



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*

ESC Congress
Munich 2018

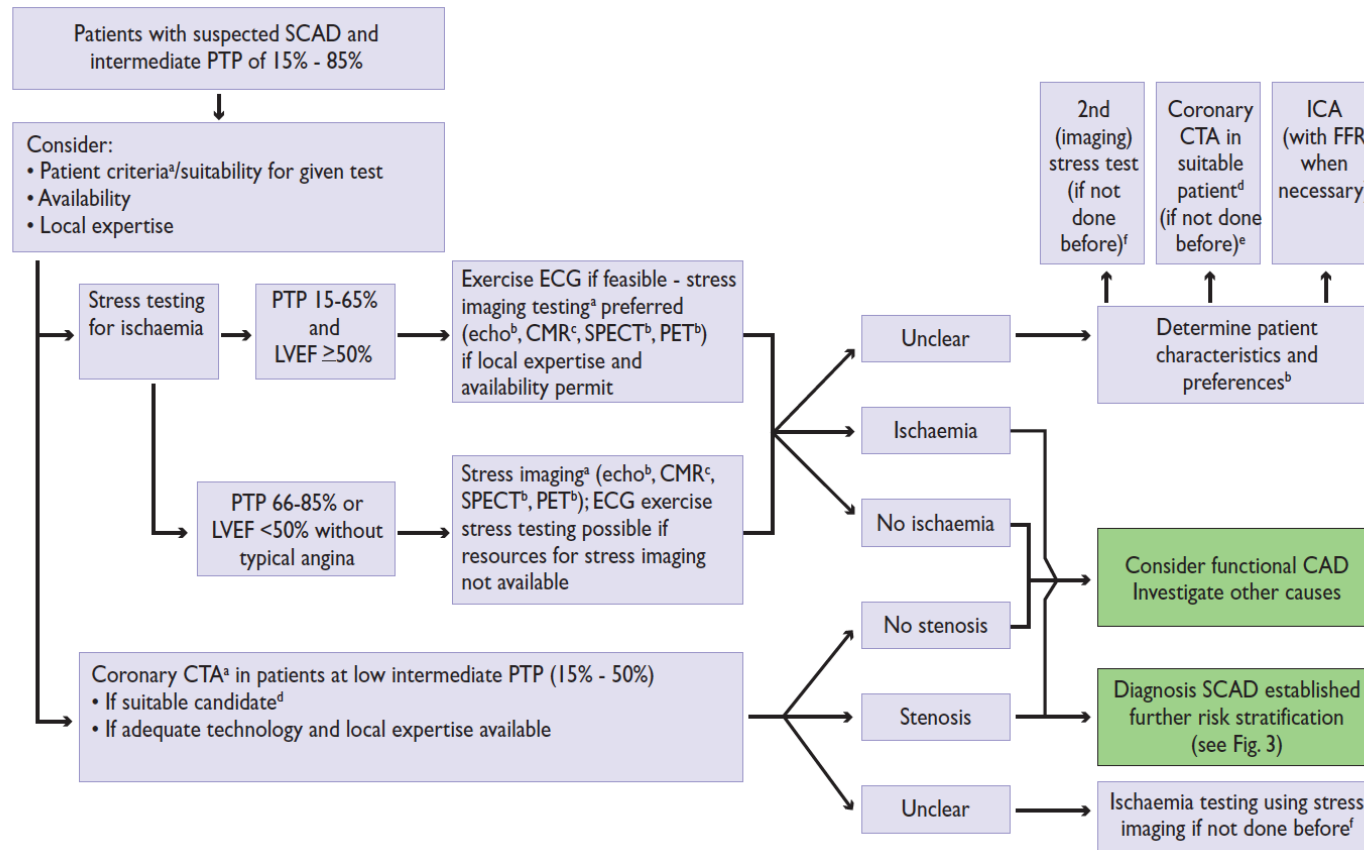
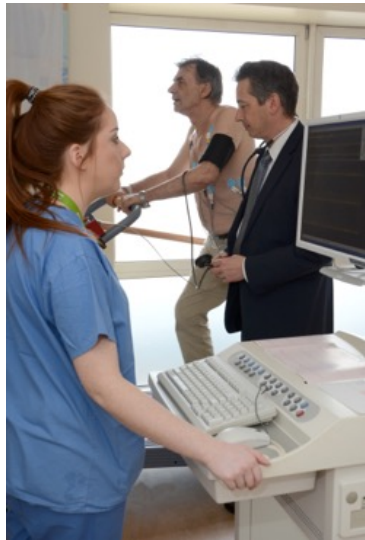


Edinburgh & Lothians
Health Foundation





European Society of Cardiology Guideline *Investigation of Stable Chest Pain*





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**



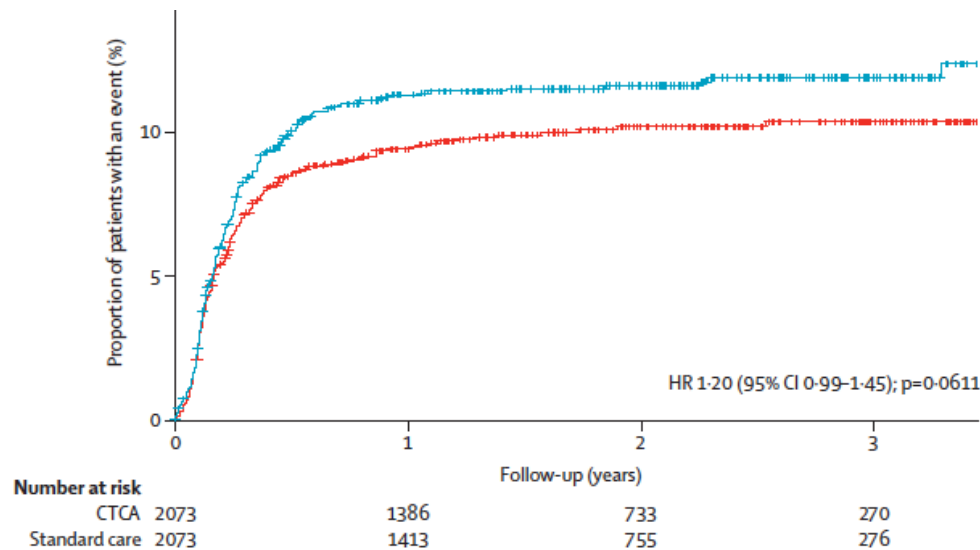
Short-term Effects of CTCA

Invasive Coronary Angiography and Coronary Revascularisation



Coronary Revascularisation

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



At 90 days:

