European Heart Journal
doi:10.1093/eurheartj/ehu278

ESC/EACTS GUIDELINES

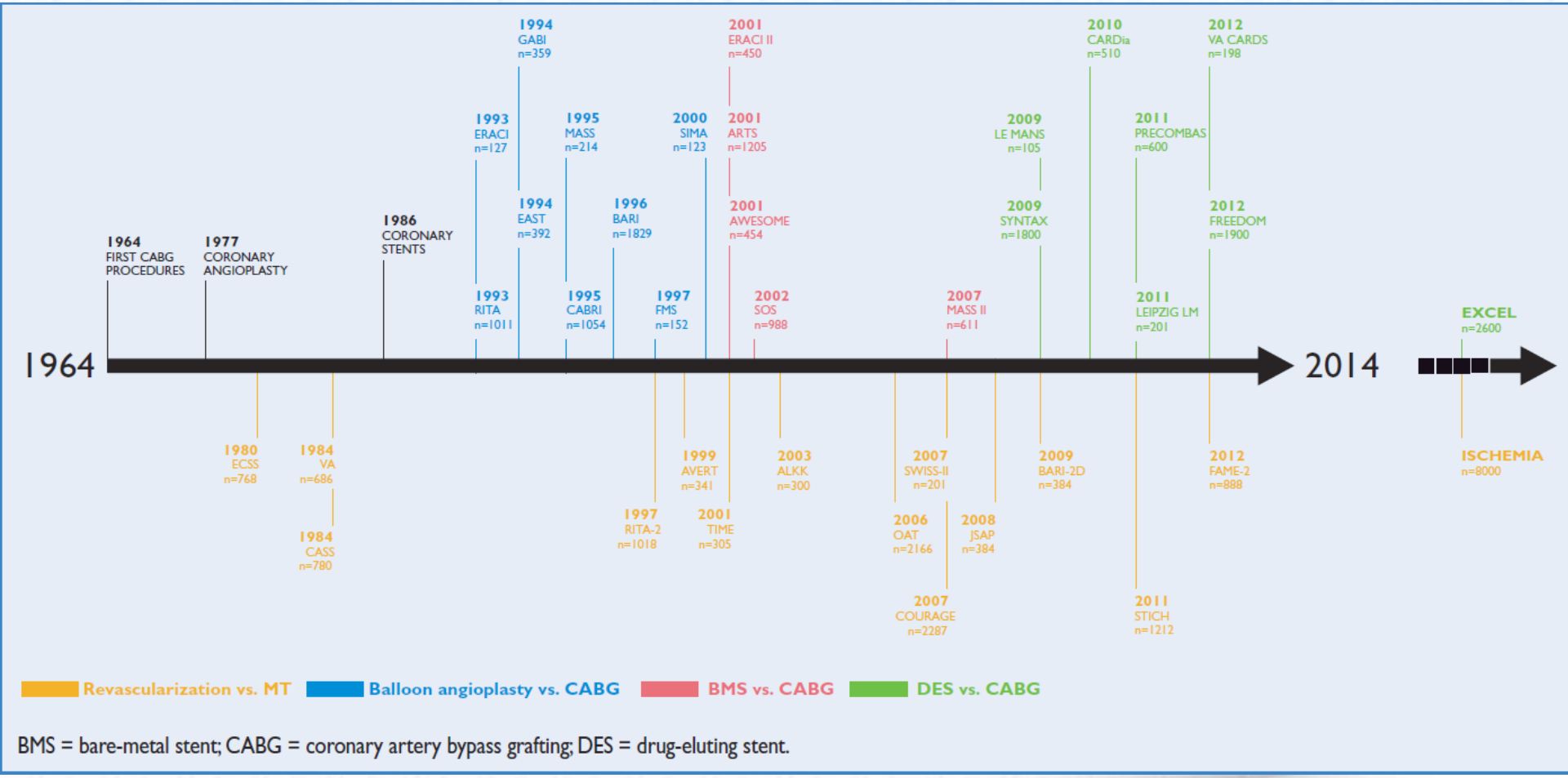
2014 ESC/EACTS Guidelines on myocardial revascularization

The Task Force on Myocardial Revascularization of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

Developed with the special contribution of the European Association for Percutaneous Cardiovascular Interventions (EAPCI)

Authors/Task Force members: Stephan Windecker* (ESC Chairperson) (Switzerland), Philippe Kolh* (EACTS Chairperson) (Belgium), Fernando Alfonso (Spain), Jean-Philippe Collet (France), Jochen Cremer (Germany), Volkmar Falk (Switzerland), Gerasimos Filippatos (Greece), Christian Hamm (Germany), Stuart J. Head (The Netherlands), Peter Jüni (Switzerland), A. Pieter Kappetein (The Netherlands), Adnan Kastrati (Germany), Juhani Knuuti (Finland), Ulf Landmesser (Switzerland), Günther Laufer (Austria), Franz-Josef Neumann (Germany), Dimitrios J. Richter (Greece), Patrick Schauerte (Germany), Miguel Sousa Uva (Portugal), Giulio G. Stefanini (Switzerland), David Paul Taggart (UK), Lucia Torracca (Italy), Marco Valgimigli (Italy), William Wijns (Belgium), and Adam Witkowski (Poland).

50 Year Anniversary of Myocardial Revascularization



BMS = bare-metal stent; CABG = coronary artery bypass grafting; DES = drug-eluting stent.

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

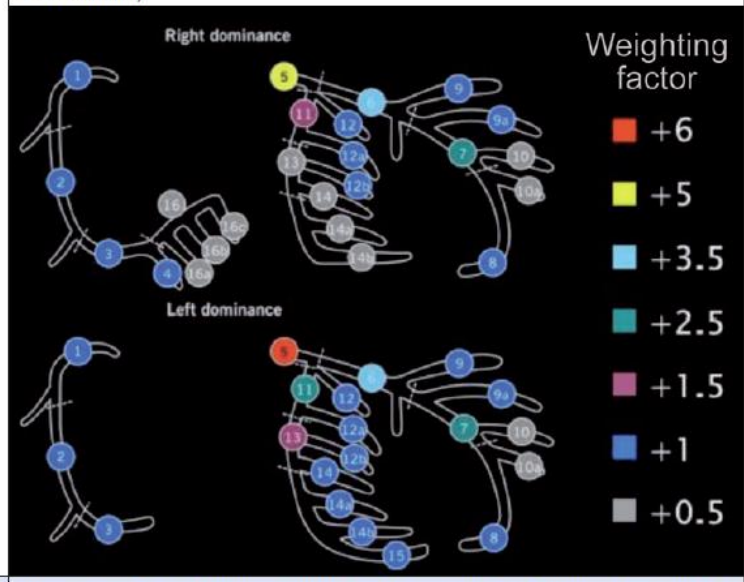
Scores and Risk Stratification

European Heart Journal
doi:10.1093/eurheartj/ehu278

Guide to calculate the SYNTAX score

- **SYNTAX score was developed to grade the anatomical complexity of coronary lesions in patients with three-vessel and left main CAD and was found to be an independent predictor of MACCE in patients undergoing PCI but not CABG.**

www.escardio.org/guidelines

Steps	Variable assessed	Description
Step 1	Dominance	The weight of individual coronary segments varies according to coronary artery dominance (right or left). Co-dominance does not exist as an option in the SYNTAX score.
Step 2	Coronary segment	The diseased coronary segment directly affects the score as each coronary segment is assigned a weight, depending on its location, ranging from 0.5 (i.e. posterolateral branch) to 6 (i.e. left main in case of left dominance). 
Step 3	Diameter stenosis	The score of each diseased coronary segment is multiplied by 2 in case of a stenosis 50–99% and by 5 in case of total occlusion. In case of total occlusion, additional points will be added as follows: - Age >3 months or unknown +1 - Blunt stump +1 - Bridging +1 - First segment visible distally +1 per non visible segment - Side branch at the occlusion +1 if <1.5mm diameter +1 if both <1.5 and ≥1.5mm diameter +0 if ≥1.5mm diameter (i.e. bifurcation lesion)
Step 4	Trifurcation lesion	The presence of a trifurcation lesion adds additional points based on the number of diseased segments: - 1 segment +3 - 2 segments +4 - 3 segments +5 - 4 segments +6
Step 5	Bifurcation lesion	The presence of a bifurcation lesion adds additional points based on the type of bifurcation according to the Medina classification:[29] - Medina 1,0,0 or 0,1,0 or 1,1,0: add 1 additional point - Medina 1,1,1 or 0,0,1 or 1,0,1 or 0,1,1: add 2 additional point Additionally, the presence of a bifurcation angle <70° adds 1 additional point.
Step 6	Aorto-ostial lesion	The presence of aorto-ostial lesion segments adds 1 additional point
Step 7	Severe tortuosity	The presence of severe tortuosity proximal of the diseased segment adds 2 additional points
Step 8	Lesion length	Lesion length >20 mm adds 1 additional point
Step 9	Calcification	The presence of heavy calcification adds 2 additional points
Step 10	Thrombus	The presence of thrombus adds 1 additional point
Step 11	Diffuse disease/small vessels	The presence of diffusely diseased and narrowed segments distal to the lesion (i.e. when at least 75% of the length of the segment distal to the lesion has a vessel diameter of <2mm) adds 1 point per segment number

