

Assessment of Cardiac Autonomic State Based on RR and QT Interval Series and Symbolic Analysis

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This project is aimed to explore the possibility in assessing cardiac autonomic state according to the consistency of heart rate variability (HRV) and QT variability (QTV) indexes in normal subjects. Fantasia Database was used to test the age and sex differences, and Normal Sinus Rhythm Database to test the circadian rhythm difference. From each long term RR interval (RRI) series (lasting 2 h) selected from the records in the two databases, 2 000 epochs of 100 beats short term RRI series were selected and the corresponding QT interval (QTI) series were selected as well. For each short term RRI and QTI series, the symbolic dynamic indexes ($0V\%$ and $2UV\%$) were calculated to get the paired indexes. Then, the probability density function for them was calculated and the mutual information was estimated based on the function. Differences in age, sex and circadian rhythm were analyzed using paired t test. $0V\%$ of RRI series increased significantly with age, while $2UV\%$ decreased significantly with age. For RRI and QTI series respectively, $0V\%$ was weaker in daytime than nighttime, $2UV\%$ stronger in daytime than nighttime; There were no sex differences in the above cases. While the mutual information of paired HRV and QTV indexes had no significant difference according to age, sex and circadian rhythm. Instead of concerning only one kind of time interval series, the measure of characterizing the consistency of QTV and HRV is expected to reduce the influence of individual difference of the normal and highlight the influence of certain pathological states, providing more potential to find clinical application.