Pacienti s rozsáhlou koronární aterosklerózou, tzn. onemocněním více koronárních tepen

Pohled intervenčního kardiologa

Petr Kala

IKK FN Brno

European Heart Journal Advance Access published September 10, 2014

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 of 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).

Skórovací systémy pro odhad rizika PCI a CABG

Intervenční kardiologie
IKK FN Brno

Risk models to assess short-term (in-hospital or 30-day) outcomes

Score	Development cohort (patients, design)	Patient inclusion	Coronary procedures	Number of variables		Outcome	Recommendation		Validation studies	Calculation	Ref[a]
				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	http://riskcalc.sts.org	15, 16
EuroSCORE II	*n* =16 828 Multicentre	05/2010 – 07/2010	47% (i)CABG	18	0	In-hospital mortality	IIa B	IIb C	>10	www.euroscore.org/calc.html	11
ACEF	*n* = 4 557 Single-centre	2001 – 2003	-	3	0	In-hospital or 30-day[b] mortality	IIb C	IIb C	5–10	[Age/ejection fraction (%)] + 1[d]	22
NCDR CathPCI	181 775 Multicentre	01/2004 – 03/2006	100% PCI	8	0	In-hospital mortality		IIb B	<5	-	21
EuroSCORE	*n* =19 030 Multicentre	09/1995 – 11/1995	64% (i)CABG	17	0	Operative mortality	III B	III C	>50	www.euroscore.org/calcold.html	7, 8

ACEF = age, creatinine, ejection fraction; (i)CABG = (isolated) coronary artery bypass grafting; NCDR = National Cardiovascular Data Registry; PCI = percutaneous coronary intervention; STS = Society of Thoracic Surgeons.

[a]References.

[b]Whichever occurs last.

[c]Permanent stroke, renal failure, prolonged ventilation, deep sternal wound infection, re-operation, length of stay <6 or >14 days.

[d]If creatinine is >2 mg/dL.

Windecker et al. EHJ 2014

Skórovací systémy pro odhad rizika PCI a CABG

Risk models to assess medium- to long-term (≥1 year) outcomes

Score	Development cohort	Patient inclusion	Coronary procedures	Number of variables		Outcome	Recommendation		Validation studies	Calculation	Ref[a]
				Clinical	Anatomical		CABG	PCI			
SYNTAX	none, expert opinion	none	-	0	11 (3 general, 8 per lesion)	MACCE	I B	I B	>50	www.syntaxscore.com	30
SYNTAX II	1 800 Multicentre	03/2005 – 04/2007	50% CABG, 50% PCI	6	12	4-year mortality	IIa B	IIa B	<5	-	25
ASCERT CABG	174 506 Multicentre	01/2002 – 12/2007	100% (i)CABG	23	2	Mortality >2 years	IIa B		<5	-	27
ASCERT PCI	206 081 Multicentre	2004 – 2007	100% PCI	17	2	Mortality >1 year		IIa B	<5	-	28
Logistic Clinical SYNTAX	6 508 Multicentre	03/2005 – 04-2007	100% PCI	3	11	1-year MACE and mortality		IIa B	<5	-	24

ASCERT = American College of Cardiology Foundation–Society of Thoracic Surgeons Database Collaboration (ACCF–STS) on the comparative effectiveness of revascularization strategies; (i) CABG = (isolated) coronary artery bypass grafting; MACCE = major adverse cardiac and cerebrovascular events; PCI = percutaneous coronary intervention; SYNTAX = synergy between percutaneous coronary intervention with TAXUS and cardiac surgery.
[a]References.

Windecker et al. EHJ 2014

Indikace revaskularizace u stabilní ICHS

Intervenční kardiologie
IKK FN Brno

Indications for revascularization in patients with stable angina or silent ischaemia

Extent of CAD (anatomical and/or functional)		Class[b]	Level[c]	References
For prognosis	Left main disease with stenosis >50%[a]	I	A	108,134,135
	Any proximal LAD stenosis >50%[a]	I	A	94,108,135,136
	Two-vessel or three-vessel disease with stenosis > 50%[a] with impaired LV function (LVEF<40%)[a]	I	A	93,94,108,112, 121,135,137–142
	Large area of ischaemia (>10% LV)	I	B	54,91,97,99,143,144
	Single remaining patent coronary artery with stenosis >50%[a]	I	C	
For symptoms	Any coronary stenosis >50%[a] in the presence of limiting angina or angina equivalent, unresponsive to medical therapy	I	A	54,96,105,108, 118–120,145

[a]With documented ischaemia or FFR ≤ 0.80 for diameter stenosis <90%.
[b]Class of recommendation.
[c]Level of evidence.
CAD = coronary artery disease; FFR = fractional flow reserve; LAD = left anterior descending coronary artery; LV = left ventricular.

