Coronary Computed Tomography Angiography and the Future Risk of Myocardial Infarction

5-Year Follow-up of the SCOT-HEART Trial
on behalf of the SCOT-HEART Investigators

CHIEF SCIENTIST OFFICE
British Heart Foundation
Edinburgh & Lothians Health Foundation
NHS Lothian

ESC Congress
Munich 2018

Scottish COmputed Tomography of the HEART (SCOT-HEART) Trial

To assess the clinical impact of the **addition** of CTCA in patients presenting with suspected angina due to coronary heart disease in the Cardiology clinic

- Diagnosis (Primary Endpoint) — Changed Diagnosis in 1 in 4
- Investigations — Changed Investigations in 1 in 6
- Treatments — Changed Treatments in 1 in 4
- Outcomes — **Pre-specified 5-year outcome:**

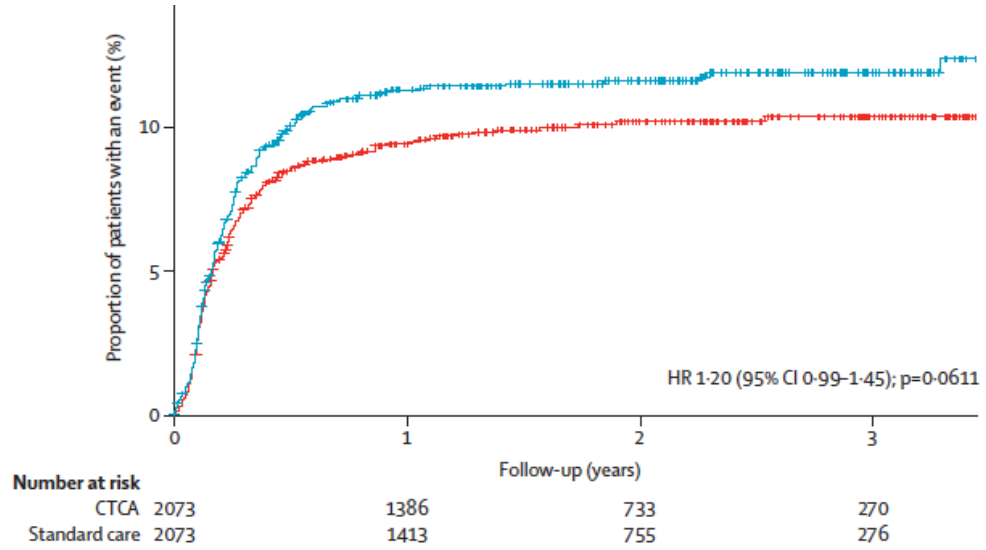
CHD death or non-fatal myocardial infarction

Trials. 2012;13:184 *Lancet* 2015;385:2383-2391 *JACC* 2016;67:1759-1768

Short-term Effects of CTCA

Invasive Coronary Angiography and Coronary Revascularisation

Coronary Revascularisation
HR 1.20 (95% CI, 0.99-1.45), P=0.0611



promise

At 90 days:

Invasive cardiac catheterisation
8.1 *versus* 12.2% (P<0.001)

Coronary Revascularisation
3.2 *versus* 6.2% (P<0.001)

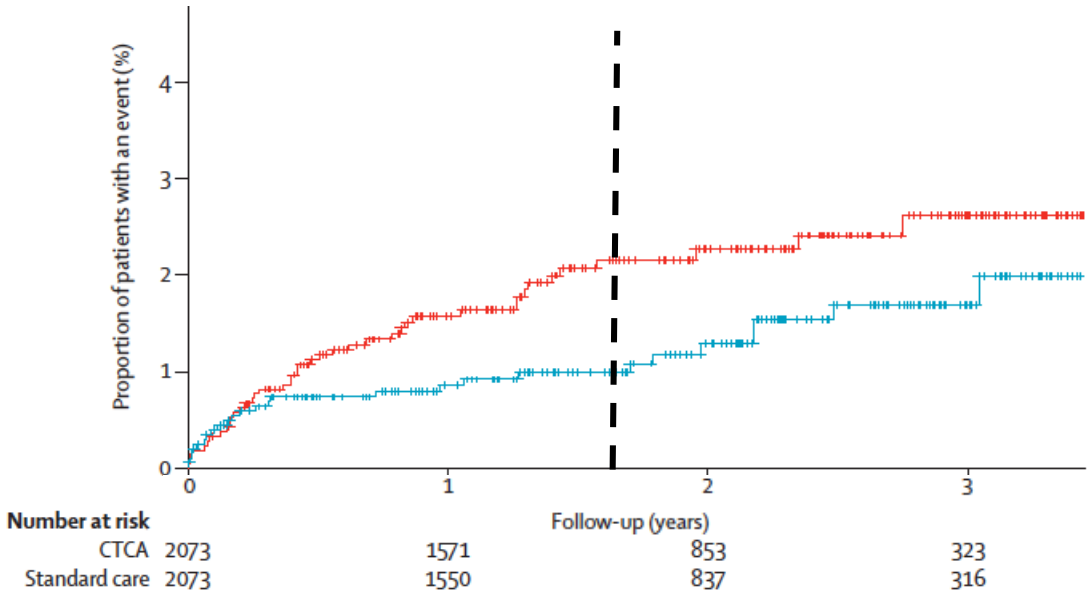
Lancet 2015;385:2383-2391

N Engl J Med 2015;372:1291-1300

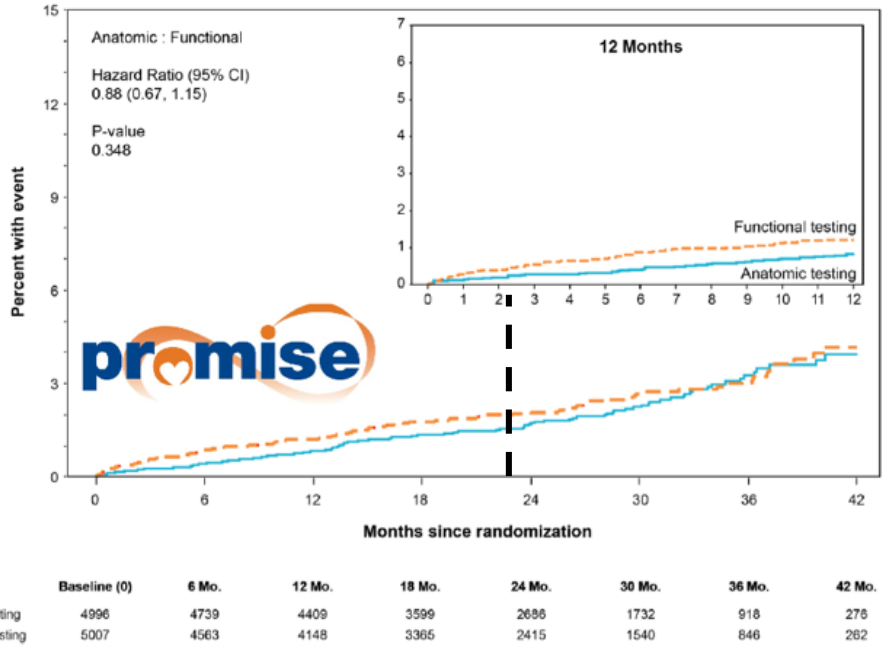
Short-term Effects of CTCA

Death and Myocardial Infarction at 20-22 Months

CHD death or non-fatal myocardial infarction
HR 0.62 (95% CI, 0.38-1.01), P=0.053



