



Mushrooms and Health Global Initiative Bulletin

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Chance Favours the Prepared Mind – The Benefits of a PR 'Machine'

The purpose of this article is to encourage those countries without a public relations communication capability (PR) to seriously consider investing in one. It doesn't have to be enormously expensive to have a PR capability but the pay-offs can be huge.

If we want consumers to eat more mushrooms, then we need to give consumers good reasons to do so, and we need to remind them of those reasons time and time again.

That's what M&HGI 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.

Unfortunately most countries/markets don't have strategically focused mushroom promotional programs to make this happen. Another alternative is to provide the media with the messages you want the public to hear and hope the media report them.

That's far easier said than done and success is highly variable and unpredictable. However, if an industry possesses a PR machine, then the chances of getting stories into the media increases significantly, as does the number of places they appear.

PR is mostly thought about with planned media releases and there is plenty of media evaluation data from Australia and the USA to support the great success of this approach.

However, it was the massive media coverage achieved in the USA, UK and Australia recently with an unplanned mushroom and breast cancer story that has caught my attention. It highlighted the importance of having a PR team ready to act when an unexpected opportunity arises.

Table 1 – Media Evaluation in the US, UK, and Australian Markets re Western Australia Breast Cancer Story

Media Evaluation Criteria	US	UK	Australia
Number of Print, Radio/TV, On-line Stories in the Media	24	15	71

A virtually unknown breast cancer paper from the University of Western Australia (Zhang et al. See *Research of Interest*, page 6) commanded a significant media presence in print, TV, radio and on-line in those three countries (see Table 1). Surprisingly, there was very little coverage in the rest of the world.

Although the same “Reuters wire story” would have been received by the media in most countries, it is interesting that the three countries with well established PR capabilities were able to secure much more media coverage than elsewhere.

It is my view that these PR machines were able to generate coverage of the Zhang story in the media way beyond what the story would have achieved if left to run its own course.

These skilled professionals were able to react quickly to the Zhang story when it hit the media to leverage it with a bit of local supplementary information and targeted redistribution in their own networks. Their actions turned a “chance” (unplanned) mushroom story into a major media coup for their industry.

“Chance favours the prepared mind” is a piece of advice I was given a many years ago. It means that if you are prepared mentally and physically capable of action, then you can take advantage of unexpected opportunities that arise which most people will miss.

The PR performance illustrated in Table 1 is a real world living example of that saying I heard all those years ago. There are many media opportunities that arise regularly but without dedicated PR professionals to identify them and act on them quickly, you miss out. Get a PR machine for your industry and capture the benefits for your growers!

Cheers,

Greg Seymour

The Web to Everywhere

Thanks to Initiative Team members Chris Rowley and Glenn Cardwell for providing this information.



Take some previous research about mushrooms and the power to enhance immune response; write a media release to coincide with the upcoming flu season; mix in some quotes on the need for natural foods; throw in a “superfood” reference to ensure everyone knows just how good the mighty mushroom is; let it settle at room temperature to make sure the message is clear; and send it out to the media.

The result - media coverage that goes international and is translated into Russian, Polish, Spanish, Croatian, Romanian and Vietnamese.

Released in Australia on 6 May the story “Mushrooms fight influenza: further studies underway” highlighted the previous work undertaken by Dayong Wu MD, PhD, at Tufts University, Boston MA where it was shown that mushrooms were able to enhance killer cell activity and play a role in defending the body against viral infections and tumours. This work was jointly funded by the US and Australian mushroom industries.

In Australia the story was picked up by a number of major newspapers with a combined audience of over one million or 5% of the total population. It also resulted in radio interviews and was covered by a number of food related blogs and on-line newsletters over the following six days.

Interestingly, significant coverage was achieved in the UK, where the story was covered in both the *Telegraph* and the *Mail Online*. The *Telegraph* listed the story under its Swine Flu coverage using the headline "Mushrooms could be key to fighting flu". From there the story has found its way into numerous other media; blogs; online newsletters and discussion boards throughout the world, starting a positive conversation with readers about the health benefits of mushrooms.

