

Evaluation and Treatment of DCS

Obtain: Pt Name, Age, SSAN (all info for phone consult sheet).

Detailed exposure history (depth, bottom time, exact deco stops, surface intervals, breathing gas, repets, deco tables used: Altitude, time into flight when Sx developed, O₂ prebreathe). Corroborate history with diving buddy, co-worker, spouse, etc.

Detailed progression of symptoms - onset, location, duration. ?Decrease on 100% O₂?

Nature of field treatment. ?On 100% O₂ now? Severity of current Sx.

For diving related DCS: use TT-6 even if Sx have “greatly abated” with prior therapy. Recurrence rates for treatment with SLO₂ or TT-5 are too high.

For altitude chamber related DCS: If joint pain only - absolutely no other Sx - and gets significantly better within 30 min on 100% surface level O₂ (SLO₂), fully resolved within 2 Hr on O₂: recommend at least 1 hour SLO₂ after 100% symptom free with a minimum of 2 hours of O₂. May observe as outpatient. F/U next day to document stable resolution. Instruct no fly or dive X 3 days, maintain hydration, no sports or exercise or strenuous activity, avoid alcoholic beverages. Return PRN (or in 3 days if needs RTFS).

Continuing for altitude hits: if any residual symptoms after 2 hours SLO₂ (sooner at discretion of treating physician - no improvement after 30 min SLO₂, sooner if condition worsening), begin hyperbaric treatment. If simple joint pains only, may try TT-5. Complete resolution of all Sx MUST occur no later than 10 minutes into the first O₂ period at 60 FSW. Even a “sensation” or “joint presence” requires moving to full TT-6. Most patients who are successfully treated on a TT-5 will report significant resolution of almost all their symptoms during the DESCENT to 60 FSW, even before O₂ is applied (multiplace chamber).

For all DCS: ensure a complete neurological exam is conducted! Often, vague suspicions regarding clarity of the patients thought process can be easily confirmed if a solid baseline is established prior to treatment. Serial 3's or 7's; spelling 5 letter words forward and backward; Rhomberg and sharpened Rhomberg; Rinnes and Webers tests; olfactory sensation (use spices in capped pill-bottles); are quick and simple procedures that may reveal hidden deficits! Neuro exam is doubly important if Pt reports any symptoms related to the CNS such as dizziness, gait disturbances, headache, feeling “fuzzy” or inability to concentrate.

If a TT-6 is used, I recommend doing extensions at 60 FSW for one full 20 min O₂ period AFTER the Pt symptoms completely resolve. Do not exceed the maximum total of 5, 20 minute periods at 60 FSW. The decision to extend at 30 FSW past the standard 6, 20 min periods (USAF) or 2, 60 min periods (USN) should be based on the patients progress. If the patients symptoms completely resolved at 60 FSW, even if extensions were used, there is no need to extend at 30 FSW. If there was some residua at 60 FSW, but the Pt fully resolved at 30 FSW, ascent may begin once the patient has had at least one full O₂ breathing period (20 min) after becoming symptom free. If the patient has residual symptoms at 30 FSW, up to 2 more hours of O₂ may be given in either 20 minute periods with 5 min breaks, or in 1 hour periods with 15 min breaks. As long as the patient remains symptomatic, I recommend using all extensions before ascending to the next level. If all extensions have been used and the patient experiences recurrence during ascent, one must consider moving to a TT-4, TT-7, or the Catalina table.

With TT-6, particularly with extensions, one must expect onset of some symptoms related to pulmonary O₂ toxicity. These may range from a “tickle” in the back of the throat, a light dry cough, all the way to severe, pleuritic, inspiratory pain. It may be differentiated from chokes as onset is a new complaint that begins during treatment, and is slow in development rather than fulminant.

If the Pt completes a full TT-6 with extensions and emerges improved, but with residual symptoms, a second TT-6 (or TT-5, depending on consultation with a hyperbaricist) should be planned for 12 hours after the completion of the first dive. The same considerations would be given for recurrence of mild joint pains (more severe recurrence should be evaluated promptly for retreatment). Residual symptoms following 2 TT-6's may be treated with tailing dives using either wound care profiles at 45 FSW, or TT-5's.

As a general rule, I recommend patients not fly for 72 hours after any episode of DCS, however those having mild symptoms responding to either SLO₂ or a TT-5 may fly after 24 hours if operational considerations so dictate (and there have been no recurrences of any symptoms). The patient should only be returned to flight status (RTFS) after a full, follow-up examination.

Diving activities may be resumed (per pending USN Diveman): 48 hours after successful treatment with a TT-5; 30 days following a TT-6 or the last treatment dive for multiple tailing treatments; and 3 months following any DCS hit serious enough to require treatment using a Catalina, TT-4 or TT-7. Navy divers must have their cases reviewed by a DMO (Dive Medical Officer).

After all treatment dives, each patient must be counseled to not fly or dive for 3 days (except as outlined above), maintain hydration, no sports or exercise or strenuous activity, avoid alcoholic beverages, and contact the treating physician if there is any worsening of their condition. Return PRN (or as indicated if needs RTFS).

For aviators or rated flight crew needing RTFS following a fully resolved, single neurological DCS hit, a neurologist's clearing evaluation is required. If all is normal, waiver is not required. Concurrence for RTFS must also be obtained with the consultant at the Davis Hyperbaric Laboratory, as well as the MAJCOM flight surgeon. Mild neurological residua may be considered for flying following full aeromedical evaluation and waiver processing.

It is very poor form to BEND your Inside Observer (IO) as a result of a treatment protocol. You may already have safe IO protocols you trust. There are newer profiles based on computer modeling suggest that on a TT-6, the IO should breathe 20 min of O₂ during the Pt's third O₂ period at 60 FSW. If there are any extensions at 60 FSW, the IO should also breathe O₂ during the 30 minute ascent from 60 FSW to 30 FSW. After 130 min at 30 FSW, the IO should take 20 min of O₂. This would normally be followed by the 30 min ascent on O₂ if the patient has resolved. If extensions at 30 FSW are required, the IO should plan on an additional 4.3 min of O₂ per 20 minutes of extension time (13 minutes per hour at depth) prior to the eventual ascent, followed by the 30 min ascent also on O₂. For a TT-5, the IO should take 10 min of O₂ during the last half of the patient's second O₂ breathing period at 60 FSW, followed by a 5 min air break, then 30 min O₂ during the ascent from 60 FSW to 30 FSW. No additional O₂ is needed. This greatly decreases the IO's nitrogen load, producing a safer profile than is currently in USAF use. You may wish to implement these, or develop more tailored profiles, once you understand their derivation (see No-bendem Quiz 1 on our web site at <http://www.brooks.af.mil/web/hyper/>).