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

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



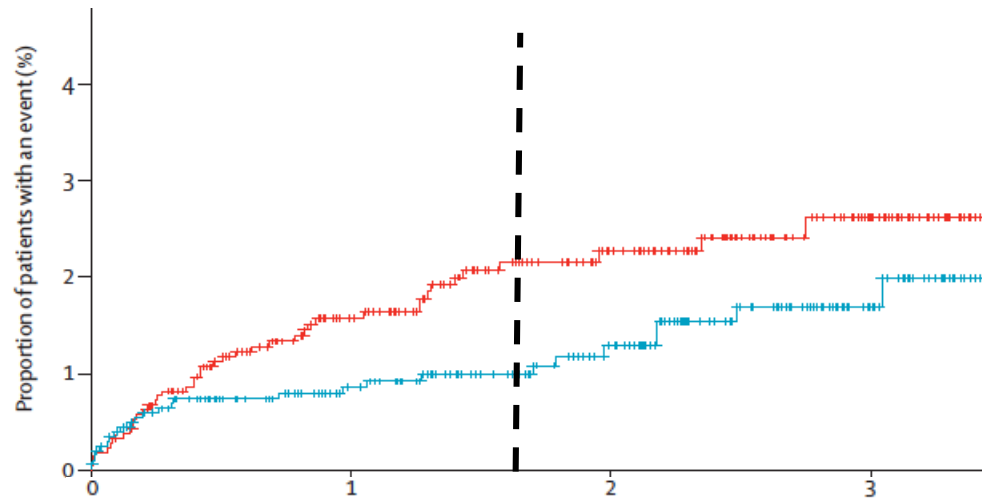
Short-term Effects of CTCA

Death and Myocardial Infarction at 20-22 Months

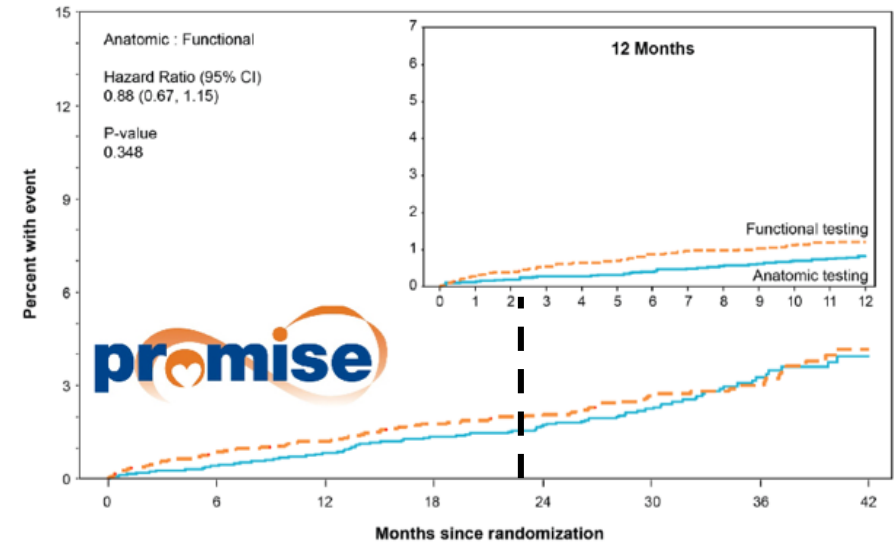


CHD death or non-fatal myocardial infarction
HR 0.62 (95% CI, 0.38-1.01), P=0.053

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



Number at risk	0	1	2	3
CTCA	2073	1571	853	323
Standard care	2073	1550	837	316



# at risk	Baseline (0)	6 Mo.	12 Mo.	18 Mo.	24 Mo.	30 Mo.	36 Mo.	42 Mo.
Anatomic testing	4996	4739	4409	3599	2686	1732	918	276
Functional testing	5007	4563	4148	3365	2415	1540	846	262

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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:

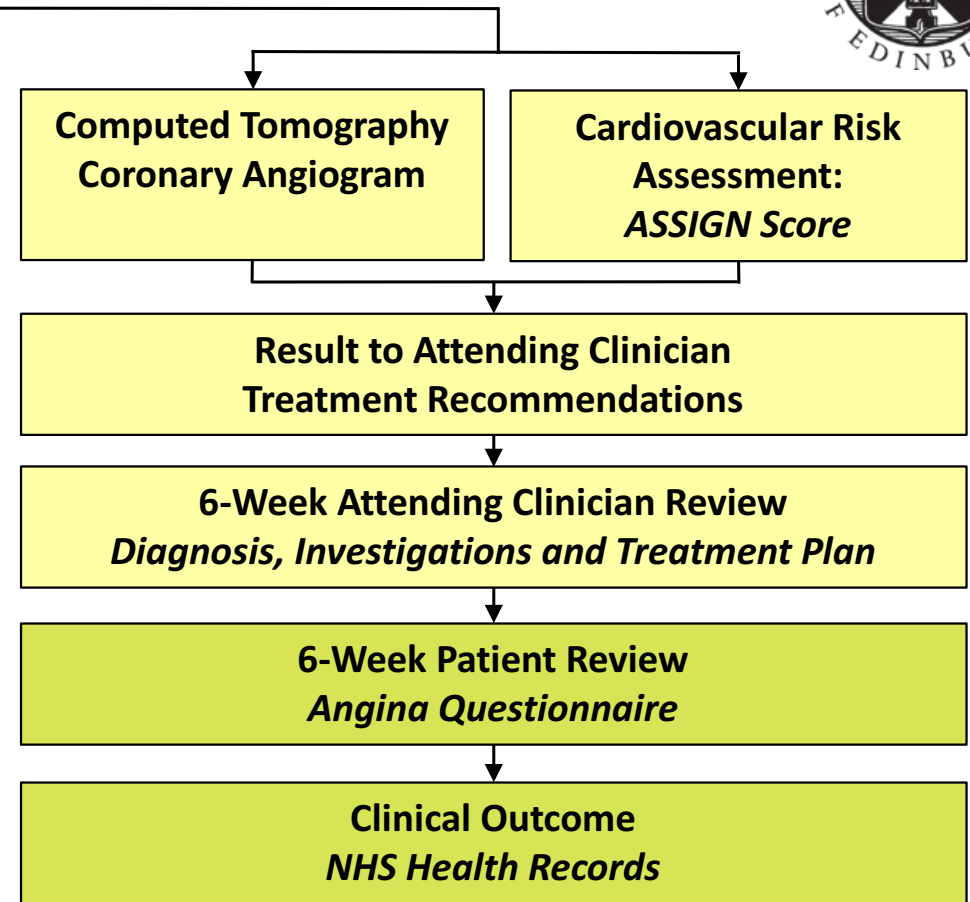
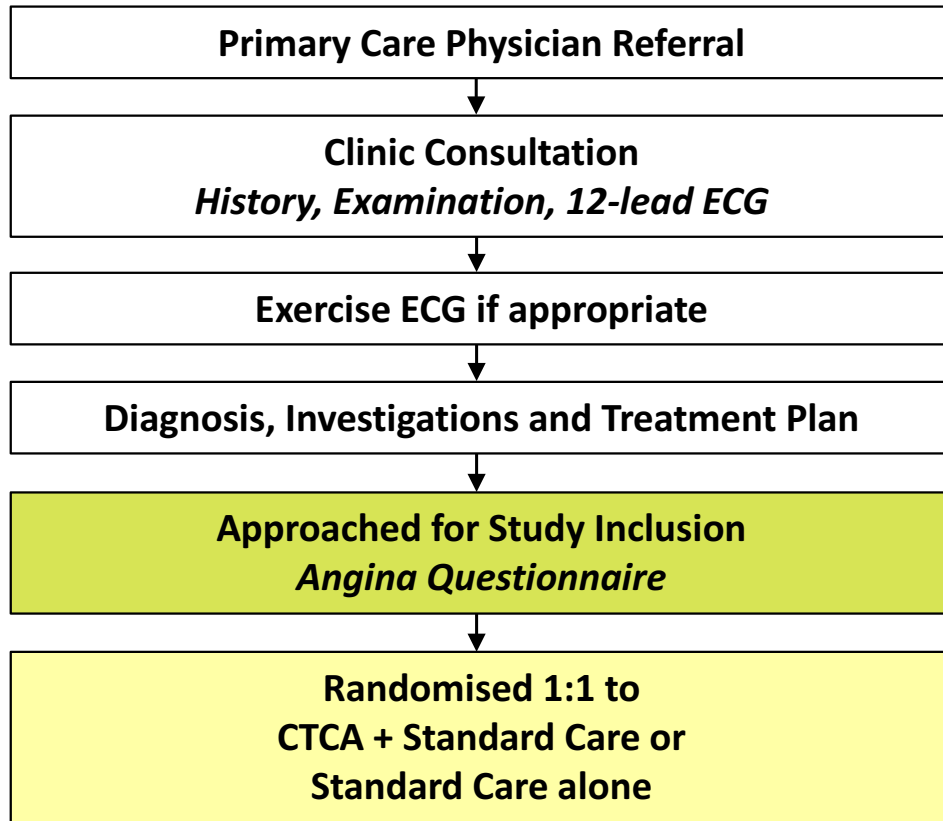
- Coronary heart disease death or non-fatal myocardial infarction
- Invasive coronary angiography and coronary revascularisation
- Prescription of preventative therapies