Death or non-fatal myocardial infarction
HR 0.66 (95% CI, 0.44-1.00), P=0.049



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Lancet 2015;385:2383-2391

N Engl J Med 2015;372:1291-1300

Scottish COmputed Tomography of the HEART (SCOT-HEART) Trial

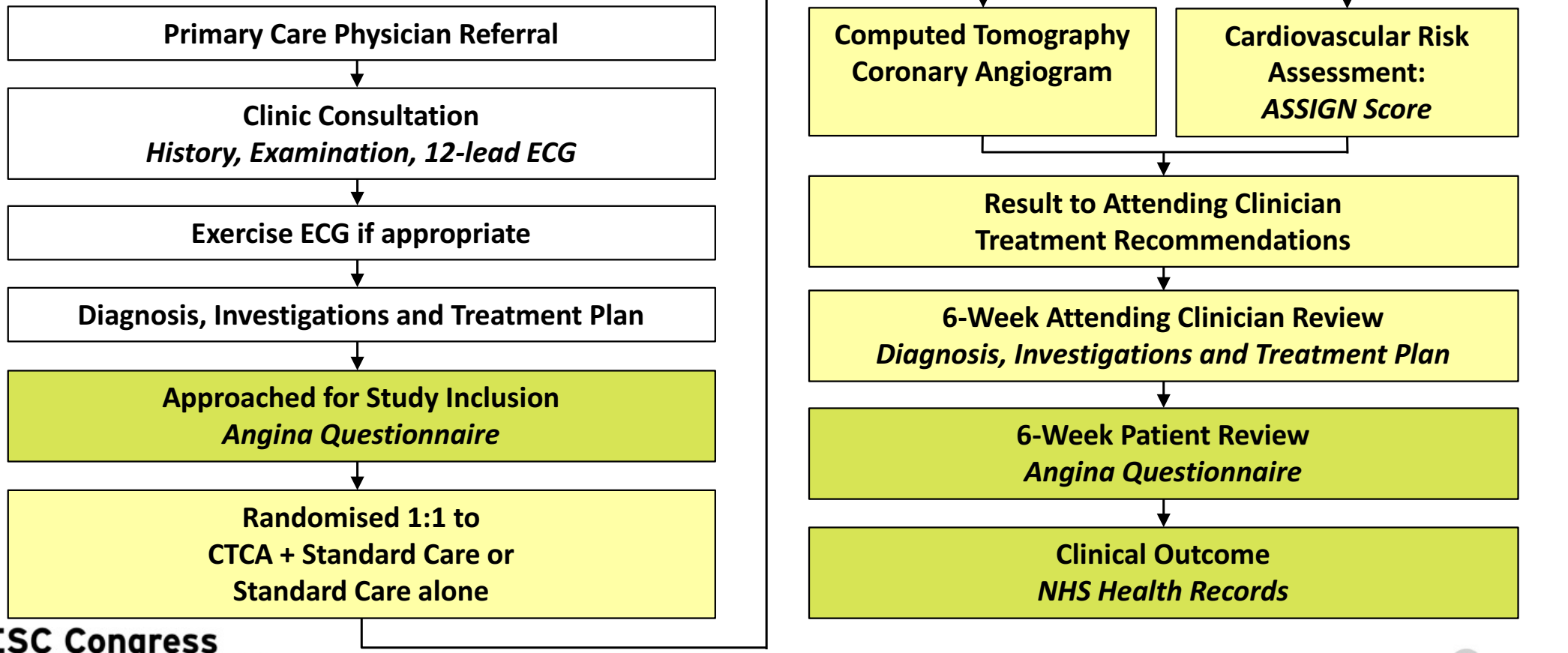
The 5-Year Data

Pre-specified 5-year assessment of Coronary CT Angiography on:

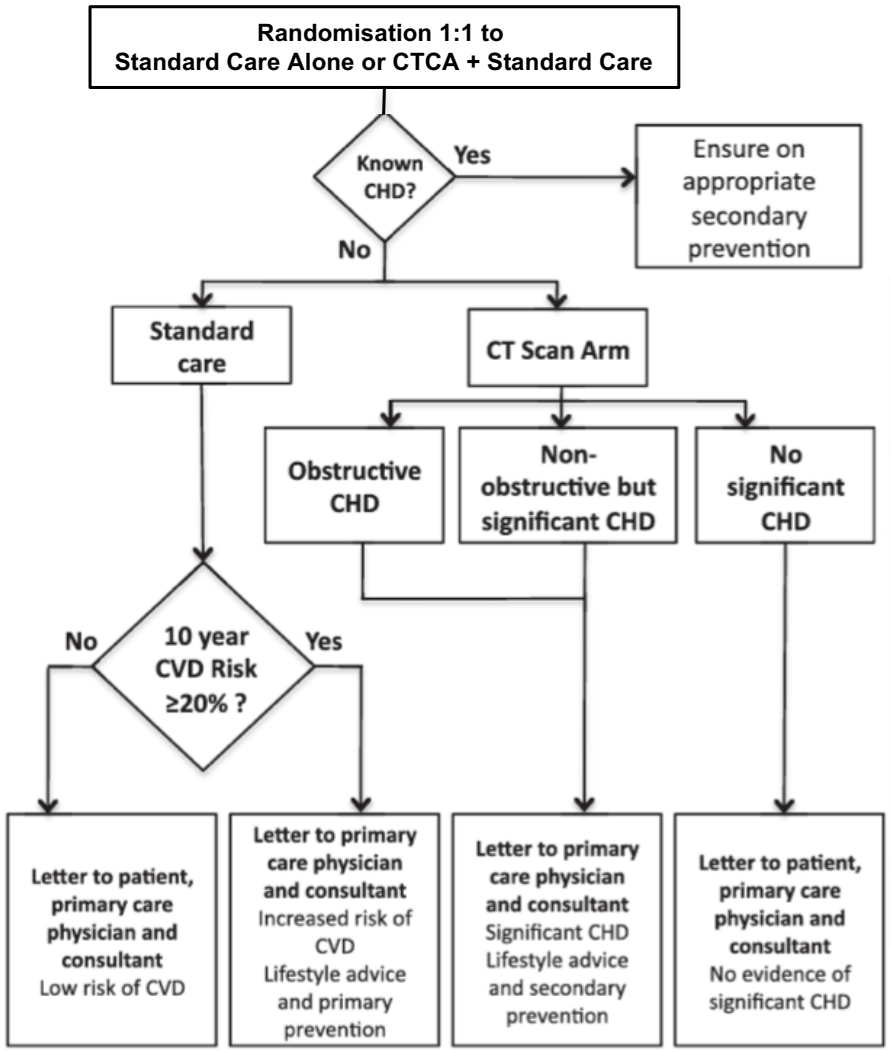
- Coronary heart disease death or non-fatal myocardial infarction
- Invasive coronary angiography and coronary revascularisation
- Prescription of preventative therapies

