



# QFR for the revascularization of non-culprit lesions of older patients with myocardial infarction

Insights from the FIRE trial

**Andrea Erriquez**

Ferrara University Hospital, Italy

The logo for the Percutaneous Coronary Intervention (PCI) Research Consortium (PCR), consisting of the letters 'PCR' in white on a dark green square background.



on behalf of the FIRE trial investigators

<https://elementrials.org>



# Potential conflicts of interest

**Speaker's name : Andrea Erriquez**

I do not have any potential conflict of interest to declare

# Background

The QFiRe is a prespecified substudy of the

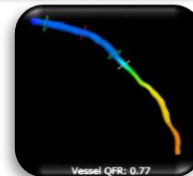


75+ AMI pts with MVD

Successful PCI of the culprit lesion

NCLs assessment

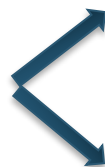
Physio-guided complete arm



Primary Endpoint

POCE (patient-oriented composite endpoint) at 1 year

Culprit-only arm



# Objectives

- **Prospective validation of the prognostic role of QFR value in the discrimination of NCLs associated with adverse events**
- **Assessment of the non-inferiority of a QFR-guidance for the treatment of NCLs vs wire-based evaluation**

# Culprit-only arm

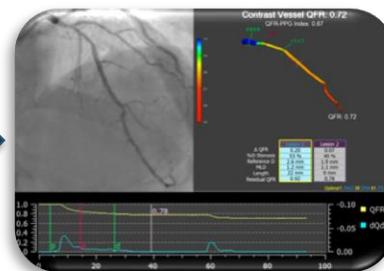
725 pts



Prospective acquisition of NCLs projections during index procedure



Offline QFR computation of all NCLs by corelab



QFR assessment results

Positive NCLs =  
 $QFR \leq 0.80$

Negative NCLs =  
 $QFR > 0.80$

**Primary Endpoint**

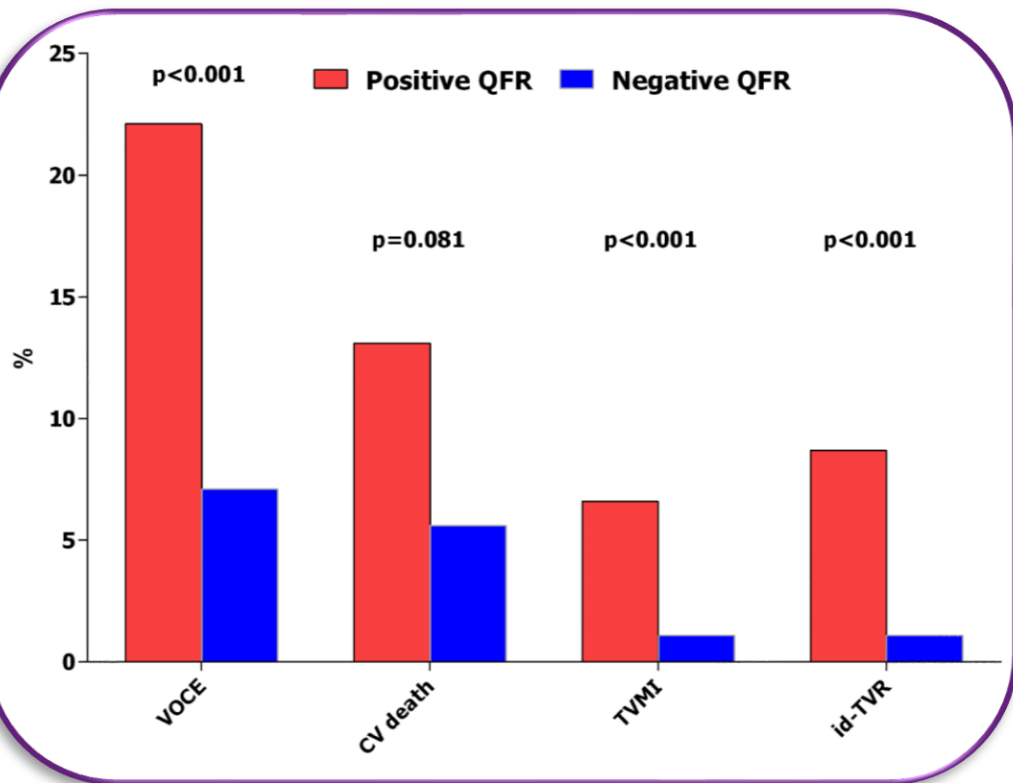
VOCE (vessel-oriented composite endpoint) at 1 year: composite of cardiac death, target-vessel MI or ischemia-driven TVR

