did not induce a significant increase in flow velocity. Intracoronary saline given on top of an intravenous infusion of adenosine did not further increase flow. Intracoronary saline infusion did not affect blood pressure, systolic, or diastolic left ventricular function. Heart rate decreased by 15% during saline infusion ($P=0.021$).

Conclusions—Intracoronary infusion of saline at room temperature through a dedicated catheter for coronary thermodilution induces steady-state maximal hyperemia at a flow rate ≥15 mL/min. These findings open new possibilities to measure maximal absolute coronary blood flow and minimal microcirculatory resistance.

6.2 FFR tras infusión de contraste

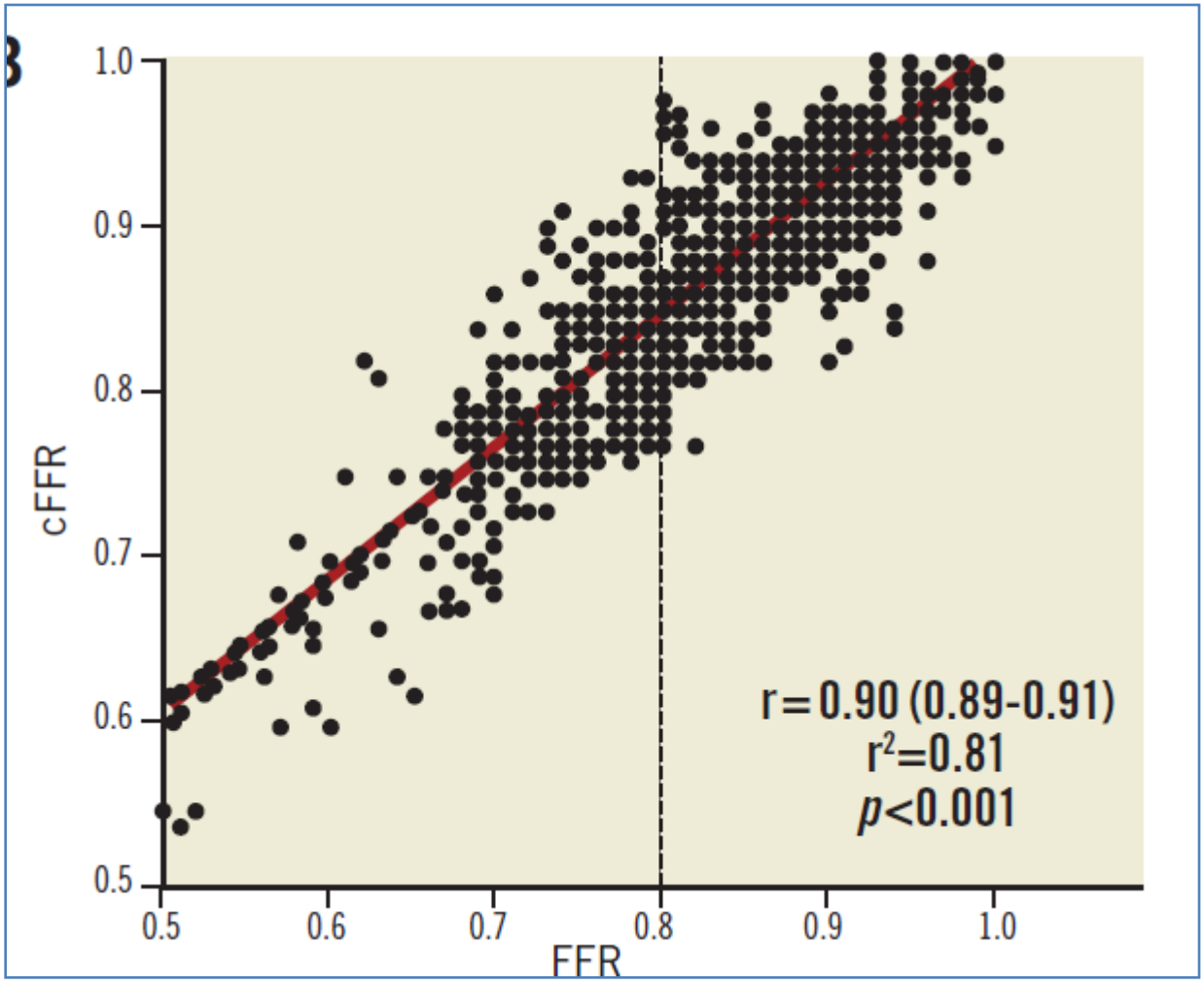
EuroIntervention 2016;12:708-715

CLINICAL RESEARCH
CORONARY INTERVENTIONS

The Multi-center Evaluation of the Accuracy of the Contrast MEdium INduced Pd/Pa RaTiO in Predicting FFR (MEMENTO-FFR) Study

Antonio Maria Leone[1]*, MD, PhD; Roberto Martin-Reyes[2], MD; Sergio B. Baptista[3], MD; Nicolas Amabile[4], MD; Luis Raposo[5], MD; Juan Antonio Franco Pelaez[2], MD; Carlo Trani[1], MD; Pio Cialdella[1], MD; Eloisa Basile[1], MD; Giuseppe Zimbardo[1], MD; Francesco Burzotta[1], MD, PhD; Italo Porto[1], MD, PhD; Cristina Aurigemma[1], MD, PhD; Antonio G. Rebuzzi[1], MD; Mariana Faustino[3], MD; Giampaolo Niccoli[1], MD; Pedro F. Abreu[3], MD; Michel S. Slama[6], MD; Vincent Spagnoli[7], MD; Miren Telleria Arrieta[8], MD; Ignacio J. Amat Santos[9], MD; Jose M. de la Torre Hernandez[10], MD; Ramon Lopez Palop[11], MD; Filippo Crea[1], MD

1. Institute of Cardiology, Catholic University of the Sacred Heart, Rome, Italy; 2. Unidad de Cardiologia Intervencionista, Servicio de Cardiologia, Hospital Universitario Fundacion Jimenez Diaz-IDC Salud, Madrid, Spain; 3. Cardiology Department, Hospital Prof. Doutor Fernando Fonseca, Amadora, Portugal; 4. Cardiology Department, L'Institut Mutualiste Montsouris, Paris, France; 5. Department of Cardiology, Centro Hospitalar de Lisboa Ocidental, Lisbon, Portugal; 6. Cardiology Department, Antoine Béclère Hospital, Assistance Publique Hôpitaux de Paris, Université Paris XI Paris Sud, Clamart, France; 7. Cardiology Department, Lariboisière Hospital, Assistance Publique Hôpitaux de Paris, Université Paris VII Denis Diderot, Paris, France; 8. Unidad de Cardiologia Intervencionista, Servicio de Cardiologia, Policlinica Gipuzkoa, San Sebastian, Guipuzcoa, Spain; 9. Unidad de Cardiologia Intervencionista, Servicio de Cardiologia, Hospital Clinico Universitario, Valladolid, Spain; 10. Unidad de Cardiologia Intervencionista, Servicio de Cardiologia, Hospital Universitario Marques De Valdecilla, Santander, Cantabria, Spain; 11. Unidad de Cardiologia Intervencionista, Servicio de Cardiologia, Hospital


