

Hydrogen inhalation after intense exercise

A clear, plain-English summary of a 2025 human study in trained athletes

The short answer: Promising early results. Athletes who inhaled hydrogen-rich gas after intense exercise showed improvements in several blood markers linked with antioxidant defence, inflammation and exercise stress. However, the study was small and did not directly test lung function or prove faster recovery or better performance.

What did the researchers do?

31 athletes Healthy, trained and aged 15-27	3 groups Control: 14 Infrared: 9 Hydrogen: 8
Exercise Repeated maximum-effort cycling sprints	Hydrogen session 20 minutes immediately after exercise

The hydrogen group breathed a mixture of 66.7% hydrogen and 33.3% oxygen at 3 litres per minute. The infrared group used an infrared blanket for the same time, while the control group recovered normally in room air.

What did the study find?

Area measured	Finding in the hydrogen group	In everyday language
Antioxidant defence	Higher T-AOC and SOD; lower MDA	The blood showed a stronger defence against exercise-related oxidative stress and less evidence of fat-membrane oxidation.
Inflammation	Lower WBC after training; CRP was lower after the first session but later increased	Some findings suggested reduced inflammation, but the CRP result was mixed and should not be oversimplified.
Exercise stress	Lower CK and BUN than controls after winter training	These blood markers suggested less muscle damage and protein-breakdown stress.
Red blood cells	RBC, haemoglobin and haematocrit remained relatively stable	The markers involved in carrying oxygen were better maintained than in the infrared group.

Encouraging - but not yet conclusive

Why the findings matter

Intense training temporarily increases oxidative stress and inflammation. The study suggests that a short hydrogen-inhalation session may influence the body's response to that stress.

The hydrogen group generally showed the strongest antioxidant response and maintained stable red-blood-cell markers. These are useful early signals for future research.

What the study did not prove

It did not show that hydrogen improves athletic performance, prevents injury, shortens recovery time or directly protects the lungs. Those outcomes were not directly measured.

Important limitations

- Only 31 athletes took part, and just 8 received hydrogen.
- The groups were not randomised and participants knew their treatment.
- Lung function and lung tissue were not directly measured.
- The groups were unequal in size.
- Only land-based athletes were included.
- The findings have not yet been independently replicated.

Best interpretation

This study provides preliminary human evidence that post-exercise hydrogen inhalation may help regulate oxidative stress and some inflammatory or exercise-stress markers. Larger randomised, blinded trials are needed before firm conclusions can be made.

Quick glossary

T-AOC	Overall antioxidant capacity	WBC	White blood cells; can rise with inflammation or physical stress
SOD	An antioxidant enzyme made by the body	CRP	A general blood marker of inflammation
MDA	A marker of oxidative damage to fats	CK / BUN	Markers influenced by muscle damage and protein breakdown

Original research

Zhang X, Lu X, Li F, et al. Alleviation of exercise-induced injury by hydrogen inhalation via the reduction of oxidative stress and inflammation in athletes. *Journal of Thoracic Disease*. 2025;17(8):6151-6162. DOI: [10.21037/jtd-2025-1278](https://doi.org/10.21037/jtd-2025-1278)

Educational summary only. Molecular hydrogen is still being researched and should not be presented as a treatment, cure or substitute for medical care. This summary explains the authors' findings and does not constitute medical advice.