

Supplement

**Artificial intelligence derived risk prediction:
a novel risk calculator using office and ambulatory blood pressure**

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Short title: Artificial intelligence derived risk prediction

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Table S1. Variable list

Variable	Comments	Unit	% Missing Values
Age	-	years	0.00
Waist circumference	-	cm	14.75
Body mass index (BMI)	-	kg/m ²	0.00
Height	-	cm	0.00
Weight	-	kg	0.00
Office heart rate	Average of 2 consecutive readings	bpm	0.00
Office SBP	Average of 2 consecutive readings	mmHg	0.00
Office DBP	Average of 2 consecutive readings	mmHg	0.00
Office PP	Average of 2 consecutive readings	mmHg	0.00
24-hour ambulatory heart rate	Average over 24 hours	bpm	9.07
Daytime heart rate	Average of daytime	bpm	9.07
Nighttime heart rate	Average of nighttime	bpm	9.07
24-hour ambulatory SBP	Average over 24 hours	mmHg	0.00
24-hour ambulatory DBP	Average over 24 hours	mmHg	0.00
24-hour ambulatory PP	Average over 24 hours	mmHg	0.00
Daytime ambulatory SBP	Average of daytime	mmHg	0.00
Daytime ambulatory DBP	Average of daytime	mmHg	0.00
Daytime ambulatory PP	Average of daytime	mmHg	0.00
Nighttime ambulatory SBP	Average of nighttime	mmHg	0.00
Nighttime ambulatory DBP	Average of nighttime	mmHg	0.00
Nighttime ambulatory PP	Average of nighttime	mmHg	0.00
Sex	(Men/Women)	-	0.00
Diabetic	(Yes/No)	-	0.00
Smoker	(Yes/No)	-	0.00
Cardiovascular disease	Antecedents (Yes/No)	-	0.00
Renal damage	Antecedents (Yes/No)	-	0.00
Ischemic heart disease	Antecedents (Yes/No)	-	0.00
Dyslipidemia	Antecedents (Yes/No)	-	0.00
Left ventricular hypertrophy	Antecedents (Yes/No)	-	0.00
Heart failure	Antecedents (Yes/No)	-	0.00
Stroke	Antecedents (Yes/No)	-	0.00
Chronic kidney disease	Antecedents (Yes/No)	-	0.00
Target organ damage	Antecedents (Yes/No)	-	0.00
Atheroma plaque	Antecedents (Yes/No)	-	0.00
Number of medications	Antihypertensive	n	0.00
Total cholesterol	-	mg/dL	40.51
Triglycerides	-	mg/dL	42.74
LDL cholesterol	-	mg/dl	46.47
HDL cholesterol	-	mg/dL	46.47
Diuretic	Treatment (Yes/No)	-	0.00

<i>Calcium-channel blocker</i>	Treatment (Yes/No)	-	0.00
<i>ACE inhibitor</i>	Treatment (Yes/No)	-	0.00
<i>Beta blocker</i>	Treatment (Yes/No)	-	0.00
<i>Alpha blocker</i>	Treatment (Yes/No)	-	0.00
<i>Angiotensin receptor blocker</i>	Treatment (Yes/No)	-	0.00
<i>Statins</i>	Treatment (Yes/No)	-	0.00
<i>Other antihypertensives</i>	Treatment (Yes/No)	-	0.00
<i>Number of CV risk factors*</i>	-	n	0.00
<i>Groups of cardiovascular risk*</i>	(Basal, Low, Moderate, High, Very High)	-	0.00
<i>Binary cardiovascular risk*</i>	(Moderate vs. High)	-	0.00
<i>Antihypertensive treatment*</i>	(Yes/No)	-	0.00
<i>Circadian profile*</i>	(Dipper, Extreme Dipper, Non-Dipper, Reverse-Dipper)	-	0.00
<i>Antihypertensive treatment type*</i>	(No, Mono, Multi) Therapy	-	0.00
<i>Obesity based BMI*</i>	IMC above 30 (Yes/No)	-	0.00
<i>Albumin-creatinine ratio*</i>	-	-	75.33
<i>Creatinine</i>	-	mg/dL	42.12
<i>BMI Grouping*</i>	(<20, 20-25, 25-30, >30)	-	0.00
<i>High Office BP*</i>	>140/90 mmHg (Yes/No)	-	0.00

BMI – Body Mass Index; BP – Blood Pressure; SBP – Systolic BP; DBP – Diastolic BP; PP – Pulse Pressure; ACE - Angiotensin-converting-enzyme; CV – Cardiovascular; LDL - Low-density lipoprotein; HDL - High-density lipoprotein.

