

# Scientists put cancer-fighting power back into frozen broccoli

August 6 2013

---



broccoli

There was bad news, then good news from University of Illinois broccoli researchers this month. In the first study, they learned that frozen broccoli lacks the ability to form sulforaphane, the cancer-fighting phytochemical in fresh broccoli. But a second study demonstrated how the food industry can act to restore the frozen vegetable's health benefits.

"We discovered a technique that companies can use to make frozen broccoli as nutritious as fresh. That matters because many people choose frozen veggies for their convenience and because they're less expensive," said Elizabeth Jeffery, a U of I professor of nutrition.

"Whenever I've told people that frozen broccoli may not be as nutritious as fresh broccoli, they look so downcast," she added.

As little as three to five servings of broccoli a week provides a cancer-protective benefit, but that isn't true for bags of broccoli that you pluck out of your grocery's [freezer](#), she noted.

The problem begins when soon-to-be-frozen broccoli is blanched, or heated to [high temperatures](#), to inactivate enzymes that can cause off-colors, tastes, and [aromas](#) during the product's 18-month [shelf life](#), she explained.

The [extreme heat](#) destroys the enzyme myrosinase, which is necessary to form sulforaphane, the powerful cancer-preventive compound in broccoli, she said.

"We know this important enzyme is gone because in our first study we tested three commercially frozen broccoli samples before and after cooking. There was very little potential to form sulforaphane before the frozen broccoli was cooked and essentially none after it was cooked as recommended," said Edward B. Dosz, a graduate student in Jeffery's laboratory.

In the second study, the researchers experimented with blanching broccoli at slightly lower temperatures instead of at 86°C, the current industry standard. When they used a temperature of 76°C, 82 percent of the enzyme myrosinase was preserved without compromising [food safety](#) and quality.

Sulforaphane is formed when fresh broccoli is chopped or chewed, bringing its precursor glucoraphanin and the enzyme myrosinase into contact with each other. The researchers first thought that thawing frozen broccoli in the refrigerator might rupture the plant's cells and kick-start the enzyme–substrate interaction. It didn't work, Dosz said.

But they had previously had success using other food sources of

myrosinase to boost broccoli's [health benefits](#). So the researchers decided to expose frozen broccoli to myrosinase from a related cruciferous vegetable.

When they sprinkled 0.25 percent of daikon radish—an amount that's invisible to the eye and undetectable to our taste buds—on the frozen broccoli, the two compounds worked together to form sulforaphane, Dosz said.

"That means that companies can blanch and freeze broccoli, sprinkle it with a minute amount of radish, and sell a product that has the cancer-fighting component that it lacked before," he said.

One question remained: Would [sulforaphane](#) survive the heat of microwave cooking? "We were delighted to find that the radish [enzyme](#) was heat stable enough to preserve broccoli's health benefits even when it was cooked for 10 minutes at 120°F. So you can cook frozen broccoli in the microwave and it will retain its cancer-fighting capabilities," Dosz said.

Jeffery hopes that food processors will be eager to adopt this process so they can market frozen broccoli that has all of its original nutritional punch.

Until they do, she said that consumers can spice up their frozen, cooked broccoli with another food that contains myrosinase to bring the cancer-fighting super-food up to nutritional speed.

"Try teaming frozen broccoli with raw radishes, cabbage, arugula, watercress, horseradish, spicy mustard, or wasabi to give those bioactive compounds a boost," she advised.

**More information:** Jeffery and Dosz of the U of I's Department of

Food Science and Human Nutrition co-authored both studies. Commercially produced frozen broccoli lacks the ability to form sulforaphane was published in the *Journal of Functional Foods* and is available online at [www.sciencedirect.com/science/.../S1756464613000510](http://www.sciencedirect.com/science/.../S1756464613000510)

Modifying the processing and handling of frozen broccoli for increased sulforaphane formation appears in the *Journal of Food Science* and can be viewed online at [onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291750-3841/earlyview](http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291750-3841/earlyview)

Provided by University of Illinois at Urbana-Champaign

Citation: Scientists put cancer-fighting power back into frozen broccoli (2013, August 6) retrieved 18 April 2024 from <https://phys.org/news/2013-08-scientists-cancer-fighting-power-frozen-broccoli.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.