



# Stabil Angina & PCI

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Elli Masoe, Kardiologi/PCI

# Case

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64 år man, DM2, hypertoni söker pga 8v bröstsmärta vid lättare- måttlig ansträngning. Nyligen varit på golfresa till Spanien och fick avsluta efter 9e hålet. Bröstsmärta när han tar ut soporna. Ingen viloangina.

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Läkemedel: Trombyl 75mg. Metformin. Enalapril 10mg.

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EKG Normalt.

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## Vad gör vi?

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1. Antianginös medicinering? OMT?

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2. OMT & A-EKG

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3. OMT & coronarangio

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4. OMT & CT kranskärl

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# COURAGE Trial

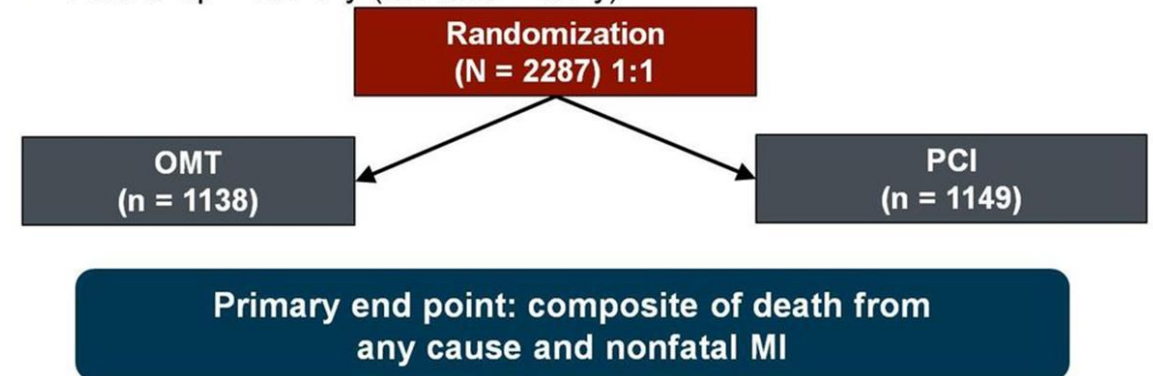
Boden WE et al. Courage Trial N Engl J Med 2007

- PCI vs OMT with CAD & on cath, and clinical evidence of ischemia.

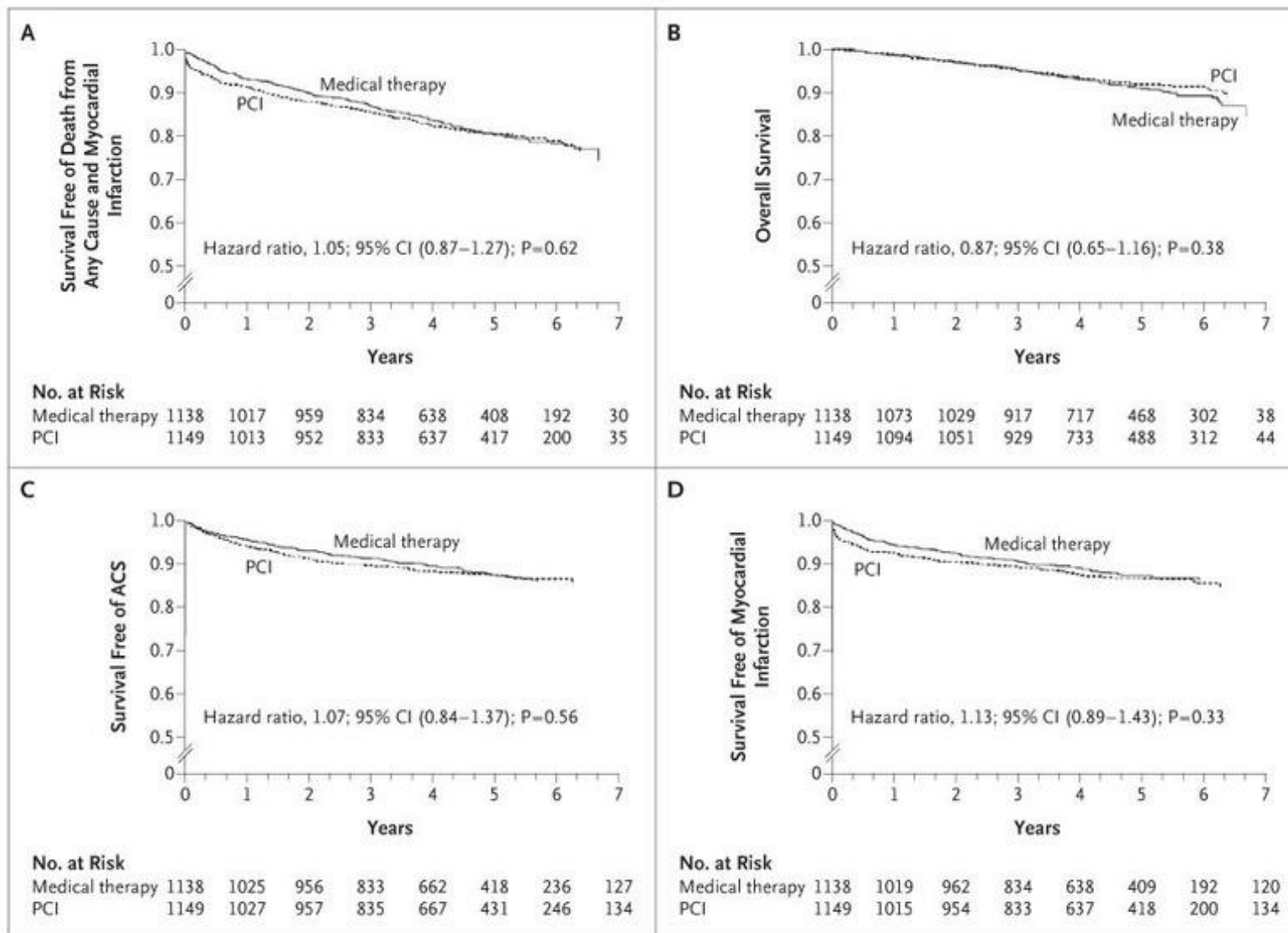
## COURAGE Trial

### *Optimal Medical Therapy (OMT) With or Without PCI for CAD*

- Patients with stable CAD:
  - Stenosis of  $\leq 70\%$  in  $\geq 1$  proximal epicardial coronary artery and objective evidence of MI or
  - $\geq 1$  coronary stenosis of  $\leq 80\%$  and classic angina without provocative testing
- Follow-up = 2.5-7 y (median = 4.6 y)



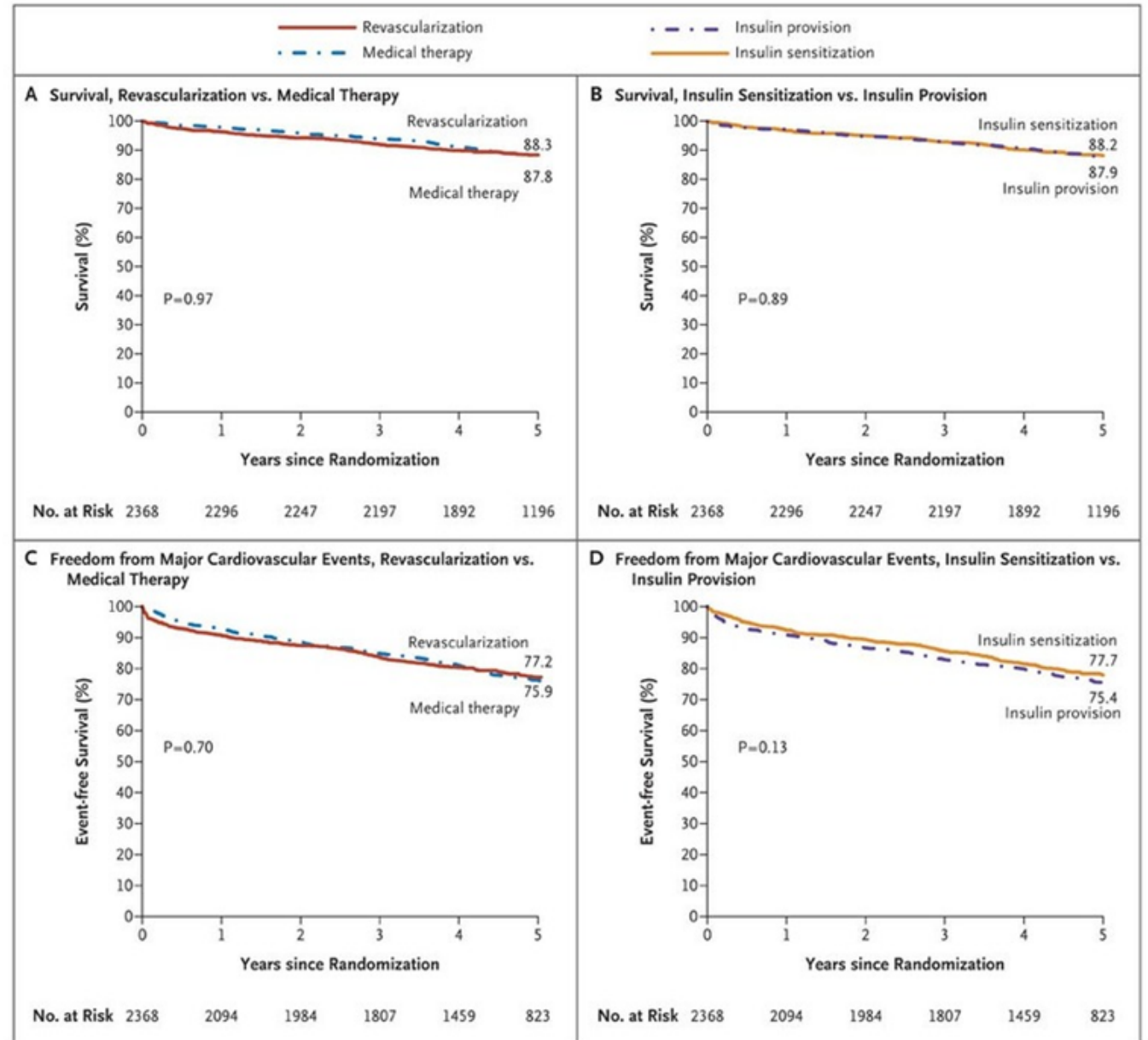
Boden WE, et al. *N Engl J Med.* 2007;356:1503-1516.<sup>[6]</sup>



