Correlation Between Brain Natriuretic Peptide and Cardiopulmonary Exercise Test Parameters in Patients With Chronic Heart Failure

Angela Beatrice Scardovi, Nadia Aspromonte, Claudio Coletta, Elena Cerquetani, Mauro Romano, Tiziana Di Giacomo, Manuela Greggi, Vincenzo Ceci, S. Spirito Hospital, Rome, Italy

We sought to evaluate if brain natriuretic peptide (BNP) levels are associated with exercise capacity determined by cardiopulmonary exercise test (CPx) in patients (pts) suffering from CHF. One-hundred sixty-five consecutive pts with CHF (age 70; beta blockers 52%; ischemic CHF: 52%; mean ejection fraction 41%; NYHA class I: 8%; II: 68%; III: 24%) were considered. Mean BNP was 228 ± 277 pg/ml ( Biosite Diagnostic, Triage BNP Test). CPx parameters were: VO2 peak (PVO2) (12.35 ± 24%), ventilation and carbon dioxide production ratio (VE/VCO2) (38.02 ± 8.27), VE/VCO2 slope (33.82 ±7.78).

Results: A reverse statistically significant correlation between BNP level, PVO2 (r = -0.297; p < 0.0001) and AT (r = 0.271; p = 0.05) was respectively observed. A significant correlation between BNP and abnormally high ventilatory response to exercise, expressed as VE/VCO2 (r = 0.345; p < 0.0001) and VE/VCO2 slope (r = 0.432; p < 0.0001) was observed. The ROC curves demonstrated BNP > 97 pg/ml to be the best cut-off for determining PVO2 < 14 ml/kg/min, with overall accuracy of 71% (sensitivity: 65%; specificity: 65%), area under the curve (AUC): 0.69. Moreover, ROC demonstrated BNP > 138 pg/ml to be the best cut-off for determining PVO2 < 10 ml/kg/min, with overall accuracy 62% (sensitivity: 67%; specificity: 64%), AUC 0.72. BNP offers an alternative tool for distinguishing pts with moderate-to-severe reduction of exercise capacity.

Discriminant Than Brain Natriuretic Peptide to Categorize Patients With Congestive Heart Failure

Ronald Van Beneden, Michel P. Hermans, Sylvie A. Ahn, Jean-Marie Ketelslegers, Michel F. Rousseau, University of Louvain, Brussels, Belgium

Background: Brain Natriuretic Peptide (BNP) and Big Endothelin-1 (BigET-1) are becoming central as diagnostic and prognostic neurohumoral markers to the management of patients with congestive heart failure.

Methods: The Discriminant Ratio (DR) method (Levy JC et al. Am J Physiol 276: E365-E375, 1999) was used to compare the respective performance of BNP and BigET-1 to rank patients according to heart failure severity. The DR estimates the ability of a method to discriminate subjects. It is obtained from the ratio of the underlying between-subject standard deviation (SDu) to the within-subject SD (SDw). DRs were calculated from BNP and BigET-1 duplicates, sampled on 2 consecutive days. Significance of differences in DRs was p<0.05. Correlation coefficients between pairs of measurements were adjusted in order to include an estimate of the underlying correlation, since standard coefficients, due to the presence of within-subject variation, tend to underestimate the true correlation between tests through attenuation. An unbiased estimation of the linear relationship equation between methods was also derived.

Results: Plasma concentrations of BNP and BigET-1 were measured in duplicates in 31 heart failure patients (NYHA II-IV, mean EF 23%). Mean values of day 1 and day 2 (SD) were 75 (52) and 77 (52) pg/ml for BNP (norma values range: 5.4-2.5-12.8 pg/ml), and 12.5 (7.4) and 12.0 (8.1) pg/ml for BigET-1 (normal values range: 5.7-4.0-7.4 pg/ml), respectively. The difference between the DRs of BNP and BigET-1 (2.73 and 4.61 respectively) was statistically significant (p<0.05) in favor of a better discriminating ability for BigET-1. Unadjusted Pearson coefficient between methods was 0.70, rising up to 0.83 following attenuation for elimination. Slope and intercept of the unbiased estimation of the linear relationship equation between measurements were 0.18 and -1.47 pg/ml, respectively.

Conclusions: According to the DR method, BigET-1 appears able to better discriminate a heart failure population than BNP. Although both markers are highly correlated in this population, BigET-1 duplicates, sampled on 2 consecutive days.