

How Chaga can Change your Health

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Abstract

Chaga (*Inonotus obliquus*), a functional mushroom primarily found on birch trees, has been revered for centuries in traditional medicine and is now gaining scientific attention for its remarkable health benefits. This article explores chaga's unique bioactive compounds, including beta-glucans, antioxidants, polyphenols, and triterpenes, which collectively contribute to its immune-boosting, anti-inflammatory, antiviral, and potential anti-cancer properties. Chaga is also rich in vitamins and minerals that promote overall wellness, skin health, and blood sugar regulation. The article delves into various consumption methods, including tea, capsules, powders, and tinctures, and provides guidance for those who should avoid its use due to potential interactions with medications or health conditions. While promising research highlights chaga's therapeutic potential, further clinical studies are needed to validate its efficacy in disease prevention and treatment. This comprehensive analysis underscores the growing recognition of chaga as a natural supplement for enhancing health and vitality.

Keywords: Chaga; Mushroom; Birch Trees, Vitamins and Minerals; Beta-Glucans, Polyphenols, Antioxidants, Melanin, Betulin, Triterpenes

Introduction

Mushrooms have been used for medicinal purposes for thousands of years, but it's only in recent decades that science has begun to unravel the specific mechanisms behind how mushrooms improve our health and vitality. One mushroom, specifically, is drawing a great deal of research interest: That mushroom is **Chaga**.



Figure 1: Chaga charcoal exterior (left) rusty brown interior (right) and in capsules

Chaga mushrooms (Figure 1) are classified as “functional mushrooms”. While most mushrooms offer valuable vitamins and minerals, functional mushrooms like chaga go a step further, providing benefits that extend beyond basic nutrition. Chaga contains a diverse range of health-boosting compounds. These compounds may sound complex—beta-glucans, polyphenols, antioxidants, melanin, betulin, triterpenes, and polysaccharides—but you don't need an advanced chemistry degree to understand the benefits. Chaga is a remarkable and chemically complex mushroom, but don't be intimidated by the unfamiliar names of its bioactive compounds. The benefits of these compounds can be simply explained.

Chaga's functional compounds have been shown to offer significant health benefits [1,2]. Key benefits include supporting the immune system, reducing inflammation, providing anti-viral properties, helping to maintain healthy blood sugar levels, promoting liver and skin health [3]. Recent studies have also highlighted chaga's potential cancer-fighting properties [4,5]. This article will break down chaga's potential and explore how it affects the body. Specifically, it will explore chaga's medicinal benefits, the best ways to use it, and who might need to avoid it.

For centuries, people in northern Europe and Asia have consumed chaga tea for its health benefits. Now, the rest of the world is catching on. Science is shedding new light on how chaga functions and interacts with the human body. In fact, over a hundred scientific papers have recently been published in the last two decades exploring chaga's effects.

While these findings are promising, further human research is needed to fully determine the effectiveness of chaga in disease prevention.

What Is Chaga and Where Does It Occur?

Chaga may not win any beauty contests, but its value lies far beyond its appearance. When walking through a forest, you might mistake chaga for a growth on a burnt section of a tree (Figure 2). However, if you look closer, beyond its burnt, charcoal-like exterior, you'll find a active compound-rich, rusty, yellowish-brown interior (Figure 3). While often referred to as a mushroom, chaga is technically a fungal canker or “conk” that almost exclusively grows on birch trees.

The scientific name for chaga is *Inonotus obliquus*, though it's known by a variety of common names, including:

- Birch conk
- Birch canker polypore
- Cinder conk
- Clinker polypore



Figure 2: Chaga growing on birch

The name “chaga” itself is derived from the Russian word *tschaga*, which comes from the Komi language, a

dialect of northeastern Russia [6] (Haines, 2013). In Chinese, chaga is called *Hua Jie Kong Jun* or *Bahua Rong*.



Figure 3: Chaga in cross section with birch bark

Chaga almost exclusively grows on the trunks of birch trees in the Northern Hemisphere. In North America, it is commonly found on birch trees in Canada, the northern U.S., and Alaska. It also occurs globally in colder northern regions like Scandinavia, Russia, Siberia, and northeast China. Additionally, chaga can be found on landscape birch plantings in suburban and urban areas in northern climates.

How Does Chaga Work?

