

Medical mushrooms in cancer treatment

Mushrooms with proofed anti-tumoral effects:

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|----------------------------|---|
| • Mamma-Carcinoma: | Maitake, Shiitake, Coriolus, Reishi, Agaricus |
| • Cervix-Carcinoma/Uterus: | Agaricus, Coriolus |
| • Colorectal Carcinoma: | Agaricus, Maitake, Hericium |
| • Stomach Carcinoma: | Hericium, Coriolus |
| • Leukemia: | Cordyceps, Reishi, Maitake, Polyporus, Coriolus |
| • Liver Cancer: | Reishi, Maitake, Shiitake, Polyporus, Coriolus |
| • Lung Cancer: | Cordyceps, Reishi, Maitake, Polyporus, Coriolus |
| • Lymphoma: | Cordyceps |
| • Melanoma: | Shiitake, Auricularia, Agaricus, Reishi |
| • Prostate Carcinoma: | Reishi, Maitake, Shiitake, Coriolus |
| • Sarcoma: | Agaricus, Reishi, Hericium |

Details about the 13 most important cancer mushrooms:

1. Agaricus blazei Murill
2. Lentinula edodes (Shiitake)
3. Ganoderma lucidum (Reishi)
4. Coriolus versicolor
5. Polyporus umbellatus
6. Hericium erinaceus
7. Cordyceps sinensis
8. Grifola frondosa (Maitake)
9. Coprinus comatus
10. Pleurotus ostreatus
11. Phellinus Linteus
12. Auricularia polytricha
13. Inonotus obliquus (Chaga)

Agaricus blazei murrill (ABM)



Almond mushroom – Hardly any other mushroom stabilizes the immune system as effectively as Agaricus blazei murrill.

Agaricus blazei murrill (ABM) regulates the entire immune system - especially for cancer and autoimmune diseases. This is because ABM is the medicinal mushroom with the highest concentration of effective immune modulators.

ABM contains numerous long-chain polysaccharides, the β -glucanes. Their complex chemical structure leads to an equally complex effectivity. Among other things, they stimulate a weak immune system and prevent or regulate immune overreactions.

This effectiveness has in particular been proven for abdominal, intestinal, lung, pancreas, prostatic and liver cancer and for brain tumours.

ABM's active ingredients have cytotoxic effects on cancer cells, can initiate apoptosis of neoplastic cells and suppress neo-angiogenesis.

If blood formation capacities are impeded after chemo or radiation therapies, ABM supports bone marrow regeneration. This may help counteract exhaustion caused by erythrocyte deficiencies or ongoing immunodeficiency caused by leucocyte loss. Furthermore, Agaricus blazei murrill is able to reduce splenic swellings that occur by leukemia or lymphomas. This helps to significantly improve the general condition of cancer patients.

Of all mushrooms analyzed so far, ABM has the highest concentration of superoxide dismutase (SOD), catalase and tyrosinase. These enzymes are also found in our organism where unfold strong antioxidant properties. ABM thus helps reducing oxidative stress and free radicals.

Additionally, ABM supports the splenic blood-purifying and defence functions. Likewise, it has a protecting effect on the liver.

Positive experiences have also been reported for fibromyalgia, multiple sclerosis, Alzheimer's and Parkinson's disease and rheumatism. ABM can also positively affect autoimmune diseases of the thyroid gland and pancreas (type I diabetes).

Effective applications verified by studies:

- Activation of tumoral defence: increased production of immunoglobulin M, which later transforms into immunoglobulin G.
- Proliferation and differentiation of macrophages and monocytes, which activates the T-cells that use messengers (cytokine IL-6) to stimulate the β -cells to increased antibody-production.

Lentinula edodes - Shiitake



Since its application range is so versatile and as it was one of the first medicinal mushrooms used as such in our culture, Shiitake is also known as “the king of medicinal mushrooms”.

The name “Shiitake” is derived from two Japanese words: “Shiia“, meaning mushroom which grows on the Shii tree (a hardwood tree), and “Take“, which means mushroom. In China, it is also called Shiang Gu, which can be interpreted as “scented mushroom”.

Due to its valuable ingredients, Shiitake has been considered the king of all mushrooms in Asia for millenia. Even during the Ming Dynasty (1368 - 1644), it was highly valued as medicinal food and used in the treatment of various disorders. According to Asian folk medicine, the mushroom is a tonic that serves to regulate the vital Qi energy, harmonising Yin and Yang and activating the blood.

Several ingredients of the Shiitake mushroom have been proven to be pharmacologically effective.

Shiitake contains eritadenine, a derivative of the purine base adenine. Eritadenine has anti-aggregative effects on thrombocytes and is thus anti-thrombotic. It influences the hepatic phospholipid metabolism and thus reduces blood fats, especially serum cholesterol. In the process, the cholesterol-biosynthesis is not suppressed; the excretion of cholesterol is accelerated.