B
1.0
0.9
0.8
0.7
0.6
0.5
cFFR
0.5
0.6
0.7
0.8
0.9
1.0
FFR
r=0.90 (0.89-0.91)
r²=0.81
p<0.001

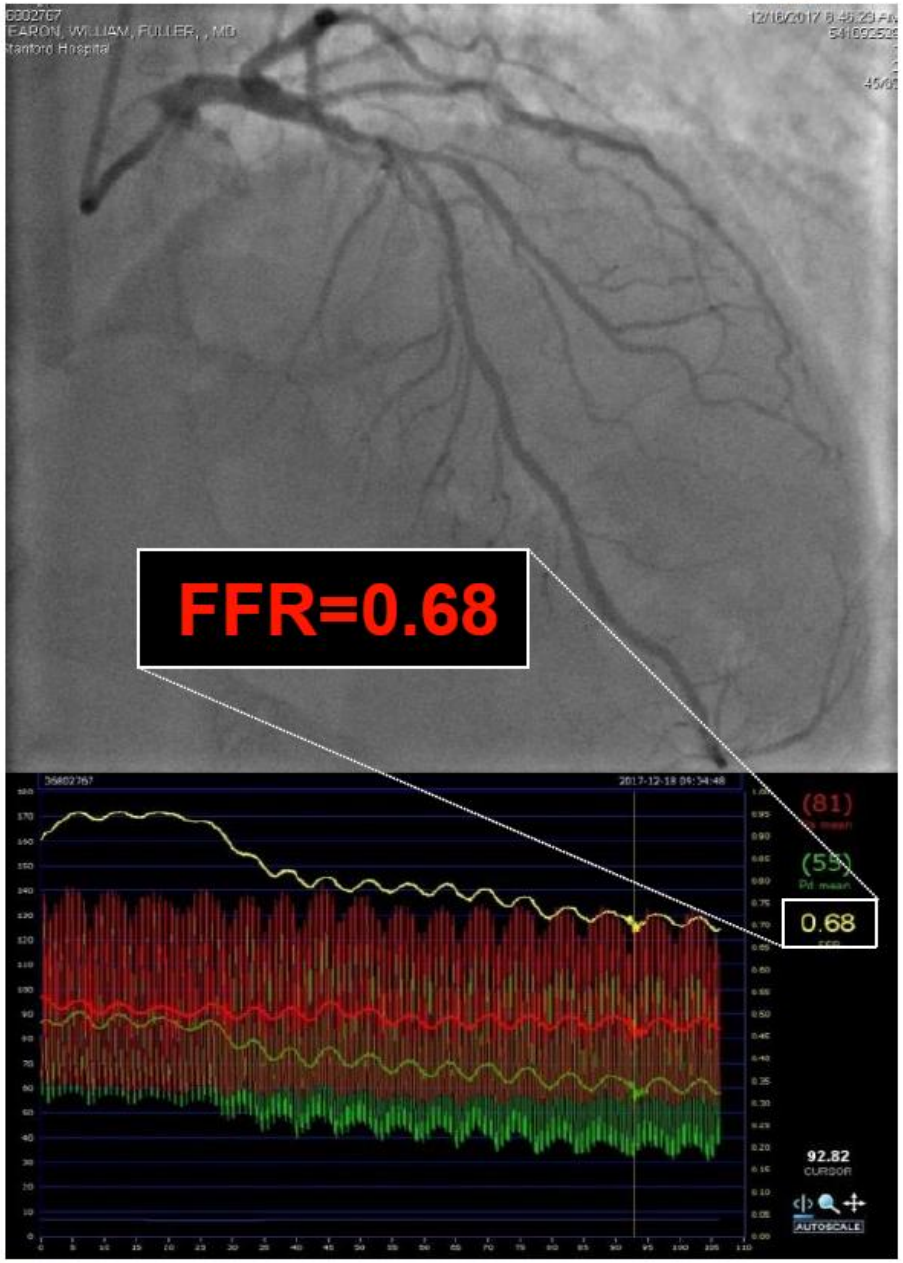
6.3 FFR “derivado del angiograma”

