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High-sensitivity cardiac troponin I and NT-proBNP and their relationship to heart failure in the European BiomarCaRE population

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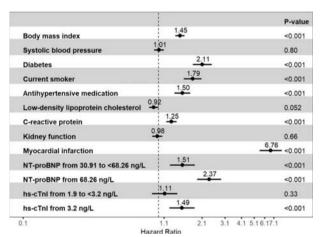
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Aims: Heart failure (HF) is an increasingly important contributor to the overall burden of cardiovascular disease in the population. We aimed to determine the distribution of the cardiac biomarkers high-sensitivity cardiac troponin I (hs-cTnI) and N-terminal prohormone of brain natriuretic peptide (NT-proBNP) concentrations across the European population to characterize the association with incident HF.

Methods and results: Based on the Biomarkers for Cardiovascular Risk Assessment in Europe (BiomarCaRE)-project, we analysed data of 48,455 individuals from four prospective population-based cohort studies (Dan-MONICA, FINRISK, Moli-Sani, Northern Sweden MONICA study) across Europe with a maximum follow-up of 27 years. The median age of the participants was 50.7 years (25th percentile: 40.0 years, 75th percentile: 61.7 years) and 49.1% (25,146) were men. Considered endpoints were incident HF and all-cause mortality. The median follow-up time for occurrence of HF was 6.61 (6.55; 6.66) years. We found that cardiovascular risk factors (CVRFs), especially diabetes with HR of 2.11 (95% CI 1.8, 2.5) and smoking status with HR of 1.79 (95% CI 1.59, 2.1) (Figure 1) were associated with incident HF. Furthermore, beyond the CVRFs, elevated hs-cTnI and NT-proBNP concentrations contributed to risk of HF in the general population with HR of 1.49 (95% CI 1.21, 1.9) and HR of 2.37 (95% CI 1.97, 3.0) respectively. As a cut-off value to select individuals, who would benefit most from preventive strategies, a hs-cTnI concentration of 2.8 ng/L was calculated using the optimal cut-off methodology by Contal and O'Quigley in CSDA 1999.

Conclusion: In our large population-based cohort, hs-cTnI and NT-proBNP were independently associated with incident HF. Use of biomarkers for HF screening thus may help to select those individuals in the general population who would benefit most from preventive strategies. Based on the cut-off value future studies are needed to evaluate therapeutic options.

Hazard ratio for incident HF