Risk models to assess SHORT-term (≤ 30 days) outcomes in candidates for PCI or CABG

- For CABG, STS and EuroScore II are well validated, mostly based on clinical variables.
- STS score undergoes periodic adjustments which makes longitudinal comparisons difficult.
- For PCI, NCDR Cath PCI score predicts in-hospital risk

Score	Development cohort (patients, design)	Patient inclusion	Coronary procedures	Number of variables		Outcome	Recommendation		Validation studies
				Clinical	Anatomical		CABG	PCI	
STS Score	*n* = 774 881 Multicentre	01/2006 – 12/2006	100% (i)CABG	40	2	In-hospital or 30-day[b] mortality, and in-hospital morbidity[c]	I B		5–10
EuroSCORE II	*n* =16 828 Multicentre	05/2010 – 07/2010	47% (i)CABG	18	0	In-hospital mortality	IIa B	IIb C	>10
ACEF	*n* = 4 557 Single-centre	2001 – 2003	-	3	0	In-hospital or 30-day[b] mortality	IIb C	IIb C	5–10
NCDR CathPCI	181 775 Multicentre	01/2004 – 03/2006	100% PCI	8	0	In-hospital mortality		IIb B	<5
EuroSCORE	*n* =19 030 Multicentre	09/1995 – 11/1995	64% (i)CABG	17	0	Operative mortality	III B	III C	>50

European Heart Journal
doi:10.1093/eurheartj/ehu278

Process for decision-making and patient information

European Heart Journal
doi:10.1093/eurheartj/ehu278

Patient information document

Patient Information

Dear Madam, Dear Sir,

You have been advised to undergo coronary angiography. This examination provides an X-ray image of the coronary arteries, the blood vessels that supply blood to your heart. Coronary angiography reveals the presence of coronary artery disease (CAD), a condition that leads to narrowing or blockage of the coronary arteries. The results of this examination will help your physician to identify the best treatment for you.

Please carefully consider the following information and share your thoughts with your referring physician, your family or close friends. Do not hesitate to ask for further information and explanation if needed. The physician who has proposed that you undergo coronary angiography will certainly provide additional information, as desirable. Keep in mind that after the angiogram, there is no time constraint to make a decision regarding further therapy. This brief commentary is aimed at providing you with the elements necessary to make an **informed decision** before proceeding to the **formal informed consent** procedure. Both are necessary to give us the opportunity to provide care for you.

Document available in the Appendix of the online version of the Guidelines.

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

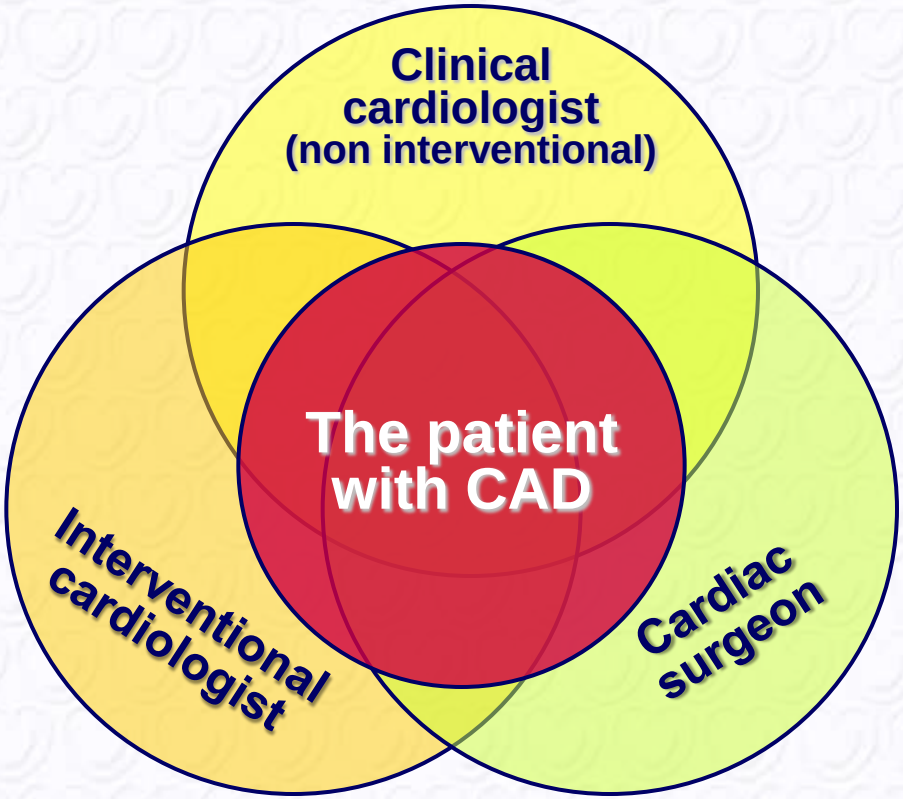
Patient information document: content

- What is significant about coronary artery disease? (CAD)
- How is CAD treated?
  1. Medical treatment
  2. Percutaneous Coronary Intervention (PCI)
  3. Coronary artery bypass grafting (CABG)
- Angioplasty: advantages and disadvantages
- Bypass surgery: advantages and disadvantages

Document available in the Appendix of the online version of the Guidelines.

European Heart Journal
doi:10.1093/eurheartj/ehu278

The Heart Team



Task Force composition = clinical cardiologists (non interventional) + interventional cardiologists + cardiac surgeons

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

Recommendations for decision making and patient information in the elective setting

Agreement before Action !

Recommendations	Class[a]	Level[b]
It is recommended that patients undergoing coronary angiography are informed about benefit and risks as well as potential therapeutic consequences ahead of the procedure.	I	C
It is recommended that patients are adequately informed about short- and long-term benefits and risks of the revascularization procedure as well as treatment options. Enough time should be allowed for informed decision-making.	I	C
It is recommended that institutional protocols are developed by the Heart Team to implement the appropriate revascularization strategy in accordance with current guidelines. In case of PCI centres without on-site surgery, institutional protocols should be established with partner institutions providing cardiac surgery.	I	C
It is recommended that patients for whom decision-making is complex or who are not covered by the institutional protocol are discussed by the Heart Team.	I	C

Euro
doi:10.1

Strategies for diagnosis: functional testing and imaging

European Heart Journal
doi:10.1093/eurheartj/ehu278

Indications for diagnostic testing in patients with suspected CAD and stable symptoms

Imaging Tests for ANATOMICAL Detection of CAD

	Asymptomatic[a]		Symptomatic					
			Probability of significant disease[b]					
			Low (<15%)		Intermediate (15–85%)		High (>85%)	
	Class[c]	Level[d]	Class[c]	Level[d]	Class[c]	Level[d]	Class[c]	Level[d]
Anatomical detection of CAD								
Invasive angiography	III	A	III	A	IIb	A	I	A
CT angiography[f,g]	III	B	III	C	IIa	A	III	B

*** Pretest likelihood of obstructive disease is calculated based on symptoms, sex, and risk factors.**

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

Indications for diagnostic testing in patients with suspected CAD and stable symptoms

Imaging Tests for Functional Detection of CAD

	Asymptomatic[a]		Symptomatic					
			Probability of significant disease[b]					
			Low (<15%)		Intermediate (15–85%)		High (>85%)	
	Class[c]	Level[d]	Class[c]	Level[d]	Class[c]	Level[d]	Class[c]	Level[d]
Functional test								
Stress echo	III	A	III	A	I	A	III	A
Nuclear imaging	III	A	III	A	I	A	III	A
Stress MRI	III	B	III	C	I	A	III	B
PET perfusion	III	B	III	C	I	A	III	B

*** Pretest likelihood of obstructive disease is calculated based on symptoms, sex, and risk factors.**

European Heart Journal
doi:10.1093/eurheartj/ehu278

www.escardio.org/guidelines

EUROPEAN SOCIETY OF CARDIOLOGY®

Revascularization for stable CAD

European Heart Journal
doi:10.1093/eurheartj/ehu278

Indications for revascularisation in stable angina or silent ischaemia

- Depending on its symptomatic, functional and anatomic complexity, stable CAD can be treated by Medical Therapy (MT) alone, or combined with revascularisation using PCI or CABG.
- The two issues to be addressed are:
  - the appropriateness of revascularisation
  - the relative merits of CABG and PCI in different patterns of CAD.
- Revascularisation can be readily justified:
  - on prognostic grounds in certain anatomical patterns of CAD or a proven significant ischaemic territory (even in asymptomatic patients)
  - on symptomatic grounds in patients with persistent limiting symptoms despite OMT.

