**Navy Experimental Diving Unit**
**321 Bullfinch Road**
**Panama City, FL 32407-7015**

**TA 03-09**
**NEDU TR 06-07**
**November 2007**

# THE INFLUENCE OF THERMAL EXPOSURE ON DIVER SUSCEPTIBILITY TO DECOMPRESSION SICKNESS


Authors:
WAYNE A. GERTH, PH.D.
VICTOR L. RUTERBUSCH, MD, LT, MC, USNR
EDWIN T. LONG, MD, CDR, MC, USN

**REPORT DOCUMENTATION PAGE**

| | |
|---|---|
| 1a. REPORT SECURITY CLASSIFICATION<br>Unclassified | 1b. RESTRICTIVE MARKINGS |
| 2a. SECURITY CLASSIFICATION AUTHORITY | 3. DISTRIBUTION/AVAILABILITY OF REPORT<br>DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited. |
| 2b. DECLASSIFICATION/DOWNGRADING AUTHORITY | |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S)<br>NEDU Technical Report No. 06-07 | 5. MONITORING ORGANIZATION REPORT NUMBER(S) |
| 6a. NAME OF PERFORMING ORGANIZATION<br>Navy Experimental Diving Unit<br>6b. OFFICE SYMBOL (If Applicable)<br>O2 | 7a. NAME OF MONITORING ORGANIZATION |
| 6c. ADDRESS (City, State, and ZIP Code)<br>321 Bullfinch Road, Panama City, FL 32407-7015 | 7b. ADDRESS (City, State, and Zip Code) |
| 8a. NAME OF FUNDING SPONSORING ORGANIZATION<br>Office of Naval Research<br>8b. OFFICE SYMBOL (If Applicable) | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER |
| 8c. ADDRESS (City, State, and ZIP Code)<br>875 North Randolph Street<br>Arlington, VA 22203-1995 | 10. SOURCE OF FUNDING NUMBERS<br>N00014-04-WR-2-0064<br>PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO. 03-09 / WORK UNIT ACCESSION NO. |
| 11. TITLE (Include Security Classification)<br>(U) THE INFLUENCE OF THERMAL EXPOSURE ON DIVER SUSCEPTIBILITY TO DECOMPRESSION SICKNESS | |
| 12. PERSONAL AUTHOR(S)<br>Wayne A. Gerth, Ph.D; Victor L. Ruterbusch, MD, LT, MC, USNR; Edwin T. Long, MD, CDR, MC, USN. | |
| 13a. TYPE OF REPORT<br>Technical Report | 13b. TIME COVERED<br>FROM October 2003 TO June 2007 |
| 14. DATE OF REPORT (Month, Year)<br>November 2007 | 15. PAGE COUNT<br>70 |
| 16. SUPPLEMENTARY NOTATION | |
| 17. COSATI CODES<br>FIELD / GROUP / SUB-GROUP | 18. SUBJECT TERMS<br>Decompression sickness, thermal exposure, exercise, Diving/ *adverse effects, Human, Risk Factors, *Temperature, 2-D cardiac echo image bubble detection, ROC plots |

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The incidences of decompression sickness (DCS) were compared in divers who completed air decompression dives while fully immersed in water at temperature controlled independently [either warm (36.1 °C, 97 °F) or cold (26.7 °C, 80 °F)] during bottom time (BT) and decompression phases. Divers wore only loosely fitting swim trunks, t-shirts, and neoprene boots and dive gloves, performed cycle ergometer exercise while at bottom, rested during decompression, and remained under controlled resting conditions at 78 ± 5 °F (25.6 ± 2.8 °C) during the immediate 4 hr postdive period when they were monitored for central venous gas emboli (VGE) with 2-D cardiac echo imaging. Four hundred man-dives were completed with 21 diagnosed cases of DCS in seven series of dives to 120 feet of seawater (fsw) with different combinations of thermal conditions and BT from 25 to 70 min, but with the same U.S. Navy Standard Air 120 fsw/70 min (depth/BT) decompression schedule (stops: 30 fsw/9 min, 20 fsw/23 min, 10 fsw/55 min). Observed effects of water temperature on DCS risk during BT ($T_{W,B}$), water temperature during decompression ($T_{W,D}$), and different BT were isolated with a fitted logistic model. The DCS odds ratio for a 10 °C increase in $T_{W,B}$ was 23.8 (95% CI = 3.8–131.5), while the odds ratio for a 10 °C increase in $T_{W,D}$ was 0.01 (95% CI = 0.002–0.114). In

another series of 84 man-dives to 150 fsw and BT = 60 min, divers were cold during compression and bottom phases and warm during subsequent decompression on a U.S. Navy Standard Air 150 fsw/60 min schedule (stops: 40 fsw/3 min, 30 fsw/19 min, 20 fsw/26 min, 10 fsw/62 min). With only a single case of DCS, the DCS incidence in this series was significantly lower ($P<0.001$) than obtained in a series of 150 fsw/60 min dives (5 DCS in 20 man-dives) conducted in an earlier study with divers cold throughout the dives and decompressed on a schedule nearly 2.5 times longer. Postdive VGE scores were only weakly associated with DCS occurrence, with maximum VGE grades of 3 or 4 after flexion of any limb providing the best positive predictive values (PPV, area under PPV curve = 0.62). The area under the receiver-operator characteristic (ROC) curve for maximum VGE grades after flexion of any limb was only 0.61. Beneficial effects of warm conditions during decompression were more pronounced than deleterious effects of warm conditions during BT, while effects of a 10 °C increase in $T_{W,D}$ were comparable to effects of halving BT.

| 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT | 21. ABSTRACT SECURITY CLASSIFICATION |
|---|---|
| [ ] UNCLASSIFIED/UNLIMITED [X] SAME AS RPT. [ ] DTIC USERS | Unclassified |

| 22a. NAME OF RESPONSIBLE INDIVIDUAL | 22b. TELEPHONE (Include Area Code) | 22c. OFFICE SYMBOL |
|---|---|---|
| NEDU Librarian | 850-230-3100 | |

DD Form 1473 UNCLASSIFIED

# CONTENTS

## FIGURES

## ACKNOWLEDGMENTS

The authors are grateful to the U.S. Navy divers who volunteered to participate as diver-subjects in this study, to the Diving Medical Officers and Diving Medical Technicians who provided medical support of those divers, and to the remaining NEDU diving community personnel who provided engineering and operational support for the dives. The authors also thank Dr. Edward T. Flynn and Dr. David J. Doolette for critical reviews of early versions of this manuscript. This work was supported by Office of Naval Research Award No. N00014-04-WR-2-0064.

## 1. INTRODUCTION

Divers who ascend from depth too quickly risk the occurrence of decompression sickness (DCS), a syndrome that consists of symptoms and signs ranging from minor joint or muscular pain to various neurological disturbances, paralysis, and death. Interrupting ascent with one or more stops at intermediate depths controls this risk.[1] The numbers and lengths of stops in current U.S. Navy diving decompression tables are explicitly based on only the maximum dive depths and times at those depths. It is recognized, however, that diver thermal status during a dive may also require consideration.[2,3]

Experience with surface decompression dives in which decompressions are completed under relatively comfortable resting conditions in dry chambers suggests that DCS risk is increased with warm conditions on the bottom. In dives completed to validate new procedures for air diving with surface decompression using oxygen (air Sur D $O_2$), the DCS incidence was 4.3% (9/212) for dives completed in open water of 73 °F (23 °C) average temperature, but only 0.7% (1/151) for a similar series of chamber dives completed in water of 45 °F (7 °C) average temperature.[4] Four divers who developed DCS in warm water repeated the same schedules in cold water without DCS. The odds ratio for DCS in these data, combined with data from more than 1000 man-dives completed in the developmental phases of the work, was 1.96 (95% confidence limit [C.L.] = 1.33–2.90) for each 10 °C increase in water temperature.[2] In more recent experience with air Sur D $O_2$ procedures in North Sea commercial diving,[5] the DCS odds ratio was 1.81 (95% CI = 0.96–3.42) for use of hot water suits, which circulate a supply of warm water through tubes around the divers' bodies to keep them warm

during the dives, over passive thermal protection.[2] Similarly, schedules were jumped in the air Sur D $O_2$ recovery and salvage dives for TWA Flight 800 after DCS incidence was perceived to increase with use of hot water suits.[6] In accord with these indications from air Sur D $O_2$ diving, postdive venous gas emboli (VGE) scores were reportedly higher after no-stop open water dives with dry suits in 10 °C water than after otherwise identical dives with less thermally protective wet suits.[7]

Other evidence suggests that DCS incidence is increased with cold conditions during decompression. DCS incidence in caisson workers during construction of the Tyne Tunnel between 1948 and 1950 was not correlated with any climactic factors,[8] but another study concluded that DCS risk increases with cold postdive conditions after "risky" dives.[9] Consistent with this latter indication, Doppler-detectable bubbles were found in three of four subjects during cold (10 °C) air exposures, but in only one of four subjects during warm (40 °C) air exposures after no-stop decompressions from 12-hour air dives to 30 feet of seawater (fsw) (91.9 kPa).[10] Finally, in chamber dives conducted in U.S. and Canadian military hyperbaric laboratories, the relative risk of DCS in wet dives, during which divers were generally working and cold, was slightly increased compared to such risk in dry dives, during which divers were generally resting and thermally comfortable — an increase from 0.8 to 1.14, with an upper 95% C.L. of 1.8.[11]

While available evidence suggests a role for diver thermal status as a governor of DCS risk, it remains inconclusive.[3] For example, divers in the early development and validation of air Sur D $O_2$ procedures[4] wore U.S. Navy standard MK 5 diving dress, confounding the correlation between ambient water temperature and diver thermal exposure, while actual thermal exposures in the North Sea air Sur D $O_2$ dives[5] could not

be accurately characterized. In chamber dives[11] the separate effects of immersion, thermal exposure during different dive phases, and exercise could not be distinguished. The small difference in DCS incidence between wet and dry chamber dives could consequently have been due to only a limited impact of the stresses on DCS risk, or to offsetting effects of the combined stresses. Lacking a quantitative understanding of how diver thermal exposure influences DCS risk, the *U.S. Navy Diving Manual*[11] simply advises "jumping" to the next longer decompression schedule than the one that would normally be selected if the diver is exceptionally cold. Unfortunately this prescription is imprecise, and successive jumps in a table can be made on the basis of trial and error before the DCS incidence in a given diving operation is reduced to an acceptable level.[6] More direct and safer techniques than are currently available for determining appropriate decompressions require that influences of diver thermal conditions on DCS risk be established and quantified.

We here report the results of a man trial designed to unequivocally determine how diver thermal status during different phases of a dive influences the incidence of DCS, and to test whether appropriate manipulation of diver thermal status during different dive phases might afford operationally significant decreases in diver susceptibility to DCS. Diver thermal conditions during compression and time at bottom (bottom time [BT]) in each dive were controlled independently of the thermal conditions during subsequent in-water decompression. To provide unambiguous control of diver thermal exposure, divers wore only loosely fitting cotton t-shirts, swim trunks, and in some cases neoprene dive gloves, and they were fully immersed in water of controlled temperature throughout all dives. Divers were consequently nearly uniformly exposed to the thermal medium,

with mean skin temperatures approximately equal to the water temperature.[13] After surfacing from each dive, divers were maintained under controlled conditions during a 4-hour monitoring period.

## 2. METHODS

The trial was designed to use operationally accepted decompression dive profiles from the U.S. Navy Standard Air Decompression Table.[12] Each man-dive was characterized in terms of the dive profile (bottom depth, BT, and decompression schedule) and its accompanying thermal condition pair (water temperature during BT / water temperature during decompression). All dives were completed in the Navy Experimental Diving Unit (NEDU) Ocean Simulation Facility (OSF), with diver-subjects breathing surface-supplied air via MK 20 full face mask underwater breathing apparatus (UBA).

A detailed protocol for the study was reviewed and approved by the NEDU Institutional Review Board (IRB) before man-diving was started. All diver-subjects were U.S. Navy divers who had met the U.S. Navy physical qualification standards[14] for diving and been qualified on MK 20 UBA standard and emergency procedures as part of their dive training. Briefed on the procedures, risks, and benefits of the study, all diver-subjects signed consent forms and had medical record reviews and medical examinations before participating in the study. Other individual data obtained included those of birth date, height, weight, smoking history, history of any orthopedic injuries, abnormal neurological findings, and use of prescription drugs.

No systemic drugs except antibiotics and approved decongestants were allowed, unless a Diving Medical Officer (DMO) had cleared them. Since many divers take daily

ibuprofen or vitamins, such use was allowed as long as (1) the diver notified the DMO and recorded such usage in the predive section of a Diver Data Sheet that was completed for each man-dive, and (2) the diver took no more than his routine amount while participating as a diver-subject.

Alcohol consumption by diver-subjects during the 24 hours before and after diving was strongly discouraged. On the other hand, diver-subjects were strongly encouraged to consume a minimum of 500 mL of decaffeinated liquid on the morning of each dive to ensure that they were adequately hydrated.

Diver-subjects were allowed to participate in their regular exercise programs before and after participating in a dive for this study, but they were prohibited from any other hyperbaric or hypobaric (flight) exposure during a minimum of 60 hours before participation in a dive. Diver-subjects were also prohibited from any hyperbaric or hypobaric exposure during a minimum of 48 hours after a dive. The amounts of sleep obtained and exercise performed within the 24-hour period preceding each dive was documented in the predive section of the Diver Data Sheet. Postdive exercise was also documented in a postdive section of the Diver Data Sheet.

A DMO not otherwise involved in the study served as a medical monitor for each dive. The medical monitor interviewed diver-subjects on the mornings of their scheduled dives to verify their fitness to dive. Each diver-subject was interviewed again within 10 minutes of surfacing and at two hours, four hours, 24 hours, and 48 hours after surfacing. Diver-subjects were also required to contact NEDU at any time if they noticed any abnormal symptoms. The actual times of the postdive interviews and the presence

or absence of symptoms were noted in the postdive section of the Diver Data Sheet. The medical monitor examined all divers who reported symptoms, prescribed and supervised administration of any treatment in accord with guidance given in the *U.S. Navy Diving Manual, Revision 4*,[12] and made the final diagnoses of outcomes.

A diver who remained symptom free during the first 48 hours after completing a dive was given the diagnosis of "no DCS" and allowed to participate in another dive after an additional 12 hours had elapsed. A diver diagnosed with a Type I DCS injury was not allowed to participate in another dive until a minimum of seven days had passed and a DMO had cleared him to dive. A diver diagnosed with a Type II DCS injury was not allowed to participate in another dive until a minimum of four weeks had passed after the injury — and then not until a DMO had cleared him.

### 2.1 Dive Profile Selection

The initial test profile consisted of a dive to 120 fsw (367.6 kPa) for 30 min followed by decompression on the 120 fsw for 70 min U.S. Navy Standard Air schedule with a total decompression time (TDT) of 91 minutes (stops: 30 fsw/9 min, 20 fsw/23 min, 10 fsw/55 min).[12] The dive depth in this profile was similar to the depths of the TWA 800 recovery and salvage dives described by Leffler,[6] while the overall profile afforded substantial times at bottom and during decompression for divers to respond to the different thermal exposures. The DCS risks ($P_{DCS}$) estimated for this schedule by the BVM(3)[15] and NMRI98[16] probabilistic models are 2.9% and 1.9%, respectively. BT in the initial profile was increased or decreased in subsequent man-dives, depending on accumulated results; other factors such as the thermal conditions and decompression

schedule were kept unchanged. The initial profile afforded considerable latitude for BT increases without changing the decompression schedule or violating prescriptions of the Standard Air Decompression Table.

## 2.2 Thermal Conditions

The pairs of diver thermal conditions tested are shown in Table 1.

**Table 1.**
**Thermal Conditions Tested**

| | | DECOMPRESSION (In-Water) | |
|---|---|---|---|
| | | Warm (97 °F; 36.1 °C) | Cold (80 °F; 26.7 °C) |
| **COMPRESSION/ BOTTOM** | Warm (97 °F; 36.1 °C) | Warm/Warm (W/W) | **Warm/Cold (W/C)** |
| | Cold (80 °F; 26.7 °C) | **Cold/Warm (C/W)** | Cold/Cold (C/C) |

Unless notes indicate otherwise, divers wore only loosely fitting cotton t-shirts and swim trunks while fully immersed in water of the desired temperature throughout each dive. Water temperature was either "warm" [97 ± 1 °F (36.1 ± 0.6 °C)] or "cold" [80 ± 1 °F (26.7 ± 0.6 °C)]. The cold temperature was selected to be near the limits of diver tolerance determined for resting 90-minute exposures of similarly dressed water-immersed subjects in a pilot series of NEDU test pool dives. The warm temperature was well within the limits of diver tolerance for 70-minute exercising exposures during dive BT or for 115-minute resting exposures during decompression, but it challenged the limit established in earlier work for combined W/W exposures of up to 161 minutes.[17] As a result, all divers participating in W/W dives were required to drink at least 32 oz of Gatorade before and after immersion and were instructed to interrupt their exercise while at bottom (Section 2.4) if they felt overly hot or fatigued. Pre- and

postdive body weights (in shorts only) were also obtained for all divers in these W/W dives.

After surfacing from each dive, divers completed a 10-minute "clean time" on deck outside the OSF and then transferred to the NEDU physiology laboratory to complete a resting 4-hour postdive observation period under controlled conditions at 78 ± 5 °F (25.6 ± 2.8 °C).

### 2.3 Dive Sequencing

Man-dives were organized into eight series, each with a particular combination of dive profile and thermal condition pair. In the first two series, the initial dive profile was tested with the thermal condition pairs expected to manifest opposite extremes of thermal effects on DCS risk (boldface in Table 1): (1) cold during BT and warm during decompression (C/W), and (2) warm during BT and cold during decompression (W/C). In three subsequent dive series, BTs were titrated upward or downward from the 30-minute initial value as the dive depth, thermal conditions, and decompression schedule were kept unchanged. Two additional series — C/C or W/W — were completed with divers cold or warm, respectively, throughout each dive. Finally, an eighth series was completed to test whether appropriate thermal exposures during different dive phases could render DCS incidence acceptable in a dive that, in earlier work, had been discontinued due to an unacceptably high incidence of DCS. The dive chosen was a 150 fsw (459.5 kPa)/60 min air dive decompressed on a 150 fsw/60 min Standard Air schedule (stops: 40 fsw/3 min, 30 fsw/19 min, 20 fsw/26 min, 10 fsw/62 min; TDT = 115 min). Thalmann[18] discontinued man-testing a dive with an identical depth and bottom

time but with a much longer — and putatively more conservative — decompression schedule (stops: 50 fsw/16 min, 40 fsw/38 min, 30 fsw/43 min, 20 fsw/50 min, 10 fsw/134 min; TDT = 283.5 min) after five DCS cases had occurred in 20 man-dives.

### 2.4 Exercise

As soon as possible after reaching bottom in each dive, divers began exercising on electrically braked pedal ergometers (W. E. Collins; Braintree, MA) in 20-minute cycles until two minutes before starting decompression, with five minutes rest after each 15 minutes of exercise. The exercise was performed at a pedaling rate of 60 rotations per minute (rpm) at ergometer workload settings of 60 watts. When adjusted to accommodate the added workload afforded by water resistance, the total workload of the exercise corresponded to an oxygen consumption of about 2.2 L/min,[19] or the work of a swimsuited diver wearing the MK 20 UBA while swimming at approximately 1 knot. Ergometers were mechanically calibrated before man diving was begun and later throughout the protocol, as needed.

## 2.5 Chamber Setup

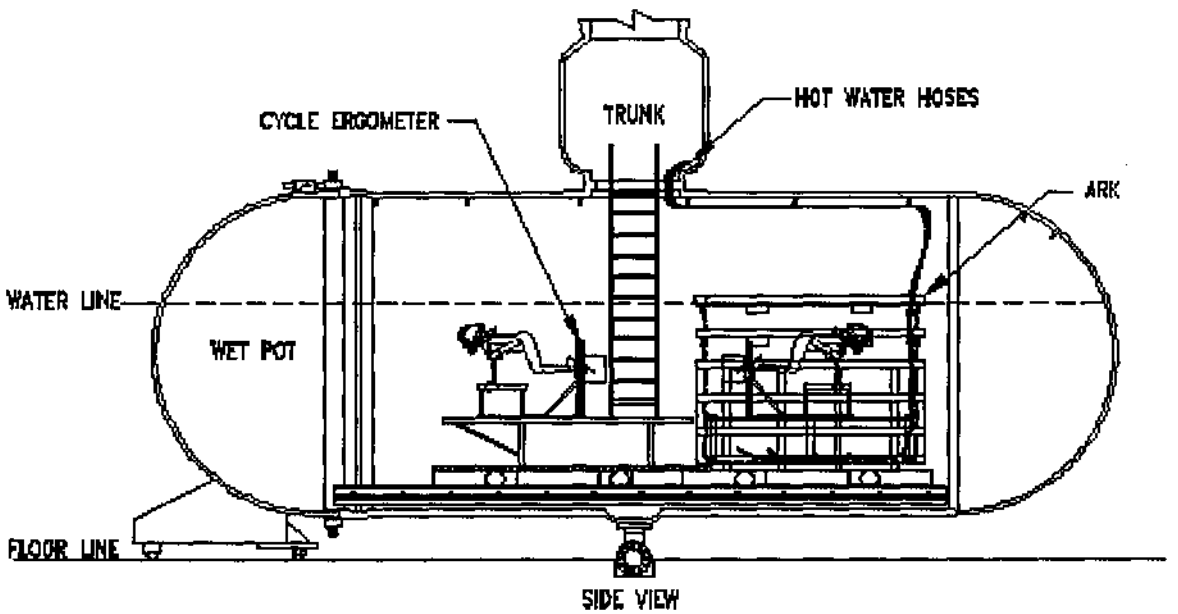


**Figure 1.** Schematic of NEDU OSF wet pot in Configuration A, showing exercise bikes (ergometers) in an ark filled with water at one temperature and in the wet pot flooded to the same level with water at another temperature.

Diver thermal conditions during the different phases of each dive were controlled with three different configurations of the NEDU OSF wet pot. Configuration A (Figure 1) was used when different condition pairs — e.g., C/W and W/C — were under test on the same dive. The wet pot was filled with cold water and contained a freestanding tank (ark) filled to the same level with water at the warm temperature. Two ergometers were positioned in a swimming inclination on a high platform in the wet pot. Two other ergometers were similarly positioned in the ark. One of two buddy pairs of diver-subjects, designated by a coin toss before each dive, completed all but the last two minutes of their bottom time exercising warm in the ark. Two minutes before the start of

decompression, the two divers stopped exercise and moved to the wet pot, where they completed the subsequent decompression while resting in cold water. The other buddy pair completed all but the last two minutes of their bottom time exercising cold in the wet pot and then moved to the ark to complete the subsequent decompression while resting in warm water. Configuration B was used when only one condition pair — i.e., C/W or W/C — was under test on a given dive. In these circumstances up to six divers, supported by six ergometers positioned on the high platform in the wet pot and by a bench in the ark for resting decompression, could participate in each dive. Water in the wet pot and ark was adjusted to the appropriate temperatures, and all divers completed the compression and exercising bottom phases of the dive in the wet pot. Two minutes before leaving bottom, all divers stopped exercise and moved from the wet pot to the ark, where they completed the remainder of the dive at rest. Finally, Configuration C was used when both bottom and decompression temperatures under test were the same — i.e., W/W or C/C. For these dives the ark was removed, and eight ergometers were placed on the high platform in the wet pot, where up to eight divers completed the entire dive in water of desired temperature.

In all OSF wet pot configurations the cycle ergometers in the wet pot and ark and the bench in the ark were set so that diver mid-chest levels were about two feet below the water surface when divers were properly positioned. The relatively large head space required above the water level in the wet pot, along with OSF gas inflow constraints, limited the descent rates for all dives to about 35–40 fsw/min. Ascents to decompression stops and to surface were at 30 fsw/min.

## 2.6 Diver Monitoring

Water temperatures in the ark and wet pot were monitored with thermistors (Yellow Springs Instrument Co.; Yellow Springs, OH) calibrated with a resistance box before the initial dive each day. Wet pot pressure was monitored with a Druck 0–150 pounds per square inch gauge (psig) pressure transducer (G. E. Sensing; New Fairfield, CT), which was also calibrated before the initial dive on each dive day. Dive depth (wet pot pressure corrected for diver water depth), time, and ergometer workload setting and rotation rate for each diver were logged in real time at 2-second intervals on a computer data acquisition system (DAS). All diver-subjects communicated with dive tenders and surface personnel throughout the dive. At 15-minute intervals during the decompression phase of each dive, diver-subjects were queried about their self-perceived thermal status. Thermal discomfort was reported according to the scale given in Table 2, adapted from the modified Borg scale for dyspnea.[20]

**Table 2.**
**Numeric Scale for Subject Thermal Status Self-Assessment**

| Score | Thermal Discomfort | Score | Thermal Discomfort |
|---|---|---|---|
| 0 | None at all | | |
| 1 | Very slight | 6 | |
| 2 | | 7 | Severe[2] |
| 3 | Slight | 8 | |
| 4 | | 9 | Very, very severe |
| 5 | Moderate[1] | 10 | Maximally severe, Terminate |

[1]Onset of shivering in cold exposures or sweating in warm exposures
[2]Uncontrollable shivering in cold exposures

Divers were examined for VGE with transthoracic 2-D echocardiographic imaging (Acuson Cypress Portable Colorflow Ultrasound System, Siemens Medical Solutions USA, Inc.; Mountain View, CA) as soon as possible after they had surfaced and arrived in the physiology laboratory, approximately two hours after surfacing and again just before their release at the end of the 4-hour postdive observation period. The images were scored in real time by a U.S. Navy cardiovascular technician according to a modified 5-grade Spencer Bubble Scale,[21] in which Grade 0 represents no bubbles detected; Grade 1 represents infrequent bubbles; and Grade 4 indicates bubbles of profusion sufficient to dominate the right atrial and ventricular image with blurring or obliteration of chamber outlines. Scores were not used for diagnosis of DCS.