*These variables were not considered for feature selection

Table S2. Proposed models for predicting CV mortality versus all-cause mortality

		AUC	Accuracy	Balanced Accuracy	Sensitivity	Specificity
CV Mortality_{OBP}	CV causes	0.865 ± 0.006	0.774 ± 0.012	0.794 ± 0.006	0.815 ± 0.019	0.772 ± 0.013
	All-causes	0.832 ± 0.004	0.772 ± 0.008	0.759 ± 0.004	0.742 ± 0.013	0.776 ± 0.011
CV Mortality_{ABP}	CV causes	0.870 ± 0.010	0.781 ± 0.020	0.793 ± 0.009	0.806 ± 0.025	0.780 ± 0.022
	All-causes	0.836 ± 0.004	0.762 ± 0.014	0.763 ± 0.004	0.763 ± 0.018	0.762 ± 0.018
AUC – Area under the curve; CV – Cardiovascular; OBP – Office Blood Pressure; ABP – Ambulatory Blood Pressure.						

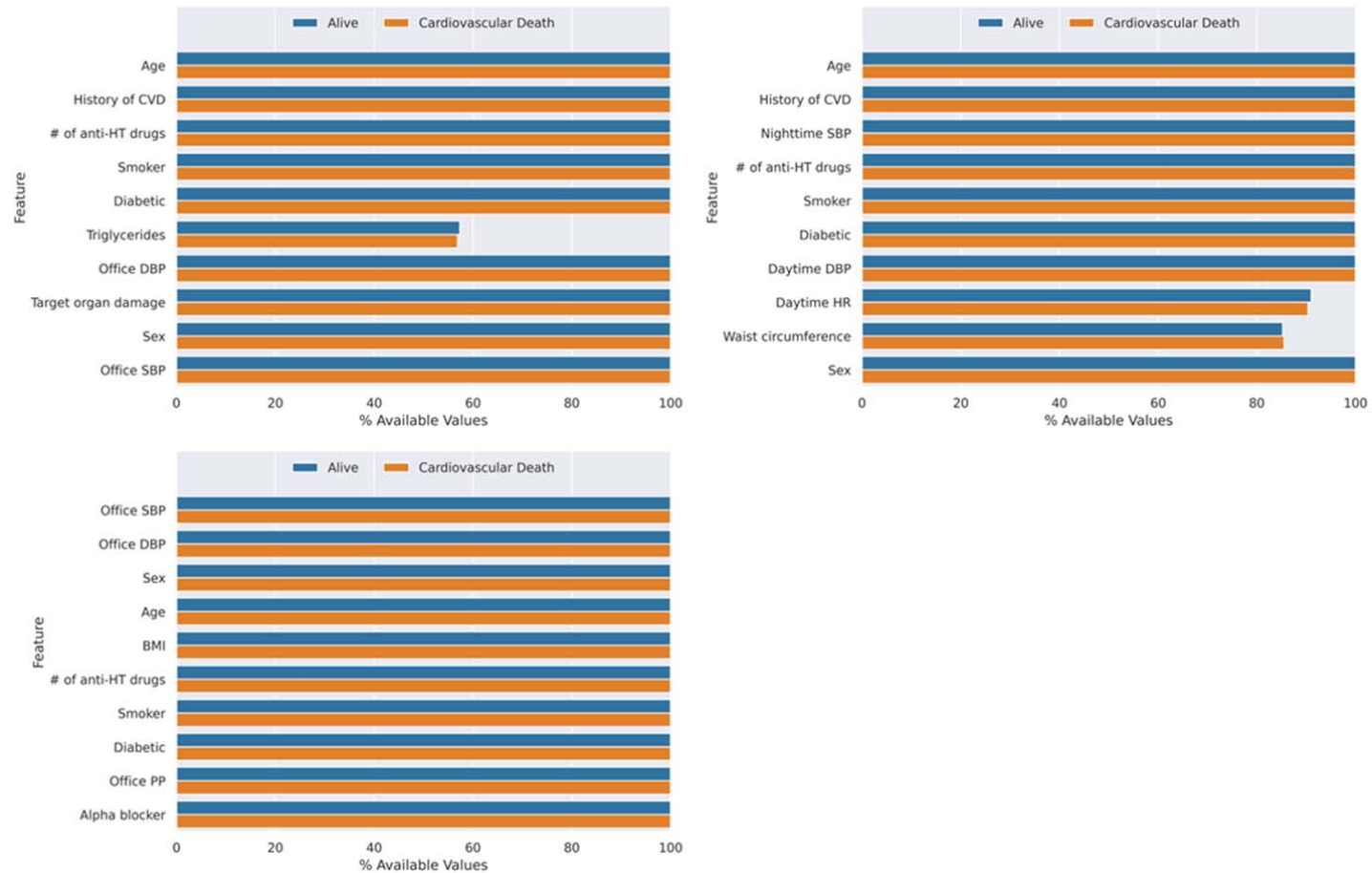


Figure S1. Data availability of each of the 10 selected features separated by class for the classification of (a) cardiovascular (CV) mortality using office blood pressure data (CV-Mortality_{OBP}), (b) CV mortality using ambulatory blood pressure (CV-Mortality_{ABP}) data, and (c) ambulatory hypertension.

