POWERFUL PROSTATE CANCER FIGHTERS

From Arugula to Wasabi, Cruciferous Veggies Pack a Powerful Punch

By Densie Webb, PhD, RD

A high intake of cruciferous vegetables, such as broccoli and cauliflower, has long been associated with lower risks of some types of cancer, especially lung and colorectal cancer. In 1982, the National Research Council published its then-groundbreaking report, "Diet, Nutrition, and Cancer," in which it stated "... there is sufficient epidemiological evidence to suggest that consumption of ... cruciferous vegetables (eg, cabbage, broccoli, cauliflower, and Brussels sprouts) is associated with a reduction in the incidence of cancer ..." The report went on to say that the specific compound or compounds responsible for that reduction in risk had not yet been identified.

Much has happened in the almost 30 years since. We now know that cruciferous vegetables are unique among plant foods as being rich sources of glucosinolates, sulfur-containing compounds responsible for the strong scent released when they're cooked and their somewhat bitter taste. Sulforaphane, a type of isothiocyanate mostly associated with broccoli, is one of the most studied compounds formed from glucosinolates.

Numerous promising studies have examined sulforaphane's ability to interfere with the cancer process at different stages of development for lung, colorectal, breast, and prostate cancers. And preliminary studies have uncovered evidence it may be effective against melanoma, esophageal cancer, and pancreatic cancer. Now, a new study conducted at the Linus Pauling Institute at Oregon State University has found even more positive news about sulforaphane's cancer-fighting capabilities.[1] The laboratory study, which examined sulforaphane's effect on human prostate cancer cells, found that the compound selectively targets not only cancerous cells, but also benign cells that are hyperplasic (eg, showing early signs of abnormality), while leaving healthy prostate cells alone. That means that not only is sulforaphane effective, it's safe—which is critical if it's to be used in cancer prevention or treatment.

The researchers discovered that sulforaphane inhibits histone deacetylase (HDAC) enzymes that are known for their involvement in the development of cancer cells. The ability to inhibit HDAC enzymes makes sulforaphane a potentially powerful cancer treatment, as any compound that can block the action of HDAC enzymes and halt the cancer process. These findings are one step toward using sulforaphane to prevent and treat prostate cancer through both diet and drugs.

Case for Sulforaphane

The link between sulforaphane and cancer prevention has been studied in the lab, in animals, and in humans. While no clinical studies have been performed to look at consumption of cruciferous vegetables and cancer risk (it's unlikely such a study ever will be done because of the decades it can take for cancer to develop), the majority of epidemiological studies have found an inverse relationship between consumption of cruciferous vegetables and cancer.[2] Other studies have looked at the effect of sulforaphane on human and animal cancer cells in the laboratory and cancer-related enzyme activities in people. The findings point to sulforaphane's potential as a pharmaceutical agent in cancer treatment, and they also suggest that simply eating more cruciferous vegetables could be beneficial.

To Cook or Not to Cook

Cruciferous vegetables are the richest sources of sulforaphane, but just how rich is determined, in part, by how the vegetable is handled before it's served. Broccoli, for example, actually has little available sulforaphane. It's released only when glucosinolates come in contact with myrosinase, a plant enzyme necessary for sulforaphane's formation. When broccoli is cut, chopped, or chewed, the enzyme is released from plant cells and the two come together to form sulforaphane. However, cooking can cause both the loss of glucosinolates in cooking water (one study found an 18% to 59% decrease after boiling for nine to 15 minutes) and inactivation of the myrosinase enzyme by heat, whether boiling, steaming, or microwaving.[2] Prolonged storage, even at optimal refrigeration, reduces the amount of sulforaphane released as well.[3]

THE CRUCIFEROUS COLLECTION

Among the most commonly consumed cruciferous vegetables are broccoli, Brussels sprouts, cabbage (red or green), cauliflower, collard greens, kale, kohlrabi, mustard, rutabaga, turnips, turnip greens, bok choy, and Chinese cabbage. Another, less recognized group of cruciferous vegetables includes arugula, radish sprouts, broccoli sprouts, horseradish, broccoli rabe, broccoflower, broccolini, wasabi, radish, daikon, and watercress.

Chewing raw cruciferous vegetables that have been stored for a short period of time is likely to provide the most sulforaphane, and even when the myrosinase enzyme is inactivated during cooking, bacteria in the intestinal tract still make formation and absorption of sulforaphane possible.

The degree to which people benefit from an increased intake of cruciferous vegetables may be a matter of genetics. People inherit different capacities to metabolize and eliminate sulforaphane, though at this point, there's no way to know who may benefit the most.[2]

How Much to Eat?

The National Cancer Institute recommends consuming five to nine servings of fruits and vegetables each day. The 2010 Dietary Guidelines for Americans recommend that one-half of each plate at a meal consist of fruits and vegetables. But no official recommendations have been established specifically for the consumption of cruciferous vegetables. However, according to Rod Dashwood, PhD, principal investigator of the new study, "Probably for maximum benefit, daily consumption of cruciferous vegetables would be recommended."

Broccoli sprouts are an excellent source of sulforaphane and Dashwood has examined their effects on the cancer process in people. In one study, people consuming 1 cup of fresh broccoli sprouts experienced a significant suppression of the HDAC enzyme, Dashwood says. However, it's unknown how much of other cruciferous vegetables it would take to have the same effect.

RDs Weigh In

The science surrounding cruciferous vegetables and their cancer-preventing potential is still growing, but what should you tell your clients and patients in the meantime? "RDs can help patients and clients by translating the science into 'how-to' tips for including cruciferous vegetables into their diets," says Dee Sandquist, MS, RD, LD, CDE, an Iowa-based spokesperson for the American Dietetic Association (ADA). What about raw vs. cooked? Sandquist says she recommends eating cruciferous vegetables in any form, as opposed to not eating them at all.

"This study is just one more piece of the puzzle," concludes Joan Salge Blake, MS, RD, LDN, a clinical associate professor at Boston University and a spokesperson for the ADA. "Preliminary research suggests that these compounds in vegetables like broccoli and cauliflower may selectively target prostate cancer cells in the body. This exciting new research provides another good reason to consume a healthy, well-balanced, plant-based diet that provides a wide variety of cruciferous vegetables."

"When we have consistent findings showing protective effects, we need to pay attention to it," says Jeannie Gazzaniga-Moloo, PhD, RD, an instructor of nutrition and foods/dietetics at California State University in Sacramento and an ADA spokesperson. "I'd tell patients with prostate cancer to, by all means, eat broccoli along with other favorite vegetables. Not only are you getting cancer-fighting compounds, it—like other cruciferous vegetables—is a good source of other nutrients, such as vitamin C, carotenoids, fiber, calcium, and folate. Cruciferous vegetables should be at the top of the list of what we're recommending to clients. And it's our responsibility to help them by sharing our knowledge of the full assortment of cruciferous vegetables, not just broccoli and cauliflower."

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References

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