


THE WORLD'S FIRST SYSTEMATIC REVIEW ON *AGARICUS BISPORUS*

What's so special about
Australia's most popular fungi?

 Read the full paper

Blumfield et al., J Nutr Biochem 2020;84:108453

Link: bit.ly/mushroomsresearch

FOODiQ
global

Australian
MUSHROOMS

What you need to know about mushrooms



NOT A VEGETABLE
But contains:
resistant starch
phytonutrients
potassium



NOT AN ANIMAL
But contains:
vitamin B12
vitamin D



NOT A WHOLE GRAIN
But contains:
beta-glucans
prebiotics
riboflavin



NOT A NUT
But contains:
copper
selenium



What's the research gap?

Over
300
reviews exist
on mushrooms

Yet
0
specifically on
Agaricus bisporus

What is *Agaricus bisporus*?



It's the world's most popular mushroom and includes^[1]:



? FUN-gi FACT

Button, cup and flat mushrooms all come from the same mushroom, just grown for different lengths of time.

What was done?

FOODiQ Global conducted the world's first systematic review on *Agaricus bisporus*, to investigate its key bioactive components and effects on health in humans.

5 databases searched
up to June 2019

Medline
Embase
Scopus
CINHAL
Cochrane Library

5,707
records found

1,037
full-text articles
screened

68
articles included
in the review

What was found?



53
articles on
bioactive
components

ANTIOXIDANTS
BETA-GLUCANS
CHITIN
D VITAMIN
ERGOTHIONEINE



15
articles on human
health effects

⬆️ Vitamin D status
⬇️ Inflammation
⬆️ Satiety
⬇️ Cancer risk & its metabolites
⬆️ Gut health
⬆️ Cardiometabolic health
⬆️ Immune function

What are the key bioactives in *Agaricus bisporus*?



What is it?

How much?

A

ANTIOXIDANTS

An array of antioxidants usually reported as flavonoids and polyphenols, including catechin, myricetin, quercetin & kaempferol^[2]. Mushrooms are one of the few non-plant foods that contain antioxidants.



Kaempferol in *Agaricus bisporus* vs. Strawberries (/100g wet weight)

B

BETA-GLUCANS

A soluble fibre, commonly found in oats, that has cholesterol lowering properties^[5].

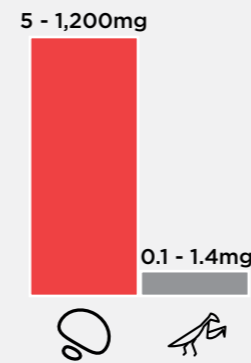


Beta-glucans in *Agaricus bisporus* vs. Oats (/100g dry weight)

C

CHITIN

A unique prebiotic polysaccharide that makes up the cell wall of fungi - it's like cellulose in plants^[7]. It's not found in any other foods, except for insects and yeasts.



Chitin in *Agaricus bisporus* vs. Edible Insects (/100g wet weight)^[8]

D

VITAMIN D

The sunshine vitamin. Mushrooms naturally contain vitamin D2, with levels increased up to 10 times after the surface of the mushroom is exposed to UVB light (i.e. sunlight)^[10].



Vitamin D equivalents in UV-exposed *Agaricus bisporus* vs. Raw Eggs (/100g wet weight)^[11]

E

ERGOTHIONEINE

An antioxidant that can only be made by some fungi and bacteria^[13]. Mushrooms are the largest dietary source.



Ergothioneine in *Agaricus bisporus* vs. Tempeh (/100g dry weight)



How to maintain in cooking?

Cook for a shorter amount of time^[3, 4].

Not affected by cooking^[6].

Increases with cooking, regardless of whether the mushroom was fresh, frozen or canned^[9].

Using UV-exposed mushrooms, squeeze some lemon juice in the pan, cook at lower temperatures and for shorter times^[12].

Cook for a shorter amount of time^[3, 4].

WHICH TYPE IS BEST?



+ More vitamin D^[14]

+ More ergothioneine^[16]

WHICH PART IS BEST?










28% more antioxidants in the cap (vs the stem)^[17, 18]

40% more beta-glucans in the stem (vs the cap)^[19]

FUN-gi FACT

The stem is a valuable source of bioactives. Don't waste it!

What is the evidence for *Agaricus bisporus* and human health?

