26. Stable and reliable measurement of intracapillary hemoglobin-oxygenation in human skin by EMPHO II

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Abstract:
To evaluate the reliability of EMPHO II in human skin measurement, hemoglobin oxygenation (HbO2) and hemoglobin concentration (Hbcon) behaviors were measured under ischemia and congestion. Functional evaluation of HbO2 and Hbcon of human skin at forearm or fingers of healthy volunteers had been obtained in visible range (500 - 628 nm) by a rapid microlightguide spectrophotometer (EMPHO II). In a first series of investigations, ischemia or congestion of the skin was induced by upper arm compression to 250 mmHg or 80 mmHg, respectively. The data show that HbO2 decreased under conditions of ischemia but also congestion, while Hbcon increased enormously under congestion alone. In a second series of experiments, the local oxygen uptakes of the skin under various temperature conditions (5 to 45 degrees Celsius) were determined from the decrease of intercapillary oxygen content [d(Hbcon*HbO2)/dt] which was induced by a stop of blood flow. We concluded that the measurement of intracapillary hemoglobin oxygenation of human skin by EMPHO II is reliable and stable under several conditions. Furthermore, our data suggested that the changes in HbO2, Hbcon and O2 uptake of the skin seem to be a very useful
parameter which can quickly change when tissue hypoxia occurs by unbalance of O2-demand andsupply.