



Fractional Flow Reserve in Chronic Coronary Syndrome: a Report from SCAAR



Potential conflicts of interest

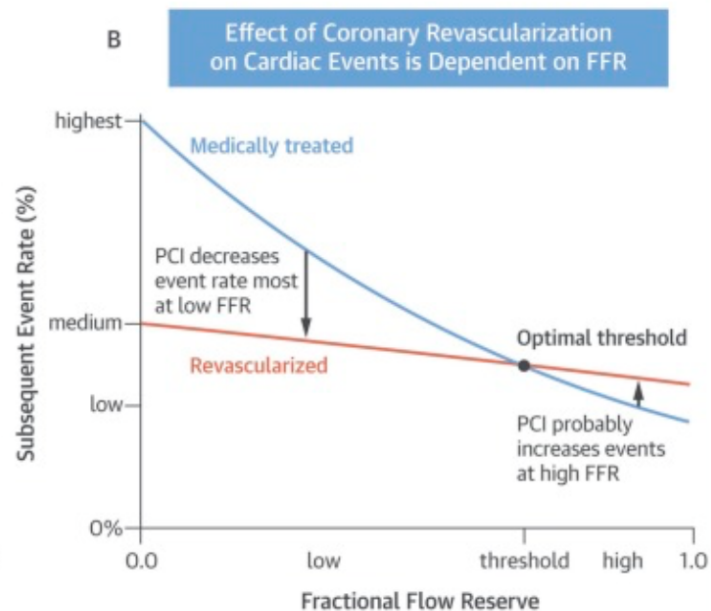
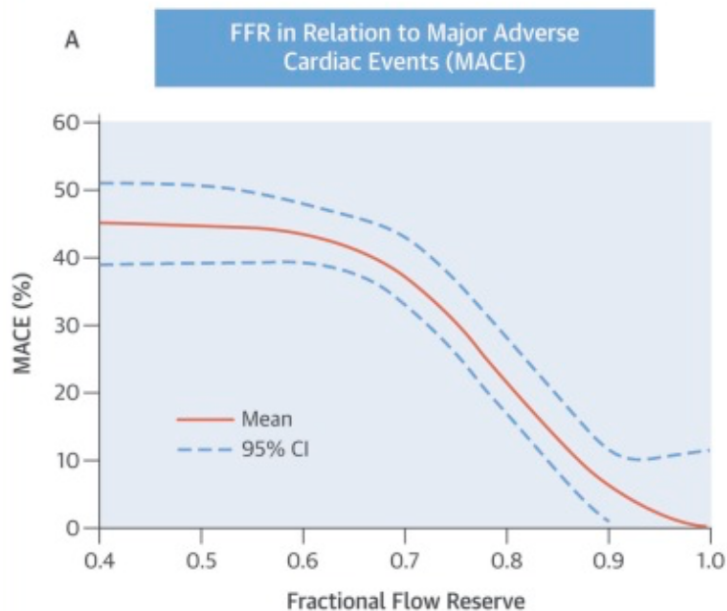
Speaker's name : Sergio Buccheri

I do not have any potential conflict of interest to declare

Why this study?

- Current European guidelines recommend the use of fractional flow reserve (FFR) with a cut-off of 0.80 for assessing the functional relevance of coronary stenoses and guiding management strategies in patients with chronic coronary syndrome (CCS).
- To date, evidence from randomized clinical trials (RCTs) supporting these recommendations remains limited.
- There has been prior controversy over what FFR cut-off value to use in daily clinical practice.

Why this study?



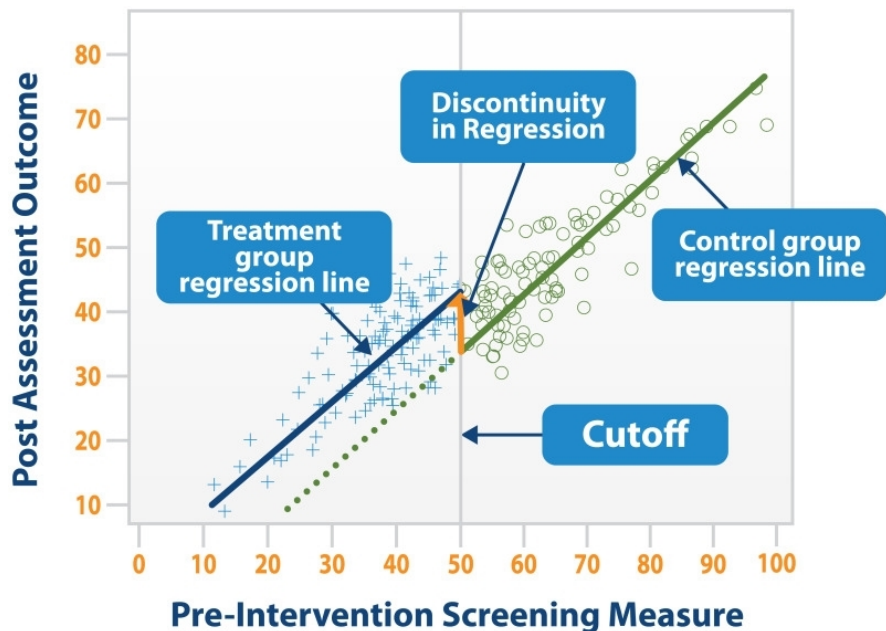
Jeremias, A. et al. J Am Coll Cardiol. 2017;69(22):2748-58.

