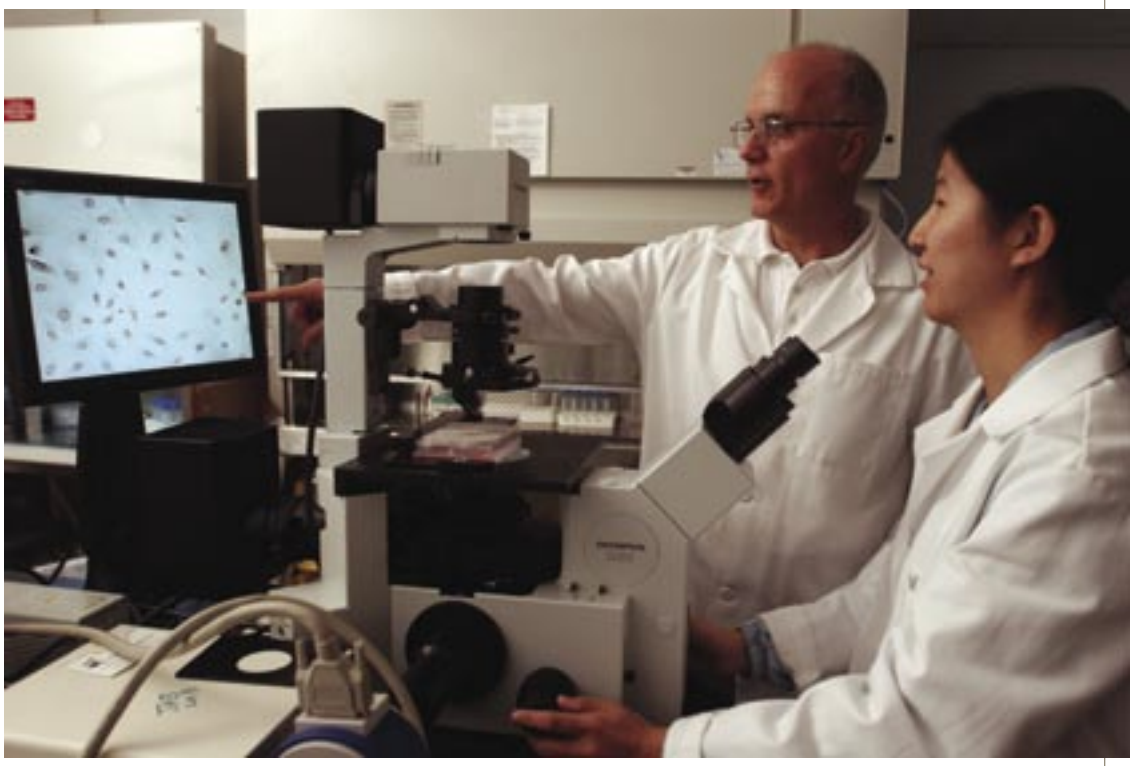
Putting the 'Function' in Functional Foods

The effects of "functional foods" on human health hold great promise. But the key is absorbability.

"The presence of a nutrient in a food does not necessarily result in its absorption and delivery to target tissues," said Mark Failla, OARDC scientist and chair of Human Nutrition in Ohio State University's College of Human Ecology.



Mark Failla, OARDC scientist, is studying how well the body can absorb important compounds.

The body can absorb anywhere from less than one percent to 100 percent of a food's compounds, Failla said, and that fact has global implications. Consumers in the developed world are interested in the potential of functional foods to reduce the incidence of many chronic diseases, from cancer and heart disease to arthritis and blindness. In contrast, vitamin A deficiency alone causes more than 500,000 children to go blind each year and is a leading cause of childhood death in developing countries. In both instances, the absorbability of a food's compounds is crucial.

Failla's work focuses on examining nutrients and other dietary compounds as they move through the digestive tract, into intestinal cells, and, finally, into the bloodstream. His team studies these processes by simulating digestion in the stomach and the small intestine and using human intestinal cells grown in the lab.

"Ideally, you would want to conduct these tests on humans," Failla said. "But that's expensive and labor-intensive. The human diet contains an estimated 20,000 compounds. Fifty or 60 of these are classified as essential, whereas many others affect physiological and pathological processes. For example, some compounds have anti-inflammatory or anti-carcinogenic properties. How can we possibly test the bioavailability of all these types of compounds from every type of food?" Failla's model system streamlines the process, and can account for the effects of plant variety, chemical make-up, style of food preparation, and other factors.

"We have evolved to eat foods, not chemicals," Failla said. "Determining how the many compounds in the complex food matrix interact is important if we're going to develop optimal functional foods."

Failla and Sherry Tanumihardjo at the University of Wisconsin-Madison have received a $200,000 grant to use his system to study several varieties of corn (a staple in Latin America) and sweet potatoes (a staple in southern Africa). They are examining the bioavailability of carotenoids, which form into vitamin A in the body. Results using Failla's model system will be compared with results of animal studies. If results match well, the model system will be used to examine many more foods with the aim of reducing micronutrient deficiencies in the developing world. The long-term goal, Failla said, is to cross-breed crop varieties with high-bioavailability of micronutrients with those that are high-yielding, to reduce deaths and disease caused by malnutrition in the developing world.

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