### 2.7 Reject/Accept Criteria

Each dive series was conducted under sequential reject rules designed to limit the number of divers exposed in series with inordinately high DCS risks. The profile/thermal condition pair in a series was to be rejected and testing in that series was to cease when results allowed assertion at 95% confidence that the real DCS risk of the profile/thermal condition pair exceeded 6% (Table 3).

**Table 3.**
**Reject Rule: Reject profile/thermal condition pair if the indicated number of DCS or greater occurred within the indicated number of exposures.**

| # DCS | # Exposures |
|---|---|
| 4* | 23 |
| 5 | 33 |
| 6 | 44 |
| 7 | 56 |
| 8 | 67 |
| 9 | 79 |
| 10 | 92 |

*Testing of a given profile/thermal condition pair was to be continued with three or fewer DCS incidents in up to 23 exposures.

A profile/thermal condition pair was also to be arbitrarily rejected with cessation of testing after more than one severe case of DCS had occurred.

Each dive series was also conducted under sequential accept rules to allow testing in a given dive series to continue to firmly quantify differences in DCS risk between different dive conditions after significance was established. A profile/thermal condition pair in a series was to be accepted and testing in the series was to cease when results allowed assertion at 95% confidence that the real DCS risk of the profile/thermal condition pair was less than 3%. As the trial unfolded, however, logistical constraints forced cessation of testing of relatively low risk profile/thermal condition pairs before any accept criterion was attained.

## 2.8 Statistical Analyses

Differences in DCS incidence between different profile/thermal condition pairs were evaluated with two-tailed Fisher Exact tests[22] and declared significant at $P<0.05$. Quantitative expressions of thermal effects during different dive phases were obtained

after differences in bottom time and dive depth in the test profiles were controlled with logistic regression analyses.[23] Model fits were evaluated with likelihood ratio tests and chi-square analyses, and significances of the coefficients were evaluated with univariate Wald test statistics. Associations between 2-D echo image VGE scores and DCS incidence were examined with receiver-operator characteristic (ROC) curves.[24,25]

## 3. RESULTS

Seventy-three diver-subjects, attributes of whom are given in Appendix A, completed 484 man-dives in eight series with an overall DCS incidence of 4.5% (22/484). Dive result details, including information about the intensity of diving by each diver-subject, are given in Appendix C. One hundred and thirty man-dives were completed with cold decompressions, and 354 man-dives were completed with warm decompressions.

### 3.1 Diver Thermal Status

Diver self-assessed thermal status during decompression is summarized in Table 4.

**Table 4.**
**Diver Self-Assessed Thermal Status Scores**

| Condition During Decompression | Last Score | Diver Mean Score |
|---|---|---|
| Cold (n=130) | Mean = 5.0<br>S.D. = 2.2<br>Max. = 9 | Mean = 3.2<br>S.D. = 1.6<br>Max. = 8.5 |
| Warm (n=354) | Mean = 2.2<br>S.D. = 2.0<br>Max. = 9 | Mean = 1.6<br>S.D. = 1.5<br>Max. = 6.3 |

Diver self-assessed thermal status varied widely among divers, but mean thermal status scores tended to be higher during cold decompressions than during warm decompressions. In either condition the mean last score during decompression tended to be higher than the diver mean score, an indication that thermal discomfort increased during the course of decompression.

### 3.2 Decompression Sickness Incidence

Results of the first seven series of dives to a depth of 120 fsw with the U.S. Navy Standard Air 120 fsw/70 min decompression schedule are summarized in Table 5.

**Table 5.**
**Summary of DCS Outcomes, 120 fsw Dives**

| Series | Thermal Condition Pair | Depth (fsw)/ Bottom Time (min)[a] | # DCS/ # Exposures | DCS Incidence (%, 95% C.L.) |
|---|---|---|---|---|
| 1 | C/W | 120/30 | 0/80 | 0.0 (0.0–3.7) |
| 3 | | 120/50 | 0/8 | 0.0 (0.0–31.2) |
| 4 | | 120/70 | 2/158 | 1.3 (0.2–4.5) |
| 2 | W/C | 120/30 | 7/32[r] | 21.9 (9.3–40.0) |
| 5 | | 120/25 | 4/80 | 5.0 (1.4–12.3) |
| 6 | W/W | 120/70 | 4/24[r] | 16.7 (4.7–37.4) |
| 7 | C/C | 120/60 | 4/18[r] | 22.2 (6.4–47.7) |
| | | Totals: | 21/400 | |

[a] All dives decompressed with the 120 fsw/70 min U.S. Navy Standard Air schedule
[r] Testing stopped with attainment of reject criterion

The influence of diver thermal status in 120 fsw/30 min dives was tested directly in dive Series 1 and 2. No DCS occurred in 80 man-dives completed C/W, while a reject criterion was met with seven DCS in 32 man-dives completed W/C. After three of the first five diagnosed DCS cases in the latter series involved symptoms in the hands and wrists, divers were required to wear neoprene dive gloves during all subsequent cold decompressions. The DCS incidence for dives completed C/W was significantly less than the incidence for otherwise identical dives completed W/C ($P<0.0002$).

Bottom time in the initial profile was titrated upward in 20-minute increments for the C/W condition pair (Series 3 and 4) and downward in 5-minute increments for the W/C condition pair (Series 5) to establish the difference between C/W and W/C dives in operationally relevant terms (i.e., increased bottom time at the same depth followed by the same decompression). Because it was believed that the 120 fsw/70 min C/W dive

would entail acceptable DCS risk, the step to this dive was taken after only eight DCS-free man-dives were completed on the intermediate 120 fsw/50 min C/W dive. DCS incidence for the 120 fsw/70 min C/W dive was only 1.3% (2/158), still significantly less than the observed 21.9% (7/32) DCS incidence for the shorter 120 fsw/30 min dives performed W/C ($P<0.0001$). The 5.0% DCS incidence for the 120 fsw/25 min W/C cold dives was significantly higher than the 1.3% incidence for the 120 fsw/70 min C/W dives ($P<0.005$). Differences between effects of the two thermal extremes consequently manifested in a more than 45-minute difference in bottom time between otherwise identical 120 fsw dives at comparable DCS risks.

C/C dives of 120 fsw/60 min were terminated after four DCS cases had occurred in 18 man-dives. The corresponding 22.2% DCS incidence was statistically indistinguishable from that for the shorter 120 fsw/30 min W/C dives ($P=1.0$). In retrospect, one of the four cases (Case 20, Appendix B) in this latter series might have been attributable to a physical injury sustained by the diver the evening after the dive. Even if this case is discounted with the exposure considered to be DCS-free, the DCS incidences in the two series remain statistically indistinguishable ($P=0.73$). Differences between effects of cold and warm conditions during BT consequently manifested in a 30 min difference in BT between otherwise identical 120 fsw dives at equal DCS risks. Additionally, the DCS incidence for the 120 fsw/60 min C/C dives was significantly higher than that for the 120 fsw/70 min C/W dives ($P<0.001$), despite the 10-minute shorter BT — a result illustrating the beneficial effects of warm over cold decompression.

Dives to 120 fsw with 70-minute bottom time under W/W conditions were terminated after completion of 24 man-dives when two cases involving severe symptoms occurred

in four DCS cases overall. Both of the cases with severe symptoms were exacerbated by heat stress and hypohydration. One of the cases (Case 17, Appendix B) was arguably attributable wholly to the latter factors and not to DCS.

DCS outcomes in the eighth series of man-dives are summarized in Table 6. The profile/thermal condition pair in this series was man-dived 84 times with only a single case of DCS. The corresponding 1.2% DCS incidence was significantly less ($P<0.001$) than the 25% incidence reported by Thalmann[18] for the same dive performed with a more conservative decompression and total dive time of 343.5 min. The latter incidence was obtained with divers wearing ¼-inch neoprene wetsuits consisting of "Farmer John" trousers, jacket, hood, gloves, and boots in 65 ± 2 °F (18.3 ± 1.1 °C) water. Divers performed cycle ergometer exercise pedaling at 55–60 rpm at 75 watts in 6-minute work/rest cycles while on bottom and rested during subsequent decompression. Because most divers emerged from the dives "visibly chilled and shivering," thermal conditions during these dives were arguably analogous to those in our present C/C condition pair.

**Table 6.**
**Summary of DCS Outcomes, 150 fsw Dives**

| Series | Thermal Condition Pair | Depth (fsw)/ Bottom Time (min)[a] | # DCS/ # Exposures | DCS Incidence (%, 95% C.L.) |
|---|---|---|---|---|
| 8 | C/W | 150/60 | 1/84 | 1.2 (0.3–6.4) |

[a] All dives decompressed with the 150 fsw/60 min U.S. Navy Standard Air schedule

### 3.2.1 DCS Case Descriptions

The clinical characteristics of the 22 DCS cases that occurred in this study are summarized in Table 7. Detailed narrative descriptions of the cases are given in Appendix B. Eleven cases involved symptoms in the hands and wrists, with symptoms no more proximal than the elbow. The chief complaint of those reporting these symptoms was pain and "fullness" in the fingers, wrist, or thenar and hypothenar areas of the palm: six were of pain only, three were of pain with paresthesia, and two were of pain with cutis marmorata (cutaneous manifestation of DCS hallmarked by a raised, cyanotic mottling or marbling discoloration of the skin). Two divers who presented with hand symptoms (one before and one after the addition of dive gloves) were compressed to 60 fsw but did not get resolution of symptoms and therefore were not diagnosed with DCS.

**Table 7.**
**Summary of DCS Clinical Characteristics**

| Location | # | Symptom/Sign: #* |
|---|---|---|
| Hand, wrist, and other involvement extending proximally no farther than elbow | 11 | Pain + cutis marmorata: **2**<br>Pain + paresthesia: **1**, 2<br>Pain only: **5**, 1 |
| Shoulder | 1 | Pain only |
| Shoulder, wrist, and hand | 1 | Pain + paresthesia |
| Knee | 3 | Pain only |
| Knee + hip | 1 | Pain only |
| Elbow | 1 | Pain only |
| Thigh | 1 | Skin bends |
| Other | 3 | Joint pain + neurological |

* Incidents underlined and in **bold** indicate that subjects wore neoprene dive gloves during cold decompression.

### 3.2.2 Regression Results

The magnitudes of thermal effects during the different dive phases were determined with logistic regression to control for differences in BT in results from the 120 fsw dives and for differences in BT, dive depth, and decompression time in the combined results from all dives. Logistic models were of general form given by

$$\text{logit} = \ln\left(\frac{P_{DCS}}{1-P_{DCS}}\right) = \beta_0 + \beta_1 X_1 + \ldots + \beta_n X_n , \qquad (2)$$

where $\beta_0$ is a constant and each remaining $\beta_i$ is the linear coefficient for the $i^{th}$ factor $X_i$. In all models considered, water temperatures during BT ($T_{W,B}$, °C) and during decompression ($T_{W,D}$, °C) were coded as continuous variables, and bottom time was transformed to ln(BT) to force $P_{DCS}$ to zero as BT approaches zero. Model 1, fitted to results from the 120 fsw dives, was the simplest model considered. A second model of form similar to that used by Leffler[2] was fitted to all results for comparative purposes. This second model included two additional factors — dive depth (Depth, fsw) and average ascent rate ($R_A$ = Depth/TDT, fsw/min) — to accommodate data from dives to different depths with different decompression schedules. Depth was transformed to ln(Depth) and $R_A$ was transformed to ln($R_A$) to force $P_{DCS}$ to zero as each of these untransformed factors approach zero. Results are given in Table 8.

**Table 8.**
**Logistic Regression Results**

| Model | Data | P(chi-square) | Factor | Coefficient | S.E. | P | Odds Ratio | | 95% CI |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Series 1–7, N = 400 | 0.85, d.f. 6 | Constant | –18.56 | 5.31 | < 0.0005 | | | |
| | | | ln(BT) | 5.06 | 1.35 | < 0.0002 | 33.34 | (ea. doubling) | (5.05–193.85) |
| | | | $T_{W,B}$ (°C) | 0.32 | 0.09 | < 0.0005 | 23.79 | (ea. 10 °C) | (3.77–131.51) |
| | | | $T_{W,D}$ (°C) | –0.44 | 0.11 | < 0.0001 | 0.01 | (ea. 10 °C) | (0.002–0.114) |
| 2 | Series 1–8, N = 484 | 0.93, d.f. 7 | Constant | –1950.66 | 5.31 | < 0.00001 | | | |
| | | | ln(Depth) | 187.32 | 3.15 | < 0.00001 | *** | | |
| | | | ln(BT) | 5.25 | 1.34 | < 0.0001 | 38.16 | (ea. doubling) | (6.17–235.96) |
| | | | $T_{W,B}$ (°C) | 0.33 | 0.09 | 0.00024 | 27.59 | (ea. 10 °C) | (4.69–162.42) |
| | | | ln($R_A$) | 3738.96 | 57.47 | < 0.00001 | *** | | |
| | | | $T_{W,D}$ (°C) | –0.45 | 0.11 | < 0.00005 | 0.01 | (ea. 10 °C) | (0.001–0.097) |

Each model fit its respective data with log likelihood significantly higher than the corresponding null model log likelihood ($P << 0.0001$), and each yielded significant chi-square goodness-of-fit statistics, as tabulated. All model terms given were highly significant, though with relatively large confidence bands due to the small number of DCS cases, bottom times, and dive depths (Model 2) in the data. Additional terms for interaction between ln(BT) and $T_{W,B}$ in either model, and between $\ln(R_A)$ and $T_{W,D}$ in Model 2, were tested by likelihood ratio test and found to be insignificant. Respective coefficients for bottom time and temperature, expressed as either the fitted values or as odds ratios, are statistically indistinguishable between the two models. The odds ratios for ln(BT) and $T_{W,B}$ can be compared to values of 10.3 (95% CI = 4.77–22.4) and 1.96 (95% CI = 1.33–2.90), respectively, from the Van Der Aue surface decompression dive data.[4] Coefficients for terms involving Depth and $R_A$ in Model 2 are very high valued with wide-ranging confidence bands, again due to the limited number of dive depths and decompression schedules in the data, and are useful for descriptive purposes only.

### 3.3 2-D Echo Image Bubble Scores

In each dive series, percentages of divers with each of the possible VGE scores as the maximum observed during the postdive observation period are illustrated in Figures 2 and 3. Results in Figure 2 were obtained with the diver-subjects at rest, while results in Figure 3 were obtained within about a dozen heartbeats after the diver-subjects had flexed the indicated limb. Comparison of the figures indicates generally increased occurrence of grades 3 and 4 after limb flexure.

In accord with the observed DCS incidences, the percentage of divers in which no central venous bubbles were detected (grade 0) was much higher in the 120 fsw/30 min C/W dives than in the 120 fsw/30 min W/C dives. Despite the low incidences of DCS in both dive series, relatively large proportions of divers produced maximum bubble grades of 1–3 in the 120 fsw/70 min C/W dives, in comparison to the scores in the 120 fsw/30 min C/W dives.

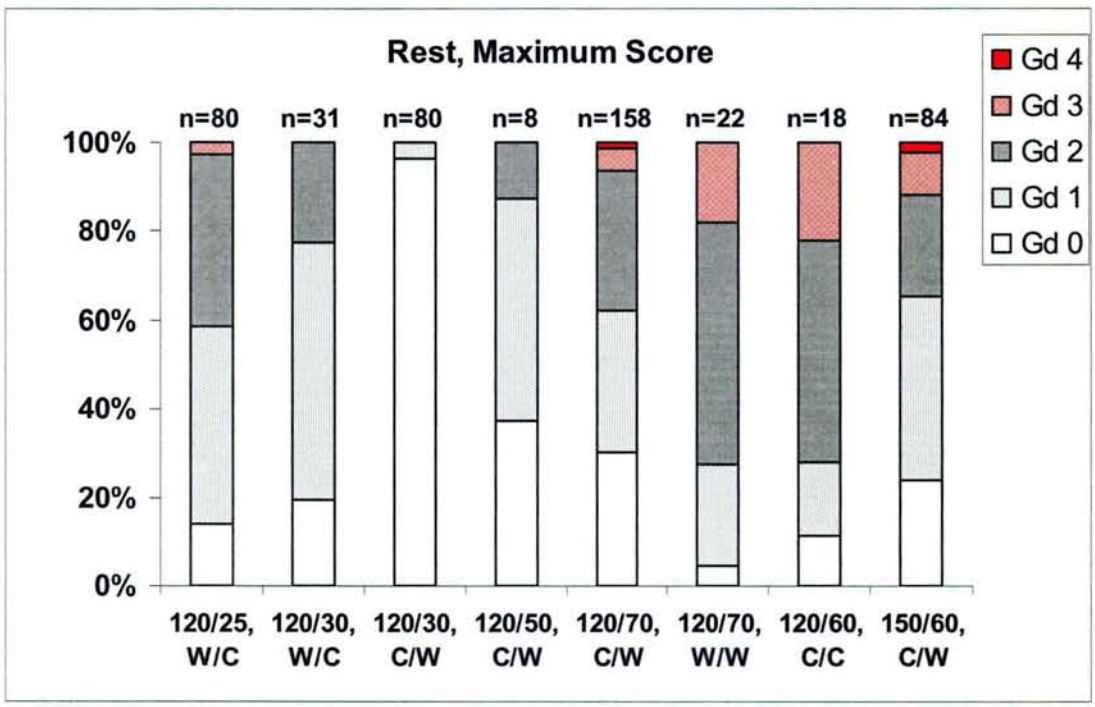


**Figure 2.** Percentage of divers in each dive series with the indicated VGE score as the maximum observed while resting during the 4 hr postdive observation period.

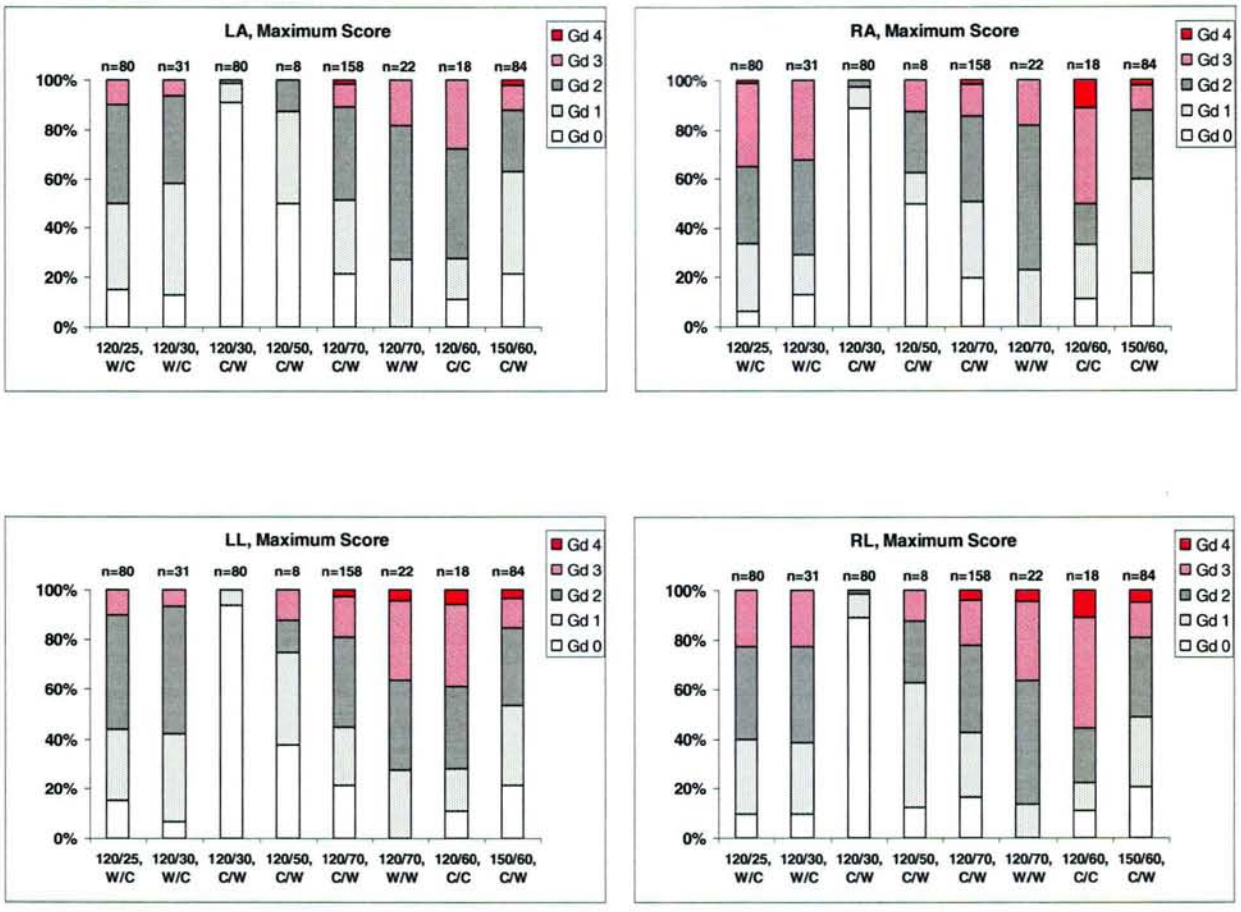


**Figure 3.** Percentage of divers in each dive series with the indicated VGE score as the maximum observed after flexing the left arm (LA), right arm (RA), left leg (LL), or right leg (RL) during the 4 hr postdive observation period.

While VGE scores can be considered as independent and objective indices of overall decompression stress, the association between such scores and the incidence of DCS is of principal interest. The DCS incidence associated with each maximum observed VGE grade in Figures 2 and 3 is given in Table 9 with the data from Figure 3 compiled across all limbs. ROC curves (true positive fractions [sensitivity] versus false positive fractions [1-specificity]) from these data for serial combinations of maximum VGE grades (4, 3–4, 2–4, 1–4, and 0–4) in resting subjects and in subjects after flexion of any limb are given in Figure 4. Grade 4 VGE occurred with zero sensitivity for DCS in

subjects at rest and with relatively poor 0.21 sensitivity for DCS in subjects after limb flexion. VGE sensitivity for DCS improved in both resting subjects and in subjects after limb flexion with the inclusion of successively lower VGE grades, as indicated by the upward graduation of the respective curves to the right. These improvements were more pronounced in subjects after limb flexion but were accompanied by high false positive rates in either case. For comparison, the ROC curve constructed from an earlier compilation of VGE and DCS data for 1726 air dives[26] is also shown. All combinations of VGE grades in these earlier dives occurred at higher sensitivities and lower false positive rates for DCS than those associated with the present VGE observations.