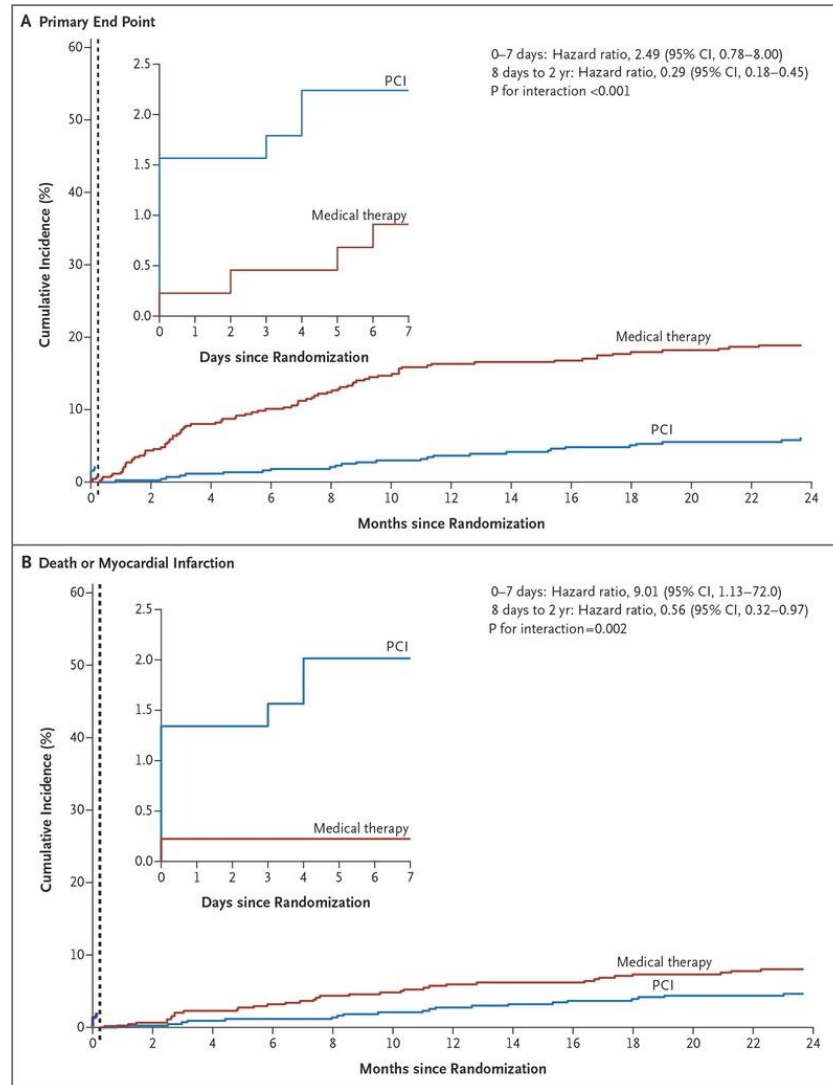
# BARI 2D Trial

BARI 2D Study Group NEJM 2009;360

- Early revas vs OMT  
N = 2368 DM2
  - Randomiserade i strata PCI & CABG, alt OMT



# FAME 2 Study FFR guided PCI De Bruyne et al FAME 2 NEJM 2014



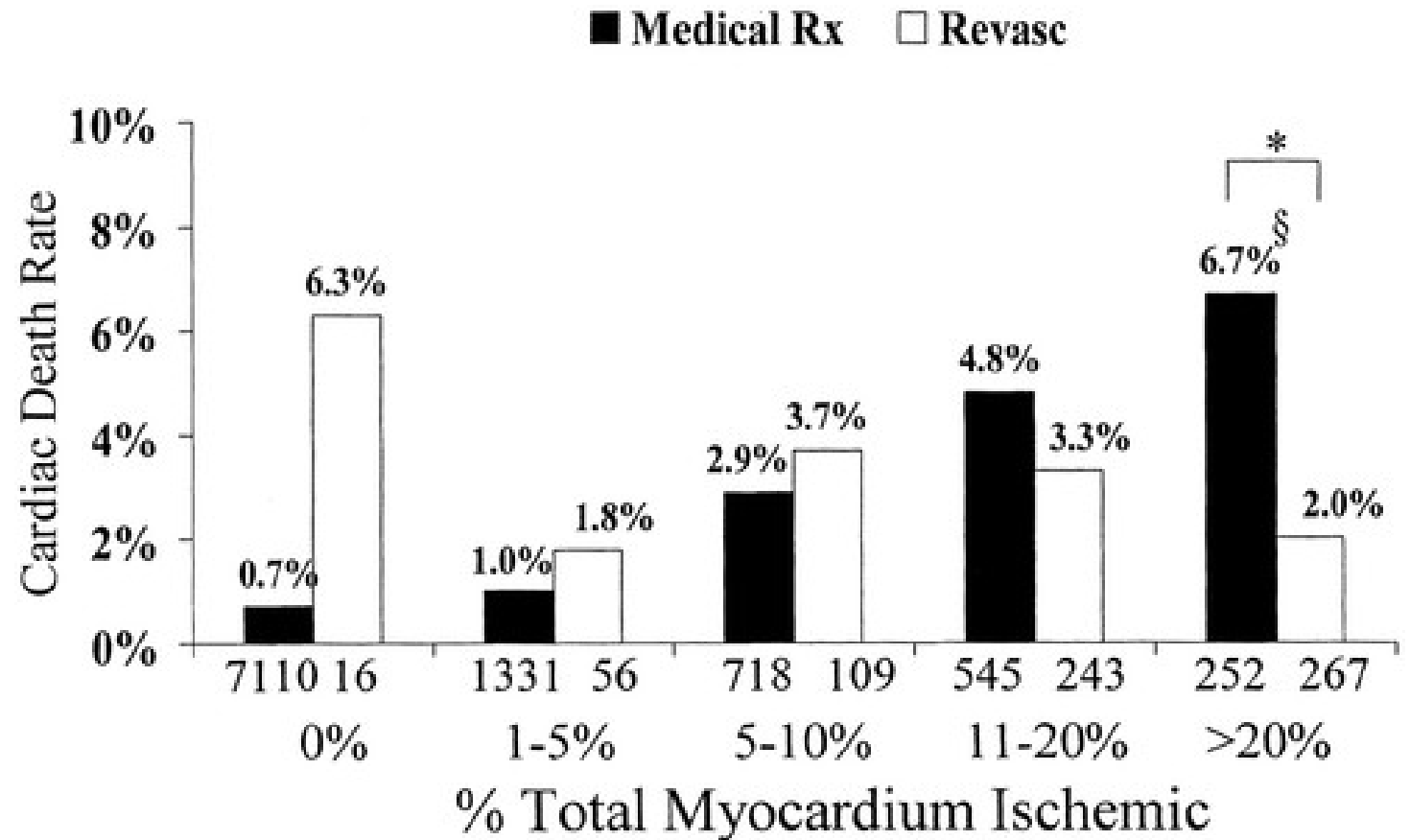
- Fractional flow reserve (FFR) <8,0 functionally sign stenosis.
- PCI vs OMT in N = 988 with coronary stenosis, FFR <0,8
- Death, non fatal MI, urgent revasc 8,1% vs 19,5%.
  - No difference in death or MI
  - Landmark analysis censored events in first 7d

## Ischemic burden & Outcomes

Hachamovitch R et al.