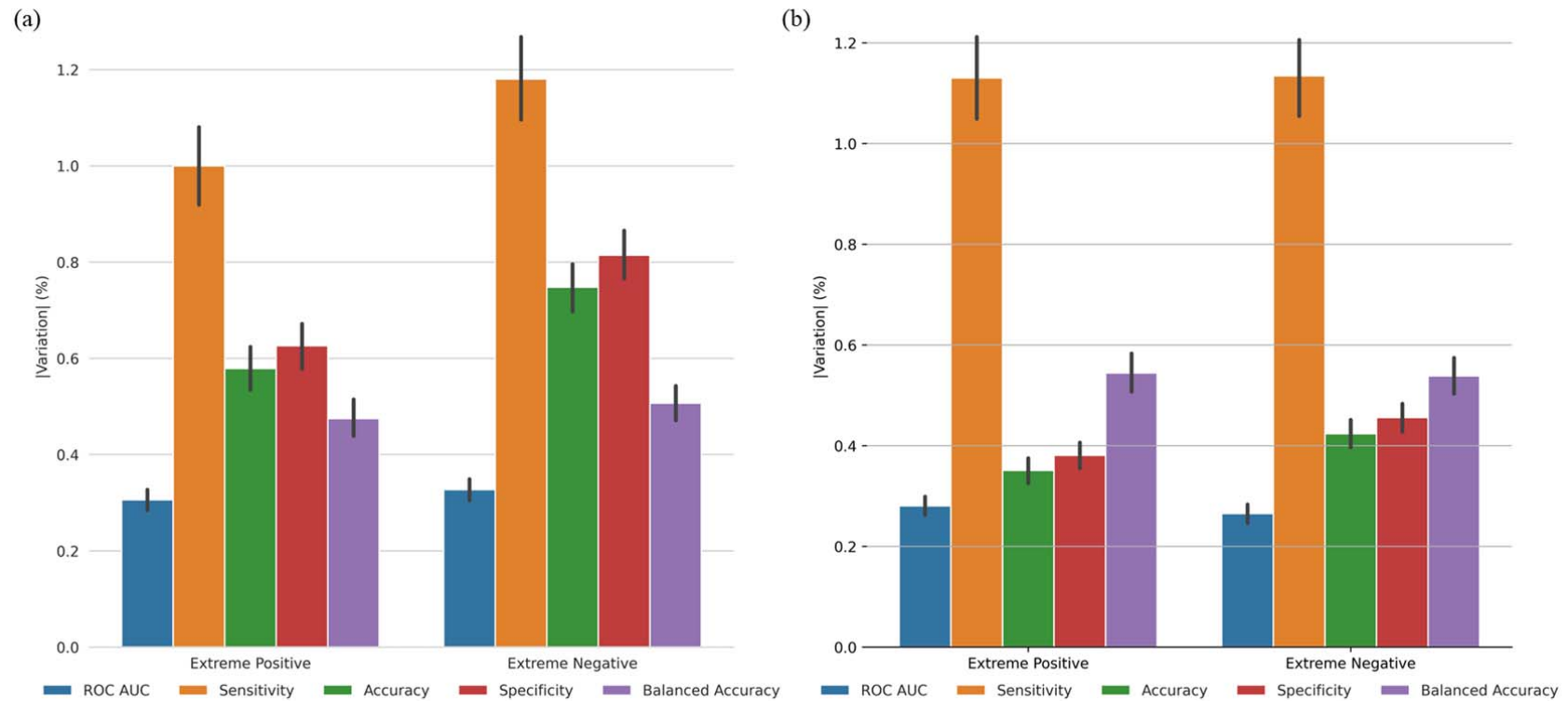


Figure S2. Sensitivity analysis for the classification of CV mortality using ambulatory blood pressure regarding (a) and office blood pressure (b). Extreme positive and negative scenarios are shown. Performance variation presented as absolute percentage change.

