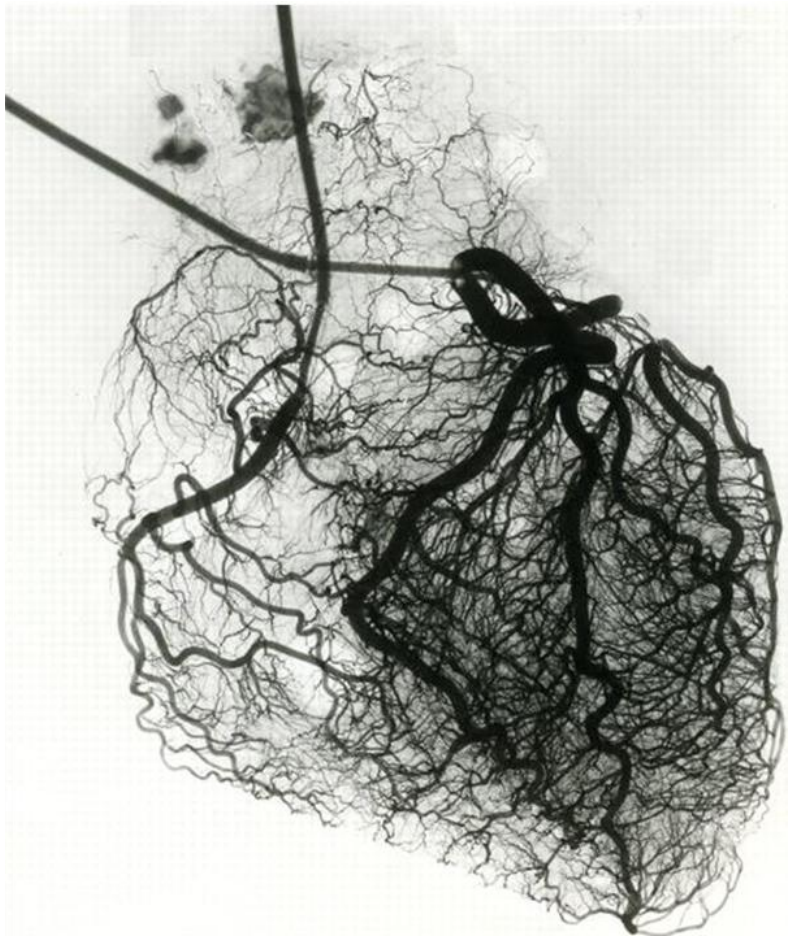


William Fulton, MD thesis, University of Glasgow 1963

The #FullPhysiology journey: Past, Present and Future

Antonio Maria Leone MD PhD

Diagnostic, Interventional and Acute Cardiac Care Unit
Ospedale Isola Tiberina - Gemelli Isola
Università Cattolica del Sacro Cuore
Roma

Potential conflicts of interest

Speaker's name: Antonio Maria Leone

☑ I have the following potential conflicts of interest to report:

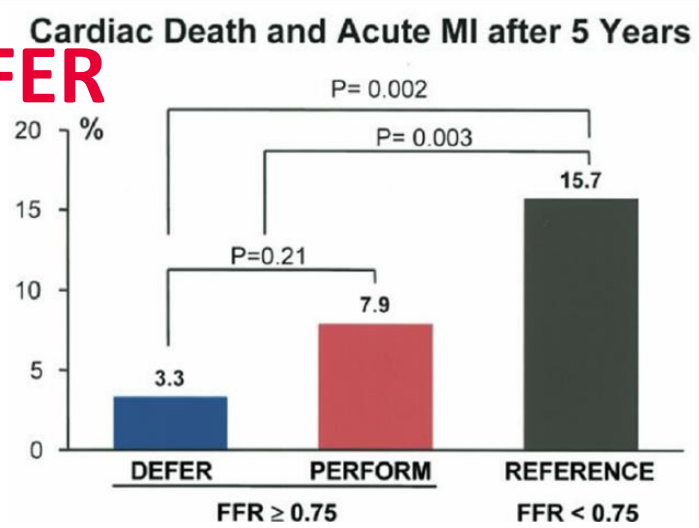
Dr. A.M. Leone is an advisor for Abbott Vascular and received speaking honoraria from Abbott Vascular, Medtronic, Menarini, Bayer, Daichii Sankyo and Bruno Farmaceutici.

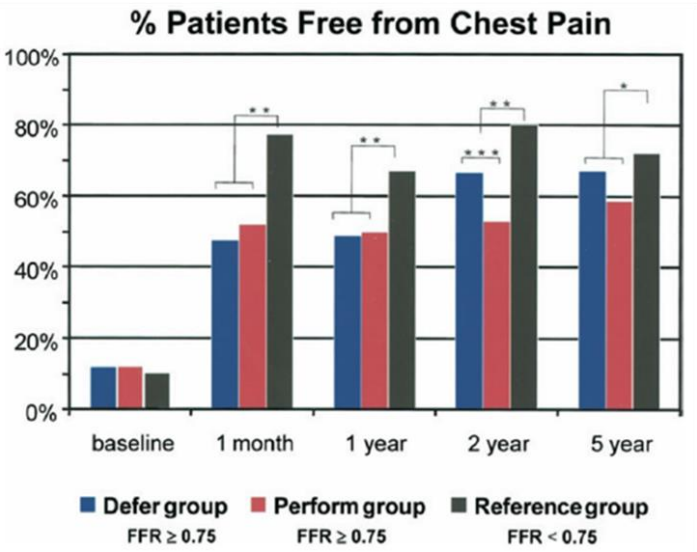
All contents provided by Dr. Leone unless otherwise noted

Past

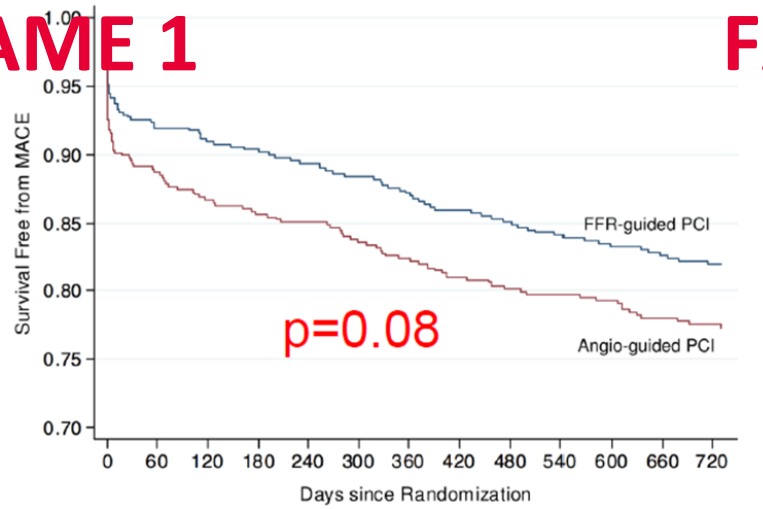
What ICs know about invasive physiology

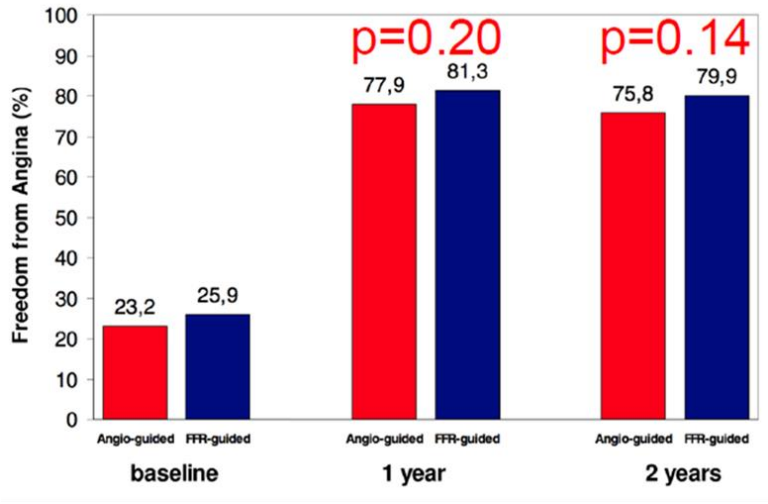
DEFER



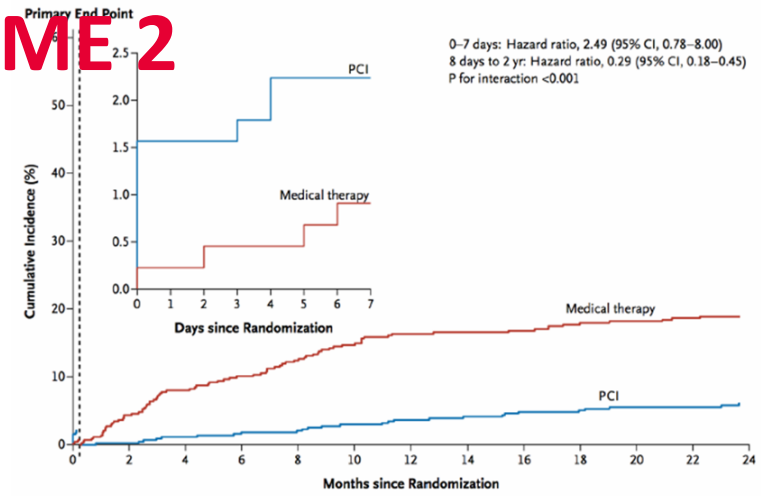


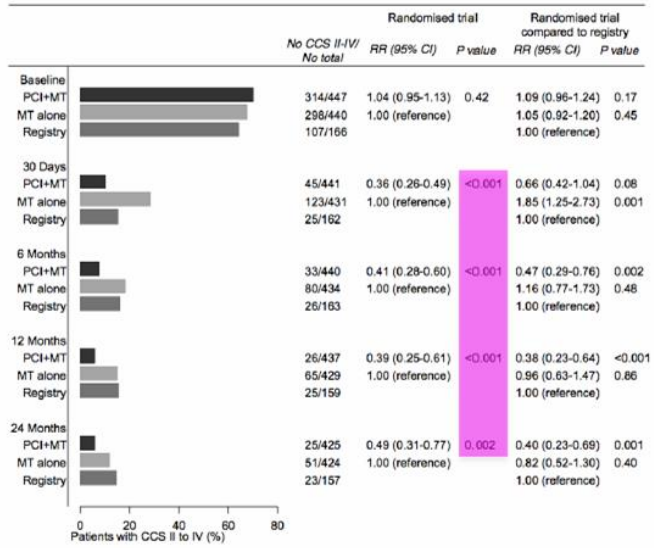
FAME 1





FAME 2

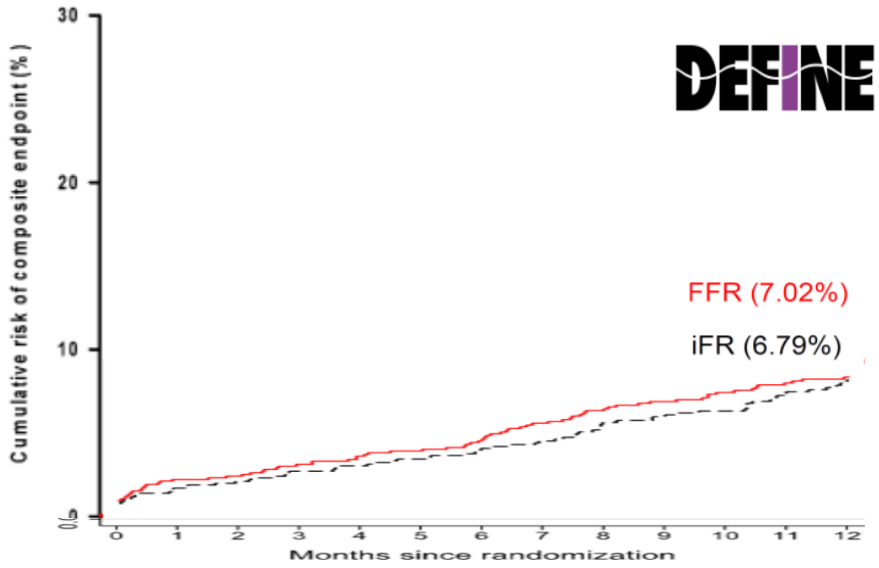




#FullPhysiology InDailyPractice

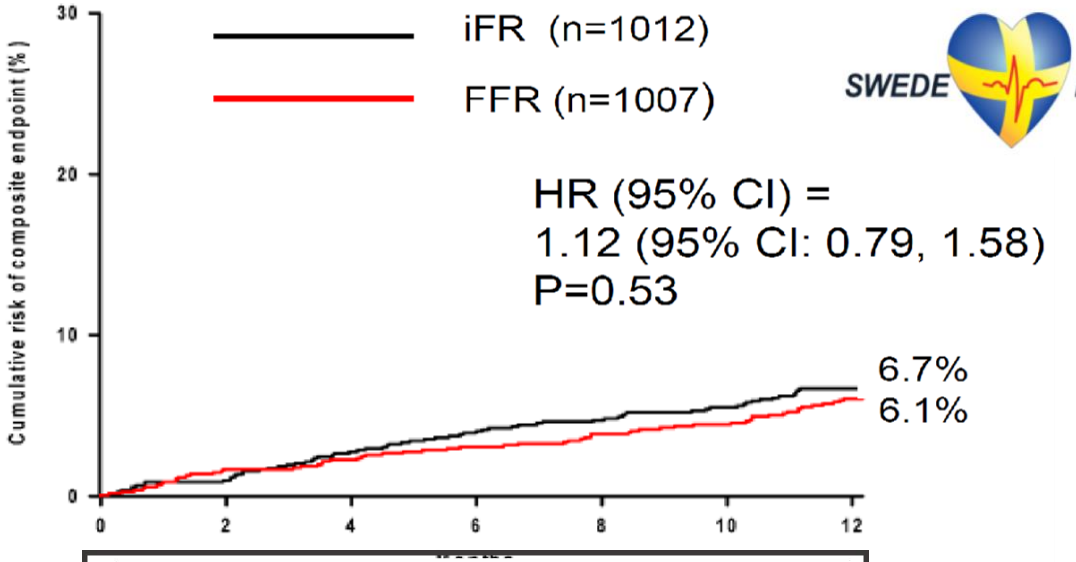
What ICs know about invasive physiology

DEFINE FLAIR



Variable	iFR Group (N=1242)	FFR Group (N=1250)	P Value†
Radial-artery approach — no. of patients (%)	896 (72.1)	888 (71.0)	0.54
Procedure time — min			
Median	40.5	45.0	0.001
Functionally significant lesions — no. (% of total vessels evaluated)§	451 (28.6)	557 (34.6)	0.004
≥1 Functionally significant lesions present — no. of patients (%)§	426 (34.3)	486 (38.9)	0.02
Mean iFR	0.91±0.09	NA	
Mean FFR	NA	0.83±0.09	
Percent of lesions within the FFR range			
<0.60	NA	1.96	
0.60–0.90	NA	75.08	
>0.90	NA	22.96	
Revascularization performed — no. of patients (%)			
Total	590 (47.5)	667 (53.4)	0.003
CABG	25 (2.0)	42 (3.4)	0.04
PCI	565 (45.5)	625 (50.0)	0.02
Stents placed — no. (% of total stents placed)			
Total	822 (100)	906 (100)	0.86
Drug-eluting stent	811 (98.7)	893 (98.6)	
Bioresorbable vascular scaffold	11 (1.3)	13 (1.4)	
No. of stents placed per patient	0.66±0.92	0.72±0.96	0.09

SWEDE HEART



Characteristic	iFR Group (N=1012)	FFR Group (N=1007)	P Value
Procedure time — min†			0.09
Median	50.8	53.1	
Interquartile range	13.8–87.8	18.1–88.1	
Fluoroscopy time — min			0.57
Median	10.5	10.2	
Interquartile range	6.3–16.8	6.5–16.0	
Intravenous adenosine administered — no. of patients (%)	NA	695 (69.0)	
Total no. of lesions evaluated	1568	1436	
No. of lesions evaluated per patient	1.55±0.86	1.43±0.70	0.002
Hemodynamically important lesions — no. (% of total lesions evaluated)‡	457 (29.1)	528 (36.8)	<0.001
No. of hemodynamically important lesions per patient‡	0.45±0.71	0.52±0.68	0.05
Mean iFR	0.91±0.10	NA	
Mean iFR in hemodynamically important lesions‡	0.80±0.13	NA	
Mean FFR	NA	0.82±0.10	
Mean FFR in hemodynamically important lesions‡	NA	0.72±0.08	
Total no. of stents placed	698	787	
No. of stents placed per patient undergoing PCI	1.58±1.08	1.73±1.19	0.05
CABG as primary revascularization procedure — no. of patients (%)	93 (9.2)	113 (11.2)	0.13
Revascularization performed — no. of patients (%)	536 (53.0)	569 (56.5)	0.11

How ICs translate invasive physiology in practice

Catheterization and Cardiovascular Interventions 74:811–813 (2009)

Letter to the Editor

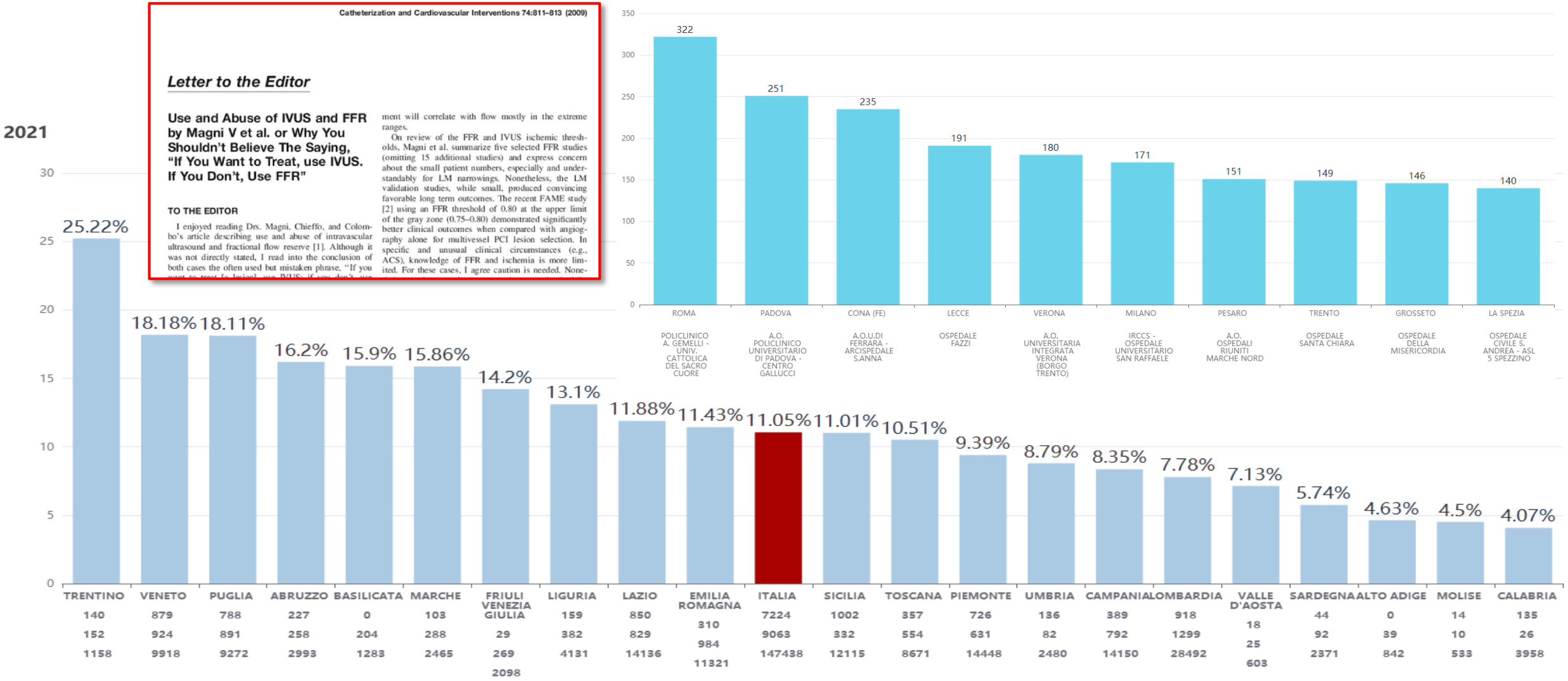
Use and Abuse of IVUS and FFR by Magni V et al. or Why You Shouldn't Believe The Saying, "If You Want to Treat, use IVUS. If You Don't, Use FFR"

TO THE EDITOR

I enjoyed reading Drs. Magni, Chieffo, and Colombo's article describing use and abuse of intravascular ultrasound and fractional flow reserve [1]. Although it was not directly stated, I read into the conclusion of both cases the often used but mistaken phrase, "If you

ment will correlate with flow mostly in the extreme ranges.

