

Science That Sells Without Compromise: Building Trust in Functional Mushroom Products

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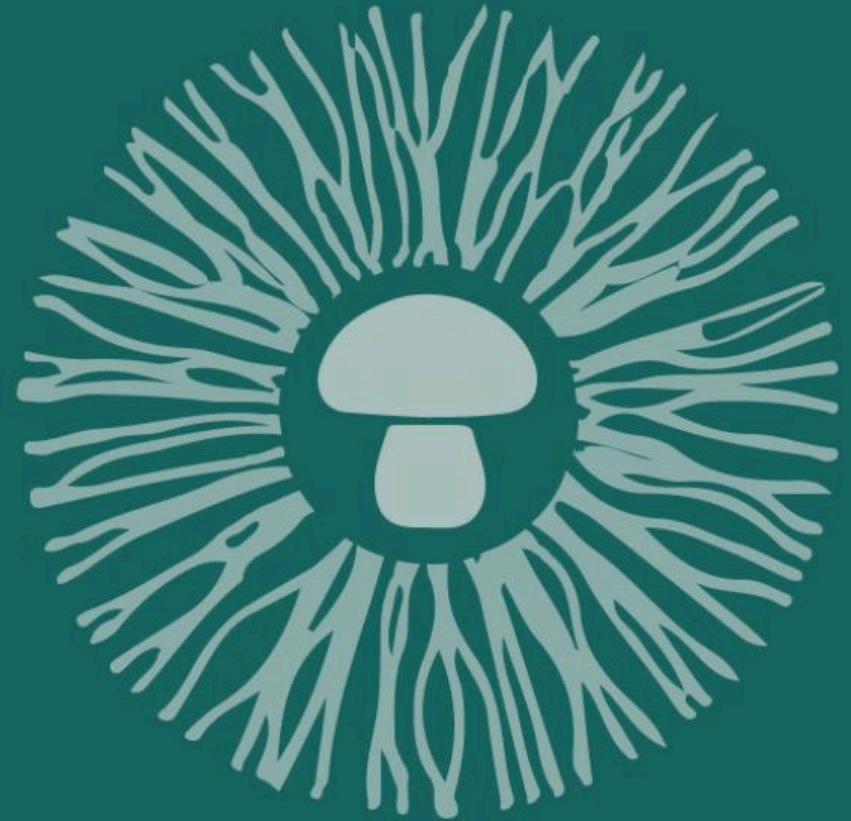
Science That Sells Without Compromise: Building Trust in Functional Mushroom Products



Dr. Julie Daoust
M2 Ingredients

FUNCTIONAL MUSHROOM COUNCIL

Science That Sells Without
Compromise: Building Trust
in Functional Mushroom
Products





Functional Mushroom Council

VISION

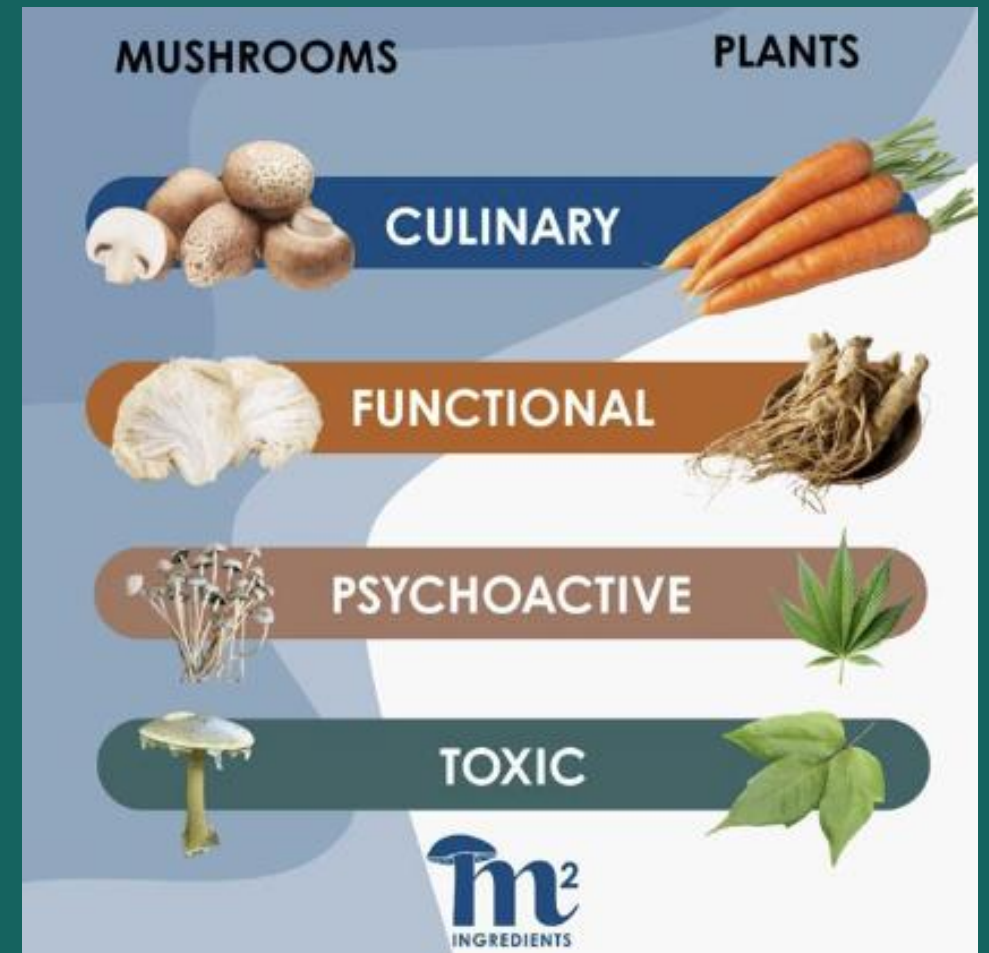
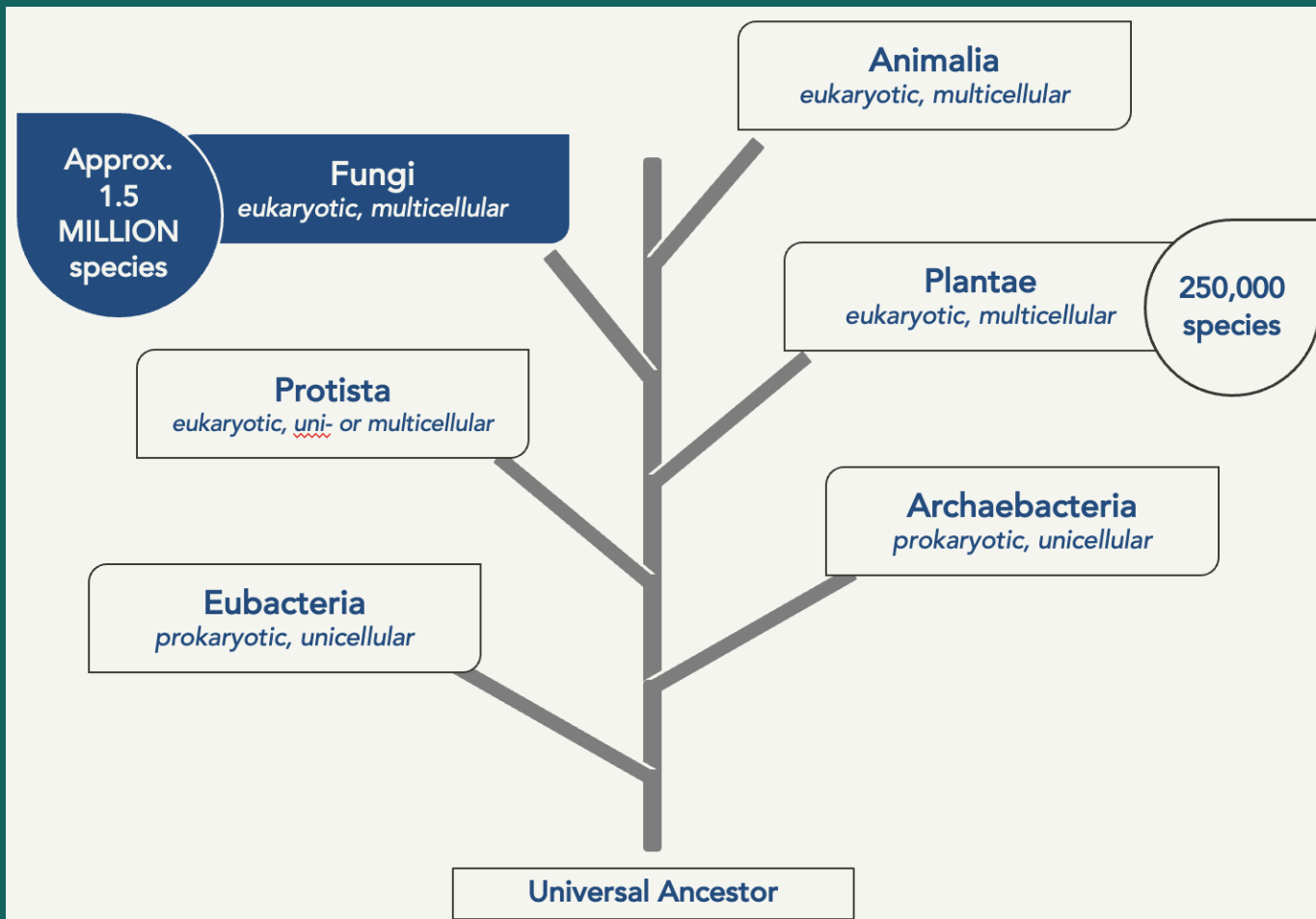
To foster a marketplace where people are enabled through education to choose high-quality, North American-grown functional mushrooms as a vital part of their wellness journey

RESEARCH | EDUCATION | PROMOTION

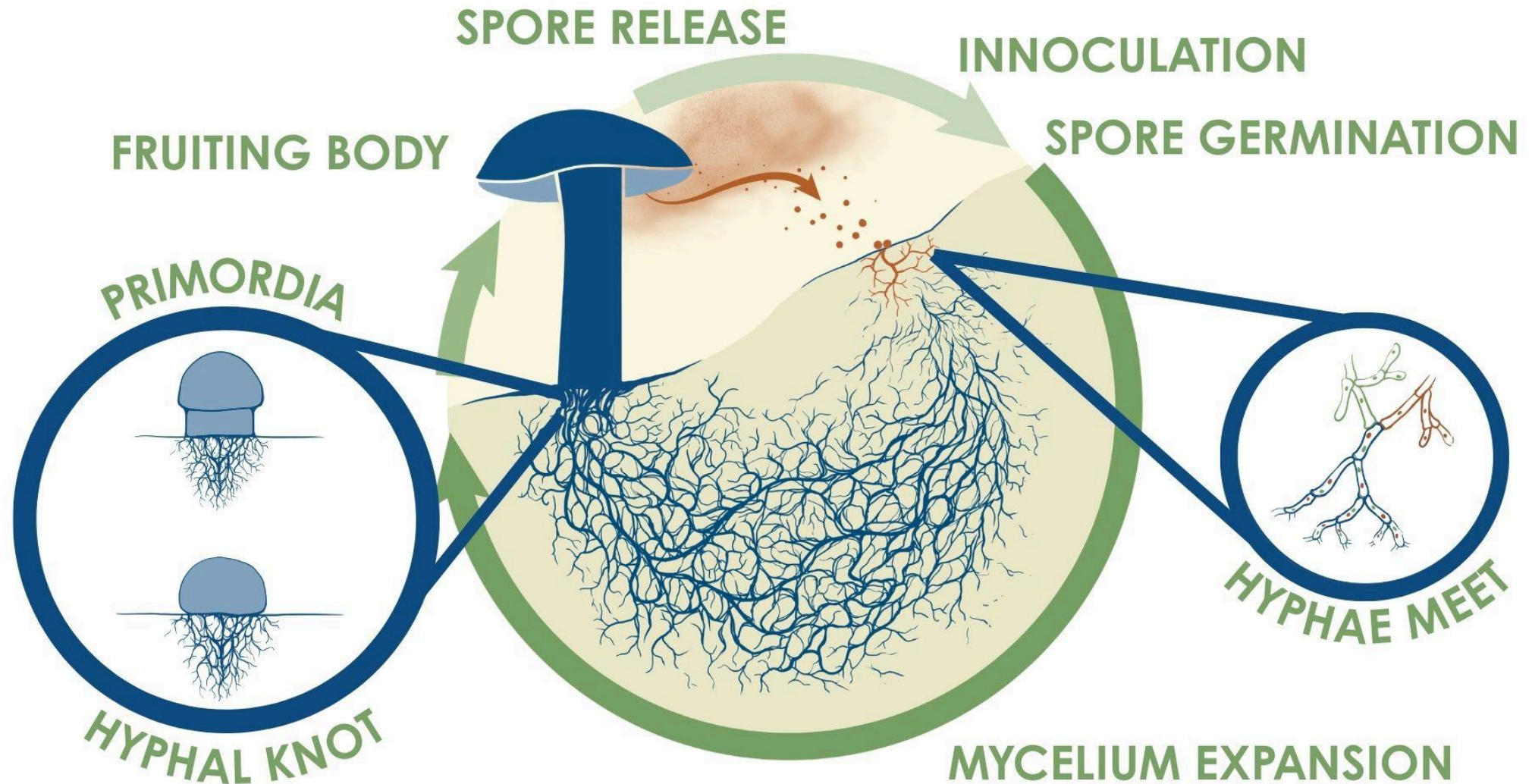
MUSHROOM FAQs

1. What is a functional mushroom?
2. What is the difference in a culinary, functional, medicinal, or psychedelic mushroom?
3. Why is there a debate over the use of the term “mushroom”?
4. Is there a life stage of the mushroom that is more efficacious? Fruiting body or mycelium?
5. Are cultivated mushrooms less efficacious than wildcrafted mushrooms?
6. What is a “filler”?
7. What is the most compelling research on functional mushrooms?
8. What should I look for on a label to ensure I am getting the highest quality functional mushroom products?

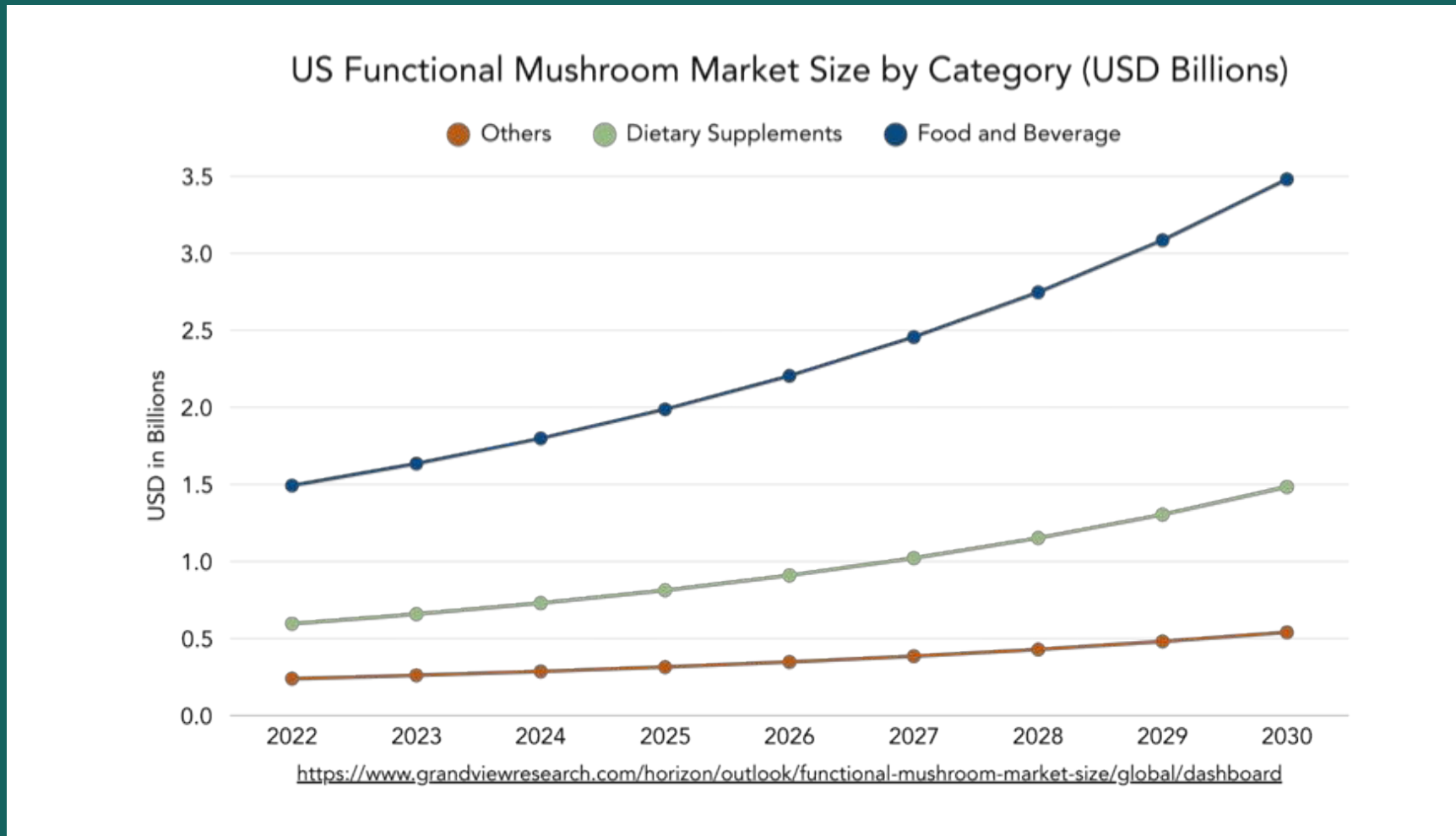
WHAT ARE FUNCTIONAL MUSHROOMS?



MUSHROOM LIFE CYCLE



A CATEGORY HERE TO STAY



Grandview Research is projecting **Functional Mushrooms Supplements to sell \$910M in finished products + 2.2 Billion in Food & Beverage in 2026.**

CONSUMER INTEREST IS GROWING

Mushroom coffee

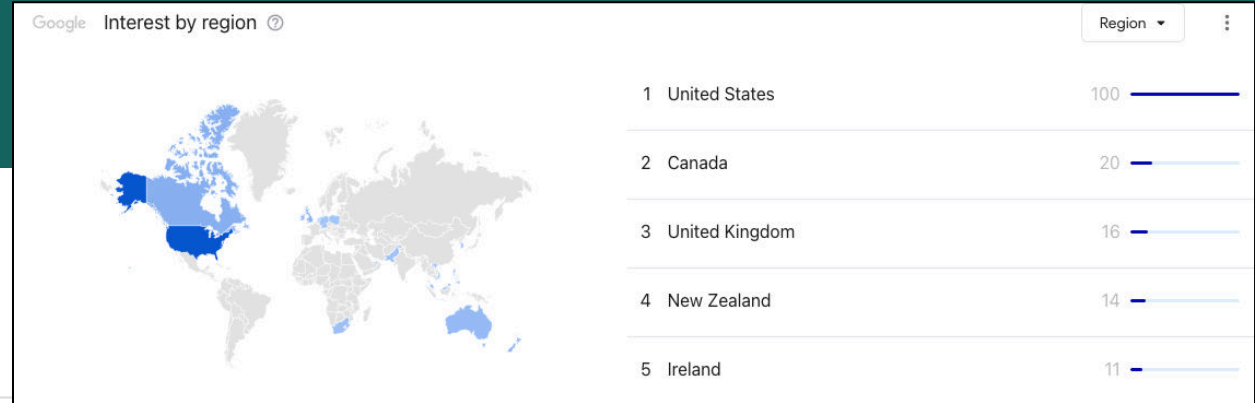
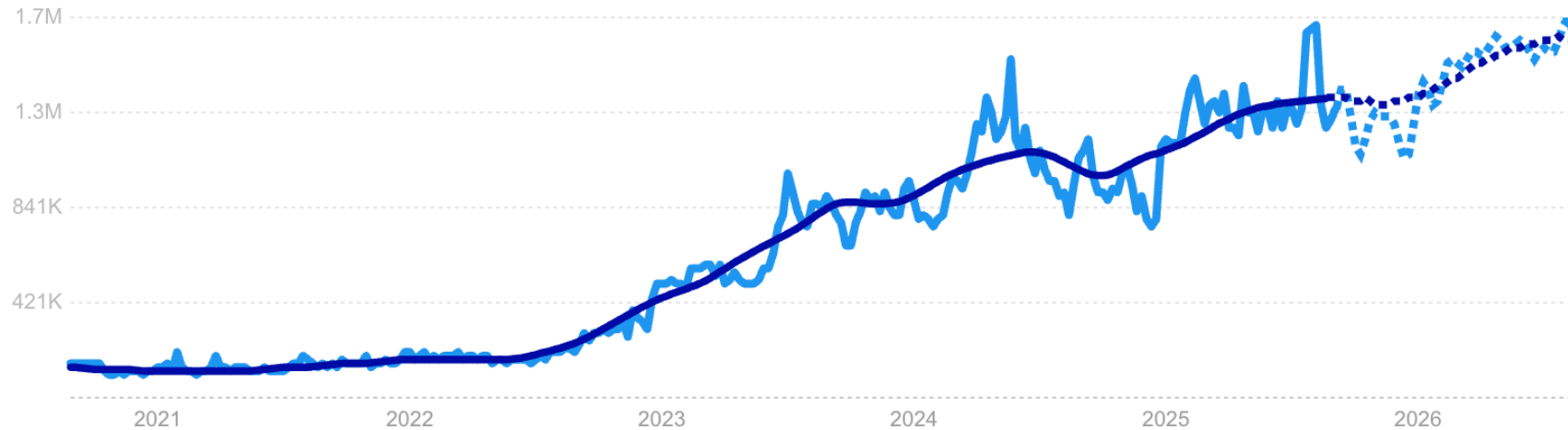
Monthly Search Volume Over Time - 5 Years