Volba optimální formy revaskularizace u stabilní ICHS

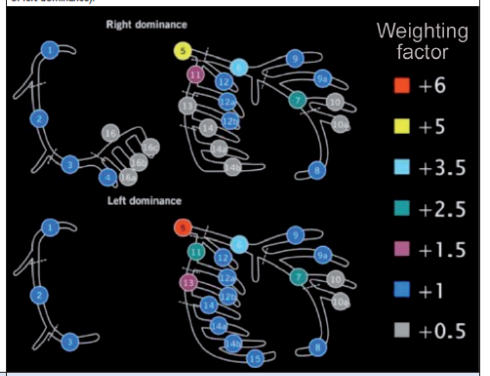
Intervenční kardiologie
IKK FN Brno

Recommendation for the type of revascularization (CABG or PCI) in patients with SCAD v for both procedures and low predicted surgical mortality

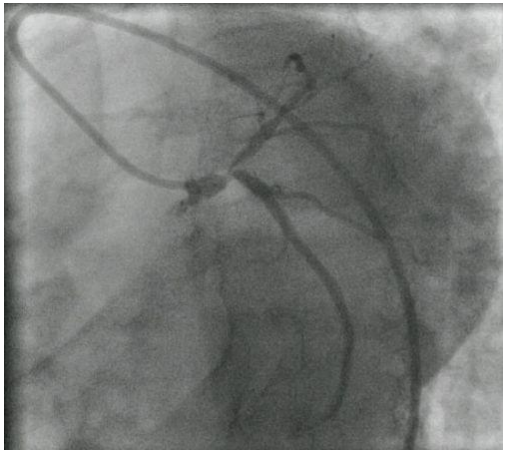
Recommendations according to extent of CAD	CABG		PCI	
	Class[a]	Level[b]	Class[a]	Level[b]
One or two-vessel disease without proximal LAD stenosis.	IIb	C	I	C
One-vessel disease with proximal LAD stenosis.	I	A	I	A
Two-vessel disease with proximal LAD stenosis.	I	B	I	C
Left main disease with a SYNTAX score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

CABG = coronary artery bypass grafting; LAD = left anterior descending coronary artery; PCI = percutaneous coronary interventi
[a]Class of recommendation.
[b]Level of evidence.
[c]References.

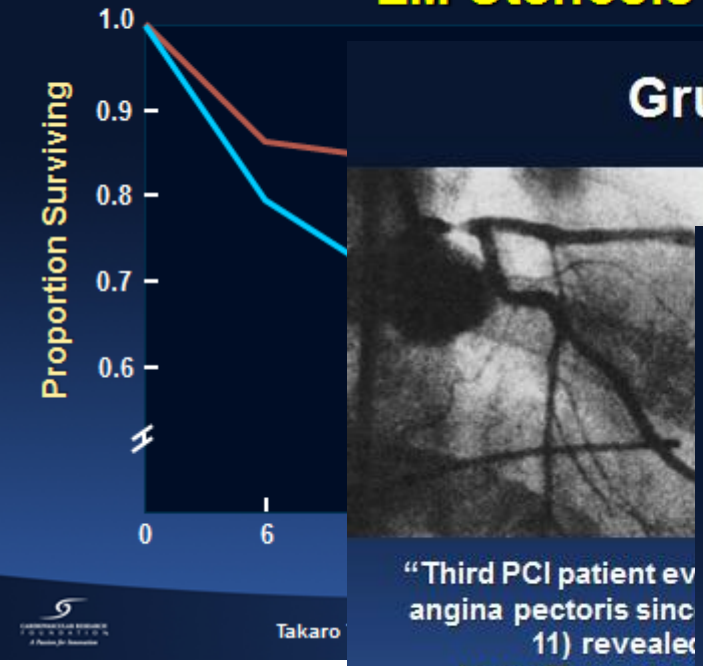
Table 3 Guide to calculate the SYNTAX score

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

1. Stenóza kmene ACS
Historie

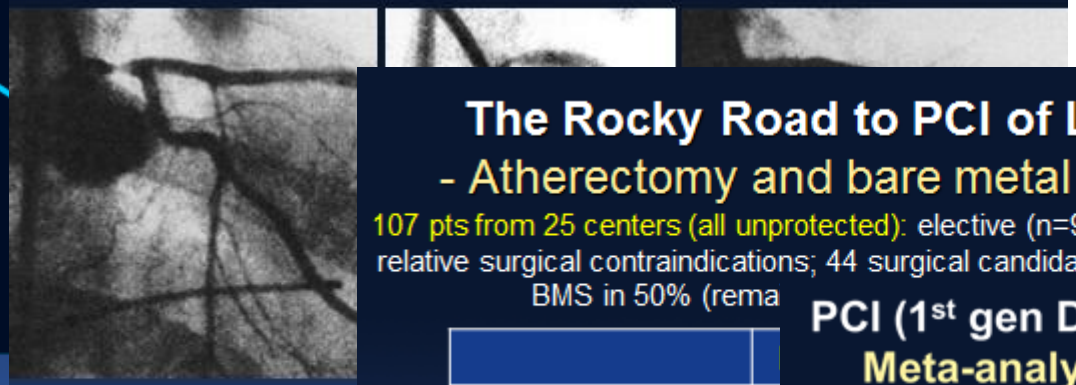


VA Randomized Trial (n=113)
LM Stenosis



Takaro

Gruntzig's 3rd PTCA



"Third PCI patient ev
angina pectoris sinc
11) revealed
Note: The patien

The Rocky Road to PCI of LM Ds.
- Atherectomy and bare metal stents -

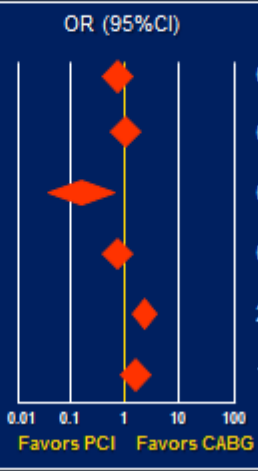
107 pts from 25 centers (all unprotected): elective (n=91; 47 absolute or relative surgical contraindications; 44 surgical candidates), AMI (n=16). BMS in 50% (rema

Procedural success	
Mortality, in-hospital	
Mortality, 9-months	
- Stent	
- CABG candidate	
- Not CABG cand.	
Restenosis >4 mos	

Ellis SG et al.

