Return to Diving for the Sport Diver After an Episode of Decompression Illness

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Introduction

A major decision to consider after an episode of decompression illness (DCI) has occurred is: **When can the diver resume diving activities?**

Criteria for return to diving have not been fully formulated, universally agreed upon or well promulgated for the multiple variations of DCI presentations and the different outcomes observed after treatment

Our Challenge

To generate a template that offers an easy-to-understand guide for decision making about return to diving activities after DCI. Two questions needed to be answered, namely

- Is the DCI "hit" **deserved or undeserved**?
- After treatment and/or recovery, **has the diver's condition returned to baseline or do residuals of the DCI "hit" remain?**

Methods

During the past 33 years, we have treated over 400 patients with DCI

Typically, one of the initial questions from the patient after evaluation and treatment is "When can I return to diving?" To standardize our recommendations we have generated a four-quadrant template to provide guidelines to this question.

The sources of information to generate the template include our experiences, collaboration with colleagues in undersea and hyperbaric medicine and reviews of the undersea and hyperbaric medicine literature

Our Return to Diving Guidelines

Residuals[1]	Deserved DCI[2]	Undeserved DCI[3]
No	YES (May return to diving at a minimum of 2 weeks after becoming asymptomatic)	NO* (Advised not to return to diving —see comment below)
Yes	NO (Return to diving not recommended)	NO (Return to diving strongly advised against)

Residuals[1]: Significant neurological symptom(s) persisting after appropriate management

Deserved DCI[2]: Dive table and/or dive computer violations or disordered decompression events

Undeserved DCI[3]: No table violations or unsafe diving practices identified; concerns because of inherited decompression illness prone factors (e.g.. PFO, coagulopathy, etc)

*If diver is determined to resume diving activities, then 1) Obtain bubble study echocardiogram to evaluate for PFO, 2) Neurology clearance including brain & spine MRI's and 3) trial recompression on air, breathing from a regulator, to 60 feet for 60 minutes in the hyperbaric chamber and assess for symptom development

Others Advice for Return to Diving

- **Dr. Albert Behnke:** Diver may return to diving when able to resume "full running activity"
- **"Old" US Navy guidelines:** If diver is fully recovered after hyperbaric treatment; Table 1- return to diving after one week; Table 2 - return to diving after two weeks; Table 4 – return to diving after four weeks, etc.
- **Undersea Medical Society Workshop** (1980): Diver may return to diving the day after recompression treatment, if fully recovered
- **Undersea and Hyperbaric Medicine Colleagues:** Two weeks to 2 months to allow full recovery of endothelial injury from inert gas, if asymptomatic

Conclusions

Dr Behnke's recommendation for return to diving after a DCI "hit" is insightful

Opinions vary greatly as to when to return to diving after a DCI "hit"

Our guidelines include the various outcome permutations after treatment of an episode of DCI and provide a logical approach for advising a diver on return to diving issues for each permutation

When decompression illness is undeserved, return to diving activities is not advised. However, our guidelines provide a logical approach for a diver to make a well informed decision regarding return to diving activities after an undeserved DCI "hit" if the individual is determined to dive again.

If significant neurological residuals are present after HBO-recompression treatments are completed, return to diving is not recommended

Sensible, consistent and objective advice can be provided to divers who have experienced DCI and want to return to diving by utilizing our four quadrant decision making guideline

References

1. U.S Navy Diving Manual, Revision 6, Published April 2008, Volume 5, Chapter 20 p28, available at http://supsalv.org/pdf/DiveMan_rev6.pdf Accessed on May 20, 2010
2. Workshop on DCS: Return to active diving after decompression sickness or arterial gas embolism, a report of the May 28, 1980 meeting held at New Orleans, Louisiana, Chairman Jefferson C. Davis, M.D., Undersea Medical Society, Incorporated, 9650 Rockville Pike, Bethesda, Maryland, 20014 UMS Publication Number 41
3. Brubakk A, Neuman T. Bennett and Elliott's Physiology and Medicine of Diving (5th Edition). Saudners, Philadelphia PA, USA 2004, p 704
4. Bove AA. Bove and Davis' Diving Medicine (4th Edition), Saunders, Philadelphia PA, USA 2004, pp542-543
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Examples of Return to Diving Challenges

Deserved/No Residuals

A 50-year-old experienced male diver flagrantly omitted a decompression stop as recommended by his dive computer while returning to the surface from catching lobsters. He recovered fully from shoulder-pain only decompression sickness with a single HBO-recompression treatment and a "washout" HBO treatment the following day. The diver was advised to follow his dive computer alerts and not to return to diving for at least 2 weeks. He returned 48 hours later with recurrent symptoms in the same joint after having resumed diving activities earlier than medically advised.

Comment: The diver did not follow the advice provided above. Had he waited 2 weeks before diving again, he likely would he have avoided recurrent symptoms even though in the second episode of DCS he reportedly followed his dive computer recommendations accurately.

Undeserved/No Residuals

A 51-year-old female diver develops a passion for SCUBA diving after becoming a certified diver for her 50th birthday. On her 11th dive she develops shoulder pain and right arm paresthesias even though she was well within the "safety limits" of her dive computer. Her symptoms cleared with a single HBO-recompression treatment.

She was advised not to return to diving because of the undeserved "hit," but was determined to resume diving!

Comment: After comprehensive discussions including the risks of resuming diving, she underwent a bubble study echocardiogram, spine & brain MRI's and a test dive (60 feet for 60 minutes on air). With the negative workup and asymptomatic pressure challenge she was given our OK to return to diving. The patient was advised to avoid predispositions to DCS such as dehydration, poor fitness, high volume repetitive diving activities, chilling, etc. She was also advised to always use safe ascent rates & rest stops, dive Nitrox on air tables and use the most conservative settings on her dive computer. To date there has been no reports of recurrent DCI events