Bivariate phase-rectified signal averaging for assessment of spontaneous baroreflex sensitivity: normalization of the results.

Previously proposed technique for assessment of spontaneous baroreflex sensitivity (BRS) based on bivariate phase-rectified signal averaging measures averaged R-R interval (RRI) changes triggered by beat-to-beat increases in systolic blood pressure (SBP). In this study, we investigate a normalized version of the method that relates the averaged RRI changes to the triggering blood pressure changes, thus providing the results in measurement units comparable with existing literature. Data of previously reported prospective observational study were used. In each of 146 heart failure patients presenting with sinus rhythm, 10-minute recordings of electrocardiogram and arterial and blood pressures were obtained in the supine resting position. The averaged RRI increases initiated by beat-to-beat SBP increases were measured (original BRS result in milliseconds) and normalized for the averaged beat-to-beat SBP increases (normalized BRS result in milliseconds per millimeters of mercury). Both results were compared in terms of predicting all-cause mortality during a mean follow-up of 2.7 ± 1.1 years when 42 patients (28.8%) died. Both types of results were highly correlated (r = 0.938, P< .001) and led to similarly strong separation of high- and low-risk groups. The receiver operator characteristics of both indices were well within the 95% confidence.
intervals of each other, and the areas under the characteristics were practically identical: 71.1% (95% confidence interval, 60.7%-80.9%) for original BRS and 69.7% (58.9%-79.2%) for normalized BRS. The results might question the concept of a linear relationship between the SBP changes and RRI changes. The phase-rectified signal averaging-based assessment of BRS may be used with equal legitimacy in the nonnormalized and normalized forms; the normalized form provides results in conventional measurement units.