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Title: Decompression-induced bubble formation in salmonids: comparison to gas bubble disease

Authors: Beyer, DL
D'Aoust, BG
Smith, LS

Keywords: decompression
bubble

Issue Date: 1976

Abstract: The relationship of gas bubble disease (GBD) in fish to decompression-induced bubble formation was investigated with salmonids. Acute bioassays were used to determine equilibration times for critical effects in fish decompressed from depths to 200 fsw. It was found that equilibration of critical tissues was complete in 60-90 min. Salmonids and air-breathers are sensitive to decompressions at similar levels of supersaturation if elimination of excess gas following decompression is unrestricted. However, if elimination is restricted, bubble formation and growth increase accordingly. Tests with mixtures of He-O₂, Ar-O₂, N₂-O₂ (80% inert gas: 20% O₂) and pure oxygen demonstrated that gas solubility as well as supersaturation (ΔP), pressure ratio (initial pressure: final pressure), and absolute pressure must be considered in setting tolerance limits for any decompression. Gases with higher solubility are more likely to produce bubbles upon decompression. Oxygen, however, does not follow this relationship until higher pressures are reached, probably owing to its function in metabolism and in binding with hemoglobin. Tissue responses observed in both GBD and decompressed fish involved similar pathological effects at acute exposures. The circulatory system was consistently affected by bubbles that occluded vessels and blocked flow through the heart.

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

URI: [PMID: 10897859](http://archive.rubicon-foundation.org/2437)
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