

Exclusive combination of 6 highly concentrated medicinal mushrooms (8:1 extract) that act in synergy on the different components of immunity. Among its active substances are polysaccharides, and specifically, beta-glucans, which are responsible for its inestimable therapeutic value focused on activating immune response, anti-tumour activity and antibacterial and antiviral response. Our product is an extract providing the highest concentration of polysaccharides (40%).

In addition to its activity on the immune system, other constituents such as betulinic acid (chaga); 3-deoxyadenosine or cordycepin (cordyceps); hericenones and erinacines (lion's mane); triterpenes (reishi); and lentinan (shiitake) exert further activities unique to each mushroom. Each of these mushrooms offers its own unique health benefits.

The method of polysaccharide extraction is a critical point that determines the concentration and efficacy of the product. Our extract is obtained through a validated extraction process in hot water which concentrates, guarantees and preserves the active compounds, leading to a higher final concentration of polysaccharides. Mycelium contains polysaccharides that are bound to the cell walls of chitin, which is indigestible in the gastrointestinal tract. Chitin must be dissolved in hot water in order to release the polysaccharides and guarantee a high polysaccharide content as well as greater bioavailability. The extract is standardized to 40% polysaccharide content.

The mushrooms used for our formulation have been cultivated in greenhouses under climate controlled conditions and are free of heavy metals, herbicides and pesticides in order to guarantee the purity and strength of the extract.

Ingredients: Reishi extract (*Ganoderma lucidum*), Maitake extract (*Grifola frondosa*), Shiitake extract (*Lentinula edodes*), Chaga extract (*Inonotus obliquus*), Cordyceps extract (*Paecilomyces hepiali*), Lion's mane extract (*Hericium erinaceus*), anticaking agent (magnesium salts of fatty acids), vegetable capsule (glazing agent: hydroxypropylmethylcellulose; purified water).

Nutritional Information:

**3 capsules
(1 566 mg)**

Size and format:

90 vegetable capsules

Reishi (<i>Ganoderma lucidum</i>) (8:1)*	238,5 mg
Maitake (<i>Grifola frondosa</i>) (8:1)*	238,5 mg
Shiitake (<i>Lentinula edodes</i>) (8:1)*	238,5 mg
Chaga (<i>Inonotus obliquus</i>) (8:1)*	238,5 mg
Cordyceps (<i>Paecilomyces hepiali</i>) (8:1)*	123 mg
Lion's mane (<i>Hericium erinaceus</i>) (8:1)*	123 mg

Recommended daily dose:

1 capsule three times daily.

Do not exceed the stated recommended daily dose.

*Standardized extract, 40% polysaccharides.

Hot-water extraction.

Indications and uses:

- Increasing immune response in a variety of imbalances related to viral and bacterial infections (hepatitis, herpes, candidiasis...), repeated infection, autoimmune diseases (rheumatoid arthritis, systemic lupus, polymyalgia), immune-deficiency and inflammatory diseases. It also offers cardiovascular protection and acts as an antioxidant (high cholesterol, diabetes, hypertension, coronary disease).
- It is helpful for respiratory health (asthma, bronchitis, allergies...), liver protection, benign prostatic hyperplasia, neuroprotection (Parkinson's disease), antiaging therapies, states of convalescence and feeling run-down, and in situations requiring greater resistance to several types of stress (anxiety, depression, insomnia).
- Additionally, it has anti-tumour properties and is recognized as a co-adjuvant for chemotherapy and radiotherapy.

Cautions:

Consult a health-care practitioner before use if you are pregnant or breast-feeding, if you are treated with medication (immunosuppressors or anticoagulants), or if you have a special medical condition (immune system disorder or diabetes).

REISHI: Used and known as Lingzhi in Traditional Chinese Medicine for thousands of years, today it is still one of the most widely used medicinal fungi because of its great variety of properties. Reishi is its name in Japanese, which translates as “the mushroom of immortality” and “the elixir of life”, as it is known for increasing longevity and as an adaptogen, improving the body’s ability to adapt to changes and diverse stressors (physical, mental or emotional).

The use of its extract allows for a synergic effect between the different active principles that make it up; the triterpenes suppress the growth and invasive behaviour of cancer cells, while the polysaccharides stimulate the immune system, increasing the cytokine production and anti-tumour activity of the immune cells, as well as exerting an antioxidant action. This fungus also exerts antiangiogenic activity, suppressing the creation of new blood vessels which supply nutrients to tumour cells and allow for their invasion.

This fungus has been used in different clinical trials for its benefits on strengthening the defences of cancer patients (lung, breast, colon and prostate cancer), above all in combination with chemotherapy and/or radiotherapy. It significantly increases immune response in patients with advanced stages of cancer ⁽¹⁻³⁾. In several studies, *G. lucidum* interferes with different points of the cell cycle, detaining the growth of tumour cells and reducing fatigue related to breast cancer ⁽⁴⁾.

Its activity against allergies and asthma is due to its immune-modulating and anti-inflammatory properties, which inhibit the release of histamine and other chemical mediators of mastocytes, neutrophils and macrophages ⁽⁵⁻⁷⁾.

Triterpenes are attributed other properties as well, such as their hepatoprotective effect, for which they have been used in the treatment of hepatic diseases ⁽⁸⁻¹⁰⁾. Clinical studies show that its extracts are effective in patients with chronic hepatitis B ⁽¹¹⁻¹²⁾.

Some of the triterpenes in *G. lucidum* have been studied in cardiovascular disease with very good results, showing beneficial effects on blood pressure and serum lipids in patients with coronary disease ⁽¹³⁻¹⁴⁾.

It is also highly considered for certain states such as anxiety, insomnia and stress because of its hypnotic and calming effect on the nervous system, significantly decreasing time to sleep onset and increasing total sleep time ⁽¹⁵⁻¹⁶⁾.

Its anti-inflammatory properties explain its effect on chronic pathologies such as arthritis, or its modulating effect on chronic inflammatory response. “In vitro”, it inhibits the production of synovial fibroblasts of rheumatoid arthritis, suggesting its possible application in treating autoimmune conditions such as rheumatoid arthritis ⁽¹⁷⁾.

It inhibits the toxicity of synaptic beta-amyloid, making it a potential treatment for Alzheimer's disease ⁽¹⁸⁾.

It also affects cardiovascular health ⁽¹³⁻¹⁴⁾, the immune system (1) and the control of glucose ⁽¹⁹⁾ and cholesterol levels ⁽²⁰⁾. It improves the symptoms of neurasthenia ⁽²¹⁾.