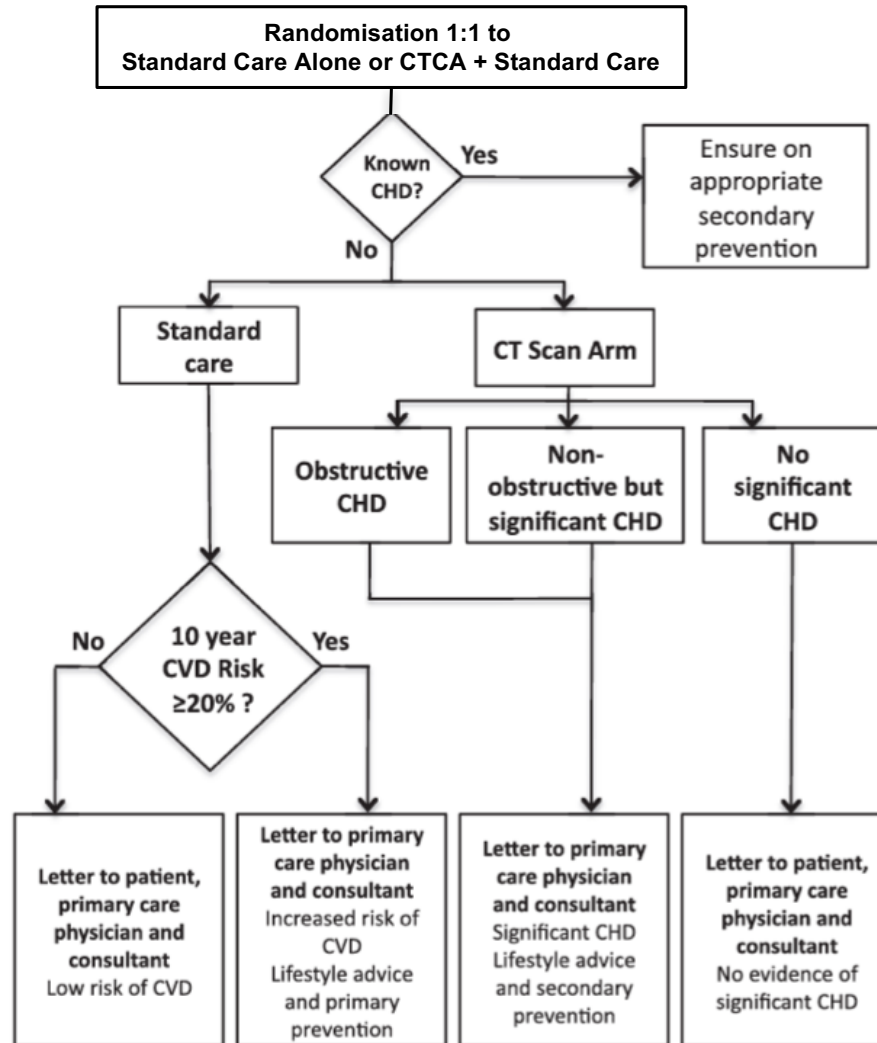
The SCOT-HEART Trial

Study Protocol





Healthy Living





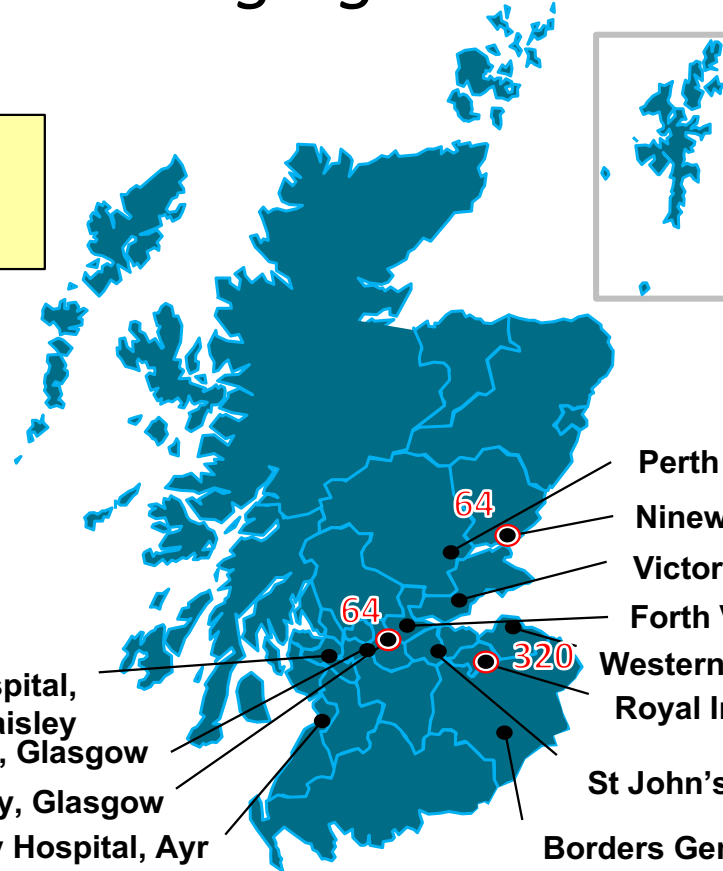
The SCOT-HEART Trial

Recruiting and Imaging Centres



Complete Health Record Data Capture

12 Centers Across Scotland



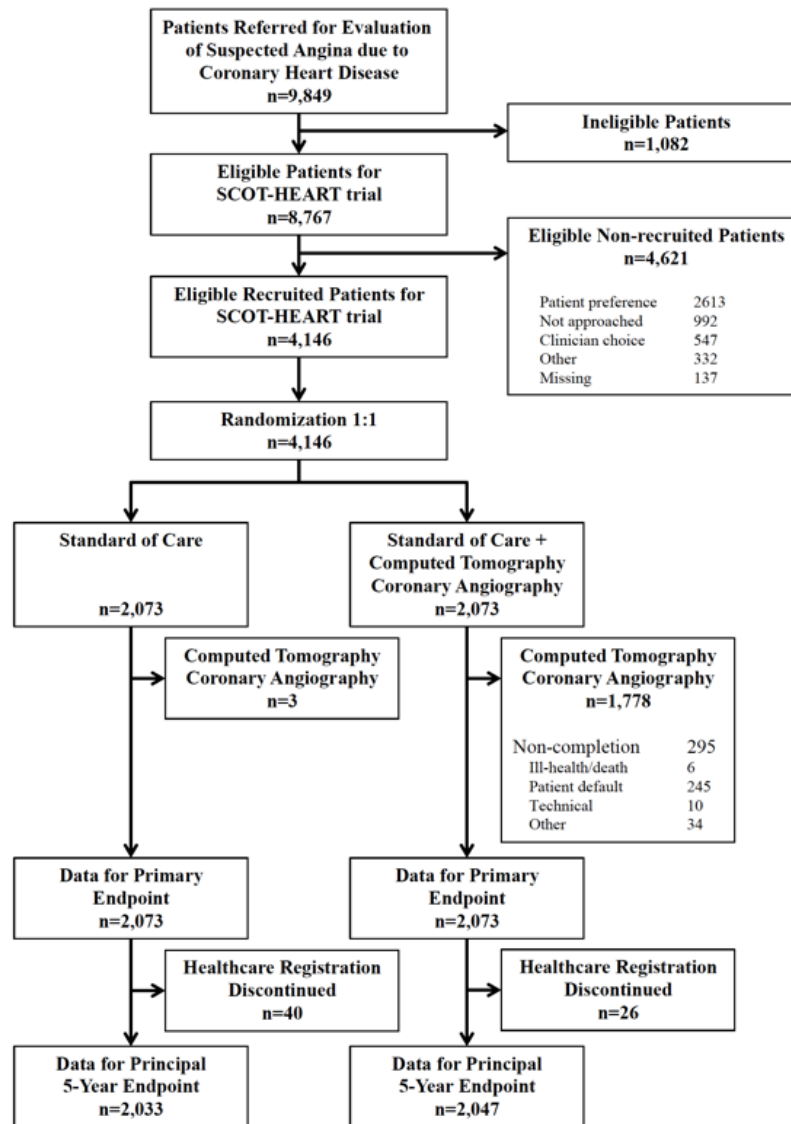
- Perth Royal Infirmary, Perth
- Ninewells, Dundee
- Victoria Hospital, Kirkcaldy
- Forth Valley Hospital, Larbert
- Western General Hospital, Edinburgh
- Royal Infirmary, Edinburgh
- St John's Hospital, Livingston
- Borders General Hospital, Melrose
- Royal Alexandra Hospital, Paisley
- Western Infirmary, Glasgow