1.2M searches past month

▲ 21% past year

▲ 21% next year

— Searches — Trajectory

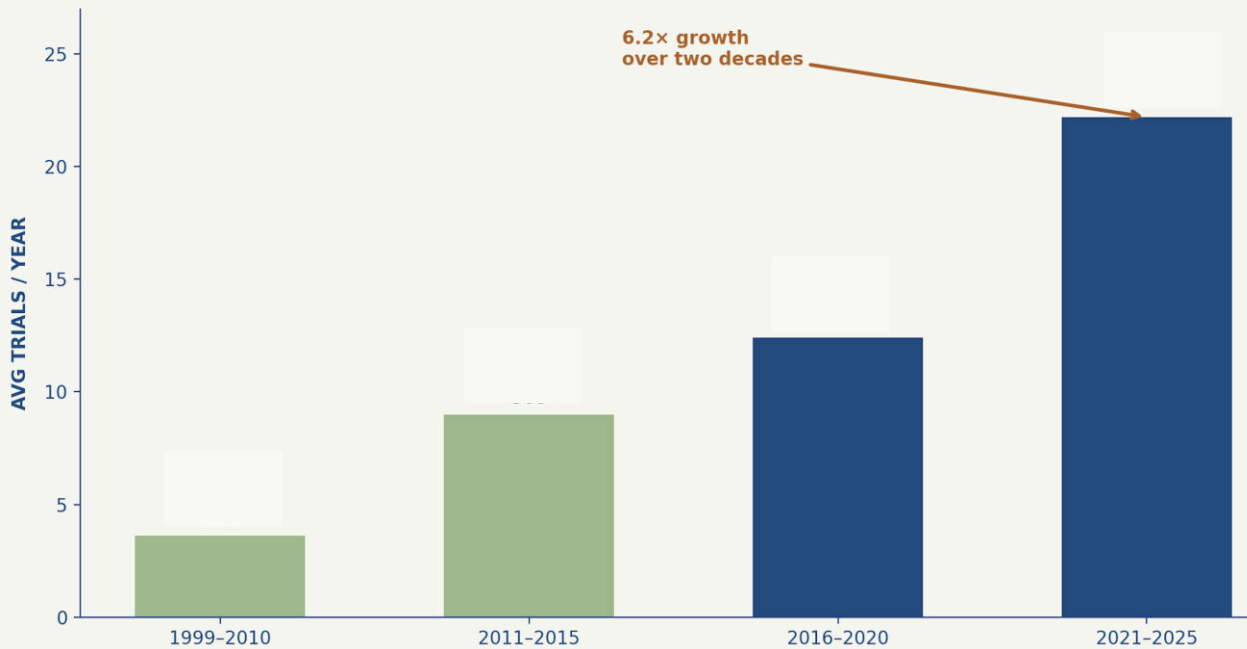


Google Trends



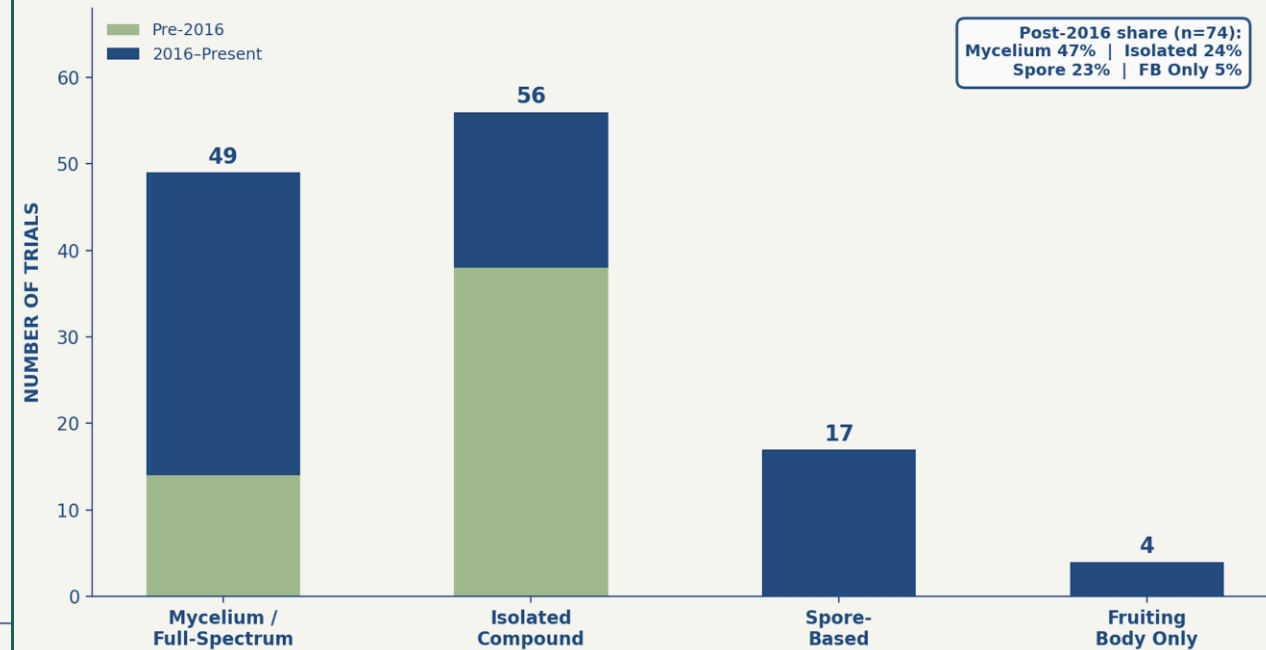
CLINICAL RESEARCH IS GROWING

AVERAGE ANNUAL TRIAL REGISTRATIONS BY PERIOD



Growth over the last 20 years

PREPARATION TYPE — WHERE SOURCE MATERIAL IS SPECIFIED (n=126)



Trials by Product Types

WHO International Clinical Trials Registry Platform (ICTRP) across the 12 species in M2 Ingredients' cultivation portfolio, 267 unique clinical trials have been registered globally



LEADING THE FUTURE OF FUNCTIONAL MUSHROOMS



M2 INGREDIENTS

CLINICALLY STUDIED MUSHROOM INGREDIENTS IN A WIDE RANGE OF BENEFITS

Backed by the largest body of human and preclinical research on mushroom ingredients approved for use in food, beverage, & supplements.

VERTICALLY INTEGRATED WITH LARGEST GROWING CAPACITY IN WESTERN HEMISPHERE

M2 Ingredients grows and processes 10 species of Function Mushrooms at their 155,000 sq. facility in Vista, California.

PRODUCTS FOR EVERY APPLICATION & ON SITE INNOVATION CENTER + R&D CAPABILITIES

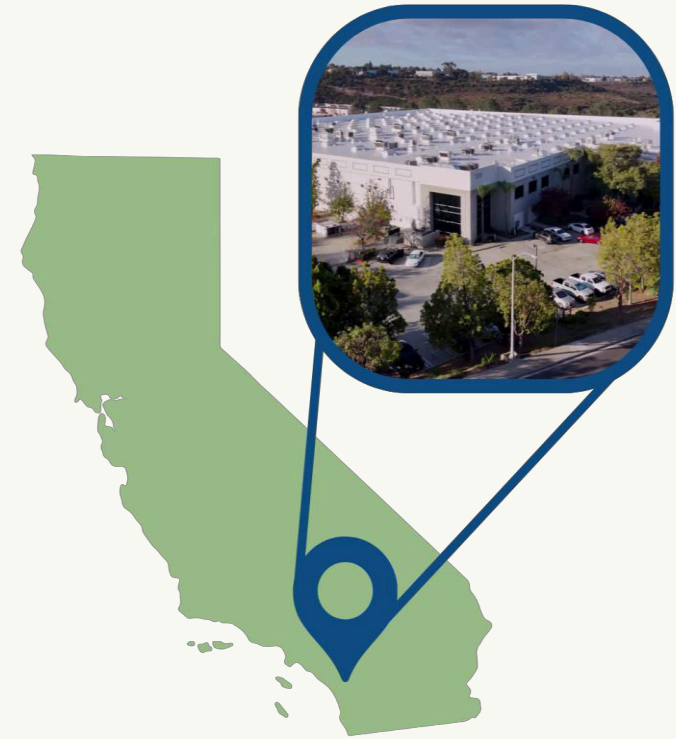
From ready-to-mix, to carbonated beverage to filtered coffee, -our mushrooms can provide functional benefits with minimal impact to taste and texture. Our food science team can provide support to get your formulas to market.

THE DEEPEST EXPERT SUPPORT IN THE CATEGORY

A full in-house team with experts in food science, health and wellness, mycology, quality, safety, and regulatory to strengthen and extend your internal team. Available to you around the clock.

HIGHEST QUALITY STANDARDS

Certified Organic, Regenerative Organic, BRCGS AA+, Non- GMO, Vegan Kosher



CALIFORNIA GROWN



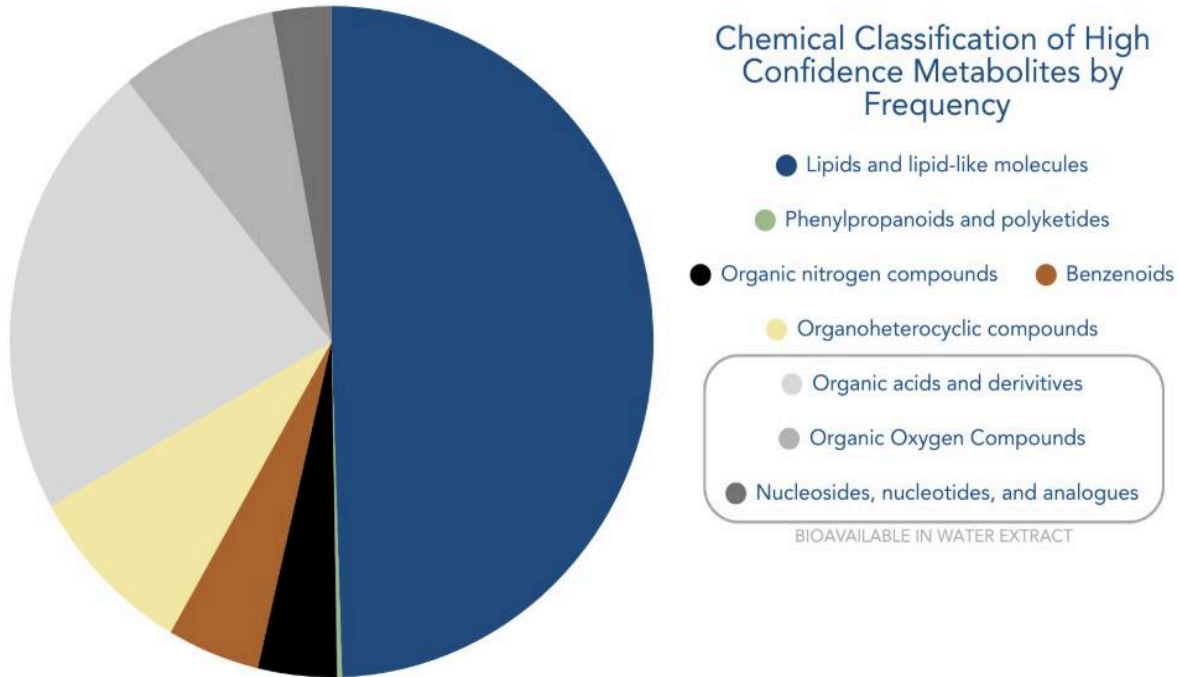
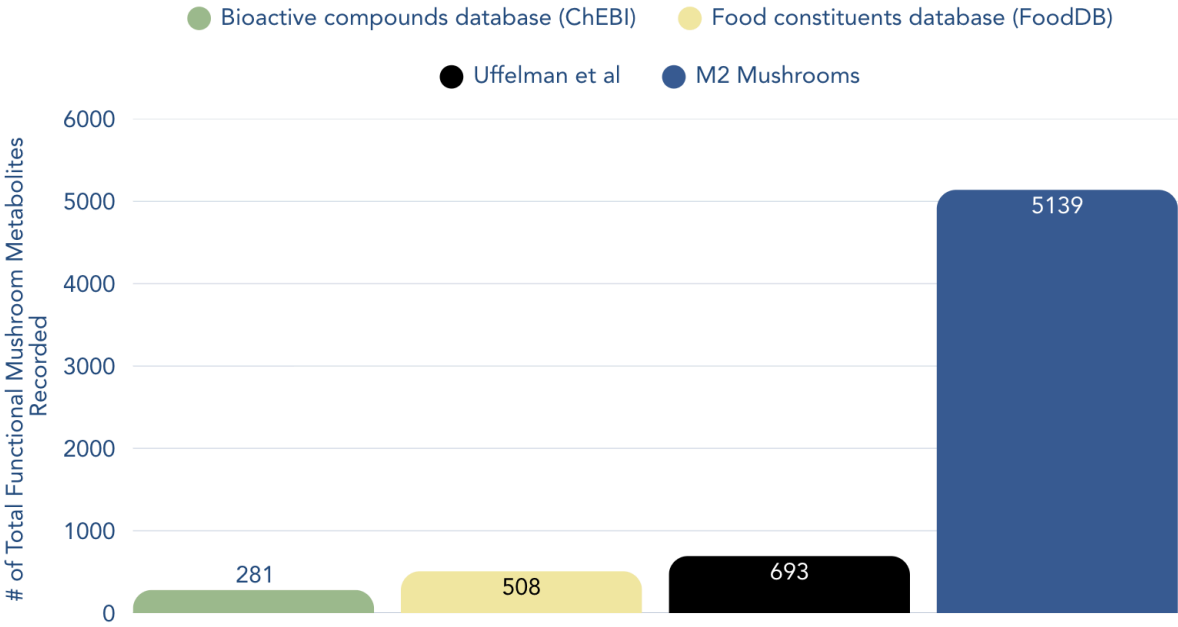
BEST OF BOTH WORLDS

Whole-life cycle ingredients harness the full biology of the mushroom



M2 METABOLOMICS STUDY: HIGHLIGHTS THE CONTINUED NEED FOR INVESTMENT IN RESEARCH

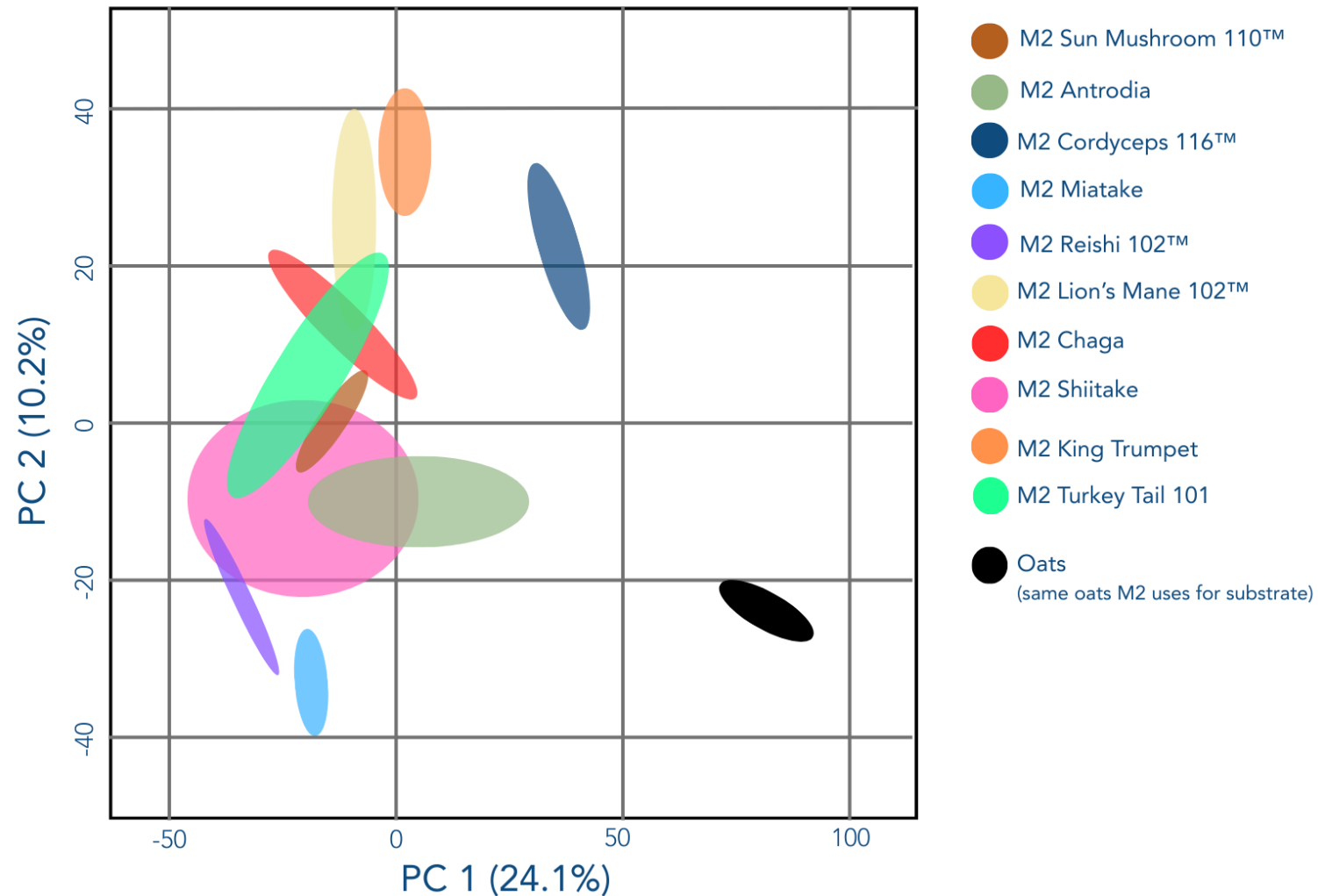
Largest fungal metabolome reported to date: literature review vs secondary metabolites in m2 cordyceps 116™



Adikai Insights. (2025, October 15). *M2 Bioactivity Atlas — Analytical characterization of mushroom-derived metabolites*. M2 Ingredients.