On review of the FFR and IVUS ischemic thresholds, Magni et al. summarize five selected FFR studies (omitting 15 additional studies) and express concern about the small patient numbers, especially and understandably for LM narrowings. Nonetheless, the LM validation studies, while small, produced convincing favorable long term outcomes. The recent FAME study [2] using an FFR threshold of 0.80 at the upper limit of the gray zone (0.75–0.80) demonstrated significantly better clinical outcomes when compared with angiography alone for multivessel PCI lesion selection. In specific and unusual clinical circumstances (e.g., ACS), knowledge of FFR and ischemia is more limited. For these cases, I agree caution is needed. None-

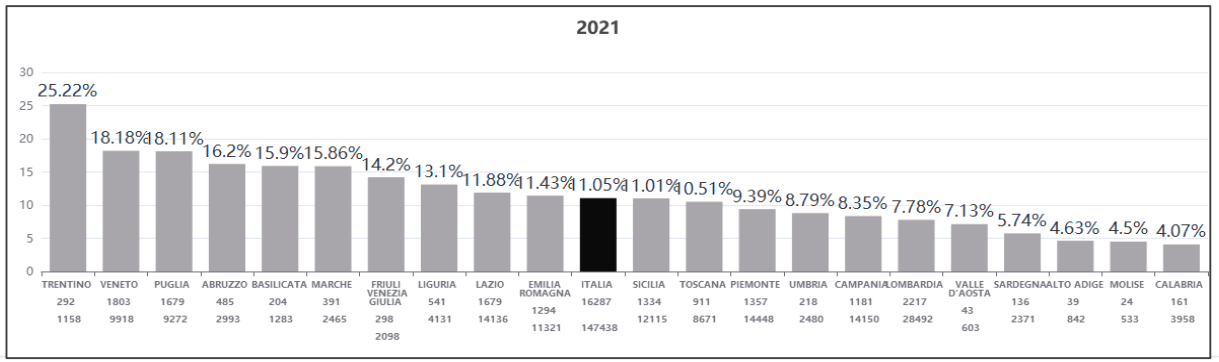


$$\frac{\textit{Invasive Assessment}}{\textit{Coronary Angiograms}} = \frac{16.287}{280.604} = 5.8\%$$

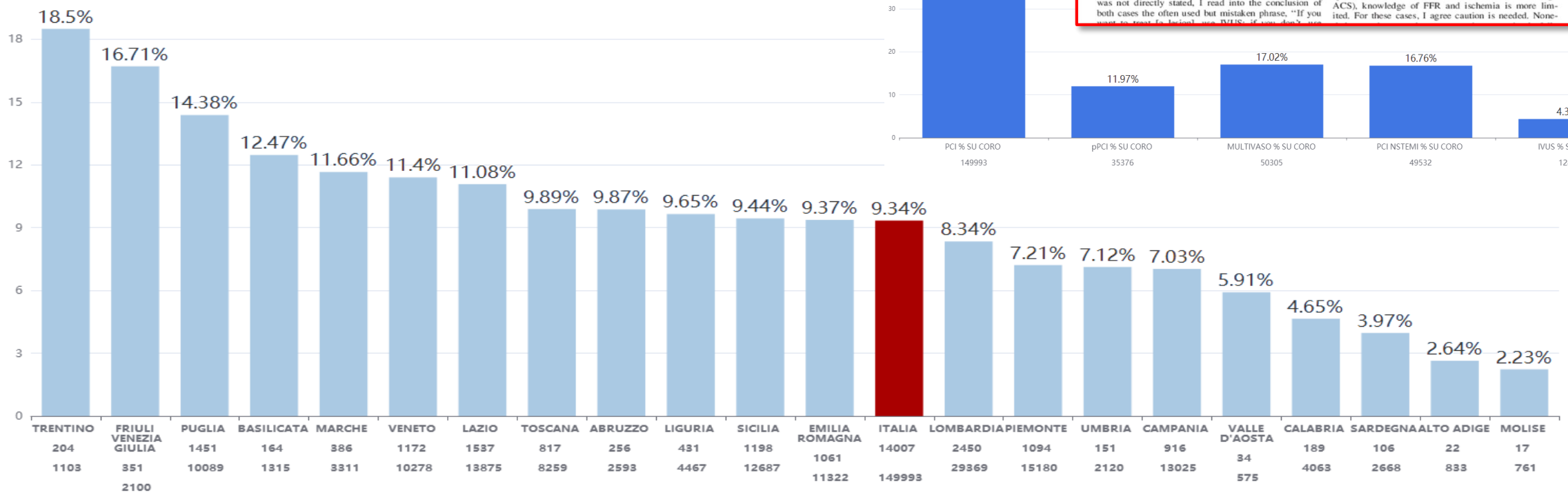
Dati Nazionali GISE 2021

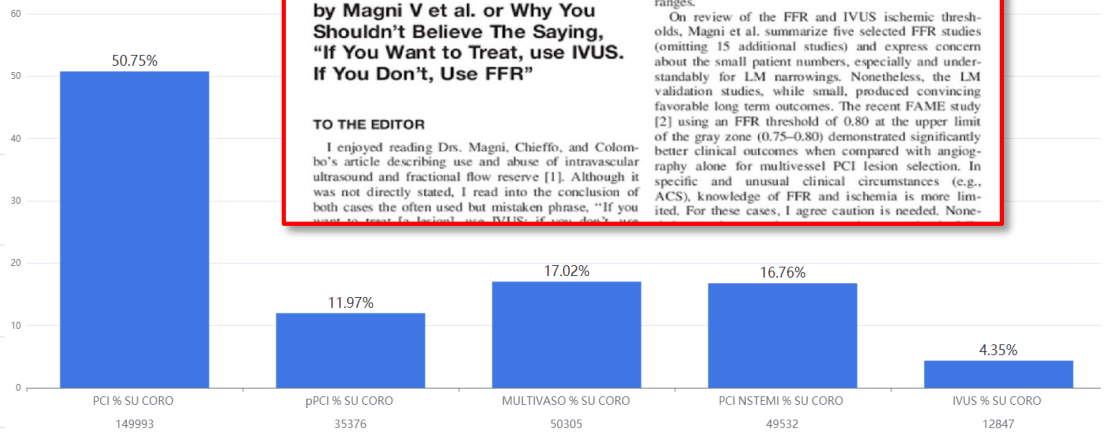
#FullPhysiology InDailyPractice

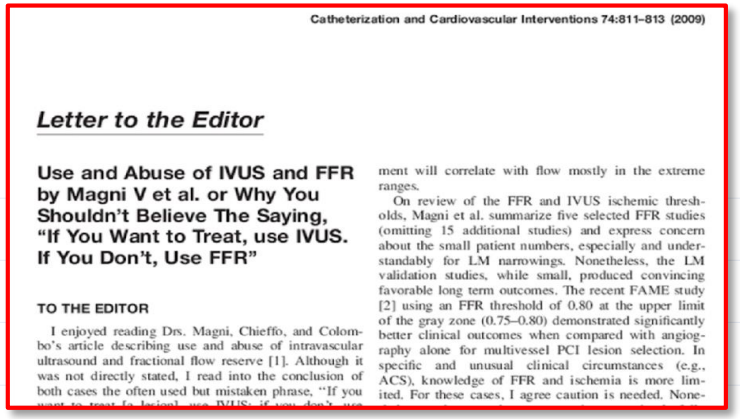
How ICs translate invasive physiology in practice



2022







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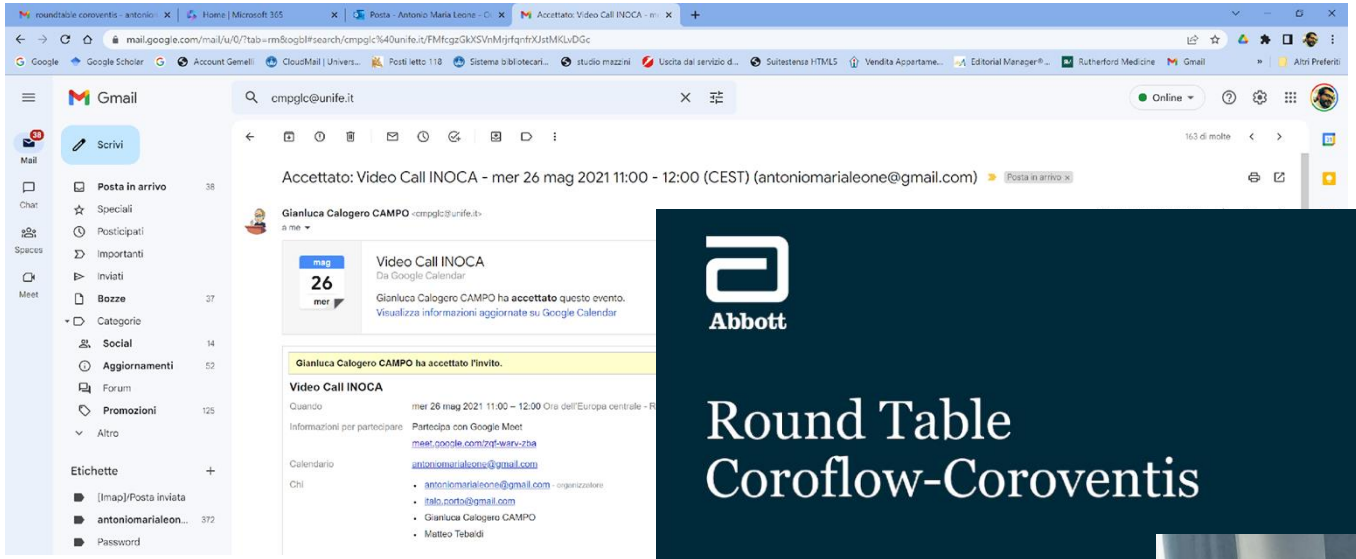
$$\frac{Invasive\ Assessment}{Coronary\ angiograms} = \frac{14007}{295576} = 4.7\%$$

Dati Nazionali GISE 2022

#FullPhysiology InDailyPractice

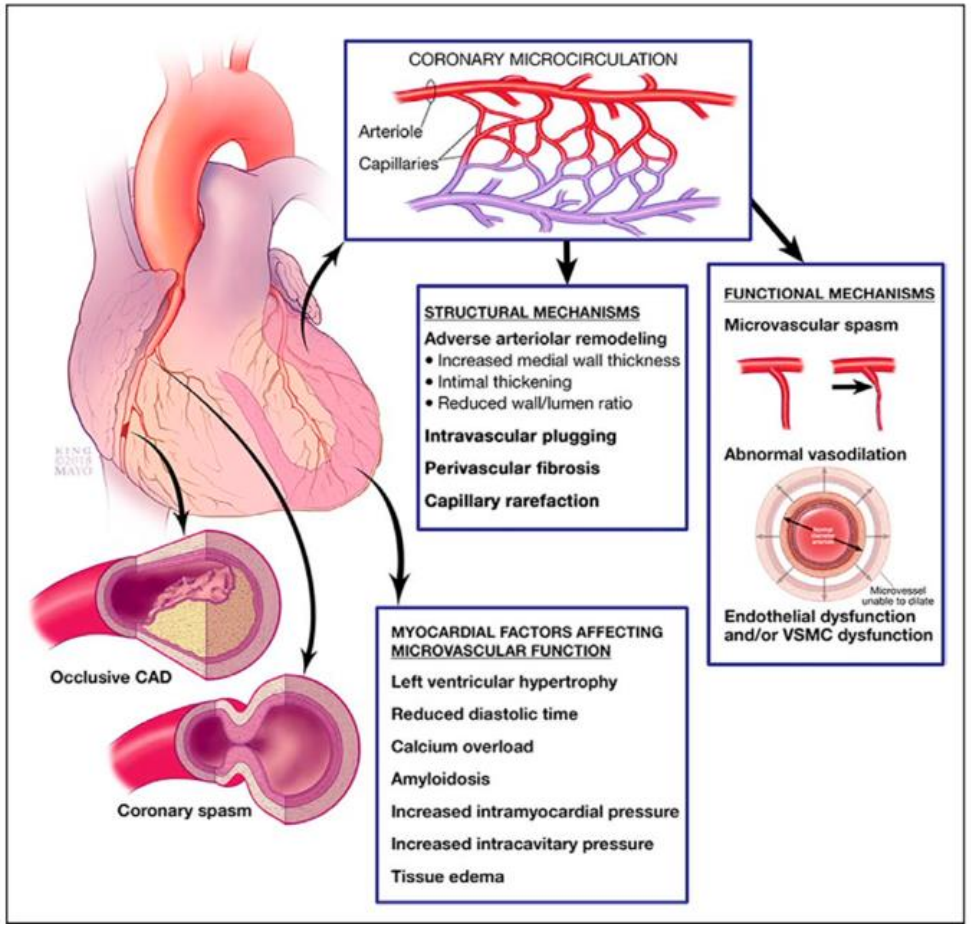
The #FullPhysiology group

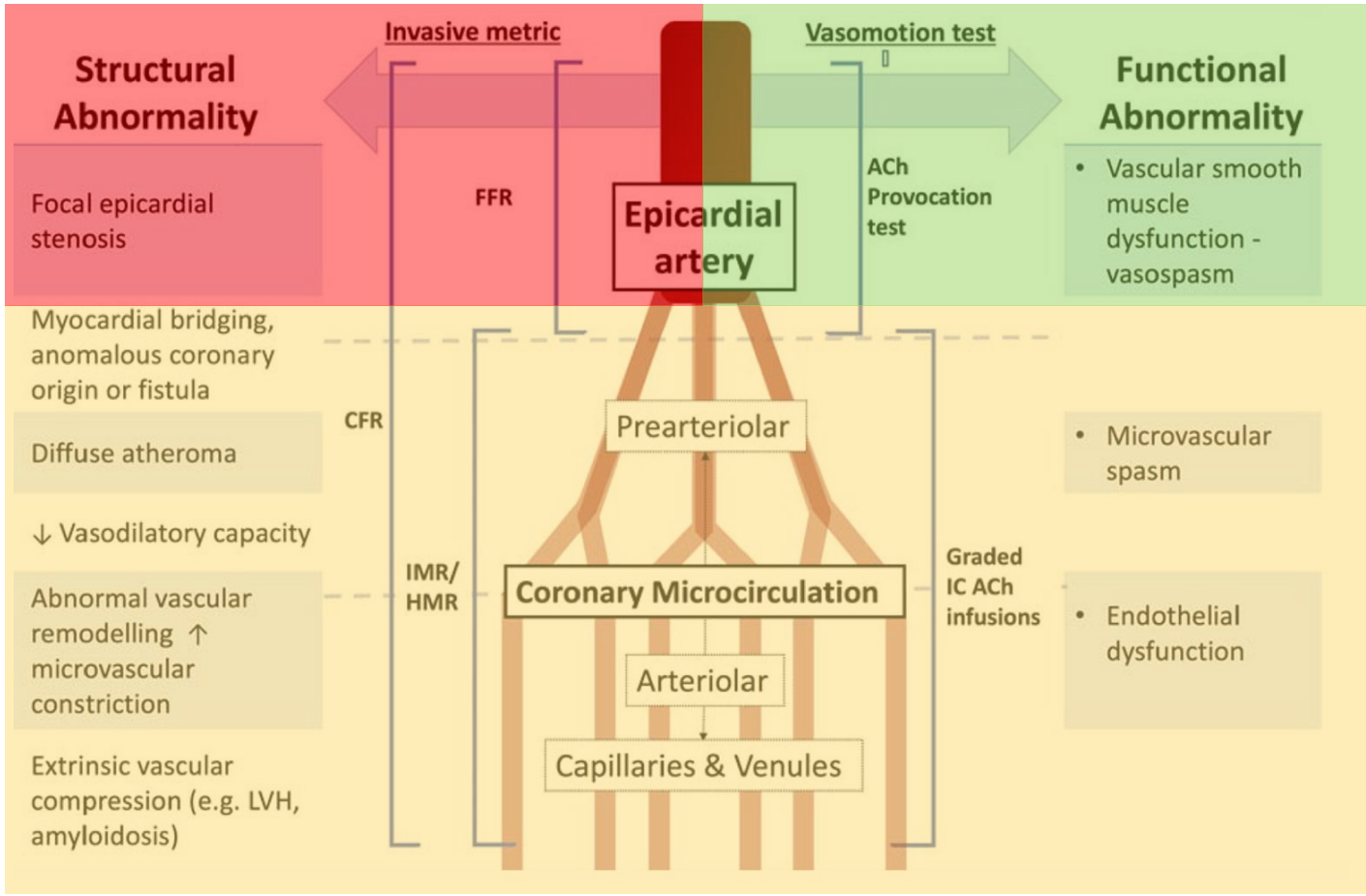


- No Club / «niche»
- Sharing a common language
- Expressing the full potential of physiology in daily practice (case-based approach)

Coronary circulation as a continuum

F. Ph. For Structural and Functional abn.





Crea F, et al. *Eur Heart J* 2016;37:1514-6

Courtesy from T. Engstroem

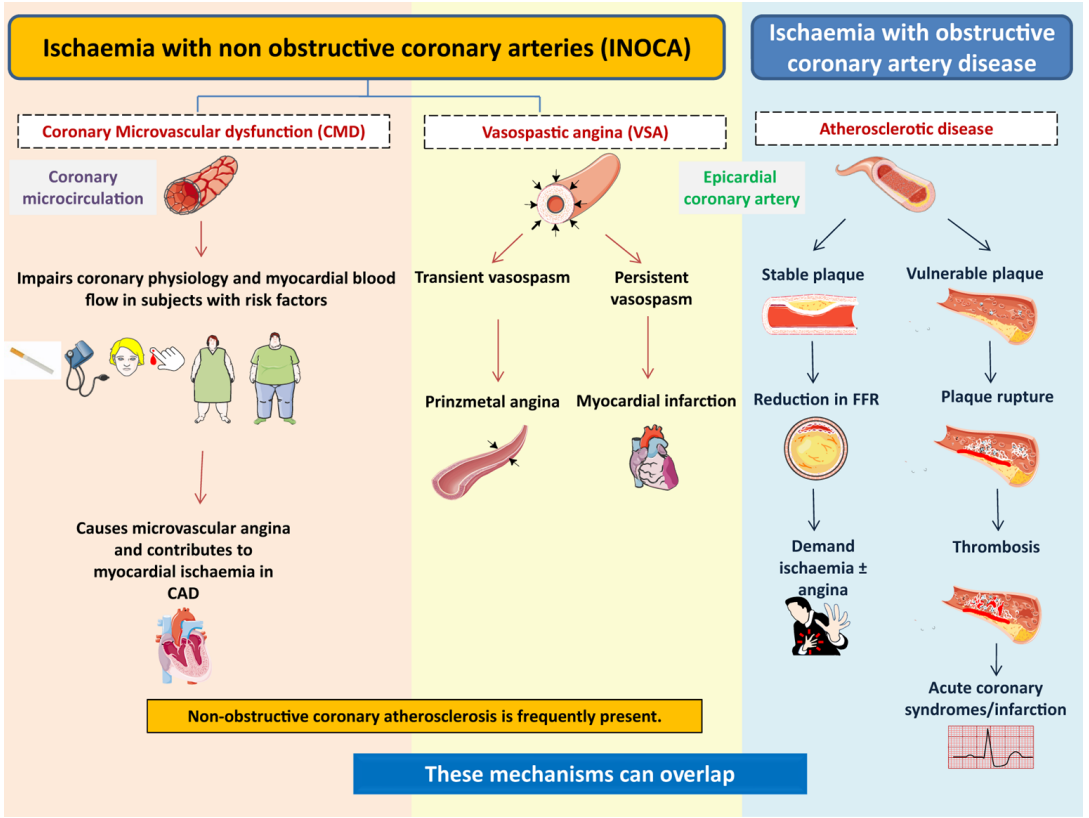
ESC guidelines for CCS

Recommendations	Class[a]	Level[b]
Guidewire-based CFR and/or microcirculatory resistance measurements should be considered in patients with persistent symptoms, but coronary arteries that are either angiographically normal or have moderate stenoses with preserved iwFR/FFR.[412,413]	IIa	B
Intracoronary acetylcholine with ECG monitoring may be considered during angiography, if coronary arteries are either angiographically normal or have moderate stenoses with preserved iwFR/FFR, to assess microvascular vasospasm.[412,438–440]	IIb	B
Transthoracic Doppler of the LAD, CMR, and PET may be considered for non-invasive assessment of CFR.[430–432,441]	IIb	B

Recommendations	Class[a]	Level[b]
An ECG is recommended during angina if possible.	I	C
Invasive angiography or coronary CTA is recommended in patients with characteristic episodic resting angina and ST-segment changes, which resolve with nitrates and/or calcium antagonists, to determine the extent of underlying coronary disease.	I	C
Ambulatory ST-segment monitoring should be considered to identify ST-segment deviation in the absence of increased heart rate.	IIa	C
An intracoronary provocation test should be considered to identify coronary spasm in patients with normal findings or non-obstructive lesions on coronary arteriography and a clinical picture of coronary spasm, to diagnose the site and mode of spasm.[412,414,438–440]	IIa	B

