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.

TABLE OF CONTENTS

News from the Initiative .................................. 1
Mary Jo Feeney

Mushroom Research ...................................... 2

News from Australia ..................................... 4
Glenn Cardwell

News from Spain ......................................... 5
Irene Roncero Ramos

News from the United Kingdom....................... 6
Stephen Allen

News from the United States ......................... 7
Michelle Green

NEWS FROM THE INITIATIVE

Mary Jo Feeney

The Bulletin provides ideas on how to communicate mushroom research.

Mushroom research remains among top downloaded articles

Use information in “The role of edible mushrooms in health” to support your marketing efforts to communicate the nutrition and health benefits of mushrooms.

The role of edible mushrooms in health: Evaluation of the evidence, a review undertaken on behalf of the Initiative under direction of Peter Roupas, PhD, CSIRO (Commonwealth Scientific and Industrial Research Organisation, Australia’s national science agency) continues in high demand. Published in the Journal of Functional Foods in October 2012, the article again is featured in the journal’s Top 20 most often downloaded articles during the last full quarter of 2014 and was the 15th most downloaded paper for the entire year. The review still is being downloaded from the Scopus, the largest abstract and citation database of peer-reviewed literature, more than 10 times a day some 2.5 years after it was published. The review is the 8th most cited among articles published since 2011 in Scopus – and the number of citations keeps growing.
Mushrooms exposed to UV light increased bone density in osteoporotic mice possibly through enhanced bone metabolism.

Vitamin D2 mushrooms associated with bone health

Chen SY, Yu HT, Kao JP, Yang CC, Chian SS, Mishchuk DO, Mau JL and Slupsky CM. Consumption of vitamin D2 enhanced mushrooms is associated with improved bone health. Journal of Nutritional Biochemistry 2015 published online March 5. DOI: http://dx.doi.org/10.1016/j.jnutbio.2015.01.006.

According to the article, mushrooms are the best non-animal food source of vitamin D2. Pulsed irradiation can enhance vitamin D2 in mushrooms quickly. The researchers investigated the effect of supplementing high vitamin D2 Pleurotus ferulae mushrooms in a mouse model of osteoporosis. Thirty-two female C57BL/6JNarl mice were divided into four groups including sham, ovariectomized (OVX), OVX+nonpulsed mushroom (NPM) and OVX+pulsed mushroom (PM). After 23 weeks of treatment, serum samples were analyzed for osteoblast and osteoclast indicators, as well as metabolites using NMR spectroscopy. To examine bone density, femurs were analyzed using micro-computed tomography. The NPM and PM treatment mice showed increased bone density in comparison with OVX mice. In addition, the PM mice showed higher osteoblast and lower osteoclast indicators in comparison with OVX mice. Serum metabolomics analysis indicated several metabolites that were different in PM mice, some of which could be correlated with bone health. Taken together, these results suggest that pulsed irradiated mushrooms are able to increase bone density in osteoporotic mice possibly through enhanced bone metabolism. Further studies in humans are needed to show their efficacy in preventing osteoporosis.

Review article on mushrooms’ health promoting qualities


Mushrooms have been consumed since earliest history; ancient Greeks believed that mushrooms provided strength for warriors in battle, and the Romans perceived them as the “Food of the Gods.” For centuries, the Chinese culture has treasured mushrooms as a health food, an “elixir of life.” Mushrooms have been part of human culture for thousands of years and have considerable interest in the most important civilizations in history because of their sensory characteristics; they have been recognized for their attractive culinary attributes. Nowadays, mushrooms are popular valuable foods because they are low in calories, carbohydrates, fat, and sodium: also, they are cholesterol-free and provide important nutrients, including selenium, potassium, riboflavin, niacin, vitamin D, protein, and fiber. Together with a long history as a food source, mushrooms are important for their healing capacities and properties in traditional medicine and their reported beneficial effects for health and treatment of some diseases. Many nutraceutical properties are described in mushrooms, such as prevention or treatment of Parkinson, Alzheimer, hypertension, and high risk of stroke. They are also utilized to reduce the likelihood of cancer invasion and metastasis due to antitumoral attributes. Mushrooms act as antibacterial, immune system enhancer and cholesterol lowering agents; additionally, they are important sources of bioactive compounds. Because of these properties, some mushroom extracts are used to promote human health.
Mushrooms represent an unexplored source of potentially useful and novel lectins.

