Acute cardiac stress and ECG responses, an ischemic heart disease risk for Africans of the SABPA study?

Short title: Acute mental **s**tress responses and cardiovascular disease risk

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Abstract

Autonomic responsivity of the heart is a recognized as a risk factor for cardiovascular disease (CVD). However, the manner in which cardiac stress markers, i.e. cardiac troponin T (cTnT) and N-terminal pro-brain natriuretic peptide (NT-proBNP) levels, change in response to acute mental stress, and whether these levels relate to specific vascular and-cardiac responses, remains unclear. Africans (n=193) and Caucasians (n=195) from the Sympathetic activity and Ambulatory Blood Pressure in Africans (SABPA) study, were included in our analysis. The Colour-Word Conflict (STROOP) test was administered for 1 minute whilst Finapres® beat-to-beat BP and 12-lead ECG responses were obtained. Blood samples for cTnT, NT-proBNP and cardio-metabolic markers were obtained at baseline and 10 min post-stress application. CVD markers changed detrimentally in Africans, who exhibited greater vascular, cTnT and NT-proBNP responses compared to their Caucasian counterparts. There were inverse associations of changes in stroke volume with diastolic blood pressure responses (ΔDBP) (β=-0.31; 95%CI -0.38 to -0.20; p<0.001), cTnT responses (β=-0.13; CI -0.22 to -0.01; p=0.009) and QTc responses (β=-0.25; CI -0.35 to -0.15; p<0.001) in Africans. ROC analyses revealed that acute increases (4.16pg/mL) in as well as resting values (4.19pg/mL) of cTnT were associated with 24 hour diastolic hypertension [specificity/sensitivity 65%/69%; AUC 0.63 (95% CI, 0.55, 0.70)] in Africans exclusively. The R wave of the aVL lead predicted acute mental stress induced and resting increases in cTnT [Odds ratio of 11 (95%CI)] in the Africans only – indicating a possible maladaptive, vascular response to acute mental stress. CVD vulnerability was accompanied by acute cardiac stress (increases in cTnT and NT-proBNP) and α-adrenergic responsivity in Africans. Ultimately, this reaction to acute mental stress may increase this African cohorts' risk for ischemic heart disease.

Key words: Stressor responses; ethnicity; South Africa; Cardiac Troponin T; NT-proBNP; CVD