Terminology: A continuum of Angina Endotypes on CCS

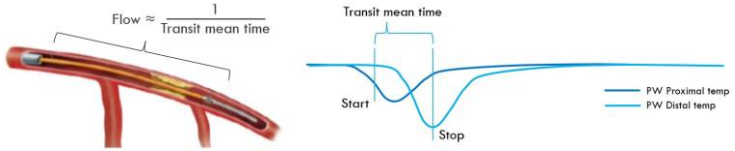
1. **Obstructive Epicardial CAD**
   - NHPR ≤0.89 and/or cFFR ≤0.83 and/or FFR ≤0.80
2. **Microvascular angina**
   - **Structural: IMR >25**
   - **Functional*: CFR < 2.0 (+ FFR>0.80 and IMR ≤25)**
3. **Vasospastic angina**
   angina + ST changes and >90% epicardial spasm
4. **Mixed Angina**
   combination of 1, 2 and 3
5. **Non cardiac pain**
   exclusion of 1-2-3

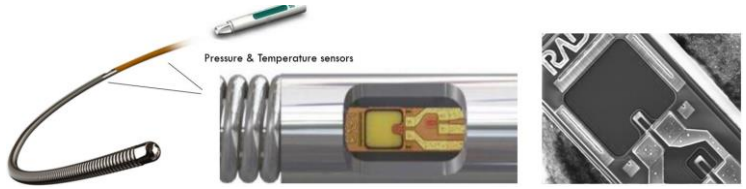


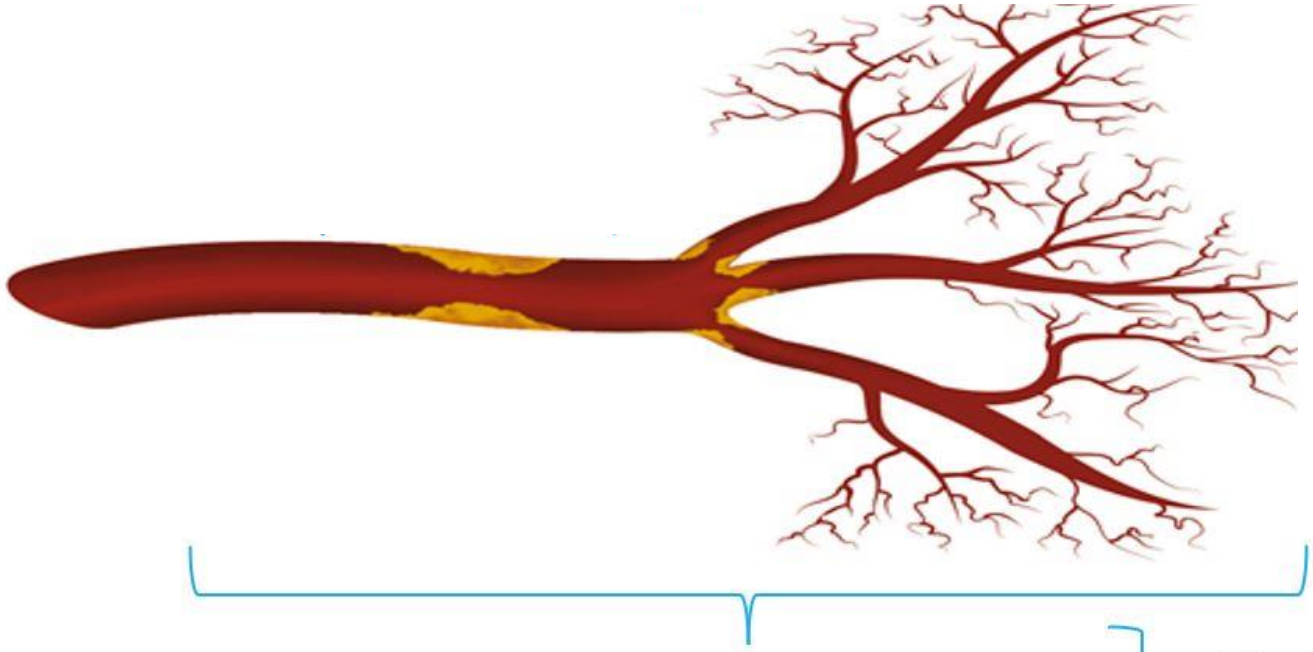
Kunadian EHJ 2020 (mod)

*+MV spasm: angina + ST changes and no epicardial spasm (+ ↑Tmn) by COVADIS definition

Different indexes for different compartments?







CFR = Flow at rest vs Flow at Hyperemia (au)

Affected by epicardial AND micro-circulatory disease

$$CFR = \frac{\text{Hyperemic Flow}}{\text{basal flow}}$$

Flow ≈ 1 / Tmn (mean transit time)

$$CFR = \frac{1 / hTmn}{1/rTmn}$$

$$\mathbf{CFR = \frac{rTmn}{hTmn}}$$

Pathological value < 2.0

Nico H.J. Pijls, Circulation. 2001;104:2003-2006
Fearon et al. Circulation. 2003;107:3129-3132

Our Ado and Ach protocols

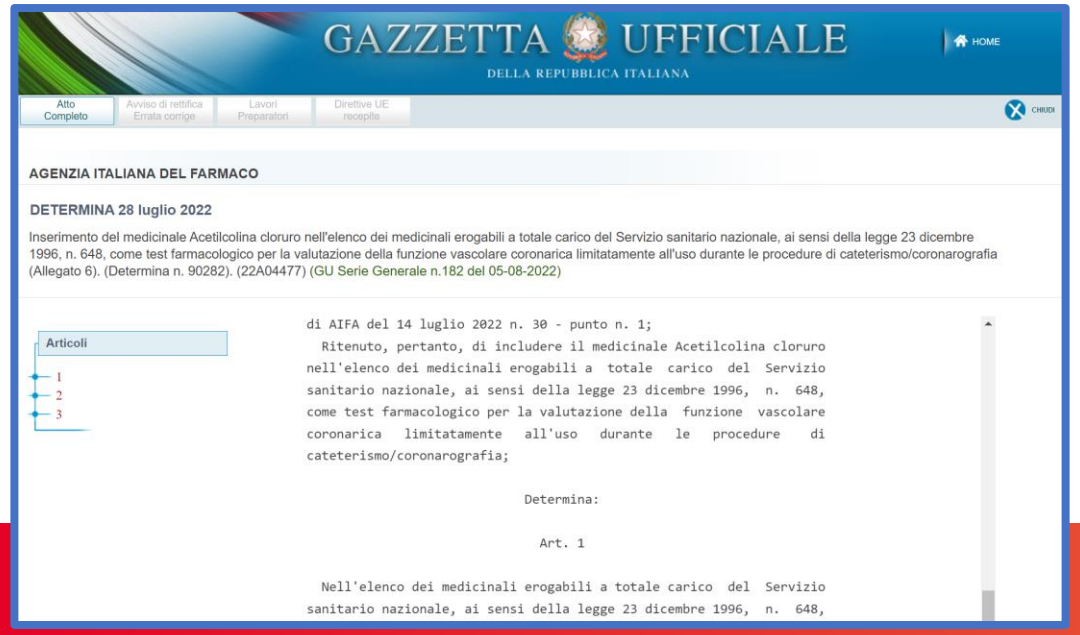
Adenosine 140 mcg/Kg/min

X vials (see below) of Adenosine diluted in 60 ml di NaCl 0.9% and infused in 2'

Weight	Adenosine vials
60 Kg	2.8 vials
70 Kg	3.3 vials
80 Kg	3.7 vials
90 Kg	4.2 vials
100 Kg	4.7 vials

Acetilcholine

- 1 vial of Miovisin 20mg/2ml diluted in 100 ml of NaCl 0.9%
- 1 ml of this solution (200 mcg/ml) diluted with 19 ml of 0.9% NaCl = 20 ml of 10 mcg/ml Ach (Master solution)
- Take from the Master solution:
  - 2 ml + 18 ml of 0.9% NaCl % (20 mcg)
  - 5ml + 15 ml of 0.9% NaCl % (50 mcg)
  - 10 ml + 10 ml of 0.9% NaCl % (100 mcg)
  - 20 ml (200 mcg)
- infuse manually in the LCA incremental doses oh Ach (20-50-100-200 mg) in 2 minutes (rarely we infuse incremental doses of Ach 20-50-80 mg in the RCA)



GAZZETTA UFFICIALE
DELLA REPUBBLICA ITALIANA

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AGENZIA ITALIANA DEL FARMACO

DETERMINA 28 luglio 2022

Inserimento del medicinale Acetilcolina cloruro nell'elenco dei medicinali erogabili a totale carico del Servizio sanitario nazionale, ai sensi della legge 23 dicembre 1996, n. 648, come test farmacologico per la valutazione della funzione vascolare coronarica limitatamente all'uso durante le procedure di cateterismo/coronarografia (Allegato 6). (Determina n. 90282). (22A04477) (GU Serie Generale n.182 del 05-08-2022)

Articoli
1
2
3

di AIFA del 14 luglio 2022 n. 30 - punto n. 1;
Ritenuto, pertanto, di includere il medicinale Acetilcolina cloruro nell'elenco dei medicinali erogabili a totale carico del Servizio sanitario nazionale, ai sensi della legge 23 dicembre 1996, n. 648, come test farmacologico per la valutazione della funzione vascolare coronarica limitatamente all'uso durante le procedure di cateterismo/coronarografia;

Determina:

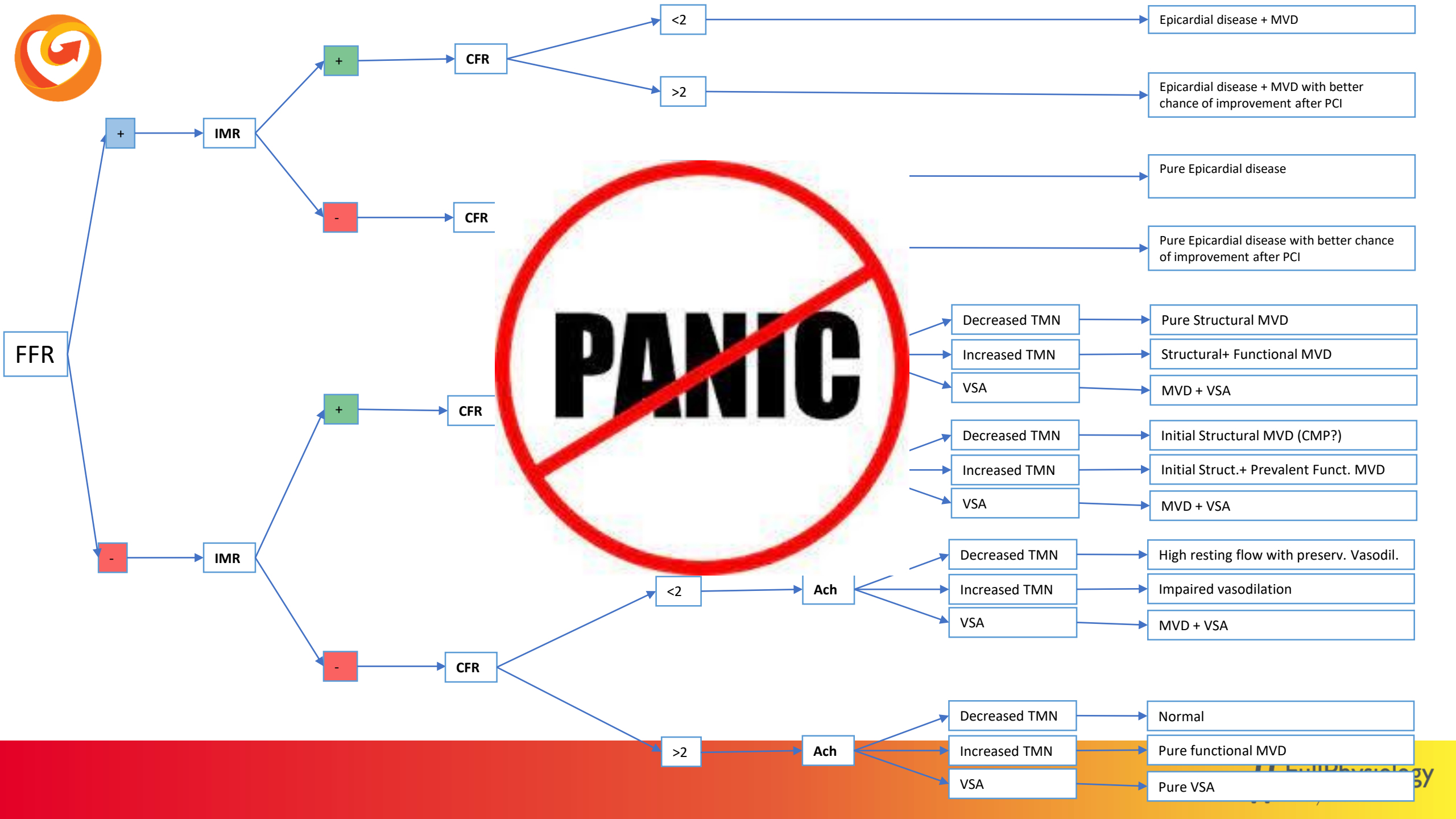
Art. 1

Nell'elenco dei medicinali erogabili a totale carico del Servizio sanitario nazionale, ai sensi della legge 23 dicembre 1996, n. 648,

Approved!

https://www.gazzettaufficiale.it/eli/id/2022/08/05/22A04477/sg

#FullPhysiology InDailyPractice

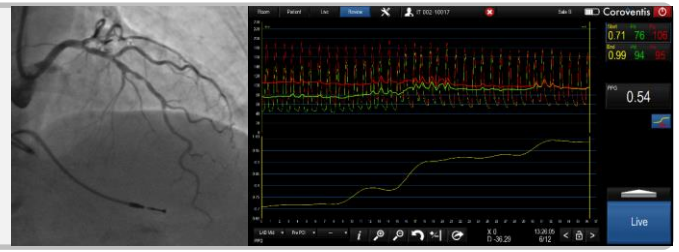

FFR
+
IMR
+
CFR
<2
Epicardial disease + MVD
>2
Epicardial disease + MVD with better chance of improvement after PCI
-
CFR
Pure Epicardial disease
Pure Epicardial disease with better chance of improvement after PCI
PANIC
-
IMR
+
CFR
Decreased TMN
Pure Structural MVD
Increased TMN
Structural+ Functional MVD
VSA
MVD + VSA
-
CFR
<2
Ach
Decreased TMN
Initial Structural MVD (CMP?)
Increased TMN
Initial Struct.+ Prevalent Funct. MVD
VSA
MVD + VSA
Decreased TMN
High resting flow with preserv. Vasodil.
Increased TMN
Impaired vasodilation
VSA
MVD + VSA
>2
Ach
Decreased TMN
Normal
Increased TMN
Pure functional MVD
VSA
Pure VSA

Present

What is #FullPhysiology assessment

1 Epicardial disease assessment

- NHPR (≤0.89)
- cFFR (≤0.83)
- FFR (≤0.80) -> perform pullback



2 Microvascular disease assessment

- IMR (>25)
- CFR (< 2.0)
- RRR (<2.0)*

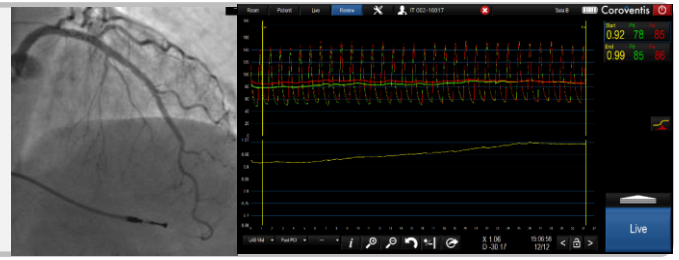
Resistive resistance ratio $= \frac{Trm * Pdr}{Thm * Pdh}$

3 Vasomotor testing

- Ach

4 Post PCI Full Physiology assessment if applicable

- NHPR/cFFR/IMR/CFR/FFR -> perform pullback



#FullPhysiology InDailyPractice

The #FullPhysiology Approach

Minerva Cardiology and Angiology 2023 October;71(5):504-14
DOI: 10.23736/S2724-5683.23.06414-1

REVIEW

#FullPhysiology: a systematic step-by-step guide to implement intracoronary physiology in daily practice

Roberto SCARSINI [1] *, Gianluca CAMPO [2], Luigi DI SERAFINO [3], Sofia ZANON [1], Francesca RUBINO [1], Giovanni MONIZZI [4], Simone BISCAGLIA [2], Marco ANCONA [5], Alberto POLIMENI [6], Giampaolo NICCOLI [7], Massimo FINESCHI [8], Italo PORTO [9], Antonio M. LEONE [10]

DOI: 10.23736/S2724-5683.23.06414-1

#FullPhysiology InDailyPractice

What is #FullPhysiology assessment

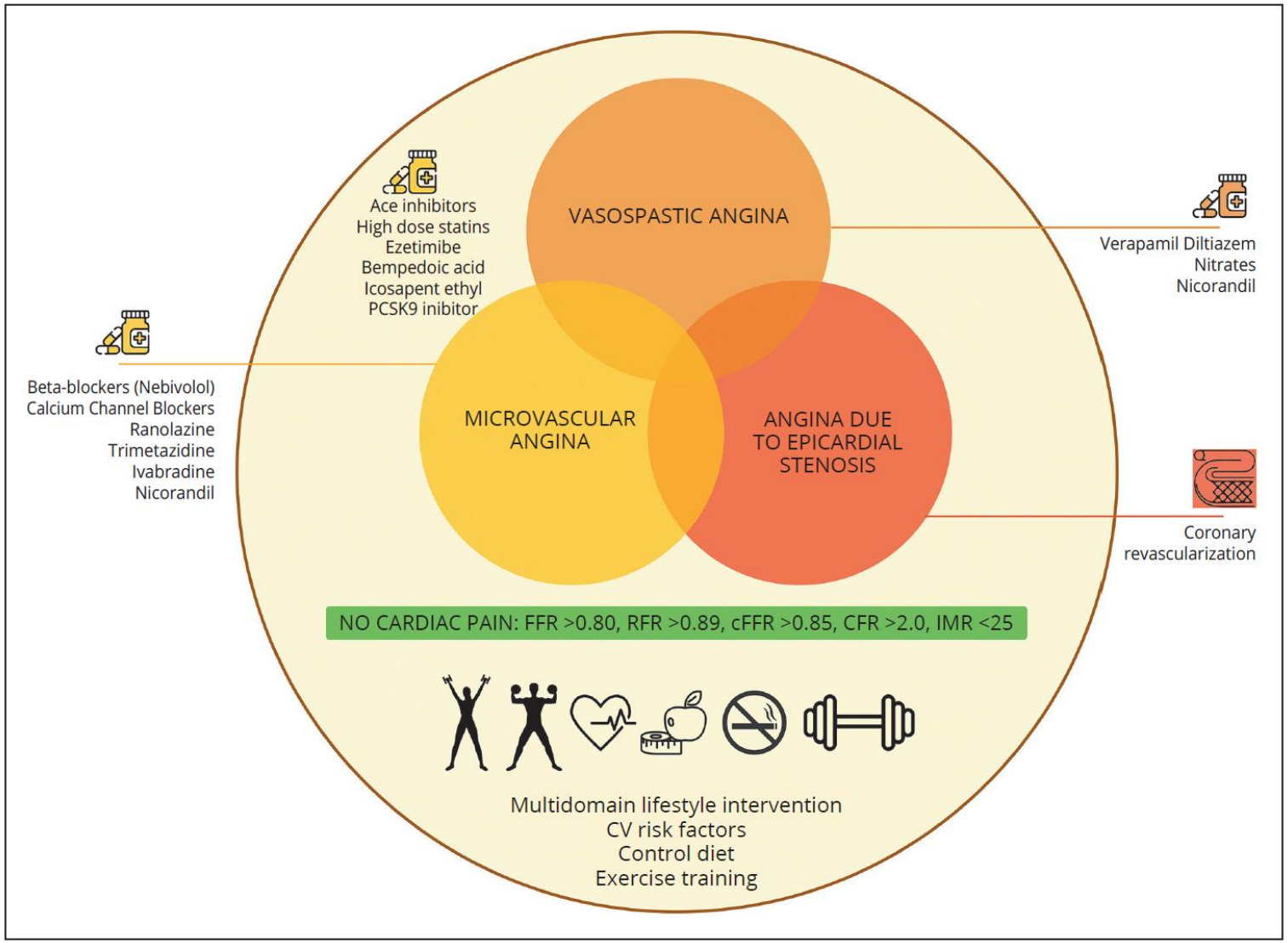
ABSTRACT

#FullPhysiology is a comprehensive and systematic approach to evaluate patients with suspected coronary disease using PressureWire technology (Abbott Vascular, Santa Clara, CA, USA). This advancement in technology enables the investigation of each component of the coronary circulation, including epicardial, microvascular, and vasomotor function, without significantly increasing procedural time or technical complexity. By identifying the predominant physiopathology responsible for myocardial ischemia, #FullPhysiology enhances precision medicine by providing accurate diagnosis and facilitating tailored interventional or medical treatments. This overview aims to provide insights into modern coronary physiology and describe a systematic approach to assess epicardial flow-limiting disease, longitudinal physiological vessel analysis, microvascular and vasomotor dysfunction, as well as post- percutaneous coronary intervention (PCI) physiological results.