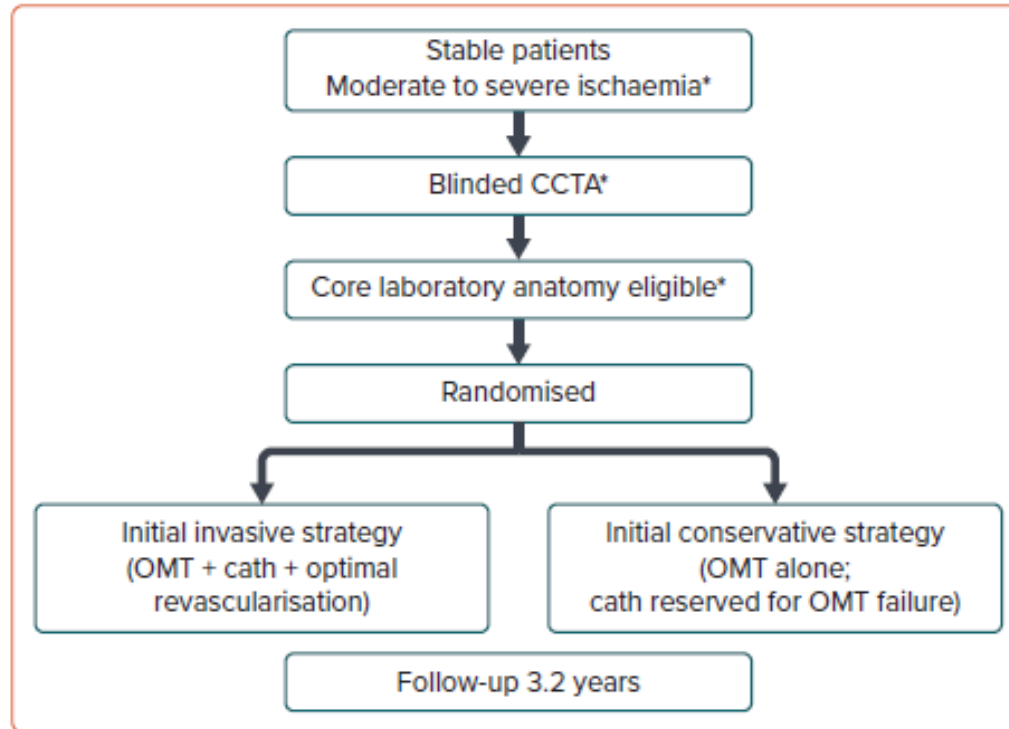
Circulation 2003; 107: 2900-2907

- Observational study from Cedars- Sinai nuclear lab



# ISCHEMIA Study Design

Figure 2: ISCHEMIA Trial Design



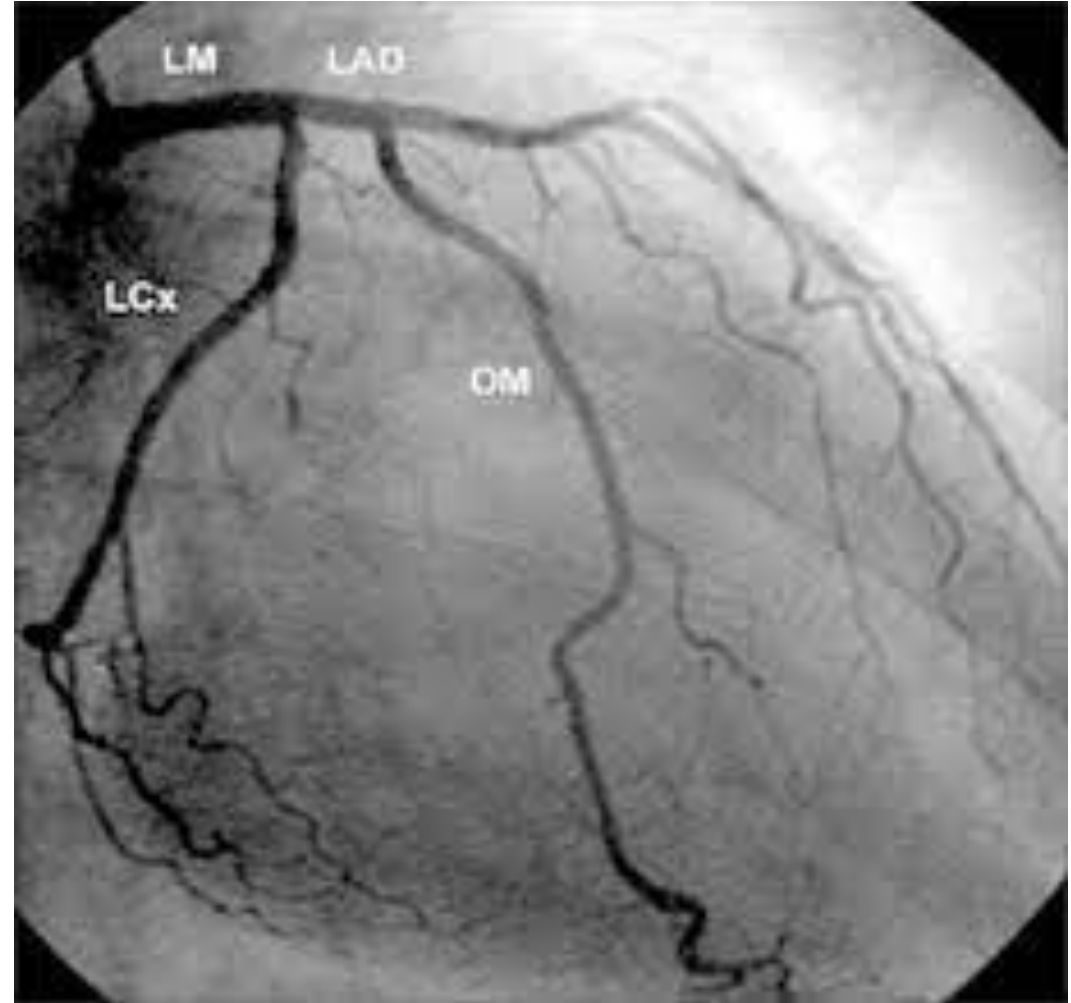
\*Central laboratory evaluation. Cath = catheterisation; CCTA = coronary CT angiography; OMT = optimal medical therapy.

- 8518 enrolled
  - Diagnostiserades: Skint. MR. A-EKG. Stress EKO.
- 3339 Screen failure insufficient ischemia, no obstructive CAD, unprotected LMD
- 5179 randomiserades
- 2588 PCI
- 2591 OMT

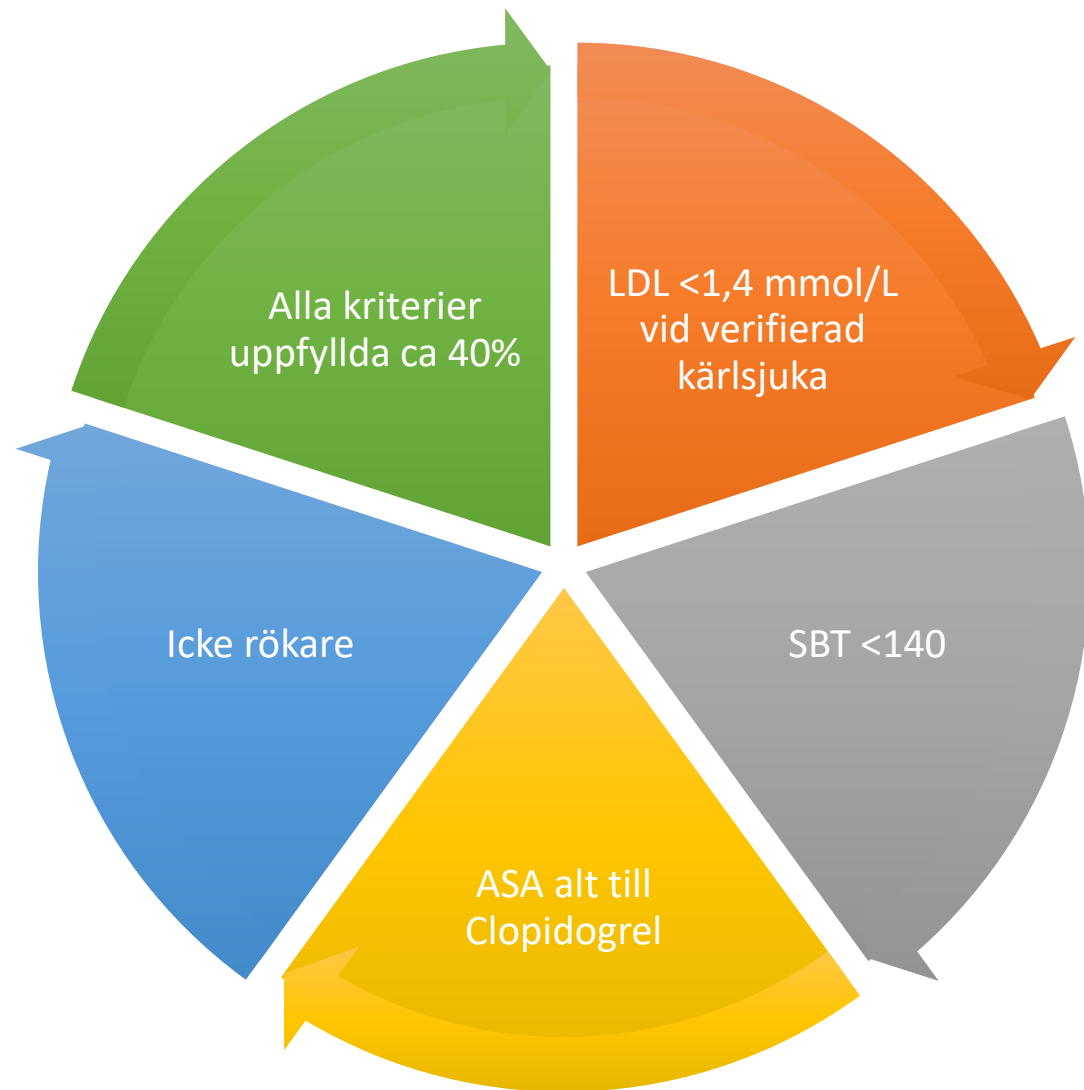


# Coronary Anatomy

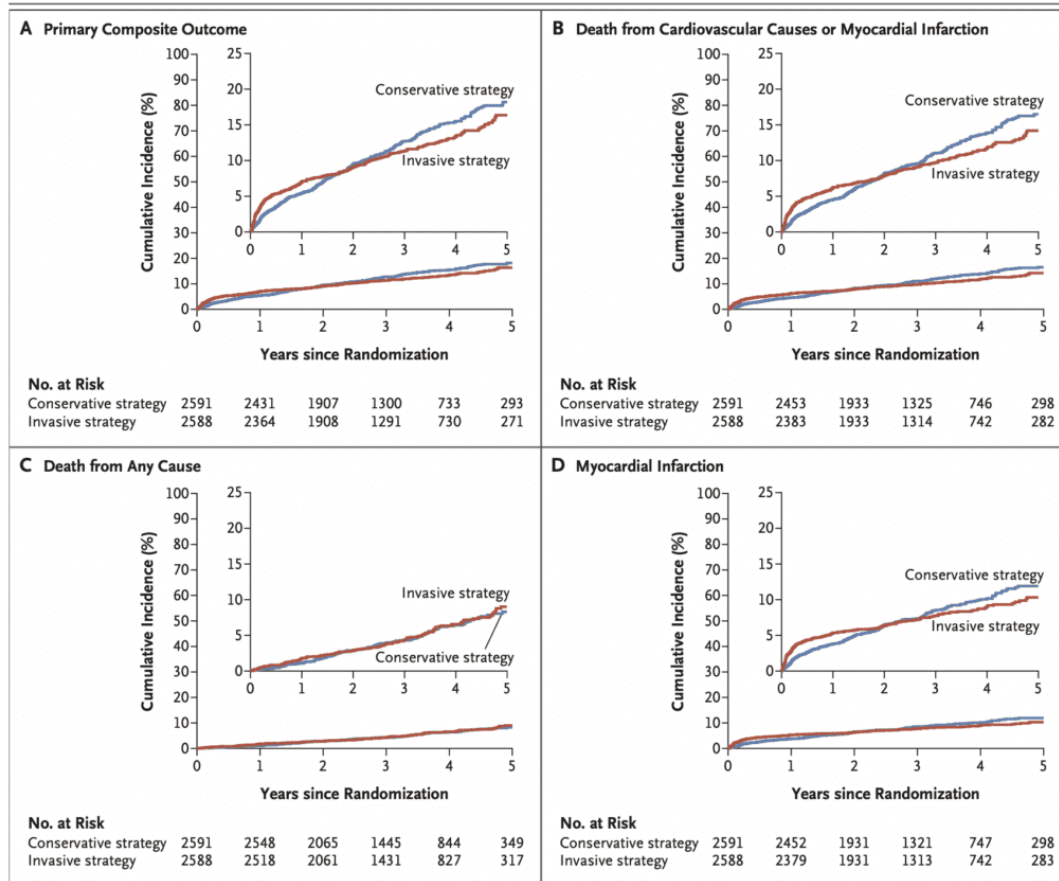
- 47% proximal stenosis
- LAD 87%
- 3VD in 46%