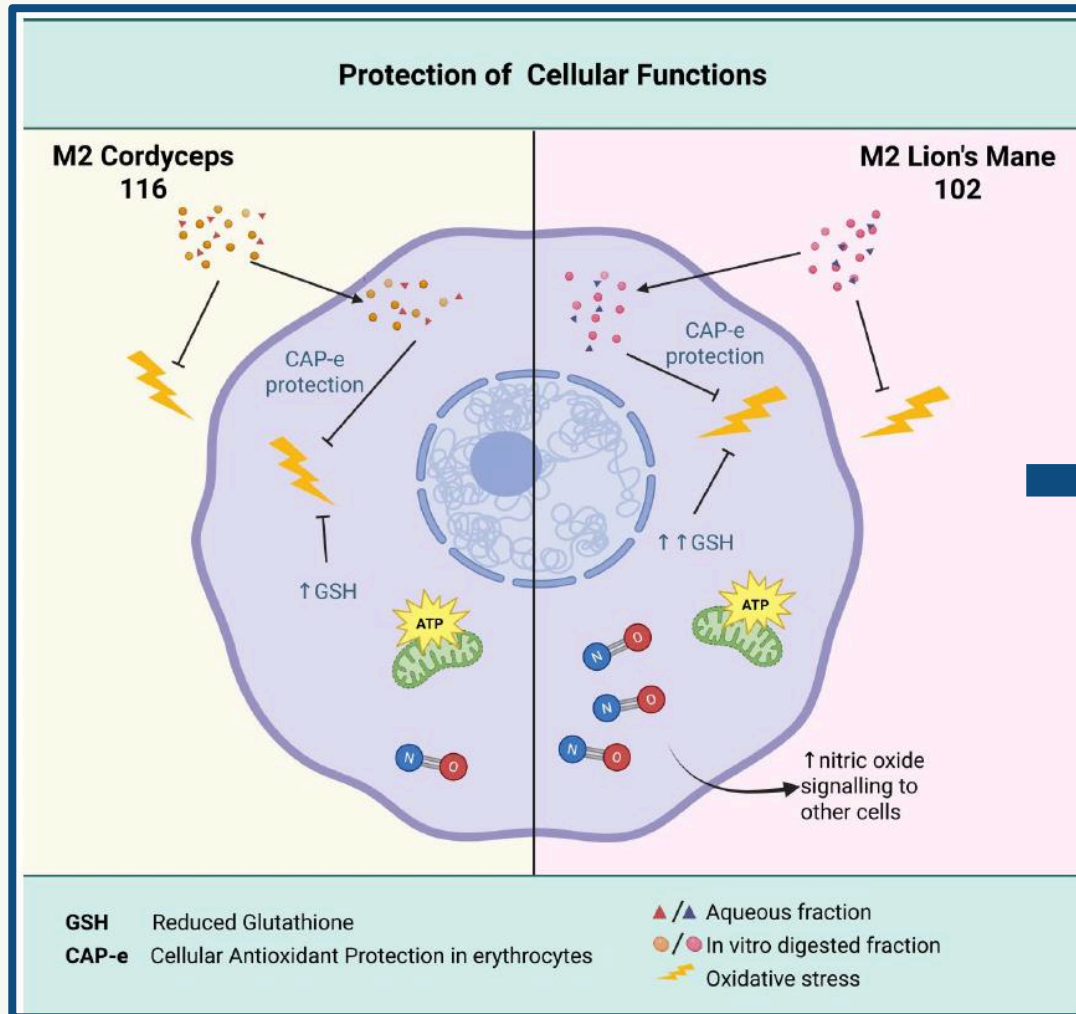


THE OAT SUBSTRATE BECOMES FUNGAL TISSUE



- **Each M2 product has a unique metabolic fingerprint**—they're not interchangeable and are species specific
- M2 Cordyceps 116™ shows the strongest separation, indicating its' distinct metabolite profiles.
- **Oats cluster completely apart from all mushrooms.**
 - If our powders contained any oat metabolite, the metabolic fingerprints would overlap.
 - Instead, the profiles are entirely different, confirming the conversion of the oats into fungi in our mushroom powders.
- Some mushroom species share metabolites, but **each still has its own signature compounds.**

CELLULAR HEALTH: ANTIOXIDANT PROTECTION



M2 Cordyceps 116 and Lion's Mane 102™ improve cellular antioxidant protection, energy production, and nitric oxide formation.

HEALTH IMPACTS

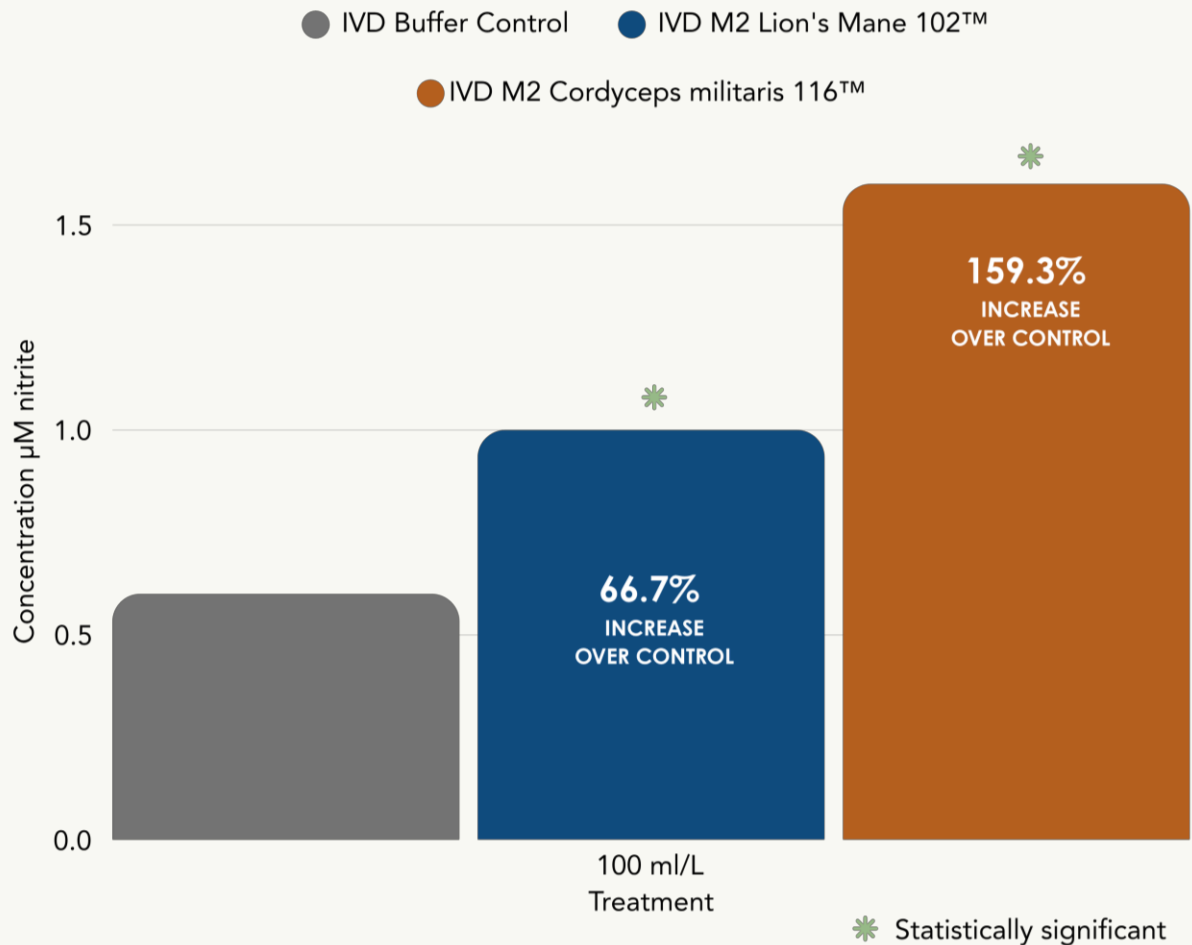


SPORT PERFORMANCE + RECOVERY



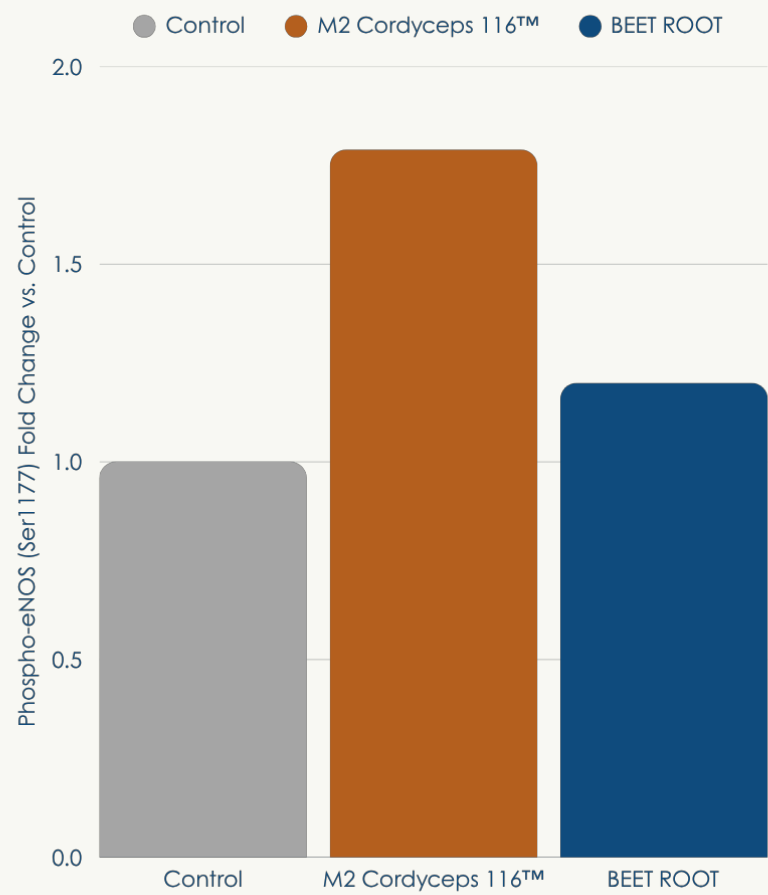
Grinage, E. A. F., Anderson, L., Sanchez, K., Cruickshank, D., Gamble, A. S. D., Daoust, J., Schmalz, J., Steve Farrar, S., Gitte S. Jense, G. S. (2026). M2 Lion's Mane 102™ and M2 Cordyceps 116™ aqueous and post-aqueous in vitro digested fractions have differential effects on cellular antioxidant protection, energy production, and nitric oxide production. International journal of medicinal mushrooms, In Press

CELLULAR HEALTH | NITRIC OXIDE (NO)



Roberts, M., & Mobley, C. B. (2025). *Cell culture experiment to determine the effects of plant extracts on vascular endothelial cell markers* [Unpublished technical report]. School of Kinesiology, Auburn University.

INCREASE IN eNOS ACTIVATION



SPORT PERFORMANCE & RECOVERY

M2 CORDYCEPS 116™ is like a natural turbo boost — it helps your body use oxygen better, which is why it's a favorite among athletes.

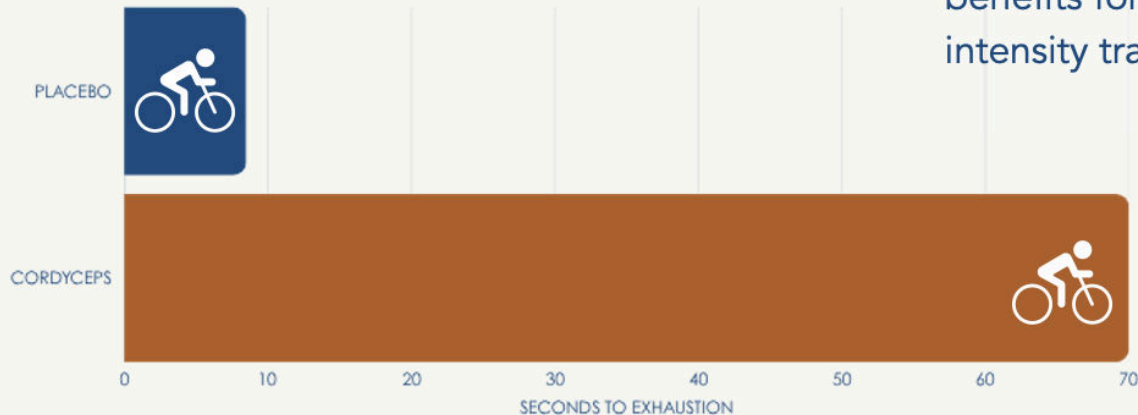
CLINICAL STUDY SUMMARY

THREE weeks of Cordyceps-containing mushroom blend supplementation improved key performance metrics:

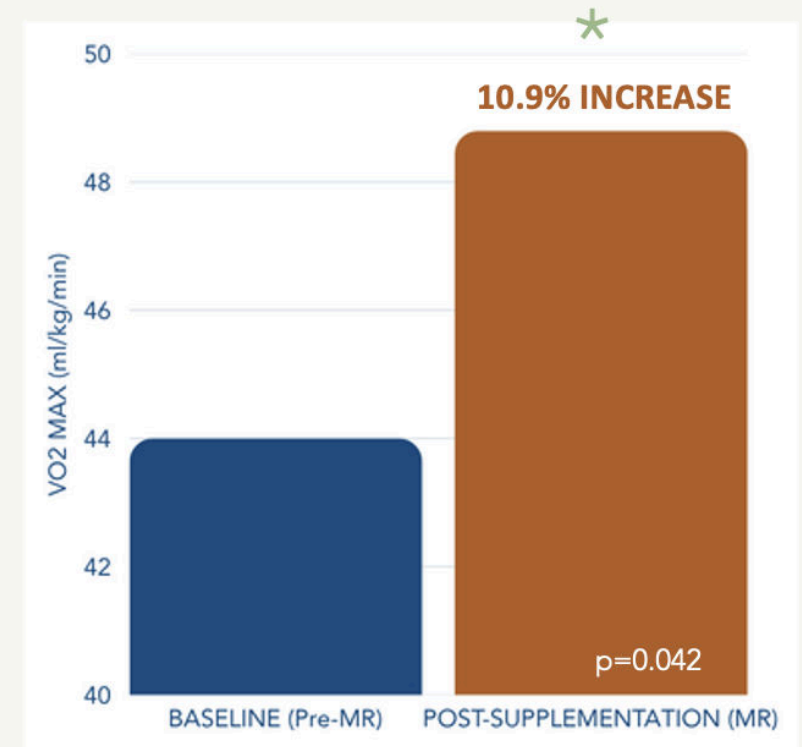
- ↑ **VO2 MAX**
- ↑ **TIME TO EXHAUSTION**

Suggesting potential ergogenic benefits for endurance and high-intensity training.

INCREASED TIME TO EXHAUSTION



SIGNIFICANT INCREASE IN VO2 MAX



Hirsch et al.: Chronic supplementation of a mushroom blend on oxygen kinetics, peak power, and time to exhaustion. Journal of the International Society of Sports Nutrition, 2015.

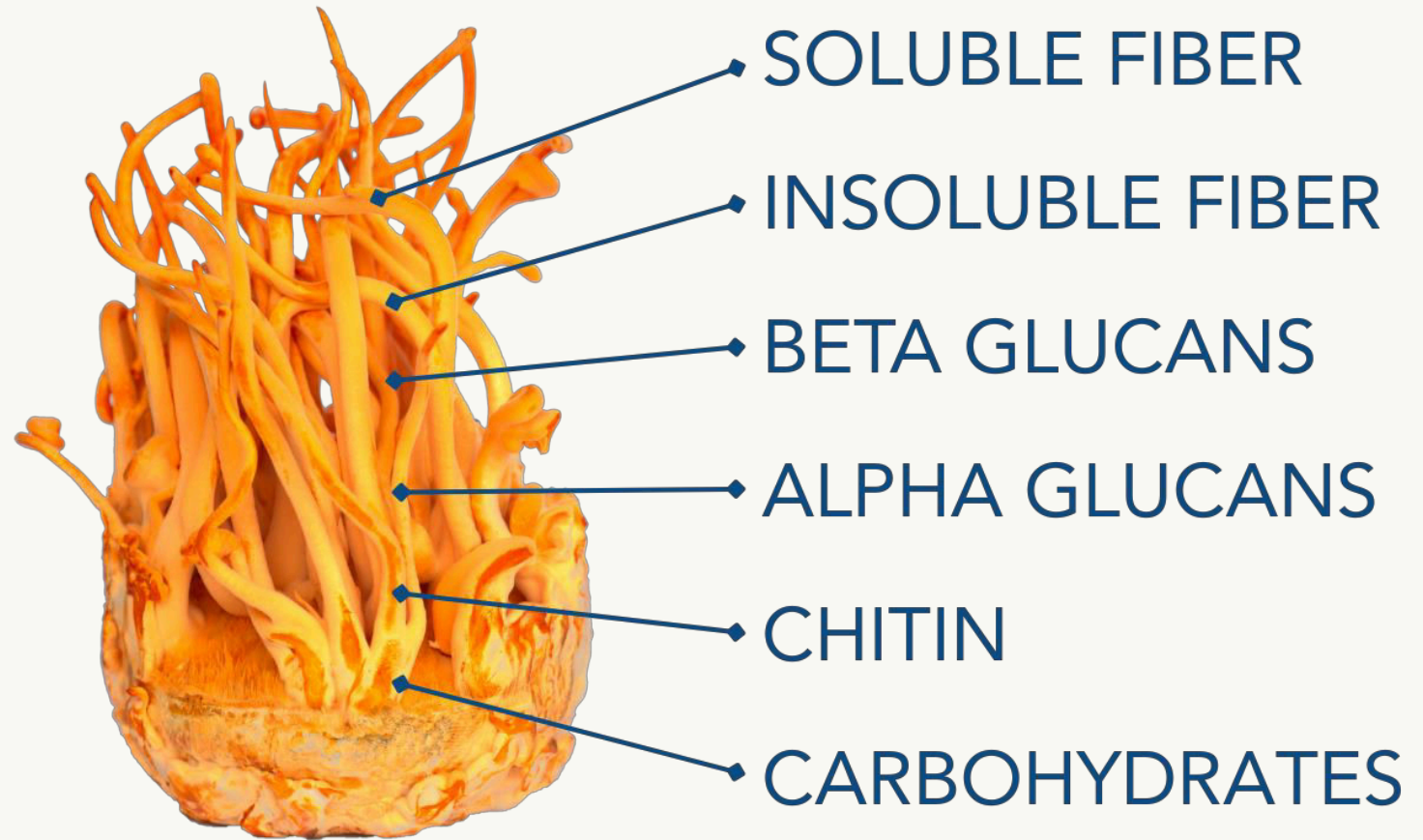


RESEARCH SHOWS

MUSHROOMS ARE PREBIOTICS

Prebiotic - *noun*

:a substance that when consumed promotes the growth of beneficial bacteria in the digestive tract.



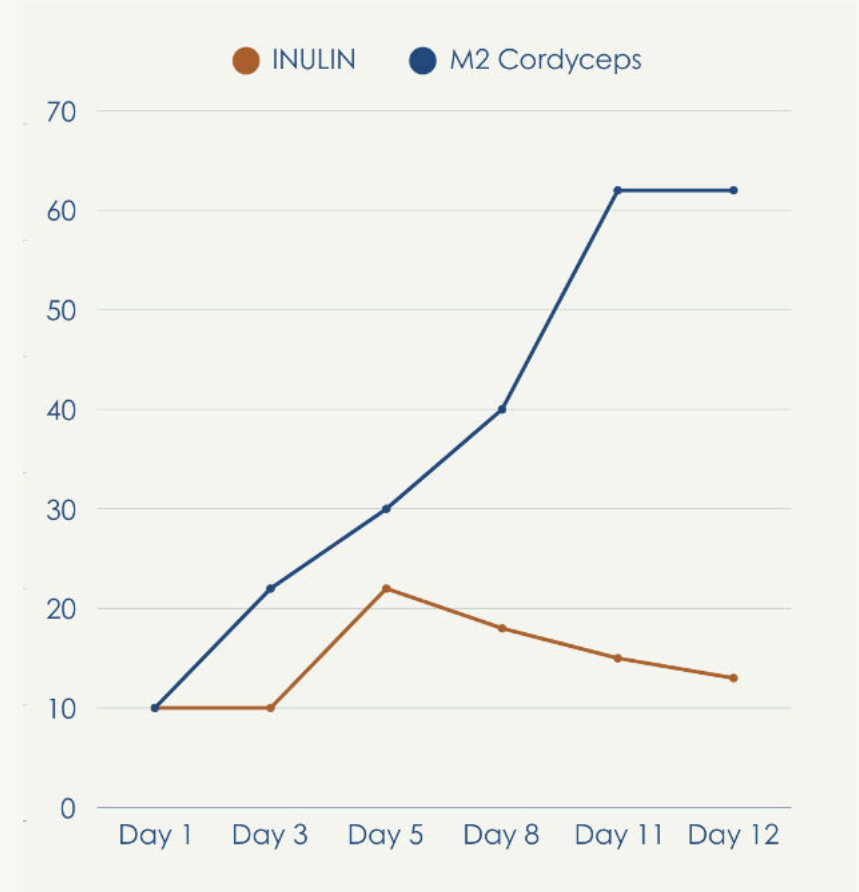
M2 CORDYCEPS MILITARIS VS INULIN AS PREBIOTIC

Butyrate, a short-chain fatty acid produced by the fermentation of dietary fiber in the colon, is essential for gut health and overall well-being. It serves as a primary energy source for colonocytes, the cells lining the colon, fueling up to 70% of their needs. Butyrate strengthens the gut barrier and the blood brain barrier, preventing harmful substances from entering the bloodstream and reducing inflammation. Its anti-inflammatory properties can soothe gut irritation and lessen IBD symptoms. Additionally, butyrate promotes regular bowel movements and can alleviate constipation. Butyrate also has impact on memory and focus

CORDYCEPS WIN!



