Prognostic Role of Routine Stress Testing in Diabetic Patients After PCI: Key Analysis from POST-PCI

Hoyun Kim, MD
Department of Cardiology,
University of Ulsan College of Medicine,
Asan Medical Center, Seoul, Korea

Disclosure

- I have nothing to disclose.

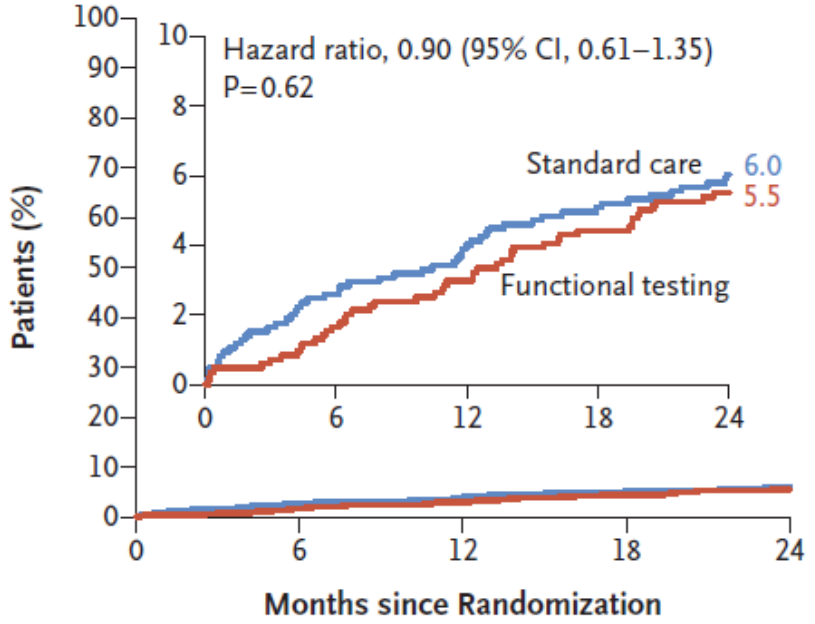
Follow-up Strategies after PCI
2018 ESC Guideline for Myocardial Revascularization

	COR	LOE
➢ Surveillance by non-invasive imaging-based stress testing *may be considered* in high-risk patient subsets 6 months after revascularization	IIb	C
➢ Routine non-invasive imaging-based stress testing *may be considered* 1 year after PCI	IIb	C

The POST-PCI trial

- **DESIGN**: a multicenter, pragmatic, randomized trial conducted at 11 sites in South Korea
- **OBJECTIVE**: To compare a follow-up strategy of routine functional testing and standard care alone in patients with high-risk anatomical or clinical characteristics who had undergone PCI
- **Primary Composite Outcome:** a composite of death from any cause, myocardial infarction, or hospitalization for unstable angina) at 2 years
- A total of 1706 patients were randomly assigned to the functional testing group (n = 849) and the standard care group (n = 857)

Primary Composite Outcome:
All-cause Death, MI, or Hospitalization for UA



6.0% in Standard care vs. 5.5% in Functional Testing

Park D-W, et al. NEJM 2022;387:905-15

Diabetes in Coronary Artery Disease

- Diabetic patients have a more aggressive form of atherosclerosis and more extensive coronary artery disease.

Circulation 2013;128:1675-1685
Circulation 2015;132:923-931

- Diabetes is a major determinant of adverse clinical events after myocardial revascularization.

The Lancet Diabetes & Endocrinology 2013;1:317-328
Journal of the American College of Cardiology 2019;73:1629-1632

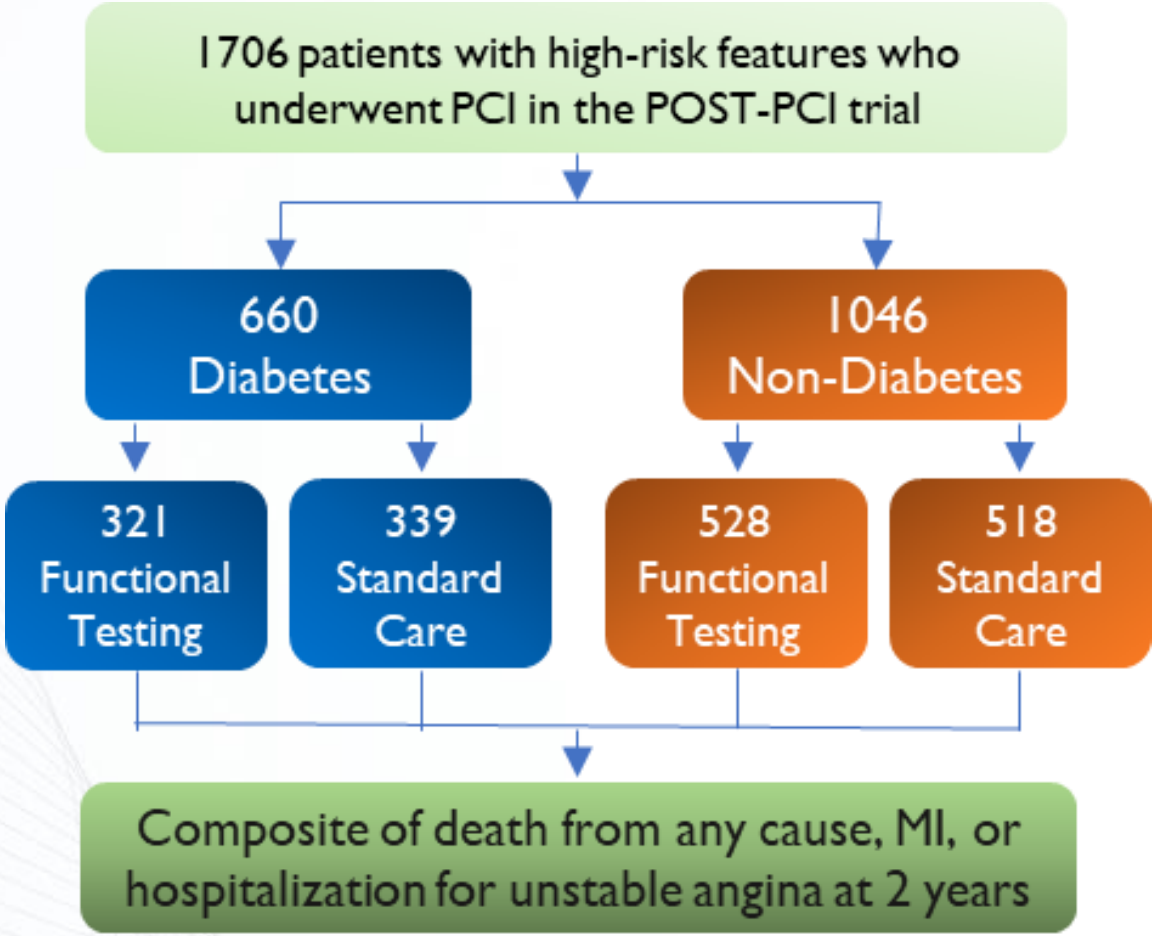
- Percutaneous coronary intervention (PCI) for diabetic patients is often being more complex and anatomically challenging.