European Heart Journal
doi:10.1093/eurheartj/ehu278

Indications for revascularisation in stable angina or silent ischaemia

Extent of CAD (anatomical and/or functional)		Class[b]	Level[c]
For symptoms	Any coronary stenosis >50%[e] in the presence of limiting angina or angina equivalent, unresponsive to medical therapy	I	A

[a] With documented ischaemia or Fractional Flow Reserve (FFR) <0.80 for angiographic diameter stenosis 50-90%.

European Heart Journal
doi:10.1093/eurheartj/ehu278

Indications for revascularisation in stable angina or silent ischaemia

Extent of CAD (anatomical and/or functional)		Class[b]	Level[c]
For prognosis	Left main disease with stenosis >50%[a]	I	A
	Any proximal LAD stenosis >50%[a]	I	A
	Two-vessel or three-vessel disease with stenosis > 50%[a] with impaired LV function (LVEF<40%)[a]	I	A
	Large area of ischaemia (>10% LV)	I	B
	Single remaining patent coronary artery with stenosis >50%[a]	I	C

[a] With documented ischaemia or Fractional Flow Reserve (FFR) <0.80 for angiographic diameter stenosis 50-90%.

European Heart Journal
doi:10.1093/eurheartj/ehu278

Evidence basis for revascularization in stable CAD:

Revascularization versus medical treatment

European Heart Journal
doi:10.1093/eurheartj/ehu278

RCTs of revascularization versus medical therapy

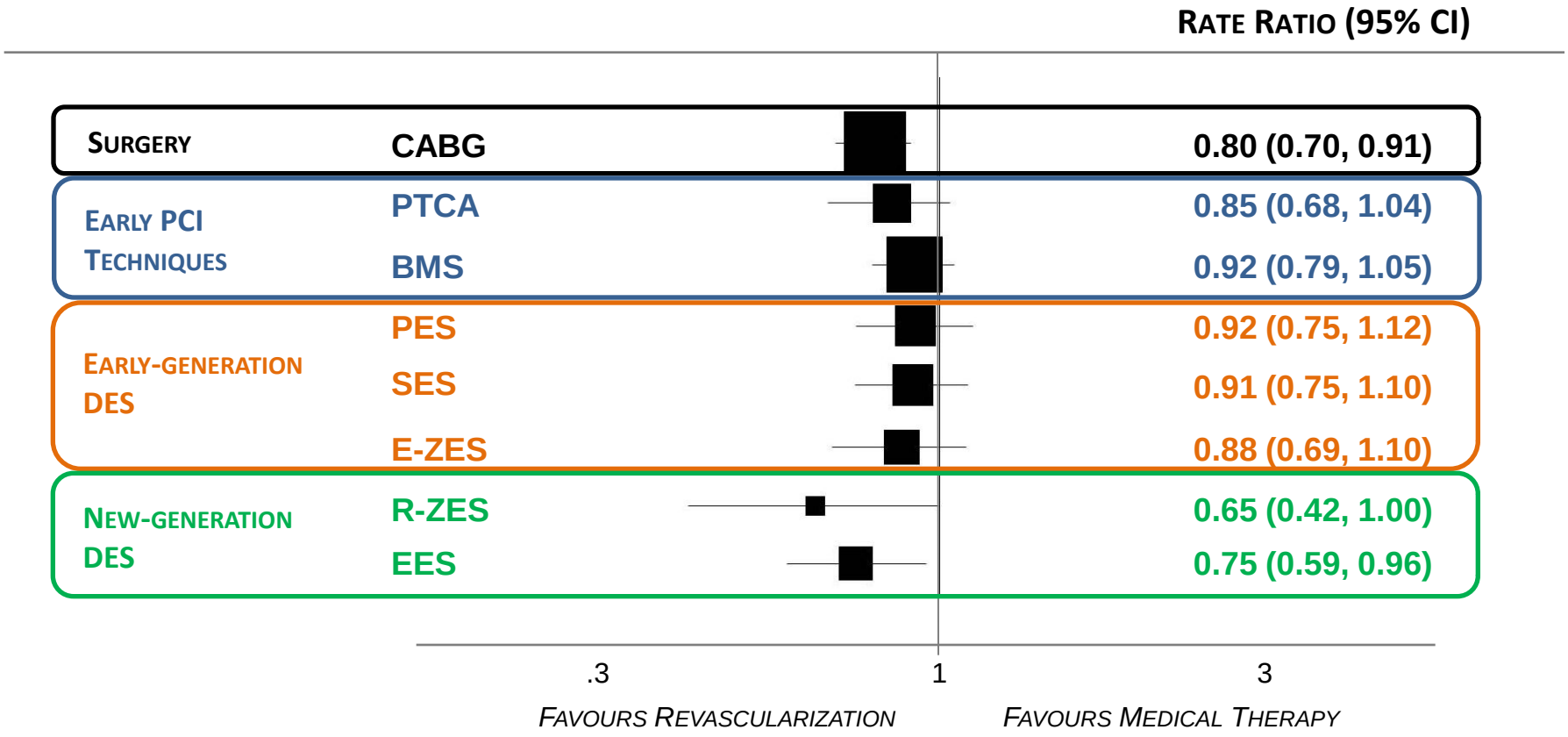
Year of publication	Study	N	Baseline characteristics					Primary endpoint			Max clinical follow-up			
			Age (y)	Women (%)	Diabetes (%)	MVD (%)	EF (%)	Definition	y	Results	y	Death	MI	Revasc.
CABG														
1980	ECSS[109]	768	<65[c]	0	-	100	>50[c]	-	-	-	8	11.4% vs. 20.1%[a]	-	-
1984	VA[110]	686	-	-	-	86	-	-	-	-	18	70% vs. 67%	49% vs. 41%	41% vs. 62%[d]
1984	CASS[111]	780	51	10	9	73	-	-	-	-	10	19.2% vs. 21.8%	-	8.9% vs. 36.9%[e]
2011	STICH[112]	1212	60	12	39	91	27	Death	4.7	36% vs. 41%	4.7	36% vs. 41%	-	-
Balloon angioplasty														
1997	RITA-2[89]	1018	-	18	9	40	-	Death or MI	2.7	6.3% vs. 3.3%[a]	7	8.5% vs. 8.4%	6.3% vs. 4.5%[d]	27.2% vs. 35.4%[d]
1999	AVERT[113]	341	58	16	16	43	61	Cardiac death, cardiac arrest, MI, stroke, revascularization, or hospitalization due to angina	1.5	20.9% vs. 13.4%[a]	1.5	0.6% vs. 0.6%[b]	2.8% vs. 2.4%[d]	16% vs. 12%[d]
2003	ALKK[114]	300	58	13	16	0	-	MI, revascularization, or rehospitalization for severe angina	1	10% vs. 18%	4.7	4.0% vs. 11.2%[a]	6.7% vs. 7.9%	17% vs. 24%
2007	SWISSI-II[92]	201	55	12	11	-	57	Cardiac death, MI, or revascularization	10.2	28.1% vs. 63.8%[a]	10.2	6.3% vs. 21.0%[a]	11.5% vs. 38.1%[a]	27.1% vs. 43.8%[a]
BMS/CABG														
2001	TIME[90]	305	80	43	23	79	53	Death, MI, or hospitalization for ACS	0.5	19.0% vs. 49.3%[a]	1	11.1% vs. 8.1%	-	-
2004	MASS-II[94]	611	60	31	29	100	67	Cardiac death, MI, or revascularization	1	6.4% (CABG) vs. 24.4% (BMS) vs. 14.3% (MT)[a]	10	25.1% (CABG) vs. 24.9% (PCI) vs. 31% (MT)	10.3% (CABG) vs. 13.3% (PCI) vs. 20.7 (MT)[a]	7.4% (CABG) vs. 41.9% (PCI) vs. 39.4 (MT)[a]
BMS														
2006	OAT[115]	2166	59	22	21	18	48	Death, MI, or NYHA IV heart failure	4	17.2% vs. 15.6%	4	9.1% vs. 9.4%	6.9% vs. 5.0%	18.4% vs. 22.0%[a]
2007	COURAGE[91]	2287	62	15	33	69	61	Death or MI	4.6	19.0% vs. 18.5%	4.6	7.6% vs. 8.3%	13.2% vs. 12.3%	21.1% vs. 32.6%[a]
2008	JSAP[116]	384	64	26	40	32	65	Death, ACS, stroke, or emergency hospitalization	3.3	22.0% vs. 33.2%[a]	3.3	2.9% vs. 3.9%	1.6% vs. 3.8%	21.4% vs. 36.5%[a]
DES														
2012	FAME-2[54]	888	64	22	27	42	-	Death, MI, or urgent revascularization	1	4.3% vs. 12.7%[a]	1	0.2% vs. 0.7%	3.4% vs. 3.2%	3.1% vs. 19.5%[a]

