

Commercial diving with insulin-dependent diabetes

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Introduction / background

Insulin-dependent diabetes is usually considered to prohibit commercial diving but legislation in many countries to prevent employment discrimination against persons with disabilities warrants re-examination of this issue.

Materials / methods

A 32 year old male experienced commercial diver presented for a diving medical examination despite having developed insulin dependent type-1 diabetes. Extensive investigations and consultations were undertaken (endocrinologist, ophthalmologist, cardiologist, nephrologist, neurologist and family physician).

Compliance with medical and diving restrictions

Date	Lantus	Glucose Pre (mmol)	Duration (mins)	Depth (feet)	Glucose Post (mmol)	Activity Level	Aerobic or anaerobic	Description		Difference	
04/10/2012	16	13.1	37	15	10.2	Moderate	Aerobic	Swimming Inspection of Wharf		-2.9	
04/10/2012	16	10.2	30	15	7.6	Moderate	Aerobic	Swimming Inspection of Wharf		-2.6	
09/10/2012	8	13.5	110	15	12.9	Moderate	Aerobic	First Half of dive was swimming inspection and manual cleaning of blades with hand tools		-0.6	
		12.9			15	Moderate	Anaerobic	Second Half of dive was polishing propeller blade with hydraulic grinder		2.1	
20/10/2012	10	12	19	25	12.7	Mild	Anaerobic	Removal of Plug in stern seal		0.7	
20/10/2012	10	12.7	25	25	10.2	Moderate	Aerobic	Swimming Inspection of vessel		-2.5	
20/10/2012	10	10.2	25	25	10.3	Mild	Anaerobic	Poker Gauge Readings		0.1	
24/10/2012	10	13.7	147	15	7.7	Moderate	Aerobic	Manual Removal of logs, sticks and debris from pit		-6	
24/10/2012	10	7.7	50	15	7.4	Mild	N/A	Removal of sediment using pump		-0.3	
26/10/2012	10	14.1	92	15	10.2	Moderate	Aerobic	Manual Removal of logs, sticks and debris from pit		-3.9	
05/11/2012	10	10.2	25	40	9.5	Mild	N/A	Inspection of wharf face		-0.7	
Note 1: Intentionally starting with a higher than normal glucose level to error on the side of caution until more results can be established											
Note 2: Normal Lantus levels are 18 - 20 / day. Reduced intentionally on dive days as this seems to be a major factor.											

Results

- No end-organ damage, exercise stress testing (EST) normal
- Hb A1C and blood glucose control were good, including after regular exercise.
- Dive helmet configured to use nose pusher to give oral glucose
- Diver’s employer was supportive
- Diver permitted to dive
- Diving physician required multiple restrictions

Medical restrictions

- Review at 6 months and full medical annually
- Recording pre- and post-dive glucose for review
- Exercise Stress Test bi-annual, annual after age 40
- Hb A1C every medical (< 9 required, < 8 preferred)
- All specialist assessments must be available to diving physician
- Dive physician may require additional investigations
- Dive medical only by particular experienced dive physicians

The lowest post-dive glucose so far was 7.4 mmol/l

Note: Blood glucose (mmol/l) * 18 = blood glucose (mg/dl)

Equipment for glucose drink during helmet diving (tested but never needed)



Diving restrictions

- Prior to dive no insulin for 4 hrs, no insulin pump for 2 hrs
- No decompression diving
- Depth 75 fsw maximum
- Glucometer > 7 mmol/l, stable or rising trend required prior to diving (repeated testing necessary before diving)
- Method for oral glucose during dive mandatory
- Diving requiring strenuous exercise prohibited
- Audio communications mandatory
- Dive team aware of signs and treatment of hypoglycemia
- Drink glucose, terminate dive if hypoglycemia symptoms
- Regular physical exercise required
- Avoid environments requiring strenuous diving exertion

Summary / conclusions

- The diver has so far not had any symptomatic hypoglycemic episodes or needed glucose during diving and has complied with all the restrictions imposed by the diving physician.
- Commercial diving may be safely permitted by an experienced diving medicine physician in carefully screened and selected insulin-dependent diabetics adhering to specific restrictions.
- Technological development of glucose monitoring and insulin pumps are likely to enable more diabetics to safely work as commercial divers.