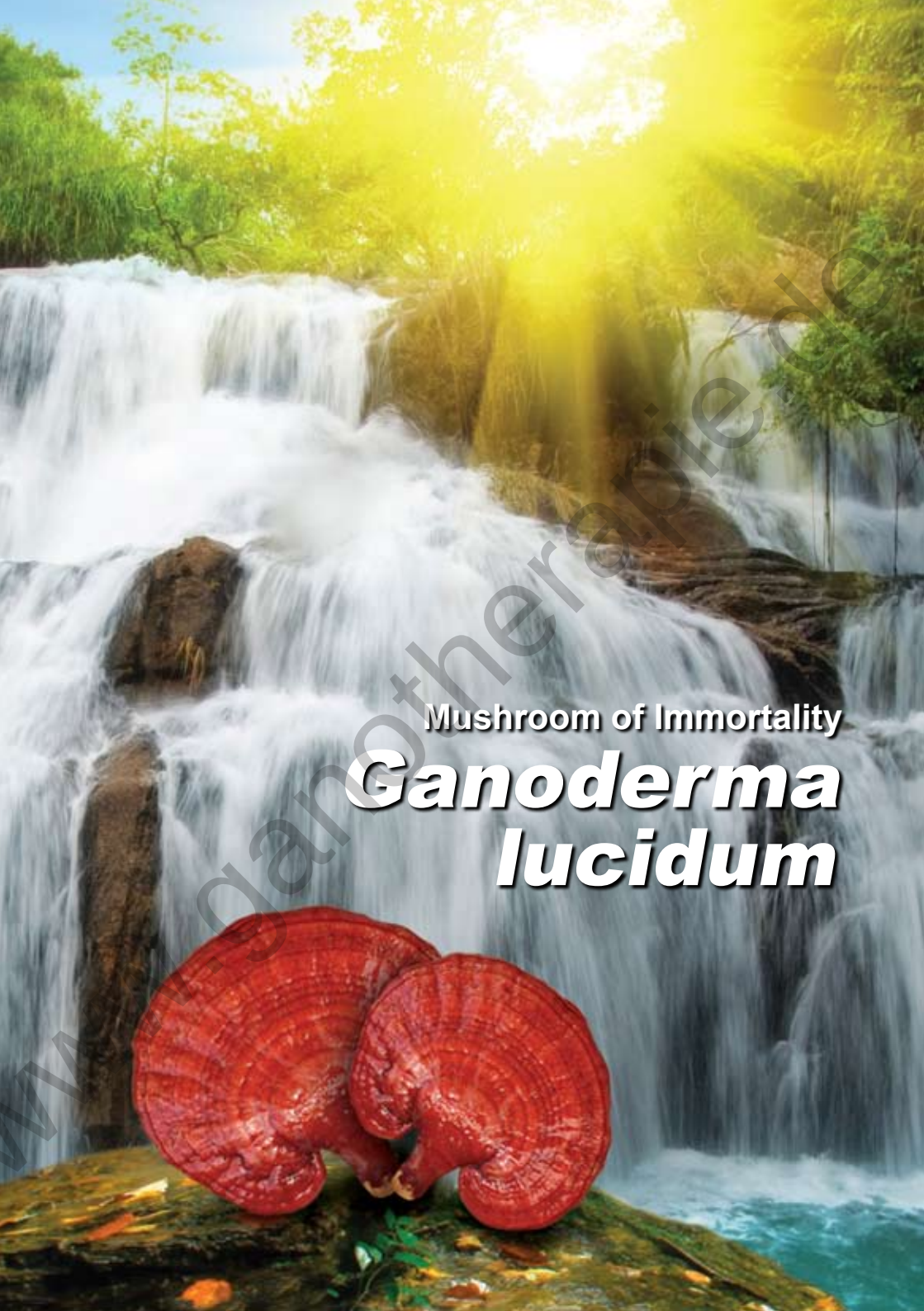

Preface

For many years, scientists have laboured on the search for viable alternatives in the maintaining and improving of human health. Recently, the need for effective health supplements has become more pressing with the surge in asymptomatic diseases, where one's seemingly healthy appearance may mask a fatal health crisis. However, it is never too late to start guarding one's health, especially in light of the recent scientific discoveries on the efficacy of Ganoderma as a health-augmenting agent. Hence, this publication intends to educate the readers on the various benefits of Ganoderma, backed by scientific research conducted over the years, and present them in an easily understandable form. It is hoped that this book will enable the readers to investigate for themselves the potential of Ganoderma, and be encouraged to re-examine their health and make the necessary lifestyle changes to achieve better living through optimal health.

Founder of Gano Excel
Mr. Leow Soon Seng

Disclaimer

This book, with the stated therapeutic claims and medical advices, is intended for educational purpose only.

Hence, the information herein is not a substitute over proper consultation with a certified medical professional in the course of seeking health-related inquiries or undertaking treatment.

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Content

Why Health? Why Supplement?

Physicians and nutritionists agree that there is little need for health supplements for a person under a healthy diet. However, in today's fast-paced society, modern lifestyles such as the lack of exercise, constant exposure to pollutants and the continuous intake of unhealthy food necessitate the need for health supplements, as such lifestyles have increased the risk of developing bodily diseases.

It does not take much to harm our body; rather, the little things that form parts of our lifestyle, unbeknownst to many, are the most destructive. For example, habitual consumption of alcohol or the preference over spicy food can cause inflammation of the digestive tract, resulting in poor absorption of nutrients. Smoking, another unhealthy habit, also causes irritation to the digestive tract and weakens the immune system, warranting more vitamin C to maintain the body. Fad diet, a popular method to loose weight through selective food intake at the exclusion of other food, is very detrimental to our health because many vital nutrients are not consumed to maintain bodily health. Overcooking, a common practice with the intention to destroy harmful bacteria during food preparation, actually destroys valuable vitamins and minerals found in food, rendering them useless to our bodies. Stress and tension, associated with living under a fast-paced lifestyle, stretch the body to a point that it needs more vitamins such as vitamin E to keep itself going. These are just a few of the many examples that point to the need to take health supplements to maintain a healthy body.

