

Life support Challenges for Human Space Exploration (10)  
Supporting Crews for Exploration Missions (2)

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## HYPERBARIC OXYGEN THERAPY FOR HUMAN SPACEFLIGHT

### Abstract

In order for astronauts to live and work in outer space, atmospheric conditions must be artificially maintained within very strict parameters. Any change in these conditions (atmospheric composition, pressure, and/or temperature) may pose a risk to the astronauts themselves and, ultimately, to the success of the mission.

The environments within which these conditions must be maintained include spacecraft, extra-vehicular activity (EVA) suits, and space habitats. Any change of pressure within one of these environments may place the astronauts at risk of decompression illness (DCI), a potentially life-threatening condition that is related to the presence of nitrogen bubbles within the body.

There are a number of strategies in low earth orbit (LEO) human spaceflight that are designed to minimize the risk of DCI or treat it if necessary. However, as humans prepare to travel beyond LEO again, the risk of developing DCI will be increased, due to the partial gravity environments of the Moon and/or Mars, in addition to the inability to return to Earth in a timely fashion for emergency medical treatment if needed.

Despite the fact that hyperbaric oxygen therapy (HBOT) is the medical gold standard for the treatment of DCI, there is currently minimal capacity for this treatment option in space. Expanding the HBOT capacity in human spaceflight could be extremely useful, given that this medical capability can also be used for the treatment of many other potentially life-threatening conditions, such as carbon monoxide poisoning, thermal burns, and gangrene. This research will examine the current issues related to HBOT in space and discuss the opportunities for the use of HBOT in future human spaceflight.