The SCOT-HEART Trial

Study Protocol



Healthy Living



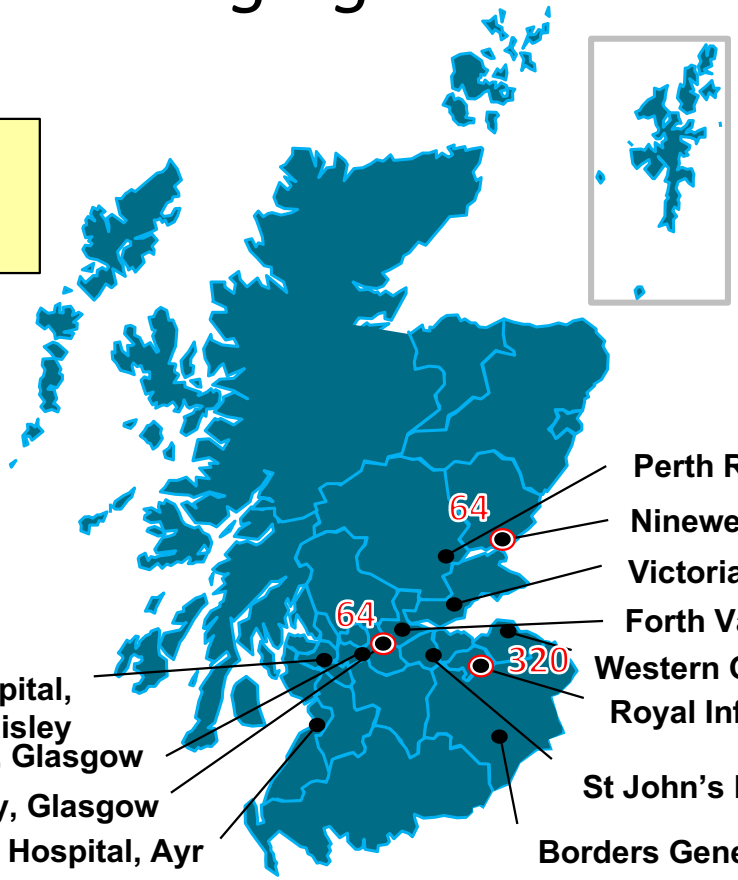
Newby *et al*. *Trials*. 2012;13:184

The SCOT-HEART Trial

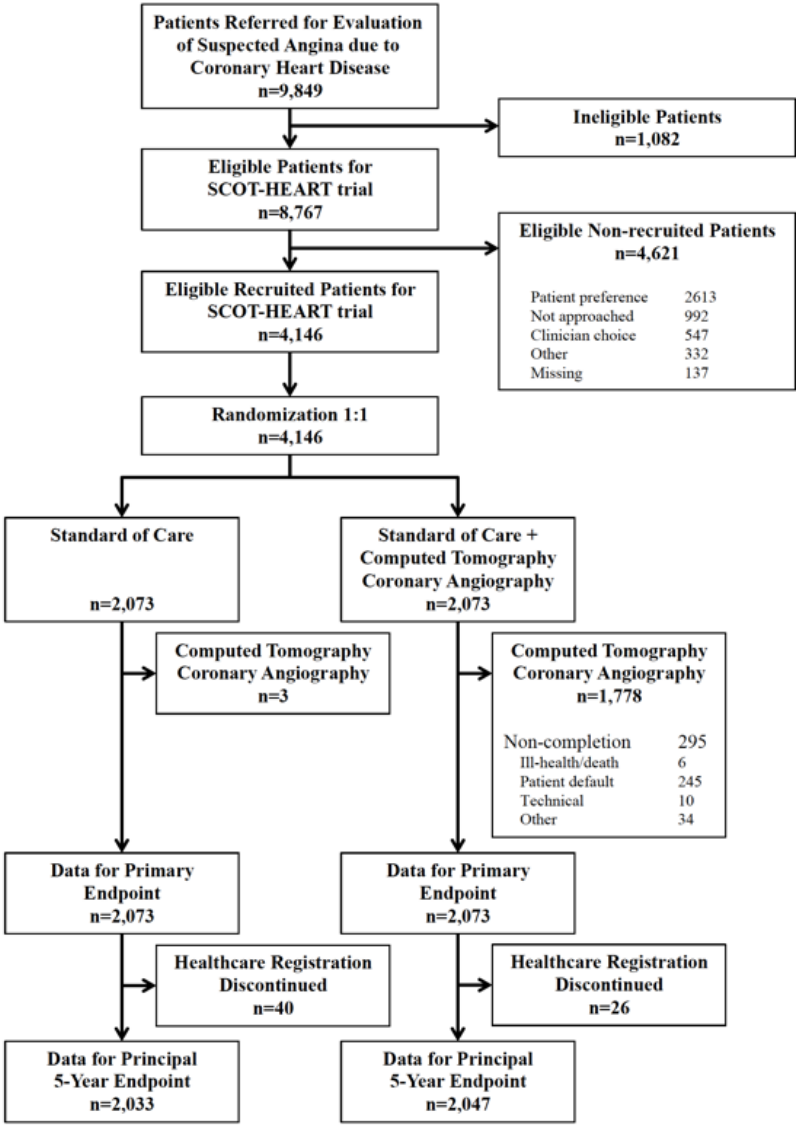
Recruiting and Imaging Centres

Complete Health Record Data Capture

12 Centers Across Scotland



Trials. 2012;13:184 *Lancet* 2015;385:2383-2391 *JACC* 2016;67:1759-1768

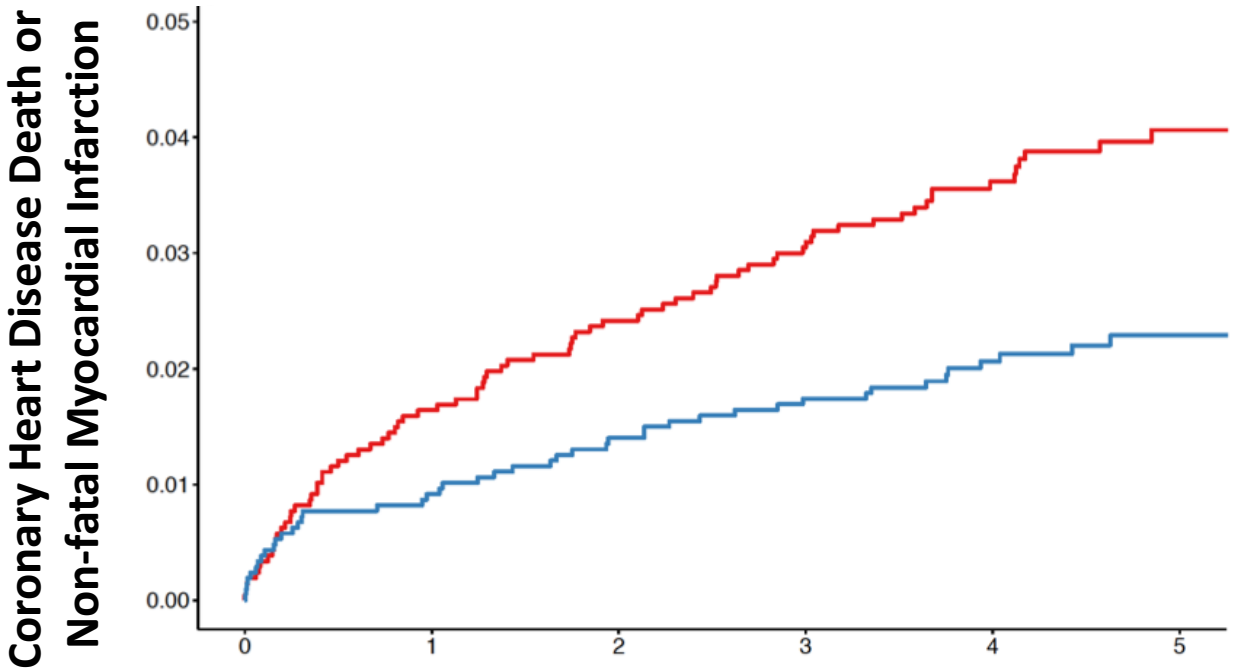


- 4,080 of 4,146 (98.4%) patients remained registered in Scotland.
- No patient withdrew consent
- Complete data over a median of 4.8 years comprising 20,254 patient-years of follow-up

	All Participants	Standard Care + CTCA	Standard Care
Number	4146 (100%)	2073 (50%)	2073 (50%)
Male	2325 (56%)	1162 (56%)	1163 (56%)
Age (years)	57±10	57±10	57±10
Body-mass Index (kg/m^2)	30±6	30±6	30±6
Atrial Fibrillation	84 (2%)	42 (2%)	42 (2%)
Prior Coronary Heart Disease	372 (9%)	186 (9%)	186 (9%)
Prior Cerebrovascular Disease	139 (3%)	91 (4%)	48 (2%)
Prior Peripheral Vascular Disease	53 (1%)	36 (2%)	17 (1%)
Current or Ex-smoker	2185 (53%)	1095 (53%)	1090 (53%)
Hypertension	1395 (34%)	712 (34%)	683 (33%)
Diabetes Mellitus	444 (11%)	223 (11%)	221 (11%)
Hypercholesterolaemia	2176 (53%)	1099 (53%)	1077 (52%)
Family History	1716 (41%)	887 (43%)	829 (40%)
Serum Total Cholesterol (mmol/L)	5.41±1.20	5.41±1.23	5.41±1.17
Serum HDL-Cholesterol (mmol/L)	1.35±0.43	1.35±0.42	1.35±0.43

		All Participants	Standard Care + CTCA	Standard Care
Anginal Symptoms	**Typical**	1462 (35%)	737 (36%)	725 (35%)
	Atypical	988 (24%)	502 (24%)	486 (23%)
	Non-anginal	1692 (41%)	833 (40%)	859 (41%)
Electrocardiogram	**Normal**	3492 (84%)	1757 (85%)	1735 (84%)
	Abnormal	608 (15%)	292 (14%)	316 (15%)
Stress Electrocardiogram				
	Performed	3517 (85%)	1764 (85%)	1753 (85%)
	Normal	2188 (62%)	1103 (63%)	1085 (62%)
	Inconclusive	566 (16%)	284 (16%)	282 (16%)
	Abnormal	529 (15%)	264 (15%)	265 (15%)
Further Investigation		1315 (32%)	633 (31%)	682 (33%)
Stress Imaging	**Radionuclide**	389 (9%)	176 (9%)	213 (10%)
	Other	30 (1%)	16 (1%)	14 (1%)
Invasive Coronary Angiography		515 (12%)	255 (12%)	260 (13%)
Predicted 10-year CHD Risk		17±12%	18±11%	17±12%