Revascularization versus Medical Therapy in Stable CAD: A Network Meta-Analysis

Primary Endpoint: All-Cause Mortality

The European Myocardial Revascularization Collaboration (EMRC). *BMJ* 2014, ahead of print

100 RCTS, 93'553 RANDOMIZED PATIENTS, 262'090 PATIENT-YEARS OF FOLLOW-UP, 5'346 EVENTS FOR THE ANALYSIS



Windecker S et al. *BMJ 2014*

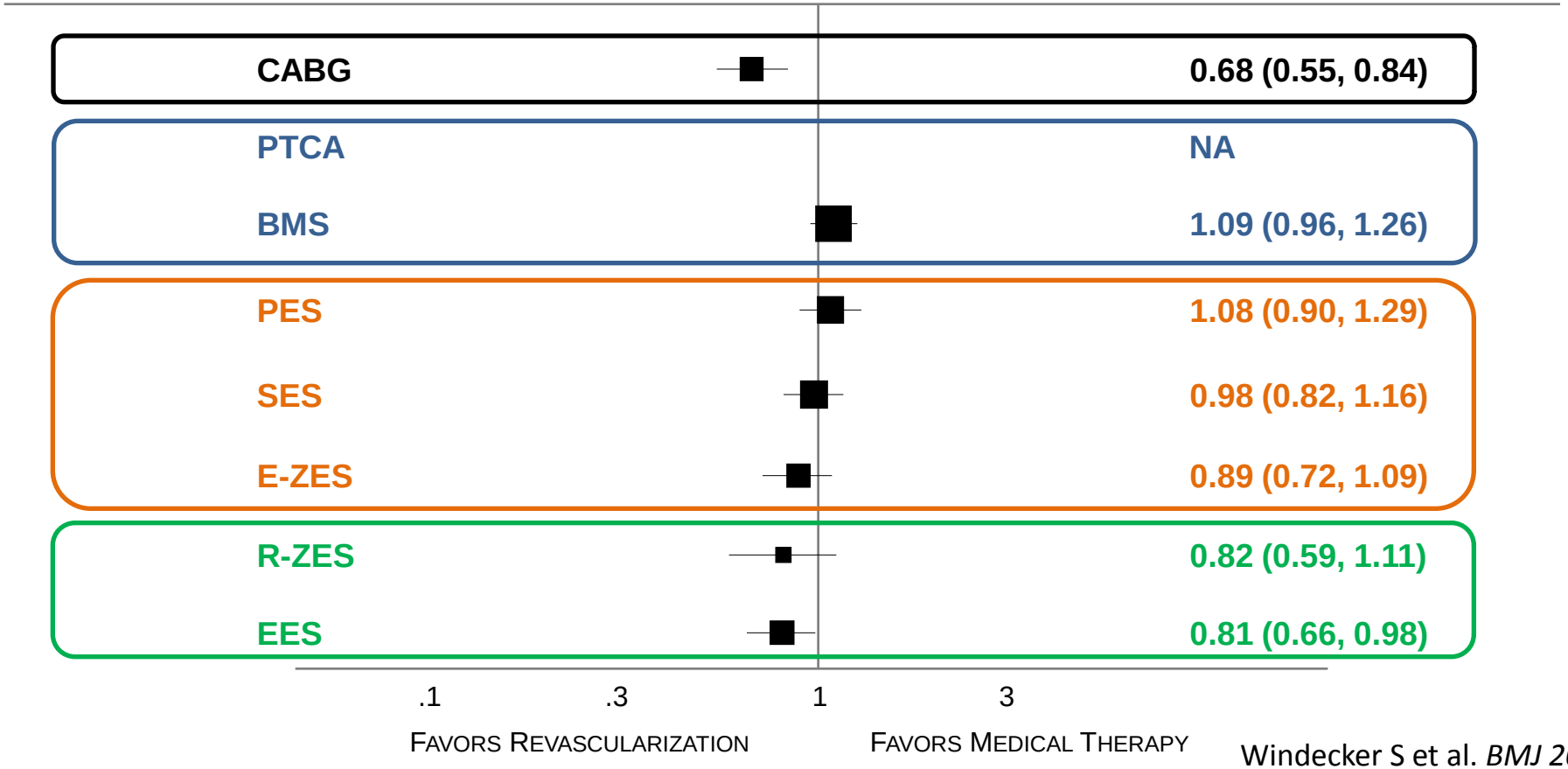
Revascularization versus Medical Therapy

A Network Meta-Analysis

Contemporary Clinical Practice

Trials with Patient Recruitment After 1999

All-Cause Mortality or Myocardial Infarction



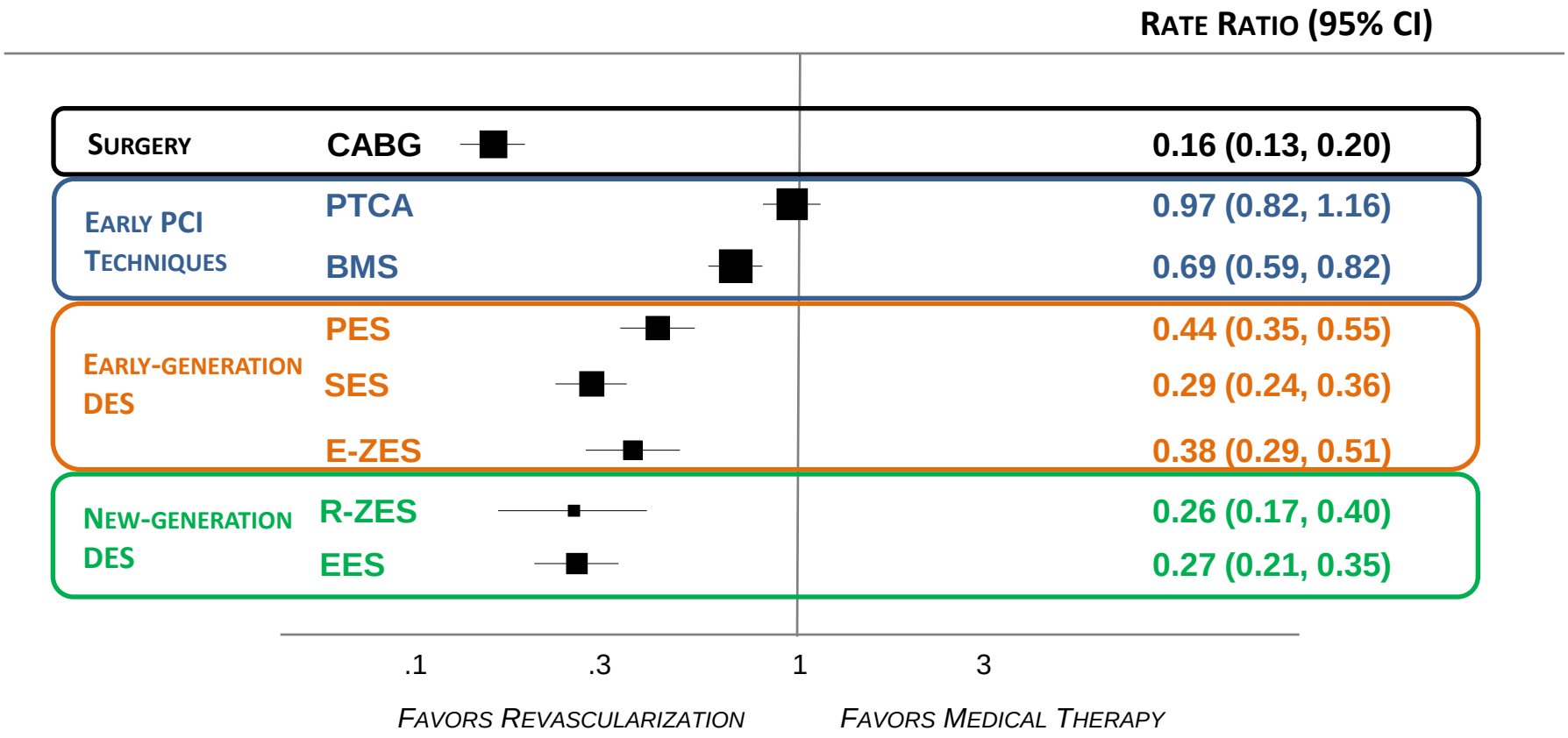
Windecker S et al. *BMJ 2014*

Revascularization versus Medical Therapy in Stable CAD: A Network Meta-Analysis

Secondary Endpoint: Repeat Revascularization

The European Myocardial Revascularization Collaboration (EMRC). *BMJ* 2014, ahead of print

