

Lactic acid fermented

Black sesame extract powder blended with adlay

Excellent properties of nutritional ingredients of sesame in human body and fermentation technologies for efficient absorption of an active sesame ingredient "sesamin"

History of sesame

It is considered that sesame is native to the savannah zone in Africa. Human beings have a long history of utilizing sesame and the records of the utilization can be found elsewhere in the world. So as to prove that, sesame seeds were discovered even in ancient monuments.

Sesame was highly valued as a medicine in Egypt and India, and as an offering to the Gods in Mesopotamia. It was a valuable food that only the privileged class can obtain. In "Shennong Ben Cao Jing," said to be the oldest Chinese book on medicinal plants, there is a description that reads "eating sesame seeds every day prevents aging." It seems that ancient people also paid attention to the benefits of sesame as the food of immortality.

Even today, sesame remains to be a very beneficial food in people's lives. In fact, there are many words and phrases associated with sesame in Japanese: "Hirake goma (Open the door)," "Gomakasu (Cheating)," "Goma wo suru (Flattering)," and so on. These demonstrate that sesame is so close to us. Incidentally, the word "Gomakasu" came from an anecdote that even the worst cook could instantly prepare a delicious dish by putting sesame seeds on it. In Japan, since ancient times, sesame has been highly valued not only as a versatile seasoning but also as a healthy food and used for a wide range of cuisines.

Among others, sesame seeds were processed into a variety of forms as a valuable source of protein and have long been used in dishes such as sesame tofu and sesame dressing. It is quite impressive even today to know the wisdom of ancient people, who had focused on the excellent use value of sesame long before the nutritional ingredients of sesame were unveiled. From these facts, it is apparent that sesame is one of the indispensable foods in our daily life for health maintenance.



Nutritional ingredients per 100 g of sesame (dried)

| | |
|---------------|---------|
| Energy | 578kcal |
| Protein | 19.8g |
| Lipid | 51.9g |
| Carbohydrate | 18.4g |
| Sodium | 2mg |
| Dietary fiber | 10.8g |
| Calcium | 1200mg |
| Iron | 9.6mg |

Source: "Standard Tables of Food Composition In Japan Fifth Revised and Enlarged Edition, 2006"

Nutritional ingredients of sesame

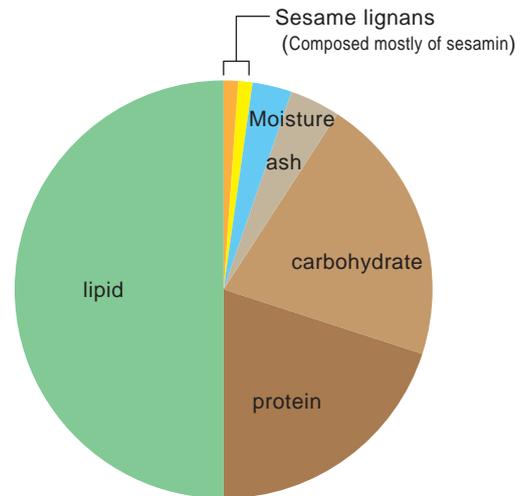
Sesame is a food that contains various nutritional ingredients such as vitamins, minerals, and dietary fiber. Among the main ingredients of sesame, oils and fats occupy about 50%; over the 80% of fatty acid content is linoleic acid and oleic acid, which are called "unsaturated fatty acids." Vegetable proteins, which occupy approximately 20%, contain an abundance of essential amino acids, such as methionine (improves liver functions) and tryptophan (helps keep your skin and hair healthy). Calcium (needed for bone health) is about 11 times more than the same volume of cow's milk and iron (that helps prevent anemia) is about five times more than the same amount of spinach. In addition, black sesame also contains a pigment called

"anthocyanin," a polyphenol with anti-oxidant properties.

Nutritional ingredients unveiled in recent years

In fact, it is in relatively recent years that a scientific study on the nutritional ingredients of sesame was commenced. Although it is widely known that sesame has health benefits, there were many things that we did not know about sesame such as what kind of effect each ingredient has. After investigation, we found that sesame was totally balanced nutrition food as described earlier. However, only investigating these nutritional ingredients does not demonstrate that sesame is absolutely superior to soybeans, rice, and other foods and therefore was not enough to identify the health benefits historically passed down among people in the world - such as the effects of sesame referred to as the food of immortality in China.

