

Institute of Aerospace Medicine

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Risks and Adaptive Processes to Hyperoxia in Diving and Hyperbaric Oxygenation Therapy (HBO)

Hyperoxia regularly occurs in diving and Hyperbaric Oxygenation Therapy (HBO), but hyperoxia is a Janus-head: on one hand, high oxygen partial pressures evidently reduce the risk of nitrogen-narcosis and the risk of decompression sickness in diving, and severely enhance tissue-oxygenation because of high amounts of dissolved oxygen in plasma.

On the other hand, hyperoxia can induce pulmonary damage and acute CNS-toxicity with cerebral seizures, and induces oxidative cell stress, which triggers an acute T-Cell response.

Our data shows, that hyperbaric hyperoxia induces DNA-double-strand breaks in vivo (humans) and ex vivo (isolated PBMCs), dependent on exposure time and pO_2 , but also suggests that antioxidants like vitamin C and quercetin are able to reduce hyperoxia-induced DNA-damage.

Further, we show, how far repetitive exposures of oxygen-divers to hyperoxia induce adaptive processes that lead to significant reductions in DNA damage.