

Pilot Study for the Evaluation of Morphological and Functional Changes in Retinal Blood Flow in Patients with Insulin Resistance and/or Type 2 Diabetes Mellitus

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Abstract

Background:

The aim of this study was to investigate early morphological and functional pathology in the retinal microcirculation in patients with insulin resistance and/or type 2 diabetes mellitus (T2DM).

Methods:

Fifty-four subjects, without features of retinopathy under ophthalmological investigation, were recruited for study participation and were classified into three study groups according to their metabolic staging: (1) Group C comprised nondiabetic, insulin-sensitive subjects with a BMI <28 kg/m²; (2) Group IR comprised nondiabetic, insulin-resistant, obese subjects with a BMI ≥28 kg/m²; and (3) Group DM comprised patients with manifested T2DM.

Retinal microvascular blood flow was assessed using scanning laser doppler flowmetry (Heidelberg Retina Flowmeter) before and after flicker light stimulation (10 Hz; Photo Stimulator 750).

Results:

No significant difference was observed in retinal blood flow (RBF) among the three groups, neither at baseline nor after stimulating the retina with flicker light. The arterial wall-to-lumen ratio (WLR) tended to be smaller in Group DM compared with Group C, and was significantly lower when comparing Group IR with Group C. When the subjects were grouped according to their insulin resistance, a steady decline in RBF and WLR could be observed with increasing insulin resistance.

Conclusions:

In conclusion, laser scanner flowmetry of the retina was found to detect very early changes in microvascular blood flow. Development of insulin resistance seems to be an important component in the deterioration of RBF.

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Abbreviations: (AD) arteriole diameter, (BMI) body mass index, (DM) diabetes mellitus, (DR) diabetic neuropathy, (HOMA) homeostatis model assessment, (IR) insulin resistance, (LD) lumen diameter, (NO) nitric oxide, (RBF) retinal blood flow, (SD) standard deviation, (SLDF) scanning laser Doppler flowmetry, (T2DM) type 2 diabetes mellitus, (WLR) wall to lumen ratio

Keywords: diabetes mellitus type 2, flicker stimulation, insulin resistance, retinal blood flow, scanning laser doppler flowmetry

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