



FFR measurement for decision making in multivessel and diffuse coronary artery disease

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Relevance

- Defer study showed that stenting a “non-ischemic” stenosis does not benefit patients with stable chest pain, neither in prognostic nor symptomatic respect
- FAME study demonstrated the superiority of FFR-guided over angiography-guided PCI
- FFR is rarely used for decision making in Russia

Purpose

To compare clinical outcomes in FFR-guided and angiography-guided PCI and medical therapy (MT) groups of patients with multivessel coronary artery disease

Inclusion criteria

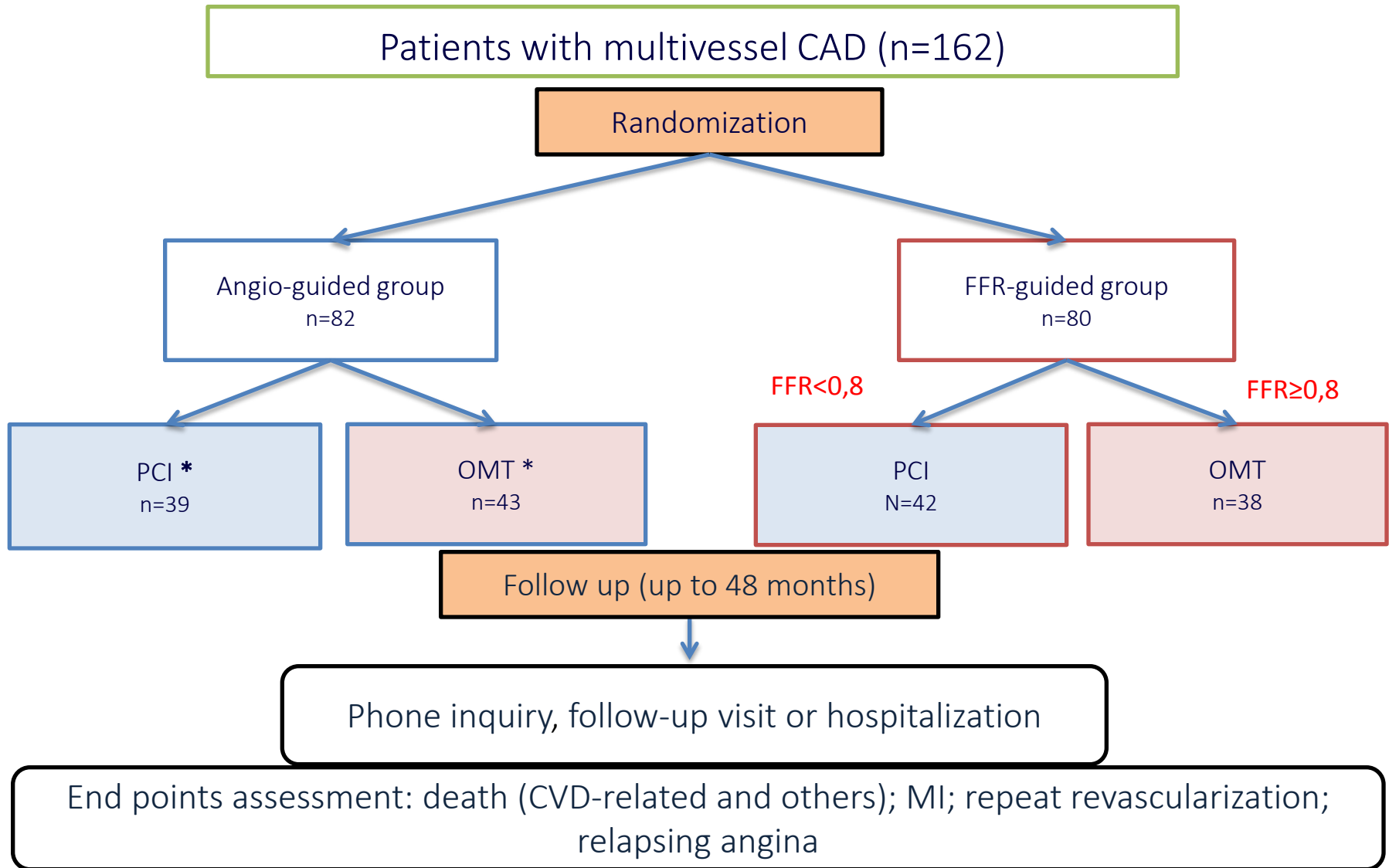
- Stable angina (CCS 1,2,3)
- Stabilized angina class 4
- No chest pain with documented ischemia