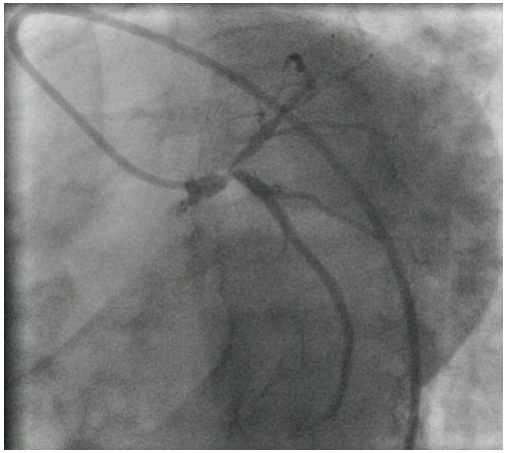
PCI (1st gen DES) vs. CABG for Left Main Ds.
Meta-analysis of 4 RCTs, 1,611 Patients
1-Year Outcomes

	PCI	CABG	OR (95%CI)	*p*-Value
Death	3.0% (24/807)	4.1% (32/790)	0.74 (0.43-1.28)	0.29
MI	2.8% (23/807)	2.9% (23/790)	0.98 (0.54-1.78)	0.95
Stroke	0.1% (1/707)	1.7% (12/689)	0.15 (0.03-0.67)	0.01
Death, MI, or stroke	5.3% (35/655)	6.8% (43/636)	0.77 (0.48-1.22)	0.26
Repeat Revasc	11.4% (92/807)	5.4% (43/790)	2.25 (1.54-3.28)	<0.001
MACCE	14.5% (117/807)	11.8% (93/790)	1.28 (0.95-1.72)	0.11



Capodanno D et al. *JACC* 2011;58:1426-32

1. Stenóza kmene ACS
Studie Syntax



MACCE to 5 Years by SYNTAX Score Tercile *Low to Intermediate Scores (0–32)*

SYNTAX

CABG (N=196)
TAXUS (N=221)

LM Disea

P=0.74

Cumulative Event Rate (%)

Months Since Allocation

Morice MC et al. C

	CABG	PCI	*P* value

MACCE to 5 Years by SYNTAX Score Tercile *High Scores ≥ 33*

SYNTAX

CABG (N=149)
TAXUS (N=135)

LM Disease

P=0.003

46.5%

29.7%

MACCE (%)

Months

Morice MC et al. Circulation. 2014;

	CABG	PCI	*P* value
Death	14.1%	20.9%	0.11
CV			
MI			
Dea CVA MI			
Reva			

2014 ESC/EACTS Guidelines on Myocardial Revascularization: Left Main PCI
(pre-EXCEL and NOBLE)

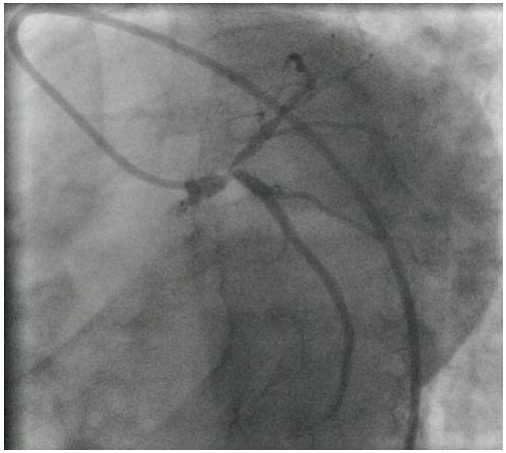
I
B
- With a SYNTAX score ≤22

IIa
B
- With a SYNTAX score 22 - 32

III
B
- With a SYNTAX score >32

Eur Heart J 2014;35:2541–2619

1. Stenóza kmene ACS
Studie EXCEL



EXCEL

Study Design

2905 pts with unprotected left main disease

SYNTA
Consensus agreement of elig

(N=

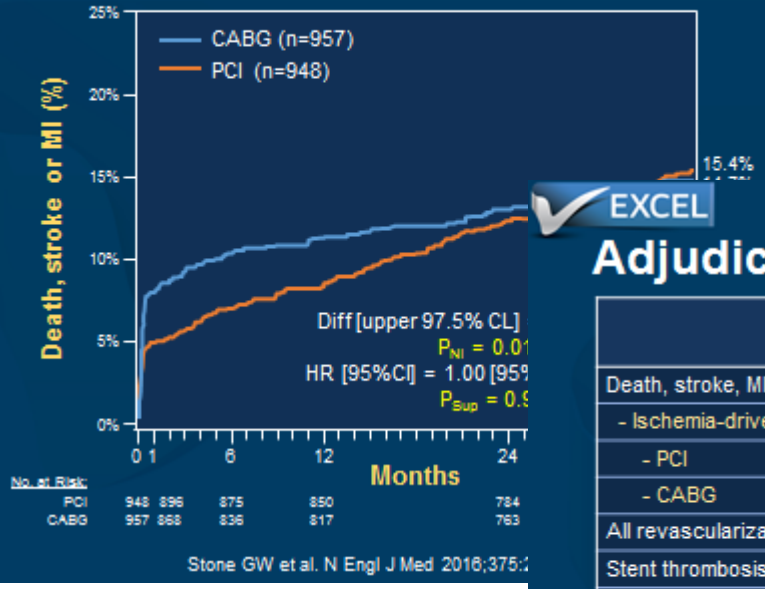
Stratified by diabetes, SYNTAX score and cente

PCI (Xience EES)
(N=948)