90'282 RANDOMIZED PATIENTS, 234'693 PATIENT-YEARS OF FOLLOW-UP 11'619 EVENTS FOR THE ANALYSIS



Windecker S et al. *BMJ 2014*

Evidence basis for revascularization in stable CAD:

PCI versus CABG

European Heart Journal
doi:10.1093/eurheartj/ehu278

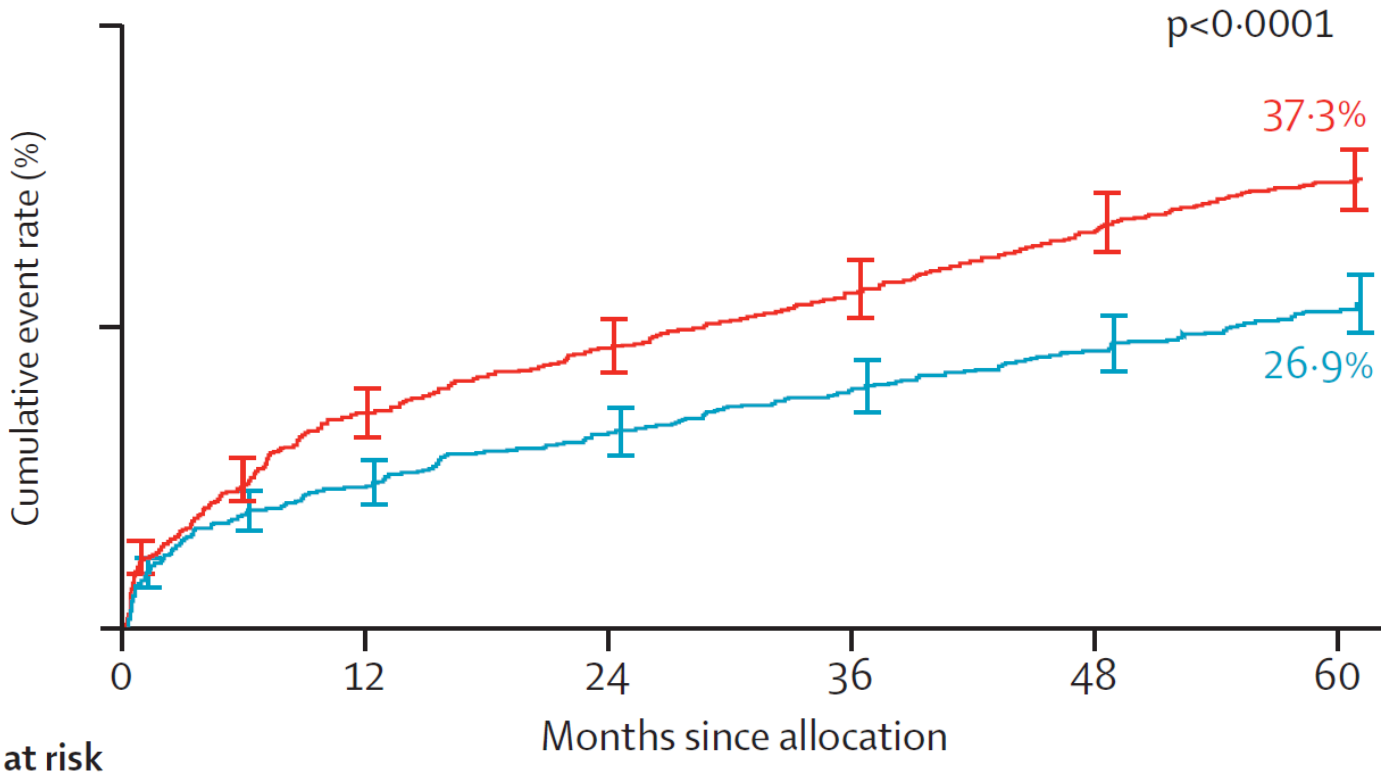
RCTs of percutaneous versus surgical revascularization

Year of publication	Study	N	Baseline characteristics					Primary endpoint			Max clinical Follow-up				
			Age (y)	Wo-men (%)	Dia-betes (%)	MVD (%)	EF (%)	Definition	y	Results	y	Death	MI	Revasc.	Stroke
Balloon angioplasty															
1993	RITA-I[146]	1011	-	19	6	55	-	Death or MI	2.5	9.8% vs. 8.6%	6.5	7.6% vs. 9.0%	10.8% vs. 7.4%	44.3% vs. 10.8%[a]	1.8% vs. 2.0% (at 2.5 y)
1994	GABI I[147]	359	-	20	12	100	-	Angina	1	29% vs. 26%	13	25.0% vs. 21.9%	4.3% vs. 5.6%	82.9% vs. 58.8%[a]	-
1994	EAST[148]	392	62	26	23	100	61	Death, MI, or a large defect at thallium scan	3	28.8% vs. 27.3%	8	20.7% vs. 17.3%	3.0% vs. 10.3%[a] (at 3 y)	65.3% vs. 26.5%[a]	0.5% vs. 1.5% (at 3 y)
1955	CABRI[149]	1054	60	22	12	99	63	Death	1	3.9% vs. 2.7%	4	10.9% vs. 7.4%	4.9% vs. 3.5% (at 1 y)	33.6% vs. 6.5%[a] (at 1 y)	-
1996	BARI[150]	1829	62	27	25	100	57	Death	5	13.7% vs. 10.7%	10	29.0% vs. 26.5%	-	76.8% vs. 20.3%[a]	0.2% vs. 0.8% (in hospital)
BMS															
2001	AWESOME[151]	454	67	-	31	82	45	Death	3	20% vs. 21%	3	20% vs. 21%	-	-	-
2001	ERACI II[152]	450	62	21	17	100	-	Death, MI, stroke, or repeat revascularization	0.1	3.6% vs. 12.3%[a]	5	7.1% vs. 11.5%	2.8% vs. 6.2%	28.4% vs. 7.2%[a]	0% vs. 0.9% (at 30 d)
2001	ARTS[153]	1205	61	23	17	99	61	Death, MI, stroke, or repeat revascularization	1	26.2% vs. 12.2%[a]	5	8.0% vs. 7.6%	6.7% vs. 5.6%	30.3% vs. 8.8%[a]	3.8% vs. 3.5%
2002	SoS[154]	988	61	21	14	100	57	Repeat revascularization	2	21% vs. 6%[a]	6	10.9% vs. 6.8%[a]	5% vs. 8% (at 2 y)	21% vs. 6%[a] (at 2 y)	-
2003	OCTOSTENT[155]	280	60	29	11	29	-	Death, MI, stroke, or repeat revascularization	1	14.5% vs. 8.5%	1	0% vs. 2.8%	4.4% vs. 4.9%	15.2% vs. 4.2%[a]	0% vs. 0%
2005	Thiele[156]	220	62	25	30	0	63	Cardiac death, MI, or TVR	0.5	31% vs. 15%[a]	5.6	10% vs. 12%	5% vs. 7%	32% vs. 10%[a] (TVR)	-
PES															
2009	SYNTAX[157]	1800	65	22	25	100	-	Death, MI, stroke, or repeat revascularization	1	17.8% vs. 12.4%[ac]	5	13.9% vs. 11.4%	9.7% vs. 3.8%[a]	25.9% vs. 13.7%[a]	2.4% vs. 3.7%
SES															
2011	Boudriot[158]	201	68	25	36	72	65	Death, MI, or repeat revascularization	1	13.9% vs. 19%[c]	1	2% vs. 5%	3% vs. 3%	14% vs. 5.9%	-
2011	PRECOMBAT[159]	600	62	24	32	90	61	Death, MI, stroke, or TVR	1	8.7% vs. 6.7%[b]	2	2.4% vs. 3.4%	1.7% vs. 1.0%	9.0% vs. 4.2%[a]	0.4% vs. 0.7%

