

The Benefits of Continuous Glucose Monitoring and a Glucose Monitoring Schedule in Individuals with Type 1 Diabetes during Recreational Diving

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Abstract

Background:

Our objective is to evaluate the Medtronic CGMS[®] continuous glucose monitoring system and plasma glucose (PG) measurement performed in a monitoring schedule as tools to identify individuals with type 1 diabetes at risk when diving.

Methods:

We studied 24 adults, 12 type 1 diabetes subjects and 12 controls, during 5 recreational scuba dives performed on 3 consecutive days. The CGMS was used by all participants on all the days and all the dives. Comparisons were made between PG performed in a monitoring schedule during the days of diving, self-monitored blood glucose (SMBG) performed 2 weeks prior to diving, and the CGMS during the study.

Results:

One hundred seventeen dives were performed. Hypoglycemia (<70 mg/dl) was found in six individuals and on nine occasions. However, no symptoms of hypoglycemia were present during or immediately postdiving. In one case, repetitive hypoglycemia prediving gave rise to a decision not to dive. None of the dives were aborted. The number of hypoglycemic episodes, 10 min prediving or immediately postdiving, were related to the duration of diabetes, $r = 0.83$ and $p = 0.01$, and the percentage of SMBG values below target (<72 mg/dl), $r = 0.65$ and $p = 0.02$. Moreover, the number of hypoglycemic episodes was also related to the total duration below low limit (<70 mg/dl), measured by the CGMS, $r = 0.74$ and $p = 0.006$.

Conclusion:

Safe dives are possible to achieve by well-informed, well-controlled individuals with type 1 diabetes. Using downloaded SMBG, CGMS, and repetitive PG in a monitoring schedule, it is possible to identify those subjects who are suitable for diving.

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Abbreviations: (CSII) continuous subcutaneous insulin infusion, (IG) interstitial glucose, (MAD) mean absolute difference, (MDI) multiple daily injections, (NGSP) National Glycohemoglobin Standardization Program, (PG) plasma glucose, (SEM) standard error of mean, (SMBG) self-monitored blood glucose

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