

Broccoli Packs Powerful Punch To Bladder Cancer Cells

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Researchers have isolated compounds from the vegetable broccoli that they believe may help prevent or slow the progress of bladder cancer.

The current work builds on a major study conducted six years ago by Harvard and Ohio State universities that found that men who ate two or more half-cup servings of broccoli per week had a 44 percent lower incidence of bladder cancer compared to men who ate less than one serving each week.

“We're starting to look at which compounds in broccoli could inhibit or decrease the growth of cancerous cells,” said Steven Schwartz, a study co-author and a professor of food science and technology at Ohio State University .

“Knowing that could help us create functional foods that benefit health beyond providing just basic nutrition.”

Some 63,000 people will be diagnosed with bladder cancer this year, according to the American Cancer Society. And more than 13,000 with the disease will die.

The researchers isolated compounds called glucosinolates from broccoli sprouts. During chopping, chewing and digestion, these phytochemicals morph into nutritional powerhouses called isothiocyanates – compounds that the scientists believed play a role in inhibiting cancer.

Their hunch was right, at least in the laboratory experiments. There, isothiocyanates hindered the growth of bladder cancer cells. And the most profound effect was on the most aggressive form of bladder cancer they studied.

The researchers presented their findings on July 18 in New Orleans at the annual Institute of Food Technologists meeting.

They first extracted and measured the levels of glucosinolates from broccoli sprouts. They then used a process that uses enzymes to convert the glucosinolates to isothiocyanates.

While young sprouts naturally have higher concentrations of these phytochemicals than full-grown broccoli spears, eating the spears also provides health benefits, Schwartz said.

He and his colleagues treated two human bladder cancer cell lines and one mouse cell line with varying amounts of glucosinolates and isothiocyanates. Even though glucosinolates are converted to isothiocyanates, the researchers wanted to know if the former would have any effect on controlling the growth of cancer cells.

It didn't.

However, the isothiocyanates decreased proliferation in all three cell lines. The strongest effect was on the most aggressive of these lines – human invasive transitional cell carcinoma.

The researchers aren't sure what caused this effect, or exactly how these compounds keep cancer cells from proliferating. But they are looking into it.

“There's no reason to believe that this is the only compound in broccoli

that has an anti-cancer effect,” said Steven Clinton, a study co-author and an associate professor of hematology and oncology at Ohio State. “There are at least a dozen interesting compounds in the vegetable.

“We're now studying more of those compounds to determine if they work together or independently, and what kind of effects they have on cancer cells,” he added.

Broccoli isn't the only cruciferous veggie with health benefits, the researchers say. The plant's kin, which include cabbage, cauliflower, Brussels sprouts and kale, may all contain similar disease-fighting phytochemicals.

It's too early to suggest just how much broccoli or other cruciferous vegetables should be eaten to stave off or slow down the progression of bladder cancer. Still, they are an important part of the diet.

“Cruciferous veggies have an effect on other types of cancer, too,” Schwartz said. “We already know that they contain compounds that help detoxify carcinogens. We're thinking more along the lines of progression and proliferation, such as once cancer starts, is there a way to slow it down?”

He and Clinton conducted the study with Ohio State colleagues Robin Rosselot, a graduate student in food science and technology and Qingguo Tian, a research associate also in food science and technology.

Source: Ohio State University

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