**Table 9.**
**Association between Maximum Observed VGE Grades and DCS Incidence**

A) Maximum VGE Grade, Rest

| | Event, E | Occurrences | True Positive Rate | Occurrences | False Positive Rate |
|---|---|---|---|---|---|
| VGE Grade | Occurrences | w/DCS | P(E\|DCS)* | w/No-DCS | P(E\|No-DCS) |
| 0 | 145 | 1 | 0.053 | 144 | 0.312 |
| 1 | 131 | 4 | 0.211 | 127 | 0.275 |
| 2 | 104 | 8 | 0.421 | 96 | 0.208 |
| 3 | 99 | 6 | 0.316 | 93 | 0.201 |
| 4 | 2 | 0 | 0.000 | 2 | 0.004 |
| Column Totals | 481 | 19 | | 462 | |

B) Maximum VGE Grade Postflexion, All Limbs

| | Event, E | Occurrences | True Positive Rate | Occurrences | False Positive Rate |
|---|---|---|---|---|---|
| VGE Grade | Occurrences | w/DCS | P(E\|DCS)* | w/No-DCS | P(E\|No-DCS) |
| 0 | 96 | 0 | 0.000 | 96 | 0.208 |
| 1 | 78 | 1 | 0.053 | 77 | 0.167 |
| 2 | 110 | 2 | 0.105 | 108 | 0.234 |
| 3 | 109 | 12 | 0.632 | 97 | 0.210 |
| 4 | 88 | 4 | 0.211 | 84 | 0.182 |
| Column Totals | 481 | 19 | | 462 | |

* P(E|DCS) ≡ probability of event E, given the occurrence of DCS

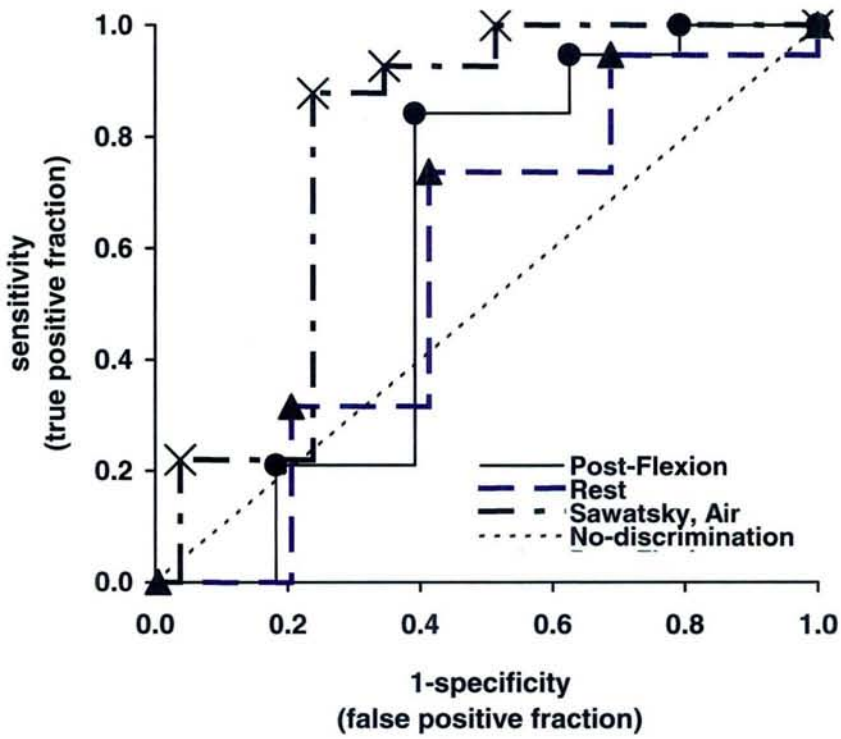


**Figure 4.** ROC curves for association of DCS occurrence with maximum observed VGE grades in present data (filled symbols). The ROC curve constructed from an earlier compilation of VGE and DCS data for 1726 air dives[26] is also shown (points designated with × symbols). Points shown on each curve graduate with increasing false positive rate (1-specificity) in order: VGE grades 4, 3–4, 2–4, 1–4, and 0–4.

Bayes' theorem[a] was used to construct the DCS positive predictive value (PPV) curves in Figure 5. These curves indicate how *a priori* probabilities of DCS are influenced by added information about observed bubble grades to yield *a posteriori* probabilities of

[a] For the two mutually exclusive, exhaustive hypotheses, DCS and No-DCS, Bayes' theorem is given by

$$P(DCS|E) = \frac{P(DCS \cap E)}{P(E)} = \frac{P(DCS) \cdot P(E|DCS)}{P(DCS) \cdot P(E|DCS) + P(No\text{-}DCS) \cdot P(E|No\text{-}DCS)}, \quad (1)$$

where

P(DCS) ≡ *a priori* probability of DCS, or *a priori* belief in DCS, before observation of E, an arbitrary event in the sample space of the experiment, and

P(DCS|E) ≡ *a posteriori* probabilitiy of DCS; probability of DCS given observation of E.

DCS. Because no DCS occurred with either of the two occurrences of grade 4 bubbles in resting subjects, the curve for P(DCS|gd 4) lies on the abscissa of the plot in the left panel and is not shown. In accord with the poor association between VGE grade and DCS indicated by the ROC curves, the proximity of all PPV curves to the no discrimination line in the two panels indicates that observation of bubbles of any grade has little influence on the *a priori* probability of DCS.

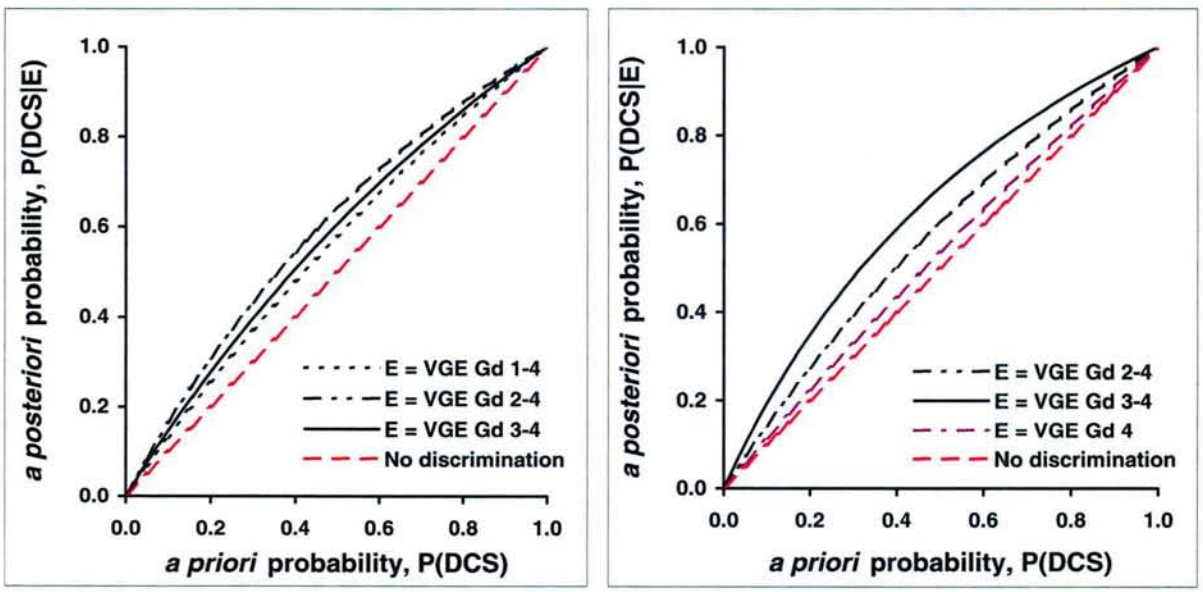


**Figure 5.** Positive DCS predictive value curves for different combinations of maximum observed VGE grades in subjects resting (left panel) or after limb flexion (right panel).

## 4. DISCUSSION

The objective of this work was to establish how diver thermal status during different phases of air decompression dives influences diver susceptibility to DCS. Diver thermal exposure during dive BT was controlled independently of the exposure during subsequent decompression. While physiologic measures were not made to establish

actual diver thermal status in response to these exposures, thermal status self-assessment scores clearly indicated that divers were indeed subjectively cold during the 80 °F exposures and warm during the 97 °F exposures. For comparison, the temperature of thermoneutral water for unclothed man at rest is 93.2 to 95 °F (34 to 35 °C), which decreases to 89.6 °F (32 °C) and 78.8 °F (26 °C) with exercise at 2.5 and 3.4 times the resting metabolic rate, respectively.[27]

Tested combinations of thermal condition pairs in the 120 fsw dives provoked DCS at incidences that could be tested directly for statistical differences attributable to thermal exposure effects, because the different dives shared the same decompression schedule. The high DCS incidence (22.2%) in 120 fsw/60 min C/C dives compared with the low incidence in C/W dives to the same depth and with that (1.3%) for 10-minute longer BT clearly indicates that warm exposure during decompression is beneficial. Similarly, the statistically indistinguishable DCS incidences for 120 fsw/30 min W/C and 120 fsw/60 min C/C dives indicate that warm exposure during BT is unfavorable: a 30-minute longer bottom time could be tolerated at equivalent DCS risk with cold conditions than with warm conditions during BT, despite any blunting of the effects of the cold exposure by performance of exercise at bottom. Finally, the large difference in DCS incidence between 120 fsw/70 min C/W dives (1.3%) and 120 fsw/30 min W/C dives (21.9%) indicates the large range spanned by "best" and "worst" case thermal exposure effects in terms of both DCS risk and bottom time. "Cold" conditions during BT and "warm" conditions during decompression (C/W) were clearly optimal for minimizing DCS risk and maximizing BT in the air decompression dives tested.

Descriptive logit models of the data isolated variations in DCS incidence attributable to thermal exposure effects from variations attributable to differences in BT, which was varied in the profile/thermal condition pairs to keep DCS incidence at levels sufficiently low to continue testing. According to Model 1, the simplest model tested, the DCS odds ratio for a 10 °C increase in water temperature during BT ($T_{W,B}$) is 23.8 (95% CI = 3.8–131.5), while the odds ratio for a similar increase in water temperature during in-water decompression ($T_{W,D}$) is 0.01 (95% CI = 0.002–0.114). Similar odds ratios were obtained from the more complex Model 2 fitted to results from all eight dive series completed in this study. Under either model, the inverse of the odds ratio for a 10 °C increase in $T_{W,D}$ is about five times the odds ratio for the same increase in $T_{W,B}$, an indication that beneficial effects of warm conditions during decompression are more pronounced than the deleterious effects of warm conditions during BT. A caveat to this indication is that the odds ratio for $T_{W,B}$ was almost certainly blunted by thermogenesis associated with the exercise performed at bottom in all dives. A higher ratio would have been expected if the divers had remained at rest during this part of the dives. In any case, these are very large and opposing effects. Notably, the high value of the odds ratio for $T_{W,B}$, and the inverse of the corresponding value for $T_{W,D}$, are comparable in magnitude to the odds ratio for ln(BT), a result indicating that 10 °C changes in temperature have effects comparable to those from doubling or halving dive bottom time. Directly comparable man-dive results from other studies are available only for the odds ratio of effect during dive BT.

Leffler[2] obtained a DCS odds ratio of 1.96 (95% CI = 1.33–2.90) for each 10 °C increase in water temperature from data for 1507 man-dives reported by Van Der Aue[4]

and a corresponding odds ratio of 1.81 (95% CI = 0.96–3.42) for use of hot water suits over passive thermal protection from data for 14,981 North Sea man-dives reported by Shields and Lee.[5] All these dives were surface decompression dives, with most or all decompression obligations completed under relatively comfortable resting conditions in dry chambers. Apparent thermal effects in the dives consequently involved principally the compression and bottom phases of the dives. Moreover, divers in the Van Der Aue study wore U.S. Navy standard MK 5 diving dress, confounding the correlation between ambient water temperature and diver thermal exposure, while actual thermal exposures in the dives reported by Shields and Lee could not be accurately characterized. The differences between the earlier and the present odds ratios for temperature increases during dive BT may thus be ascribed to (a) confounding by effects of relatively warm decompressions in the surface decompression dives, (b) actual diver thermal exposures less extreme than the prevailing ambient water temperatures used to characterize the earlier exposures, (c) nonlinear responses to changes in thermal conditions, and (d) different criteria for diagnosis of DCS.

Nine of the eleven cases of DCS after W/C dives involved symptoms that manifested in the hands and wrists. It was suspected after the third incident of this type that nonfreezing cold injury,[28] not DCS, might be involved. Although the prevailing temperatures in the present cold exposures were considerably higher than the 61 °F (16 °C) putatively required to first induce such injury, any prior nonfreezing cold injury in the hands can leave them susceptible to pain and swelling with exposure to less severe cold conditions.[29] To mitigate the possibility of such involvement, divers in subsequent cold decompression dives were required to wear neoprene dive gloves. Despite this

requirement, eleven more cases of DCS involving the hands and wrists occurred: six in W/C dives, three in C/C dives, and one each in C/W and W/W dives that were considered to be free of nonfreezing cold injury issues and were conducted without gloves. The majority of these divers had complete resolution of symptoms with recompression to 60 fsw on $O_2$. Such outcomes are consistent with diagnoses of DCS, but they are arguably also consistent with expected effects of hyperbaric $O_2$ on symptoms of nonfreezing cold injury.[30] However, none of the divers involved claimed any prior nonfreezing cold injury or inordinate sensitivity to cold in the hands, and the occurrence of the cases appeared to be unaffected by the use of hand thermal protection. We consequently maintain that these cases were in fact DCS, probably lymphatic in nature.

Four DCS cases occurred in twenty-four 120 fsw/70 min air dives completed W/W with the 120 fsw/70 min U.S. Navy Standard Air decompression schedule. Two of the divers presented with joint pain typical of Type I DCS, but the other two cases were more severe, with neurological symptoms (bilateral muscle weakness, tingling, decreased sensation, nausea, and vomiting) that developed during decompression. While these are DCS Type II symptoms, their etiology may have instead involved heat exhaustion or dehydration. Problems due to heat stress may occur whenever the rate of heat production or heat gain from the environment is sufficiently large in relation to the body's ability to dissipate heat. Our diver-subjects were not able to dissipate heat from their heads because the MK 20 full face mask left all but their faces fully exposed to the 97 °F water in which they were immersed. Exercise exacerbated the heat buildup problem, as exercising muscle can become nearly 1 °C warmer than the core

temperature.[31] Despite the measures taken to ensure that divers remained adequately hydrated during these dives, mean diver weight loss was 6.1 ± 1.7 lb S.D. (n=22; postdive weights were not obtained from two treated divers), and severe in-water symptoms were observed. Therefore, the DCS cases in these dives were almost certainly confounded by hypohydration and may have arisen from an etiological mechanism different from that involved in DCS with the other thermal condition pairs.

VGE scores obtained in the 4-hour postsurfacing periods were only weakly associated with occurrence of DCS. Areas under the ROC curves for maximum VGE grades in resting subjects and in subjects after flexion of any limb were 0.56 and 0.62, respectively — values that are only slightly greater than the 0.5 value for no association between VGE and DCS. In comparison, the area under the ROC curve from an earlier compilation of VGE and DCS data for 1726 air dives[26] is 0.78. This more favorable value is a result of higher sensitivities and lower false positive rates in the earlier data than are associated with present occurrences of VGE with DCS. With respect to those earlier data, DCS in present work occurred less frequently than would have been expected, given the present VGE observations.

The present work was not designed to illuminate the physiological mechanisms underlying the effects of thermal exposure on DCS risk, but its results are consistent with the notion that gas exchange kinetics in tissues involved in DCS are slowed by vasoconstriction during cold exposure and hastened by vasodilation during warm exposure.[2] Thus, warm conditions at bottom may hasten gas uptake and increase DCS risk, whereas the same conditions during decompression hasten gas elimination and decrease DCS risk.

The temperatures tested in this study were near the limits of diver thermal tolerance at both cold and warm extremes, but results are also consistent with data from a large body of other experimental man-dives conducted with divers under less severe thermal conditions. Current probabilistic models of DCS incidence and time of occurrence calibrated with such data[15,16] do not explicitly accommodate thermal, exercise, or immersion effects on DCS risk, but the extents to which such factors governed DCS risk in the actual dives are averaged in the final calibrated models. A preponderance of the dives in the calibration data were conducted under arguably C/C thermal conditions: i.e., divers wore wet suits (passive thermal protection) and exercised in cold water, then decompressed at rest in water at the same temperature.[32] A large fraction of the remaining dives were conducted with divers relatively comfortable under dry conditions. Accordingly, model-estimated DCS risks for the dives tested in present work lie between observed DCS incidence extremes (Figure 6), with large latitude for thermal-induced variation within those extremes.

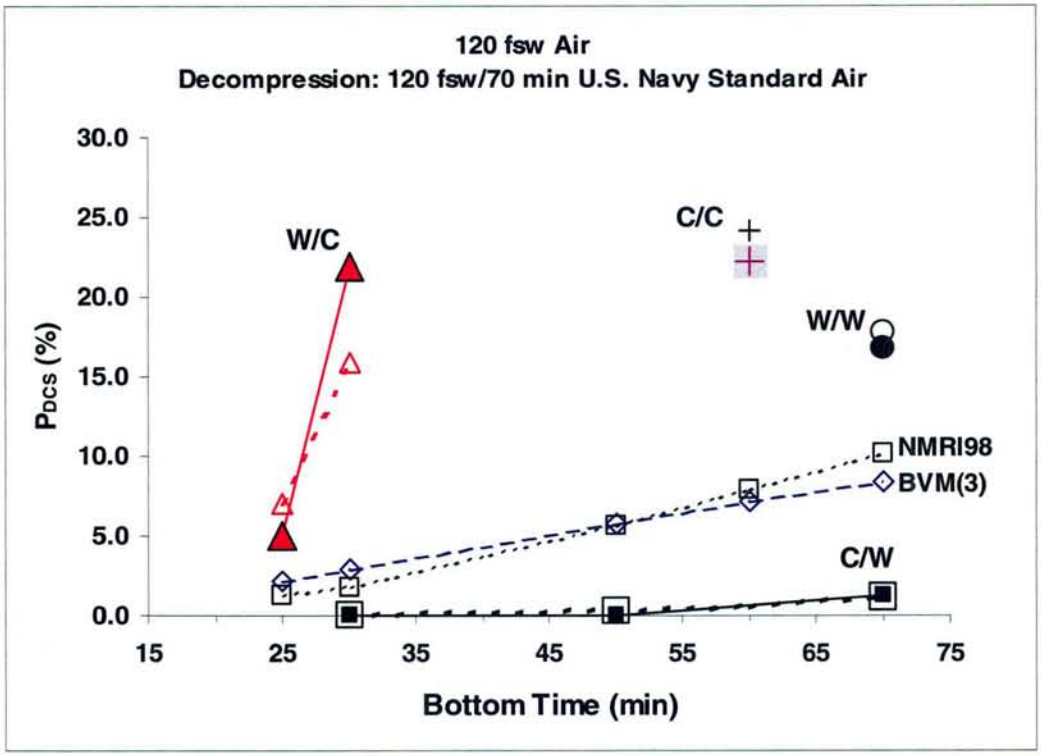


**Figure 6.** Observed DCS incidences (solid or shaded symbols) in 120 fsw air dives compared to DCS risks estimated with the BVM(3) and NMRI98 probabilistic models without explicit consideration of any thermal effects. DCS risks (open symbols) estimated for tested profile/thermal condition pairs with the descriptive logistic Model 1 are also shown.

For example, the estimated DCS risks of the 120 fsw/70 min dive are 8.5% [BVM(3)] and 10.2% (NMRI98) in neglect of any thermal effects, while the observed DCS incidence for this dive conducted C/W was only 1.3%. If the discrepancies between estimated risks and observed incidences are presumed to be due to unaccommodated thermal effects, it is clear that these effects need to be incorporated as independent variables in the models. Such model enhancements, along with further empirical work, are required to quantify the dose-response relationships that underlie cold and warm

effects and establish optimal thermal conditions under which the benefits of warm water decompression can be realized while minimizing diver discomfort.

Diver thermal status in this study was controlled in a "nonoperational" way. The next step is to transition the benefits of this research to divers in the fleet. We will describe in a later report how diver thermal exposure can be controlled with hot water suits to minimize DCS risk in operational air decompression dives.

## 5. CONCLUSIONS AND RECOMMENDATIONS

Diver thermal status during different phases of a dive can greatly influence diver susceptibility to DCS. Cold conditions during BT and warm conditions during decompression (C/W) are optimal for minimizing DCS risk and maximizing BT.

Divers should be kept cool during dive BT and warm during subsequent decompression.

## 6. REFERENCES


1. P. Tikuisis and W. A. Gerth, "Decompression Theory," in A. O. Brubakk and T. S. Neuman, eds., *Bennett and Elliott's Physiology and Medicine of Diving, 5th ed.* (London: W. B. Saunders Co., 2003), pp. 419–454.

2. C. T. Leffler, "Effect of Ambient Temperature on the Risk of Decompression Sickness in Surface Decompression Divers," *Aviat. Sp. Environ. Med.*, Vol. 72, No. 5 (2001), pp. 477–483.

3. C. B. Toner and R. Ball, *The Effect of Temperature on Decompression and Decompression Sickness Risk: A Critical Review*, NMRC 2004-003, Naval Medical Research Institute, Sep 2004.

4. O. E. Van Der Aue, R. J. Kellar, E. S. Brinton, G. Barron, H. D. Gilliam, and R. J. Jones, *Calculation and Testing of Decompression Tables for Air Dives Employing the Procedure of Surface Decompression and the Use of Oxygen*, NEDU TR 13-51, Navy Experimental Diving Unit, Nov 1951.

5. T. G. Shields and W. B. Lee, *The Incidence of Decompression Sickness Arising from the Commercial Offshore Air-Diving Operations in the UK Sector of the North Sea during 1982/1983* (Aberdeen, Scotland: Hyperbaric Medicine Unit, Robert Gordon's Institute of Technology, 1986), Offshore Technology Report OTO 97812, Health and Safety Executive, Dec 1997.

6. C. T. Leffler and J. C. White, "Recompression Treatments during the Recovery of TWA Flight 800," *Undersea Hyperbaric Medicine*, Vol. 24, No. 4 (1997), pp. 301–308.

7. R. Dunford and J. Hayward, "Venous Gas Bubble Production Following Cold Stress during a No-Decompression Dive, *Undersea Biomed. Res.*, Vol. 8, No. 1 (1981), pp. 41–49.

8. W. D. M. Pato and D. N. Walder, *Compressed Air Illness*, Special Report Medical Research Council No. 281 (London: Her Majesty's Stationery Office, 1954).

9. J. R. Broome, "Climatic and Environmental Factors in the Aetiology of Decompression Sickness in Divers, *Journal of the Royal Naval Medical Service*, Vol. 79, No. 2 (1993), pp. 68–74.

10. I. B. Mekjavic and N. Kakitsuba, "Effect of Peripheral Temperature on the Formation of Venous Gas Bubbles," *Undersea Biomed. Res.*, Vol. 16, No. 5 (1989), pp. 391–401.

11. P. K. Weathersby, S. S. Survanshi, and R. Y. Nishi, "Relative Decompression Risk of Dry and Wet Chamber Air Dives," *Undersea Biomed. Res.*, Vol. 17, No. 4 (1990), pp. 333–352.

12. Commander, Naval Sea Systems Command, *U.S. Navy Diving Manual, Revision 4*, Publication SS521-AG-PRO-010 (Arlington, VA: NAVSEA, 1999).

13. M. M. Toner and W. D. McArdle, "Human Thermoregulatory Responses to Acute Cold Stress with Special Reference to Water Immersion," in M. J. Fregly and C. M. Blatteis, eds., *Handbook of Physiology, Section 4: Environmental Physiology* (New York: Published for American Physiological Society by Oxford University Press, 1996), Vol. 1, pp. 379–397.

14. Chief of Naval Operations, *Body Composition Assessment (BCA)*, Enclosure (6), *Physical Readiness Program*, OPNAVINST 6110.1G, Oct 2002.

15. W. A. Gerth and R. D. Vann, "Probabilistic Gas and Bubble Dynamics Models of Decompression Sickness Occurrence in Air and Nitrogen-Oxygen Diving," *Undersea Hyperbaric Med.*, Vol. 24, No. 4 (1997), pp. 275–292.

16. E. Parker, S. S. Survanshi, P. B. Massell, and P. K. Weathersby, "Probabilistic Models of the Role of Oxygen in Human Decompression Sickness," *Journal of Applied Physiology*, Vol. 84 (1998), pp. 1096–1102.

17. E. T. Long, P. E. O'Connor, and T. C. Liberatore, *Development of Exposure Guidance for Warm Water Diving: Volume 1 — Physiology and Endurance*, NEDU TR 03-11, Navy Experimental Diving Unit, Dec 2003.

18. E. D. Thalmann, *Air-$N_2O_2$ Decompression Computer Algorithm Development*, NEDU TR 8-85, Navy Experimental Diving Unit, Dec 1985.

19. M. E. Knafelc, *Oxygen Consumption Rate for Different Diver Dress*, NEDU TM 07-04, Navy Experimental Diving Unit, Mar 2007.

20. J. G. W. Burdon, E. F. Juniper, K. J. Killian, F. E. Hargrave, and E. J. M. Campbell, "The Perception of Breathlessness in Asthma," *Am. Rev. Respir. Dis.*, Vol. 126, No. 5 (1982), pp. 825–828.

21. O. Eftedal and A. O. Brubakk, "Agreement between Trained and Untrained Observers in Grading Intravascular Bubble Signals in Ultrasonic Images," *Undersea Hyperbaric Med.*, Vol. 24, No. 4 (1997), pp. 293–299.

22. J. L. Fleiss, *Statistical Methods for Rates and Proportions, 2nd ed.* (New York: Wiley, 1981).

23. D. W. Hosmer and S. Lemeshow, *Applied Logistic Regression* (New York: Wiley, 1989).

24. E. A. Robertson, M. H. Zweig, and A. C. Van Steirteghem, "Evaluating the Clinical Efficacy of Laboratory Tests," *Am. J. Clin. Pathol.*, Vol. 79 (1983), pp. 78–86.

25. M. H. Zweig and G. Campbell, "Receiver-Operator Characteristic (ROC) Plots: A Fundamental Evaluation Tool in Clinical Medicine," *Clin Chem.*, Vol. 39, No. 4 (1993), pp. 561–577. [Erratum published in *Clin. Chem.*, Vol. 39 (1993), p. 1589.]

26. K. D. Sawatzky, "The Relationship between Intravascular Doppler-Detected Gas Bubbles and Decompression Sickness after Bounce Diving in Humans" (M.Sc. thesis, Toronto: York University, 1991).

27. J. A. Sterba, "Thermal Problems: Prevention and Treatment," in P. B. Bennett and D. H. Elliott, eds., *The Physiology and Medicine of Diving, 4th ed.* (London: Saunders, 1993), pp. 301–341.

