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9th Interventional Symposium on
High Risk and Innovative Cardiac Interventions

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MTE 2016

Università della Svizzera Italiana
Lugano
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21st - 23rd June, 2016

FFR in Surgical Candidates: Luxury or Necessity?

Carlo Trani

Istituto di Cardiologia
Fondazione Policlinico Universitario A. Gemelli
UCSC - Roma

Role of FFR in Surgical Candidates:

- in patients with multivessel disease

- in patients with valve disease

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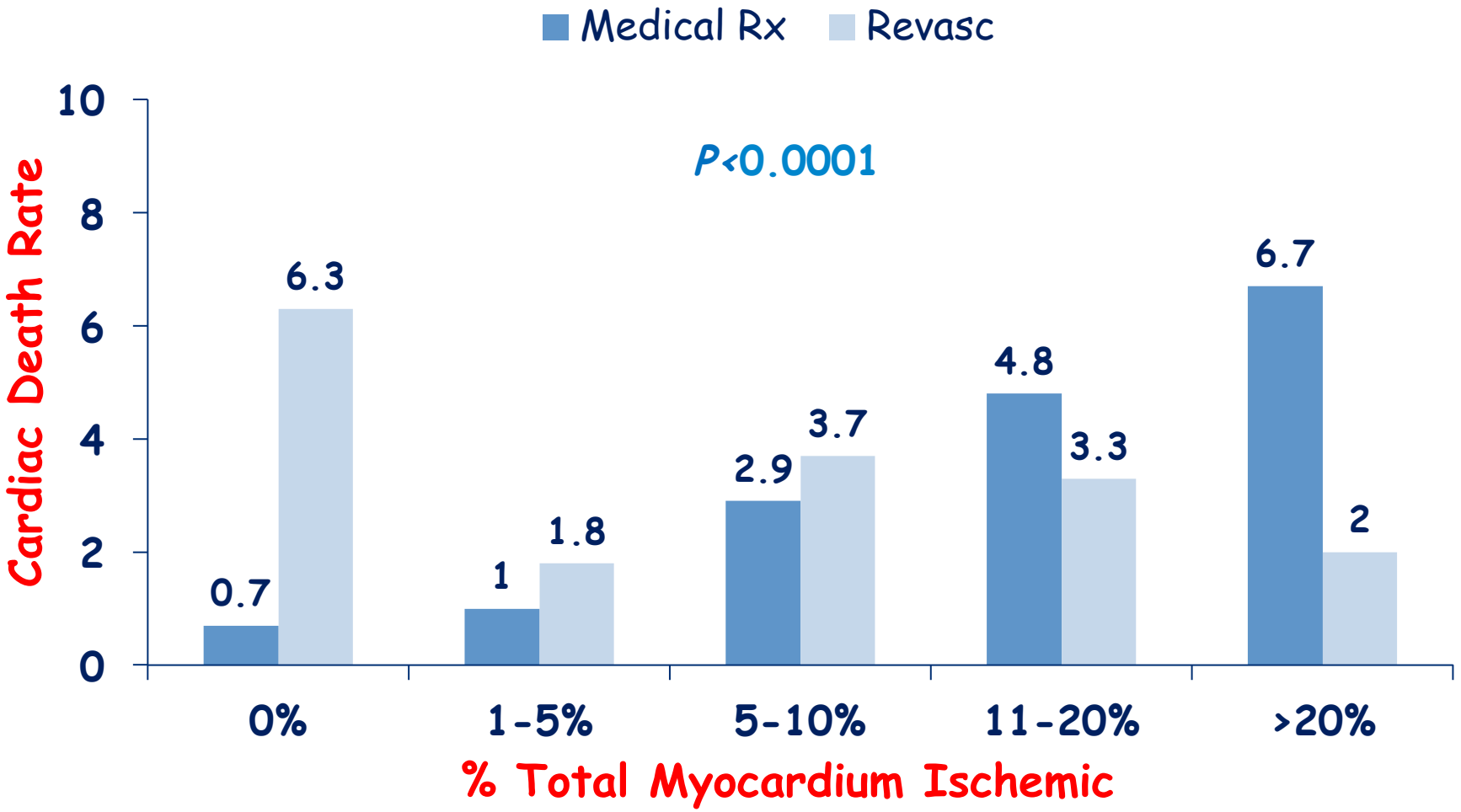
The underlying ischemic burden

Increase in cardiac death frequency as a function of inducible ischemia

10.627 pts
671 pts undergoing revascularization



Hachamovitch R et al, *Circulation* 2003

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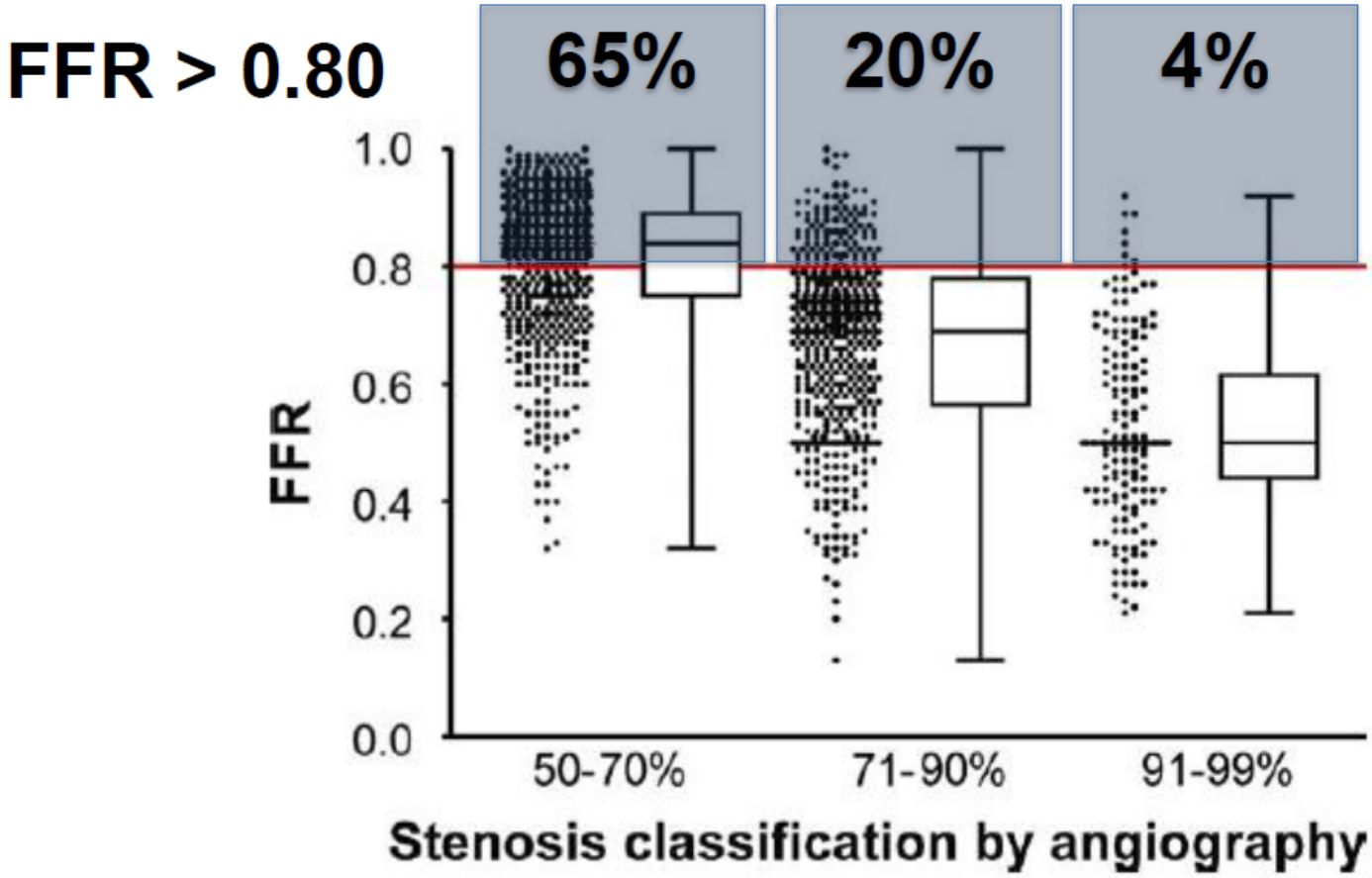
FFR vs angiography