Lectins, non-immunoglobulin proteins that bind diverse sugar structures with a high degree of selectivity, play a crucial role in various biological processes such as cellular signaling, scavenging of glycoproteins from the circulatory system, cell–cell interactions in the immune system, differentiation and protein targeting to cellular compartments, as well as in host defence mechanisms, inflammation, and cancer. Plant lectins have been most extensively studied. However, more recently fungal lectins have attracted attention due to their antitumor, antiproliferative and immunomodulatory activities. Given that only 10% of mushroom species are known and have been taxonomically classified, mushrooms represent an unexplored source of potentially useful and novel lectins. This review provides an up-to-date summary on the biochemical, molecular and structural properties of mushroom lectins, as well as their versatile applications specifically focusing on mushroom lectin bioactivity.

Review of mushroom lectins

Abol Hassan MA, Rouf R, Tiralongo E, May TW and Tiralongo J. Mushroom lectins: Specificity, structure and bioactivity relevant to human disease, Int. J. Mol. Sci. 2015, 16(4), 7802-7838; DOI:10.3390/ijms16047802. This is an open access article.

Shiitake derived beta glucan’s anti-inflammatory mechanism


High levels of the chemokine CCL3/MIP-1α are associated with various human diseases. In the investigators’ previous study, (Shiitake mushrooms improve immunity in healthy adults in the next column) shiitake mushrooms (Lentinula edodes), consumed as a whole food, had an inhibitory effect on MIP-1α production in human ex vivo PBMC. The investigators hypothesized that this effect was due to lentinan, a β-1,3;1,6-glucan, acting in an anti-inflammatory manner, and that the change in MIP-1α production was under Toll-like receptor (TLR) and NF-κB regulation. This study examined the mechanism using the human THP-1 monocyte cell line. Pam3CSK4 and LPS were used as TLR ligands to induce TLR2 and TLR4 activation, respectively. The researchers showed that lentinan attenuated TLR2- and TLR4-induced MIP-1α production and NF-κB activation of the THP-1 cells. Flow cytometric analysis revealed that both surface and intracellular levels of TLR2 were decreased by lentinan. However, neutralization of TLR2 did not blunt the inhibitory effect of lentinan, suggesting that the effect was not due to TLR2 alone. Cytochalasin D, a β-glucan internalization inhibitor, cancelled the inhibition of MIP-1α production by lentinan, suggesting that the inhibitory activity of lentinan requires particle internalization. The investigators conclude that the down-modulation of TLR2 expression, suppression of NF-κB activation and attenuation of MIP-1α production by lentinan may play important roles in the anti-inflammatory effect of shiitake mushrooms. It is possible that lentinan may be effective as an anti-inflammatory agent to prevent or control the diseases associated with excessive MIP-1α production.

Shiitake mushrooms improve immunity in healthy adults


Although mushrooms are widely cited for their medicinal qualities, there have been very few human intervention studies using contemporary guidelines. This study investigated whether consumption of whole, dried Lentinula edodes (shiiitake) mushrooms could improve human immune function. Primary objectives were to ascertain whether L. edodes consumption would improve γδ-T cell proliferation and activation responses, quantify a dose response, and elicit cytokine secretion patterns. Secondary objectives included determining changes in natural killer T (NK-T) cell proliferation and activation, secretary immunoglobulin A (sIgA) in saliva, and C-reactive protein (CRP) in serum.

Fifty-two healthy males and females 21–41 years in age participated in a 4-week parallel group study, consuming either 5 or 10g of mushrooms daily. Each subject had blood drawn before and after 4 weeks of daily L. edodes consumption. Saliva and serum were also collected. Peripheral blood mononuclear cells (PBMC) were cultured in autologous serum for 24 hours or 6 days, stained, and examined by flow cytometry.

