

J. Ellert

DEPARTMENT OF CARDIOLOGY - INTENSIVE THERAPY AND INTERNAL DISEASES,
POZNAN UNIVERSITY OF MEDICAL SCIENCES, PRZYBYSZEWSKIEGO 49, POZNAN,
POLAND

e-mail: jeel@epoczta.pl

J. Piskorski

INSTITUTE OF PHYSICS, UNIVERSITY OF ZIELONA GORA, SZAFRANA 4A, ZIELONA
GORA, POLAND

e-mail: jaropis@zg.home.pl

T. Krauze

DEPARTMENT OF CARDIOLOGY - INTENSIVE THERAPY AND INTERNAL DISEASES,
POZNAN UNIVERSITY OF MEDICAL SCIENCES, PRZYBYSZEWSKIEGO 49, POZNAN,
POLAND

e-mail: tomaszkrauze@wp.pl

P. Guzik

DEPARTMENT OF CARDIOLOGY - INTENSIVE THERAPY AND INTERNAL DISEASES,
POZNAN UNIVERSITY OF MEDICAL SCIENCES, PRZYBYSZEWSKIEGO 49, POZNAN,
POLAND

e-mail: pguzik@ptkardio.pl

Heart rate asymmetry and its reflection in HRV complexity measures

Heart rate asymmetry (HRA) is a physiological phenomenon by which the contribution of decelerations to short-term variability is greater than that of accelerations, and the contribution of accelerations to long-term variability is greater than that of decelerations. After shuffling the above differences vanish, so it was concluded that HRA depends on the structure of the RR intervals series. Complexity based measures, such as sample entropy or symbolic dynamics, try to quantify the structure of a dataset trying it on the continuum between perfect order and randomness. It is therefore interesting to see if the two approaches are related.

Materials and methods: 30-min ECG recordings were obtained from 200 healthy subjects, 87 women. Variance based asymmetry descriptors ($SD1_a$, $SD1_d$, $SD2_a$, $SD2_d$, $SDNN_a$, $SDNN_d$, $C1_d$, $C2_d$, C_d) and sample entropy (SampEn) as well as parameters of symbolic dynamics (V0, V1, V2, SymbEnt) were calculated for each of them. The associations between these parameters was studied with the use of the non-parametric Kendall correlation.

Results: The variance based HRA descriptors are not associated with SampEn. $C1_d$, $C2_d$ and C_d are statistically significantly correlated with SampEn for $m=1$ ($\tau=-0.3$, -0.13 , -0.12) and only $C1_d$ is correlated with SampEn for $m=2$ ($\tau = -0.25$). All variance parameters are correlated with the parameters of symbolic dynamic, negatively with V0 and positively with the remaining parameters. $C1_d$ is negatively correlated with V0 ($\tau = 0.3$) and positively with all the other symbolic dynamic parameters, a similar observation can be made of $C2_d$ and C_d , but the magnitude of the correlation coefficient is very small.

Discussion: HRA descriptors are associated with the studied complexity based parameters. The nature of this association is, however unclear, and needs further study.