



DOSSIER · SUBSTANCE

Hericium (Lion's Mane)

The database records works on Hericium, of which a small number in humans. The **controlled study situation is still under development** – only seven randomised, placebo-controlled studies exist. They focus on **cognition**, while other areas of application have hardly been tested. Basic research predominates clearly, with focuses on polysaccharides and neuroprotection.

602

STUDIES IN
TOTAL

28

IN HUMANS

7

OF WHICH
CONTROLLED

108

IN ANIMALS

127

IN THE LAB

Figures from the IHR study database · Last updated 2026-10-17

How to Read This Dossier

ESTABLISHED

measured in humans, with a comparison group

PLAUSIBLE

supported by mechanism, animal studies or observation

HYPOTHESIS

a likely connection that still needs to be tested

Hericum (Lion's Mane) at a Glance

ORIGIN:
Hericum erinaceus (Lion's Mane) is an edible mushroom from the Hericiaceae family that grows in temperate climate zones of Asia, Europe and North America. Its fruiting bodies and mycelia contain bioactive compounds such as polysaccharides (e.g. β -glucans), erinacines (diterpenes from the mycelium) and hericenones (from the fruiting bodies), which are investigated as modulators of neuroplasticity, inflammatory processes and oxidative stress.

EVIDENCE BASE:
602 evaluated papers · 7 controlled human studies · 21 observational studies · 48 review articles · 108 animal studies · 111 cell-culture studies

STRONGEST EVIDENCE:

- **Cognition and psyche** Six controlled human studies show acute improvements in cognitive tests (e.g. reaction time in the Stroop or N-back test) and subjective mood improvements after intake of Hericum extracts. One study with 109 adults (40–75 years) found significant effects on visual attention and working memory after eight weeks of intake.
- **Neuroprotection (preclinical/indirect)** A 49-week study with 30 Alzheimer patients showed stable contrast sensitivity and unchanged BDNF values under mycelium extract (5 mg/g erinacin A), while the biomarker declined in the placebo group. The study provides a hint of possible neuroprotective effects, yet the clinical relevance of these biomarker changes for cognitive functions in humans has not been investigated.
- **Gut microbiome (preclinical)** In-vitro studies and animal experiments show that Hericum polysaccharides increase production of short-chain fatty acids (SCFAs) and promote growth of beneficial gut bacteria (e.g. Bifidobacterium, Faecalibacterium). A pilot study with 13 participants observed increased alpha-diversity of the microbiota and reduced inflammatory markers (e.g. ALP), yet the clinical relevance of these effects for gut health or immune function in humans has not been investigated.
- **Safety** Three controlled studies on tolerability show no serious adverse effects with short-term intake of Hericum extracts. The data are nevertheless insufficient for statements on long-term effects or interactions.

LIMITATIONS:

- **Cognition** Results are heterogeneous: some studies show acute effects, others none. Methodological weaknesses (small samples, lack of standardisation of extracts) and placebo effects limit reliability.
- **Inflammation/oncology/dermatology** Controlled human studies are still outstanding. Data rest on preclinical models (cell cultures, animal experiments) or indirect hints (e.g. biomarkers). Clinical relevance unclear.
- **Bioavailability and preparation** Fruiting bodies and mycelium exhibit different active-compound profiles (hericenones vs. erinacines). Extraction methods and dosages vary widely, complicating comparability.

CLASSIFICATION:
Hericum erinaceus has supplied hints of moderate cognitive effects in controlled studies, while preclinical data point to neuroprotective and microbiome-mediated actions. For inflammation, oncology or dermatology, controlled human studies are still outstanding.

1. What Hericum Is and How It Is Investigated

Hericum erinaceus (Lion's Mane) is an edible mushroom from the tooth-fungus family (Hericiaceae) that grows in temperate climate zones of Asia, Europe and North America. B. β -glucans), **erinacines** (diterpenes from the mycelium) and **hericenones** (from the fruiting bodies). These substances are discussed in research as potential modulators of **neuroplasticity, inflammatory processes** and **oxidative stress**. Industrially Hericum is processed as a food supplement in the form of extracts, powders or capsules, with composition varying according to cultivation and extraction method.

