

1 SUPPLEMENTAL MATERIAL

2 Supplemental Table 1

	Definition
Heart rate >80 bpm	Heart rate >80 bpm
PR >220 ms	PR duration >220 ms in lead II or V5, whichever was longer
QRS >110 ms	QRS duration >110 ms in lead II or V5, whichever was longer
Prolonged QTc	QT interval measured from lead II or V5, whichever was longer. Corrected for heart rate using Bazett's formula. QTc >450 ms in men and >460 ms in women was considered prolonged
Left ventricular hypertrophy	SV1+RV5 \geq 35 mm or SV1+RV6 \geq 35 mm (Sokolow–Lyon criterion)
Early repolarization pattern	End-QRS notch or slur with an amplitude of \geq 0.1 mV in either \geq 2 of the inferior (II, III, aVF) or \geq 2 of the lateral (I, aVL, V4–V6) leads
Delayed intrinsicoid deflection	R-wave peak time \geq 50 ms in leads V5 and V6
Frontal QRS-T angle >90°	The absolute difference of >90° in value between the frontal plane QRS axis and T-wave axis
T-peak to T-end interval >90 ms	T-peak to T-end interval >90 ms in lead V5
Delayed QRS transition zone	R-wave amplitude exceeding or equaling the S-wave amplitude at lead V4 or later
T-wave inversion	Negative T-wave with an amplitude of \geq 0.1 mV in \geq 1 of the following leads: I, II, V4–V6

ST-segment depressions

Negative ST-segment of ≥ 0.1 mV at 60 ms from the J point in ≥ 2 of the following leads: I, II, III, aVL, aVF, and V1–V6

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4 Supplemental Table 2

5 Risk of SCD, Non-SCD, All-Cause Mortality, and Cardiac Hospitalization Associated with the ECG Risk Score in the Complete Follow-Up in

6 the Mini-Finland Health Survey

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	ECG Risk Score			
	0	1	2	≥3
	n=4563	n=1859	n=312	n=96
SCD				
No. of SCDs	170	144	46	18
Age- and sex-adjusted HR (95% CI)	1	2.02 (1.62–2.53)	4.60 (3.29–6.44)	7.29 (4.40–12.07)
Multivariate adjusted HR (95% CI)	1	1.79 (1.43–2.25)	3.72 (2.63–5.26)	5.42 (3.23–9.08)
Non-SCD				
No. of non-SCDs	697	406	99	39

Age- and sex-adjusted HR (95% CI)	1	1.30 (1.15–1.47)	2.10 (1.69–2.62)	2.83 (2.04–3.94)
Multivariate adjusted HR (95% CI)	1	1.19 (1.05–1.35)	1.82 (1.46–2.27)	2.04 (1.46–2.84)
Death from any cause				
No. of deaths	2139	1199	266	94
Age- and sex-adjusted HR (95% CI)	1	1.29 (1.20–1.39)	1.98 (1.74–2.26)	2.51 (2.04–3.10)
Multivariate adjusted HR (95% CI)	1	1.23 (1.14–1.32)	1.80 (1.57–2.05)	2.06 (1.66–2.55)
Cardiac hospitalization				
No. of hospitalizations	1942	1017	224	65
Age- and sex-adjusted HR (95% CI)	1	1.39 (1.28–1.50)	2.53 (2.19–2.92)	2.91 (2.26–3.75)
Multivariate adjusted HR (95% CI)	1	1.30 (1.20–1.41)	2.21 (1.91–2.55)	2.25 (1.74–2.91)

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9 The age- and sex-adjusted and the multivariate adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for sudden cardiac death (SCD),
10 non-sudden cardiac death (non-SCD), all-cause mortality, and hospitalization due to coronary artery disease or heart failure (cardiac
11 hospitalization) in the complete follow-up were calculated using the Cox proportional hazards model. Variables included in the multivariate
12 analyses consisted of age, sex, systolic blood pressure, total serum cholesterol, diabetes, current smoker, coronary artery disease, and the ECG
13 risk score.