(*Cite this article as:* Scarsini R, Campo G, Di Serafino L, Zanon S, Rubino F, Monizzi G, *et al*. #FullPhysiology: a systematic step-by-step guide to implement intracoronary physiology in daily practice. Minerva Cardiol Angiol 2023;71:504-14. DOI: 10.23736/S2724-5683.23.06414-1)

KEY WORDS: Myocardial ischemia; Physiopathology; Technology.

#FullPhysiology–based therapy



Scarsini et al Minerva Cardiol Angiology 2023

#FullPhysiology InDailyPractice

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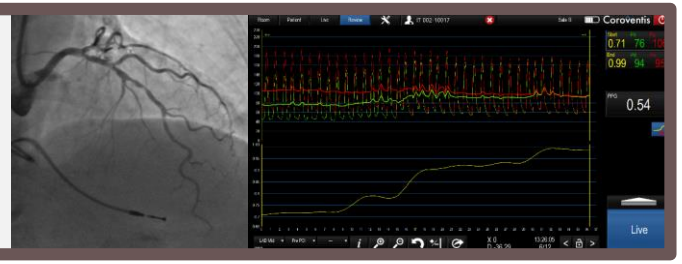
- cFFR (≤0.83)
- FFR (≤0.80) -> perform pullback



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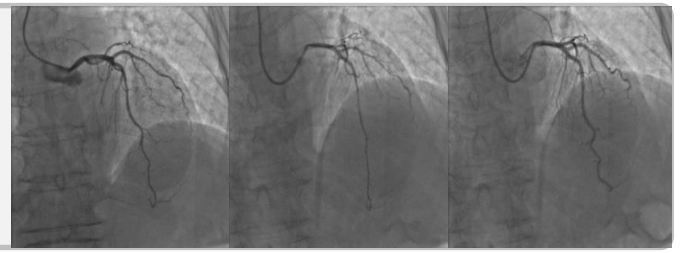
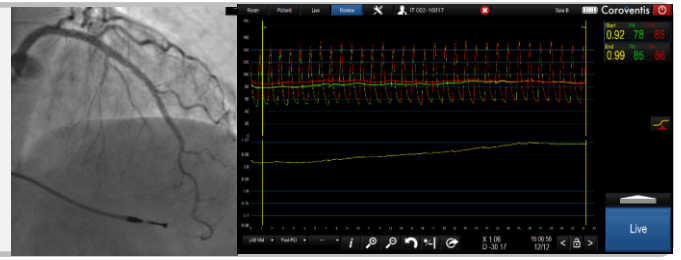


4 Post PCI Full Physiology assessment if applicable

- NHPR/cFFR/IMR/CFR/FFR -> perform pullback



#FullPhysiology InDailyPractice

Epicardial disease assessment

Pd/Pa

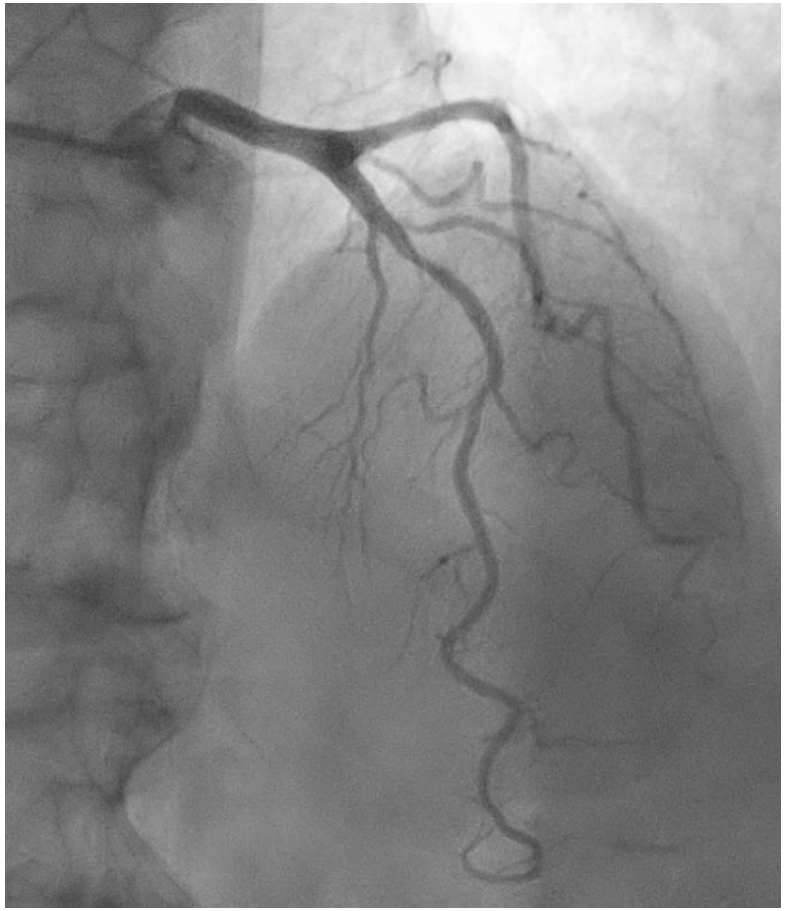
RFR

cFFR

FFR

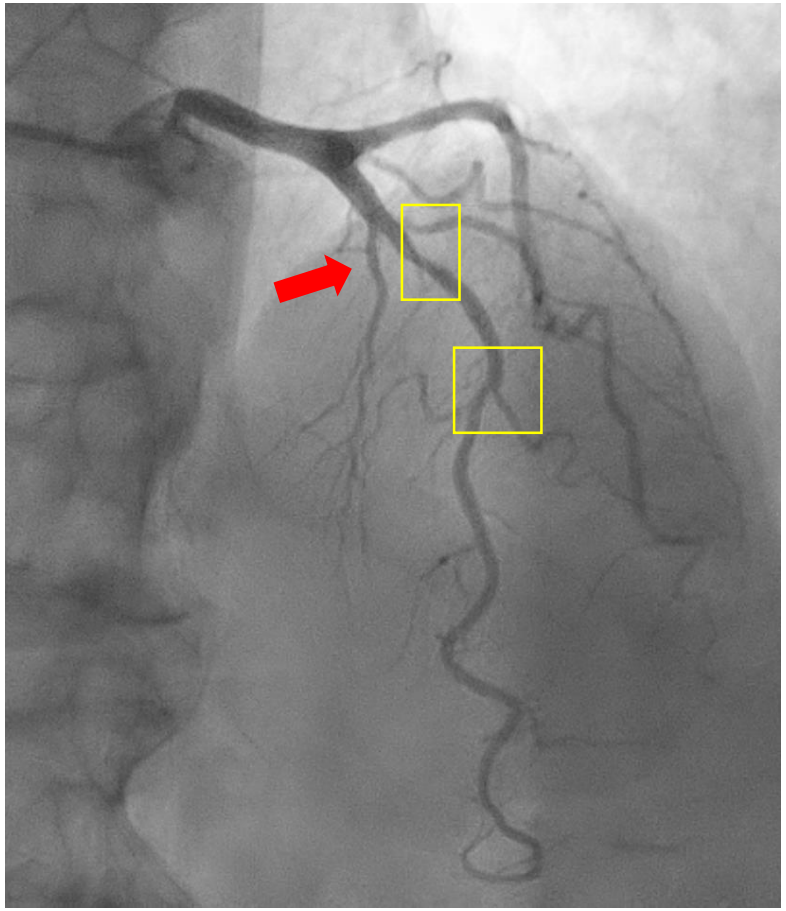
Epicardial disease assessment

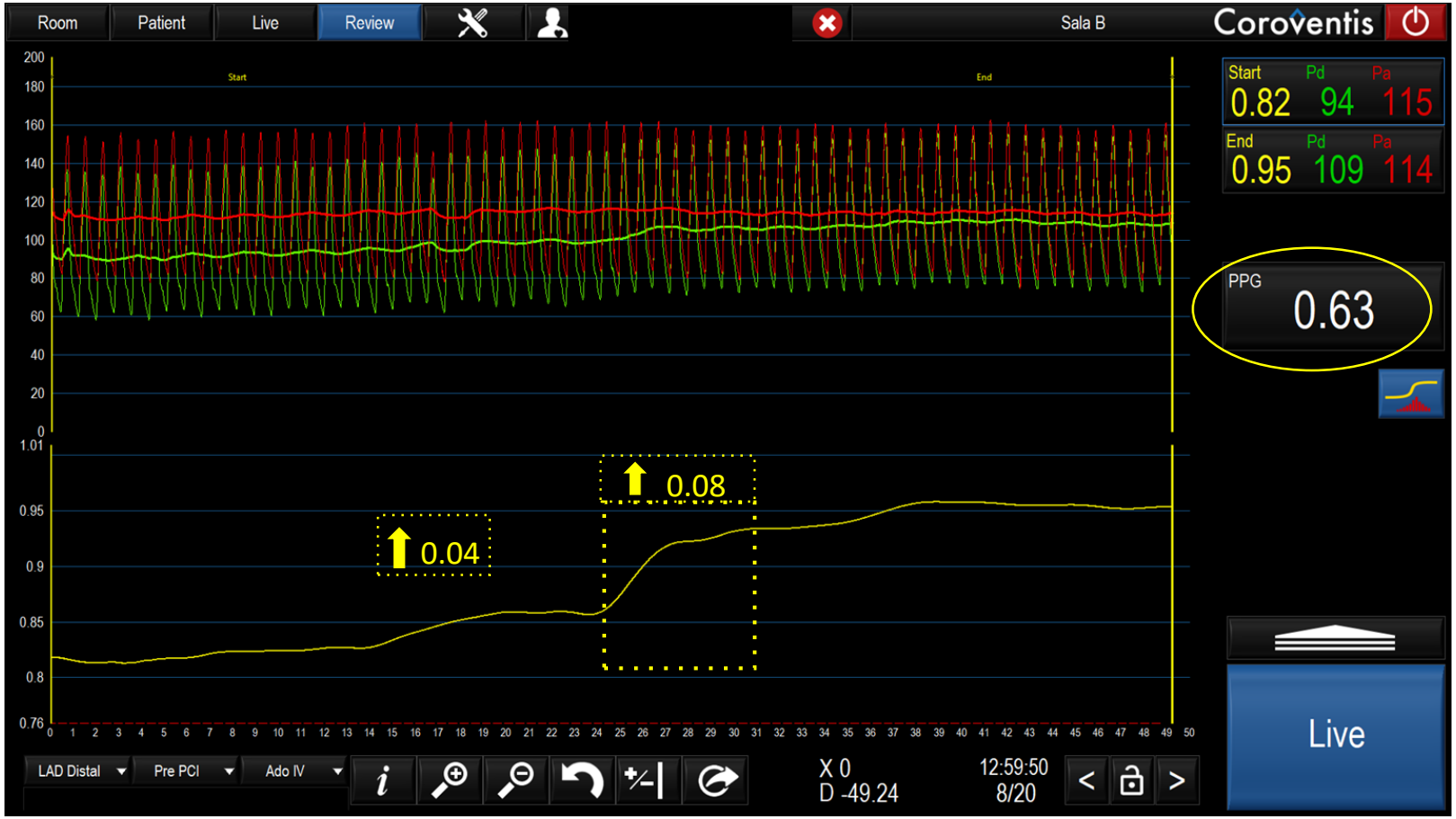
The importance of pullback



Epicardial disease assessment

The importance of pullback

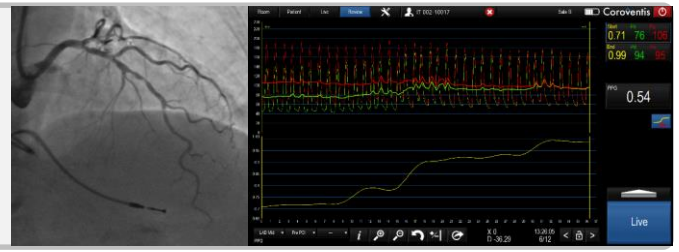




What is #FullPhysiology assessment

1 Epicardial disease assessment

- NHPR (≤0.89)
- cFFR (≤0.83)
- FFR (≤0.80) -> perform pullback



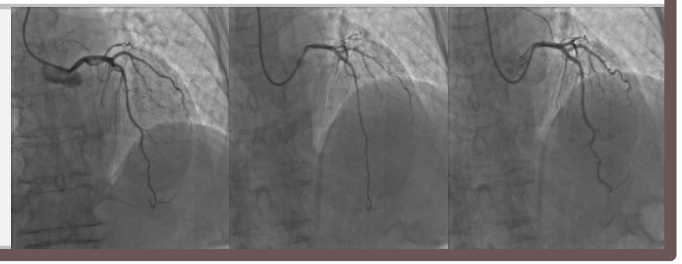
2 Microvascular disease assessment

- IMR (>25)
- CFR (< 2.0)
- RRR (<2.0)*

Resistive resistance ratio $= \frac{Trm * Pdr}{Thm * Pdh}$

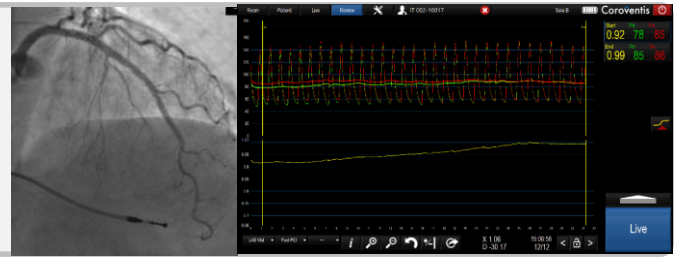
3 Vasomotor testing

- Ach



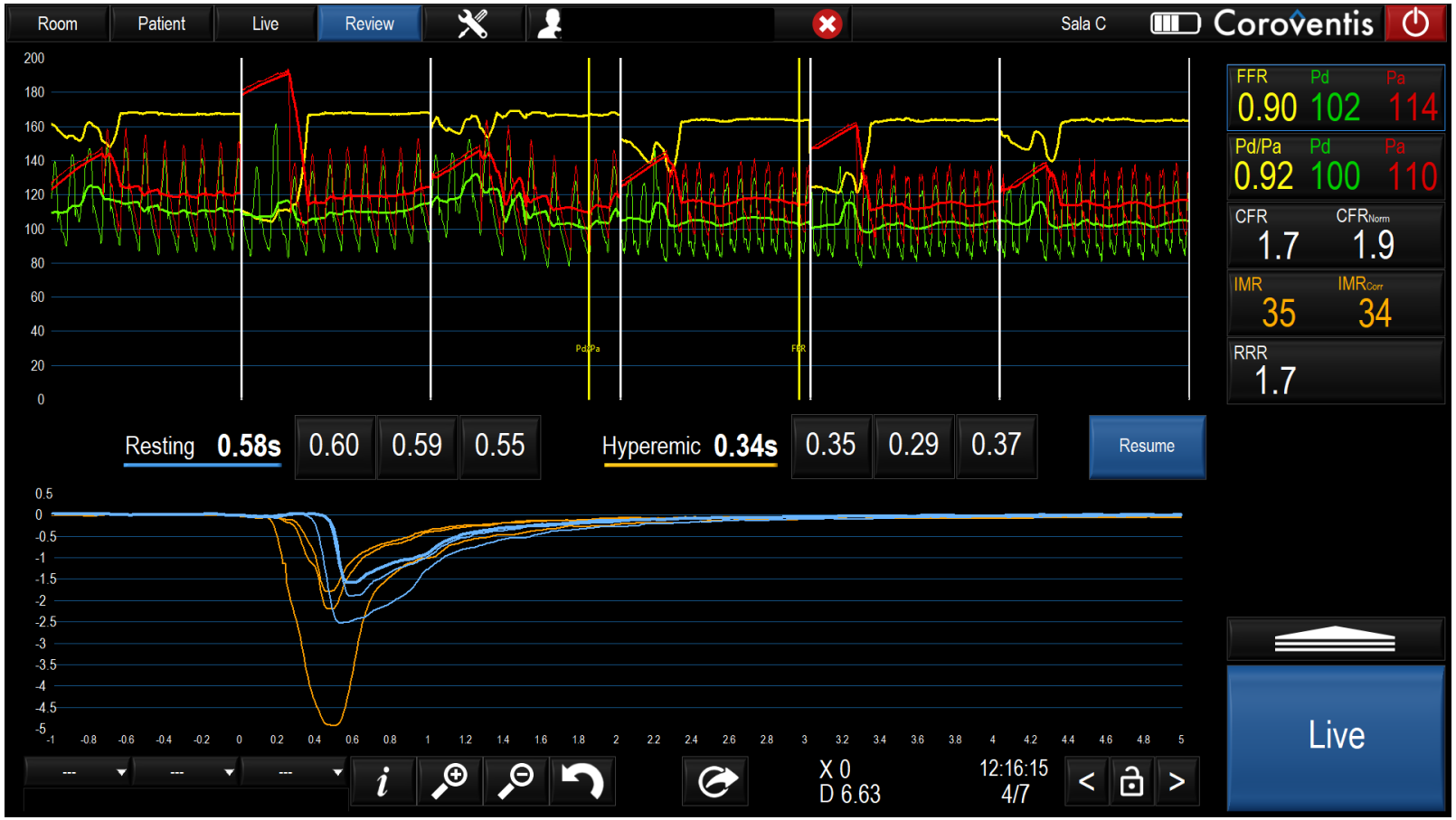
4 Post PCI Full Physiology assessment if applicable

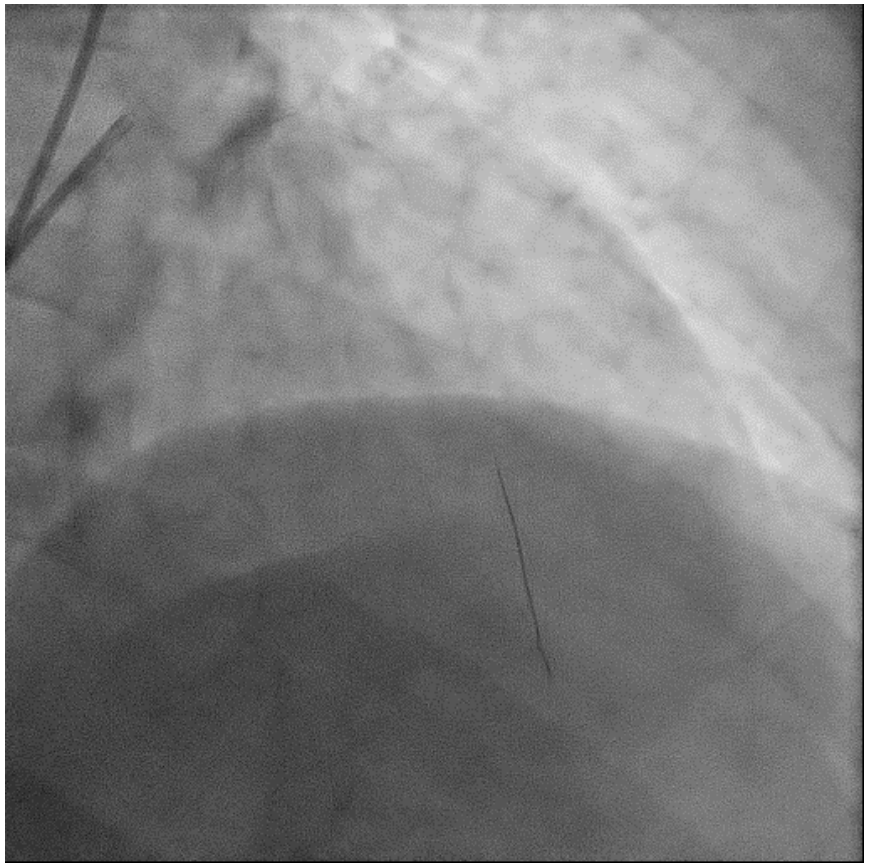
- NHPR/cFFR/IMR/CFR/FFR -> perform pullback



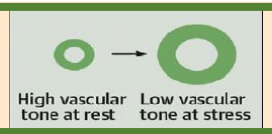
#FullPhysiology InDailyPractice

Microvascular disease assessment / Vasomotor testing





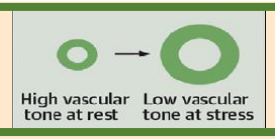
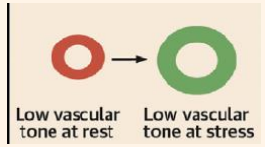
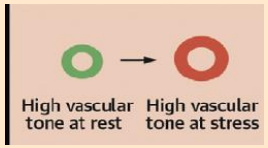
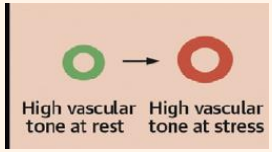
Different endotypes of INOCA

