



**SESSION MÉDICALE 4** : Lecture accélérée des recommandations ESC sur la revascularisation myocardique

## **Populations spécifiques et nouveautés techniques**

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## Les guidelines identifient :

1. Les patients avec IC
2. Les patients diabétiques
3. Les patients avec IRC



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doi:10.1093/eurheartj/ehy394

ESC/EACTS GUIDELINES

### 2018 ESC/EACTS Guidelines on myocardial revascularization

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

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

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<sup>1</sup>Representing the European Association for Cardio-Thoracic Surgery (EACTS).

ESC entities having participated in the development of this document:

**Associations:** Acute Cardiovascular Care Association (ACCA), European Association of Preventive Cardiology (EAPC), European Association of Cardiovascular Imaging (EACVI), European Association of Percutaneous Cardiovascular Interventions (EAPCI), European Heart Rhythm Association (EHRA), Heart Failure Association (HFA), Council on Cardiovascular Nursing and Allied Professions, Council for Cardiology Practice, Council on Cardiovascular Primary Care, Council on Stroke, Council on Valvular Heart Disease.

**Working Groups:** Aorta and Peripheral Vascular Diseases, Cardiovascular Pharmacotherapy, Coronary Pathophysiology and Microcirculation, Thrombosis.

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# Les patients avec IC

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
In patients with severe LV systolic dysfunction and coronary artery disease suitable for intervention, myocardial revascularization is recommended. <sup>81,250</sup>	I	B

# Les patients avec IC

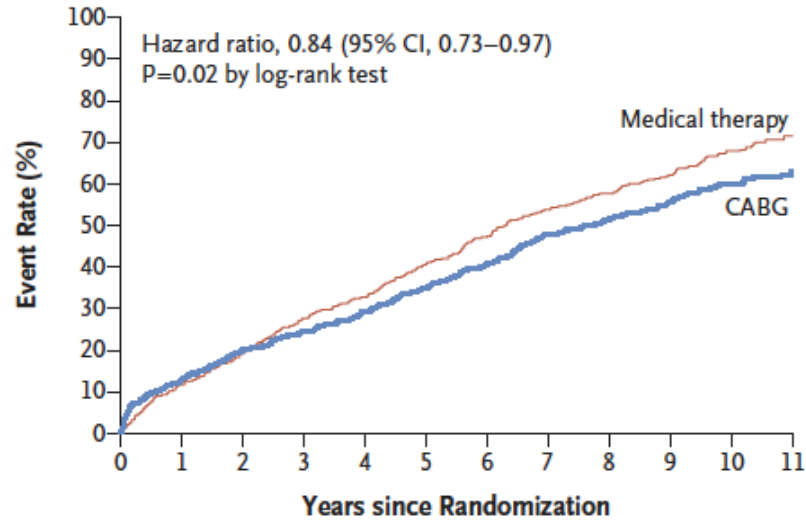
STICH: 1212 patients with EF < 35%

CABG

**Randomized**

Medical ttt

**A Death from Any Cause (Primary Outcome)**



**No. at Risk**

Medical therapy	602	532	487	435	404	357	315	274	248	164	82	37
CABG	610	532	487	460	432	392	356	312	286	205	103	42

**Primary percutaneous coronary intervention for myocardial reperfusion in ST-elevation myocardial infarction: procedural aspects (strategy and technique)**

Recommendations	Class*	Level <sup>b</sup>
<b>Strategy</b>		
Routine revascularization of non-IRA lesions should be considered in patients with multivessel disease before hospital discharge. <sup>211-214</sup>	IIa	A
CABG should be considered in patients with ongoing ischaemia and large areas of jeopardized myocardium if PCI of the IRA cannot be performed.	IIa	C
In cardiogenic shock, routine revascularization of non-IRA lesions is not recommended during primary PCI. <sup>200</sup>	III	B
<b>Technique</b>		
Routine use of thrombus aspiration is not recommended. <sup>227-24,228</sup>	III	A

CABG = coronary artery bypass grafting; IRA = infarct-related artery; PCI = percutaneous coronary intervention; STEMI = ST-segment elevation myocardial infarction.  
\*Class of recommendation.  
<sup>b</sup>Level of evidence.

## 8 Myocardial revascularization in patients with heart failure

### 8.1 Chronic heart failure

#### 8.1.1 Recommendations for myocardial revascularization in patients with chronic heart failure

When compared with medical therapy alone, coronary revascularization is superior in improving survival in patients with HF of ischaemic origin and is recommended in clinical practice.<sup>81,248</sup> However, the optimal revascularization strategy is not defined. The choice between CABG and PCI should be made by the Heart Team after careful evaluation of the patient's clinical status and coronary anatomy, expected completeness of revascularization (see section 5.3.1.3), myocardial viability, coexisting valvular disease, and comorbidities. Considerations relating to the need for viability testing prior to revascularization are discussed in section 3.