Moreover, Shiitake has been found to shift the lipoprotein ratio towards HDL. This enables an increased removal of cholesterol from the vessels and an accelerated breakdown of cholesterol in the liver. The protective effects of HDL are its ability to remove cholesterol from tissue and macrophages, and because HDL is accompanied by enzymes that are capable of decomposing oxidized lipids. The anti-inflammatory and cholesterol-regulating properties of Shiitake reduce the risk of foam cell deposits on arterial walls and thus of arteriosclerosis. Similarly, hypertension (high blood pressure) caused by vascular plaque can be counteracted. To a certain extent, the blood pressure-lowering properties are also owed to the tyrosinase enzyme, which studies have verified to be a Shiitake ingredient.

Another active substance contained by Shiitake is the high-molecular polysaccharide lentinan. It is mainly clinically administered as an immune-therapeutic medicine for tumour patients since it activates the immune response functions and inhibits tumour growth. Highly-malignant cells have a protective mechanism: they block the synthesis of type TH 1

cytokines. Lentinan deploys an alternative approach to activate the complement system by stimulating the macrophages and activating the TH 1 cells. The released IL-2 subsequently suppresses the tumour growth. Shiitake is thus a great help for all cancer patients who are not yet in orthodox treatment, and it is not surprising that Japan has long since approved lentinan as a cancer medication.

Apart from lentinan, Shiitake contains other polysaccharides with anti-carcinogenic and immune-regulating properties. The β -glycans (polysaccharides) contained in Shiitake are capable of activating inherent antioxidant enzymes such as superoxide dismutase, catalase or glutathione peroxidase. This is highly significant for detoxification and in order to provide protection from cellular damage and inflammations.

Western mycotherapy mainly administers the Shiitake medicinal mushroom in the treatment of arteriosclerosis and circulatory disorders. Since Shiitake is able to regulate the blood circulation by influencing vascular tone, it is also successfully used to treat migraines and tinnitus.

Shiitake is furthermore supportive in conditions caused by metabolic disorders that result in articular (joint) swelling and pain. Positive experiences using Reishi and Shiitake medicinal mushrooms have also been reported for treating arthritis, gout and rheumatism. In these cases, pain and mobility restrictions can be reduced.

We should furthermore mention Shiitake's hepato-protective properties. Consuming this medicinal mushroom protects liver cells and improves the hepatic (liver) function. The production of antibodies has been found to be stimulated by hepatitis B. Moreover, the lentinan contained in Shiitake has been found to regulate the SGPT and GPT levels by toxic hepatitis.

Shiitake is a generally reinforcing and strengthening mushroom that - also due to the B vitamins it contains - is recommended for exhaustion, work-related stress and chronic fatigue syndrome. Thanks to its ergosterol content (a preliminary vitamin D which is primarily contained in meat) it is also a valuable menu alternative for vegetarians and vegans.

Verified effects from research:

- the cholesterol level is lowered through the transformation of the hepatic (liver) phospholipid metabolism.
- the ingredient tyrosinase serves to reduce excessive blood pressure.

Application in Traditional Chinese Medicine:

- **Properties:** sweet, neutral
- spleen, stomach, lung
- regulates the Qi and blood for void but not for blockages
- releases mucus
- reinforces the centre and Qi
- enables rashes to break through
- counteracts anorexia and weakness
- counteracts frequent urination
- counteracts rachitis
- counteracts gastric and uterine carcinomas
- counteracts hyperlipidaemia

Reishi - *Ganoderma lucidum*



Lingzhi mushroom - Reishi, the “mushroom of eternal life”, is primarily effective in regenerating the liver and thus detoxifying. Due to its high triterpene content it is also anti-inflammatory.

Reishi has been used in China for medicinal purposes for thousands of years and is considered even more valuable than ginseng. The well-known approximately 2000 year old Chinese pharmacopeia “Shen Long Ben Tsao” classifies all herbs known at that time into three groups, Reishi being a member of the most valued group, the “Herbs of God”. There it is ranked superior to all other plants and is termed the “king of medicinal plants”, “mushroom of longevity” or “herb of spiritual power”.

From a modern point of view, this honour makes sense. Almost all effects attributed to Reishi in ancient China have been verified by recent scientific studies. The term “immune power” was unknown in ancient China, but one meant the same when one emphasised: “Reishi helps to overcome diseases and prolongs human longevity. It helps us to stay healthy and avoid becoming sick in the first place because it has both a preventive and curing effect.” In any case, it supports our body’s energetic system.

Due to its high triterpene content, Reishi has an extremely beneficial influence on all kinds of physical inflammations. Its triterpenes have effects similar to those of cortisone and inhibit the release of histamine, which accounts for swellings, reddening and itching. Specifically inflammation has been recently shown to play a central role in our bodies. The latest research has revealed that if complex inflammations escalate out of control they can result in a cardiac infarction, cancer, diabetes or Alzheimer’s disease. Reishi is thus vital for sustainable health or recovery.

