



MUSHROOMS AND HEALTH GLOBAL INITIATIVE BULLETIN

An ISMS Global Initiative to increase the worldwide consumption of mushrooms through the collection, evaluation and dissemination of scientifically validated information.

AUGUST 2012 ISSUE #19

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Mushrooms get social

Australia

- Power of Mushrooms website
- My Mushrooms blog
- Mighty Mushroom Twitter
- Mushroom Lovers Club Facebook
- Power of Mushrooms YouTube

Canada

- Mushrooms Canada website
- Mushrooms Canada blog
- Mushrooms Canada Twitter
- Mushrooms Canada Facebook
- Mushrooms Canada Pinterest
- Mushrooms Canada YouTube

Netherlands

- Champignonidee website
- Champignonidee Twitter
- Champignonidee Facebook
- Champignonidee Pinterest
- Champignonidee YouTube
- Champignonidee Google+

South Africa

- SAMFA website
- Fresh Mushrooms Twitter

Spain

- CTICH website
- Champinonidea website
- Asochamprioja Twitter
- Asoc Prof Cultivadores Champiñon de La Rioja, Navarra y Aragon Facebook
- Asochamprioja YouTube
- ASOC.PROF.CULT Champiñón DE LA RIOJA Google+

United Kingdom & Ireland

- More to Mushrooms website
- More to Mushrooms Twitter
- More to Mushrooms Facebook

United States

- Mushroom Info website
- The Mushroom Channel blog
- Mushroom Channel Twitter
- Mushroom Channel Facebook
- Fresh Mushrooms Pinterest

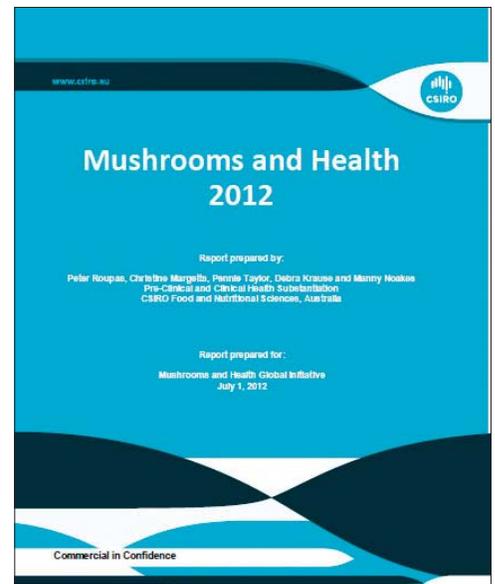
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News from the Initiative - Mary Jo Feeney

► Mushrooms and Health Report 2012

The CSIRO Food and Nutritional Sciences team of Peter Roupas, Christine Margetts, Pennie Taylor, Debra Krause and Manny Noakes have completed the 2012 update to the *Mushrooms and Health Report*. Project leader Dr. Roupas noted a very significant increase in the number of human trials undertaken that provide a higher level of evidence than animal or *in vitro* studies. The report includes nutritional profiles for over 100 mushroom varieties. New areas of research include exercise performance studies, oral/dental and reproductive health. The report will be posted on the website, so be sure to check: www.mushroomsandhealth.com.



The Mushrooms and Health Report is the crown jewel of the Initiative and is the scientific anchor on which communications efforts are based.

Mushroom Research

► Mushrooms' role in health

Roupas P, Keogh J, Noakes M, Margetts C and Taylor P. [The role of edible mushrooms in health: Evaluation of the evidence](#). *Journal of Functional Foods* 2012. Available online May 26.

This review summarizes the current knowledge on edible mushrooms and their components on health outcomes, with a focus on the evaluation of the evidence from human trials. Trials to date indicate that mushrooms and their extracts are

generally well-tolerated with few, if any, side-effects. Immunomodulating and anti-tumor effects of mushrooms and their extracts appear to hold potential health benefits. These benefits are primarily due to their polysaccharide content, either in the form of beta-glucans or polysaccharide-protein complexes, which appear to exert their anti-tumorigenic effects by enhancement of cellular immunity via effects on the balance of T helper cell populations and induction of certain interleukins and interferon (IFN)- γ . The most promising data are those indicating an inverse relationship between mushroom consumption and breast cancer risk.

These abstracts report on a range of topics on mushrooms' role in health.

