

Presentation at the Congress of American Diabetes Association in New Orleans, 2003

Differential Role of Type 2 Diabetes and Cardiovascular Autonomic Neuropathy in Impaired Control of Skin Microcirculation

Alin Stirban MD , Burak Salgin , Theodor Koschinsky MD and Dan Ziegler MD
German Diabetes Research Institute Duesseldorf, Germany

Aim:

The purpose of our study was to determine whether microvascular dysfunction is related to Type 2 diabetes and in particular to diabetic cardiovascular autonomic neuropathy (CAN).

Patients:

Microvascular function was compared between 17 healthy control(C) adults, a group of 18 patients with Type 2 diabetes (DM2) without CAN and a group of 16 patients with Type 2 diabetes and CAN (CAN+) matched for age and the latter two also for diabetes duration. Mean age(range): C: 52.35(37-68)yr; DM2: 57.33(45-65)yr; CAN+: 57.44(48-64)yr.

Methods:

Cutaneous microvascular function was assessed at the forearm level using laser Doppler flowmetry. Superficial blood flow (BF) reactivity was measured in 2 mm depth after iontophoresis of acetylcholine (ACH) and sodium nitroprusside (SNP) as well as after a deep breath and ice-cold water immersion of the contralateral hand for 30 sec. Results are expressed as mean \pm SEM.

Results:

The ACH-induced increase in BF was higher in C (346,57 \pm 51,19%) than both in DM2 (198,50 \pm 41,95 %, p<0.05 vs. C) and CAN+ (133,50 \pm 41,06 %, p<0.01 vs. C). Deep-breath-induced BF reduction was exacerbated in DM2 as compared to C (DM2: -61,82 \pm 3,03 %, C: -49,67 \pm 4,21%;p<0.05). Blood flow reduction following a deep breath was impaired in CAN+ (-24,70 \pm 11,12 %) compared to both DM2 (p<0.01) and C (p<0.05). In both groups of diabetic subjects, no difference in BF reactivity was noted to SNP or ice-cold water immersion when compared to C.

Conclusions:

Type 2 diabetic patients not only show evidence of endothelium-dependent cutaneous microvascular dysfunction, but also enhanced vasoconstriction following a deep breath, suggesting increased sympathetic activity. By contrast, in patients with cardiovascular autonomic neuropathy, microcirculation reactivity is impaired due to diminished sympathetic tone.