Besides unhealthy lifestyles, situations such as accidents and pregnancies demand the intake of more nutrients for the body to recuperate, heal and grow. Certain health condition, such as premenstrual tension, requires the intake of supplements such as vitamin B6 and evening primrose oil to ease the symptoms.

All these examples point to the necessity of a regular intake of health supplements, as it is the only way to stay healthy while living in today's hectic lifestyle. When one's body experiences constant dizziness, fatigue, loss of appetite, lack of concentration, regular migraines, constipation or other outward symptoms, they are the signs that the body may be in trouble, and that one has to make the decision of either to ignore them, or take charge to improve one's health.

Therefore, in view of the above, the need to take care of one's health is immediate and pressing. It is time that we face reality, examine our health and take command of our bodies.

History

Lingzhi is the Chinese name for *Ganoderma lucidum*. The herbal history of *Ganoderma lucidum* had long been documented in the oldest Chinese pharmacopoeia, "Shen Nong's Herbal Classic". *Ganoderma lucidum* was seen as a symbol of prosperity and peace for the nation and longevity for the emperor.

During the reign of Emperor Han Wu Di about 2100 years ago, *Ganoderma lucidum* was found growing all over the palace. Officials attributed these unusual sights to the merits and virtues of the emperor. It was said that he had touched heaven and earth to bring the growth of *Ganoderma lucidum* in the palace grounds. If the Emperor was wise and kind, heaven would show auspicious signs. So, if *Ganoderma lucidum* was found in the palace, it meant the Emperor had more integrity, which would bring about peace and prosperity. Consequently, it had been known as an auspicious herb and claimed by the ruling class for having a mysterious super natural power.

After the ruling of Emperor Han Wu Di, Taoism renewed the legend of *Ganoderma lucidum*. Taoism focused more on life and promoted immortality. Taoist believed that with practice and frequent consumption of this *Ganoderma lucidum*, one would attain immortality.

Ganoderma lucidum has different names in various countries. For example, *Ganoderma lucidum* is known as "Reishi" in Japan, "Lingzhi" in China and "Youngzhi" in Korea.

Ganoderma lucidum is a member of the fungus family that naturally grows on fallen trees and logs of other broad leaf trees [16]. Generally, it can be classified accordingly to taxonomy as below:

Taxonomy

Kingdom	: Fungi	Family	: Ganodermataceae
Phylum	: Basidiomycota	Genus	: Ganoderma
Class	: Basidiomycetes	Species	: *Ganoderma lucidum* P. Karst.
Order	: Polyporales		

Did You Know?

The virtues of Ling-zhi are believed to have been known since the reign of 'Fuxi'.

What do you know about *Ganoderma lucidum*?

Ganoderma lucidum (red Ganoderma) is a mushroom which is used as traditional Chinese medicine. Today, *Ganoderma lucidum* is still widely revered as a valuable health supplement and herbal medicine worldwide. *Ganoderma lucidum* offers this nature of health benefits.

To cultivate Ganoderma, paddy husks, brown rice flour and rubber tree scrapes are used as the medium of plantation. No chemicals, pesticides or hormones are used in the cultivation. Exposure to the sun is also controlled to ensure that the therapeutic properties are not lost. It takes 3 months for Ganoderma to mature before it is harvested under close supervision.

Did You Know?

To find Lingzhi in ancient times, people had to go high up to the mountains and deep into the forest to harvest this most valuable medicine. The discovery of Lingzhi, which was very scarce and believed to bring external longevity, led to wide spread festivities. Lingzhi was valued as it was used almost exclusively by Emperors and by courtesans.

Why Ganoderma is so attractive?

Many diseases are caused by the imbalance of body functions due to the accumulation of toxins in the body. Ganoderma may help the body to remove the built-up toxins and strengthen the body's natural immune system.

Ganoderma is considered to be a popular folk medicine for the treating various diseases such as hepatitis, hypertension, hypercholesterolemia, hepatopathy, arthritis, bronchitis and cancer [8].

Ganoderma has been used in traditional Chinese medicine for promotion of vitality and longevity. It had been recently used in the treatment of debility and weakness, insomnia, gastric ulcer, immunological disorders, diabetes, cardiovascular disease and others [14].

Importantly, Ganoderma has been demonstrated by recent scientific studies to possess anti-cancer properties against leukemia, anti-aging and antimicrobial/ anti-viral activities, including anti-human immunodeficiency virus (HIV) activity [11].

During the past two decades, modern research has revealed that Ganoderma contains a variety of chemical ingredients, including triterpenes, polysaccharides, nucleosides, sterols, fatty acids, alkaloids, proteins, peptides, amino acids and other inorganic elements. Among these ingredients, triterpenes and polysaccharides have attracted considerable attention as they have been shown to possess diverse and potentially significant pharmacological properties.

Ganoderma appears to be safe because oral administration of Ganoderma does not display any toxicity.

Fact

Recent studies of Ganoderma have revealed its various appealing biological activities, including anti-tumor, hypoglycemic activity, anti-inflammatory effects and cytotoxicity toward cancerous cells. Many investigations have also suggested that the polysaccharide (1,3-ß-D-glucan) produced by Ganoderma has the potential to become a new carcinostatic that may be useful in immunotherapy.

