

Biophotonics, Internet Invited Lecture

EVALUATING ADAPTATION OPTIONS MICROCIRCULATORY-TISSUE SYSTEMS BASED ON CORRELATION NUTRITIVE BLOOD FLOW AND REDOX RATIO.

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ABSTRACT

Introduction The delivery/consumption law is a key part of maintaining a balance of function of microcirculatory-tissue systems (MTS). Accordingly, the aim of the study was evaluating the adaptive capacity of MTS using indicators of links nutritive blood flow and redox ratio in a physiological rest and functional load.

Material and methods Research was conducted in two areas: on the palmar surface of the middle finger and on the forearm. Laser Doppler Flowmetry device LAKK-02 was used to estimate the nutritional blood flow level. Redox-Ratio (RR) was measured using diagnostic device "LAKK-M" fluorescence channel. For simultaneous recording of optical fibre probes parameters were recorded at one study site. Each test contained 4 parts: state of rest, occlusion (220mm Hg pressure on the upper arm), reperfusion (reactive hyperemia) and recovery. RR was defined as the ratio of the normalized amplitudes of NADH and FAD.

Results and discussion There was a linear correlation ($r = 0.926$) between change rate of normalized Redox-ratio on occlusion and reperfusion on the forearm (zone without arteriovenous anastomoses). The skin of the palmar surface of the fingers (zone with arteriovenous anastomoses) correlation

value was lower because Here the volumetric flow in a large extent related to thermoregulatory control, not only with the metabolism of the tissue. In the phase of reperfusion the correlation of nutritive blood flow and redox ratio was lost because observed discrepancy high gain levels and relatively low metabolism. In the recovery phase we observed two types - 1) rapid recovery of the normal metabolism level (RR), and 2) a slow recovery or maintaining high level of metabolism compared with baseline values. The second option shows a decline in adaptive capabilities of MTS. Conclusion With the help of non-invasive methods showed high correlation of nutritive blood flow and redox - ratio in human skin in terms of physiological rest. The speed of change of metabolism in the phase of occlusion and reperfusion and duration of phase of recovery may be the criteria for adaptive capabilities of MTS, which has practical significance for physiology and medicine. This research was provided by Grant ABLADE.

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