# Patients and vessels characteristics

Characteristics	Patients (n = 725)		
	Negative QFR (n=366)	Positive QFR (n=319)	p
Age – years	81.4±5	80.6±5	0.030
Female sex – no. (%)	143 (39.1)	113 (35.4%)	0.365
Diabetes	114 (31.1)	112 (35.1%)	0.308
Prior PCI	70 (19.1)	58 (18.2%)	0.828
eGFR <60 ml/min	208 (56.8)	196 (61.4%)	0.252
PAD	58 (15.8)	62 (19.4%)	0.258
STEMI – no. (%)	118 (32.2)	123 (38.6%)	0.100
NSTEMI – no. (%)	248 (67.8)	196 (61.4%)	
LVEF – %	49±11	49±11	0.612
Culprit vessel – no. (%)			
Left anterior descending artery	190 (51.9)	121 (37.9)	< 0.001

Analysis – no. (%)	NC Vessels (n = 951)		
	903 (94.9%)		
Characteristics	Negative QFR (n=537)	Positive QFR (n=366)	p
Non-culprit vessels			
Left anterior descending artery	124 (23.2)	154 (42.2)	<0.001
Reference vessel diameter, mm	2.8 [2.4-3.3]	2.8 [2.4-3.2]	0.256
Diameter stenosis, (%)	60±15	70±16	<0.001
Lesion length – mm	10 [7-16]	14.1 [9.7-22.4]	<0.001
QFR Value	0.90 [0.87-0.93]	0.70 [0.60-0.80]	<0.001

# Outcomes



At Cox regression, **QFR  $\leq$  0.80** emerged as an independent predictor of:

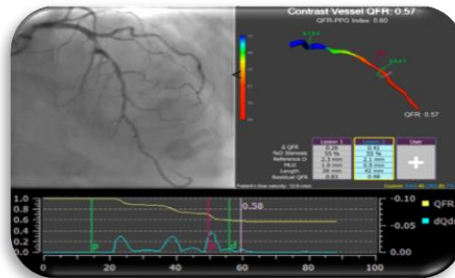
- VOCE [HR 2.79, 95%CI 1.64-4.75]
- TVMI [HR 6.81, 95%CI 2.59-17.93]
- id-TVR [HR 8.63, 95%CI 3.27-22.8]

# Physiology-guided complete arm

720 pts

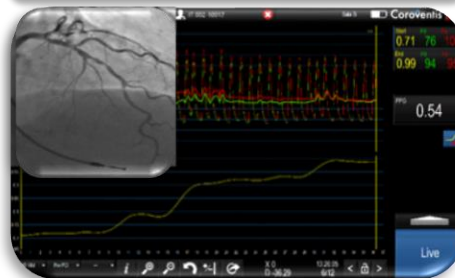


Non-culprit vessels



Assessment with QFR

Assessment with wire (FFR or NHRP)



Primary Endpoint

VOCE (vessel-oriented composite endpoint) at 1 year: composite of cardiac death, target-vessel MI or ischemia-driven TVR