Because the triterpenes it contains inhibit the release of histamine, Reishi is one of the most important mushrooms in the treatment of allergies of all kinds. Dermal or mucosal inflammations are alleviated.

Reishi regulates the immune system and thus supports our body’s self-regulating forces in fighting viral infections such as Herpes zoster and Herpes simplex.

Reishi has pronounced liver-regenerating properties and thus purifies the blood and detoxifies. It is particularly supportive in the treatment of chronic hepatitis. By improving hepatic metabolism, it lowers the blood fat values. Moreover, its triterpene inhibits ganodermic acids, cholesterol synthesis and the accumulation of lipids. They also lower blood pressure and counteract thrombocyte aggregation.

Reishi is not only closely associated to the liver but also to the lungs. It is extraordinarily effective in the treatment of asthma, chronic bronchitis, cough and dyspnoea (shortness of breath). Particularly by chronic respiratory diseases with insufficient oxygen supply, Reishi significantly improves the blood oxygen absorption. This is also beneficial for athletes, since Reishi is also an energetic tonic that improves our stamina. A research study chronicled the reactions of 900 soldiers in Tibet at 4700 meters above sea level. Despite the oxygen deficient environment, the group which consumed Reishi were almost entirely free from symptoms such as headache or nausea.

A control group showed significantly more symptoms of high-altitude sickness. The body's increased oxygen supply is also beneficial for cardiac activity: Reishi improves the oxygen supply to the cardiac muscle and helps coronary vessel constrictions, cardiac arrhythmias, severe blood pressure irregularities and cardiac insufficiency. Since Reishi has a close organ connection to the liver, it is also very effective in the treatment of skin disorders. Thanks to its detoxification and blood purification properties, it alleviates all kinds of skin disorders. Its anti-inflammatory and anti-allergic properties are highly supportive in this context.

Moreover, due to its detoxifying influence, Reishi is very beneficial for fibromyalgia. Additionally, it eases the frequently related vegetative symptoms by rebalancing the autonomic nervous system under sympathicotonic conditions.

Reishi is furthermore recommended in the treatment of muscular dystrophy and muscle tenseness, since the adenosine it contains soothes and relaxes the muscles, in contrast to the neurotransmitter acetylcholine. The impulse transmission between nerve and contraction of the smooth muscle is reduced. Moreover, Reishi's high triterpene content helps regulate the histamine which is increasingly released under stress.



Reishi eases the discomfort of neurological disorders, in particularly weakness, neurasthenia, forgetfulness, uneasiness, and sleeplessness.

By activating superoxide dismutase, glutathione-S-transferase and laccase, Reishi can reduce oxidative stress.

Verified effects of Reishi from research:

- the triterpenes in Reishi can inhibit the release of histamine.
- the overall cholesterol in plasma and liver is lowered via reduced cholesterol synthesis and/or an accelerated cholesterol metabolism.
- Reishi can be implemented for acute and chronic hepatitis. It has anti-inflammatory and anti-fibrotic effects on liver cirrhosis.
- oxidative damages to liver and kidney can be prevented.
- eases the pain and improves the skin by herpes zoster.
- has direct anti-viral effects on Herpes simplex: prevents the virus' adhesion to and penetration of the host cell
- regardless of administration before or after radiotherapy (roentgen radiation), it facilitates a faster restoration of the leucocyte, erythrocyte and thrombocyte count.
- Reishi protects the nerves and promotes the differentiation of neural cells.
- Reishi can be used in the treatment of muscular dystrophy

Application in Traditional Chinese Medicine:

- **Properties:** sweet, warm to neutral
- acts on stomach, spleen, lung, liver, kidney, and heart
- soothes and nourishes the heart
- invigorates Qi and Xue, nourishes the blood
- moves toxins and disperses their accumulation
- channels away heat and mucus
- astringent
- eases the mind
- serves as tonic
- acts as sedative
- counteracts inflammations, hypertension, hepatic diseases, cancer, sleeplessness, cough, vertigo, anorexia (loss of appetite), asthma, bronchitis, gastric ulcers, arthritis, neurasthenia, nephritis, altitude sickness, muscular dystrophy
- for immunomodulation

Coriolus versicolor



Rainbow bracket – This mushroom - used in Eastern Asia for generations - supports the immune system in fighting viruses, bacteria and cancer. “Ötzi” carried a related species in his travel pharmacy 5200 years ago.

The polysaccharides in Coriolus, PSK (Krestin) and PSP, support the body's immune system, have anti-viral and anti-bacterial properties and a cytotoxic effect on cancer cells. Various studies performed on cancer patients have revealed that Coriolus can inhibit angiogenesis and metastasis and trigger apoptosis. Coriolus activates the TH 1-immune response, which is why this mushroom is particularly effective counteracting viruses and tumour cells.