Follow-up: 1 month, 6 months
Primary endpoint: D/MI/CVA at

EXCEL

Primary Endpoint
Death, Stroke or MI at 3 Years



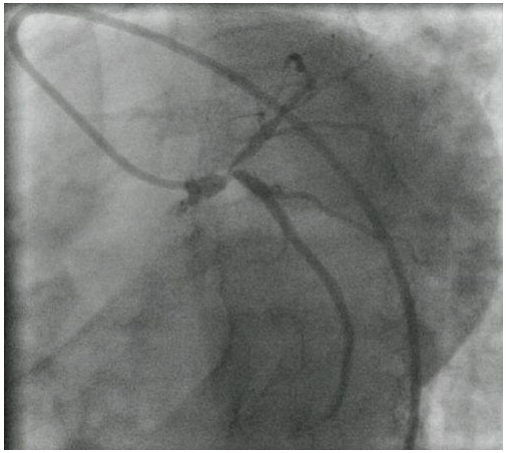
Stone GW et al. N Engl J Med 2016;375:

EXCEL

Adjudicated Outcomes at 3 Years (ii)

	PCI (n=948)	CABG (n=957)	HR [95%CI]	P-value
Death, stroke, MI or IDR	23.1%	19.1%	1.18 [0.97, 1.45]	0.10
- Ischemia-driven revasc (IDR)	12.6%	7.5%	1.72 [1.27, 2.33]	<0.001
- PCI	10.3%	6.8%	1.57 [1.13, 2.18]	0.006
- CABG	3.5%	0.8%	4.29 [1.88, 9.77]	<0.001
All revascularization	12.9%	7.6%	1.72 [1.27, 2.33]	<0.001
Stent thrombosis, def/prob	1.3%	0.0%	-	<0.001
- Definite	0.7%	0.0%	-	0.01
- Probable	0.7%	0.0%	-	0.01
- Early (0 - 30 days)	0.7%	0.0%	-	0.008
- Late (30 days – 1 year)	0.1%	0.0%	-	0.32
- Very late (1 year - 3 years)	0.5%	0.0%	-	0.05
Graft occlusion, symptomatic	0.0%	5.4%	-	<0.001
Definite stent thrombosis or symptomatic graft occlusion	0.7%	5.4%	0.12 [0.05, 0.28]	<0.001

1. Stenóza kmene ACS
Studie NOBLE



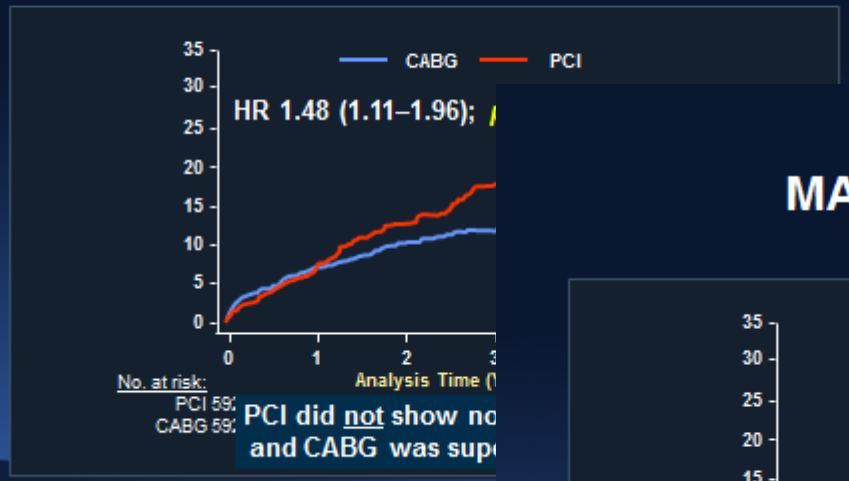
EXCEL and NOBLE – Study Features

	EXCEL	NOBLE
Randomized pts, centers, countries, geographies	1,905 pts at 126 sites in 17 countries (US, EU)	1,201 pts at 36 sites in 9 countries (EU)
Recruitment period	2010-2014	2009-2015
Age*	66	
Diabetes mellitus*		
LVEF*	5	
Acute coronary syndrome*		
SYNTAX score* (Core-lab)		
Distal location*		
IVUS use*		
Off-Pump CABG		
Arterial conduits used		
Only arterial conduits used		

* Data are shown for the PCI cohort

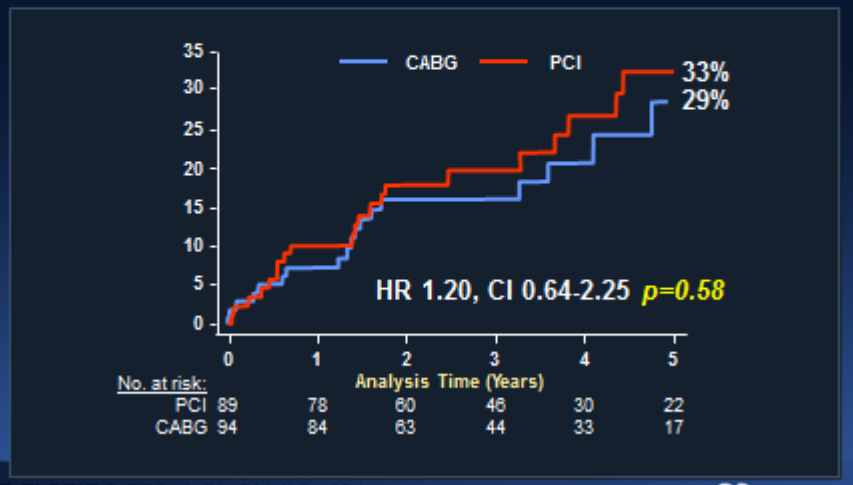
CHIP FLORIDA CHIP: Complex Higher-Risk (and Indicated) Patients Step-by-Step Approach

