FORUM

Is Your Health What You Eat?

Ten years ago, phytonutrients were almost unheard of. Today, they are one of the hottest research and consumer-interest topics imaginable.

The term "phytonutrient" refers to plant components that promote human health. Unlike the traditional classes of nutrients—protein, fat, vitamins, minerals—phytonutrients are not considered essential for day-to-day human life, but they may contribute to optimal human health.

Since the initial recognition of phytonutrients, we've found several classes of compounds in foods that seem to promote health benefits. Among these are carotenoids, which are found in a variety of plant foods and appear to decrease the risk of age-related loss of vision; flavonoids, found in berries, which mitigate nerve cell deterioration; and a wide array of other compounds that appear to be antioxidants, preventing cell function loss.

In what was a relatively new field of research just a decade or so ago, we have already learned a great deal. On the other hand, what we've mostly learned is that there is a lot more to learn.

We have begun to categorize food plants by the amount of phytonutrients they contain. ARS has published three such databases for phytonutrients.

Five years ago, ARS extensively expanded the 1993 U.S. Department of Agriculture-National Cancer Institute Carotenoid Database by collaborating with the Nutrition Coordinating Center (NCC) at the University of Minnesota to bring on line the USDA-NCC Carotenoid Database for U.S. Foods. Last year, ARS published the USDA-Iowa State University Database on the Isoflavone Content of Foods. And just a short time ago, ARS added a USDA Database for the Flavonoid Content of Selected Foods. All three databases can be found at www.nal.usda.gov/fnic/foodcomp/index.html. ARS has also published a Phytochemical Database at www.pl.barc.usda.gov. It can be searched by name, class, or biological activity.

ARS' plant researchers have opened many new doors in phytonutrient research. They have shown that levels of specific phytonutrients do vary among plant varieties and that we can manipulate those levels through conventional breeding and biotechnology.

We know it is possible to add—through genetic engineering—a phytonutrient across species where the phytonutrient did not previously exist. We can also breed for over-expression of phytonutrients, as ARS has recently done with a new tomato that has about 10 times the lycopene levels of the average tomato. Lycopene is a pigment that gives watermelon and tomatoes their red color. It is thought to act as a powerful antioxidant.

Our plant scientists are also devising ways to manipulate phytonutrient levels through cultivation changes as well as developing new information about the roles these phytonutrients play in plant physiology. But our knowledge about which phytonutrients are in plants is far ahead of our scientific understanding about their health benefits for humans.

There are many questions that still require solid scientific answers before we can make specific recommendations to consumers. We may know what a phytochemical does in plant physiology, but does it do the same thing in human beings?

Among the research questions we need to ask are: How much of a phytonutrient do you need to eat to get the potential health benefit? Is there a level beyond which there is a possible problem? How do requirements differ depending on gender, age, body type, and so forth?

We also need to investigate the interaction between phytonutrients and other compounds within plants. Can people get the dietary benefits from an isolated phytonutrient, or do these compounds confer their benefits only when eaten as part of the whole plant? Eating that stem of broccoli or that whole carrot may prove more beneficial than taking a supplement made of an extracted phytonutrient. These are things we don't know right now.

Then there is the whole gamut of questions about how processing and preparation affect phytonutrients. We know that cooking actually makes lycopene more available in tomato products—in contrast to the traditional understanding that cooking lessens levels of vitamins.

Answering such questions will be a fundamental part of building consumer confidence, so that when foods specifically bred for phytonutrient content reach the market, consumers will be willing to buy them. For example, it will not be useful to develop a soybean extra high in phytoestrogens, which may protect women from breast cancer, if women do not have enough confidence in the concept to buy products made with the specialty bean.

The number of phytonutrients with scientifically proven health benefits will only increase in the next few years. But research needs to provide a lot of solid information before people start making major alterations in their diets.

In the meantime, eating a balanced diet high in fruits, vegetables, and grains is still the best way to achieve optimum health.

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