► **Mushrooms as anti-cancer therapeutics**

Patel S, Goyal A. [Recent developments in mushrooms as anti-cancer therapeutics: a review](#) *3 Biotech* Volume 2, Number 1 (2012), 1-15, DOI: 10.1007/s13205-011-0036-2. This is an Open Access article.

The present review updates the recent findings on the pharmacologically active compounds, their anti-tumor potential and underlying mechanism of biological action in order to raise awareness for further investigations to develop cancer therapeutics from mushrooms. The chief medicinal uses of mushrooms discovered so far are as anti-oxidant, anti-diabetic, hypocholesterolemic, anti-tumor, anti-cancer, immunomodulatory, anti-allergic, nephroprotective, and anti-microbial agents. The mushrooms credited with success against cancer belong to the genus *Phellinus*, *Pleurotus*, *Agaricus*, *Ganoderma*, *Clitocybe*, *Antrodia*, *Trametes*, *Cordyceps*, *Xerocomus*, *Calvatia*, *Schizophyllum*, *Flammulina*, *Suillus*, *Inonotus*, *Inocybe*, *Funlia*, *Lactarius*, *Albatrellus*, *Russula*, and *Fomes*. The anti-cancer compounds play crucial roles as reactive oxygen species inducer, mitotic kinase inhibitor, anti-mitotic, angiogenesis inhibitor, topoisomerase inhibitor, leading to apoptosis and eventually checking cancer proliferation.

► **Mushrooms - A model for human health**

Chang ST, Wasser SP. [The role of culinary-medicinal mushrooms on human welfare with a pyramid model for human health](#). *Int J Med Mushrooms*. 2012; 14(2): 95-134.

This review presents a pyramid model for mushroom uses (industries), as food, dietary supplements (tonic) and medicine. The sense of purpose and vision for the mushroom industries is also briefly discussed. A variety of mushrooms have been used traditionally in many different cultures for the maintenance of health and in the prevention and treatment of various diseases. A total of 126 medicinal functions are thought to be produced by medicinal mushrooms (MM) and fungi. The review discusses legal and regulatory issues introducing and controlling dietary supplements from MMs in different countries, including the United States, the European Community, Australia, New Zealand, Japan, and P.R. China, and guidelines of the World Health Organization. The present review also draws attention to many critically important unsolved problems in the future development of medicinal mushroom science in the 21st century.

► Effect of Vit. D from mushrooms or supplements on D2 and 25(OH)D levels

Stephensen CB, Zerofsky M, Burnett DJ, Lin Y-P, Hammock BD, Hall LM and McHugh T. [Ergocalciferol from mushrooms or supplements consumed with a standard meal increases 25-hydroxyergocalciferol but decreases 25-hydroxycholecalciferol in the serum of healthy adults.](#) *J. Nutr.* July 1, 2012 vol. 142 no. 7 1246-1252.

This study evaluated the impact of consuming UV-treated white button mushrooms (*Agaricus bisporus*) on the vitamin D status of 38 healthy adults randomized to 4 treatments for 6 weeks: control (C) group received untreated mushrooms providing 0.85 µg/d ergocalciferol; groups M1 and M2 received UV-treated mushrooms providing 8.8 and 17.1 µg/d (362-684 IU) respectively; and the supplement (S) group received purified ergocalciferol plus untreated mushrooms, providing a total of 28.2 µg/d (1120 IU). Serum total 25-hydroxyvitamin D [25(OH)D] and 25-hydroxyergocalciferol [25(OH)D₂] were 83 ± 38 and 2.4 ± 2.0 nmol/L, respectively, at baseline. At wk 6, 25(OH)D₂ had increased and was higher in all treatment groups than in the C group, whereas 25-hydroxycholecalciferol [25(OH)D₃] had decreased and was lower in the M2 and S groups than in the C group. In summary, ergocalciferol was absorbed and metabolized to 25(OH)D₂ but did not affect vitamin D status, because 25(OH)D₃ decreased proportionally. Previous studies with ergocalciferol-containing mushrooms conducted under conditions of low cutaneous cholecalciferol synthesis showed improved vitamin D status. Thus, ergocalciferol intake from mushrooms is beneficial for participants at risk of deficiency but may not improve cholecalciferol status in those with considerable sun exposure resulting in cutaneous synthesis of cholecalciferol.

► Ergosterol-derived photoproducts following pulsed UV exposure

Kalaras MD, Beelman RB, Holick MF and Elias RJ. [Generation of potentially bioactive ergosterol-derived products following pulsed ultraviolet light exposure of mushrooms \(*Agaricus bisporus*\)](#) *Food Chemistry* Volume 135, Issue 2, 15 November 2012, Pages 396–401 Available online 7 May 2012.