	7 health outcomes	Reference	Study Type	Quality of Study*	Sample Size	Population	Intervention	Control	Result
	1 Vitamin D status	Stephensen et al. (2012) ^[20]	RCT	Higher	29	Healthy adults	88 g/day UV white button mushrooms for 6 wks	Non-UV white button	↑ serum 25(OH)D
		Keegan et al. (2013) ^[21]	RCT	Lower	25	Healthy adults	2000 IU vit D/day UV white button mushroom extract for 12 wks	Vitamin D supplement	↑ serum 25(OH)D (equivalent to a supplement)
		Urbain et al. (2011) ^[22]	RCT	Higher	26	Healthy adults	28 000 IU vit D/day UV white button mushrooms for 5 wks	Non-UV white button + placebo supplement	↑ serum 25(OH)D
		Shanely et al. (2014) ^[23]	RCT	Neutral	34	Athletes insufficient in vitamin D	600 IU vit D/day UV powdered portobello mushroom for 6 wks	Placebo	↑ serum 25(OH)D
	2 Inflammation	Calvo et al. (2016) ^[24]	RCT	Higher	37	Adults with metabolic syndrome	100 g/day UV white button mushrooms for 16 wks	Vitamin D supplement	↑ ergothioneine, ORAC, adiponectin ↓ oxidative stress factors
		Volman et al. (2010) ^[25]	RCT	Neutral	56	Adults with hypercholesterolemia	Juice with 5 g/day of α-glucans extracted from white button mushrooms for 5 wks	Juice without α-glucans extracted from white button	↓ TNFα ↔ IL-1b and IL-6
		Weigand-Heller et al. (2012) ^[26]	RCT	Neutral	20	Healthy adults	8 g and 16 g/day powdered mushroom over 3 days	Placebo	↓ oxygen radical absorbance capacity ↑ ergothioneine
	3 Satiety	Hess et al. (2017) ^[27]	RCT	Neutral	70	Healthy adults	226 g/day mushrooms for 10 days	Beef (kJ and protein matched)	↑ satiety ↔ energy intake
		Cheskin et al. (2008) ^[28]	RCT	Neutral	152	Healthy adults	1418 kJ/day white button mushrooms for 4 days	Beef (volume matched)	↓ energy intake ↔ satiety
	4 Cancer risk & its metabolites	Lee et al. (2013) ^[29]	Case-control	Higher	1000	Cases of ovarian cancer	N/A	Healthy adults (no ovarian cancer)	↓ ovarian cancer risk at intakes >2 g/day after 2 years
		Twardoski et al. (2015) ^[30]	Phase 1 trial	Higher	36	Adults with elevated prostate specific antigen	4-14 g/day powdered white button for 10 months	N/A	↓ prostate specific antigen
	5 Gut health	Hess et al. (2018) ^[31]	RCT	Neutral	70	Healthy adults	226 g/day mushrooms for 10 days	Beef (kJ matched)	↑ faecal weight and microbiota composition
		Nishihira et al. (2017) ^[32]	RCT	Lower	80	Adults with problematic halitosis, faecal or body odour	50 to 1000 mg/day mushroom extract for 4 weeks	Placebo	↓ odour and bowel strain
	6 Cardiometabolic markers	Abd-alwahad et al. (2018) ^[33]	Non-randomised trial	Lower	50	Not specified	2 g/kg body weight mushroom (in olive oil) /day for 30 days	Usual diet	↓ glucose, LDL cholesterol, triglycerides, body weight ↑ HDL cholesterol
		Weigand-Heller et al. (2018) ^[26]	RCT	Neutral	20	Healthy adults	8 or 16 g/day powdered mushrooms for 3 days	Placebo	↔ cholesterol and triglycerides
	7 Immune function	Jeong et al. (2018) ^[34]	RCT	Higher	20	Healthy adults	100 g/day white button mushrooms for 7 days	Usual diet	↑ salivary igA secretion

*Quality of study assessed using the Quality Criteria Checklist by the Academy of Nutrition and Dietetics.

Memorable mushroom messages

Bioactive Properties

1 Nutrition allrounder



Mushrooms provide nutrients found not only in vegetables, but in meat and whole grains too.

2 The special sterol



Mushrooms contain a unique sterol called ergosterol, that converts to vitamin D when exposed to light.

3 Beta-ful on the inside



The cell wall of mushrooms consists of the soluble fibre beta-glucan.

4 Unparalleled prebiotic



Mushrooms contain chitin, a unique prebiotic fibre that's not found in fruits, vegetables or grains.

5 First for ergothioneine



Mushrooms contain more ergothioneine (a unique antioxidant) than any other food.

Health Benefits

1 Fill up with fungi



Swapping beef for mushrooms has been shown to lower calorie intake, with no difference to satiety.

2 Nature's supplement



UV-exposed mushrooms can be as effective as a vitamin D supplement.

3 Healthy heart



Mushrooms cooked in extra virgin olive oil may help to improve markers of heart health.

4 Your gut bacteria loves them



Mushrooms contain special prebiotics which feed your gut bacteria.

5 Tan your mushrooms



Putting 1 cup in the sun for 15 mins can provide you with your daily vitamin D needs.

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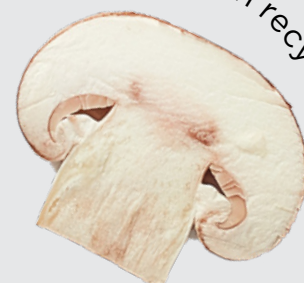
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