What did we study?

- We investigated the clinical outcomes of a large cohort of CCS patients who underwent functional evaluation of one or more coronary artery stenoses using FFR.
- We sought to understand whether the utility of FFR as a diagnostic tool is confirmed in a less controlled environment than RCTs and if the current policy of using FFR with a cut-off value of 0.80 translates into improved clinical outcomes.

How was the study executed?

- Registry-based analysis using a **quasi-experimental design** (regression discontinuity).



When accurately applied, RDD is able to provide **robust implications on causality** using observational data.

Goodrich DE et al. The QUERI Roadmap for Implementation and Quality Improvement. Washington (DC): Department of Veterans Affairs (US); 2020.

How was the study executed?



Nobel prize in 2021 for their contribution to the characterization and mathematical modeling of **natural experiments**, including RDD.

How was the study executed?

- From June 1st, 2015 to June 1st, 2019, we selected CCS patients who underwent functional evaluation of one or more coronary artery stenoses using FFR and were registered in the Swedish Coronary Angiography and Angioplasty Registry (SCAAR).

Selection process:

- Swedish SSN
- Left main excluded
- Chronic coronary syndrome
- No staged PCI, no ACS
- No previous CABG

Anatomical criteria

- No more than 2 segments in the same vessel
- No stenting distal to an FFR-investigated segment
- No more than 2 FFR assessments per vessel
- No imaging at the same procedure

How was the study executed?

- **Primary outcome:** Composite of all-cause death and FFR-oriented target vessel revascularization (TVR) by PCI at 1 year.
- **Secondary outcome:** Composite of all-cause death, FFR-oriented TVR and hospitalization for AMI

How was the study executed?

Outcomes With Fractional Flow Reserve in Chronic Coronary Syndrome



The safety and scientific validity of this study is the responsibility of the study sponsor and investigators. Listing a study does not mean it has been evaluated by the U.S. Federal Government. Read our [disclaimer](#) for details.

ClinicalTrials.gov Identifier: NCT05592535

[Recruitment Status](#) ⓘ : Completed

[First Posted](#) ⓘ : October 24, 2022

[Last Update Posted](#) ⓘ : October 24, 2022

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Sponsor:

