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Multispectral optoacoustic tomography of systemic sclerosis

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The study aimed to evaluate the clinical feasibility of hybrid ultrasound/multispectral optoacoustic tomography (MSOT) for assessing microvascular dysfunction in systemic sclerosis (SSc). A handheld US/MSOT imaging system was applied for imaging patients diagnosed with SSc (n = 7) and healthy volunteers (n = 8). Semiquantitative MSOT values for deoxygenated (HbR), oxygenated (HbO₂) and total haemoglobin (HbT) were analysed for subcutaneous finger tissue of both hands (8 fingers per subject, 120 fingers in total) and used to assess disease activity (progressive vs stable). Grouped data were compared by one-way nested analysis of variance, Tukey post-hoc test as well as student's t test were used for statistical analysis. Subcutaneous finger tissue of patients with SSc provided significantly lower MSOT values for HbO₂ (26.16 ± 0.71 vs 38.2 ± 1.54 , $P = .023$) and HbT (55.92 ± 1.62 vs 72.46 ± 1.90 , $P = .018$) compared to healthy volunteers. Patients with progressive SSc had significantly lower MSOT values compared to patients with stable disease and healthy volunteers. This pilot study shows the feasibility of MSOT imaging to resolve microvascular dysfunction in SSc as a marker of disease activity. By providing biological tissue properties not revealed by other imaging modalities, MSOT might help to grade SSc non-invasively and monitor early therapy response.