Randomized clinical trial data comparing revascularization with medical therapy exists only for CABG in the setting of the STICH trial.<sup>21</sup> One analysis from this trial showed that CABG can be performed with acceptable 30-day mortality rates (2-14%) in patients with LV dysfunction (LVEF <35%).<sup>249</sup> Extended follow-up in the STICH Extension Study (STICH-ES) supports a significant survival benefit of CABG combined with medical therapy vs. medical therapy alone in a 10-year observation period.<sup>251</sup>

There are currently no dedicated randomized clinical trials comparing PCI vs. medical therapy in patients with HF with reduced EF (HFrEF). In addition, CABG vs. PCI randomized trials have excluded patients with severe HF. In one prospective registry including 4616 patients with multivessel disease and severe HFrEF, propensity score-matched comparison revealed similar survival (mean follow-up 2.9 years) with PCI (using DES) vs. CABG.<sup>252</sup> PCI was associated with a higher risk of MI, particularly in patients with incomplete revascularization, and repeat revascularization. CABG was associated with a higher risk of stroke. The conclusion of the study was that multivessel PCI can be a valuable option in HF patients if complete revascularization is possible. A systematic review of studies comparing

revascularization with medical therapy in patients with an EF <40% showed that there was a significant mortality reduction with CABG (HR 0.64, 95% CI 0.61-0.72, P <0.001) and PCI (HR 0.73, 95% CI 0.62-0.85, P <0.001) vs. medical therapy, though these findings are limited by the predominantly observational nature of the included studies and missing information on the completeness of revascularization.<sup>248</sup>

A recent observational study investigated outcomes with PCI or CABG for multivessel CAD and LV dysfunction in 1738 propensity-matched patients with diabetes mellitus.<sup>251</sup> Similar to the findings in the absence of LV dysfunction, when CABG was compared with PCI it was associated with a significantly lower risk of MACE, which included a significant reduction in mortality. Event curves separated early during the first year and continued to separate out to 12 years.

PCI should be considered in older patients without diabetes in whom complete revascularization can be achieved, whereas CABG is preferred in younger patients with more extensive CAD or those with diabetes. In patients with diabetes and LV moderate or severe dysfunction (EF <50%), CABG is associated with better long-term survival and reduced incidence of MACE.<sup>249,251</sup>

#### 8.1.2 Ventricular reconstruction and aneurysm resection

The aim of surgical ventricular reconstruction (SVR) is to restore physiological volume, and achieve an elliptical shape of the LV, by scar resection and LV wall reconstruction on a mannequin of predefined size. The aim of ventricular aneurysmectomy is to remove fibrous scars in cases of severe dilatation, thrombus formation, or a source of life-threatening ventricular arrhythmias.

The STICH trial revealed no difference in the primary outcome (total mortality or cardiac hospitalization) between patients randomly allocated to CABG vs. combined CABG and SVR.<sup>253</sup> Subgroup analyses of patients with a less dilated LV and better LVEF showed benefit from SVR.<sup>253</sup> In the STICH trial, a post-operative LV end-systolic volume index <70 mL/m<sup>2</sup> after CABG plus SVR resulted in improved survival compared with CABG alone.<sup>253,254</sup> In experienced centres, SVR may be done at the time of CABG if HF

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There are currently no dedicated randomized clinical trials comparing PCI vs. medical therapy in patients with HF with reduced EF (HFrEF).

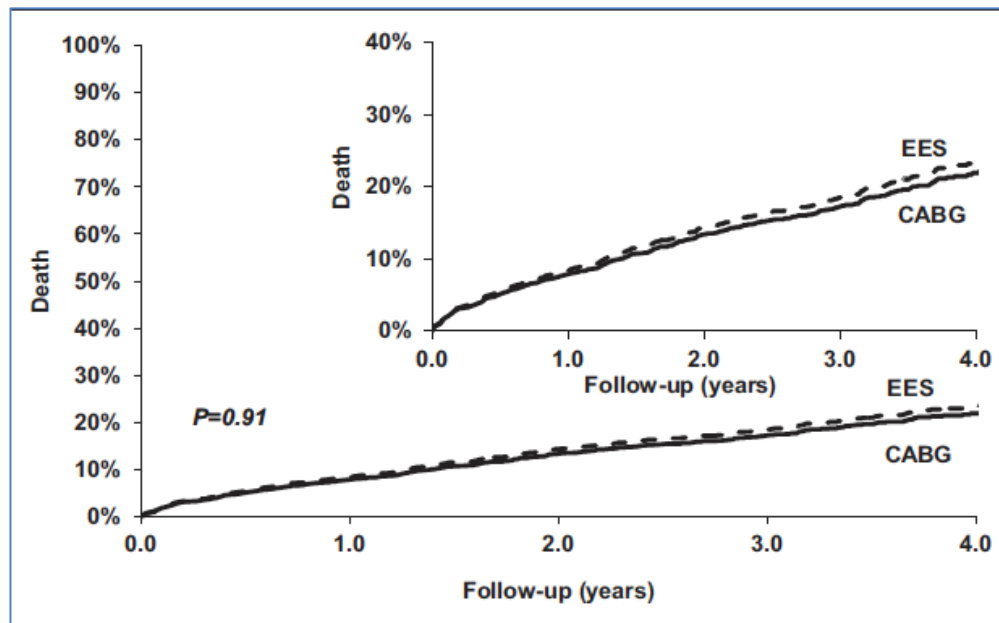
# Les patients avec IC

2126 patients with multivessels & EF < 35%

DES (everolimus)