Poor correlation between angiographic and fuctional stenosis severity in MVD



Tonino P et al, JACC 2010

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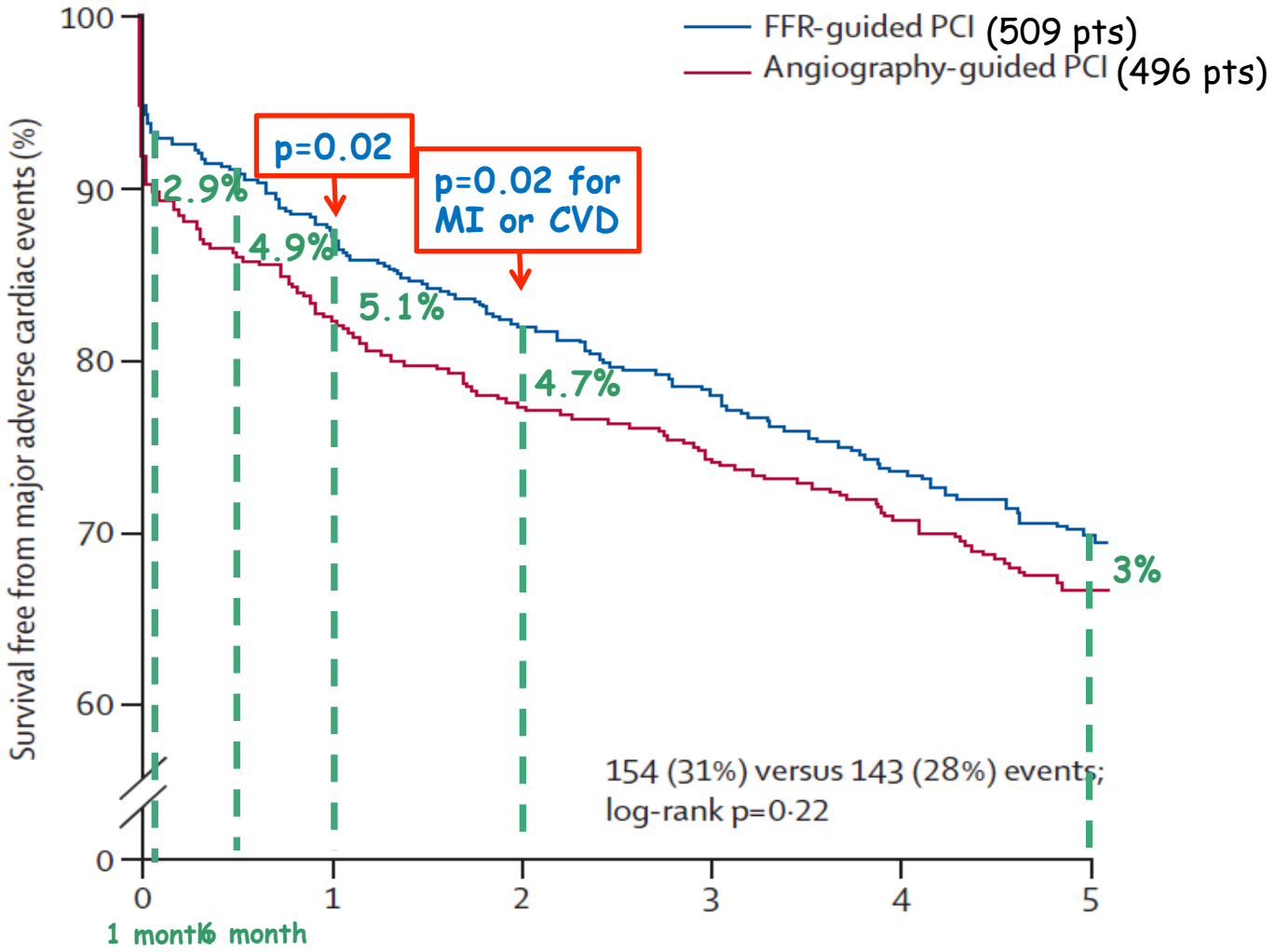
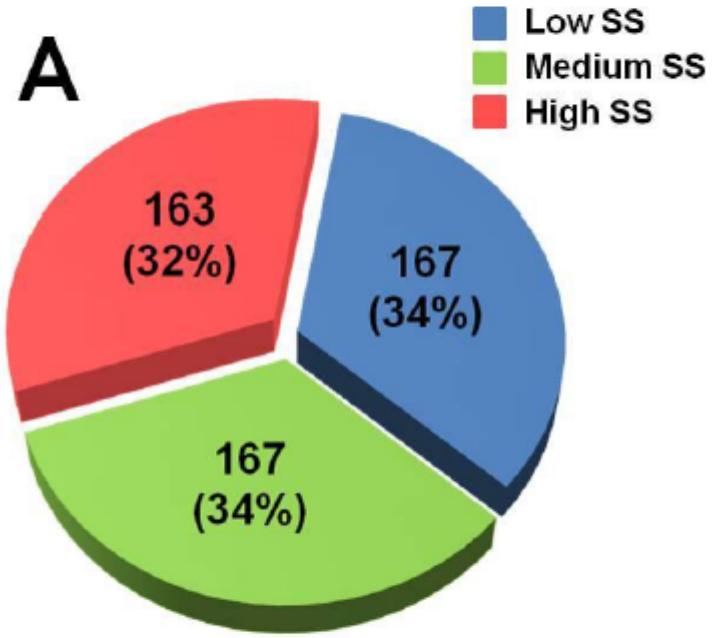
FFR vs angio-guided PCI



van Nunen LX et al. *Lancet 2015*

Functional SYNTAX score

Reclassifies > 30% of Cases

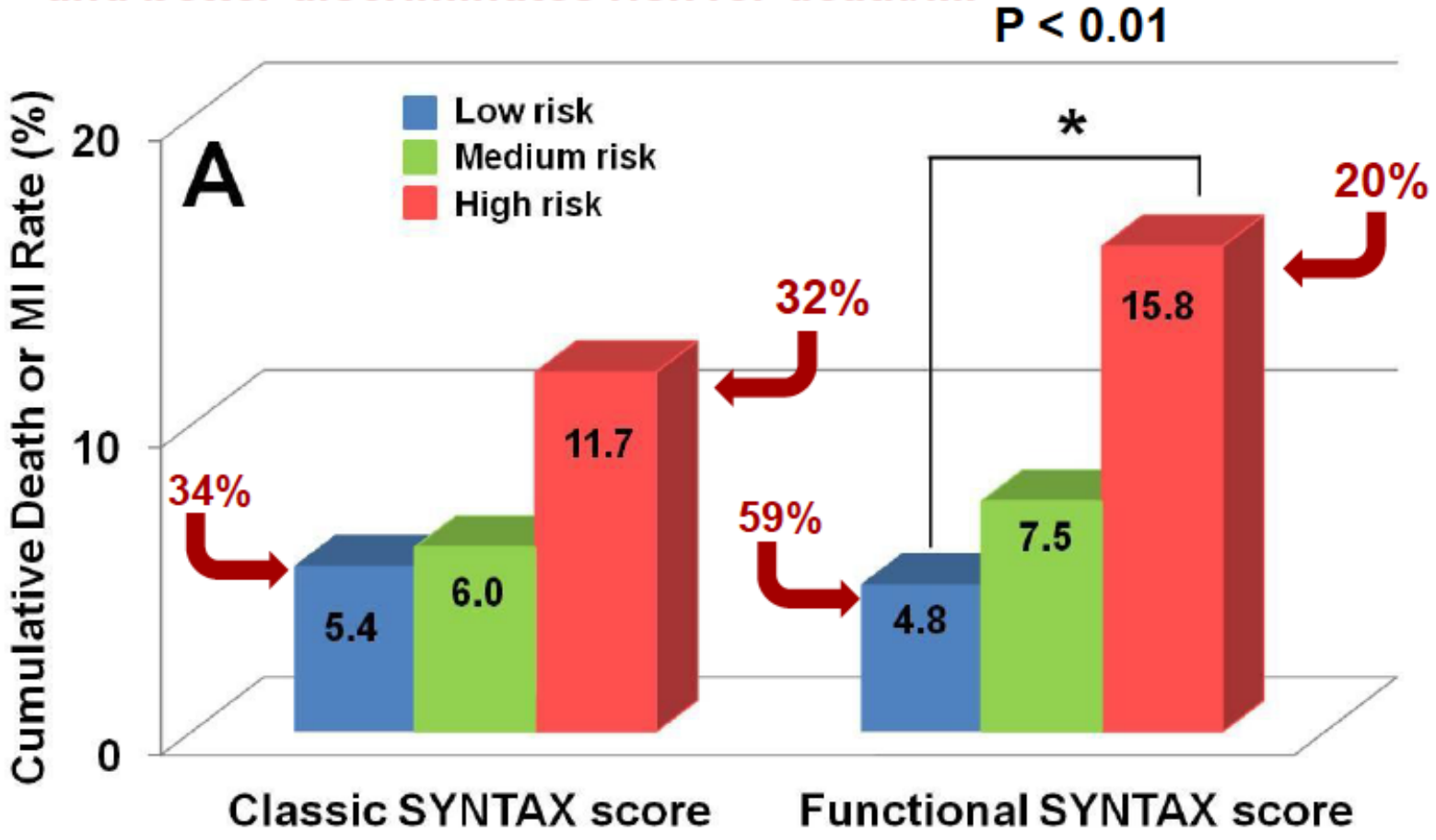


Without FFR

Nam CW et al, *JACC 2011*

Functional SYNTAX score

FSS converts patients from higher to lower risk and better discriminates risk for death/MI



Nam CW et al, *JACC 2011*

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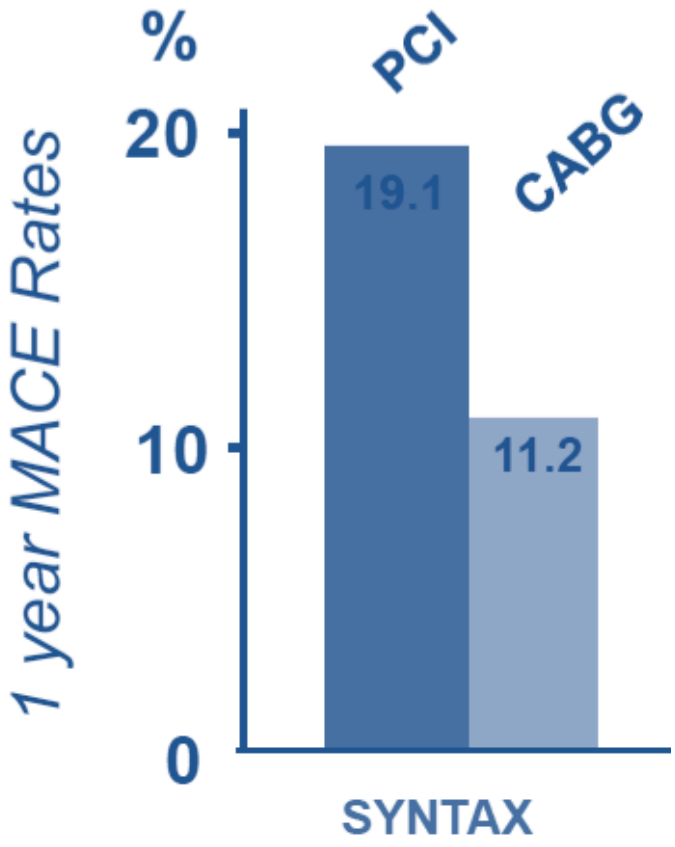
Implications of FAME



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FAME 3 Trial (RCT)

Rationale and design of the Fractional Flow Reserve versus Angiography for Multivessel Evaluation (FAME) 3 Trial: A comparison of fractional flow reserve–guided percutaneous coronary intervention and coronary artery bypass graft surgery in patients with multivessel coronary artery disease

Frederik M. Zimmermann, MD,[a] Bernard De Bruyne, MD, PhD,[b] Nico H. J. Pijls, MD, PhD,[a,c] Manisha Desai, PhD,[d] Keith G. Oldroyd, MD,[e] Seung-Jung Park, MD, PhD,[f] Michael J. Reardon, MD,[g] Olaf Wendler, MD, PhD,[h] Joseph Woo, MD,[i] Alan C. Yeung, MD,[i] and William F. Fearon, MD[i] *Eindhoven, The Netherlands; Aalst, Belgium; Stanford, CA; Glasgow, UK; Seoul, South Korea; Houston, TX; and London, UK*

Am Heart J. 2015 Oct;170(4):619-626

Zimmermann FM et al, *Am Heart J 2015*

FAME 3 Trial (RCT)

Hypothesis

- Fractional flow reserve (FFR)-guided percutaneous coronary intervention (PCI) using the 2nd generation Resolute DES in patients with multivessel coronary artery disease (CAD) will result in similar outcomes to coronary artery bypass graft surgery (CABG).