Circulation: Cardiovascular Interventions 2015;8:e001944

Background

- It is still unclear whether diabetic patients who undergo PCI could benefit from routine surveillance stress testing during follow-up.

Diabetic subgroup analysis of the POST-PCI trial



Primary outcome

- Composite of death from any cause, MI, or hospitalization for unstable angina at 2 years

Secondary outcome

- Individual component of primary outcome
- Any hospitalization for cardiac or noncardiac causes
- Invasive coronary angiography
- Repeat revascularization

Inclusion and Exclusion Criteria

__All__ patients enrolled in __the Original POST-PCI trial__ were included in this prespecified subgroup analysis

INCLUSION

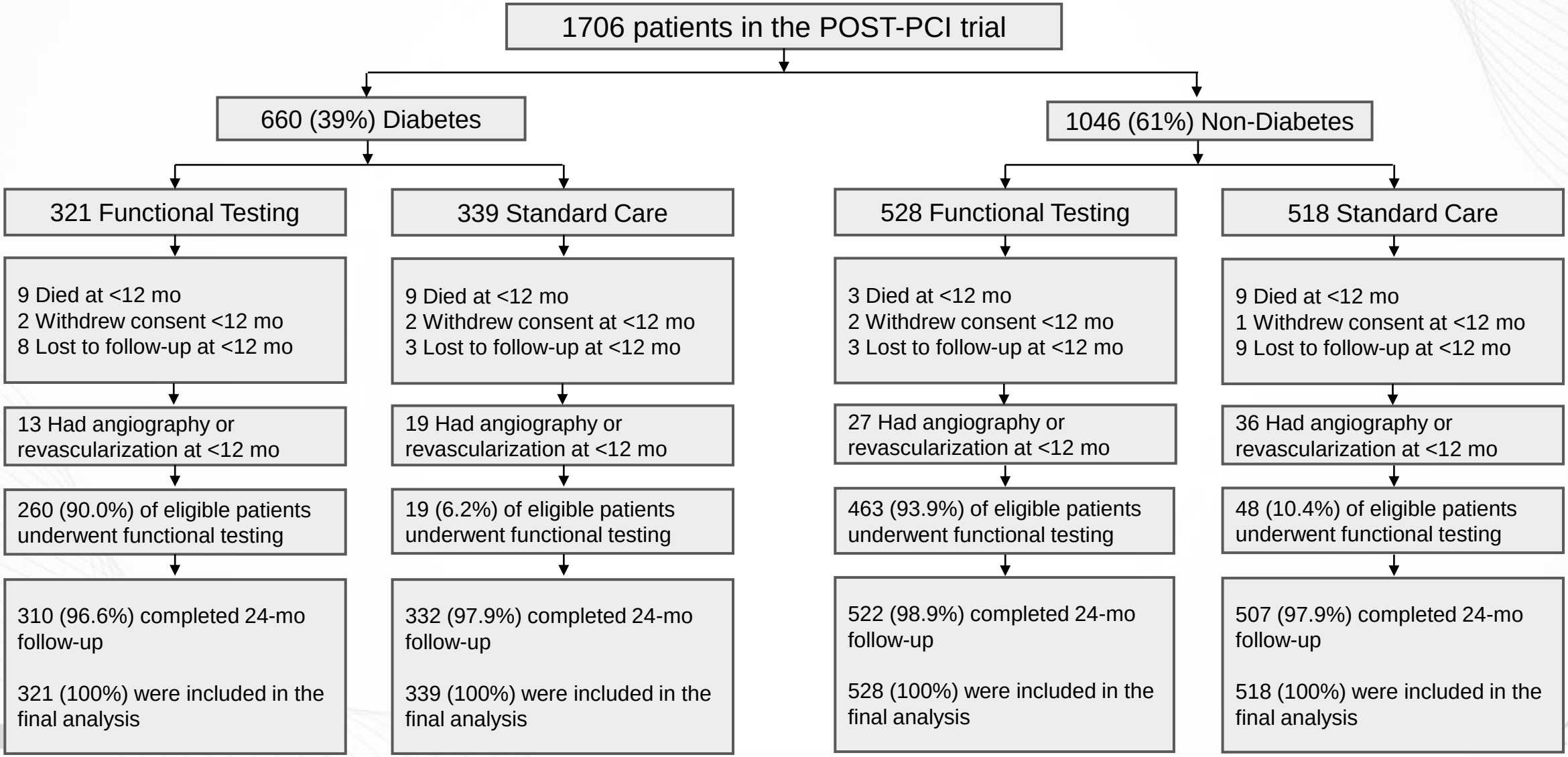
- ≥ 19 years of age.
- Patients who underwent successful PCI with contemporary drug-eluting stents, bioresorbable scaffolds, or drug-coated balloons.
- Patients must have at least one of the following high-risk anatomical or clinical characteristics:
  - Anatomical characteristics: left main lesion, bifurcation lesion, ostial lesion, chronic total occlusion lesion, multivessel disease (≥2 vessels stented), re-stenotic lesion, diffuse long lesion (lesion length ≥30 mm or stent length ≥32 mm), or bypass graft disease.
  - Clinical characteristics: diabetes, chronic renal failure, enzyme positive acute coronary syndrome (e.g., STEMI or NSTEMI).

