Relevance of laser Doppler and laser speckle techniques for assessing vascular function: state of the art and future trends.

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Résumé en anglais	In clinical and research applications, the assessment of vascular function has become of major importance to evaluate and follow the evolution of cardiovascular pathologies, diabetes, hypertension, or foot ulcers. Therefore, the development of engineering methodologies able to monitor noninvasively blood vessel activities-such as endothelial function-is a significant and emerging challenge. Laser-based techniques have been used to respond-as much as possible-to these requirements. Among them, laser Doppler flowmetry (LDF) and laser Doppler imaging (LDI) were proposed a few decades ago. They provide interesting vascular information but possess drawbacks that prevent an easy use in some clinical situations. Recently, the laser speckle contrast imaging (LSCI) technique, a noninvasive camera-based tool, was commercialized and overcomes some of the LDF and LDI weaknesses. Our paper describes how-using engineering methodologies-LDF, LDI, and LSCI can meet the challenging clinician needs in assessing vascular function, with a special focus on the state of the art and future trends.
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