

PHOTOPLETHYSMOGRAPHY AND PULSE OXIMETRY OF BODY CAVITIES AND ORGANS*

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Pulse oximetry is as a non-invasive photometric technique that provides non-invasively information about the global arterial blood oxygen saturation (SpO_2) and heart rate, and has widespread clinical applications. This can be made possible via the peripheral pulse oximetry probes mainly attached to the finger, toe or earlobe. However, there is a need for monitoring perfusion on a more regional level. The direct application of pulse oximetry to an organ such as the esophagus, liver, kidney, brain or the bowel might be a very useful application in determining organ specific SpO_2 , regardless if the patients SpO_2 as measured from an extremity (finger) is normal, and therefore reducing the risk of hypoperfusion, severe ischemia, multiple organ failure, and, ultimately, death. Also, the placement of a pulse oximetry probe at a more central site such as the esophagus might be proved more reliable at a time where conventional peripheral oximetry fails. The focus of this paper will be in the development and in vivo applications of new custom made photoplethysmographic (PPG) and pulse oximetry optical and fiber optic probes and instrumentation in an effort to investigate their suitability in the estimation of blood oxygen saturation and their contribution in the assessment of organ/tissue perfusion and viability. The paper will cover examples of application areas including real-time PPG monitoring using custom made probes from body cavities and solid organs, including free flaps.
