Title: EMPIRICAL EVALUATION OF THE EFFICACY OF DEEP STOPS IN AIR DECOMPRESSION DIVES.

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Keywords: Decompression
Decompression Sickness
deep stops
algorithm
immersion
ERGOMETERS
probabilistic
BVM(3)
VVAL18
Humans

Issue Date: 2007

Publisher: Undersea and Hyperbaric Medical Society, Inc.

Abstract: *BACKGROUND:* Classical decompression algorithms limit hypothetical tissue gas contents and prescribe decompressions that advance rapidly to shallow stops where most of the total stop time (TST) is scheduled. Recent bubble-based algorithms limit calculated bubble profusion and size and prescribe decompressions with TST skewed toward deeper stops. Navy Experimental Diving Unit (NEDU) has completed a controlled comparative study of these approaches.
MATERIALS AND METHODS: Divers wearing swimsuits and t-shirts, breathing surface-supplied air via full face masks, and immersed in 86 F water in the NEDU Ocean Simulation Facility wetpot were compressed at 60 fsw/min to 170 fsw. They performed 115 Watt cycle ergometer work during an ensuing 27.2 minutes at bottom and were decompressed at 30 fsw/min with stops prescribed by one of two schedules, each with 174 min TST. Schedule 1, with first stop at 40 fsw, was prescribed by the man-tested, deterministic gas content, VVAL18 Thalmann Algorithm. Schedule 2, with first stop at 70 fsw, was the optimum distribution of TST according to the man-dive calibrated, probabilistic BVM(3) bubble model. Decompression sickness (DCS) incidence with these schedules was compared under the sequential stopping rules of reject-high if DCS risk > 7% or reject-low if DCS risk < 3% with 95% confidence.
RESULTS: The trial was terminated after midpoint interim analysis. Neither schedule was rejected, but DCS incidence in Schedule 2 (deep stops, 11 DCS/198 dives)

was significantly higher than in Schedule 1 (3/192, p=0.030, one-sided Fisher Exact). On review, one Schedule 2 DCS was excluded, but the result remained significant (p=0.047). Most DCS was mild, late onset, Type I, but two Schedule 2 cases involved rapidly progressing CNS manifestations.
CONCLUSIONS: The deep stops schedule had a greater risk of DCS than the matched conventional schedule. Slower gas washout or continued gas uptake offset benefits of reduced bubble growth at deep stops.

Description: Abstract of the Undersea and Hyperbaric Medical Society, Inc. Annual Scientific Meeting held June 14-16, 2007. Ritz-Carlton Kapalua Maui, Hawaii (http:www.uhms.org)

URI: http://archive.rubicon-foundation.org/5069