

Scuba Diving and Diabetes

Practical guidelines

We have been asked to sign medical release forms for diabetic patients who wish to scuba dive. With minimal personal experience and ambivalent literature (1–4), we developed a questionnaire to gather information about individuals with diabetes who dive that has been completed by 18 active divers with insulin-dependent diabetes mellitus (IDDM). This information has helped us develop safety tips for such people. Nine women and nine men responded to our questionnaire. Their ages ranged from 14 to 46 years, with a mean of 33 years. Duration of diabetes was 2–27 years, with a mean of 12 years.

Seventeen individuals took two to four insulin injections daily, and one patient used an insulin pump. All patients monitored their blood glucose; 17 monitored more frequently the day of and the day after scuba diving. Of the 18 patients, 16 increased their carbohydrate intake the day of a dive and ate within 60 min of their dive. All patients avoided alcohol use for 24 h before diving and carried a liquid form of glucose to treat hypoglycemia on the day of the dive. Thirteen of the patients carried glucose with them when diving. No patients reported hypoglycemia during the dive. Three individuals reported a successful trial of ingesting liquid glucose during the dive.

Of the 18 patients, 17 were certified divers with from 1 month to 19 years of diving experience. Three of these individuals were certified before the onset of diabetes. Five had received a medical release stating that they had diabetes. Seventeen of the 18 patients always dive with a buddy. The adverse experiences reported by these individuals included one episode of indigestion, one episode of ear congestion, and one report of being lost under water, unrelated to hypoglycemia.

The remaining 15 individuals have had no adverse experiences while diving.

We believe that individuals should be accountable for their own personal safety. In accentuating the safety of a person with diabetes who chooses to scuba dive, consider the following guidelines.

1. Blood glucose should be measured and be >150 mg/dl before the dive, and the dive should follow a meal.
2. If blood glucose before the dive is <150 mg/dl, 5 g of glucose for every 25 mg under 150 mg/dl should be ingested. Carbohydrates in the form of simple sugars should be ingested, such as fruit juice, milk, or glucose tablets/liquid.
3. The diver should carry liquid glucose in the wet suit during the dive and use as needed.
4. The diver should measure the blood glucose after the dive and ingest glucose as needed.
5. The diver should always dive with a companion who understands how to recognize and treat a hypoglycemic reaction. When under water, divers should have a pre-arranged means to communicate the likely presence of hypoglycemia.
6. Glycemic control should be stable during the days of planned diving.
7. Alcohol should not be used 24 h before or during diving activities.

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Measurement of D-chiro-Inositol in Clinical Studies

A recent report by Suzuki et al. (1) in *Diabetes Care* relates urinary chiro-inositol excretion to insulin sensitivity. Since D-chiro-inositol may be involved in the mediation of insulin action, this is an important research area, but the conclusions depend critically on the method of measurement for D-chiro-inositol. The authors (1) use gas chromatography/mass spectrometry (GC/MS), a technique that is highly specific but prone to errors in quantitation under some circumstances. Their method, given by citation of previous work (2), requires that before analysis chiro-inositol be partially purified with quantitative recovery and that the analyzed samples produce equivalent ionization in the mass spectrometer ion source. In our own assays of D-chiro-inositol using several derivatives and both positive and negative ion GC/MS, we have noted that incomplete purification and/or recovery of samples often results in reduction or even complete loss of our ability to detect D-chiro-inositol. For this reason, we routinely add hexadeuterated chiro-inositol to all samples as an internal standard and we compare our results to a standard curve also containing deuterated chiro-inositol (3). As described in Kennington et al. (2), the authors did not use any internal standard. Thus, reduction in the amount of D-chiro-inositol that they observed in diabetic urine relative to that in control samples may be due to either a reduced chiro-inositol level, as they