Multiscale Analysis of Microvascular Blood Flow: A Multiscale Entropy Study of Laser Doppler Flowmetry Time Series

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Résumé en anglais	Processes regulating the cardiovascular system (CVS) are numerous. Each possesses several temporal scales. Their interactions lead to interdependences across multiple scales. For the CVS analysis, different multiscale studies have been proposed, mostly performed on heart rate variability signals (HRV) reflecting the central CVS; only few were dedicated to data from the peripheral CVS, such as laser Doppler flowmetry (LDF) signals. Very recently, a study implemented the first computation of multiscale entropy for LDF signals. A nonmonotonic evolution of multiscale entropy with two distinctive scales was reported, leading to a markedly different behavior from the one of HRV. Our goal herein is to confirm these results and to go forward in the investigations on origins of this behavior. For this purpose, 12 LDF signals recorded simultaneously on the two forearms of six healthy subjects are processed. This is performed before and after application of physiological scales-based filters aiming at isolating previously found frequency bands linked to physiological activities. The results obtained with signals recorded simultaneously on two different sites of each subject show a probable central origin for the nonmonotonic behavior. The filtering results lead to the suggestion that origins of the distinctive scales could be dominated by the cardiac activity.
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