

Vegetables, Fruit, Soy May Prevent Certain Cancers

April 16, 2007 - When Mom said eat your vegetables, you should have listened and kept on doing it right into old age as a way to fight cancer. We all know eating fruits, vegetables and soy products provides essential nutrition for a healthy lifestyle and avoiding obesity, but new research is finding many of these products may also prevent cancer.

These reports are being presented at the 2007 Annual Meeting of the American Association for Cancer Research.

Breast and Ovarian Cancer

Eating such foods as broccoli and soy are believed to offer some protection against cancer, but how this occurs is not well-understood. Now, in laboratory experiments, researchers at the University of California, Los Angeles, have discovered a biological mechanism whereby two compounds in these foods might lower the invasive and metastatic potential of breast and ovarian cancer cells.

They found that diindolylmethane (DIM), a compound resulting from digestion of cruciferous vegetables, and genistein, a major isoflavone in soy, reduce production of two proteins whose chemotactic attraction to each other is necessary for the spread of breast and ovarian cancers.

When applying purified versions of DIM and genistein to motile cancer cells, the researchers could literally watch these cells come to a near halt. When either compound was applied, migration and invasion were substantially reduced.

"We think these compounds might slow or prevent the metastasis of breast and ovarian cancer, which would greatly increase the effectiveness of current treatments," said Erin Hsu, a graduate student in molecular toxicology.

"But we need to test that notion in animals before we can be more definitive."

Both DIM and genistein are already being developed for use as a preventive and a chemotherapy treatment for breast cancer, although more extensive toxicological studies are necessary, the researchers say.

Hsu says that this same chemotactic attraction is thought to play a role in the development of more than 23 different types of cancer, and, so far, they have found that messenger RNA expression of CXCR4 and CXCL12 (which is known to play a central role in the metastasis of breast cancer and is also thought to play a role in the development of ovarian cancer.) is substantially reduced when melanoma and prostate cancer cells are treated with the two compounds.

"We have also tested other phytochemicals and seen similar effects, indicating that this mechanism may mediate protective effects of other vegetable products as well," Hsu said.

The amount of DIM and genistein used in this study is probably comparable to use of a high dose of supplements, and is likely not achievable through consumption of food alone, the researchers say.

Pancreatic Cancer

A study of food consumption in 183,518 residents of California and Hawaii has found that a diet high in flavonols might help reduce pancreatic cancer risk, especially in smokers. These compounds are generally ubiquitous in plant-based foods, but are found in highest concentrations in onions, apples, berries, kale and broccoli.

People who ate the largest amounts of flavonols had a 23 percent reduced risk of developing pancreatic cancer compared to those who ate the least, according to a research team led by Laurence Kolonel, M.D., Ph.D., at the Cancer Research Center of Hawaii.

Smokers gained the most benefit. Those who ate the most flavonols reduced their risk of developing pancreatic cancer by 59 percent, compared to those who ate the least, says the study's lead author, Ute Nöthlings, DrPH, who conducted the study as a postdoctoral fellow in Hawaii and is now a researcher at the German Institute of Human Nutrition Potsdam-Rehbruecke.

"The effect was largest in smokers, presumably because they are at increased pancreatic cancer risk already," said Nöthlings. Smoking is the only

established risk factor for pancreatic cancer, and “short of stopping tobacco use, it has been difficult to consistently show lifestyle factors that might help protect against this deadly cancer,” she says.

As part of a larger research project known as The Multiethnic Cohort Study, Kolonel and Nöthlings followed the participants for an average of eight years after they filled out a comprehensive food questionnaire.

Although Nöthlings says the study has a large statistical power because of the large number of pancreatic cancer cases (529) that occurred in the study population, she says that this one study cannot firmly answer the question of whether flavonols can prevent development of pancreatic cancer.

“Further epidemiological studies in other populations and geographic regions are needed to confirm our findings,” she said.

The study also is the first to examine prospectively specific classes of flavonols and pancreatic cancer risk.

The researchers looked at consumption of three flavonols: quercetin, which is most abundant in onions and apples; kaempferol, found in spinach and some cabbages; and myricetin, found mostly in red onions and berries.

