In type 1 diabetes, new technology creates opportunities to dive with increased safety

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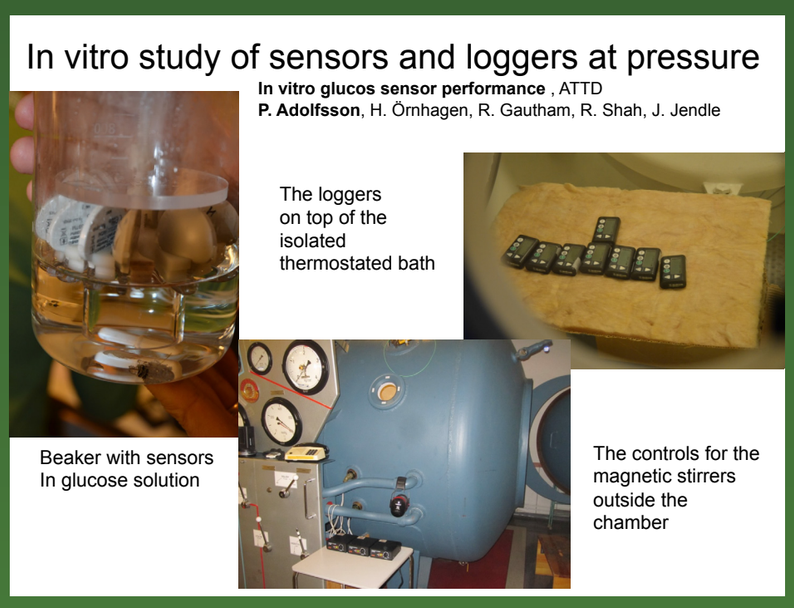
Take home message:
Using today available techniques for blood glucose determination such as Diasend and CGM, assessment of fitness to dive gets easier and diving safer for persons with diabetes.

Introduction

In type 1 diabetes glucose control has been assessed by self-monitoring of blood glucose. Continuous glucose monitoring (CGM) offers an alternative, complementary method. Studies have been conducted where CGM have been used during scuba diving and in a pressure chamber, providing a basis for the updated Swedish recommendations on recreational diving and diabetes mellitus.

The underwater sign for "I feel symptoms of hypoglycemia".



Results

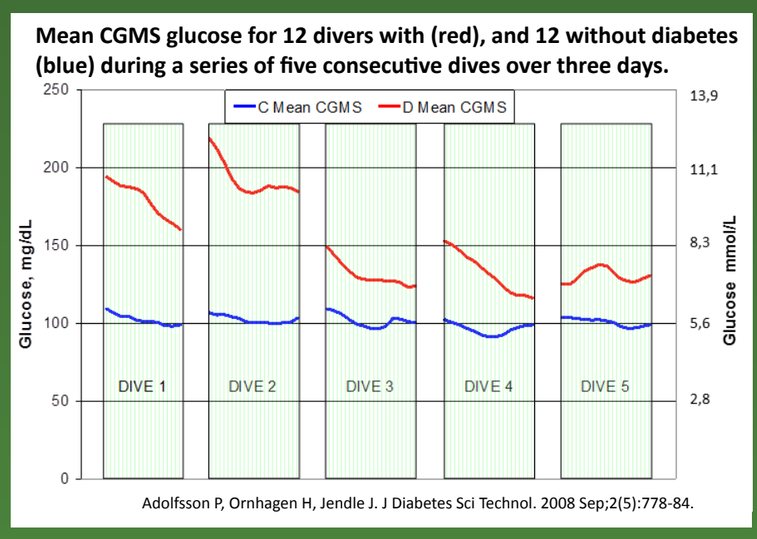
Used under a dry suit, CGM recordings were available during a total of 117 dives. Mean Absolute Relative Difference (MARD) between plasma and interstitial glucose was 14.4 ± 6% and 13.1 ± 5.4%, whereas coefficient of correlation (r) was 0.93 ± 0.04 and 0.95 ± 0.02. Hypoglycemia without symptoms was detected.
In the pressure chamber all 24 sensors worked. No significant differences in sensor signal were noticed depending on applied pressure conditions, glucose concentration, pre-wetted sensor or sensor insertion site in these studies.

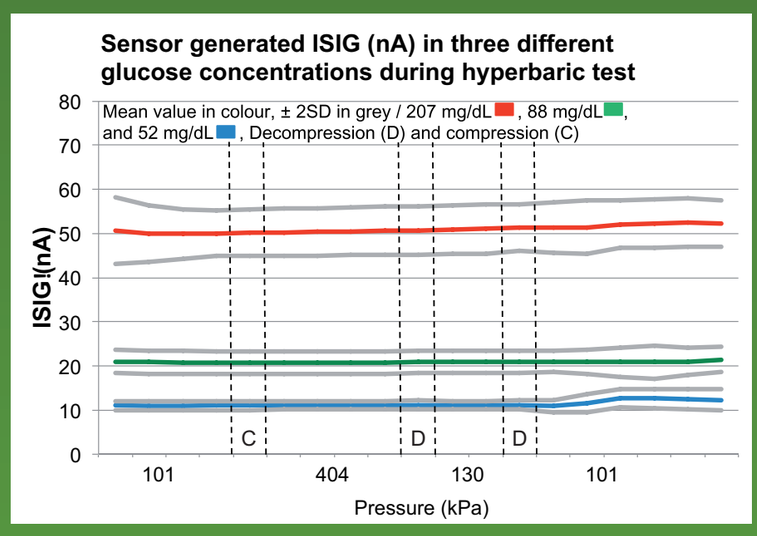
Discussion

When assessing Fitness to dive (FTD), CGM offers a potential advantage revealing hypoglycemia unawareness. In close relation to, and before a dive, CGM, provide a useful tool improving the knowledge base whether a dive should be conducted or not. The fact that the CGM technique can be used dry, but pressurized, under a diving suit, without the use of pressure proof containers, makes it simpler to collect information regarding blood glucose also during diving. This will increase diving safety in divers with diabetes.

Methods

CGM (Medtronic, SOF) was used during five repetitive scuba air dives during three days using dry suit. Later CGM (Medtronic, Enlite) was evaluated in a pressure chamber including both an *in vitro* and an *in vivo* study. Sensors, attached to two different Medtronic CGM systems, were immersed into three different glucose concentrations and exposed to scheduled pressure changes between 100 and 400 kPa. The performance of 24 sensors was also evaluated attached in one healthy individual who was exposed to the same scheduled pressure changes.





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