

Why nitrate supplementation may increase athletic performance

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Walk down the aisles of any food supplement store and you'll see that the use of nitrate supplements by athletes and fitness buffs has been popular for years. The hope is that these supplements will increase endurance (and possibly other performance/health benefits) by improving the efficiency at which muscles use oxygen. Now, a research study published in the March 2015 issue of *The FASEB Journal* helps explain how some of these supplements may work and why they may increase performance—they decrease the viscosity of blood, aiding in blood flow, while at the same time ensuring that tissue oxygen requirements are not compromised.

"Our research sheds new light on how [oxygen delivery](#) to bodily tissues is controlled to support mammalian life, and what role the kidneys and the liver play in achieving this," said Andrew Murray, Ph.D., a researcher involved in the work from the Department of Physiology, Development and Neuroscience at the University of Cambridge in Cambridge, United Kingdom. "These findings offer potential therapeutic avenues for dietary intervention in polycythemia and other conditions that warrant a reduction in red cell mass, but may have broader implications related to the way that supply and demand of oxygen are matched."

Scientists investigated the effects of [nitrate](#) supplementation on hemoglobin in four groups of rats, which were housed in either normoxic or hypoxic (low oxygen) conditions and supplemented with sodium nitrate (or sodium chloride, ordinary table salt, as a control).

Intake of nitrate via diet and drinking water was carefully monitored. Hypoxia is known to elevate hemoglobin levels, but nitrate supplementation at a moderate dose largely suppressed this effect. Unexpectedly, nitrate also lowered hemoglobin levels in normoxic animals. They found that at higher doses of nitrate, hemoglobin levels began to rise again. Researchers investigated the mechanisms underlying these effects and found that the suppression of hemoglobin was due to nitrate enhancing liver oxygenation and suppressing its expression of the hormone, erythropoietin. Conversely, as [hemoglobin levels](#) fell, the kidney became less well supplied with oxygen and at higher doses of nitrate it expressed more erythropoietin, reversing the effect.

"This doesn't mean that taking a nitrate supplement will transform you into the next Marshawn Lynch," said Gerald Weissmann, M.D., Editor-in-Chief of *The FASEB Journal*. "What it does mean, however, is that we're beginning to understand the science behind why some people feel they turn into the Seahawk's 'Beast Mode' when taking these [supplements](#)."

More information: Tom Ashmore, Bernadette O. Fernandez, Colin E. Evans, Yun Huang, Cristina Branco-Price, Julian L. Griffin, Randall S. Johnson, Martin Feelisch, and Andrew J. Murray. Suppression of erythropoiesis by dietary nitrate. *FASEB J.* March 2015 29:1102-1112; [DOI: 10.1096/fj.14-263004](https://doi.org/10.1096/fj.14-263004)

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