For understanding the evidence base it is crucial that **fruiting bodies and mycelium exhibit different active-compound profiles**. Erinacines occur almost exclusively in the mycelium, hericenones in the fruiting bodies. Most **human studies** use standardised extracts whose exact composition is often not disclosed. In addition, **various measurement methods** are employed: cognitive effects are recorded via neuropsychological tests, inflammatory markers via blood analyses, and neuroprotective actions frequently via **surrogate parameters** such as BDNF (Brain-Derived Neurotrophic Factor). The **bioavailability** of the active compounds has hardly been investigated, limiting the transferability of laboratory findings to humans.

2. What the Studies Show in Detail

The key human studies and the most important reviews — by application area, with population, duration, preparation, measured variable and result as reported in the original papers. Numbers appear only where the work states them.

Distribution of **controlled human studies** by application area — the numbers are not additive, as one paper may be assigned to several areas:

APPLICATION AREA	CONTROLLED STUDIES
Cognition and psyche	7
Fatigue and stress	4
Safety and tolerability	3
Inflammatory processes	2

APPLICATION AREA	CONTROLLED STUDIES
Oncology	2
Gut and microbiome	1
Oxidative stress	1
Immune system	1

Skin

The controlled human study on *Hericum erinaceus* in mild Alzheimer dementia primarily examined cognitive parameters but also measured ophthalmological markers as secondary endpoints; skin or skin-related effects were not recorded. In the double-blind, placebo-controlled parallel-group study ¹ participants received 3× daily 350 mg mycelium capsules (corresponding to 5 mg/g erinacin A) or placebo for 49 weeks. The population comprised 30 participants (15 per group) with mild Alzheimer dementia (DSM-IV criteria). After 49 weeks the verum group showed significantly better contrast sensitivity compared with the placebo group ($p < 0.05$), while in the placebo arm values for biomarkers such as BDNF, haemoglobin and apolipoprotein E4 declined significantly and alpha-1-antichymotrypsin as well as amyloid-beta 1-40 rose. The study was nevertheless subject to limitations: the small sample, the absence of active skin measurement (e.g. barrier function, inflammatory markers) and the focus on neurodegenerative processes permit no direct conclusions about dermatological effects. In addition, the preparation (mycelium with specific erinacin-A enrichment) was not compared with other *Hericum* forms.

HYPOTHESIS The observed improvement in contrast sensitivity could be due to neuroprotective mechanisms that indirectly stabilise the retina or optic nerve. Whether similar effects on the skin barrier or inflammatory processes (e.g. in atopic dermatitis) are transferable remains speculative, as no dermatological parameters were recorded. The review article ³⁸ mentions antioxidant and immunomodulatory properties of *Hericum erinaceus*, yet supplies no clinical data on skin. Targeted studies with dermatological endpoints (e.g. TEWL, cytokine profiles) and different preparations (fruiting body vs. mycelium) are lacking.

Cognition and Psyche

Study ² examined acute and chronic effects of *Hericum erinaceus* on cognitive performance and mood in 41 healthy adults (18–45 years) in a double-blind, placebo-controlled parallel-group design. Participants received 1.8 g *Hericum erinaceus* (exact preparation not specified) or placebo daily for 28 days. Acutely (60 minutes after intake) a significant improvement in reaction time on the Stroop test was observed ($p = 0.005$), while after 28 days a trend toward reduction in subjective stress scores emerged ($p = 0.051$). Other cognitive tests (e.g., working memory) showed no significant effects. Limitations: the study was small with 41 participants, and the preparation (e.g., extraction method, erinacine content) was not described in detail. In addition, a dose-response analysis was absent.

In an acute crossover study ³ with 20 healthy adults (age not stated) the effect of 1 g *Hericum erinaceus* (Nordic cultivation, exact preparation not specified) on cognitive tests (Go/No-go, N-Back, Serial 7s) was examined. After 1–2 hours a significant improvement in reaction time on the N-Back test ($p \leq 0.05$) and in the number of attempts on the Serial-7s test ($p \leq 0.05$) was observed, while accuracy on the Go/No-go test decreased slightly. Subjectively, participants reported improved mental clarity and concentration ($p < 0.05$). However, the study was limited to acute effects, and the small sample restricts generalisability. In addition, no placebo containing caffeine or other stimulants was compared, which complicates interpretation of the subjective effects.

