

11. Micro-light guide spectrophotometric measurement of changes in local haemoglobin oxygenation and concentration in the rabbit lung induced by hypoxia and hyperoxia.

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Due to the high flexibility of the micro-light guides used with the Erlangen micro-light guide spectrophotometer (EMPHO) the instrument can be coupled to the lung surface without interfering with the local lung mechanics. The local pressure exerted on the lung varies between 45 and 47 mg/cm². This enables the continuous investigation of local haemoglobin oxygenation and relative local haemoglobin concentration. The effect of different inspired oxygen concentrations on local oxygen saturation of intravascular haemoglobin and relative local haemoglobin concentration was investigated in 6 rabbits. The animals were anaesthetized, intubated and artificially ventilated. After thoracotomy, a light guide was placed on the pleural lung surface and haemoglobin spectra were measured at a frequency of 5 Hz using the EMPHO. Two types of changes in the local haemoglobin concentration were observed; one was correlated with the respiratory cycle. During inspiration a decrease in relative local haemoglobin concentration was observed. Opposite changes occurred during expiration. These changes were observed with simultaneous changes in local haemoglobin oxygenation. The oxygenation increased during inspiration and decreased during expiration. The amplitude of the oxygenation changes depended on the fraction of inspired oxygen FiO₂. A second type of reaction in local haemoglobin concentration was observed when the inspired oxygen concentration was decreased or increased by changing the FiO₂. A decrease in the oxygen partial pressure in the inspired gas mixture (PiO₂) was associated with an increase in relative local haemoglobin concentration, whereas an increase in PiO₂ was accompanied by a decrease in relative local haemoglobin concentration. (ABSTRACT TRUNCATED AT 250 WORDS)

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