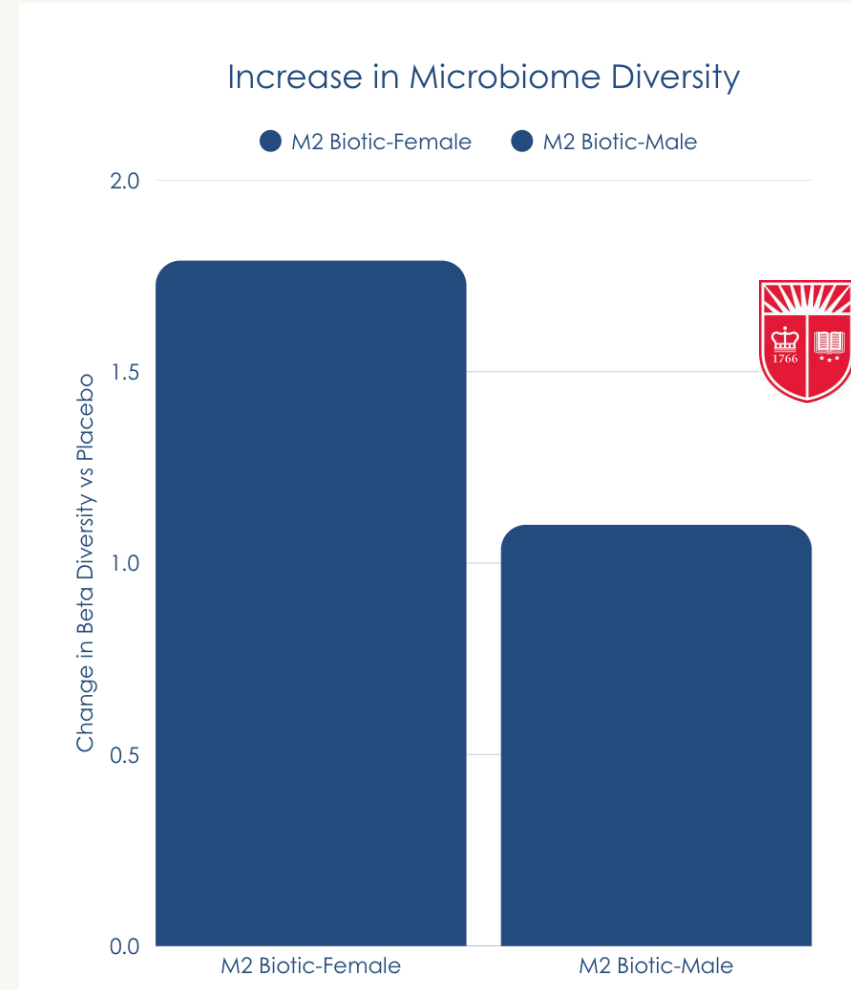
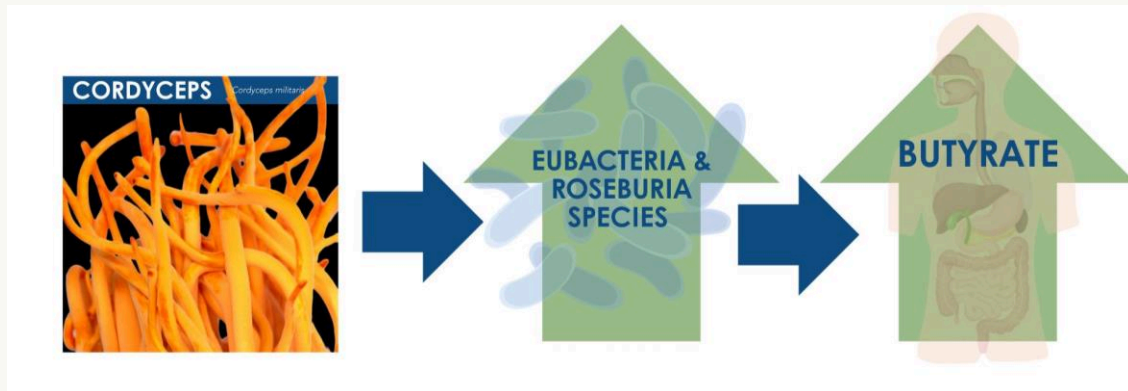
- ✓ Superior Butyrate Production
- ✓ Gradual and Sustained Increase
- ✓ Reduced Gas Discomfort
- ✓ Fiber + ADDED FUNCTION



Daoust, J., Schmalz, J., Rotsaert, C., Vannieuwenhuysse, C., De Medts, J., Van Meulebroek, L., & Duysburgh, C. (2025). Prebiotic activity of functional whole mushroom powders compared to inulin in SHIME® model colonic simulations. *Journal of Functional Foods*.

CLINICAL TRIAL RESULTS UPDATE- Rutgers University & USC Collaboration

M2 CORDYCEPS 116™ + M2BIOTIC™



RUTGERS

USC



Julie Daoust, Jay Schmalz, Lieven Van Meulebroek, Jonas Ghyselinck, Lynn Verstrepen, Massimo Marzorati, Prebiotic activity of functional whole mushroom powders in short-term in vitro colonic simulations, Journal of Functional Foods, Volume 130, 2025, 106912, ISSN 1756-4646, <https://doi.org/10.1016/j.jff.2025.106912>.

Campbell, S., Arent, S. Impact of a Functional Mushroom Blend on digestive health, microbiome and metabolic outcomes. 2026. Manuscript in process

Science That Sells Without Compromise: Building Trust in Functional Mushroom Products



Chase Beathard, PhD, MBA
Fungi Perfecti



For millennia we've focused on the mushroom you can see...

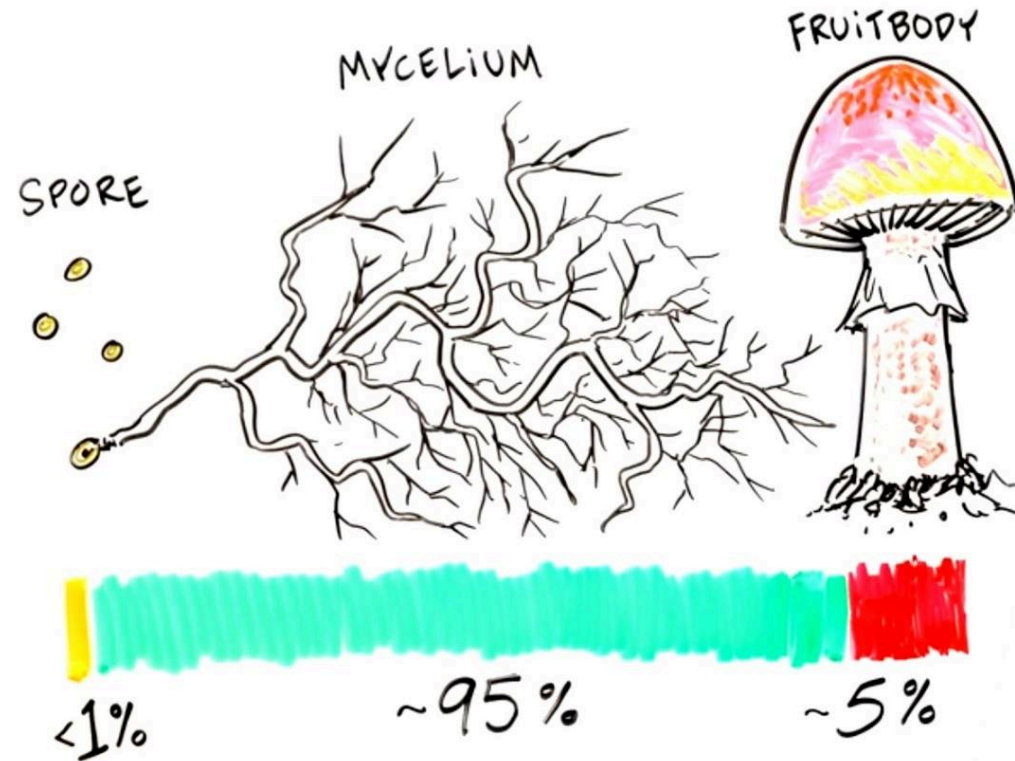


Illustration by AfterSkool

***...But the organism itself has always been
something much larger.***



Fungi Perfecti Research & Development

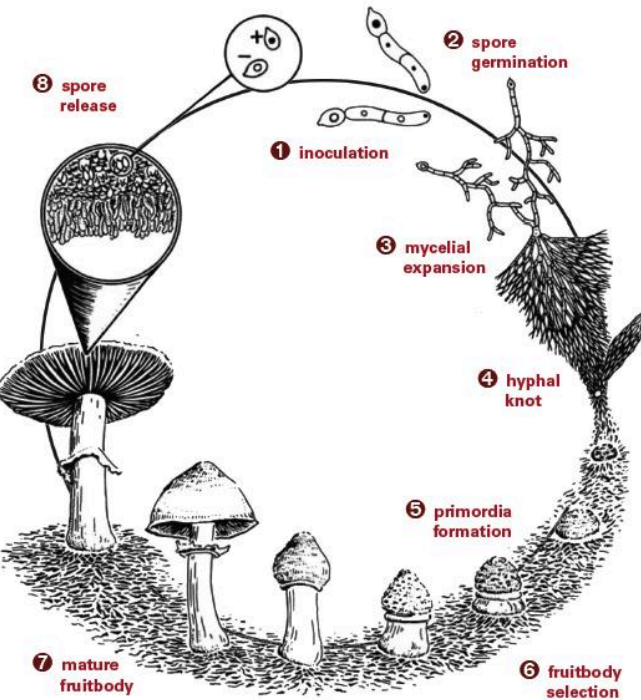
Expanding the Mycelial Frontier



Chase Beathard, PhD, MBA
Director of R&D



RESEARCH & DEVELOPMENT





Mycelium Consistently Shows More Uniquely Active Genes Than Fruiting Body

Peer-reviewed studies show that mycelium activates more genes than the fruiting body across species—including Lion’s Mane, Reishi, Cordyceps, and Shiitake.

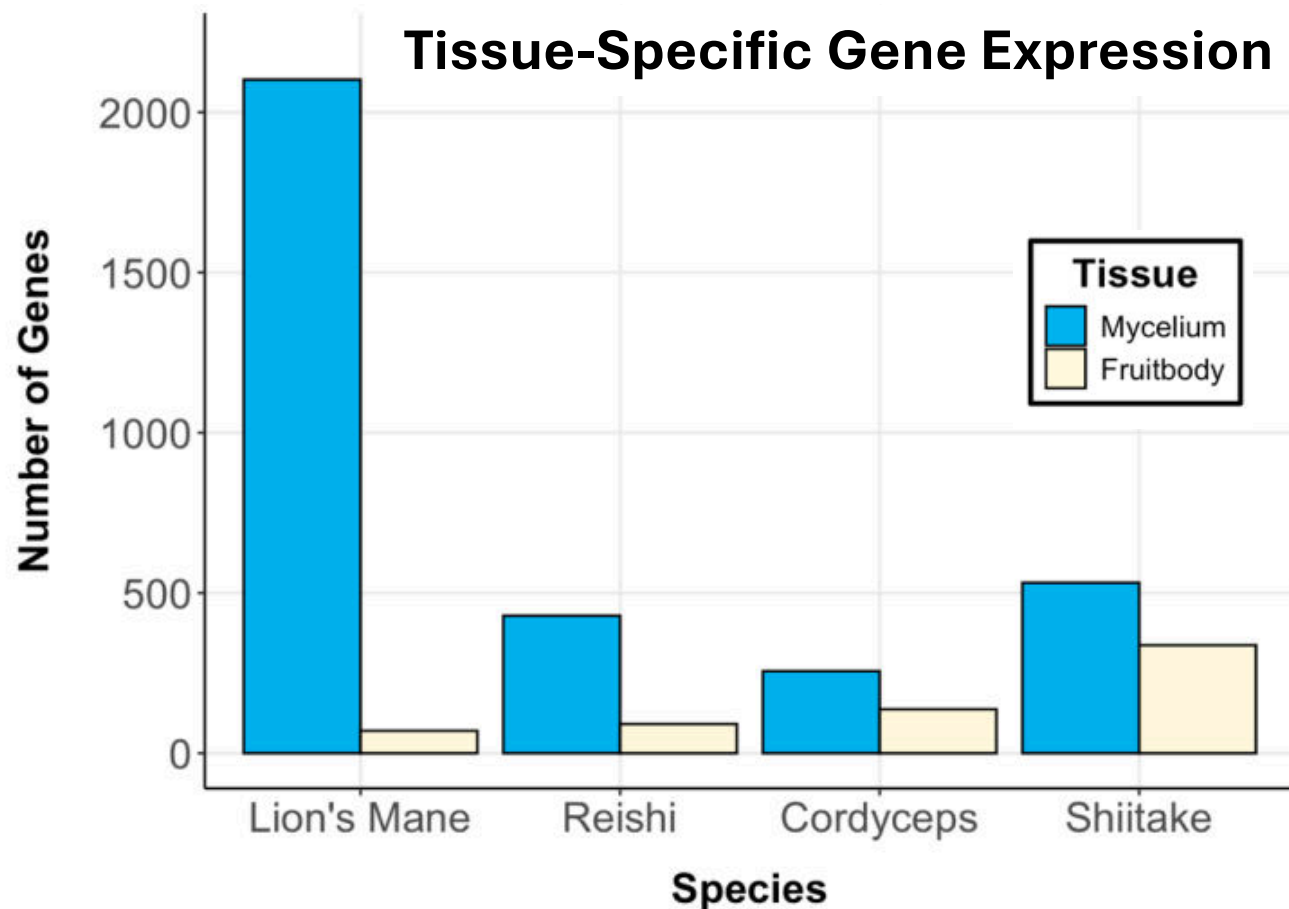


Table 1. Summary of studies evaluating differential gene expression between mycelium and fruiting body among the most common functional mushrooms (DK = dikaryotic mycelium; MK = monokaryotic mycelium; P = primordia; FB = fruitbody).

Species	Study	Comparison
<i>Ganoderma lucidum</i>	Chen et al. (2012)	DK vs. P vs. FB
<i>Hericium erinaceus</i>	Chen et al. (2017)	MK vs. DK vs. FB
<i>Lentinula edodes</i>	Song et al. (2018)	DK vs. FB
<i>Cordyceps militaris</i>	Thananusak et al. (2022)	DK vs. FB

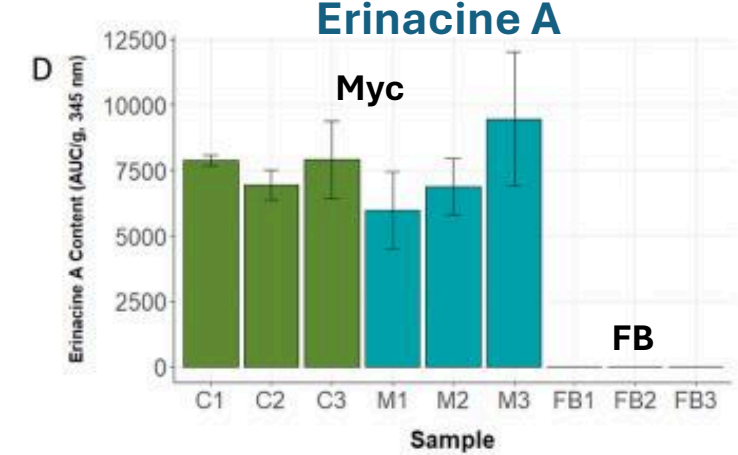
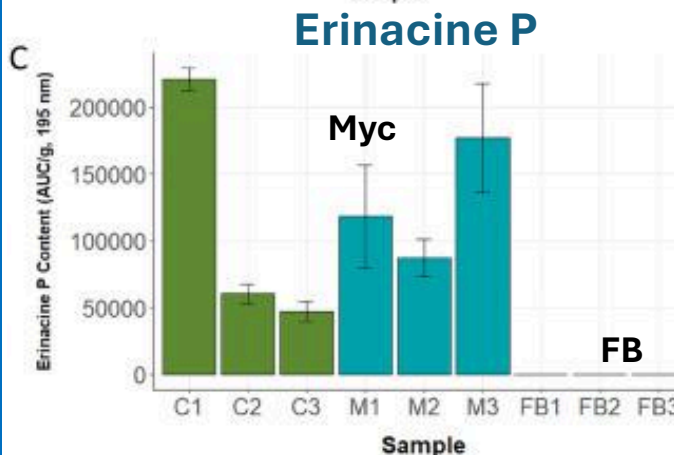
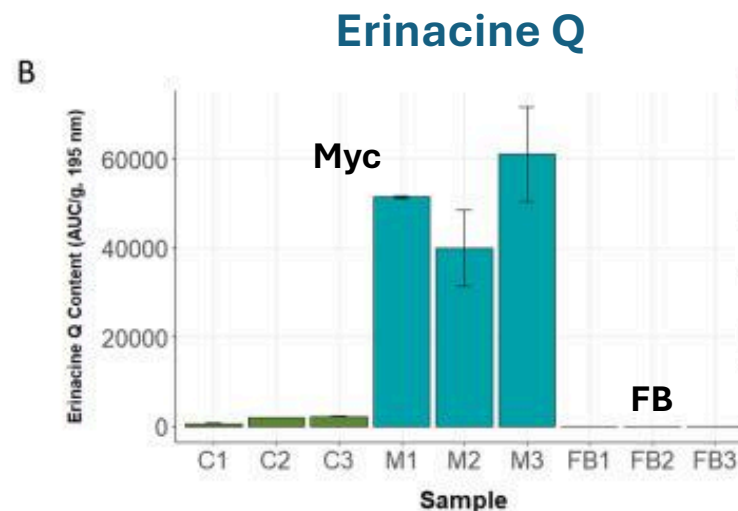
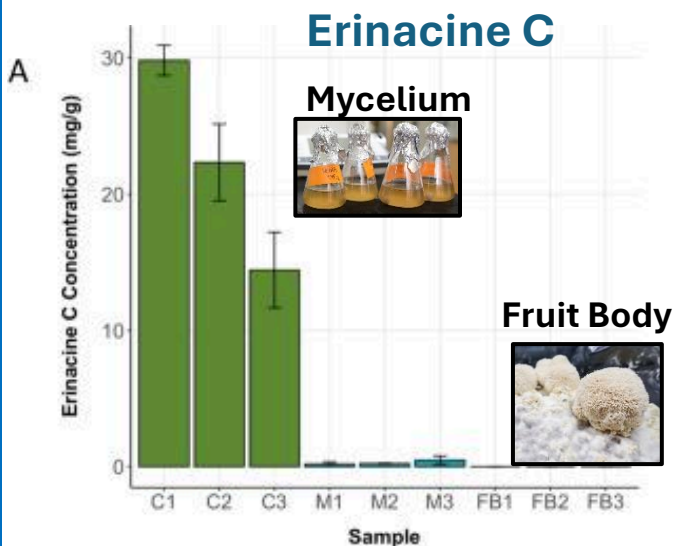


A Mycelium Exclusive:

Brain Supporting Erinacines *Unique* to Lion's Mane Mycelium

Doar et al. *Fungal Biology and Biotechnology* (2025) 12:4
<https://doi.org/10.1186/s40694-025-00194-9>

Fungal Biology and
Biotechnology

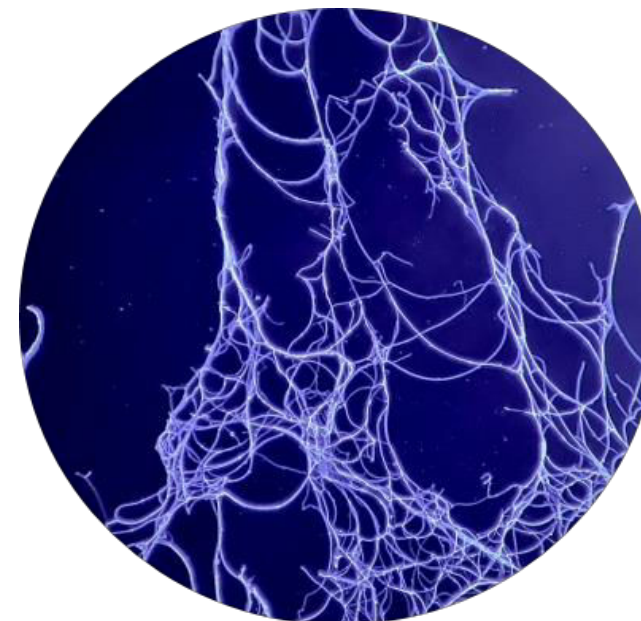


RESEARCH

Open Access

Influences of substrate and tissue type on erinacine production and biosynthetic gene expression in *Hericium erinaceus*

