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Title: Roles of nitrogen, oxygen, and carbon dioxide in compressed-air narcosis

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Abstract: In an attempt to determine the roles of nitrogen, oxygen, and carbon dioxide in compressed-air narcosis, the effects on performance (mental function and manual dexterity) of adding CO2 in various concentrations to the inspired gas under three different conditions were studied in eight healthy male volunteers. The three conditions were: (1) air breathing at 1.3 ATA; (2) oxygen breathing at 1.7 ATA; and (3) air breathing at 8.0 ATA (same inspired O2 pressure as in (2)). By relating performance to the changes induced in end-tidal (alveolar) gas pressures, and comparing the data from the three conditions, we arrived at the following results and conclusions. A rise in O2 pressure to 1.65 ATA, or in N2 pressure to 6.3 ATA at a constant high PO2 level, caused a significant decrement of 10percent in mental function but no consistent effect on psychomotor function. A rise in end-tidal PCO2 of 10 mmHg caused an impairment of approximately 10percent in both mental and psychomotor functions. The results suggest that, at raised partial pressures, all three gases have narcotic properties, and that the mechanism of CO2 narcosis differs fundamentally from that of N2 and O2 narcosis. Adult Atmospheric Pressure Carbon Dioxide/*adverse effects Human Inert Gas Narcosis/*etiology/physiopathology Male Middle Aged Nitrogen/*adverse effects Oxygen/*adverse effects Respiration

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