A further acute study ⁵ with 18 healthy participants (18–35 years) examined the effect of 3 g of a 10:1 extract from *Hericum erinaceus* fruiting bodies (equivalent to 30 g fresh mushroom) in a crossover design. Ninety minutes after intake no significant effects on global cognitive functions or mood were observed. Only in individual subtests (e.g., psychomotor speed) were non-significant trends noted. The study was underpowered with 18 participants, and the short observation period permitted no statements on chronic effects. In addition, the extract was not standardised for bioactivity (e.g., erinacine content).

In an eight-week, placebo-controlled study ⁶ with 109 adults (40–75 years) with subjective cognitive complaints, daily intake of 2 g *Hericum erinaceus* (fruiting-body and mycelial biomass) led to significant improvements in visual attention and working memory (Juggle-Factor test, $p < 0.05$) as well as in subjective sleep quality, morning recovery and mood ($p < 0.05$). The effects were nevertheless moderate, and the study did not focus on objective biomarkers (e.g., BDNF). A limiting factor was that participants already had cognitive complaints, which restricts transferability to healthy populations.

However, the study was not designed with a calorie-reduced diet as a control condition, and participants did not follow a uniform diet, which complicates causal attribution of the effects to *Hericum erinaceus*. In addition, a placebo control group was present, so the observed effects could be attributed to the mushroom provided other influencing factors were excluded.

Inflammatory Processes

A pilot study ¹¹ with 13 healthy adults examined the effects of *Hericum erinaceus* powder (dose not specified) on gut microbiota and serological inflammatory markers after short-term intake. After the intervention alpha-diversity of the gut microbiota increased significantly ($p < 0.05$), and the relative abundance of SCFA-producing bacteria (*Kineothrix alysoides*, *Faecalibacterium prausnitzii*) rose while pathobiont species (*Streptococcus thermophilus*, *Bacteroides caccae*) declined. The microbial changes are preclinical findings; an effect on human health was not examined. In parallel, serum levels of alkaline phosphatase (ALP), LDL cholesterol and uric acid decreased ($p < 0.05$). The changes in serum markers are laboratory findings without demonstrated clinical relevance. The study was not placebo-controlled, and the short duration (no information on intake length) together with the small sample limit its informative value. In addition, the *Hericum* preparation was not standardised (e.g., extraction method, polysaccharide content).

The systematic review ⁴ summarises five randomised controlled trials (RCTs) and 15 laboratory studies that demonstrated anti-inflammatory effects of *Hericum erinaceus* in preclinical models. In cell and animal models *Hericum* reduced pro-inflammatory cytokines. Clinical data are still outstanding: only one small study in mild cognitive impairment ¹ provided indirect indications of inflammation-modulating effects (e.g., reduction of alpha-1-antichymotrypsin).

The review ³⁷, which covers several related medicinal mushrooms, confirms these mechanisms but emphasises that transferability to chronic inflammatory diseases (e.g., rheumatoid arthritis) remains unclear. Targeted RCTs with inflammatory markers (e.g., CRP, cytokines) as primary endpoints and standardised preparations are lacking.

Oncology

The review ⁸, which covers several mushroom extracts, summarises preclinical and clinical data on antineoplastic effects. Specifically for *Hericium erinaceus*, cell-culture and animal models showed antiproliferative, pro-apoptotic and metastasis-suppressive effects, particularly through induction of caspase-3 and inhibition of angiogenesis. The clinical relevance of these preclinical findings has nevertheless not been examined. Clinical studies in humans are completely absent. The review ³⁵ describes polysaccharides from *Hericium erinaceus* as immunomodulatory (e.g., activation of NK cells and macrophages) and antioxidant; a reduction in tumour risk in humans was not examined. Both works nevertheless emphasise that the evidence rests on preclinical models and that no dose-response relationships or bioavailability data are available. In addition, no studies with oncological patients were conducted, so clinical relevance remains unclear. RCTs with tumour-related endpoints (e.g., progression-free survival, overall survival) and standardised extracts are lacking.

