

**Measurement of T<sub>cp</sub>O<sub>2</sub>, toe pressure index, and laser Doppler flowmetry reveals hitherto undiagnosed subclinical ischaemia in diabetic patients with palpable pedal pulses and foot ulceration**

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**Introduction and Objective:** Patients presenting with a diabetic foot ulcer should be assessed and treated urgently as a "foot attack". However, their clinical vascular assessment is often limited to palpation of pulses and measurement of Ankle Brachial Pressure Index (ABPI). The aim of this study was to investigate the contribution of a full assessment of the macro- and microcirculation in patients with foot ulceration. **Design and Method:** Consecutive patients with ulceration in one or both limbs underwent measurement of ABPI, Toe Blood Pressure Index (TBPI), T<sub>cp</sub>O<sub>2</sub> in both feet, at supine and at 30° elevation and simultaneously in forearm, and forefoot laser Doppler flowmetry, in perfusion units (PU), at baseline and with heat provocation. All measurements were carried out within 35min. Results are reported as mean±SD.

**Results:** There were 53 limbs in 27 patients, age 57±9.8 yrs, 93% males, 86% with type 2 diabetes and 66% of limbs were ulcerated; 40 limbs had palpable pedal pulses (Group 1) and 13 limbs had a known diagnosis of ischemia (Group 2). Unexpectedly 58% of group 1 had evidence of ischemia (we called Group 1a) as denoted by a low TBPI of ≤ 0.7 (mean 0.5±0.1), compared with the remaining patients (Group 1b), with normal TBPI (mean 1.0±0.2) [p=0.001]. Doppler flow increment on heating was less in Group 1a, 12±9 to 52 PU compared with Group 1b, 12±4 to 68 PU [p=0.03]. However, there was no significant difference between Group 1a and 1b as regards ABPI, 1.1±0.2 vs 1.2±0.2 [p=0.053] nor T<sub>cp</sub>O<sub>2</sub> at supine, 52±11 vs 55±8mmHg [p=0.55]. However, foot elevation identified 10% in group 1b with a ≥15mmHg drop in T<sub>cp</sub>O<sub>2</sub> despite their normal TBPI. As expected, in group 2 (known diagnosis of ischaemia), mean TBPI was 0.5±0.3, baseline T<sub>cp</sub>O<sub>2</sub> 39±20mmHg. There was no difference in proportion of ulcers across all groups, p=0.79.

**Conclusion:** We have identified a subgroup of patients with palpable pulses that have a low TBPI and a reduced heating response to Doppler flowmetry but a preserved t<sub>cp</sub>O<sub>2</sub> at baseline. This subgroup is distinct both from patients with palpable pulses and normal TBPI who have a normal T<sub>cp</sub>O<sub>2</sub> and heat response and also distinct from patients with known ischaemia in whom all these parameters are abnormal. This demonstrates that it is essential for all patients to have a thorough examination of both macro- and micro circulation on presentation to the multidisciplinary team with a foot attack.