



E-MAZING

News About Mushrooms

WINTER 2006 / SPRING 2007

Unearthing Mushrooms' Nutritional Treasure

Mushrooms' Nutritional Profile

Although often grouped with vegetables, mushrooms are fungi and provide many of the attributes of fruits and vegetables, as well as nutrients more commonly found in meat, beans or grains. New data in the USDA Nutrient Database shows that mushrooms are low in calories, fat-free, cholesterol-free and very low in sodium, yet they are also an important source of several nutrients including B-vitamins riboflavin, niacin and pantothenic acid; the antioxidant selenium; potassium; copper; and phosphorus.

The September 2006 issue of *Nutrition Today*, states that mushrooms are approximately 92% water by weight, which contributes to mushrooms' very low energy density rating. Low energy-dense foods help people feel full on fewer calories. Thus, mushrooms can be a delicious and filling food for those watching their weight, cholesterol, blood glucose or blood pressure. (Please see page four for more information on the nutritional profiles of mushrooms.)

Antioxidants in Mushrooms

Despite the nutrients found in mushrooms, the focus on antioxidants in brightly colored fruits and vegetables has unintentionally left mushrooms in the dark. Penn State University researchers have unveiled a body of evidence that suggests mushrooms provide more antioxidants than commonly thought. A study published in the December 2006 issue of the *International Journal of Medicinal Mushrooms* found that a serving of white, Portabella, or crimini (brown) mushrooms contain 2.8-4.9 mg of the antioxidant L-ergothioneine.

Research presented at the 2006 Institute of Food Technologist Conference looked at L-ergothioneine and polyphenols in mushrooms and found that the antioxidant capacity of White button mushrooms, based on the ORAC assay score, is comparable to that of colorful vegetables such as tomatoes, green peppers, pumpkin, and carrots. It also found that the antioxidant capacities of crimini and Portabella mushrooms are comparable to that of green beans,

red peppers and broccoli. While more research is needed on the antioxidant components of mushrooms, this research is just the beginning of what is sure to be an exciting journey into a fuller understanding of mushrooms' role in health.



Sources:

- USDA Nutrient Database. Release 19. 2006. www.ars.usda.gov/ba/bhnrc/nrl
- Feeney, MJ. Mushrooms- Intake, Composition, and Research. *Nutr Today*. 2006. 219-226.
- Dubost, NJ, et al. Identification and Quantification of Ergothioneine in Cultivated Mushrooms by Liquid Chromatography-Mass Spectroscopy. *Int J Med Mushrooms*. 2006. 215-222.
- Brummel MC, et al. Ergothioneine in foods and human erythrocytes. *FASEB*. 1993. (7) A741-A741.
- Dubost, NJ, et al. Quantification of Polyphenol and Ergothioneine in Cultivated Mushrooms and Correlation to Total Antioxidant Capacity Using ORAC and HORAC Assays. Presented at the Institute of Food Technologist Meeting. June 2006.

WHAT THE SCIENCE SAYS ABOUT MUSHROOMS

Antioxidants

•Dubost, NJ, et al. Identification and quantification of ergothioneine in cultivated mushrooms by liquid chromatography-mass spectroscopy. *Int J of Med Mushrooms*. 2006. 8, 215-22. <http://tinyurl.com/264nrg>

•Miller, HE, et al. Antioxidant content of whole grain breakfast cereals, fruits and vegetables. *JACN*. 2000. 19(3), 312S-95S. <http://tinyurl.com/2yrfqh>

Cancer

•Chen, S, et al. Anti-aromatase activity of phytochemicals in white button mushrooms. *Cancer Res*. 2006. 66(24), 12026-34. <http://tinyurl.com/22nlmz>

•Chen, S, et al. Chemopreventive properties of mushrooms against breast cancer and prostate cancer. *Int J of Med Mushrooms*. 2005. 7(3), 342-3. <http://tinyurl.com/yhrpyh>

Lipid Control

•Bradley, P, et al. Blood lipid responses to consumption of two different very low carbohydrate diets versus a lower fat diet. *Exp Bio* 2006. San Francisco, CA. Abstract #109.4. <http://www.faseb.org/>

•Petrisko, Y, et al. Postprandial serum triglyceride responses following four weeks of consuming two different very low carbohydrate diets versus a lower fat diet. *Exp Bio* 2006. San Francisco, CA. Abstract #109.5. <http://www.faseb.org/>

Nutrient Composition

•USDA National Nutrient Database for Standard Reference. Release 19. 2006. <http://www.ars.usda.gov/nutrientdata>

•Dikeman, CL, et al. Effects of stage of maturity and cooking on the chemical composition of select mushroom varieties. *J of Agric and Food Chem*. 2005. 1130-8. <http://tinyurl.com/yulty6>

Vitamin D

•Calvo, MS, et al. Optimizing vitamin D intake for populations with special needs. *J of Nutr*. 2006. 136(4), 1135-39. <http://tinyurl.com/yut5ov>

Weight Management

•Kloss, R, et al. Body weight and composition changes after consumption of two different very low carbohydrate diets versus a lower fat diet. *Exp Bio* 2006. San Francisco, CA. Abstract #267.8. <http://www.faseb.org/>

* tinyurl.com converts long links into shorter links that are easy to type. Enter the tinyurl.com link in your browser to be directed to the host site.



