

OXYGEN-DRIVEN DECOMPRESSION AFTER AIR, NITROX, HELIOX AND TRIMIX SATURATION EXPOSURES

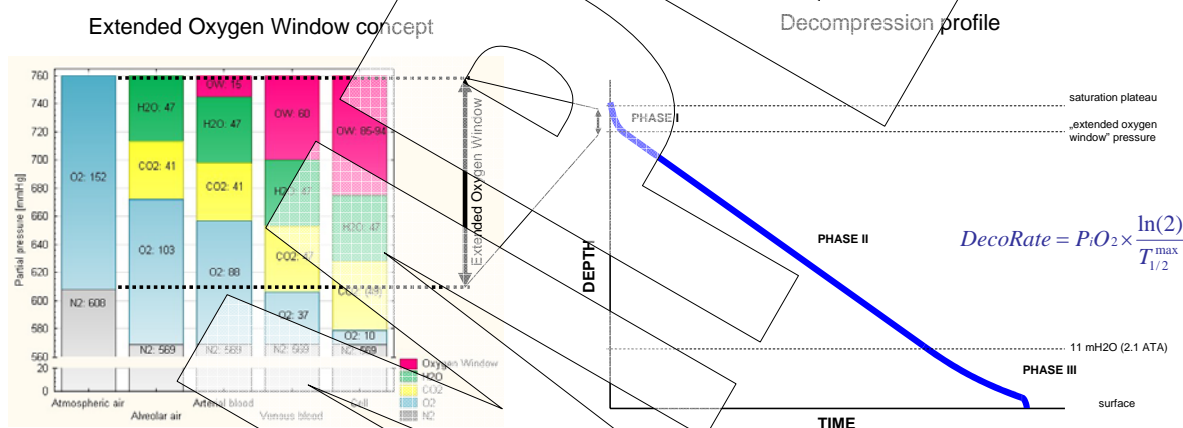
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INTRODUCTION

The Polish model of the oxygen-driven saturation decompression is based on physiological parameters, namely the Extended Oxygen Window concept (see graph below). It defines three phases of decompression profile (see Decompression Profile below). During the Phase I (passage through the Extended Oxygen Window) decompression is relatively fast and enhances elimination of inert gas(es) from fast tissues; pressure is gradually decreased within about 1.5 hour. Then, in the Phase II, decompression is slowed down to stabilize gas out flow from the slowest tissue described by the longest tissue half-time ($T_{1/2}^{\max}$, 180 minutes for helium, 360 minutes for nitrogen, and variable half-time for trimix as depending on the relative content of nitrogen and helium). From depth of 11 mH₂O (Phase III) partial pressure of oxygen is gradually decreased in order to keep the fractional content below 23% (due to fire-protection restrictions). At the end of decompression fast surfacing (within 30 minutes) is allowed from depth of about 1.5 mH₂O.

MODEL'S CONCEPT

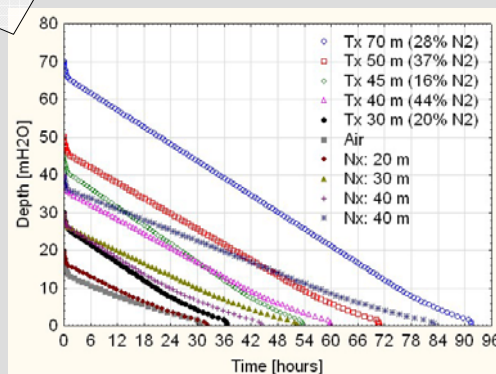


MATERIAL & METHODS

127 dry man-expositions with air, nitrox, heliox, trimix at pressures up to 11 ATA with a minimum plateau time of 48 hours in the 3-chamber saturation habitat.

	Number of divers	Max Depth	PiO ₂ or FiO ₂
Air	36	9-30 mH ₂ O	21%
Nitrox	36	20-45 mH ₂ O	0.4-0.6 ata
Heliox	31	30-100 mH ₂ O	0.4-0.6 ata
Trimix	24	50-70 mH ₂ O	0.4-0.6 ata
TOTAL	127	9-100 mH ₂ O	0.4-0.6 ata

Example profiles



RESULTS & CONCLUSIONS

There was no symptom of DCS in any decompression conducted according to the presented model (binomial 95% CI from 0.00 to 0.02).

Oxygen plays a dominant role in the process of desaturation of inert gas(es) from human body after hyperbaric exposures. The concept of the Extended Oxygen Window is based on physiological parameters and it allows to plan very long decompressions with different inert gases (including any usable combination of oxygen, nitrogen and helium). Optimization of decompression process is based on fast initial phase of saturation decompression and then controlling the rate of further decompression limited by the half-time of inert gas elimination from the slowest compartment (with relation of 1:2 between helium and nitrogen).