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CARDIAC VERSUS VASCULAR RESPONDER TYPES DURING COMBINED HYPOXIA AND HYPOXIC ORTHOSTATIC STRESS.

Abstract

Acute changes in environmental conditions presents a hazard for manned space crews. One such scenario that could occur during take-off, orbital re-entry, or aerobraking maneuvers involves exposure to acute onset hypoxia combined with hypergravity. Hypoxia can result in systemic vasodilation, while resilience to hyper-gravity relies upon effective systemic vasoconstriction. An inability to mount an adequate vasomotor response during hypoxic hyper-gravity could result in an orthostatic event, possibly rendering a pilot of a space vehicle incapacitated, which could lead to critical mission compromise. This study set out to explore cardiovascular reactions occurring during acute onset hypoxia followed by rapid onset hypoxic lower body negative pressure (LBNP). We hypothesized that a vasodilatory response to hypoxia would lead to a greater propensity for orthostatic collapse during hypoxic LBNP. For this study, 29 healthy male subjects took part. Each subject was exposed to rapid onset normobaric hypoxia using a gas mixture of 12During hypoxia, 17/29 subjects (Group D) experienced a -8.1In conclusion, the original hypothesis proposed was not supported. Despite the vasodilatory effects of hypoxia seen amongst the Group D subjects, resilience to hypoxic LBNP was no different than Group I. This was due to a reliance on cardiac, rather than vascular reactions, to maintain orthostatic stability in the face of an extreme environmental challenge. It appears that 2 types of response patterns are apparent during a combined hypoxic and hypoxic hyperG challenge.