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# Oesophageal Pulse Oximetry: A New Monitoring Site

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## Introduction

Pulse oximeter probes placed peripherally may fail to give accurate values of arterial blood oxygen saturation (SpO<sub>2</sub>) when peripheral perfusion is poor. Since central blood flow may be preferentially preserved, the oesophagus was investigated as an alternative monitoring site.

## Methods

A miniature opto-electronic reflectance pulse oximetry probe was constructed to allow SpO<sub>2</sub> measurements within the whole depth of the oesophagus [1]. A processing system was developed to detect and display the oesophageal photoplethysmographic (PPG) signals on a laptop computer. Software was implemented in *LabVIEW* to make continual estimations of oesophageal SpO<sub>2</sub>. The system was evaluated on clinical measurements performed on 50 critically ill patients undergoing thoracic surgery, mainly cardiothoracic bypass. Oesophageal SpO<sub>2</sub> values were systematically compared with both conventional finger SpO<sub>2</sub> measurements and arterial blood oxygen saturation (SaO<sub>2</sub>) values obtained from laboratory blood analysis.

## Results

It was found that the oesophageal pulse oximeter was in good agreement with SaO<sub>2</sub> measurements obtained by a blood gas analyser and a CO-oximeter and with SpO<sub>2</sub> values from a commercial finger pulse oximeter. The means ( $\pm$  SD) of the differences between the oesophageal SpO<sub>2</sub> and SaO<sub>2</sub> results from blood gas analysis and CO-oximetry were  $0.02 \pm 0.88\%$  and  $-0.73 \pm 0.72\%$ , respectively. A Bland and Altman statistical analysis showed that the oesophageal and finger pulse oximeters agreed sufficiently to allow them to be used interchangeably. In five patients SpO<sub>2</sub> readings from the commercial finger pulse oximeter probe failed for at least ten minutes while the oesophageal readings remained stable and reliable.

## Conclusion

The results from the clinical measurements suggest that oesophageal pulse oximetry may be used as an alternative for patients with compromised peripheral perfusion.

## References

[1] Kyriacou, PA, Moye, AR, Choi, DMA, Langford, RM, and Jones, DP. A system for investigating oesophageal photoplethysmographic signals in anaesthetised patients. *Med. & Biol. Eng. & Comput.*, 1999; 37: 639-43