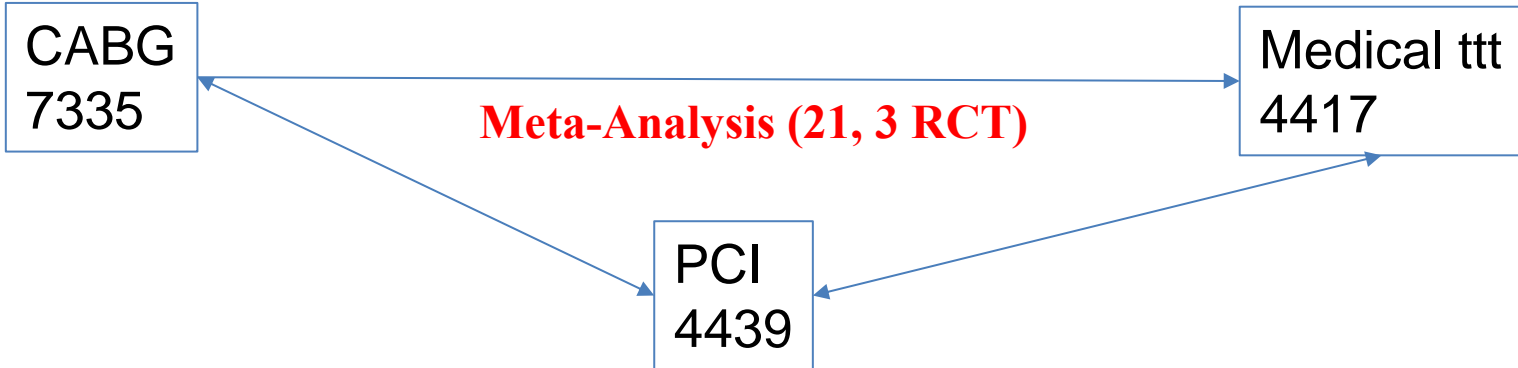
**similar propensity scores**

CABG



# Les patients avec IC

16 191 patients  
Mean age 64 years, 79%, Male



## Limitations

Etudes observationnelles  
Revascularisation complete ?

# Les patients avec IC



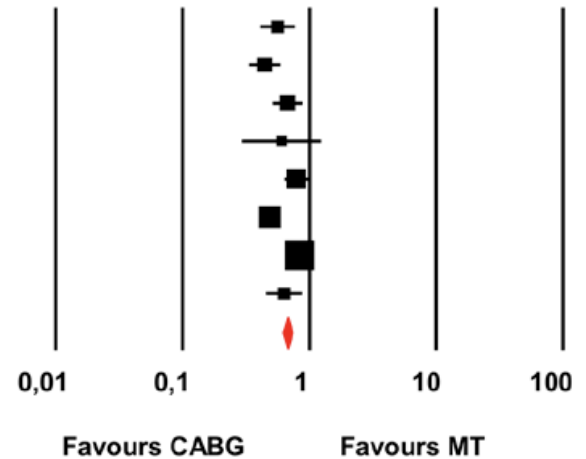
**A**

Study name

Statistics for each study

Hazard ratio and 95% CI

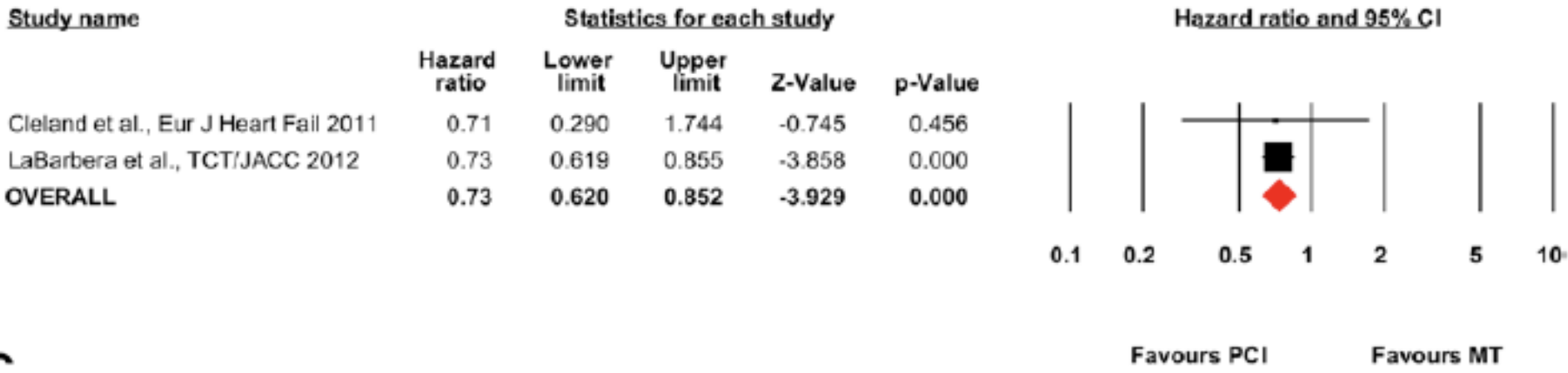
	Hazard ratio	Lower limit	Upper limit	Z-Value	p-Value
Appoo et al., Circulation 2004	0,56	0,409	0,774	-3,532	0,000
Bounous et al., Circulation 1988	0,44	0,333	0,594	-5,494	0,000
CASS, Circulation 1983	0,68	0,516	0,887	-2,827	0,005
Cleland et al., Eur J Heart Fail 2011	0,61	0,293	1,251	-1,356	0,175
Kwon et al., Circulation 2012	0,79	0,633	0,980	-2,144	0,032
LaBarbera et al., TCT/JACC 2012	0,49	0,405	0,592	-7,376	0,000
STICH, NEJM 2016	0,84	0,729	0,968	-2,404	0,016
Velazquez et al., AnnThoracSurg 2012	0,63	0,451	0,881	-2,700	0,007
<b>OVERALL</b>	<b>0,66</b>	<b>0,611</b>	<b>0,721</b>	<b>-9,655</b>	<b>0,000</b>