Primary Clinical End Point



Hazard Ratio 0.59
(95% CI, 0.41 to 0.84)
P=0.004

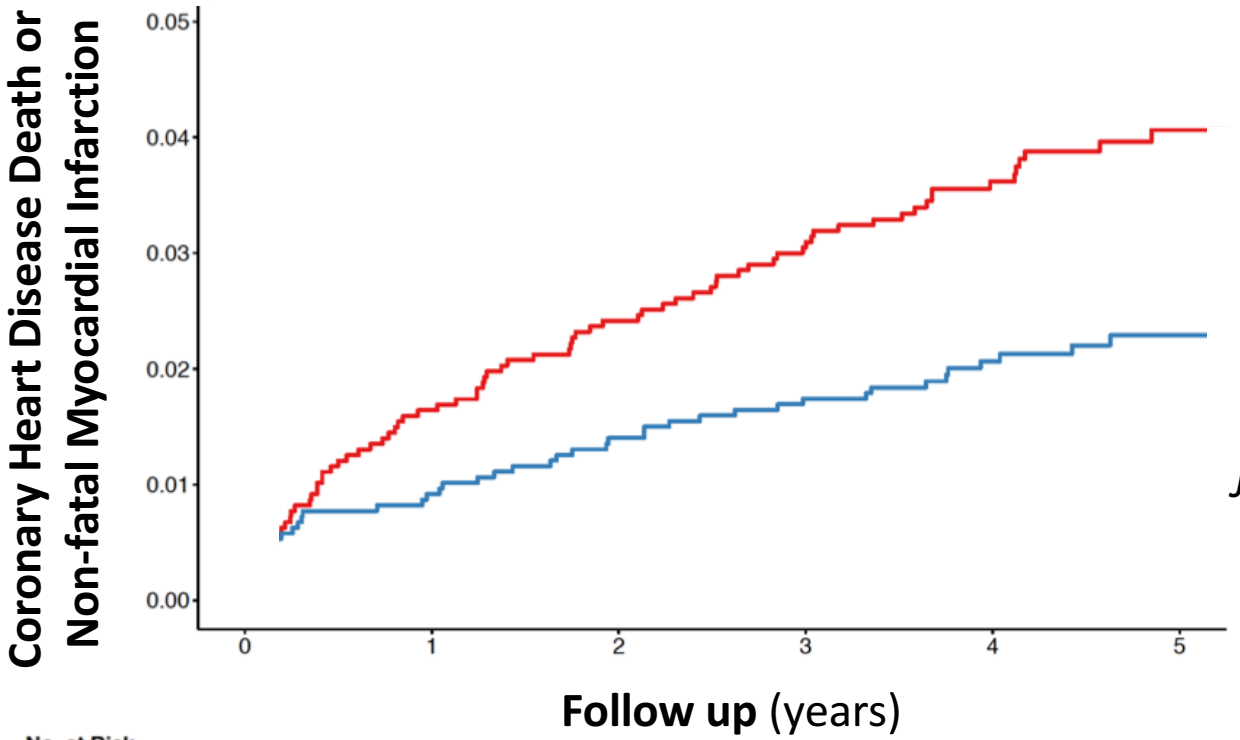
No. at Risk						
Standard Care	2073	2033	2008	1994	1572	856
CCTA	2073	2051	2029	2015	1588	872

Standard Care Alone

CTCA + Standard Care

Primary Clinical End Point

Excluding the 50-day treatment delay



No. at Risk						
Standard Care	2073	2033	2008	1994	1572	856
CCTA	2073	2051	2029	2015	1588	872

