Determinants of absolute and relative exercise-induced changes in B-type natriuretic peptides

Micha T. Maeder, Daniel Staub, Yves Surnier, Tobias Reichlin, Markus Noveanu, Tobias Breidthardt, Mihael Potocki, Nora Schaub, David Conen & Christian Mueller

BACKGROUND: Exercise is associated with changes in circulating B-type natriuretic peptide (BNP) and N-terminal-proBNP (NT-proBNP). However, the biological relevance of this phenomenon is poorly examined. We sought to assess determinants of absolute (Delta) and relative (Delta%) exercise-induced changes in BNP and NT-proBNP. METHODS: BNP (n=418) and NT-proBNP (n=478) at rest and peak exercise were measured in patients undergoing symptom-limited cycle ergometer tests. Multivariate logistic regression was performed to identify predictors of high DeltaBNP/DeltaNT-proBNP and high DeltaBNP/Delta%NT-proBNP defined as their highest quartiles (Q4). RESULTS: The median (interquartile range) DeltaBNP and DeltaNT-proBNP was 12 (0-28) pg/ml and 7 (2-21) pg/ml respectively, and Delta%BNP and Delta%NT-proBNP was 21 (0-46) % and 7 (3-12) % respectively. Higher BNP [odds ratio (OR) 3.92 per ln unit; p<0.001] or NT-proBNP [OR 4.88 per ln unit; p<0.001] at rest was the strongest predictor of DeltaBNP in Q4 (>/=28pg/ml) or DeltaNT-proBNP in Q4 (>/=21pg/ml). In contrast, higher maximal work rate expressed as the percentage of the predicted value (OR 1.015 per %; p=0.007) was the only independent predictor of Delta%BNP in Q4 (>/=46%), and lower resting heart rate (OR 0.97 per bpm; p=0.001) and lower age (OR 0.95 per year; p=0.001) were the only independent predictors of Delta%NT-proBNP in Q4 (>/=12%). CONCLUSIONS: Higher DeltaBNP and DeltaNT-proBNP primarily reflected higher BNP and NT-proBNP plasma levels at rest. In contrast, higher Delta%BNP and Delta%NT-proBNP were associated with several prognostically favorable features, indicating that higher Delta%BNP and Delta%NT-proBNP may be markers of health rather than disease.