EXCLUSION

- Cardiogenic shock at the index admission.
- Patients treated only with bare metal stents or balloon angioplasty without stent implantation at the index procedure.
- Pregnant and/or lactating women.
- Concurrent medical condition with a life expectancy < 1 year.
- Patients who were actively participating in another drug or device investigational study and had not completed the primary endpoint follow-up period.
- Patients who were unable to provide written informed consent or participate in long-term follow-up.

Enrollment, Randomization, and Follow-up

Stratified by the presence of Diabetes



Baseline Characteristics

	Overall (n=1706)	Diabetes (n=660)	Non-Diabetes (n=1046)	P Value
Age, yr	64.69±10.28	66.43±9.53	63.59±10.59	<0.001
Male sex	1356 (79.48)	505 (76.52)	851 (81.36)	0.016
Body-mass index	24.91±3.09	24.96±3.18	24.88±3.03	0.584
Cardiac risk factors and comorbidities				
Hypertension	1178 (69.05)	513 (77.73)	665 (63.58)	<0.001
Dyslipidemia	1487 (87.16)	584 (88.48)	903 (86.33)	0.195
Current smoker	462 (27.08)	174 (26.36)	288 (27.53)	0.596
Family history of premature CAD	102 (5.98)	36 (5.45)	66 (6.31)	0.468
Previous myocardial infarction	113 (6.62)	43 (6.52)	70 (6.69)	0.886
Previous PCI	375 (21.98)	172 (26.06)	203 (19.41)	0.001
Previous CABG	42 (2.46)	19 (2.88)	23 (2.2)	0.377
History of cerebrovascular disease	109 (6.39)	52 (7.88)	57 (5.45)	0.046
History of peripheral-artery disease	39 (2.29)	20 (3.03)	19 (1.82)	0.102
Atrial fibrillation or atrial flutter	43 (2.52)	24 (3.64)	19 (1.82)	0.020

Baseline Characteristics

	Overall (n=1706)	Diabetes (n=660)	Non-Diabetes (n=1046)	P Value
Criteria for high risk after PCI				
High-risk anatomical characteristics				
Left main disease	359 (21.04)	148 (22.42)	211 (20.17)	0.266
Bifurcation disease	742 (43.49)	266 (40.3)	476 (45.51)	0.035
Ostial lesion	255 (14.95)	99 (15)	156 (14.91)	0.961
Chronic total occlusion	342 (20.05)	114 (17.27)	228 (21.8)	0.023
Multivessel disease	1191 (69.81)	482 (73.03)	709 (67.78)	0.021
≥2 vessels stented	765 (44.84)	297 (45)	468 (44.74)	0.917
Restenotic lesion	194 (11.37)	78 (11.82)	116 (11.09)	0.644
Diffuse long lesion	1196 (70.11)	448 (67.88)	748 (71.51)	0.111
Bypass graft disease	11 (0.64)	5 (0.76)	6 (0.57)	0.759
High-risk clinical characteristics				
Diabetes on insulin	73 (4.28)	73 (11.06)	0 (0)	-
Chronic renal failure	87 (5.1)	70 (10.61)	17 (1.63)	<0.001
Receipt of dialysis	49 (2.87)	39 (5.91)	10 (0.96)	<0.001
Enzyme-positive acute coronary syndrome	331 (19.4)	116 (17.58)	215 (20.55)	0.130
Clinical indication for index PCI				
Stable angina or silent ischemia	1180 (69.17)	465 (70.45)	715 (68.36)	0.364
Unstable angina	195 (11.43)	79 (11.97)	116 (11.09)	
Non-STEMI	203 (11.9)	75 (11.36)	128 (12.24)	
STEMI	128 (7.5)	41 (6.21)	87 (8.32)	