It also has an effect on glucose control in patients with diabetes mellitus type II ⁽²²⁾.

The synergy between polysaccharides and triterpenes has also been seen in benign prostatic hyperplasia upon inhibiting the activity of 5-alpha-reductase ⁽²³⁾ and improving its related symptoms ⁽²⁴⁾.

Many studies have been carried out in order to quantify this antioxidant action using biomarkers, the assessment of antioxidant enzymes and the activity of the mitochondrial complex in cardiac cells. The results indicate a potent antioxidant action in *G. lucidum* that has been linked to a lower risk of coronary disease and a decrease in cell energy loss associated with age ⁽²⁵⁾.

It also exerts an antiviral effect by inhibiting replication, which has been shown in herpes simplex I and II, HIV and Hepatitis B ^(11, 26, 27). As an antibacterial agent, it has shown efficacy against Gram + bacteria (*B. subtilis*, *Staphylococcus aureus*, *E. faecalis*) and Gram – bacteria (*E.coli*, *Pseudomonas aeruginosa*) ⁽²⁸⁾.

References:

- 1) Gao, Yihuai, et al. "Effects of Ganopoly® (A *Ganoderma lucidum* polysaccharide extract) on the immune functions in Advanced-Stage cancer patients." *Immunological investigations* 32.3 (2003): 201-215.
- 2) Gao, Yihuai, et al. "A randomized, placebo-controlled, multicenter study of *Ganoderma lucidum* (W. Curt.: Fr.) Lloyd (Aphyllophoromycetideae) polysaccharides (Ganopoly®) in patients with advanced lung cancer." *International Journal of Medicinal Mushrooms* 5.4 (2003).
- 3) Gao, Yihuai, et al. "Effects of water-soluble *Ganoderma lucidum* polysaccharides on the immune functions of patients with advanced lung cancer." *Journal of medicinal food* 8.2 (2005): 159-168.

- 4) Zhao, Hong, et al. "Spore powder of *Ganoderma lucidum* improves cancer-related fatigue in breast cancer patients undergoing endocrine therapy: a pilot clinical trial." *Evidence-Based Complementary and Alternative Medicine* 2012 (2011).
- 5) Tasaka, K., et al. "Anti-allergic constituents in the culture medium of *Ganoderma lucidum*.(I) Inhibitory effect of oleic acid on histamine release." *Inflammation Research* 23.3 (1988): 153-156.
- 6) Tasaka, K., et al. "Anti-allergic constituents in the culture medium of *Ganoderma lucidum*.(II) The inhibitory effect of cyclooctasulfur on histamine release." *Agents and Actions* 23.3-4 (1988): 157-160.
- 7) Powell, Martin. "The use of *Ganoderma lucidum* (Reishi) in the management of histamine-mediated allergic responses." *Townsend Letter: The Examiner of Alternative Medicine* 274 (2006): 78-82.
- 8) Shi, Yanling, et al. "Hepatoprotective effects of *Ganoderma lucidum* peptides against D-galactosamine-induced liver injury in mice." *Journal of Ethnopharmacology* 117.3 (2008): 415-419.
- 9) Lakshmi, B., et al. "Antimutagenic activity of methanolic extract of *Ganoderma lucidum* and its effect on hepatic damage caused by benzo [a] pyrene." *Journal of ethnopharmacology* 107.2 (2006): 297-303.
- 10) Wang, Xin, et al. "Effects of *Ganoderma lucidum* polysaccharide on CYP2E1, CYP1A2 and CYP3A activities in BCG-immune hepatic injury in rats." *Biological and Pharmaceutical Bulletin* 30.9 (2007): 1702-1706.
- 11) Gao, Yihuai, et al. "A Phase I/II Study of a *Ganoderma lucidum* (Curt.: Fr.) P. Karst.(Ling Zhi, Reishi Mushroom) extract in patients with chronic hepatitis B." *International Journal of Medicinal Mushrooms* 4.4 (2002).
- 12) Yan, R., Y. X. Zhou, and J. B. Liu. "Treatment of chronic hepatitis B with Wulingdan pill." *J Fourth Milit Med Coll* 8 (1987): 380-3.
- 13) Gao, Yihuai, et al. "A phase I/II study of ling zhi mushroom *Ganoderma lucidum* (W. Curt.: Fr.) Lloyd (Aphyllophoromycetideae) extract in patients with coronary heart disease." *International Journal of Medicinal Mushrooms* 6.4 (2004).
- 14) Chu, Tanya TW, et al. "Study of potential cardioprotective effects of *Ganoderma lucidum* (Lingzhi): results of a controlled human intervention trial." *British journal of nutrition* 107.7 (2012): 1017-1027.
- 15) Chu, Qing-Ping, et al. "Extract of *Ganoderma lucidum* potentiates pentobarbital-induced sleep via a GABAergic mechanism." *Pharmacology Biochemistry and Behavior* 86.4 (2007): 693-698.
- 16) Cui, Xiang-Yu, et al. "Extract of *Ganoderma lucidum* prolongs sleep time in rats." *Journal of ethnopharmacology* 139.3 (2012): 796-800.
- 17) Ho, Y. W., et al. "*Ganoderma lucidum* polysaccharide peptide reduced the production of proinflammatory cytokines in activated rheumatoid synovial fibroblast." *Molecular and cellular biochemistry* 301.1-2 (2007): 173-179.
- 18) Lai, Cora Sau-Wan, et al. "Antagonizing β -amyloid peptide neurotoxicity of the anti-aging fungus *Ganoderma lucidum*." *Brain research* 1190 (2008): 215-224.
- 19) Seto, S. W., et al. "Novel hypoglycemic effects of *Ganoderma lucidum* water-extract in obese/diabetic (+ db/+ db) mice." *Phytomedicine* 16.5 (2009): 426-436.
- 20) Berger, A., et al. "Cholesterol-lowering properties of *Ganoderma lucidum* in vitro, ex vivo, and in hamsters and minipigs." *Lipids in health and disease* 3.1 (2004): 2.
- 21) Tang, Wenbo, et al. "A randomized, double-blind and placebo-controlled study of a *Ganoderma lucidum* polysaccharide extract in neurasthenia." *Journal of medicinal food* 8.1 (2005): 53-58.
- 22) Gao, Yihuai, et al. "A phase I/II study of Ling Zhi mushroom *Ganoderma lucidum* (W. Curt.: Fr.) Lloyd (Aphyllophoromycetideae) extract in patients with type II diabetes mellitus." *International Journal of Medicinal Mushrooms* 6.1 (2004).
- 23) Liu, Jie, et al. " 5α -Reductase inhibitory effect of triterpenoids isolated from *Ganoderma lucidum*." *Biological and Pharmaceutical Bulletin* 29.2 (2006): 392-395.
- 24) Noguchi, Masanori, et al. "Randomized clinical trial of an ethanol extract of *Ganoderma lucidum* in men with lower urinary tract symptoms." *Asian journal of andrology* 10.5 (2008): 777-785.
- 25) Wachtel-Galor, Sissi, et al. "*Ganoderma lucidum* ('Lingzhi'); acute and short-term biomarker response to supplementation." *International journal of food sciences and nutrition* 55.1 (2004): 75-83.
- 26) Avtonomova, A. V., and L. M. Krasnopolskaya. "Antiviral properties of basidiomycetes metabolites." *Antibiotiki i khimioterapii= Antibiotics and chemotherapy [sic]* 59.7-8 (2014): 41-48.
- 27) Hijikata, Yasuyo, Seika Yamada, and Akihiro Yasuhara. "Herbal mixtures containing the mushroom *Ganoderma lucidum* improve recovery time in patients with herpes genitalis and labialis." *The Journal of Alternative and Complementary Medicine* 13.9 (2007): 985-987.
- 28) Vazirian, Mahdi, et al. "Antimicrobial effect of the Lingzhi or Reishi medicinal mushroom, *Ganoderma lucidum* (higher Basidiomycetes) and its main compounds." *International journal of medicinal mushrooms* 16.1 (2014):77-84.