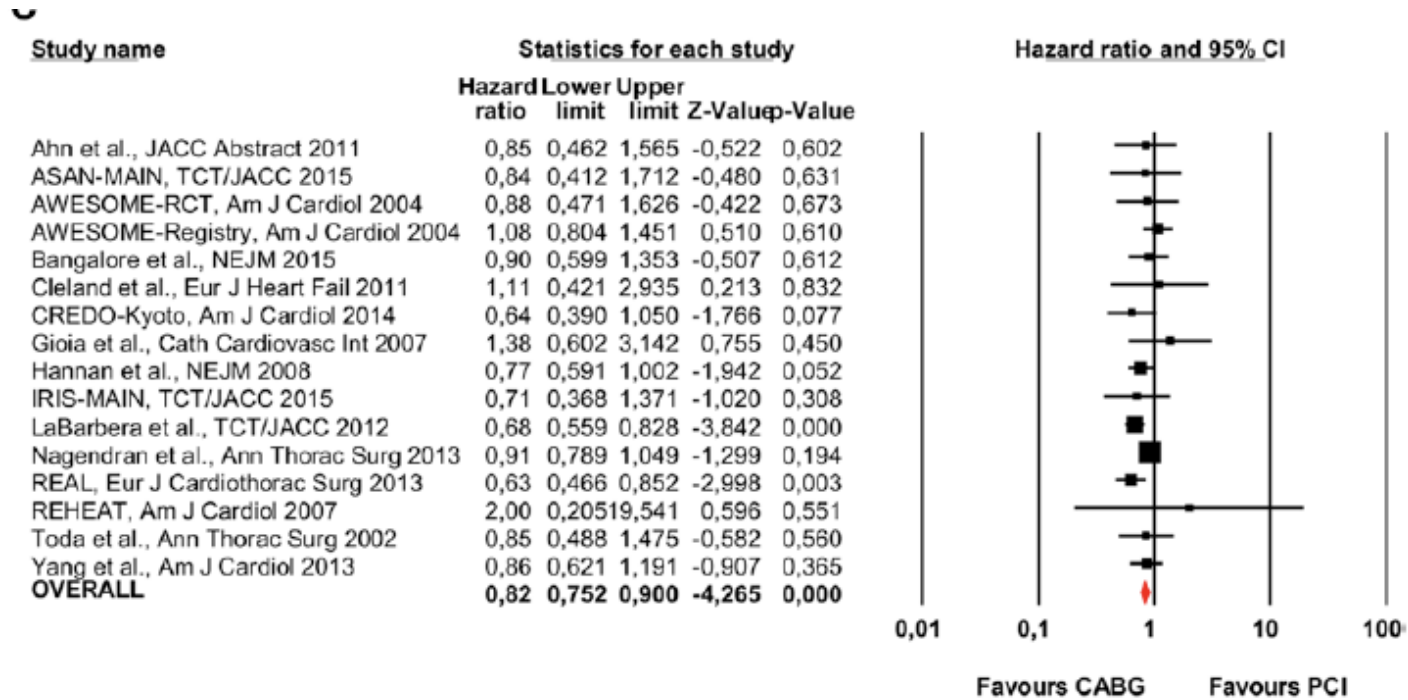
**B**



# Les patients avec IC



# Les patients avec IC



# Les patients avec IC

Multivessels

<p>CABG is recommended as the first revascularization strategy choice in patients with multivessel disease and acceptable surgical risk.<sup>68,81,248,255</sup></p>	<b>I</b>	<b>B</b>
<p>In patients with three-vessel disease, PCI should be considered based on the evaluation by the <b>Heart Team</b> of the patient's coronary anatomy, the expected completeness of revascularization, diabetes status, and comorbidities.</p>	<b>IIa</b>	<b>C</b>

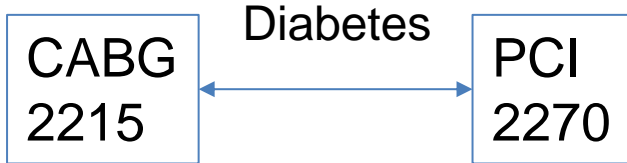
1-2 vessels

<p>In patients with one- or two-vessel disease, PCI should be considered as an alternative to CABG when <b>complete revascularization</b> can be achieved.</p>	<b>IIa</b>	<b>C</b>
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# Les patients diabétiques

Les indications à une revascularisation sont les mêmes.

## Randomized



*J Am Coll Cardiol* 2004; **43**: 1743–51.

*Lancet* 2002; **360**: 965–70

*N Engl J Med* 2001; **344**: 1117–24

*N Engl J Med* 2009; **360**: 961–72

*N Engl J Med* 2011; **364**: 1718–27

*N Engl J Med* 2012; **367**: 2375–84.