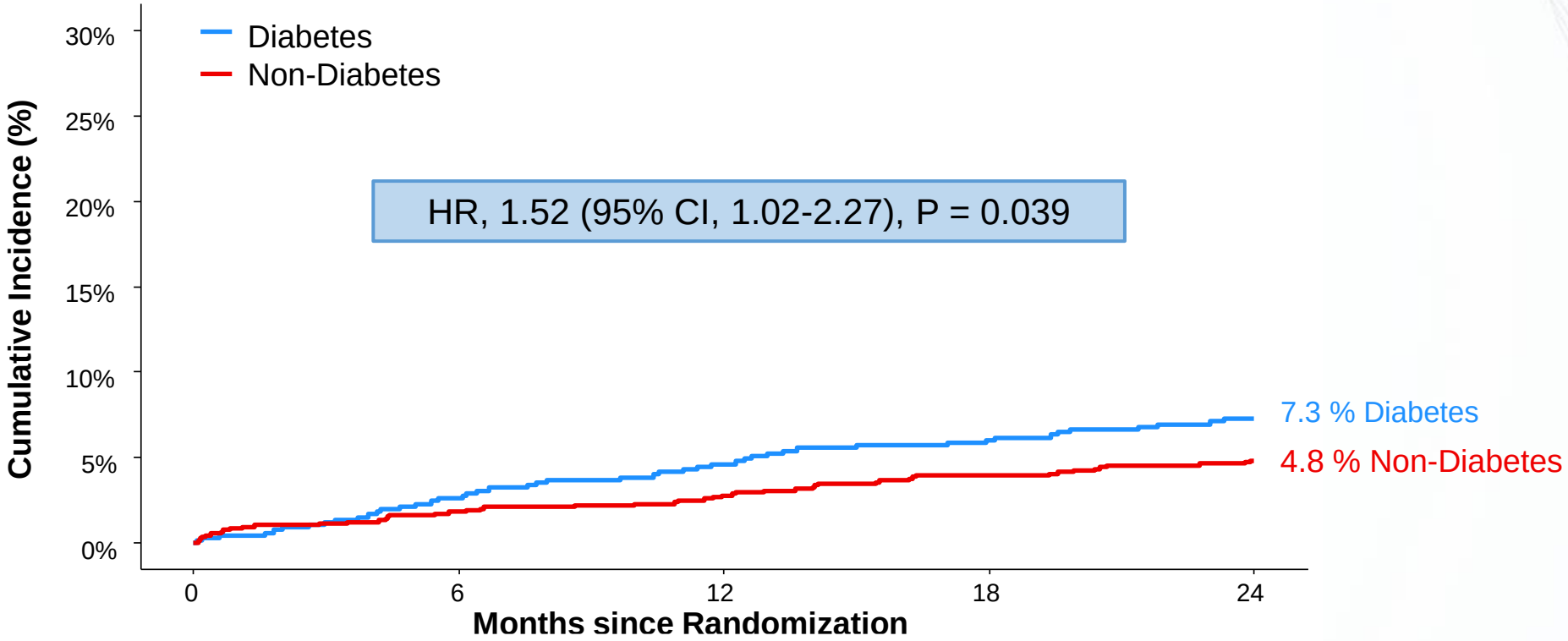
Procedural Characteristics

	Overall (n=1706)	Diabetes (n=660)	Non-Diabetes (n=1046)	P Value
Procedural characteristics				
Total no. of diseased lesions per patient	2.24±1.16	2.35±1.21	2.16±1.12	0.002
Total no. of treated lesions per patient	1.45±0.68	1.46±0.67	1.45±0.69	0.553
Total no. of stents per patient	1.95±1.15	1.93±1.11	1.97±1.18	0.743
Total stent length per patient — mm	57.11±33.84	55.94±32.49	57.85±34.66	0.364
Use of drug-eluting stents — no. (%)	1645 (96.42)	640 (96.97)	1005 (96.08)	0.335
Use of bioabsorbable scaffold — no. (%)	16 (0.94)	2 (0.3)	14 (1.34)	0.031
Use of drug-coated balloon — no. (%)	105 (6.15)	42 (6.36)	63 (6.02)	0.776
Intravascular ultrasound guidance — no. (%)	1269 (74.38)	490 (74.24)	779 (74.47)	0.915
Fractional flow reserve assessed — no. (%)	609 (35.7)	236 (35.76)	373 (35.66)	0.967

Primary Composite Outcome

A composite of Death from any cause, MI, or hospitalization for unstable angina at 2 years

Diabetes vs. Non-Diabetes



No.at Risk

Diabetes	660	631	615	604	575
Non-Diabetes	1046	1016	1002	988	945

Primary and Secondary Outcomes

Diabetic and Non-Diabetic patients

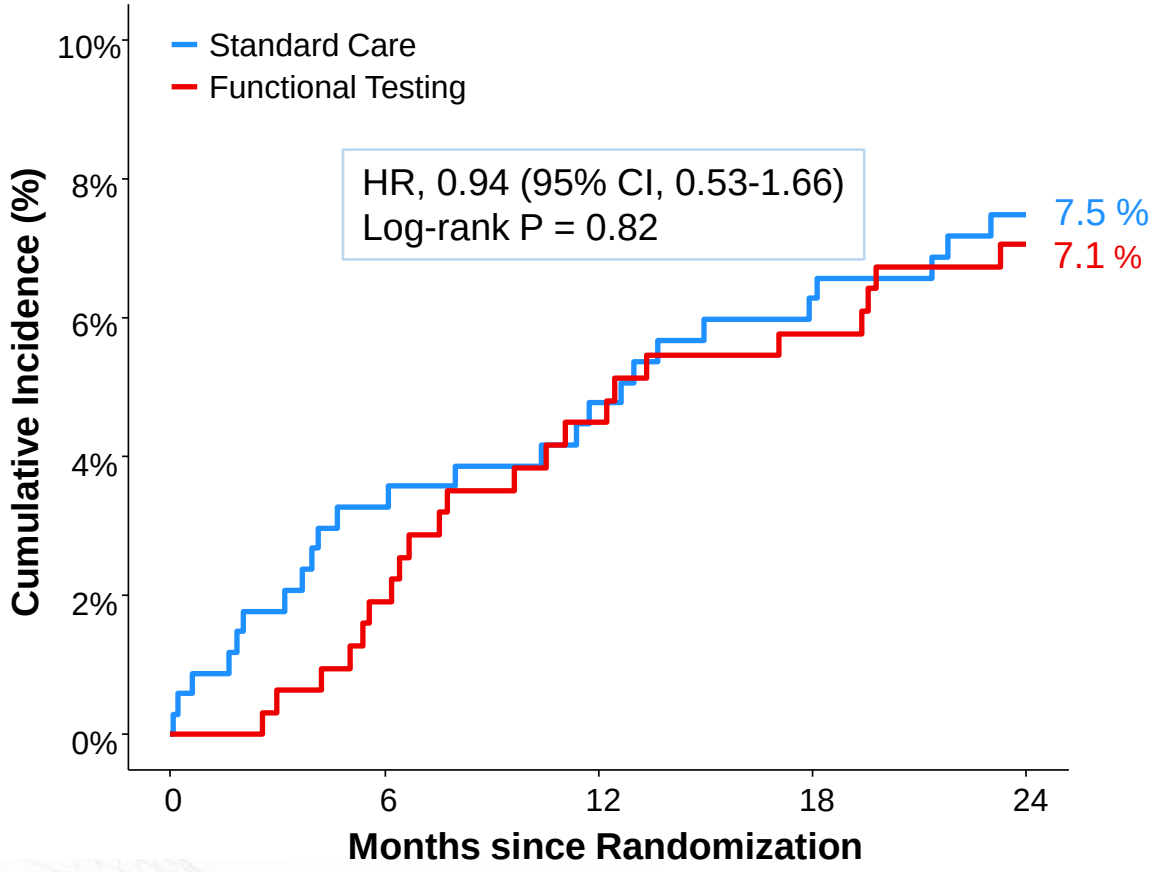
	Diabetes (n=660)	Non-Diabetes (n=1046)	Hazard Ratio (95% CI)	P Value
Primary composite outcome	47 (7.3)	50 (4.8)	1.52 (1.02–2.27)	0.039
Death from any cause	28 (4.3)	23 (2.2)	1.97 (1.13–3.42)	0.016
Myocardial infarction	8 (1.3)	6 (0.6)	2.17 (0.75–6.24)	0.153
Hospitalization for unstable angina	11 (1.7)	22 (2.2)	0.81 (0.39–1.67)	0.56
Secondary outcomes				
Death or myocardial infarction	36 (5.6)	29 (2.8)	2.01 (1.23–3.28)	0.005
Hospitalization				
Any reason	187 (29.3)	214 (20.9)	1.49 (1.22–1.81)	<0.001
Cardiac reason	87 (13.8)	145 (14.2)	0.97 (0.75–1.27)	0.832
Noncardiac reason	100 (10.0)	69 (6.7)	2.45 (1.80–3.32)	<0.001
Invasive coronary angiography	63 (10.0)	115 (11.3)	0.89 (0.65–1.21)	0.445
Showing restenosis or obstructive CAD	44	70		
Showing no restenosis or obstructive CAD	19	45		
Repeat revascularization	45 (6.5)	73 (7.2)	0.91 (0.62–1.34)	0.631
Target-lesion revascularization	24 (3.8)	36 (3.5)	1.09 (0.65–1.82)	0.753
Nontarget-lesion revascularization	17 (2.7)	37 (3.6)	0.74 (0.42–1.32)	0.311

