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Title: Dissociation of the behavioral and subjective components of nitrogen narcosis and diver adaptation

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Abstract: We investigated adaptation to nitrogen narcosis by compressing 11 highly experienced divers in a hyperbaric chamber to the equivalent of 54.6 meters of seawater once a day for 5 consecutive days. The behavioral component of narcosis was assessed with a serial choice-reaction time (RT) task, and the subjective component with a global magnitude estimate. Supplementary magnitude estimates were obtained with adjectives describing work effectiveness and body sensations. The results showed that there was no adaptation on the RT task, although learning was evident. In contrast, the global estimate dissociated from RT and showed clear adaptation by Day 3. The work effectiveness adjectives followed RT and did not show adaptation. Some body sensation adjectives showed clear adaptation, but others did not. These results lead to the conclusion that the anecdotal reports of adaptation by divers can probably be attributed to the subjective rather than the behavioral component of narcosis. Dissociation of these components suggests mediation by different brain mechanisms, and it is speculated that the gamma-aminobutyric acidA/benzodiazepine receptor complex, which has been implicated in both the anesthetic and anxiolytic properties of agents such as nitrous oxide, may be involved.

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