14 Supplemental Table 3

15 Risk of SCD Associated with the ECG Risk Score in Subjects without and with Diagnosed Coronary Artery Disease in a 10-Year Follow-Up in
 16 the Mini-Finland Health Survey

		ECG Risk Score			
No CAD		0	1	2	≥3
n=6093		n=4215	n=1608	n=222	n=48
No. of SCDs		19	37	12	3
Age- and sex-adjusted HR (95% CI)	1	3.82 (2.19–6.68)	6.17 (2.92–13.05)	7.38 (2.15–25.38)	
Multivariate adjusted HR (95% CI)	1	3.49 (1.98–6.14)	4.92 (2.27–10.66)	5.83 (1.65–20.65)	
		ECG Risk Score			
CAD		0	1	2	≥3
		n=348	n=251	n=90	n=48

n=737				
No. of SCDs	11	18	10	13
Age- and sex-adjusted HR (95% CI)	1	2.26 (1.06–4.81)	5.09 (2.15–12.04)	14.23 (6.15–32.95)
Multivariate adjusted HR (95% CI)	1	2.33 (1.09–4.99)	5.37 (2.24–12.86)	14.77 (6.21–35.17)

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18 CAD = coronary artery disease. SCD = sudden cardiac death. The age- and sex-adjusted and the multivariate adjusted hazard ratios (HRs) and
 19 95% confidence intervals (CIs) for SCD, in a 10-year follow-up, were calculated using the Cox proportional hazards model. Variables included
 20 in the multivariate analyses consisted of age, sex, systolic blood pressure, total serum cholesterol, diabetes, current smoker, and the ECG risk
 21 score. There was no significant interaction between the ECG risk score and CAD in the age- and sex-adjusted analysis ($P=0.366$) or in the
 22 multivariate analysis ($P=0.518$).

23 Supplemental Table 4

24 Risk of SCD Associated with the ECG Risk Score in Subjects without and with Diagnosed Heart Failure in a 10-Year Follow-Up in the Mini-

25 Finland Health Survey

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	ECG Risk Score			
	0	1	2	≥3
No heart failure				
n=6256	n=4362	n=1643	n=213	n=38
No. of SCDs	26	39	15	5
Age- and sex-adjusted HR (95% CI)	1	3.12 (1.89–5.14)	6.75 (3.51–12.97)	11.53 (4.34–30.63)
Multivariate adjusted HR (95% CI)	1	2.78 (1.68–4.60)	5.51 (2.81–10.79)	6.97 (2.57–18.89)
	ECG Risk Score			
Heart failure	0	1	2	≥3

n=574	n=201	n=216	n=99	n=58
No. of SCDs	4	16	7	11
Age- and sex-adjusted HR (95% CI)	1	3.80 (1.26–11.45)	4.83 (1.41–16.57)	14.97 (4.69–47.76)
Multivariate adjusted HR (95% CI)	1	3.89 (1.29–11.74)	5.08 (1.47–17.53)	15.19 (4.60–50.16)

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28 The age- and sex-adjusted and the multivariate adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for sudden cardiac death (SCD),
 29 in a 10-year follow-up, were calculated using the Cox proportional hazards model. Variables included in the multivariate analyses consisted of
 30 age, sex, systolic blood pressure, total serum cholesterol, diabetes, current smoker, coronary artery disease, and the ECG risk score. There was no
 31 significant interaction between the ECG risk score and diagnosed heart failure in the age- and sex-adjusted analysis ($P=0.771$) or in the
 32 multivariate analysis ($P=0.754$).