This study, for the first time, identified and quantified the ergosterol-derived photoproducts previtamin_{D₂}, lumisterol₂ and tachysterol₂ in white button mushrooms (*Agaricus bisporus*) following treatment with pulsed UV (PUV) light. Mushrooms were treated with up to 60 pulses of PUV irradiation and the formation of major photoproducts was observed to increase as a function of dose. Vitamin D₂ was the most abundant product, followed by previtamin D₂, lumisterol₂ and tachysterol₂ in order of decreasing abundance. Untreated mushroom samples were not observed to contain detectable levels of any photoproduct. This study shows for the first time the production of these photoproducts in UV irradiated mushrooms. A complete understanding of the potential biological significance of these products remains to be seen.

► Influenza infection and immune function in mice

Xu Y, Na L, Ren Z, Xu J, Sun C, Smith D, Meydani S and Wu D. [Effect of dietary supplementation with white button mushrooms on host resistance to influenza infection and immune function in mice.](#) *British Journal of Nutrition* 2012. FirstView Article available online July 11.

These researchers previously demonstrated that mice fed white button mushrooms

(WBM) had enhanced immune functions known to help the body's antiviral defense. This study tested whether WBM protected against viral infection. Young (4 month) and old (22 month) C57BL/6 mice were fed a diet with 0, 2, or 10% WBM powder for 8 weeks prior to infection with influenza Puerto Rico/8/34 (H1N1) and killed at day 0 (uninfected), 2, 5 or 7 days post-infection. The primary outcomes were viral titre and body weight; secondary outcomes were natural killer (NK) cell activity, lymphocyte proliferation and cytokine production. According to the results, WBM did not affect viral titre, nor prevent infection-induced weight loss. WBM supplementation enhanced NK cell activity in old mice and increased interferon (IFN)- γ production in young and old mice under uninfected conditions but had no such effect after infection. The lack of effect on NK activity and concanavalin A-stimulated IFN- γ production after infection may explain the immune system's failure to reduce viral load and weight loss after influenza infection. However, WBM supplementation did induce changes in other aspects of immune response: it significantly increased the production of T-helper type 2 cytokines IL-4 and IL-10 in uninfected mice and pro-inflammatory cytokines IL-1 β and TNF- α in infected mice. These mushroom-induced systemic changes, however, were not adequate to confer a protective effect against influenza infection.



News from Australia - Glenn Cardwell and Chris Rowley

► Nutrition professionals

The Science of Nutrition in Medicine conference in Melbourne attracted 750 delegates, making it the 2nd biggest nutrition conference in Australia after the dietitians' annual conference. Glenn Cardwell had an abstract accepted and got to present on Vitamin D in mushrooms and the potential for its public health benefits. The Australian mushroom industry is going to consider the value of having a booth at the next conference in Sydney 2013.

► Doctors and nurses

The General Practitioner and Practice Nurse Convention and Exhibition was held in Sydney in May. This very popular convention attracts 1,500 doctors and nurses both locally and from the west coast of Australia, all through to New Zealand. Dietitian Glenn Cardwell gave four workshops on "Superdiets & Superfoods" and a short nutrition quiz.

Sue Dodd and her team provided scrumptious tastings of mushrooms for these influential attendees. This was our first opportunity to offer the new brochure detailing the health benefits of mushrooms and the new poster on the 10 reasons why we should all be eating three mushrooms a day. Another Practice Nurse event happened over two days in Perth, Western Australia in mid-July



where Glenn got to present again to the nurses, including the health benefits of mushrooms. The new health professional brochure can be downloaded from here: <http://www.powerofmushrooms.com.au/health-nutrition-s102/health-nutrition-s119/>

The *Power of Mushrooms* campaign was launched successfully in five cities.

► Power of Mushrooms launch

During May, the new *Power of Mushrooms* marketing program was showcased to the media, health professionals, chefs and dietitians in each of the five major cities around Australia. Everyone got to see a video of the mushroom researchers and experts in Australia and the United States explaining their views and research on mushrooms and the potential benefits to humans. The video of eight experts was compiled by Chris Rowley and deemed to be an excellent insight into current mushroom research. The launches were held in movie theatres so people could get the red carpet treatment, watch the video and know they were at the opening of something special. The public marketing of the *Power of Mushrooms* began Australia-wide in July.



