Title: Effect of air, heliox, and oxygen breathing on air bubbles in aqueous tissues in the rat

Authors: Hyldegaard, O
Madsen, J

Keywords: helium
heliox
retinal
eye
decompression
diffusion
decompression sickness
animal
rat
air
chamber

Issue Date: 1994

Abstract: Our purpose was to examine the behavior of air bubbles in three non-lipid tissues (skeletal muscle, tendon, and the anterior chamber of the eye) during breathing of air, helium-oxygen (heliox, 80:20), or oxygen. Air bubbles were injected into skeletal muscle or tendon in rats after decompression from a 1-h air exposure at 3.5 atm abs (355 kPa) or into the anterior chamber of the rat eye without any previous pressure exposure. The bubbles were studied by photomicroscopy at 1 atm abs (101 kPa) during either air breathing or during air breathing followed by heliox or O2 breathing. Muscle: during air breathing, all bubbles initially increased in size for a period of 55-100 min after decompression and then started to shrink. Both heliox and O2 breathing increased the shrinking rate as compared to air. Bubble size decreased more rapidly during O2 than heliox breathing. Tendon: during air breathing, bubble size decreased at a constant rate; in one bubble the decrease was preceded by a small increase. During heliox breathing most bubbles decreased faster than during breathing of air. O2 breathing caused a short-term increase in bubble size in 4 out of 10 bubbles. Otherwise, the shrinkage rate

was increased in six bubbles and uninfluenced in four bubbles during breathing of O2. Rat eye: during air breathing all bubbles shrank in the observation period. When heliox breathing was started, all bubbles transiently grew for 10-35 min, after which they began shrinking faster than during air breathing. When O2 breathing was started, five out of seven bubbles initially grew or stopped shrinking for 5-15 min, after which they decreased in size faster than during both air and heliox breathing. We conclude that breathing of either heliox or O2 will cause air bubbles in aqueous tissues to disappear faster than during breathing of air. Since heliox breathing promoted bubble shrinking in both muscle and tendon, gas exchange was probably not primarily limited by extravascular diffusion in these aqueous tissues. The present experiments suggest that heliox breathing at 1 atm abs may not exacerbate limb bends.

Description: Undersea and Hyperbaric Medical Society, Inc. (http://www.uhms.org)

URI: PMID: 8000281
http://archive.rubicon-foundation.org/2156

Appears in Collections: Undersea and Hyperbaric Medicine Journal

Files in This Item:

File	Size	Format	
8000281.pdf	1836Kb	Adobe PDF	View/Open

Show full item record