(Hsieh et al, 2006)

Studies (mostly conducted in China, Korea, Japan and the United States) regarding the medicinal and nutritional values of Ganoderma reveal that it does indeed contain certain bioactive ingredients (such as triterpenes and polysaccharides) that may be beneficial for the prevention and treatment of a variety of diseases such as hypertension, diabetes, hepatitis, cancers and AIDS.

(Huie and Di, 2004)

How does Ganoderma work?

After the consumption of Ganoderma, its active ingredients will react with the body. These reactions can be summarised in five stages:

Scanning (1-30 days)	The active ingredients in Ganoderma start to regulate bodily functions. At this stage, one will experience the subtle but noticeable effects of Ganoderma's workings as it detects toxins and hidden diseases in the body.
Cleansing - detoxification (1-30 weeks)	At this stage, Ganoderma, known as the 'King of Toxin Removers', acts to remove excessive uric acid, lactic acid, cholesterol, fat deposit, dead tissue and toxins accumulated in the body. These toxins are then eliminated through the circulation system by urination and stool, by perspiration, or are manifested as boils, rashes, phlegm and mucus. These are signs of the detoxification process taking place in the body.
Regulation (1-12 months)	During this period, the active components of Ganoderma react with the body to heal it. This process is observable and tangible. Thus, should the reaction prove too strong, the dosage may be reduced.
Building (6-24 months)	Here, Ganoderma continues to rejuvenate the body by strengthening the immune system and repair affected body organs and systems. At this stage, Ganoderma also supplies the essential vitamins and minerals to accelerate the recovery process.
Rejuvenating (1-3 years)	At this stage, Ganoderma continues to maintain bodily functions at its optimal level. One will experience optimal health and enjoy the benefits that come with a restored youthfulness with the prolonged consumption of Ganoderma.

**Duration taken for the above processes may vary according to individual.*

Compounds of *Ganoderma lucidum*

Polysaccharides

Triterpenes / Triterpenoids

Complexes

Dietary Fibres

Proteins

Enzymes

Organic Germanium

Alkaloids, Vitamins, Essential Minerals, Steroids, Sterols and Fatty Acids

Adenosine, Nucleosides, Nucleotides, RNAs

Triterpenes / Triterpenoids

The fruiting body of Ganoderma is extremely bitter. This characteristic is not found in any other mushroom. The bitterness varies in degree depending on the place of production, cultivation conditions, its strain, etc.

Triterpenes / triterpenoids are the bitter components of Ganoderma that have received considerable attention owing to their well-known pharmacological properties [11]. The more bitter it is, the higher the level of triterpenoids. Triterpene molecules are cyclic hydrophobic hydrocarbon [12]. Triterpenes have been reported to possess significant bioactivity properties, such as anti-oxidation, hepatoprotection, anti-allergy, antihypertension, cholesterol lowering, as well as inhibiting platelet aggregation, due to the inhibition of certain enzymes (such as ß-galactosidase, angiotension converting enzyme, cholesterol synthase) [12].

The major components of the triterpene fraction are ganoderic acids A, B, C and D, lucidenic acid B and ganodermanontriol [11].

Some of the triterpenes, such as ganoderic and lucidic acids, recently isolated from Ganoderma have demonstrated cytotoxicity against mouse sarcoma and mouse lung carcinoma cells in vitro [17].

Fact

Since the first isolation of two types triterpenes, ganoderic acid A and B, from dried epidermis of Ganoderma in 1982 by Kubota et al., more than 130 triterpenes have subsequently been isolated from the fruiting bodies, spores, mycelia and culture media of Ganoderma. It should be noted that Ganoderma is the only known source of these bioactive ganoderic acids. Triterpene isolated from Ganoderma contains anti-oxidative properties. At least 100 different triterpenoids have been identified from fruiting bodies and mycelium of Ganoderma.

(Huie and Di, 2004)

Polysaccharides

At present, more than 200 polysaccharides have been isolated from the fruiting bodies, spores, mycelia and cultivation broth of Ganoderma [11].

The importance of polysaccharides as pharmaceuticals has a long history and is receiving considerable attention in recent years [11]. More recently, extensive studies have been carried out on the anti-tumor ingredients contained in Ganoderma, especially polysaccharides [4, 11].

Ganoderma has been shown to inhibit proliferation, induce apoptosis in prostate cancer cells and suppress cell invasion and anchorageindependent growth of breast cancer cells [19].

The polysaccharides of Ganoderma are the major sources of its biological activity and therapeutic uses. Recent studies on Ganoderma have shown many interesting biological activities, including anti-tumor and hypoglycemic effects [7].

Polysaccharides in Ganoderma have immunomodulating properties, including the enhancement of lymphocyte proliferation and antibody production [14].

Fact

Several ß-glucans that were isolated from Ganoderma were found to be bioactive by Miyazaki and Nishijima in the early 1980s. Importantly, these Japanese researchers discovered that polysaccharides of Ganoderma strongly inhibited the growth of tumor. The levels of anti-tumor cancer are related to the molecular weight, branching and solubility of ß-glucans in water.

(Huie and Di, 2004)

Did You Know?

Polysaccharides contained in Ganoderma are different from the polysaccharides normally found in carbohydrate food such as rice and potatoes. The difference is due to the existence of ß-glucans in Ganoderma which can contribute to anti-tumor properties.

Ganoderans such as Ganoderans A, B and C from Ganoderma may help to enhance glucose utilisation. This is because they help to increase the plasma insulin level in normal and glucose-loaded cells. The hypoglycemic activity of Ganoderma is due to an increase of plasma insulin level and an acceleration of glucose metabolism occurring not only in the peripheral tissues but also in the liver.

Proteins and Amino Acids

The proteins namely LZP-1, LZP-2 and LZP-3 from the fruiting body and spores of Ganoderma show mitogenic activity. A new immuno-modulatory protein, known as Ling Zhi-8 is isolated from the mycelia of Ganoderma [11].