The Journey to Discovery video can be viewed here: <http://www.youtube.com/watch?v=nkf0AGxbIAA&feature=plcp>.
A short video of the Sydney launch can be seen here: <http://www.youtube.com/watch?v=CijMh8qKSac&feature=plcp>.

► Vitamin D Mushrooms

Vitamin D Mushrooms were enjoyed at conferences and launches around Australia.

Another mushroom grower started to produce Vitamin D Mushrooms in Australia, making it possible for the mushrooms to be available to everyone who came to the *Power of Mushrooms* launches around Australia.

International Life Sciences Institute

General Manager of the Australian Mushroom Growers, Greg Seymour, was invited to present a paper at the International Life Sciences Institute (ILSI) conference on vitamin D in Melbourne. Three in 10 Australians are low in vitamin D, more during the wintertime. Greg's message was that, if four out of five Australians eat mushrooms, it makes sense that Vitamin D Mushrooms should be consumed regularly, and it is certainly easier than trying to change the Food Standards Code to permit the vitamin D fortification of foods. Vitamin D Mushrooms are convenient, tasty and offer many nutritional benefits other than the potential to reduce vitamin D deficiency in Australia. Each delegate was able to take a punnet of Vitamin D Mushrooms home to cook.





News from Spain - Carmen Urbina Sáenz

► XVI Vegetable gastronomic days

Each year Calahorra's council organizes the vegetable gastronomic days, which occurred from 23rd April to 1st May featuring different events. CTICH (our research and technological centre on mushroom business) and ASOCHAMP (our mushroom growers association) actively participated. On Monday 23rd, at midday the exposition "Mushrooms and Fungi: health source" was inaugurated at Fundación Hospital de Calahorra and remained until Friday 27th. Different fungi species in different stages of growing were shown. In addition people could see several panels with its excellent properties: Healthy and Nutritive and Tasty and Versatile. On Tuesday 24th, the colloquium "Healthy Nutrition and Cancer Prevention" took place, with the following conferences:



- "Recommendation and Evidence in Diet and Health from Preventive Medicine and Public Health" from Dr. M^a Teresa Jiménez Buñuales, who is a specialist Doctor in Preventive Medicine and Public Health at Fundación Hospital de Calahorra. She discussed how important diet is to be healthy and she gave some recommendations to eat healthy. She highlighted prevention versus treatment since it is easier and less expensive.
- Dr. Laura Ochoa Callejero, from CIBIR's Angiogenesis Unit, Oncology Area (Biomedical Research Centre of La Rioja) explained "What is cancer?" She commented the prevalence of different types of cancer and causal factors. Smoking and diet/feeding are the most important. She gave some recommendations to avoid or reducing some of these factors.
- CTICH researcher Carmen Urbina presented "Cultivated Fungi and Health". She made a fungi characterization in nutritive and bioactive compounds, showing fungi as nutritive, healthy and tasty too.
- Attendees could direct different questions to the experts. The event was moderated by Dr. Carlos José Piserra Bolaños, Fundación Hospital de Calahorra's director.



Conferences and exhibits showcase mushrooms' nutrition, taste, health benefits and versatility.

On Saturday 28th April through to 1st of May, the Vegetable Market opened its doors during which stakeholders visited the different stands where quality products could be bought. The ASOCHAMP and CTICH exhibit featured fresh

mushrooms and the growing process of different kind of fungi in a simulated growing room. CTICH researchers answered visitors' questions and gave brochures with mushrooms' health information and cookbooks with delicious fungi recipes. On Saturday 28th at 12.30, ASOCHAMP made its traditional mushrooms tasting together with Rioja's wine. 750 servings were distributed.



News from the United Kingdom - Geoff Taylor

► Update on Nutrition & Health Claims:

In *Bulletin #8* (November 2009), a synopsis of the European Union (EU) Nutrition and Health Claim Legislation was described. Since then important progression has been made regarding Health Claims. On 16th May 2012 the European Commission published Regulation (EU) 492/2012 which authorises 222 scientifically proven general function claims about the health benefits of certain foods, for use on food labelling and advertising throughout the European Union.

The claims come after a significant period of waiting. Over 40,000 claims were originally submitted by member states to the European Food Safety Authority (EFSA), with only 222 of these claims making it to authorisation to date. In 2007, Regulation (EC) 1924/2006 required that health claims were to be submitted to EFSA by 31 January 2008 so that the scientific evidence behind each claim could be assessed and considered. It was initially expected that these claims would be assessed and published by January 2010.

