An open computational toolbox to analyze microneurographic MSNA recordings

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Abstract

Microneurographic recordings provide a means to study action potentials of postganglionic sympathetic fibers at different levels, from compound to single unit analysis. However, most existing computational toolboxes used for the analysis of microneurographic recordings are not open-ended or limited in scope. Additionally, conventional burst-based metrics have limitations in pathological conditions and are highly sensitive to electrode distance from the active fibers. To address these challenges, we developed an open-source toolbox that offers advanced analysis capabilities for studying autonomic reflexes and physiological responses to sympathetic nerve activity. Our toolbox leverages the observation of temporal sequences of action potentials within the cardiac cycle, introducing innovative methods and indexes to enhance analysis accuracy. Importantly, we have designed our computational toolbox to be accessible to users without engineering backgrounds. This includes researchers and professionals in healthcare domains, such as clinical medicine, life sciences, and related fields. By prioritizing user-friendliness, our software application serves as a valuable resource for the scientific community, allowing researchers to extract advanced indexes of neural activity and evaluate their impact on other physiological variables in a consistent and standardized manner.

Keywords: Microneurography, Computational toolbox, Data analysis

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