

- 2 Venous blood sampling (not arterial or capillary) using a tourniquet to minimise PO₂ level.
- 3 Preferably a reliable glucometer using a measurement technique that is PO₂-independent, such as the SureStepPro (LifeScan Inc; Milpitas, CA) and the YSI 2300 STAT PLUS (Yellow Springs Instruments, Yellow Springs, OH). However, I cannot recommend the Precision PCx (PCx, Abbott Laboratories; Bedford, MA) and would be wary of any system that uses the glucose oxidase method with electrochemical detection techniques.

David Vote

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Key Words

Diabetes, hyperbaric oxygen, hyperbaric research, letter.

Dr Vote's letter has been shown to Drs Ekanayake and Doolette. Their reply is reproduced below.

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01/4/26

Dear Editor

We thank Dr Vote for his comments about our study on the effects of hyperbaric oxygen treatment on blood sugar and insulin levels in diabetics.¹ The evidence from previous brief reports and from our small study suggests a fall in blood glucose in diabetics during hyperbaric oxygen therapy and we await with interest the results of the Duke University

and Prince of Wales Hospital studies. Dr Vote's comments are a reminder that monitoring of blood glucose during hyperbaric oxygen therapy is problematic as clearly demonstrated in his and colleagues' careful study of two blood glucose meters.² It was an oversight on our part not to give more detail of the blood sampling and analysis methods, particularly since one of us was fortunate to see a pre-print of Dr Vote's manuscript before submitting our own.

In our study, blood was collected from the antecubital or a forearm vein as described, without a tourniquet. Samples were collected into fluoride-oxalate tubes and batch analysed by the hexokinase method under normobaric conditions following each study; the time between collection and analysis therefore differed for each sample but exceeded one hour. Samples from all four arms of our study were treated identically. Although PO₂ was not measured, we believe that the PO₂ of these samples would not have been elevated at the time of analysis and therefore not interfered with glucose measurement. As Dr Vote also points out, the use of control patients provides reassurance of accuracy. Edge's earlier study of the hexokinase method is an important illustration of the difficulties of glucose monitoring but is not directly comparable to the present study since it showed that a glucometer inside the chamber at 3.7 bar absolute air pressure produced falsely *elevated* glucose readings compared to instruments outside the chamber.³

We agree with Dr Vote that, in the case of insulin dependent diabetics, it is improbable that hyperbaric oxygen decreases blood glucose by stimulating endogenous insulin secretion, as has been previously hypothesised.⁴ Indeed our study provides evidence against this proposed mechanism since serum insulin did not increase during hyperbaric oxygen therapy in any of the subjects in our study.

Lalith Ekanayake and David Doolette

References

- 1 Ekanayake L and Doolette DJ. Effects of hyperbaric oxygen treatment on blood sugar levels and insulin levels in diabetics. *SPUMS J* 2001; 31 (1): 16-20
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