Very few bioactive proteins, such as lectin and ribonuclease have been isolated from Ganoderma [21].

Complexes

Recent studies show that anti-tumor glycoprotein has been isolated from Ganoderma. The glycoproteins also possessing hypoglycemic and immuno-stimulant activities [6].

The protein-bound polysaccharides have been found as anti-viral agents against herpes simplex viruses [11] .

Ganoderma lucidum polysaccharide peptide (GLPP) is found to have anti-oxidant property. From various studies, it was found that *Ganoderma lucidum* polysaccharide peptide can exhibit anti-oxidant effect by scavenging reactive free radicals in mice [11].

Fact

A series of experiments have demonstrated that *Ganoderma lucidum* polysaccharides peptide (GLPP) could stimulate host immune functions.

(Cao and Lin, 2004)

Dietary Fibre

Dietary fibre is a high molecular component neither digested nor absorbed but excreted upon intake by human beings. Ganoderma contains dietary fibre belonging to ß-glucan, chitinous substances, polysaccharides and others. Since ß-glucan and chitinous substances are contained much in the dietary fibre of Ganoderma, certain pharmacological effects can be expected. Thereafter, by physical actions, the substances absorb hazardous matters such as carcinogens and prevent their absorption in the intestine and also hasten their excretion. Hence, it seems to work effectively to prevent cancer of colon and rectum.

Did You Know?

To maintain good health, the recommended intake of dietary fibre is 25-30g per day.

Organic Germanium

Organic germanium is a precious compound that gives Ganoderma its important medicinal values. The amount of organic germanium in Ganoderma has direct connection with its effectiveness in fighting cancer.

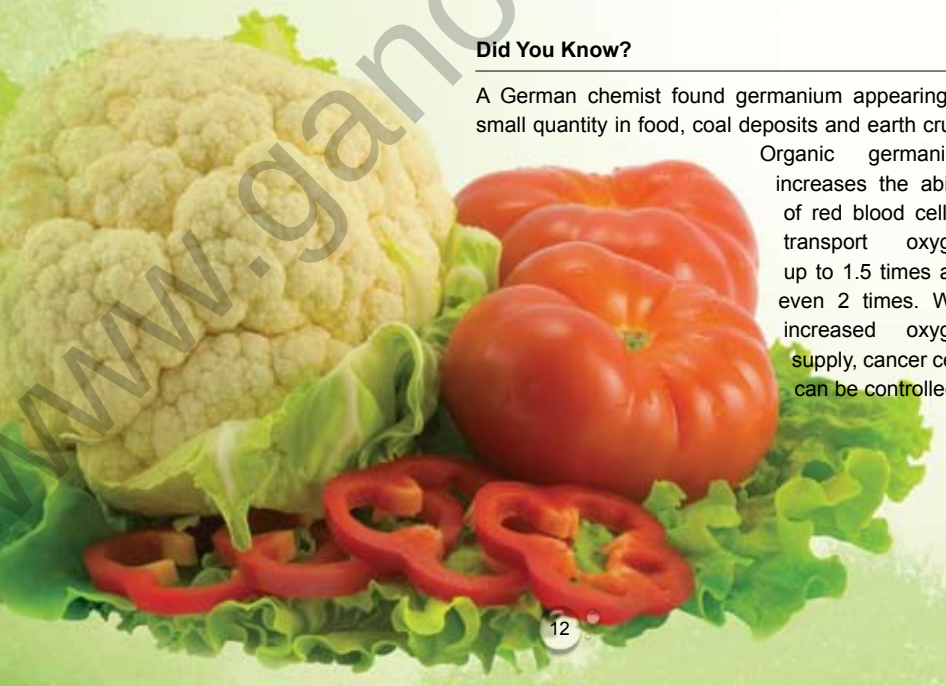
When a chemotherapeutic agent is added directly to cancer cells in a test tube, the cells are destroyed. When organic germanium is added to cancer cells in the same manner, the cells exhibit no change. However, it indirectly stimulates anti-cancer defense. Although it does not cure the cancer, it appears to enhance the body's metabolic ability to do so. Besides, organic germanium also acts as an adaptogen that helps to cope with any stress (physical, emotional or chemical) as needed.

Germanium has been associated with antimutagenic,immuno-modulatory, anti-oxidant and anti-tumor effects [5].

Fact

Gerber and Leonard (1997) reported that organic germanium providing anti-mutagenic or anticarcinogenic properties which was useful in cancer treatment. Organic germanium has been used as a dietary supplement and its therapeutic attributes include immuno-enhancement, oxygen enrichment, free radical scavenging, analgesia and heavy metal detoxification.

(Chiu et al., 2000)



Did You Know?

A German chemist found germanium appearing in small quantity in food, coal deposits and earth crust. Organic germanium increases the ability of red blood cell to transport oxygen up to 1.5 times and even 2 times. With increased oxygen supply, cancer cells can be controlled.

Enzymes

Ganoderma contains various enzymes such as Superoxide Dismutase, lysozyme enzyme and protein enzymes. The body uses them in fighting diseases, creating energy and accelerating all metabolic processes. Lysozyme is an enzyme that destroys bacterial cell walls by hydrolysing the polysaccharide component of the cell wall.

Superoxide Dismutase is an important component in Ganoderma. It acts as anti-oxidant which helps to protect against attack from harmful free radicals.

Adenosine, Nucleosides, Nucleotides, RNAs

Adenosine is a purine nucleoside consists of adenine and ribose; it is a component of RNA. It is also a cardiac depressant used in pharmacy as an anti-arrhythmic.