The Coriolus medicinal mushroom has powerful antiviral properties that counteract herpes zoster, flu or cytomegaly viruses. It activates the cell defence and the production of antibodies. In particular HIV- and hepatitis patients experience an enormous improvement in quality of life. However, the mushroom should not be used for the treatment of autoimmune diseases.

Viruses also play an important role in the formation of cancer: Epstein-Barr virus infections increase the risk for lymphomas and breast cancer, while the human papilloma virus (HPV) is suspected to cause cervical cancer. A clinical study verifies that Coriolus can change HPV positive results into negative ones after one year of administration. Similarly, lesions at the uterine orifice regressed during consumption. Thus Coriolus is also a significant fungi in cancer prevention.

Coriolus has been observed to have antibacterial and antifungal effects on various pathogens (E.coli, streptococci and candida). Coriolus can support in the treatment of canker sores and inflammations of the oral mucosa.

The Coriolus mushroom is particularly implemented before and during radiotherapy. The negative side effects radiotherapy has on blood formation and mucous membranes can be eased, even preventatively. Various studies prove that Coriolus reduces radiation damage in healthy tissue. This is probably due to its antioxidant effects. Its polysaccharides suppress fat peroxidation and intercept other free radicals caused by chemo and radiotherapy. The mushroom activates the body's antioxidant enzymes such as superoxide dismutase (SOD) and glutathione peroxidase.

Furthermore, individual studies mention Coriolus' effectiveness in the treatment of hormone-dependent tumours such as breast and prostatic cancer. It is supportive in hormone blocker therapies.

Verified effects from research:

- Can prevent the growth of hormone-dependent prostatic cancer cells. Possibly delays the development of hormone resistance. The PSA value is reduced through an androgen receptor-dependent mechanism.
- The cell defence is activated: T-, B-lymphocytes, monocytes, macrophages, natural killer cells and myeloid cells are stimulated.
- The production of antibodies and cytokines (interleukin, interferon, TNF) is promoted.
- Tumour size can be reduced and cancer cell proliferation can be prevented via inhibiting DNA synthesis. Coriolus has a cytotoxic effect on cancer cells.
- Antiviral effects were observed for the cytomegalic virus, HIV, herpes and the human papilloma virus (HPV).
- Coriolus can be used to prevent cancer - especially when exposed to radiation and chemical substances.
- PSK is capable of inhibiting angiogenesis and thus the spreading of tumours.
- PSP is capable of triggering apoptosis.

Application in Traditional Chinese Medicine:

- **Properties:** sweet, slightly warm
- spleen-strengthening
- positive effects on heart and liver
- helps to exude heat and toxins
- strengthens energy and mind
- reduces mucus and dampness
- strengthens the kidney and the liver Yin
- counteracts cancer
- counteracts chronic hepatitis
- counteracts infections of the upper respiratory tract, the urinary tract and the intestinal tract
- counteracts fatigue

Polyporus umbellatus



Lumpy bracket – The cluster-shaped mushroom can prevent fluid retention and lymphatic blockage.

Polyporus acts diuretically and thus increases the urine flow - without causing an increase in the excretion of potassium. This relieves the heart and lowers the diastolic blood pressure. The Polyporus medicinal mushroom is closely connected with the lymphatic system, which evacuates numerous toxins from body tissue to be excreted via liver and kidneys. Moreover, the lymphatic system plays an important role in the immune system. Any blockage of the lymphatic system causes overloading of the organism with waste products and thus additional stress on the immune system.

In cancer, for instance, the proper functioning of the lymphatic system is particularly important. In particular, if lymph nodes have already had to be removed due to the cancer, lymphatic blockage and accumulation are likely to occur. These should definitely be counteracted with the Polyporus medicinal mushroom within the scope of holistic treatment. The lymphatic system also needs to be supported before, during and after chemotherapy to evacuate toxins caused by the treatment. Polyporus can thus alleviate the side effects of chemotherapy.

Polyporus also helps to support the lymph by acne and articular (joint) swelling.

Tumour growth can be inhibited by, e.g. lung or liver cancer. Moreover, its polysaccharides have modulating effects on the immune system.

Application in Traditional Chinese Medicine:

- **Properties:** sweet, slightly cool, neutral
- acts on spleen, kidneys and bladder
- releases fluid retention
- has diuretic and reducing effects
- antibiotic for oedemas and by painful urination
- counteracts diarrhoea
- counteracts Fluor albus
- counteracts bladder dysfunctions
- counteracts nephritis

Hericium erinaceus



Bearded tooth – The gastrointestinal mucosa plays a central role in our immune system. Hericium strengthens it.