***Hazard Ratio 0.53**
***(95% CI, 0.36 to 0.78)**
***P=0.001**

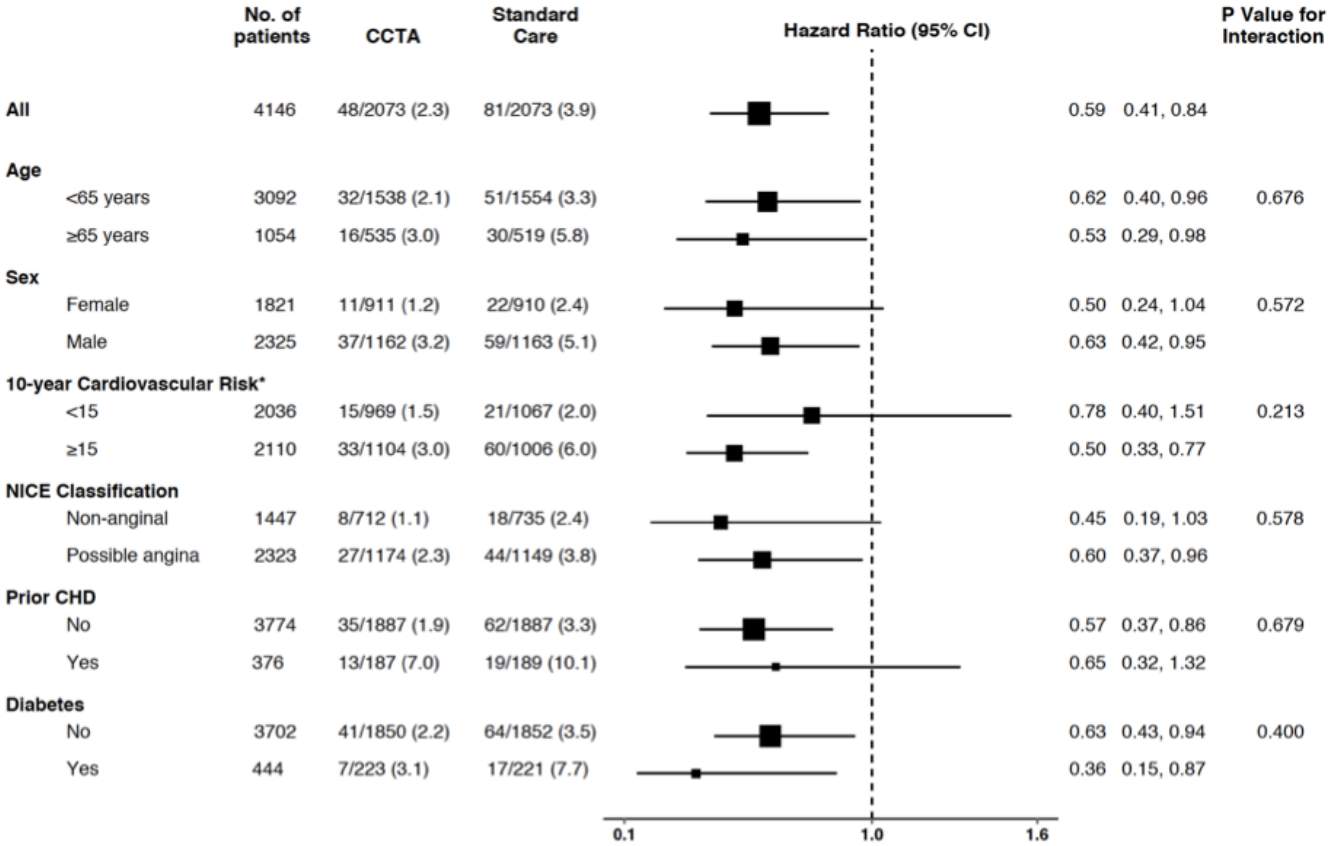
JACC 2016;67:1759-1768

Standard Care Alone

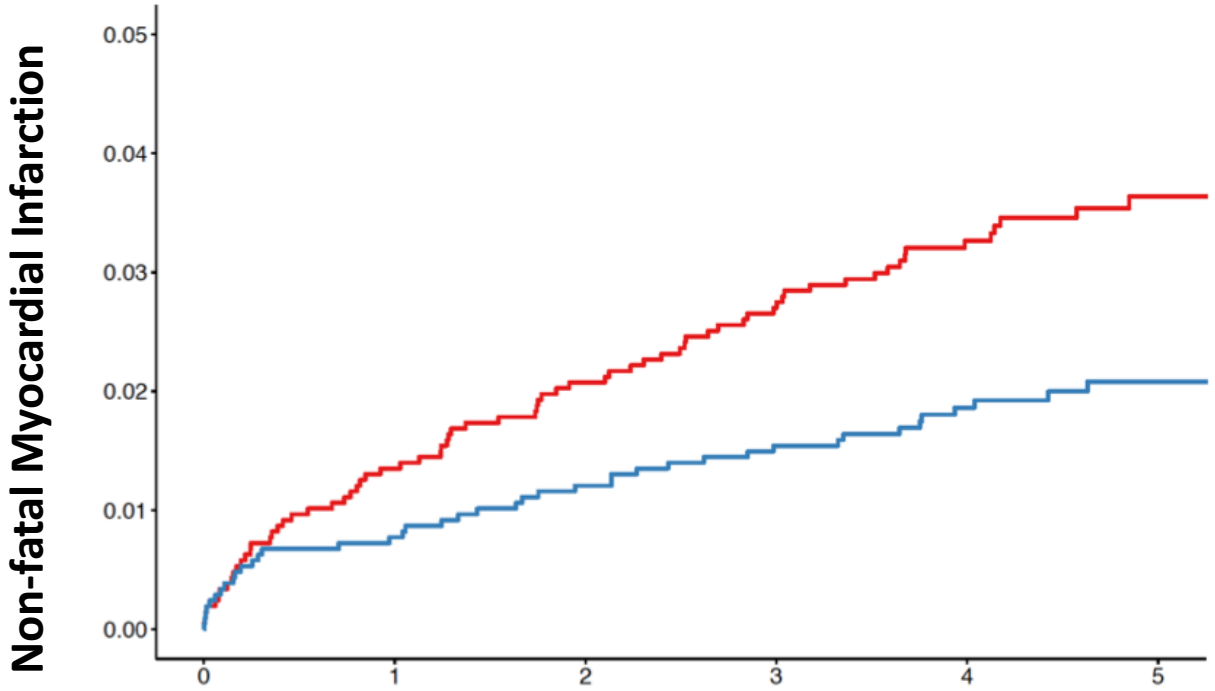
CTCA + Standard Care

Primary Clinical End Point

Subgroups of Interest



Non-fatal Myocardial Infarction



Hazard Ratio 0.60
(95% CI, 0.41 to 0.87)
P=0.007

No. at Risk						
Standard Care	2073	2045	2030	2017	1597	881
CCTA	2073	2057	2048	2041	1618	891