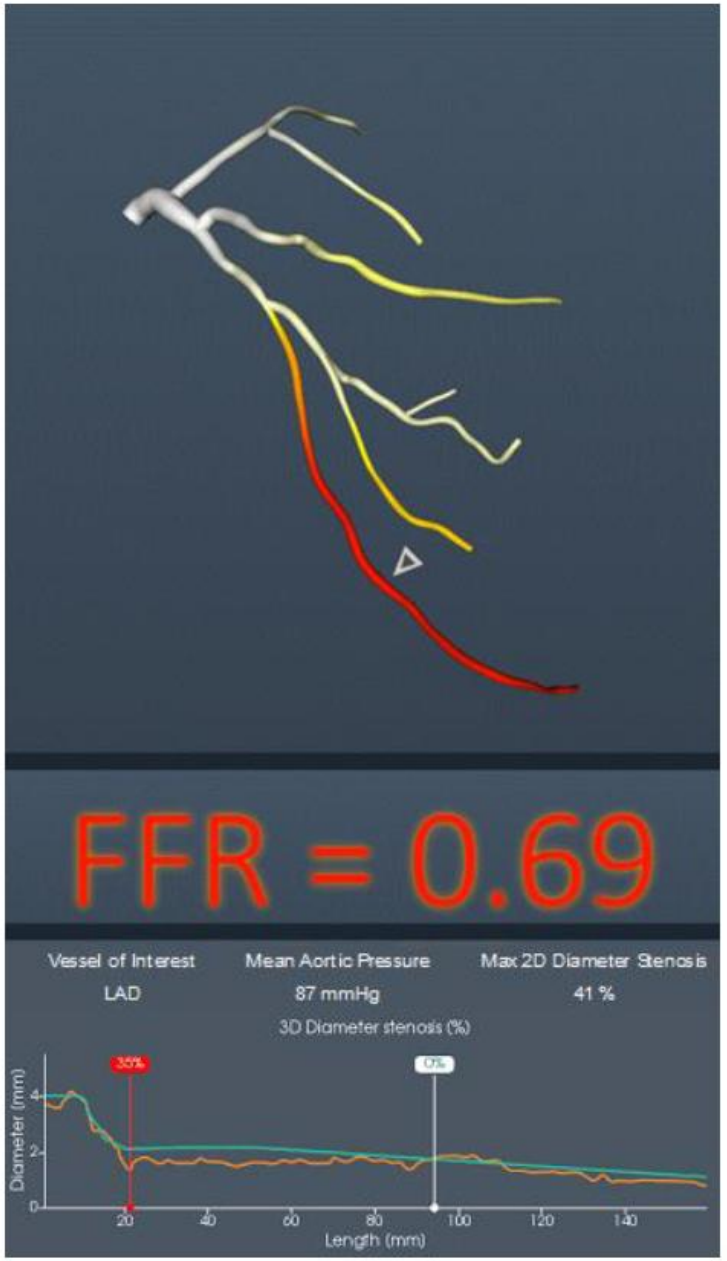
Circulation

Accuracy of Fractional Flow Reserve Derived From Coronary Angiography

William F. Fearon, MD[1]., Stephan Achenbach, MD PhD[2], Thomas Engstrom, MD PhD[3], Abid Assali, MD[4], Richard Shlofmitz, MD[5], Allen Jeremias, MD[5], Stephane Fournier, MD[6], Ajay J. Kirtane, MD[7], Ran Kornowski, MD[4], Gabriel Greenberg, MD[8], Rami Jubeh, MD[9], Daniel M. Kolansky, MD[10], Thomas McAndrew, PhD[11], Ovidiu Dressler, MD[11], Akiko Maehara, MD[7], Mitsuaki Matsumura, BS[11], Martin B. Leon, MD[7], and Bernard De Bruyne, MD PhD[6]
for the FAST-FFR Study Investigators

Published on line Monday, September 24, 2018


FFR=0.68
(81)
(55)
0.68
92.82
CURSOR
AUTOSCALE


FFR = 0.69
Vessel of Interest
LAD
Mean Aortic Pressure
87 mmHg
Max 2D Diameter Stenosis
41 %
3D Diameter stenosis (%)
35%
0%
Diameter (mm)
Length (mm)

FFR and FFR_{angio} Results

Physiologic Result	FFR	FFR_{angio}
Mean	0.81 ± (0.13)	0.80 ± (0.12)
Median	0.83 (0.74, 0.90)	0.82 (0.73, 0.89)
% of positive lesions (≤ 0.80)	43.3%	45.5%
% within 0.70-0.90	58.9%	63.6%
% within 0.75-0.85	31.3%	31.0%

FFR_{angio} was successfully measured in 98.7% of cases

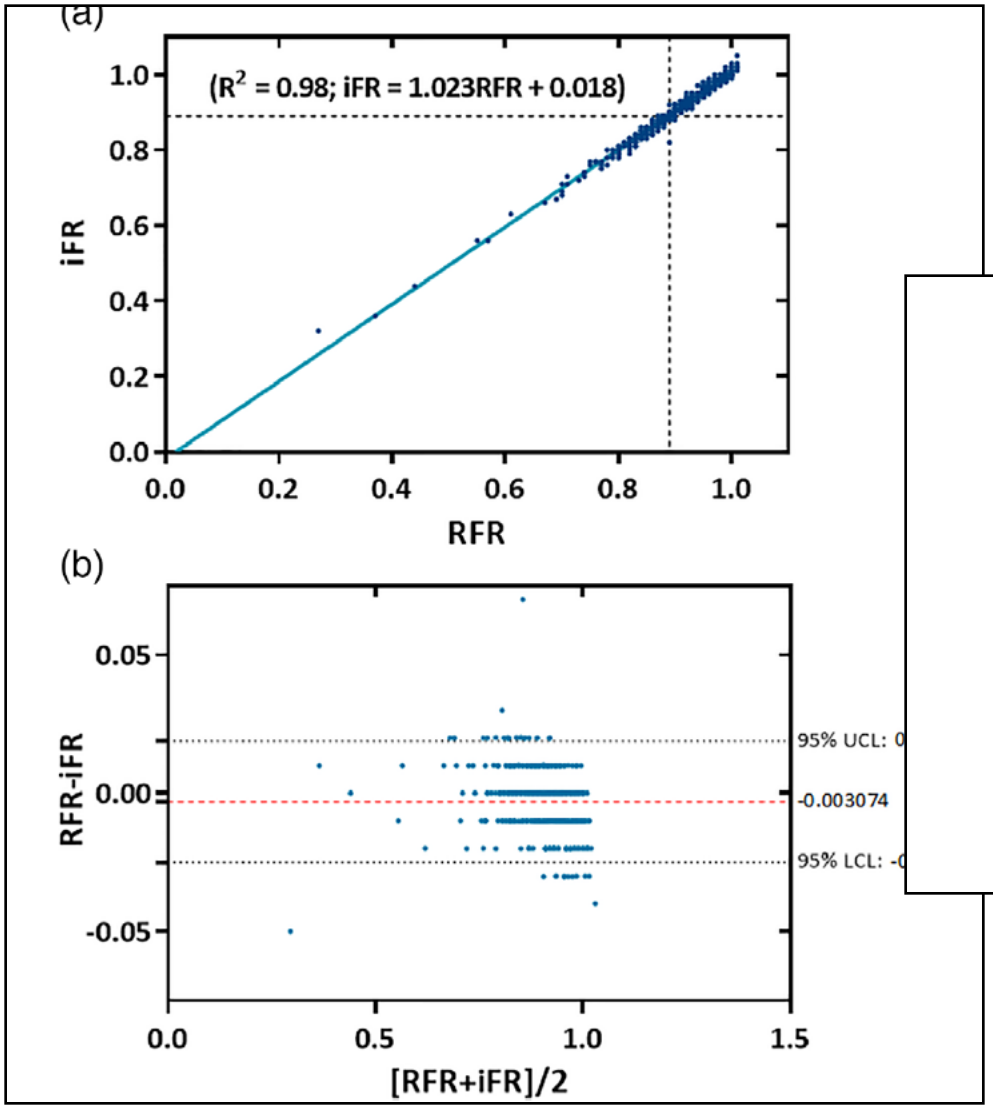
6.4 Un nuevo índice no-hiperémico: RFR

- Limitations of iFR:

1. The algorithm requires sensitive landmarking of components of the pressure waveform (being limited in clinical scenarios where the pressure waveform is suboptimal or the rhythm is disturbed).