# OMT Medical therapy Optimization

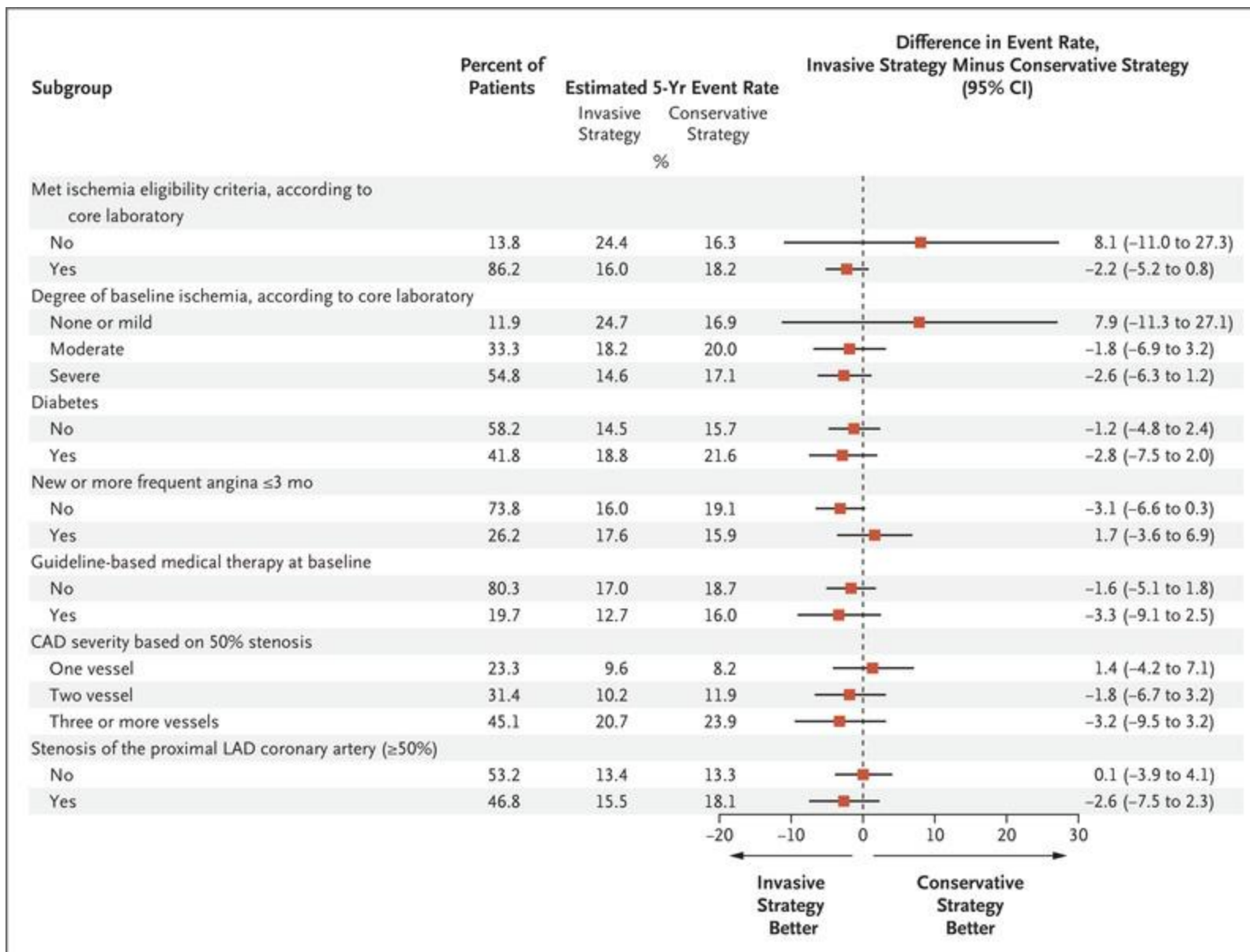


# ISCHEMIA



**Figure 2. Time-to-Event Curves for the Primary Composite Outcome and Other Outcomes.**

Panel A shows the cumulative incidence of the primary composite outcome of death from cardiovascular causes, myocardial infarction, or hospitalization for unstable angina, heart failure, or resuscitated cardiac arrest in the conservative-strategy group and the invasive-strategy group. Panel B shows the cumulative incidence of death from cardiovascular causes or myocardial infarction. Panel C shows the cumulative incidence of death from any cause, and Panel D shows the cumulative incidence of myocardial infarction. In each panel, the inset shows the same data on an enlarged y axis.



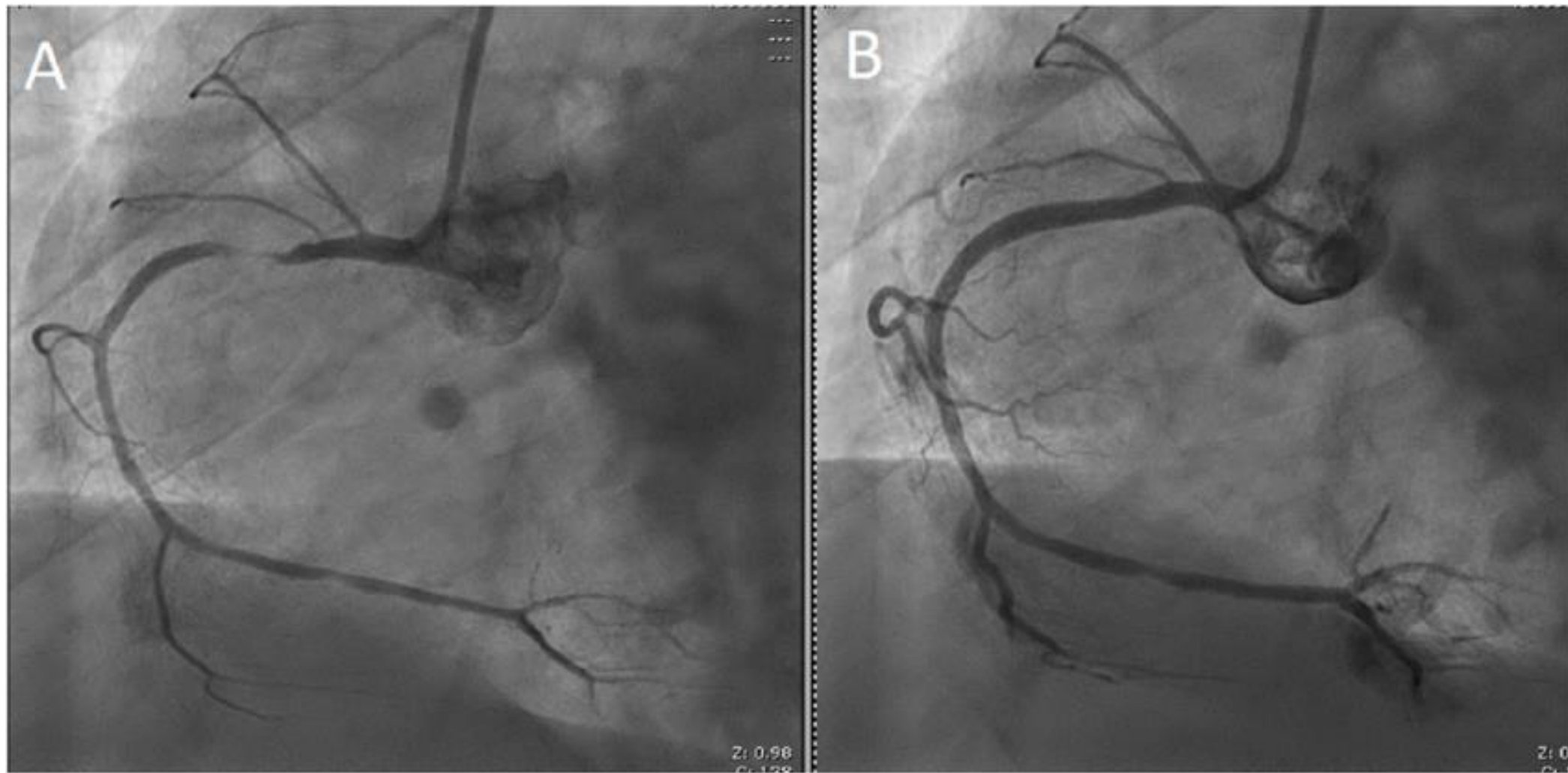
**Table 1: Contemporary Randomised Controlled Trials of Medical Therapy with Revascularisation Versus without Revascularisation in Patients with Stable Ischaemic Heart Disease**

	<b>COURAGE<sup>8</sup></b>	<b>BARI 2D<sup>9</sup></b>	<b>FAME 2<sup>10</sup></b>	<b>ISCHEMIA<sup>19</sup></b>
Enrolment period	1999–2004	2001–2005	2010–2012	2012–2018
Patients (n)	2,287	2,368	888	5,179
Clinical characteristics	SIHD	Diabetes and SIHD or UIHD	SIHD	SIHD
Ischaemia evidence	Non-invasive ischaemia evidence or >80% stenosis + classic angina	Non-invasive ischaemia evidence or ≥70% stenosis + classic angina	FFR ≤0.80	Moderate or severe non-invasive ischaemia evidence
Coronary anatomy	Stenosis >70% by ICA (left main >50% excluded)	Stenosis >50% by ICA (left main >50% excluded)	Stenosis >50% by ICA (left main >50% excluded)	ICA not required (blinded CCTA to exclude non-obstructive CAD and left main >50%)
Revascularisation	PCI (BMS)	PCI (BMS or first-generation DES) or CABG	PCI (second-generation DES)	PCI (second-generation DES) or CABG
Follow-up period (years)	Median 4.6 (IQR 3.3–5.7)	Mean 5.3 (range 3.4–7.8)	5	Median 3.2 (IQR 2.1–4.3)
Primary endpoint outcome	No difference in all-cause death and MI	No difference in all-cause death	PCI reduced all-cause death, MI and urgent revascularisation (no difference in death or MI)	No difference in CV death, MI, unstable angina, CHF and resuscitated CV death
Quality of life	Improved by PCI out to 2 years	Improved by revascularisation	No difference (PCI reduced angina)	Improved by revascularisation

*BMS = bare metal stent; CABG = coronary artery bypass grafting; CCTA = coronary CT angiography; CHF = congestive heart failure; CV = cardiovascular; DES = drug-eluting stent; FFR = fractional flow reserve; ICA = invasive coronary angiography; IQR = interquartile range; PCI = percutaneous coronary intervention; SIHD = stable ischaemic heart disease; UIHD = unstable ischaemic heart disease.*



Titta Så fint det blev!