Chaga have been used for centuries in traditional medicine for its potential health benefits [6]. Scientific studies in the last two decades have shed light on the compounds and the mechanisms in which chaga can promote health. Here’s an overview of some of the key beneficial compounds in chaga mushrooms and how they work in the human body [7]:

- **Beta-glucans:** Chaga mushrooms are rich in beta-

glucans, naturally occurring carbohydrates that enhance immune function. These compounds help regulate the immune system and support various aspects of immune defense [8]. Beta-glucans can also help lower cholesterol and blood sugar levels.

- **Antioxidants:** Chaga is packed with antioxidants that combat oxidative stress caused by free radicals. These antioxidants support your body's natural

inflammatory response and help protect cells from damage [9-11]. Giridharan et al. 2011 [12] showed that water extracts of chaga can reduce cognitive dysfunction and oxidative stress. In fact, chaga has an exceptionally high antioxidant content—up to **1500 times greater** than blueberries or blackberries [13,14]. When brewing chaga tea, the dark pigment it releases contains potent antioxidants, including polyphenols and melanin. (Figure 4)

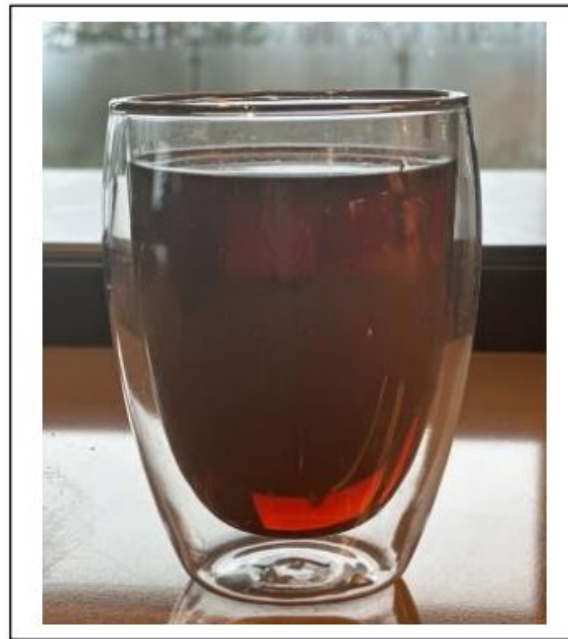


Figure 4: Dark pigment from polyphenols and melanin are released in quickly in a hot water extract of chaga

Polyphenols: Chaga contains a variety of unique polyphenols, and these organic compounds are abundant in the chaga mushroom. These polyphenols act as antioxidants, protecting cells from oxidative damage caused by free radicals [15].

Vitamins and Minerals: Chaga mushrooms provide a rich array of vitamins and minerals that support overall wellness and immune health. They are especially high in potassium, containing 5.1 grams per 100 grams, which is about 1.5 times more than a similar serving of bananas. Chaga is also a good source of B-complex vitamins, vitamin D, and essential minerals such as calcium, magnesium, iron, zinc, copper, and manganese.

Betulin and Betulinic Acid: Chaga absorbs these compounds from the birch tree bark as it grows. Both be-

tulin and betulinic acid are being studied for their potential to fight cancer and reduce inflammation [16,17]. Hordyjewska et al. 2019 [16] examined the potential molecular mechanisms of action and numerous medical applications of betulin and betulinic acid, including previous studies of anti-cancer activity of the compounds, with listed cancer cell types susceptible to therapy.

Melanin: Chaga contains exceptionally high levels of melanin, the pigment responsible for color in the skin, hair, and eyes [18]. Melanin acts as a protective shield against ultraviolet radiation. It also supports the health of the skin by improving moisture retention and elasticity and is an additive in many skin care products. Additionally, melanin from chaga forms a complex with glucan that provides antiviral protection.

Triterpenes: Triterpenes are anti-inflammatory, antiviral, antimicrobial and antitumoral compounds. Chaga is rich in triterpenes [19-20] that studies indicate may help combat cancer cells and viruses [21]. Huynh 2022 [20] found six triterpenoids with chaga extraction: ergosterol, lanosterol, β -sitosterol, stigmastanol, betulin, and inotodiol.

Health Benefits of Chaga

Cancer Prevention and Progression

Several studies have shown that compounds in chaga may help prevent cancer and slow tumor growth [22-24]. In a recent study, Real et al. (2024) [25] tested chaga extracts against 31 different cancer cell lines and found moderate activity against all of them, highlighting chaga's potential as a source of bioactive compounds with selective anti-cancer properties. Other studies have demonstrated antitumor activity in mice and human breast cancer cell lines [26-27].