5-Year Outcomes of the SYNTAX Trial

Mohr FW et al. *Lancet* 2013; 381:629-38

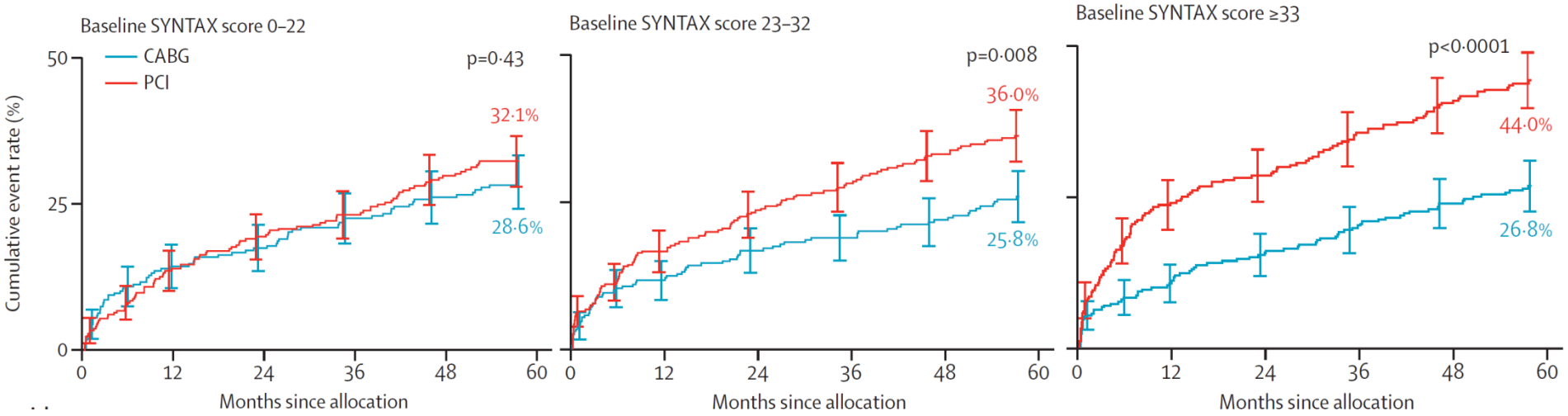
MACCE: Death, MI, Stroke, or Repeat Revasc



MACCE to 5 Years by SYNTAX Score

Mohr FW et al. *Lancet* 2013; 381:629-38

Low Scores (0-22) | **Intermediate Scores (23-32)** | **High Score ≥33**



	Death	MI	Death	MI	Death	MI
PCI	**8.9**	**7.8**	**13.8**	**11.2**	**19.2**	**10.1**
CABG	**10.1**	**4.2**	**12.7**	**3.6**	**11.4**	**3.9**
	P=0.64	***P=0.11***	***P=0.68***	***P=0.0009***	***P=0.005***	***P=0.004***

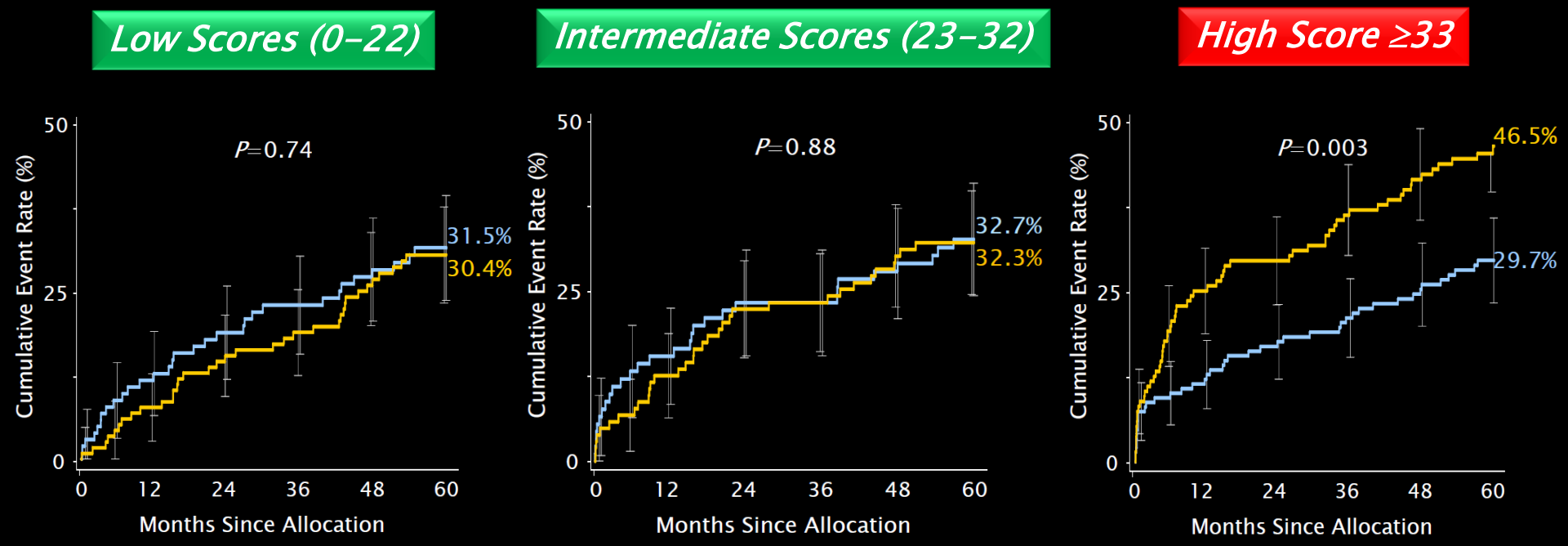
Evidence basis for revascularization in stable CAD:

PCI versus CABG in left main disease

European Heart Journal
doi:10.1093/eurheartj/ehu278

MACCE to 5 Years by SYNTAX Score Tercile in Patients With Left Main CAD

Serruys PW et al. *Presented at TCT 2012*



Recommendations for the type of revascularization (CABG or PCI) in patients with SCAD with suitable coronary anatomy for both procedures and low predicted mortality

Recommendations according to extent of CAD	CABG		PCI	
	Class[a]	Level[b]	Class[a]	Level[b]
One or two-vessel disease without proximal LAD stenosis.	IIb	C	I	C
One-vessel disease with proximal LAD stenosis.	I	A	I	A
Two-vessel disease with proximal LAD stenosis.	I	B	I	C
Left main disease with a SYNTAX score ≤ 22.	I	B	I	B
Left main disease with a SYNTAX score 23–32.	I	B	IIa	B
Left main disease with a SYNTAX score >32.	I	B	III	B
Three-vessel disease with a SYNTAX score ≤ 22.	I	A	I	B
Three-vessel disease with a SYNTAX score 23–32.	I	A	III	B
Three-vessel disease with a SYNTAX score >32.	I	A	III	B

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

Revascularization in Non-ST-segment elevation ACS

European Heart Journal
doi:10.1093/eurheartj/ehu278

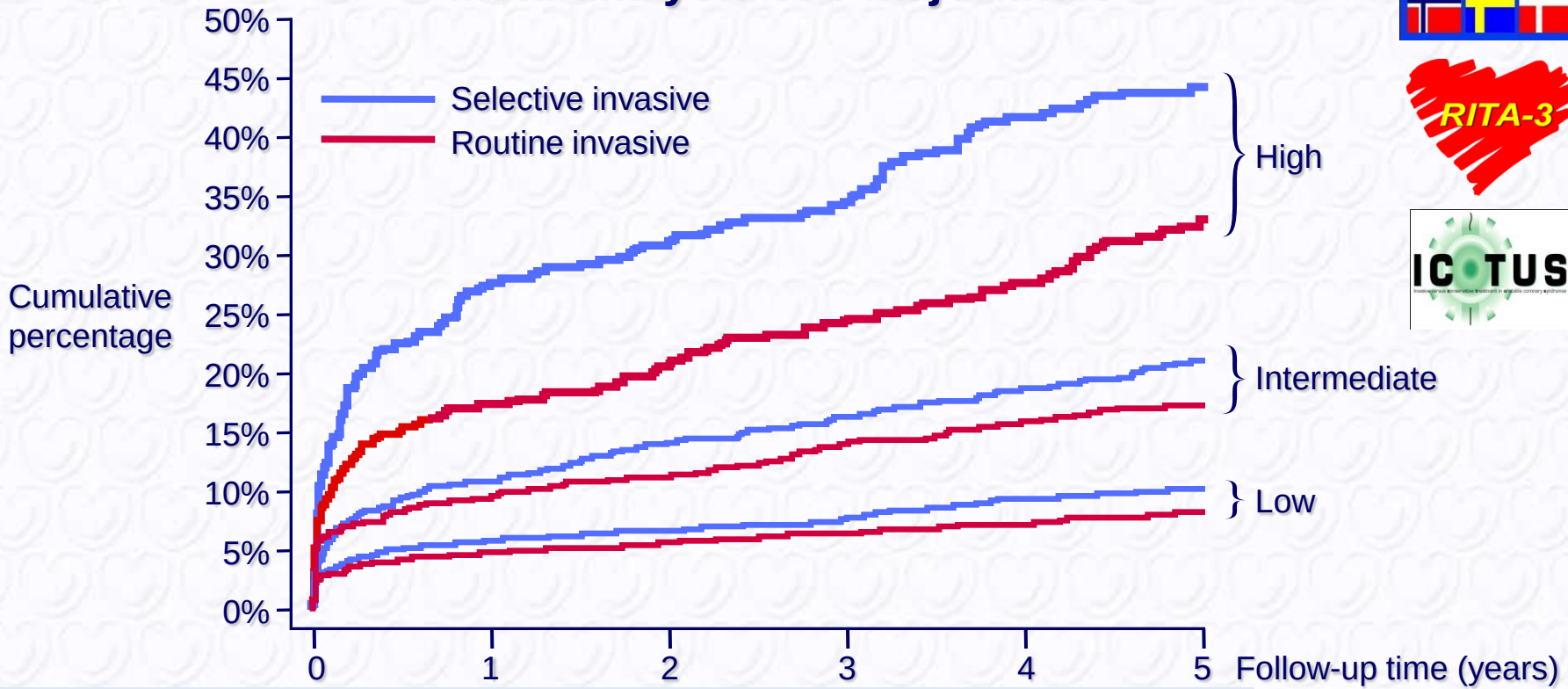
High risk criteria with indication for invasive management