MAITAKE: This mushroom with a Japanese name ("king of mushrooms") has long been highly regarded in Japan for its delicious flavour and great health benefits. It grows in a fan-like shape in shades of greyish-brown on trees and fallen wood, and can reach over 45 kg in weight. A Japanese mycologist identified a fraction present in the mushroom with excellent anti-tumour activity, consisting of a mix of proteins and polysaccharides called the D-fraction. This important activity has an antimetastatic effect, slowing the progression of malignant cells and increasing the activity of NK cells and Th lymphocytes. The D-Fraction has been widely studied for diseases such as hypertension, type II diabetes, hepatitis B and HIV, among others, and has been shown to activate macrophages, Th lymphocytes, interleukins 1 and 2 and lymphokines.

Maitake is a good preventive and adjuvant treatment for therapies such as chemotherapy, since it induces apoptosis in tumour cells ⁽¹⁾. There are many mechanisms that modify the expression of certain genes involved in the stimulation of apoptosis, the inhibition of cell growth and proliferation, detaining the cell cycle and tumour cell metastasis and inducing sensitivity to multiple drugs. Specifically, the concomitant use of maitake with chemotherapy decreased the incidence of adverse effects caused by anti-neoplastic agents for breast, lung and prostate cancer ⁽²⁻⁴⁾. In mice, it increases the efficacy of chemotherapy with cisplatin and reduces the nephrotoxicity⁽⁵⁾. The maitake D-fraction (beta-glucans) has great potential for treating cancer, stimulating the immune system and reducing the adverse effects of chemotherapy ^(4,6-8). It has also shown beneficial and preventive effects in bladder cancer ⁽⁹⁻¹⁰⁾.

Maitake is specifically recognized for its action on metabolic syndrome since it very effectively controls hyperglycaemia by improving insulin sensitivity and by protecting pancreatic beta cells from oxidative stress and from nitric oxide synthesis. ⁽¹¹⁻¹²⁾ Other studies have shown that it contains an alpha-glucosidase inhibitor that decreases blood sugar levels naturally ⁽¹³⁾.

Its cholesterol-lowering activity is associated with its possible role in lipid metabolism by regulating gene expression in the liver. In animals fed a high-fat diet, it helps lipid metabolism by inhibiting hepatic and serum lipids ⁽¹⁴⁾. It also has the short-term effect of reducing blood pressure in animals ⁽¹⁵⁾.

Some studies have shown that maitake, alone or combined with drug therapy, can induce ovulation in patients with polycystic ovary syndrome ⁽¹⁶⁾.

Certain isolated beta-glucans in maitake participate actively in the collagen biosynthesis of fibroblasts and as cicatrizing agents in cosmetic and skincare products ⁽¹⁷⁾.

It increases antibody production in response to flu vaccination, and also reduces cold symptoms ⁽¹⁸⁾.

References:

- 1) Tsao, Yao-Wei, et al. "Characterization of a novel maitake (*Grifola frondosa*) protein that activates natural killer and dendritic cells and enhances antitumor immunity in mice." *Journal of agricultural and food chemistry* 61.41 (2013): 9828-9838.
- 2) Deng, Gary, et al. "A phase I/II trial of a polysaccharide extract from *Grifola frondosa* (Maitake mushroom) in breast cancer patients: immunological effects." *Journal of cancer research and clinical oncology* 135.9 (2009): 1215-1221.
- 3) Kodama, Noriko, Kiyoshi Komuta, and Hiroaki Nanba. "Can maitake MD-fraction aid cancer patients?." *Alternative medicine review* 7.3 (2002): 236-239.
- 4) Alonso, Eliana Noelia, et al. "Genes related to suppression of malignant phenotype induced by Maitake D-Fraction in breast cancer cells." *Journal of medicinal food* 16.7 (2013): 602-617.
- 5) Masuda, Yuki, et al. "Maitake β -glucan enhances therapeutic effect and reduces myelosuppression and nephrotoxicity of cisplatin in mice." *International immunopharmacology* 9.5 (2009): 620-626.
- 6) Namba, H. "Maitake D-fraction: healing and preventive potential for cancer." *Journal of orthomolecular medicine* 12.1 (1997): 43-49.
- 7) Mayell, Mark. "Maitake extracts and their therapeutic potential-a review." *Alternative Medicine Review* 6.1 (2001): 48-60.
- 8) Braico, Diego Aguilera, et al. "Comparative Effect of Maitake Pro4x with Chemotherapy Breast Cancer Treatment." *Biology and Medicine* 9.3 (2017).
- 9) Yang, Dean, et al. "Prevention of postoperative recurrence of bladder cancer: a clinical study." *Zhonghua wai ke za zhi [Chinese journal of surgery]* 37.8 (1999): 464-465.
- 10) Yang, D. A., S. Q. Li, and X. T. Li. "Prophylactic effects of zhuling and BCG on postoperative recurrence of bladder cancer." *Zhonghua wai ke za zhi [Chinese journal of surgery]* 32.7 (1994): 433-434.
- 11) Kubo, Keiko, Hisao Aoki, and Hiroaki Nanba. "Anti-diabetic activity present in the fruit body of *Grifola frondosa* (Maitake). I." *Biological and Pharmaceutical Bulletin* 17.8 (1994): 1106-1110.
- 12) Hong, Lei, Ma Xun, and Wu Wutong. "Anti-diabetic effect of an α -glucan from fruit body of maitake (*Grifola frondosa*) on KK-Ay mice." *Journal of pharmacy and pharmacology* 59.4 (2007): 575-582.
- 13) Konno, Sensuke, et al. "Anticancer and hypoglycemic effects of polysaccharides in edible and medicinal Maitake mushroom [*Grifola frondosa* (Dicks.: Fr.) SF Gray]." *International Journal of Medicinal Mushrooms* 4.3 (2002).
- 14) Kubo, Keiko, and Hiroaki Nanba. "Anti-hyperliposis effect of maitake fruit body (*Grifola frondosa*). I." *Biological and Pharmaceutical Bulletin* 20.7 (1997): 781-785.
- 15) ADAChi, KyoKo, et al. "Blood pressure-lowering activity present in the fruit body of *grifola frondosa* (maitake). I." *Chemical and pharmaceutical bulletin* 36.3 (1988): 1000-1006.
- 16) Chen, Jui-Tung, et al. "Maitake mushroom (*Grifola frondosa*) extract induces ovulation in patients with polycystic ovary syndrome: a possible monotherapy and a combination therapy after failure with first-line clomiphene citrate." *The Journal of Alternative and Complementary Medicine* 16.12 (2010): 1295-1299.
- 17) Illana-Esteban, Carlos. "El hongo maitake (*Grifola frondosa*) y su potencial terapéutico." *Revista Iberoamericana de Micología* 25.3 (2008): 141-144.
- 18) Nishihira, Jun, et al. "Maitake mushrooms (*Grifola frondosa*) enhances antibody production in response to influenza vaccination in healthy adult volunteers concurrent with alleviation of common cold symptoms." *Functional Foods in Health and Disease* 7.7 (2017): 462-482.

