

Towards Measuring Autonomic Dysfunction in Essential Tremor

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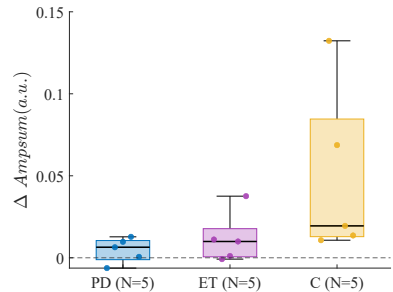
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The autonomic nervous system (ANS) regulates involuntary bodily functions. Autonomic dysfunction is well documented in Parkinson’s disease (PD), affecting patients quality of life. Evidence in essential tremor (ET), another prevalent movement disorder, remains scarce and limited — due to the use of nonstandardized metrics and sometimes uncontrolled conditions — with contradicting results across studies. This paper presents a preliminary study that aims at characterizing autonomic responses in ET by employing heart rate variability (HRV) metrics and electrodermal activity (EDA) analysis under controlled experimental conditions of mental stress, addressing another gap in the literature that has solely focused on physical stressors.

ECG and EDA signals were recorded from 5 PD patients, 5 ET patients, and 5 age-matched healthy controls during rest and during a cognitive stress task, the Serial Subtraction Task (SST). Different sympathetic EDA and HRV markers available in the literature were extracted, including $R_{LF/HF}$ and $Ampsum$.

Results indicate reduced sympathetic activation, as measured by EDA, in both PD and ET patients compared to controls during mental stress, aligning with prior findings in ET focussed on physical stressors. In contrast, HRV results were inconclusive, potentially due to small sample size, and confounding factors such as altered respiration during SST.

These findings suggest that ET may involve a form of dysautonomia affecting sympathetic function, while parasympathetic response requires more investigation. Further research with larger cohorts and standardized methodologies is necessary to clarify the nature and extent of autonomic involvement in ET.



Sympathetic increment from rest to mental stress. The closer to zero, the smaller the ANS reactivity