2. iFR assumes that the maximal flow and minimal resistance occurs during the “wave-free” period of diastole, which may not be the case in all coronary beds.

The resting full-cycle ratio (RFR) is a novel NHPR reporting the maximal relative pressure difference during the entire cardiac cycle, irrespective of systole or diastole, and is thus independent of the EKG.



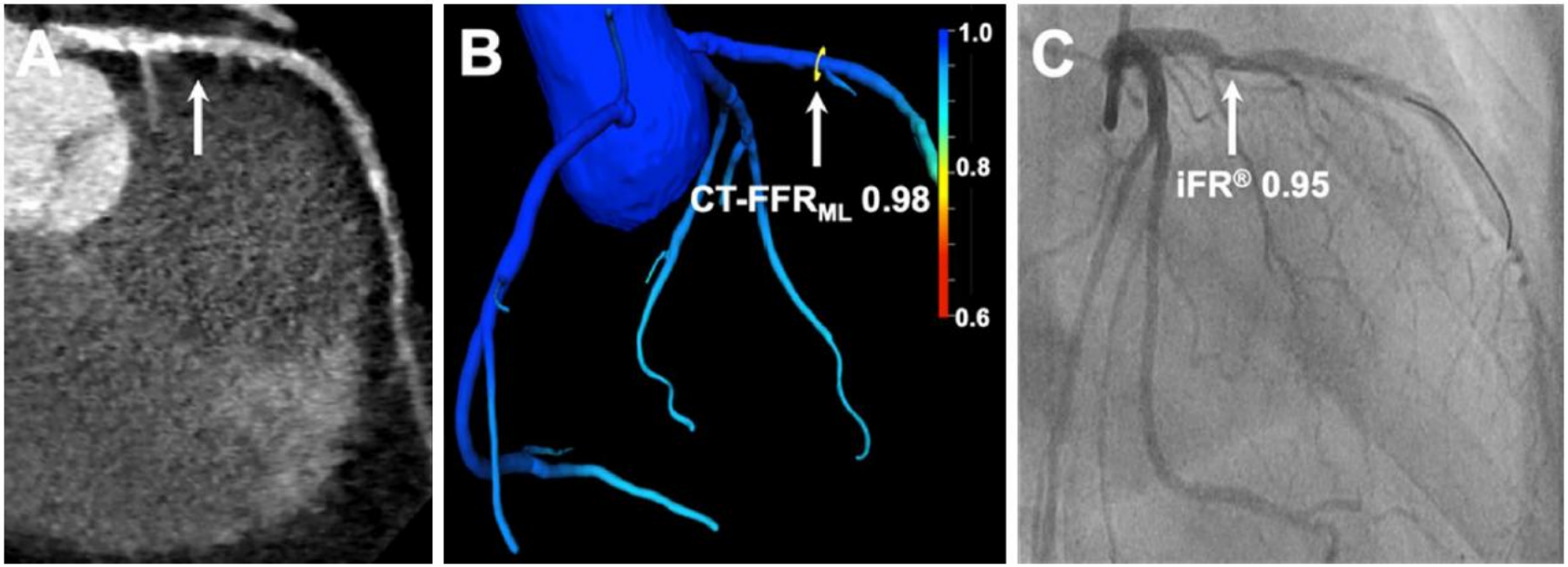
n=431

	RFR ≤ 0.89	RFR > 0.89
iFR ≤ 0.89	177 (35.3%)	4 (0.8%)
iFR > 0.89	7 (1.4%)	313 (62.5%)

Catheter Cardiovasc Interv. 2019;1–6

6.5 FFR “derivado del TAC coronario”

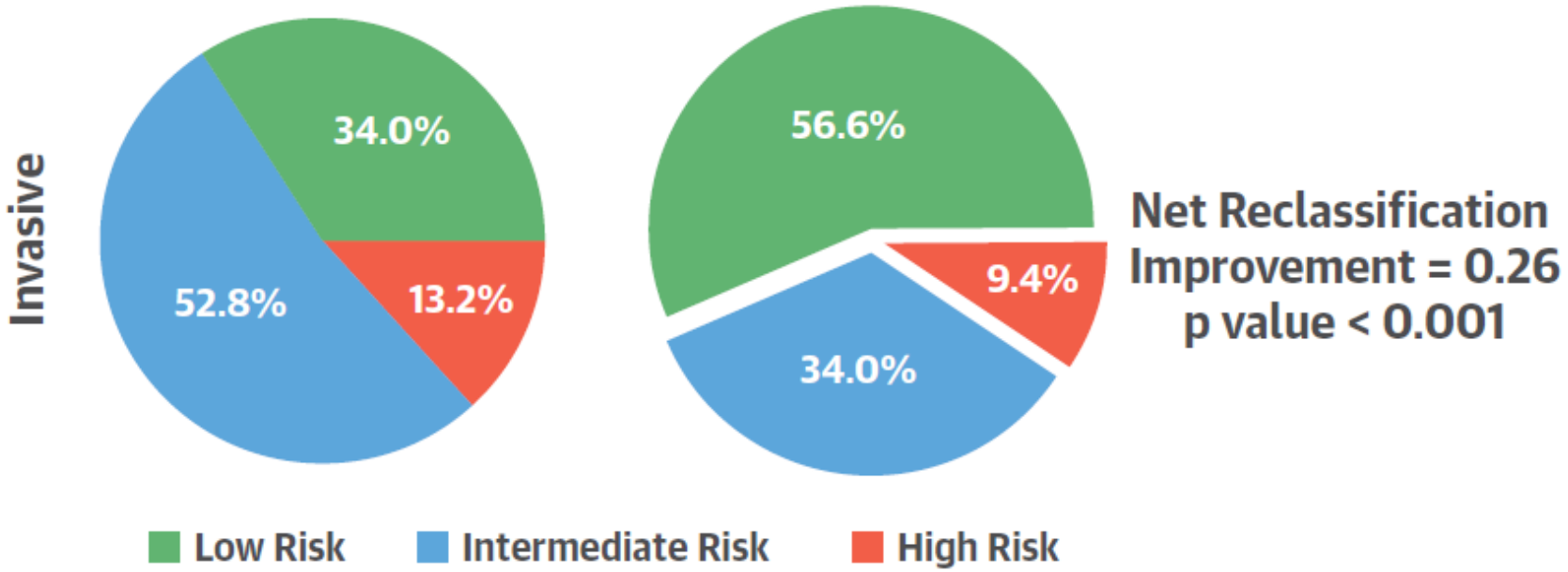
Correlation of machine learning computed tomography-based fractional flow reserve with instantaneous wave free ratio to detect hemodynamically significant coronary stenosis



Clinical Research in Cardiology
https://doi.org/10.1007/s00392-019-01562-3

Received: 11 July 2019 / Accepted: 17 October 2019

El Syntax score “funcional” basado en el FFR derivado del TAC



Collet, C. et al. J Am Coll Cardiol. 2018;71(24):2756-69.