SHIITAKE (*Lentinula edodes*): This mushroom with a Japanese name (Shii=brown; Take=mushroom) has been used since antiquity both in China and Japan. A famous doctor from the Ming dynasty said that Shiitake was a good remedy for liver problems, diseases of the upper respiratory tract, venous insufficiency and weakness, preventive of premature ageing and revitalizing of the Chi (life force). Today, these benefits have been proven through modern medicine.

It supplies a great amount of lentinan, a beta-glucan which is responsible for its anti-tumour action, which, according to experimental studies, works by inhibiting tumour growth through the induction of T cell and macrophage-dependent immune response. Study data confirm that the administration of Shiitake improves immune function, quality of life and survival in patients undergoing chemotherapy.

One study has shown that the combination of shiitake and monoclonal antibodies could act synergically to activate the complementary system, making it one of the most efficient treatments for gastric cancer ⁽¹⁾. A meta-analysis of 5 clinical trials showed a significant increase in survival in advanced gastric cancer patients treated with chemotherapy and lentinan,

the beta-glucan found in shiitake ⁽²⁾. One study showed that the administration of tegafur with lentinan increased survival in metastatic prostate cancer ⁽³⁾. Other studies confirm an increase in survival, a decrease in side effects from chemotherapy and improvement in quality of life for colorectal, hepatic, prostate, breast and oesophageal cancer patients ⁽⁴⁻⁷⁾.

Eritadenine, an active compound of this mushroom, is responsible for its ability to reduce cholesterol and blood lipids. It exerts a very beneficial effect on patients with hyperhomocysteinemia, a pathological situation associated with cardiovascular and neurodegenerative disorders, and it has a pronounced anti-atherosclerotic action. In one study, it was shown that Shiitake inhibits the expression of adhesion molecules on vascular endothelia in pro-inflammatory conditions. Its cholesterol-lowering activity is associated with its possible role in lipid metabolism by regulating gene expression in the liver ⁽⁸⁾.

Shiitake has been extensively studied for viral diseases such as hepatitis B, HIV, herpes simplex I and II, polio, measles and mumps, among others, with good results as it activates T cells and macrophages and stimulates interleukin-1. ⁽⁹⁾ The lignin derivatives in this mushroom are partially responsible for its antiviral action ⁽¹⁰⁾.

The increased immunity provided by this mushroom is from an increase in antiviral activity shown in vivo and in vitro for HIV ⁽¹¹⁻¹²⁾, and clinical studies have shown its immune-modulating effect in HIV patients. ⁽¹³⁻¹⁴⁾

It has been proven to exert powerful anti-candida activity in-vitro. ⁽¹⁵⁻¹⁸⁾

References:

- 1) Ina, Kenji, Takae Kataoka, and Takafumi Ando. "The use of lentinan for treating gastric cancer." *Anti-Cancer Agents in Medicinal Chemistry (Formerly Current Medicinal Chemistry-Anti-Cancer Agents)* 13.5 (2013): 681-688.
- 2) Oba, Koji, et al. "Individual patient based meta-analysis of lentinan for unresectable/recurrent gastric cancer." *Anticancer research* 29.7 (2009): 2739-2745.
- 3) Tari, K., et al. "Effect of lentinan for advanced prostate carcinoma." *Hinyokika kyo. Acta urologica Japonica* 40.2 (1994): 119-123.
- 4) Taguchi, T. "Effects of lentinan in advanced or recurrent cases of gastric, colorectal, and breast cancer." *Gan to kagaku ryoho. Cancer & chemotherapy* 10.2 Pt 2 (1983): 387-393.
- 5) Yamaguchi, Yoshiyuki, Eiji Miyahara, and Jun Hihara. "Efficacy and safety of orally administered Lentinula edodes mycelia extract for patients undergoing cancer chemotherapy: a pilot study." *The American journal of Chinese medicine* 39.03 (2011): 451-459.
- 6) Wang, Ji-Lian, et al. "Combination therapy with lentinan improves outcomes in patients with esophageal carcinoma." *Molecular medicine reports* 5.3 (2012): 745-748.
- 7) Hazama, Shoichi, et al. "Efficacy of orally administered superfine dispersed lentinan (β -1, 3-glucan) for the treatment of advanced colorectal cancer." *Anticancer Research* 29.7 (2009): 2611-2617.
- 8) Wasser, Solomon P. "Shiitake (Lentinus edodes)." *Encyclopedia of dietary supplements* (2005): 653-664.
- 9) Harada, T. "Clinical study of Lentinus edodes mycelia (LEM) against chronic hepatitis B." *Kan-Tan-Sui* 15 (1987): 127.
- 10) Akamatsu, Soichiro, et al. "Hepatoprotective effect of extracts from Lentinus edodes mycelia on dimethylnitrosamine-induced liver injury." *Biological and Pharmaceutical Bulletin* 27.12 (2004): 1957-1960.
- 11) Suzuki, Harumi, et al. "Structural characterization of the immunoactive and antiviral water-solubilized lignin in an extract of the culture medium of Lentinus edodes mycelia (LEM)." *Agricultural and biological chemistry* 54.2 (1990): 479-487.
- 12) Yamamoto, Yoshiki, et al. "Immunopotentiating Activity of the Water-soluble Lignin Rich Fraction Prepared from LEM—The Extract of the Solid Culture Medium of Lentinus edodes Mycelia—." *Bioscience, biotechnology, and biochemistry* 61.11 (1997): 1909-1912.
- 13) Gordon, Maxwell, et al. "A placebo-controlled trial of the immune modulator, lentinan, in HIV-positive patients: a phase I/II trial." *Journal of medicine* 29.5-6 (1998): 305-330.
- 14) Gordon, Maxwell, et al. "A phase II controlled study of a combination of the immune modulator, lentinan, with didanosine (ddI) in HIV patients with CD4 cells of 200-500/mm³." *Journal of medicine* 26.5-6 (1995): 193-207.
- 15) Hearst, Rachel, et al. "An examination of antibacterial and antifungal properties of constituents of Shiitake (Lentinula edodes) and Oyster (Pleurotus ostreatus) mushrooms." *Complementary Therapies in Clinical Practice* 15.1 (2009): 5-7.
- 16) Kitzberger, Cintia Sorane Good, et al. "Antioxidant and antimicrobial activities of shiitake (Lentinula edodes) extracts obtained by organic solvents and supercritical fluids." *Journal of food engineering* 80.2 (2007): 631-638.
- 17) Rao, Juluri R., B. Cherie Millar, and John E. Moore. "Antimicrobial properties of shiitake mushrooms (Lentinula edodes)." *International journal of antimicrobial agents* 33.6 (2009): 591-592.
- 18) Kuznetsov, O. I. U., et al. "Antimicrobial action of Lentinus edodes juice on human microflora." *Zhurnal mikrobiologii, epidemiologii, i immunobiologii* 1 (2004): 80-82.

CHAGA: The active components of chaga are polysaccharides (β -glucans) and the triterpene betulinic acid and its derivatives. Chaga that grows on birch trees has been shown to be rich in betulinic acid since it is absorbed from the tree's bark. It has traditionally been used in Russia and Poland as a cancer remedy ⁽¹⁾.

Betulinic acid induces mitochondrial apoptosis in cancer cells ⁽²⁾ and chaga extract and/or betulinic acid has been shown to inhibit the growth of several types of cancer cells, including those of the colon, breast, lung and brain ⁽³⁻⁷⁾. The polysaccharide fraction of the chaga mushroom has also shown anti-tumour effects ⁽⁸⁾.

Other in vitro studies show that the betulinic acid present in chaga exerts activity against different types of cancer cells (human melanoma, neuroblastoma, brain tumour, ovarian cancer, leukaemia, etc.)⁽⁹⁻¹⁰⁾. It shows a promising effect when combined with radiotherapy on human melanoma cells⁽¹¹⁾. In rodents it exerts cancer-fighting activity with no systemic toxicity⁽⁹⁾. Its polysaccharides have an immune-stimulating effect⁽¹²⁾.

Betulinic acid has been proven effective against the HIV-1 virus by inhibiting replication⁽¹³⁻¹⁵⁾. In a preliminary study, activity was detected against flu virus A and B⁽¹⁶⁾, as well as herpes simplex⁽¹⁷⁾ and human papilloma virus⁽¹⁸⁾.

It shows an anti-inflammatory effect in vitro⁽¹⁹⁾ and in vivo⁽²⁰⁾.

In animal models, a blood sugar-lowering effect has been seen⁽²¹⁾.

References:

- 1) Powell, Martin. Medicinal Mushrooms-A Clinical Guide. Mycology Press, 2015.
- 2) Gheorgheos, Dorina, et al. "Betulinic acid as a potent and complex antitumor phytochemical: a minireview." *Anti-Cancer Agents in Medicinal Chemistry (Formerly Current Medicinal Chemistry-Anti-Cancer Agents)* 14.7 (2014): 936-945.
- 3) Chintharlapalli, Sudhakar, et al. "Betulinic acid inhibits colon cancer cell and tumor growth and induces proteasome-dependent and-independent downregulation of specificity proteins (Sp) transcription factors." *BMC cancer* 11.1 (2011): 371.
- 4) Damle, Archana A., Yogita P. Pawar, and Archana A. Narkar. "Anticancer activity of betulinic acid on MCF-7 tumors in nude mice." *Indian Journal of Experimental Biology* 51.7 (2013): 485-491.
- 5) Lemieszek, Marta Kinga, et al. "Anticancer effects of fraction isolated from fruiting bodies of Chaga medicinal mushroom, *Inonotus obliquus* (Pers.: Fr.) Pilát (Aphyllphoromycetidae): in vitro studies." *International journal of medicinal mushrooms* 13.2 (2011): 131-143.
- 6) Mertens-Talcott, Susanne U., et al. "Betulinic acid decreases ER-negative breast cancer cell growth in vitro and in vivo: Role of Sp transcription factors and microRNA-27a: ZBTB10." *Molecular carcinogenesis* 52.8 (2013): 591-602.
- 7) Mullauer, Franziska B., et al. "Betulinic acid delivered in liposomes reduces growth of human lung and colon cancers in mice without causing systemic toxicity." *Anti-cancer drugs* 22.3 (2011): 223-233.
- 8) Ning, Xianbin, et al. "Inhibitory effects of a polysaccharide extract from the Chaga medicinal mushroom, *Inonotus obliquus* (higher Basidiomycetes), on the proliferation of human neurogliocytoma cells." *International journal of medicinal mushrooms* 16.1 (2014).
- 9) Mullauer, Franziska B., Jan H. Kessler, and Jan Paul Medema. "Betulinic acid, a natural compound with potent anticancer effects." *Anti-cancer drugs* 21.3 (2010): 215-227.
- 10) Schmidt, M. L., et al. "Betulinic acid induces apoptosis in human neuroblastoma cell lines." *European Journal of Cancer* 33.12 (1997): 2007-2010.
- 11) Selzer, Edgar, et al. "Effects of betulinic acid alone and in combination with irradiation in human melanoma cells." *Journal of investigative dermatology* 114.5 (2000): 935-940.
- 12) Kim, Yong Ook, et al. "Anti-cancer effect and structural characterization of endo-polysaccharide from cultivated mycelia of *Inonotus obliquus*." *Life Sciences* 79.1 (2006): 72-80.
- 13) Fujioka, Toshihiro, et al. "Anti-AIDS agents, 11. Betulinic acid and platanic acid as anti-HIV principles from *Syzygium claviflorum*, and the anti-HIV activity of structurally related triterpenoids." *Journal of natural products* 57.2 (1994): 243-247.
- 14) Cichewicz, Robert H., and Samir A. Kouzi. "Chemistry, biological activity, and chemotherapeutic potential of betulinic acid for the prevention and treatment of cancer and HIV infection." *Medicinal Research Reviews* 24.1 (2004): 90-114.
- 15) Aiken, Christopher, and Chin Ho Chen. "Betulinic acid derivatives as HIV-1 antivirals." *Trends in molecular medicine* 11.1 (2005): 31-36.
- 16) Kahlos, K., et al. "Preliminary tests of antiviral activity of two *Inonotus obliquus* strains." *Fitoterapia* 67.4 (1996): 344-347.
- 17) Pan, Hong-hui, et al. "Aqueous extract from a Chaga medicinal mushroom, *Inonotus obliquus* (higher basidiomycetes), prevents herpes simplex virus entry through inhibition of viral-induced membrane fusion." *International journal of medicinal mushrooms* 15.1 (2013).
- 18) Schettino, M. T., et al. "Betulinic acid and possible influence on the clearance of Human Papilloma Virus: cytological and virological follow-up." *Minerva ginecologica* 65.6 (2013): 661-668.
- 19) Ma, Lishuai, et al. "Anti-inflammatory and anticancer activities of extracts and compounds from the mushroom *Inonotus obliquus*." *Food Chemistry* 139.1 (2013): 503-508.
- 20) Mishra, Siddhartha Kumar, et al. "Orally administered aqueous extract of *Inonotus obliquus* ameliorates acute inflammation in dextran sulfate sodium (DSS)-induced colitis in mice." *Journal of ethnopharmacology* 143.2 (2012): 524-532.
- 21) Sun, Jun-En, et al. "Antihyperglycemic and antilipidperoxidative effects of dry matter of culture broth of *Inonotus obliquus* in submerged culture on normal and alloxan-diabetes mice." *Journal of ethnopharmacology* 118.1 (2008): 7-13.

CORDYCEPS: Used in Traditional Chinese Medicine as an aphrodisiac and diuretic, it favours kidney function because of its mannitol content. The antioxidants supplied by this fungus neutralize the free radicals responsible for cell mutation, the cause of the ageing process. By reducing cell damage and acting on collagen, antioxidants help prevent expression lines and wrinkles and preserve a youthful appearance in the skin^(2,3).

Cordyceps causes an increase in ATP levels in cells and increases aerobic capacity and oxygen use, as well as offering a greater resistance to fatigue. In athletes it improves sports performance upon increasing muscle tissue metabolism. In healthy individuals between 50 and 75 it improves exercise capacity and resistance to fatigue⁽⁴⁾.

In sedentary people, aerobic capacity is increased⁽⁵⁾ while in athletes this effect is not noticed since maximum aerobic capacity has already been reached⁽⁶⁾. It increases the antioxidant capacity of enzymes such as superoxide dismutase, glutathione peroxidase and catalase, providing additional benefits for cardiovascular health in older patients, while its anti-fatigue and anti-stress effect allows for its use in cases of asthenia and depression⁽²⁾.

This fungus treats hyposexuality, driving sexual desire. It increases libido in both men and women, and increases steroid hormones in urine. One study has shown that cordyceps acts through the sex hormone system by exerting a regulatory effect on reproductive organs, indicating its use for infertility and irregular menstruation by stimulating the production of 17 β -estradiol (oestrogen) ⁽⁸⁾. This effect could be beneficial for the treatment of post-menopausal osteoporosis ⁽⁹⁾. Other studies in animals have shown that it increases male hormone levels and improves the quality and quantity of sperm ⁽⁷⁾.

Cordyceps can also increase insulin release and cellular insulin sensitivity ^(10,11). Cordycepin and its derivatives have an active role in its anti-diabetic action ⁽¹²⁾. Additionally, in animals it has been proven capable of inhibiting hepatic fibrosis and of helping re-establish and improve hepatic function in patients with renal failure ⁽¹³⁾. It protects the kidneys from nephrotoxicity caused by cyclosporine ⁽¹⁴⁾ and gentamicin ⁽¹⁵⁾.

Its nucleosides inhibit viral replication ⁽¹⁹⁾ and its polysaccharides modulate immune response to viral infections ⁽²⁰⁾.

The fungus strengthens the respiratory system and has a mucolytic and cough suppressing function. This makes it valid as a treatment for asthma, chronic bronchitis, respiratory insufficiency, emphysema, tuberculosis and cystic fibrosis ^(16,17).

Research has revealed that it has a regulating effect on blood lipid metabolism, helps control hyperlipidaemia and acts against the formation of atherosclerosis, decreasing triglycerides and increasing HDL cholesterol ⁽¹⁸⁾.

Cordyceps modulates the immune system, preventing organ transplant rejection and protecting against the effects of radiotherapy, particularly on bone marrow and the gastrointestinal system. It carries out an important role in immune modulation by stimulating Th cells, prolonging lymphocyte survival and increasing the production of tumour necrosis factor and interleukin. In vitro evidence shows promising activity for cancer treatment ⁽²¹⁻²⁴⁾. It aids recovery from Taxol-induced leukopenia in mice. ⁽²⁵⁾ It also offers protection against radiotherapy-induced damage to bone marrow and intestinal tissue in mice ⁽²⁶⁾.

The effective dose was 3-6 g/day for most conditions. Doses of up to 50 g/day have been used with good results in cancer ⁽²⁷⁾. It improves survival in patients with hepatocellular carcinoma ⁽²⁸⁾.

