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## If mushrooms see the light

By Susan Bowerman

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Vitamin D, the “sunshine vitamin,” got its nickname because our bodies rely on a bit of sun exposure to manufacture the vitamin under the surface of the skin. But some recent research shows that a little bit of ultraviolet light also boosts vitamin D production where you might not expect it – in fresh mushrooms.

A serving of conventionally cultivated white mushrooms contains small amounts of one form of vitamin D, called ergocalciferol, or vitamin D2. That’s about 4% of the daily value of 400 IU (international units) established by the Food and Drug Administration to represent the needs of the typical consumer. But mushrooms are an abundant source of a cholesterol-like compound, ergosterol, which can be converted into vitamin D2 when the fungi are exposed to ultraviolet rays. (Our bodies manufacture vitamin D3 – cholecalciferol – from a different cholesterol derivative present in the skin.)

There’s just one hitch: Mushrooms are typically raised indoors in the dark, with the lights switched on only when they are harvested. But recent pilot testing by Pennsylvania State University researchers and Monterey Mushrooms growers has shown that even brief pulses of UV light can send the vitamin D content of a mushroom soaring.

In the pilot test, the university’s Mushroom Research Center found that after one hour of UV light exposure right before the mushrooms were harvested, the vitamin D2 content in a serving of mushrooms rose to more than twice the FDA daily value. The effects were even more pronounced if mushrooms were exposed after harvesting: Monterey Mushrooms found increases as high as four times the FDA daily value per serving after only five minutes of UV treatment.

Though there is no question that UV light works to increase the conversion of ergocalciferol to vitamin D2, work is still ongoing to determine the best timing – before or after harvest – and length of exposure to optimize the vitamin D levels, as well as to confirm the preliminary findings.

Mushrooms darken with UV exposure, just as people do. Traditional white button mushrooms turn brown after treatment, but the color change is less noticeable in darker mushrooms such as crimini. The mushroom industry is planning to bring both varieties of these high vitamin-D fungi to the market, perhaps by this fall.

This would be great news. Many people don’t get enough sun exposure – especially in the winter – to produce adequate vitamin D, so dietary sources need to fill in the gap. But very few foods naturally contain vitamin D (egg yolks, liver, fish and the reviled cod liver oil) and only a few are permitted by the Food and Drug Administration to be vitamin D-fortified (milk and some juices and cereals). Getting enough D is especially an issue for vegetarians or vegans or others who don’t eat fish or drink milk.

In fact, on average, adults consume only about 60% of the FDA daily value of vitamin D from food sources – and even with supplements many people still come up short, because these don’t always provide 100% of the daily value. Obese people are often low on vitamin D, even if they meet the daily value, because the fat-soluble vitamin can be taken out of blood circulation and deposited in body fat.

We may be even shorter of vitamin D than we knew. In a 2006 review of the vitamin D literature published in the American Journal of Clinical Nutrition, researchers at the Harvard School of Public Health concluded that the recommended daily intake may need to be more than doubled to reduce the risk of chronic disease.

That's because, aside from keeping bones and teeth healthy and strong, vitamin D is increasingly thought to play a role in reducing the risk of colon, breast and prostate cancers; stroke; hypertension; congestive heart failure and diabetes. It would take about 4 ounces of fish, 4 cups of milk or up to 10 servings of fortified cereal to meet the current daily recommendation of 400 IU of vitamin D.

But just five "optimized" mushrooms would more than meet this recommended amount. When these do come to market, they'll be a delicious way to boost your vitamin D – especially if you eat them outdoors.

Susan Bowerman is a registered dietitian and assistant director of the UCLA Center for Human Nutrition.

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