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34 Supplemental Table 5

35 Risk of Sudden Cardiac Death Associated with the Secondary ECG Risk Score in a 10-Year Follow-Up in the Mini-Finland Health Survey

	Secondary ECG Risk Score			
	0	1	2	>3
	n=4510	n=1646	n=591	n=443
	(60.8%)	(24.1%)	(8.7%)	(6.5%)
SCD				
No. of SCDs	25	34	17	47
Age- and sex-adjusted HR (95% CI)	1	2.71 (1.61–4.56)	3.32 (1.77–6.25)	11.10 (6.55–18.81)
Multivariate adjusted HR (95% CI)	1	2.42 (1.43–4.08)	2.58 (1.36–4.92)	8.00 (4.61–13.87)

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37 SCD = sudden cardiac death. The secondary ECG risk score consisted of all the 8 ECG parameters associated with SCD when analyzed

38 individually: heart rate >80 bpm, PR duration >220 ms, QRS duration >110 ms, left ventricular hypertrophy, T wave inversion, prolonged QTc,

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39 frontal QRS-T angle $>90^\circ$, and ST-segment depressions. Compared to the baseline model of age, sex, systolic blood pressure, total serum
40 cholesterol, current smoker, diabetes, and coronary artery disease, the addition of the secondary ECG risk score significantly improved the
41 model's ability to estimate the risk of SCD. The C-statistics for the baseline model was 0.871, improving to 0.897 using the secondary ECG risk
42 score, representing a statistically significant improvement of 0.026 ($P<0.05$). Furthermore, IDI of 0.033 ($P<0.05$), continuous NRI of 0.298
43 ($P<0.05$), and categorical NRI of 0.114 ($P<0.05$) improved significantly. With the addition of the secondary ECG risk score to the baseline
44 model, 26.0% of the SCD cases were appropriately reclassified into a higher risk group and 13.0% inappropriately reclassified into a lower risk
45 group, whereas of the subjects without SCD 4.2% were appropriately reclassified into a lower risk group and 3.7% inappropriately reclassified
46 into a higher risk group.

47 Supplemental Table 6

48 Sudden Cardiac Death Risk Associated with ECG Parameters in a 10-year Follow-Up in the Coronary Heart Disease Study

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ECG parameters	n (%)	ECG parameters individually		ECG parameters in the same model	
		HR (95% CI)	<i>P</i>	HR (95% CI)	<i>P</i>
Heart rate >80bpm	3397 (32.0%)	1.63 (1.11–2.39)	0.13	1.72 (1.17–2.53)	0.006
PR >220ms	122 (1.1%)	3.08 (1.25–7.54)	0.014	3.08 (1.25–7.60)	0.014
QRS >110ms	66 (0.6%)	6.22 (2.88–13.41)	<0.001	4.89 (2.21–10.81)	<0.001
Left ventricular hypertrophy	3352 (31.6%)	1.41 (0.98–2.04)	0.067	1.42 (0.98–2.06)	0.064
T-wave inversion	74 (0.7%)	6.88 (3.19–14.83)	<0.001	5.05 (2.28–11.21)	<0.001

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51 Association between individual ECG parameters used in the ECG risk score and SCD risk in the validation cohort. The number of subjects with

52 ECG parameters (% of the total study population). Age- and sex-adjusted hazard ratios (HRs), 95% confidence intervals (CIs), and *P* values for

53 SCD risk associated with ECG parameters calculated using the Cox proportional hazards model. Each ECG parameter was first analyzed

54 individually and then simultaneously with other ECG parameters in the same model.

55 Supplemental Table 7

56 Baseline Characteristics of the Coronary Heart Disease Study Population According to the ECG Risk Score

	ECG risk score			
	0 n=4681	1 n=4887	2 n=1023	≥3 n=26
Male (%)	2532 (50.2%)	2621 (53.6%)	598 (58.5%)	19 (73.1%)
Age (years)	43.7 ± 8.3	44.0 ± 8.5	45.0 ± 8.8	49.4 ± 7.8
Systolic blood pressure (mmHg)	132.2 ± 18.3	141.4 ± 21.5	152.2 ± 24.4	159.6 ± 26.7
Diastolic blood pressure (mmHg)	80.1 ± 11.2	83.2 ± 12.7	87.0 ± 14.4	92.0 ± 17.4
Body mass index (kg/m ²)	26.0 ± 3.8	25.9 ± 4.0	25.6 ± 3.6	26.0 ± 4.9
Cholesterol (mmol/l)	6.5 ± 1.3	6.5 ± 1.3	6.5 ± 1.5	6.4 ± 1.2
Smoking (%)	1576 (33.7%)	1665 (34.1%)	371 (36.3%)	11 (42.3%)
Diabetes (%)	28 (0.5%)	48 (0.9%)	9 (0.9%)	0 (0%)