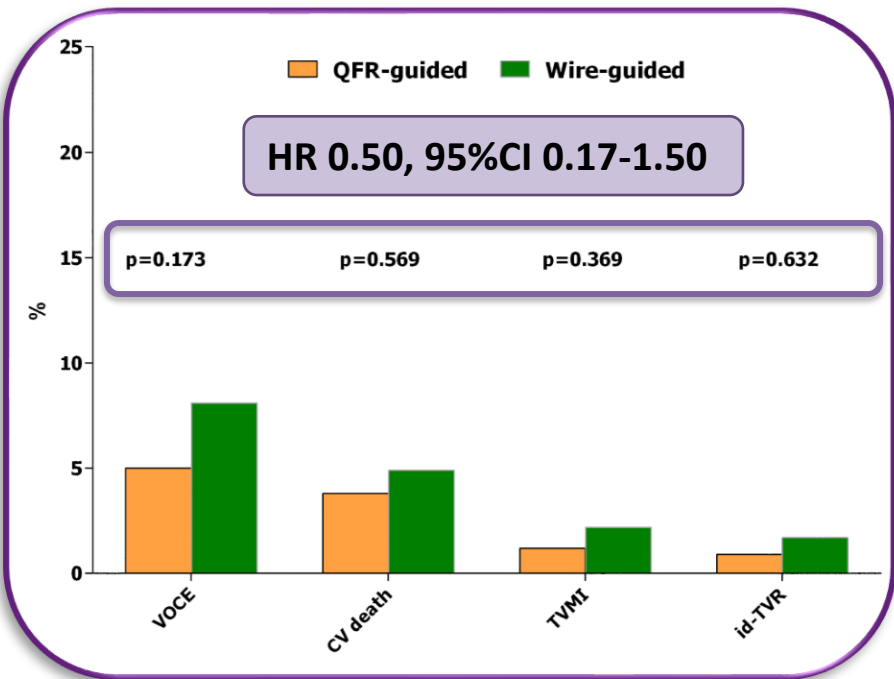


# Patients and vessels characteristics

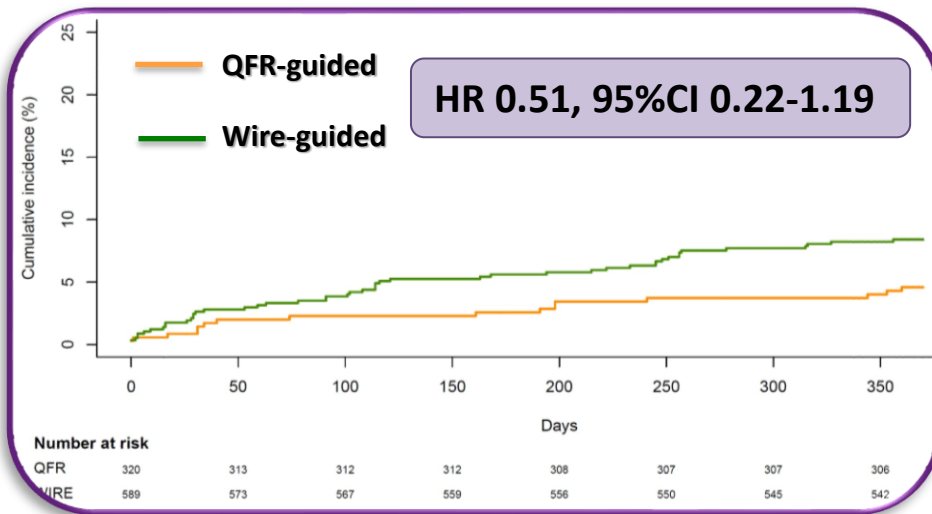
Characteristics	Patients (n = 720)		
	Wire-guided (n=451)	QFR-guided (n=249)	p
Age – years	81±4	81±4	0.993
Female sex – no. (%)	173 (38.4)	84 (33.7)	0.257
Diabetes	144 (31.9)	81 (32.5)	0.937
Prior PCI	74 (16.4)	45 (18.1)	0.648
eGFR <60 ml/min	289 (64.1)	142 (57)	0.079
<b>PAD</b>	<b>66 (14.6)</b>	<b>53 (21.3)</b>	<b>0.033</b>
STEMI – no. (%)	155 (34.4)	86 (34.5)	1
NSTEMI – no. (%)	296 (65.6)	163 (65.5)	
Culprit vessel – no. (%)			
Left anterior descending artery	207 (45.9)	114 (45.8)	0.094

Characteristic	NCLs vessels (n = 948)		
	Wire-guided (n=589)	QFR-guided (n=320)	p
Non-culprit vessels			
<b>Left anterior descending artery</b>	<b>179 (30.4)</b>	<b>103 (32.3)</b>	<b>0.004</b>
Reference vessel diameter, mm	2.8 [2.5-3.3]	2.8 [2.4-3.3]	0.069
Diameter stenosis, (%)	68±29	65±15	0.076
<b>Lesion length – mm</b>	<b>14.3 [10-21.7]</b>	<b>12 [8-19.5]</b>	<b>0.004</b>
QFR Value		0.80 [0.70-0.90]	
Positive QFR (≤0.80), no.		129 (40.3)	
Vessels investigated with FFR, no.	451 (76.6)		
FFR Value	0.80 [0.70-0.90]		
Positive FFR (≤0.80), no.	230 (51)		
Vessels investigated with NHPI, no.	138 (23.4)		
NHPI, mean value	0.90 [0.81-0.99]		
Positive NHPI (≤0.89), no.	67 (48.6)		
Positive wire-based, no.	297 (50.4)		

# Outcomes



## Occurrence of VOCE after adjusting for propensity score matching



# Conclusions

QFR  $\leq 0.80$  effectively identifies NCLs at a higher risk of adverse events

QFR value  $\leq 0.80$  stands out as an independent predictor of VOCE

QFR-guided PCI of NCLs is comparable to wire-based physiology

These results should be considered preliminary and hypothesis-generating

# Available on JACC CVI

ARTICLE IN PRESS

VOL. ■, NO. ■, 2024

JACC: CARDIOVASCULAR INTERVENTIONS

© 2024 THE AUTHORS. PUBLISHED BY ELSEVIER ON BEHALF OF THE AMERICAN

COLLEGE OF CARDIOLOGY FOUNDATION. THIS IS AN OPEN ACCESS ARTICLE UNDER

THE CC BY LICENSE (<http://creativecommons.org/licenses/by/4.0/>).

