

Mushrooms Show Nutritional Benefits

Using modern analytic tools, scientists at the U of I found that the six mushroom varieties tested — in raw and cooked forms and at various harvest times and maturity levels — are rich in total dietary fibers, including those associated with cholesterol-lowering (chitin) and healthy hearts (beta-glutan).

"What we've reported in this paper are the complete carbohydrate profiles of this popular food," said George C. Fahey Jr., a professor of nutritional sciences in the Department of Animal Sciences at Illinois. "The profiles include the digestible carbohydrates, the starches, and the fermentable fibers that reach the large bowel. This work was important to the Mushroom Council that funded this research because they had little information on these components."

It was already known that mushrooms offer high-quality protein, vitamins, unsaturated fatty acids, and fiber, but a precise carbohydrate breakdown had been elusive.

The mushrooms studied were white button, crimini, portabella, maitake, shiitake, and enoki. The latter two mushrooms were analyzed only in their consumed cooked form. "The maitakes and shiitakes tended to be very similar in their nutrient concentrations, and quite a bit different than the others," said Cheryl L. Dikeman, a doctoral student in Fahey's lab and lead author of the paper. "Portabellas were off on their own in terms of their contents of oligosaccharides, beta-glucans, and chitin."

Chitin concentrations were 8 percent in raw mature portabellas and 6 percent in raw immature ones. When cooked, chitin content fell to 2.7 percent in both forms, but their levels of total dietary fibers went up significantly. Also showing the same pattern were raw enokis, which had a 7.7 percent chitin content; cooking also lowered that to 2.7 percent, but total dietary fibers jumped from 29.3 percent in raw to 41.6 percent in cooked. Raw mature white buttons and cooked, mature shiitakes boasted chitin levels of 3 per-

cent and 3.6 percent, respectively. Raw mature portabellas also had the highest level of beta-glucan (0.2 percent), while most of the other mushrooms had 0.1 percent. Enokis and maitakes had none. Relatively small amounts are required to provide cardiovascular benefits, Fahey said.

Cooking tended to increase starch, total dietary fibers and fat contents and to decrease chitin concentrations in all of the mushrooms. "Some nutrients went up after cooking, while some went down," Dikeman said. "Part of that you'd expect to happen as water is cooked out."

Also measured were oligosaccharide levels. These sugar molecules are only partially digestible, but the undigested components are considered prebiotics in that they elicit growth of healthful bacteria in the colon.

Raw, immature portabellas had a total oligosaccharide concentration of 5,272 micrograms per gram. Also found to have more than 1,000 micrograms per gram were raw mature portabellas and cooked, immature crimini. None were detected in enokis, maitakes, or shiitakes.

The research primarily involved the use of high-performance liquid chromatography, which was adapted by Laura L. Bauer, a research specialist in animal sciences and a co-author of the paper, to quantify chitin concentrations in each mushroom. A spectrophotometer was used to analyze beta-glucan levels and sort out uronic acids that are associated with total dietary fibers.

The information obtained in the study, Fahey said, will allow people to choose the mushrooms that provide the dietary punch they may be needing. It also should allow food scientists to search for optimum preparation strategies for using the various products.

The Mushroom Council of Dublin, California funded the mushroom study and provided the samples.

