Additive prognostic value of vascular aging and coronary artery calcium for all-cause mortality in the Heinz Nixdorf Recall Study

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Background: Vascular aging, defined by aortic pulse wave velocity (aoPWV), as well as coronary artery calcium (CaC), are emerging risk predictors.

Purpose: To investigate the prognostic role of functional (vascular aging) and structural (CaC) arterial parameters in individuals without established cardiovascular disease.

Methods: We utilized our recently established population-based reference values for healthy (HVA), normal (NVA) and early (EVA) vascular aging in the poipulation-based Heinz Nixdorf Recall (HNR) study. HVA was the lowest, and EVA the highest age- and sex-specific decile of estimated aoPWV, derived from radial waveforms with a validated regression formula. CaC was measured with electron beam computed tomography (Agatston-score). The additive prognostic value of both parameters for all-cause mortality was tested, using Kaplan Meier curves and Cox Regression models. The latter included age, sex, diastolic blood pressure, cholesterol, and diabetes as covariates.

Results: We included 1805 participants (976 women), mean age was 68.2 years (range 55–85), mean blood pressure 129/76 mm Hg. 64.7% were hypertensives, 17.0% diabetics. The percentage of participants with CaC = 0 was 44.8, 40.6, amd 33.5 in HVA, NVA, and EVA, respectively. During a mean follow up of 4.7 years, 67 participants died. Mortality was 0% / 2.2%, 1.8% / 4.8%, 3.5% / 7.1% in participants with HVA: CaC 0 / >0, NVA: CaC 0 / >0, EVA: CAC 0 / >0, respectively (p=0.003, log rank test) – Figure. In Cox regression analysis, vascular aging (HR for HVA: 0.18, CI 0.04–0.73, and HR for NVA: 0.48, CI 0.27–0.88; both compared to EVA), CaC, as well as age (directly related) and diastolic blood pressure (inversely related) were independently associated with all-cause mortality.

Conclusion: Aortic stiffness, expressed as vascular aging, as well as coronary artery calcium, provide additive and independent prognostic information regarding all-cause mortality in a middle-aged and elderly primary - prevention population.

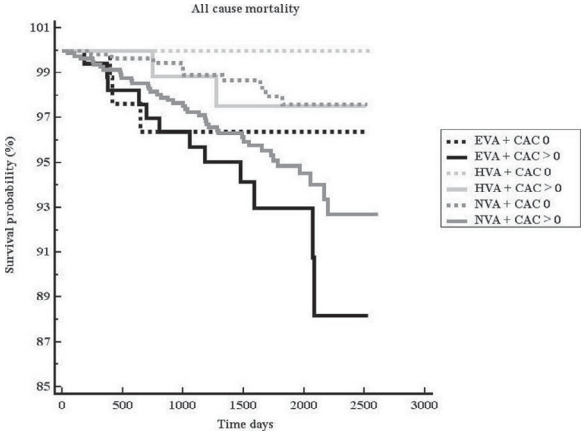

Figure 1