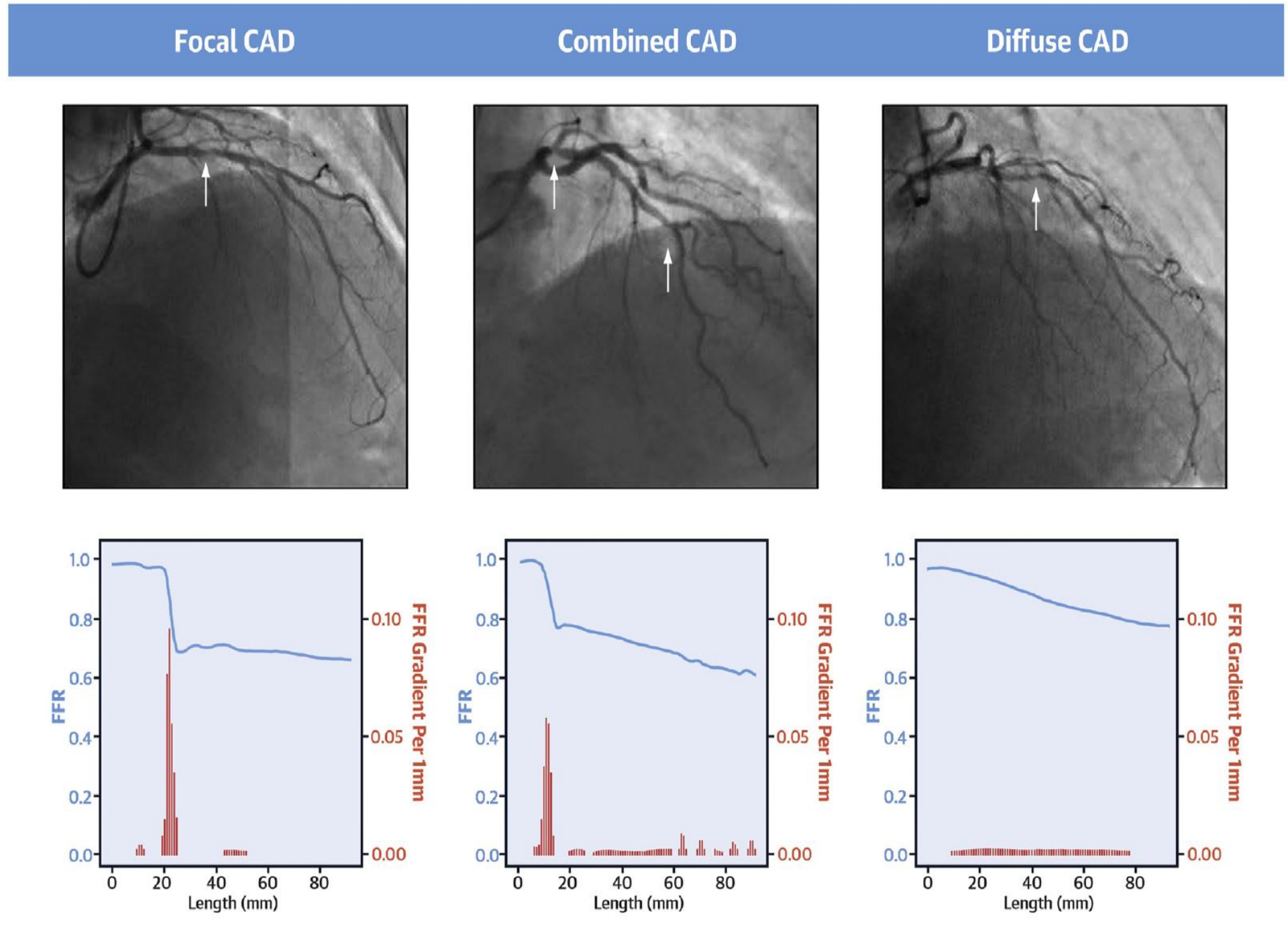
JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 74, NO. 14, 2019

PUBLISHED BY ELSEVIER

Measurement of Hyperemic Pullback Pressure Gradients to Characterize Patterns of Coronary Atherosclerosis

Carlos Collet, MD,[a,*] Jeroen Sonck, MD,[a,b,*] Bert Vandeloo, MD,[c] Takuya Mizukami, MD, PhD,[a,d] Bram Roosens, MD, PhD,[c] Stijn Lochy, MD,[c] Jean-Francois Argacha, MD, PhD,[c] Danny Schoors, MD, PhD,[c] Iginio Colaiori, MD,[a] Giuseppe Di Gioia, MD,[a] Monika Kodeboina, MD,[a] Hiroshi Suzuki, MD, PhD,[d] Marcel Van 't Veer, MSc, PhD,[e] Jozef Bartunek, MD, PhD,[a] Emanuele Barbato, MD, PhD,[a,b] Bernard Cosyns, MD, PhD,[c] Bernard De Bruyne, MD, PhD[a,f]

* con sistema motorizado de retirada


Focal CAD
Combined CAD
Diffuse CAD
FFR
FFR Gradient Per 1mm
Length (mm)
1.0
0.8
0.6
0.4
0.2
0.0
0.10
0.05
0.00
0
20
40
60
80

El nuevo índice "*PPG*"

Pullback Pressure Gradients Index

$$\{MaxPPG_{20mm}/\Delta FFR_{vessel} + (1\text{-Length with Functional Disease (mm)/Total Vessel Length (mm)})\}/2$$

