Medical Xpress

Soy compound may halt spread of prostate cancer

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A compound found in soybeans almost completely prevented the spread of human prostate cancer in mice, according to a study published in the March 15 issue of *Cancer Research*, a journal of the American Association for Cancer Research.

Researchers say that the amount of the chemical, an antioxidant known as genistein, used in the experiments was no higher than what a human would eat in a soybean-rich diet.

Investigators from Northwestern University found that genistein decreased metastasis of prostate cancer to the lungs by 96 percent compared with mice that did not eat the compound in their chow - making the study the first to demonstrate genistein can stop prostate cancer metastasis in a living organism.

“These impressive results give us hope that genistein might show some effect in preventing the spread of prostate cancer in patients,” said the study’s senior investigator, Raymond C. Bergan, MD, director of experimental therapeutics for the Robert H. Lurie Comprehensive Cancer Center of Northwestern University.

“Diet can affect cancer and it doesn’t do it by magic,” Bergan said. “Certain chemicals have beneficial effects and now we have all the preclinical studies we need to suggest genistein might be a very promising chemopreventive drug.”

Bergan and his team have previously demonstrated in prostate cancer cell cultures that genistein inhibits detachment of cancer cells from a primary prostate tumor and represses cell invasion. It does this by blocking activation of p38 MAP kinases, molecules which regulate pathways that activate proteins that loosen cancer cells from their tight hold within a tumor, pushing them to migrate. “In culture, you can actually see that when genistein is introduced, cells flatten themselves in order to spread out and stick strongly to nearby cells,” he said.

In this study, investigators fed genistein to several groups of mice before implanting them with an aggressive form of prostate cancer .The amount of genistein in the blood of the animals was comparable to human blood concentrations after consumption of soy foods, Bergan said.

The researchers found that while genistein didn’t reduce the size of tumors that developed within the prostate, it stopped lung metastasis almost completely. They repeated the experiment and found the same result.

They then examined tissue in the animals, measuring the size of tumor cells’ nuclei to determine if the cells had flattened out in order to spread. “Within a tumor, it is hard to tell where the borders of cells stop, so one way to measure adherence is to look at the size of the nuclei in cells and see if they are wider due to cell spread,” Bergan said. “And that is what we found, demonstrating that the drug is having a primary effect on metastasis.”

He said that the study also found that mice fed genistein expressed higher levels of genes that are involved in cancer cell migration which, Bergan says, at first might not make sense in light of the study’s conclusion that genistein almost completely blocked metastasis.

“What we think is happening here is that the cells we put in the mice

normally like to move. When genistein restricted their ability to do so, they tried to compensate by producing more protein involved in migration. But genistein prevented those proteins from being activated," he said. "This is really a lesson for researchers who depend on biomarker studies to test whether a treatment is working. They need to be aware that those biomarkers might be telling only half of the story."

Bergan cautioned that much is unknown about use of genistein in preventing cancer spread. For example, it may be that the effects of the compound in people who have eaten soy all their lives is stronger than benefit seen in patients who have only started to use genistein.

"The problem we have faced is that epidemiology studies that found men who eat soy are at reduced risk of prostate cancer death are all associative. They don't prove anything," he said. "The only way we will find out how promising genistein is will be from conducting clinical trials."

Human observational studies have found that while the spread of prostate cancer is reduced in men who eat soy-rich foods, findings have been mixed as to whether prostate cancer incidence is markedly different. Results of some laboratory studies of genistein have also been mixed, but most have shown favorable results, Bergan said, demonstrating that genistein can inhibit a variety of cell molecules including tyrosine kinases, which activate proteins by attaching them to phosphate chemicals.

Source: American Association for Cancer Research