ABSTRACT

The present invention discloses methods and apparatus for the quantitation and localization of tissue hypoxia by both time and frequency domain spectroscopy. The present invention provides several alternate embodiments of apparatus by which the saturation of a tissue region may be determined. In the time-resolved embodiment, a simplified system provides data which are directly proportional to the tissue saturation. In the phase modulating embodiments of the present invention, a first embodiment provides phase shift data which may be converted into saturation readings. A second embodiment, separates the real and imaginary portions of the signal and uses these data along with the data gathered from the DC portion of the signal to determine saturation. Methods of determining the hemoglobin concentration/oxygenation of a tissue region are also disclosed.

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