Unveiling How to Buy and Prepare Mushrooms



SELECTION Look for firm mushrooms with a fresh, smooth and flawless complexion. The surfaces should be dry, but not dried out, and appear plump. The veil under the cap actually reveals a lot about flavor. A closed veil under the cap mushroom indicates a delicate flavor; while an open veil and exposed gills result in a richer flavor.

STORAGE How mushrooms are stored is an important part of maximizing freshness and flavor. Remember these key points:

- Mushrooms keep for up to a week in the refrigerator.
- Keep mushrooms in original packaging until ready to use.
- Once opened, store mushrooms in a brown paper bag.
- Fresh mushrooms should never be frozen, but frozen sautéed mushrooms will keep for up to a month.

CLEANING Gently wipe mushrooms with a damp paper towel or a soft brush. Another option is to quickly rinse them with cold water just before use; and pat dry.

TRIMMING The stems of white, crimini and portabella mushrooms are edible and typically need only a little trimming at the ends. Shiitake and oyster mushroom stems tend to be tough and should be removed before cooking.

Try these tips to add flavor and nutrition to your meals:

Slice and sauté **white button** mushrooms to top a pizza, toss in pasta or wrap in a quesadilla.

Combine the earthy flavor and hearty textured **crimini** mushrooms with beef, poultry or veggie dishes.

Marinate and grill meaty **Portabellas** and serve on a bun for a unique veggie burger experience.

For added crunch and eye appeal jazz up sandwiches or soups with **enoki** mushrooms.

Heat **shiitakes** and add to everything from vegetable to meat-based dishes to illuminate the unique richness and texture of this mushroom variety.

Success with Shrooms

Sautéing is an easy way to cook whole, sliced or chopped mushrooms.

1. Brush pan with oil or butter, and heat on high
2. Add a single layer of mushrooms; turn once mushrooms become reddish brown on one side.
3. Cook until the other side turns the same color, remove from heat and season to taste.

Microwaving is a quick method to prepare mushrooms without any added fat.

1. Place eight ounces of thickly sliced mushrooms in a microwavable bowl.
2. Cover and cook on 100% power for two to three minutes.

Grilling and Broiling is preferable for larger capped mushrooms, like Portabellas and shiitakes.

1. Lightly brush mushrooms with oil to keep them moist.
2. Season with salt and pepper.
3. Grill or broil 4 to 6 inches from heat source for 4 to 6 minutes on each side.

Roasting is a terrific way to bring out the savory flavor of mushrooms.

1. Preheat oven to 450°.
2. Brush mushrooms with oil and place on a shallow baking sheet. Use about one tablespoon of oil for eight ounces of mushrooms
3. Roast for about 20 minutes until brown; stir occasionally.

Visit www.mushroominfo.com for more information on mushroom usage ideas and recipes.



Popular Mushroom Varieties

White Button



White

The most popular mushroom. In fact, they represent about 90 percent of mushrooms consumed in the United States.

Flavor

They have a fairly mild taste and blend well with almost anything. Their flavor intensifies when cooked.

Preparation

They can be sautéed or cooked any way or enjoyed raw in salads.

Uses

Try them sliced and sautéed on pizza, in pasta, quesadillas or cheeseburgers.

**Crimini
Cremini**



Crimini

Baby portabellas, similar in appearance to whites, but have a light tan to rich brown cap and a firmer texture.

Flavor

They have a deeper, earthier flavor than whites.

Preparation

Sauté, broil, microwave or cook almost any way.

Uses

Their hearty, full-bodied taste makes them an excellent addition to beef, wild game and vegetable dishes.

**Portabella
Portobello**



Portabella

A larger relative of crimini. They have tan or brown caps and measure up to 6 inches in diameter.

Flavor

They have a deep, meat-like texture and flavor.

Preparation

They can be grilled, broiled or roasted and served as appetizers, entrees or side dishes.

Uses

Their hearty taste and texture makes them a flavorful vegetarian alternative – grill and serve them as "burgers" on toasted buns.

Oyster



Oyster

Can be gray, pale yellow or even blue, with a velvety texture.

Flavor

Oysters have a very delicate flavor.

Preparation

Sauté with butter and onions to bring out their flavor.

Uses

Try over linguine with sliced steak and red peppers, sprinkled with grated Parmesan cheese.

Maitake



Maitake

Appear rippling and fan-shaped, without caps. They are also called "Hen of the Woods"

Flavor

Maitake have a distinctive aroma and a rich, woody taste.

Preparation

Sauté lightly in butter or oil.

Uses

For a richer taste in any recipe calling for mushrooms, use maitakes. They can be a main dish ingredient, or used in side dishes and soups.