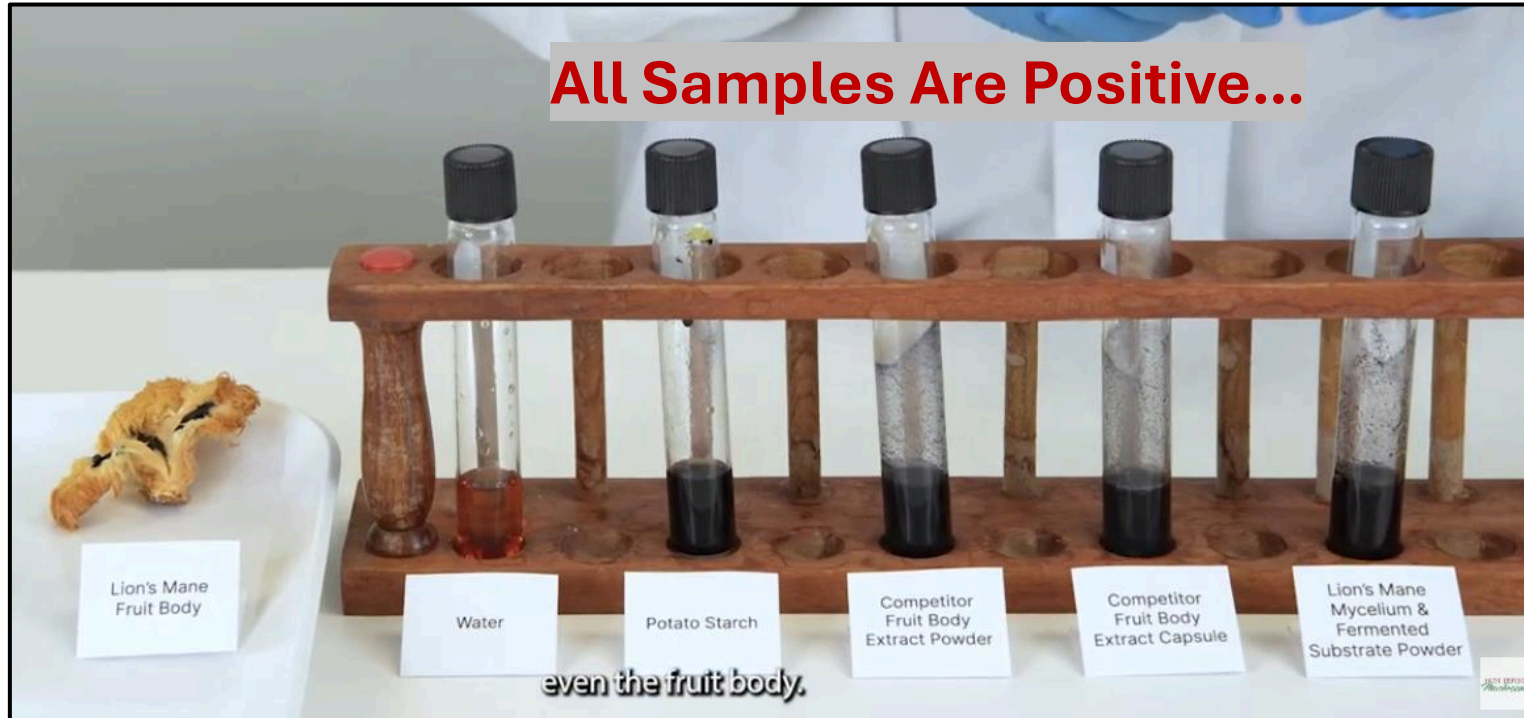
Elizabeth Doar¹, Kyle W. Meyer¹, Zolton J. Bair¹, Regan Nally¹, Steve McNalley², Renee Davis³ and Chase Beathard^{1*}





Starch Iodine Testing

19th Century Chemistry, 21st Century Mistake



Fruitbody and Mycelium Results

Hericium erinaceus
Fruitbody
Tissue color



Hericium coralloides
Fruitbody
Tissue color



Hericium erinaceus
Mycelium (Liq. Cult.)
Powder color



Ganoderma lucidum
Fruitbody
Tissue color



Morchella populiphila
Fruitbody
Tissue color



Grifola frondosa
Fruitbody
Tissue color



Pleurotus sp.
Fruitbody
Tissue color





A ‘Canker’ in the Mushroom Industry: ‘Wood’ You Believe? Most Chaga Is Predominantly Woody Tissue

“Chaga contains approximately 10% fungal mycelium, with the remainder consisting of **decayed woody tissue.**”



Article

Comparative Study of Chaga (*Inonotus obliquus*) Dietary Supplements Using Complementary Analytical Techniques

Coleton Windsor ¹, Anna E. Kreynes ^{1,*}, Jeff S. Chilton ¹, William A. Chioffi ¹, Arun Krishnamurthy ²
and Melissa Ishii ¹

Supplement Facts

Serving Size 2 Capsules

	Amount per serving	%DV
Organic Chaga (<i>Inonotus obliquus</i>) extract	1000 mg	*
Beta-(1,3)(1,6)-glucans	80 mg	*

* Daily Value (DV) not established.

OTHER INGREDIENTS: Hypromellose (vegetable capsule), microcrystalline cellulose (flow agent), silicon dioxide.

Microcrystalline cellulose & silicon dioxide are commonly used in product processing.

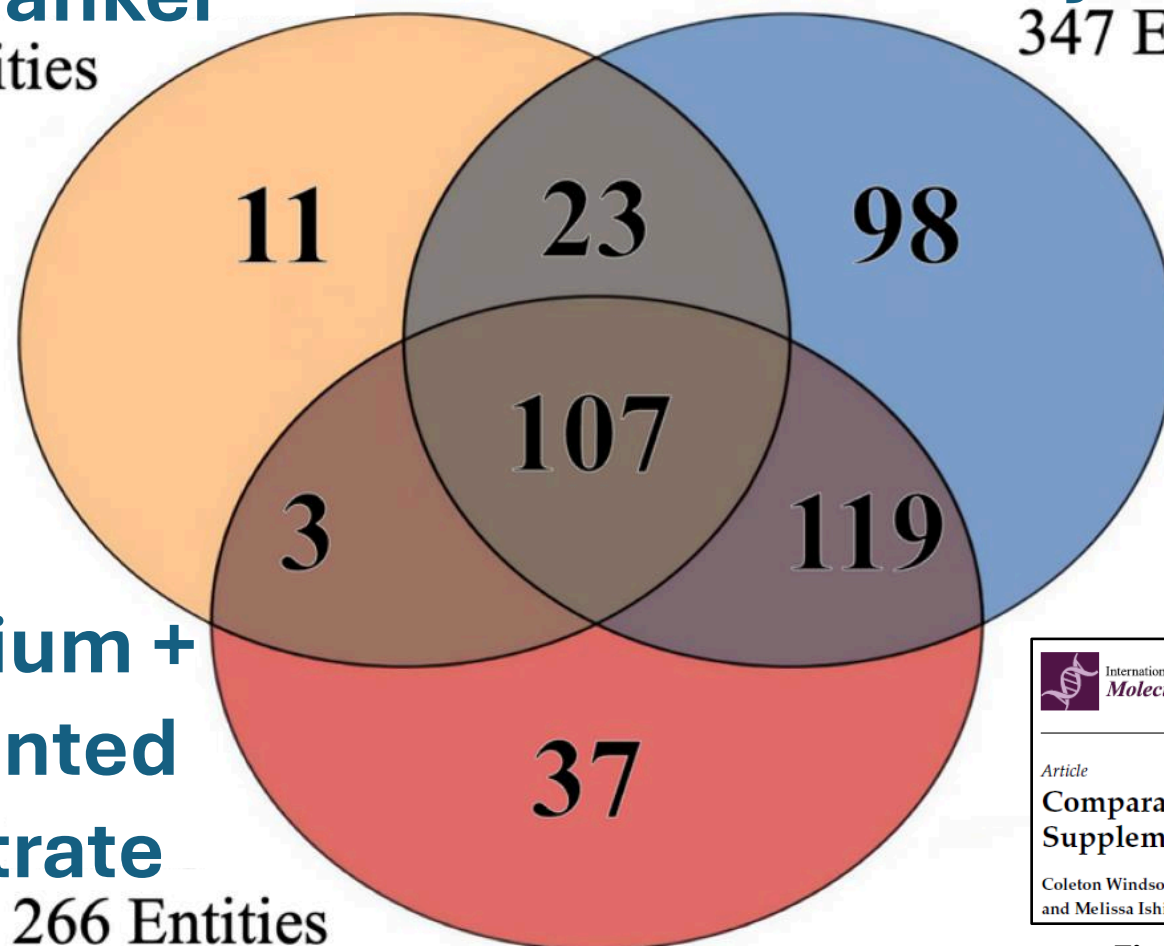


Hidden Power: Mushroom Mycelium's Chemical Complexity


Chaga Canker
144 Entities

Mycelium
347 Entities






**Mycelium +
Fermented
Substrate**
266 Entities



**Mycelium Offers
~3x to ~9x the
Chemical
Diversity in
Chaga!**

International Journal of
Molecular Sciences 

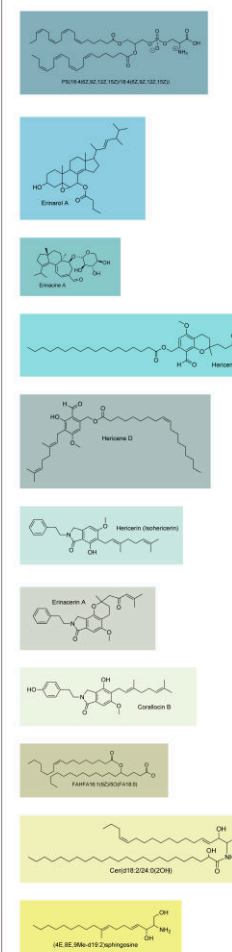
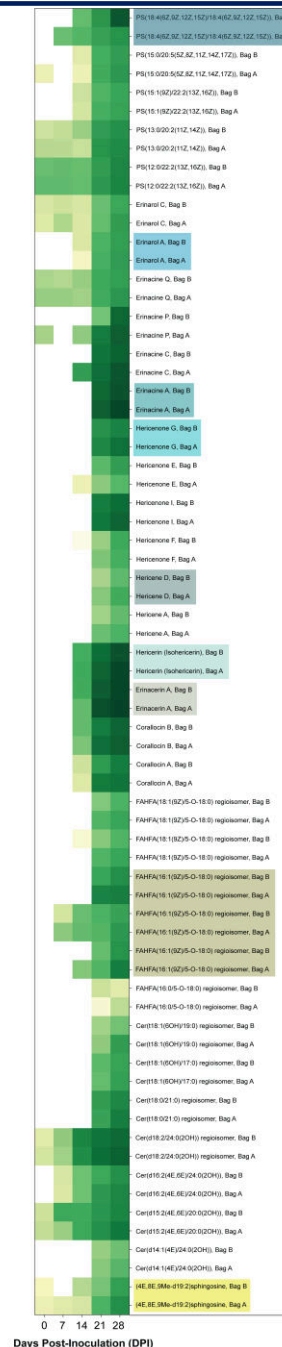
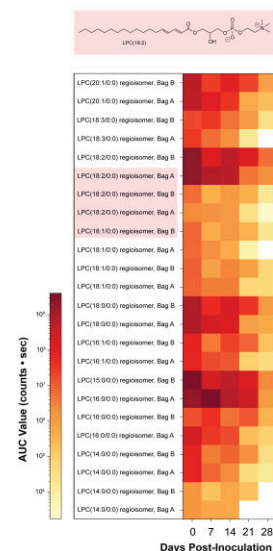
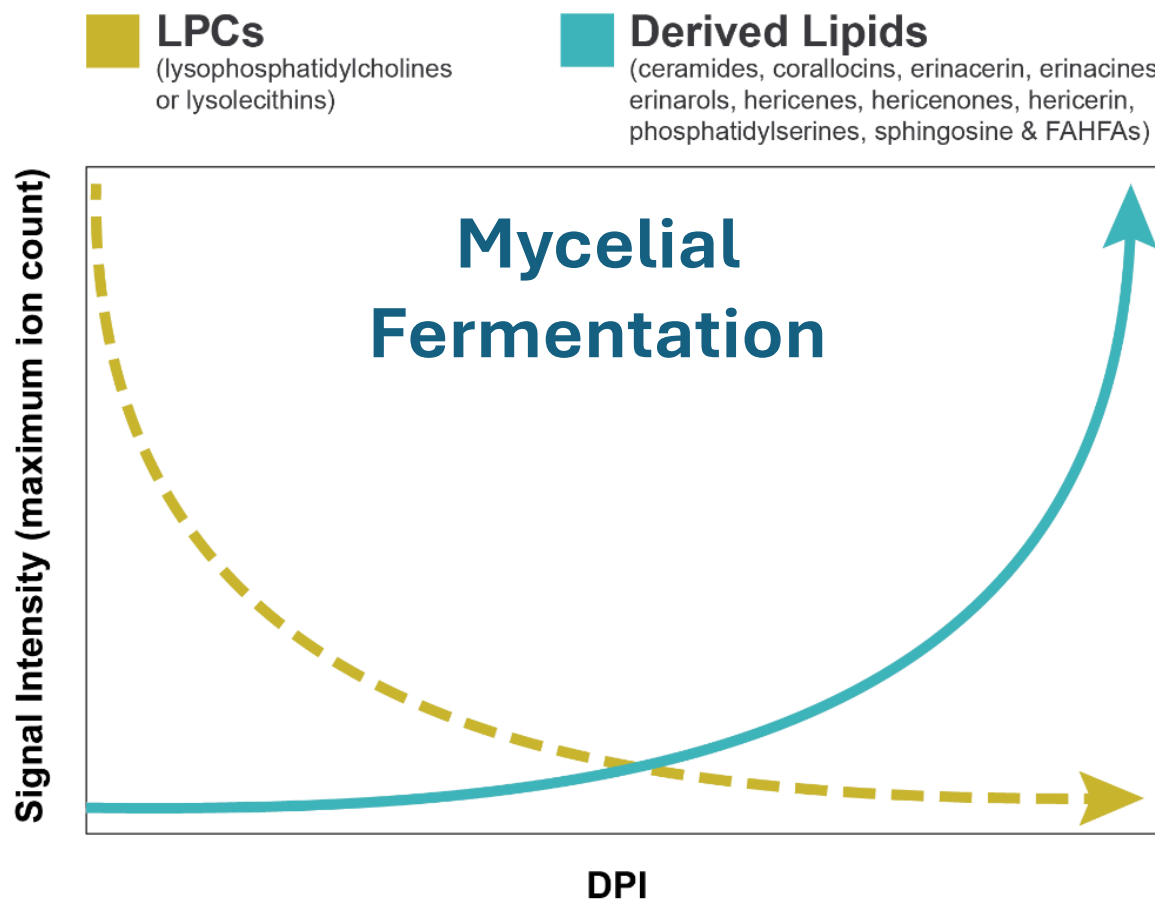
Article
**Comparative Study of Chaga (*Inonotus obliquus*) Dietary
Supplements Using Complementary Analytical Techniques**

Coleton Windsor ¹, Anna E. Kreyne ^{1,*}, Jeff S. Chilton ¹, William A. Chioffi ¹, Arun Krishnamurthy ²
and Melissa Ishii ¹



Biochemical Transformation Driving Functional Potential

Metabolomics of Lion's Mane Colonization





Hidden Power in Action:

Complex Chemistry for Complex Immune Support

immuno MDPI

Article
Calm Under Challenge: Immune-Balancing and Stress-Quenching Effects of *Hericium erinaceus* Mycelium in Human Immune Cells

Elizabeth Doar , Jessica Kishiyama , Zolton J. Bair and Chase Beathard

Department of Research and Development, Fungi Perfecti, LLC, Olympia, WA 98507, USA;
 elizabeth.d@fungi.com (E.D.)
 * Correspondence: chase.b@fungi.com

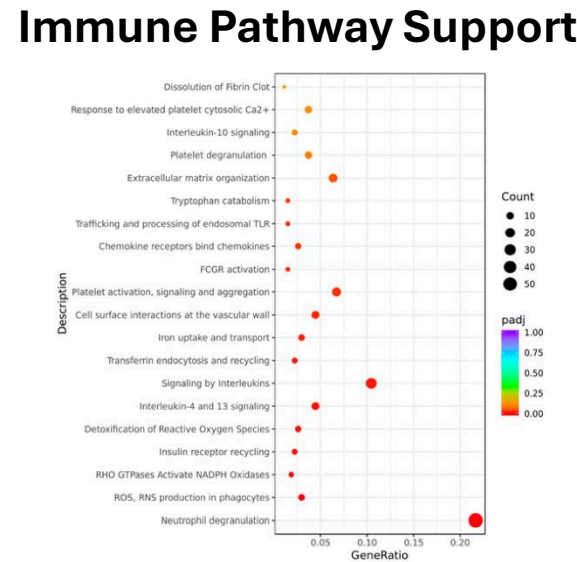
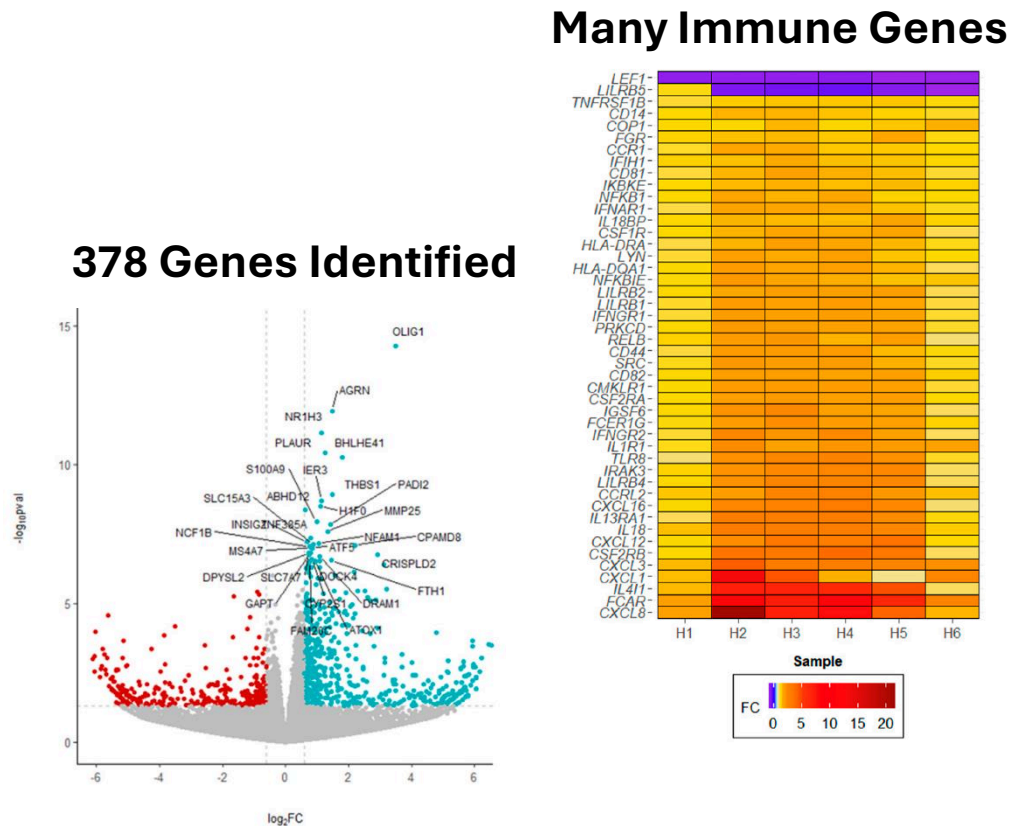
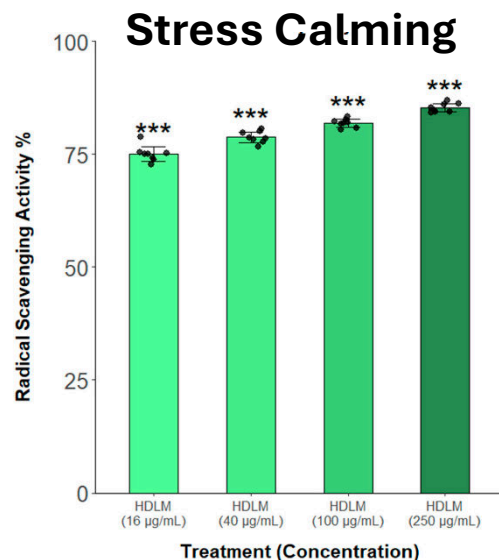
41

About this Attention Score

In the top 5% of all research outputs scored by Altmetric

OUTPUTS FROM IMMUNO

#2



“The immune system is the most complex biological system known to humanity, other than the human brain.”

— Philipp Dettmer



Same Mushroom, Different Outcomes: Diverging Immune Responses from Popular Lion's Mane Products

IMMUNE HEALTH | HEALTHY LIVING | SUPPLEMENTS | HERBS & BOTANICALS | NEWS

Mycelia and fruiting bodies not created equal: New insights on lion's mane mushrooms

Researchers at Fungi Perfecti put two lion's mane mushroom extracts to the test, from the mycelium and fruiting body, to understand their impact on immune health. The results were quite different, illustrating the need for clearer science and standardization on mushroom ingredients.