NOBLE : Results
Primary Endpoint: MACCE



CHIP FLORIDA CHIP: Complex Higher-Risk (and Indicated) Patients – Step-by-Step Approach

NOBLE :
MACCE Diabetes



CHIP FLORIDA CHIP: Complex Higher-Risk (and Indicated) Patients – Step-by-Step Approach

Cardiovascular Research Foundation

1. Stenóza kmene ACS
Revaskularizace PCI vs CABG u pacientů s nízkým a středním Syntax skóre

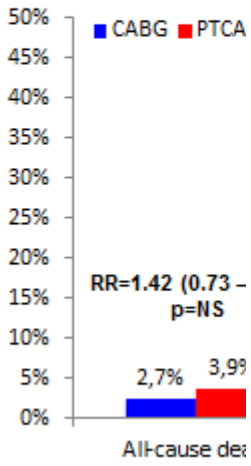
- Úmrtnost: Podobná
- IM: PCI s nižším výskytem periproceruálně; vyšším v průběhu dlouhodobého sledování a podobným v průběhu 5 let
- CMP: Podobná
- Krátkodobá nemocnost: Významně nižší u PCI
- Revaskularizace: Méně po CABG (cca o 5%)

PCI s moderním typem DES (Xience ve studii EXCEL) se jeví přijatelnou nebo dokonce lepší alternativou revaskularizace oproti CABG u selektované skupiny pacientů s nízkým a středním Syntax skóre.

…uvidíme, jak se výsledky odrazí v nových ESC Guidelines pro revaskularizace myokardu 2018.

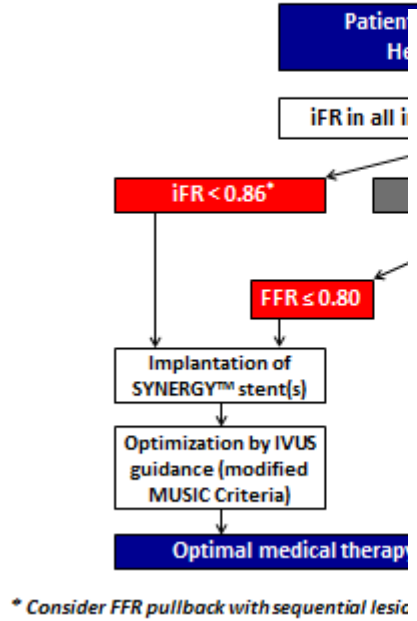
2. Onemocnění více koronárních tepen

CABRI trial – 1 year
(n=1054 MVD patients)



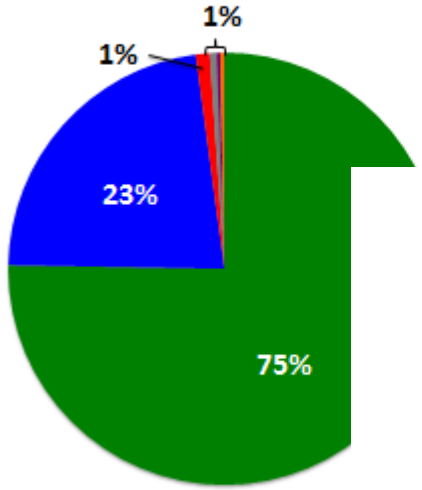
Trials in MVD	
GABI	1994
EAST	1994

PCI Procedure Flowchart



*Consider FFR pullback with sequential lesic

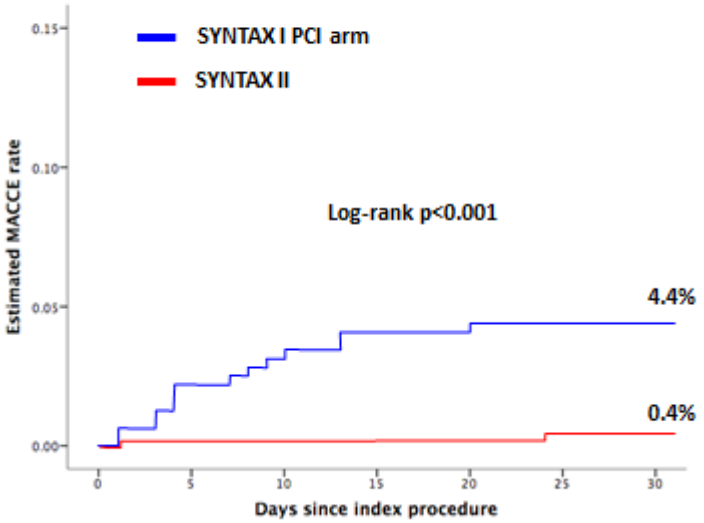
Anatomic lesions intended to be treated before functional assessment
n=1553 lesions – 3.5 lesions/patient