Of the three individual flavonols, kaempferol (spinach-cabbage) was associated with the largest risk reduction (22 percent) across all participants.

When the researchers divided intake into quartiles, and then compared highest intake to lowest, all the three classes of flavonols were associated with a significant trend toward reduced pancreatic cancer risk in current smokers, but not in never or former smokers. The interaction with smoking status was statistically significant for total flavonols, quercetin and kaempferol.

The researchers say their study did not examine the biological mechanisms by which these flavonols could exert a protective effect against pancreatic cancer. “But anti-carcinogenic effects of flavonoids in general have been attributed to the ability of these constituents to inhibit cell cycle, cell proliferation and oxidative stress, and to induce detoxification enzymes and apoptosis,” Nöthlings said.

Head and Neck Cancer

A new study among AARP members shows that just one additional serving of fruit and vegetables per day may lower your risk of head and neck cancer, but the data suggest that you may not want to stop at just one, according to researchers from the National Cancer Institute.

A large prospective study of 500,000 men and women aged 50 and older has found that those who ate more fruit and vegetables had a reduced risk of head and neck cancer. Head and neck cancer is the sixth leading cause of cancer-related mortality worldwide, resulting in more than 350,000 deaths annually.

“Identifying protective factors for head and neck cancer is particularly important as it has a high mortality rate,” said Neal Freedman, Ph.D., cancer prevention fellow at the National Cancer Institute.

At the beginning of the study, participants reported their typical dietary habits on a food frequency questionnaire. Freedman and his colleagues followed participants for five years and recorded all diagnoses of head and neck cancer cases during this time.

In their findings, the researchers report that participants who ate six servings of fruit and vegetables per day per 1000 calories had 29 percent less risk for head and neck cancer than did participants who consumed one and a half servings per 1000 calories per day.

Typically, adults consume approximately 2000 calories per day. One serving equals approximately one medium sized fresh fruit, one half cup of cut fruit, six ounces fruit juice, one cup leafy vegetables, or one half cup of other vegetables.

“Increasing consumption by just one serving of fruit or vegetables per 1000 calories per day was associated with a six percent reduction in head and neck cancer risk,” Freedman said.

According to Freedman, people who ate a lot of fruit also tended to eat a lot of vegetables, and vice versa. To measure these two types of foods independently, the researchers included both fruit and vegetable intake in the statistical models, a common statistical approach. This allowed them to compare participants with different levels of fruit consumption while holding constant the level of vegetable intake and vice versa. When examining fruit

and vegetable intake simultaneously, the protective association with vegetables seemed to be stronger than the association with fruits.

“Although we cannot absolutely rule out a cancer preventive role for other lifestyle factors that go along with eating more fruits and vegetables, our results are consistent with those from previous studies,” Freedman said. “Our study suggests that fruit and vegetable consumption may protect against head and neck cancer and adds support to current dietary recommendations to increase fruit and vegetable consumption.”

About American Association for Cancer Research

The mission of the American Association for Cancer Research is to prevent and cure cancer. Founded in 1907, AACR is the world's oldest and largest professional organization dedicated to advancing cancer research. The membership includes more than 25,000 basic, translational, and clinical researchers; health care professionals; and cancer survivors and advocates in the United States and more than 70 other countries.

AACR marshals the full spectrum of expertise from the cancer community to accelerate progress in the prevention, diagnosis and treatment of cancer through high-quality scientific and educational programs. It funds innovative, meritorious research grants. The AACR Annual Meeting attracts over 17,000 participants who share the latest discoveries and developments in the field. Special Conferences throughout the year present novel data across a wide variety of topics in cancer research, diagnosis and treatment.

AACR publishes five major peer-reviewed journals: Cancer Research; Clinical Cancer Research; Molecular Cancer Therapeutics; Molecular Cancer Research; and Cancer Epidemiology, Biomarkers Prevention. Its most recent publication, CR, is a magazine for cancer survivors, patient advocates, their families, physicians, and scientists. It provides a forum for sharing essential, evidence-based information and perspectives on progress in cancer research, survivorship and advocacy.

About the Author

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