Hericium plays a significant role in strengthening the gastrointestinal mucosa, which acts as a protective barrier against environmental toxins. This also makes it more difficult for allergy-causing food components to pass through the intestinal walls, which is important especially for counteracting food intolerances, all kinds of allergies, skin conditions such as neurodermatitis and immune system weakness.

The intestinal mucosa plays a significant role in the stabilisation, regulation and development of the immune system. Here defence cells are produced not only remain in the intestines but also spread via blood circulation.

Hericium has soothing and anti-inflammatory effects on gastric and intestinal mucosa, which make it a great support in the treatment of gastritis, reflux, heartburn or over-acidification. It can also work positively on chronic inflammatory diseases such as ulcerative colitis and Crohn's disease.

Hericium's anti-carcinogenic properties can be observed especially by sarcoma 180, stomach cancer, colon cancer or oesophageal cancer. The mushroom can also soothe mucosal injuries caused by chemo or radiotherapy and ease and reinforce the irritated mucosal membranes.

Hericium acts as tonic for nerves. Its positive implementation has been reported for anxiety, stress, restlessness, sleeplessness and memory lapses. The mushroom is particularly supportive and soothing if our digestion is affected by an irritable stomach or colon caused by stress.

Studies have shown that Hericium stimulates nerve growth factor (NGF) through its components hericenone and erinacine (a diterpenoid). This is very significant for nerve regeneration. NGF ensures that the myelin sheaths are reconstructed to nourish and protect the neural cells. This is particularly supportive for peripheral nerve damage caused by trauma or metabolic processes, but also for damage to the central nervous system caused by strokes, trauma, Alzheimer's disease or dementia. Moreover, NGF regulates the TH 1/TH 2 immune response in the central nervous system. This is highly beneficial in particular for autoimmune processes in the nervous system such as e.g. multiple sclerosis. Moreover, a specific polysaccharide contained by Hericium promotes neuronal differentiation and neural cell survival.

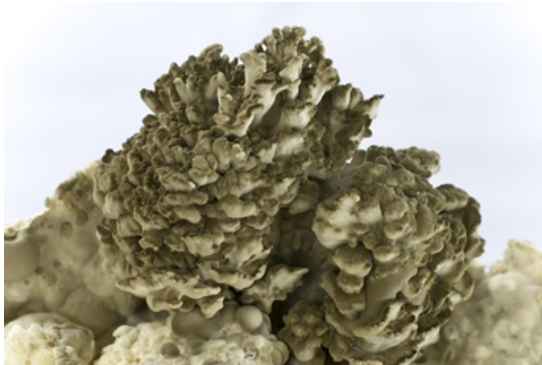
Verified effects from research:

- The polysaccharides contained in *Hericium* have anti-carcinogenic properties.
- The production of nerve growth factors is increased. The peripheral nerves are regenerated by degenerative neuronal diseases.

Application in Traditional Chinese Medicine:

- gastric disorders
- gastrointestinal tumours

Maitake - *Grifola frondosa*



Ram's head – Natural weight-loss: This mushroom - considered a delicacy in Asia - lowers the cholesterol level and inhibits cellular fat deposits.

After only a few months of consuming Maitake, the cholesterol and triglyceride levels are lowered. Additionally, the development of a fatty liver and the reduction of HDL cholesterol are counteracted.

By type I or type II diabetes, Maitake lowers the blood sugar level. Simultaneously, the cellular sensitivity for insulin is increased, which facilitates improved cellular sugar utilisation.

Maitake regulates the blood pressure. Its ergosterol content probably regulates the renin angiotensin system.

The mushroom thickens the stool and is thus recommended for chronic diarrhoea. With ABM, Maitake has the highest concentration of the most effective polysaccharides and plays a significant role in the treatment of cancer and in influencing the immune system. Maitake is particularly beneficial for a dominance of TH 2 immune response. Via a polysaccharide (grifone D), it shifts the TH 2 dominance towards TH 1 and thus strengthens the cellular defence. Subsequently, β -cells and TH 1 cells are activated and increased amounts of interferon and interleukin 12 and 18 are released. Allergic reactions are thus reduced while the cellular defence is activated. In a TH 2 dominated defence situation, the formation of interleukin 4 is inhibited and the conversion of TH 1 to TH 2 cells prevented. Its implementation in the treatment of brain tumours and osseous metastasis has also been proven.

Due to its ergosterol (a vitamin D precursor), Maitake promotes the absorption of calcium, thus helping to protect the bones prevent osteoporosis. Studies have shown that Maitake also activates the osteoblasts. It is thus an excellent mushroom for healthy bones.