ORIGINAL RESEARCH



## QFR for the Revascularization of Nonculprit Vessels in MI Patients Insights From the FIRE Trial

Andrea Erriquez, MD,<sup>a</sup> Gianluca Campo, MD,<sup>a</sup> Vincenzo Guiducci, MD,<sup>b</sup> Gianni Casella, MD,<sup>c</sup> Mila Menozzi, MD,<sup>d</sup> Enrico Cerrato, MD, PhD,<sup>e,f</sup> Giorgio Sacchetta, MD,<sup>g</sup> Raul Moreno, MD,<sup>h</sup> Marco Arena, MD,<sup>i</sup> Ignacio Amat Santos, MD,<sup>j</sup> Jose Luis Diez Gil, MD,<sup>k</sup> Roberto Scarsini, MD,<sup>l</sup> Marco Ruoizzi, MD,<sup>m</sup> Manfredi Ariotti, MD,<sup>n</sup> Andrea Picchi, MD,<sup>o</sup> Marco Barbierato, MD,<sup>p</sup> Elisabetta Moscarella, MD,<sup>q</sup> Sergio Musto D'Amore, MD,<sup>b</sup> Valerio Lanzilotti, MD,<sup>r</sup> Caterina Cavazza, MD,<sup>d</sup> Marco Rezzaghi, MD,<sup>b</sup> Marta Cocco, MD,<sup>s</sup> Andrea Marrone, MD,<sup>s</sup> Filippo Maria Verardi, MD,<sup>s</sup> Javier Escaned, MD,<sup>t</sup> Emanuele Barbato, MD,<sup>t</sup> Iginio Colaioni, MD,<sup>t</sup> Nicola Pesenti, STAT,<sup>u</sup> Greta Carrara, STAT,<sup>u</sup> Simone Biscaglia, MD<sup>u</sup>

### ABSTRACT

**BACKGROUND** The role of quantitative flow ratio (QFR) in the treatment of nonculprit vessels of patients with myocardial infarction (MI) is a topic of ongoing discussion.

**OBJECTIVES** This study aimed to investigate the predictive capability of QFR for adverse events and its noninferiority compared to wire-based functional assessment in nonculprit vessels of MI patients.

**METHODS** The FIRE (Functional Assessment in Elderly MI Patients With Multivessel Disease) trial randomized 1,445 older MI patients to culprit-only (n = 725) or physiology-guided complete revascularization (n = 720). In the culprit-only arm, angiographic projections of nonculprit vessels were prospectively collected, centrally reviewed for QFR computation, and associated with endpoints. In the complete revascularization arm, endpoints were compared between nonculprit vessels investigated with QFR or wire-based functional assessment. The primary endpoint was the vessel-oriented composite endpoint (VOCE) at 1 year.

**RESULTS** QFR was measured on 903 nonculprit vessels from 685 patients in the culprit-only arm. Overall, 366 (40.5%) nonculprit vessels showed a QFR value  $\leq 0.80$ , with a significantly higher incidence of VOCEs (22.1% vs 7.1%;  $P < 0.001$ ). QFR  $\leq 0.80$  emerged as an independent predictor of VOCEs (HR: 2.79; 95% CI: 1.64-4.75). In the complete arm, QFR was used in 320 (35.2%) nonculprit vessels to guide revascularization. When compared with propensity-matched nonculprit vessels in which treatment was guided by wire-based functional assessment, no significant difference was observed (HR: 0.57; 95% CI: 0.28-1.15) in VOCEs.

**CONCLUSIONS** This prespecified subanalysis of the FIRE trial provides evidence supporting the safety and efficacy of QFR-guided interventions for the treatment of nonculprit vessels in MI patients. (Functional Assessment in Elderly MI Patients With Multivessel Disease [FIRE]; [NCT03772743](https://doi.org/10.1016/j.jacc.2024.03.011)) (J Am Coll Cardiol Intv 2024; ■:■-■) © 2024 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).



<https://elementrials.org>

# The essentials to remember

**Why?**

Conclusive evidence about the role of QFR in NCLs of AMI patients is lacking

**What?**

To investigate the predictive capability of QFR for VOCE and its non-inferiority compared to wire-based physiology in NCLs of AMI patients of the FIRE trial

**How?**

QFR computation of NCLs of the culprit-arm; comparison between QFR guidance and wire-based guidance PCI in physiology-complete arm

**What are the results?**

VOCE is higher in NCLs with  $QFR \leq 0.80$  and QFR resulted non-inferior to wire-based tools in NCLs treatment

**Why is this important?**

QFiRe substudy provides evidence supporting the safety and efficacy of QFR-guided interventions for the treatment of NCLs in AMI patients

PCR

PCRonline.com