$$\frac{MaxPPG_{20mm}}{\Delta FFR_{vessel}} = \frac{0.300}{0.325} = 0.923$$

$$\text{Length CAD} = \frac{20}{100} = 0.200$$

$$\text{PPG Index} = \frac{0.923 + (1\text{-}0.20)}{2} = 0.86$$

$$\frac{MaxPPG_{20mm}}{\Delta FFR_{vessel}} = \frac{0.236}{0.387} = 0.610$$

$$\text{Length CAD} = \frac{65}{92} = 0.707$$

$$\text{PPG Index} = \frac{0.610 + (1\text{-}0.707)}{2} = 0.45$$

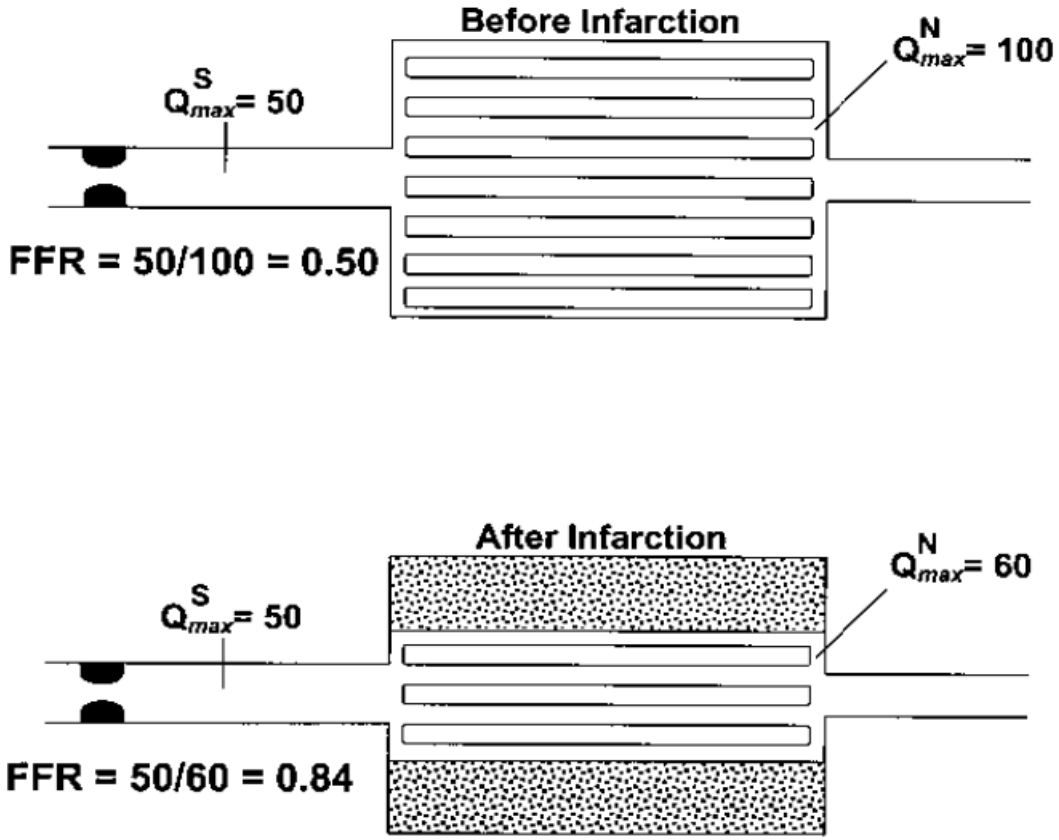
$$\frac{MaxPPG_{20mm}}{\Delta FFR_{vessel}} = \frac{0.056}{0.193} = 0.290$$

$$\text{Length CAD} = \frac{74}{101} = 0.733$$

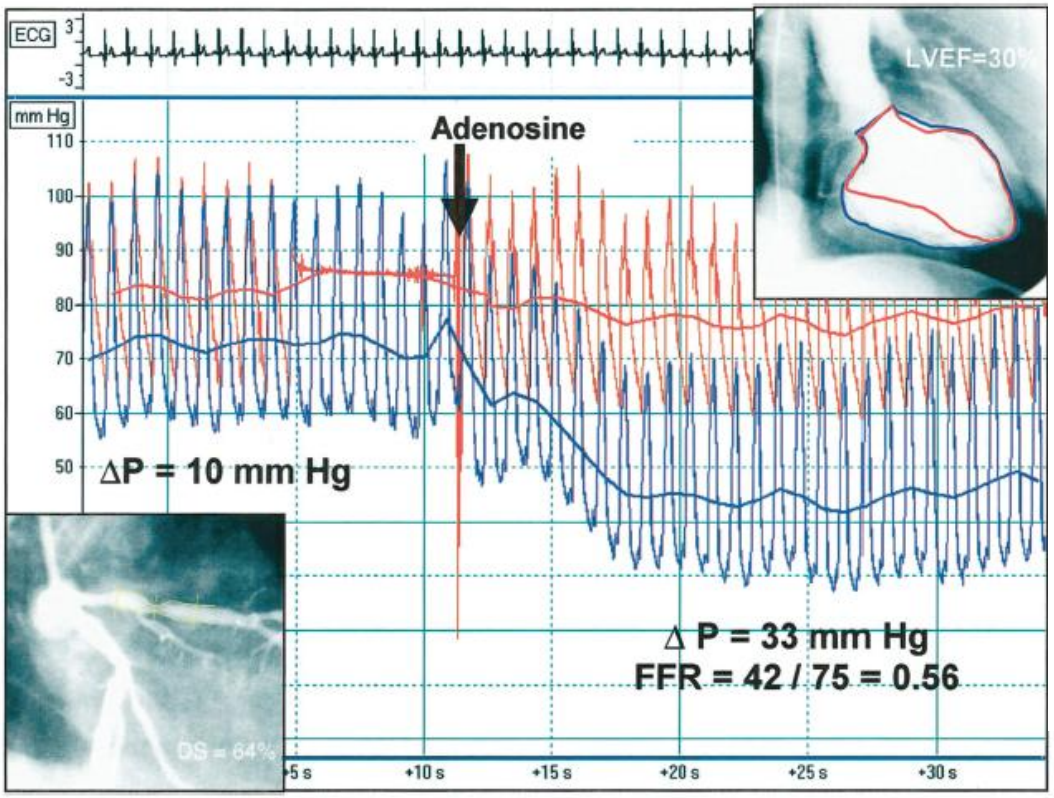
$$\text{PPG Index} = \frac{0.290 + (1\text{-}0.733)}{2} = 0.28$$

Collet, C. et al. J Am Coll Cardiol. 2019;74(14):1772-84.

La guía de presión como marcador de viabilidad miocárdica, ¿es cierto?