Zimmermann FM et al, *Am Heart J 2015*

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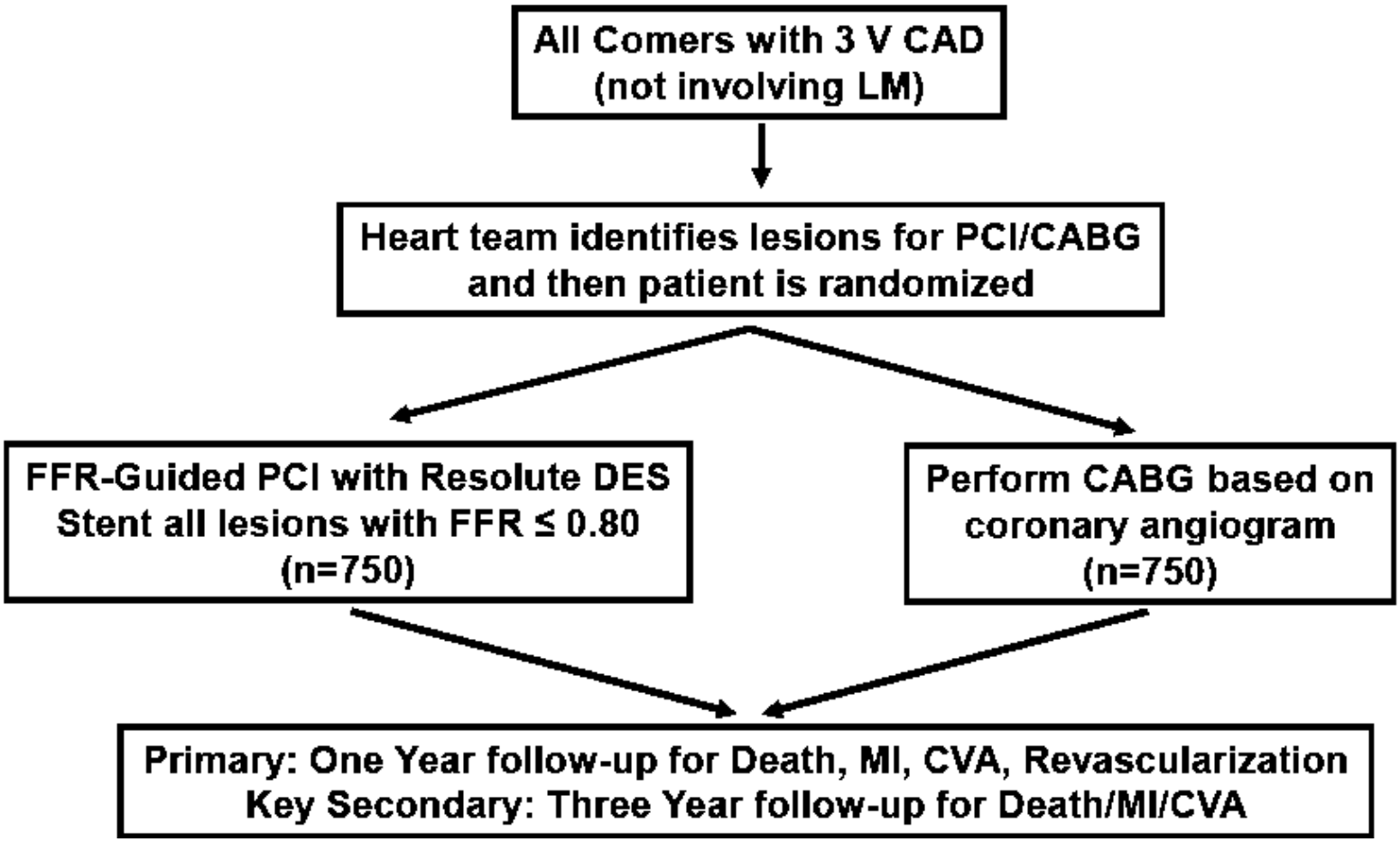
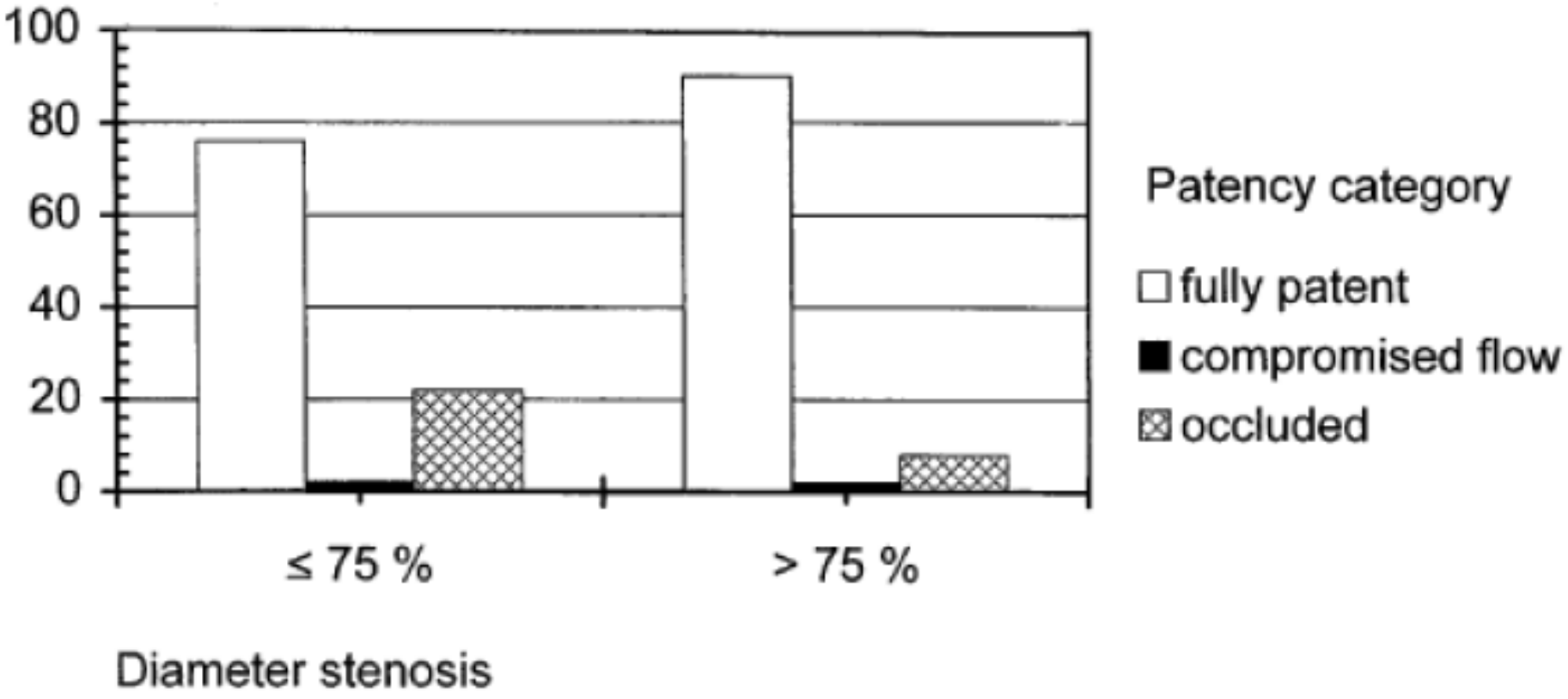
FAME 3: study flow



Zimmermann FM et al, *Am Heart J 2015*

Graft patency

SVG patency and stenosis severity of native vessel



Manninen HL et al. *Ann Thorac Surg 1998*

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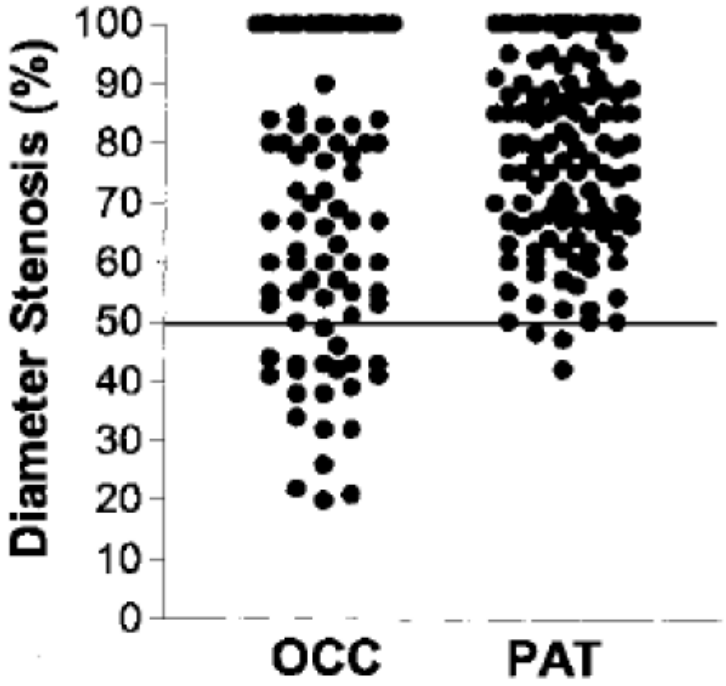
Graft patency

IMA graft patency and stenosis severity of native vessel



DS<50% is a strong predictor of IMA occlusion (OR 21.5[5.2-64.4]

