



# Mushrooms and Health Global Initiative Bulletin

*“An ISMS Global Initiative”*

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### **How the Initiative’s Bulletin “works” - Mary Jo Feeney**

Helen Cordes who writes on advantages of eating locally grown mushrooms for *Edible Austin* (Austin, Texas) recently contacted the *Bulletin* editor: “I saw your name associated with research on health benefits of mushrooms. This led me to the newsletter, which I found to be a useful source for much of the recent studies - particularly those funded by the Mushroom Council - on those health benefits. I think our readers will be surprised to know how mushrooms stack up compared to other vegetables, and about the research emerging concerning immunity, cancer prevention, antioxidants, Vitamin D. So I sought you out to get the overview and additional detail on those studies.”

I was delighted to talk with Ms. Cordes about mushroom nutrition and health - because this demonstrates how the Initiative works. As Greg Seymour wrote in the May *Bulletin*: “That’s what the Mushrooms and Health Global Initiative is all about – spreading the word about mushrooms and health to as many people as we can, as often as we can! If we want the messages repeated regularly then we need to take advantage of every chance that comes our way to do it.”

The interview will appear in the August issue of *Edible Austin*, a magazine that focuses on healthy, sustainable eating in the Austin and central area of Texas. *Edible Austin* is part of 40 some *Edible Communities* food magazines across the United States. Visit the following Websites for more information:

<http://www.edibleaustin.com/content/index.php> and  
<http://www.ediblecommunities.com/content/>.

### Research of interest



Koyyalamudi SR, Leong SG, Cho KY, Pang G. "Vitamin B12 is the active corrinoid produced in cultivated white button mushrooms (*Agaricus bisporus*)."  
*J. Agric. Food Chem.* 2009. DOI: 10.1021/jf9010966.

<http://pubs.acs.org/doi/abs/10.1021/jf9010966>.

According to the abstract, this study analyzed vitamin B12 in freshly harvested white button mushrooms (*Agaricus bisporus*) from five farms using affinity chromatography and HPLC-ESI-MS techniques. The vitamin B12 concentrations obtained varied from farm to farm, with higher concentrations of vitamin B12 detected in outer peel than in cap, stalk, or flesh. This suggested that the vitamin B12 is probably bacteria-derived. High concentrations of vitamin B12 were also detected in the flush mushrooms including cups and flats. HPLC and mass spectrometry showed vitamin B12 retention time and mass spectra identical to those of the standard vitamin B12 and those of food products including beef, beef liver, salmon, egg, and milk. but not of the pseudovitamin B12, an inactive corrinoid in humans. The results suggest that the consumer may benefit from the consumption of mushroom to increase intake of this vitamin in the diet.



Lee GS, Byun HS, Yoon KH, Lee JS, Choi KC, and Jeung EB. "Dietary calcium and vitamin D2 supplementation with enhanced *Lentinula edodes* improves osteoporosis-like symptoms and induces duodenal and renal active calcium transport gene expression in mice." *European Journal of Nutrition* 2009, 48:2; 75-83. <http://www.springerlink.com/content/27121018123w20v6/>

According to the abstract, the two main sources of vitamin D3 are de novo synthesis through exposure to ultraviolet (UV) light from the sun, and diet. Vitamin D3 deficiency causes rickets or osteoporosis. Oak mushrooms (*Lentinula edodes*) that are exposed to UV radiation contain enhanced vitamin D2 and have much higher calcium content than unmodified (non-irradiated) mushrooms. These modified edible mushrooms have been proposed as a natural alternative source of dietary vitamin D.

The researchers examined whether modified oak mushrooms could improve or prevent osteoporosis-like symptoms in mice fed with low calcium and vitamin D3-deficient diet. Four-week-old male mice were fed low calcium, vitamin D3-deficient diets supplemented with 5, 10, or 20% unmodified, calcium-enhanced, or calcium plus vitamin D2-enhanced oak mushrooms for 4 weeks. To assess the effects of the supplemented diets, the authors evaluated femur density and length, bone histology, the expression of active calcium transport genes, and serum calcium levels. Mice fed with low calcium and vitamin D3-deficient diet developed osteoporosis-like symptoms within 4 weeks. Femur density and tibia thickness were significantly higher in mice fed calcium plus vitamin D2-enhanced mushrooms, and the expression of duodenal and renal calcium transport genes was significantly induced.

The results indicate that in mice, vitamin D2 and/or calcium derived from irradiated oak mushrooms may improve bone mineralization through a direct effect on the bone, and by inducing the expression of calcium-absorbing genes in the duodenum

and kidney. (Editor's note: The calcium-enhanced oak mushrooms were generated by adding 5.2% eggshell as a calcium source to sawdust source media.)



