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LETTER

Response to: Comparison of laser Doppler imaging, fingertip lacticemy test, and nailfold capillaroscopy for assessment of digital microcirculation in systemic sclerosis

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We read with interest the article by Correa and colleagues [1] in a recent issue of *Arthritis Research & Therapy*: 'Comparison of laser Doppler imaging, fingertip lacticemy test, and nailfold capillaroscopy for assessment of digital microcirculation in systemic sclerosis'.

Using the laser Doppler imaging (LDI) technique, the authors found lower digital blood flow in systemic sclerosis (SSc) patients when compared with healthy controls. However, the authors did not discover any correlation between the functional (LDI) and morphological microvascular abnormalities, evaluated by nailfold capillaroscopy (NFC), suggesting that these techniques are complementary tools for the evaluation of independent microangiopathy aspects in SSc patients.

The conclusions of the article may be controversial since these findings are in contrast with those of other recent reports that were not reported and considered in the authors' investigation. In particular, some recent studies described a correlation between fingertip blood perfusion (FBP), evaluated separately by LDI and laser Doppler flowmetry (LDF) techniques, and the extent of nailfold microvascular damage, as evaluated by nailfold videocapillaroscopy (NVC) [2-4].

The paper from Cutolo and colleagues [2] demonstrated a significantly lower FBP in SSc patients (P <0.05) compared with controls, and this FBP was found to be partially reversible (increasing) after heating of the LDF probe at 36°C (P <0.001), even if the slope of variation was significantly lower in SSc patients compared with controls (P <0.05). Interestingly, SSc patients showing the 'late' NVC pattern of microangiopathy showed an FBP that was significantly lower than that of patients with the 'active' or 'early' NVC patterns (P <0.05) [2,5]. In addition, a negative correlation between the FBP degree and the NVC rating (score) of the microvascular damage was observed (P <0.05) [2,6,7].

Similar results were found by Rosato and colleagues [3], who described significantly lower mean blood perfusion in the hand/fingers of SSc patients characterized by the 'late' NVC pattern of microangiopathy when compared with patients showing the 'early' or 'active' NVC patterns. The authors concluded that the LDI and capillaroscopic images fully matched the definition of the various stages of the microvascular digital damage in SSc [3].

In the third study, again, SSc patients characterized by the 'active' or 'late' NVC patterns showed a red blood cell velocity that was more decreased (65.5% and 66.2% reduction, respectively) than that of patients sharing the 'early' pattern of microangiopathy [4]. This reduced red blood cell velocity was significantly associated with selected NVC morphological parameters, including capillary ramification and capillary loss that characterize the advanced microvascular damage (P <0.01) [4].

In recent years, the morphological features identifying the SSc microvascular damage progression have been recognized. Consequently, microvascular lesions detected by NVC in patients with SSc have been classified according to the three different NVC patterns mentioned above (namely, 'early', 'active', and 'late'), which are clearly distinguishable from the 'normal' nailfold capillaroscopic pattern [5,8].

The 'early' pattern is characterized by the presence of a small number of giant capillaries and capillary microhemorrhages, no evident loss of capillaries, and relatively well-preserved capillary distribution. If the vascular disease progresses, an 'active' SSc pattern becomes evident: giant capillaries and capillary microhemorrhages

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increase and there is moderate loss of capillary, whereas ramified capillaries are absent or mildly branched and the capillary architecture is mildly disorganized. Finally, the 'late' SSc pattern becomes manifest in the more advanced stage of the vascular disease. This latter pattern is characterized by the absence of giant capillaries and microhemorrhages but shares severe loss of capillaries and the development of extensive avascular areas, together with ramified and bushy capillaries (indicative of neoangiogenesis) [5,8]. As a matter of fact, the different nailfold microvascular abnormalities are not all present at the same time but are expressed in a dynamic manner during the progression of the SSc microangiopathy [9].

For these reasons, when searching in SSc patients for a possible link between digital blood flow and nailfold capillary abnormalities without considering the dynamic evolution of these morphological markers, a lack of correlation may be expected. Obviously, further studies are needed to better understand whether the morphological nailfold capillary abnormalities are the cause or the effect (or both) of digital blood hypoperfusion in patients with SSc.

Abbreviations

FBP, fingertip blood perfusion; LDF, laser Doppler flowmetry; LDI, laser Doppler imaging; NFC, nailfold capillaroscopy; NVC, nailfold videocapillaroscopy; SSc, systemic sclerosis.

Competing interests

The authors declare that they have no competing interests.

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Published: 24 January 2011

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doi:10.1186/ar3201
Cite this article as: Sulli A, *et al.*: Response to: Comparison of laser Doppler imaging, fingertip lacticemy test, and nailfold capillaroscopy for assessment of digital microcirculation in systemic sclerosis. *Arthritis Research & Therapy* 2011, **13:**301.