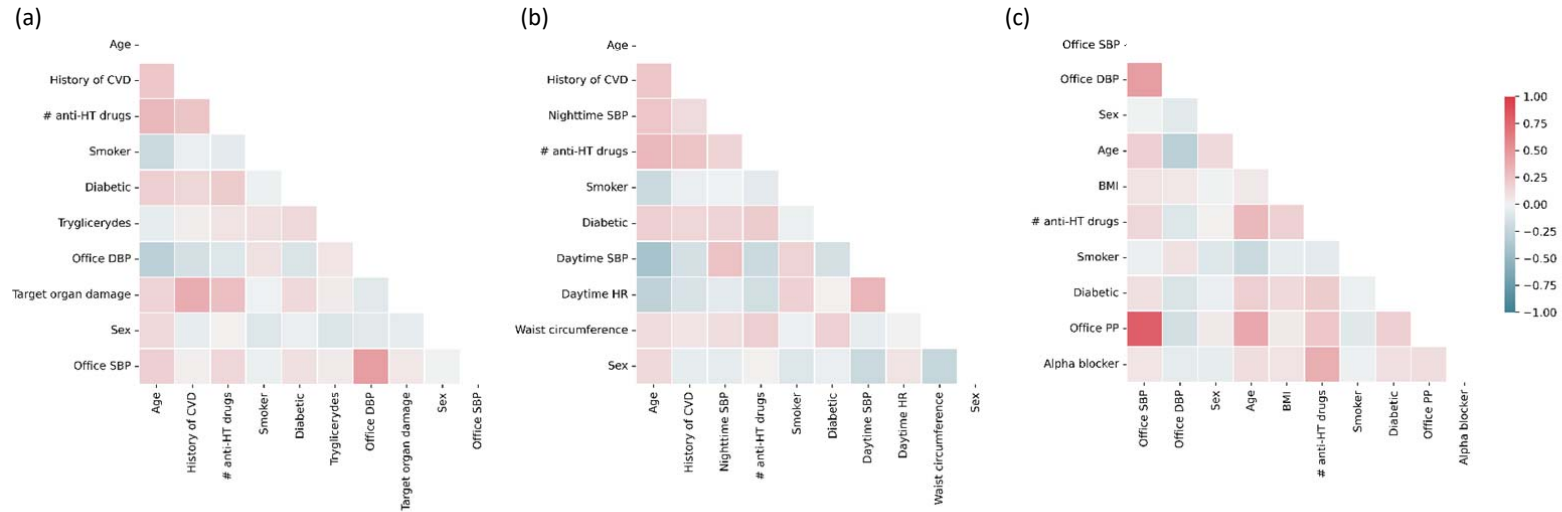


Figure S3. Pairwise correlations for the sorted best 10 features as determined by feature selection for the prediction of: (a) ambulatory hypertension, (b) cardiovascular (CV) mortality using office blood pressure data (CV-Mortality_{OBP}), and (c) CV mortality using ambulatory blood pressure (CV-Mortality_{ABP}) data. SBP – Systolic Blood Pressure; DBP – Diastolic Blood