*J Am Coll Cardiol* 2013; **61**: 808–16

*N Engl J Med* 2015; **372**: 1204–12

*Lancet* 2016; **388**: 2743–52

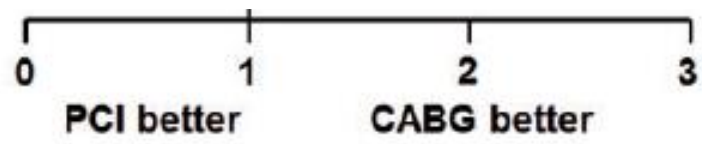
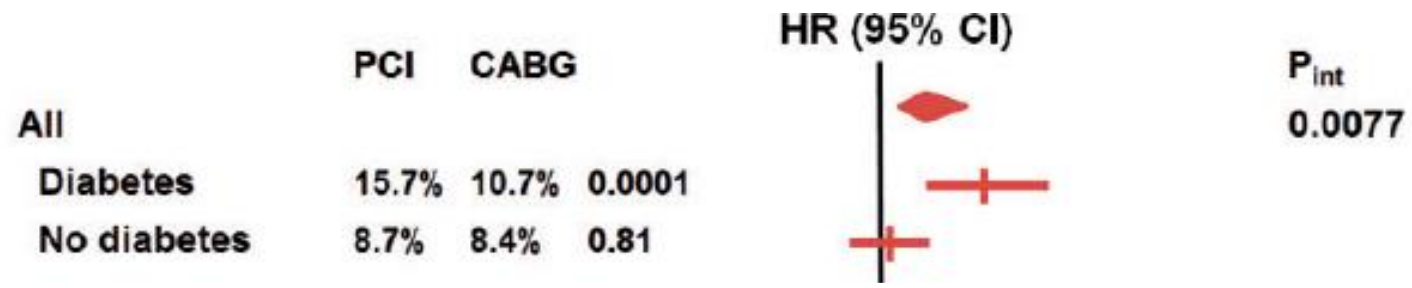
*N Engl J Med* 2016; **375**: 2223–35.

*JACC Cardiovasc Interv* 2016; **9**: 318–27.

*J Am Coll Cardiol* 2001; **37**: 51–58.

# Les patients diabétiques

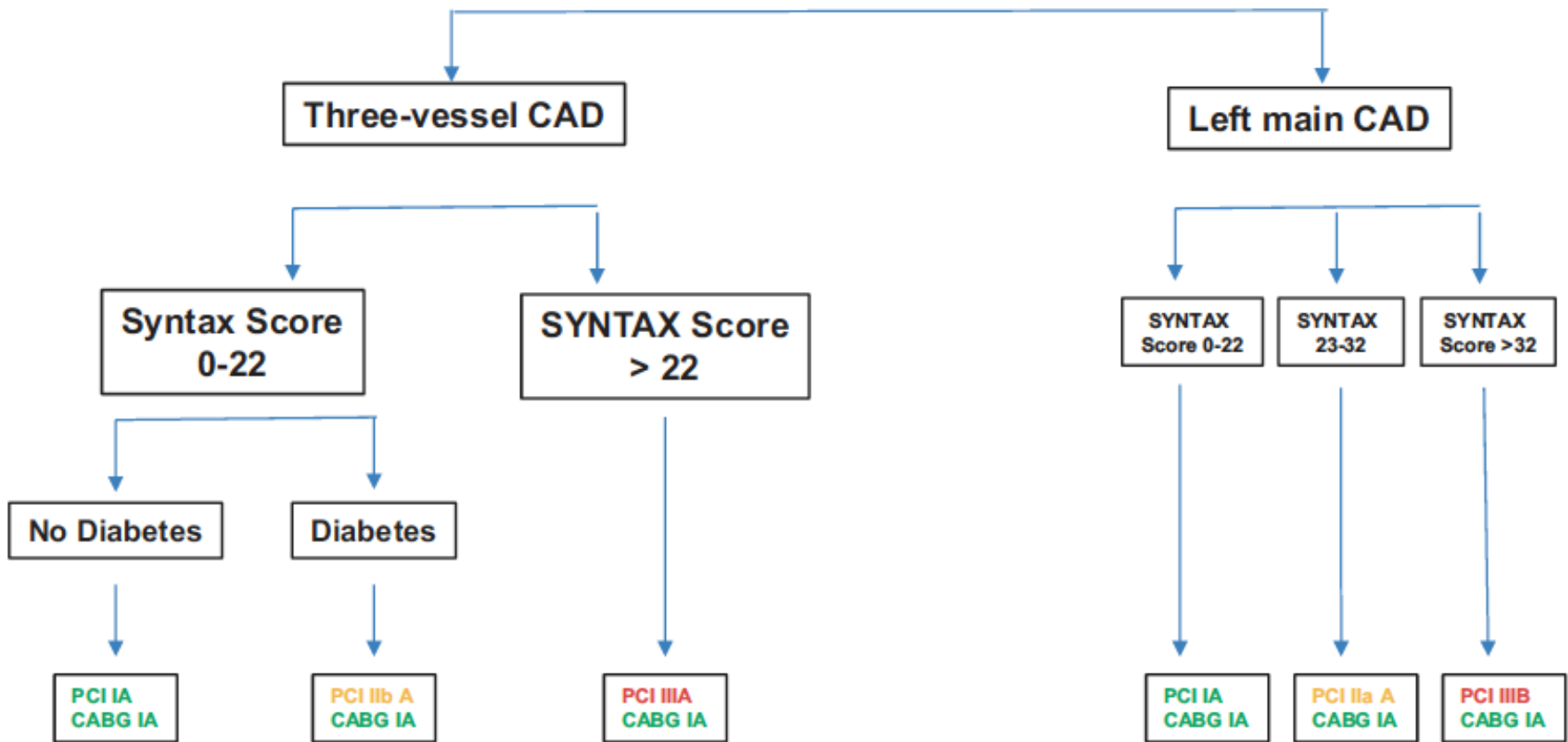
All cause mortality



Head SJ et al., Lancet 2018; 391: 939-48

# Les patients diabétiques

**Stable Multi-vessel or Left Main Coronary Artery Disease  
With Suitable Anatomy for PCI and CABG and  
Clinical Eligibility for either PCI or CABG**