Circulation. 2001;104:157-162



	MIBI + n = 47	MIBI - n = 67
FFR≥0.75 n = 66	8	58
FFR<0.75 n = 48	39	9

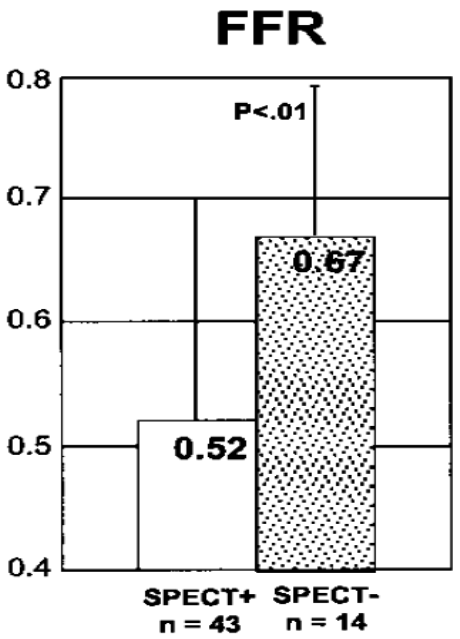
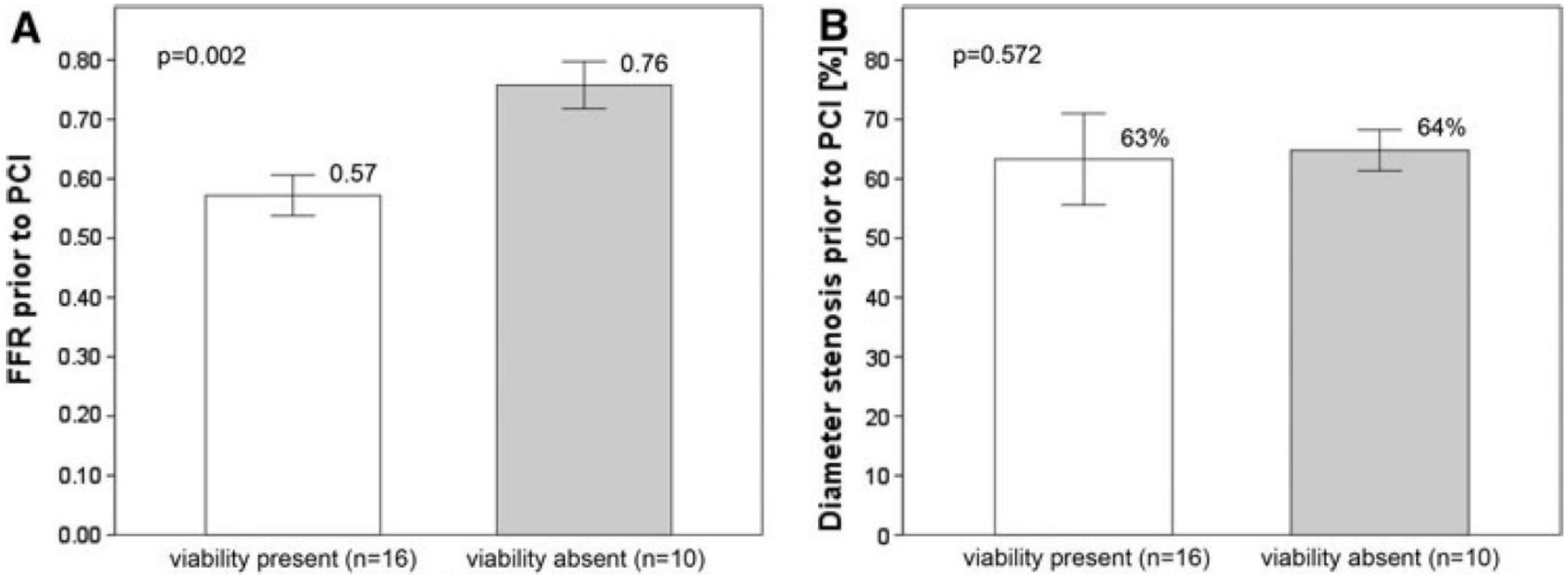


Figure 1. Example of pressure recording in 60-year-old woman who sustained anterior MI 6 days before catheterization. Coronary angiogram (bottom left) showed 64% diameter stenosis in proximal left anterior descending coronary artery. Left ventriculography (top right) shows severe anterior hypokinesia. Transstenotic pressure gradient is 9 mm Hg at rest and 33 mm Hg during maximal hyperemia, which corresponds to FFR of 0.56. Large increase in pressure gradient during hyperemia indicates maintained vasoreactivity, which, in turn, suggests presence of myocardial viability of anterior wall.

Beleskin et al.



J Nucl Cardiol. 2010 Oct;17(5):817-24

EDITORIAL

Invasive evaluation of patients after reperfused STEMI: One-stop-shop for anatomy and physiology

Habib Samady, MD, FACC

of lesions subtending normal beds.[7] In a subsequent study, we showed that FFR had excellent predictive value for identifying peri-infarct ischemia on SPECT and myocardial contrast echocardiography in patients 48-72 h after myocardial infarction.[8] Despite these data supporting the value of FFR for detecting peri-infarct ischemia in the early post-infarct phase, outcome data are lacking using an FFR-guided revascularization

revascularization in this setting. Clearly, large randomized trials comparing non-invasive testing to combined angiography and FFR to guide revascularization in the reperfused STEMI population are warranted. Until the results of such studies are available, revascularization decisions in patients after stabilized myocardial infarction will likely continue to be individualized and may depend on the treating cardiologist's bias. In the interim