The coverage highlights the international nature of the media and the ability for positive health issues to easily migrate internationally. Using available research highlighted that mushrooms and health is a global message worth telling over and over again.

To see the media clippings visit:
<https://rcpt.yousendit.com/685961480/132dac8ceebcea4196c6888fafd541de>.

After June 1, contact Chris Rowley at chris.rowley@optusnet.com.au for a file copy.

Welcome to the Strategic Communications Group

Greg Seymour

A warm welcome to the inaugural members of the Mushrooms and Health Global Initiative Strategic Communications Group: Wendy Akers - UK & Ireland; Franz Schmaus – Germany; François Marche – France; Ignace Deroo and Evy Detroch – Belgium; Jose Antonio Jimenez Hernandez – Spain; Kent Stenvang - Denmark. We hope to have a few more names from our contributing countries to join them shortly. The Initiative team looks forward to working with you.

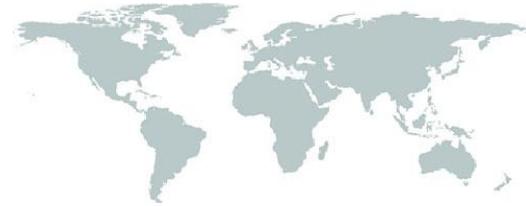
The Strategic Communications Group has been established to strengthen The Initiative's communication capability and develop a local public relations presence in each country whose industry is contributing financially to the project.

These important people will be the facilitators of stories about mushrooms and health appearing in their local media. In addition, they will be the eyes, ears and mouth for the Initiative in their country - they monitor mushroom nutrition and health research, liaison with scientists, media and other influencers, provide feedback to the Initiative

and share their PR success stories through the Bulletin.

Other countries wishing to join this exciting project should contact Greg Seymour to discuss how they can become involved.

More Mushroom Publicity Around The Globe



The studies described on pages 6-8 *Research of Interest* generated a lot of worldwide publicity. Examples follow from the UK and the US – illustrating how the same research is customized for consumer audiences in different regions and countries.

United Kingdom – Cheap, Delicious and Easy Way to Prevent Breast Cancer



Thanks to Stephen Allen and Initiative Team member John Collier for providing this information.

The following is a press release by the UK Mushroom Bureau (www.mushroom-uk.com) that highlighted several studies on mushrooms and breast cancer.

Eating mushrooms and drinking green tea could protect against breast cancer, a study conducted jointly by The University of Western Australia (UWA) and Zhejiang University in China has found.

Research Associate Professor Min Zhang, of UWA's School of Population Health, led the research team who examined the mushroom and tea consumption of more than 2,000 women aged from 20 to 87 in relatively affluent southeast China. Half of the women had confirmed breast cancer and the others were healthy women recruited from outpatient clinics.

"Breast cancer is the most common type of cancer among women worldwide and its rate is

increasing in both developed and developing countries,” Professor Zhang said.

In China, the incidence of the cancer is four or five times lower than in developed countries. The researchers, including UWA’s Professor D’Arcy Holman and Zhejiang University’s Dr Jian Huang and Professor Xing Xie, investigated whether this could be due to the use of dried and fresh mushrooms and green leaf tea in the traditional Chinese diet.

“Mushrooms and mushroom extracts have been shown to possess anticarcinogenic properties and to stimulate immune responsiveness,” Dr Zhang said. “And it has been found fairly consistently in epidemiological research that green tea has anticarcinogenic effects against breast cancer.”

By interviewing all the women about their consumption of mushrooms and tea, the researchers found that the most common mushroom species eaten were fresh white button mushrooms, *Agaricus bisporus*, and fragrant dried mushrooms, *Lentinula edodes*. Some of the women in the study consumed neither mushrooms nor green tea while others enjoyed both up to three times a day. The data were adjusted for factors such as physical activity, weight, menopause, alcohol consumption and smoking, including passive smoking.