Gut and Microbiome

An *in-vitro* study ⁹ examined the fermentability of *Hericium erinaceus* polysaccharides (HEPs) by human faecal microbiota. Three polysaccharide fractions (HEP-30, HEP-50, HEP-70) were obtained by ethanol precipitation from hot-water extracts and fermented for 24 hours with faeces from male and female subjects. All fractions significantly increased production of short-chain fatty acids (SCFAs, $p < 0.05$) and reduced pH, with HEP-50 showing the strongest effect. The relative abundance of SCFA-producing bacteria (*Bifidobacterium*, *Faecalibacterium*, *Lactobacillus*) rose while opportunistic pathobionts (*Bacteroides caccae*) declined. The findings are nevertheless restricted to *in-vitro* conditions, and the effect on the human gut was not examined. In addition, no clinical parameters (e.g., stool consistency, inflammatory markers) were recorded.

The review ³⁶ summarises structural and functional properties of *Hericium erinaceus* polysaccharides. In animal models the polysaccharides showed prebiotic effects by promoting the growth of beneficial gut bacteria and increasing SCFA production. Antioxidant and immunomodulatory effects were also described. Transferability of these preclinical findings to humans has nevertheless not been examined. Clinical data in humans are lacking, and most studies used different extraction methods (e.g., hot-water extraction versus enzymatic hydrolysis), which limits comparability. Targeted human studies with standardised polysaccharide fractions, measured values (e.g., gut-barrier function, inflammatory markers) and clinical endpoints are absent.

Overall Picture

Across all areas a pattern emerges: neuro-protective, immunomodulatory and microbiome-mediated mechanisms of *Hericium erinaceus* have been examined in preclinical models; whether these mechanisms operate in humans has not been investigated. Some of the controlled studies suggest cognitive effects (e.g., improved reaction time, working memory), although effect sizes are moderate and the studies are often underpowered. For skin, inflammatory processes, oncology and gut microbiome, by contrast, targeted clinical studies with relevant endpoints are lacking. Most works use different preparations (fruiting bodies, mycelium, extracts with varying erinacine content), which complicates comparability. In addition, samples are often small, and placebo effects were not always adequately controlled (e.g., in observational studies).

Evidence for oncological and dermatological applications is limited to preclinical models or indirect indications (e.g., biomarkers). For inflammatory processes and the gut microbiome promising *in-vitro* and animal data exist, yet human studies with clinically relevant endpoints (e.g., symptom scores, inflammatory parameters) are still outstanding. In the area of cognition and psyche, long-term studies with objective biomarkers (e.g., BDNF, amyloid-beta) and standardised preparations are also lacking. Systematic dose-finding studies and comparisons between different *Hericium* forms (e.g., mycelium versus fruiting body) are rare in all areas.

Methodology of the Evidence Base

The studies on *Hericium erinaceus* encompass a broad spectrum of designs: from acute crossover studies (e.g., ³, ⁵) through 4–8-week parallel-group RCTs (e.g., ², ⁶) to 49-week long-term studies (¹). Typical endpoints are cognitive tests (e.g., Stroop test, N-Back), subjective scales (e.g., stress, mood) and biomarkers (e.g., BDNF, cytokines). Typical weaknesses are the often small samples ($n = 13$ – 109), missing dose-response analyses and insufficient standardisation of preparations (e.g., extraction method, erinacine content). Placebo controls are not always present (e.g., ¹⁰, ¹¹), and long-term data (> 1 year) are still outstanding. In addition, objective biomarkers (e.g., fMRI, stool metabolomics) were rarely recorded. For skin, oncology and chronic inflammatory diseases, targeted RCTs with clinically relevant endpoints (e.g., TEWL, tumour progression rate, CRP) are lacking.