Nucleoside is one of the compounds into which a nucleotide is split by the action of nucleotidase or by chemical means, and it consists of sugar with a purine or pyrimidine base. Nucleotidase is an enzyme that catalyses the cleavage of a nucleotide into nucleoside and orthophosphate. Nucleotide is one of the compounds into which nucleic acid is split by action of nuclease.

Fact

Shimizu et al. (1985) demonstrated that the active substance identified as adenosine of Ganoderma suppressed platelet aggregation.

(Huie and Di, 2004)

Did You Know?

Human beings have 46 chromosomes, arranged in 23 pairs. Heredity is encoded in DNA (Deoxyribonucleic acid) within the chromosomes. A gene is a very small cluster of chemical units which group up to form the DNA molecule. RNA (ribonucleic acid) is the messenger of DNA within the cell. Forms of RNA direct the cell to manufacture specific enzymes and other proteins.

Alkaloids, Vitamins, Essential Minerals, Steroids, Sterols and Fatty Acids

Alkaloid is any of a group of organic basic substances found in plants, many of which are pharmacologically active and contribute to health-giving functions. Ganodosterone has been isolated as a steroid which plays a role as anti-hepatotoxic. A sterol derivative of Ganoderma may help to inhibit cholesterol synthesis.

Fact

Zhang and Zhang (1997) analysed the vitamin contents in the spores of Ganoderma using High Performance Liquid Chromatography (HPLC) and the result indicated the presence of vitamin C and E, as well as ß-carotene. Besides, the existence of selenium* in Ganoderma also had been proved using ion-exchange chromatography, gel filtration chromatography and electrophoresis.

(Huie and Di, 2004)

Did You Know?

Selenium* is derived from the Greek word selene meaning "moon goddess". It was discovered by Jacob Berzelius of Sweden in 1817. Selenium is an essential component of the body's antioxidants defense system.

Properties of Ganoderma

Anti-viral / Anti-microbial activities

Blood pressure lowering effect

Immuno-modulating properties

Detoxification

Blood glucose lowering effect

Cholesterol lowering properties

Anti-allergic activities

Anti-oxidant properties

Anti-tumor properties

Table 1: Cross index of medically active higher Basidiomycetes mushrooms and their medicinal properties

Scientific name	Common names	Anti-fungal	Anti-inflammatory	Anti-tumor	Anti-viral (e.g. anti-HIV)	Anti-bacterial & anti-parasitic	Blood pressure regulation	Cardiovascular disorders	Hypercholesterolemia, hyperlipidemia	Anti-diabetic	Immuno-modulating	Kidney tonic	Hepatoprotective	Nerve tonic	Sexual potentiator	Chronic bronchitis
Auriculariales		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Auricularia auricula-judae (Bull.) Wettst.	Jelly fungi, wood ear, cloud ear			*			*	*	*							*
Tremellales																
Tremella fuciformis Berk.	Silver ear		*	*					*	*	*		*			*
Tremella mesenterica Rits.:Fr.	Witch's butter						*									*
Polyporales																
Schizophyllum commune Fr.:Fr.	Common porecrust		*	*		*					*	*	*			
Grifola frondosa (Dicks.:Fr.) S.F.Gray	Hen of the woods, Maitake	*		*	*	*	*			*	*		*			*
Fomes fomentarius (L.:Fr.) Fr.	Tinder polypore			*		*										
Fomitopsis pinicola (Schw.:Fr.) P. Karst.	Brown Crumbly Rot		*	*		*							*			
Trametes versicolor (L.:Fr.) Lloyd	Turkey tails			*	*	*						*	*			
Piptoporus betulinus (Bull.:Fr.) P. Karst.	Birch Polypore	*		*		*										
Hericium erinaceus (Bull.:Fr.) Pers.	Lion's Mane			*							*			*		*
Inonotus obliquus (Pers.:Fr.) Bond.et Sing.	Chaga		*	*							*		*			
Lenzites betulina (L.:Fr.) Fr.	Multicolor Gill Polypore			*				*								
Laetiporus sulphureus (Bull.:Fr.) Murr.	Chicken of the wood	*		*												

Table 1: Cross index of medically active higher Basidiomycetes mushrooms and their medicinal properties

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ganodermatales																
Ganoderma lucidum (Curt.:Fr.) P. Karst.	Lingzhi, Reishi		*	*	*	*	*	*	*	*	*	*	*	*	*	*
Ganoderma applanatum (Pers.) Pat.	Artist Conk			*	*	*					*					
Agaricomycetideae																
Agaricales s.l.																
Pleurotaceae																
Lentinus edodes (Berk.) Sing.	Shitake, Hua gu		*	*	*	*	*		*	*	*	*	*		*	
Pleurotus ostreatus (Jacq.:Fr.) Kumm.	Oyster Mushroom			*	*	*			*					*		
Pleurotus pulmonarius (Fr.:Fr.) Quel.	Phoenix Oyster	*		*					*							
Tricholomataceae																
Flammulina velutipes (Curt.:Fr.) P. Karst.	Velvet foot, Enokitake	*	*	*	*						*					
Oudemansiella mucida (Schrad.:Fr.) v. Höhn.	Porcelain fungus	*														
Armillariella mellea (Vahl.:Fr.) P. Karst.	Honey fungus	*					*	*						*		
Marasmius androsaceus (L.:Fr.) Fr.	Horsehair parachute		*											*		
Agaricaceae																
Agaricus blazei Murr.	Royal sun agaricus			*												
Agaricus bisporus (J.Lge) Imbach.	Button mushroom			*							*	*				
Pluteaceae																
Volvariella volvacea (Bull.:Fr.) Sing.	Straw mushroom			*	*	*			*							
Bolbitiaceae																
Agrocybe aegerita (Brig.) Sing.	Brown Swordbelt	*		*					*					*		

Immuno-modulating activities of Ganoderma

Ganoderma has been promoted as an effective health supplement due to the various active components found in it such as polysaccharides, triterpenoids and proteins. These ingredients are shown to have marked immuno-modulating effect on our immune system.