Sesamin - a rare ingredient specific to sesame

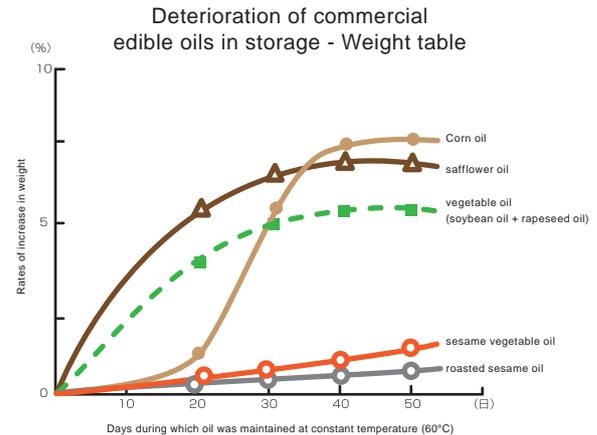


Sesamin - a rare ingredient specific to sesame

So, a study on sesame-specific ingredients was commenced and eventually the attention of researchers was attracted to the sesame-specific ingredients called "sesame lignans," contained in sesame in only a small amount. There are several types of sesame lignans; sesamin is the most abundant lignan contained in sesame. Besides sesamin, there are sesamol and sesamol. All of these are called generally "sesame lignans." The benefit of sesame lignans that was discovered first was their anti-oxidative effect. Sesame seeds oil, frequently used as frying oil, has a characteristic that it can be used repeatedly over and over, compared with other edible oils. Oil has a property of gaining its weight by absorbing oxygen and moisture in the air if left at a temperature of 60 ° C as oxidative deterioration progresses. Based on this, an experiment was conducted to determine which oil is poorly oxidized.

Anti-oxidant properties of "sesame lignans"

While oxidation progresses in corn oil, safflower oil, soybean oil, and rapeseed oil at an early stage, oxidation does not progress that much in sesame oil even after exposed to the air for a period of 50 days. This is due to the anti-oxidant properties of sesame lignans that protect oil from oxidation. Although unsaturated fatty acids such as linoleic acid and oleic acid have a disadvantage of being oxidized easily, sesame contains lignans that have excellent anti-oxidant properties to inhibit this effect.

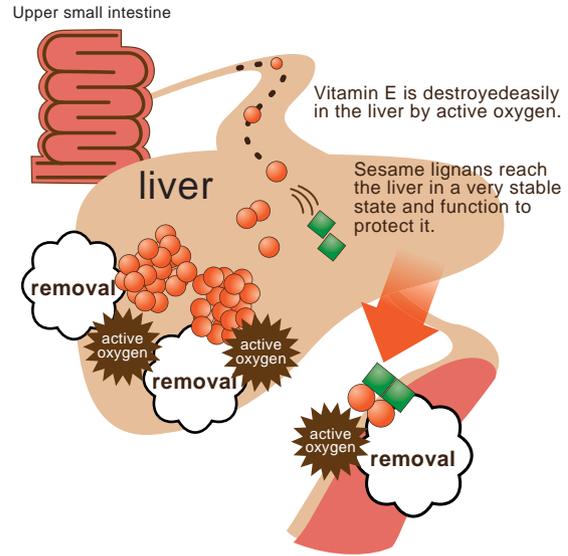


Source: "Science of Sesame" (Asakura Shoten)

Amazing mechanism of sesame lignans Sesame lignans exhibit superior effects by reaching and working directly on the liver

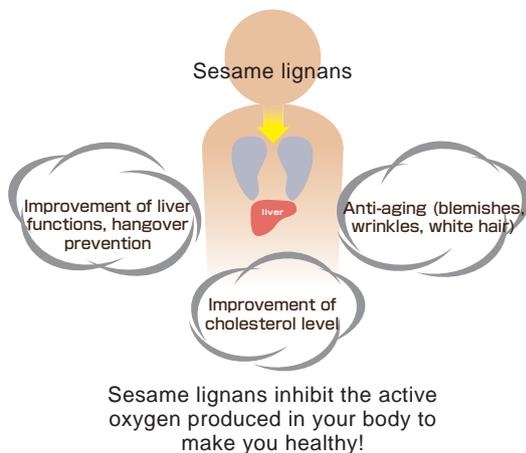
The study revealed how the sesame lignans ingested into the body and works. It was found that sesamin, a sesame lignan, is absorbed from the intestine and reaches the liver without being activated through a blood vessel called portal vein, and then activated in the liver. This is a unique characteristic of sesamin. It was also revealed that sesame lignans are excreted from the body after a period of one

day. Because sesame lignans with anti-oxidant properties are excreted from the body in a short period of time instead of being accumulated in the body, it is ideal to ingest it regularly every day. It is known that active oxygen, said to be a cause of aging, is particularly produced in the liver. To prevent the body from being oxidized, it is essential to eliminate this active oxygen from the liver. The sesame lignan "sesamin" is absorbed efficiently into the body and activated once it reaches the liver, where active oxygen tends to produce the most, to exhibit an excellent anti-oxidative potency that inhibits active oxygen.



Liver is the key to active oxygen reduction

It is said that the liver consumes much of the oxygen taken into the body (30 to 50%) for vital functions such as energy supply, synthesis of body components, and decomposition of toxic substances. Therefore, it is an organ where active oxygen is produced easily. Allowing an excessive amount of active oxygen to be produced in the liver causes damage to normal cells, interrupting the supply of energy to the whole body. This could result in symptoms such as a feeling of unwellness, fatigability, and poor complexion.



Basically, in the human body, an enzyme called SOD (superoxide dismutase) that inhibits active oxygen is produced in the liver.