Berger A et al, *Circulation 2004*

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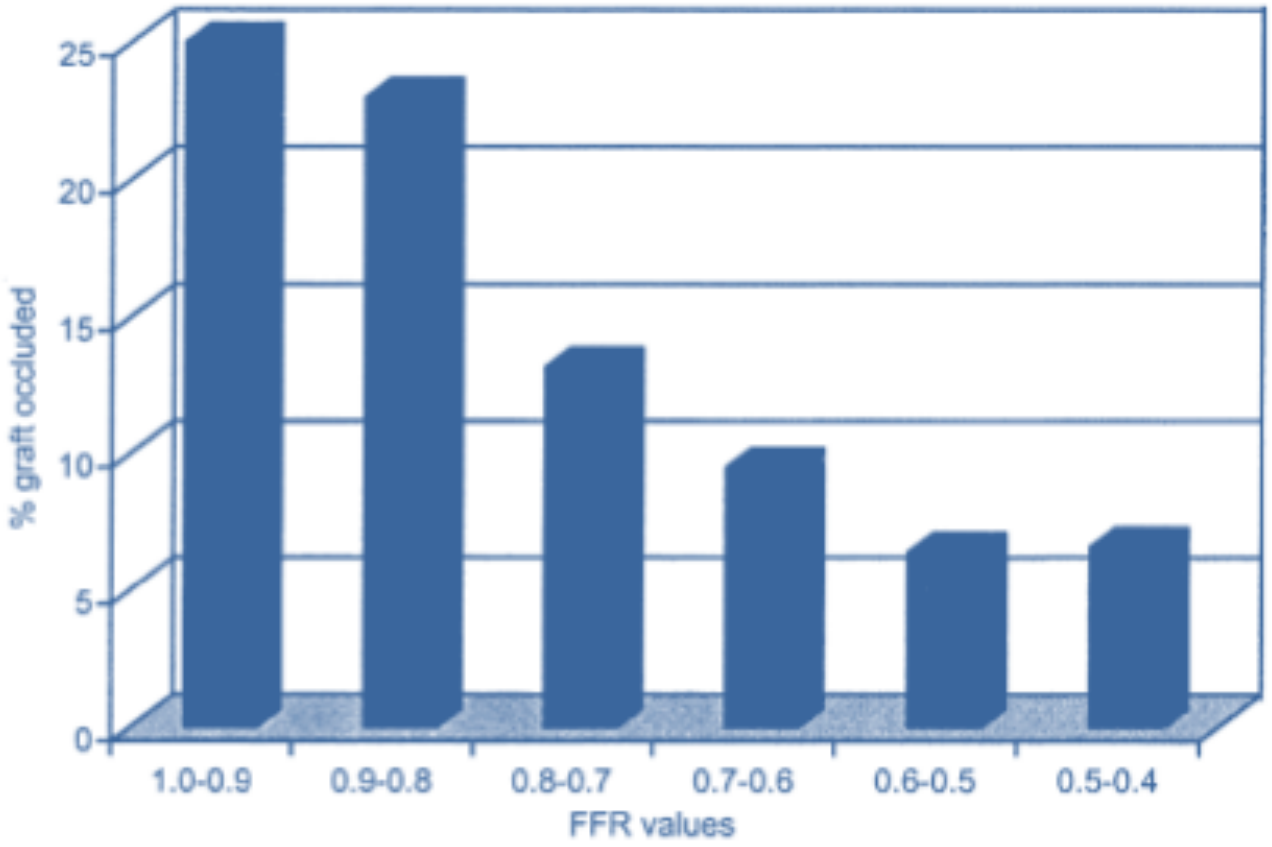
FFR vs angiography-guided CABG

Graft patency

Failure of grafts at 1 year implanted on arteries with non-significant FFR is 3 times higher



Botman et al. Ann Thorac Surg 2007

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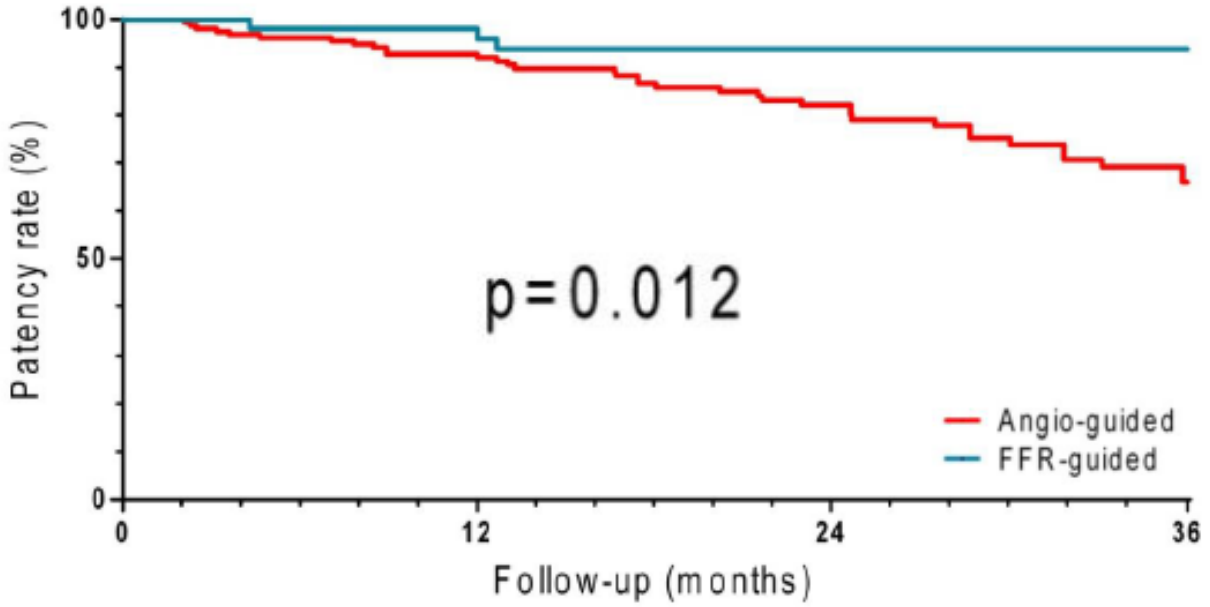
FFR vs angiography-guided CABG

Graft patency

Rate of graft occlusion is 4 times lower
in the FFR-guided CABG compared with the angiography-guided CABG



Angio-guided:	174	128	83	39
FFR-guided:	60	47	26	16

Toth G et al. *Circulation* 2013

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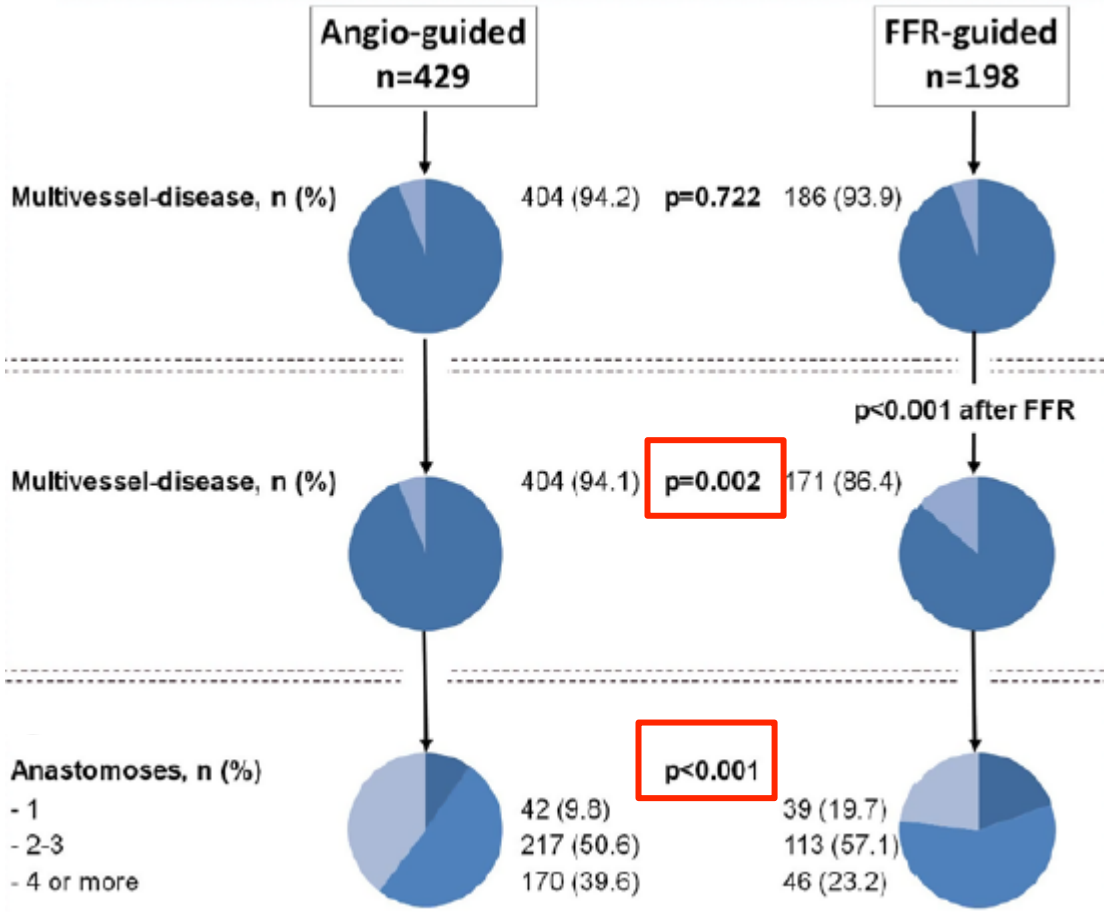
FFR vs angiography-guided CABG