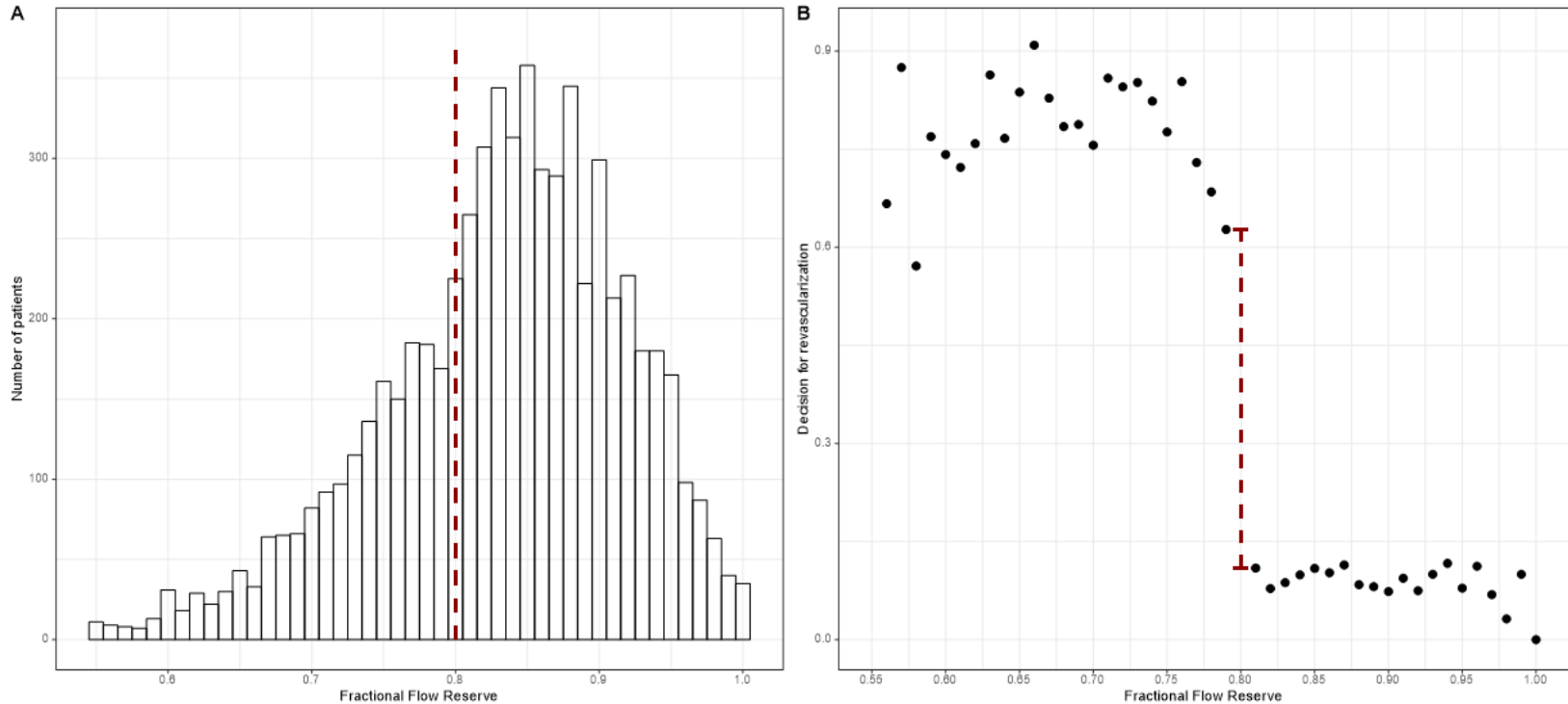
Uppsala University

Information provided by (Responsible Party):

Uppsala University

What are the essential results?

5,066 individual patients contributing with 6,143 vessels to the analysis

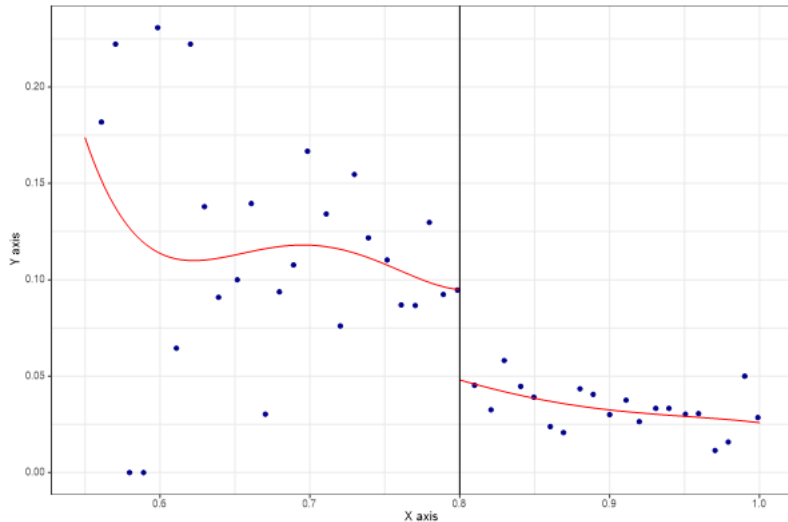


What are the essential results?