A number of these new health claims can be applied to mushrooms.

General function health claims are claims that describe the effect that a nutrient or some other substance has on growth, development and the functions of the human body, on psychological and behavioural functions, or on slimming and weight control. Examples of approved health claims that can be used on mushrooms (*Agaricus bisporus*) are:

Blood pressure: "Potassium contributes to the maintenance of normal blood pressure"

Tiredness & fatigue: "Niacin (vitamin-B3) contributes to the reduction of tiredness and fatigue".

The newly authorised health claims may only be used where a relevant nutrition claim already exists, for example: "Mushrooms are a natural source of Potassium; Potassium contributes to the maintenance of normal blood pressure"

Some approved health claims can be used on mushrooms.

Some modification of the wording of the health claim is permitted provided that the meaning does not change, although at this time no precedent exists.

The authorisation of these health claims allows the mushroom industry to highlight the health benefits of consuming mushrooms through advertising and on pack. In addition, the publication of the permitted list should give consumers confidence in that the claims have been rigorously assessed and approved at a European level.

The newly permitted health claims are available to be checked online, on the [Community Register](#). Nutrient profiles for foods have not yet been put in place.

► International Mushroom Festival - Ireland

On 13th & 14th October 2012, the second "International Mushroom Festival" takes place at Killegar, Co. Leitrim, Ireland. Promoting the health benefits of mushrooms holds a prominent position amongst guided forays for wild mushrooms, live cookery demonstrations, craft displays, and various talks and demonstrations. Last year at the inaugural festival, Dr. John Collier made a presentation regarding the recognised health benefits of mushrooms.



The festival brings international experts from various aspects of mycology together with the public in order to promote learning about mushrooms in a relaxed and fun atmosphere. www.internationalmushroomfestival.com.

News from the United States - Heidi Gengler

► 70 Percent of U.S. nutrition influencers recommend mushrooms

Since 2008, the U.S. Mushroom Council (Council) has conducted an annual survey of nutrition influencers to track knowledge and awareness surrounding mushrooms and health. Year over year, including the 2012 survey, the most important finding is that there has been a consistent increase in respondents (70 percent) who recommend mushrooms to clients. This represents a growth of nearly 85 percent over the past four years. And more influencers are recommending that clients add more mushrooms to their favorite meals.

Survey results show that dietitians' recognition of various mushroom health benefits parallels the marketing efforts and specific communications that the Council has employed. For example, since last issuing the survey, the Council leveraged MyPlate and introduced "Swapability" to tell the mushroom story of weight management, nutrition and versatility; and has consistently promoted information about mushrooms and vitamin D. Responses to this year's survey indicate a positive alignment:

- The survey revealed an almost nine percentage point increase in this audience's belief that mushrooms help with satiety, a key component to weight management messaging.
- Thirty-eight percent of respondents recommend that clients add mushrooms to family favorite meals, which showcases mushroom versatility at the core of Council MyPlate and "Swapability" communications efforts.

Since 2008, there has been a consistent increase in respondents (70 percent) who recommend mushrooms to clients.



- Twenty percent of respondents recommend mushrooms as a source of vitamin D, with 14 percent recommending light-exposed mushrooms (increases of six and four percentage points from 2011 respectively).
- Beyond the survey data on particular messages, this annual survey is a testament to the Council's ongoing nutrition programming which presents the mushroom nutrition story in a responsible, professional and scientifically substantiated manner to earn the respect (and endorsement of) the esteemed health influencers we target.

Be sure to visit the Mushrooms and Health website <http://www.mushroomsandhealth.com/>

Send what's happening in your country to communicate the benefits of mushrooms to consumers, shoppers, households, doctors, health professionals and the media to info@mushroomsandhealth.com.

Note: The *Bulletin* provides links to other sites for your convenience and information. These sites contain information created, published, maintained or otherwise posted by organizations independent of the Initiative which does not endorse, approve, certify or control these sites and does not guarantee the accuracy of the information contained on them.

► **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:

- Michal Slawski - United Kingdom
- Franz Schmaus - Germany
- Ignace Deroo - Belgium
- José Antonio Jiménez Hernandez - Spain
- Kent Stenvang - Denmark
- Dick Roodhuyzen de Vries - Netherlands
- Elizabeth O'Neil - Canada