	Mechanism		Invasive Physiology	Therapy
Normal	Normal		CFR>2 AND IMR<25	Primary prevention Lifestyle change

Rahman H et al. JACC 2020
COVADIS criteria
Scarsini et al. Minerva Cardiol Angiology 2023

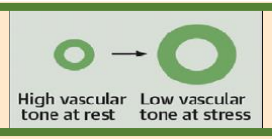
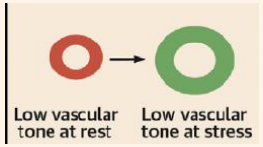
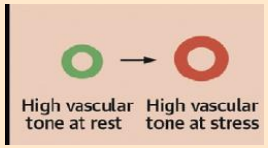
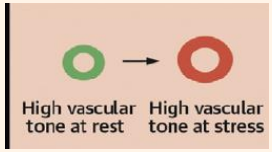
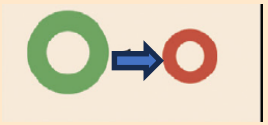
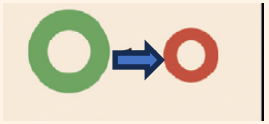
#FullPhysiology InDailyPractice

Different endotypes of INOCA

	Mechanism		Invasive Physiology	Therapy
Normal	Normal		CFR>2 AND IMR<25	Primary prevention Lifestyle change
Functional CMD	Impaired Vasodilation		CFR<2 (2.5) AND IMR<25	Treat non cardiac disease ARBs β-Blockers (nebivolol) Ranolazine
Compensated Structural CMD	Early abnormal MV resistance		CFR>2 AND IMR≥25	Lifestyle (rehabilitation?) ARBs β-Blockers (nebivolol) Ranolazine
Structural CMD	Abnormal MV resistance		CFR<2 (2.5) AND IMR≥25	Lifestyle (rehabilitation?) ARBs β-Blockers (nebivolol) Ranolazine

Rahman H et al. JACC 2020
COVADIS criteria
Scarsini et al. Minerva Cardiol Angiology 2023

Different endotypes of INOCA

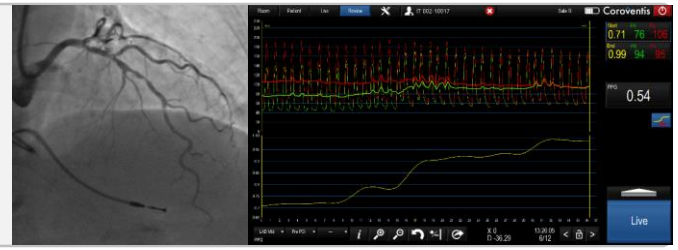
	Mechanism		Invasive Physiology	Therapy
Normal	Normal		CFR>2 AND IMR<25	Primary prevention
Functional CMD	Impaired Vasodilation		CFR<2 (2.5) AND IMR<25	Treat non cardiac disease ARBs β-Blockers (nebivolol) Ranolazine
Compensated Structural CMD	Early abnormal MV resistance		CFR>2 (2.5) AND IMR≥25	Lifestyle (rehabilitation?) ARBs β-Blockers (nebivolol) Ranolazine
Structural CMD	Abnormal MV resistance		CFR<2 (2.5) AND IMR≥25	Lifestyle (rehabilitation?) ARBs β-Blockers (nebivolol) Ranolazine
Vasospastic Angina	Epicardial spasm		Angina + ST deviation with epicardial spasm	CCB Nitrates
Microvascular Spasm ?	Impaired ED vasodilatation / MV spasm		Angina + ST deviation w/o epicardial spasm	CCB Nitrates ?

Rahman H et al. JACC 2020
COVADIS criteria
Scarsini et al. Minerva Cardiol Angiology 2023

What is #FullPhysiology assessment

1 Epicardial disease assessment

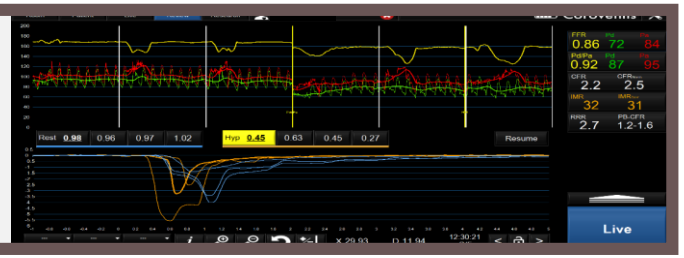
- NHPR (≤0.89)
- cFFR (≤0.83)
- FFR (≤0.80) -> perform pullback



2 Microvascular disease assessment

- IMR (>25)
- CFR (< 2.0)
- RRR (<2.0)*

Resistive resistance ratio $= \frac{Trm * Pdr}{Thm * Pdh}$

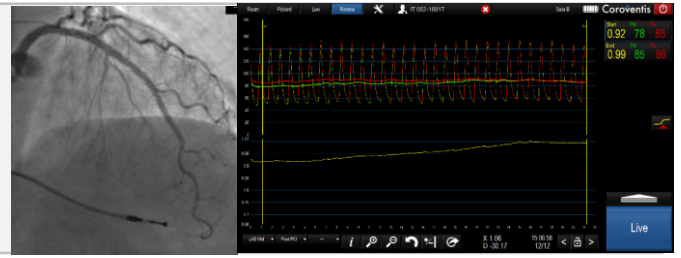


3 Vasomotor testing

- Ach

4 Post PCI Full Physiology assessment if applicable

- NHPR/cFFR/IMR/CFR/FFR -> perform pullback



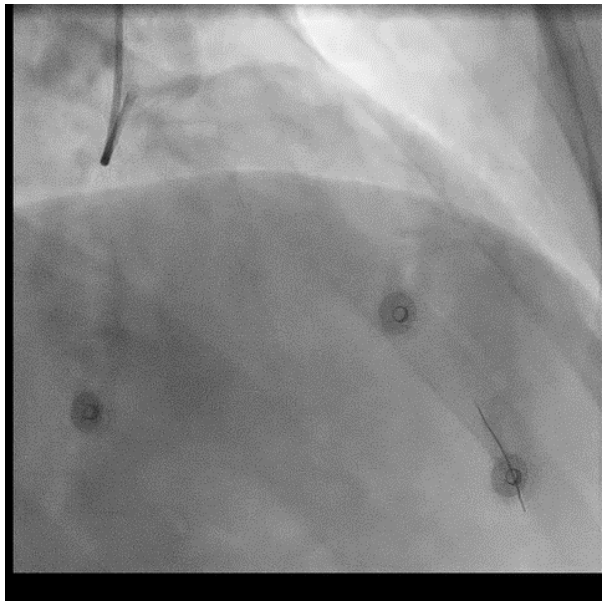
#FullPhysiology InDailyPractice

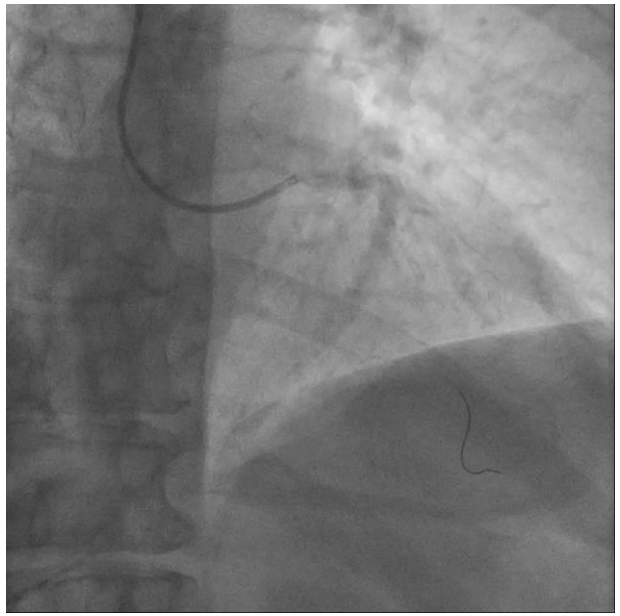
Diagnosis according to COVADIS definitions

Vasospastic angina

J. F. Beltrame et al., Eur Heart J 38, 2565 (2017)

Vasospastic angina	Epicardial spasm	Angina symptoms during ACh bolus (e.g. 100 µg acetylcholine over 20 seconds) AND: • ST-segment deviation on ECG • >90% epicardial coronary constriction during ACh reduction[34]





Coronary Microvascular Dysfunction

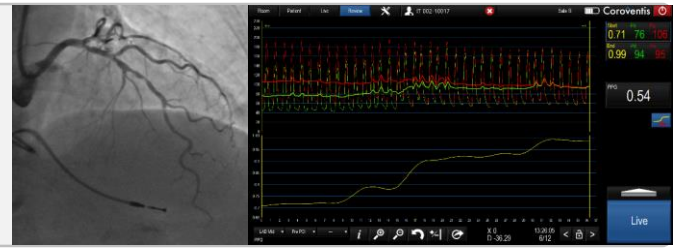
P. Ong et al., Int J Cardiol 250, 16 (2018)

Disorder	Symptoms	Clinical measurement
Microvascular angina	Abnormal microvascular resistance	• IMR ≥25[27] • Hyperaemic microvascular resistance ≥2.5 mmHg/cm/s[28]
	Impaired coronary vasorelaxation	• CFR by thermodilution <2.0[25]
	Microvascular spasm	Angina symptoms with ACh infusion AND: • ST-segment deviation on ECG • No significant epicardial coronary spasm (<90% diameter reduction)

What is #FullPhysiology assessment

1 Epicardial disease assessment

- NHPR (≤0.89)
- cFFR (≤0.83)
- FFR (≤0.80) -> perform pullback



2 Microvascular disease assessment

- IMR (>25)
- CFR (< 2.0)
- RRR (<2.0)*

Resistive resistance ratio $= \frac{Trm*Pdr}{Thm*Pdh}$

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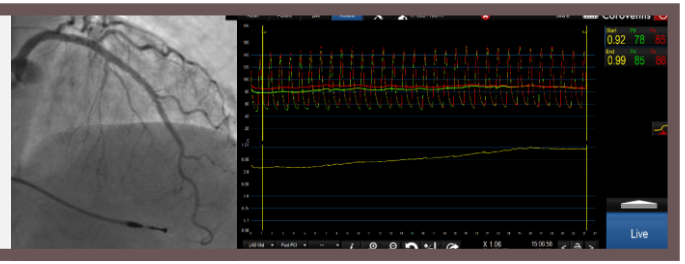
- NHPR/cFFR/IMR/CFR/FFR -> perform pullback



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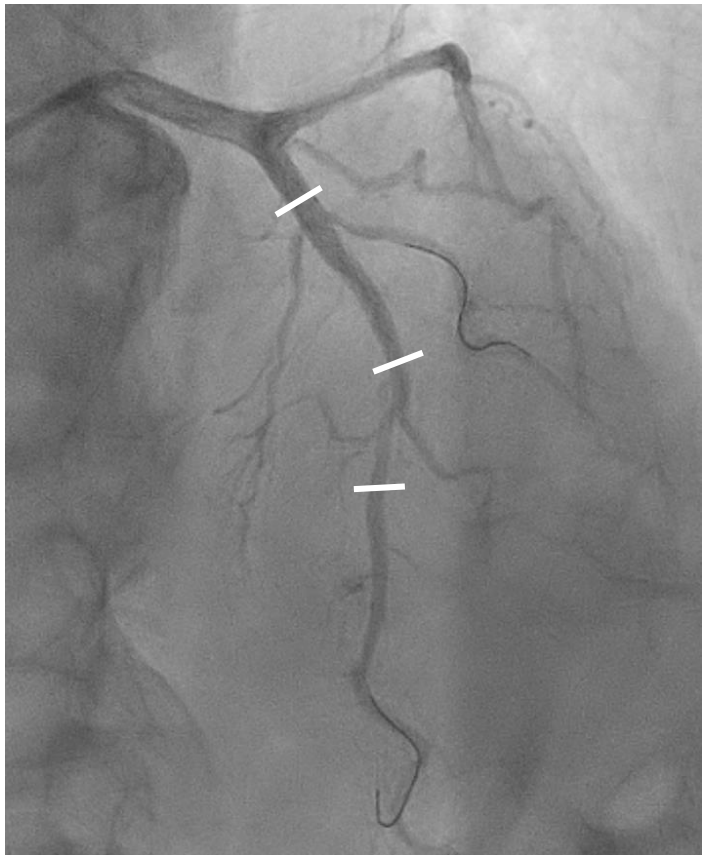
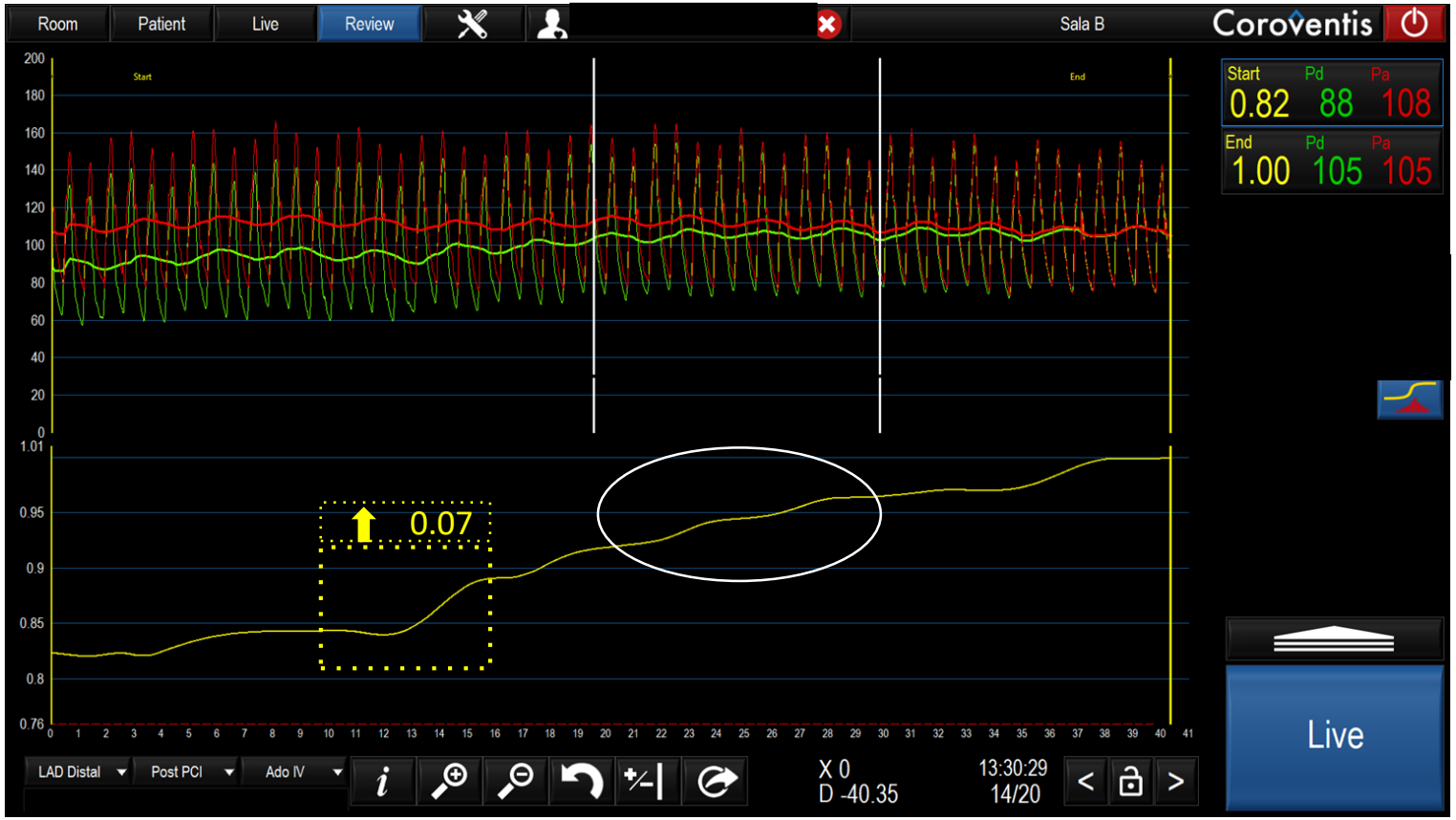
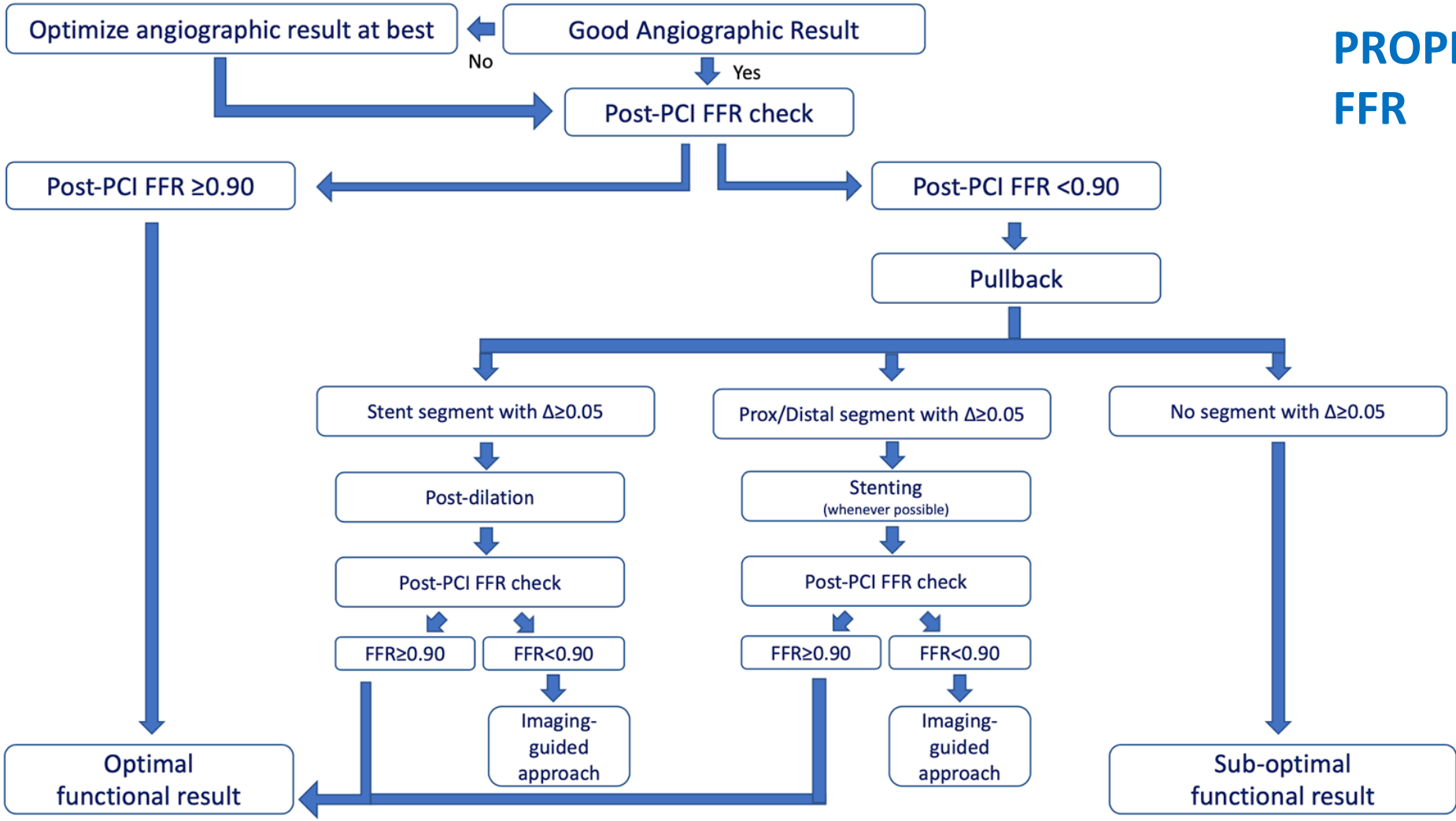
Pullback assessment in hyperemia post PCI

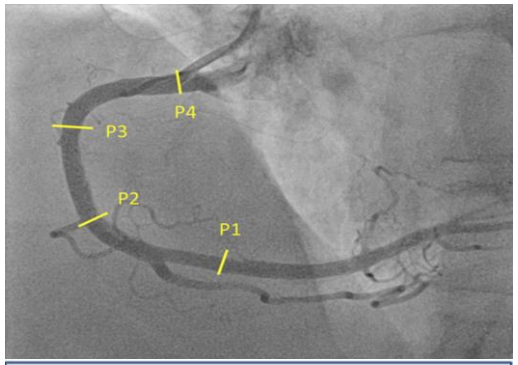




How to manage an unsatisfactory post-PCI FFR



PROPHET-FFR



- P1: 20mm distal of stent
- P2: distal stent edge
- P3: proximal stent edge
- P4: ostium (drift)