- Glasgow Royal Infirmary, Glasgow
- University Hospital, Ayr

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Trials. 2012;13:184

Lancet 2015;385:2383-2391

JACC 2016;67:1759-1768



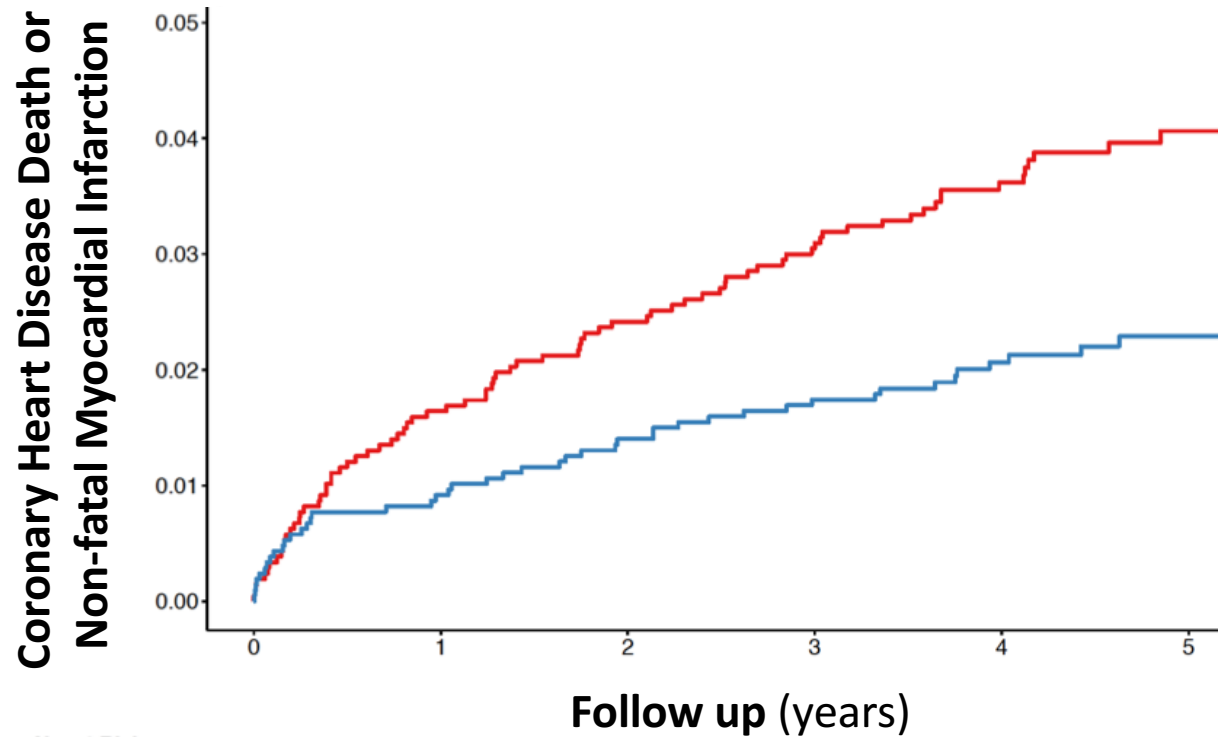
- 4,080 of 4,146 (98.4%) patients remained registered in Scotland.
- No patient withdrew consent
- Complete data over a median of 4.8 years comprising 20,254 patient-years of follow-up

	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/m²)	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

	0	1	2	3	4	5
Standard Care	2073	2033	2008	1994	1572	856
CCTA	2073	2051	2029	2015	1588	872