Ng et al. (2024) [28] observed anti-cancer activity in chaga extracts against lung and breast cancer cell lines. Jiang (2020) [29] found a compound extracted from the chaga mushroom, can trigger apoptosis (programmed cell death) in lung cancer cells by influencing their energy metabolism through the LKB1/AMPK signaling pathway; essentially, the polysaccharides disrupt the energy balance within cancer cells, leading to their self-destruction. Baek et al. (2018) and Gery et al. (2018) [30-31] also found significant anti-cancer effects on lung cancer cells.

Lee et al. (2009) [32] found that hot water extracts of chaga inhibited the proliferation of human colon cancer cells (HT-29). Chaga hot water extract inhibited cell growth in a dose-dependent manner, and this inhibition was accompanied by apoptotic cell death. The maximum inhibitory effect (56%) was observed when chaga hot water extract was used as a treatment at a concentration of 1.0 mg/mL for 48 h. Other research has shown efficacy against colorectal cancers [33,34]. In mice, chaga water extracts slowed cancer progression, significantly decreasing the number and size of tumors [35,36]. Arata et al 2016 [35] found in tumor-bearing mice, 60% tumor reduction was observed, while in metastatic mice, the number of nodules decreased by 25% compared to the control group. Moreover, chaga extract-treated

mice demonstrated the increase in tumor agglomeration and inhibition of vascularization.

Chung et al. (2010) [37] found that chaga water extracts were effective against human sarcoma cancer cells. This study investigated the anticancer properties of subfractions derived from chaga mushrooms extract, testing its effects on human cancer cells in vitro and in mice with Sarcoma-180 tumors and demonstrated that certain components of the Chaga extract exhibited significant anti-tumor activity in both settings. While these studies are promising, further clinical trials are necessary to determine the effectiveness of chaga for cancer prevention and treatment in humans.

Immune System Function

Chaga is a compound-dense mushroom containing beta-glucans, melanin, inotodiol, and birch derived compounds like betulin and betulinic acid, which support immune function and have antiviral properties [38]. Beta-glucans in chaga help balance the immune system, stimulating it when needed and downregulating it when it's overactive. Many of the chemical constituents in chaga have been shown to improve immune system function [38-40].

Reduction of Inflammation

Chaga has significant anti-inflammatory effects. Cytokines, which are responsible for inflammation, can be modulated by chaga. Kumar-Mistra et al. (2012) [41] found that chaga significantly inhibited pro-inflammatory cytokines in colon tissues. Compounds like betulinic acid, inotodiol, and ergosterol in chaga help reduce inflammation by inhibiting cytokine production [42]. Additionally, extracts from chaga have broad anti-inflammatory properties [43,44].

Liver Protection

Chaga may help prevent or reduce certain liver diseases. The outer part of the chaga mushroom (sclerotium) contains high levels of polyphenols, which act as antioxidants and protect against free radicals that could damage the liver and other organs [45,46]. Ishfaq et al 2022 found significant reduction in the histopathology of liver in mice and as a preventive measure by using aqueous extract of cha-

ga. While early studies are promising, more research is needed to confirm chaga's effectiveness in liver protection in humans.

Anti-Viral Properties

Chaga's beta-glucans, melanin, inotodiol, and birch compounds like betulin and betulinic acid all contribute to its antiviral properties [47,48]. Pan et al. 2013 found aqueous extract from chaga exhibited marked decrease in herpes simplex virus (HSV) infection (the 50% inhibitory concentration was 3.82 µg/mL in the plaque reduction assay and 12.29 µg/mL in the HSV-1/blue assay. Chaga compounds may support the body's defense mechanisms against various viruses.

Lower Blood Sugar

In addition to its immune-boosting properties, the beta-D-glucans in chaga have been shown to help lower blood sugar levels [48-50]. Cha et al. (2006) [49] found that insulin levels were significantly higher after 8 weeks of fermented chaga ingestion. However, more research is needed to determine the effectiveness of chaga in managing conditions like diabetes.