“We found that the combination of dietary intake of mushrooms and green tea-drinking decreased breast cancer risk with an additional reduced effect on the malignance of cancer. Our findings, if confirmed consistently in other research, have potential implications for protection against breast cancer development using an inexpensive dietary intervention,” Dr Zhang said. Read the abstract in *Research of Interest* page 6.

In addition, recent research from nutrition researchers at Arizona State University (ASU) and Pennsylvania State University has found that mushrooms may help boost the immune system and reduce inflammation, especially in the colon. Keith R. Martin, ASU assistant professor in nutrition, along with his Penn State colleagues, experimented with various types of mushrooms, from the more common white button to the exotic, like shiitake and oyster, to see what sort of effect they had on the immune system. “We found that the white

button mushroom seemed to be the most effective in boosting the immune system, which is good because they are the most affordable,” said Martin. The ASU and Penn State researchers performed a series of experiments adding five mushroom varieties to the diets of mice. The amount of mushrooms consumed by the animals is equivalent to roughly 2.5 cups of raw mushrooms daily for humans. Read the abstract in *Research of Interest* page 6.

Professor Shiuan Chen, Director of Surgical Research at City of Hope Hospital in California, is currently undertaking clinical trials involving 24 post menopausal breast cancer survivors eating between five and 13 grams of freeze-dried white button mushrooms in tablet form daily for 12 weeks. This follows his initial work which discovered that compounds in mushrooms suppressed the effects of aromatase, an enzyme responsible for oestrogen conversion in the body. Blocking aromatase reduces oestrogen levels among post-menopausal women – important because about 75 percent of post-menopausal women with breast cancer have tumours that depend on oestrogen to grow. To read the published research, see:

S. Chen, S. Phung, S. Kwok, J. Ye, G. Hur, S. Oh, D. Smith, Y.-C. Yuan, K. Karlsberg, & K. Lui. Chemopreventive Properties of Mushrooms Against Breast Cancer and Prostate Cancer. *International Journal of Medicinal Mushrooms*, Vol. 7 (2005).

Shiuan Chen, Sei-Ryang Oh, Sheryl Phung, Gene Hur, Jing Jing Ye, Sum Ling Kwok, Gayle E. Shrode, Martha Belury, Lynn S. Adams, and Dudley Williams. Anti-Aromatase Activity of Phytochemicals in White Button Mushrooms (*Agaricus bisporus*). *Cancer Res* 2006; 66: (24). December 15, 2006.

Baiba J Grube, Elizabeth T. Eng, Yeh-Chih Kao, Annette Kwon and Shiuan Chen. White Button Mushroom Phytochemicals Inhibit Aromatase Activity and Breast Cancer Cell Proliferation. 0022-3166/01 \$3.00 © 2001 American Society for Nutritional Sciences.



United States – Researching and Cooking Mushrooms

Thanks to Initiative Team member Heidi Gengler for this information.

Although we expect to learn about mushroom research at conferences organized by the mushroom industry, it is important to have mushroom research presented at meetings of other scientific disciplines.

New mushroom research was presented April 18-22 in the U.S. at the [Experimental Biology meeting](#). Experimental Biology is a multi-society scientific meeting featuring award lectures, symposia, and poster sessions and is attended by over 13,000 scientists. The research described mushrooms' role in enhancing immune function, protecting against breast cancer and collagen-induced arthritis. The U.S. Mushroom Council distributed a media alert to health and nutrition editors with summaries of the research abstracts being presented about mushrooms. Dr. Keith Martin's mushroom immunity research was recently featured in a syndicated Reuters article online. The article notes white button mushrooms have stronger immune-boosting effects than most exotic mushrooms. This placement generated more than 6.5 million impressions. To view the full article click [here](#). It is the Council's intention that this research will add to the growing body of science on the nutrition and health benefits of mushrooms while continuing to educate consumers and health professionals.