# Les patients avec un diabète & IC

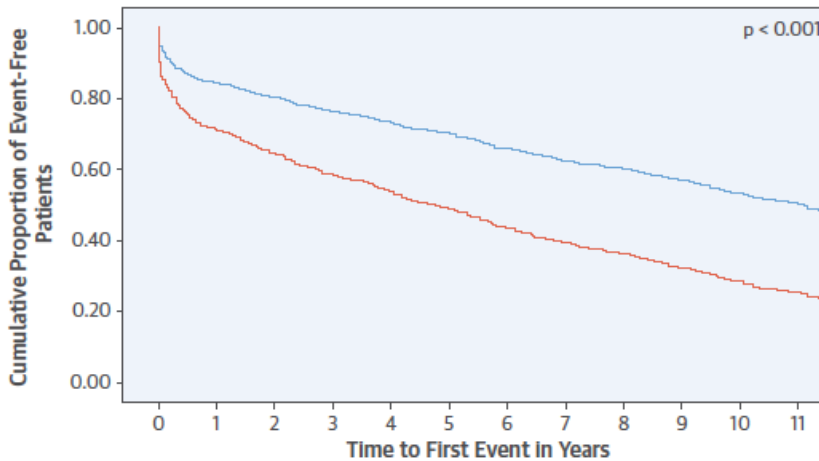
1738 patients with diabetes & EF < 50%

PCI

similar propensity scores

CABG

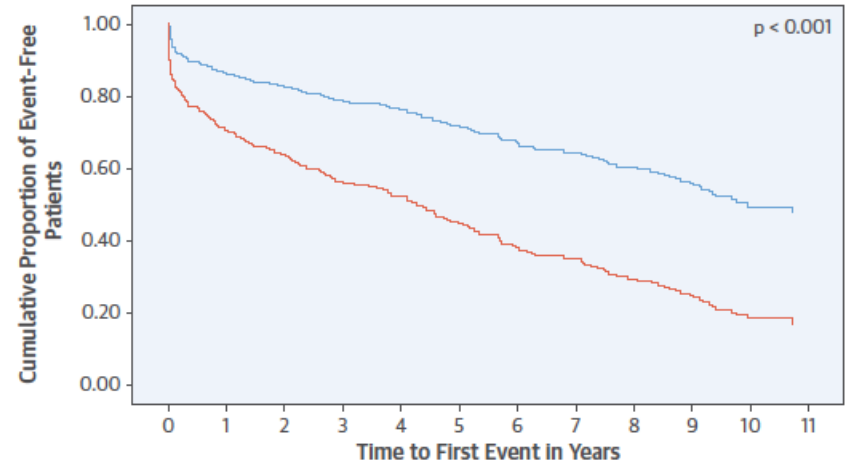
EF 35-49%



Number at Risk

PCI	457	314	287	247	193	169	140	100	74	58	35	19
CABG	516	446	421	385	340	295	247	214	183	146	103	68

EF <35%



Number at Risk

PCI	412	237	170	84	73	58	41	32	21	15	8	3
CABG	353	264	206	146	133	115	95	88	72	59	33	20

First Treatment Post Index Cath — CABG — PCI

*“Myocardial revascularization in patients with CKD is addressed by the 2014 ESC/EACTS Guidelines on myocardial revascularization. After reviewing the literature, the current Task Force has not found any evidence to support a major update”*

2014

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
CABG should be considered over PCI in patients with multivessel CAD and symptoms/ischaemia whose surgical risk profile is acceptable and life expectancy is beyond 1 year.	IIa	B
PCI should be considered over CABG in patients with multivessel CAD and symptoms/ischaemia whose surgical risk profile is high or life expectancy is less than 1 year.	IIa	B
It should be considered to delay CABG after coronary angiography until the effect of contrast media on renal function has subsided.	IIa	B
Off-pump CABG may be considered rather than on-pump CABG.	IIb	B
New-generation DES are recommended over BMS.	I	B



# Les patients avec IRC

UPGRADES	
For PCI of bifurcation lesions, stent implantation in the main vessel only, followed by provisional balloon angioplasty with or without stenting of the side branch	
Immediate coronary angiography and revascularization, if appropriate, in survivors of out-of-hospital cardiac arrest and an ECG consistent with STEMI	
Assess all patients for the risk of contrast-induced nephropathy	
OCT for stent optimization	

Diabetes mellitus  
Congestive HF  
Haemodynamic instability  
Female sex,  
Advanced age  
Anaemia  
Periprocedural bleeding

- Use of low-osmolar or iso-osmolar contrast media is recommended (1A)
- Total contrast volume/GFR <3.7.c (1B)
- In statin-naïve patients, pre-treatment with highdose statins (IIa A)
- Pre- and post-hydration with isotonic saline should be considered if the expected contrast volume is >100 mL. (IIa C)

## Recommendations on intravascular imaging for procedural optimization

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
IVUS or OCT should be considered in selected patients to optimize stent implantation. <sup>603,612,651–653</sup>	<b>IIa</b>	<b>B</b>
IVUS should be considered to optimize treatment of unprotected left main lesions. <sup>35</sup>	<b>IIa</b>	<b>B</b>

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IVUS = intravascular ultrasound; OCT = optical coherence tomography.

