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Hemodialysis impairs cutaneous microcirculation in diabetic patients.

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Introduction: In diabetic patients, a close temporal association between the incidence of foot ulcers, major amputations and the beginning of hemodialysis has been established. However, no mechanism has been described so far. We investigated cutaneous microcirculation prior to, during and after hemodialysis in diabetic compared with non-diabetic patients.

Material and Methods: In total, 11 patients (6 diabetics, 5 non-diabetics) with a median age of 67 [52-81] years were included. There were no significant differences in demographic data between both groups. Peripheral arterial occlusive disease and severe neuropathy were excluded by palpable pedal pulses and the 10g Semmes-Weinstein monofilament, respectively. There were no active foot ulcerations. Cutaneous microcirculation was assessed by the micro-lightguide spectrophotometer O2C (Lea Medizintechnik, Germany) with the parameters venous oxygen saturation (SO₂), relative haemoglobin (rH_b), relative blood flow (flow) and velocity (velo) determined in 2mm as well as 6 mm tissue depth. Measurements were performed at the dorsum of the foot with the patients in supine position. Results are given as median percent change scores [min-max]. Significances between groups were calculated by the Wilcoxon-Whitney-U test with a p<0.05 considered significant.

Results: Prior to treatment, there were no statistical differences between both groups in respect to all microcirculatory parameters. However, the area under the curve (AUC) for flow (p=0.009; p=0.004) and velo (p=0.03; p=0.004) was significantly lower in diabetic patients in 2 as well as 6 mm. Similarly, flow_{min} during the dialysis period was significantly lower in diabetics in 2mm and 6 mm as well (-51% [0-76] vs. -77% [53-86]; p=0.05 and -49% [0-72] vs. -75% [55-92]; p=0.03). Even 20 min after hemodialysis, non-diabetics had still a significantly increased flow in 6 mm tissue depth compared with diabetics (p=0.05).

Discussion: Hemodialysis induces significant changes in cutaneous microcirculation. Diabetic subjects have a significant decrease in flow and velo that remain significantly different throughout the entire dialysis period showing values that equal tissue ischemia. This might provide evidence for the correlation of the beginning of hemodialysis and the incidence of foot ulcerations.