Separately in 2009, the U.S. Mushroom Council partnered with Taste of Home both online and offline. As part of the partnership, mushrooms are featured in editorial and advertising content on [TasteofHome.com](#) for three months, and the Council sponsored Taste of Home Cooking Schools. Currently underway, the Cooking Schools are live cooking demonstrations available in 125 markets. An engaged audience anywhere from 800-1,000 people attend each event. The sponsorship of the Cooking Schools includes a 10-minute on-stage mushroom recipe demonstration developed by the U.S. Mushroom Council. The host delivers several mushroom key messages throughout the demonstration, including mushrooms' vitamin D content, weight management education, taste and versatility. Finally, Taste of Home will include one mushroom

question created by the Council to be incorporated in an omnibus survey fielded to all cooking school participants. The Council hopes to gain valuable consumer insight from the survey for future promotional efforts. Total impressions for the partnership are estimated at more than 45 million media impressions.



Australia: Mushrooms as a Core Food Group

Thanks to Initiative Team Member Glenn Cardwell for providing this article.

As the mushroom is not a plant food, it is no

surprise that it has a nutrition profile different to that found in fruits and vegetables. Quite logically, the mushroom is a separate food group as it doesn't fit any of the traditional food groups, such as grains, dairy, meats, fruits and vegetables.

In Australia, the peak health body (National Health & Medical Research Council – NHMRC) has requested submissions to update the Core Food Groups. The Australian Mushroom Growers Association realised that this was a great opportunity to present the case for mushrooms being a food group of their own.

The key arguments for a separate food group were:

1. Mushroom consumption has quintupled in the last 30 years, reaching 3.1 kg per capita, and consumption has increased by 20% since the last Australian food consumption census over a decade ago. Over 80% of households bought mushrooms each year, while 55% do so at least weekly. The white button mushroom (*Agaricus bisporus*) is the #3 best selling item in the fresh produce section at supermarkets. That means that mushrooms make a significant nutrition contribution to the Australian diet, significantly more than health and nutrition experts realise and officially recognise.
2. A serve of mushrooms provides at least 20% of the daily needs of the essential nutrients riboflavin, niacin, pantothenic acid, biotin, copper and selenium, therefore packing a bigger nutrition punch than vegetables. The mushroom also provides vitamins D and B12, more commonly associated with animal foods.
3. There is mounting evidence that mushrooms independently influence immune function and

cancer risk, especially breast and prostate cancer. Part of this effect is likely due to the mushroom's unique bio-active compounds, such as aromatase inhibitors that could reduce the risk of breast cancer. In addition, mushrooms contain the bioactive compound ergothioneine, which may also confer health benefits.

4. As mushrooms have a different biology to fruits and vegetables, they shouldn't be lumped in with "other vegetables" as has been the case in the past in government nutrition surveys. Due to the amount and frequency of consumption they should always be considered as a separate food group.

Although we are hopeful that our recommendation is acted upon, we are concerned that nutrition professionals still see the mushroom as a vegetable, as do 81% of Australian consumers. At the very least our submission will have increased their understanding of the nutritional benefits of mushrooms and stop them thinking that the mushroom is a plant food.

Having mushrooms recognized as a separate food group is strategically important to the Australian mushroom industry. Official public confirmation sends a message that mushrooms should be a regular inclusion in a balanced healthy diet. It will help move mushrooms from being a discretionary purchase to an essential one.

The full AMGA submission can be found at:
http://www.nhmrc.gov.au/your_health/healthy/nutrition/review.htm

(see the 2nd download under 'Other Information')

Research of Interest



Zhang M, Huang J, Xie X and D'Arcy J. Holman C. "Dietary intakes of mushrooms and green tea combine to reduce the risk of breast cancer in

Chinese women." *Int. J. Cancer* 2009; 124:1404-1408.

<http://www3.interscience.wiley.com/journal/12428129/abstract>

This case control study conducted in southeast China in 2004-05 investigated the effects of dietary mushrooms and joint effects of mushrooms and green tea on breast cancer. Based on the results, the researchers concluded that higher dietary intake of

mushrooms decreased breast cancer risk in pre- and postmenopausal Chinese women and an additional decreased risk of breast cancer from joint effect of mushrooms and green tea was observed. More research is warranted to examine the effects of dietary mushrooms and mechanism of joint effects of phytochemicals on breast cancer.

