

Studying elite divers could give insights into lung disease

January 9 2023, by Laurel HamersLaurel Hamers



Credit: Pixabay/CC0 Public Domain

The world's top free divers can hold their breath for minutes at a time, embarking on extended underwater adventures without the aid of scuba equipment.

UO scientist Andy Lovering is studying those athletes to understand the limits of human physiology. The insights could lead to better treatments for [lung disease](#).

People with [chronic obstructive pulmonary disease](#) often struggle to get enough oxygen. In response, arterioles—tiny branches of the arteries—bringing blood to the lungs constrict. That leads to high pulmonary blood pressure and strains the heart.

"It's mostly thought of as a beneficial adaptation; if you inhale something blocking an airway, [blood vessels](#) going to that area will constrict and send blood elsewhere where it can pick up oxygen," Lovering said. "But the problem is that if you deplete the oxygen from the entire [lung](#), the pressure inside increases, causing pulmonary hypertension."

Free divers, on the other hand, intentionally put themselves into an oxygen-deprived state. During long dives, their blood oxygen levels sink to extreme lows. That could cause organ damage in some people. But trained divers can quickly bounce back, ready for another dive.

In studies of Croatian divers, Lovering's team has identified a few distinctive adaptations, described in two recent papers. Together, those adaptations might help divers keep their heart and lungs working effectively under extremely low oxygen conditions.

In one study, the researchers placed both trained divers and healthy nondivers into a low-oxygen environment for 20 to 30 minutes.

"The normal response to low oxygen is for arterioles in lungs to constrict," raising pulmonary blood pressure, said Tyler Kelly, a graduate student in Lovering's lab who led the work. "But we found that these athlete divers had a minimal response, if any."

The arterioles in their lungs didn't constrict as much in response to low oxygen, reducing the strain on the heart that diminished oxygen usually causes.

"It's a really unique adaptation," Lovering said.

The divers were also more likely than nondivers to have a patent foramen ovale, a hole that creates a passageway between the left and right sides of the upper chambers of the heart. This hole is present in all babies in utero, allowing [blood](#) to circumvent the developing lungs. It usually closes soon after birth once the lungs kick into action. But in a small number of people, it remains partially open.

In divers, this hole could act like a relief valve, helping to reduce pressure on the right side of the heart under low-oxygen conditions, Lovering suggests.

Lovering's team isn't sure yet whether these are adaptations that arise due to extensive training or whether people who have the differences from birth are simply more likely to succeed as divers.

Divers often build their stamina via dryland training, essentially practicing holding their breath for increasingly long time periods while out of the water. In follow-up work, Lovering wants to test whether sending [ordinary people](#) through a breath-holding diving [training program](#) can induce the same physiological changes in regular people as is seen in the divers.

If so, structured breath-holding exercises could be a treatment for people with [chronic lung disease](#), dampening their body's response to low [oxygen](#) and minimizing the strain on the heart and lungs.

The paper is published in the journal *Experimental Physiology*.

More information: Tyler Kelly et al, Blunted hypoxic pulmonary vasoconstriction in apnoea divers, *Experimental Physiology* (2022). [DOI: 10.1113/EP090326](https://doi.org/10.1113/EP090326)

Provided by University of Oregon

Citation: Studying elite divers could give insights into lung disease (2023, January 9) retrieved 19 April 2024 from <https://medicalxpress.com/news/2023-01-elite-divers-insights-lung-disease.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.