Zimbardo "The Hard truth"
Panminerva 2020

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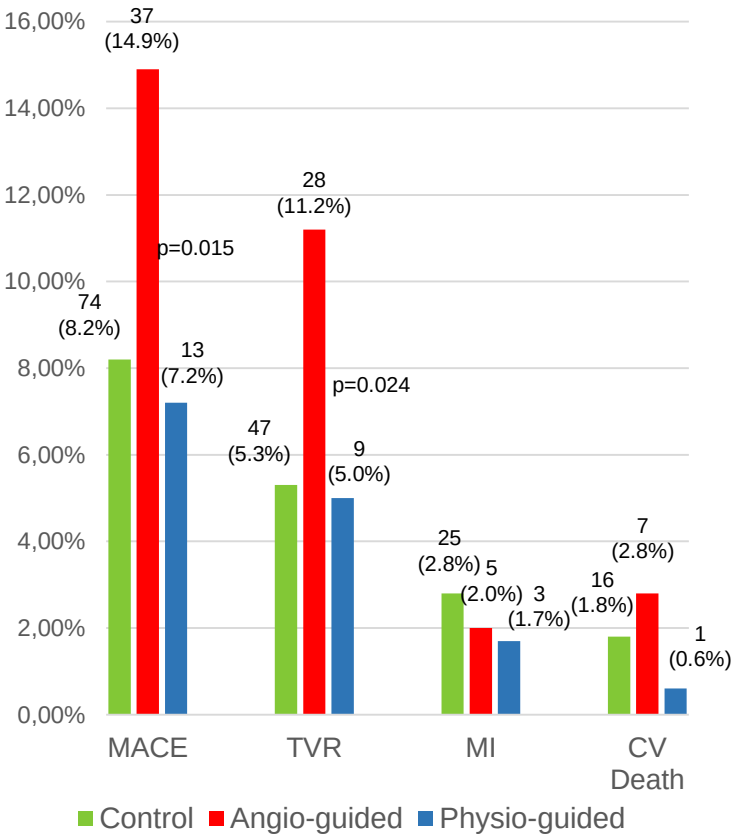
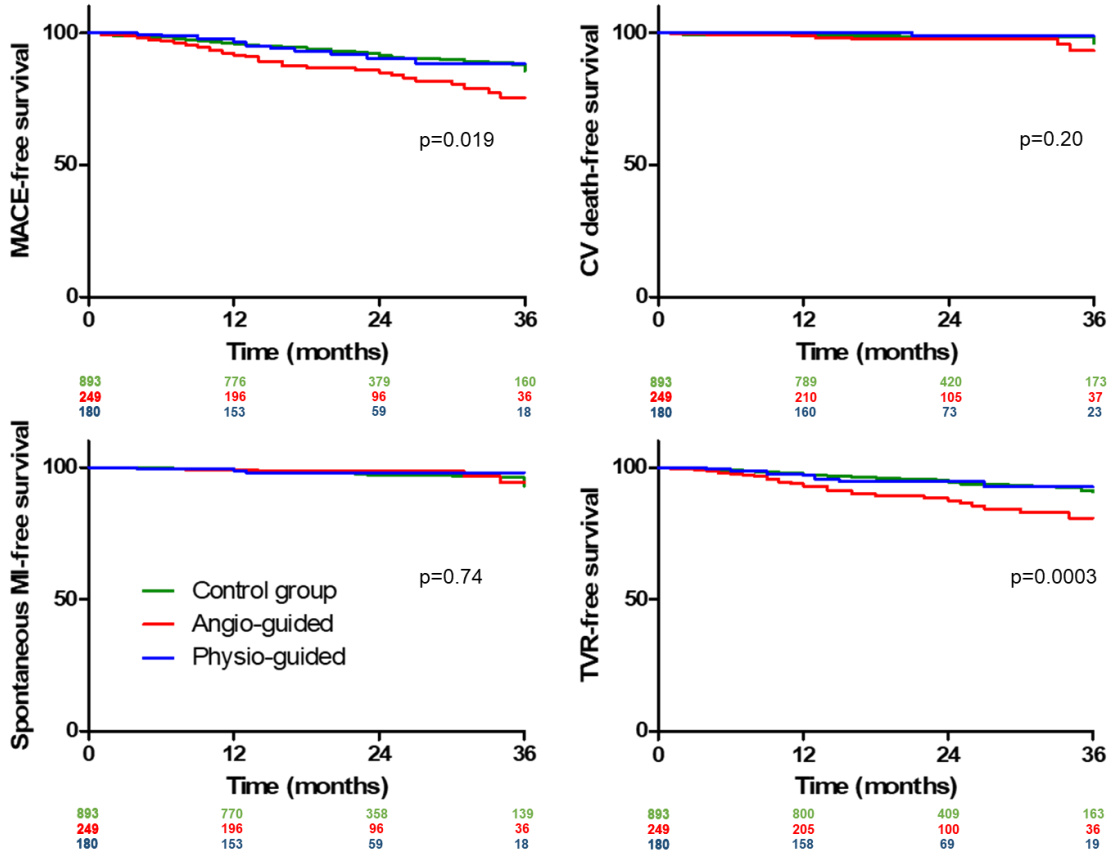
Importance of post PCI physiology



21 months (IQR 14-32)

PROPHET-FFR Study



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Leone Frontiers Cardiovasc Med 2022

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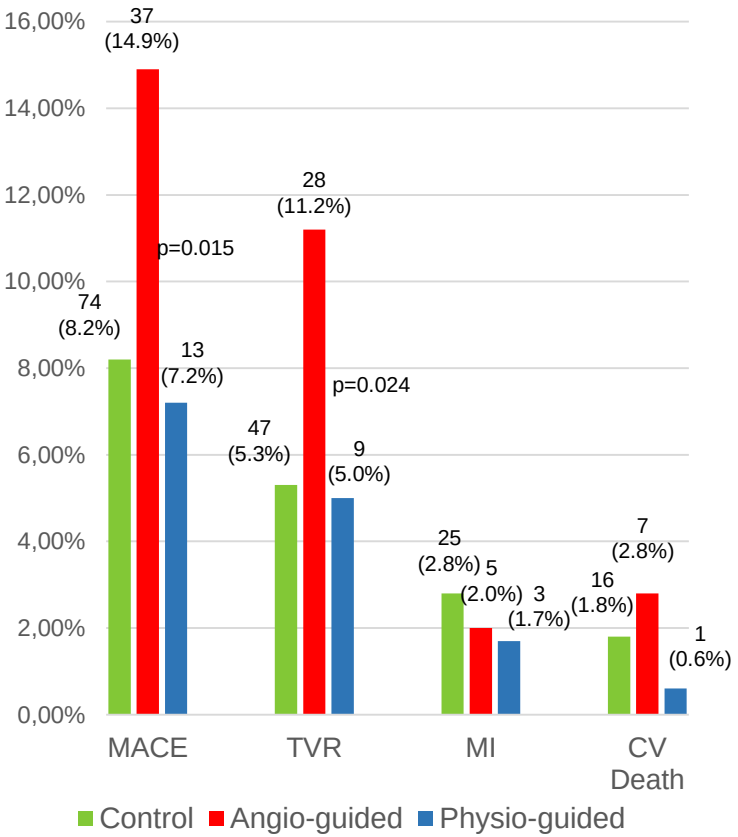
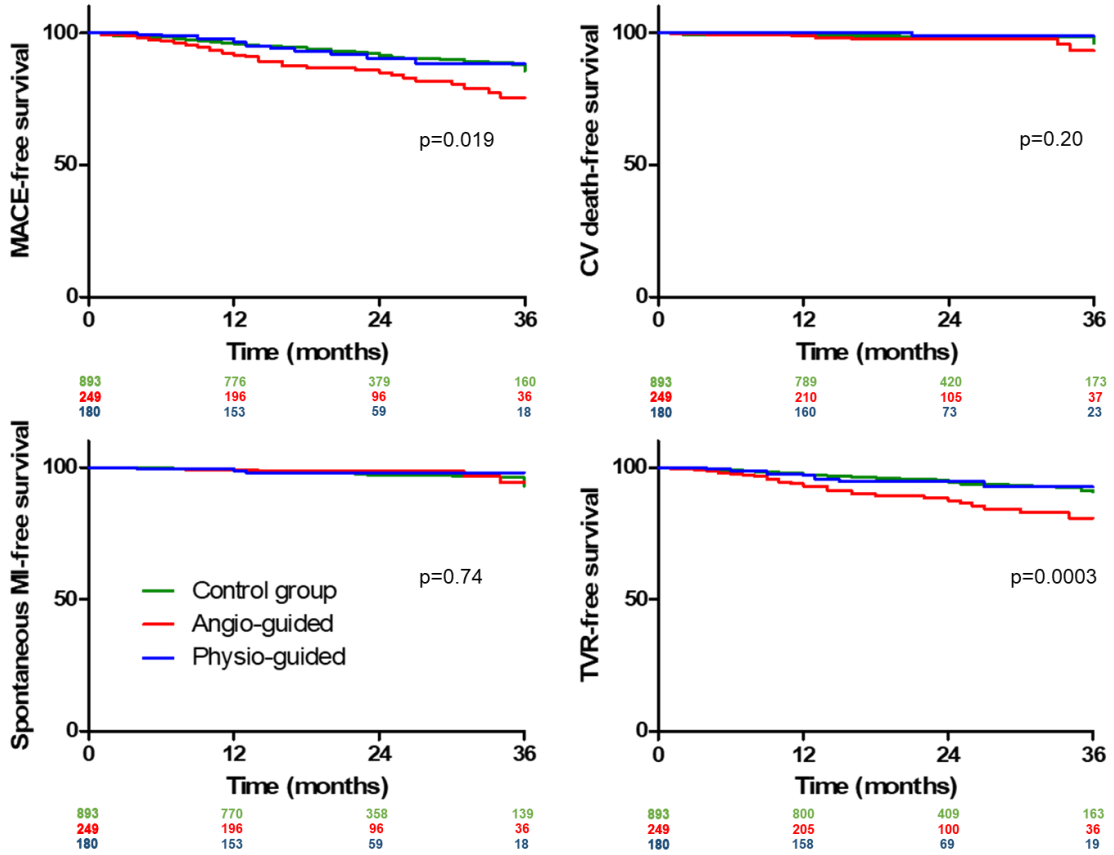
Importance of post PCI physiology



21 months (IQR 14-32)

PROPHET-FFR Study



Leone LBT EuroPCR 2022
Leone Frontiers Cardiovasc Med 2022

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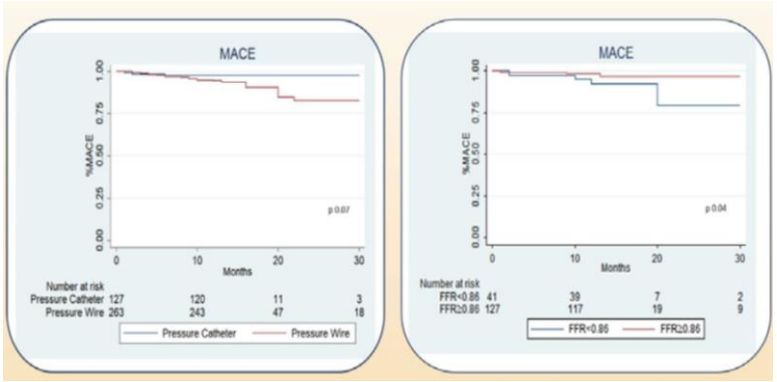
Collaborations

Brief report

Efficacy of "Physiology-Guided PCI" Using Pressure Catheter in Comparison to Conventional Pressure Wires: A Multicenter Analysis

G. Anastasia, MD[a,b], D. Galante, MD[c,d], S. Biscaglia, MD[c], R. Vergallo, MD, PhD[a,b], F. Di Giusto, MD[d], S. Migliaro, MD[f], E. Petrolati, MD[d], A. Viceré, MD[d], D. Scancarello, MD[c], A. Marrone, MD[c], F.M. Verardi, MD[c], G. Campaniello, MD[d], C. Giuliana, MD[d], C. Pollio Benvenuto, MD[d], V. Viccaro, MD[d], S. Todisco, MD[d], F. Burzotta, MD[d,g], C. Aurigemma, MD[g], E. Romagnoli, MD[g], C. Trani, MD[d,g], F. Crea, MD[c], I. Porto, MD[a,b], G. Campo, MD[c], and A.M. Leone, MD[c,d,g,*]

www.ajconline.org
https://doi.org/10.1016/j.amjcard.2024.01.020



L'ischemia miocardica in assenza di coronaropatia ostruttiva: stato dell'arte

Giulia Ghizzoni[1,2], Luigi Di Serafino[3], Giulia Botti[1,2], Domenico Galante[4,5], Domenico D'Amario[6], Stefano Benenati[7,8], Filippo Luca Gurgoglione[9], Renzo Laborante[10], Graziella Pompei[11], Italo Porto[7,12], Gianluca Calogero Campo[11], Giampaolo Niccoli[9], Giovanni Esposito[3], Antonio Maria Leone[4,5], Alaide Chieffo[1,2]

G Ital Cardiol 2023;24(10 Suppl 2):5S-20S

The American Journal of Cardiology

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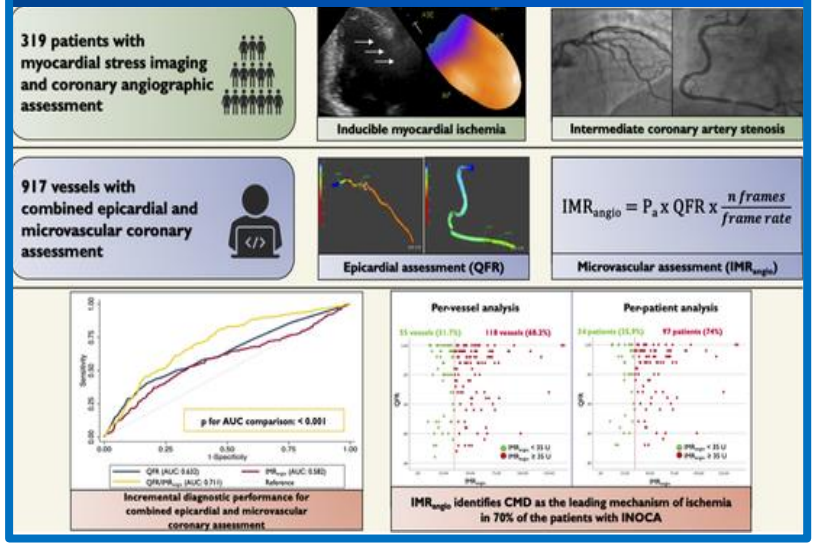
RESEARCH ARTICLE | ARTICLES IN PRESS

Comprehensive Angiography-Derived Functional Assessment of Epicardial and Microvascular Coronary Disease, Correlation With Noninvasive Myocardial Stress Imaging

Francesco Della Mora, MD • Leonardo Portolan, MD • Dimitrios Terentes-Printzios, MD PhD • Andrea Vicerè, MD • Stefano Andreaggi, MD • Marco Biasin, MD • Gabriele Pesarini, MD PhD • Domenico Tavella, MD • Caterina Maffeis, MD • Elvin Tafciu, MD • Giovanni Benfari, MD PhD • Dimitrios Oikonomou, MD • Konstantia-Paraskevi Gkini, MD • Domenico Galante, MD • Konstantinos Tsioufis, MD PhD • Charalambos Vlachopoulos, MD PhD • Antonio Maria Leone, MD • Flavio Ribichini, MD • Roberto Scarsini, MD PhD • Show less

Published: February 29, 2024 • DOI: https://doi.org/10.1016/j.amjcard.2024.01.037

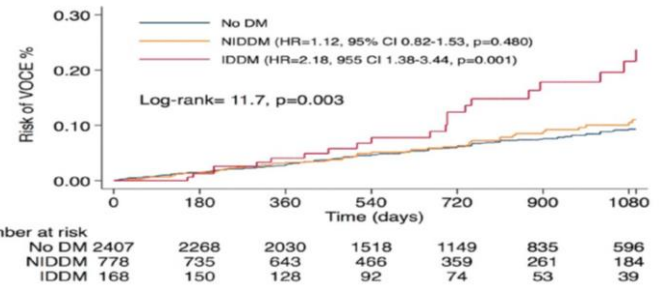


Clinical Research in Cardiology (2023) 112:1331–1342
https://doi.org/10.1007/s00392-023-02243-y

ORIGINAL PAPER

Intracoronary physiology-guided percutaneous coronary intervention in patients with diabetes

Roberto Scarsini[1,8] · Matteo Tebaldi[2] · Francesca Rubino[1,8] · Sara Sgreva[1,8] · Giovanni Vescovo[3] · Marco Barbierato[3] · Andrea Vicerè[4] · Domenico Galante[5] · Concetta Mammone[1] · Mattia Lunardi[1] · Domenico Tavella[1] · Gabriele Pesarini[1] · Gianluca Campo[7] · Antonio Maria Leone[5,6] · Flavio Luciano Ribichini[1,8]



ELSEVIER

JACC: Cardiovascular Interventions
Volume 17, Issue 2, 22 January 2024, Pages 277-287

Original Research
Coronary

Coronary Physiology Guidance vs Conventional Angiography for Optimization of Percutaneous CoronaryIntervention: The AQVA-II Trial

Simone Biscaglia MD [a], Filippo Maria Verardi MD [a], Andrea Erriquez MD [a], Iginio Colaiori MD [b], Marta Cocco MD [a], Anna Cantone MD [a], Graziella Pompei MD [a], Andrea Marrone MD [a], Serena Caglioni MD [a], Carlo Tumscitz MD [a], Carlo Penzo MD [a], Marco Manfrini PhD [c], Antonio Maria Leone MD [d], Francesco Versaci MD [b], Gianluca Campo MD [a]

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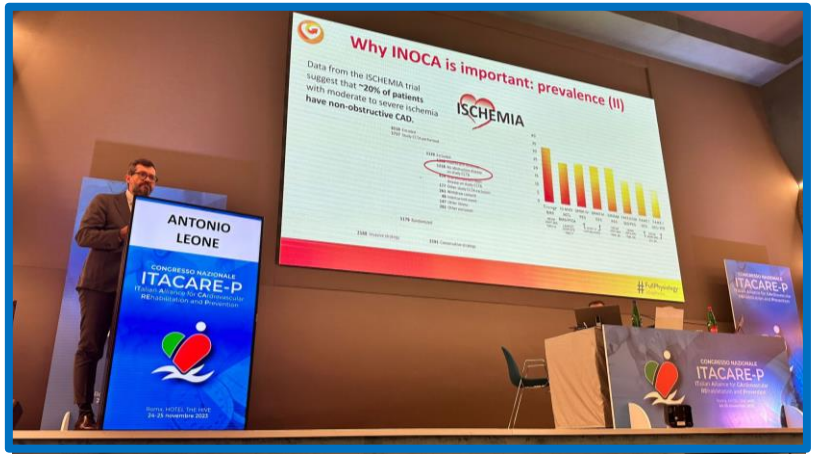
Disseminations



Future

Italian registries

INOCA Ischemia with Non-Obstructive Coronary Artery disease

INOCA-IT Registry

- IRCCS San Raffaele Hospital, Milano
- Policlinico Universitario A. Gemelli IRCCS/ Ospedale Fatebenefratelli Gemelli Isola, Roma
- Azienda Ospedaliera Universitaria Federico II, Napoli

Cardiologia Federico II

Università degli Studi di Napoli FEDERICO II
AZIENDA OSPEDALIERA UNIVERSITARIA

Dipartimento ad Attività Integrate di Emergenze Cardiovascolari, Medicina Clinica e dell'Invecchiamento

UOC Cardiologia Emodinamica e UTIC
Direttore: Prof. **Giovanni Esposito**

PROTOCOLLO DI STUDIO CLINICO

Caratterizzazione di diversi fenotipi di disfunzione microvascolare e il loro impatto sulla severità dell'angina nei pazienti con angina cronica in assenza di malattia coronarica ostruttiva.