— Standard Care Alone

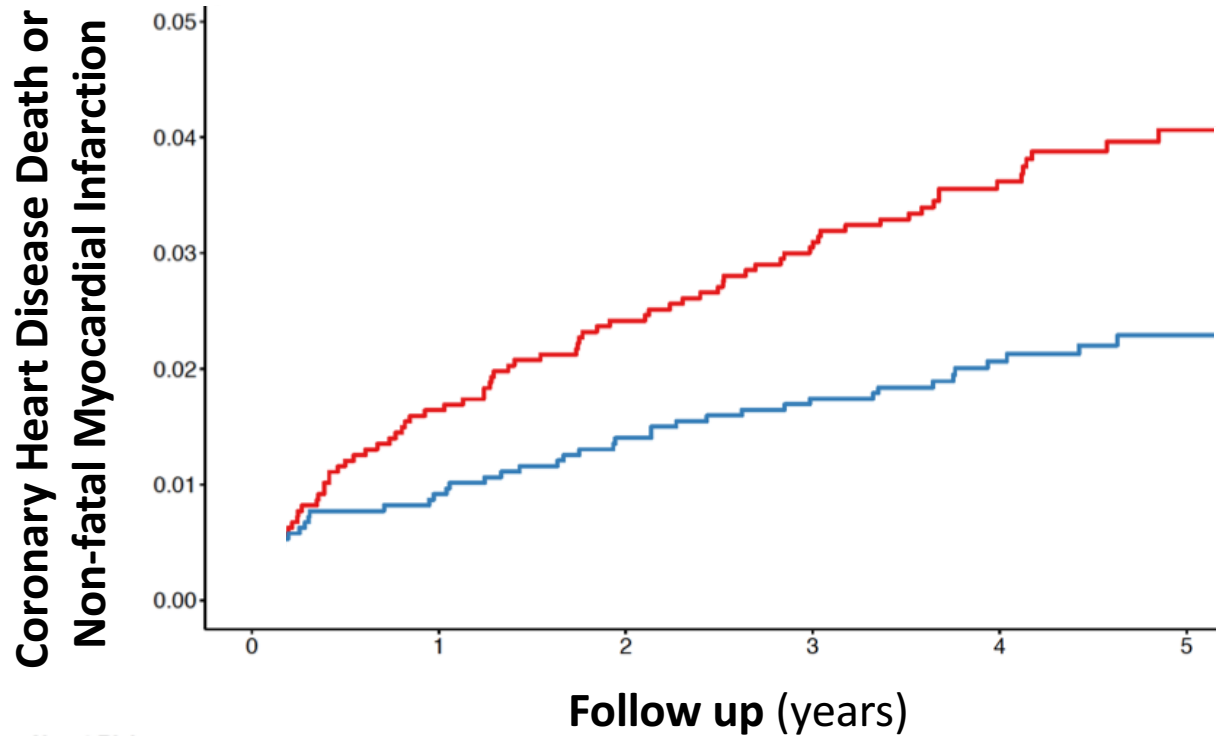
— CTCA + Standard Care

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Primary Clinical End Point

Excluding the 50-day treatment delay



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

JACC 2016;67:1759-1768

No. at Risk

	0	1	2	3	4	5
Standard Care	2073	2033	2008	1994	1572	856
CCTA	2073	2051	2029	2015	1588	872