Primary Composite Outcome

Stratified by Diabetes status and Randomization Group

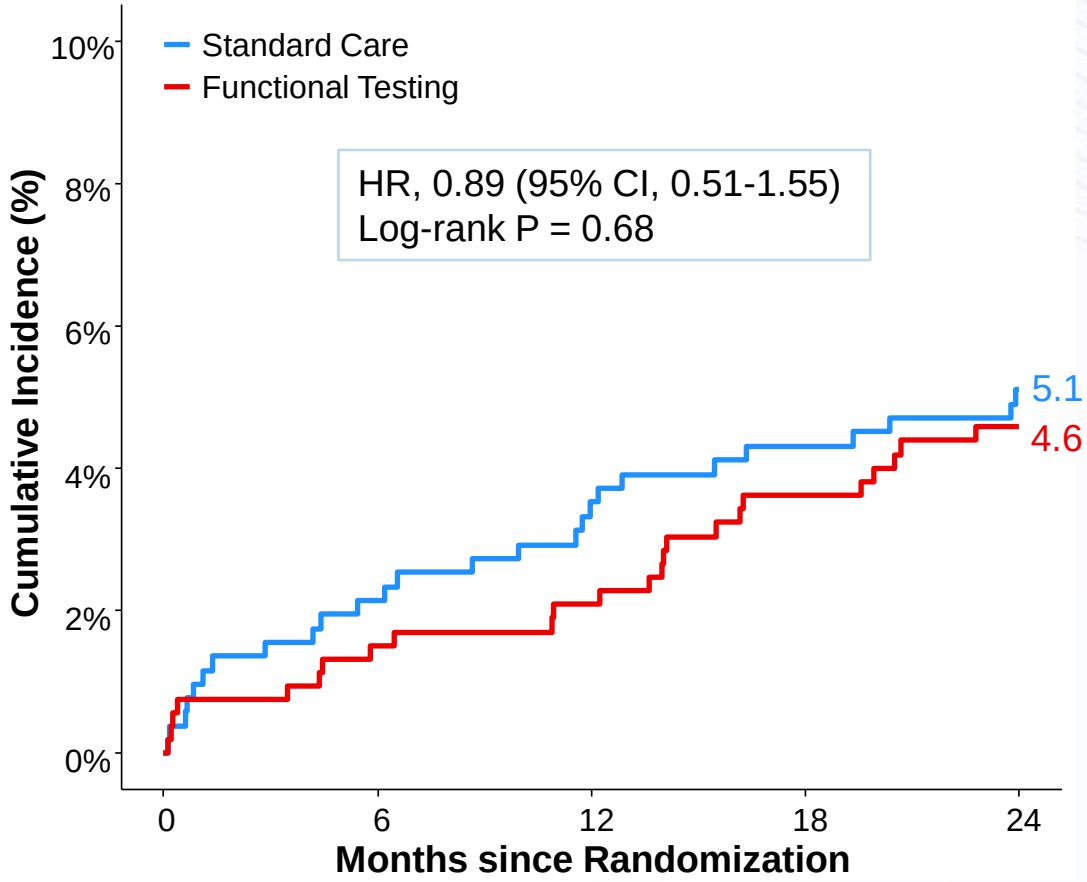
P for interaction = 0.91

Diabetics



No.at Risk					
Standard Care	339	324	318	311	293
Functional Testing	321	307	297	293	282

Non-Diabetics



No.at Risk					
	518	500	490	485	469
	528	516	512	503	476

Primary and Secondary Outcomes

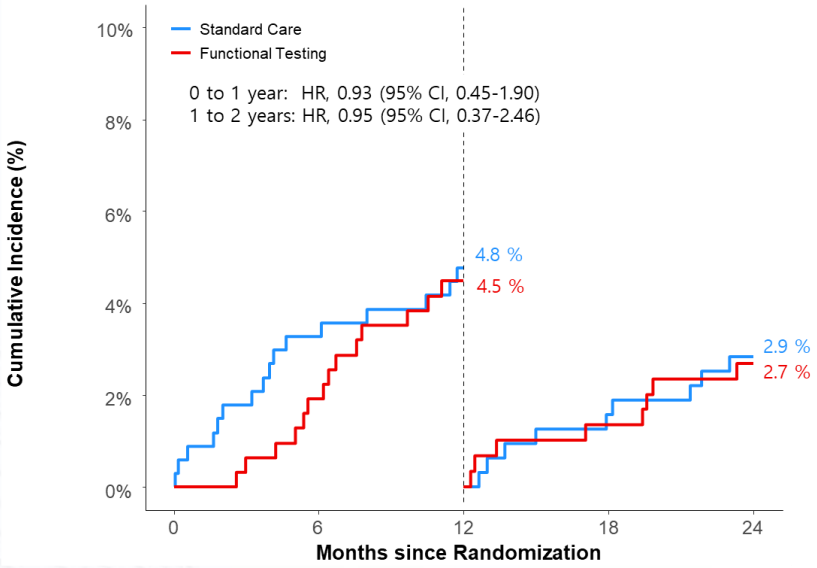
Stratified by Diabetes status and Randomization Group

