

K2

Retinal vasodilatation is maintained to exogenous nitric oxide but reduced to flicker stimulation in type 1 diabetes

Leopold Schmetterer^{1,2}, Berthold Pemp¹, Gerhard Garhöfer¹, Günther Weigert¹, Katharina Karl¹, Hemma Resch¹ and Michael Wolzt¹

¹*Department of Clinical Pharmacology, Medical University Vienna, 1090 Vienna, Austria*

²*Center for Biomedical Engineering and Physics, Medical University of Vienna, 1090 Vienna, Austria*

E-mail: leopold.schmetterer@meduniwien.ac.at

Background

It has been shown previously that retinal vessels of patients with diabetes mellitus have a reduced capacity to adapt to changes of perfusion pressure or to stimulation with flickering light. The mechanisms behind this abnormal autoregulation have not yet been completely identified. To gain more insight into this topic we measured the dilatation of retinal vessels after systemic administration of a direct nitric oxide donor in patients with diabetes and in healthy controls. In addition, the retinal vessel response to stimulation with diffuse luminance flicker light was measured.

Methods

Twenty type 1 diabetes patients with no or only mild non-proliferative diabetic retinopathy and 20 age-matched healthy subjects were included in this study. The diameters of retinal arteries and veins were measured using the Imedos Dynamic Vessel Analyzer. The diameter change during stimulation with flickering light as well as immediately after sublingual application of 0.8 mg of nitroglycerin was assessed. Retinal vessel responses were compared between groups using an ANCOVA model.

Results

The response of retinal arteries to flickering light was significantly reduced in patients with diabetes compared to healthy controls ($2.9 \pm 2.8\%$ vs. $7.0 \pm 2.3\%$, $p < 0.002$ between groups). Venous dilatation was also found to be reduced in diabetes ($4.6 \pm 2.0\%$ vs. $6.8 \pm 3.4\%$, $p = 0.020$). Nitroglycerin induced a comparable vasodilatation of retinal vessels in both groups (arteries: $1.6 \pm 3.5\%$ in patients vs. $1.7 \pm 2.8\%$ in controls, $p = 0.70$ between groups; veins: $1.6 \pm 3.2\%$ vs. $1.6 \pm 2.5\%$, $p = 0.92$).

Conclusions

The present study confirms a reduced response of retinal vessels to stimulation with flickering light in diabetes mellitus. The vasodilatory response of retinal vessels to a direct nitric oxide donor is, however, maintained. This indicates that abnormal retinal autoregulation in diabetes, as observed previously, is not a consequence of generally reduced retinal vascular reactivity.