— Standard Care Alone

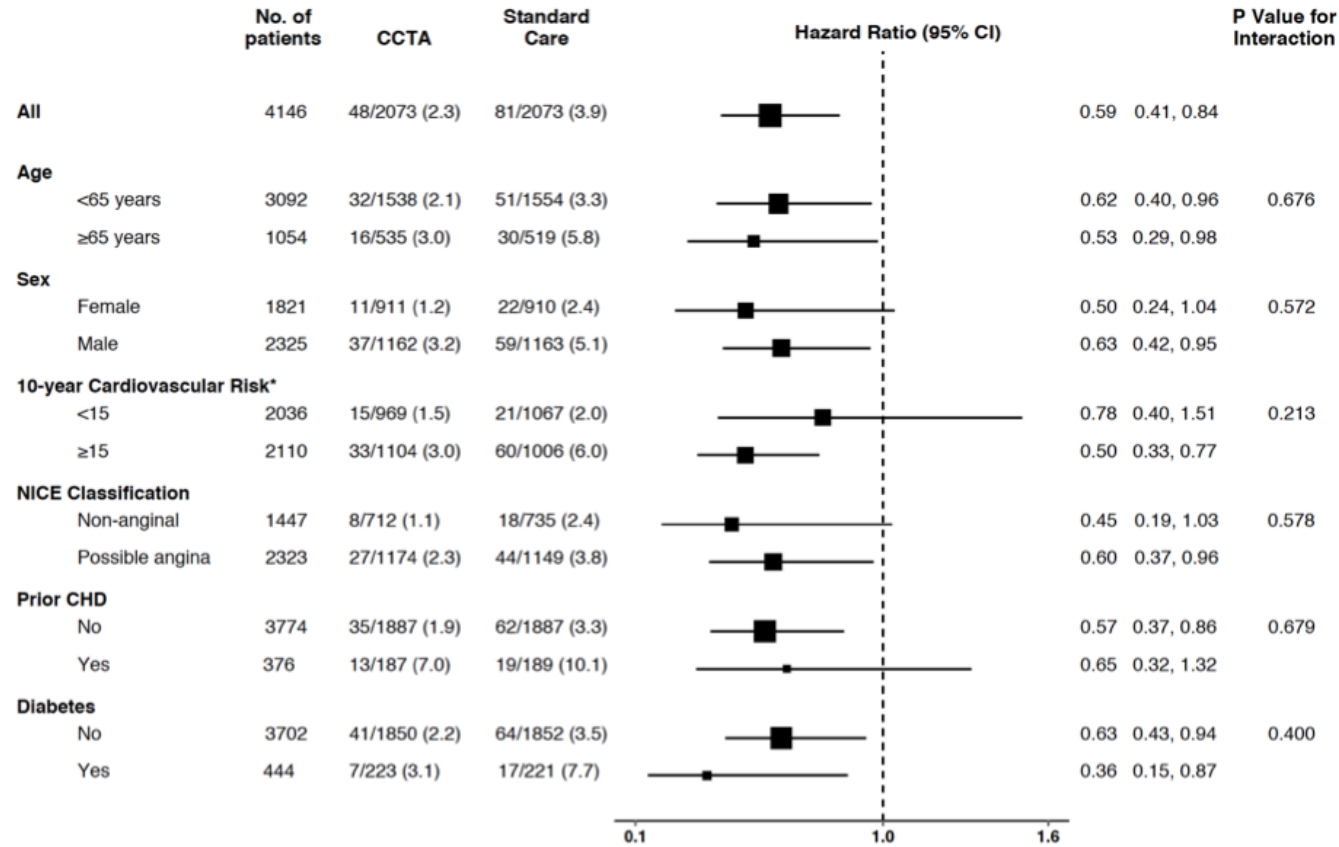
— CTCA + Standard Care

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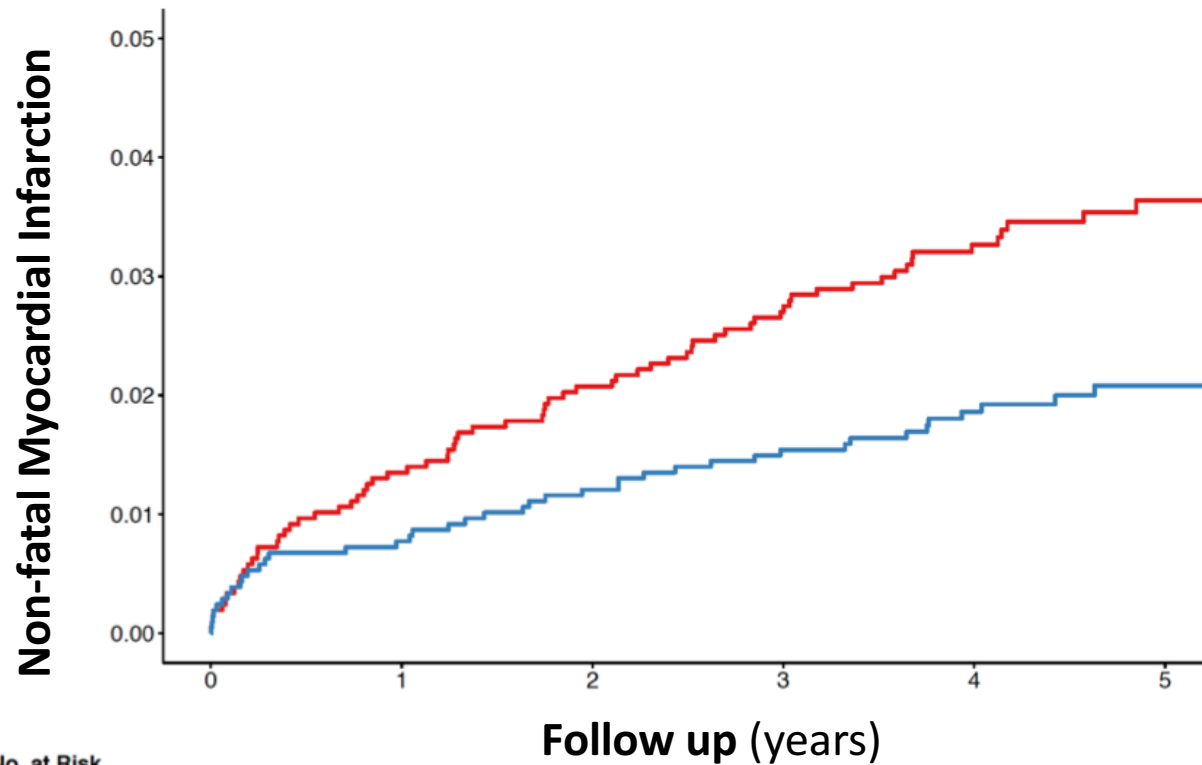
Primary Clinical End Point

