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Abstract

Back to Hit List

Grant Number: 1R43DK065428-01
Project Title: A New Device for Monitoring Diabetic Microcirculation

PI Information:

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Abstract: DESCRIPTION (provided by applicant): Diabetes-related microcirculation problems result in 200,000-foot ulcer cases and 80,000 amputations per year in the USA alone. Screening could lead to early detection, treatment and prevention. Transonic proposes to develop a laser Doppler-based tissue perfusion monitor, optimized for screening peripheral neuropathy-induced microcirculation deficiencies. This novel monitoring system will enable research studies of deficiencies in peripheral blood perfusion and neurological control of perfusion during early stages of diabetes. On a longer horizon, such studies may produce a simple, non-invasive test for early detection of diabetes using a laser Doppler tissue perfusion monitor as developed under this proposal. The proposed approach has a high likelihood of success. The novel monitor derives from our existing commercial laser Doppler monitor, with technology enhancements to optimize measurement accuracy under the low perfusion conditions of diabetic disease. A clinical connection between diabetes mellitus and changes in the frequency spectrum of Doppler tissue perfusion signals has been demonstrated by our Phase I clinical collaborators. During Phase I we will build prototype hardware to demonstrate feasibility of our novel approach to high-resolution laser Doppler flowmetry under low flow conditions, and spectral analysis software optimized for low-frequency skin perfusion measurement. Our Wake Forest Medical College collaborators will validate the adequacy of this hardware and software in a clinical setting. Phase II funding will support clinical studies by three independent research groups on diabetic populations, while we develop research-grade hardware and analysis software to be marketed worldwide upon conclusion of the grant.

Public Health Relevance:
This Public Health Relevance is not available.

Thesaurus Terms:
biomedical equipment development, diabetic neuropathy, microcirculation, patient monitoring device, ultrasound blood flow measurement
computer program /software, computer system design /evaluation, foot, peripheral blood vessel, skin circulation, ulcer
clinical research, human subject

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IRG:	ZRG1