Cognition: Acute Effects versus Clinically Relevant Action

The

MOST-CITED CONTROLLED STUDY

(2020) on *Hericium* in **early Alzheimer's** shows in a **pilot study** with a small sample **no significant improvement** of the primary cognitive parameters, but merely **trends in secondary measures**. The work is nevertheless frequently cited as evidence for neuroprotective effects. A similar situation applies to the **acute cognition studies in healthy subjects**: two of the controlled investigations report **short-term improvements** in attention tests, while a third **finds no effects**. The **heterogeneity of the extracts** (mycelium versus fruiting body, differing standardisations) and **test procedures** (e.g., subjective versus objective cognitive measurement) makes a **meta-analysis impossible**. Even if acute effects were present, it would remain unclear whether they are **clinically relevant**—for example for dementia prevention or performance enhancement.

A central problem is the

MIXING OF LABORATORY FINDINGS AND HUMAN APPLICATIONS

. Animal studies do show **NGF stimulation** and **reduction of beta-amyloid**, yet these effects have **never been confirmed in controlled human studies**. The **reviews** rest almost exclusively on **preclinical data** and extrapolate **human effects** from them without taking **pharmacokinetic differences** into account. In addition, **dose-response studies** are lacking: most human investigations use **single or short-term administrations**, whereas preclinical effects often require **chronic administration**. The **ALSUntangled study** (2024) on amyotrophic lateral sclerosis (ALS) exemplifies the **methodological limits**: it finds **no indications of efficacy**, yet points to **possible biases** arising from small samples and missing biomarkers.

3. How Robust the Research Is

Research on Hericum is distributed **asymmetrically**: cell-culture work, animal experiments and reviews together constitute a substantial portion of the publications, while only a small part was conducted in humans. Of these human studies, **seven are controlled**—six of them on **cognition**, one on **safety**. Further application areas such as **fatigue, inflammation or oncology** have hardly been examined in controlled designs. The most-cited human studies are **pilot studies with small samples**, including a 2020 investigation on **early Alzheimer’s** and several studies on **acute cognitive effects in healthy subjects**. The **animal- and cell-based research** focuses on **polysaccharides** (e.g., antioxidant and immunomodulatory effects) and **neuroprotection** (e.g., stimulation of NGF, nerve growth factor).

The controlled human studies on *Hericum* are rare, heterogeneous and exhibit methodological limitations. Most investigations do not employ validated cognitive test batteries but individual parameters such as reaction time or subjective mood questionnaires. Placebo controls are present, yet blinding and standardisation of extracts are often insufficiently documented. Reviews emphasise consistent effects in animal models (e.g., reduction of inflammatory markers), yet these findings are preclinical and permit no conclusions about effects in humans. Even in cognition—the best-studied area—the results are not reproducible: some studies show acute improvements in attention tests, others show none. Safety data derive from small, short-term investigations and permit no statements on long-term effects.

4. What Is Frequently Claimed — and What the Data Show

CLAIM	STUDY SITUATION
Hericum in Dementia or Alzheimer’s	Only one pilot study exists. It shows no significant effects on primary cognitive parameters, but merely trends in secondary measures . Long-term data are missing.
Hericum for Performance Enhancement in Healthy Individuals	Controlled studies investigate acute cognitive effects . Some report short-term improvements , others find no effects . The results are not reproducible across studies.
Hericum in Inflammation or Immunomodulation	Controlled studies examine inflammatory markers or immune parameters . The body of evidence is not yet sufficient for statements on chronic inflammation or immunomodulation.
Hericum in Oncology	Controlled studies investigate quality of life and side effects in cancer patients. No study examines antitumour effects in humans. Animal and cell studies suggest potential.

5. Profile: Molecule and Charge

Hericum (Lion’s Mane) is not a single molecule but a **mixture** — there is no molecular formula and no fixed molecular mass. What can be described are functional groups, charge behaviour and redox properties; that is precisely what the next section addresses.

6. Charge, Electrons, Radicals

Constituents from Hericum show radical-scavenging properties in human samples and tissue studies. Activities were measured against ABTS, DPPH and nitric oxide radicals (NO) ^{13 13}. Fractions with a molecular weight below 0.65 kDa and subfraction F4 in particular displayed the highest radical-scavenging activity ^{13 13}. In vitro, extracts reduced reactive oxygen species (ROS) and protected against DNA damage ²⁵. The antioxidant effect correlated with concentration; at 5 mg/mL, DPPH- and hydroxyl-radical-scavenging activity reached a maximum of 83.77 % and 67.31 % respectively ²³. An iron-reducing capacity (FRAP value: 4.43 mmol/L) was also demonstrated ²³.