- Angiographic 1 (more than 1 stenosis), 2, 3 vessel disease,
- Feasibility of PCI

Exclusion criteria:

- Acute coronary syndrome
- Patients refusal of PCI
- Negative stress-test
- Inability to receive DAPT
- Papaverine intolerance
- LM disease
- Prior CABG

Study design



- The decision was made by the case management team consisted of representatives from clinical cardiology departments and endovascular treatment department

Primary End Point

Composite of:

- All cause death
- Myocardial infarction
- Urgent revascularization

Secondary End Point

Composite of:

- All cause death
- Myocardial infarction
- Urgent revascularization

Plus

- Angina relapse/progression

Baseline clinical characteristics

	Angio-guided n=82		FFR-guided n=80		p
	PCI n=39	OMT n=43	PCI n=42	OMT n=38	
Age, years	61,9±8,2	65,3±10,1	63,2±8,4	61,6±11,2	0,45
Male	79,5%	60,5%	59,5%	44,7%	0,02
BMI	27,4±3,3	29,2±4,5	28,8±4,2	26,8±4,8	0,42
Diabetes mellitus	5,1%	16,3%	21,4%	10,5%	0,41
MI	43,6%	25,6%	33,3%	26,3%	0,28
PCI	23,1%	16,3%	26,2%	26,3%	0,66
Hypertension	84,6	83,7	76,2	79	0,74
Smoking	48,7	32,6	35,7	34,2	0,59
LVEF %	55,1±8,1	56,4±9,7	55,4±9,2	55,2±7,8	0,91

Angio- and FFR measurement characteristics

	Angio-guided n=82		FFR-guided n=80		p
	PCI n=39	OMT n=43	PCI n=42	OMT n=38	
Reference vessel diameter	2,84±0,61	2,77±0,56	2,94±0,57	2,90±0,64	0,79
Diameter stenosis, %	61±12	60±11	59±12	61±12	0,38
Lesion length	17,3±8,1	15,2±9	18,1±8,2	17,1±8,4	0,13
Number of atherosclerotic plaques (including initial changes)	360	318	404	317	0,23
Number of >50% stenoses	115	106	124	105	0,81
Number of >50% stenoses per patient	2,9±1,5	2,5±1,3	2,9±1,4	2,7±1,4	0,45
Left main disease (30-50%)	0	1	3	2	0,60
LAD lesion	30	35	38	34	0,54
LCx lesion	15	22	25	17	0,13
RCA lesion	46	40	36	24	0,09
Side branches lesions	24	8	22	28	0,12
FFR value	-	-	0,56±0,17	0,87±0,05	0,04
Number of FFR measures (mean)	-	-	4,8 (1-8)	3,9 (1-7)	0,06

PCI results

	Angio-guided n=82		FFR-guided n=80		p
	PCI n=39	OMT n=43	PCI n=42	OMT n=38	
Number of stents per patient in PCI groups (mean)	1,95 (1-4)	-	1,5 (1-3)	-	0,04
Fluoroscopy time during diagnostic coronary angiography, min	1,4(0,8-5,8)	1,5 (0,9-5,2)	3,7 (1,2-8,6) *	3,6 (1,3-6,9)#	0,05
Procedure time, min	45,3 ± 10,1	15,8±4,6	49,9±8.9*	18±5.6#	0,56
Radiopaque dye volume (mean), ml	203 ± 86	67±45	191± 74*	75 ± 43#	0,43

