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Insight in human skin microcirculation using in vivo reflectance-mode confocal laser scanning microscopy.

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ABSTRACT

Reflectance-mode confocal laser scanning microscopy allows in vivo imaging of the human skin. We hypothesized that this high-resolution technique enables observation of dynamic changes of the cutaneous microcirculation. Twenty-two volunteers were randomly divided in two groups. Group 1 was exposed to local heating and group 2 to local cold stress. Confocal microscopy was performed prior t (0) (control), directly t (1) and 5 min t (2) after local temperature changes to evaluate quantitative blood cell flow, capillary loop diameter, and density of dermal capillaries. In group 1, blood flow increased at t (1) (75.82 +/- 2.86/min) and further at t (2) (84.09 +/- 3.39/min) compared to the control (61.09 +/- 3.21/min). The control capillary size was 9.59 +/- 0.25 microm, increased to 11.16 +/- 0.21 microm (t (1)) and 11.57 +/- 0.24 microm (t (2)). The dermal capillary density increased in t (1) (7.26 +/- 0.76/mm(2)) and t (2) (8.16 +/- 0.52/mm(2)), compared to the control (7.04 +/- 0.62/mm(2)). In group 2, blood flow decreased at t (1) (41.73 +/- 2.61/min) and increased at t (2) (83.27 +/- 3.29/min) compared to the control (60.73 +/- 2.90/min). The control capillary size was 9.55 +/- 0.25 microm, decreased at t (1) (7.78 +/- 0.26 microm) and increased at t (2) (11.38 +/- 0.26 microm). Capillary density decreased at t (1) (5.01 +/- 0.49/mm(2)) and increased at t (2) (7.28 +/- 0.53/mm(2)) compared to the control (7.01 +/- 0.52/mm(2)). Confocal microscopy is a sensitive and noninvasive imaging tool for characterizing and quantifying dynamic changes of cutaneous microcirculation on a histomorphological level.