References:

- 1) Powell, Martin. Medicinal Mushrooms-A Clinical Guide. Mycology Press, 2015.
- 2) Ji, Deng-Bo, et al. "Antiaging effect of Cordyceps sinensis extract." *Phytotherapy Research* 23.1 (2009): 116-122.
- 3) Canney, Simon. "Cordyceps sinensis animal, vegetable or both?." *Journal of Chinese Medicine* 80 (2006).
- 4) Chen, Steve, et al. "Effect of Cs-4®(Cordyceps sinensis) on exercise performance in healthy older subjects: A double-blind, placebo-controlled trial." *The Journal of Alternative and Complementary Medicine* 16.5 (2010): 585-590.
- 5) Yi, Xiao, Huang Xi-zhen, and Zhu Jia-shi. "Randomized double-blind placebo-controlled clinical trial and assessment of fermentation product of Cordyceps sinensis (Cs-4) in enhancing aerobic capacity and respiratory function of the healthy elderly volunteers." *Chinese Journal of Integrative Medicine* 10.3 (2004): 187-192.
- 6) Walker, Thomas B. "Does Cordyceps sinensis Ingestion Aid Athletic Performance?." *Strength and Conditioning Journal* 28.2 (2006): 21.
- 7) Hsu, Chih-Chao, et al. "In vivo and in vitro stimulatory effects of Cordyceps sinensis on testosterone production in mouse Leydig cells." *Life Sciences* 73.16 (2003): 2127-2136.
- 8) Huang, Bu-Miin, et al. "Upregulation of steroidogenic enzymes and ovarian 17 β -estradiol in human granulosa-lutein cells by Cordyceps sinensis mycelium." *Biology of reproduction* 70.5 (2004): 1358-1364.
- 9) Qi, Wei, et al. "The mechanism of Cordyceps sinensis and strontium in prevention of osteoporosis in rats." *Biological trace element research* 143.1 (2011): 302-309.
- 10) Kiho, Tadashi, et al. "Structural features and hypoglycemic activity of a polysaccharide (CS-F10) from the cultured mycelium of Cordyceps sinensis." *Biological and Pharmaceutical Bulletin* 22.9 (1999): 966-970.
- 11) Kiho, T., et al. "Hypoglycemic activity of a polysaccharide (CS-F30) from the cultural mycelium of Cordyceps sinensis and its effect on glucose metabolism in mouse liver." *Phytother Res* 4 (2000): 647-9.
- 12) Shin, Seulmee, et al. "Cordycepin suppresses expression of diabetes regulating genes by inhibition of lipopolysaccharide-induced inflammation in macrophages." *Immune Network* 9.3 (2009): 98-105.
- 13) Wang, Ying, et al. "Protection of chronic renal failure by a polysaccharide from Cordyceps sinensis." *Fitoterapia* 81.5 (2010): 397-402.
- 14) Xu, F., et al. "Amelioration of cyclosporin nephrotoxicity by Cordyceps sinensis in kidney-transplanted recipients." *Nephrology Dialysis Transplantation* 10.1 (1995): 142-143.
- 15) Zhen, F., J. Tian, and L. S. Li. "Mechanisms and therapeutic effect of Cordyceps sinensis (CS) on aminoglycoside induced acute renal failure (ARF) in rats." *Zhongguo Zhong xi yi jie he za zhi Zhongguo Zhongxiyi jiehe zazhi= Chinese journal of integrated traditional and Western medicine* 12.5 (1992): 288-91.
- 16) Zheng, L. Y., and W. W. Deng. "The clinical efficacy of Cordyceps sinensis Cs-4 capsule in treating chronic bronchitis and its effect on pulmonary function." *J Admin Trad Chin Med* 5 (1995): 9-11.
- 17) Qiuo, Y. L., and X. C. Ma. "Treatment of 32 tussive asthma patients with JinShuiBao." *Chin J Integr Trad Western Med.(Chung-KuoChungHsi I Chieh Ho Tsa Chih)* 13 (1993): 660.
- 18) Panda, Ashok Kumar, and Kailash Chandra Swain. "Traditional uses and medicinal potential of Cordyceps sinensis of Sikkim." *Journal of Ayurveda and integrative medicine* 2.1 (2011): 9.
- 19) Montefiori, David C., et al. "Phosphorothioate and cordycepin analogues of 2', 5'-oligoadenylate: inhibition of human immunodeficiency virus type 1 reverse transcriptase and infection in vitro." *Proceedings of the National Academy of Sciences* 86.18 (1989): 7191-7194.

- 20) Kuo, Yuh-Chi, et al. "Cordyceps sinensis as an immunomodulatory agent." *The American journal of Chinese medicine* 24.02 (1996): 111-125.
- 21) Wang, Xu-An, et al. "Cordycepin induces S phase arrest and apoptosis in human gallbladder cancer cells." *Molecules* 19.8 (2014): 11350-11365.
- 22) Chen, Lisa S., Christine M. Stellrecht, and Varsha Gandhi. "RNA-directed agent, cordycepin, induces cell death in multiple myeloma cells." *British journal of haematology* 140.6 (2008): 682-391.
- 23) Wong, Ying Ying, et al. "Cordycepin inhibits protein synthesis and cell adhesion through effects on signal transduction." *Journal of Biological Chemistry* 285.4 (2010): 2610-2621.
- 24) Zhou, Xiaoxia, et al. "Effect of cordycepin on interleukin-10 production of human peripheral blood mononuclear cells." *European journal of pharmacology* 453.2-3 (2002): 309-317.
- 25) Liu, Wei-Chung, et al. "Cordyceps sinensis health supplement enhances recovery from taxol-induced leukopenia." *Experimental biology and medicine* 233.4 (2008): 447-455.
- 26) Liu, Wei-Chung, et al. "Protection against radiation-induced bone marrow and intestinal injuries by Cordyceps sinensis, a Chinese herbal medicine." *Radiation research* 166.6 (2006): 900-907.
- 27) Holliday, John C., and Matt P. Cleaver. "Medicinal value of the caterpillar fungi species of the genus Cordyceps (Fr.) Link (Ascomycetes). A review." *International Journal of Medicinal Mushrooms* 10.3 (2008).
- 28) Niwa, Yukie, et al. "Evidence that naturopathic therapy including Cordyceps sinensis prolongs survival of patients with hepatocellular carcinoma." *Integrative cancer therapies* 12.1 (2013): 50-68.

LION'S MANE: Lion's mane is a mushroom with a unique aspect that grows in dead trees. Unlike common varieties of mushrooms, lion's mane has long white threads that give it the look of a mane or beard.

Lion's mane is well known in the Orient for its regenerative and restorative effects on cognition and the nervous system, as well as its immune-modulating function. This mushroom has great therapeutic potential, as it protects and regenerates both the gastrointestinal mucosa and the myelin sheaths that line nerve cells.