The study abstract reported incident cases of 1,009 female patients aged 20-87 years with histologically confirmed breast cancer. The 1,009 age-matched controls were healthy women randomly recruited from outpatient breast clinics. Face-to-face interviews using a validated and reliable questionnaire collected information on frequency and quantity of dietary intake of mushrooms and tea consumption, usual diet, and lifestyle. When compared with nonconsumers, the Odds ratios (Ors) were 0.36 (95% CI = 0.25-0.51) and 0.53 (0.38-0.73) for daily intake of ≥ 10 g fresh mushrooms and ≥ 4 g dried mushrooms, based on multivariate logistic regression analysis adjusting for established and potential confounders.

There were dose-response relationships with significant tests for trend ($p < 0.001$). The inverse association was found in both pre- and postmenopausal women. Compared with those who consumed neither mushrooms nor green tea, the ORs were 0.11 (0.06-0.20) and 0.18 (0.11-0.29) for daily high intake of fresh and dried mushrooms combined with consuming beverages made from ≥ 1.05 g dried green tea leaves per day. The corresponding linear trends were statistically significant for joint effect ($p < 0.001$).

More research is warranted to examine the effects of dietary mushrooms and mechanism of joint effects of phytochemicals on breast cancer.



Yu S, Weaver V, Martin K, Cantorna M. "The effects of whole mushrooms during inflammation." *BMC*

Immunology 2009; 10:12 doi: 10.1186/1471-2172-10-12.

<http://www.biomedcentral.com/content/pdf/1471-2172-10-12.pdf>

Note: according to the journal website, this research has been especially highly accessed. Dr. Martin presented this research during the Experimental Biology 2009 Annual Meeting in New Orleans, LA.

Consumption of edible mushrooms has been suggested to improve health, and a number of isolated mushroom constituents have been shown to modulate immunity. This research was undertaken to investigate whether five commonly consumed edible mushrooms stimulated the immune system *in vitro* and *in vivo*.

Results suggest that the white button (WB) extracts readily stimulated macrophage production of TNF- α . The crimini, maitake, oyster and shiitake extracts also stimulated TNF- α production in macrophage but the levels were lower than from WB stimulation. Primary cultures of murine macrophage and ovalbumin (OVA) specific T cells showed that whole mushroom extracts alone had no effect on cytokine production but co-stimulation with either lipopolysaccharide or OVA (respectively) induced TNF- α , IFN- γ , and IL-1 β while decreasing IL-10.

Feeding mice diets that contained 2% WB mushrooms for 4 weeks had no effect on the *ex vivo* immune responsiveness or associated toxicity (changes in weight or pathology of liver, kidney and gastrointestinal tract).

Dextran sodium sulfate (DSS) stimulation of mice that were fed 1% WB mushrooms were protected from DSS induced weight loss. In addition, 2% WB feeding protected the mice from transient DSS induced colonic injury. The TNF- α response in the colon and serum of the DSS challenged and 2% WB fed mice was higher than controls

According to the study, the data support a model whereby edible mushrooms regulate immunity *in vitro*. The *in vivo* effects of edible mushrooms required a challenge with DSS to detect small changes in TNF- α and transient protection from colonic injury. There are modest effects of *in vivo* consumption of edible mushrooms on induced inflammatory responses. The result is not surprising since it would certainly be harmful to strongly induce or suppress immune function following ingestion of a commonly consumed food.



Sliva D, Jedinak A, Jiang J, and Dudhgaonkar S. "Pleurotus ostreatus suppresses food-borne carcinogen and inflammation-induced colon carcinogenesis and inhibits endotoxemia in mice." *FASEB J*, Apr 2009; 23: 221.3.