	Diabetes				Non-Diabetes				
	Functional Testing (n=321)	Standard Care (n=339)	Hazard Ratio (95% CI)	P Value	Functional Testing (n=528)	Standard Care (n=518)	Hazard Ratio (95% CI)	P Value	P for Interaction
Primary composite outcome	22 (7.1)	25 (7.5)	0.94 (0.53–1.66)	0.818	24 (4.6)	26 (5.1)	0.89 (0.51–1.55)	0.684	0.906
Death from any cause	14 (4.5)	14 (4.2)	1.07 (0.51–2.24)	0.86	9 (1.7)	14 (2.8)	0.62 (0.27–1.43)	0.264	0.34
Myocardial infarction	2 (0.7)	6 (1.9)	0.36 (0.07–1.76)	0.21	2 (0.4)	4 (0.8)	0.48 (0.09–2.62)	0.397	0.80
Hospitalization for unstable angina	6 (2.0)	5 (1.5)	1.28 (0.39–4.19)	0.684	13 (2.5)	9 (1.8)	1.40 (0.60–3.27)	0.442	0.907
Secondary outcomes									
Death or myocardial infarction	16 (5.1)	20 (6.0)	0.85 (0.44–1.64)	0.633	11 (2.1)	18 (3.5)	0.59 (0.28–1.25)	0.166	0.467
Hospitalization									
Any reason	101 (32.8)	86 (26.1)	1.30 (0.97–1.73)	0.076	110 (21.1)	104 (20.7)	1.01 (0.77–1.32)	0.939	0.213
Cardiac reason	46 (15.0)	41 (12.6)	1.19 (0.78–1.81)	0.427	76 (14.6)	69 (13.8)	1.06 (0.76–1.46)	0.743	0.67
Noncardiac reason	55 (18.0)	45 (13.7)	1.35 (0.91–2.01)	0.134	34 (6.5)	35 (7.0)	0.93 (0.58–1.50)	0.775	0.238
Invasive coronary angiography	38 (12.6)	25 (7.7)			63 (12.1)	52 (10.4)			
Showing restenosis or obstructive CAD	28 (73.7)	16 (64.0)			41 (65.1)	29 (55.8)			
Showing no restenosis or obstructive CAD	10 (26.3)	9 (36.0)			22 (34.9)	23 (44.2)			
Repeat revascularization	24 (8.0)	17 (5.2)			42 (8.1)	31 (6.2)			
Target-lesion revascularization	13 (4.3)	11 (3.4)			21 (4.1)	15 (3.0)			
Nontarget-lesion revascularization	11 (3.7)	6 (1.8)			21 (4.1)	16 (3.2)			

Landmark Analysis

In Diabetic Patients

Primary Composite Outcome



No.at Risk

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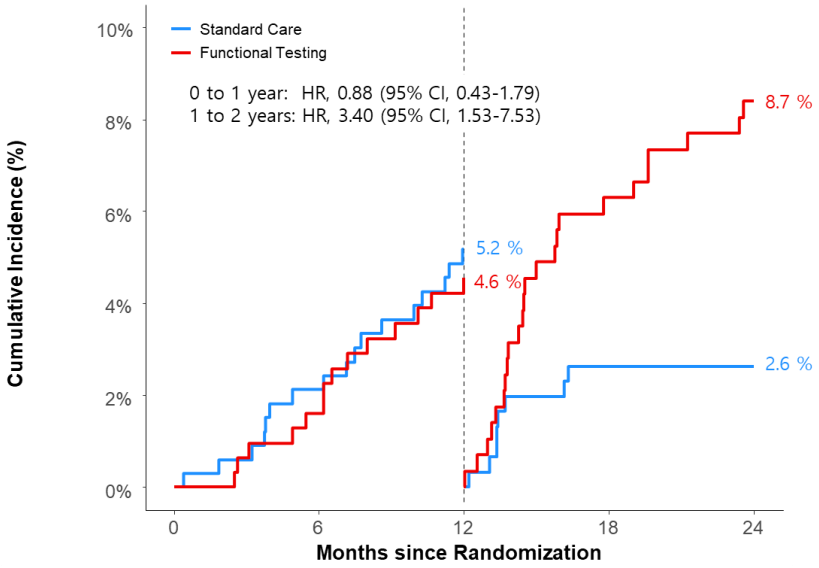
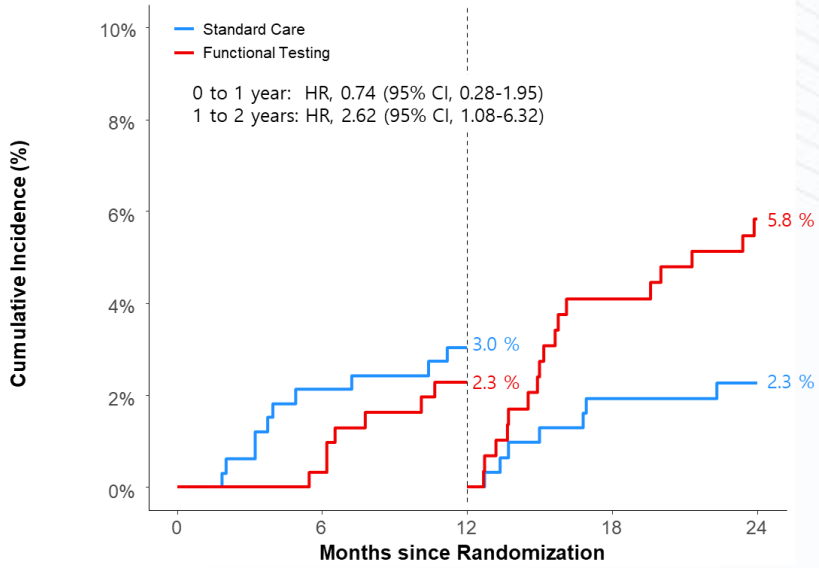
Invasive Coronary Angiography