- Compared to PCI in angio-control group
- # Compared to withhold PCI

In-hospital complications

	Angio-guided (n=82)		FFR-guided (n=80)	
	n	%	n	%
Death	0	0	0	0
MI 4a type	2	2,4	0	0
Repeated revascularization	0	0	0	0
Stroke	0	0	0	0
Complications during FFR- measurement	-	-	1	1,2
PCI access site complications	2	2,4	1	1,3

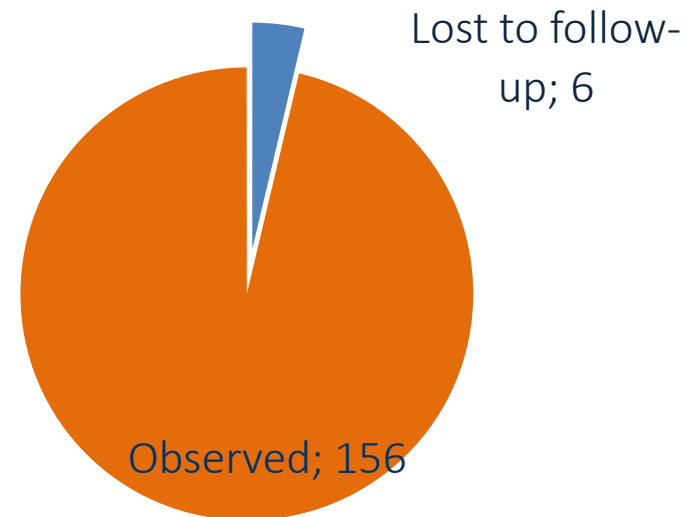
Follow-up results for the angiographic and FFR-control in patients with multivessel and diffuse coronary artery disease