In addition, derivatives from fruiting bodies and cultured mycelia of Ganoderma have shown positive effects on liver protection, hypoglycemia and platelet-aggregation inhibition in addition to its use for allevating hypertension [3].

Ganoderma also contains compounds with immuno-biological and anti-inflammatory properties. The biological activities of these compounds are characterised by their ability to increase white blood cell counts and reduce allergy reactions.

Fact

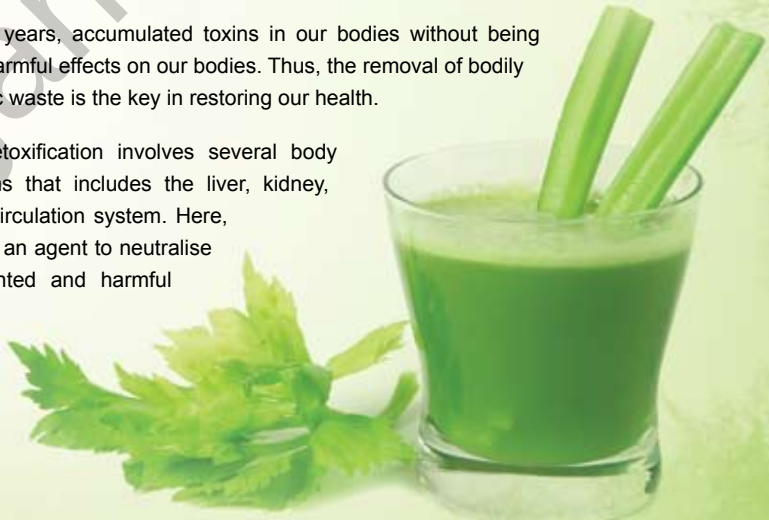
Production of interleukin-2 (IL-2) and interferon (IFN) were significantly increased after Ganoderma treatment.

(Tao and Feng, 1991)

Detoxification

We have, over the years, accumulated toxins in our bodies without being aware of it and its harmful effects on our bodies. Thus, the removal of bodily toxins and metabolic waste is the key in restoring our health.

The process of detoxification involves several body organs and systems that includes the liver, kidney, the lymphatic and circulation system. Here, Ganoderma acts as an agent to neutralise and remove unwanted and harmful toxins in our body by filtering the blood.



Anti-tumor activities of Ganoderma

The disease cancer develops through multiple genetic alterations of cancerous cells that lead to altered growth differentiation and apoptosis control. The aggresiveness of cancer is characterised by tumor invasion and metastasis, which is partially associated with an increase ability of cells to migrate among others.

Studies indicate that Ganoderma is capable of inhibiting human bladder cancer cell growth and migration in vitro. It is speculated that multiple mechanisms may be responsible for the anti-tumor effects of Ganoderma, due to its chemically diversified constituents. This suggests that Ganoderma may be a potentially effective chemo-preventive and therapeutic agent.

Did You Know?

Ganoderma can be consumed during chemotherapy or radiotherapy to reduce side effects such as fatigue, loss of appetite, hair loss, bone marrow suppression and the risk of infection.

Fact

Hu et al. recent study found that Ganoderma inhibited the proliferation of breast cancer cells. The study demonstrated the potential of Ganoderma to suppress the motility of highly invasive breast and prostate cancer.

(Sliva et al., 2003)

Previous studies on Ganoderma have shown that polysaccharide, one of the active components of Ganoderma, exhibits antitumor characteristics and reduces tumor metastasis. When Ganoderma polysaccharide was administered alone or in combination with cytotoxic and anti-tumor drugs, the lifespan of tumor-implanted mice was prolonged.

(Chen et al., 2004)

Anti-viral / Anti-microbial activities of Ganoderma

Ganoderma helps to protect the body's immune system from viral, bacteria and protozoal infections which are resistant to current antibiotics. The positive effects of Ganoderma can be seen clearly when such infections occur in individuals with weak immune systems, such as young children, the elderly and patients recovering from surgical procedures.

Cholesterol lowering properties

A highly significant cause of death in most developed countries is coronary artery disease. The main risk factors for this disease are hypercholesterolemia, high blood pressure, diabetes, etc. In recent years, there has been interest in the cholesterol lowering properties of mushrooms, including Ganoderma. As described, Ganoderma has been occasionally studied for its cholesterol lowering and hypotensive properties.

The components in Ganoderma that may lower cholesterol are not known, but may include ganoderantype glucans, hetero-ß-glucans, glycoprotein complexes, dietary fibres, lectins, terpenoid triterpenes, ergostane sterols and highly oxygenated ganoderic acid-type, lanostanoid triterpenes [1].

Ganoderma fibrous components could affect cholesterol absorption and bile acid recycling, whereas lipophilic components could affect cholesterol synthesis [1].

Blood pressure lowering effect

The arterial pressure may be reduced for those who have high blood pressure after consumption of Ganoderma. Studies showed that blood pressure of about half the patients with hypertension was reduced when Ganoderma were administered.

It had been reported that a hypertension related enzyme was inhibited by ganoderic acids, ganoderal A, ganoderol A and B.

Blood glucose lowering effect

Blood glucose lowering effect Ganoderma has been shown to lower blood glucose. For those who have high blood glucose level or diabetes, their condition may improve after consuming Ganoderma.

The constituents in Ganoderma – ganoderans has been shown to lower blood glucose by enhancing the utilisation of blood glucose by body tissues.

Fact

Due to its high content of fibre and proteins and low fat content, Ganoderma has been considered to be an ideal food for diabetic preventions of hyperglycemia.

