Multiscale Entropy Study of Medical Laser Speckle Contrast Images

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Résumé en anglais	Laser speckle contrast imaging (LSCI) is a noninvasive full-field optical imaging technique that gives a 2-D microcirculatory blood flow map of tissue. Due to novelty of commercial laser speckle contrast imagers, image processing of LSCI data is new. By opposition, the numerous signal processing works of laser Doppler flowmetry (LDF) data-that give a 1-D view of microvascular blood flow-have led to interesting physiological information. Recently, analysis of multiscale entropy (MSE) of LDF signals has been proposed. A nonmonotonic evolution of MSE with two distinctive scales-probably dominated by the cardiac activity-has been reported. We herein analyze MSE of LSCI data. We compare LSCI results with the ones of LDF signals obtained during the same experiment. We show that when time evolution of LSCI single pixels is studied, MSE presents a monotonic decreasing pattern, similar to the one of Gaussian white noises. By opposition, when the mean of LSCI pixel values is computed in a region of interest (ROI) and followed with time, MSE pattern becomes close to the one of LDF data, for ROI large enough. LSCI is gaining increased interest for blood flow monitoring. The physiological implications of our results require future study.
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