Correlation between Time Domain Baroreflex Sensitivity and Sympathetic Nerve Activity

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Dysfunction of the autonomic nervous system (ANS) is evidenced by reduced baroreflex sensitivity (BRS), which can be quantified as the slope between SBP and RR values identified in baroreflex segments. However such BRS estimates do not distinguish fast/parasympathetic from slow/sympathetic ANS modulations. The traditional sequences technique is known to provide a BRS estimate based on short baroreflex sequences (BSs) reflecting essentially parasympathetic ANS activity. The alternative events technique is able to provide longer baroreflex events (BEs), besides BEs of the same length as BSs, and so it is more likely to additionally capture sympathetic modulation. The Muscle Sympathetic Nerve Activity signal (MSNA) has been used to directly investigate ANS modulations and it has been suggested that MSNA powers in LF and HF bands are respectively related with sympathetic neural excitation and inhibition. In this work, BRS estimates from short and long BEs are associated with MSNA powers, in order to test if the BRS estimates from the events are able to distinguish parasympathetic/sympathetic ANS modulations.

Simultaneous recordings of ECG, ABP, RESP and MSNA were acquired from 15 healthy subjects in supine rest condition. Short and long BEs are defined from a cutoff length adjusted to each subject, from the respiratory frequency estimated from RESP signal. The results indicate that BRS from short BEs are significantly correlated with MSNA powers in HF ($r=0.65$, $p<0.05$ for the hypothesis of no correlation) and not significantly correlated with MSNA powers in LF ($r=0.33$). On the other hand, BRS from long BEs are not significantly correlated with MSNA powers in HF ($r=0.40$) whereas they are significantly correlated with MSNA powers in LF ($r=0.61$, $p<0.05$). In conclusion, the results in this study evidence that short and long BEs may carry different information on ANS modulations in baroreflex regulation.