(Gunde-Cimerman, 1999)

Anti-oxidants properties

Unhealthy diet and lifestyle, working stress and polluted environment can create a lot of free radicals that harm our body.

Polysaccharide of Ganoderma can help to decrease the production of free radicals which is believed to be a main factor in the human aging process. This observation can be implied that Ganoderma plays an important role in the anti-aging effect.

Superoxide Dismutase in Ganoderma also helps to support our body throughout the aging process. This may help to defend against free radicals attack that causes most of the diseases.

Fact

Ganoderma lucidum can apparently remove the hyperoxide radical believed to be a main factor in the human aging process.

(Liu et al., 1997)

Anti-allergic activities

Histamine is an important protein involved in many allergic reactions. Histamine can cause inflammation directly as well as indirectly.

The compounds that contribute to anti-allergic activity of Ganoderma has been identified to be the four triterpenes ganoderic acids namely Ganoderic A, B, C and D. These ganoderic acids can help to suppress the release of histamine from the cells.

Possible bodily reactions after consumption of Ganoderma

Type of disease	Symptoms of disease	Bodily reactions	Reasons / Healing process
Allergy	Allergy to dust, feathers, etc		Ganoderma is capable of blocking the secretion of histamine.
Anaemia	Pale, coldness of hand and feet, frequent headache and weak body	Fatigue and dizziness	Organic germanium may stimulate bone marrow to produce new red blood cells.
Angina Pectoris	Painful chest, tightness on left side of chest	Pain and increased pulse rate	Contraction of heart muscle may be strengthened and blood supply may be enhanced.
Asthma	Cough with/ without sputum, out of breath and cough incessantly, wheezing sound, dry mouth, tiredness and sleepy	Out of breath and cough lasting for 2-3 days and cough worsens with sputum	Viral infection and histamine secretion may be prevented and trachea muscles may be relaxed.
Atherosclerosis	High blood pressure and heart disease	Symptoms of diseases may appear	Adenosine may dissolve cholesterol and neutralise fat while slowing the formation of blood clot at blood vessels and strengthening heart muscles.
Constipation	Number of bowel movement less than 3 times per week and dry stool	Increased pain during bowel movement	To enhance metabolism process and bowel movement.
Diabetes	Weakness, tiredness, poor healing of wounds, constant thirst, and frequent hunger	Hands and feet swell slightly and blood sugar level will increase for a week, then the condition will gradually improve	Ganoderma can help to reduce blood sugar level, stimulating sugar to peripheral tissue and increase insulin from pancreas.
Diarrhea	Defecate frequently and gaseous discharge	Defecate more frequently and symptoms may increase	Bitter component of Ganoderma may neutralise the acidity in our body.

Possible bodily reactions after consumption of Ganoderma

Type of disease	Symptoms of disease	Bodily reactions	Reasons / Healing process
Gastritis	Experiencing pain in the stomach, loss of appetite and feeling uncomfortable while swallowing	Experiencing pain in the stomach and there may be diarrhea in between, but appetite may improve	Bitter component of Ganoderma may strengthen intestine and stimulate digestive system.
Gout	Pain and inflammation of joints, reddish and swollen joints	Pain and fever may Increase	Ganoderma react to reduce production of uric acid in the body.
Hematuria	Experiencing pain while trying to urinate and chalky urine	Feeling of pain is Increased	Polysaccharide may stimulate the body to produce antibody.
Hepatitis	Weakness, brownish urine, loss of appetite and painful joints	Symptoms may increase, but appetite may improve	Polysaccharide may stimulate thymus gland for protection of viral infection.
Influenza	Secretion of mucus, mild sore throat, sneezing and tears	Sneezing and mucus discharge may increase	Bitter component of Ganoderma may help in reducing the secretion of histamine and allergy
Kidney Problem	Weakness, pale, swollen hand and legs, sole feels painful especially in the morning	Urinate frequently and slightly swollen face, legs and hand but condition will improve gradually	Polysaccharide may stimulate body to produce antibody.
Piles	Bloody stool, anus is protruded and pain	The symptoms may increase, but the condition will improve gradually	Adenosine may dissolve blood lump and stimulate the recovery.
Pimples	Clogged pores and face is full of spots	Outbreak of more pimples	Detoxification ability of Ganoderma will increase liver functions, black spots on the skin will be reduced and hormones in body will be balanced.

Possible bodily reactions after consumption of Ganoderma

Type of disease	Symptoms of disease	Bodily reactions	Reasons / Healing process
Psoriasis	Scaly red patches of skin that are covered by white or silvery scales spots	Symptoms may increase, but the condition will improve gradually	Ganoderic acid is able to improve the skin condition.
Ringworm	Ring shape patches, reddish, scaly with light-coloured centre and prominent edge, severe patch	Symptoms may appear from the infected wound	Ganoderic acid is able to improve the skin disease.
Nasal Obstruction	Fatigue, smelling sense is deteriorated	Nose is repleted for several days	Bitter component of Ganoderma may help in reducing the secretion of histamine and allergy.
Tuberculosis	Cough with bloody mucus, weight loss and tiredness	Cough incessantly	Bitter component of Ganoderma may help in reducing the secretion of histamine and allergy.
Yellow fever	Fever and rheumatism	Symptoms may be increased, but the condition may improve gradually	Ganoderma may reduce the signs and symptoms of disease.

What may cause Ganoderma to be ineffective?