28. T. Francis, "Non-freezing Cold Injury: A Historical Review," *J. R. Nav. Med. Serv.*, Vol. 70 (1984), pp. 134–139.

29. B. M. Nagpal and R. Sharma, "Cold Injuries: The Chill Within," *Medical Journal of the Armed Forces of India*, Vol. 60 (2004), pp. 165–171.

30. D. R. Leitch and R. R. Pearson, "Decompression Sickness or Cold Injury?" *Undersea Biomed. Res.*, Vol. 5, No. 4 (1978), pp. 363–367.

31. C. B. Wenger, "Human Adaptation to Hot Environments," in K. B. Pandolf and R. E. Burr, eds., *Medical Aspects of Harsh Environments* (Washington, DC: Borden Institute, 2001), Vol. 1, pp. 51–86.

32. D. J. Temple, R. Ball, P. K. Weathersby, E. C. Parker, and S. S. Survanshi, *Dive Profiles and Manifestations of Decompression Sickness Cases After Air and Nitrogen-Oxygen Dives. Volume I: Data Set Summaries, Manifestation Descriptions, and Key Files*, NMRC Report No. 99-02, Naval Medical Research Center, 1999.

# APPENDIX A

## Diver Characteristics

| Diver ID # | DOB (MM/DD/YY) | Age+ (yr) | Ht (cm) | Wt (kg) | Waist (cm) | Neck (cm) | BMI | # Man-Dives |
|---|---|---|---|---|---|---|---|---|
| 1 | 06/09/67 | 35 | 185.4 | 96.2 | * | * | 28.0 | 4 |
| 2 | 12/21/67 | 35 | 172.7 | 108.9 | 96.5 | 48.3 | 36.5 | 7 |
| 3 | 10/27/60 | 42 | 172.7 | 79.4 | * | * | 26.6 | 14 |
| 4 | 04/29/71 | 32 | 170.2 | 77.1 | 83.8 | 40.6 | 26.6 | 6 |
| 5 | 10/08/55 | 47 | 180.3 | 88.0 | * | * | 27.1 | 7 |
| 6 | 11/26/75 | 27 | 175.3 | 77.1 | 83.8 | 40.6 | 25.1 | 2 |
| 7 | 08/13/74 | 29 | 188.0 | 89.8 | 86.4 | 41.9 | 25.4 | 6 |
| 8 | 08/26/70 | 32 | 175.3 | 74.8 | * | * | 24.4 | 9 |
| 9 | 07/06/69 | 33 | 175.3 | 84.8 | * | * | 27.6 | 3 |
| 10 | 04/07/75 | 28 | 170.2 | 80.3 | 83.8 | * | 27.7 | 5 |
| 11 | 08/30/64 | 38 | 165.1 | 70.8 | * | * | 26.0 | 6 |
| 12 | 07/31/49 | 53 | 177.8 | 90.7 | 91.4 | 43.2 | 28.7 | 9 |
| 13 | 02/09/64 | 39 | 175.3 | 84.8 | * | * | 27.6 | 10 |
| 14 | 06/12/61 | 41 | 181.6 | 94.3 | 91.4 | 43.2 | 28.6 | 13 |
| 15 | 11/21/62 | 40 | 176.5 | 97.5 | * | * | 31.3 | 10 |
| 16 | 06/15/70 | 33 | 175.3 | 73.9 | * | * | 24.1 | 2 |
| 17 | 12/25/63 | 39 | 175.3 | 82.6 | 86.4 | 38.1 | 26.9 | 7 |
| 18 | 03/04/65 | 38 | 185.4 | 122.0 | 106.7 | 49.5 | 35.5 | 8 |
| 19 | 04/04/67 | 36 | 170.2 | 81.6 | 86.4 | 40.6 | 28.2 | 9 |
| 20 | 05/25/62 | 41 | 193.0 | 97.5 | 86.4 | 41.9 | 26.2 | 2 |
| 21 | 05/30/70 | 32 | 172.7 | 86.2 | 91.4 | 40.6 | 28.9 | 10 |
| 22 | 05/03/73 | 29 | 170.2 | 86.2 | 91.4 | 44.5 | 29.8 | 7 |
| 23 | 01/05/61 | 42 | 181.6 | 113.4 | 101.6 | 47.0 | 34.4 | 9 |
| 24 | 05/11/59 | 44 | 182.9 | 87.1 | 81.3 | 41.9 | 26.0 | 2 |
| 25 | 02/22/61 | 42 | 184.2 | 86.2 | 86.4 | 40.6 | 25.4 | 1 |
| 26 | 02/11/63 | 40 | 185.4 | 96.6 | 86.4 | 43.2 | 28.1 | 12 |
| 27 | 10/02/59 | 43 | 184.2 | 87.1 | 86.4 | 41.9 | 25.7 | 13 |
| 28 | 03/15/67 | 36 | 167.6 | 70.3 | 83.8 | * | 25.0 | 5 |
| 29 | 12/14/59 | 43 | 182.9 | 80.7 | 86.4 | 40.1 | 24.1 | 12 |
| 30 | 02/02/75 | 28 | 177.8 | 83.9 | 83.8 | 45.7 | 26.5 | 9 |
| 31 | 02/16/71 | 32 | 175.3 | 70.3 | * | * | 22.9 | 9 |
| 32 | 02/24/69 | 34 | 175.3 | 83.9 | 81.3 | 41.9 | 27.3 | 6 |
| 33 | 10/17/56 | 46 | 172.7 | 74.8 | 86.4 | 40.6 | 25.1 | 1 |
| 34 | 08/24/69 | 33 | 188.0 | 79.4 | * | * | 22.5 | 5 |
| 35 | 04/04/69 | 34 | 175.3 | 83.5 | 86.4 | 43.2 | 27.2 | 11 |
| 36 | 07/14/76 | 26 | 177.2 | 93.0 | * | * | 29.6 | 5 |
| 37 | 12/31/69 | 33 | 180.3 | 88.5 | * | * | 27.2 | 9 |
| 38 | 06/21/72 | 30 | 174.6 | 90.3 | 86.4 | 41.9 | 29.6 | 16 |
| 39 | 11/17/68 | 34 | 182.9 | 86.2 | * | * | 25.8 | 2 |
| 40 | 02/12/72 | 31 | 188.0 | 99.8 | * | * | 28.2 | 9 |
| 41 | 09/22/64 | 39 | 177.8 | 83.0 | 83.8 | 39.4 | 26.3 | 5 |

| Diver ID # | DOB (MM/DD/YY) | Age+ (yr) | Ht (cm) | Wt (kg) | Waist (cm) | Neck (cm) | BMI | # Man-Dives |
|---|---|---|---|---|---|---|---|---|
| 42 | 05/25/59 | 43 | 177.8 | 89.8 | 86.4 | 44.5 | 28.4 | 7 |
| 43 | 05/30/69 | 33 | 177.8 | 106.6 | 94.0 | 44.5 | 33.7 | 16 |
| 44 | 12/21/73 | 30 | 177.8 | 81.6 | 81.3 | 44.5 | 25.8 | 2 |
| 45 | 10/10/69 | 34 | 172.7 | 84.4 | 96.5 | 43.2 | 28.3 | 2 |
| 46 | 03/27/57 | 46 | 172.7 | 74.8 | 73.7 | 39.4 | 25.1 | 5 |
| 47 | 11/20/62 | 40 | 172.7 | 74.8 | 81.3 | 40.6 | 25.1 | 9 |
| 48 | 02/07/63 | 41 | 182.9 | 105.7 | 100.3 | 44.5 | 31.6 | 2 |
| 49 | 10/01/55 | 47 | 175.3 | 90.7 | 96.5 | 43.2 | 29.5 | 7 |
| 50 | 04/03/75 | 28 | 172.7 | 79.8 | 81.3 | 43.2 | 26.8 | 15 |
| 51 | 11/30/61 | 41 | 182.9 | 79.4 | * | * | 23.7 | 10 |
| 52 | 02/12/61 | 42 | 188.0 | 99.8 | 91.4 | 44.5 | 28.2 | 7 |
| 53 | 03/15/66 | 37 | 167.6 | 90.3 | 96.5 | 45.7 | 32.1 | 6 |
| 54 | 08/28/62 | 40 | 182.9 | 95.7 | * | * | 28.6 | 14 |
| 55 | 09/20/56 | 46 | 182.9 | 88.5 | 96.5 | 40.6 | 26.4 | 4 |
| 56 | * | * | * | * | * | * | * | 1 |
| 57 | 05/13/58 | 44 | 182.9 | 86.2 | * | * | 25.8 | 5 |
| 58 | 09/18/70 | 32 | 175.3 | 73.5 | * | * | 23.9 | 1 |
| 59 | 11/25/70 | 32 | 172.7 | 86.2 | 88.9 | 43.2 | 28.9 | 8 |
| 60 | 05/03/64 | 38 | * | * | * | * | * | 8 |
| 61 | 05/31/71 | 31 | 182.9 | 88.5 | 88.9 | 40.6 | 26.4 | 2 |
| 62 | 02/16/70 | 33 | 177.8 | 74.8 | * | * | 23.7 | 2 |
| 63 | 11/21/70 | 32 | 182.9 | 104.3 | 99.1 | 41.9 | 31.2 | 11 |
| 64 | 11/14/62 | 40 | 175.3 | 90.7 | 91.4 | 40.6 | 29.5 | 13 |
| 65 | 02/28/67 | 36 | 152.4 | 72.6 | 78.7 | 40.6 | 31.2 | 7 |
| 66 | 10/02/72 | 30 | 172.7 | 83.9 | 86.4 | 40.6 | 28.1 | 13 |
| 67 | 02/02/69 | 34 | 177.8 | 72.6 | * | * | 23.0 | 1 |
| 68 | 09/23/61 | 41 | 175.3 | 61.2 | * | * | 19.9 | 1 |
| 69 | 08/25/61 | 41 | 182.9 | 113.4 | 101.6 | 47.0 | 33.9 | 2 |
| 70 | 10/29/57 | 45 | 170.2 | 85.7 | * | * | 29.6 | 2 |
| 71 | * | * | * | * | * | * | * | 1 |
| 72 | 03/24/73 | 30 | 180.3 | 95.3 | * | * | 29.3 | 2 |
| 73 | 09/05/58 | 45 | 162.6 | 79.4 | 91.4 | 40.6 | 30.0 | 1 |

+ as of diver's first dive in study

* not recorded

# APPENDIX B

## Case Narratives

**Case 1) Diver 36, Dive: 123/30 W/C, 040803**

26 year-old male noticed decreased sensation on the dorsal surface of his left hand, "coolness" in his left hand, and "fullness" in his left elbow about 1 hr after surfacing. Patient alerted a DMO about 3 hr after surfacing with no abatement or progression of symptoms. On examination, dorsum of left hand was found to have decreased sensation to touch and pinprick in a radial nerve distribution, with no skin discoloration or mottling. Remainder of neurological examination was normal. The complaint of fullness in the elbow completely resolved during compression to 60 fsw. Decreased sensation and coolness in left hand resolved completely by 19 min into the first $O_2$-breathing period at 60 fsw. Diver completed a U.S. Navy Treatment Table 6 (TT6) and remained asymptomatic. Patient had a history of Type II DCS similar to this presentation in 1995 after a scuba dive, except the presentation was bilateral in that case. Diagnosis: Type II DCS.

**Case 2) Diver 17, Dive: 120/30 W/C, 040903**

39 year-old male presented approximately 10 hr after surfacing with bilateral 2-3/10 pain to palpation and fullness with swelling of the 2$^{nd}$ digit at the proximal inter-phylangeal joints (PIPs). Patient was found on examination to have significant pain to distraction bilaterally (Patient winced visibly with test) and decreased sensation to pinprick bilaterally on the dorsal/palmer surfaces of the thumb and forefingers (50% of normal left, 25% of normal right). Remainder of neurological examination was normal. Patient denied trauma to hands or overuse. Patient was treated on a TT6. By the end of the first $O_2$-breathing period, left finger pain was completely relieved and right finger pain was at 2/10 severity. Finger pain in both hands was completely resolved by the end of the second $O_2$-breathing period, though sensation of fullness in the right hand and a small area of decreased sensation on the dorsal surface of the left hand persisted. One $O_2$-breathing extension at 60 fsw was completed, after which complete relief of all symptoms, including return of normal sensation to the dorsum of the left hand, was noted. The TT6 was completed with another $O_2$-breathing extension at 30 fsw and no recurrence of symptoms. Post treatment, diver was pain-free and neurological examination was normal, but some residual swelling persisted bilaterally in affected PIP joints. Diagnosis: Type II DCS.

**Case 3) Diver 31, Dive: 120/30 W/C, 040903**

32 year-old male reported 18 hr post surfacing that his wife had noticed a red rash on his left upper lateral thigh approximately 5 hr after surfacing. Patient noted at that time that the skin in the affected area was red, raised and very "itchy", but without blue discoloration or marbling. Pruritis resolved over the course of the night, but the area became tender and remained erythematous. Patient presented with a 7cm x 7cm, slightly raised rash on L upper lateral thigh, which was 2/10 tender to palpation. Results of neurological examination were within normal limits. Patient denied possible trauma or insect bite. Patient was compressed to 60 fsw and commenced $O_2$ breathing. After 5 min, Patient noted that tenderness had decreased by approximately 25% and the tender observed a decrease in the accompanying edema and erythema. Tenderness was completely resolved within 10 min and the tender observed continued improvement of the erythema. Patient completed a TT5 with one extension at 30 fsw and full resolution of all symptoms except for very slight residual erythema over the originally affected area. Diagnosis: Type I DCS.

**Case 4) Diver 26, Dive: 120/30 W/C, 041403**

40 year-old male presented approximately 25 hr after surfacing with 4/10 dull achy pain in the left knee proximal to the patella. Patient first noticed pain in this location on awakening the morning after the dive (approximately 20 hr after surfacing), and noted that the pain had not awakened him earlier. Patient ran without difficulty with the pain during regular morning physical training (PT) and experienced no worsening or relief thereafter. No history of

mechanical injury or trauma, nor involvement of any aggravating factors other than running, was noted. Physical examination of the left knee revealed no skin discoloration, crepitus, or sensitivity to movement within full range of motion or to palpation. Results of neurological examination were within normal limits. Patient was compressed to 60 fsw, began $O_2$ breathing 1 min after arrival at bottom, and reported complete relief of knee pain 11 min later. Patient completed a TT5 with one extension at 30 fsw, no recurrence of symptoms, and normal post treatment examination results. Diagnosis: Type I DCS.

**Case 5) Diver 60, Dive: 120/30 W/C, 041503**

38 year-old male presented approximately 1.5 hr after surfacing with bilateral 1-3/10 deep, achy, "arthritic", and poorly localized dorsal wrist pain elicited by flexion but relieved at rest. Hands were normal in appearance, without bruising, swelling, or abnormal range of motion. Patient denied physical trauma to hands, although 2 bruises were noted on right anterior forearm. Strength and sensation were normal. Remainder of neurological examination was within normal limits. Patient was compressed to 60 fsw and put on $O_2$. Patient reported 50% relief of his wrist pain after 7 min and complete relief after 14 min, though mild bilateral wrist "stiffness" persisted. Patient completed a TT6 with no extensions and no recurrence of pain. Post treatment neurological examination was normal, but bilateral wrist stiffness persisted, attributed to overuse of the wrists during examinations. Diagnosis: Type I DCS.

**Case 6) Diver 47, Dive: 120/30 W/C, 041703**

40 year-old male presented 45 min after surfacing with complaint of left hand "tingling." During examination, the hand became mottled, purple and diffusely pruritic across the palm, concentrated along the thenar eminence just proximal to the 2nd and 3rd metacarpalphalangeal (MCP) joints. Strength was 5/5 bilaterally and sensation was intact throughout the episode. Patient continued to complain of parasthesia in a left median nerve distribution. Remainder of neurological examination was within normal limits. As the examination progressed, the skin mottling decreased to a generalized erythema, minimally pruritic, and the paresthesia diminished to approximately 50% of the original complaint. A TT6 was initiated. Color was normal between left and right hands upon reaching 60 fsw. Paresthesia decreased gradually with $O_2$ breathing and was completely resolved by the end of the second $O_2$ period at 60 fsw. Remainder of the TT6, including one extension at 60 fsw, was completed without recurrence of symptoms. Results of post treatment examination were within normal limits and patient was released symptom-free. Diver had worn gloves during cold-water decompression. Diagnosis: cutis marmorata; Type II DCS.

**Case 7) Diver 70, Dive: 120/30 W/C, 041703**

45 year-old male presented approximately 7 hr after surfacing with complaint of 2-3/10 constant pain in the right wrist and fingers of the right hand. Patient was found on neurological examination to have some numbness of 2nd through 4th digits, decreased adduction/abduction strength in the 2nd and 3rd digits, and decreased right hand grip strength (3/5). Remainder of neurological examination was within normal limits except for nystagmus on right lateral gaze. Patient was compressed to 60 fsw where he noted complete relief of symptoms during the second $O_2$ period at 60 fsw. Patient completed a TT6 with two extensions at 60 fsw and two extensions at 30 fsw, and surfaced without original symptoms, but with complaint of mild expiratory burning, which was diagnosed as mild pulmonary oxygen toxicity. Patient remained asymptomatic and expiratory burning disappeared over the next 3 days. Diver had worn gloves during cold-water decompression. Diagnosis: Type II DCS.

**Case 8) Diver 15, Dive: 120/25 W/C, 052703**

40 year-old male noticed onset of intense itching under the watchband on his left wrist 8 hr post dive. He removed the watch and continued his regular activity. He reported being awakened by the itching several times during the ensuing night. The itching persisted but was not reported until 20 hours post dive, shortly after the patient had noticed 7/10 left wrist pain while performing morning push-ups. Patient denied physical trauma to the left hand or overuse during the preceding 24 hr. Patient remarked that he had "felt much colder" during his last dive than during

any of the five previous dives in this protocol in which he had participated. Physical examination revealed left wrist circumferential pruritis with decreased pinprick sensation, no erythema or swelling, and decreased extension with pain to 7/10 on full extension localized to a watchband distribution. Vibration sense was intact. Remainder of neurological examination, including CN II – CN III, motor, deep tendon reflexes (DTRs), and mental status, were within normal limits. The diver was compressed to 60 fsw and started $O_2$ breathing with complete relief of itching symptoms by the end of the first $O_2$-breathing period and reduction of left wrist pain to 2/10 by the end of the second $O_2$-breathing period at 60 fsw. A TT6 was completed with no extensions and no change in remaining left wrist pain. Results of post-treatment neurological examination were normal, left wrist itching remained fully resolved, and left wrist pain was greatly reduced at 2/10 level with improved extension. Patient reported full resolution of wrist pain and stiffness on follow-up 2 days after TT6 administration. Diver had worn gloves during cold-water decompression. Diagnosis: Type I DCS.

**Case 9) Diver 1, Dive: 120/25 W/C, 052903**

35 year-old male noticed onset of bilateral shoulder pain approximately 8 hr post dive. Patient reported for examination at 0700 the following morning, 19 hr after surfacing, after bilateral wrist pain and tingling developed with no abatement or worsening of the shoulder pain. Patient was found on examination to have bilateral, non-localized shoulder pain (5/10) not affected by movement, and left (6/10) and right (5/10) wrist pain not affected by movement or palpation, but with reduced extension in both wrists. Patient complained of bilateral tingling and numbness in the fingers, but objective results of neurological examination (including CN II - CN XII, sensory, motor, cerebellar, DTR, and mental status exams) were within normal limits. The diver was compressed to 60 fsw with Diver 65 from Case 10. Three holds during compression, delaying arrival at 60 fsw by 22 min, were required to accommodate a sinus squeeze in Diver 10. Two minutes after reaching bottom, Patient started first $O_2$-breathing period. Shoulder pain was relieved to 1/10 within 2 min and to 90% relief within 16 min. Tingling in the left arm was also completely relieved after the first 16 min of $O_2$ breathing, with 90% relief of right wrist pain and 40% relief of left wrist pain. Right wrist pain had completely resolved and left wrist pain had 75% relief by the end of the third $O_2$-breathing period. Two $O_2$ extensions were completed at 60 fsw, with 90% relief of the left wrist pain by the end of the fifth $O_2$-breathing period. No further changes occurred in the remainder of the TT6. Post treatment examination revealed an area over the AC joint bilaterally with mild tenderness to palpation, attributed to bruising from the cycle ergometer horns during the dive. Diver reported somewhat reduced range of motion and sensation of swelling in the left wrist, but no pain. A neurological examination was completed with no abnormal findings. Diver reported completely asymptomatic at 0900 the morning following the treatment. Diver had worn gloves during cold-water decompression. Diagnosis: Type II DCS.

**Case 10) Diver 65, Dive: 120/25 W/C, 052903**

36 year-old male noticed onset of pain (intensity 5/10) in the proximal interphalangeal (PIP) joint of the 5$^{th}$ digit (little finger) of his right hand approximately 3 hr after surfacing. The digit was painful at rest and the pain was exacerbated by movement and palpation. Diver did not report for evaluation until 0700 the following morning, 19 hr after surfacing, because the symptoms had not changed. Physical examination revealed mild erythema over right 5$^{th}$ PIP with pain 7/10 to palpation localized to joint. Results of neurological examination were within normal limits. The diver was recompressed to 60 fsw with Diver 1 from Case 9. Diver experienced a frontal sinus squeeze during descent requiring three holds to accommodate and a consequent delay of 22 min to reach 60 fsw. PIP joint pain remained at 5/10 at the start of the first $O_2$-breathing period at 60 fsw, diminished to 4/10 after 14 min, and was reduced to 1/10 by the end of the period. Two $O_2$ extensions at 60 fsw were completed to relieve Diver 1 symptoms. Diver 65 reported complete relief of symptoms by the end of the second extension. Remainder of TT6 was uneventful and the diver remained asymptomatic post-treatment. Diver volunteered after treatment that his finger pain had been accompanied by dull pain in the right elbow that he did not report, and that this pain also resolved during the TT6. Diver had worn gloves during cold-water decompression. Diagnosis: Type I DCS.

**Case 11) Diver 35, Dive: 120/25 W/C, 060303**

33 year-old male noticed onset of right 3rd, 4th, and 5th metacarpalphalangeal (MCP) joint pain intensity 4/10 within 30 minutes of surfacing. Patient stated that the 3rd, 4th, and 5th digits of the right hand became numb to the touch within an additional 15 min, and these same digits became intensely pruritic 10 min after that. Patient finally reported his symptoms approximately 1 hr after surfacing. Patient was examined at 1310, at which time both hands were deeply erythematous on the palmer surface, with good pulses and slightly cooled digits bilaterally. During examination, the hypnothenar region of the right palm began to mottle, displaying full cutis marmarata within approximately 5 min. Neurological examination was within normal limits except for the loss of pinpoint sensation over dorsal surface of the 3rd, 4th, and 5th digits of the right hand up to the knuckle region and loss of two-point discrimination over 3rd and 4th digit palmer surface. Intense pruritis remained as did 4/10 pain in the 3rd, 4th, and 5th metacarpalphalangeal (MCP) joints. Patient was pressed to 60 fsw with complete relief of itching and numbness upon reaching 60 fsw. MCP joint pain was reduced to 1/10 by the end of the first $O_2$ period and completely resolved by the end of the second $O_2$ period. One oxygen extension at 60 fsw was given. Remainder of TT6 was uneventful with patient asymptomatic post-treatment. Diver had worn gloves during cold-water decompression. Diagnosis: cutis marmoratoa; Type II DCS.

**Case 12, Diver 69, Dive: 120/70 C/W, 100903**

41 year-old male reported to medical 4 hr after surfacing with complaint of dull, achy, poorly localized pain (2/10) in right knee. He also complained of some mild left calf pain, which he thought was cramping. He denied trauma to the knee and described the pain as being unlike pain he had felt before. During the interview and examination the pain increased in intensity from 2/10 to 7/10. Neurological examination was within normal limits and knee examination was unremarkable except for the aforementioned pain. Pain was constant and unchanged with motion. On descent during TT6, the patient reported almost complete resolution of symptoms and that the pain had decreased to 2/10 in intensity by the time he reached bottom. The patient also reported that he felt "overall a lot better". His symptoms had completely resolved 14 min into the first $O_2$ period. Neurological examination at depth was normal. A standard TT6 was completed without recurrence of symptoms. Diagnosis: Type I DCS.

**Case 13) Diver 70, Dive: 120/70 C/W, 102703**

46 year-old male reported left knee pain of 4-5/10 level within 8 hr of surfacing. Neurological examination (including CN II - CN XII, sensory, motor, cerebellar, DTR, and mental status exams) were within normal limits except for new onset dull, poorly localized left knee pain that did not improve or worsen with manual manipulation or palpation of the knee joint. Patient has chronic bilateral knee pain, but his chronic pain has always been localized to the patellar tendons. This new, acute knee pain is located within the joint and surrounding (hand sized) area of the knee. Patient also had worsening (from 1/10 to 3/10) left hip pain that progressed during the exam. Tentative diagnosis of DCS I was made and a TT6 was initiated.

The subject reached 60 fsw in the treatment chamber without incident. Repeat neurological examination at depth failed to reveal any resolution of knee pain until midway through the second oxygen period at 60 fsw, at which time the pain had decreased to 3/10. The left hip pain reported earlier was completely resolved by the end of the second oxygen period. Two oxygen extensions were given at 60-fsw and knee pain reduced to 1/10 by the end of the fourth oxygen period.