- The duration of the follow-up period was 4 years

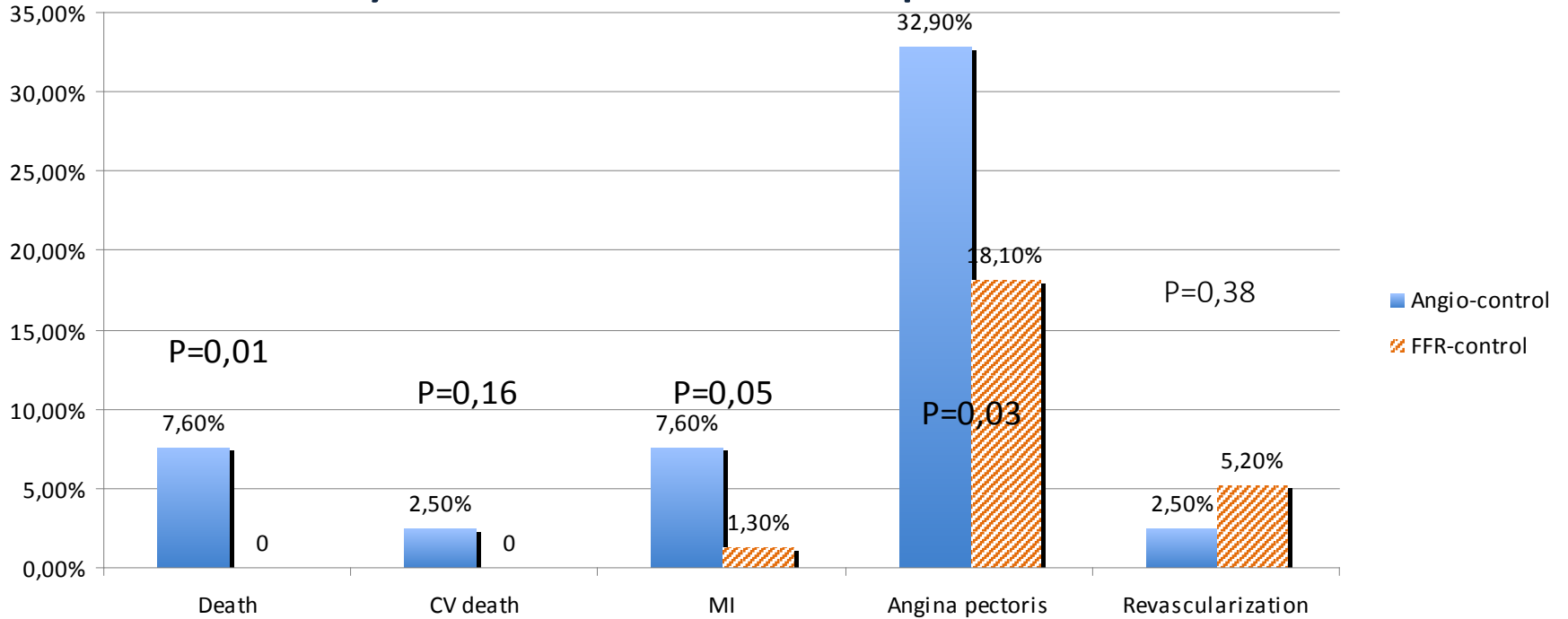
Medical treatment at discharge

	Angio-control n=82	FFR-control n=80
Acetylsalicylic acid	82 (100%)	80 (100%)
Clopidogrel	46 (56,1%)	58 (72,5%)
Beta-blockers	75 (91,5%)	67 (83,8%)
Calcium antagonists	20 (24,4%)	24 (30%)
Nitrates	43 (52,4%)	47 (58,8%)
ACE inhibitors/ ARA	74 (90,2%)	70 (87,5%)
Statins	79 (96,3%)	75 (93,8%)
Proton pump inhibitors	13 (15,9%)	14 (17,5%)

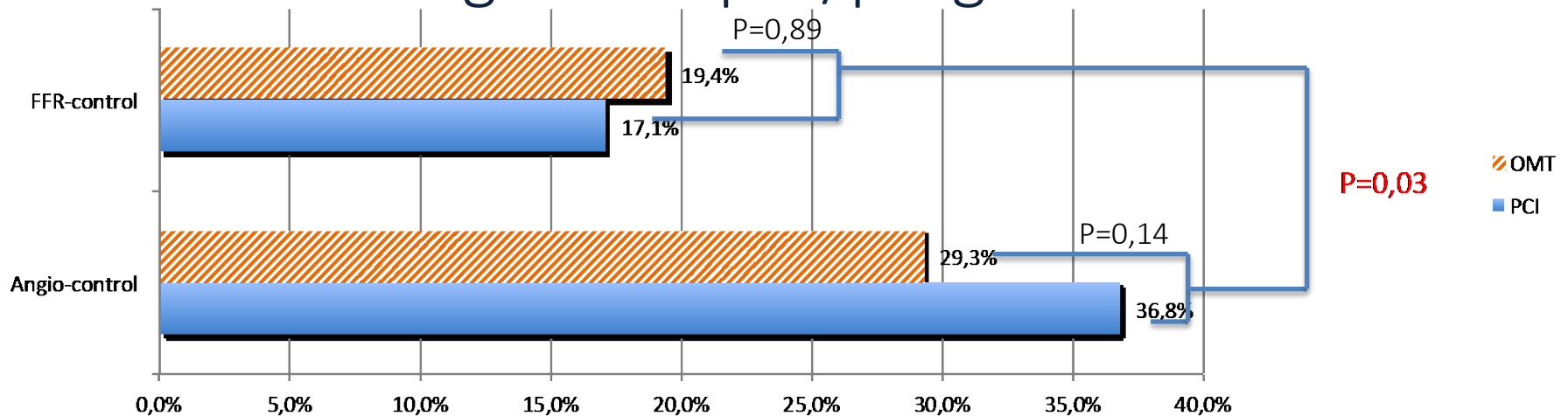
We observed 156 patients (96%):
79 in angio-control group and 77
in FFR-control group



