

E-MAZING

News About Mushrooms

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What the Science Says: Mushrooms & Immunity

Ask anyone for foods or beverages they believe help boost the body's defenses, and you're likely to hear replies including chicken soup, orange juice and tea. Yet, one food is rising above the folklore with some preliminary scientific footing supporting its role in maintaining a healthy immune system: the mushroom.¹

Recent studies out of the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University have explored mushrooms' ability to enhance the body's immune response.

One study, published in 2008, examined the effect of supplementing cells with white button mushrooms, at varying doses, on the maturation of bone marrow derived dendritic cells in mice. Results indicated that mushroom supplementation increased the expression of maturation markers, dependent on the dose, and enhanced their antigen-presenting functions. The effects have the potential to boost both inherent and T cell-mediated immunity, which may lead to a more efficient surveillance and defense mechanism against microbial invasion and tumor development.¹

The same investigative team previously studied the effects of white button mushrooms on enhancing natural killer cell activity and other markers of immune function. The lead investigator Dayong Wu, M.D., Ph.D., Nutritional Immunology Laboratory, fed mice diets supplemented with white button mushrooms at varying levels and examined measures of in-born and cell-mediated immunity. Results suggested that white button mushroom intake may potentially increase the body's inherent immunity to viral infections and tumors by enhancing natural killer cell activity, which is associated with higher levels of interferon-gamma and tumor necrosis factor, two cytokines (immune cell-secreted protein molecules) important for natural killer cell activity as well as in-born immunity in general.²

Given the important role of immunity in defense against microbial invasion, viral infection and tumors, the Tufts investigators maintain a high degree of interest in mushrooms. According to Dr. Wu, "Mushrooms have long been suggested to have immuno-stimulatory properties. However, little is known about the effect of dietary intake of white button mushrooms, which represent 90 percent of the mushrooms consumed in the U.S., on immune function." Dr. Wu's team continues to follow up their preliminary findings with additional mushroom studies using animal models to advance knowledge in this area.



Sauté 1-2-3

Even novice cooks can achieve that coveted reddish color in sautéed mushrooms—the secret is leaving the 'shrooms alone.

1. Brush pan lightly with oil and heat on high.
2. Add a single layer of mushrooms; turn once mushrooms become reddish brown on one side (after a few minutes).
3. Cook until the other side turns the same color, remove from heat.

Usage idea: Add to an omelet or breakfast burrito

Tasteful Treasure

Making turkey soup this holiday season? Toss mushrooms into your family's favorite turkey soup recipe or try this one to savor post-holiday flavors or warm your heart and soul any day of the year.

Turkey Mushroom Soup



Preparation Time: 10 minutes
Cooking Time: 35 minutes
Serves: 8

- 1 tablespoon olive oil
- 8 ounces white button mushrooms, quartered
- 1 cup chopped onion (about 1 large onion)
- 1 tablespoon finely minced garlic (about 3 cloves)
- 3/4 cup chopped celery (about 3 stalks)
- 8 cups low-sodium turkey stock (or store bought chicken broth)
- 8 ounces (about 2 cups) cooked turkey (or chicken), removed from the bone and shredded
- 2 fresh sage leaves, finely chopped
- 1 15-ounce can cannellini beans, drained and rinsed
- 2 cups packed fresh baby spinach (a large handful)
- 1 tablespoon fresh-squeezed lemon juice
- 1 teaspoon salt
- 1/4 teaspoon freshly ground pepper

Heat oil in a Dutch oven over medium heat. Add a single layer of mushrooms and cook, without stirring, for about 5 minutes or until mushrooms become red-brown on one side. Add onions, garlic and celery and sauté until translucent, about 5 more minutes. Add turkey stock (see recipe below) or chicken broth, turkey and sage. Cover and simmer over medium-low heat for 20 minutes.

Add rinsed beans, spinach, lemon juice, salt and pepper. Bring to a boil to wilt spinach and serve hot.

To make turkey stock: Place turkey bones in a large stock pot and cover with cold water. Add 1 quartered onion, 2 coarsely chopped stalks of celery, 1 coarsely chopped carrot, 1 bay leaf and 2 sage leaves. Bring to a boil, reduce heat to a low simmer and cook 2 or more hours. Strain and skim fat from top and store stock for future use.

Each serving provides: 120 Calories, 3g fat, 1g saturated fat (5% DV), 30mg cholesterol (10% Daily Value), 16 g carbohydrate (13% DV), 3g dietary fiber (12% Daily Value), 16g protein (33% Daily Value), 530mg sodium (22% Daily Value), 450 mg potassium (15% DV), 5 IU/1% Daily Value for vitamin D, 15% Daily Value for iron, 6% Daily Value for vitamin C, 6% Daily Value for vitamin A, 6% Daily Value for calcium, 13 mcg selenium (20% DV)

Grill and Broil

These techniques are best reserved for larger capped mushrooms, like Portabellas.

1. Lightly brush caps and stems with oil to keep them moist; season as desired.
2. Grill or broil 4 to 6 inches from heat source for 4 to 6 minutes on each side, brushing once or twice.

Tip: Make these savory mushrooms the "main stage" of the meal.

Roast for Flavor

Roasting mushrooms is perfect technique for multitasking cooks.

1. Preheat oven to 450 degrees.
2. Brush mushrooms with oil, using about 1of oil for each 8 oz. of mushrooms.
3. Place mushrooms on a shallow baking pan in oven, stirring occasionally until brown, about 20 minutes.

Tip: Turn your attention to something (or someone) else!

Steam in the microwave

Microwaved mushrooms can freshen up lunchtime meals enjoyed at work or home.

1. Place 8 ounces of sliced mushrooms in a microwaveable bowl.
2. Cover and cook on 100% power for 2-3 minutes.

Tip: Toss onto a hot sandwich, chili, soup or packaged meal.



Mushrooms' Immunity Treasures

Since the science on mushrooms and immunity is evolving, it's important to recognize mushrooms as a scientifically-proven, nutrient-rich food. Mushrooms offer a variety of nutrients associated with immunity:

- **Antioxidant capacity** - A focus on the antioxidant capacity of brightly colored fruits and vegetables has unintentionally left nutrient-dense mushrooms in the dark. The truth is mushrooms' antioxidant capacity is comparable to that of brightly colored vegetables. For example, the antioxidant capacity of white mushrooms is comparable to that of tomatoes, green peppers, pumpkin, zucchini and carrots.³ Similarly, the antioxidant capacity of brown (crimini) and Portabella mushrooms is comparable to the antioxidant capacity of green beans, red peppers and broccoli.³
- **Selenium** - White button mushrooms, Portabella or crimini mushrooms make up the leading source of the antioxidant selenium in the fruit and vegetable category⁴ with 8-22 mcg per serving. Selenium is a mineral that is incorporated into proteins to make selenoproteins, which are important antioxidant enzymes. In turn, selenoproteins help regulate thyroid function and have a role in the immune system.⁵
- **Ergothioneine** - White button mushrooms, Portabella or crimini mushrooms also contain ergothioneine in varying amounts (2.8-4.9 mg). Ergothioneine is a naturally occurring antioxidant that may help protect the body's cells from damage.³
- **Vitamin D** - Mushrooms also contain 4 percent of the Daily Value of Vitamin D-no other fresh vegetable or fruit has it.^{4,6} Vitamin D has many roles for overall health, among them is regulation of immune function and reduction of inflammation.⁷

The latest science is just beginning to further our knowledge about mushrooms' role in the body's immune systems. While more wisdom will continue to unfold, mushrooms are deservedly nature's hidden treasure as an everyday, every way food to include in meals any time throughout the year.

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