Devon Gholam, Ph.D., Editor | SupplySide Supplement Journal
December 26, 2025 | 3 Min Read

nutrition insight | Industry news | Category news | Reports | Key trends | Multimedia

Mushrooms may support long-term immunity without overactivation

16 Jan 2026 | By Venya Patel

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nutraceutical BUSINESS REVIEW | Robuvit | ELEVATE YOUR LIFE | Worldwide Exclusive Ingredient for Energy, Detox & Mitochondrial Support

Research & Development | New study shows Lion's Mane mycelium may offer distinct immune-balancing benefits over fruiting body extracts

New study shows Lion's Mane mycelium may offer distinct immune-balancing benefits over fruiting body extracts

Published: 9-Jan-2026

Research published in Immuno finds that Lion's Mane mushroom mycelium supports a regulated immune response and stress modulating pathways in human immune cells, compared with hot water fruiting body extracts

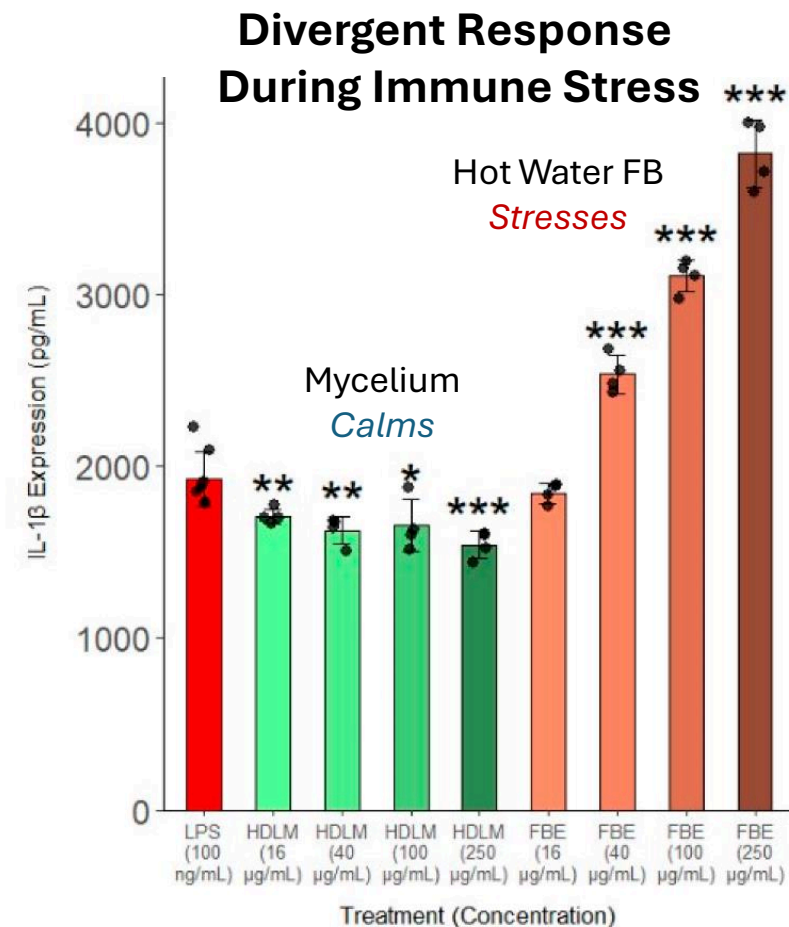
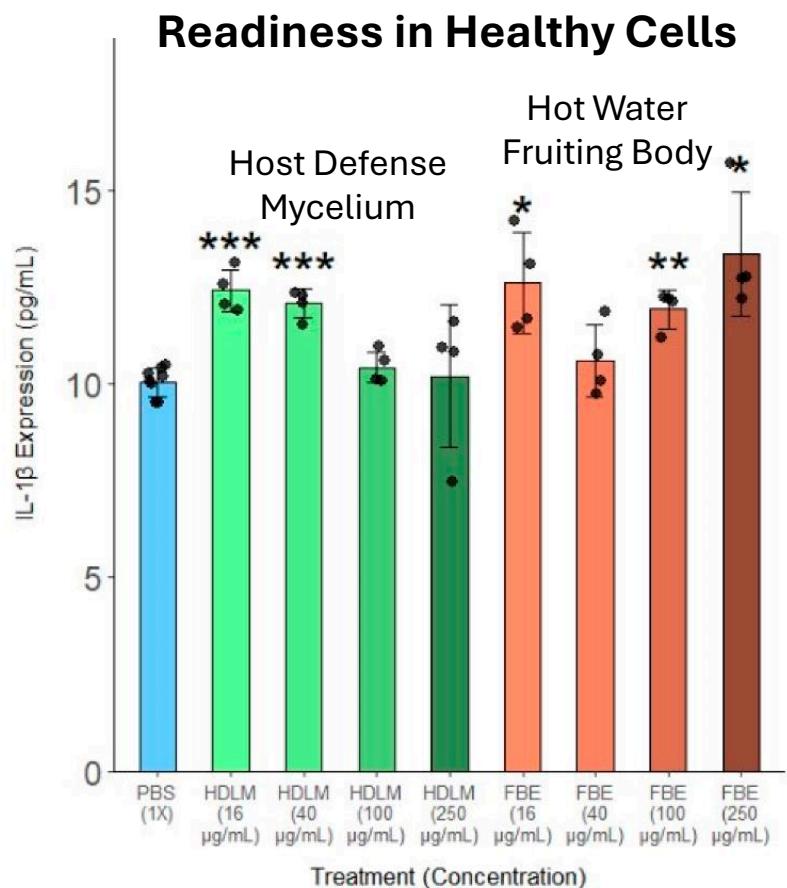


Figure derived from Doar et al., 2025



Immune Support Drives Brain Support



Neurite Outgrowth in a PC12 Brain Cell Model

► Front Integr Neurosci. 2023 May 17;17:1057622. doi: [10.3389/fnint.2023.1057622](https://doi.org/10.3389/fnint.2023.1057622)

The brain is not mental! coupling neuronal and immune cellular processing in human organisms

[Anna Ciaunica](#)^{1,2,*}, [Evgeniya V Shmeleva](#)^{3,4}, [Michael Levin](#)^{3,4,*}

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PMCID: PMC10230067 PMID: [37265513](https://pubmed.ncbi.nlm.nih.gov/37265513/)

Hindawi
Evidence-Based Complementary and Alternative Medicine
Volume 2019, Article ID 7861297, 12 pages
<https://doi.org/10.1155/2019/7861297>



Research Article

***Hericium erinaceus* Improves Mood and Sleep Disorders in Patients Affected by Overweight or Obesity: Could Circulating Pro-BDNF and BDNF Be Potential Biomarkers?**

[Luisella Vigna](#)¹, [Federica Morelli](#)¹, [Gianna M. Agnelli](#)¹, [Filomena Napolitano](#)²,
[Daniela Ratto](#)³, [Alessandra Occhinegro](#)³, [Carmine Di Iorio](#)³, [Elena Savino](#)⁴,
[Carolina Girometta](#)⁴, [Federico Brandalise](#)⁵ and [Paola Rossi](#)³

¹Occupational Medicine Unit, Clinica del Lavoro Luigi Devoto,

Obesity and Work Center at IRCCS Foundation Policlinico Hospital of Milan, 20133, Italy

²Biochemical and Microbiology Unit, IRCCS Foundation Policlinico Hospital of Milan, 20122, Italy

³Department of Biology and Biotechnology "L. Spallanzani", University of Pavia, 27100, Italy

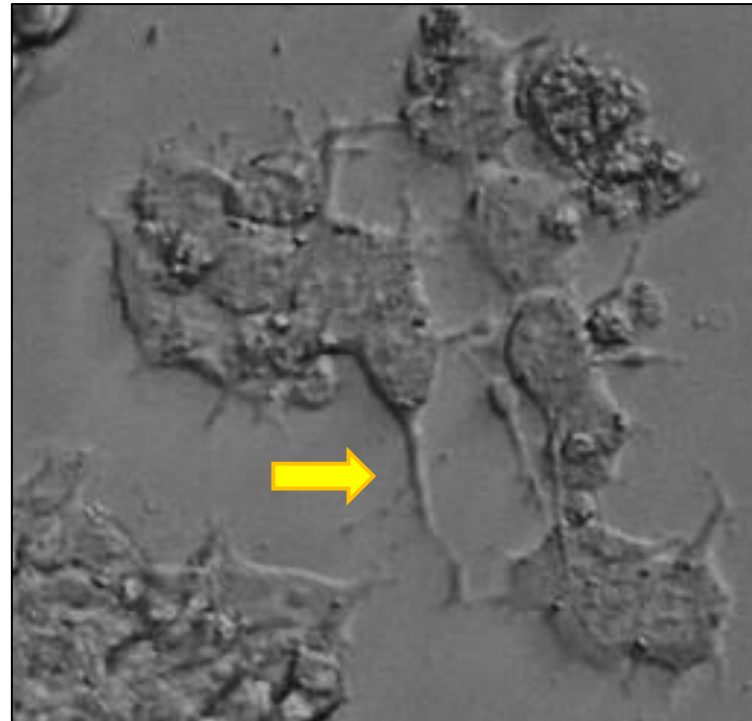
⁴Department of Earth and Environmental Sciences, University of Pavia, 27100, Italy

⁵Department of Fundamental Neurosciences (NEUFO), University of Geneva, 1211, Switzerland

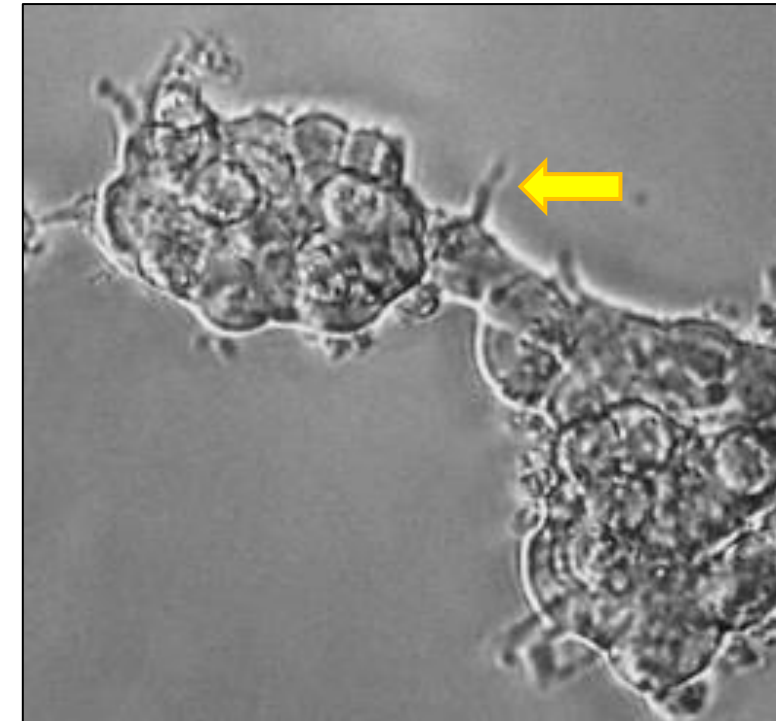
Correspondence should be addressed to Paola Rossi; paola.rossi@unipv.it

Received 5 February 2019; Revised 2 April 2019; Accepted 9 April 2019; Published 18 April 2019

**Host Defense Lion's Mane
Mycelium Extract**



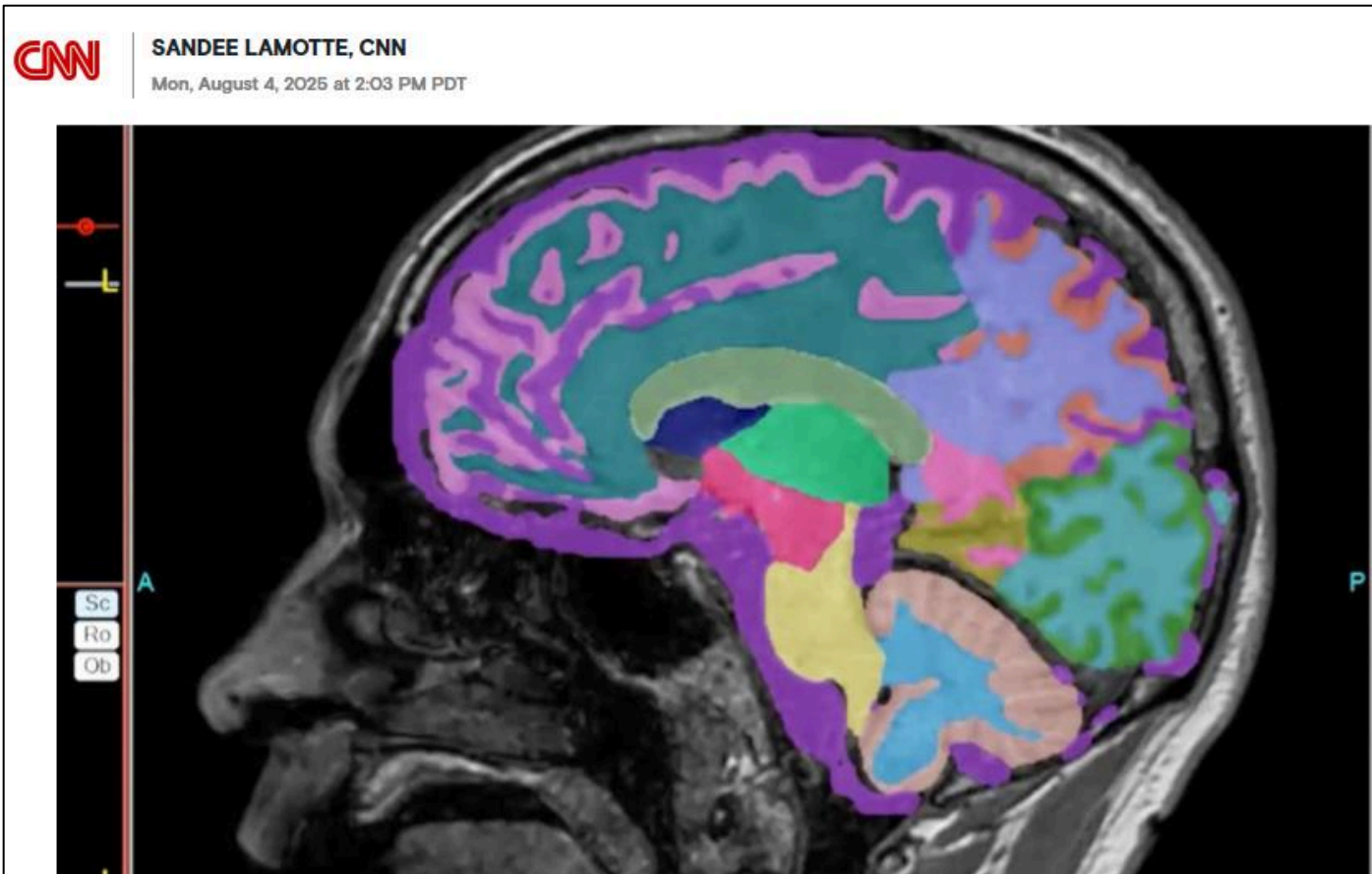
**Baseline
Vehicle (DMSO) Control**





Whole-Body Wellness Meets Mushroom Wisdom

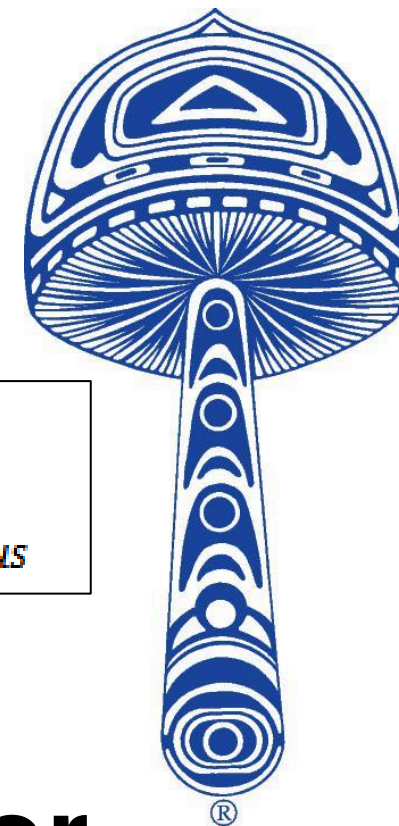
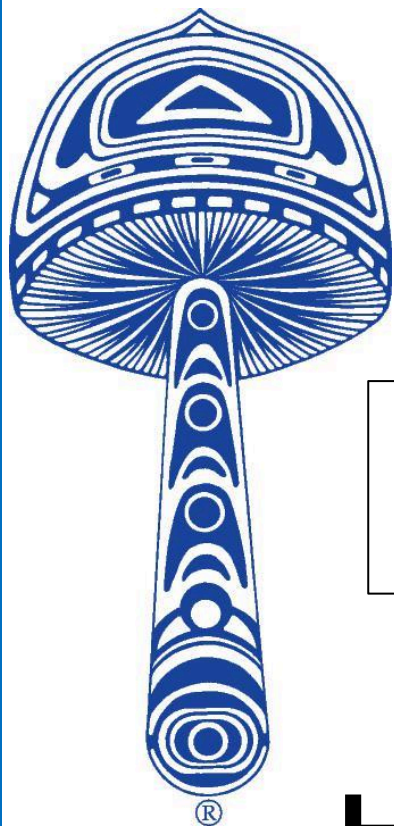
Lion's Mane mycelium and lifestyle changes together show promise for promoting brain and memory health as we age.



"Hericium erinaceus (Lion's Mane, Stamets Host Defense, 2 grams/day): Lion's mane may produce significant improvements in cognition and function in healthy people over 50..."



Mushrooming Outcomes in Clinical Research:



mushroomreferences.com

A Curated List of References Relevant to Physicians, Scientists, and the Intellectually Curious

Harnessing Mycelial Complexity for Human-Centered Outcomes

*THESE STATEMENTS HAVE NOT BEEN EVALUATED BY THE FOOD AND DRUG ADMINISTRATION.
THIS PRODUCT IS NOT INTENDED TO DIAGNOSE, CURE, OR PREVENT ANY DISEASE.

Science That Sells Without Compromise: Building Trust in Functional Mushroom Products



Paul Stamets
Fungi Perfecti



Nature's Hidden Immune System: Mycelium.

My Mentors



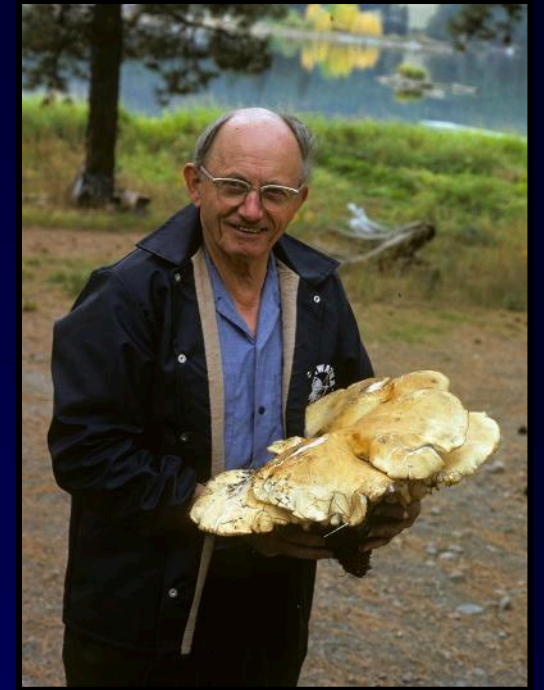
Dr. Michael Beug



Catherine "Kit"
Scates



Dr. Daniel Stuntz



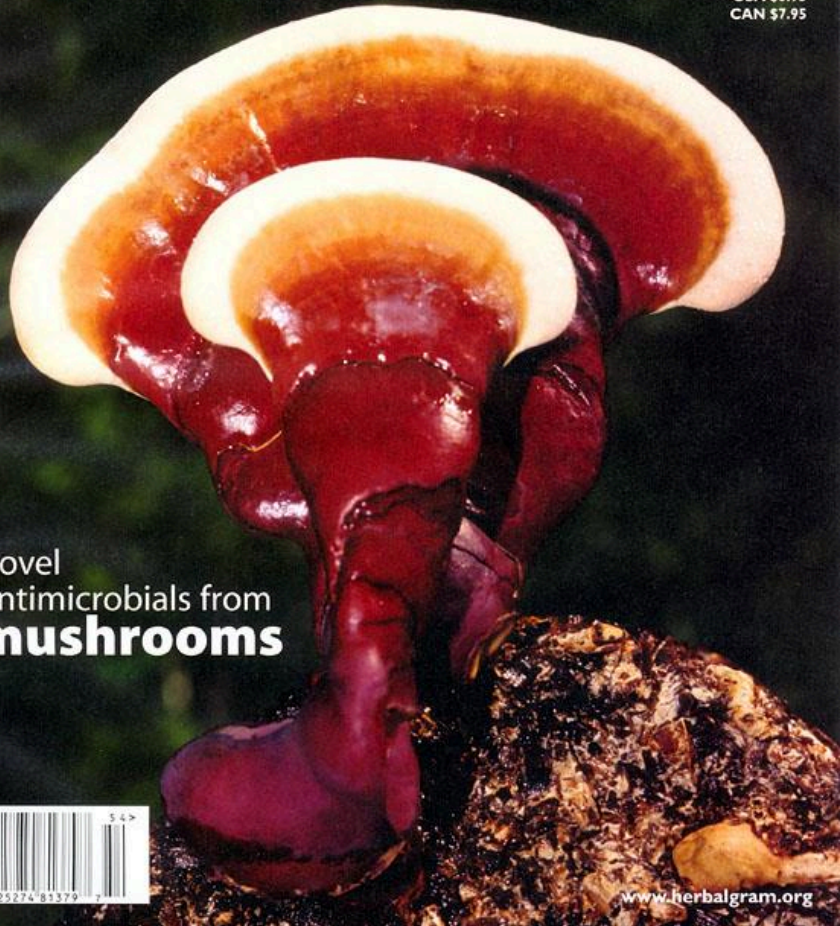
Dr. Alexander Smith

Ginseng Use • Herbal Ear Drops • Flax for Prostate Health

HERBALGRAM

The Journal of the American Botanical Council

Number 54
USA \$6.95
CAN \$7.95



Novel
Antimicrobials from
mushrooms



www.herbalgram.org

Mycology

New Anti-viral Compounds from Mushrooms

by Paul Stamets

A new class of anti-viral compounds has been recently discovered in mushrooms. Frank Piraino, Ph.D., and Curtis Brandt, Ph.D., at the University of Wisconsin-Madison Medical School, found a new antiviral, RC-183, that shows *in vitro* activity in inhibiting the herpes simplex I and II viruses, as well as varicella zoster virus, influenza A virus, and the respiratory syncytial virus.¹ The mushroom yielding this novel antiviral is *Rozites caperata*, the gypsy mushroom, a mycorrhizal species associated with pines (*Pinus* spp., Pinaceae) and Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco, Pinaceae) with a wide range that includes the old growth coniferous forest in the Pacific Northwest, the East and Northern North America. This mushroom thrives in both coniferous and in hardwood forests and where huckleberry (*Vaccinium ovalifolium* Smith, Ericaceae) grows in the midwest.²