Subject began to complain of mild substernal burning on inspiration towards the end of the fourth oxygen period. Subject was brought to 30 fsw per TT6, where he completed two oxygen periods. Subject reported complete resolution of symptoms by the end of the second oxygen period at 30 fsw. Repeat neurological examination was normal. No residual knee or hip pain was noted. Diagnosis: Type I DCS.

**Case 14) Diver 18, Dive: 150/60 C/W, 051704**

39 year-old male reported 3 hr after surfacing with complaints of nausea and 5/10 pain in his right arm from the shoulder to the fingertips. Upon rising, the diver reported bilateral knee weakness and a generalized fatigue. A partial neurological examination revealed right upper extremity weakness (4/5) with approximately a 50% reduction in triceps, biceps, and finger-squeeze compared to the contra-lateral side. Patient reported continued knee weakness, a burning sensation in the skin of the abdominal region, 5/10 right shoulder, arm, forearm, and hand pain. A raised, erythematous rash covered the patient's back and appeared to be rapidly progressing. The patient was not able to track with either eye. Neurological examination was terminated and patient was recompressed to 60 fsw. Delay from presentation to pressurization was approximately 10 min. Patient reported full recovery from all symptoms except 2/10 right elbow pain upon reaching 60 fsw. The patient experienced complete resolution of symptoms within 4 min of starting the first $O_2$–breathing period.

TT6 was completed without difficulty except for mild inspiratory burning beginning just prior to the last $O_2$–breathing period at 30 fsw. Patient was offered the splitting of the last oxygen period into four 15-min oxygen periods with intervening 5-min air breaks but the patient chose to complete this period in a single 60-min oxygen period as written. Patient completed the TT6 without extensions, surface neurological examination was normal, and patient was observed at NEDU for 2 hr before being released. Final Diagnosis: Type II DCS.

**Case 15) Diver 63, Dive: 120/70 W/W, 052604**

33 year-old male presented with 3/10 constant, dull left wrist pain 4 hr post surfacing, noting that actual onset of symptoms was 1 hr earlier at 2/10 intensity. He states that he "popped his wrist" but pain did not decrease. Patient denied injury or mechanical trauma. Physical examination revealed no left wrist numbness or weakness. Remainder of neurological examination was within normal limits. Suspicion of Type I DCS motivated recompression to 60 fsw on TT6. Patient had complete relief of symptoms in first $O_2$–breathing period at 60 fsw. Patient completed TT6 with no extensions and normal post treatment examination. Slight stiffness in left wrist, attributed to excessive "poking and prodding" from repeated examination, noted in follow-up examination the next day. Diagnosis: Type I DCS.

**Case 16) Diver 41, Dive: 120/70 W/W, 052604**

39 year-old male reported bilateral leg weakness and decreased sensation on anterolateral right thigh at 10 fsw (1051) in the OSF during decompression. Patient transferred to the OSF trunk, where he was met by a Diving Medical Technician (DMT) for evaluation. Patient confirmed above complaints with added note of slight lightheadedness. Patient was subsequently transferred to Delta Chamber for immediate recompression treatment. The initial descent for treatment was aborted at 20 fsw to return the chamber to 10 fsw to retrieve Diver 12, Case 17, for treatment. Patient was recompressed to 60 fsw with no change in original symptoms, but otherwise normal neurological examination. An intravenous (IV) line was inserted in the left antecubital space and a normal saline (NS) bolus was started. Midway through the second $O_2$-breathing period at 60 fsw, patient reported complete relief of right thigh numbness but inside tender reported that the patient had a bout of "increased temperature" with profuse perspiration. Leg weakness symptoms were reported improved and a second bag of NS was started at the end of the second $O_2$ period. Patient continued to improve and had full resolution of symptoms by the end of TT6 with one extension at 60 fsw and one extension at 30 fsw. During the TT6, the patient received totals of 3L NS IV, 54 oz water orally and 64 oz Gatorade orally. Results of a post-treatment follow-up examination were normal. Patient was kept overnight at NEDU for observation. Results of a follow-up examination at 0730 the following morning were normal and the patient was released.

Patient returned at 0700 the next morning, approx. 36 hr after surfacing from the first TT6, complaining of decreased sensation on the medial and lateral aspects of the right thigh, first noticed about 0.5 hr earlier while eating breakfast. Neurological examination confirmed the complaint, but was otherwise normal. Diagnosed as unresolved/recurrent Type II DCS, patient was recompressed to 60 fsw to commence a TT6. Patient noted approximately 10% relief of symptoms during the first $O_2$-breathing period and complete relief by the end of the second $O_2$-breathing period at 60

fsw. Patient remained asymptomatic thereafter and completed the TT6 with no extensions. Patient had no complaints on follow-up at 0830 the next day. Diagnosis: Type II DCS exacerbated by heat stress and dehydration.

**Case 17) Diver 12, Dive: 120/70 W/W, 052604**

53 year-old male noticed that he just "didn't feel right" at 50 fsw during decompression, and began complaining of pruritis on his shoulder/back with discomfort in his chest. While at the subsequent 30 fsw stop, the patient stood up, removed his dive mask and vomited. Patient returned to his station underwater and rested. At 1056 (approx. 2 hr into the dive), the patient started feeling a bilateral tingling sensation in his fingers. Patient notified the medical deck and made his way up the ladder to the OSF trunk. Patient lay down in the trunk until a Diving Medical Technician (DMT) could be locked-in to evaluate him. Patient's symptoms did not subside and 2 min later he began cramping in his left calf. Patient was then moved into Delta chamber for treatment with Diver 41, Case 16. Pre-treatment neurological examination was difficult secondary to patient being "extremely hot" and somewhat dizzy, but was normal except for tingling sensation in both hands and fingers and dilated pupils. Patient stated that symptoms began to subside within 5 min of reaching 60 fsw. An intravenous (IV) line was inserted in the left antecubital space and a 300ml bolus of NS was administered. Patient also drank 64 oz. of Gatorade. Patient's symptoms significantly improved throughout the treatment with nearly full resolution of symptoms at the conclusion of a TT6 with one extension at 60 fsw and one extension at 30 fsw. Patient received a total of 3 L of NS IV and 64 oz. of Gatorade orally during the TT6 and consumed another 16 oz of water immediately after reaching surface. Post-treatment neurological examination was normal, but patient was kept overnight in the NEDU sickbay for observation and continued pushing of clear fluids orally. At 0700 the following morning, patient still felt somewhat ill and dizzy, appeared pale, and became nauseous on standing for examination. No residual DCS symptoms were noted. Patient was administered 3 L lactated Ringers over the ensuing 2.5 hr with improvement in color and relief of all symptoms except fatigue and some muscle soreness. Patient was released with no abnormal neurological findings, intact strength and sensation throughout, no focal deficits, and direction to continue aggressive oral hydration. Diagnosis: Type II DCS exacerbated by heat stress and dehydration.

**Case 18) Diver 50, Dive: 120/70 W/W, 052604**

29 year-old male reported 4 hr after surfacing with 4/10 right knee pain, first noticed approximately 1 hr earlier and noted since that time to have increased to the severity prevailing when reported. Patient denied past history of similar pain and admitted no previous history of DCS. Patient denied recent trauma to the area and voiced no further complaints. Physical examination showed full range of motion in the right knee with no decreased strength or sensation, but with pain increasing to 6/10 with movement against resistance. Remainder of the neurological examination was unremarkable. Patient was pressed to 60 fsw. Patient had significant relief at 60 fsw on $O_2$ and reported complete relief after a full TT6 with one extension at 60 fsw. Patient noted "fullness" in both ears, diagnosed as Draeger ear, in follow-up examination the next day; with no recurrence of other symptoms and signs. Diagnosis: Type I DCS.

**Case 19) Diver 53, Dive: 120/60 C/C, 060904**

38 year-old male presented 19 hr after surfacing with 6/10 right elbow pain; 1/10 right wrist pain; altered sensation in right finger tips and right forearm fullness. Patient states that elbow pain woke him up at 0500, 17.3 hr after surfacing. On examination, strength and sensation were normal throughout and there were no objective findings of paraesthesia, hypoaesthesia or dysaesthesia in the affected arm. The patient was pressed to 60 fsw and he reported 50% resolution of elbow pain prior to first $O_2$ period. Patient had complete resolution of elbow pain during second $O_2$ period at 60 fsw. The feeling of "forearm fullness" resolved in the third $O_2$ period at 60 fsw. During second $O_2$ period at 30 fsw, diver stated that he had begun to notice pain with flexion of right wrist and thumb but had no pain at rest. Inside tender reported tenderness to palpation for the tendons of both the thumb and medial wrist. Patient completed a TT6 with one extension at 60 fsw and 2 extensions at 30 fsw. Post treatment neurological examination was unremarkable. Wrist pain diagnosed as being most likely due to tenosynovitis secondary to 5 hr of video game

playing the previous evening. Follow-up examination the next morning was unremarkable. Diver had worn gloves during cold-water decompression. Diagnosis: Type I DCS.

**Case 20) Diver 7, Dive: 120/60 C/C, 060904**

29 year-old male presented 18.5 hr post surfacing with 6/10 right shoulder pain, poorly localized and deep, that he complained had awakened him 1.5 hr earlier. Patient described the pain as a deep dull ache with no aggravating or relieving factors, and noted that pain could be related to having played softball the evening prior. Physical and neurological examination was normal with no deficiencies. Patient reported 50% resolution of pain immediately upon reaching 60 fsw to commence a TT6. Patient noted complete resolution of "pain" within the first $O_2$-breathing period at 60 fsw. Right shoulder "soreness" 3/10 persisted through completion of the TT6 with 2 extensions at 60 fsw and 2 extensions at 30 fsw. In post treatment examination, lateral rotation of right shoulder was found to elicit pain, and tenderness to palpation was noted at posterior aspect of shoulder. Residual soreness and pain upon movement was diagnosed as rotator cuff strain secondary to softball injury the evening prior. Post treatment neurological examination was unremarkable. Diver had worn gloves during cold-water decompression. Diagnosis: Type I DCS.

**Case 21) Diver 37, Dive: 120/60 C/C, 061404**

34 year-old male developed 2/10 pain in 4$^{th}$ MP joint of the left hand approximately 10 min after surfacing, but did not report pain onset. Pain rapidly progressed to the wrist and then the elbow of the left arm while also increasing in intensity. Patient first reported symptoms 60 min after surfacing. Complete neurological examination demonstrated no other abnormality, but wrist pain during this 10-minute examination increased from 4/10 to 5/10. Patient was recompressed to 60 fsw and reported complete relief of elbow pain and reduction of finger and wrist pain from 5/10 to 1/10 upon reaching bottom. Oxygen-breathing by BIBS was initiated, and patient reported complete recovery from symptoms 8 minutes into the first $O_2$-breathing period. Patient completed a TT6 without extensions and without further incident. Repeat neurological examination on surface elicited no abnormalities or complaints. Diver had worn gloves during cold-water decompression. Diagnosis: Type I DCS.

**Case 22) Diver 23, Dive: 120/60 C/C, 061404**

43 year-old male awoke at 0230, 15 hr after surfacing, with "tingling" in the fingertips of the right hand. The tingling sensation resolved within 20 min of awakening, but a 5/10 pain developed in the right wrist and rapidly progressed from the wrist to include 4/10 pain in the elbow. Patient first reported symptoms 18 hr after surfacing. Complete neurological examination demonstrated no other abnormality, but wrist pain during this 10-min examination decreased from 5/10 to 4/10. Patient was recompressed to 60 fsw and experienced complete relief of elbow pain and reduction of finger and wrist pain from 5/10 to 1/10 within 7 min of starting $O_2$ breathing at 60 fsw. 1/10 right wrist pain, elicited only by movement, was the only patient complaint at the end of a second $O_2$-breathing extension at 60 fsw. Patient completed the TT6 with no other extensions without incident. Repeat neurological examination on surface elicited no abnormalities or complaints. Diver had worn gloves during cold-water decompression. Diagnosis: Type I DCS.

