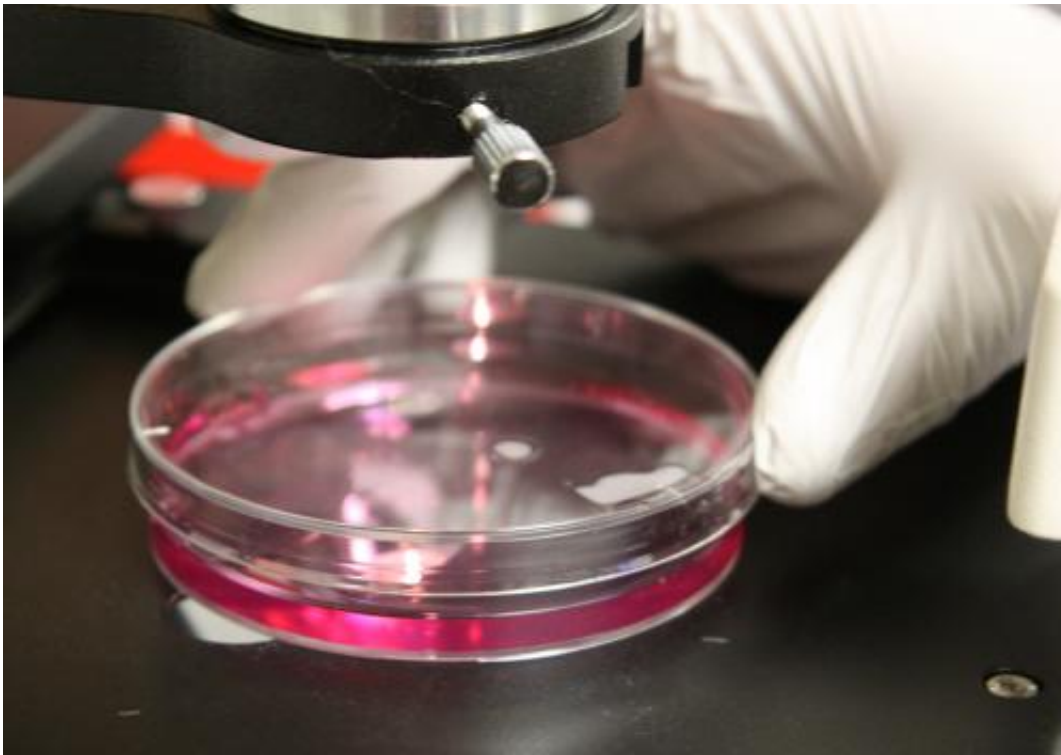


Most clinical studies on vitamins flawed by poor methodology

December 30 2013



Research at Oregon State University has identified one of the ways in which vitamin D can help protect against respiratory infections. Credit: Oregon State University.

Most large, clinical trials of vitamin supplements, including some that have concluded they are of no value or even harmful, have a flawed methodology that renders them largely useless in determining the real value of these micronutrients, a new analysis suggests.

Many projects have tried to study nutrients that are naturally available in the human diet the same way they would a powerful prescription drug. This leads to conclusions that have little scientific meaning, even less accuracy and often defy a wealth of other evidence, said Balz Frei, professor and director of the Linus Pauling Institute at Oregon State University, in a new review published in the journal *Nutrients*.

These flawed findings will persist until the approach to studying micronutrients is changed, Frei said. Such changes are needed to provide better, more scientifically valid information to consumers around the world who often have poor diets, do not meet intake recommendations for many vitamins and minerals, and might greatly benefit from something as simple as a daily multivitamin/mineral supplement.

Needed are new methodologies that accurately measure baseline nutrient levels, provide [supplements](#) or dietary changes only to subjects who clearly are inadequate or deficient, and then study the resulting changes in their health. Tests must be done with blood plasma or other measurements to verify that the intervention improved the subjects' micronutrient status along with biomarkers of health. And other approaches are also needed that better reflect the different ways in which nutrients behave in cell cultures, lab animals and the [human body](#).

The new analysis specifically looked at problems with the historic study of [vitamin](#) C, but scientists say many of the observations are more broadly relevant to a wide range of vitamins, micro nutrients and studies.

"One of the obvious problems is that most large, clinical studies of vitamins have been done with groups such as doctors and nurses who are educated, informed, able to afford healthy food and routinely have better dietary standards than the public as a whole," said Frei, an international expert on vitamin C and antioxidants.

"If a person already has adequate amounts of a particular vitamin or nutrient, then a supplement will probably provide little or no benefit," Frei said. "That's common sense. But most of our supposedly scientific studies take results from people with good diets and healthy lifestyles and use them to conclude that supplements are of no value to anyone."

Vitamin or mineral supplements, or an improved diet, will primarily benefit people who are inadequate or deficient to begin with, OSU researchers said. But most modern clinical studies do not do baseline analysis to identify nutritional inadequacies and do not assess whether supplements have remedied those inadequacies. As a result, any clinical conclusion made with such methodology is pretty much useless, they said.

An optimal diet, rich in fruits and vegetables, can provide most of the nutrients needed for good health – which critics say is reason enough not to use supplements. LPI researchers say that misses a pretty obvious point – that most Americans do not have an optimal diet.

"More than 90 percent of U.S. adults don't get the required amounts of vitamins D and E for basic health," Frei said. "More than 40 percent don't get enough vitamin C, and half aren't getting enough vitamin A, calcium and magnesium. Smokers, the elderly, people who are obese, ill or injured often have elevated needs for vitamins and minerals.

"It's fine to tell people to eat better, but it's foolish to suggest that a multivitamin which costs a nickel a day is a bad idea."

Beyond that, many scientists studying these topics are unaware of ways in which nutrients may behave differently in something like a cell culture or lab animal, compared to the human body. This raises special challenges with vitamin C research in particular.

"In cell culture experiments that are commonly done in a high oxygen environment, vitamin C is unstable and can actually appear harmful," said Alexander Michels, an LPI research associate and lead author on this report. "And almost every animal in the world, unlike humans, is able to synthesize its own vitamin C and doesn't need to obtain it in the diet. That makes it difficult to do any lab animal tests with this vitamin that are relevant to humans."

Many studies have found that higher levels of vitamin C intake are associated with a reduced incidence of chronic disease, including coronary heart disease, stroke, diabetes, hypertension and some types of cancer. The levels of vitamins needed for optimal health also go beyond those needed to merely prevent deficiency diseases, such as scurvy or rickets.

Even though such studies often significantly understate the value of [vitamin supplements](#), the largest and longest clinical trial of multivitamin/mineral supplements found a total reduction of cancer and cataract incidence in male physicians over the age of 50. It suggested that if every adult in the U.S. took such supplements it could prevent up to 130,000 cases of cancer each year, Frei said.

"The cancer reduction would be in addition to providing good basic health by supporting normal function of the body, metabolism and growth," he said. "If there's any drug out there that can do all this, it would be considered unethical to withhold it from the general public. But that's basically the same as recommending against multivitamin/[mineral supplements](#)."

More information: www.mdpi.com/2072-6643/5/12/5161

Provided by Oregon State University

Citation: Most clinical studies on vitamins flawed by poor methodology (2013, December 30)
retrieved 20 March 2024 from <https://medicalxpress.com/news/2013-12-clinical-vitamins-flawed-poor-methodology.html>

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