Cardiovascular disease (%)	342 (7.3%)	394 (8.1%)	105 (10.3%)	11 (42.3%)
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58 Continuous data are presented as means \pm standard deviations and categorical data as the number of cases (% of the total study population). The

59 ECG risk score consisted of 5 ECG abnormalities: heart rate >80 bpm, PR duration >220 ms, QRS duration >110 ms, LVH, and T-wave

60 inversion.

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62 Supplemental Table 8

63 Discrimination and Calibration with ECG Risk Score in the CHD Study Population

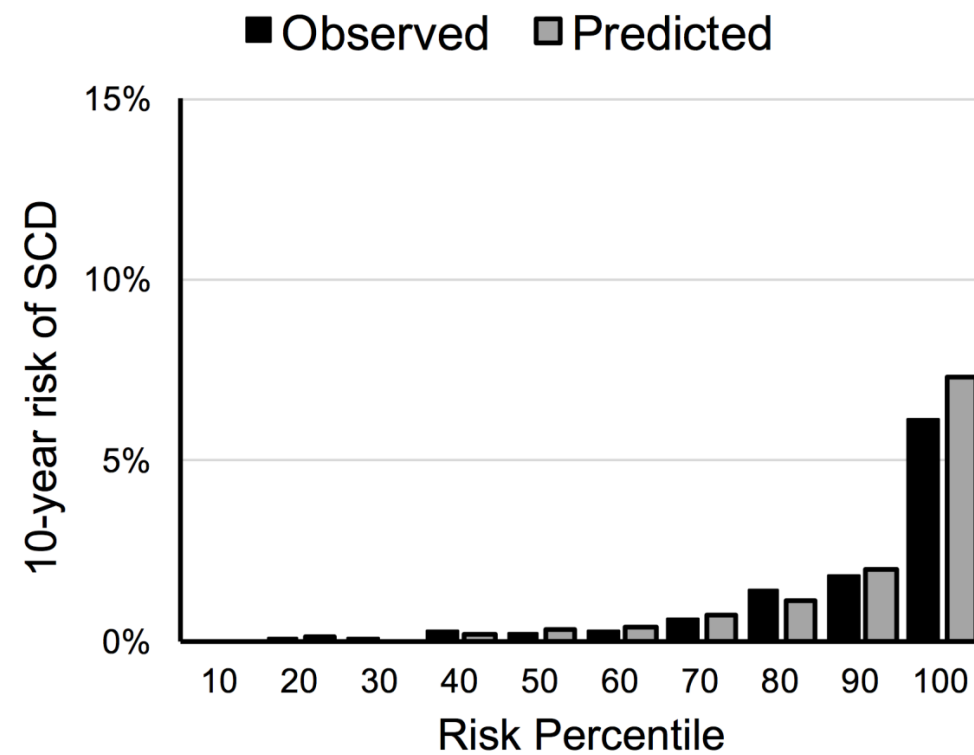
	Value	<i>P</i>
C-statistics of the baseline model	0.861	-
C-statistics of the baseline model + ECG risk score	0.865	-
C-statistics improvement with the addition of the ECG risk score	0.004	insignificant
Categorical NRI	0.015	insignificant
Continuous NRI	0.249	0.006
IDI	0.007	0.016
GND statistics (chi-squared test)	114	insignificant

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65 NRI = net reclassification improvement; IDI = integrated discrimination index; GND = Greenwood-Nam-D'Agostino

66 Supplemental Figure 1

67 Calibration of the ECG Risk Score with Baseline Model in the CHD Study population



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