# APPENDIX C

## Dive Results Details

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 120/30 | 3 | --- | 42.2 | 96.8 | 0.3 | 80.1 | 0.0 | 24.77 | 56 | 6 | 60 | 1.0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 11 | 36.9 | 96.4 | 0.3 | 80.1 | 0.1 | 24.37 | 61 | 3 | 60 | 2.0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 38 | 32.1 | 80.0 | 0.6 | 97.1 | 0.1 | 18.80 | 61 | 6 | 59 | 4.3 | 6 | 2 | 3 | 2 | 2 | 2 | 1 |
| | 120/70 | 3 | 119 | 38.4 | 97.0 | 0.1 | 80.4 | 0.1 | 48.00 | 57 | 4 | 56 | 1.5 | 2 | 1 | 3 | 2 | 2 | 2 | 0 |
| 2 | 120/30 | 3 | --- | 38.2 | 96.8 | 0.2 | 80.2 | 0.1 | 25.30 | 55 | 7 | 30 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 16 | 37.3 | 96.9 | 0.2 | 80.1 | 0.1 | 11.50 | 58 | 10 | 55 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 26 | 37.5 | 79.9 | 0.3 | 97.5 | 0.1 | 19.57 | 55 | 4 | 59 | 2.3 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 126 | 35.5 | 96.7 | 0.1 | 80.1 | 0.2 | 48.40 | 57 | 5 | 58 | 0.0 | 0 | 2 | 2 | 2 | 2 | 1 | 0 |
| | 150/60 | 3 | 219 | 38.6 | 96.5 | 0.4 | 79.8 | 0.1 | 42.40 | 52 | 5 | 58 | 0.0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 12 | 34.8 | 97.0 | 0.2 | 79.6 | 0.2 | 43.17 | 55 | 4 | 59 | 1.1 | 3 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 4 | 14 | 31.8 | --- | --- | 96.9 | 0.1 | 47.30 | 54 | 5 | 53 | 2.0 | 1 | 0 | 1 | 1 | 2 | 1 | 0 |
| 3 | 120/30 | 2 | --- | 37.2 | 96.8 | 0.1 | 80.1 | 0.1 | 0.27 | 20 | 21 | 30 | 6.7 | 8 | 1 | 2 | 1 | 1 | 2 | 0 |
| | 120/30 | 3 | 7 | 37.3 | 96.8 | 0.3 | 80.1 | 0.1 | 24.83 | 66 | 6 | 60 | 1.0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 9 | 37.5 | 97.3 | 0.3 | 80.2 | 0.1 | 24.37 | 72 | 5 | 59 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 5 | 38.8 | 97.0 | 0.5 | 80.1 | 0.1 | 24.50 | 72 | 6 | 59 | 0.7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 21 | 33.3 | 80.0 | 0.3 | 97.5 | 0.1 | 19.23 | 61 | 6 | 58 | 6.3 | 8 | 1 | 3 | 1 | 2 | 1 | 0 |
| | 120/25 | 2 | 16 | 36.8 | 80.3 | 0.3 | 97.2 | 0.1 | 19.83 | 47 | 7 | 57 | 3.3 | 5 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/50 | 3 | 103 | 39.8 | 96.7 | 0.4 | 80.2 | 0.1 | 35.67 | 59 | 5 | 54 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 21 | 35.7 | 96.9 | 0.1 | 80.5 | 0.2 | 49.67 | 61 | 5 | 56 | 0.0 | 0 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 17 | 33.9 | 96.1 | 5.4 | 80.0 | 2.2 | 48.50 | 57 | 5 | 56 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 33.1 | 97.3 | 0.1 | 80.4 | 0.1 | 48.27 | 55 | 5 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 13 | 33.0 | 97.1 | 0.2 | 80.3 | 0.1 | 47.80 | 59 | 6 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 166 | 35.5 | 96.1 | 0.7 | 79.5 | 0.2 | 40.33 | 59 | 5 | 57 | 3.7 | 6 | 0 | 2 | 1 | 1 | 0 | 0 |
| | 150/60 | 3 | 9 | 37.0 | 96.8 | 0.2 | 79.9 | 0.2 | 42.53 | 62 | 5 | 58 | 2.9 | 5 | 1 | 2 | 1 | 1 | 1 | 0 |
| | 120/60 | 1 | 36 | 37.6 | --- | --- | 80.1 | 0.1 | 43.30 | 59 | 6 | 58 | 5.5 | 8 | 2 | 3 | 2 | 3 | 2 | 0 |
| 4 | 120/25 | 2 | --- | 37.2 | 80.1 | 0.4 | 97.3 | 0.0 | 19.97 | 49 | 5 | 58 | 2.8 | 4 | 2 | 2 | 2 | 2 | 2 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score: Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/25 | 2 | 6 | 35.4 | 80.2 | 0.3 | 97.2 | 0.0 | 19.23 | 65 | 6 | 58 | 1.2 | 2 | 1 | 2 | 3 | 2 | 2 | 0 |
| | 120/50 | 3 | 111 | 39.9 | --- | --- | 80.1 | 0.1 | 42.93 | 54 | 4 | 58 | 1.0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 120/70 | 3 | 21 | 35.7 | 96.9 | 0.1 | 80.5 | 0.2 | 50.00 | 57 | 5 | 55 | 1.3 | 2 | 1 | 1 | 2 | 1 | 2 | 0 |
| | 120/70 | 3 | 38 | 35.9 | 97.1 | 0.2 | 80.4 | 0.1 | 49.47 | 57 | 6 | 55 | 0.5 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 180 | 35.0 | 96.3 | 1.9 | 81.0 | 0.1 | 41.93 | 63 | 7 | 59 | 0.3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5 | 120/30 | 3 | --- | 42.0 | 96.8 | 0.2 | 80.1 | 0.0 | 23.43 | 57 | 4 | 60 | 1.2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 37.1 | 96.9 | 0.3 | 80.1 | 0.1 | 24.67 | 61 | 5 | 58 | 0.0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| | 120/30 | 3 | 7 | 37.0 | 97.0 | 0.2 | 80.6 | 0.2 | 24.80 | 61 | 5 | 59 | 1.0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 152 | 36.3 | 96.9 | 0.2 | 80.3 | 0.1 | 49.50 | 53 | 4 | 57 | 2.5 | 4 | 3 | 3 | 2 | 3 | 2 | 0 |
| | 120/70 | 3 | 25 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.30 | 62 | 7 | 57 | 3.3 | 5 | 0 | 0 | 0 | 1 | 1 | 0 |
| | 120/70 | 3 | 18 | 33.2 | 97.0 | 0.2 | 80.4 | 0.3 | 48.47 | 59 | 5 | 57 | 2.2 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 187 | 34.8 | 97.0 | 0.2 | 79.6 | 0.2 | 43.17 | 57 | 5 | 59 | 1.3 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| 6 | 120/70 | 3 | --- | 35.2 | 96.6 | 0.1 | 79.9 | 0.1 | 49.13 | 54 | 6 | 55 | 0.2 | 0 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 210 | 34.8 | 97.5 | 0.3 | 79.9 | 0.2 | 42.33 | 55 | 6 | 59 | 1.1 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| 7 | 150/60 | 3 | --- | 38.6 | 96.5 | 0.4 | 79.8 | 0.1 | 42.00 | 65 | 8 | 58 | 1.9 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 6 | 36.0 | 97.4 | 0.3 | 80.1 | 0.2 | 41.73 | 65 | 6 | 58 | 1.4 | 2 | 1 | 1 | 1 | 2 | 2 | 0 |
| | 150/60 | 3 | 9 | 35.8 | 97.5 | 0.3 | 79.8 | 0.1 | 42.47 | 63 | 5 | 59 | 1.1 | 2 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 5 | 34.8 | 97.5 | 0.3 | 79.9 | 0.2 | 42.37 | 62 | 5 | 59 | 1.9 | 4 | 2 | 2 | 2 | 2 | 3 | 0 |
| | 120/70 | 4 | 6 | 31.8 | --- | --- | 96.9 | 0.1 | 47.37 | 61 | 5 | 58 | 5.7 | 5 | 2 | 2 | 2 | 3 | 2 | 0 |
| | 120/60 | 1 | 16 | 45.0 | --- | --- | 80.0 | 0.1 | 28.83 | 63 | 5 | 58 | 3.0 | 4 | 2 | 3 | 3 | 3 | 3 | 1 |
| 8 | 120/30 | 3 | --- | 37.2 | 96.8 | 0.1 | 80.1 | 0.1 | 21.93 | 67 | 9 | 30 | 1.0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 16 | 37.5 | 97.3 | 0.3 | 80.2 | 0.1 | 24.37 | 63 | 6 | 59 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 28 | 38.0 | 79.9 | 0.3 | 97.3 | 0.1 | 19.40 | 62 | 5 | 59 | 4.0 | 6 | 1 | 2 | 1 | 2 | 1 | 0 |
| | 120/25 | 2 | 14 | 36.8 | 80.3 | 0.3 | 97.2 | 0.1 | 18.60 | 64 | 8 | 58 | 2.3 | 4 | 2 | 3 | 3 | 2 | 2 | 0 |
| | 120/50 | 3 | 103 | 39.8 | 96.7 | 0.4 | 80.2 | 0.1 | 34.90 | 58 | 6 | 55 | 0.0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 120/70 | 3 | 7 | 35.5 | 96.7 | 0.1 | 80.1 | 0.2 | 48.40 | 57 | 5 | 58 | 0.2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 16 | 37.4 | 96.7 | 0.1 | 80.2 | 0.2 | 48.80 | 61 | 7 | 57 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 20 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 48.23 | 64 | 5 | 56 | 0.3 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 31.7 | 97.4 | 0.1 | 80.3 | 0.2 | 49.13 | 60 | 5 | 57 | 0.7 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| 9 | 120/30 | 3 | --- | 39.3 | 97.0 | 0.4 | 80.2 | 0.1 | 24.93 | 66 | 7 | 60 | 0.8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/30 | 2 | 9 | 37.1 | 96.9 | 0.3 | 80.1 | 0.1 | 24.67 | 62 | 4 | 58 | 3.5 | 5 | 1 | 2 | 1 | 3 | 2 | 0 |
| | 120/25 | 2 | 40 | 36.6 | 80.4 | 0.4 | 97.2 | 0.1 | 19.43 | 66 | 7 | 59 | 1.2 | 2 | 1 | 1 | 0 | 1 | 1 | 0 |
| 10 | 120/30 | 3 | --- | 42.2 | 96.8 | 0.3 | 80.1 | 0.0 | 24.73 | 53 | 5 | 60 | 1.0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 6 | 39.2 | 96.9 | 0.2 | 80.0 | 0.1 | 24.23 | 55 | 8 | 57 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 5 | 36.5 | 97.0 | 0.3 | 80.1 | 0.0 | 24.20 | 59 | 5 | 59 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 35.1 | 96.8 | 4.8 | 80.1 | 0.1 | 24.23 | 64 | 5 | 59 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 21 | 33.3 | 80.0 | 0.3 | 97.5 | 0.1 | 18.97 | 52 | 3 | 59 | 1.0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 120/30 | 3 | --- | 30.8 | 96.7 | 0.2 | 80.2 | 0.1 | 22.97 | 55 | 3 | 60 | 0.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 36.4 | 96.9 | 0.2 | 80.4 | 0.1 | 23.97 | 58 | 3 | 56 | 0.7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 37.8 | 97.0 | 0.3 | 80.1 | 0.1 | 0.40 | 22 | 19 | 60 | 0.7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 38.0 | 97.4 | 2.3 | 79.9 | 0.5 | 23.70 | 61 | 4 | 59 | 2.3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 21 | 38.4 | 80.3 | 0.3 | 97.3 | 0.0 | 18.90 | 55 | 6 | 58 | 5.2 | 9 | 2 | 3 | 3 | 3 | 2 | 0 |
| | 120/70 | 3 | 162 | 38.2 | 96.4 | 0.1 | 80.0 | 0.1 | 49.00 | 55 | 4 | 58 | 2.2 | 4 | 3 | 3 | 3 | 4 | 4 | 0 |
| 12 | 120/30 | 3 | --- | 37.0 | 96.9 | 0.2 | 80.2 | 0.1 | 24.47 | 56 | 6 | 60 | 1.5 | 1 | 1 | 2 | 2 | 1 | 1 | 0 |
| | 120/30 | 2 | 5 | 37.3 | 96.8 | 0.3 | 80.1 | 0.1 | 24.40 | 54 | 5 | 60 | 0.7 | 1 | 1 | 3 | 2 | 1 | 2 | 0 |
| | 120/50 | 3 | 154 | 39.9 | --- | --- | 80.1 | 0.1 | 42.93 | 54 | 4 | 58 | 1.8 | 2 | 1 | 3 | 1 | 3 | 1 | 0 |
| | 120/70 | 3 | 7 | 35.2 | 97.0 | 0.2 | 80.2 | 0.1 | 49.77 | 55 | 4 | 57 | 1.0 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 7 | 37.0 | 96.7 | 0.1 | 80.4 | 0.2 | 48.97 | 53 | 6 | 58 | 1.7 | 1 | 2 | 2 | 2 | 2 | 3 | 0 |
| | 120/70 | 3 | 22 | 35.2 | 96.6 | 0.1 | 79.9 | 0.1 | 49.30 | 60 | 6 | 54 | 0.2 | 0 | 1 | 1 | 1 | 2 | 2 | 0 |
| | 120/70 | 3 | 9 | 33.1 | 97.3 | 0.1 | 80.4 | 0.1 | 47.63 | 57 | 5 | 58 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 32.9 | 97.1 | 0.3 | 80.0 | 0.1 | 48.63 | 57 | 4 | 58 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 4 | 202 | 39.0 | --- | --- | 97.1 | 0.1 | 48.33 | 43 | 4 | 58 | 5.7 | 5 | | | | | | 1 |
| 13 | 120/30 | 3 | --- | 36.9 | 97.0 | 0.3 | 80.0 | 0.1 | 24.10 | 63 | 4 | 58 | 0.7 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 5 | 36.5 | 97.0 | 0.3 | 80.1 | 0.0 | 24.40 | 69 | 5 | 58 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 35.1 | 96.8 | 4.8 | 80.1 | 0.1 | 24.30 | 68 | 5 | 59 | 0.0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| | 120/50 | 3 | 140 | 39.9 | --- | --- | 80.1 | 0.1 | 42.93 | 54 | 4 | 58 | 1.0 | 1 | 1 | 1 | 1 | 2 | 3 | 0 |
| | 120/70 | 3 | 3 | 35.2 | 97.0 | 0.2 | 80.2 | 0.1 | 49.47 | 55 | 5 | 57 | 0.0 | 0 | 1 | 2 | 1 | 2 | 2 | 0 |
| | 120/70 | 3 | 55 | 33.0 | 97.1 | 0.2 | 80.3 | 0.1 | 48.33 | 59 | 5 | 57 | 0.7 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 168 | 38.6 | 96.5 | 0.4 | 79.8 | 0.1 | 41.80 | 69 | 6 | 59 | 2.0 | 2 | 1 | 1 | 1 | 2 | 2 | 0 |
| | 150/60 | 3 | 6 | 36.0 | 97.4 | 0.3 | 80.1 | 0.2 | 42.30 | 62 | 8 | 57 | 1.0 | 1 | 2 | 1 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 6 | 34.8 | 97.0 | 0.2 | 79.6 | 0.2 | 43.03 | 58 | 7 | 59 | 0.0 | 0 | 1 | 1 | 1 | 2 | 2 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/70 | 4 | 14 | 32.0 | --- | --- | 96.9 | 0.1 | 47.27 | 58 | 9 | 56 | 3.2 | 2 | 2 | 2 | 2 | 3 | 3 | 0 |
| 14 | 120/30 | 2 | --- | 38.2 | 96.8 | 0.2 | 80.2 | 0.1 | 25.23 | 55 | 8 | 30 | 2.5 | 4 | 1 | 2 | 1 | 3 | 3 | 0 |
| | 120/30 | 2 | 7 | 40.6 | 97.1 | 0.3 | 80.1 | 0.1 | 24.70 | 55 | 5 | 60 | 2.7 | 6 | 1 | 3 | 2 | 2 | 2 | 0 |
| | 120/30 | 3 | 7 | 36.5 | 97.0 | 0.3 | 80.1 | 0.0 | 24.37 | 58 | 8 | 58 | 2.5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 38.8 | 97.0 | 0.5 | 80.1 | 0.1 | 24.53 | 58 | 3 | 58 | 0.8 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 21 | 37.5 | 79.9 | 0.3 | 97.5 | 0.1 | 19.53 | 55 | 2 | 59 | 3.3 | 5 | 1 | 3 | 1 | 1 | 1 | 0 |
| | 120/25 | 2 | 14 | 36.1 | 79.9 | 0.3 | 97.1 | 0.0 | 19.53 | 55 | 5 | 59 | 2.7 | 5 | 0 | 2 | 1 | 2 | 2 | 0 |
| | 120/70 | 3 | 119 | 37.0 | 96.7 | 0.1 | 80.4 | 0.2 | 49.30 | 56 | 3 | 58 | 2.0 | 3 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 120/70 | 3 | 9 | 37.4 | 96.7 | 0.1 | 80.2 | 0.2 | 48.73 | 59 | 5 | 57 | 2.2 | 4 | 1 | 1 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 15 | 33.9 | 96.1 | 5.4 | 80.0 | 2.2 | 47.03 | 55 | 6 | 58 | 2.3 | 5 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 33.1 | 97.3 | 0.1 | 80.4 | 0.1 | 47.33 | 57 | 5 | 58 | 2.5 | 6 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 5 | 31.7 | 97.4 | 0.1 | 80.3 | 0.2 | 49.27 | 55 | 4 | 57 | 4.3 | 6 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 182 | 36.0 | 97.4 | 0.3 | 80.1 | 0.2 | 42.03 | 59 | 6 | 57 | 5.0 | 7 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/60 | 1 | 36 | 45.0 | --- | --- | 80.0 | 0.1 | 43.97 | 57 | 4 | 56 | 3.2 | 7 | 3 | 3 | 3 | 4 | 4 | 0 |
| 15 | 120/30 | 3 | --- | 36.4 | 96.9 | 0.2 | 80.4 | 0.1 | 24.17 | 53 | 6 | 56 | 4.7 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 9 | 39.6 | 96.5 | 2.1 | 80.3 | 0.1 | 25.40 | 60 | 5 | 59 | 3.5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 26 | 35.2 | 80.1 | 0.2 | 97.3 | 0.0 | 19.40 | 65 | 4 | 59 | 1.5 | 3 | 1 | 3 | 2 | 1 | 1 | 0 |
| | 120/25 | 2 | 7 | 35.4 | 80.2 | 0.3 | 97.2 | 0.0 | 18.60 | 63 | 7 | 59 | 3.8 | 6 | 2 | 3 | 3 | 3 | 2 | 1 |
| | 120/70 | 3 | 121 | 38.4 | 97.0 | 0.1 | 80.4 | 0.1 | 47.47 | 57 | 6 | 56 | 3.7 | 5 | 1 | 2 | 1 | 2 | 1 | 0 |
| | 120/70 | 3 | 7 | 36.0 | 96.7 | 0.4 | 80.4 | 0.2 | 49.10 | 57 | 5 | 58 | 4.2 | 7 | 2 | 2 | 2 | 3 | 2 | 0 |
| | 120/70 | 3 | 7 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.03 | 54 | 5 | 57 | 2.2 | 2 | 2 | 2 | 2 | 3 | 2 | 0 |
| | 150/60 | 3 | 215 | 35.0 | 96.3 | 1.9 | 81.0 | 0.1 | 42.20 | 59 | 6 | 58 | 3.7 | 6 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 4 | 14 | 39.4 | --- | --- | 97.3 | 0.1 | 47.57 | 54 | 11 | 33 | 6.3 | 6 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 120/60 | 1 | 16 | 37.6 | --- | --- | 80.1 | 0.1 | 43.23 | 64 | 5 | 58 | 4.7 | 7 | 2 | 3 | 2 | 3 | 2 | 0 |
| 16 | 150/60 | 3 | --- | 40.2 | 96.9 | 0.6 | 79.7 | 0.2 | 42.83 | 55 | 7 | 59 | 1.7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 4 | 27 | 39.0 | --- | --- | 97.1 | 0.1 | 48.40 | 54 | 6 | 58 | 5.3 | 4 | 2 | 2 | 2 | 2 | 2 | 0 |
| 17 | 120/30 | 2 | --- | 37.0 | 96.9 | 0.2 | 80.2 | 0.1 | 23.77 | 60 | 4 | 60 | 3.7 | 6 | 1 | 2 | 2 | 2 | 2 | 1 |
| | 120/25 | 2 | 49 | 37.3 | 79.9 | 0.4 | 97.1 | 0.0 | 19.20 | 60 | 4 | 58 | 4.5 | 8 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 7 | 36.0 | 79.6 | 0.2 | 97.2 | 0.1 | 18.87 | 60 | 7 | 59 | 4.5 | 6 | 2 | 3 | 1 | 3 | 1 | 0 |
| | 120/70 | 3 | 106 | 35.2 | 97.0 | 0.2 | 80.2 | 0.1 | 48.20 | 61 | 6 | 58 | 0.5 | 1 | 1 | 2 | 2 | 4 | 3 | 0 |
| | 120/70 | 3 | 33 | 35.2 | 96.6 | 0.1 | 79.9 | 0.1 | 47.83 | 60 | 7 | 56 | 1.3 | 2 | 2 | 2 | 2 | 3 | 3 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 = C/C 2 = W/C 3 = C/W 4 = W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score: Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/70 | 3 | 9 | 33.1 | 97.3 | 0.1 | 80.4 | 0.1 | 47.50 | 60 | 6 | 58 | 1.8 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 32.9 | 97.1 | 0.3 | 80.0 | 0.1 | 48.80 | 54 | 5 | 58 | 1.8 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| 18 | 120/70 | 3 | --- | 37.9 | 97.0 | 0.2 | 79.9 | 0.3 | 48.53 | 57 | 5 | 57 | 1.2 | 4 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 15 | 36.0 | 96.7 | 0.4 | 80.4 | 0.2 | 48.57 | 62 | 4 | 58 | 5.2 | 8 | 2 | 3 | 2 | 3 | 3 | 0 |
| | 120/70 | 3 | 7 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.30 | 62 | 7 | 57 | 3.3 | 5 | 2 | 3 | 2 | 2 | 3 | 0 |
| | 120/70 | 3 | 9 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.30 | 62 | 7 | 57 | 3.3 | 5 | 1 | 2 | 3 | 3 | 3 | 0 |
| | 120/70 | 3 | 18 | 33.2 | 97.0 | 0.2 | 80.4 | 0.3 | 48.20 | 59 | 5 | 57 | 4.7 | 7 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 173 | 35.5 | 96.1 | 0.7 | 79.5 | 0.2 | 40.17 | 58 | 4 | 58 | 3.6 | 6 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 150/60 | 3 | 9 | 37.0 | 96.8 | 0.2 | 79.9 | 0.2 | 42.17 | 60 | 5 | 59 | 5.7 | 7 | 2 | 2 | 2 | 3 | 3 | 0 |
| | 150/60 | 3 | 12 | 37.2 | 97.5 | 0.2 | 79.9 | 0.1 | 42.23 | 57 | 5 | 58 | 6.0 | 8 | 3 | 3 | 3 | 3 | 3 | 1 |
| 19 | 120/30 | 3 | --- | 37.8 | 97.0 | 0.3 | 80.1 | 0.1 | 24.50 | 62 | 8 | 59 | 1.0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 38.0 | 97.4 | 2.3 | 79.9 | 0.5 | 24.43 | 62 | 6 | 57 | 3.7 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 28 | 36.6 | 80.4 | 0.4 | 97.2 | 0.1 | 19.33 | 57 | 3 | 58 | 1.2 | 2 | 0 | 1 | 1 | 1 | 1 | 0 |
| | 120/25 | 2 | 9 | 36.2 | 79.7 | 0.4 | 97.8 | 0.2 | 18.80 | 53 | 6 | 58 | 3.7 | 7 | 0 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 104 | 37.9 | 97.0 | 0.2 | 79.9 | 0.3 | 49.00 | 55 | 6 | 57 | 1.2 | 3 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 120/70 | 3 | 35 | 33.8 | 97.3 | 0.3 | 80.1 | 0.1 | 48.30 | 57 | 7 | 57 | 1.3 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 19 | 31.7 | 97.3 | 0.2 | 80.6 | 0.3 | 48.50 | 56 | 7 | 56 | 2.2 | 4 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 183 | 35.0 | 96.3 | 1.9 | 81.0 | 0.1 | 42.37 | 67 | 6 | 58 | 2.1 | 5 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 120/60 | 1 | 30 | 37.6 | --- | --- | 80.1 | 0.1 | 43.27 | 60 | 6 | 58 | 5.0 | 7 | 2 | 2 | 2 | 3 | 3 | 0 |
| 20 | 150/60 | 3 | --- | 35.0 | 96.3 | 1.9 | 81.0 | 0.1 | 42.17 | 58 | 7 | 58 | 0.4 | 0 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 4 | 14 | 39.4 | --- | --- | 97.3 | 0.1 | 47.57 | 63 | 5 | 59 | 6.3 | 6 | 2 | 2 | 2 | 2 | 3 | 0 |
| 21 | 120/30 | 2 | --- | 42.2 | 96.8 | 0.3 | 80.1 | 0.0 | 26.17 | 66 | 13 | 60 | 2.7 | 3 | 0 | 0 | 1 | 0 | 2 | 0 |
| | 120/30 | 3 | 4 | 40.6 | 97.1 | 0.3 | 80.1 | 0.1 | 25.07 | 66 | 8 | 60 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 49 | 36.1 | 79.9 | 0.3 | 97.1 | 0.0 | 19.53 | 62 | 4 | 59 | 2.5 | 3 | 1 | 1 | 0 | 1 | 2 | 0 |
| | 120/25 | 2 | 3 | 37.8 | 80.4 | 0.3 | 97.1 | 0.1 | 19.77 | 59 | 5 | 59 | 1.0 | 2 | 1 | 1 | 2 | 1 | 2 | 0 |
| | 120/70 | 3 | 116 | 37.0 | 96.7 | 0.1 | 80.4 | 0.2 | 50.07 | 58 | 4 | 57 | 1.0 | 1 | 1 | 2 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 22 | 35.2 | 96.6 | 0.1 | 79.9 | 0.1 | 47.80 | 50 | 4 | 56 | 0.0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| | 120/70 | 3 | 7 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 47.17 | 57 | 4 | 56 | 0.5 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 31.7 | 97.4 | 0.1 | 80.3 | 0.2 | 49.83 | 62 | 7 | 56 | 0.5 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 8 | 33.0 | 97.1 | 0.2 | 80.3 | 0.1 | 48.93 | 61 | 6 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 180 | 34.8 | 97.0 | 0.2 | 79.6 | 0.2 | 43.57 | 63 | 7 | 58 | 1.0 | 1 | 1 | 2 | 1 | 1 | 1 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 120/30 | 3 | --- | 37.8 | 97.0 | 0.3 | 80.1 | 0.1 | 24.53 | 56 | 3 | 59 | 1.0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 38.0 | 97.4 | 2.3 | 79.9 | 0.5 | 24.20 | 59 | 3 | 58 | 3.5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 154 | 35.3 | 96.2 | 0.4 | 80.1 | 0.4 | 48.70 | 57 | 5 | 58 | 0.3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 22 | 33.8 | 97.3 | 0.3 | 80.1 | 0.1 | 48.23 | 57 | 5 | 57 | 1.5 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 38.2 | 96.4 | 0.1 | 80.0 | 0.1 | 49.00 | 58 | 4 | 58 | 1.8 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 180 | 35.5 | 96.1 | 0.7 | 79.5 | 0.2 | 40.07 | 59 | 6 | 58 | 3.3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 150/60 | 3 | 9 | 37.0 | 96.8 | 0.2 | 79.9 | 0.2 | 42.53 | 59 | 4 | 58 | 3.6 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 120/30 | 3 | --- | 42.0 | 96.8 | 0.2 | 80.1 | 0.0 | 23.67 | 63 | 5 | 60 | 1.5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 47 | 36.6 | 80.4 | 0.4 | 97.2 | 0.1 | 19.40 | 54 | 5 | 59 | 1.2 | 2 | 1 | 1 | 0 | 3 | 3 | 0 |
| | 120/25 | 2 | 7 | 39.6 | 79.2 | 0.3 | 97.2 | 0.0 | 18.97 | 57 | 4 | 59 | 1.2 | 2 | 1 | 1 | 0 | 1 | 0 | 0 |
| | 120/70 | 3 | 119 | 35.3 | 96.2 | 0.4 | 80.1 | 0.4 | 48.80 | 47 | 6 | 57 | 0.0 | 0 | 2 | 3 | 3 | 2 | 3 | 0 |
| | 120/70 | 3 | 9 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.40 | 53 | 6 | 57 | 0.3 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 9 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.30 | 62 | 7 | 57 | 3.3 | 5 | 1 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 16 | 31.8 | 96.7 | 0.8 | 80.2 | 0.1 | 49.37 | 62 | 6 | 57 | 1.8 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 31.7 | 97.3 | 0.2 | 80.6 | 0.3 | 47.77 | 54 | 4 | 58 | 1.5 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/60 | 1 | 217 | 39.9 | --- | --- | 80.1 | 0.1 | 42.67 | 54 | 4 | 58 | 2.2 | 3 | 3 | 4 | 3 | 3 | 3 | 1 |
| 24 | 120/70 | 3 | --- | 33.8 | 97.3 | 0.3 | 80.1 | 0.1 | 48.57 | 58 | 7 | 57 | 2.2 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 4 | 217 | 38.8 | --- | --- | 97.1 | 0.0 | 48.13 | 59 | 6 | 59 | 4.7 | 4 | 3 | 3 | 3 | 3 | 3 | 0 |
| 25 | 120/30 | 3 | --- | 35.1 | 96.8 | 4.8 | 80.1 | 0.1 | 24.27 | 55 | 3 | 59 | 1.0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 26 | 120/30 | 2 | --- | 38.2 | 96.8 | 0.2 | 80.2 | 0.1 | 0.47 | 18 | 14 | 13 | 2.2 | 5 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/30 | 2 | 7 | 37.3 | 96.8 | 0.3 | 80.1 | 0.1 | 24.63 | 62 | 7 | 60 | 4.2 | 9 | 1 | 2 | 1 | 3 | 2 | 1 |
| | 120/30 | 3 | 9 | 37.3 | 96.9 | 0.2 | 80.1 | 0.1 | 23.13 | 69 | 7 | 60 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 5 | 35.1 | 96.8 | 4.8 | 80.1 | 0.1 | 23.13 | 57 | 8 | 59 | 0.8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 21 | 37.5 | 79.9 | 0.3 | 97.5 | 0.1 | 18.67 | 56 | 7 | 58 | 6.0 | 9 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 9 | 37.3 | 79.9 | 0.4 | 97.1 | 0.0 | 19.47 | 62 | 7 | 58 | 4.5 | 8 | 1 | 2 | 1 | 3 | 1 | 0 |
| | 120/25 | 2 | 7 | 36.8 | 80.3 | 0.3 | 97.2 | 0.1 | 18.33 | 58 | 9 | 59 | 4.0 | 7 | 2 | 3 | 2 | 3 | 2 | 0 |
| | 120/70 | 3 | 117 | 37.0 | 96.7 | 0.1 | 80.4 | 0.2 | 49.07 | 57 | 6 | 58 | 2.7 | 5 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 24 | 33.9 | 96.1 | 5.4 | 80.0 | 2.2 | 48.23 | 55 | 6 | 56 | 0.5 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 186 | 35.5 | 96.1 | 0.7 | 79.5 | 0.2 | 40.17 | 59 | 5 | 58 | 1.9 | 2 | 0 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 9 | 37.0 | 96.8 | 0.2 | 79.9 | 0.2 | 42.30 | 63 | 7 | 58 | 1.4 | 2 | 0 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 4 | 20 | 39.5 | --- | --- | 97.3 | 0.1 | 48.90 | 60 | 8 | 58 | 6.0 | 6 | 1 | 2 | 1 | 3 | 1 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 27 | 120/30 | 2 | --- | 38.5 | 97.4 | 0.2 | 80.1 | 0.1 | 24.03 | 54 | 6 | 60 | 4.0 | 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 2 | 7 | 39.2 | 96.9 | 0.2 | 80.0 | 0.1 | 23.60 | 37 | 8 | 1 | 3.5 | 6 | 1 | 2 | 0 | 1 | 0 | 0 |
| | 120/30 | 3 | 5 | 36.5 | 97.0 | 0.3 | 80.1 | 0.0 | 24.23 | 59 | 4 | 59 | 0.8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 38.8 | 97.0 | 0.5 | 80.1 | 0.1 | 24.03 | 57 | 3 | 60 | 1.0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 23 | 38.0 | 79.9 | 0.3 | 97.3 | 0.1 | 19.27 | 55 | 5 | 58 | 3.5 | 6 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 120/25 | 2 | 14 | 36.0 | 79.6 | 0.2 | 97.2 | 0.1 | 18.17 | 54 | 6 | 59 | 3.5 | 6 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 120/50 | 3 | 103 | 39.9 | --- | --- | 80.1 | 0.1 | 42.93 | 54 | 4 | 58 | 1.0 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 7 | 35.5 | 96.7 | 0.1 | 80.1 | 0.2 | 48.40 | 57 | 5 | 58 | 1.0 | 1 | 2 | 2 | 3 | 3 | 3 | 0 |
| | 120/70 | 3 | 9 | 31.5 | 96.8 | 0.1 | 79.9 | 4.1 | 47.67 | 53 | 4 | 59 | 1.0 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 20 | 35.2 | 96.6 | 0.1 | 79.9 | 0.1 | 48.77 | 55 | 5 | 55 | 1.0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| | 120/70 | 3 | 7 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 48.50 | 60 | 5 | 56 | 1.0 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 9 | 32.9 | 97.1 | 0.3 | 80.0 | 0.1 | 48.17 | 59 | 5 | 59 | 1.0 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 180 | 36.0 | 97.4 | 0.3 | 80.1 | 0.2 | 41.70 | 55 | 4 | 58 | 1.7 | 2 | 1 | 2 | 1 | 2 | 1 | 0 |
| 28 | 120/30 | 3 | --- | 38.0 | 97.4 | 2.3 | 79.9 | 0.5 | 23.67 | 49 | 7 | 59 | 2.0 | 3 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 120/70 | 3 | 184 | 33.1 | 97.3 | 0.1 | 80.4 | 0.1 | 47.20 | 51 | 6 | 57 | 1.0 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 13 | 33.0 | 97.1 | 0.2 | 80.3 | 0.1 | 48.43 | 59 | 6 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 174 | 36.0 | 97.4 | 0.3 | 80.1 | 0.2 | 41.17 | 58 | 5 | 59 | 0.6 | 2 | 1 | 1 | 1 | 2 | 2 | 0 |
| | 120/70 | 4 | 20 | 31.8 | --- | --- | 96.9 | 0.1 | 47.77 | 62 | 7 | 58 | 4.3 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| 29 | 120/30 | 2 | --- | 39.3 | 97.0 | 0.4 | 80.2 | 0.1 | 24.83 | 52 | 4 | 60 | 2.3 | 4 | 2 | 1 | 2 | 2 | 2 | 0 |
| | 120/30 | 3 | 9 | 37.1 | 96.9 | 0.3 | 80.1 | 0.1 | 0.70 | 25 | 16 | 54 | 0.0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 120/30 | 3 | 7 | 39.6 | 96.5 | 2.1 | 80.3 | 0.1 | 25.40 | 62 | 4 | 60 | 0.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 27 | 38.0 | 79.9 | 0.3 | 97.3 | 0.1 | 19.77 | 56 | 4 | 58 | 2.5 | 5 | 1 | 2 | 0 | 1 | 0 | 0 |
| | 120/25 | 2 | 8 | 32.1 | 79.9 | 0.3 | 97.1 | 0.0 | 19.33 | 54 | 5 | 57 | 2.5 | 5 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 5 | 40.7 | 80.0 | 0.2 | 97.2 | 0.1 | 19.93 | 57 | 5 | 58 | 3.5 | 6 | 1 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 113 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 47.80 | 55 | 4 | 57 | 1.0 | 2 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 120/70 | 3 | 33 | 36.4 | 96.9 | 0.1 | 80.4 | 0.4 | 47.67 | 56 | 4 | 56 | 1.7 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 8 | 31.7 | 97.4 | 0.1 | 80.3 | 0.2 | 49.00 | 58 | 5 | 57 | 1.0 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 6 | 31.7 | 97.3 | 0.2 | 80.6 | 0.3 | 47.97 | 55 | 5 | 57 | 0.5 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 171 | 40.2 | 96.9 | 0.6 | 79.7 | 0.2 | 43.37 | 59 | 4 | 58 | 1.3 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 14 | 35.8 | 97.5 | 0.3 | 79.8 | 0.1 | 42.33 | 56 | 6 | 59 | 1.6 | 2 | 2 | 2 | 2 | 3 | 2 | 0 |
| 30 | 120/30 | 2 | --- | 39.3 | 97.0 | 0.4 | 80.2 | 0.1 | 24.87 | 57 | 7 | 60 | 2.3 | 4 | 0 | 0 | 0 | 2 | 1 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco): Mean | Thermal Status (Deco): Last | Maximum VGE Score: Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/30 | 3 | 14 | 36.7 | 96.8 | 0.3 | 80.1 | 0.1 | 5.70 | 30 | 18 | 60 | 1.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 37.5 | 96.8 | 1.9 | 80.2 | 0.2 | 23.00 | 50 | 8 | 57 | 2.2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 37 | 37.8 | 80.4 | 0.3 | 97.1 | 0.1 | 19.73 | 60 | 3 | 58 | 1.5 | 3 | 1 | 1 | 1 | 1 | 0 | 0 |
| | 120/70 | 3 | 124 | 36.4 | 96.7 | 0.2 | 79.8 | 0.5 | 49.53 | 63 | 6 | 57 | 0.3 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 205 | 40.2 | 96.9 | 0.6 | 79.7 | 0.2 | 43.53 | 66 | 6 | 58 | 1.9 | 3 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 18 | 37.2 | 97.5 | 0.2 | 79.9 | 0.1 | 42.20 | 62 | 5 | 58 | 4.0 | 5 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 4 | 8 | 39.4 | --- | --- | 97.3 | 0.1 | 48.50 | 61 | 5 | 58 | 6.3 | 6 | 2 | 1 | 2 | 2 | 2 | 0 |
| | 120/60 | 1 | 16 | 37.6 | --- | --- | 80.1 | 0.1 | 43.30 | 59 | 6 | 58 | 4.5 | 7 | 2 | 1 | 2 | 3 | 2 | 0 |
| 31 | 120/30 | 2 | --- | 38.5 | 97.4 | 0.2 | 80.1 | 0.1 | 23.20 | 49 | 7 | 59 | 0.7 | 2 | 1 | 2 | 2 | 3 | 1 | 1 |
| | 120/30 | 3 | 14 | 37.3 | 96.9 | 0.2 | 80.1 | 0.1 | 23.93 | 49 | 9 | 36 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 35 | 31.5 | 80.3 | 0.2 | 97.1 | 0.1 | 18.53 | 54 | 4 | 57 | 2.0 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/25 | 2 | 7 | 36.0 | 79.6 | 0.2 | 97.2 | 0.1 | 18.90 | 58 | 4 | 59 | 2.8 | 6 | 2 | 2 | 2 | 2 | 1 | 0 |
| | 120/70 | 3 | 106 | 35.2 | 97.0 | 0.2 | 80.2 | 0.1 | 39.80 | 54 | 4 | 58 | 0.2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 20 | 37.4 | 96.7 | 0.1 | 80.2 | 0.2 | 48.43 | 55 | 7 | 58 | 0.0 | 0 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 120/70 | 3 | 33 | 31.7 | 97.3 | 0.2 | 80.6 | 0.3 | 48.60 | 53 | 4 | 57 | 0.5 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 185 | 35.8 | 97.5 | 0.3 | 79.8 | 0.1 | 42.47 | 59 | 8 | 59 | 1.0 | 2 | 1 | 0 | 0 | 1 | 1 | 0 |
| | 120/70 | 4 | 11 | 32.0 | --- | --- | 96.9 | 0.1 | 47.23 | 55 | 5 | 58 | 3.2 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| 32 | 120/30 | 2 | --- | 39.2 | 96.8 | 0.2 | 80.4 | 0.1 | 24.40 | 56 | 6 | 58 | 5.0 | 8 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/30 | 3 | 9 | 37.0 | 97.0 | 0.2 | 80.6 | 0.2 | 24.47 | 55 | 5 | 59 | 0.8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 42 | 37.8 | 80.4 | 0.3 | 97.1 | 0.1 | 19.87 | 58 | 7 | 59 | 4.2 | 6 | 1 | 1 | 2 | 1 | 2 | 0 |