Procedural Differences in Coronary Artery Bypass Graft Surgery



Rate of on-pump surgery	269 (69%)	97 (49%)	p<0.001

Toth G et al. *Circulation* 2013

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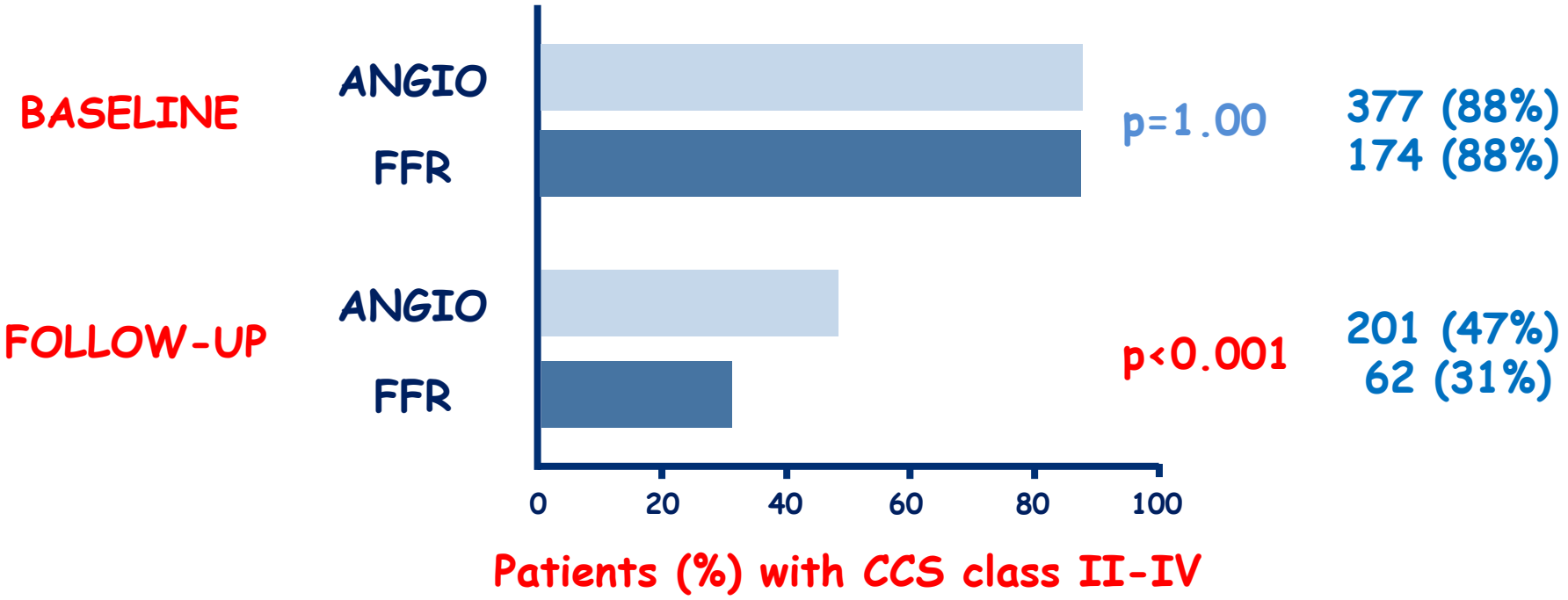
FFR vs angiography-guided CABG

CCS class II-IV

At 3 years of follow-up the rate of CCS class II to IV is significantly lower in the FFR-guided CABG compared with the angiography-guided CABG



Toth G et al. *Circulation* 2013

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FFR vs angiography-guided CABG

UCSC Interventional Cardiology

Graft Patency After FFR-guided versus Angio- guided CABG: a randomized clinical Trial (GRAFFITI trial)

www. Clinicaltrial.gov NCT01810224

Principal investigators:
Emanuele Barbato
Bernard De Bruyne
Gabor Toth

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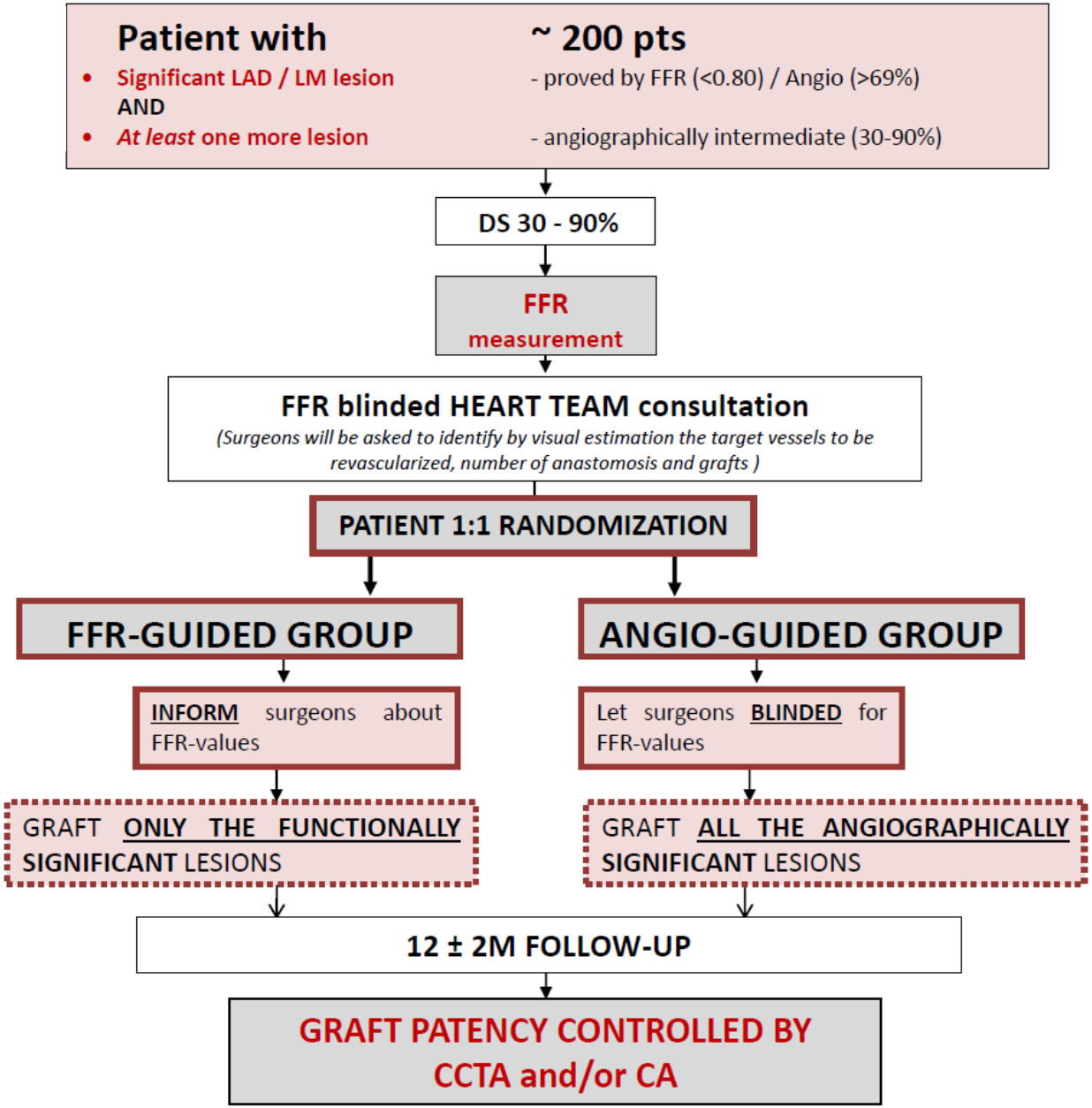
GRAFFITI Trial: study design



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GRAFFITI Trial: endpoints

Primary : - Rate of **occluded grafts** at 12M FU

Secondary:

- Graft **patency** at 12M FU (defined as average percent of patent graft per patient)
- Perioperative **myocardial infarction** and **periprocedural necrosis** - Changes in Syntax Score classification regarding to Angio-guided vs FFR guided calculation
- Length of **hospitalization** after surgery
- **Cost of Care**: defined as costs of index hospitalization, re-hospitalization, repeat revascularization (redo-CABG or PCI)
- Changes in **surgical strategy** depending upon FFR results i.e. Open-chest vs. Minithoracotomy, On-pump vs. Off-pump, etc.(*in FFR-guided group only*)
- Changes in **functional state** (CCS classification) - Rate of **Major Adverse Cardiovascular Events** (Death, Myocardial Infarction, Symptom-driven revascularisation)

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The present day potential role of fractional flow reserve–guided coronary artery bypass graft surgery

Filip Casselman, MD, PhD, FETCS,[a] Johan Van der Merwe, MD, MMED(Thorax),[a] Angela Ferrara, MD,[a] and Emanuele Barbato, MD, PhD, FESC[a,b]

J Thorac Cardiovasc Surg 2016;151:933-4

CONCLUSIONS

FFR-guided CABG is now under intense investigation and may have an important role in determining whether angiographically intermediate stenoses should be bypassed,

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Conclusions

EDITORIAL COMMENTARY

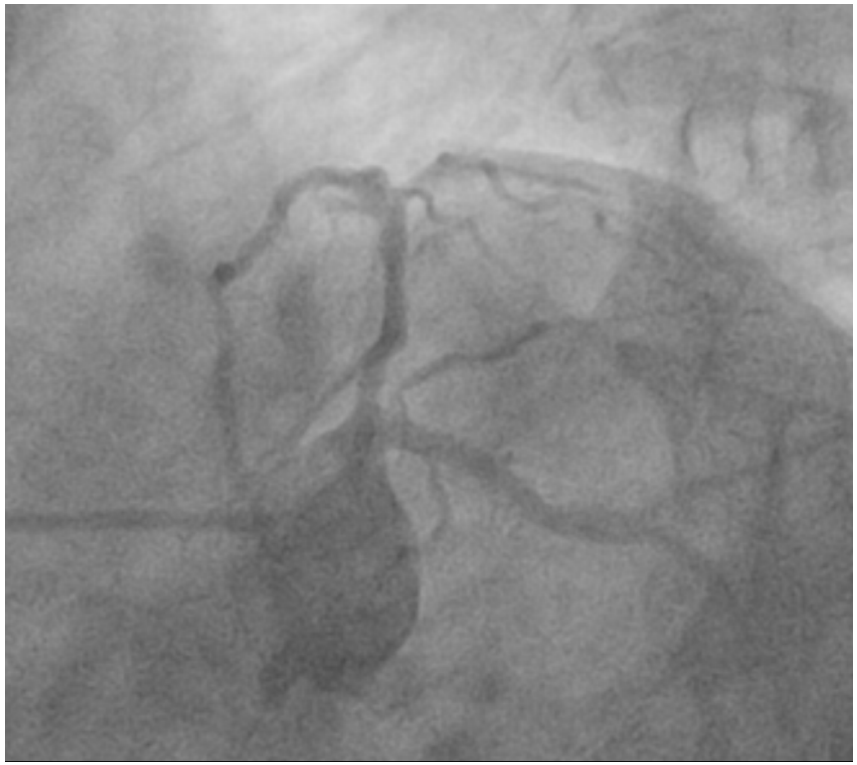
FFR 4 CABG: More than a vanity plate

Jack H. Boyd, MD

J Thorac Cardiovasc Surg 2016;151:933-4

FFR vs angio-guided surgery

FFR vs angio-guided surgery



Role of FFR in Surgical Candidates:

- in patients with multivessel disease

- in patients with valve disease

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Fractional Flow Reserve–Guided Revascularization in Patients With Aortic Stenosis

Giuseppe Di Gioia, MD[a,b], Mariano Pellicano, MD[a,b], Gabor G. Toth, MD[a,c], Filip Casselman, MD, PhD[a], Julien Adjedj, MD[a], Frank Van Praet, MD[a], Angela Ferrara, MD[a], Bernard Stockman, MD[a], Ivan Degrieck, MD[a], Jozef Bartunek, MD, PhD[a], Bruno Trimarco, MD[b], William Wijns, MD, PhD[a], Bernard De Bruyne, MD, PhD[a], and Emanuele Barbato, MD, PhD[a,b,*]

(Am J Cardiol 2016;117:1511–1515)

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FFR in valve disease

Retrospectively study from 2002 to 2010

106 pts with AS and significant CAD in whom at least one intermediate lesion was either revascularized with an FFR value 0.80 or deferred with FFR >0.8 (**FFR-guided group**)

212 pts matched from 694 pts contemporary patients in whom the decision to revascularize was based on angiography only, represented comparator (**angio-guided group**)

FFR guidance impacts the management of selected patients with moderate or severe AS and coronary artery disease by resulting into:

- deferral of aortic valve replacement (46% vs 57%; p=0.056),
- more patients treated with percutaneous coronary intervention (24% vs 13%; p=0.019),
- and in patients treated with CABG, less venous grafts (0.5±0.69 vs 0.73±0.76; p=0.05) and anastomoses (0.61±0.85 vs 0.94±1; p= 0.032) without increasing adverse event rates up to 5 years.