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

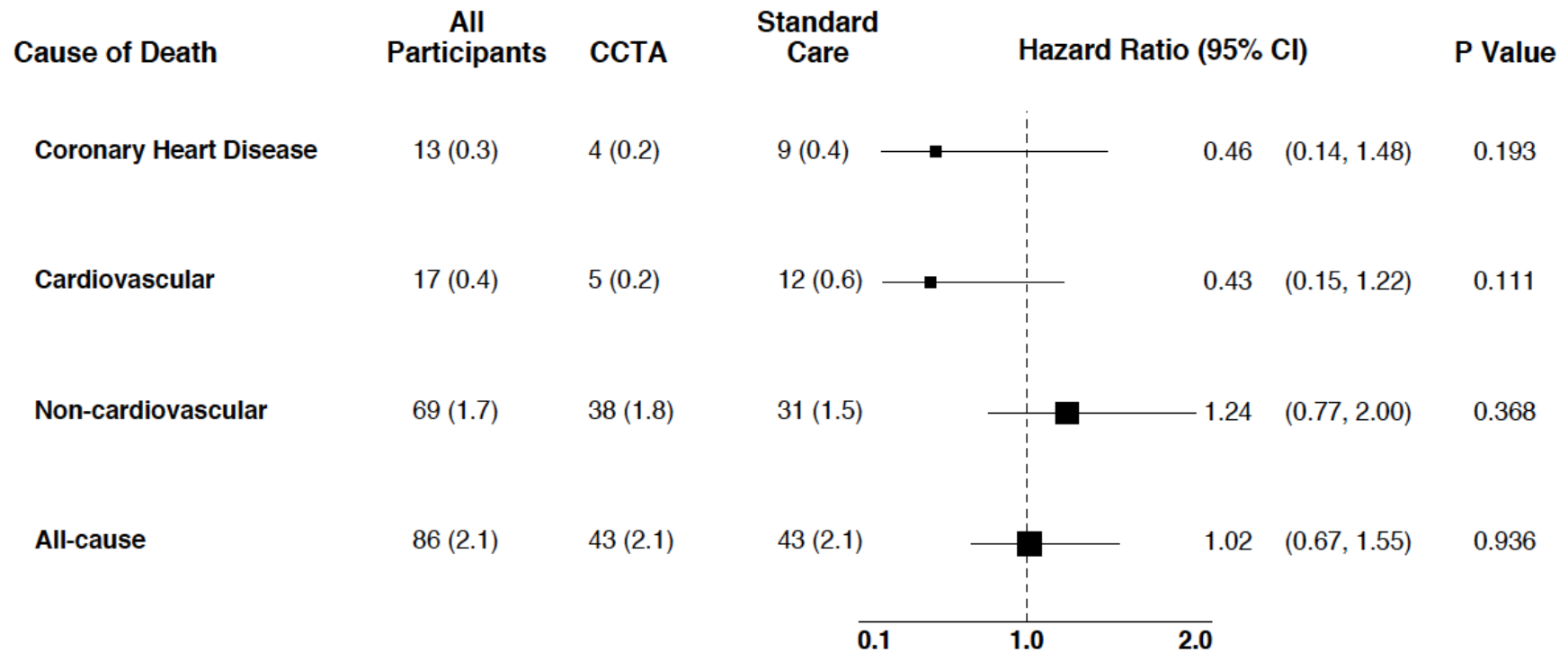
— Standard Care Alone

— CTCA + Standard Care



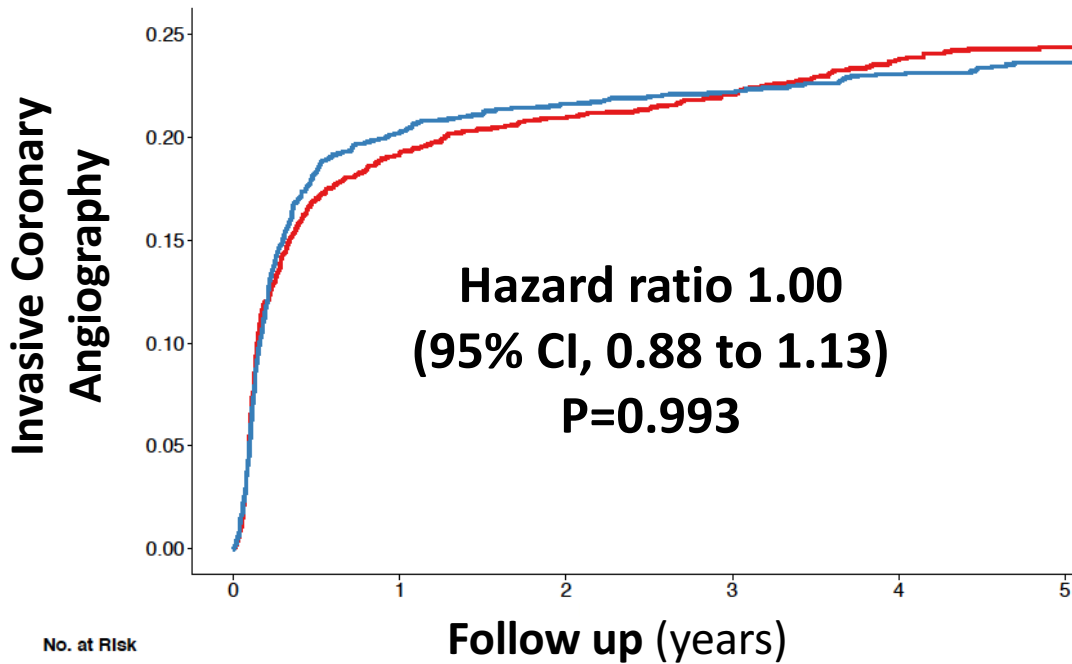
Mortality

Cardiovascular and Non-cardiovascular

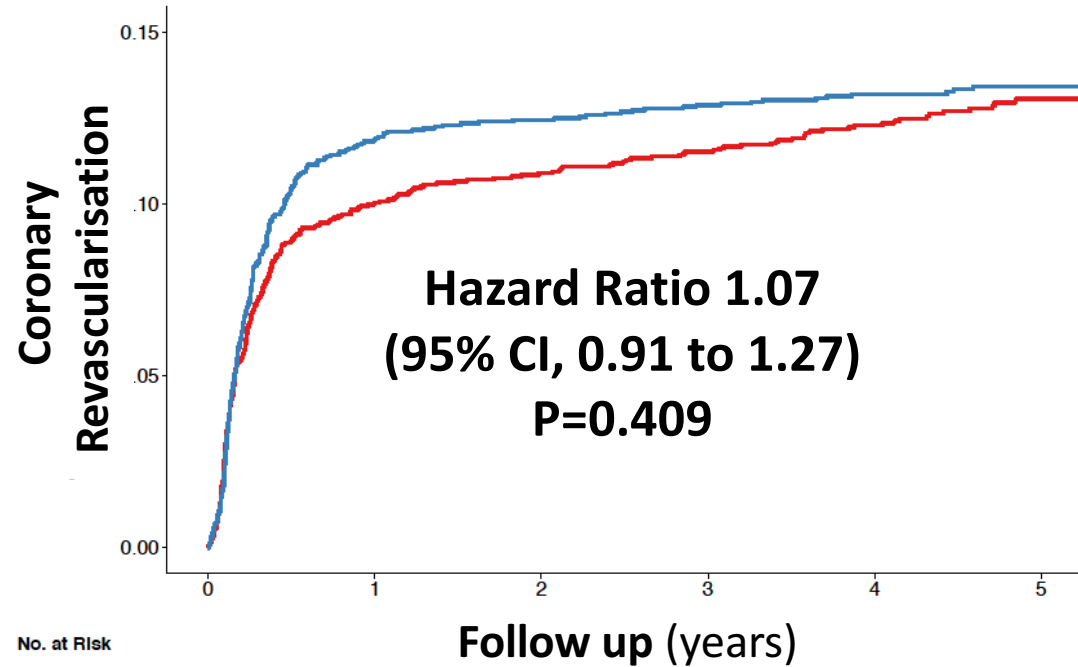




Invasive Coronary Angiography and Coronary Revascularisation



No. at Risk		Follow up (years)				
	0	1	2	3	4	5
Standard Care	2073	1674	1639	1616	1251	678
CCTA	2073	1654	1625	1613	1258	656



No. at Risk		Follow up (years)				
	0	1	2	3	4	5
Standard Care	2073	1865	1847	1834	1450	794
CCTA	2073	1827	1815	1806	1426	771

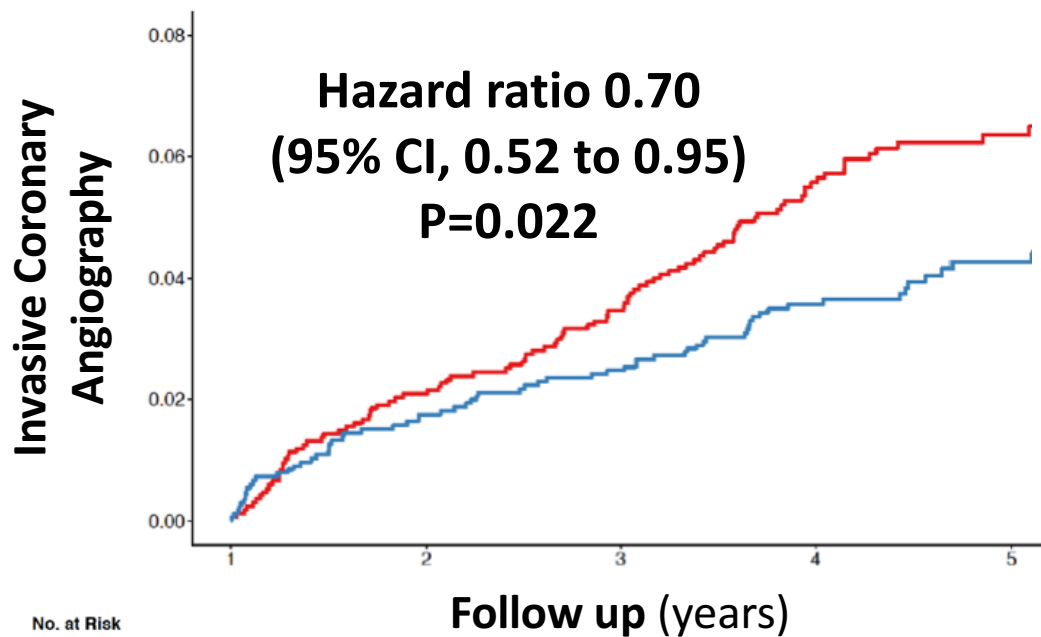
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— Standard Care Alone