Research study verified effects of Maitake:

- an increase in blood sugar level by type II diabetics is prevented, independent of body weight fluctuations
- an increase in triglyceride is inhibited, independent of body weight fluctuations.
- the insulin sensitivity of targets cell is increased, the insulin level lowered.
- weight gain is inhibited.
- counteracts the development of a fatty liver.
- after being consumed for several months, lowers the overall cholesterol level and keeps the HDL at a constant level.
- the systolic blood pressure via the renin angiotensin system.

Application in Traditional Chinese Medicine:

- **Properties:** sweet, mild, slightly cool
- functional circuit: spleen, bladder, kidneys
- dissolves humidity and oedemas.

Coprinus comatus



Shaggy mane – Its blood sugar-lowering effects make it most effective in the treatment of diabetes.

Coprinus is able to impressively increase the body's insulin release. Its blood sugar-lowering properties are used in the treatment of type I and type II diabetes.

For diabetics Coprinus has been found to lower the blood sugar level to the same extent as conventional medicines do - however, without stressing the organism.

The mushroom's antidiabetic properties derive from its vanadium content: peripherally, the insulin target cells are sensitised while insulin-producing β -cells are protected and regenerated in the pancreas.

Coprinus not only lowers the blood sugar level but also the HbA1c (glyco-haemoglobin) value that indicates the blood sugar level for the previous two to three months. It has been observed that, through the regulation of glucose metabolism, weight gain (by unchanged energy intake) can be stopped.

Chinese scientists have experimentally demonstrated an inhibition of the growth of malicious tumours in connective and supportive tissue. Traditional Far Eastern folk medicine administers Coprinus as a digestive for constipation and to treat haemorrhoids.

Verified effects of Coprinus from research:

- slight decrease of the blood glucose level even 10 hours after consumption; significant reduction after 11 days
- improved glucose tolerance
- inhibits weight gain

Application in Traditional Chinese Medicine:

- promotes digestion
- counteracts hemorrhoids

Auricularia polytricha



Promotes blood circulation and prevents thromboses – Auricularia is the blood thinner of medicinal mushrooms.

This mushroom is certainly well-known to all those who love Chinese food as “Mu-Erh” or “Chinese morel”. Its medicinal properties have long been known both in Asia and in Europe. In Europe it has been implemented since the Middle Ages to treat disorders and conditions such as cardiac and abdominal pain or toothache, haemorrhoids, inflammations of the eye, to support wound healing or to strengthen weakened immune systems. Today, Auricularia is highly valued for its capability of improving blood fluidity. It is the so-called blood thinner among the medicinal mushrooms.

However, due to its adaptogenic properties, Auricularia is also traditionally administered to treat blood in the urine, haemorrhoid bleeding and uterine haemorrhage.

Auricularia confirms: medicinal mushrooms are never effective unilaterally or for only one specific purpose!

Studies verify that Auricularia can prevent the aggregation of thrombocytes and thus reduce the risk of a thrombosis and promote the blood circulation. Possible cardiac infarctions or strokes can thus be prevented. It also lowers cholesterol and triglyceride levels. These properties are of particular importance for an existing arteriosclerosis or hypertension/high blood pressure.

Auricularia contains adenosine, which has known vasodilatory properties and stimulates blood circulation. Dilatation can alleviate cardiac pain and lower the blood pressure. Practically, this jelly-like mushroom can also be implemented to prevent cerebral ischemia. Through its active ingredients, Auricularia enhances cellular oxygen absorption and thus protects cranial nerves from damage caused by oxygen or blood deficiencies. Thanks to its cholesterol lowering and blood fluidity improving properties it counteracts vascular dementia,

because dementia frequently follows cerebral insults. The risk of these can be reduced through the administration of this medicinal mushroom.

Auricularia is also helpful by intermittent claudication. This condition, triggered by a peripheral vascular disease, involves extreme leg pain under stress, especially when walking due to insufficient circulation. Here Auricularia strengthens the vessels and facilitates their circulation. Because of these properties, it is also recommended for long-distance flights, in the treatment of varicosis, by insufficient physical activity or confinement in bed, migraine and tinnitus.

According to Traditional Chinese medicine (TCM), it can moisturise mucous membrane and thus soothes mucosal inflammations. It is supportive in the treatment of constipation caused by dehydration, tracheal cough, cystitis and otolaryngological (ear, nose and throat) diseases. Auricularia also strengthens mucosal membranes damaged by chemo or radiation therapies.

Application fields in Traditional Chinese Medicine:

- **Properties:** sweet, neutral, mild
- acts on stomach, spleen, colon, lung & liver
- relaxes, distributes and regulates the Qi
- antihæmorrhagic (esp. by hæmorrhoids, uterus), nourishes blood
- laxative
- moisturizes the lung
- reinforces the stomach's Yin
- counteracts Yin weakness = dry lung, stomach and intestines
- counteracts dry cough, throat and mouth
- counteracts lumbar and leg pain
- for excessive leucorrhoea
- counteracts cramps, numbness and pain after accidents or injuries
- counteracts vascular blockage

Pleurotus ostreatus



Oyster mushroom – Pleurotus relaxes muscles, sinews and joints. It is an important vitamin B source and lowers the blood's homocysteine level.