Di Gioia G et al, *Am J Cardiol 2016*

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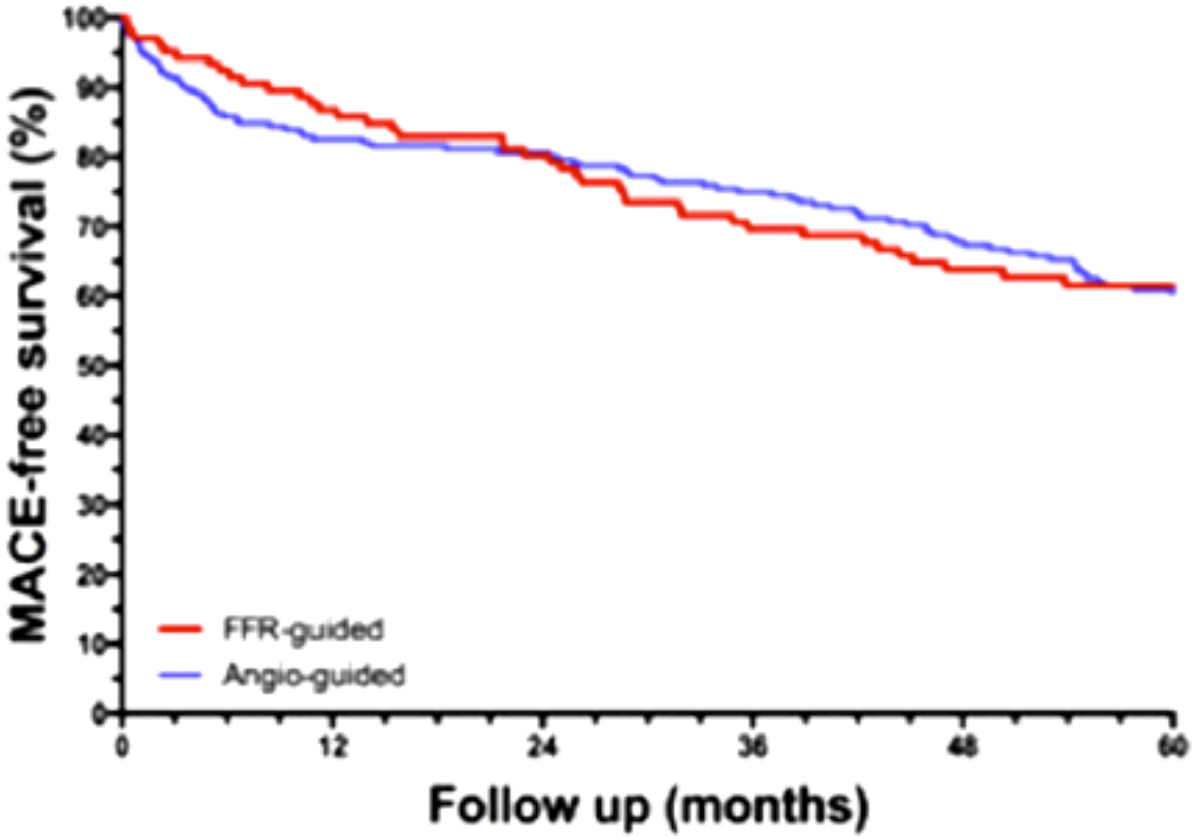
FFR in valve disease

