

Low vitamin D levels impair stamina and performance over time

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To better understand how low levels of vitamin D affect physical performance, Bruce Troen, left, and Kenneth Seldeen studied mice with insufficient vitamin D levels over the long term. Credit: University at Buffalo

It's generally accepted that most adults in the U.S. don't get enough

Vitamin D, but how that impacts their muscle mass and function over the long term is not well understood.

Researchers in the field have been split over vitamin D's importance in physical and cognitive function throughout the aging process. Part of the challenge has to do with the fact that studying humans for several decades is difficult.

Earlier this month, researchers at the University at Buffalo who also are affiliated with the U.S. Department of Veterans Affairs published in the journal *Aging* results of an animal study that may be one of the first to examine how low levels of vitamin D affect [physical performance](#) over the long term. While the study involved mice, not humans, the researchers say it eliminated some of the confounders possible in human studies, such as genetic or lifestyle factors, like diet and exercise, that can complicate the results.

"The findings of our study suggest that the relatively short-term, one-to-two-year studies that have failed to find differences in outcomes with vitamin D supplementation may not be adequate to comprehensively assess whether or not vitamin D plays an important role in physical performance as we age," said Bruce R. Troen, MD, senior author, professor and chief of the Division of Geriatrics and Palliative Medicine, Department of Medicine in the Jacobs School of Medicine and Biomedical Sciences, and director of the UB Center for Successful Aging. Troen is a physician with UBMD Internal Medicine.

"The take-home message of this study is that while having low serum vitamin D for a month or even a year or two may not matter for a person, yet over several decades it may have clinical ramifications," explained lead author Kenneth L. Seldeen, Ph.D., research assistant professor of medicine in the Jacobs School.

Both Troen and Seldeen and some of their co-authors are also with the Veterans Affairs Western New York Healthcare System.

"This is particularly concerning since an estimated 50-70 percent of the national population is either vitamin D deficient or insufficient," he said.

While most animal studies involve complete dietary elimination of the vitamin or knockout animals, who lack receptors for the vitamin, the UB study examined vitamin D insufficiency, which more accurately reflects the level of serum vitamin D in the general population.

"Vitamin D deficiency, defined as 12 nanograms per milliliter or less is relatively infrequent nowadays, whereas vitamin D insufficiency, less than 30 ng/ml, is widely prevalent and likely lasts for decades," said Troen.

Vitamin D insufficiency was induced in mice aged six months—the equivalent of a 20–25-year-old human for one full year—which is the equivalent of an additional 25-30 human years. A control group received vitamin D at normal levels.

After two weeks, the mice with low vitamin D exhibited a rapid decline in their serum vitamin D levels down to 11-15 ng/ml, where they remained for the duration of the study.

These mice performed worse than controls on several measures; they include grip endurance, which is the ability to maintain strength in a grip, sprint speed and stride length, meaning the mice took shorter steps, which may indicate slow gait speed, an important clinical parameter in geriatric medicine.

Troen noted that interestingly, there was no difference in grip strength between the two groups, but that the difference noted in grip endurance

may be significant.

"The decline in grip endurance likely represents a decline in anaerobic capacity, the ability to maintain peak performance," said Troen. "That was reinforced by the corresponding decline we observed in uphill sprint capacity. Together, these tests implicate that vitamin D status is an important factor for maintaining this critical aspect of physical performance."

The researchers were intrigued by the finding that after eight months the low vitamin D mice were found to have less lean body mass than the controls, but that difference went away after 12 months.

"The loss of lean body mass with aging is extremely important and inexorable," said Troen. "Our data suggest that [vitamin D](#) status plays a role in lean body mass, but more studies—both on geriatric mice and older humans—are needed."

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