Shiitake



Shiitake

Tan to dark brown and have broad, umbrella-shaped caps, wide open veils, tan gills, and curved stems that should be removed. They have a meaty texture.

Flavor

They are rich and woody when cooked.

Preparation

Taste best when cooked.

Uses

They add a meaty flavor and texture to stir-fry, pastas, soups, entrees and sides.

Enoki

Tiny, button-shaped caps and long spindly stems.

Flavor

They are mild tasting and crunchy.

Preparation

Before using, trim roots at cluster base. Separate stems before serving.

Uses

Try them raw in salads and sandwiches. Or use them as an ingredient in soups, such as a stock made with soy sauce and tofu.

Mushrooms' Nutritional Treasure

Nutrient ^{1,2,3}	White	Crimini	Portabella	Enoki	Oyster	Maitake	Shiitake
Calories	18	23	22	37	29	31	37
Fat gm (% Daily Value)	0.3 (1%)	0.1 (0%)	0.2 (0%)	0.3 (1%)	0.3 (1%)	0.2 (0%)	0.3 (1%)
Total Carbohydrate gm (% Daily Value)	2.8 (1%)	3.5 (1%)	4.3 (1%)	6.4 (2%)	5.4 (2%)	5.7 (2%)	6 (2%)
Total Fiber gm (% Daily Value)	0.8 (3%)	0.5 (2%)	1.3 (5%)	2.3 (9%)	1.9 (8%)	2.3 (9%)	2.8 (11%)
Protein gm (% Daily Value)	2.6 (5%)	2.1 (4%)	2.1 (4%)	2.1 (4%)	2.8 (6%)	1.6 (3%)	2.7 (5%)
Sodium mg (% Daily Value)	4 (0%)	5 (0%)	5 (0%)	3 (0%)	15 (0%)	1 (0%)	4 (0%)
Riboflavin mg (% Daily Value)	0.3 (18%)	0.4 (24%)	0.4 (24%)	0.1 (6%)	0.3 (18%)	0.2 (12%)	0.2 (12%)
Niacin mg (% Daily Value)	3 (15%)	3.2 (16%)	3.8 (19%)	4.9 (25%)	4.2 (21%)	5.5 (28%)	3 (15%)
Copper mg (% Daily Value)	0.3 (15%)	0.4 (20%)	0.3 (15%)	0.1 (5%)	0.2 (10%)	0.2 (10%)	0.1 (5%)
Pantothenic Acid mg (% Daily Value)	1.2 (12%)	1.3 (13%)	1.3 (13%)	0.9 (9%)	1.1 (11%)	0.2 (2%)	1.1 (11%)
Selenium µg (mcg) (% Daily Value)	7.8 (11%)	21.8 (31%)	9.2 (13%)	1.8 (3%)	2.2 (3%)	1.8 (3%)	4.9 (7%)
Potassium mg (% Daily Value)	267 (8%)	376 (11%)	407 (12%)	309 (9%)	353 (10%)	171 (5%)	254 (7%)
Thiamin mg (% Daily Value)	0.1 (7%)	0.1 (7%)	0.1 (7%)	0.1 (7%)	0.1 (7%)	0.1 (7%)	0.1 (7%)
Vitamin B6 mg (% Daily Value)	0.1 (5%)	0.1 (5%)	0.1 (5%)	0.1 (5%)	0.1 (5%)	0	0.1 (5%)
Vitamin D IU (% Daily Value)	15 (4%)	No data	No data	No data	No data	No data	No data
Folate µg (mcg) (% Daily Value)	13 (3%)	12 (3%)	18 (5%)	44 (11%)	23 (6%)	24 (6%)	11 (3%)
Magnesium mg (% Daily Value)	8 (2%)	8 (2%)	9 (2%)	13 (3%)	15 (4%)	8 (2%)	15 (4%)
Zinc mg (% Daily Value)	0.4 (3%)	0.9 (6%)	0.5 (3%)	0.5 (3%)	0.6 (4%)	0.6 (4%)	0.7 (5%)
Iron mg (% Daily Value)	0.4 (2%)	0.3 (2%)	0.5 (3%)	0.9 (5%)	1.1 (6%)	0.2 (1%)	0.4 (2%)

1. U.S. Department of Agriculture. Agriculture Research Service 2006. USDA National Nutrient Database for Standard Reference. Release 19. www.ars.usda.gov/nutrientdata. See Web site for complete nutritional data and for nutrient data for mushrooms in a cooked state. USDA values are not for labeling purposes. Nutrition Facts label declarations by individual brands may vary.
2. Based on FDA reference serving size of 84 grams for raw mushrooms. Shiitake values are based on a ½ cup cooked serving.
3. Based on the reference serving amount. 10-19% of the Daily Value (% DV) is a "good source" of the nutrient. 20% or more of the Daily Value is a "high, rich in or excellent source" of the nutrient.

*Not a significant source of saturated fat, trans fat, cholesterol, sugars, vitamin A and calcium.