No.at Risk

Standard Care	339	322	308	295	282
Functional Testing	321	303	288	268	253

Repeat Revascularization



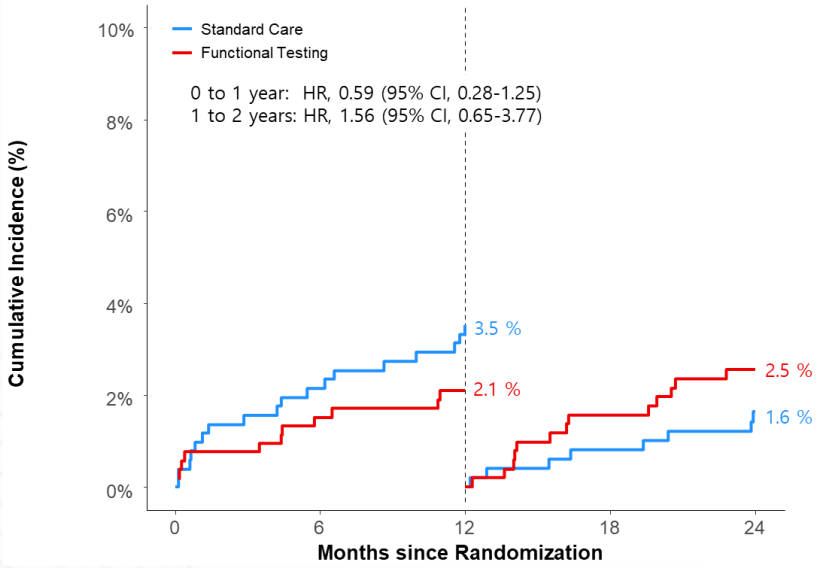
No.at Risk

Standard Care	339	322	315	304	288
Functional Testing	321	307	295	280	266

Landmark Analysis

In Non-Diabetic Patients

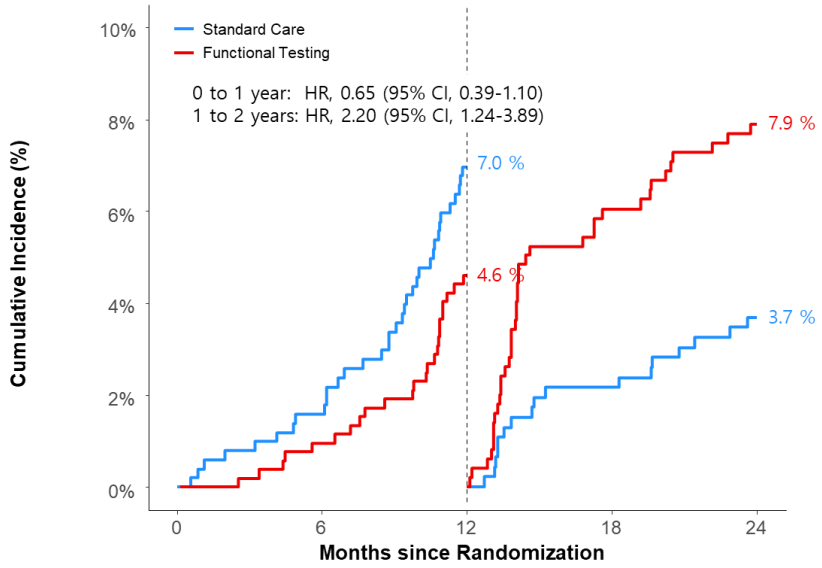
Primary Composite Outcome



No.at Risk

Standard Care	518	500	490	485	469
Functional Testing	528	516	512	503	476

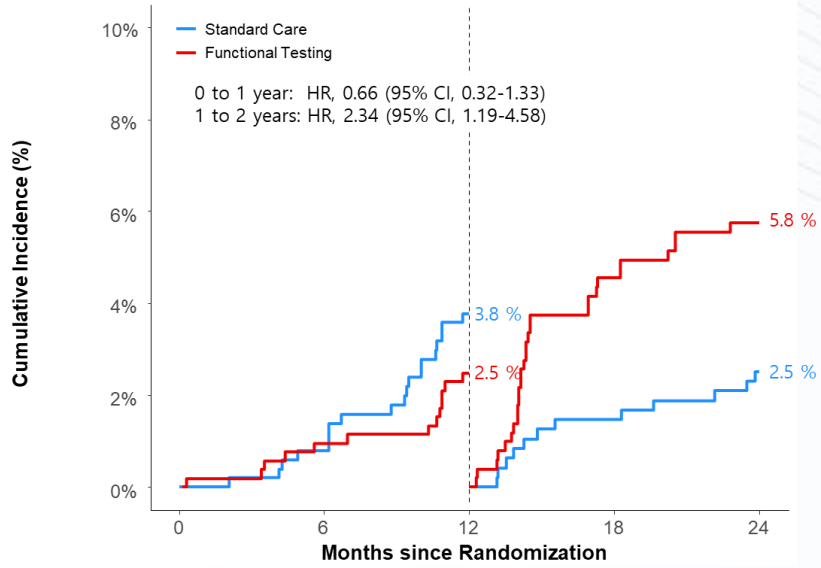
Invasive Coronary Angiography



No.at Risk

Standard Care	518	496	464	451	434
Functional Testing	528	516	496	462	433

Repeat Revascularization



No.at Risk

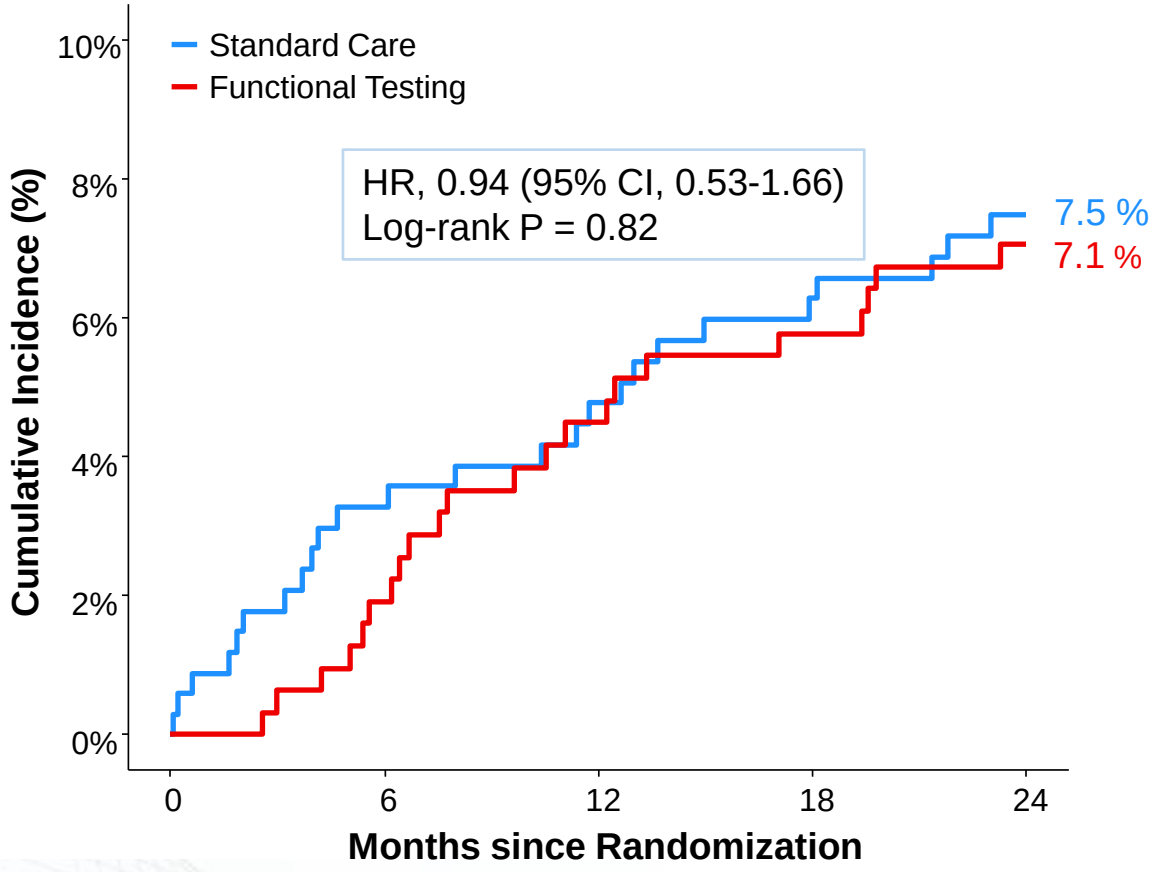
Standard Care	518	500	480	470	453
Functional Testing	528	516	507	479	450

Primary Composite Outcome

