

Instantaneous Changes in the Heart Rate Variability during Head-Up Tilt Revealed by Positive Time-Frequency Distribution

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Abstract

Energy distribution of the heart rate variability signal is perturbed in patients with impaired cardiac function compared to normal subjects [11. We hypothesized that the energy distribution reflects the changes in autonomic regulation that are not exposed by conventional methods estimating the power in the empirically defined frequency ranges. To test this hypothesis instantaneous power changes in the heart rate variability signal were computed between 0.0025 and 0.25 Hz in 20 patients undergoing head-up tilting. Positive time frequency distribution (TFD) was obtained by the method of minimum cross entropy [4] that satisfies the time and frequency marginals. The distribution of power was calculated by separating the total frequency range into seven scales. Significant changes in the mean spectral power and its distribution were observed in those patients who experienced symptoms compared to those who were asymptomatic. We conclude that the loss of spectral power and changes in the power distribution revealed by positive TFD can be useful for assessment of physiological[^] adaptation and diagnosis of the disorders related to autonomic imbalance.

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