Skin and Hair Health

Chaga's melanin content and high antioxidant levels help protect the skin from UV radiation and free radical damage. Melanin in chaga improves the health of the epidermis, supporting healthy pigmentation in both skin and hair. It also aids skin elasticity, which is important for healthy aging and preventing premature skin aging [51]. Furthermore, chaga has potential protective effects against skin cancer. Yuon et al. (2009) [52] demonstrated that water extracts of chaga exhibited anticancer activity against melanoma cells, both in vitro and in vivo.

How Quickly Does Chaga Work?

If you're using chaga daily, it may take about three weeks to begin noticing its benefits. The recommended daily therapeutic dose of chaga is typically 3000 mg (3 grams).

What Is the Best Way to Consume Chaga?

The numerous health benefits of chaga have made it increasingly popular in supplement form. It is available as tea, capsules, powders, and tinctures. Here's a breakdown of each method and how to incorporate chaga into your routine:



Figure 5: Chaga can be ingested in many forms such as tea, capsules, powders and tinctures

Tea

One of the best ways to extract the nutrients and medicinal compounds from chaga is to brew it in hot water. Chaga tea is traditionally made from chunks or powder of the mushroom. For chunks, use pieces that are about 1.5 inches or smaller. To prepare:

- **Ingredients:** 1 tablespoon (5 grams) of chaga for every 3 cups of water.
- **Instructions:** Bring to a low boil for about 5 minutes.
- **Taste:** Chaga tea has a mild flavor with hints of vanilla. You can sweeten it with honey, maple syrup, or even whipped cream.

After brewing, you typically don't need to filter the grounds as they will settle at the bottom. The spent grounds can be reused for a second brewing. Simply add ½ tablespoon (2.5 grams) of fresh chaga per 3 cups of water and boil again. Spent grounds can be used for up to a week. Tea can be stored in the refrigerator for a week after brewing.

Capsules

For those on the go, chaga capsules offer a convenient option to get your daily dose. Simply swallow 3 capsules (providing 1000 mg/capsule, the recommended daily

dose 3000mg/day) with water. Capsules can be taken in the morning, at lunch, or at night.

Powder

If you enjoy smoothies or shakes, adding chaga powder to your morning routine is an easy way to incorporate it into your diet. Add ½ to 1 tablespoon of chaga powder to your fruit or veggie shake. Its delicate flavor won't overpower your other ingredients and provides an excellent way to start your day.

Tincture

Chaga tinctures are a versatile way to consume chaga. Tinctures can extract both water soluble and alcohol soluble beneficial compound from chaga. Simply add a dropper full to your favorite hot drink, coffee, tea, soda, fruit juice, or even food. A dropper full of tincture won't alter the taste but will supercharge your drink or dish with chaga's beneficial compounds. Chaga tinctures are widely available in health food stores and online. You can also make your own:

Making Your Own Chaga Tincture

Chaga tinctures are typically an extraction of both water- and alcohol-soluble compounds. Some compounds like triterpenes are better extracted by alcohol. To make your own tincture:

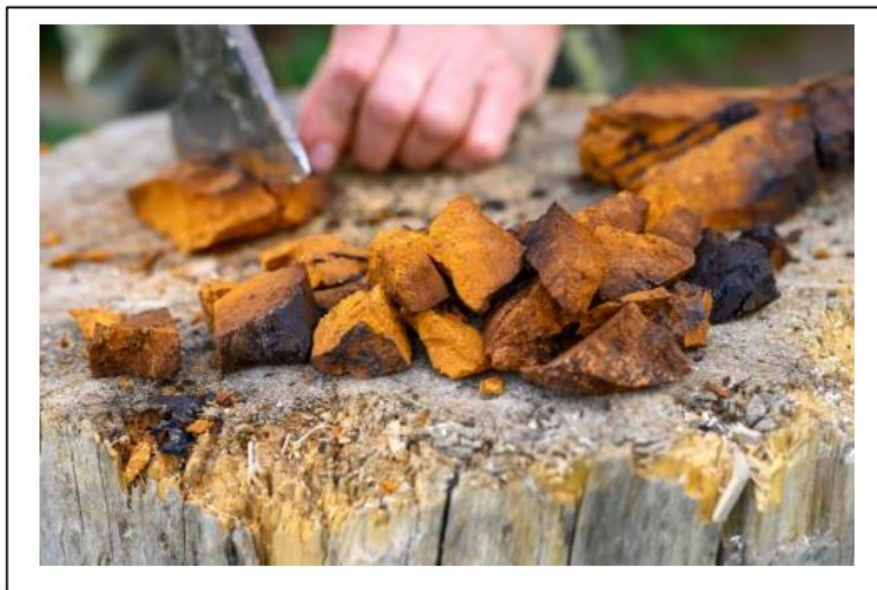


Figure 6: Chaga is broken into chunks before being soaked in alcohol for tincture

Materials: Chaga chunks (Figure 6) or powder, a glass jar (avoid plastic), high-percentage alcohol (e.g., Everclear or vodka).