Variables	Overall (n=5,066)	Missing	FFR=0.79 (n=167)	FFR=0.81 (n=261)	p-value	Missing
Age (years), median [IQR]	68.0 [61.0, 74.0]	0.0	68.0 [62.0, 73.5]	69.0 [62.0, 75.0]	0.326	0.0
Sex (male), n (%)	3,659 (72.2)	0.0	133 (79.6)	189 (72.4)	0.115	0.0
Hypertension, n (%)	4,140 (81.8)	0.1	136 (81.4)	216 (83.1)	0.761	0.2
Dyslipidemia, n (%)	4,041 (79.9)	0.1	141 (84.4)	211 (81.2)	0.460	0.2
Diabetes mellitus, n (%)	1,293 (25.5)	0.0	46 (27.5)	70 (26.8)	0.958	0.0
Previous AMI, n (%)	1,549 (30.8)	0.8	59 (35.5)	76 (29.3)	0.218	0.7
Previous PCI, n (%)	2,237 (44.2)	0.0	75 (44.9)	110 (42.1)	0.643	0.0
Smoking status, n (%)		2.1			0.599	2.3
None	2,087 (42.1)		62 (37.6)	105 (41.5)		
Previous	2,407 (48.5)		84 (50.9)	116 (45.8)		
Current	464 (9.4)		19 (11.5)	32 (12.6)		
Angina class, n (%)		0.2			0.095	0.2
1-2	4,089 (80.9)		127 (76.5)	218 (83.5)		
3-4	965 (19.1)		39 (23.5)	43 (16.5)		
Creatinin, median [IQR]	81.0 [70.0, 93.0]	10.7	78.0 [69.0, 88.0]	81.0 [70.2, 95.0]	0.060	8.6
Weight (kg), median [IQR]	82.0 [73.0, 93.0]	10.3	84.0 [75.0, 93.0]	84.0 [75.0, 91.0]	0.607	7.9
Height (cm), median [IQR]	174.0 [167.0, 180.0]	13.2	176.0 [168.5, 180.0]	174.0 [168.0, 179.0]	0.087	10.7
BMI (kg/m ²), median [IQR]	27.2 [24.8, 30.3]	13.2	26.9 [25.2, 30.0]	27.7 [25.7, 30.1]	0.241	10.7
Aspirin before cath., n (%)	4,685 (92.5)	0.1	154 (92.2)	233 (89.3)	0.400	0.0
Aspirin during cath., n (%)	139 (2.7)	0.0	6 (3.6)	11 (4.2)	0.946	0.0
Clopidogrel before cath., n (%)	2,171 (42.9)	0.0	73 (43.7)	93 (35.6)	0.116	0.0
Clopidogrel during cath., n (%)	322 (6.4)	0.0	15 (9.0)	20 (7.7)	0.760	0.0
Chronic anticoagulation, n (%)	425 (8.4)	0.0	11 (6.6)	20 (7.7)	0.820	0.0
Any FFR on LAD, n (%)	3,668 (72.4)	0.0	139 (83.2)	214 (82.0)	0.842	0.0
Any FFR on circumflex, n (%)	1,293 (25.5)	0.0	37 (22.2)	70 (26.8)	0.331	0.0
Any FFR on RCA, n (%)	1,182 (23.3)	0.0	37 (22.2)	52 (19.9)	0.665	0.0

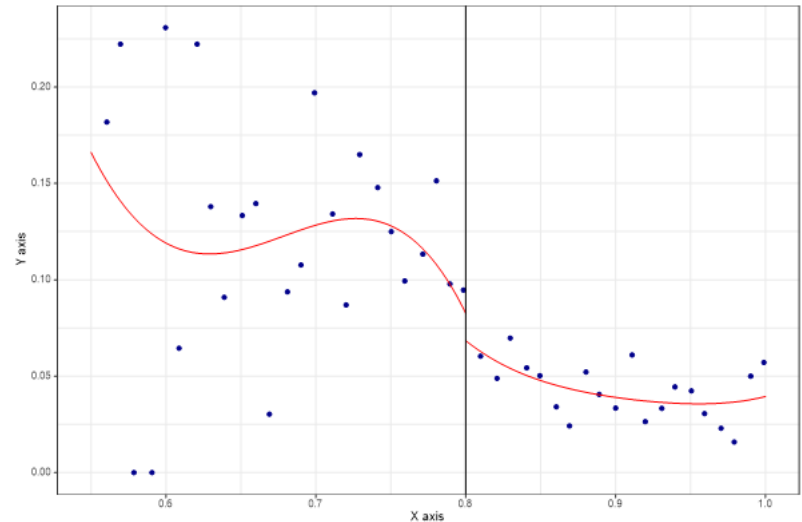
What are the essential results?

Primary outcome



ARD: 5.9%, 95% CI 0.3% - 11.5%, $p=0.038$
Rescaled ARD: 9.4%, 95% CI 1.1 - 17.7, $p=0.027$

Secondary outcome



ARD: 4.0%, 95% CI -1.9% - 10.1%, $p=0.188$
Rescaled ARD: 6.6%, 95% CI -0.2 - 13.4, $p=0.057$

Why is this important?

- The use of FFR with a cut-off value of 0.80 (not the method) was not effective in a large cohort of CCS patients and it was associated with an increased risk for the composite outcome of TVR and all-cause death at 1 year.
- No differences in secondary outcomes of interest.

Interpretation

- FFR was validated against other imaging modalities using a cut-off of 0.75.
- Medical therapy has improved over time (previous trials investigating FFR are not contemporary).
- All trials of revascularization in CCS are substantially neutral (ISCHEMIA, COURAGE etc.).

The essentials to remember

- The recommended FFR cut-off value (not the method) that is used in daily practice was not (cost-)effective.
 - **Why?** Limited evidence to support FFR use with a cut-off of 0.80 in CCS patients.
 - **What?** Clinical outcomes at 1 year in patients who underwent FFR.
 - **How?** Quasi-experimental design in a large registry.
 - **What are the results?** FFR use using the cut-off of 0.80 was not effective.
 - **Why is this important?** Limitations of a general cut-off, more evidence corroborating the current FFR cut-off is necessary.

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