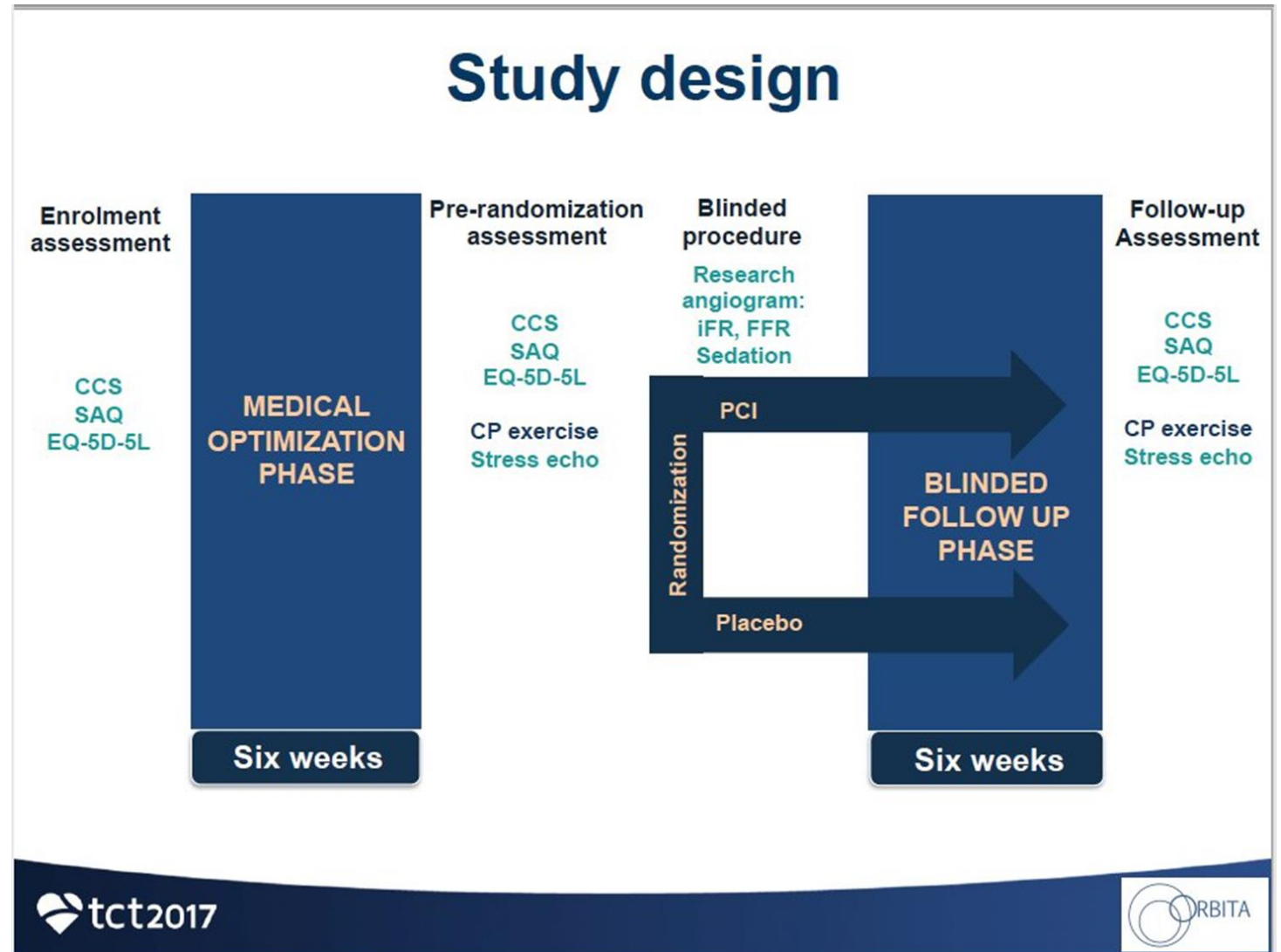


# ORBITA

## Orbita Investigators.

### The Lancet 2018:391

- PCI vs sham in stable angina
- QOL study (exercise time, angina relief)
- Båda grupperna förbättrades, ingen signifikant skillnad i träningstid, eller livskvalitet
- Limitation: Få med i studien, 1 kärlsjuk, mild ischemi, och patienter som ville delta



	<b>ORBITA</b>	<b>ORBITA-2</b>
Background anti-anginal meds	Continued	Discontinued
PCI strategy	As add-on therapy to OMT	As alternative therapy to OMT
Primary outcome	ETT exercise time	Angina score w/ app
Stenosis assessment	Angio (iFR/FFR done per research protocol)	Angio + invasive physiologic
Number of stenotic vessels	Single vessel disease	MV disease included
Run-in	6 weeks	2 weeks
Follow-up	6 weeks	12 weeks



ORIGINAL ARTICLE

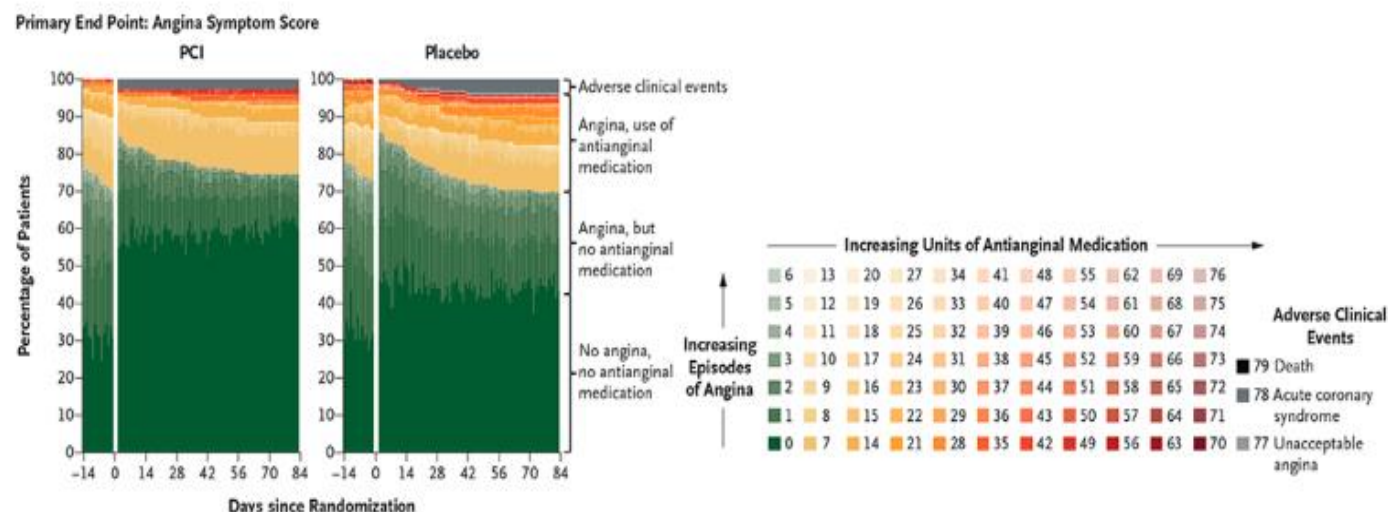
# A Placebo-Controlled Trial of Percutaneous Coronary Intervention for Stable Angina

Christopher A. Rajkumar, M.B., B.S., Michael J. Foley, M.B., B.S., Fiyyaz Ahmed-Jushuf, M.B., B.S., Alexandra N. Nowbar, Ph.D., et al., for the ORBITA-2 Investigators\*

November 11, 2023

DOI: 10.1056/NEJMoa2310610

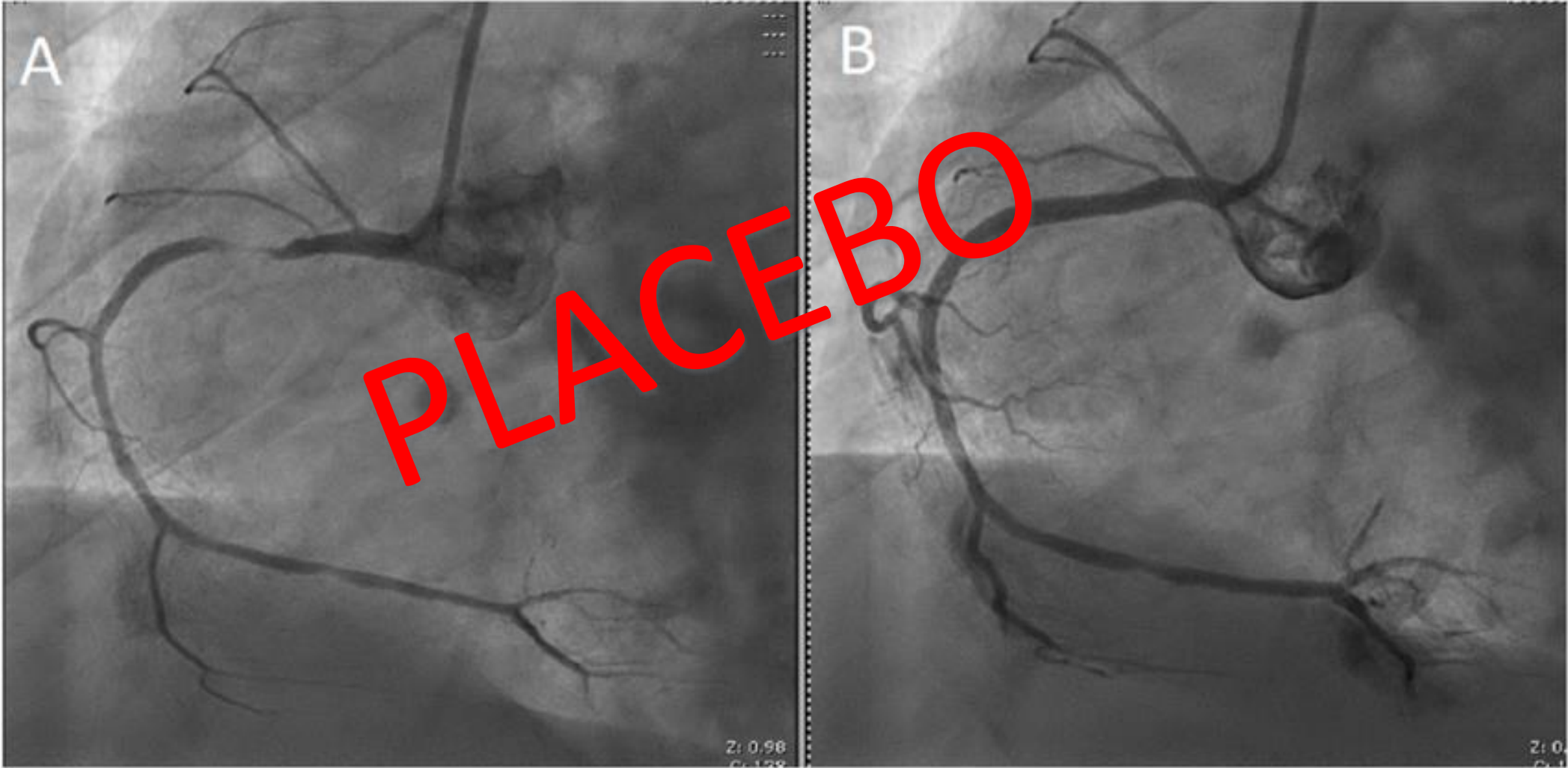
- 301 patienter CCS 1-2, 80% 1-kärl, FFR-pos
- Alla antianginösa läkemedel ut 2v
- Randomisering till PCI eller placebo (sham)
- Angina symtom score 2,9 vs 5,6 p
- Freedom from Angina 40 vs 15%