Primary criteria
1. Relevant rise or fall in troponin
2. Dynamic ST- or T-wave changes (symptomatic or silent)
3. GRACE score >140
Secondary criteria
4. Diabetes mellitus
5. Renal insufficiency (eGFR <60 mL/min/1.73 m^2)
6. Reduced LV function (ejection fraction <40%)
7. Early post-infarction angina
8. Recent PCI
9. Prior CABG
10. Intermediate to high GRACE risk score (http://www.gracescore.org)

European Heart Journal
doi:10.1093/eurheartj/ehu278

Routine Versus Selective Invasive Strategy

Long term outcome by initial Risk Score
Meta-analysis of 3 major trials



Sélective invasive	2746	2452	2351	2178	2077	2005
Routine invasive	2721	2485	2410	2235	2166	2079

Fox KA et al. *JACC* 2010;55(22):2435-45

European Heart Journal
doi:10.1093/eurheartj/ehu278

Recommendations for invasive evaluation and revascularisation in NSTE-ACS

Recommendations	Class[a]	Level[b]
Urgent coronary angiography (<2 hours) is recommended in patients at very high ischaemic risk (refractory angina, with associated heart failure, cardiogenic shock, life-threatening ventricular arrhythmias, or haemodynamic instability).	I	C
An **early** invasive strategy (<24 hours) is recommended in patientswith at least one **primary** high-risk criterion (*Table 7*).	I	A
An invasive strategy (<72 hours after first presentation) is indicated in patients with at least one high-risk criterion (*Table 7*) or recurrent symptoms.	I	A
Non-invasive documentation of inducible ischaemia is recommended in low-risk patients without recurrent symptoms before deciding on invasive evaluation.	I	A
It is recommended to base the revascularization strategy (*ad hoc* culprit-lesion PCI/multivessel PCI/CABG) on the clinical status and comorbidities as well as the disease severity, i.e. distribution and angiographic lesion characteristics (e.g. SYNTAX score), according to the local Heart Team protocol.	I	C
New-generation DES are indicated for percutanous treatment of significant coronary lesions in ACS patients.	I	A

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

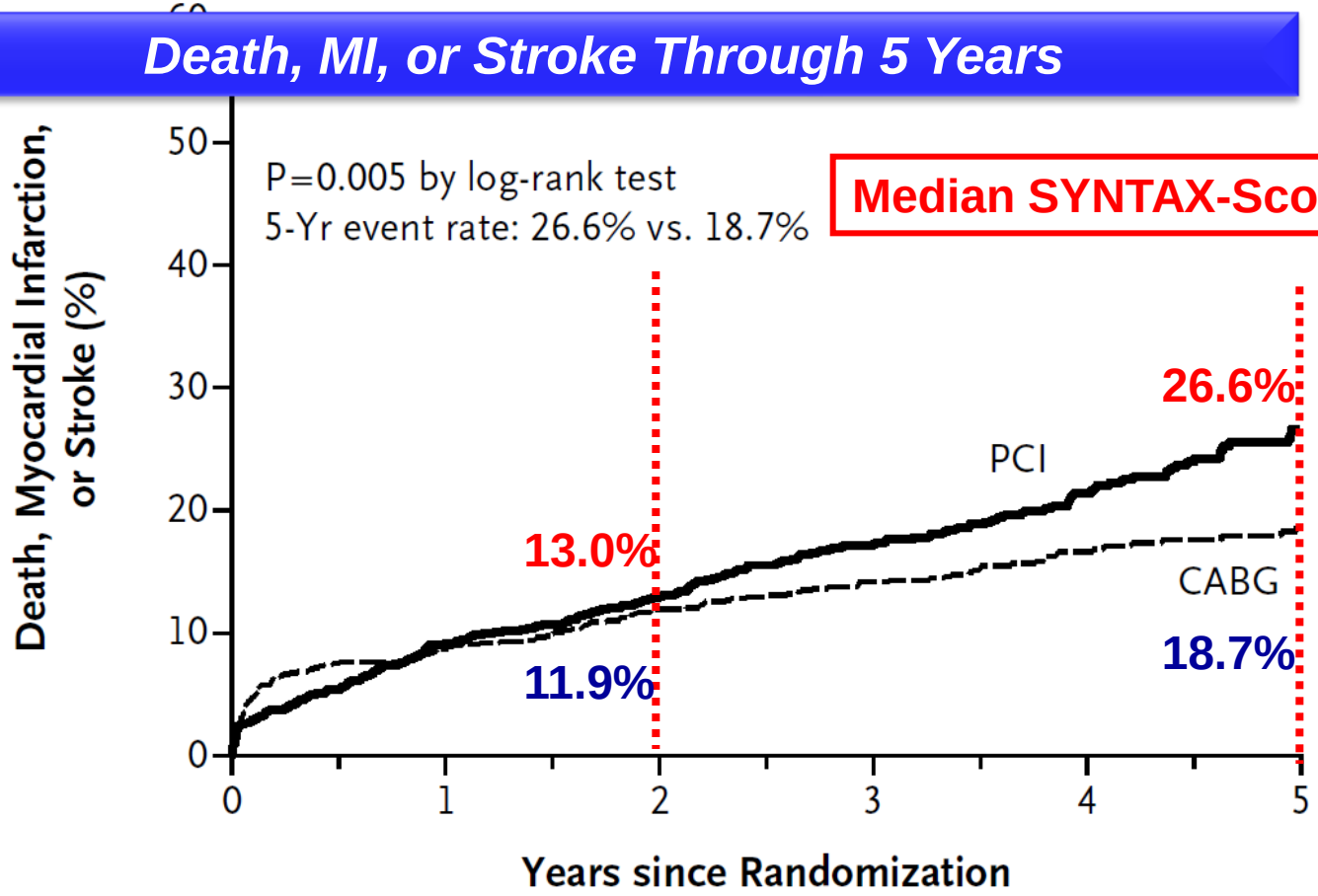
EUROPEAN SOCIETY OF CARDIOLOGY®

Revascularization in patients with diabetes

European Heart Journal
doi:10.1093/eurheartj/ehu278

STRATEGIES FOR MULTIVESSEL REVASCULARIZATION IN PATIENTS WITH DIABETES – THE FREEDOM

Death, MI, or Stroke Through 5 Years



No. at Risk						
PCI	953	848	788	625	416	219
CABG	947	814	758	613	422	221

Specific recommendations in diabetic patients

Recommendations	Class[a]	Level[b]
In patients presenting with STEMI, primary PCI is recommended over fibrinolysis if it can be performed within recommended time limits.	I	A
In patients with NSTE-ACS, an early invasive strategy is recommended over non-invasive management.	I	A
In stable patients with multivessel CAD and/or evidence of ischaemia, revascularization is indicated in order to reduce cardiac adverse events.	I	B
In patients with stable multivessel CAD and an acceptable surgical risk, CABG is recommended over PCI.	I	A
In patients with stable multivessel CAD and SYNTAX score ≤ 22, PCI should be considered as alternative to CABG.	IIa	B
New-generation DES are recommended over BMS.	I	A
Bilateral mammary artery grafting should be considered.	IIa	B
In patients on metformin, renal function should be carefully monitored for 2 to 3 days after coronary angiography/PCI.	I	C

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

Antithrombotic treatments in SCAD patients undergoing PCI

European Heart Journal
doi:10.1093/eurheartj/ehu278

Antiplatelet therapy in SCAD patients undergoing PCI

Antiplatelet therapy during PCI		
ASA is indicated before elective stenting.	I	B
ASA oral loading dose of 150–300 mg (or 80-150 mg i.v.) is recommended if not pre-treated.	I	C
Clopidogrel (600 mg loading dose or more, 75 mg daily maintenance dose) is recommended for elective stenting.	I	A
Antiplatelet therapy after stenting		
DAPT is indicated for at least 1 month after BMS implantation.	I	A
DAPT is indicated for 6 months after DES implantation.	I	B
Shorter DAPT duration (<6 months) may be considered after DES implantation in patients at high bleeding risk.	IIb	A
Life-long single antiplatelet therapy, usually ASA, is recommended.	I	A
Instruction of patients about the importance of complying with antiplatelet therapy is recommended.	I	C
DAPT may be used for more than 6 months in patients at high ischaemic risk and low bleeding risk.	IIb	C
GP IIb/IIIa antagonists should be considered only for bail-out.	IIa	C

