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Title: Heart rate and respiratory frequency in hydrostatically compressed, liquid-breathing mice

Authors: Lundgren, CEG
Ornhagen, HC

Keywords: decompression
liquid breathing

Issue Date: 1976

Abstract: The effects of hydraulic compression on heart rate and respiratory frequency were studied in liquid-breathing, hypothermic (17-31 degrees C) mice. Increasing the hydrostatic pressure caused a bradycardia that was first evident at 25 at. and progressed to 48% of the control heart rate at 175 at. The bradycardia was reversed, although incompletely, by decompression. Similar changes in respiratory frequency were seen. Autonomic blockage with atropine and propranolol did not change the response patterns to any major extent. Compression rate (2-6 at. x min⁻¹) did not seem to influence the degree of heart-rate reduction. Compression caused an increase in colonic temperature, and decompression a decrease (0.5 degree C for a pressure change of 100 at.). These temperature changes could be ascribed partly to adiabatic heating and cooling of the body tissues as revealed by similar changes in dead animals and partly to increased metabolic heat generation in connection with compression-induced convulsions. The temperature changes, although partly accounting for the hysteresis in the heart-rate changes during compression/decompression, were not responsible for the major effects. It was concluded that high pressure causes bradycardia by a direct action on cardiac-pacemaker cells.

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

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