In general, one will experience the positive effects of Ganoderma after consuming it continuously to improve one's health. However, such experience depends on several factors, with the possibility that some may not experience any effects at all. These factors include:

- Ganoderma is not consumed with the recommended dosage and time.
- Cease to consume Ganoderma during the 'adverse effect reaction' phase.
- Unhealthy lifestyle, unbalanced diet and the lack of exercise.
- Contacted multiple illness or prescribed too many drugs for treatment. In such scenarios, toxins within the body cannot be discharged fully.
- Patients lose confidence in the efficacy of Ganoderma, not knowing that the severity of the illness could vary after the beginning of treatment. Thus, during the healing process, patients who do not consume Ganoderma may experience an oscillating phenomena before the pain reduces gradually.
- Some may be wrongly influenced and informed about Ganoderma and decide not to continue its consumption.

Conclusion

So far, this book has given you a glimpse of the amazing power of Ganoderma. You have witnessed Ganoderma's immuno-modular and anti-cancer activities. You have seen too its effectiveness in blood pressure lowering, cholesterol lowering, liver protection, anti-inflammation, anti-diabetic, antiviral and other anti-microbial activities. In other words, Ganoderma is nothing short of a miracle, a gift from nature.

We believe that you have verified the claims on the efficacy of Ganoderma noted throughout this book through your own research and investigation, and that you are now convinced on the benefits of Ganoderma for you health. However, one must remember that the consumption of Ganoderma is not a substitute over a balanced lifestyle that encompasses regular exercise, a healthy diet and a positive outlook to life. It is quite difficult to experience the power of Ganoderma, or for that matter, any health supplements, when one leads an unhealthy lifestyle.

Still, today's fast-paced and hectic lifestyle demand the consumption of health supplements to keep one moving forward amidst the stress and pressures of life. In this respect, nothing offers better health and vitality than Ganoderma. Give yourself a chance, to experience the efficacy of Ganoderma for yourself and let it be your companion of health. You will see the difference. You will witness change.

Glossary

Absorption: The uptake of substances into or across tissues.

Adaptogen: A substance which helps to normalise body functions indirectly.

Aggregation: Clumping of materials together.

Analgesia: Absence of sensibility of pain; the relief of pain without loss of consciousness.

Angiotensin: A peptide-based hormone.

Antigen: Any substance capable of inducing a specific immune response.

Apoptosis: A pattern of cell death affecting single cells that are eliminated by phagocytosis (the ingestion of microorganisms / other cells / foreign particles).

Arrhythmia: Variation from the normal rhythm of the heartbeat.

Arthritis: Inflammation of a joint.

Basidiomycete: An individual fungus of Basidiomycotina (a sub-division of fungi in which spores are borne on club-shaped organs).

Bioactive: Of or relating to a substance that has an effect on living tissue: bioactive compounds.

Bronchitis: Inflammation of one or more bronchi.

Glossary

Carcinogen: Any substance which causes cancer.

Constipation: Infrequent or difficult passing of stools.

Cytotoxicity: The degree to which an agent possesses a specific destructive action on certain cells or the possession of such action.

Depressant: An agent that diminishes any functional activity.

Dizziness: A sensation of unsteadiness and a feeling of movement within the head.

Fatigue: A state of increased discomfort and decreased efficiency due to prolonged or excessive exercise.

Healing: A process of cure.

Hematuria: Blood in the urine.

Hepatitis: Inflammation of the liver.

Hypercholesterolemia: An excess of cholesterol in the blood.

Hypertension: High blood pressure.

Hypoglycemic: An agent that lowers blood glucose levels.

Hypotensive: Marked by low blood pressure or serving to reduce blood pressure.

Glossary

Infection: Multiplication of microorganisms in body tissues causing injury.

Inflammation: A protective tissue response to injury or destruction of tissues.

Influenza: Marked by inflammation of the nasal mucosa, pharynx and headache.

Insomnia: Inability to sleep.

Interferon: Any of a family of glycoproteins, production of which can be stimulated by viral infection, parasites, bacteria, protozoa and toxins that exert anti-viral activity.

Interleukin: A term for a group of multifunctional cytokines (the substances released by one cell population on contact with specific antigen).

Invasion: The attack or onset of a disease.

Irritation: The act of stimulating.

Lamella: A thin leaf or plate, as of bone.

Metastasis: Transfer of disease from one organ or part of the body to another not directly connected with it.

Mitogenic: Action of a substance that induces mitosis and cell transformation.

Mutagenic: The action of an agent which induces genetic mutation (A change in the genetic material).

Glossary

Nuclease: An enzyme that hydrolyzes nucleic acids.

Perspiration: Sweating.

Phlegm: Mucus excreted in abnormally large quantities from the respiratory tract.

Polysaccharide: Any of a class of carbohydrates, such as starch and cellulose, consisting of a number of monosaccharides jointed by glycosidic bonds.

Premenstrual: Preceeding menstruation.

Proliferation: The reproduction or multiplication of similar forms, especially of cells.

Purine: A compound not found in nature, but variously substituted to produce a group of compounds which include adenine and guanine (one constituent of nucleic acids) found in nucleic acids.

Rash: A temporary eruption (the act of breaking out, appearing or becoming visible) on the skin.

Glossary

Sputum: Materials ejected from the trachea, bronchi and lungs through the mouth.

Sterol: Any of a group of predominantly unsaturated solid alcohols of the steroid group, such as cholesterol and ergosterol, present in the fatty tissues of plants and animals.

Suppress: The act of holding back or stopping the secretion, excretion or normal discharge.

Synthase: A term used in the names of some enzymes particular when the synthetic aspect of the reaction is emphasized.

Therapeutic: Pertaining to therapy; tending to overcome disease and promote recovery.

Tonic: Producing and restoring normal tone.

Toxin: A poison, especially a protein that is produced by some plants, certain animals and bacteria of which is highly poisonous for other living organisms.

Triterpenes: A compound ($C_{30}H_{48}$) that derived from 6 isoprene units.

ß-glucans: Polysaccharides contained in the cell wall of fungi but also present in nature as normal constituents of oats, barley and yeast.

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