Constituents from Hericum showed antioxidant and iron-chelating effects in human cells (PBMCs) ²⁷. Chelation indicates interaction with metal ions, suggesting electrochemical properties such as cation exchange or electron transfer. In tissue studies, a dose-dependent increase in DPPH- and ABTS-radical-scavenging activity was observed ²⁶. Reviews refer to contained polyphenols, terpenoids and polysaccharides that can act as radical scavengers and metal chelators ²⁴. Whether these mechanisms are directly attributable to electrochemical charge relationships or redox processes remains to be examined in vivo.

7. Interactions with Other Substances

With which other substances on the platform this substance has been jointly investigated or discussed in human studies and reviews — combination, comparison or shared mechanism of action. The number indicates works in which both appear.

SUBSTANCE	SHARED WORKS	OF WHICH CONTROLLED IN HUMANS
Chronic Inflammation	27	2
Stress, Cortisol and Inflammation	14	2
Gut Microbiome	13	1
Beta-Glucans	9	0
Adaptogens	7	0
Butyrate (Butyric Acid)	4	1
Berberine	2	0
Probiotics	2	0

Evidence of synergistic effects exists for interactions of Hericum with medicinal products. In preclinical models, an enhancement of the effect of chemotherapeutics such as 5-fluorouracil was observed²⁰. Whether this is due to enzyme modulation (e.g. CYP systems), altered pharmacokinetics or direct binding effects is not specified. Molecular docking studies suggest possible interactions of active constituents without naming concrete target structures¹⁸. In cell cultures, Hericum extract showed a synergistic effect with nerve growth factor (NGF), whereby a combination of 1 µg/mL extract with 10 ng/mL NGF produced a 60.6 % increase in neurite outgrowth^{29 29}. Whether similar effects occur with other neuroactive substances remains to be examined.

Data on interactions with nutrients or other substances are limited to in-vitro and tissue studies. Synergistic effects have been described for the anti-inflammatory actions of other fungal extracts (e.g. Ganoderma lucidum), although it is unclear whether Hericum exhibits similar mechanisms. Animal studies show neuroprotective effects of Hericum polysaccharides, for example in combination with glutamate-induced cellular stress, without interactions with other substances having been investigated²⁸. Chemical characterisation of Hericum constituents (e.g. glycans with (1→6)-linked α-D-galactopyranosyl residues) provides starting points for possible binding or complex-formation reactions³⁰, whose clinical relevance, however, remains open.

8. Overdosage, Tolerability, Limits

Data on overdose, toxicity and upper limits of Hericum are scarcely available. In controlled human studies, no adverse effects were reported with the intake of Hericum extracts⁶. However, systematic dose-finding studies are lacking. In-vitro investigations on human cell lines (liver, intestinal, gastric cancer cells) showed concentration-dependent cytotoxicity from 0.80±0.08 mg/ml to 5.00±0.22 mg/ml, depending on the cell line³³. These values are, however, not directly transferable to oral intake. Observational studies in humans name gastrointestinal complaints as the most common adverse effect³². Contraindications have not been systematically investigated. Standardised treatment parameters and regulatory requirements are lacking¹⁵.

The safety of Hericum is only limitedly documented in clinical studies. Reviews emphasise that long-term safety profiles, pharmacokinetics and standardisation of the extracts are insufficiently researched³⁴. Animal studies (e.g. in Javanese macaques) showed no signs of acute toxicity, yet no dose-response relationships were examined¹⁶. In-vitro studies indicate neuroprotective and anti-inflammatory effects, without permitting safety statements to be derived from them^{31 24}. Further clinical studies are required to clarify adverse effects, contraindications and possible interactions^{12 20}.

9. The Most Robust Studies

Ordered by strength of evidence, not by prominence. The complete evaluation comprises considerably more studies; the most robust ones are listed here.

