

Incoherent optical fluctuation flowmetry method in foot tissue perfusion assessment

Polina A. Glazkova¹, Alexey A. Glazkov¹, Dmitry A. Kulikov^{2,3}, Sergei S. Zagarov¹,
Yulia A. Kovaleva⁴, Alina Yu. Babenko⁴, Elena A. Kitaeva⁴, Yulia A. Kononova⁴, Timur A.
Britvin¹, Natalia N. Mazur¹, Roman N. Larkov¹, and Dmitry A. Rogatkin¹

¹Moscow Regional Research and Clinical Institute ("MONIKI"), Moscow, Russia

²Moscow Region State University, Mytishchi, Moscow Region, Russia

³N.A. Semashko National Research Institute of Public Health, Moscow, Russia

⁴Almazov National Medical Research Centre, St. Petersburg, Russia

Abstract

Objective. The aim of the study was to evaluate the informativity of the Incoherent optical fluctuation flowmetry method (IOFF) in the diagnosis and assessment of the severity of peripheral artery disease (PAD) in patients with diabetes mellitus (DM).

Methods. A total of 54 patients with type 2 DM were included in this observational, two-center study: 27 patients with diagnosed peripheral artery disease and/or diabetic foot ulcers were studied and 27 patients without such lower extremity lesions. All patients underwent ultrasound duplex scanning, IOFF and TcPO₂ measurements. The foot tissue perfusion measurement using the IOFF method was performed during a local heating test on the dorsal surface of the foot.

Results. It was shown that the IOFF method with a sensitivity of 80% and a specificity of 88% allows to detect limbs with hemodynamically significant stenoses (AUROC 0.884, CI: 0.817-0.953). In patients with diabetes-related lower-extremity complications high correlation coefficient of perfusion measured by IOFF and TcPO₂ (R_s 0.75, $p < 0.001$) were shown. IOFF method made it possible to identify limbs with critical ischemia with a sensitivity of 79 % and specificity of 94% (AUROC 0,939, CI: 0,886-0,993).

Conclusion. IOFF method demonstrated moderately high diagnostic accuracy in detecting limbs with hemodynamically significant stenoses and high correlation with TcPO₂. The NOFF method

is promising as an accessible, noninvasive screening method of lower limb tissue perfusion assessment.