

Abstract for LSU Research Day

Title: Mind Under Pressure: Assessing the Impact of Recreational Diving Gases on Scuba Divers' Neurocognitive Performance

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Abstract:

INTRODUCTION / BACKGROUND - Enriched air nitrox (EANx) has established itself as a primary tool for divers to extend their no decompression limits. Despite its popularity, few studies have examined the anecdotal neurocognitive benefits. The purpose of this pilot study was to evaluate the effects of air, EANx28, EANx32, and EANx36 on neurocognitive performance at isobaric conditions (60 FSW). It was hypothesized that breathing a higher percentage of oxygen would be associated with a higher score on the Montreal Cognitive Assessment (MoCA). This study also assessed relationships between the gases and individual cognitive domains.

MATERIALS AND METHODS - 20 volunteer scuba divers were recruited and randomized to 1 of 4 gas groups, with 5 divers being assigned to each group. All divers dove to 60 FSW to complete their neurocognitive assessment.

RESULTS - 11 divers received normal cognition scores and 9 received scores in the mild cognitive impairment category (1 air diver, 3 EANx28 divers, 2 EANx32 divers, and 3 EANx36 divers). The lowest score was 18/30, bordering on moderate cognitive impairment, and was obtained by 1 air diver and 1 EANx36 diver. The highest score was 29/30 and obtained by a EANx36 diver. Orientation scores were notably poor amongst divers who scored in the mild cognitive impairment category.

SUMMARY / CONCLUSIONS - As no previous studies have compared these gases' impact on neurocognitive performance, this research has the potential to provide important information to divers regarding gas choice. Although this pilot study was underpowered with no statistical significance, patterns were described, outcomes assessed, and feasibility of a future and larger-scaled neurocognitive study were addressed. The future study at 80 FSW will involve 100 volunteer divers with 25 randomly assigned to each of the 4 groups. If the hypothesis is proven correct that breathing a higher percentage of oxygen is associated with higher neurocognitive test scores, it can be extrapolated that nitrox blends containing a higher percentage of oxygen may allow divers to more efficiently manage task loading. Overall, nitrox may have the potential to improve diving safety based on enhanced mental clarity and the MoCA was found to be a viable tool for assessing scuba divers' neurocognitive function in the field.