Stratified by Diabetes status and Randomization Group

P for interaction = 0.91

Diabetics



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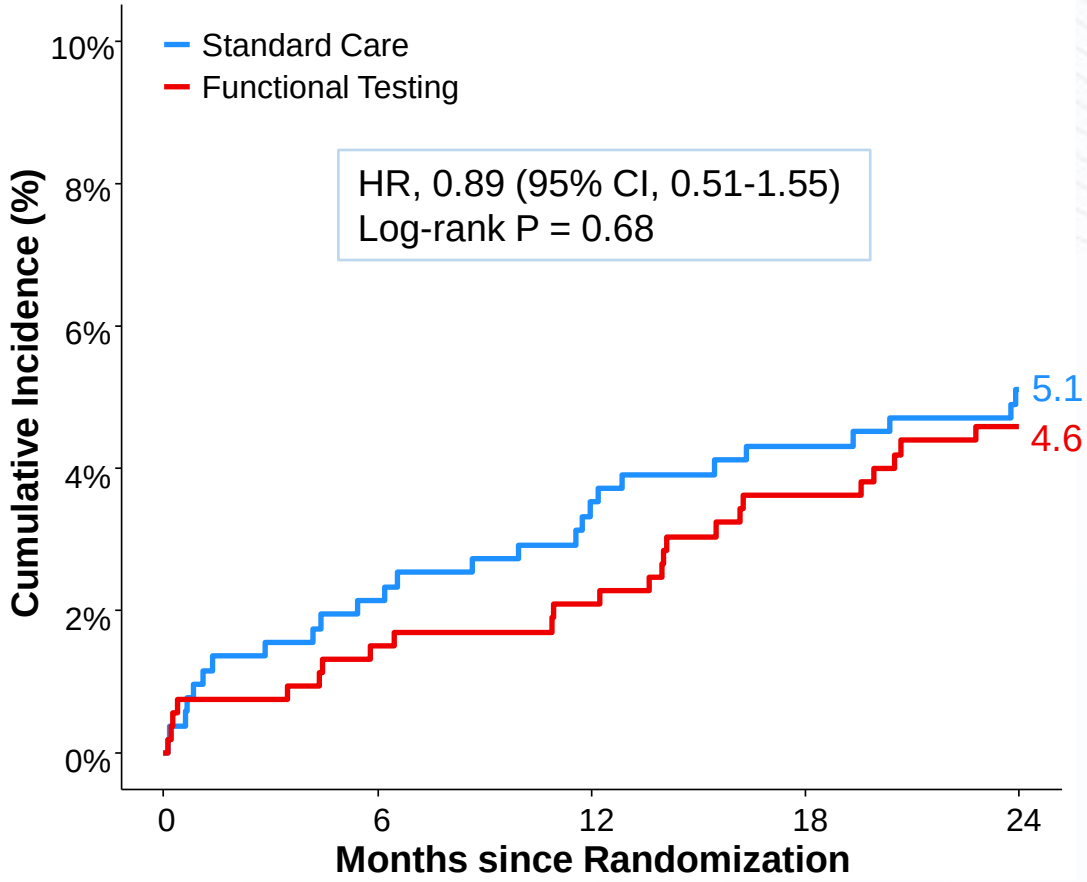
Non-Diabetics



No.at Risk					
	518	500	490	485	469
	528	516	512	503	476

Conclusion

- Patients with Diabetes had an increased risk of adverse cardiovascular events at 2 years.

- The adverse cardiovascular events rate did not differ between the routine functional-testing group and the standard-care group both in patients with and without diabetes.

- Invasive coronary angiography and repeat revascularization after 1 year occurred more frequently in the functional-testing group, irrespective of diabetes status. However, this additional invasive management did not reduce major adverse cardiovascular events or mortality.