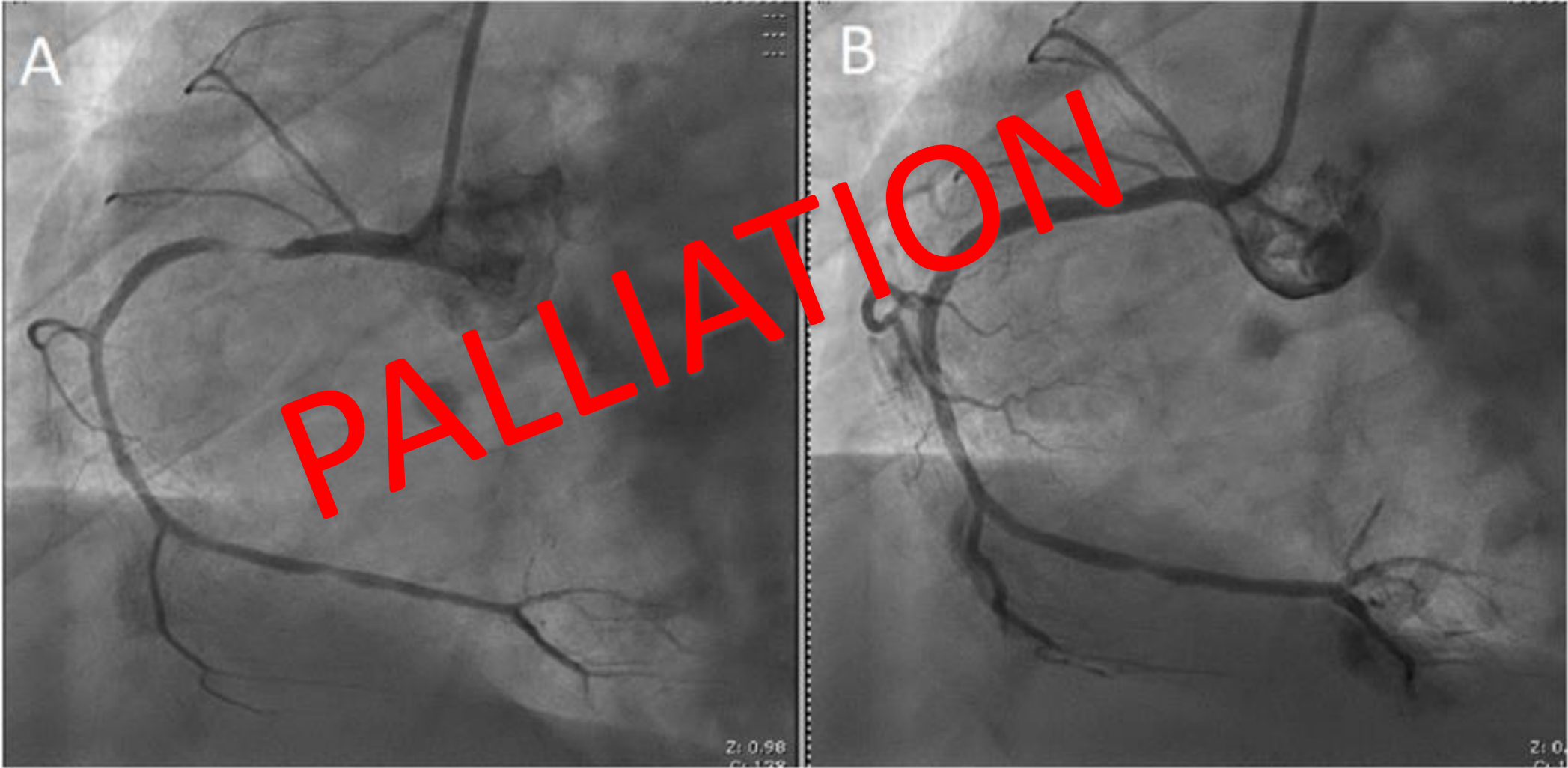
ORIGINAL ARTICLE

## Percutaneous Coronary Intervention for Stable Angina

Titta Så fint det blev!



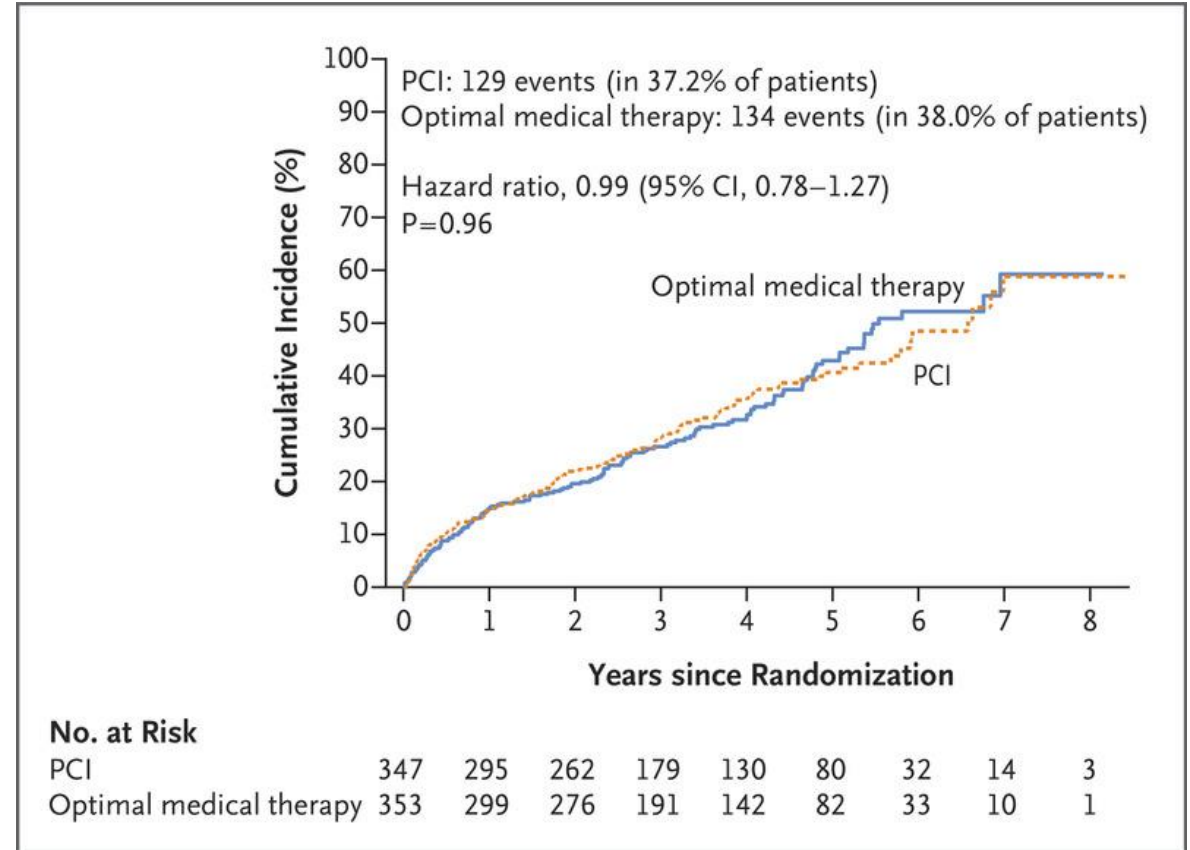
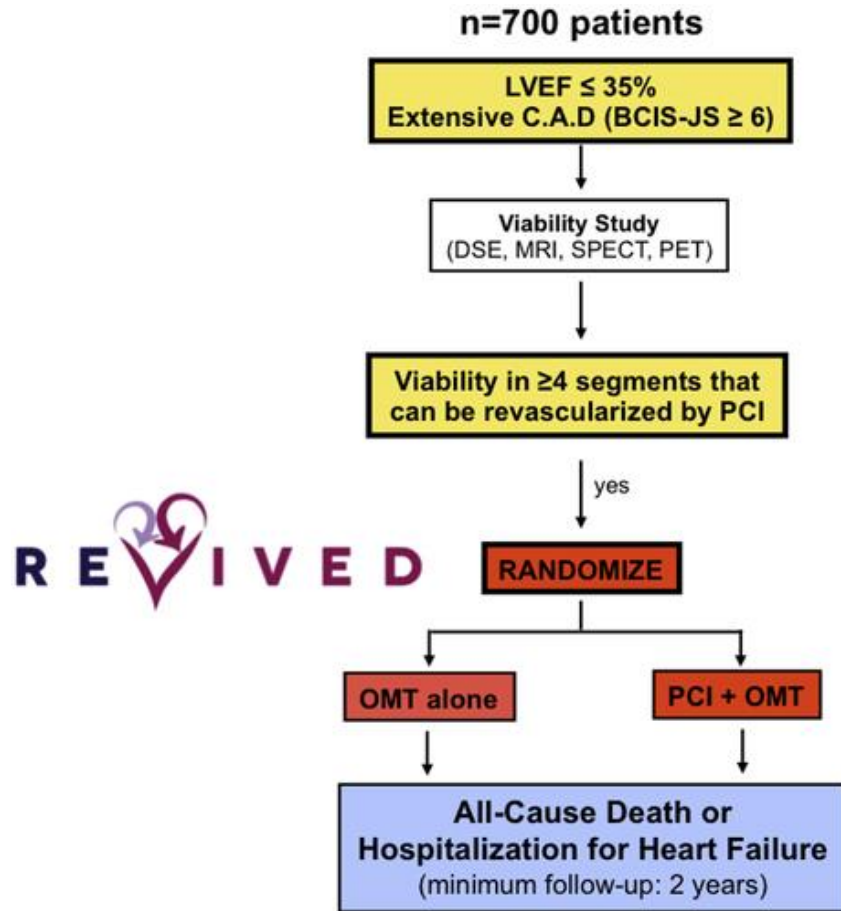
Titta Så fint det blev!