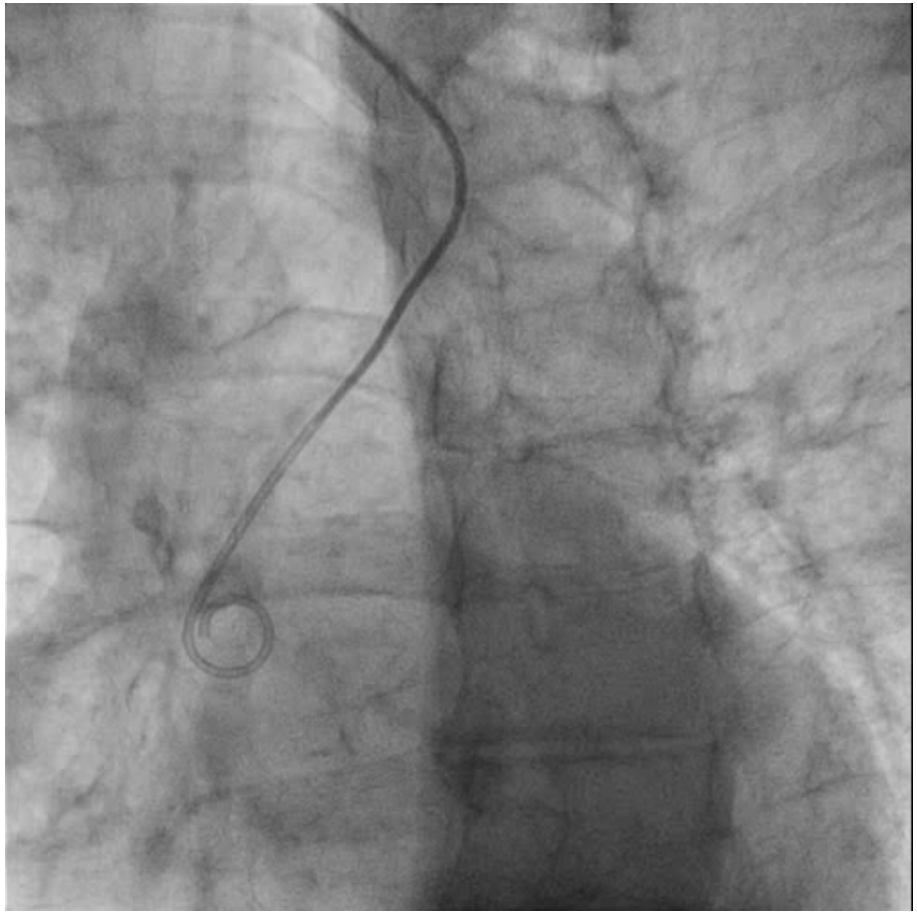


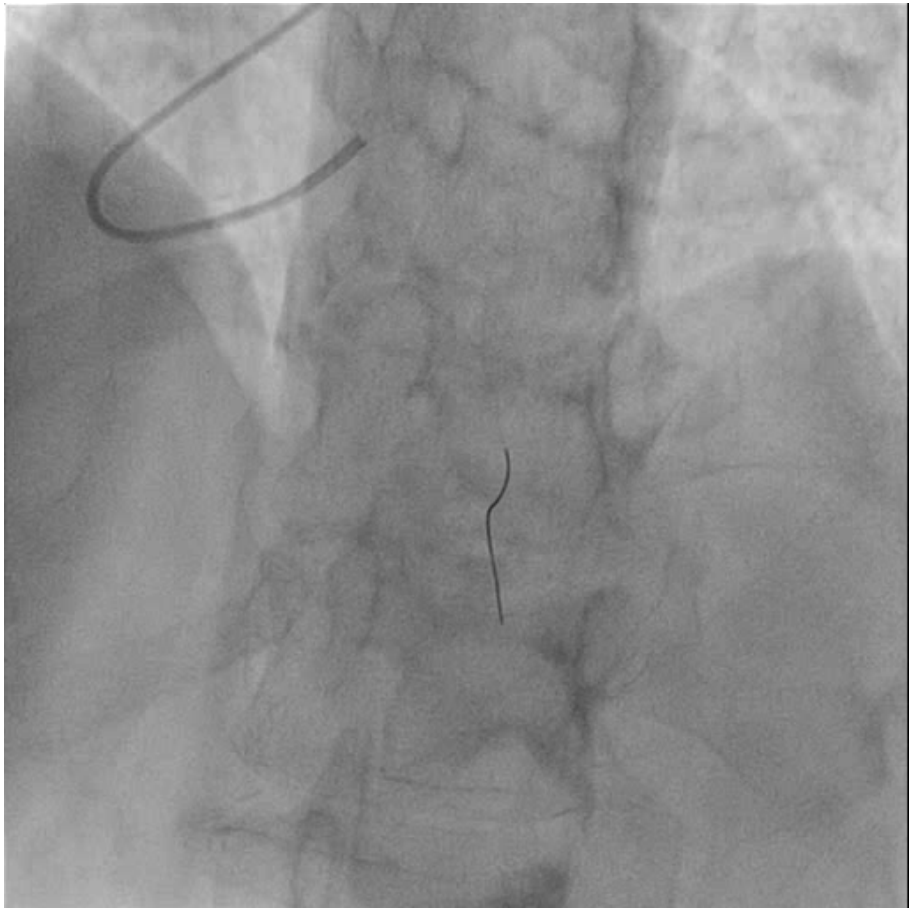
p=0.098

FFR-guided	106	78	45 -guided
Angio-guided	212	165	101 -guided

Di Gioia G et al, *Am J Cardiol 2016*

FFR vs angio-guided surgery





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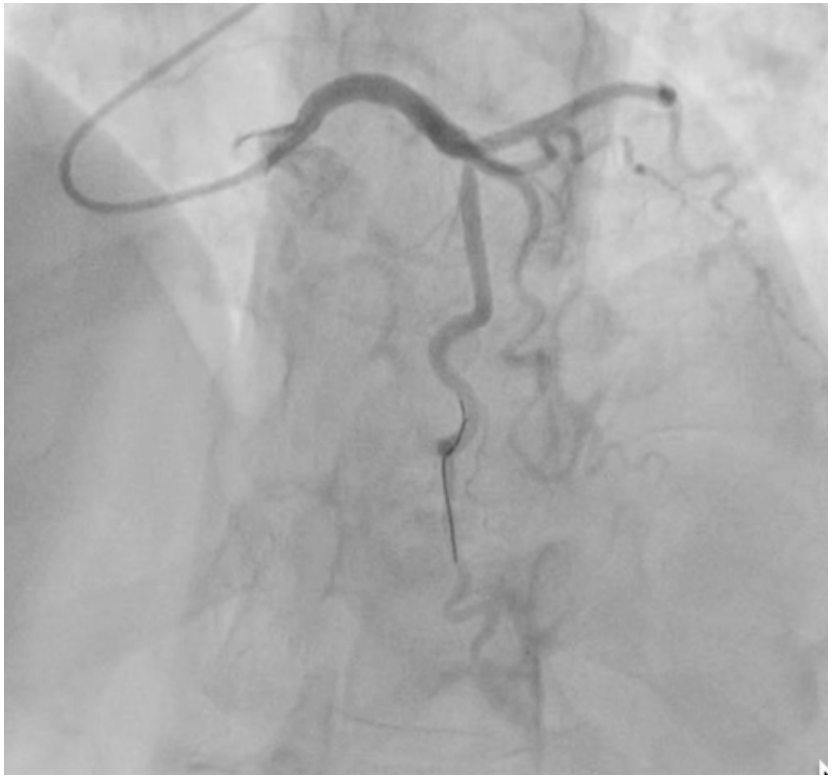
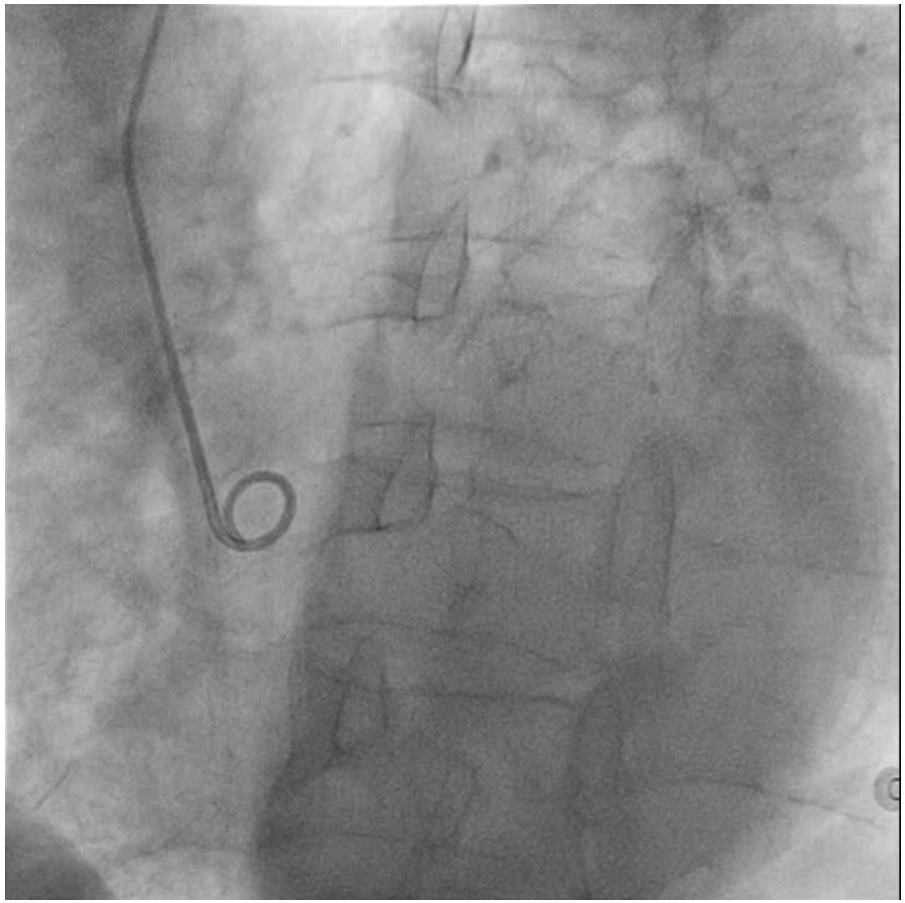
FFR vs angio-guided surgery



FFR vs angio-guided surgery



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FFR vs angio-guided surgery

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FFR in Surgical Candidates

Luxury

Necessity

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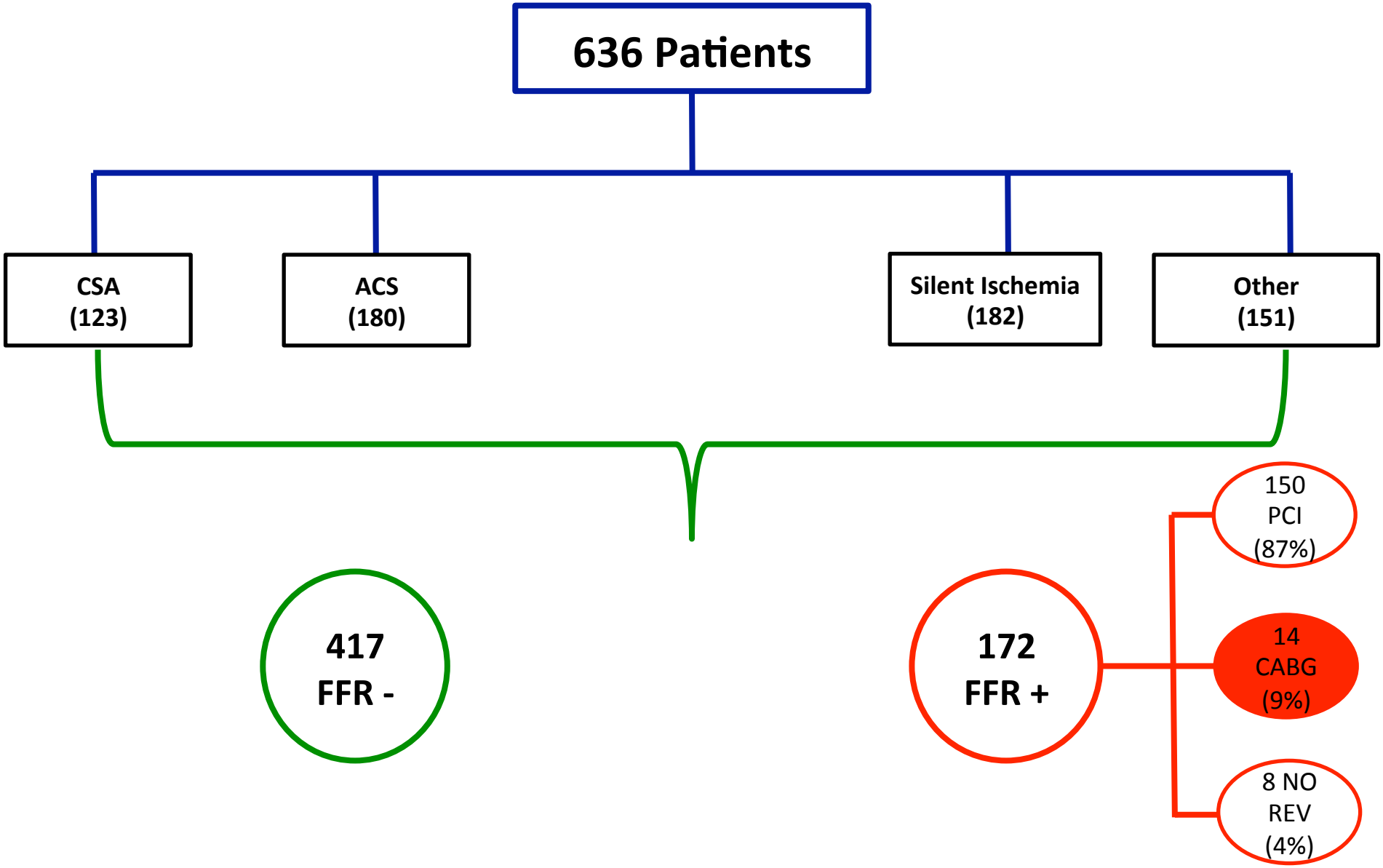
FFR in Real-life



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Conclusions

- ✓ FFR-guided PCI allows to achieve clinical results comparable to surgery in the majority of patients with multivessel disease

- ✓ FFR-guided Surgical revascularization, compared to the simpler angio-guided strategy, seems to be associated with a clinical benefit although this has yet to be demonstrated in randomized trials

- ✓ FFR-guided management of patients eligible for CABG and/or AVR results in better therapeutic selection but is still underused in clinical practice

