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Title: Cardiovascular risk evaluation using two different methods of pulse Wave analysis

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Body: BACKGROUND: Cardiovascular (CV) diseases are a major health issue. The autonomic state indicator (ASI) technique appears to provide a possibility to recognize subjects with increased cardiovascular risk based on extracting information from the photoplethysmographic pulse wave signal. In our setup we analyzed validity and variability of daytime ASI pulse propagation time (PPT) and compared it to the well-established SphygmoCor® applanation tonometry device. METHODS: 66 patients (29 male, 37 female; mean age $64,6 \pm 14,5$ years; mean BMI $26,7 \pm 4,9$ kg/m²) underwent daytime recording of the SphygmoCor® applanation tonometry device of the radial artery and ASI (n=66), 34 of these additionally overnight ASI recording. The ASI algorithm extracted patterns of the peripheral pulse wave by amplitude and time/frequency analysis. RESULTS: ASI daytime PPT ($R^2=0.334$; $p<0.01$) and ASI reflective index ($R^2=0.397$; $p<0.01$), both showed a high correlation to aortic augmentation index based on SphygmoCor® applanation tonometry device. The analysis also showed a linear correlation between daytime and nighttime PPT ($R^2=0.196$, $P=0.02$). However, ASI nighttime PPT didn't correlate with the SphygmoCor® device. Interestingly there was a significant linear correlation between Δ PPT(nighttime – daytime) variability and systolic blood pressure (left arm $R^2=0.176$, $p<0.05$) and aortic augmentation index ($R^2=0.167$, $p<0.05$). CONCLUSION: Daytime ASI measurement appears to be a useful alternative to the SphygmoCor® device for evaluation of CV risk. Further studies should be carried out to establish the value of the daytime as compared to the nighttime ASI algorithm for prediction of outcome in CV disease.