# REVIVED

Percutaneous Revascularization for Ischemic Left Ventricular Dysfunction

Divaka Perera, M.D., et al. NEJM N Engl J Med 2022; 387:1351-1360





# Cardiac mortality in patients randomised to elective coronary revascularisation plus medical therapy or medical therapy alone: a systematic review and meta-analysis

Eliano P. Navarese<sup>1,2,3\*</sup>, Alexandra J. Lansky<sup>4</sup>, Dean J. Kereiakes<sup>5</sup>, Jacek Kubica<sup>1,3</sup>, Paul A. Gurbel<sup>6</sup>, Diana A. Gorog<sup>7,8</sup>, Marco Valgimigli<sup>9</sup>, Nick Curzen<sup>10,11</sup>, David E. Kandzari<sup>12</sup>, Marc P. Bonaca<sup>13</sup>, Marc Brouwer<sup>14</sup>, Julia Umińska<sup>15</sup>, Milosz J. Jaguszewski<sup>16</sup>, Paolo Raggi<sup>2</sup>, Ron Waksman<sup>17</sup>, Martin B. Leon<sup>18,19</sup>, William Wijns<sup>20</sup>, and Felicita Andreotti<sup>21,22</sup>

<sup>1</sup>Interventional Cardiology and Cardiovascular Medicine Research, Department of Cardiology and Internal Medicine, Nicolaus Copernicus University, Bydgoszcz, Poland; <sup>2</sup>Faculty of Medicine, University of Alberta, Edmonton, Canada; <sup>3</sup>SIRIO MEDICINE research network, Poland; <sup>4</sup>Yale University School of Medicine, New Haven, CT, USA; <sup>5</sup>Christ Hospital and Lindner Research Center, Cincinnati, OH, USA; <sup>6</sup>Sinai Center for Thrombosis Research and Drug Development, Sinai Hospital of Baltimore, Baltimore, MD, USA; <sup>7</sup>Faculty of Medicine, National Heart and Lung Institute, Imperial College, London, UK; <sup>8</sup>Cardiology Department, East and North Hertfordshire NHS Trust, Stevenage, UK; <sup>9</sup>Department of Cardiology, Inselspital Universitätsspital, Bern, Switzerland; <sup>10</sup>University Hospital Southampton NHS Foundation Trust, Southampton, UK; <sup>11</sup>University of Southampton, Southampton, UK; <sup>12</sup>Department of Interventional Cardiology, Piedmont Heart Institute, Atlanta, GA, USA; <sup>13</sup>CPC Clinical Research, University of Colorado School of Medicine, USA; <sup>14</sup>Department of Cardiology, Radboud University Medical Centre, Nijmegen, the Netherlands; <sup>15</sup>Department of Geriatrics, Nicolaus Copernicus University, Bydgoszcz, Poland; <sup>16</sup>1st Department of Cardiology, Medical University of Gdansk, Gdansk, Poland; <sup>17</sup>Section of Interventional Cardiology, MedStar Washington Hospital Center, Washington, DC, USA; <sup>18</sup>Division of Cardiovascular Medicine, Columbia University Irving Medical Center, New York, NY, USA; <sup>19</sup>Cardiovascular Research Foundation, New York, NY, USA; <sup>20</sup>The Lambie Institute for Translational Medicine and Curam, National University of Ireland Galway and Saolta University Healthcare Group, Galway, Ireland; <sup>21</sup>Direzione Scientifica, Fondazione Policlinico Universitario Gemelli IRCCS, Rome, Italy; and <sup>22</sup>Cardiovascular Medicine, Catholic University Medical School, Rome, Italy

Received 4 March 2021; revised 28 March 2021; editorial decision 11 April 2021; accepted 13 April 2021



Listen to the audio abstract of this contribution.

## Aims

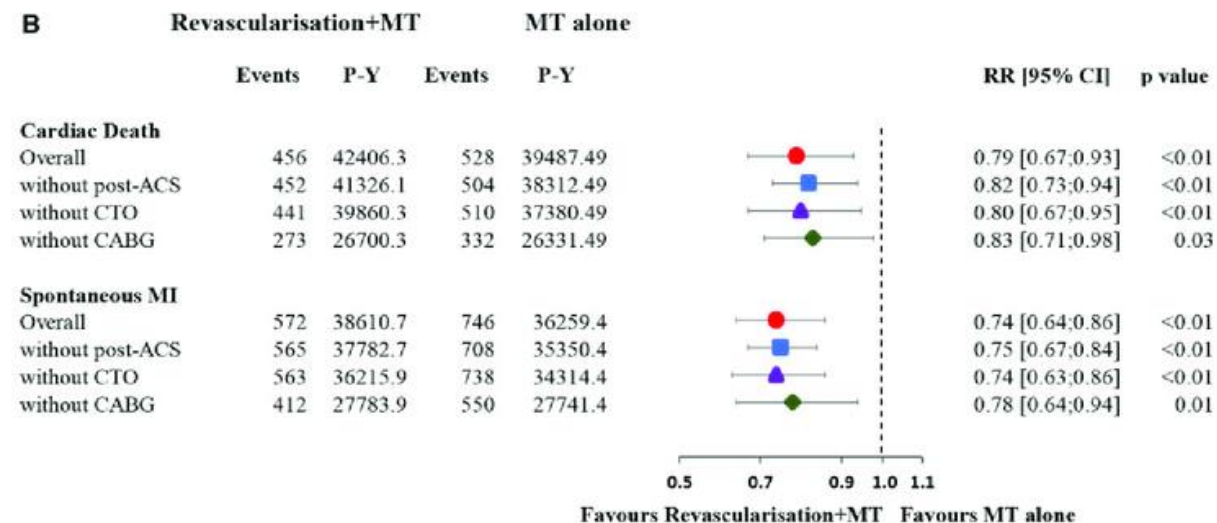
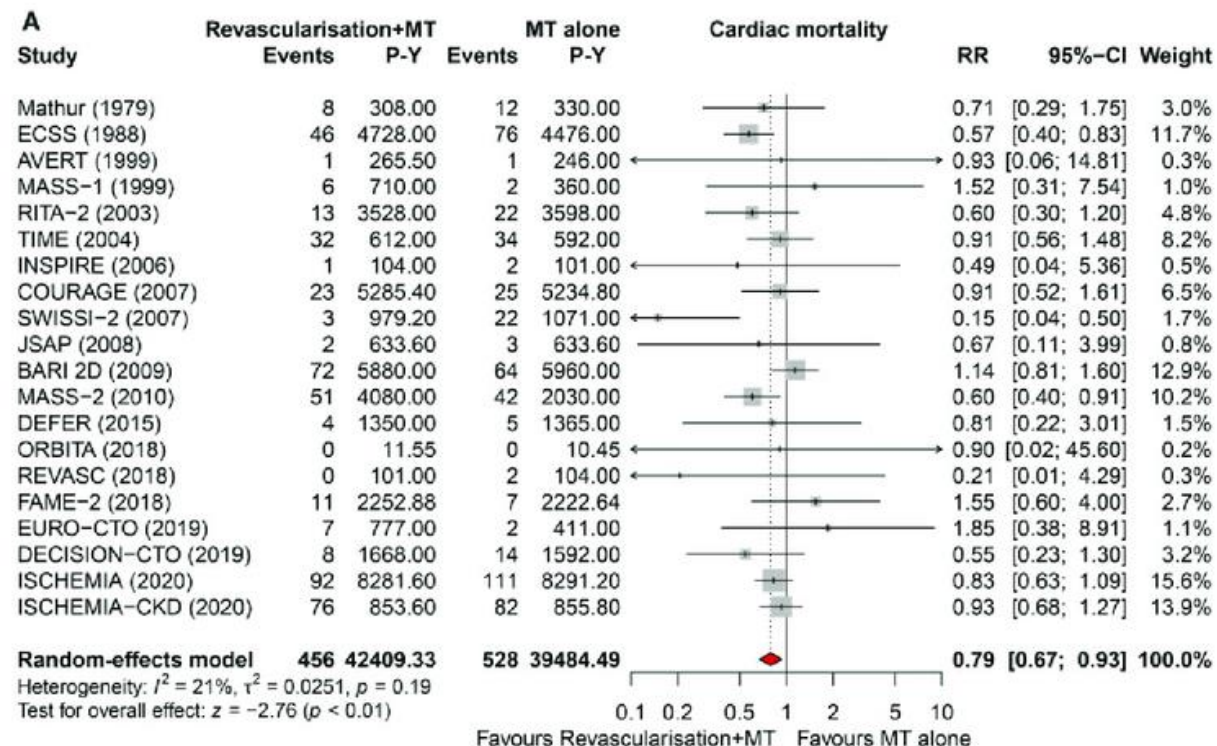
The value of elective coronary revascularisation plus medical therapy over medical therapy alone in managing stable patients with coronary artery disease is debated. We reviewed all trials comparing the two strategies in this population.

## Methods and results

From inception through November 2020, MEDLINE, EMBASE, Google Scholar, and other databases were searched for randomised trials comparing revascularisation against medical therapy alone in clinically stable coronary artery disease patients. Treatment effects were measured by rate ratios (RRs) with 95% confidence intervals, using random-effects models. Cardiac mortality was the pre-specified primary endpoint. Spontaneous myocardial infarction (MI) and its association with cardiac mortality were secondary endpoints. Further endpoints included all-cause mortality, any MI, and stroke. Longest follow-up data were abstracted. The study is registered with PROSPERO (CRD42021225598). Twenty-five trials involving 19 806 patients (10 023 randomised to revascularisation plus medical therapy and 9783 to medical therapy alone) were included. Compared with medical therapy alone, revascularisation yielded a lower risk of cardiac death [RR 0.79 (0.67–0.93),  $P < 0.01$ ] and spontaneous MI [RR 0.74 (0.64–0.86),  $P < 0.01$ ]. By meta-regression, the cardiac death risk reduction after revascularisation, compared with

\* Corresponding author. Tel: +48 52 585 4023. Fax: +48 52 585 4024. Email: elianonavarese@gmail.com  
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# PCI....