The Pleurotus is rich in B vitamins such as B1 (thiamin), B2 (riboflavin), B5 (niacin), B6 (pyridoxine), B7 (biotin) or B12 (cobalamin). In addition, it contains folic acid and vitamins C and D (calciferol). A quarter of the mushroom's dry substance consists of proteins and contains all essential amino acids.

B vitamins help the body to extract energy from fats, carbohydrates and proteins and are responsible for the function of neural cells and muscles. Vitamin D (calciferol) promotes the formation of bone and prevents osteoporosis. A sufficient B vitamin supply from food is ensured by the consumption of fish, meat and innards/ giblets. However, vegetarians and those suffering from high uric acid levels or gout won't consume these high-purine foods. Here, Pleurotus can play an important role as vitamin B source.

The folic acid also contained in Pleurotus is a significant factor in blood formation and promotes the growth of new cells, also in the bone marrow. Moreover, Pleurotus lowers the blood homocysteine level. This is very important, since a high level of folic acid and B vitamins in combination with low homocysteine reduces the risk of cardio-vascular diseases. In contrast, increased homocysteine levels entail higher risks for the development of vascular dementia and Alzheimer's disease.

Another significant ingredient in Pleurotus is the β -glucane (polysaccharide) pleuran. It has antioxidative properties and can inhibit the spread of metastases. Additionally, Pleurotus has been found to contain a protein with antiviral properties.

Animal tests have demonstrated that Pleurotus has a protective effect on organisms exposed to larger amounts of chemical substances. This is because the mushroom activates the body's antioxidant enzymes (superoxide dismutase, catalase, glutathione system).

A further important property of Pleurotus is its ability to lower the lipoprotein content, i.e. the cholesterol and triglyceride levels in blood and liver. At the same time, HDL is raised. Studies performed by the Prague Food Research Institute demonstrated that Pleurotus ostreatus promotes the growth of probiotic bacteria in the intestinal flora. The generation of lactobacilli, enterococci and bifidobacteria is increased. This in turn positively affects the intestinal flora and the intestinal immune system. This is highly beneficial, e.g. after ingesting antibiotics.

Verified effects from research:

- The growth of lactobacilli, enterococci and bifidobacteria is promoted.

Application in Traditional Chinese Medicine:

- relaxes muscles, sinews and joints; strengthens the veins
- expels wind and cold
- supports the treatment of lumbago.

Phellinus linteus



Phellinus linteus has been traditionally used in Korea for ages as an anti-cancer product. One Korean study found that polysaccharides isolated from Phellinus linteus

provided the broadest spectrum of anti-cancer properties of any of the mushroom species tested. Among the seven species of medicinal mushrooms compared in this study, *Phellinus linteus* had the most powerful effect on enhancing macrophage activity, by 5,700%. Macrophages are an important part of the immune system's cancer fighting arsenal.

The anti-tumour activity of a medicinal mushroom *Phellinus linteus* (PL), through the stimulation of the immune system or the induction of apoptosis, has been recently described. However, the molecular mechanisms responsible for the inhibition of the invasive behaviour of cancer cells remain to be addressed. In the present study, we demonstrate that PL inhibits proliferation (anchorage-dependent growth) as well as colony formation (anchorage-independent growth) of highly invasive human breast cancer cells. The growth inhibition of MDA-MB-231 cells is mediated by the cell cycle arrest at S phase through the upregulation of p27Kip1 expression.

Phellinus linteus also suppressed the invasive behaviour of MDA-MB-231 cells by the inhibition of cell adhesion, cell migration and cell invasion through the suppression of secretion of urokinase-plasminogen activator from breast cancer cells. In addition, PL markedly inhibited the early event in angiogenesis, capillary morphogenesis of the human aortic endothelial cells, through the downregulation of the secretion of the vascular endothelial growth factor from MDA-MB-231 cells. These effects are mediated by the inhibition of serine-threonine kinase AKT signalling, because PL suppressed phosphorylation of AKT at Thr308 and Ser473 in breast cancer cells. Taken together, our study suggests potential therapeutic effect of PL against invasive breast cancer.

***Inonotus obliquus* – Chaga**



The secret of Siberian Chaga was not revealed until the mushroom was studied in Japan, Russia, China and Europe in the 1980's and the compounds finally documented. These compounds are an effective and natural remedy for immunity protection, skin beauty, youthful vigor and anti-aging.

