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Cutaneous microcirculation in the neuropathic diabetic foot improves significantly but not completely after successful lower extremity revascularization * **

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Abstract

Objective: The purpose of this study was the examination of the effect of successful large vessel revascularization on the microcirculation of the neuroischemic diabetic foot.

Research design and methods: We measured the cutaneous microvascular reactivity in the foot in 13 patients with diabetes with peripheral arterial disease and neuropathy (group DI) before and 4 to 6 weeks after successful lower extremity arterial revascularization. We also compared them with age-matched and sex-matched groups of 15 patients with diabetes and neuropathy, seven patients without neuropathy, and 12 healthy patients for control. We used single-point and laser Doppler scan imaging for the measurement of the foot skin vasodilatation in response to heating to 44°C and to iontophoresis of 1% acetylcholine (endothelial-dependent response) and 1% sodium nitroprusside (endothelial-independent response). **Results:** The group DI response to heat increased from 289% ± 90% before surgery (percent increase over baseline measured in volts) to 427% ± 61% ($P < .05$) after surgery but was still comparable with the response of the patients with diabetes and neuropathy (318% ± 51%) and lower than the responses of the patients without neuropathy

(766% ± 220%) and the healthy patients for control (891% ± 121%; $P < .0001$). The group DI acetylcholine response also improved from 6% ± 4% before surgery to 26% ± 8% after surgery ($P < .05$) and was similar to the responses of patients with diabetes and neuropathy (18% ± 3%) and patients without neuropathy (38% ± 8%) but still lower when compared with the response of the patients for control (48% ± 9%; $P < .001$). The sodium nitroprusside response for group DI improved from 10% ± 4% to 29% ± 9% ($P < .05$) and was similar to the responses of the neuropathic (25% ± 9%), nonneuropathic (32% ± 6%), and control (40% ± 5%) groups. The group DI neurovascular response, which depends on the healthy function of the C-fiber nociceptors, was similar at baseline (5% ± 9%) and after surgery (14% ± 10%) and in the neuropathic group (33% ± 21%), but it was dramatically reduced when compared with the nonneuropathic (110% ± 40%) and control (198% ± 54%) groups ($P < .001$).

Conclusion: Impaired vasodilation in the diabetic neuropathic lower extremity leads to functional ischemia, which improves considerably but is not completely corrected with successful bypass grafting surgery. Therefore, patients with diabetes and neuropathy may still be at high risk for the development of foot ulceration or the failure to have an existing ulcer heal despite adequate correction of large vessel blood flow. (J Vasc Surg 2002;35:501-5.)



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Competition of interest: nil.

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