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**PCI har ingen effekt på överlevnad** (*OAT, COURAGE, BARI 2D, ISCHEMIA*)

**PCI skyddar inte mot hjärtinfarkt** (?)

**Stent gör skada (PCI leder till PCI)** (*Om FFR > 0,8 FAME, DEFER*)

**PCI hjälper inte mot ischemisk hjärtsvikt** (*REVIVED-BCIS2*)

**Preoperativ revaskularisering hjälper ej** (*Kärlkirurgi CARP, TAVI ACTIVATION*)



ESC  
Revaskulariserings  
Guidelines 2018

Stable angina / silent ischemia

*For prognosis:*

- Left main >50% **class I A**
- Any LAD >50% with documented ischemia or FFR <0.80 **class I A**
- 2VD or 3VD, LV dysfunction, with ischemia or FFR <0.80 **class I B**
- Large area of ischemia (>10%) **class I B**
- Remaining patent vessel >50% with ischemia or FFR <0.80 **class I C**
- 1VD, no LAD >50%, no ischemia **class III A**



# HUR GÅR VI VIDARE

Ischemibördan spelar ingen roll....eller

CT kranskärl CTA better first line test?

Obstruktiv kranskärlssjukdom?

**OMT?**

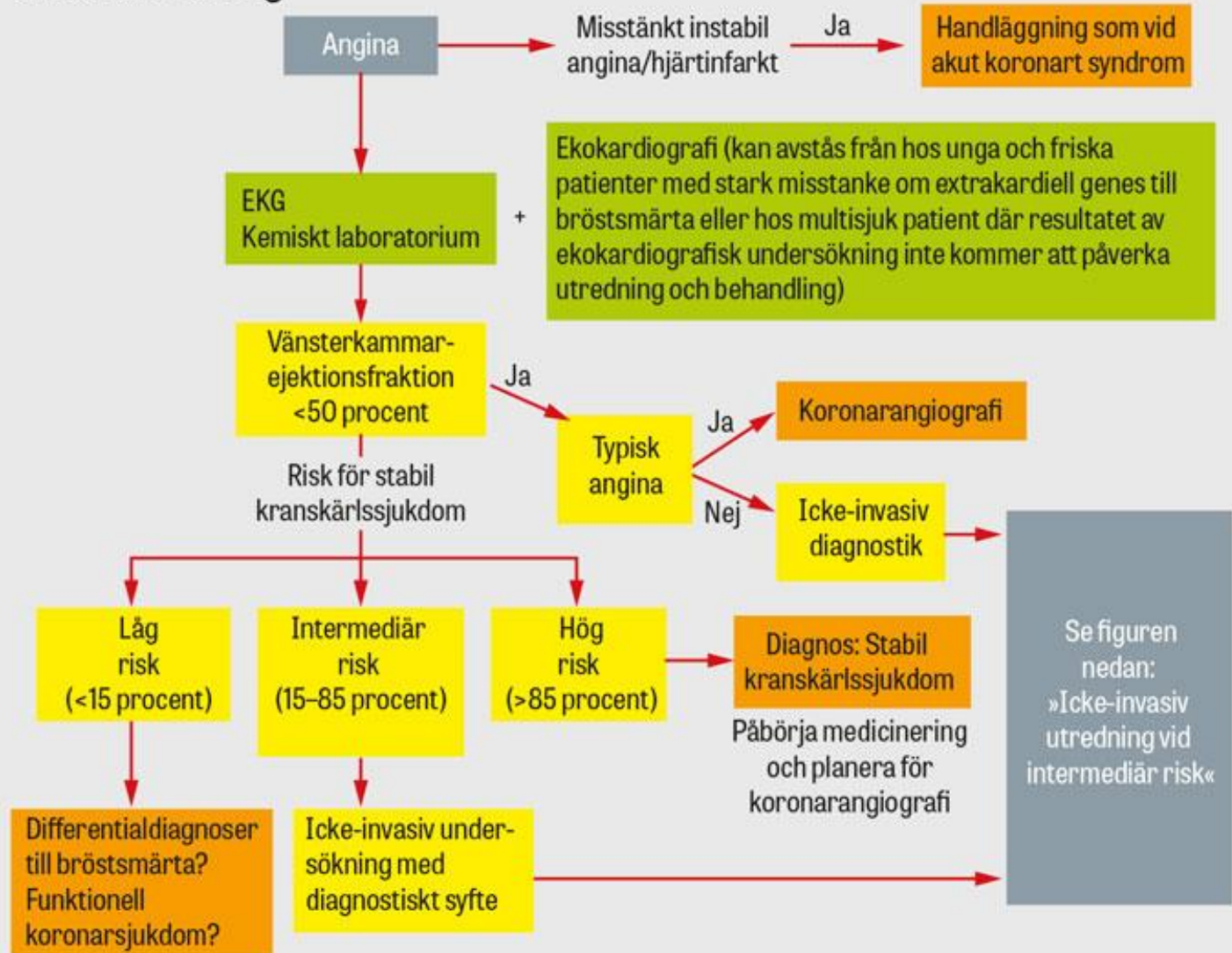
Identifiera HS

ESC guidelines CCTA in stable patients klass  
IA rekommendation?





## Initial utredning



► Initial utredning vid misstanke om stabil kransårslssjukdom. Efter Montalescot et al [1], med tillstånd från Oxford University Press.

# DT kranskärl RVN

## Indikationer

- Patienter som utreds med misstanke om angina med **låg till intermediär** pretest-probability.
- Patienter **utan angina** inför **thoraxkirurgiska ingrepp** med låg till måttlig sannolikhet för kranskärlssjukdom.
- Andra utredningsindikationer där man vill utesluta ischemisk hjärtsjukdom hos patienter med låg till intermediär pretest-probability. (**Svikt, Arrytmi**)
- Utredning av **strukturell hjärtsjukdom** där tex fistulering, abcess, shuntar, trombos och tumor kan misstänkas.
- Kartläggning av mekanisk klaffprotes.
- Utesluta tromb i vänster förmaksöra.
- Kartläggning av vengrafter.

## Kontraindikationer/olämpliga fall:

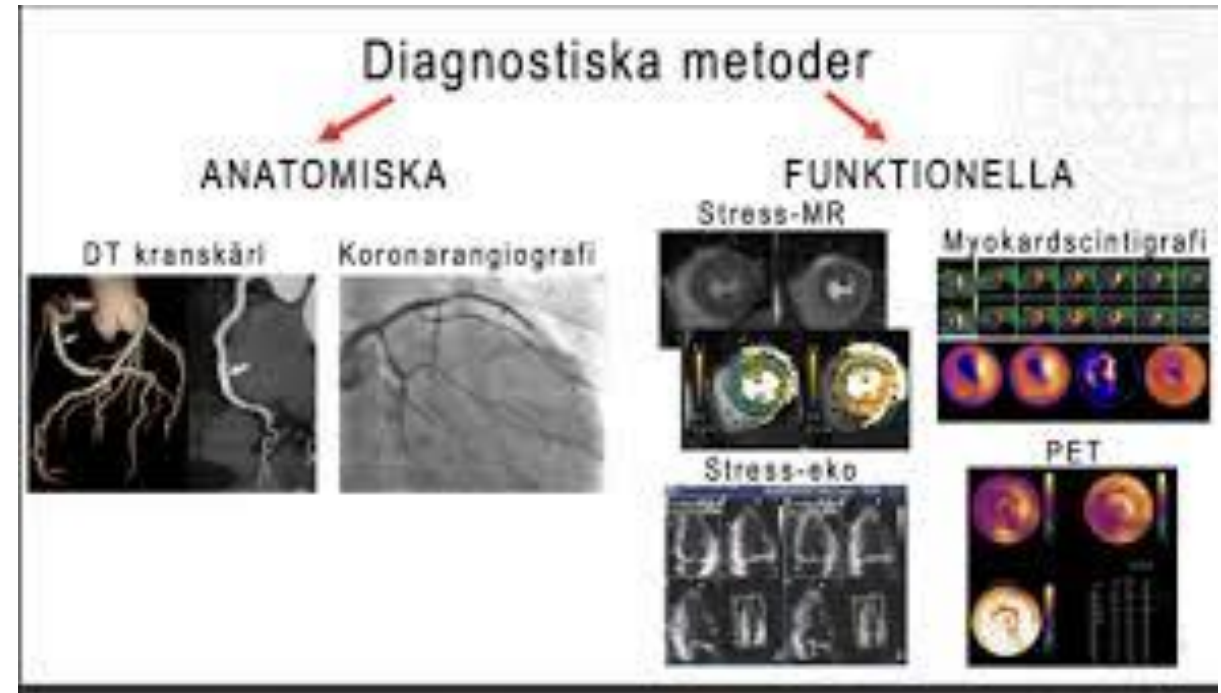
- Kontrastöverkänslighet (relativ om vi kan premedicinera).
- Grav övervikt.
- DT-kranskärl lämpar sig ej bra vid oregelbunden rytm så som vid Flimmer eller frekventa extraslag. Mindre lämpligt med skänkelblock. Pacemaker är inget hinder för undersökning.
- Tidigare, känd kranskärlssjukdom. Frf tidigare stentad.
- Förekomst av flera riskfaktorer som talar för utbredd ateroskleros tex diabetes.



# Remissinnehåll till hjärtmottagningen

## Utredning av misstänkt koronarinsufficiens:

- Typ av symptom (Duration & Karaktär)
- Riskfaktorer (Hereditet? Diabetes? Rökning? Lipider?)
- Utlösande/förvärrande/lindrande faktorer?  
Progress av symtom över tid?  
Konditionsnedsättning?
- **Arytmi?**
- **Tidigare PCI?**
- **BMI?**
- **Faktorer som talar emot DAPT (Hb? Blödning? Alkohol? Leverfunktion?)**
- **Njurfunktion? (Krea)**



# Case

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Läkemedel: Trombyl 75mg. Metformin. Enalapril 10mg.

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EKG Normalt.

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## Vad gör vi?

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OMT & A-EKG

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**OMT & coronarangio**

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OMT & CT kranskärl

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# TAKE HOME

## OMT Fungerar

- ASA
- **LDL <1,4** (Statiner, Ezetemib)
- SBT <130
- Rökstop

**Revaskularisering är bra till rätt patient på rätt indikation, OMT och trots det angina.**

- ***Antianginös behandling:***
  - Långtidsverkande Nitro
  - Betablockad
  - Kalciumblockare

**Studierna är inte applicerabara på HS eller AKS**