Researchers from the Cancer Research Laboratory, Methodist Research Institute,

School of Medicine, Indiana University, and the Indiana University Simon Cancer Center, Indianapolis, presented the following abstract at the April meeting of Experimental Biology.

The association among diet, colon cancer risk and mortality is well established, and epidemiological studies suggest that mushroom intake may prevent the development of cancer. In the present study we evaluated whether edible oyster mushroom (*Pleurotus ostreatus*) affects the development of food-borne carcinogen- (2-amino-1-methyl-6-phenylimidazo [4-5-b] pyridine, PhIP) and inflammation- (dextran sodium sulfate, DSS) induced colon carcinogenesis in mice. Here we show that an oral administration of *P. ostreatus* extract (POE) for 16 weeks (3 times per week at 0, 100 and 500 mg/kg of body weight) significantly decreased the PhIP/DSS-induced formation of colonic tumors, and reduced the numbers of aberrant colonic crypts in a dose-dependent manner. Anti-inflammatory properties of the oyster mushroom were evaluated in macrophages treated with *P. ostreatus* powder (POP). Thus, POP suppressed LPS-induced secretion of TNF- α , IL-6, IL-12p40, and nitric oxide (NO), and down-regulated expression of iNOS and COX-2 in RAW264.7 cells. These effects were mediated by the inhibition of AP-1 but not NF- κ B activity in macrophages challenged with LPS. Finally, POP suppressed LPS-induced secretion of TNF- α and IL-6 in the endotoxemia mice model. In summary, our data suggest that the dietary oyster mushroom can be used for the prevention against colon carcinogenesis and inflammation.



Koyyalamudi, SR, Jeong SC, Song, CH, Cho KY, and Pang G. "Vitamin D2 formation and bioavailability from *Agaricus bisporus* button mushrooms treated with ultraviolet irradiation." *J. Agric. Food Chem.*, 2009, 57 (8), pp 3351–3355.
<http://pubs.acs.org/doi/abs/10.1021/jf803908q>
DOI: 10.1021/jf803908q Publication Date (Web): March 13, 2009

Agaricus bisporus mushrooms contain an abundance of ergosterol, which on exposure to UV irradiation is converted to vitamin D2. The study evaluated the effects UV-C irradiation on vitamin D2 formation and its bioavailability in rats. Fresh button mushrooms were exposed to UV-C irradiation at mean intensities of 0.403, 0.316, and 0.256 mW/cm² from

respective distances of 30, 40, and 50 cm for periods ranging from 2.5 to 60 min. Vitamin D2 and ergosterol were measured by HPLC-MS/MS. Vitamin D2 stability, retention and extent of discoloration were assessed during storage at 4°C or at room temperature.

Exposure to UV-C irradiation at 0.403 mW/cm² intensity from 30 cm distance resulted in a time-dependent increase in vitamin D2 concentrations that was significantly higher than those produced at intensities of 0.316 and 0.256 mW/cm² from distances of 40 and 50 cm, respectively. Furthermore, the concentrations of vitamin D2 produced after exposure to UV-C irradiation doses of 0.125 and 0.25 J/cm² for, 2.5, 5, and 10 min were 6.6, 15.6, and 23.1 µg/g solids, equivalent to 40.6, 95.4, and 141 µg/serving, respectively.

Data showed a high rate of conversion from ergosterol to vitamin D2 at short treatment

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time, which is required by the mushroom industry. The stability of vitamin D2 remained unchanged during storage at 4°C and at room temperature over 8 days ($P = 0.36$), indicating no degradation of vitamin D2. By visual assessment or using a chromometer, no significant discoloration of irradiated mushrooms, as measured by the degree of "whiteness", was observed when stored at 4°C compared to that observed with mushrooms stored at room temperature over an 8 day period ($P < 0.007$). Vitamin D2 was well absorbed and metabolized as evidenced by the serum response of 25-hydroxyvitamin D in rats fed the irradiated mushrooms. Taken together, the data suggest that commercial production of button mushrooms enriched with vitamin D2 for improving consumer health may be practical.