Siberian Chaga is a superior grade medicinal mushroom containing over 215 phytonutrients, including:

Betulinic acid	29 Betaglucans	Saponins
Polysaccharides	SOD antioxidants	Triterpenes
Inotodiols	Organic minerals	Amino acids

- Polysaccharides to enhance the immune system, treat cancer, HIV virus, and other anti-bacterial and viral infections.
- Betulinic acid to counter viral infections and tumors.
- Triterpenes to lower cholesterol, improve digestion, detoxify the liver, treat hepatitis, chronic bronchitis, coughs and asthma.
- Germanium to cleanse the blood, normalize blood pressure and prevent tumors.
- Other nucleosides, phytonutrients, minerals and amino acids such as Saponin, Iron, Magnesium, Chromium, Betaglucan, Inotodiol, Isoprenoid and others.

Siberian Chaga contains an extraordinary amount of SOD (Super oxide dismutase) antioxidants that absorb free radicals and neutralize them before they can damage body tissue cells. Chaga contains 25-50 times more SOD antioxidants than other medicinal mushrooms.

SOD (Super oxide dismutase) units per gram:



Verified effects from research:

The post-antibiotic world of Western Medicine is now beginning to study, evaluate, and test Chaga for the active compounds underlying its historically understood homeopathic benefits. As with many other natural medicinal foods and herbs, the modern medical and scientific community is coming to understand that whole supplements like Chaga, offer a complex balance of active compounds, delivery mineral structures, and co-agents, more effective to sustaining a healthy immune balance than isolated compounds synthesized from these natural products.

The primary active compounds discovered in Siberian Chaga are a variety of triterpenes and sterols, including Lanosterol, Ergosterol Inotodials, Saponins, and Polysaccharides. Modern research is now beginning to demonstrate that these compounds are effective for human maladies treated by folk medicine practitioners with natural products, without toxic side-effect, for millennia.

After being ignored for hundreds of years by western pharmacologists, Chaga is currently enjoying a resurgence as a possible treatment for a wide variety of diseases and health problems, including chronic fatigue syndrome, the flu, stomach problems, and even HIV and certain types of cancer. Recent studies in the U.S., Russia, and other countries have shown Chaga to have anti-tumor benefits related to the mammary glands and female sex organs; studies in Finland have demonstrated that inotodial, one of the most active ingredients in Chaga, was effective against influenza virus and various cancer cells; and Japanese research not only found similar antiviral activity, but also discovered that Chaga shows activity against HIV (protease inhibition). Chaga has even been classified as a medicinal mushroom under World Trade Organization (WTO) codes.

Arguably, the most well known western research conducted on the use of Chaga has been performed by Dr. Kirsti Kahlos and her team at School of Pharmacology, at the University of Helsinki, Finland. Dr. Kahlos' team conducted studies validating the immuno-modulating impact of Lanosterol-linked triterpenes effective as a flu-vaccination and for anti-tumor applications.

Institutional studies at the University of Tokyo, Japan have determined effectiveness of Inotodials in the destruction of certain carcinosarcomas and mammary adenocarcinomas.

The Melanin complex produced by the Chaga mushroom demonstrates high antioxidant and genoprotective effects (Melanin Complex from Medicinal Mushroom *Inonotus Obliquus*, Journal of Medical Mushrooms, 2002, vol. 4) . The polysaccharide beta-glucan, also present in Chaga, is proven to be effective at inhibiting mutagenic and immuno-modulating effects of cancerous tumors by triggering immune system response (SP Wasser, 2002, Institute of Evolution, University of Haifa, Israel).

The following article was published by the NCBI (National Center for Biotechnology Information) a joint venture by the National Library of Medicine and the National Institutes of Health.

Established in 1988 as a national resource for molecular biology information, NCBI creates public databases, conducts research in computational biology, develops software tools for analyzing genome data, and disseminates biomedical information - all for the better understanding of molecular processes affecting human health and disease
Chaga mushroom extract inhibits oxidative DNA damage in human lymphocytes as assessed by comet assay.

The Chaga mushroom (*Inonotus obliquus*) is claimed to have beneficial properties for human health, such as anti-bacterial, anti-allergic, anti-inflammatory and antioxidant activities. The antioxidant effects of the mushroom may be partly explained by protection of cell components against free radicals.

We evaluated the effect of aqueous Chaga mushroom extracts for their potential for protecting against oxidative damage to DNA in human lymphocytes. Cells were pretreated with various concentrations (10, 50, 100 and 500 microg/mL) of the extract for 1 h at 37 degrees C. Cells were then treated with 100 microM of H₂O₂ (Hydrogen Peroxide) for 5 min as an oxidative stress. Evaluation of oxidative damage was performed using single-cell gel electrophoresis for DNA fragmentation (Comet assay). Using image analysis, the degree of DNA damage was evaluated as the DNA tail moment.

Cells pretreated with Chaga extract showed over 40% reduction in DNA fragmentation compared with the positive control (100 micromol H₂O₂ treatment). Thus, Chaga mushroom treatment affords cellular protection against endogenous DNA damage.