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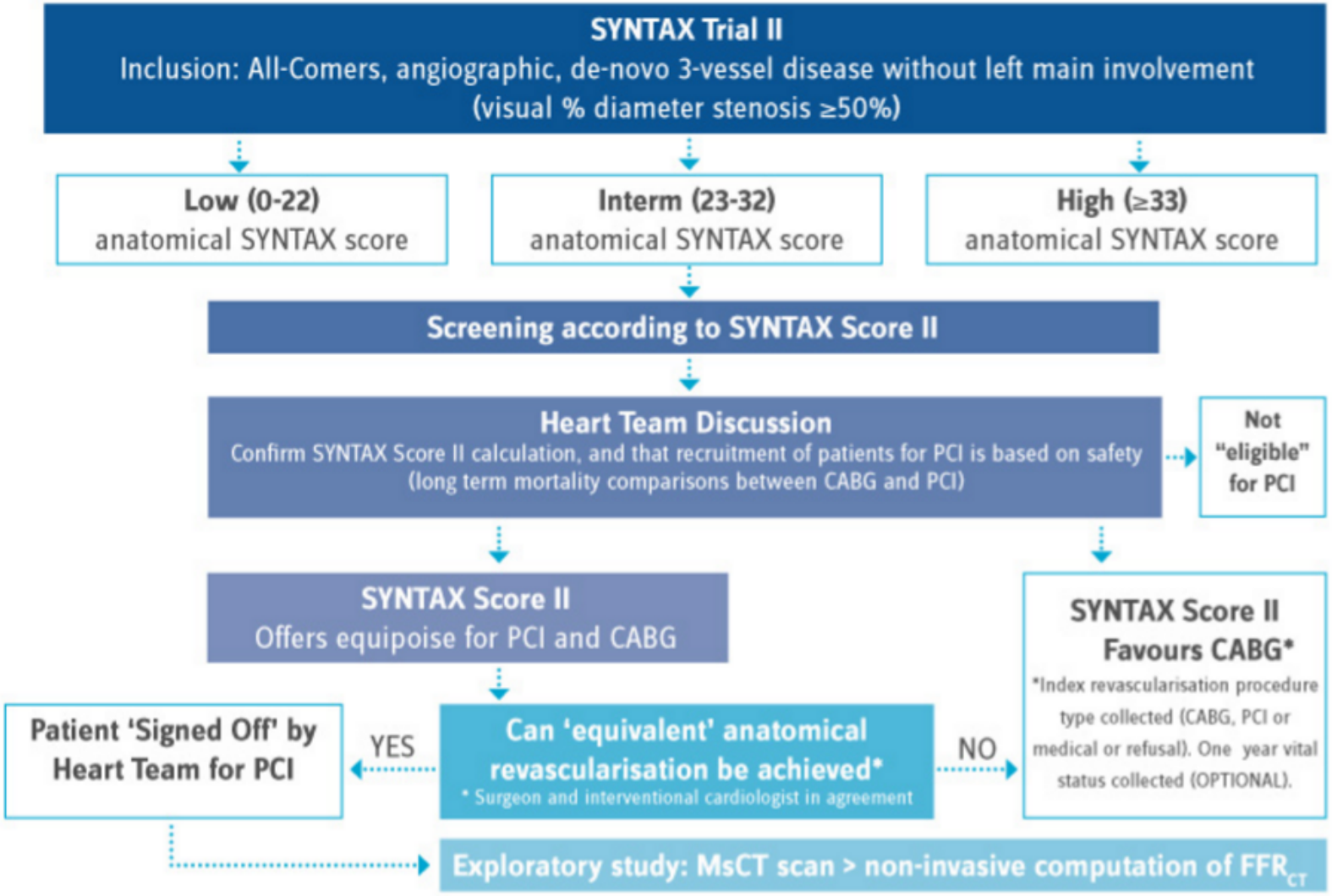
Syntax II study design



Serruys PW *EuroPCR 2016*

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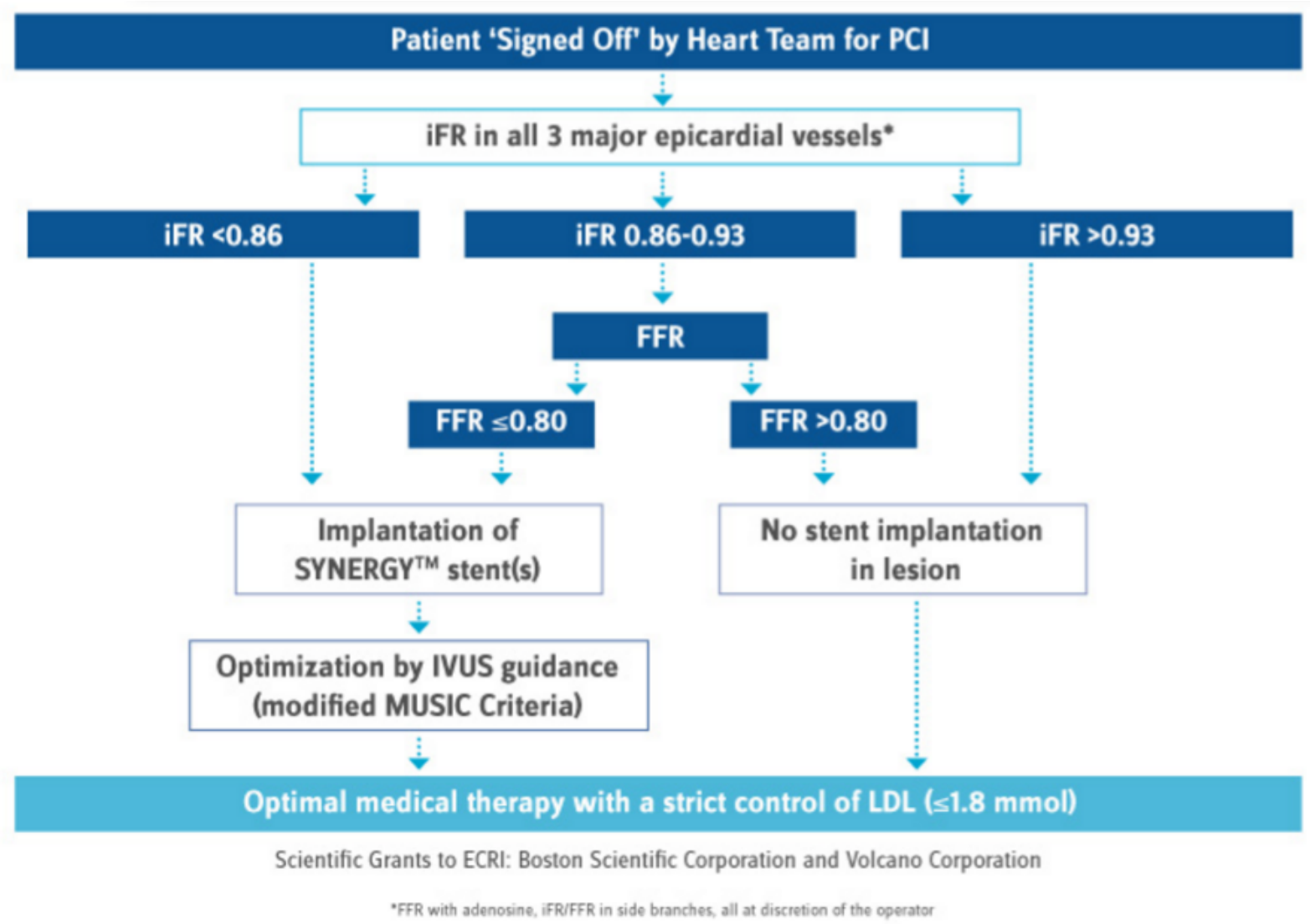
Syntax II study design



Scientific Grants to ECRI: Boston Scientific Corporation and Volcano Corporation

*FFR with adenosine, iFR/FFR in side branches, all at discretion of the operator

Serruys PW EuroPCR 2016

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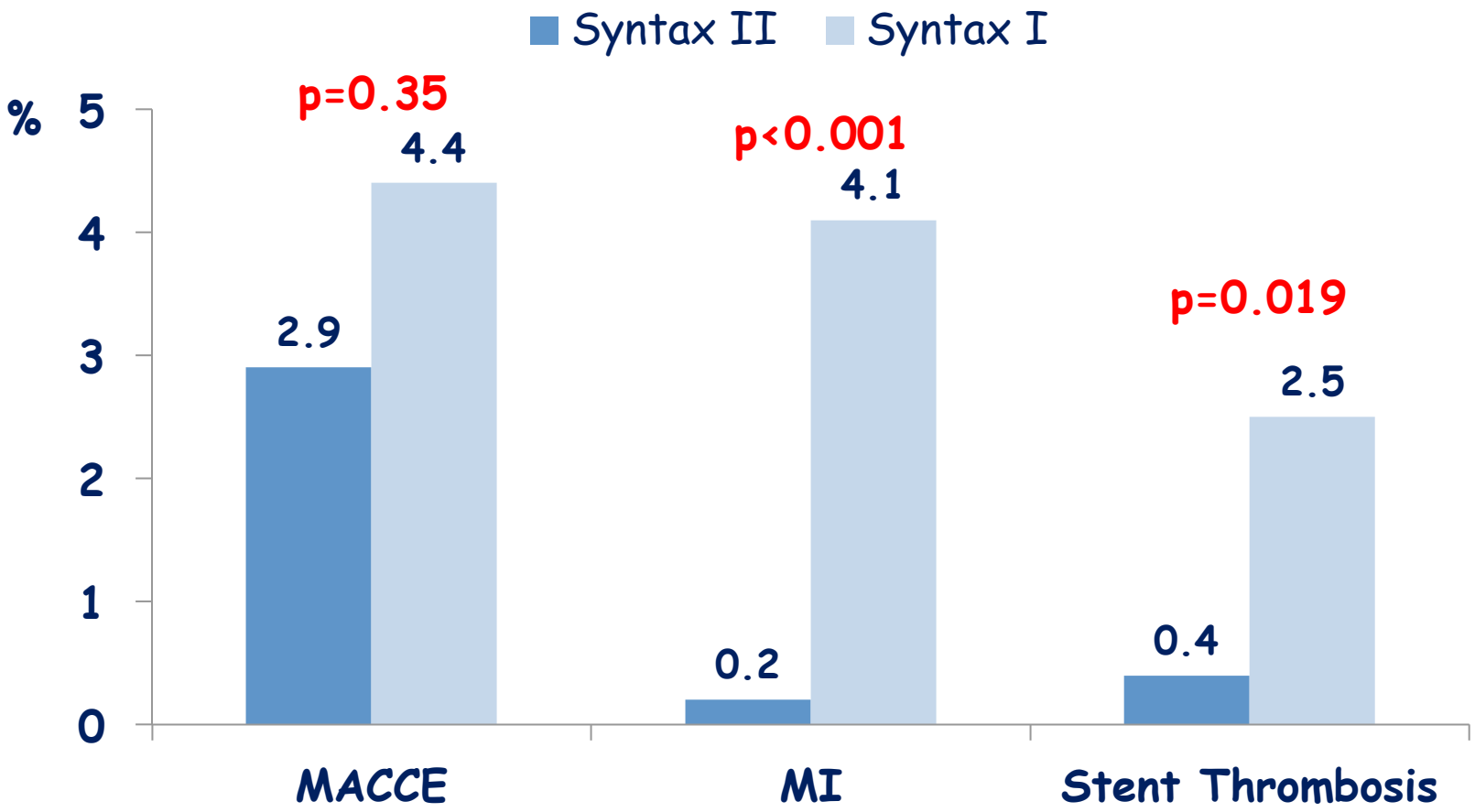
Syntax II: preliminary results

Outcomes at 30 days



Serruys PW *EuroPCR 2016*

There may be major differences in the manner in which high-flow passive conduits, such as saphenous vein grafts, and physiologically responsive intact nitric oxide–producing grafts, such as the internal thoracic artery, affect the long-term outcome when applied to a vessel that does or does not have physiologically obstructive disease measured by FFR.[29]

J Thorac Cardiovasc Surg 2016;151:933-4