Versione 1.1 del 12/05/2023

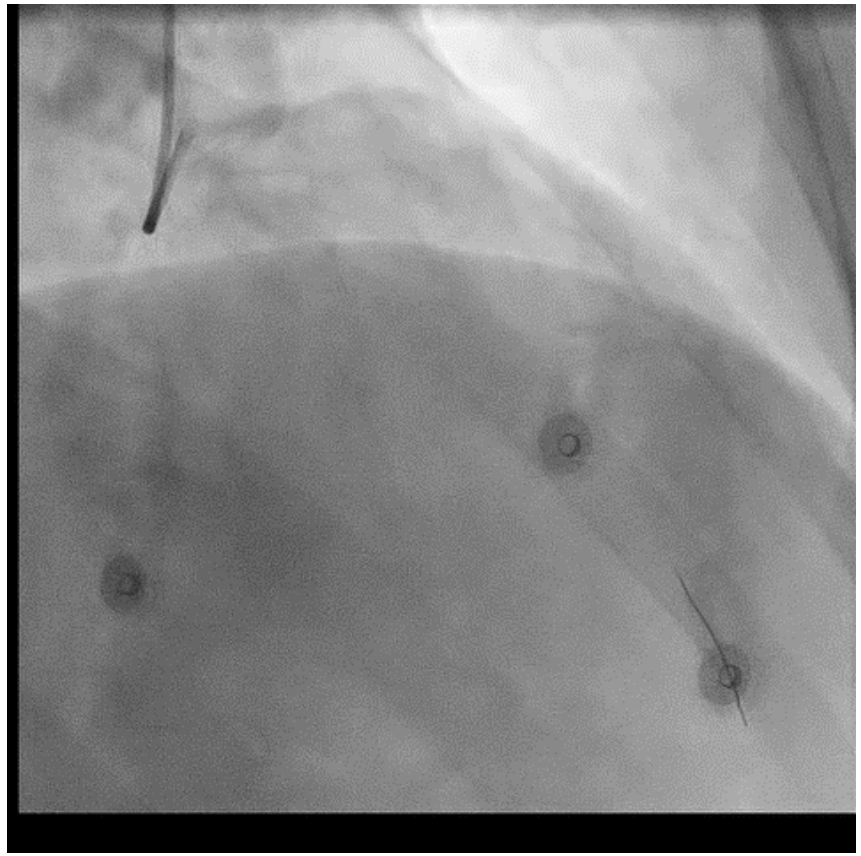
Titolo breve: Studio MiVa: uno studio di registro multicentrico in pazienti con angina microvascolare

Sponsor
Dipartimento di Scienze Biomediche Avanzate dell'università Federico II di Napoli
P.I. Prof. Giovanni Esposito-Prof. Ciro Indolfi
Co-P.I. Prof. Luigi Di Serafino; Prof. Alberto Polimeni
Indirizzo Via Sergio pansini,5 Napoli
Telefono/Fax: 0817463075
e-Mail espogiov@unina.it

#FullPhysiology 2.0

Invasive Functional demonstration of Epicardial Spasm

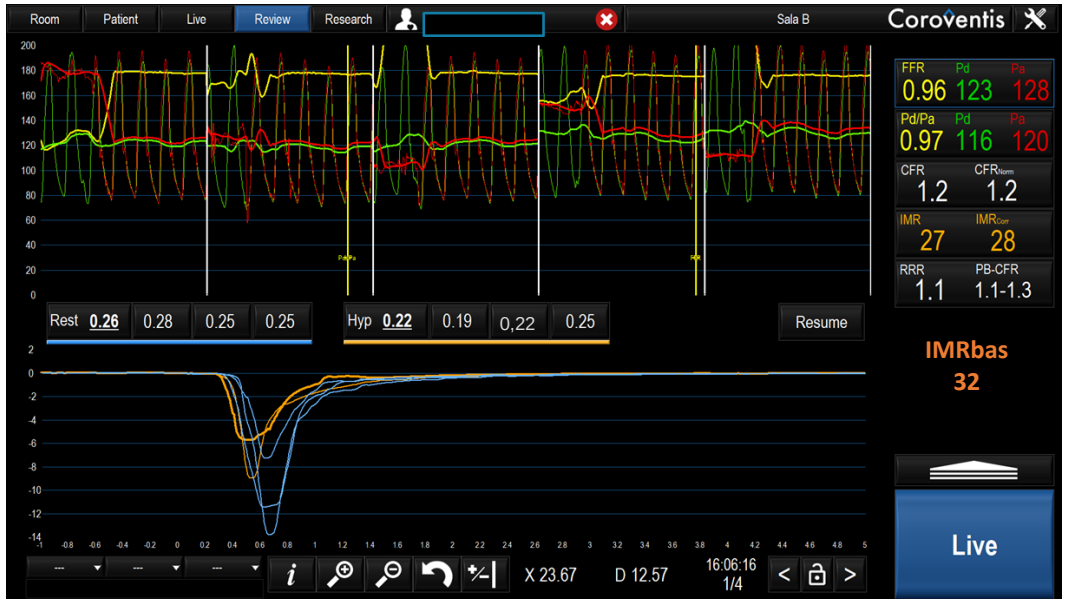
- Typical chest pain
- ECG changes: ST segment elevation
- Epicardial spasm (>90%) with distal occlusion of LAD

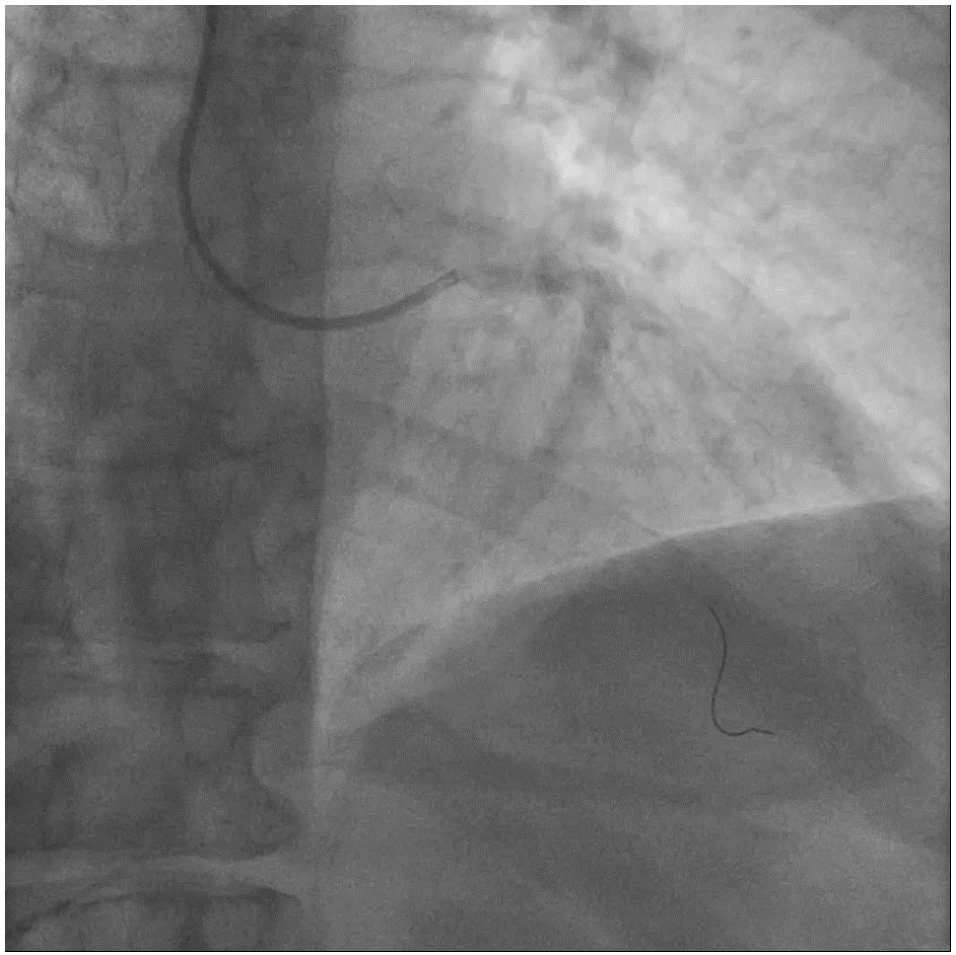


#FullPhysiology 2.0

Invasive Functional demonstration of Microvascular Spasm

- Typical chest pain
- ECG changes
- NO epicardial spasm





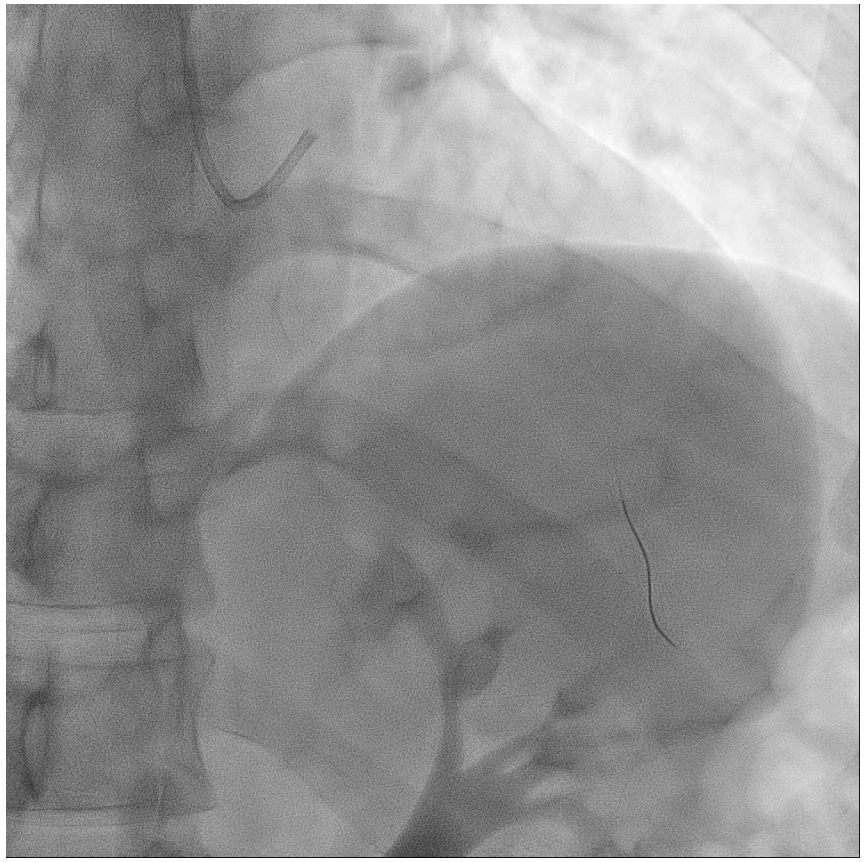
Real Microvascular Spasm

#FullPhysiology InDailyPractice

#FullPhysiology 2.0

Invasive Functional demonstration of Microvascular Spasm

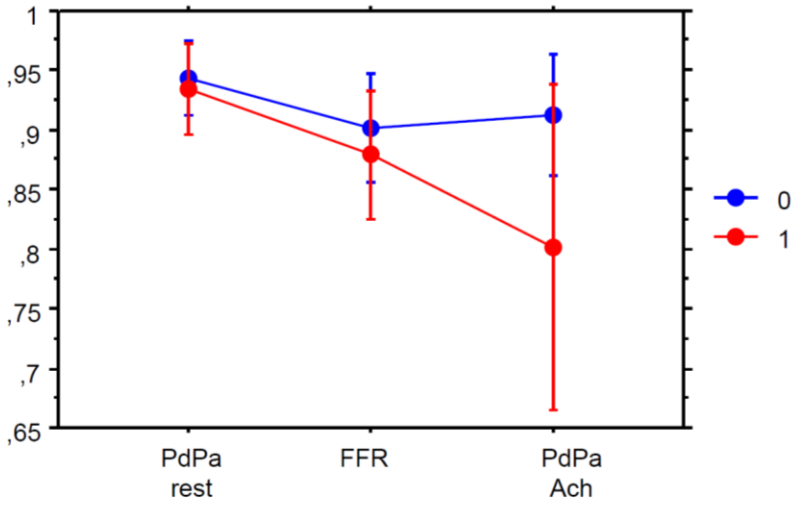
- Typical chest pain
- ECG changes
- NO epicardial spasm

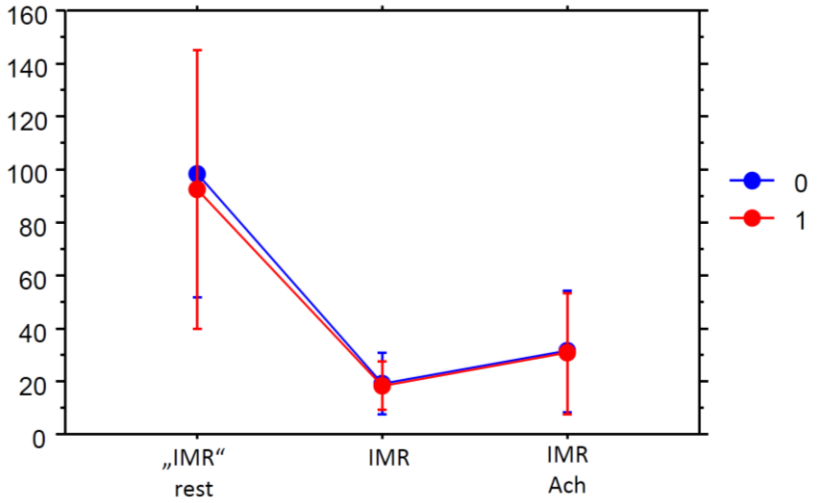


False Microvascular Spasm

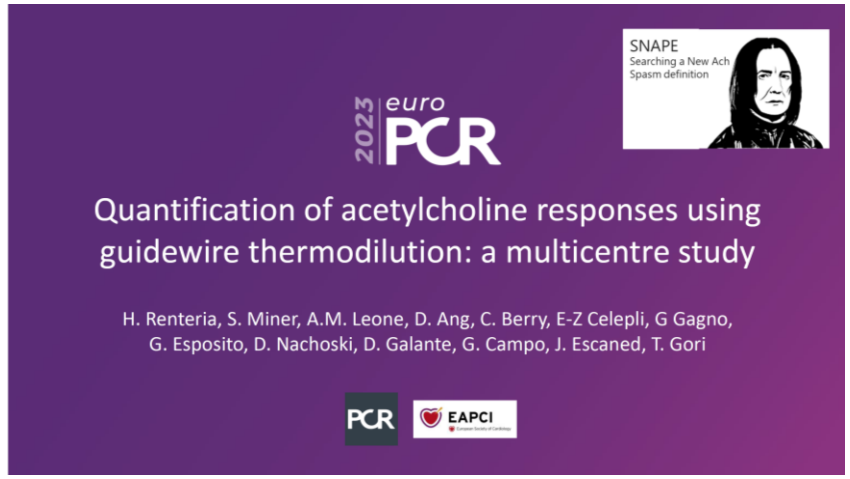
#FullPhysiology InDailyPractice

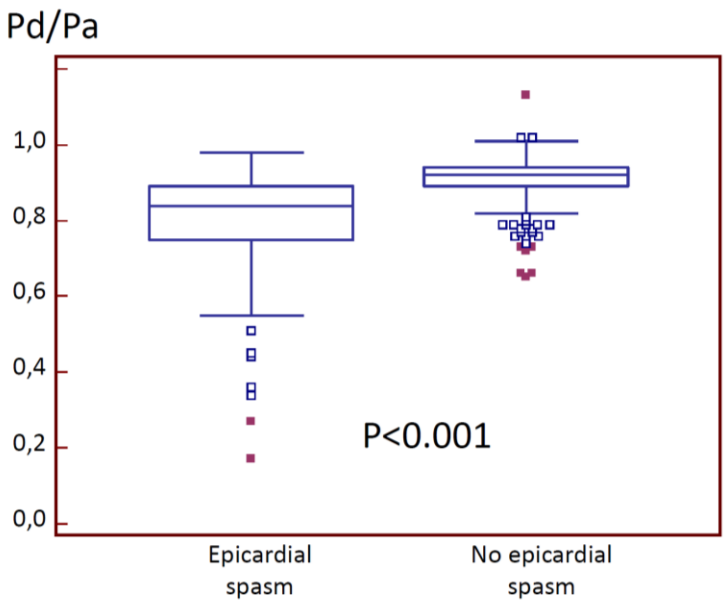
#FullPhysiology 2.0

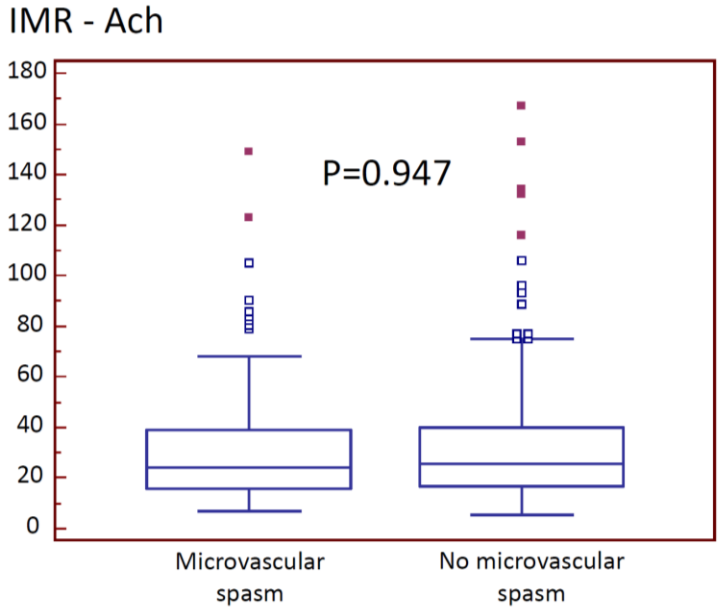




- **Hemodynamic definition of spasm**
- **New entity?**

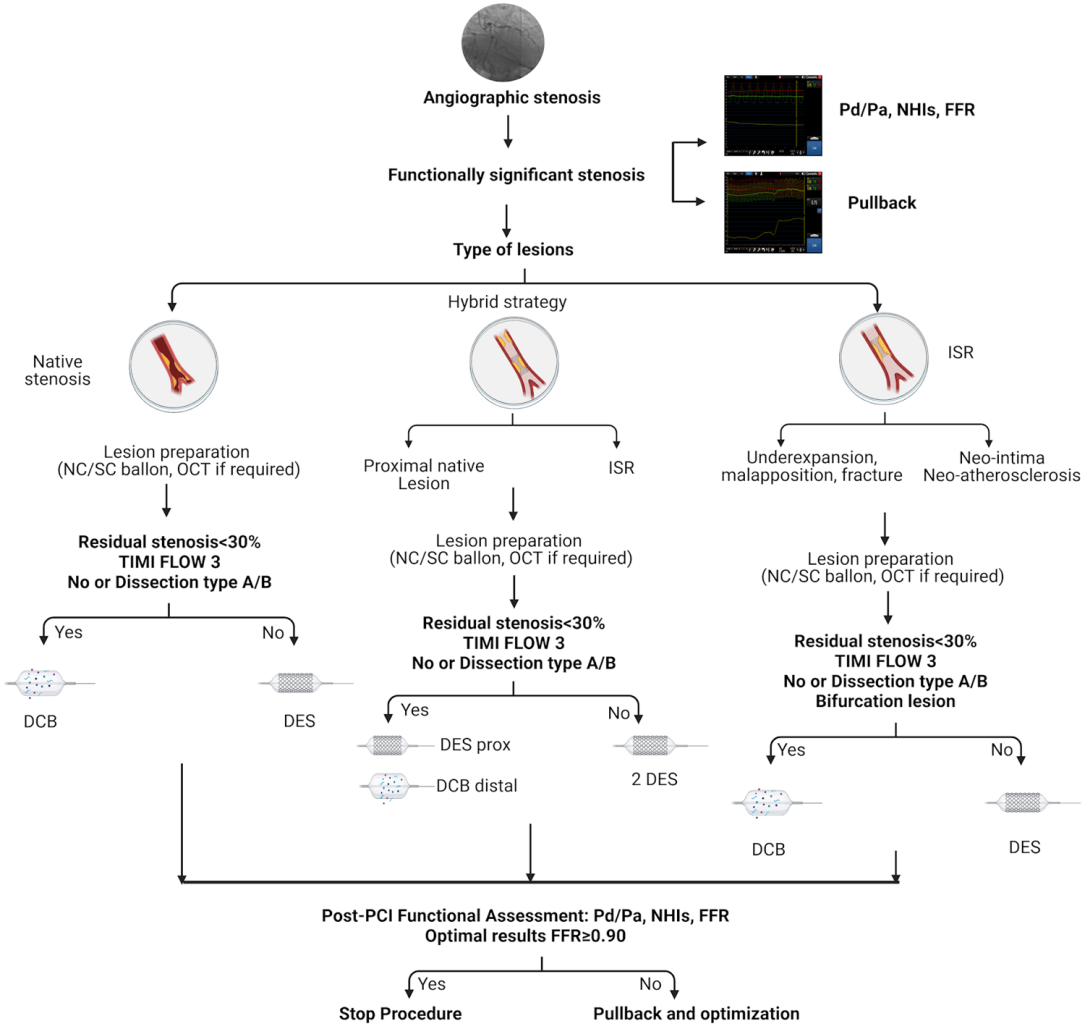






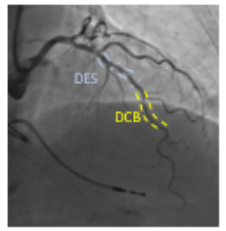
Integration of #FullPhysiology in DCB PCI

Fondazione Policlinico Universitario A. Gemelli IRCCS/ Gemelli Isola - Rome (Italy)

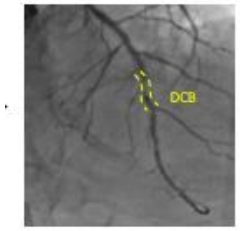


- Data collection period: 2018-2024
- Total DCB-PCI (2018-2024): 668
- Physiology guided DCB-PCI: 31 (4.6%).