<sup>a</sup>Class of recommendation.

<sup>b</sup>Level of evidence.

# Les nouveautés techniques

Recommendations	Class <sup>a</sup>	Level <sup>b</sup>
<p>DES are recommended over BMS for any PCI irrespective of:</p> <ul style="list-style-type: none"><li>● clinical presentation</li><li>● lesion type</li><li>● planned non-cardiac surgery</li><li>● anticipated duration of DAPT</li><li>● concomitant anticoagulant therapy.<sup>100,578,579,640</sup></li></ul>	I	A

# Les nouveautés techniques

In true bifurcation lesions of the left main, the double-kissing crush technique may be preferred over provisional T-stenting.<sup>620</sup>

**IIb**

**B**

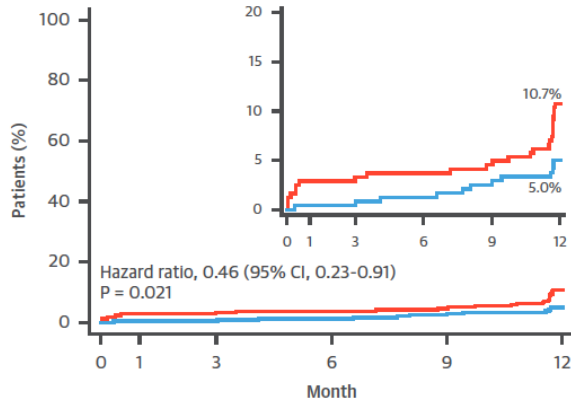
482 patients (26 centers), randomized  
(Medina 1,1,1 or 0,1,1)

Target Lesion Failure

# Les nouveautés techniques

**A**

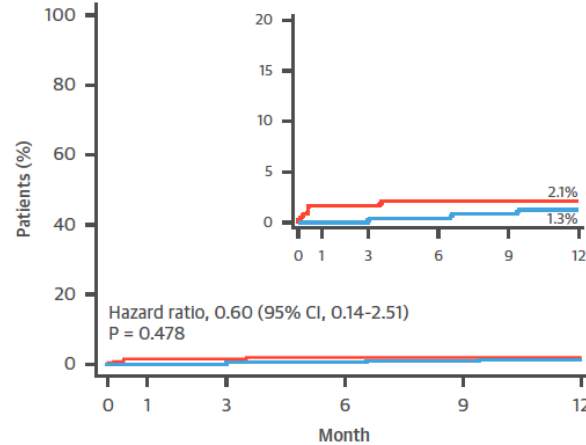
Target Lesion Failure



No. at risk	0	1	3	6	9	12
DK crush	240	239	239	236	230	224
Provisional stenting	242	236	235	234	231	216

**B**

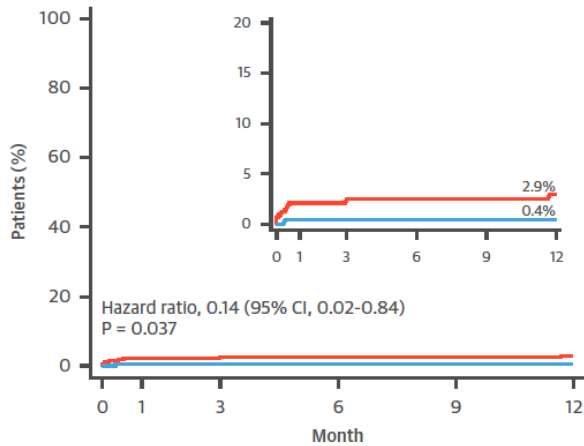
Cardiac Death



No. at risk	0	1	3	6	9	12
DK crush	240	240	239	239	238	237
Provisional stenting	242	239	239	238	238	237

**C**

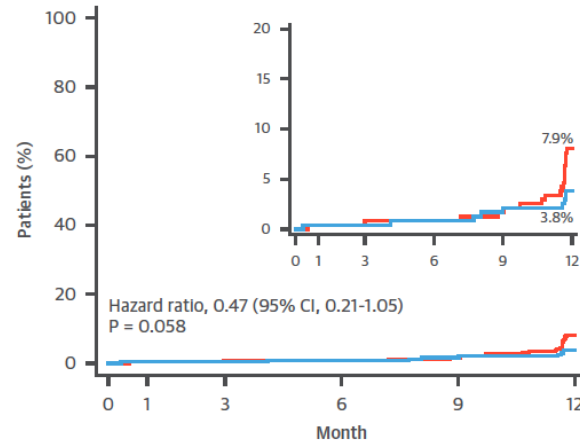
Target Vessel Myocardial Infarction



No. at risk	0	1	3	6	9	12
DK crush	240	240	239	239	238	236
Provisional stenting	242	236	235	234	234	232