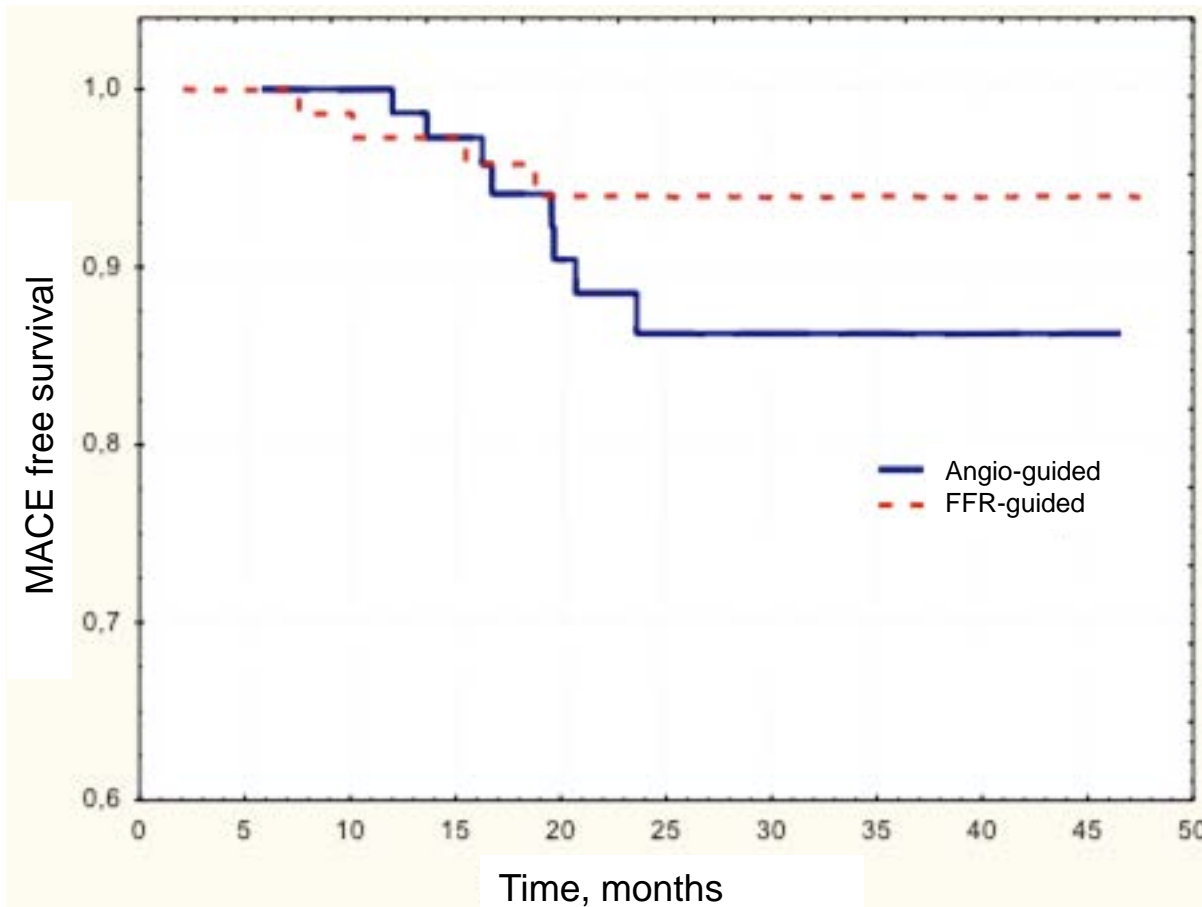
4 years follow-up results



Angina relapse/progression



Cardiovascular complications free survival in comparison groups in the follow-up period: Kaplan-Meier plots