Treated lesions (n=11

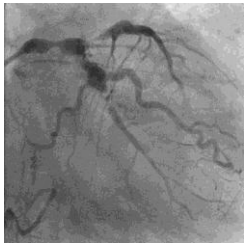
*investigator reported

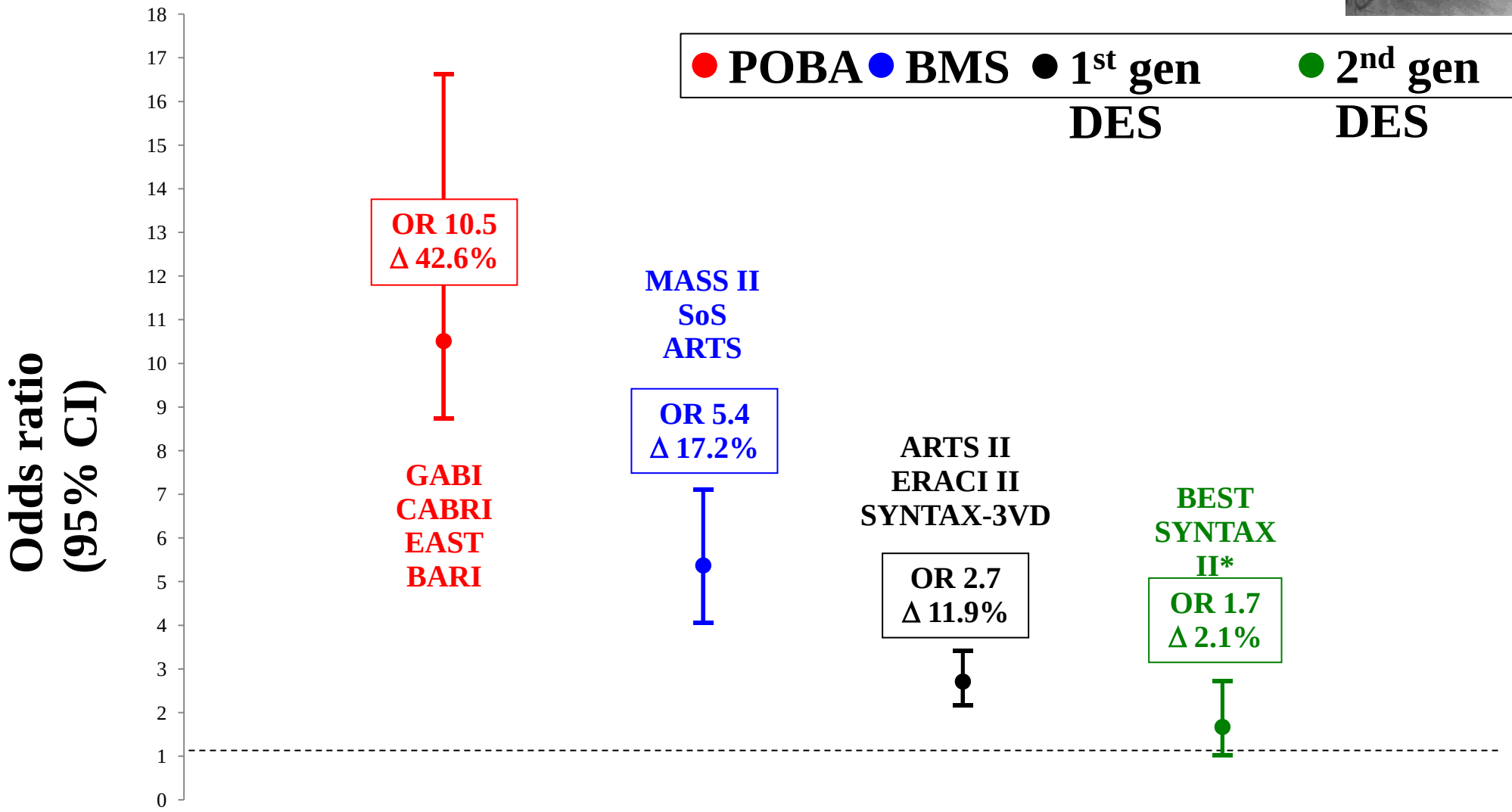
MACCE at 30 days
All-cause death, stroke, MI or repeat revascularization
Including only device failure



Opakovaná revaskularizace u pacientů s onemocněním více koronárních tepen (MVD) studie PCI vs. CABG