Eating L. edodes for 4 weeks resulted in increased ex vivo proliferation of γδ-T (60% more, p< 0.0001) and NK-T (2-fold more, p< 0.0001) cells. Both cell types also demonstrated a greater ability to express activation receptors, suggesting that consuming mushrooms improved cell effector function. The increase in sIgA implied improved gut immunity. The reduction in CRP suggested lower inflammation. The pattern of cytokines secreted before and after mushroom consumption was significantly different; consumption resulted in increased interleukin (IL)-4, IL-10, tumor necrosis factor (TNF)-α, and IL-1α levels, a decreased macrophage inflammatory protein-1α/chemokine C-C ligand 3 (MIP-1α/CCL3) level, and no change to IL-6, IL-1β, MIP-1β, IL-17 and interferon (IFN)-γ levels.

According to the investigators, regular L. edodes consumption resulted in improved immunity, as seen by improved cell proliferation and activation and increased sIgA production. The changes observed in cytokine and serum CRP levels suggest that these improvements occurred under conditions that were less inflammatory than those that existed before consumption.
Health professional brochure

It is time to update the brochure we have for health professionals, advising them about the research demonstrating mushrooms’ influence on human health. The last brochure was published in 2013 and a lot of new research has emerged since then. With limited space in the brochure, the trick is determining what information and references to leave out. We still have a long way to go in educating health professionals, as I still have to write to bloggers who list ‘10 superfoods’ or ‘8 foods to control your appetite’ and state why they need to include mushrooms in their lists.

Dietitians’ Day

This event, held in Brisbane, Queensland on March 13, has doubled in size since last year. Dietitians around the country logged onto the webinar, while 250 attended the all-day conference. Mushrooms were one of the key supporters, being mentioned as a Twitter sponsor, and offering samples to delegates. The intention is to move the event to a bigger location, such as Melbourne, for 2016, which will give mushrooms even more scope to promote their health benefits. In the photo, Glenn Cardwell addresses the delegates.

Vitamin D levels in mushrooms

As reported previously we now have a very good working relationship with Food Standards Australia New Zealand (FSANZ), the government food regulators, and the National Measurement Institute, the government’s official laboratory for analysing the nutrient levels in food.

Currently, there is very little information regarding the vitamin D content of foods in the official Australian food tables, partly because it has been difficult to get accurate figures for wholesome foods like eggs, oily fish and mushrooms. This year FSANZ want the vitamin D levels in Australian foods to be measured for later publication in the Australian food tables. As we have good evidence that even store-bought mushrooms have a significant level of D, this is a great opportunity to have mushrooms ‘sanctioned’ as a source of D in government and health authority documents and websites.
News from Australia continued

Australia’s Healthy Weight Week (AHWW)
February 2015

For the 3rd year mushrooms have supported AHWW, run by the Dietitians Association of Australia. During the week Glenn Cardwell gave a talk at the Diabetes South Australia public seminar in Adelaide. The event was booked out with 420 people attending. Professor Alison Coates spoke on nuts and legumes. Glenn spoke on mushrooms and vegetables. We signed up 119 new people to the Mushroom Lovers Club (many had signed up the previous year). Other AHWW events were held in Melbourne and Sydney. In the photo, Chef Judita demonstrates a mushroom stir-fry at the AHWW even in Adelaide.

Australia's Healthy Weight Week (AHWW) February 2015

News from Spain
Irene Roncero Ramos

The Spanish Mushroom Growers Association (ASOCHAMP) and CTICH (Mushroom Technological Research Center) have recently published a new report about the nutritional and health properties of mushrooms. This report includes a review of the nutritional benefits of mushrooms and the compounds responsible for these effects that make mushrooms so useful for certain pathologies. The report concludes with the idea that mushrooms should be included in our daily diet to get an improvement of our health status.

Promoting mushrooms’ nutritional and health properties

The report concludes with the idea that mushrooms should be included in our daily diet to get an improvement of our health status.

Talking Research e-newsletter

We keep health professionals up-to-date on mushroom research by sending out a regular brief summary, often highlighting current health concerns. For example, Salt Awareness Week was in March so we sent out an e-newsletter explaining how mushrooms, through umami, can replace some of the added salt and fat in recipes. March was also Coeliac Awareness Week, so we reminded people that mushrooms are gluten-free and a delicious source of fibre.

Talking Research e-newsletter

The report concludes with the idea that mushrooms should be included in our daily diet to get an improvement of our health status.