Instructions:

1. Pack the jar with chaga chunks or powder.
2. Cover with the alcohol and seal the jar.
3. Shake it once a day for 2–4 weeks.

1. Once ready, strain the tincture through filter cloth and squeeze out the remaining liquid.

2. You can add 1 tablespoon of fresh chaga to 3 cups of water, boil for 5 minutes, and then combine the water extract with the alcohol extract at a 5:1 ratio for the finished tincture.

- **Storage and use:** Tinctures are stable and can be stored at room temperature for up to a year. To use, add a full dropper (one milliliter or 20 drops) to water, coffee, tea, or any other beverage, morning, and night.

Who Should Not Use Chaga?

While chaga is generally considered safe, there are some groups who should exercise caution or consult a healthcare provider before using it.

Chaga and Blood Medications

- **Blood Thinners:** Chaga may interact with medications like **warfarin** or **clopidogrel**. Chaga might enhance the effects of blood thinners, increasing the risk of bleeding.
- **Bleeding Disorders:** People with bleeding disorders should avoid chaga, as it may increase the risk of bleeding. Chaga contains compounds that can interfere with blood clotting.
- **Surgery:** Chaga may affect blood sugar control and increase the risk of bleeding during surgery. It's recommended to stop using chaga at least **2 weeks**

before surgery.

Chaga and Diabetes Medications

Chaga can lower blood sugar, and if you are taking medication to regulate blood sugar, consult with your healthcare provider before consuming chaga. It may interfere with insulin or other diabetes medications.

Chaga and Auto Immune Diseases

An autoimmune disease is a condition where the body's immune system attacks healthy cells, tissues, or organs. With autoimmune disorders, your immune system can't tell the difference between invaders and healthy cells. Auto-immune diseases include multiple sclerosis (MS), lupus (systemic lupus erythematosus (SLE)), rheumatoid arthritis (RA), type one diabetes (DB1) or other conditions. Since treatment of these disorders often involves suppression of the immune system, chaga, which might cause the immune system to become more active, should be avoided.

Chaga and Immunosuppressants

As mentioned before, chaga can increase activity of the immune system. Immunosuppressant medications are often used after a transplant to decrease the activity of the immune system.

Chaga could decrease the effectiveness of these medications by stimulating the immune system response.

Kidney Disease

Chaga is high in oxalates, which can bind to calcium in the body. Excess oxalates can pass through the kidneys, and in some cases, form kidney stones. People with kidney disease or a history of kidney stones should consult their doctor before using chaga.

Final Thoughts

Chaga has long been recognized as a traditional folk remedy and wildland collection of chaga from birch trees has occurred for centuries. Chaga consumption has increased in popularity in the last decade. While recent research is promising, caution is recommended especially for some groups and in treatment of some disorders.



Figure 7: Chaga harvest

Recent scientific research is uncovering its wide range of health benefits. Studies suggest that chaga may support immune function, skin health, reduce inflammation, help regulate blood sugar levels, protect liver health, and even combat certain types of viruses and cancer.

Modern phytochemical and pharmacological research highlight key active compounds in chaga, such as antioxidants, beta-glucans, betulin, triterpenes, and polyphenols, which have demonstrated a variety of important biological activities. These activities include antitumor, antioxidant, anti-inflammatory, hypoglycemic, and antiviral effects [53].

This does not mean chaga is a substitute for other forms of medical care. People who have conditions such as

cancer, diabetes, and high blood sugar should continue with their usual treatment and their doctors' recommendations. In addition, since chaga can interact with certain medications used in immunosuppressant and auto immune diseases, affected persons should consult their doctor before using chaga supplements.

More chaga research is needed, especially in North America, and with larger human populations. Still, with the growing body of research over the last two decades, it has become increasingly clear that regular consumption of chaga can offer significant health benefits. As more studies explore its potential, chaga may continue to gain recognition for its medicinal properties and its role in promoting overall wellness.

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