Controlled Studies in Humans

- ¹ Prevention of Early Alzheimer's Disease by Erinacine A-Enriched <i>Hericum erinaceus</i> Mycelia Pilot Double-Blind Placebo-Controlled Study (2020)
- ² The Acute and Chronic Effects of Lion's Mane Mushroom Supplementation on Cognitive Function, Stress and Mood in Young Adults: A Double-Blind, Parallel (2023)
- ³ Acute Effects of Naturally Occurring Guayusa Tea and Nordic Lion's Mane Extracts on Cognitive Performance (2023)
- ⁴ Benefits, side effects, and uses of Hericum erinaceus as a supplement: a systematic review (2025)
- ⁵ Acute effects of a standardised extract of Hericum erinaceus (Lion's Mane mushroom) on cognition and mood in healthy younger adult (2025)
- ⁶ A randomized, double-blind, placebo-controlled study evaluating the impact of <i>Hericum erinaceus</i> (Lion's Mane) on cognitive performance and s (2026)
- ⁷ ALSUntangled #73: Lion's Mane (2024)

Observational Studies in Humans

- Therapeutic potential of culinary-medicinal mushrooms for the management of neurodegenerative diseases: diversity, metabolite, and mechanism (2015)
- ⁸ Mushroom extracts and compounds with suppressive action on breast cancer: evidence from studies using cultured cancer cells, tumor-bearing animals, an (2020)
- ⁹ Digestive Characteristics of *Hericum erinaceus* Polysaccharides and Their Positive Effects on Fecal Microbiota of Male and Female Volunteers Du (2022)
- ¹⁰ *Hericum erinaceus* Improves Mood and Sleep Disorders in Patients Affected by Overweight or Obesity: Could Circulating Pro-BDNF and BDNF Be Pote (2019)
- ¹¹ Influence of Short-Term Consumption of *Hericum erinaceus* on Serum Biochemical Markers and the Changes of the Gut Microbiota: A Pilot Study (2021)
- ¹² *Hericum erinaceus* in Neurodegenerative Diseases: From Bench to Bedside and Beyond, How Far from the Shoreline? (2023)
- ¹³ Peptides obtained from edible mushrooms: *Hericum erinaceus* offers the ability to scavenge free radicals and induce apoptosis in lung cancer cells in (2020)
- Can medicinal mushrooms have prophylactic or therapeutic effect against COVID-19 and its pneumonic superinfection and complicating inflammation? (2021)
- ¹⁴ Erinacine Facilitates the Opening of the Mitochondrial Permeability Transition Pore Through the Inhibition of the PI3K/ Akt/GSK-3 β Signaling Pathway i (2018)
- ¹⁵ The Monkey Head Mushroom and Memory Enhancement in Alzheimer's Disease (2022)
- ¹⁶ *Hericum erinaceus* mycelium-Derived Polysaccharide Alleviates Ulcerative Colitis and Modulates Gut Microbiota in Cynomolgus Monkeys (2023)
- ¹⁷ Enhancing Oral 5-ASA Effectiveness in Mild-to-Moderate Ulcerative Colitis through an *H. erinaceus*-Based Nutraceutical Add-on Multi-Compound: Th (2024)
- ¹⁸ Docking Studies and Biological Evaluation of a Potential β -Secretase Inhibitor of 3-Hydroxyhericenone F from *Hericum erinaceus* (2017)
- ¹⁹ A review of the effects of mushrooms on mood and neurocognitive health across the lifespan (2024)
- ²⁰ Medicinal Mushrooms in Colon Cancer Therapy: Mechanisms of Action of Bioactive Compounds and Therapeutic Potential (2025)
- ²¹ *Hericum erinaceus* mycelium ameliorate anxiety induced by continuous sleep disturbance in vivo (2021)
- ²² Lion's Mane Medicinal Mushroom, *Hericum erinaceus* (Agaricomycetes), Modulates Purinoceptor-Coupled Calcium Signaling and Murine Nociceptive Behavior (2017)

10. Summary

Hericum erinaceus showed moderate effects on cognitive parameters such as reaction time, attention and subjective mood in controlled human studies. The strongest indications exist for acute and short-term improvements in healthy individuals and persons with mild cognitive impairments. Changes in BDNF levels were observed in a small study with Alzheimer's patients, yet these findings originate from a pilot study and permit no conclusions regarding neuroprotective effects in humans. Preclinical data point to immunomodulatory and microbiome-mediated effects, especially via polysaccharides and other bioactive constituents. Safety during short-term intake is documented in small studies; however, long-term data are absent.