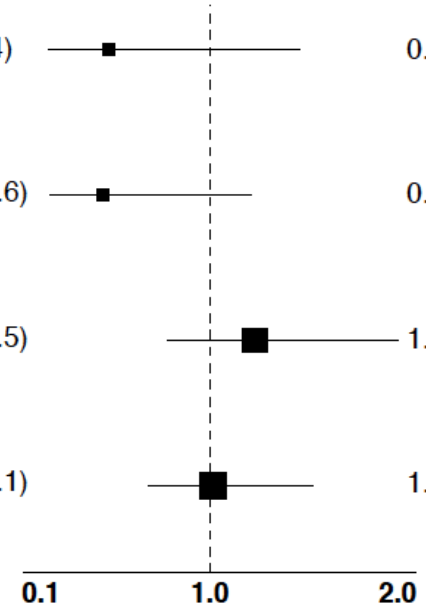
Standard Care Alone

CTCA + Standard Care

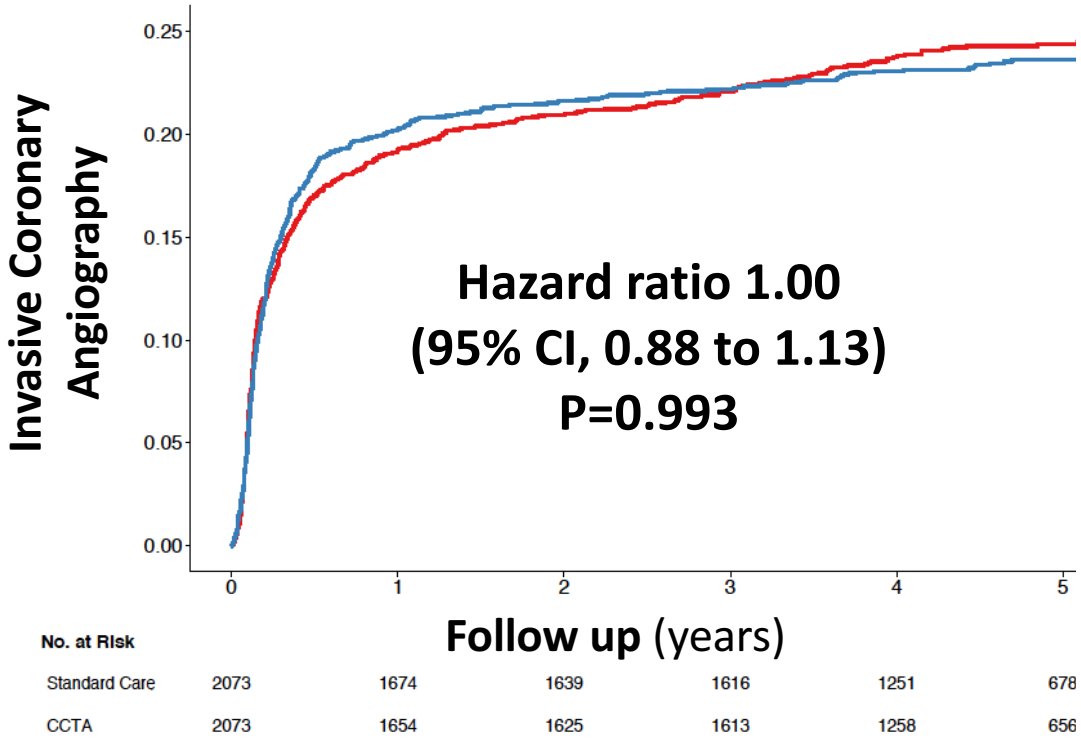
Mortality

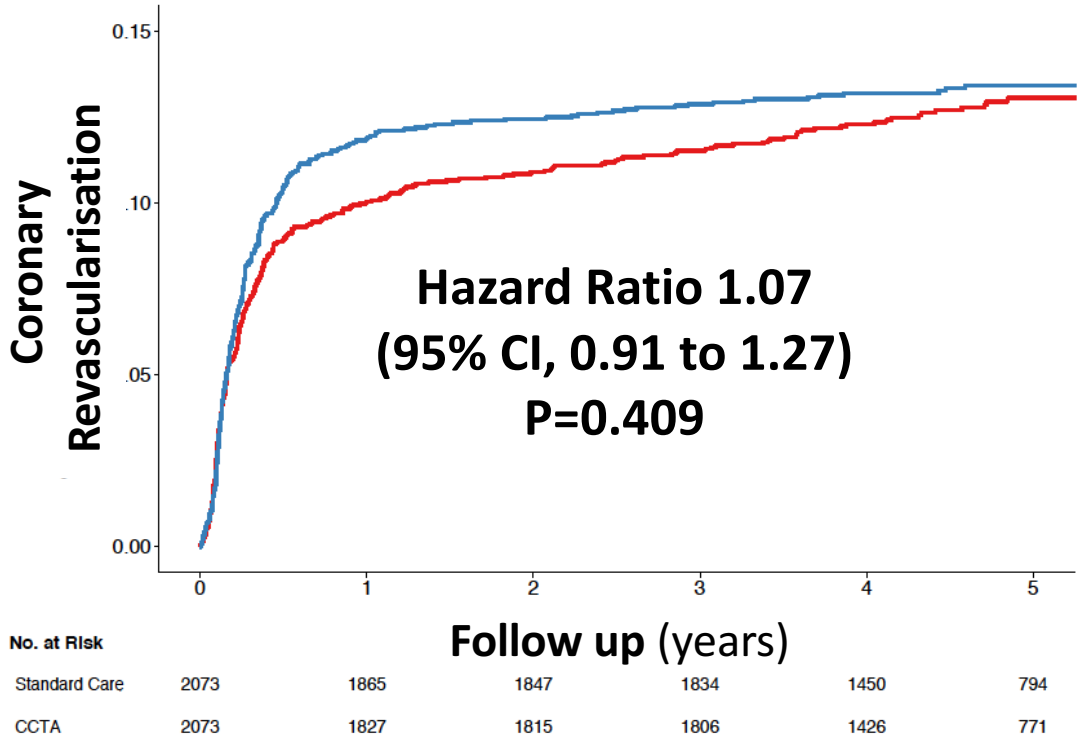
Cardiovascular and Non-cardiovascular

Cause of Death	All Participants	CCTA	Standard Care	Hazard Ratio (95% CI)		P Value
Coronary Heart Disease	13 (0.3)	4 (0.2)	9 (0.4)	0.46	(0.14, 1.48)	0.193