Odds ratios (95% CI), Δ = Absolute difference

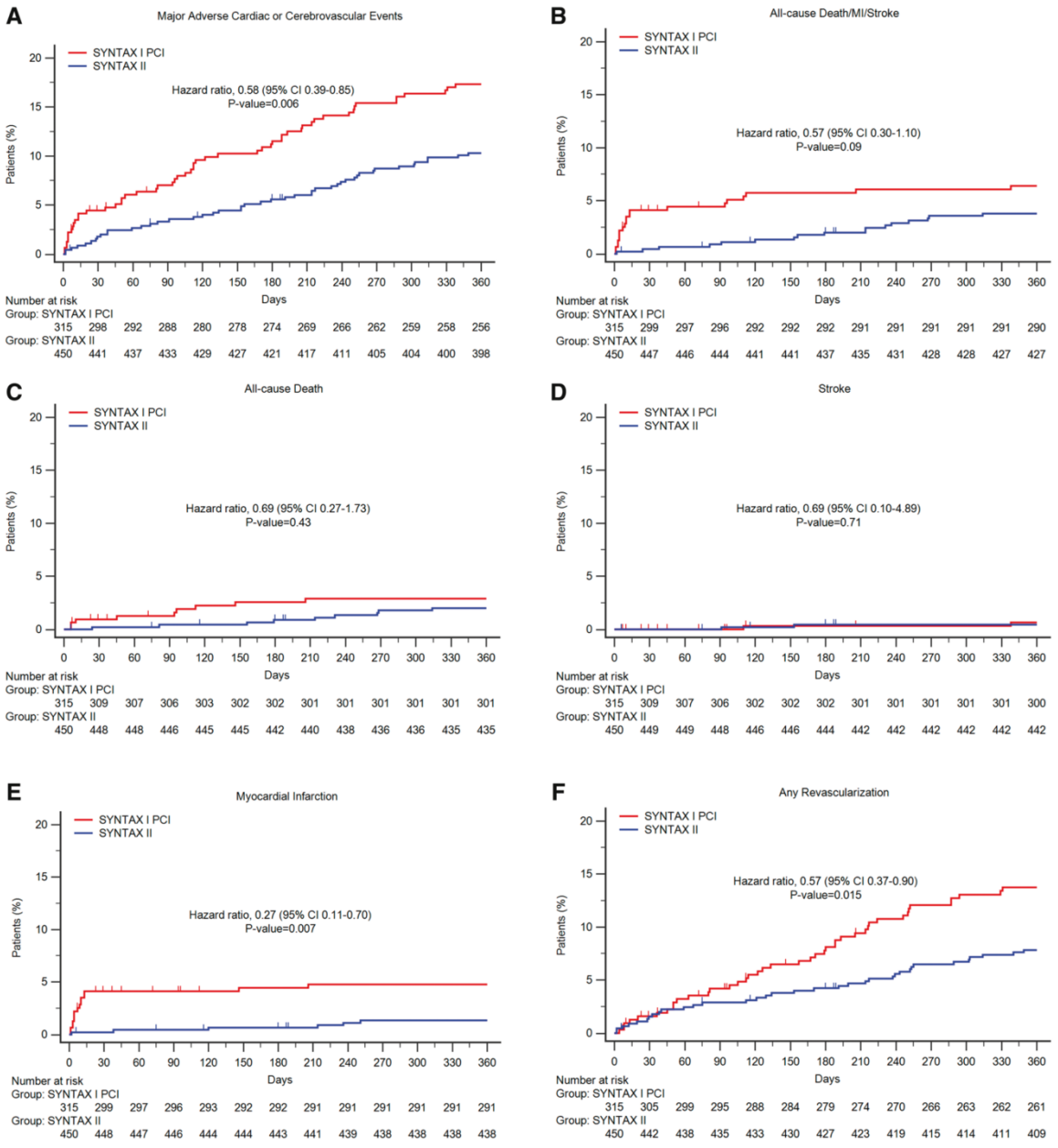




* Preliminary 30-day outcomes.

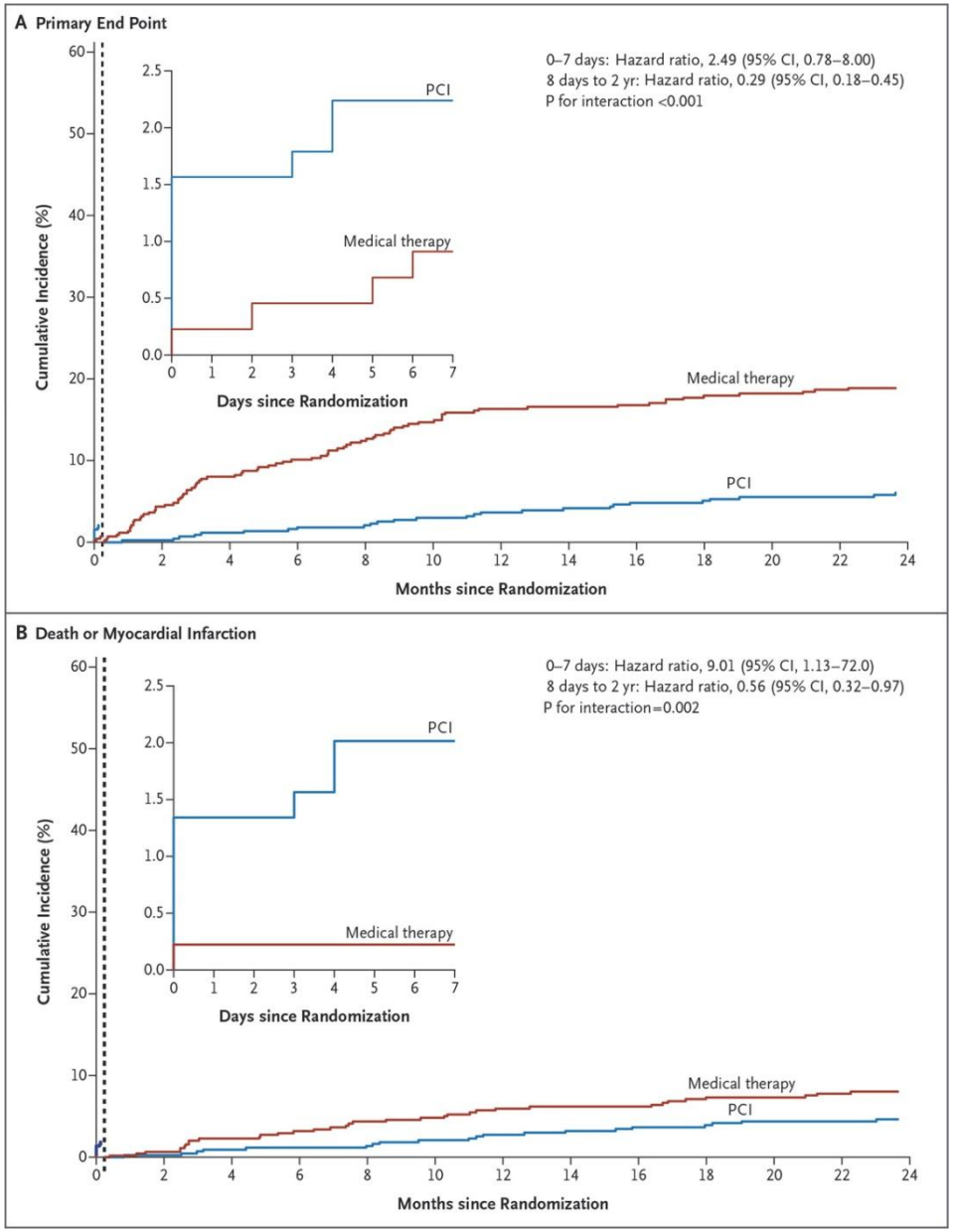
Cavalcante R, Serruys PW. Submitted for publication