HYPOTHESIS The observed cognitive effects could be attributable to neuroprotective mechanisms such as the stimulation of NGF (Nerve Growth Factor) or BDNF, which have been demonstrated in preclinical models (animal and cell studies). Translation of these effects to humans, however, remains outstanding. The improvement in contrast sensitivity in the Alzheimer's study suggests that *Hericum* could indirectly stabilise the retina or optic nerve – a preclinical effect that may be based on antioxidant or anti-inflammatory properties. **Hypothesis:** The prebiotic effects on the gut microbiome (e.g. SCFA production) could modulate systemic inflammatory processes; however, an effect on cognitive or metabolic parameters in humans has not been investigated. Since polysaccharides and other bioactive constituents exert antioxidant and immunomodulatory actions in preclinical models, transfer of these effects to chronic inflammatory conditions (e.g. rheumatoid arthritis) or skin barrier functions (e.g. atopic dermatitis) is conceivable – clinical data in humans are nevertheless outstanding.

Future studies must close the following gaps: 1) **Standardisation of extracts:** Comparison of fruiting-body and mycelium preparations with defined contents of erinacines, hericenones and polysaccharides, including bioavailability studies. 2) **Clinical endpoints:** Targeted RCTs with relevant biomarkers (e.g. BDNF, cytokines, amyloid-beta) and validated test batteries for cognition, inflammation or dermatological parameters. 3) **Long-term and dose-response studies:** Investigation of chronic effects (e.g. over 12 months) and optimal dosages, particularly for neuroprotective or immunomodulatory applications. 4)

Application areas with open questions: Controlled studies on oncology (e.g. progression-free survival in breast cancer), skin disorders (e.g. TEWL, inflammatory markers) or chronic inflammation. 5) **Mechanistic studies:** Clarification of the role of polysaccharides and other bioactive constituents in the interaction with the gut microbiome and the blood-brain barrier.

11. What Remains Open

- **Long-term effects:** There are **no controlled studies** with a duration exceeding 12 weeks. It is unclear whether acute cognitive effects are **sustainable** or whether **tolerance** develops.
- **Dose-response relationship:** The **optimal dosage** for different application areas is **unknown**. Preclinical effects often require **higher doses** than those used in human studies.

- **Biomarkers:** Validated surrogate parameters for neuroprotective or anti-inflammatory effects are lacking. BDNF or NGF are **not routinely** measured in human studies.

12. Further Paths

Topics, pathways and chains in which this substance occurs — for all who wish to look beyond the substance.

- Interaction network

Frequently Asked Questions

Can Hericium be used for neurodegenerative diseases such as Parkinson's or ALS?

There are **no controlled human studies** on Parkinson's. One study on ALS shows **no indications of efficacy**, but points to **methodological weaknesses**. Animal studies on Parkinson's report **neuroprotective effects**, yet these are **not transferable to humans**. The data situation permits **no recommendation** for neurodegenerative diseases.

Are there differences between fruiting body and mycelium extracts?

Yes. **Fruiting bodies** contain mainly **hericenones**, **mycelium** mainly **erinacines**. Both substance groups are linked in research with **neuroprotective effects**, yet **direct comparisons in humans are lacking**. Most **controlled studies** use **mycelium extracts**, while **traditional applications** often employ fruiting bodies. **Bioavailability** and **active substance profiles** presumably differ, but have **not been systematically investigated**.

How safe is the intake of Hericium?

Controlled studies examine **safety and tolerability** with short-term intake. They report **no serious adverse effects**, but **possible mild gastrointestinal complaints**. **Long-term data are completely lacking**. It is unclear whether **interactions** with medications or **allergic reactions** occur. The **quality of the extracts** varies greatly, which carries **risks from contaminants**.

Sources

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