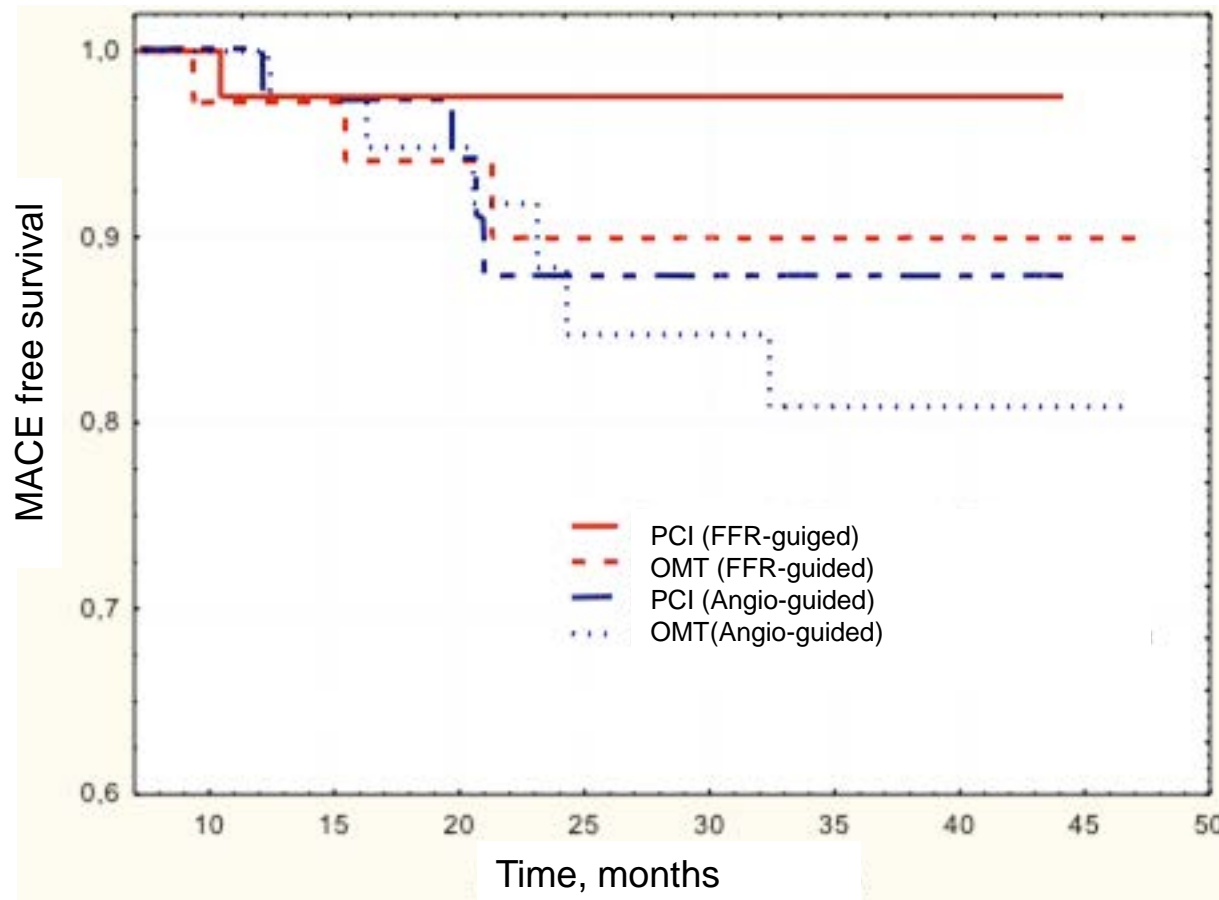
Angio-guided (blue) N=79
Primary end point was reached in 10 patients (12,7%)

FFR-guided (red) N=77
Primary end point was reached in 4 patients (5,2%)

p=0,04

Cardiovascular complications free survival in comparison subgroups in the follow-up period:

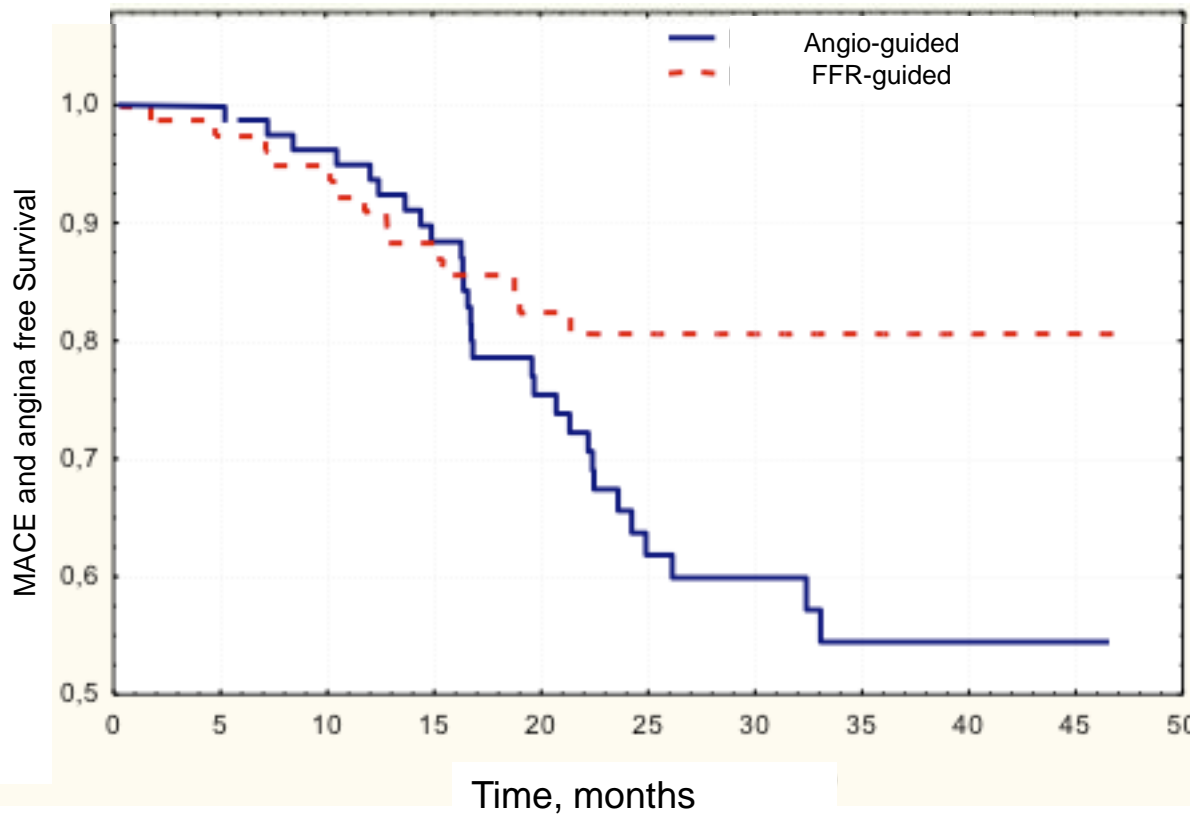
Kaplan-Meier plots



Cardiovascular complications free survival rate in MT (91,6%) and PCI (97,6%) subgroups was higher in FFR-guided group in general compared to angio-guided group survival rate with similar subgroups (82,3% and 89,4%, respectively)