Pressure; PP – Pulse Pressure; HR – Heart Rate; BMI – Body Mass Index; # – number; CVD – CV disease.

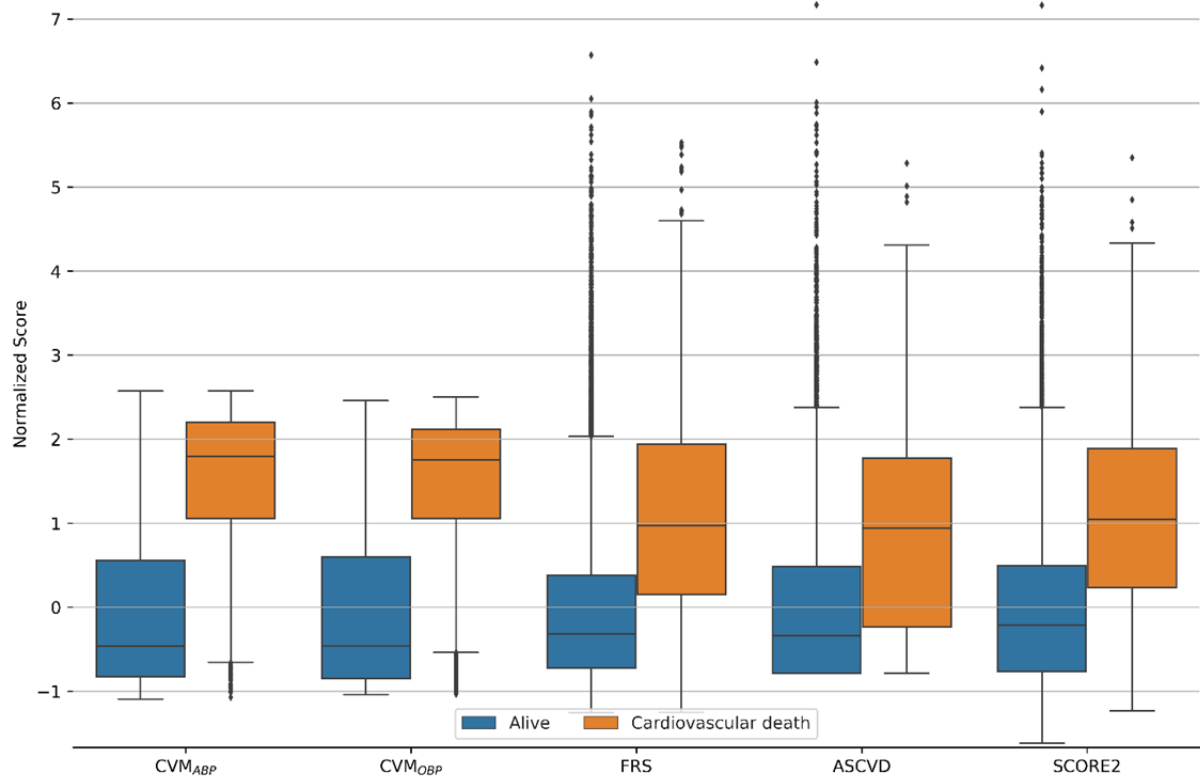


Figure S4. Distribution of the normalized values of the risk scores using office blood pressure (CV-Mortality_{OBp}), ambulatory blood pressure (CV-Mortality_{ABp}) data, Framingham (FRS) risk score, the SCORE and ASCVD. Red – alive; Blue – Cardiovascular (CV) death.