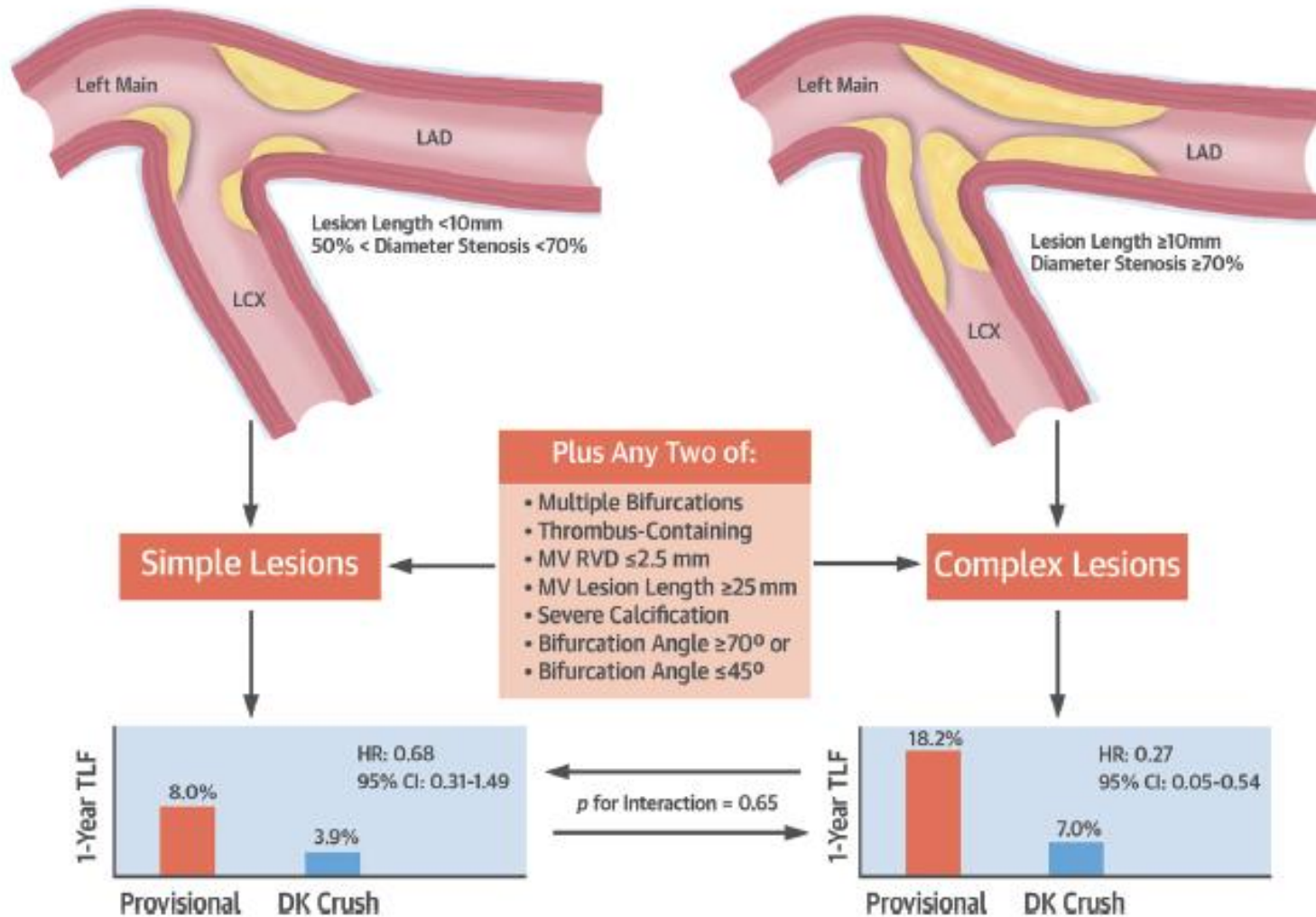
**D**

Target Lesion Revascularization



No. at risk	0	1	3	6	9	12
DK crush	240	240	240	236	231	224
Provisional stenting	242	238	237	236	234	218

# Les nouveautés techniques



# Les nouveautés techniques

## UPGRADES

For PCI of bifurcation lesions, stent implantation in the main vessel only, followed by provisional balloon angioplasty with or without stenting of the side branch

Immediate coronary angiography and revascularization, if appropriate, in survivors of out-of-hospital cardiac arrest and an ECG consistent with STEMI

Assess all patients for the risk of contrast-induced nephropathy

OCT for stent optimization

## DOWNGRADES

Distal protection devices for PCI of SVG lesions

Bivalirudin for PCI in NSTEMI-ACS

Bivalirudin for PCI in STEMI

PCI for MVD with diabetes and SYNTAX score <23

Platelet function testing to guide antiplatelet therapy interruption in patients undergoing cardiac surgery

EuroSCORE II to assess in-hospital mortality after CABG

	Class I		Class IIa
	Class IIb		Class III

The figure does not show changes compared with the 2014 version of the Myocardial Revascularization Guidelines that were due to updates for consistency with other ESC Guidelines published since 2014.



# Conclusions

- L'insuffisance cardiaque
  - La chirurgie est la modalité de revascularisation de choix
  - L'angioplastie est sous-étudiée
- Les diabétiques
  - La chirurgie est la modalité de revascularisation de choix
- OCT
  - Reconnu pour l'optimisation de l'angioplastie
- Stent
  - DES pour tout le monde
- Tronc commun
  - DK crush est potentiellement mieux que le provisional stenting

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