It is mainly composed of cyanthane derivatives, polysaccharides, beta-glucans, ergosterol (pro-vitamin D), erinacine and hericenone. Like many medicinal mushrooms, it's a natural source of beta-glucans which are responsible for its anti-tumour potential, and have immune-modulating, lipid-lowering, antioxidant and neuroprotective activity.

Erinacines and hericenones have the ability to cross the blood-brain barrier and stimulate the production of nerve growth factor (NFG), a soluble protein that promotes the growth of nerve cells and neuron survival, necessary for the development and function of the nervous system. These compounds stimulate the production of new neurons and protect against neuron death, useful for treating different types of dementia such as Alzheimer's or cognitive decline, multiple sclerosis, Parkinson's and neuropathy ⁽¹⁻²⁾.

In patients with multiple sclerosis, lion's mane helps with myelin regeneration (myelinisation), the insulation that protects neurons and allows for intact nerve transmission in "in vitro" studies ⁽³⁻⁴⁾.

It stimulates nerve growth factor (NGF) which plays an important role in neuropathy ⁽⁵⁾. In animals, it has a protective effect for diabetic neuropathy ⁽⁶⁾. It also improves recovery in rodents with damaged peroneal nerve ⁽⁷⁾.

Lion's mane has shown activity against methicillin-resistant *Staphylococcus aureus* (MRSA), responsible for many nosocomial infections (contracted at hospital) ⁽⁸⁾.

Heridium erinaceus has been extensively studied in China for digestion and gastric ulcers because of its excellent regenerative capacity in the gastrointestinal mucosa, making it valuable for all disorders related to intestinal hyperpermeability such as gastritis, gastroesophageal reflux and gastric ulcers. It also inhibits the activity of *Helicobacter pylori* ⁽⁹⁻¹⁰⁾. Studies carried out also show the mushroom's positive effect on ulcerative colitis, Crohn's disease and cancers of the stomach, colon and pancreas ⁽¹¹⁻¹²⁾. Its fibre is only metabolized by bacteria living in the intestine, so it stimulates proper development of intestinal flora, exerting a prebiotic effect, important for good intestinal function. It also stimulates macrophage production, the cells that reduce the invasion of pathogens through their antibacterial activity ⁽¹¹⁾.

It strengthens apoptosis induced by doxorubicin in hepatocarcinoma cells ⁽¹³⁾. Its extracts have been shown to decrease the growth of several types of tumours both "in vitro" and "in vivo", due to its anti-tumour and immune-stimulating properties. ⁽¹⁴⁻¹⁶⁾

References:

- 1) Kawagishi, Hirokazu, Cun Zhuang, and Ellen Shnidman. "The anti-dementia effect of Lion's Mane mushroom (*Heridium erinaceum*) and its clinical application." *Townsend letter for doctors and Patients* 249 (2004): 54-57.
- 2) Mori, Koichiro, et al. "Improving effects of the mushroom Yamabushitake (*Heridium erinaceus*) on mild cognitive impairment: a double-blind placebo-controlled clinical trial." *Phytotherapy Research* 23.3 (2009): 367-372.
- 3) Kolotushkina, E. V., et al. "The influence of *Heridium erinaceus* extract on myelination process in vitro." *Fiziol Zh* 49.1 (2003): 38-45.

- 4) Grygansky, Andriy P., Mykhaylo Moldavan, and Olena V. Kolotushkina. "Heridium erinaceus (Bull.: Fr.) Pers. extract effect on nerve cells." *International Journal of Medicinal Mushrooms* 3.2-3 (2001).
- 5) Mori, Koichiro, et al. "Nerve growth factor-inducing activity of *Heridium erinaceus* in 1321N1 human astrocytoma cells." *Biological and Pharmaceutical Bulletin* 31.9 (2008): 1727-1732.
- 6) Yi, Zhang, et al. "Protective effect of ethanol extracts of *Heridium erinaceus* on alloxan-induced diabetic neuropathic pain in rats." *Evidence-Based Complementary and Alternative Medicine* 2015 (2015).
- 7) Wong, Kah-Hui, et al. "Neuroregenerative potential of lion's mane mushroom, *Heridium erinaceus* (Bull.: Fr.) Pers.(higher Basidiomycetes), in the treatment of peripheral nerve injury." *International journal of medicinal mushrooms* 14.5 (2012).
- 8) Kawagishi, Hirokazu. "Anti-MRSA Compounds from *Heridium erinaceus* (Bull.: Fr.) Pers." *International Journal of Medicinal Mushrooms* 7.3 (2005).
- 9) Shang, Xiaodong, et al. "In vitro anti-*Helicobacter pylori* effects of medicinal mushroom extracts, with special emphasis on the Lion's Mane mushroom, *Heridium erinaceus* (higher Basidiomycetes)." *International journal of medicinal mushrooms* 15.2 (2013).
- 10) Zhu, Yang, et al. "Preparation, characterization, and anti-*Helicobacter pylori* activity of Bi 3+-*Heridium erinaceus* polysaccharide complex." *Carbohydrate polymers* 110 (2014): 231-237.
- 11) Xu, C. P., et al. "A double-blind study of effectiveness of *Heridium erinaceus* pers therapy on chronic atrophic gastritis. A preliminary report." *Chinese medical journal* 98.6 (1985): 455.
- 12) Wong, Jing-Yang, et al. "Gastroprotective effects of Lion's Mane mushroom *Heridium erinaceus* (Bull.: Fr.) Pers.(Aphyllophoromycetidae) extract against ethanol-induced ulcer in rats." *Evidence-Based Complementary and Alternative Medicine* 2013 (2013).
- 13) Lee, Jong Seok, and Eock Kee Hong. "*Heridium erinaceus* enhances doxorubicin-induced apoptosis in human hepatocellular carcinoma cells." *Cancer letters* 297.2 (2010): 144-154.
- 14) Mizuno, Takashi, et al. "Antitumor-active polysaccharides isolated from the fruiting body of *Heridium erinaceum*, an edible and medicinal mushroom called yamabushitake or houtou." *Bioscience, Biotechnology, and Biochemistry* 56.2 (1992): 347-348.
- 15) Wang, Jinn-Chyi, et al. "Antitumor and immunoenhancing activities of polysaccharide from culture broth of *Heridium* spp." *The Kaohsiung journal of medical sciences* 17.9 (2001): 461-467.
- 16) Li, Guang, et al. "Anticancer potential of *Heridium erinaceus* extracts against human gastrointestinal cancers." *Journal of ethnopharmacology* 153.2 (2014): 521-530.