| | 120/70 | 3 | 139 | 33.8 | 97.3 | 0.3 | 80.1 | 0.1 | 48.23 | 61 | 7 | 57 | 3.3 | 5 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 38.2 | 96.4 | 0.1 | 80.0 | 0.1 | 49.40 | 68 | 5 | 57 | 2.5 | 5 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 15 | 35.9 | 97.1 | 0.2 | 80.4 | 0.1 | 49.97 | 63 | 7 | 55 | 3.3 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| 33 | 120/25 | 2 | --- | 33.3 | 80.0 | 0.3 | 97.5 | 0.1 | 19.13 | 56 | 5 | 58 | 6.5 | 8 | 1 | 1 | 1 | 0 | 2 | 0 |
| 34 | 120/25 | 2 | --- | 32.1 | 80.0 | 0.6 | 97.1 | 0.1 | 18.90 | 55 | 11 | 57 | 5.3 | 8 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 120/25 | 2 | 7 | 36.2 | 79.7 | 0.4 | 97.8 | 0.2 | 19.30 | 60 | 6 | 56 | 5.7 | 9 | 1 | 2 | 2 | 1 | 1 | 0 |
| | 120/50 | 3 | 102 | 39.8 | 96.7 | 0.4 | 80.2 | 0.1 | 35.03 | 58 | 5 | 55 | 0.0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| | 120/70 | 3 | 9 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 47.33 | 56 | 5 | 58 | 0.6 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| | 120/70 | 3 | 34 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 47.57 | 58 | 4 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| 35 | 120/30 | 3 | --- | 37.5 | 96.8 | 1.9 | 80.2 | 0.2 | 23.93 | 62 | 9 | 58 | 2.5 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/25 | 2 | 22 | 37.2 | 80.1 | 0.4 | 97.3 | 0.0 | 19.30 | 60 | 8 | 59 | 2.2 | 3 | 2 | 3 | 1 | 1 | 2 | 0 |
| | 120/25 | 2 | 8 | 32.1 | 79.9 | 0.3 | 97.1 | 0.0 | 18.47 | 56 | 8 | 57 | 2.0 | 4 | 1 | 2 | 1 | 0 | 0 | 0 |
| | 120/25 | 2 | 5 | 40.7 | 80.0 | 0.2 | 97.2 | 0.1 | 19.43 | 61 | 7 | 60 | 2.5 | 4 | 2 | 4 | 2 | 2 | 2 | 1 |
| | 120/70 | 3 | 114 | 38.4 | 97.0 | 0.1 | 80.4 | 0.1 | 47.70 | 57 | 7 | 56 | 3.7 | 4 | 2 | 3 | 3 | 3 | 3 | 0 |
| | 120/70 | 3 | 26 | 35.2 | 96.6 | 0.1 | 79.9 | 0.1 | 48.43 | 62 | 8 | 55 | 2.0 | 2 | 0 | 2 | 2 | 2 | 3 | 0 |
| | 120/70 | 3 | 23 | 35.9 | 97.1 | 0.2 | 80.4 | 0.1 | 12.73 | 58 | 14 | 30 | 2.0 | 2 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 168 | 40.2 | 96.9 | 0.6 | 79.7 | 0.2 | 42.83 | 66 | 6 | 58 | 3.0 | 3 | 2 | 2 | 2 | 4 | 2 | 0 |
| | 150/60 | 3 | 18 | 37.2 | 97.5 | 0.2 | 79.9 | 0.1 | 42.50 | 64 | 6 | 58 | 4.3 | 5 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 4 | 8 | 39.5 | --- | --- | 97.3 | 0.1 | 48.33 | 57 | 5 | 59 | 6.3 | 6 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/60 | 1 | 16 | 37.6 | --- | --- | 80.1 | 0.1 | 43.30 | 59 | 6 | 58 | 4.2 | 6 | 1 | 1 | 1 | 1 | 1 | 0 |
| 36 | 120/30 | 2 | --- | 30.8 | 96.7 | 0.2 | 80.2 | 0.1 | 23.60 | 60 | 6 | 60 | 1.2 | 4 | 0 | 1 | 1 | 1 | 1 | 1 |
| | 120/70 | 3 | 175 | 35.3 | 96.2 | 0.4 | 80.1 | 0.4 | 48.63 | 55 | 6 | 58 | 0.0 | 0 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 150/60 | 3 | 210 | 32.6 | 97.0 | 0.2 | 79.6 | 0.2 | 41.03 | 63 | 8 | 57 | 0.4 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 9 | 42.0 | 97.6 | 0.1 | 79.9 | 0.2 | 42.73 | 66 | 7 | 58 | 1.3 | 2 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 120/60 | 1 | 39 | 39.9 | --- | --- | 80.1 | 0.1 | 42.47 | 56 | 6 | 58 | 1.0 | 3 | 2 | 3 | 2 | 3 | 3 | 0 |
| 37 | 120/30 | 2 | --- | 39.2 | 96.8 | 0.2 | 80.4 | 0.1 | 24.37 | 58 | 7 | 59 | 5.5 | 7 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 120/30 | 3 | 7 | 36.7 | 96.8 | 0.3 | 80.1 | 0.1 | 24.90 | 62 | 7 | 59 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 28 | 38.4 | 80.3 | 0.3 | 97.3 | 0.0 | 19.53 | 57 | 5 | 59 | 0.8 | 2 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 120/70 | 3 | 128 | 38.4 | 97.0 | 0.1 | 80.4 | 0.1 | 46.47 | 55 | 6 | 58 | 0.0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 34 | 38.2 | 96.4 | 0.1 | 80.0 | 0.1 | 48.87 | 54 | 4 | 58 | 0.7 | 2 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 33.2 | 97.0 | 0.2 | 80.4 | 0.3 | 47.30 | 56 | 8 | 57 | 3.7 | 5 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 5 | 31.7 | 97.3 | 0.2 | 80.6 | 0.3 | 48.87 | 56 | 6 | 57 | 2.3 | 4 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 175 | 37.5 | 97.2 | 0.2 | 80.0 | 0.2 | 39.87 | 55 | 7 | 58 | 3.4 | 5 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 120/60 | 1 | 42 | 39.9 | --- | --- | 80.1 | 0.1 | 42.47 | 56 | 6 | 58 | 3.2 | 5 | 1 | 1 | 1 | 2 | 2 | 1 |
| 38 | 120/30 | 2 | --- | 42.0 | 96.8 | 0.2 | 80.1 | 0.0 | 23.60 | 55 | 4 | 60 | 2.3 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/30 | 3 | 7 | 35.6 | 97.3 | 0.3 | 80.1 | 0.0 | 24.13 | 54 | 4 | 59 | 3.8 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 37.0 | 97.0 | 0.2 | 80.6 | 0.2 | 24.40 | 56 | 6 | 60 | 1.8 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 26 | 38.4 | 80.3 | 0.3 | 97.3 | 0.0 | 19.50 | 56 | 4 | 59 | 1.2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 7 | 35.4 | 80.2 | 0.3 | 97.2 | 0.0 | 19.03 | 57 | 4 | 59 | 1.2 | 2 | 0 | 0 | 0 | 1 | 1 | 0 |
| | 120/25 | 2 | 7 | 39.6 | 79.2 | 0.3 | 97.2 | 0.0 | 18.97 | 57 | 5 | 59 | 1.2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 106 | 37.9 | 97.0 | 0.2 | 79.9 | 0.3 | 48.77 | 62 | 6 | 57 | 1.7 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/70 | 3 | 6 | 36.3 | 96.9 | 0.2 | 80.3 | 0.1 | 49.43 | 53 | 6 | 57 | 3.5 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 9 | 36.0 | 96.7 | 0.4 | 80.4 | 0.2 | 49.10 | 60 | 6 | 58 | 4.7 | 6 | 1 | 1 | 1 | 0 | 0 | 0 |
| | 120/70 | 3 | 5 | 36.4 | 96.7 | 0.2 | 79.8 | 0.5 | 48.50 | 58 | 5 | 57 | 3.8 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 15 | 33.8 | 97.3 | 0.3 | 80.1 | 0.1 | 47.73 | 55 | 6 | 58 | 4.3 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 5 | 36.4 | 96.9 | 0.1 | 80.4 | 0.4 | 47.80 | 56 | 5 | 56 | 2.8 | 4 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 9 | 33.2 | 97.0 | 0.2 | 80.4 | 0.3 | 48.03 | 57 | 4 | 57 | 3.7 | 5 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 173 | 35.5 | 96.1 | 0.7 | 79.5 | 0.2 | 40.37 | 56 | 5 | 57 | 3.3 | 5 | 1 | 1 | 1 | 0 | 1 | 0 |
| | 150/60 | 3 | 9 | 37.0 | 96.8 | 0.2 | 79.9 | 0.2 | 42.47 | 55 | 5 | 58 | 3.7 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 4 | 20 | 39.5 | --- | --- | 97.3 | 0.1 | 48.63 | 56 | 4 | 54 | 6.3 | 4 | 1 | 1 | 1 | 2 | 1 | 0 |
| 39 | 120/30 | 2 | --- | 37.0 | 96.9 | 0.2 | 80.2 | 0.1 | 24.23 | 55 | 6 | 60 | 4.0 | 8 | 1 | 3 | 2 | 2 | 2 | 0 |
| | 120/70 | 4 | 411 | 32.0 | --- | --- | 96.9 | 0.1 | 47.17 | 57 | 6 | 57 | 3.2 | 2 | 1 | 2 | 1 | 1 | 1 | 0 |
| 40 | 120/30 | 3 | --- | 39.2 | 96.8 | 0.2 | 80.4 | 0.1 | 24.80 | 58 | 9 | 57 | 0.0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| | 120/30 | 3 | 9 | 39.6 | 96.5 | 2.1 | 80.3 | 0.1 | 25.57 | 54 | 5 | 59 | 0.8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 35 | 32.1 | 79.9 | 0.3 | 97.1 | 0.0 | 19.30 | 57 | 6 | 58 | 2.2 | 4 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 5 | 39.6 | 79.2 | 0.3 | 97.2 | 0.0 | 18.97 | 56 | 3 | 59 | 3.5 | 5 | 1 | 1 | 2 | 1 | 2 | 0 |
| | 120/70 | 3 | 114 | 38.4 | 97.0 | 0.1 | 80.4 | 0.1 | 47.20 | 60 | 8 | 56 | 1.0 | 2 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 7 | 36.0 | 96.7 | 0.4 | 80.4 | 0.2 | 49.50 | 56 | 6 | 58 | 0.7 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 16 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.30 | 62 | 7 | 57 | 3.3 | 5 | 1 | 1 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 11 | 38.2 | 96.4 | 0.1 | 80.0 | 0.1 | 49.07 | 58 | 4 | 58 | 0.2 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 5 | 31.8 | 96.7 | 0.8 | 80.2 | 0.1 | 48.77 | 54 | 8 | 58 | 1.3 | 4 | 3 | 3 | 3 | 4 | 4 | 0 |
| 41 | 150/60 | 3 | --- | 32.6 | 97.0 | 0.2 | 79.6 | 0.2 | 39.93 | 60 | 7 | 57 | 0.0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 6 | 37.5 | 97.2 | 0.2 | 80.0 | 0.2 | 40.53 | 66 | 5 | 56 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 150/60 | 3 | 9 | 34.8 | 96.8 | 0.2 | 79.6 | 0.1 | 42.73 | 66 | 9 | 58 | 0.0 | 0 | 1 | 2 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 6 | 34.8 | 97.5 | 0.3 | 79.9 | 0.2 | 42.57 | 69 | 6 | 59 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 4 | 8 | 39.0 | --- | --- | 97.1 | 0.1 | 48.73 | 63 | 8 | 58 | 5.0 | 5 | | | | | | 1 |
| 42 | 120/30 | 3 | --- | 37.5 | 97.3 | 0.3 | 80.2 | 0.1 | 24.60 | 55 | 3 | 58 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 166 | 35.7 | 96.9 | 0.1 | 80.5 | 0.2 | 49.37 | 58 | 6 | 56 | 1.5 | 3 | 0 | 0 | 1 | 1 | 2 | 0 |
| | 120/70 | 3 | 31 | 32.9 | 97.1 | 0.3 | 80.0 | 0.1 | 49.37 | 53 | 7 | 57 | 1.3 | 2 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 6 | 33.0 | 97.1 | 0.2 | 80.3 | 0.1 | 48.37 | 56 | 4 | 57 | 1.0 | 2 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 182 | 34.8 | 96.8 | 0.2 | 79.6 | 0.1 | 42.30 | 57 | 5 | 59 | 1.3 | 3 | 1 | 1 | 1 | 2 | 2 | 0 |
| | 150/60 | 3 | 6 | 34.8 | 97.5 | 0.3 | 79.9 | 0.2 | 43.07 | 51 | 6 | 58 | 3.6 | 6 | 2 | 2 | 2 | 2 | 2 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/70 | 4 | 8 | 38.8 | --- | --- | 97.1 | 0.0 | 48.60 | 57 | 7 | 59 | 5.7 | 5 | 1 | 1 | 1 | 1 | 1 | 0 |
| 43 | 120/30 | 3 | --- | 38.2 | 96.8 | 0.2 | 80.2 | 0.1 | 25.27 | 61 | 9 | 30 | 0.0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 |
| | 120/30 | 3 | 7 | 40.6 | 97.1 | 0.3 | 80.1 | 0.1 | 24.67 | 59 | 5 | 60 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 9 | 37.3 | 96.9 | 0.2 | 80.1 | 0.1 | 24.73 | 55 | 5 | 58 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 26 | 33.3 | 80.0 | 0.3 | 97.5 | 0.1 | 19.23 | 58 | 4 | 58 | 1.3 | 2 | 1 | 3 | 1 | 3 | 2 | 0 |
| | 120/25 | 2 | 9 | 31.5 | 80.3 | 0.2 | 97.1 | 0.1 | 18.83 | 59 | 5 | 56 | 1.3 | 2 | 1 | 3 | 2 | 3 | 3 | 0 |
| | 120/25 | 2 | 5 | 36.1 | 79.9 | 0.3 | 97.1 | 0.0 | 19.47 | 58 | 4 | 59 | 1.5 | 3 | 2 | 2 | 1 | 3 | 2 | 0 |
| | 120/70 | 3 | 128 | 37.4 | 96.7 | 0.1 | 80.2 | 0.2 | 48.83 | 65 | 7 | 58 | 0.0 | 0 | 2 | 3 | 2 | 3 | 2 | 0 |
| | 120/70 | 3 | 15 | 33.9 | 96.1 | 5.4 | 80.0 | 2.2 | 47.90 | 64 | 7 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 7 | 33.1 | 97.3 | 0.1 | 80.4 | 0.1 | 47.43 | 61 | 5 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 5 | 31.7 | 97.4 | 0.1 | 80.3 | 0.2 | 49.00 | 61 | 5 | 57 | 1.8 | 4 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 175 | 32.6 | 97.0 | 0.2 | 79.6 | 0.2 | 40.80 | 57 | 5 | 57 | 0.7 | 1 | 2 | 2 | 2 | 3 | 2 | 0 |
| | 150/60 | 3 | 9 | 42.0 | 97.6 | 0.1 | 79.9 | 0.2 | 42.37 | 63 | 5 | 58 | 1.3 | 2 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 6 | 34.8 | 96.8 | 0.2 | 79.6 | 0.1 | 42.70 | 68 | 6 | 58 | 0.0 | 0 | 1 | 1 | 1 | 3 | 3 | 0 |
| | 150/60 | 3 | 6 | 34.8 | 97.5 | 0.3 | 79.9 | 0.2 | 42.40 | 67 | 5 | 59 | 0.7 | 1 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 120/70 | 4 | 8 | 38.8 | --- | --- | 97.1 | 0.0 | 48.30 | 64 | 6 | 59 | 5.7 | 5 | 2 | 2 | 2 | 3 | 3 | 0 |
| | 120/60 | 1 | 19 | 39.9 | --- | --- | 80.1 | 0.1 | 42.47 | 56 | 6 | 58 | 1.3 | 3 | 2 | 3 | 2 | 3 | 3 | 0 |
| 44 | 150/60 | 3 | --- | 37.2 | 97.5 | 0.2 | 79.9 | 0.1 | 41.73 | 58 | 6 | 57 | 3.6 | 4 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 4 | 8 | 39.5 | --- | --- | 97.3 | 0.1 | 48.63 | 54 | 6 | 59 | 4.2 | 4 | 2 | 2 | 2 | 2 | 2 | 0 |
| 45 | 120/60 | 1 | --- | 45.0 | --- | --- | 80.0 | 0.1 | 43.83 | 64 | 6 | 56 | 4.2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/60 | 1 | 5 | 39.9 | --- | --- | 80.1 | 0.1 | 42.93 | 54 | 4 | 58 | 3.0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46 | 120/30 | 2 | --- | 37.2 | 96.8 | 0.1 | 80.1 | 0.1 | 22.97 | 64 | 11 | 29 | 8.5 | 9 | 1 | 3 | 1 | 2 | 1 | 0 |
| | 120/30 | 3 | 7 | 37.3 | 96.8 | 0.3 | 80.1 | 0.1 | 3.23 | 52 | 11 | 24 | 2.0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 9 | 37.5 | 97.3 | 0.3 | 80.2 | 0.1 | 24.83 | 65 | 8 | 58 | 4.2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 35 | 31.5 | 80.3 | 0.2 | 97.1 | 0.1 | 18.87 | 59 | 3 | 56 | 6.8 | 8 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 7 | 36.8 | 80.3 | 0.3 | 97.2 | 0.1 | 16.37 | 62 | 6 | 58 | 5.2 | 8 | 1 | 3 | 2 | 1 | 2 | 0 |
| 47 | 120/30 | 3 | --- | 30.8 | 96.7 | 0.2 | 80.2 | 0.1 | 23.40 | 47 | 4 | 60 | 0.0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| | 120/30 | 2 | 9 | 37.1 | 96.9 | 0.3 | 80.1 | 0.1 | 24.53 | 55 | 4 | 58 | 3.8 | 7 | 2 | 3 | 3 | 2 | 2 | 1 |
| | 120/25 | 2 | 33 | 35.2 | 80.1 | 0.2 | 97.3 | 0.0 | 19.43 | 56 | 4 | 59 | 4.3 | 7 | 2 | 2 | 3 | 3 | 3 | 0 |
| | 120/25 | 2 | 14 | 40.7 | 80.0 | 0.2 | 97.2 | 0.1 | 19.70 | 52 | 6 | 58 | 3.5 | 6 | 2 | 3 | 2 | 3 | 2 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/70 | 3 | 112 | 36.3 | 96.9 | 0.2 | 80.3 | 0.1 | 49.03 | 53 | 4 | 58 | 2.3 | 3 | 1 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 8 | 31.5 | 96.8 | 0.1 | 79.9 | 4.1 | 45.23 | 56 | 10 | 53 | 1.7 | 2 | 1 | 2 | 1 | 1 | 2 | 0 |
| | 120/70 | 3 | 26 | 36.4 | 96.9 | 0.1 | 80.4 | 0.4 | 47.37 | 66 | 5 | 56 | 2.0 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 9 | 33.2 | 97.0 | 0.2 | 80.4 | 0.3 | 47.57 | 55 | 7 | 57 | 1.7 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 180 | 37.5 | 97.2 | 0.2 | 80.0 | 0.2 | 39.90 | 62 | 5 | 57 | 3.0 | 4 | 1 | 2 | 2 | 2 | 2 | 0 |
| 48 | 150/60 | 3 | --- | 42.0 | 97.6 | 0.1 | 79.9 | 0.2 | 42.43 | 70 | 7 | 58 | 2.6 | 4 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 4 | 18 | 31.8 | --- | --- | 96.9 | 0.1 | 46.80 | 49 | 6 | 54 | 3.2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 |
| 49 | 120/70 | 3 | --- | 35.5 | 96.7 | 0.1 | 80.1 | 0.2 | 48.40 | 57 | 5 | 58 | 0.0 | 0 | 1 | 1 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 9 | 31.5 | 96.8 | 0.1 | 79.9 | 4.1 | 49.00 | 60 | 8 | 58 | 0.0 | 0 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 210 | 38.6 | 96.5 | 0.4 | 79.8 | 0.1 | 42.10 | 64 | 8 | 58 | 0.0 | 0 | 4 | 4 | 4 | 4 | 4 | 0 |
| | 150/60 | 3 | 12 | 34.8 | 97.0 | 0.2 | 79.6 | 0.2 | 43.33 | 64 | 9 | 59 | 0.0 | 0 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 150/60 | 3 | 3 | 35.8 | 97.5 | 0.3 | 79.8 | 0.1 | 42.87 | 64 | 8 | 58 | 0.0 | 0 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 150/60 | 3 | 4 | 37.2 | 97.5 | 0.2 | 79.9 | 0.1 | 42.53 | 62 | 8 | 57 | 0.1 | 0 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 120/60 | 1 | 23 | 45.0 | --- | --- | 80.0 | 0.1 | 43.30 | 63 | 7 | 57 | 0.8 | 0 | 2 | 2 | 2 | 2 | 2 | 0 |
| 50 | 120/30 | 3 | --- | 37.2 | 96.8 | 0.1 | 80.1 | 0.1 | 22.40 | 58 | 8 | 30 | 3.7 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 2 | 7 | 40.6 | 97.1 | 0.3 | 80.1 | 0.1 | 24.63 | 59 | 9 | 60 | 1.2 | 3 | 1 | 2 | 1 | 3 | 2 | 0 |
| | 120/30 | 3 | 7 | 36.9 | 96.4 | 0.3 | 80.1 | 0.1 | 24.63 | 59 | 8 | 59 | 2.3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 38.8 | 97.0 | 0.5 | 80.1 | 0.1 | 22.77 | 53 | 8 | 59 | 1.3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 21 | 37.5 | 79.9 | 0.3 | 97.5 | 0.1 | 19.57 | 57 | 5 | 59 | 2.8 | 4 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 9 | 37.3 | 79.9 | 0.4 | 97.1 | 0.0 | 19.70 | 59 | 3 | 58 | 3.8 | 7 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 120/25 | 2 | 7 | 36.0 | 79.6 | 0.2 | 97.2 | 0.1 | 19.50 | 53 | 3 | 58 | 3.5 | 6 | 1 | 2 | 1 | 2 | 0 | 0 |
| | 120/70 | 3 | 117 | 37.0 | 96.7 | 0.1 | 80.4 | 0.2 | 49.27 | 60 | 6 | 58 | 2.2 | 3 | 1 | 1 | 1 | 1 | 0 | 0 |
| | 120/70 | 3 | 9 | 37.4 | 96.7 | 0.1 | 80.2 | 0.2 | 48.57 | 65 | 7 | 58 | 0.8 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| | 120/70 | 3 | 15 | 33.9 | 96.1 | 5.4 | 80.0 | 2.2 | 48.57 | 57 | 6 | 56 | 0.7 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 20 | 33.0 | 97.1 | 0.2 | 80.3 | 0.1 | 48.33 | 57 | 3 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 167 | 32.6 | 97.0 | 0.2 | 79.6 | 0.2 | 40.80 | 60 | 5 | 57 | 1.4 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 6 | 37.5 | 97.2 | 0.2 | 80.0 | 0.2 | 40.40 | 54 | 5 | 56 | 2.9 | 4 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 9 | 34.8 | 96.8 | 0.2 | 79.6 | 0.1 | 42.67 | 57 | 6 | 58 | 2.0 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 4 | 14 | 39.0 | --- | --- | 97.1 | 0.1 | 47.73 | 59 | 8 | 59 | 6.3 | 6 | 3 | 3 | 3 | 3 | 3 | 1 |
| 51 | 120/30 | 3 | --- | 39.3 | 97.0 | 0.4 | 80.2 | 0.1 | 24.97 | 60 | 5 | 60 | 1.7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 16 | 39.6 | 96.5 | 2.1 | 80.3 | 0.1 | 25.33 | 58 | 4 | 60 | 0.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/25 | 2 | 26 | 35.2 | 80.1 | 0.2 | 97.3 | 0.0 | 19.40 | 60 | 5 | 59 | 4.7 | 7 | 1 | 1 | 1 | 1 | 0 | 0 |
| | 120/25 | 2 | 14 | 40.7 | 80.0 | 0.2 | 97.2 | 0.1 | 19.87 | 58 | 5 | 58 | 4.7 | 9 | 2 | 2 | 2 | 3 | 2 | 0 |
| | 120/70 | 3 | 113 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 47.77 | 62 | 4 | 57 | 2.2 | 2 | 0 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 33 | 36.4 | 96.9 | 0.1 | 80.4 | 0.4 | 46.77 | 55 | 6 | 57 | 0.8 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 14 | 31.7 | 97.3 | 0.2 | 80.6 | 0.3 | 49.07 | 64 | 5 | 57 | 0.7 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 169 | 32.6 | 97.0 | 0.2 | 79.6 | 0.2 | 41.93 | 60 | 5 | 55 | 0.9 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| | 150/60 | 3 | 9 | 42.0 | 97.6 | 0.1 | 79.9 | 0.2 | 42.33 | 58 | 5 | 58 | 1.3 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| | 150/60 | 3 | 6 | 34.8 | 96.8 | 0.2 | 79.6 | 0.1 | 42.67 | 56 | 4 | 58 | 0.6 | 1 | 1 | 1 | 1 | 2 | 2 | 0 |
| 52 | 120/30 | 3 | --- | 38.5 | 97.4 | 0.2 | 80.1 | 0.1 | 24.13 | 61 | 7 | 60 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 8 | 35.6 | 97.3 | 0.3 | 80.1 | 0.0 | 24.03 | 60 | 6 | 59 | 2.2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 40 | 35.4 | 80.2 | 0.3 | 97.2 | 0.0 | 19.40 | 56 | 4 | 58 | 4.7 | 8 | 3 | 3 | 3 | 3 | 3 | 0 |
| | 120/70 | 3 | 149 | 33.9 | 96.1 | 5.4 | 80.0 | 2.2 | 47.60 | 57 | 7 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 12 | 31.7 | 97.4 | 0.1 | 80.3 | 0.2 | 48.00 | 59 | 5 | 58 | 3.0 | 2 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 177 | 40.2 | 96.9 | 0.6 | 79.7 | 0.2 | 43.00 | 62 | 6 | 58 | 2.7 | 2 | 2 | 2 | 2 | 3 | 2 | 0 |
| | 120/60 | 1 | 46 | 39.9 | --- | --- | 80.1 | 0.1 | 42.50 | 63 | 8 | 58 | 5.3 | 7 | 3 | 3 | 3 | 4 | 3 | 0 |
| 53 | 120/30 | 2 | --- | 36.9 | 97.0 | 0.3 | 80.0 | 0.1 | 14.13 | 53 | 18 | 55 | 3.7 | 7 | 2 | 2 | 3 | 2 | 2 | 0 |
| | 120/25 | 2 | 42 | 37.3 | 79.9 | 0.4 | 97.1 | 0.0 | 19.33 | 61 | 7 | 59 | 4.5 | 8 | 1 | 2 | 2 | 3 | 1 | 0 |
| | 120/70 | 3 | 119 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 47.93 | 62 | 6 | 57 | 1.4 | 2 | 1 | 2 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 12 | 35.7 | 96.9 | 0.1 | 80.5 | 0.2 | 48.77 | 63 | 6 | 57 | 0.8 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 22 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 47.03 | 58 | 5 | 57 | 1.0 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/60 | 1 | 225 | 45.0 | --- | --- | 80.0 | 0.1 | 42.40 | 66 | 8 | 58 | 3.4 | 5 | 3 | 4 | 3 | 2 | 2 | 1 |
| 54 | 120/30 | 2 | --- | 30.8 | 96.7 | 0.2 | 80.2 | 0.1 | 23.80 | 53 | 4 | 60 | 3.0 | 3 | 0 | 2 | 1 | 1 | 1 | 0 |
| | 120/30 | 3 | 7 | 39.2 | 96.8 | 0.2 | 80.4 | 0.1 | 24.57 | 53 | 3 | 58 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 36.7 | 96.8 | 0.3 | 80.1 | 0.1 | 25.07 | 58 | 6 | 58 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 28 | 35.2 | 80.1 | 0.2 | 97.3 | 0.0 | 19.70 | 57 | 5 | 58 | 3.0 | 5 | 1 | 3 | 1 | 1 | 1 | 0 |
| | 120/25 | 2 | 7 | 36.6 | 80.4 | 0.4 | 97.2 | 0.1 | 19.33 | 54 | 5 | 59 | 1.2 | 2 | 1 | 2 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 9 | 36.2 | 79.7 | 0.4 | 97.8 | 0.2 | 19.37 | 58 | 5 | 56 | 2.8 | 6 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 104 | 37.9 | 97.0 | 0.2 | 79.9 | 0.3 | 48.70 | 54 | 3 | 57 | 0.5 | 1 | 2 | 2 | 2 | 2 | 3 | 0 |
| | 120/70 | 3 | 20 | 36.4 | 96.7 | 0.2 | 79.8 | 0.5 | 49.20 | 57 | 5 | 58 | 0.7 | 1 | 0 | 1 | 1 | 2 | 1 | 0 |
| | 120/70 | 3 | 27 | 31.8 | 96.7 | 0.8 | 80.2 | 0.1 | 48.73 | 56 | 5 | 58 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 175 | 35.5 | 96.1 | 0.7 | 79.5 | 0.2 | 39.57 | 57 | 4 | 58 | 1.1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data | | | | Exercise Data | | | | Thermal Status (Deco) | | Maximum VGE Score | | | | | Outcome |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ark Temp (°F) | | Wet Pot Temp (°F) | | Time | Ergometer rpm | | WattLD | | | | | | | | |
| | | | | | Mean | SD | Mean | SD | (min) | Mean | SD | Mean | Mean | Last | Rst | RA | LA | RL | LL | DCS (0,1) |
| | 150/60 | 3 | 9 | 37.0 | 96.8 | 0.2 | 79.9 | 0.2 | 41.90 | 57 | 5 | 59 | 1.4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 150/60 | 3 | 12 | 37.2 | 97.5 | 0.2 | 79.9 | 0.1 | 41.50 | 58 | 5 | 59 | 1.9 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 4 | 8 | 39.4 | --- | --- | 97.3 | 0.1 | 48.60 | 56 | 7 | 57 | 6.3 | 6 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/60 | 1 | 16 | 37.6 | --- | --- | 80.1 | 0.1 | 42.63 | 54 | 3 | 59 | 5.3 | 7 | 2 | 2 | 2 | 2 | 1 | 0 |
| 55 | 120/25 | 2 | --- | 31.2 | 79.7 | 0.3 | 97.2 | 0.0 | 19.37 | 57 | 6 | 58 | 3.7 | 6 | 1 | 2 | 2 | 3 | 2 | 0 |
| | 120/25 | 2 | 3 | 37.8 | 80.4 | 0.3 | 97.1 | 0.1 | 19.67 | 55 | 3 | 59 | 1.8 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 118 | 31.5 | 96.8 | 0.1 | 79.9 | 4.1 | 47.73 | 57 | 7 | 59 | 0.5 | 0 | 2 | 2 | 2 | 3 | 2 | 0 |
| | 120/70 | 3 | 36 | 32.9 | 97.1 | 0.3 | 80.0 | 0.1 | 49.30 | 58 | 5 | 57 | 0.7 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| 56 | 150/60 | 3 | --- | 37.5 | 97.2 | 0.2 | 80.0 | 0.2 | 40.50 | 61 | 7 | 56 | 4.0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 57 | 120/30 | 3 | --- | 36.9 | 97.0 | 0.3 | 80.0 | 0.1 | 24.27 | 56 | 8 | 57 | 0.0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 35 | 37.2 | 80.1 | 0.4 | 97.3 | 0.0 | 19.73 | 61 | 10 | 57 | 5.3 | 6 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 12 | 36.1 | 79.9 | 0.3 | 97.1 | 0.0 | 19.37 | 52 | 5 | 59 | 3.7 | 5 | 1 | 2 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 126 | 35.7 | 96.9 | 0.1 | 80.5 | 0.2 | 49.83 | 64 | 6 | 56 | 1.0 | 1 | 0 | 2 | 1 | 2 | 2 | 0 |
| | 120/70 | 3 | 38 | 35.9 | 97.1 | 0.2 | 80.4 | 0.1 | 49.40 | 56 | 6 | 56 | 1.0 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| 58 | 120/30 | 3 | --- | 37.8 | 97.0 | 0.3 | 80.1 | 0.1 | 24.43 | 62 | 7 | 59 | 0.8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 59 | 120/30 | 2 | --- | 42.2 | 96.8 | 0.3 | 80.1 | 0.0 | 25.03 | 55 | 5 | 60 | 3.8 | 5 | 1 | 2 | 1 | 3 | 1 | 0 |
| | 120/30 | 3 | 6 | 39.2 | 96.9 | 0.2 | 80.0 | 0.1 | 23.53 | 62 | 6 | 58 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 35 | 38.0 | 79.9 | 0.3 | 97.3 | 0.1 | 19.17 | 62 | 4 | 59 | 2.3 | 3 | 2 | 2 | 1 | 3 | 3 | 0 |
| | 120/70 | 3 | 125 | 36.3 | 96.9 | 0.2 | 80.3 | 0.1 | 48.07 | 59 | 4 | 59 | 0.7 | 1 | 1 | 1 | 1 | 2 | 3 | 0 |
| | 120/70 | 3 | 34 | 36.4 | 96.9 | 0.1 | 80.4 | 0.4 | 46.43 | 59 | 6 | 57 | 0.7 | 2 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 9 | 33.2 | 97.0 | 0.2 | 80.4 | 0.3 | 48.10 | 63 | 6 | 57 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 176 | 40.2 | 96.9 | 0.6 | 79.7 | 0.2 | 43.43 | 59 | 6 | 58 | 0.7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 150/60 | 3 | 12 | 35.0 | 96.3 | 1.9 | 81.0 | 0.1 | 42.80 | 56 | 8 | 58 | 1.7 | 3 | 1 | 1 | 1 | 2 | 1 | 0 |
| 60 | 120/30 | 2 | --- | 36.4 | 96.9 | 0.2 | 80.4 | 0.1 | 24.40 | 56 | 5 | 56 | 0.7 | 1 | | | | | | 1 |
| | 120/25 | 2 | 43 | 31.5 | 80.3 | 0.2 | 97.1 | 0.1 | 18.77 | 52 | 6 | 56 | 1.0 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 5 | 31.2 | 79.7 | 0.3 | 97.2 | 0.0 | 18.50 | 47 | 6 | 59 | 0.5 | 1 | 2 | 3 | 3 | 2 | 3 | 0 |
| | 120/70 | 3 | 113 | 36.3 | 96.9 | 0.2 | 80.3 | 0.1 | 49.33 | 52 | 5 | 57 | 6.3 | 9 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 14 | 36.4 | 96.7 | 0.2 | 79.8 | 0.5 | 49.60 | 51 | 5 | 57 | 3.8 | 6 | 1 | 2 | 2 | 3 | 1 | 0 |
| | 120/70 | 3 | 27 | 31.8 | 96.7 | 0.8 | 80.2 | 0.1 | 48.07 | 52 | 6 | 58 | 4.7 | 7 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 10 | 35.9 | 97.1 | 0.2 | 80.4 | 0.1 | 47.50 | 58 | 7 | 55 | 1.3 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data | | | | Exercise Data | | | | Thermal Status (Deco) | | Maximum VGE Score | | | | | Outcome |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Ark Temp (°F) | | Wet Pot Temp (°F) | | Time | Ergometer rpm | | WattLD | | | | | | | | |
| | | | | | Mean | SD | Mean | SD | (min) | Mean | SD | Mean | Mean | Last | Rst | RA | LA | RL | LL | DCS (0,1) |
| | 150/60 | 3 | 175 | 42.0 | 97.6 | 0.1 | 79.9 | 0.2 | 41.77 | 54 | 6 | 59 | 4.0 | 6 | 1 | 1 | 1 | 2 | 2 | 0 |
| 61 | 120/30 | 3 | --- | 38.5 | 97.4 | 0.2 | 80.1 | 0.1 | 24.43 | 57 | 5 | 60 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 2 | 7 | 39.2 | 96.9 | 0.2 | 80.0 | 0.1 | 24.20 | 56 | 4 | 57 | 5.8 | 7 | 1 | 1 | 1 | 1 | 1 | 0 |
| 62 | 120/70 | 3 | --- | 36.0 | 96.7 | 0.4 | 80.4 | 0.2 | 48.87 | 58 | 6 | 58 | 1.8 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 150/60 | 3 | 222 | 35.0 | 96.3 | 1.9 | 81.0 | 0.1 | 42.37 | 62 | 5 | 58 | 2.3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 63 | 120/70 | 3 | --- | 35.3 | 96.2 | 0.4 | 80.1 | 0.4 | 48.90 | 57 | 8 | 57 | 0.0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 7 | 36.4 | 96.7 | 0.2 | 79.8 | 0.5 | 49.80 | 56 | 5 | 57 | 0.3 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| | 120/70 | 3 | 11 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.30 | 62 | 7 | 57 | 3.3 | 5 | 2 | 2 | 3 | 3 | 3 | 0 |
| | 120/70 | 3 | 11 | 38.2 | 96.4 | 0.1 | 80.0 | 0.1 | 49.63 | 62 | 6 | 57 | 0.5 | 2 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 120/70 | 3 | 5 | 31.8 | 96.7 | 0.8 | 80.2 | 0.1 | 49.20 | 62 | 5 | 58 | 0.7 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 176 | 32.6 | 97.0 | 0.2 | 79.6 | 0.2 | 40.87 | 58 | 6 | 57 | 1.1 | 2 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 6 | 37.5 | 97.2 | 0.2 | 80.0 | 0.2 | 40.07 | 55 | 5 | 57 | 1.9 | 3 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 150/60 | 3 | 3 | 42.0 | 97.6 | 0.1 | 79.9 | 0.2 | 41.77 | 56 | 4 | 59 | 2.3 | 4 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 150/60 | 3 | 6 | 34.8 | 96.8 | 0.2 | 79.6 | 0.1 | 42.53 | 62 | 5 | 58 | 1.4 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 150/60 | 3 | 6 | 34.8 | 97.5 | 0.3 | 79.9 | 0.2 | 42.30 | 58 | 4 | 59 | 3.1 | 6 | 1 | 1 | 2 | 1 | 2 | 0 |
| | 120/70 | 4 | 8 | 38.8 | --- | --- | 97.1 | 0.0 | 48.67 | 47 | 6 | 51 | 5.7 | 5 | 2 | 2 | 2 | 2 | 3 | 1 |
| 64 | 120/30 | 2 | --- | 42.0 | 96.8 | 0.2 | 80.1 | 0.0 | 23.60 | 58 | 5 | 60 | 1.8 | 3 | 1 | 3 | 2 | 2 | 2 | 0 |
| | 120/30 | 3 | 12 | 36.7 | 96.8 | 0.3 | 80.1 | 0.1 | 25.10 | 62 | 6 | 58 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 7 | 37.5 | 96.8 | 1.9 | 80.2 | 0.2 | 23.63 | 67 | 7 | 58 | 0.2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/25 | 2 | 21 | 38.4 | 80.3 | 0.3 | 97.3 | 0.0 | 19.60 | 57 | 4 | 59 | 1.2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 9 | 32.1 | 79.9 | 0.3 | 97.1 | 0.0 | 19.53 | 63 | 6 | 57 | 1.2 | 2 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/25 | 2 | 7 | 36.2 | 79.7 | 0.4 | 97.8 | 0.2 | 19.60 | 56 | 4 | 55 | 2.0 | 3 | 2 | 3 | 2 | 2 | 2 | 0 |
| | 120/70 | 3 | 117 | 35.3 | 96.2 | 0.4 | 80.1 | 0.4 | 48.97 | 63 | 5 | 57 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 9 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.10 | 65 | 5 | 57 | 0.3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 25 | 31.8 | 96.7 | 0.8 | 80.2 | 0.1 | 49.43 | 61 | 5 | 57 | 1.2 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 177 | 38.6 | 96.5 | 0.4 | 79.8 | 0.1 | 42.47 | 61 | 7 | 58 | 0.9 | 1 | 2 | 2 | 2 | 2 | 2 | 0 |
| | 150/60 | 3 | 6 | 36.0 | 97.4 | 0.3 | 80.1 | 0.2 | 42.00 | 57 | 4 | 57 | 4.6 | 7 | 4 | 4 | 4 | 4 | 4 | 0 |
| | 150/60 | 3 | 9 | 35.8 | 97.5 | 0.3 | 79.8 | 0.1 | 42.57 | 57 | 5 | 59 | 1.7 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/60 | 1 | 27 | 45.0 | --- | --- | 80.0 | 0.1 | 43.97 | 59 | 7 | 56 | 2.0 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| 65 | 120/30 | 3 | --- | 37.0 | 96.9 | 0.2 | 80.2 | 0.1 | 24.60 | 57 | 8 | 60 | 1.2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