J Nucl Cardiol. 2010 Oct;17(5):775-7

iFR & Corregistro

D. Higashioka et al. / Journal of Cardiology xxx (2019) xxx–xxx

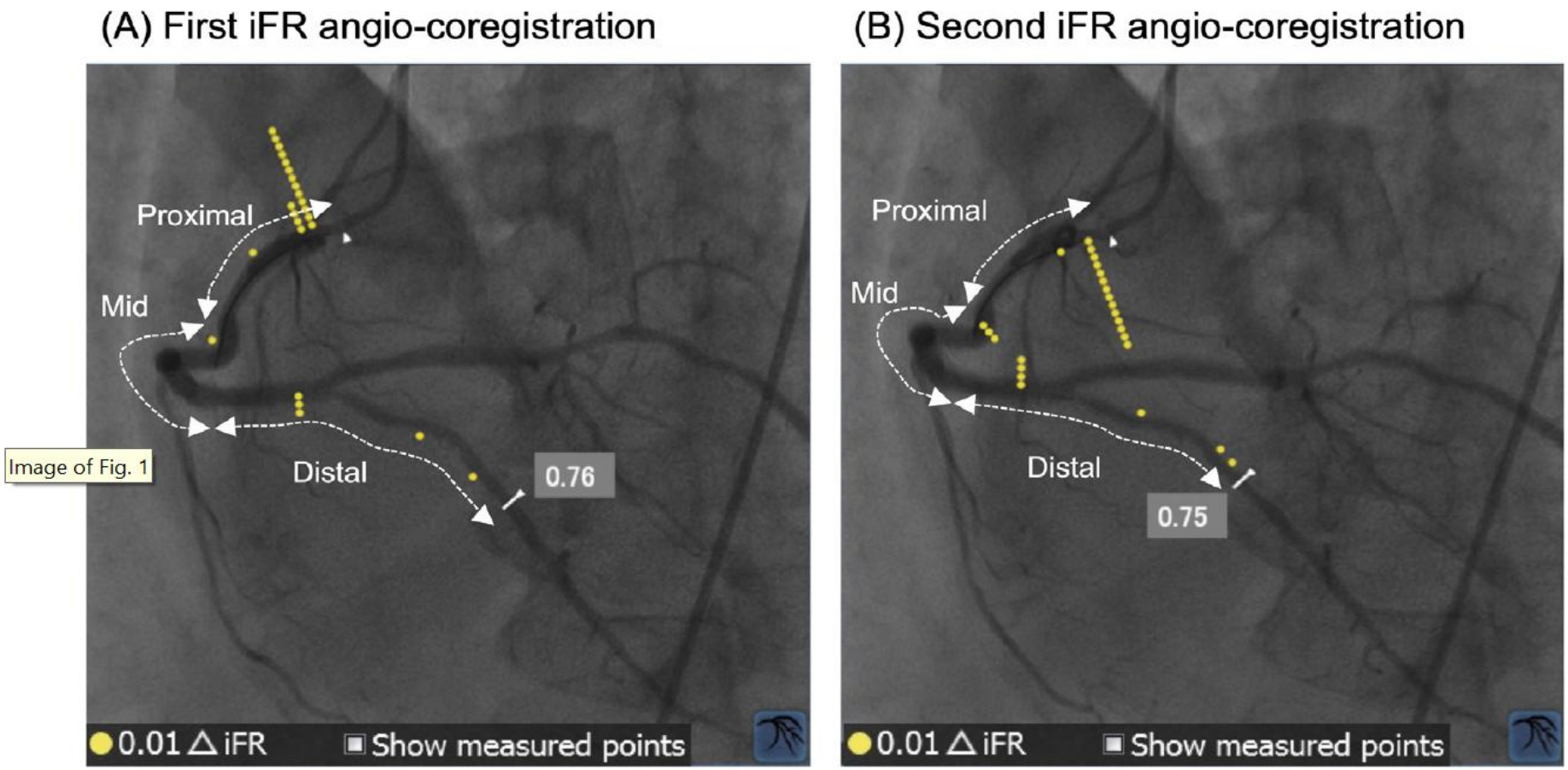


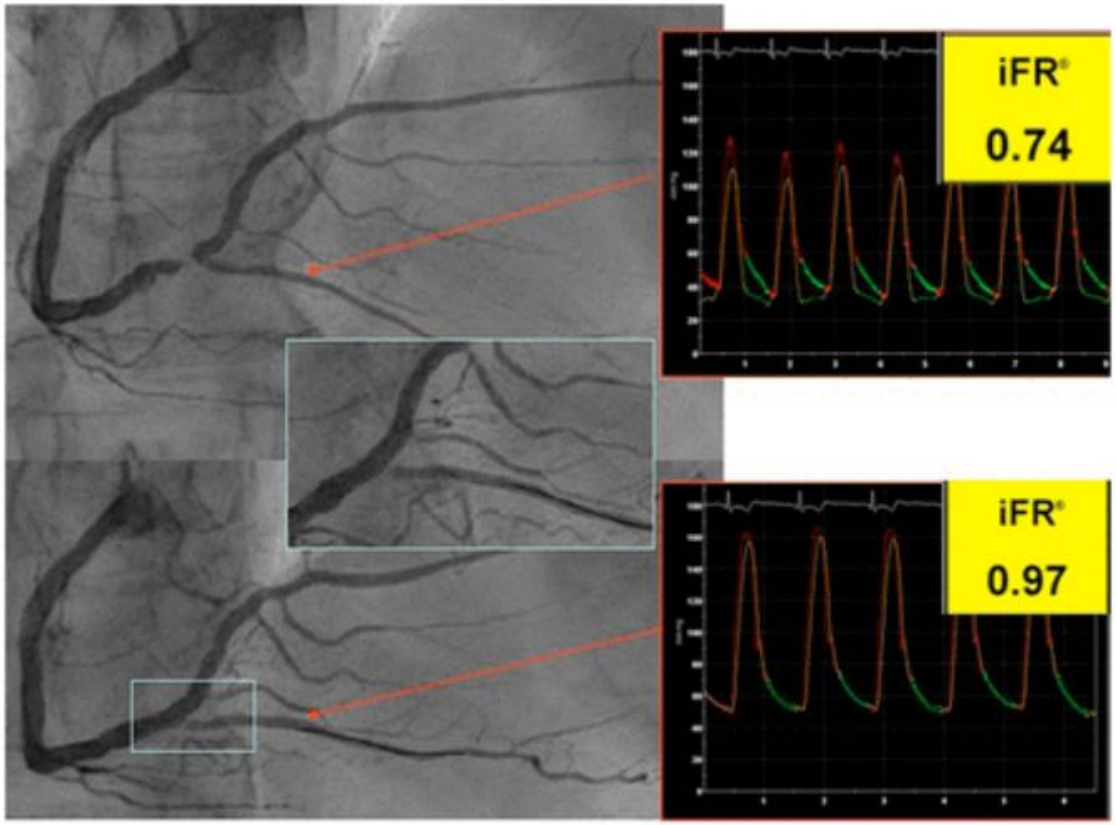
Image of Fig. 1

Journal of the American College of Cardiology
Volume 74, Issue 13 Supplement, October 2019
DOI: 10.1016/j.jacc.2019.08.691

PHYSIOLOGIC LESION ASSESSMENT - 2

TCT-581 Jailed Pressure Wire to Assess the Side Branch Result for Bifurcation Lesions Treated by Provisional Stenting Strategy: iFR as a New Index

Francisco Hidalgo, Soledad Ojeda, Adrián Lostalo, Javier Suarez De Lezo, Aurora Luque, Miguel Romero, José Segura and Manuel Pan



Conclusiones

- En el manejo de lesiones intermedias por iFR es equivalente al de FFR, excepto para SCA, donde iFR puede ser superior.

- El uso de FFR tras el implante (>0.88) indica una mejor evolución pos-stent.

Conclusiones

- La guía de flujo coronario puede complementar la información del FFR, pues explora la microcirculación. Se han propuesto otros métodos (IMR…) para explorarla. Concordancia. ¿opciones de tratamiento?

- Desarrollo constante de nuevos métodos para valorar el gradiente de presión: FFR con suero salino, contraste…….