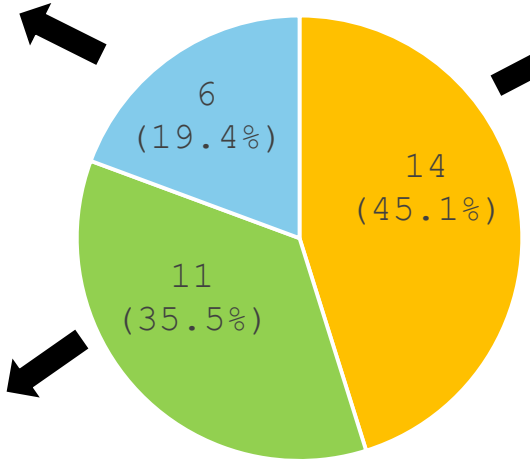
«…utilization of Physiology to optimize an angiographically acceptable DCB-PCI"



Proximal DES+ Distal DCB



ISR DCB



De novo lesions DCB

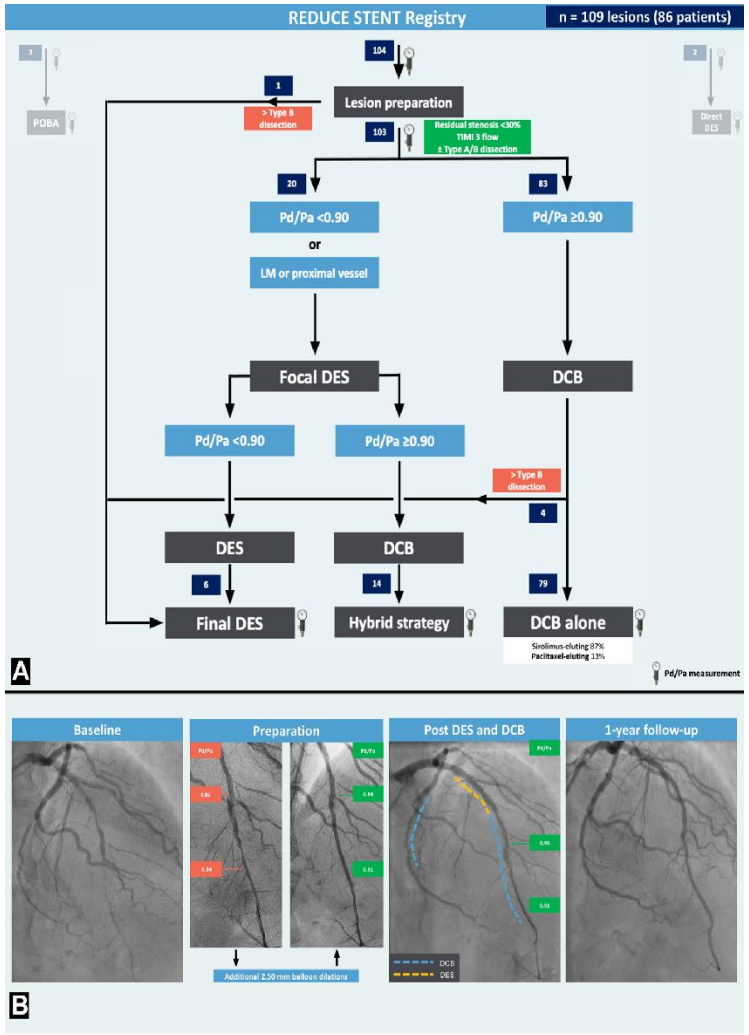
#FullPhysiology InDailyPractice

Integration of @Fullphysiology in DCB PCI

Drug-Coated Balloon Angioplasty Guided by Post-Percutaneous Coronary Intervention Pressure Gradient

The REDUCE-STENT Retrospective Registry

«…utilization of the distal coronary-to-aortic pressure ratio (Pd/Pa) post–lesion preparation to safely limit stenting when the result is considered angiographically imperfect...”



TVF

	Definite	Probable
Acute	0	0
Subacute	0	1
Late	1	0
Very late	0	1

Target vessel MI	1(0.01%)
TLF	11 (13.2%)
TVR	8 (8.7%)

Median follow-up 246 days (interquartile range 136-400 days)

The future of #FullPhysiology starts today

From INROAD to SAMCRO
S. Biscaglia

MiVa
L. Di Serafino

MICROREV-DCM
R. Scarsini

REDUCE CMD
F. D'Ascenzo

RIALTO PRO
D. D'Amario

PROMISE
R. Montone

#FullPhysiology InDailyPractice

Conclusions

1. We have relatively **simple tools** to comprehensively assess coronary circulation in a short time*

2. A **correct diagnosis** can have important therapeutic and prognostic implications

3. INOCA has an important **socio-economic impact** and now can be **treated appropriately** only using an invasive guide using a pressure/thermodilution wire

4. INOCA is a useful model for a variety of clinical settings in which **#FullPhysiology** can make the difference including PCI

*Mean procedural time 20±7 minutes from the first NHPR to the end of the test

Conclusions…

Usefulness of #FullPhysiology in daily practice

PROPHET-FFR and FERRARA registries (2015-2019)

↓

Chronic Coronary Syndromes

↓

(CCS≥1) and/or Positive ischemia testing

↓

Control Group :
Single Lesion
Physiological deferred PCI

543 patients

PROPHET-FFR and FERRARA registries (2020-2023)

↓

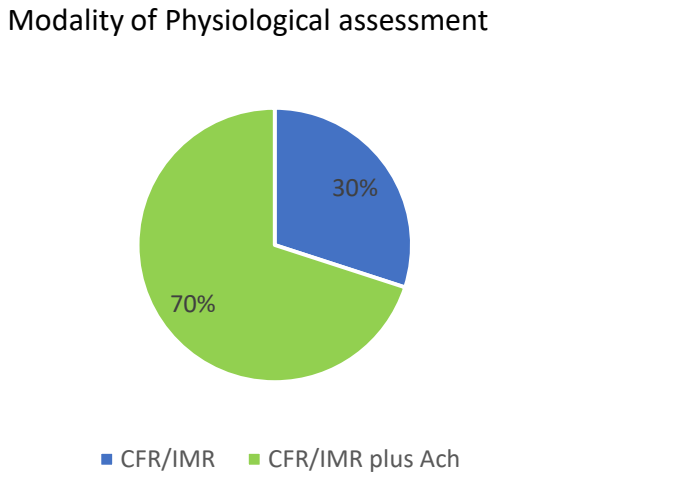
Chronic Coronary Syndromes

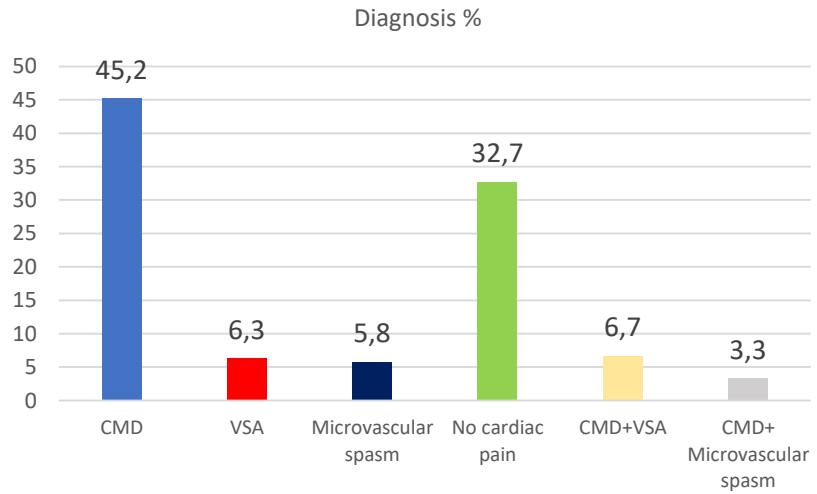
↓

(CCS≥1) and/or Positive ischemia testing

↓

Study Group :
Physiological deferred PCI + CFR/IMR with or without Acetylcholine test
208 patients



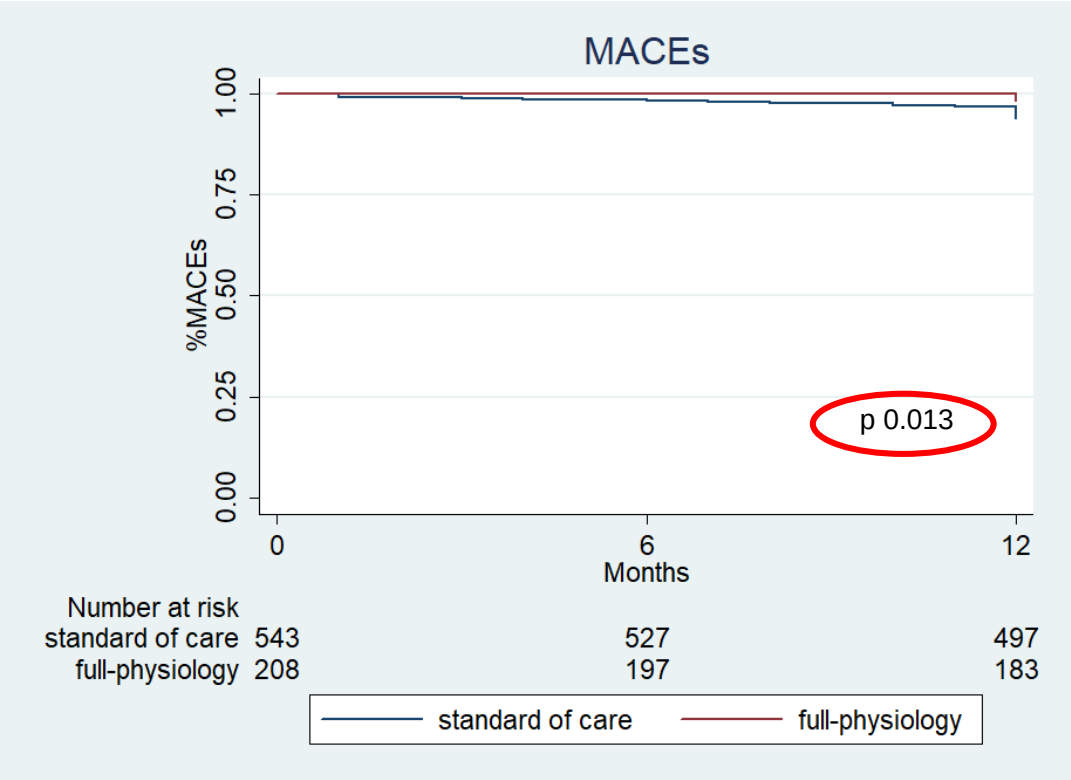


#FullPhysiology InDailyPractice

Usefulness of #FullPhysiology in daily practice

Patients (n=751)	Global	Standard of care (n= 543)	#FullPhysiology (n=208)	p value
Age (mean ± SD)	68.1±10.9	68.8±10.2	66.1±12.3	<0.01
Male sex (%)	62	65.2	53.6	<0.01
Hypertension (%)	77.2	80.5	68.6	<0.01
Smoking (%)	44.9	45.0	44.7	0.945
Dyslipidemia (%)	66	65.9	66.3	0.918
Diabetes (%)	26.2	26.9	24.3	0.488
CKD (%)	14.4	15.1	12.5	0.37
History of CAD	33.2	34	32	0.637
EF (mean ± SD)	55.8±10.4	56.5±9.5	53.8±12.3	<0.01
BMI (mean ± SD)	28.2±16.8	27.2±4.6	29.9±6.8	0.08
CCS 3-4 (%)	-	-	-	-
Previous MI (%)	21.3	18.6	28.5	<0.01
Previous PCI (%)	33.5	32.17	39.4	0.09
Vessel (n=751)	Global	Standard of care (n= 543)	#FullPhysiology (n=208)	p value
FFR (mean ± SD)	0.89±0.04	0.89±0.04	0.89±0.04	0.239
LAD (%)	78.4	75.3	86.5	<0.01
LCX (%)	9.1	9.9	6.7	0.170
RCA (%)	12.5	14.8	6.8	<0.01

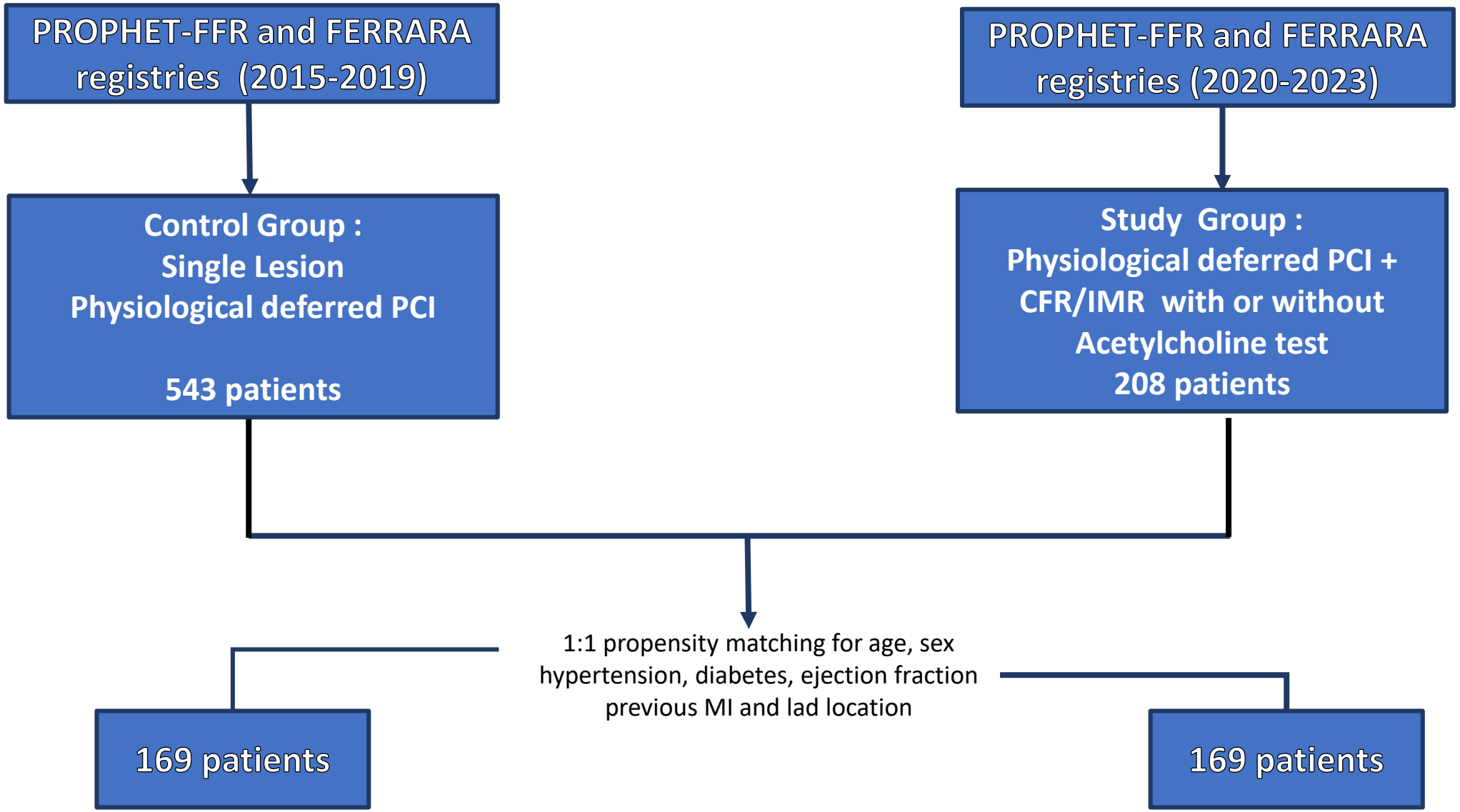
Usefulness of #FullPhysiology in daily practice



Follow up 12 months

	Standard of care (n=543)	#FullPhysiology (n=208)	p value (chi2)
Follow up (mean± DS)	11.5±1.8	11.3±2.1	0.132
MACEs (%)	5.9	1.4	0.009
TVR (%)	2.6	0	0.02
MI (%)	0.7	0.4	0.7
Cardiac Hospitalization (%)	5.7	1.4	0.011
Cardiac Death (%)	0.4	0	0.381

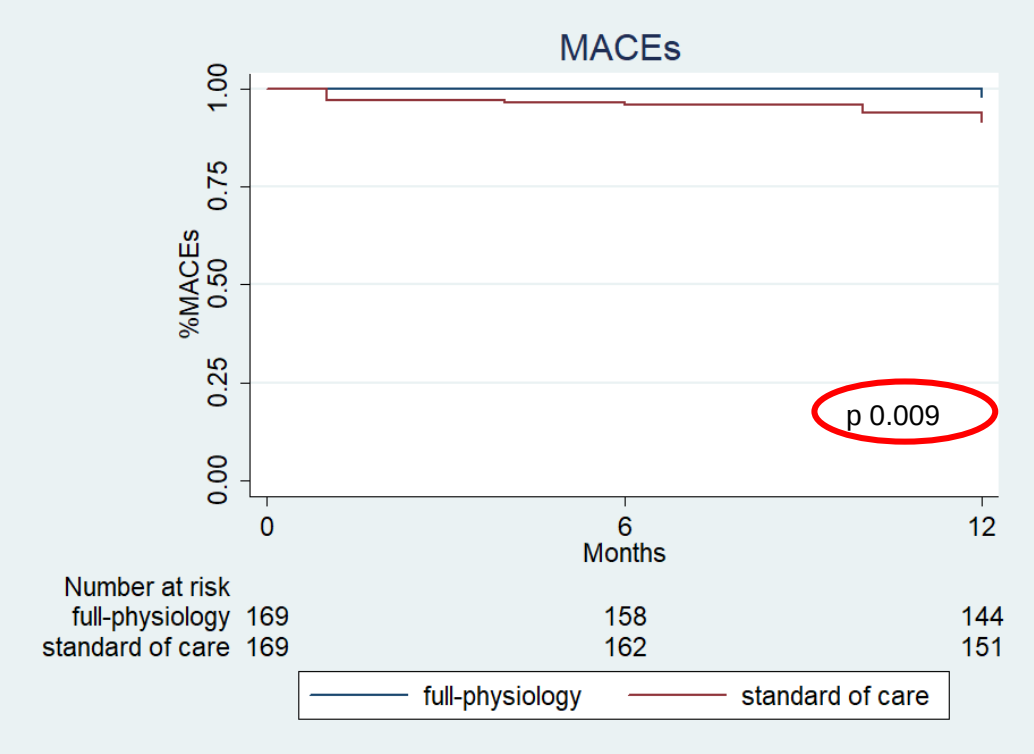
Usefulness of #FullPhysiology in daily practice



Usefulness of #FullPhysiology in daily practice

Patients (n=338)	Standard of care (n= 169)	#FullPhysiology (n=169)	p value
Age (mean ± SD)	66.5±11.6	66.6±12.1	0.952
Male sex (%)	48	49.7	0.744
Hypertension (%)	70.4	68	0.637
Smoking (%)	41.3	47.3	0.266
Dyslipidemia (%)	60.7	67.4	0.197
Diabetes (%)	27.8	24.8	0.536
CKD (%)	17.7	13.1	0.236
EF (mean ± SD)	53.0±11.9	53.7±12.5	0.601
BMI (mean ± SD)	27.0±5.7	30.3±8.7	0.257
Previous MI (%)	27.2	28.9	0.716
Previous PCI (%)	38.4	36.7	0. 736
Vessel (n=338)	Standard of care (n= 169)	#FullPhysiology (n=169)	p value
FFR (mean ± SD)	0.88±0.04	0.89±0.04	0.158
LAD (%)	86.4	87.6	0.746

Usefulness of #FullPhysiology in daily practice



Follow up 12 months

	Standard of care (n=169)	#FullPhysiology (n=169)	p value (chi2)
Follow up (mean± DS)	11.4±2.2	11.2±2.3	0.312
MACEs (%)	8.2	1.8	0.006
TVR (%)	4.7	0	0.004
MI (%)	0.6	0.6	1
Cardiac Hospitalization (%)	8.2	1.8	0.006
Cardiac Death (%)	0.6	0	0.316

#FullPhysiology InDailyPractice

#Grazie