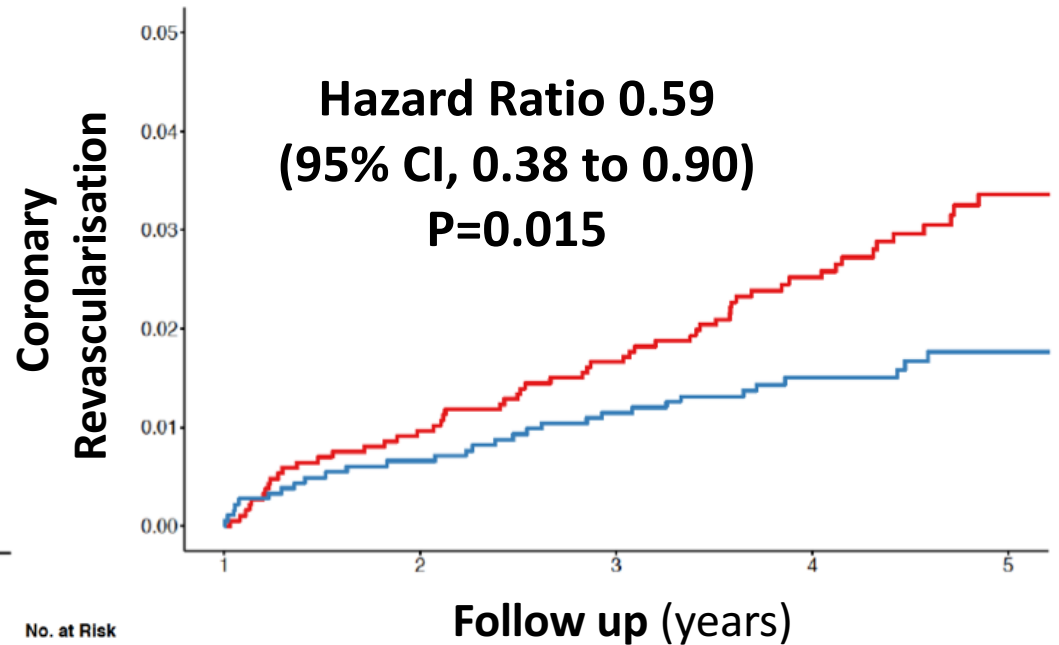
— CTCA + Standard Care



Invasive Coronary Angiography and Coronary Revascularisation Beyond One-Year (Post-hoc Analysis)



No. at Risk	Follow up (years)				
Standard Care	1674	1639	1616	1251	678
CCTA	1654	1625	1613	1258	656

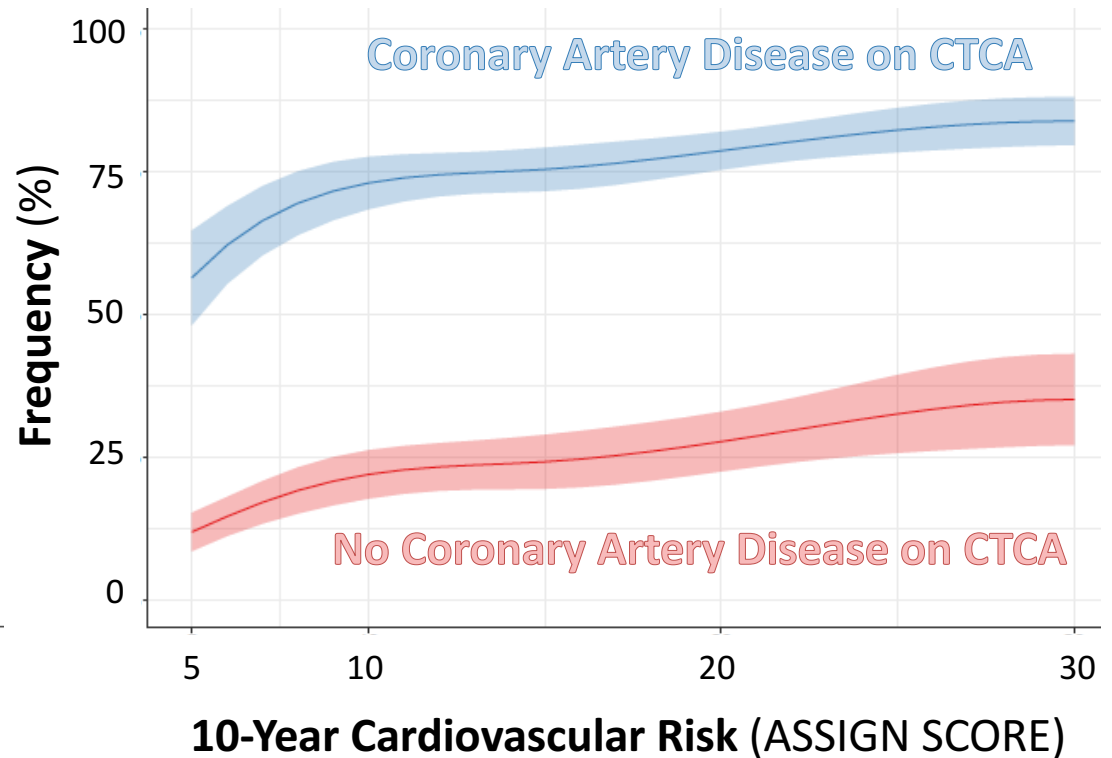
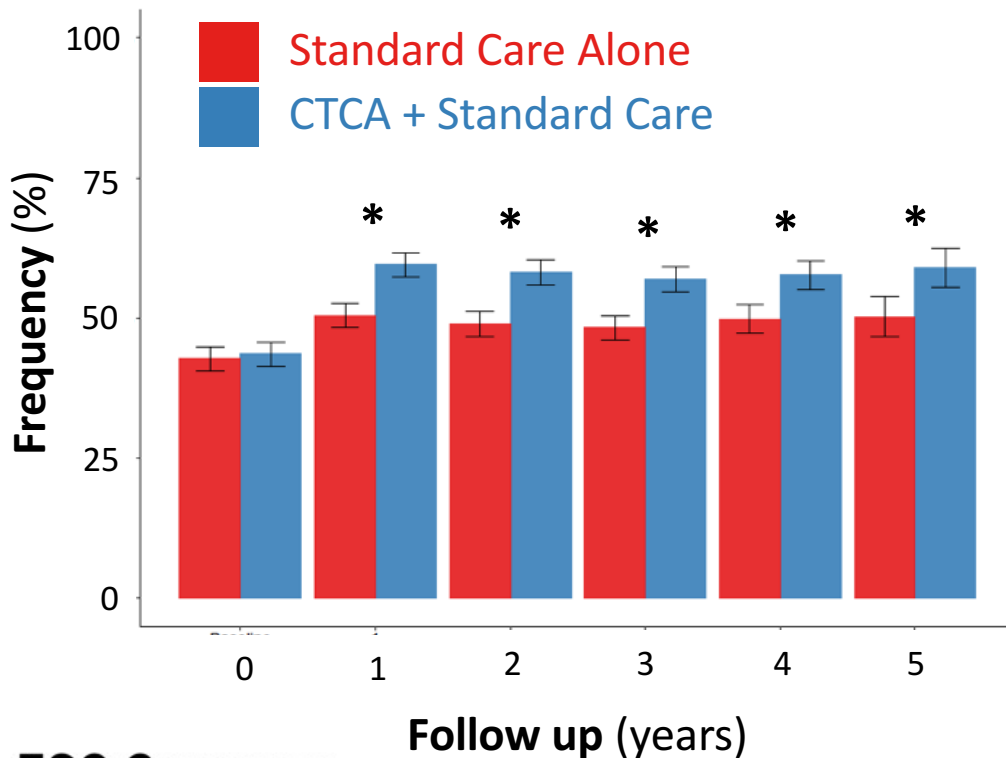


No. at Risk	Follow up (years)				
Standard Care	1865	1847	1834	1450	794
CCTA	1827	1815	1806	1426	771



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?



British Heart Foundation



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The SCOT-HEART Investigators

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ORIGINAL ARTICLE

Coronary CT Angiography and 5-Year Risk of Myocardial Infarction

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