| Diver ID | Dive (Depth, fsw/ BT, min) | Exposure Code 1 == C/C 2 == W/C 3 == C/W 4 == W/W | Days Since Last Dive in Study | DSCNT RATE (fsw/min) | Thermal Exposure Data: Ark Temp (°F) Mean | Ark Temp (°F) SD | Wet Pot Temp (°F) Mean | Wet Pot Temp (°F) SD | Exercise Data: Time (min) | Ergometer rpm Mean | Ergometer rpm SD | WattLD Mean | Thermal Status (Deco) Mean | Thermal Status (Deco) Last | Maximum VGE Score Rst | RA | LA | RL | LL | Outcome DCS (0,1) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120/30 | 2 | 8 | 35.6 | 97.3 | 0.3 | 80.1 | 0.0 | 23.97 | 58 | 5 | 59 | 2.5 | 5 | 2 | 3 | 2 | 3 | 3 | 0 |
| | 120/30 | 3 | 4 | 36.9 | 96.4 | 0.3 | 80.1 | 0.1 | 24.40 | 65 | 7 | 59 | 1.5 | 2 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 120/25 | 2 | 38 | 32.1 | 80.0 | 0.6 | 97.1 | 0.1 | 19.10 | 62 | 6 | 58 | 4.3 | 7 | 2 | 3 | 1 | 2 | 2 | 1 |
| | 120/50 | 3 | 109 | 39.8 | 96.7 | 0.4 | 80.2 | 0.1 | 35.83 | 62 | 7 | 54 | 0.2 | 0 | 1 | 2 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 33 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 49.30 | 62 | 7 | 57 | 3.3 | 5 | 1 | 2 | 2 | 3 | 2 | 0 |
| | 120/70 | 3 | 19 | 32.9 | 97.1 | 0.3 | 80.0 | 0.1 | 49.40 | 62 | 5 | 57 | 1.5 | 3 | 3 | 3 | 3 | 4 | 4 | 0 |
| 66 | 120/30 | 3 | --- | 36.9 | 96.4 | 0.3 | 80.1 | 0.1 | 24.40 | 67 | 5 | 59 | 0.8 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 3 | 37.0 | 97.0 | 0.2 | 80.6 | 0.2 | 24.37 | 63 | 4 | 60 | 1.3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120/30 | 3 | 5 | 37.5 | 96.8 | 1.9 | 80.2 | 0.2 | 24.43 | 56 | 4 | 57 | 0.3 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 120/25 | 2 | 22 | 37.2 | 80.1 | 0.4 | 97.3 | 0.0 | 19.93 | 55 | 4 | 59 | 3.3 | 5 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/25 | 2 | 12 | 31.2 | 79.7 | 0.3 | 97.2 | 0.0 | 19.50 | 53 | 5 | 58 | 3.3 | 5 | 1 | 1 | 1 | 2 | 1 | 0 |
| | 120/70 | 3 | 108 | 35.2 | 97.0 | 0.2 | 80.2 | 0.1 | 49.77 | 55 | 4 | 57 | 0.0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| | 120/70 | 3 | 6 | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 48.20 | 53 | 4 | 57 | 0.4 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| | 120/70 | 3 | 7 | 31.5 | 96.8 | 0.1 | 79.9 | 4.1 | 49.37 | 56 | 6 | 57 | 0.0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| | 120/70 | 3 | 43 | 35.9 | 97.1 | 0.2 | 80.4 | 0.1 | 49.80 | 53 | 4 | 56 | 0.0 | 0 | 3 | 3 | 3 | 4 | 4 | 0 |
| | 150/60 | 3 | 167 | 38.6 | 96.5 | 0.4 | 79.8 | 0.1 | 42.20 | 56 | 5 | 58 | 0.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 150/60 | 3 | 12 | 34.8 | 97.0 | 0.2 | 79.6 | 0.2 | 43.07 | 56 | 5 | 59 | 0.9 | 2 | 0 | 0 | 1 | 1 | 0 | 0 |
| | 150/60 | 3 | 3 | 35.8 | 97.5 | 0.3 | 79.8 | 0.1 | 42.53 | 57 | 4 | 59 | 1.9 | 2 | 1 | 1 | 0 | 1 | 0 | 0 |
| | 120/70 | 4 | 11 | 32.0 | --- | --- | 96.9 | 0.1 | 47.40 | 57 | 4 | 58 | 3.2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 |
| 67 | 120/70 | 3 | --- | 36.2 | 96.8 | 0.1 | 80.4 | 0.1 | 46.37 | 53 | 5 | 58 | 1.5 | 1 | 3 | 3 | 3 | 4 | 4 | 0 |
| 68 | 120/30 | 2 | --- | 36.4 | 96.9 | 0.2 | 80.4 | 0.1 | 24.13 | 50 | 6 | 56 | 4.7 | 4 | 1 | 3 | 1 | 1 | 1 | 0 |
| 69 | 120/25 | 2 | --- | 39.6 | 79.2 | 0.3 | 97.2 | 0.0 | 18.87 | 54 | 3 | 59 | 2.7 | 4 | 2 | 3 | 2 | 3 | 3 | 0 |
| | 120/70 | 3 | 128 | 33.7 | 96.8 | 0.1 | 79.4 | 0.5 | 48.60 | 55 | 6 | 58 | 1.0 | 1 | 3 | 3 | 3 | 3 | 3 | 1 |
| 70 | 120/30 | 2 | --- | 35.6 | 97.3 | 0.3 | 80.1 | 0.0 | 24.13 | 56 | 4 | 59 | 2.2 | 5 | 2 | 3 | 2 | 2 | 2 | 1 |
| | 120/70 | 3 | 193 | 36.4 | 96.9 | 0.1 | 80.4 | 0.4 | 48.23 | 59 | 7 | 55 | 1.7 | 2 | 3 | 3 | 3 | 4 | 4 | 1 |
| 71 | 120/25 | 2 | --- | 31.2 | 79.7 | 0.3 | 97.2 | 0.0 | 19.50 | 61 | 6 | 58 | 3.3 | 5 | 2 | 2 | 2 | 2 | 2 | 0 |
| 72 | 120/30 | 2 | --- | 36.9 | 97.0 | 0.3 | 80.0 | 0.1 | 24.53 | 56 | 4 | 57 | 1.2 | 3 | 1 | 1 | 1 | 1 | 1 | 0 |
| | 120/25 | 2 | 43 | 32.1 | 80.0 | 0.6 | 97.1 | 0.1 | 18.37 | 62 | 8 | 59 | 4.2 | 6 | 0 | 1 | 1 | 0 | 1 | 0 |
| 73 | 120/70 | 3 | --- | 33.8 | 97.3 | 0.3 | 80.1 | 0.1 | 47.80 | 59 | 8 | 58 | 1.7 | 2 | 3 | 3 | 3 | 4 | 4 | 0 |
| | | | Selected Means: | 36.4 | | | | | | 57.8 | 5.8 | 57.0 | | | | | | | | |