Oing YC, Alarcon S, Tharp A, Ahmed OS, Estrella NL, Greene T, Rucker J and Breslin P. "Perceptual variation in umami taste and polymorphism in TAS1R taste receptor genes." *American Journal of Clinical Nutrition* 2009 90 (suppl) 1S010S. doi: 10.3945/ajcn.2009.27462N.  
<http://www.ajcn.org/cgi/content/abstract/ajcn.2009.27462Nv1>.

According to the introduction, sweet, sour, salty, bitter, and umami constitute the predominant taste qualities that humans perceive. Glutamate, the prototypical umami stimulus, is found in many protein-rich foods, such as meats, cheeses, wines, and certain fruits and vegetables (green peas, tomatoes, and mushrooms), and sometimes is added directly to selected cuisines as a flavor enhancer. The results of this study help strengthen the understanding of taste preferences and suggest that variations in the genes that code for certain proteins correspond to individual variation to the perceived intensity of the umami taste.

### ***Mushroom publicity around the globe***



#### ***Australia: What is a superfood? Glenn Cardwell***

A favourite topic for newspapers and magazines is to provide a list of "superfoods" and why each food has made their top 10. Sadly, the mushroom rarely makes the list, while various herbs, spices and expensive seasonal fruit are featured. If a food is rarely used or only affordable to a few people, it is difficult to see it being a useful "superfood".

I asked four prominent Australian dietitians how they would define a superfood as there had been no previous formal attempt at a definition. This generated a lot of discussion, and no real broad agreement. One dietitian stated that the term "superfood" should be banned as no single food was essential, nor could it alone prevent disease. While that is true, there are still foods that punch well above their weight, and I think the mushroom is one of them.

Based on my discussion with these dietitians, I suggest that if there were a formal definition, a superfood might have the following characteristics:

- Be minimally processed without nutrient enriching
- Have nutritional benefits not seen in other foods commonly eaten in its class
- Have at least 20% of the recommended daily intake (RDI) of two or more essential nutrients in a normal serve (serving)
- Have a high nutrient density compared to its kilojoule (calorie) content
- Provide essential nutrients without increasing the consumption of sodium, saturated fat or other compounds linked to poor health
- Provide other bioactive compounds such as antioxidants
- Have research linking the food to a potential reduced risk of long-term disease
- Be easily available and affordable

Judging against these characteristics, it is indisputable that the mushroom is quite an exceptional food! The mushroom is:

- A popular and frequently consumed fresh produce item
- Very different to vegetables because it
  - provides nutrients in amounts not usually found in vegetables; and
  - has a different flavour to vegetables (often referred to as the “5th taste” or “umami”)
- A serve provides more than 20% of the RDI for six essential nutrients: riboflavin, niacin, pantothenic acid, biotin, copper and selenium
- Low in kilojoules, with a high nutrient density
- Provides good nutrition without adding fat, cholesterol or sodium to the meal
- Has an antioxidant capacity similar to, or better than, common vegetables
- Provides bioactive compounds that appear to improve immune function and potentially lower the risk of breast and prostate cancer
- Is as close as your supermarket or greengrocer, and less than \$1 per serve in Australia (approx \$US0.80, £0.50, €0.60). Note: A serve of mushrooms in Australia is 100g, about three button mushrooms.

Whenever we see an article with a list of “superfoods” that doesn’t include the mushroom, I write to the author or publication to state our case. It may be a long journey to swing opinion and improve knowledge of the mushroom, but we are prepared for it.

### ***Mushroom breakfast at dietitians conference: Big success - Glenn Cardwell***

As part of the Australian mushroom industry’s program to alert health professionals to the health benefits of the mushroom, they sponsored a Mushroom Breakfast at the annual Dietitians Association of Australia conference held in May in Darwin, northern Australia.



On arrival, delegates received a barbequed mushroom appetizer prepared on-site by chef Fast Ed, who is well-known through his cooking segments on the popular Better Homes and Gardens TV show. Everyone then sat down to a hot breakfast featuring the mushroom and listened to Dr Manny Noakes, one of the authors of the mushroom and health report from the CSIRO Food and Nutritional Sciences group based in

Victoria (the CSIRO is Australia’s premier scientific research body).

Dr Noakes spoke of the nutritional depth and range of the mushroom, informing dietitians that as the mushroom was so flavoursome it reduced the need for added

salt in recipes. As the dietitian with the mushroom industry, I gave an update on the recent international research on the mushroom, making specific reference to the vitamins B12 and D in mushrooms, two vitamins not normally associated with non-animal foods.

There was some very positive feedback from the dietitians. “The breakfast was an absolute delight in all aspects. “A stunning location, delicious food, great recipe ideas and entertainment from Fast Ed” said Nicole Senior, Accredited Practising Dietitian (APD).