In a more recent article, Brandt and Piraino identified a new class of anti-viral compounds from mushrooms.³ Antivirals from other mushrooms have been identified previously from shiitake (lentinan and KS-2 from *Lentinula edodes* (Berk.) Singer, Polyporaceae),⁴ turkey tail (PSP and PSK from *Trametes versicolor* (L.-Fr.) Pilát, Polyporaceae),⁵ reishi (ganaderiol-F, ganoderic acid-B, lucidumol from *Ganoderma lucidum* (Fr.) Lloyd, Ganodermataceae),⁶ maitake (3 branched B-1-6 glucans from *Grifola frondosa* (Dicks.) S.F. Gray, Polyporaceae),⁷ and oyster mushroom (ubiquitin-like protein with anti-HIV activity from *Pleurotus ostreatus* (Jaqu.) Kumm, Polyporaceae).⁸ Other antivirals, not yet characterized, but having shown activity from hot water extracts of the fruitbodies include the ice man or tinder fungus (*Fomes fomentarius* (L.) Fr., Polyporaceae),⁹ chaga or cinder conk (*Ionotus obliquus* (Pers.) Pilát, Hymenochaetaceae)¹⁰ and zhu ling (*Polyporus umbellatus* Fries, Polyporaceae).¹¹



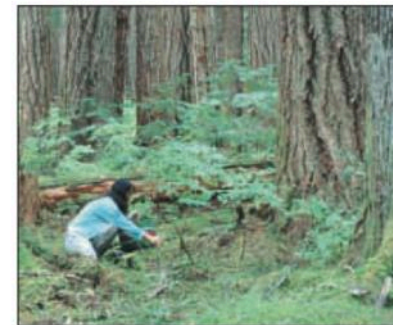
Rozites caperata, the gypsy mushroom, shown one quarter actual size. Photo © 2000 P. Stamets

The predominant mushrooms showing promise for their antiviral activities are polypores — the so-called woody conks that are now believed, through ongoing DNA research, to be the ancestors of most, if not all, gilled mushrooms.¹² Interestingly, no poisonous polypores are known, whereas there are more than 100 species of poisonous gilled mushrooms, of which only perhaps 20 are deadly. Most of these anti-viral compounds from mushrooms are water soluble, and relatively heat-stable. Furthermore, most of the mushrooms mentioned and/or their mycelia can be cultured to commercially significant levels. The anti-viral compounds are present both in the mycelium and in the fruiting bodies.

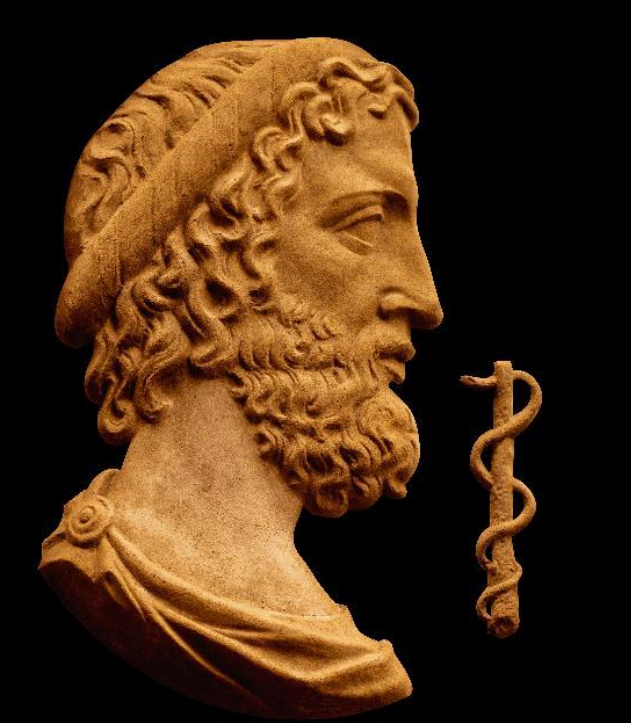
The current literature points to fungi, particularly those in the family Polyporaceae, as a rich frontier of new medicines. Many of these species are long-term residents of old growth forests, playing an essential role in nutrient recycling by decomposing aged trees. In a time when new anti-viral medicines are critically needed, mushrooms stand out as an untapped resource and deserve intensive studies. 🍄

Paul Stamets is the author of five books, including *Growing Gourmet & Medicinal Mushrooms*, a mushrooms cultivation textbook used worldwide. On the editorial boards of the *International Journal of Medicinal Mushrooms* and *Mushroom*, the Journal, he is an advisor to the Center for Integrative Medicine, Tucson, Arizona. A pioneer in the cultivation of mushrooms, especially the family Polyporaceae, he is an active adventurer into the old growth forests of the Pacific Northwest, cloning and archiving mushroom strains from these ancient woodlands. He owns Fungi Perfecti, website: <<http://www.fungi.com>>.

Continues on page 27



Dusty Yao hunts for *Rozites caperata* in old growth forest in the Elwa River Valley of Washington, Olympic National Park. Photo © 2000 P. Stamets



Hippocrates 285 ca. BCE

"Let food be thy medicine
and medicine be thy food"



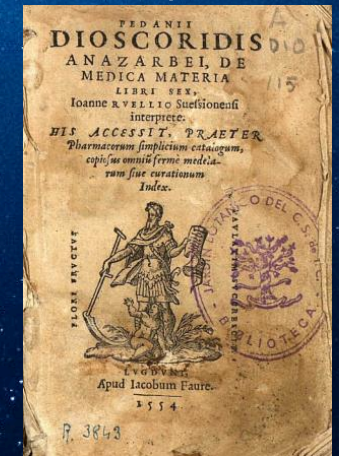
Amadou for supporting
healing and
cauterization of wounds



Dioscorides Pedanius ca. 77 CE
"Father of Pharmacognosy"
author of *De Materia Medica*



Agarikon for treating
inflammation and
"consumption"



Amadou and Agarikon are wood decaying polypore mushrooms, hard conks, that grow on trees.

"Exlirium ad longam vitam"

Agarikons



El Dorado National Forest,
California

Agarikon fruitbodies can be variable in forms and biochemically change as they age.

Mycelium can be grown with consistently and exponentially scalable.



Cortes Island, BC,





Fomitopsis officinalis, Agarikon in the upper Snoqualmie River Watershed
Cascades, Washington State
Recording GPS coordinates



Solid State Fermentation *in vitro* allows for production at scale.



32 of the 120 strains of Agarikon our research team has banked in liquid nitrogen.
118 have undergone full genome sequencing. *If printed at a 12 font, each genome would 8,000+ pages long!*



Agarikon, *Fomitopsis officinalis*
(aka *Laricifomes officinalis*)



In 2003-2009 Project BioShield ran

2392 assays on Paul Stamets' s compounds

Dr. Craig Day

USU Institute for Antiviral Research

Dr. Earl Kern, virologist

NIAID / USAMRIID / NIH

BioDefense/BioShield Program,

U.S. Department of Defense

Selectivity Index >10 are considered very active.

Agarikon enriched extract	Flu A (H5N1)	Vietnam/120 3/2004H	Neutral Red	MEM	MDCK	dilution	5/23/06	1	<0.0001		0.02	>200
	Flu A (H5N1)	Vietnam/120 3/2004H	Visual	MEM	MDCK	dilution	5/23/06	1	<0.0001		0.03	>300

Selectivity Index Score*

*Cytotoxicity/Effective Concentration

(CC50/E50) = SI

The mycelium of the *Trametes versicolor* (Turkey tail) mushroom and its fermented substrate each show potent and complementary immune activating properties in vitro

Kathleen F. Benson, Paul Stamets, Renee Davis, Regan Nally, Alex Taylor, Sonya Slater & Gitte S. Jensen



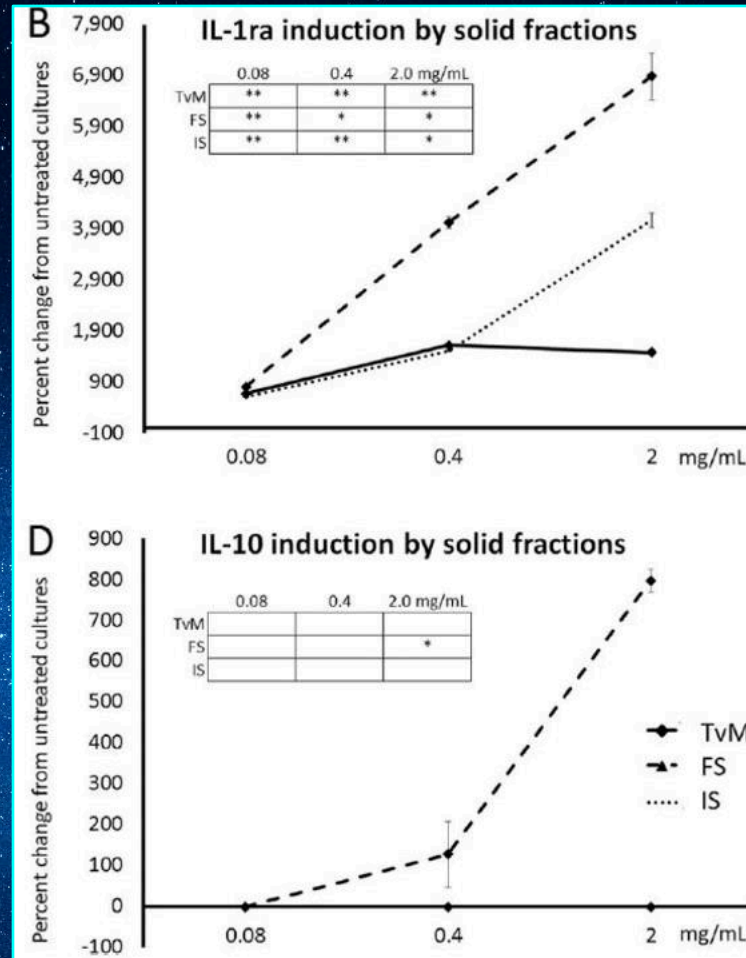
BMC Complementary and Alternative Medicine 19, Article number: 342 (2019) | [Cite this article](#)

42k Accesses | 32 Citations | 204 Altmetric | [Metrics](#)

Abstract

Background

The medicinal mushroom *Trametes versicolor* (Tv, Turkey Tail) is often prepared for consumption as a powder from the fungal mycelium and the fermented substrate on which it grew. The goal for this study was to evaluate the immune-modulating properties of the mycelium versus the fermented substrate, to document whether an important part of the immune-activating effects resides in the metabolically fermented substrate.



TvM = *Trametes versicolor* Mycelium. IS=Initial Substrate (rice). FS = Tv Fermented Substrate

Research has evaluated immune-associated cytokines IL-10 & IL-1ra, in relation to mycelium fermented on rice, compared to mycelium or rice.

Two Traditional Mushroom Species “Rediscovered” by Modern Medicine



Agarikon

Fomitopsis officinalis
(=*Laricifomes officinalis*)



Turkey Tail

Trametes versicolor
(=*Coriolus versicolor*)



ClinicalTrials.gov

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Record 1 of 2 | [Previous Study](#) | [Return to Search](#) | [Next Study](#) →

[Home](#) > [Search Results](#) > Study Record

NCT04667247 **Completed** [WITH RESULTS](#)

RCT of Fomitopsis Officinalis and **Trametes Versicolor** to Treat **COVID-19**

Conditions

COVID-19

Locations

Los Angeles, California, United States

San Diego, California, United States

NCT04951336 **Completed** [WITH RESULTS](#)

RCT of Mushroom Based Natural Product to Enhance Immune Response to **COVID-19** Vaccination

Conditions

COVID-19 Vaccination

Locations

San Diego, California, United States



Fo + Tv

Phase I, II

n=26 FoTv

n=24 Placebo

Phase I, II

n=52 FoTv

n=38 Placebo

Home > BMC Immunology > Article

Polypore mushroom mycelia as an adjunct to COVID-19 vaccination: a randomized clinical trial

Research | [Open access](#) | Published: 31 January 2026

article number , (2026) [Cite this article](#)

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BMC Immunology

[Aims and scope](#) →

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[Gordon Saxe](#) [✉](#), [Christine N. Smith](#), [Shahrokh Golshan](#), [Tatyana Shekhtman](#), [Zolton J. Bair](#), [Chase Beathard](#), [Renee A. Davis](#), [Lauray MacElhern](#), [Andrew Shubov](#), [Daniel Slater](#), [Lan K. Kao](#), [Phoebe Senowitz](#) & [Stephen Wilson](#)

Sections

References

[Abstract](#)

[Data availability](#)

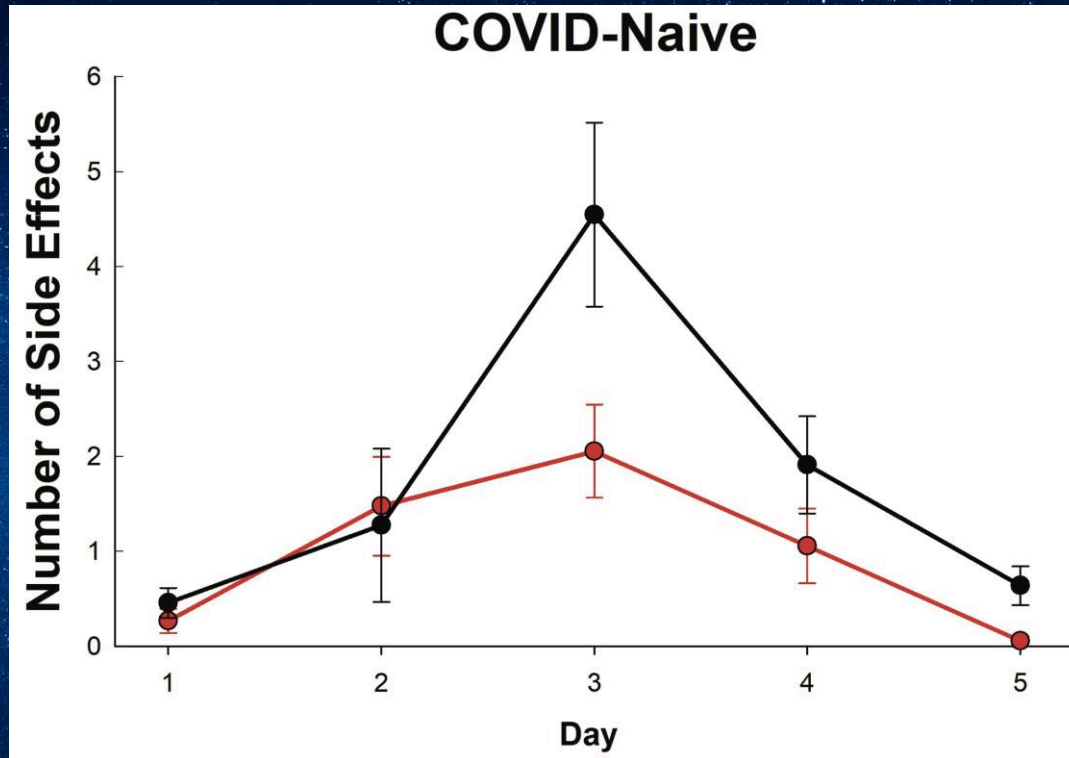


PUBLISHED TUESDAY, MARCH 3, 2026

In press.

mRNA Vaccine Side Effects

Number of side effects by day
CDC's 10 adverse symptoms to vaccine



$N=90$

$n=52$ Treatment with FoTv (red)
 $n=38$ Placebo (black)

$p= 0.023$ over 5 days

No Evidence of Cytokine Storm!

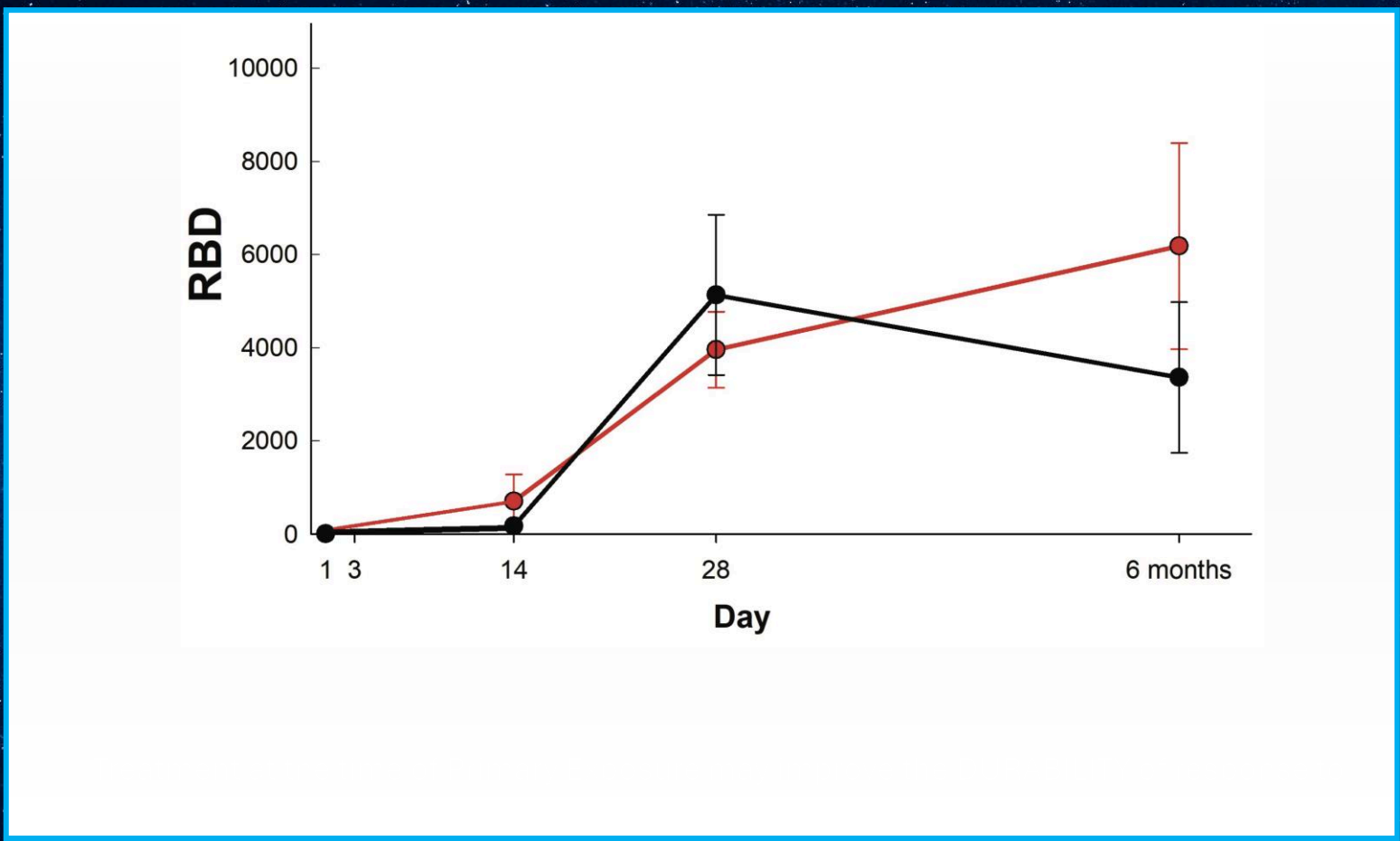
Four Days of FoTv (Agarikon & Turkey Tail) vs. placebo. Participant-reported outcomes related to post vaccination tolerability were assessed in the FoTv and placebo groups, showing statistically significant results.

mRNA Vaccine Cohorts

DURABILITY of PRIMARY Response Improved

Receptor Binding Domain / RBD

4-day treatment.
Participants 6 months post vaccination retained immune tiers.



N=90
n=52 FoTv (red)
n=38 Placebo (black)

p<0.027 RBD (fragment)
p<0.001 Spike protein
(across all timepoints)

Shift toward long term immune memory and readiness.

