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Title: Modification of oxygen tolerance in rats by adaptation to combined hypoxia and hypercapnia

Authors: Clark, JM

Keywords: pulmonary hypoxia oxygen toxicity hypercapnia carbon dioxide animal rat

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Abstract: Tolerance to 100% O₂ or to O₂ with 60 torr PICO₂ (O₂-CO₂) was determined at pressures of 1.0-4.0 atm abs in normal rats and in rats adapted to combined hypoxia and hypercapnia (HHA) before O₂ or O₂-CO₂ exposure. Results were compared with previous studies of tolerance to O₂ or O₂-CO₂ after adaptation to hypoxia or hypercapnia alone. Both the positive effect on pulmonary O₂ tolerance and the negative effect on CNS O₂ tolerance found in hypoxia-adapted rats were reduced or eliminated in HHA rats. The increased CNS tolerance to O₂-CO₂ found in hypercapnia-adapted rats was also reduced in HHA rats. The observation that some of the O₂ tolerance modifications associated with adaptation to hypoxia or hypercapnia were reduced or eliminated by adaptation to both stresses concurrently may be because physiologic responses to chronic hypoxia and chronic hypercapnia are opposite in some ways. Results of the present and previous related studies indicate that physiologic adaptations to chronic alterations in the oxygen and acid-base environments have prominent influences on O₂ tolerance over a range of useful pressures.

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