“The mushroom industry should be congratulated on their commitment to nutrition research and its communication. The gravity of the findings presented rivaled that of the scientific program and should have the nutrition community re-writing the nutrition textbooks” added Nicole.

Dr Therese O’Sullivan APD also enjoyed the breakfast. “I learned a lot. I now know that mushrooms do have bioavailable B12 (See Research of Interest) and I found it very interesting that mushrooms exposed to sunlight generate a lot more vitamin D” she said.

A printed Mushroom and Health brochure, specifically written for dietitians, was given to each delegate at the breakfast. The information provided can be found at [http://www.mushroomsforlife.net/scientific\\_facts.html](http://www.mushroomsforlife.net/scientific_facts.html). Unexpectedly, this brochure became in demand from those who weren’t at the breakfast. For fun and education, dietitians were asked to complete a mushroom quiz and also guess the weight of the mushrooms in a bowl at the entrance. The quiz was a reminder that the mushroom wasn’t a plant and therefore had nutritional attributes not found in plants, such as the vitamins B12 and D.

We asked dietitians to guess the weight of mushrooms as most people underestimate mushroom weight by around one third - for example, 400g of mushrooms is thought to weigh 600g. We emphasised that only one flat mushroom or three button mushrooms was a serve (about 100g).



To make the Mushroom Breakfast even more memorable, it was held outside overlooking the harbour, just after sunrise with a temperature of 25°C (77°F), instead of being in a windowless meeting room where another breakfast was held. The Mushroom Breakfast was the most popular breakfast, with the most fun, in an enjoyable environment for learning about the nutritional benefits of the mushroom.



### ***United States: Promoting mushrooms in U.S. foodservice – Heidi Gengler***

In the last year, the U.S. Mushroom Council completed promotional campaigns in restaurants. The Mushroom Council partnered with Applebee's, the United States' largest casual dining chain. In total, 378 restaurants participated in a Server Incentive Program, in which Applebee's servers suggested customers add mushrooms to steaks and other entrées and the server who was able to sell the most mushrooms received a gift card. The Mushroom Council provided servers with tip sheets with mushroom fun facts and "pick-up" lines to use with customers. The promotion reached more than 2.4 million customers and increased overall mushroom topper sales by 49.2%. Also, the Mushroom Council partnered with Moe's Southwest Grill, for a three-month-long promotion of their Phil E. burrito and quesadilla with mushrooms. Moe's launched a nationwide mobile campaign in which guests sent a text message to Moe's to receive a coupon for a Phil E. mushroom burrito. As a result, approximately 10,000 guests signed up.

The Mushroom Council participated in a number of conferences and events, strategically targeting an array of segments in the foodservice industry. For example, in June, the Mushroom Council convened a group of growers, distributors and representatives from independent, chain and university segments of the foodservice industry to increase awareness and excitement for mushrooms. The event, held at a restaurant in Dallas, Texas, drew 33 representatives from foodservice organizations, including Pizza Hut, Sysco, Maggiano's Little Italy and Boston's Gourmet Pizza. Attendees were most interested in mushroom nutrition and culinary uses and enjoyed a cooking demonstration and tasting of three mushroom dishes. The event also gave attendees a valuable networking opportunity. At other events, the Council educated foodservice professionals on vegetarian cuisine and distributed a sell sheet about [mushrooms in vegetarian cuisine](#).

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#### ***Initiative project team***

- Greg Seymour, President, ISMS General Manager AMGA, Australia; Manager, Mushrooms and Health Global Initiative
- Bart Minor, President, Mushroom Council, United States
- John Collier, Group Research and Development Manager, Monaghan Mushrooms Ltd, Republic of Ireland
- Mary Jo Feeney, Mushrooms and Health Global Initiative Operations Manager, Bulletin Editor, United States
- Glenn Cardwell, Accredited Practising Dietitian, Nutrition Impact P/L, Australia
- Chris Rowley, Communications Consultant, Australia
- Heidi Gengler, Vice President, Edelman Public Relations, United States

#### ***Strategic communications group***

Members of the Strategic Communications Group strengthen the Initiative's communication capability and develop a local public relations presence in each country whose industry is contributing financially to the project. Members of this group help facilitate stories about mushrooms and health appearing in their local media, monitor mushroom nutrition and health research, liaison with scientists,

media and other influencers, and provide feedback to the Initiative. They include

- Wendy Akers – United Kingdom/Ireland
- Franz Schmaus – Germany
- Francois Marche – France
- Ignace Deroo, Evy Detroch – Belgium
- Jose Antonio Jimenez Hernandez – Spain
- Kent Stenvang – Denmark