Cardiovascular	17 (0.4)	5 (0.2)	12 (0.6)	0.43	(0.15, 1.22)	0.111
Non-cardiovascular	69 (1.7)	38 (1.8)	31 (1.5)	1.24	(0.77, 2.00)	0.368
All-cause	86 (2.1)	43 (2.1)	43 (2.1)	1.02	(0.67, 1.55)	0.936



Invasive Coronary Angiography and Coronary Revascularisation





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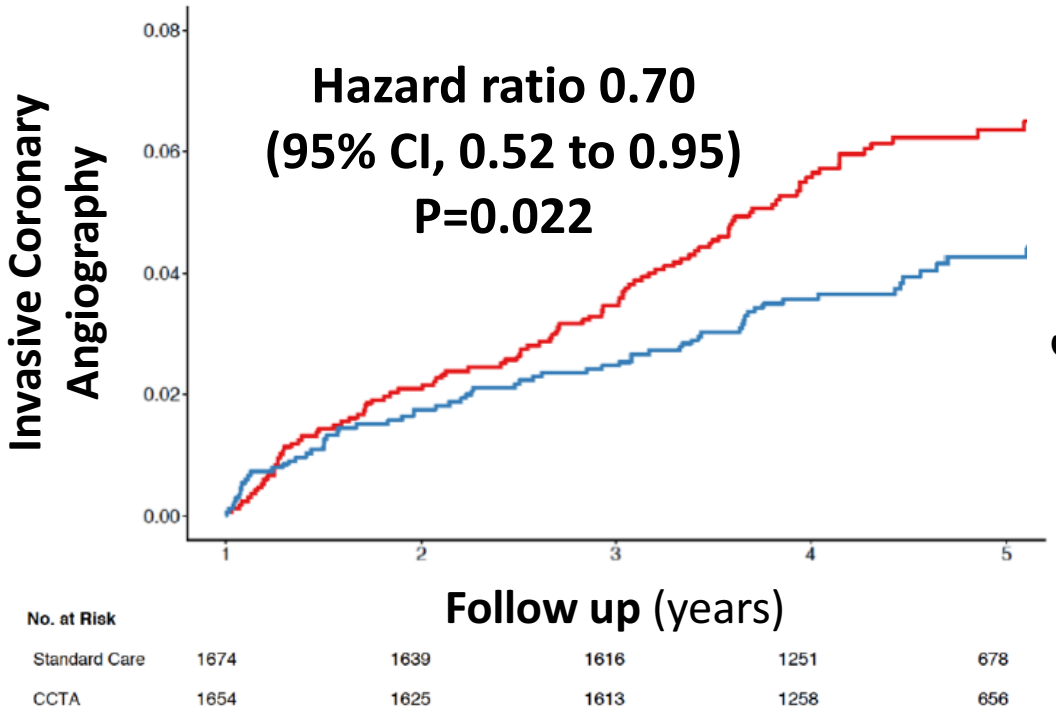
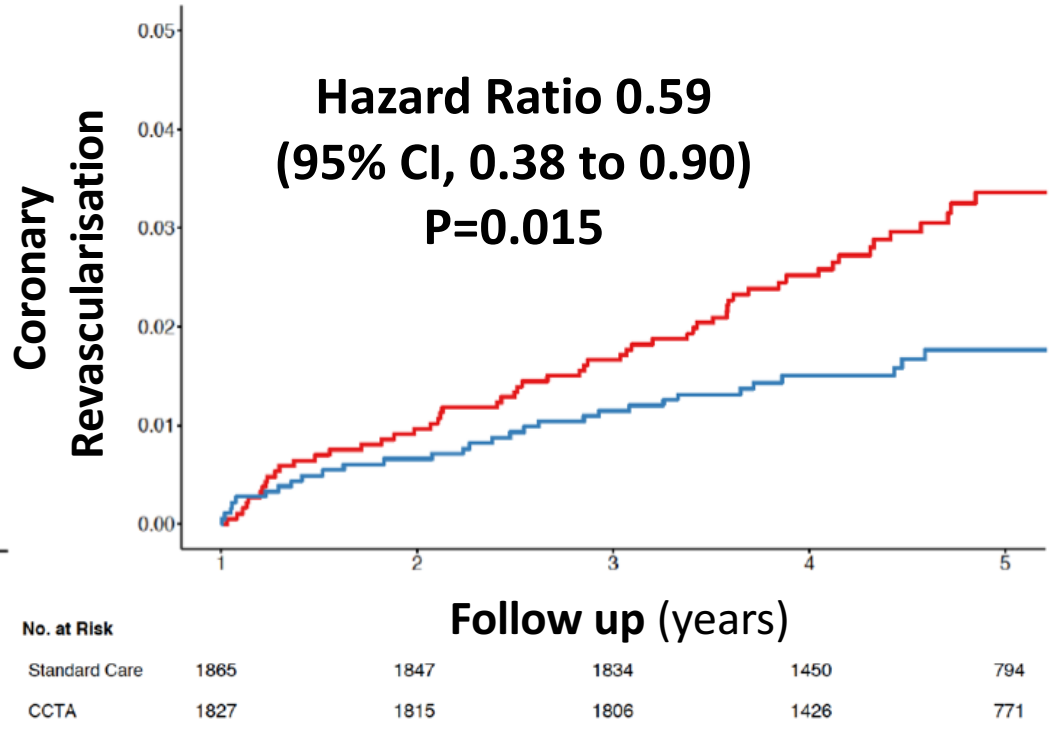
Standard Care Alone

