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Summary of
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Non-patient specific forecasting of epileptic seizures using heart rate characteristics

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Background:
Since several decades, heart rate variability (HRV) attracts lot of attention as a potential marker for epilepsy management due to availability of simple tools to reliably identify heartbeats in the everyday life environment. However, the techniques to extract the descriptive features of cardiac activity useful for robust classification between interictal and preictal states are still under development. The aim of this work is to develop the classification and validation approach for prediction of epileptic seizures using HRV characteristics.

Materials & Methods:
Recordings from subjects with generalized seizures (13 subjects, between 2 and 15 years old) were performed and validated by qualified neurophysiologist. Electroencephalogram recordings accompanied with video monitoring were used to label seizure start/stop times. Statistical, spectral, nonlinear HRV features of filtered and interpolated heartbeat intervals for raw rhythmogram and for its low- and high-frequency components were extracted in sliding windows of variable widths for interictal and preictal recordings. Support Vector Machine (SVM) was tested as classifier with Leave-One-Group-Out validation scheme.

Results and Conclusions:
Results for generalized seizure prediction with SVM, averaged over subjects: mean AUC 0.72±0.19, mean sensitivity 0.62±0.39, mean specificity 0.82±0.16. Inter-subject variance of parameters might indicate that patient-specific approach may work with HRV as a source of features. The study suggests that HRV is a promising for both patient specific and non-specific seizure prediction, but selection of both feature set and classifier is far from final solution.