The Spanish Mushroom Growers Association (ASOCHAMP) and CTICH (Mushroom Technological Research Center) have recently published a new report about the nutritional and health properties of mushrooms. This report includes a review of the nutritional benefits of mushrooms and the compounds responsible for these effects that make mushrooms so useful for certain pathologies. The report concludes with the idea that mushrooms should be included in our daily diet to get an improvement of our health status.

In addition to this scientific book, a smaller report has been also published and we have prepared a brochure with some information about nutritional and health mushrooms properties. To promote this new report we are carrying out numerous actions, such as attending conferences and inclusion of the report in the conference bags to disseminate this information.
New mushroom cookbooks

Two new cookbooks have been published by the Spanish Mushroom Growers Association. One of the cookbooks contains white button (Agaricus bisporus) recipes and the other book contains oyster (Pleurotus ostreatus), Shiitake (Lentinula edodes) and king oyster (Pleurotus eryngii) recipes. Nutritional information is also included in each recipe and some recommendations for its consumption. You can download the cookbooks from www.ctich.com or by using the QR codes.

Visit www.ctich.com to download the cookbooks and the report on the health and nutritional properties of mushrooms.

NEWS FROM THE UNITED KINGDOM

Stephen Allen

Just Add Mushrooms Campaign

Just Add Mushrooms communicates the health benefits, versatility and simplicity of cooking with mushrooms to different influencer audiences, who then pass these messages on to consumers. The three targeted audiences include doctors/nutritionists as the primary audience; caterers; and secondary school children through teachers. A Just Add Mushrooms website hosts resources promoting the various benefits and uses of mushrooms, and audiences are reached through customized digital advertising. According to activity tracking, the campaign has delivered 6.4M impressions, the number of people who may have seen the messages.
The Mushroom Blend – a science based menu strategy

For many years, the U.S. Mushroom Council’s (Council) communication strategy has used nutrition information and science to describe mushrooms’ incredible nutritional properties to help improve the nutrient quality of consumers’ food choices and lower risk of major chronic diseases associated with obesity. Mushrooms’ health and wellness benefits also provide innovative solutions to meet the challenge of balancing nutrition and taste, and the need to improve the nutrient quality of the country’s food supply.

More recently, the Council began integrating its growing nutrition research program with emerging foodservice efforts to position mushrooms on menus. A new culinary technique known as the Mushroom Blend (Blend) adds chopped fresh mushrooms, which look, taste and perform like meat, to ground meat in common recipes. The Blend helps consumers make everyday favorite dishes (burgers, meatballs, tacos) more healthful and flavorful. In addition, chefs can use the Blend technique to develop creative menu offerings and food manufacturers can use the technique in new product development.

A business strategy with results

The Council tested the Blend’s feasibility and viability through practical application-based research, pilot programs, influencer engagement and direct-to-consumer initiatives. These efforts put the Council – an agricultural commodity – on the map of today’s most groundbreaking food companies, changing the way Americans eat. The Blend has escalated into a fully integrated, new business strategy, has opened new mushroom markets and has helped propel sales and growth of the U.S. mushroom industry to a new annual peak of more than US$1B.

Science and partnerships: Ingredients for success

Of course, all this took time – beginning over a decade ago – and didn’t happen overnight. Carefully planned scientific research, cross-discipline thought leadership, product visibility and exposure were needed so that the Council’s key food and business stakeholders embraced and implemented the Blend concept. The Blend is now at the epicenter of a new food trend because of a solid science-based menu strategy implemented by a multi-faceted and integrated consumer and foodservice industry campaign that introduced a new menu solution featuring mushrooms at the center of the plate. See “The Evolution of the Blend,” on page 8, for details on the milestones throughout the years.

The Blend campaign is up for one of the country’s top public relations awards and is a finalist for the 2015 Silver Anvils.

continued on page 8
2003: Asking “What if.”
Large calorie, fat and cholesterol savings could be achieved by substituting mushrooms for meat in popular dishes such as hamburgers, pizza and for a smaller portion of steak, according to a simulation analysis conducted by researchers on behalf of the Council.

2008: Satisfaction not compromised.
Mushrooms’ role in weight management became one of the fundamental pillars of the Council’s consumer communication campaign based on Johns Hopkins University research. This study demonstrated mushrooms’ unique dual ability to lower calorie intake without compromising satisfaction when partially substituted in recipes using energy-dense foods, like lean ground beef.