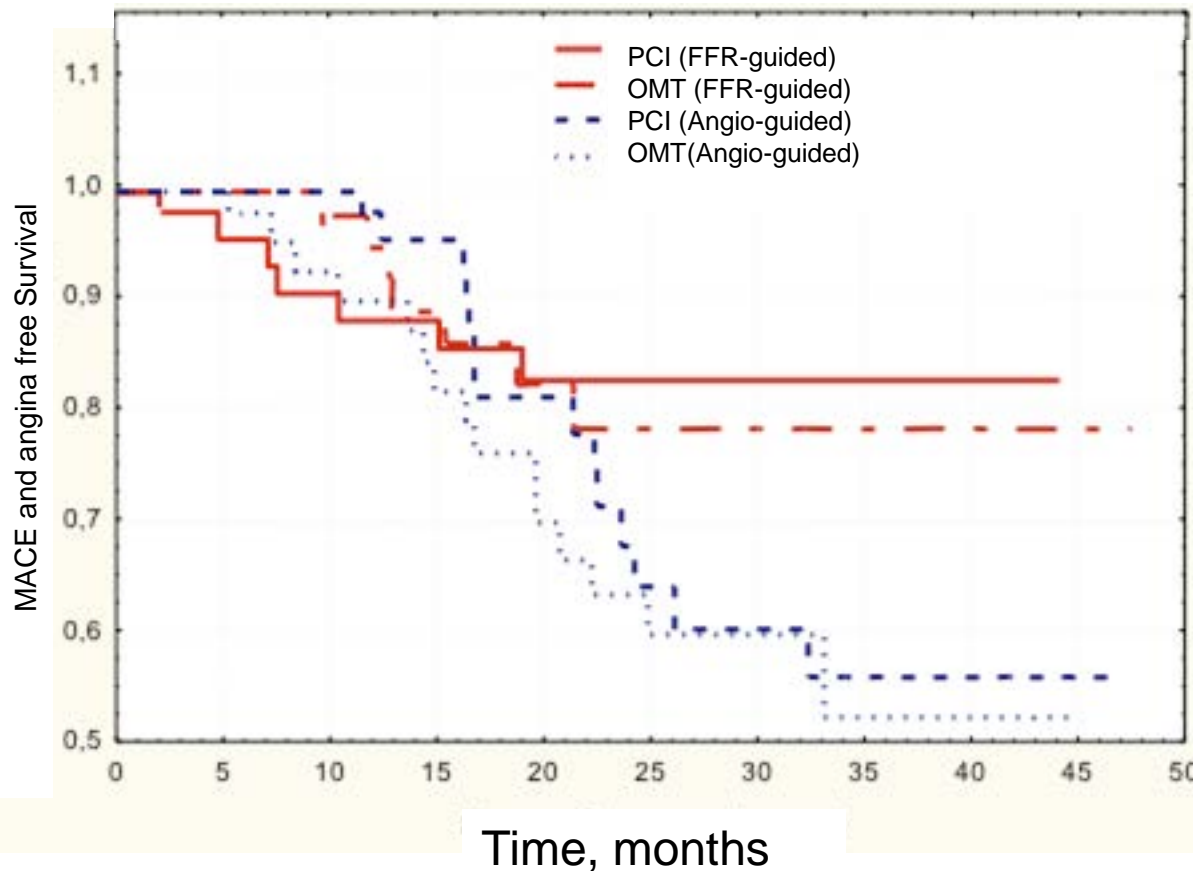
There were no significant differences in cardiovascular complications free survival rates between subgroups ($p=0,17$)

Cardiovascular complications and angina relapse free survival in comparison groups in the follow-up period: Kaplan-Meier plots



Survival rate was significantly (up to 23,4%) higher in FFR-guided group compared to angio-guided group (62 (80,6%) versus 45 (57%), $p=0,0005$)

Cardiovascular complications and angina relapse free survival in comparison subgroups in the follow-up period: Kaplan-Meier plots



Cardiovascular complications and angina relapse free survival rate in the OMT (77,8%) and PCI (83%) subgroups was significantly higher in FFR-control group in general compared to angio-control group survival rate with similar subgroups (56,1% and 57,9%, respectively), $p=0,0064$

Summary

- FFR measurement should be recommended for decision making in patients with multivessel and diffuse coronary artery disease
- Number of stents is significantly lower with FFR, procedure time is the same
- Revascularization of only functionally significant stenoses prevents the recurrence of ischemic symptoms in patients with multivessel and diffuse disease
- FFR measurement before invasive/noninvasive strategy determination in multivessel and diffuse CAD patients allows to reduce the cardiovascular complications and angina relapse rates in long-term follow-up

Thank you for your
attention!