CTCA + Standard Care

Invasive Coronary Angiography and Coronary Revascularisation

Beyond One-Year (Post-hoc Analysis)





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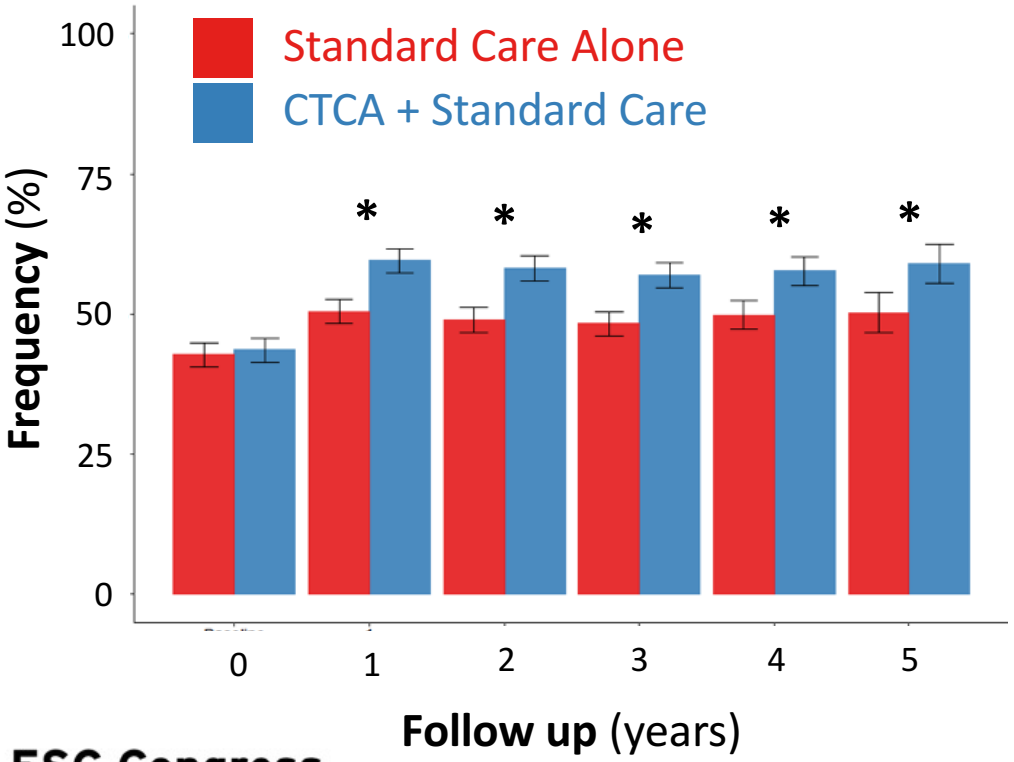
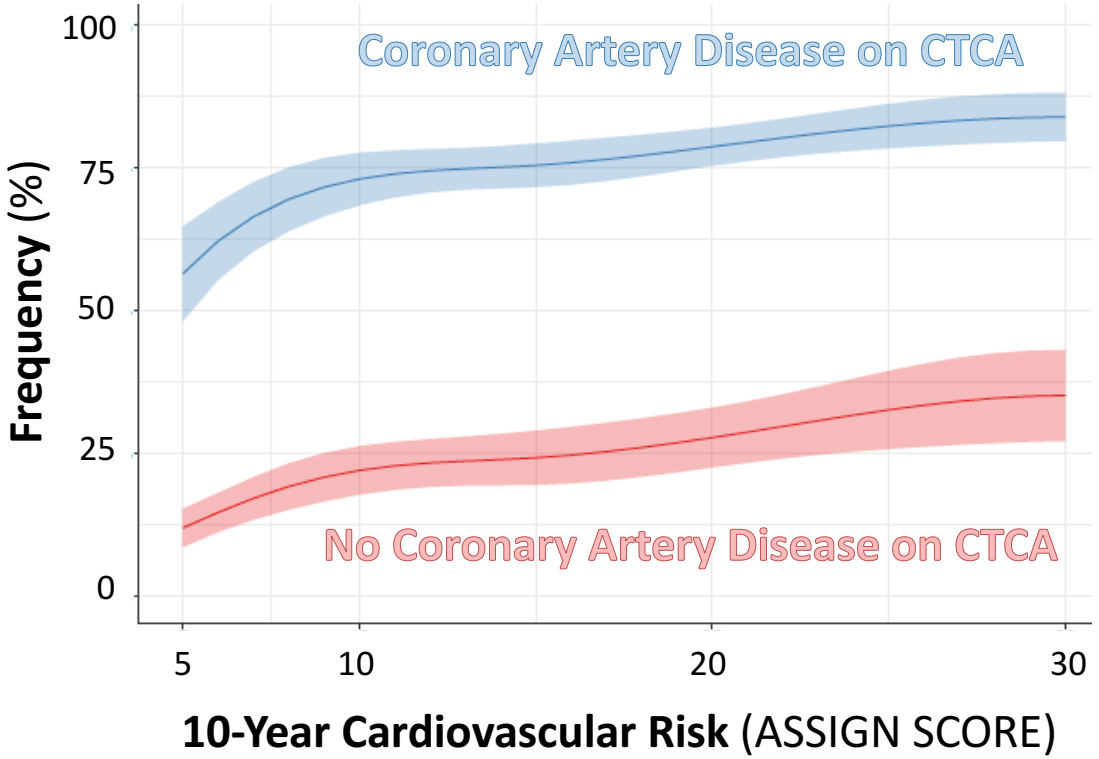
Standard Care Alone

CTCA + Standard Care

Statin Therapy Use over 5 Years

The Right Patient Gets the Right Treatment





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*P<0.0001

Coronary CT Angiography and the Future Risk of Myocardial Infarction

The Right Patient Gets the Right Treatment

- Coronary CT angiography leads to a reduction in 5-year coronary heart disease death or non-fatal myocardial infarction
- Early increases in invasive coronary angiography and coronary revascularisation are offset by lower rates beyond 1 year
- Benefits appear to be attributable to better targeted preventative therapies that persist out to 5 years
- Should coronary CT angiography be the non-invasive test of choice?