2009: A new role for mushrooms on the plate. A study spanning the next three years by the Culinary Institute of America (CIA) and University of California-Davis demonstrated the palatability of a low-sodium hamburger with mushrooms compared to a normal hamburger, thus improving the healthfulness of the dish.

2010: Leading the way.
The Council initiated a long-term partnership with the CIA to bring innovative healthy menu solutions to life. “Tasting Success with Cutting Salt,” a collaborative report from the department of nutrition at Harvard School of Public Health and the CIA, featured a new role for mushrooms in healthy menus.

2011: Nutrition is the basis for a new culinary technique.
The Blend debut recipe, a 50% ground mushrooms and 50% ground meat “meatball,” was positioned as a substitution strategy to reduce calorie intake and increase vegetable consumption. This “Swapability” idea was showcased at the Academy of Nutrition and Dietetics’ Food & Nutrition Conference & Expo. Media praised the technique’s taste and weight management benefits and the Council joined the Partnership for a Healthier America (PHA) as a key sponsor of the inaugural Building a Healthier Future Summit that seeks to solve childhood obesity in the U.S.

2012: Swapability for consumers and nutrition influencers, and 80:20 for foodservice operators.
With registered dietitians to serve as spokespeople and recipe developers to generate news and consumer-friendly applications of the Blend, the Council introduced the concept to select colleges and foodservice operators using a ratio of 20% meat and 80% mushrooms, “80-20.”

2013: Mushrooms “Blendability” provides nutrition and culinary solutions.
Celebrity Chef Richard Blais put Blendability on the map through a national media splash and on his burger chain menu. The Council’s “Swap It or Top It” recipe contest promoted this versatile technique that lowered calories/fat/sodium while retaining flavor. The inaugural Mushrooms and Health Summit discussed the growing body of research supporting mushrooms’ health and nutrition benefits and key health and nutrition influencers, academics and researchers tasted a Blend-based menu.

2014: The trend to Blend.
The Council’s integrated campaign encouraged adoption of the Blend through credible partnerships, established a national dialogue about the Blend and built a base of industry and influencer support through chef and dietitian relationships, media campaigns and having a presence at industry conferences. Market research identified the technique as a chef trend to watch for 2015.

2015: Trial and adoption.
Partnering with the esteemed James Beard Foundation (JBF) – the country’s preeminent organization for chefs and culinary expertise – the Council is launching the Better Burger Project. This is a nationwide in-restaurant menu promotion to create a “better burger” by blending ground meat with finely chopped mushrooms to introduce a more delicious, healthier, and sustainable alternative. The multi-faceted foodservice and consumer program will launch Memorial Day, May 25.
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

ITALY
Italian Association Fungicoltori (AIF) Website
Italian Association Fungicoltori (AIF) email
Funghincucina Twitter
Funghincucina Facebook
Funghincucina Pinterest

NETHERLANDS
Champignonidee Website
Champignonidee Twitter
Champignonidee Facebook
Champignonidee Pinterest
Champignonidee YouTube
Champignonidee Google+

SOUTH AFRICA
SAMFA Website
Fresh Mushrooms Twitter
MushroomsSA Facebook

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

UNITED KINGDOM & IRELAND
Just Add Mushrooms Website
Just Add Mushrooms Twitter
Just Add Mushrooms Facebook
Just Add Mushrooms YouTube

UNITED STATES
Mushroom Info Website
The Mushroom Channel blog
Mushroom Channel Twitter
Mushroom Channel Facebook
Fresh Mushrooms Pinterest

Resources

Be sure to visit the Mushrooms and Health website 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; Project Manager, Mushrooms and Health Global Initiative
• Bart Minor, President, Mushroom Council, United States
• 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
• Juan Valverde, Food Science Programme Manager, Monaghan Mushrooms Group, Ireland
• Michelle Green, 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/market that is participating in 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:
• Ignace Deroo – Belgium
• Elizabeth O’Neil Meurehg – Canada
• Kent Stenvang – Denmark
• Franz Schmaus – Germany
• Annemieke Bouwmeester – Netherlands
• Jose Antonio Jimenez Hernandez – Spain
• Stephen Allen – United Kingdom