

IMPACT

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IMPACT is a series of publications highlighting how UC Davis' College of Agricultural and Environmental Sciences makes a difference in the lives of Californians. Through research, teaching and outreach programs, UC Davis research touches almost all aspects of Californian life. Today, millions of people eat safer foods, breathe cleaner air and drink healthier water with the help of our researchers. We're making discovery work -- for California and the world.

FOODS FOR BETTER HEALTH

THE ISSUE

Nearly 2,500 years ago, Hippocrates said, "Leave your drugs in the chemist's pot if you can heal the patient with food." That wisdom applies now more than ever as our population increases and people demand a healthier and more affordable food supply.

The scientific understanding of the role of food has expanded from a century ago when diet was considered only in the narrow context of how to prevent nutrient-deficient diseases such as rickets and scurvy. Today, scientists agree that access to a wholesome mix of foods and nutrients is critical for health and well-being -- the kind that is "optimal" rather than merely adequate. We know that diet plays an important role in the prevention and management of chronic diseases such as cancer and heart disease. Conventional plant breeding techniques, genetic modification and diet strategies can reduce the possibility of chronic disease and enhance individual well-being.

These revolutionary strides provide long-term benefits for the economic and physical health of communities and people -- in California and around the world.

WHAT WE'RE DOING

A few of the many research findings originating in the College of Agricultural and Environmental Sciences at UC Davis include:



Health-Boosting Foods. Cardiovascular disease is the leading cause of death in the United States. Carl Keen, professor in the nutrition department, has found that the flavonoids in cocoa and chocolate work much like low-dose aspirin in preventing aggregation of blood platelets, which is an important risk factor for blood clots that can cause heart attacks and strokes.

Flavonoids are a group of naturally occurring compounds found in plant-based foods such as tea, wine, cocoa and chocolate. They have a unique chemical structure and appear to be powerful antioxidants, preventing certain harmful biochemical processes in the body.

The Benefits of Antioxidants. UC Davis research has demonstrated that catechin in grape skins and seeds significantly delays tumor onset in mice. The discovery adds to a

growing body of evidence detailing the cancer-prevention effects of flavonoids, which are found in grapes, as well as in other fruits and vegetables.

“We know that catechin can act as an antioxidant (a substance that helps the body’s cells resist certain kinds of damage) and prevent free-radical formation in vitro,” says researcher Susan Ebeler, professor in the viticulture and enology department. “But we don’t know yet if it acts similarly in the body.”

Fruit. Research by Robert Jacob and Adel Kader, professors in the nutrition and pomology departments, respectively, is showing how consumption of fruit can help protect the body against oxidative disease. Damage caused by free radicals is believed to contribute to chronic diseases such as heart disease, cancer, cataracts and dementias. Nutrition is an important factor in determining the body’s balance of oxidative damage and defense.

Grapes. Edwin Frankel, professor in the food science and technology department, and his research team have discovered that antioxidants in red grapes and red wine may help prevent low-density lipoprotein cholesterol (LDL) or “bad” cholesterol from oxidizing in test tube tests. The oxidation of LDL in human blood is believed to contribute to the clogging of arteries leading to heart attacks. Their research indicates that grapes’ antioxidants, of which there are at least 20, are as strong as vitamin E, which is assumed to have beneficial activity in artery protection. In their tests, red wines contain 10 times more antioxidants than white and block LDL oxidation by 46-100 percent, compared with 3-6 percent for white wines. Frankel’s study in this area is one of the most cited in agricultural sciences.

Nourishing Cow’s Milk. James Murray, professor of animal science, is trying to make healthier food for children. Instead of modifying plants, he hopes to alter cow’s milk at its source. The ultimate goal is to develop a dairy cow genetically altered to express genes responsible for the anti-microbial qualities of human breast milk that can help children stay well.

“We are trying to make cow’s milk that is healthier and more wholesome for human consumption,” Murray explains.

Currently, he is using goats as a research model. Once they express the beneficial gene at the appropriate levels, the same procedure will be tried on cows. Murray adds that the human gene also could reduce the incidence of mastitis, a serious infection for cows and a great expense for dairy farmers. His work may contribute significantly one day to the quality of milk, the number one agricultural commodity in California.

“What we’re doing can make a tremendous difference in many people’s lives,” he says.

A SHARED VISION

Toward a greater understanding of these issues, the College of Agricultural and Environmental Sciences has designated “foods for health” as one of five academic priorities. Researchers in the college collaborate with the USDA’s Western Human Nutrition Research Center and the California Institute of Food and Agricultural Research, which are located on the UC Davis campus.

That’s impact -- science and communities at work together.

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