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**In vivo comparison of microcirculation and histomorphology of two different flap donor sites.**

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### **ABSTRACT**

**BACKGROUND:** In soft tissue reconstruction surgery using free flaps, different donor sites from various anatomical regions should be considered. Local microperfusion and histomorphology at these donor sites are often neglected during planning and operation of free tissue transfers. The aim of this in vivo study was to evaluate the microperfusion and, simultaneously, the tissue morphology of two potential free fasciocutaneous flap donor sites on the upper and lower extremity. **METHODS:** In 23 healthy nonsmoking individuals (aged  $30 \pm 8.4$  years), potential free-flap donor sites for the radial forearm flap (RFF) and the anterolateral thigh flap (ALTF) were investigated using high-resolution in vivo Reflectance-Mode-Confocal-Microscopy (Vivascope 1500, Lucid, Rochester, NY). The following parameters were evaluated: quantitative blood-cell flow; density of functional dermal capillaries; minimal epidermal thickness, and viable thickness of the epidermis. **RESULTS:** The quantitative blood-cell flow was higher in the RFF donor site ( $62 \pm 3.1$  cells/min) compared with the ALTF donor site ( $51 \pm 2.4$  cells/min,  $P < 0.05$ ). The density of functional dermal capillaries at the RFF donor site was higher than at the ALTF donor site ( $38 \pm 3$  vs.  $22 \pm 2.2$  capillaries/mm<sup>2</sup>),  $P < 0.05$ ). The minimal epidermal thickness was thinner at the RFF donor site compared with the ALTF donor site ( $44 \pm 2.9$  vs.  $55 \pm 3.8$   $\mu$ m,  $P < 0.05$ ). The viable thickness of the epidermis of the RFF region was thinner compared with the region of the ALTF ( $31 \pm 2.1$  vs.  $42 \pm 2.7$   $\mu$ m,  $P < 0.05$ ).

**CONCLUSION:** For the first time, significant differences in the in vivo microperfusion and histomorphology could be shown when comparing two different free-flap donor sites. The correlation to flap failure needs to be substantiated in further systematic trials.