A receptor-binding domain (RBD) is a region of a viral surface protein that binds to a specific host cell receptor to facilitate viral attachment and entry into the host cell.

BMC Immunology Peer Reviewer Comments

“well-conceived, methodically sound”

“highly pertinent clinical study”

“robust design”

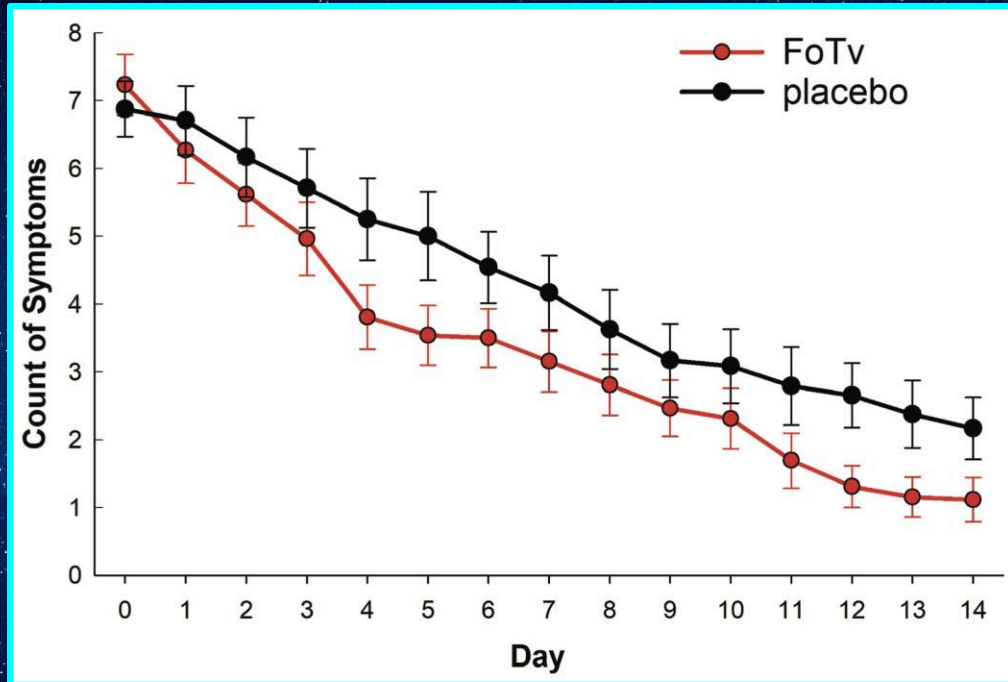
“meticulous”

“articulated clearly”

“compelling”

Two Double-Blind, Placebo-Controlled Randomized Clinical Trials

Reduction of 12 CDC Symptoms from patients diagnosed with COVID (SARS-CoV-2) treated with Agarikon & Turkey Tail Mycelium capsules for 14 days.



Multi-Symptom Reduction
14 Day Treatment with Agarikon & Turkey Tail Mycelium
N=50 participants

n=26 (FoTv), n=24 (Placebo)

Supplemental Table 3. Mixed Effects Models Examining Treatment Groups across Days for Symptoms associated with COVID-19

COVID-19 Symptoms	F value	P value
Fever	1.909	0.168
Fatigue	2.990	0.084
Muscle aches	10.826	0.001
Shortness of breath	0.010	0.919
Shortness of breath upon exertion	0.290	0.591
Cough	18.931	<0.001
Sore throat	46.928	<0.001
Stuffy nose	4.324	0.038
Runny nose	5.264	0.022
Loss of taste	2.024	0.155
Loss of smell	1.728	0.189
Headache	8.932	0.003
Number of Symptoms	7.835	0.005
Severity of Symptoms	16.560	<0.001

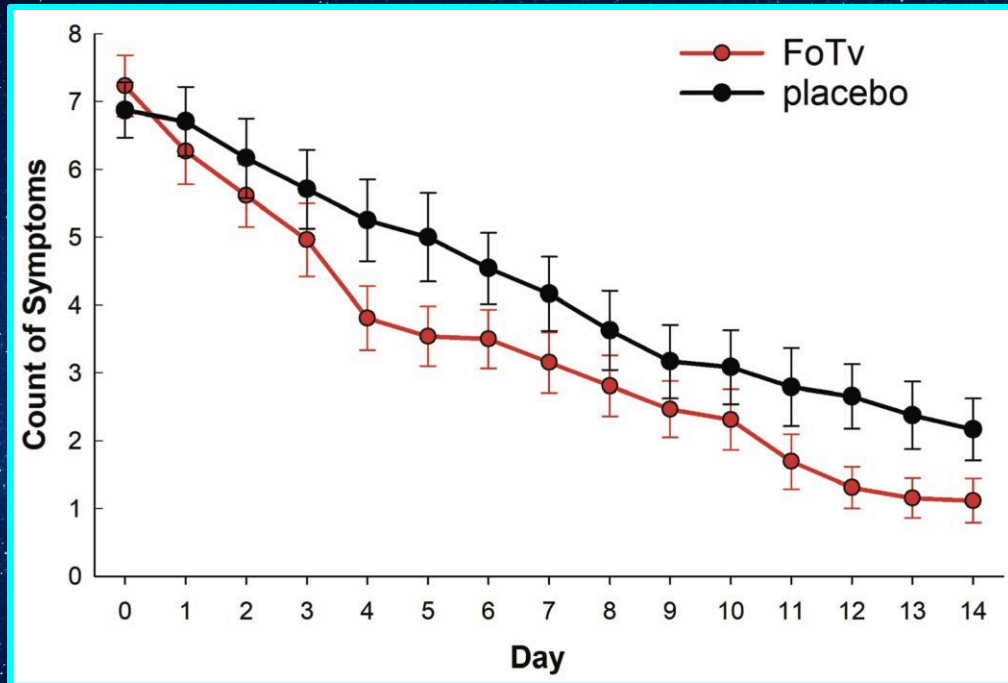
Symptom by Symptom Reduction
14 Day Treatment with Agarikon & Turkey Tail Mycelium
N=50 participants

n=26 (FoTv), n=24 (Placebo)

P-values of < 0.001 and F-value of 46.9 in a clinical trial indicates statistical significance.

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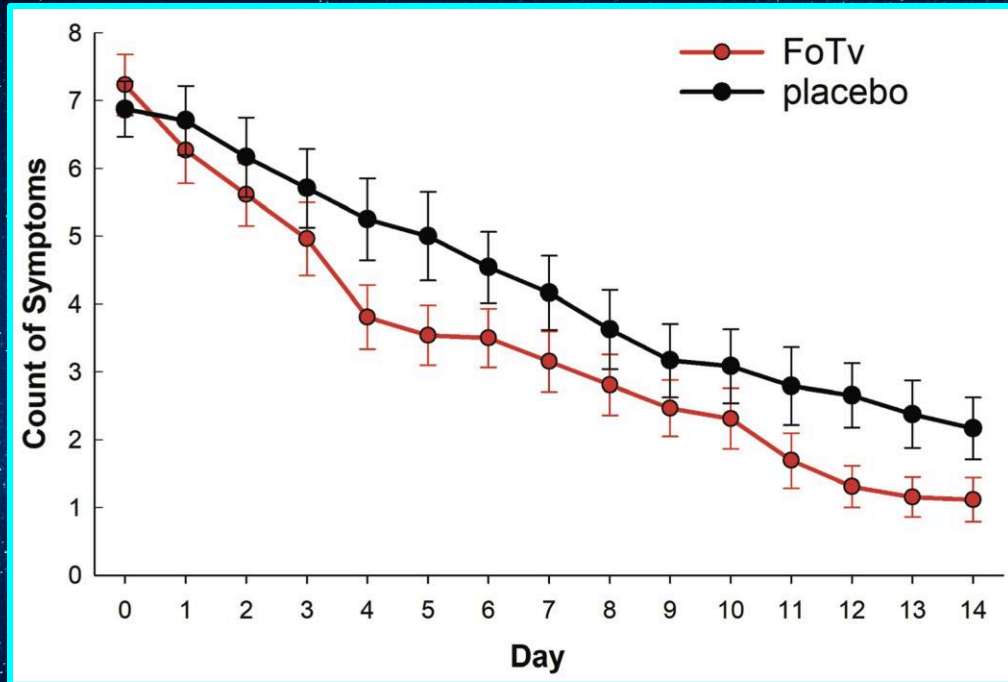
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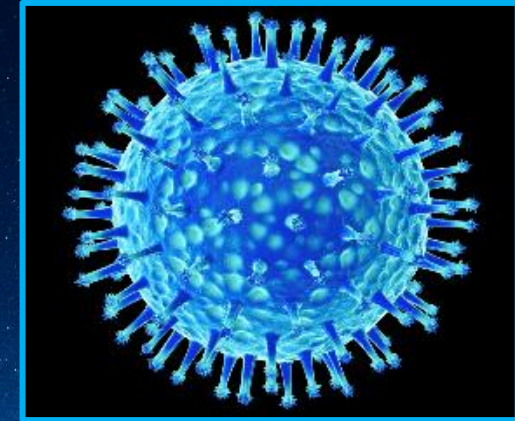


Global Center for Health
Security



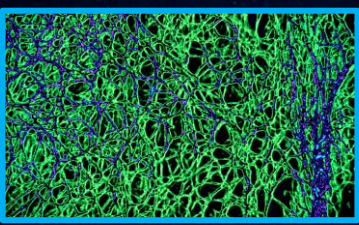
🏠 — [Global Center for Health Security](#) — [The Transmission](#) — 'It's completely out of control':
Scientists warn bird flu could spark a human pandemic
in 2026

'It's completely out of control': Scientists warn bird flu could spark a human pandemic in 2026

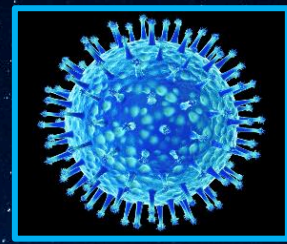


H5N1 virus
jumping species.

Up to 50%
Mortality Rate in
Humans.



What have we learned ?



The authors of the studies conclude:

1. First placebo-controlled human clinical trial to employ a fungal product as a vaccine adjunct.
2. Participants reported reduced vaccine side effects at a statistically significant rate.
3. An extension in long term innate antibodies was observed in participants post vaccination.
4. Two placebo controlled RCT studies ($n=90$, $n=50$) reinforce potential for Agarikon + Turkey Tail mycelium to support innate immunity.
5. Natural Products like mushroom mycelium may support conventional medicines.
6. Mycelium grown on rice is scalable, and has greater purity than from variable forms of fruitbodies.



Mushroom Mycelium for Pandemic Defense.

THANK YOU FOR YOUR SUPPORTING OUR RESEARCH

Science That Sells Without Compromise: Building Trust in Functional Mushroom Products



Shane Heath
MUD\WTR



Brand's Role in Building a Category

Shane Heath
Co-founder & CEO

MUD \ WTR®

A Little *About Me*

Former artist and product designer.

Mom spent 30 years in mushroom industry.

I started drinking functional mushrooms to
feel more creative.

In 2018 I built a brand to share
it with others.



MUD \ WTR[®]

Over 120k subscribers.
Over 2.5m social reach.

Inc fastest growing company.
Best places to work.

Over 10k POD in Costco, Target, Sprouts
& more.

*There's real demand for
functional mushrooms in our
daily rituals.*

Over 10k Points of Distribution



Over 2.5m Social Reach

Mushrooms Can *Be Polarizing*

Some can heal you.
Some can hurt you.
Some can make you see god.

Consumers ask, which will it be?

*Overcoming fear requires
education and trust building.*



Mushrooms Are *Growing Fast*

Fears have eased.
100s of new entrants.
Some doing 100m+ on D2C alone.

*Category growth has outpaced
consumer education within it.*

76%

Sales Growth in *Retail*

Fastest growing of all Top 40 ingredients

133%

Sales Growth in
Cognitive Health

Now top 10 in the category

1 in 3

Americans Consume a
Mushroom Product

Now top 10 in the category

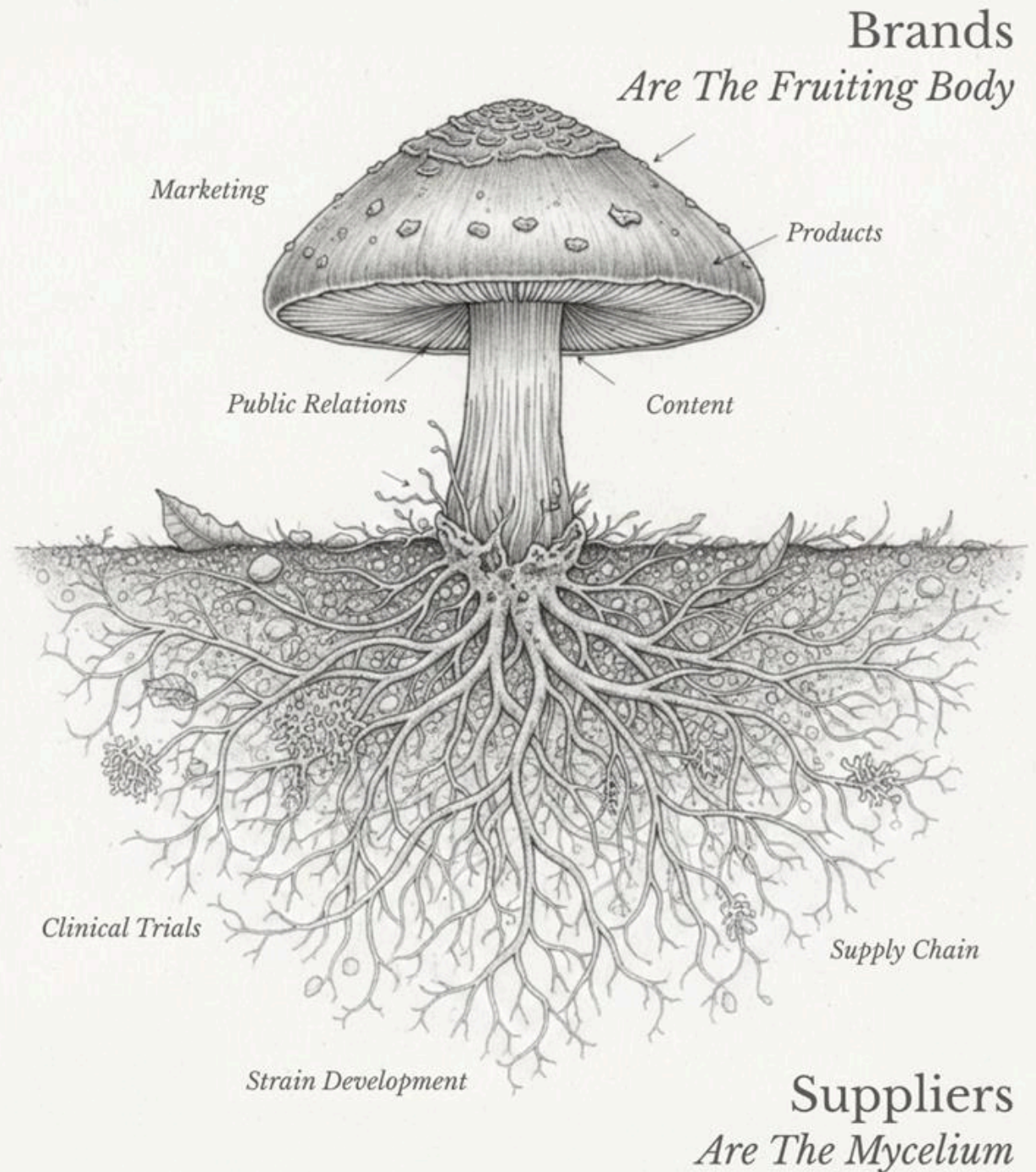
Brands Role *In Category Growth*

Brands are like the fruiting body, tasked with making the science and ingredients digestible.

Suppliers are like the mycelium; the research, clinical trials, strain development.

They work synergistically.

Brands use content as a tool to build trust and clarity in the category.



Myth 1

Mushrooms Are *A Miracle Drug*

Bad public perception and broken trust can set research and real benefits back by decades.

RYZE

- SHITAKE: Boosted immunity
- KING TRUMPET: Fights inflammation
- LION'S MANE: Better focus
- TURKEY TAIL: Gut health
- CORDYCEPS: All-day energy
- REISHI: Reduces stress
- COFFEE: Antioxidants
- MCT's: Healthy fats

GET RID OF LUNG TAR

"I wish I took care of my liver before it was too late..."

RYZE supports liver health naturally and it only takes 20 seconds to make.

- ✓ Support Natural Detoxification
- ✓ Digestive And Gut Support
- ✓ Supports Natural Energy

TRY IT RISK-FREE FOR 30 DAYS

PUFFY FACE FINALLY GOING AWAY!

January February March

SPECIAL DEAL
\$27 ~~\$45~~
THIS WEEK ONLY

LOVE HANDLES?

January February March

SPECIAL DEAL
\$27 ~~\$45~~
THIS WEEK ONLY

Lost My **Waistline**

Last Seen 3 WEEKS AGO

NOVEMBER FEBRUARY

\$27 ~~\$45~~

Tell The Truth *With Creativity*

Team of food scientists.
Database of approved claims.

We don't make crazy claims.
We have to be more creative with what
we can say.



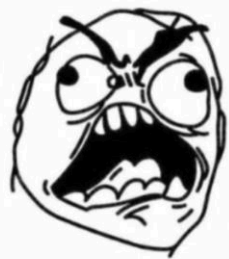
*"Laughter is the shortest distance
between two people."*



Myth 2

“Fruiting Body Only.”

“Fruiting body is the only valuable part.”
“Mycelium is just filler.”



ME WHEN I FIND OUT I'VE BEEN DRINKING MYCELIAL BIOMASS WITH GRAIN OATS AND FILLER...



ME WHEN I FOUND OUT THAT I'M DRINKING 100% FRUITING BODY MUSHROOMS!



nbnutraceutical CONFERENCE | MAJOR TRADE EXHIBITION | NETWORKING
Making 21-22 APRIL 2026 COUNTRY, UK

HOME CATEGORIES EVENTS DIRECTORY SUBSCRIBE LOGIN

Research & Development / New study shows Lion's Mane mycelium may offer distinct immune-balancing benefits over fruiting body extracts

Published 9-Jan-2026

Research published in *Immuno* finds that Lion's Mane mushroom mycelium supports a regulated immune response and stress-modulating pathways in human immune cells, compared with hot water fruiting body extracts

Journal of Functional Foods
Volume 130, July 2025, 106912

Prebiotic activity of functional whole mushroom powders in short-term in vitro colonic simulations

Julie Daoust^a, Jay Schmalz^a, Lieven Van Meulebroek^{b,c}, Jonas Ghyselincx^b, Lynn Verstrepn^b, Massimo Marzorati^{b,d}

Daily whole mushroom consumption bolsters prebiotic activity: Study

By **Claudia Adrien**
13-Oct-2025 Last updated on 13-Oct-2025 at 16:12 GMT

The study suggests that the interaction between different mushroom species produces synergistic effects, indicating that their combined chemistry offers greater benefits than individual components alone. (@ FotografiaBasica / Getty Images)

Open Access Article

Calm Under Challenge: Immune-Balancing and Stress-Quenching Effects of *Hericium erinaceus* Mycelium in Human Immune Cells

by Elizabeth Doar, Jessica Kishiyama, Zoltan J. Bair and Chase Beathard

Department of Research and Development, Fungi Perfecti, LLC, Olympia, WA 98507, USA
* Author to whom correspondence should be addressed.

Immuno 2026, 6(1), 2; <https://doi.org/10.3390/immuno6010002>

Submission received: 26 November 2025 / Revised: 18 December 2025 / Accepted: 18 December 2025 / Published: 22 December 2025

The prebiotic possibilities of mushrooms

By **Claudia Adrien**
02-Jul-2025 Last updated on 02-Jul-2025 at 16:16 GMT

There is also growing interest in the use of mushrooms as a functional food due to their nutritional attributes. (@ 1_nude / Getty Images)

Mushrooms may be useful as prebiotics, showing potential as functional foods.

Metabolite profiling of functional fungi strains of *Hericium erinaceus* & *Cordyceps militaris*: using phenotypes, untargeted metabolomics by mass spectrometry and cell-based assays

By **Julie Daoust**, *M2 Ingredients*

Follow

Make the Science *Engaging*

Science doesn't always fit in a meme.

We don't shy away from the science and nuance.

We do it with engaging long-form video.

Science can be as engaging as false claims if done well.



Build For The *Long Term*

It's not about getting to \$1b first.
It's about building a category that lasts.

Suppliers: Keep doing the research
Brands: Hold yourselves to it
Retailers: Demand more from brands

We all play a role in building this category, so the actual benefits of mushrooms can actually benefit people.



Come Say Hi Booth N1115

Follow Us

sales@mudwtr.com
@drinkmudwtr on ig
mudwtr.com



Follow Me

shane@mudwtr.com
@somanypossibilities
@shane-heath

