

Oxygen therapy could help combat dementia in individuals with lung disease

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Breathing in additional oxygen improves the function of blood vessels in the brain of people with breathing difficulties caused by lung conditions, according to new research published in *Experimental Physiology*. These findings could have implications for future research aiming to prevent the development of diseases affecting the brain, such as dementia.

Chronic obstructive pulmonary disease (COPD) is the collective term for a group of lung conditions that cause long term [breathing difficulties](#). It is a common condition affecting mainly middle-aged or older adults who smoke, with symptoms including breathlessness and a chesty 'smokers' cough. Individuals with COPD are at higher risk of dementia—one current theory suggests that this is due to lower brain oxygen levels as a result of problems with [blood](#) supply from [blood vessels](#) in the brain. In line with this theory, some studies have reported that giving COPD patients additional oxygen reduced their risk of developing dementia. However, until now, the mechanisms underlying this positive effect had not been fully investigated.

The research aimed to establish the effect of supplying additional oxygen on both blood flow to the brain and blood vessel function in COPD patients. The researchers used ultrasound to view and measure blood flow in the brain in these patients at rest, before and during delivery of this additional oxygen. The oxygen was delivered through the nasal passage for 20-30 minutes. In addition to testing blood flow in the brain, the authors also tested the link between brain activity and blood flow in the brain. Participants began this test with their eyes shut, having

to open them and then read standardised text. This task was designed to increase activity in the brain, and as a result [brain blood flow](#) was expected to increase to provide adequate oxygen supply. Ultrasound was used to measure the extent to which brain blood flow increased. Pairing these ultrasound measures with a measurement of [blood oxygen levels](#) allowed authors to estimate how much [oxygen delivery](#) to the brain increased during the eyes open reading test.

The research team found that [blood flow](#) and oxygen delivery to the brain was significantly increased during reading. This was due to blood vessels in the brain becoming dilated in response to the greater oxygen demand when the brain was active. It can thus be concluded that when COPD patients receive additional oxygen it improves the function of blood vessels in their brain.

This study showed that providing extra oxygen improves the function of blood vessels in the brain by matching blood supply to the demands of the brain activity. However, COPD patients typically use this extra oxygen therapy throughout the day and for long periods of time, potentially years. This study does not indicate the influence of long term oxygen therapy on the function of blood vessels in the brain. Despite these potential limitations, this work has set the foundation for the researchers to investigate the biological systems that control [oxygen](#) delivery to the [brain](#).

Lead author Ryan Hoiland, an early career researcher, learned much from the research process: "I am typically used to working with young, healthy individuals, and so this study in patients with lung disease was an eye-opening experience. I learned more about where I want to take my research career in the future, and how I want to design my research to hopefully improve treatments for people with breathing difficulties."

More information: Oxygen therapy improves cerebral oxygen

delivery and neurovascular function in hypoxemic chronic obstructive pulmonary disease patients, *Experimental Physiology*, [DOI: 10.1113/EP086994](https://doi.org/10.1113/EP086994)

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