2. Onemocnění více koronárních tepen nerandomizovaná studie Syntax II - PCI



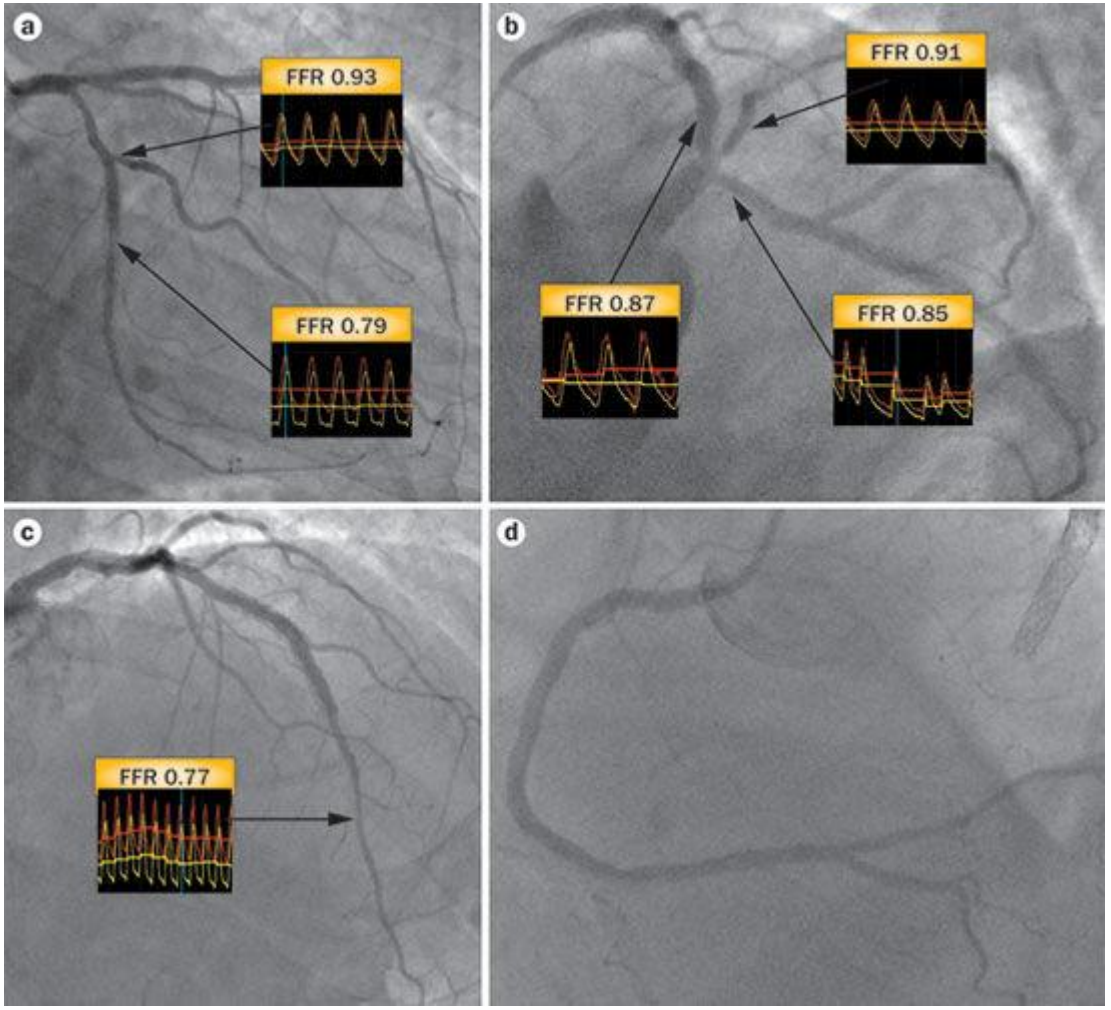
Escaned J. et al. EHJ 2017

2. Onemocnění více koronárních tepen randomizovaná studie FAME 2 – Angio vs FFR-guided PCI



De Bruyne et al. NEJM 2014

2. Onemocnění více koronárních tepen
randomizovaná studie FAME 3
Angio CABG vs FFR-PCI
probíhá nábor – t.č. zařazeno >1000 pacientů



Závěry

- Rozsáhlé koronární postižení s onemocněním kmene levé věnčité tepny a více koronárních tepen je relativně častým nálezem u pacientů s ICHS.
- ESC/EACTS Guidelines pro revaskularizace 2014 vytvořená „Heart týmem“ invazivních a neinvazivních kardiologů a kardiochirurgů preferují CABG u pacientů s LM/MVD a středním/vysokým Syntax skóre.
- Moderní technologie a lékové stenty (DES) 2. a další generace zlepšily krátko- a střednědobé výsledky.
- Funkční revaskularizace by měla být preferována především u pacientů s onemocněním více koronárních tepen a angiograficky hraničním postižením.
- Dá se očekávat, že nová Guidelines 2018 budou odrážet výsledky nedávných studií a posílí doporučení pro provádění PCI.