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

Antithrombotic treatments in NSTE-ACS patients undergoing PCI

European Heart Journal
doi:10.1093/eurheartj/ehu278

Antiplatelet therapy in NSTE-ACS patients undergoing PCI

Recommendations	Class[a]	Level[b]
Antiplatelet therapy		
ASA is recommended for all patients without contraindications at an initial oral loading dose of 150–300 mg (or 80–150 mg i.v.), and at a maintenance dose of 75–100 mg daily long-term regardless of treatment strategy.	I	A
A $P2Y_{12}$ inhibitor is recommended in addition to ASA, and maintained over 12 months unless there are contraindications such as excessive risk of bleeding. Options are:	I	A
• Prasugrel (60 mg loading dose, 10 mg daily dose) in patients in whom coronary anatomy is known and who are proceeding to PCI if no contraindication.	I	B
• Ticagrelor (180 mg loading dose, 90 mg twice daily) for patients at moderate-to-high risk of ischaemic events, regardless of initial treatment strategy including those pre-treated with clopidogrel if no contraindication.	I	B
• Clopidogrel (600 mg loading dose, 75 mg daily dose), only when prasugrel or ticagrelor are not available or are contraindicated.	I	B
GP IIb/IIIa antagonists should be considered for bail-out situation or thrombotic complications.	IIa	C
Pre-treatment with prasugrel in patients in whom coronary anatomy is not known is not recommended.	III	B
Pre-treatment with GP IIb/IIIa antagonists in patients in whom coronary anatomy is not known is not recommended.	III	A

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

Antithrombotic treatments in STEMI patients undergoing PCI

European Heart Journal
doi:10.1093/eurheartj/ehu278

Antiplatelet therapy in STEMI patients undergoing primary PCI

Recommendations	Class[a]	Level[b]
Antiplatelet therapy		
ASA is recommended for all patients without contraindications at an initial oral loading dose of 150–300 mg (or 80–150 mg i.v.) and at a maintenance dose of 75–100 mg daily long-term regardless of treatment strategy.	I	A
A $P2Y_{12}$ inhibitor is recommended in addition to ASA and maintained over 12 months unless there are contraindications such as excessive risk of bleeding. Options are:	I	A
• Prasugrel (60 mg loading dose, 10 mg daily dose) if no contraindication	I	B
• Ticagrelor (180 mg loading dose, 90 mg twice daily) if no contraindication	I	B
• Clopidogrel (600 mg loading dose, 75 mg daily dose), only when prasugrel or ticagrelor are not available or are contraindicated.	I	B
It is recommended to give $P2Y_{12}$ inhibitors at the time of first medical contact.	I	B
GP IIb/IIIa inhibitors should be considered for bail-out or evidence of no-reflow or a thrombotic complication.	IIa	C
Upstream use of a GP IIb/IIIa inhibitor (vs. in-lab use) may be considered in high-risk patients undergoing transfer for primary PCI.	IIb	B

European Heart Journal
doi:10.1093/eurheartj/ehu278

Merci pour votre attention

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

Antithrombotic treatment in patients undergoing PCI who require oral anticoagulation

Recommendations	Class[a]	Level[b]
In patients with a firm indication for oral anticoagulation (e.g. atrial fibrillation with CHA_2DS_2-VASc score ≥2, venous thromboembolism, LV thrombus, or mechanical valve prosthesis), oral anticoagulation is recommended in addition to antiplatelet therapy.	I	C
New-generation DES are preferred over BMS among patients requiring oral anticoagulation if bleeding risk is low (HAS-BLED ≤2).	IIa	C
In patients with SCAD and atrial fibrillation with CHA_2DS_2-VASc score ≥2 at low bleeding risk (HAS-BLED ≤2), initial triple therapy of (N)OAC and ASA (75–100 mg/day) and clopidogrel 75 mg/day should be considered for a duration of at least one month after BMS or new-generation DES followed by dual therapy with (N)OAC and aspirin 75–100 mg/day or clopidogrel (75 mg/day) continued up to 12 months.	IIa	C
DAPT should be considered as alternative to initial triple therapy for patients with SCAD and atrial fibrillation with a CHA_2DS_2-VASc score ≤1.	IIa	C
In patients with ACS and atrial fibrillation at low bleeding risk (HAS-BLED≤2), initial triple therapy of (N)OAC and ASA (75–100 mg/day) and clopidogrel 75 mg/day should be considered for a duration of 6 months irrespective of stent type followed by (N)OAC and aspirin 75–100 mg/day or clopidogrel (75 mg/day) continued up to 12 months.	IIa	C
In patients requiring oral anticoagulation at high bleeding risk (HAS BLED ≥3), triple therapy of (N)OAC and ASA (75–100 mg/day) and clopidogrel 75 mg/day should be considered for a duration of one month followed by (N)OAC and aspirin 75–100 mg/day or clopidogrel (75 mg/day) irrespective of clinical setting (SCAD or ACS) and stent type (BMS or new-generation DES).	IIa	C
Dual therapy of (N)OAC and clopidogrel 75 mg/day may be considered as an alternative to initial triple therapy in selected patients.	IIb	B
The use of ticagrelor and prasugrel as part of initial triple therapy is not recommended	III	C

www.escardio.org/guidelines

European Heart Journal
doi:10.1093/eurheartj/ehu278

EUROPEAN SOCIETY OF CARDIOLOGY®

Special conditions: diabetes

- **Diabetic patients represent an increasing proportion of CAD patients, many of whom are treated with revascularisation procedures.**
- **Diabetic patients are at increased risk, including long-term mortality, compared with non-diabetic patients, whatever the mode of therapy used.**
- **Diabetic patients may pose specific problems, such as higher recurrence rate after PCI and CABG.**

European Heart Journal
doi:10.1093/eurheartj/ehu278

META-ANALYSIS: DES VS CABG IN DIABETIC PATIENTS

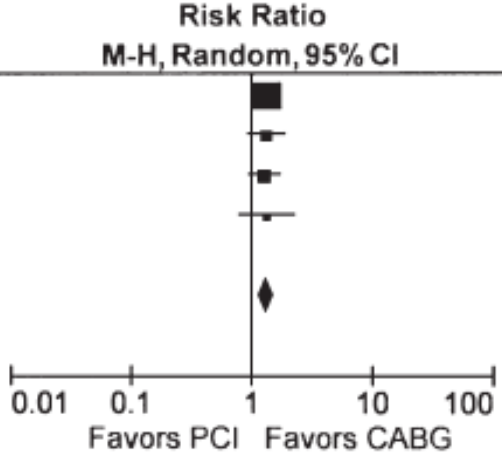
MACE: Death, MI, or Stroke

(A)

Study or Subgroup	PCI Events	PCI Total	CABG Events	CABG Total	Weight	Risk Ratio M-H, Random, 95% CI	Year
FREEDOM trial	200	953	146	947	56.2%	1.36 [1.12, 1.65]	2012
SYNTAX TRIAL	54	231	39	221	15.5%	1.32 [0.92, 1.91]	2012
CARDIA Study	68	254	52	248	21.1%	1.28 [0.93, 1.75]	2013
VA CARDS	25	101	18	97	7.3%	1.33 [0.78, 2.28]	2013
Total (95% CI)		**1539**		**1513**	**100.0%**	**1.34 [1.16, 1.54]**	
Total events	347		255				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.12$, df = 3 (P = 0.99); $I^2 = 0\%$

Test for overall effect: Z = 3.91 (P < 0.0001)



Variable		PCI	CABG	RR	*P* Value	Heterogeneity
MACE based on SYNTAX Score*	<22 (n=805)	22.2%	17.5%	1.27 (0.96 to 1.68)	0.09	0%; *P*=0.32
	23 to 32 (n=992)	26.1%	18.3%	1.32 (0.86 to 2.02)	0.21	48%; *P*=0.16
	>33 (n=541)	24.7%	14.4%	1.73 (1.21 to 2.46)	0.003	0%; *P*=0.81

Hakeem A et al. *J Am Heart Assoc* 2013

Pretreatment in SCAD patients undergoing PCI

Recommendations for PCI	Class[a]	Level[b]
~~Pre-treatment~~ with antiplatelet therapy		
Treatment with 600 mg clopidogrel is recommended in elective PCI patients once anatomy is known and decision to proceed with PCI preferably 2 hours or more before the procedure.	I	A
~~Pre-treatment~~ with clopidogrel may be considered in patients with high probability for significant CAD.	IIb	C
In patients on a maintenance dose of 75 mg clopidogrel, a new loading dose of 600 mg or more may be considered once the indication for PCI is confirmed.	IIb	C

European Heart Journal
doi:10.1093/eurheartj/ehu278