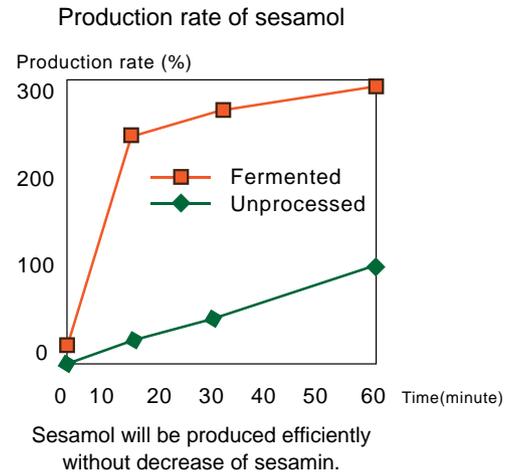
SOD, if sufficiently produced, will inhibit the production of active oxygen to a proper balance. However, unfortunately, it is said that SOD enzyme secretion starts lowering gradually at the age of 40 or older in general and deteriorates with age. This is the reason why we need to keep our liver healthy by supplementing daily meals with anti-oxidant substances to prevent excessive production of active oxygen.

Lactic acid fermentation for efficient absorption of sesamin

So, efforts were made to develop a technique that enables the nutritional ingredients of sesame to be absorbed efficiently. While sesamin, a sesame lignan, exhibits excellent anti-oxidant properties, it has a disadvantage of poor digestion and absorption due to its lipophilicity. The supplements currently available in the market are designed to dissolve together in lipids such as vitamin E so as to be absorbed more easily than sesamin alone.

However, the study showed that sesamin does not dissolve in mineral acids (HCl , H_2SO_4 , etc.), but dissolves well in alcohol and organic acids (lactic acid, acetic acid, citric acid, etc.).

Therefore, to enable sesamin to be absorbed into the body most efficiently, blending lactic acid (produced during lactic acid fermentation) with a small amount of another acid not only yields favorable results for taking full advantages of the active ingredients contained in sesame, but also provides the most streamlined method for utilizing the metabolites produced in lactic acid fermentation. This also makes it possible to ingest more sesame lignans with healthy ingredients.



Effects of lactic acid bacteria that have been utilized for a variety of fermented foods



Lactic acid bacteria also have long been used for producing fermented foods such as yogurt, cheese, and pickles. "Lactic acid bacteria" do not refer to specific bacteria, but refer collectively to bacteria that decompose a certain sugar to produce lactic acid.

Although the effects of lactic acid are diverse, it is particularly worth noting that "lactic acid improves the environment inside the intestine." In the human intestine, 100 to 500 species, or 100 trillion of intestinal bacteria are present. These include "good bacteria" that have a positive effect on health, "bad bacteria" that have a negative effect on health, and other

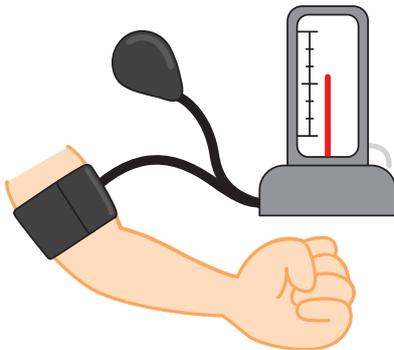
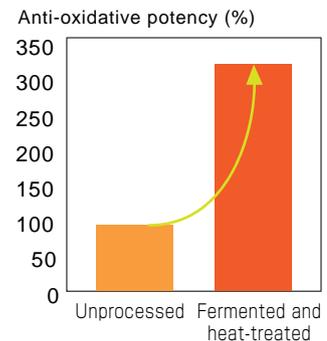
intestinal bacteria that are neither good nor bad. Among these, "bad bacteria" will exert harmful effects on health in various aspects if proliferated too much. Lactic acid bacteria help "good bacteria" increase in number, thus preventing "bad bacteria" from increasing excessively to improve the environment inside the intestine. Other than that, lactic acid bacteria have such benefits as improving and maintaining immunity. Remember that the intestine is closely linked to immunity and central to the health as an important organ. Using lactic acid bacteria to increase the number of "good bacteria" means to improve immunity, consequently.

Production of sesamol using heat treatment

Sesamol, a sesame lignan, is a precursor of a specific anti-oxidant substance. It is known that sesamol is decomposed to produce sesamol, a compound with a high anti-oxidative property.

Based on this, it is considered that heat-treating sesame after lactic acid fermentation should cause sesamol to be decomposed into sesamol. After repeated laboratory tests using varied temperature conditions and lactobacillus strains, a technique to efficiently produce sesamol with excellent anti-oxidant properties without decrease of sesamin was developed (Patent publication 2004-173692 "Method for producing fermented sesame").

Comparison between fermented and heat-treated sesame with unprocessed sesame



Production of GABA using lactic acid fermentation

GABA (gamma-aminobutyric acid), a kind of amino acid, is known to be contained in a relatively large quantity in fermented foods such as rice bran pickles and kimchi. Niwa Medical Laboratory had been conducting a study on generation of GABA using lactic acid fermentation, and recently discovered specific lactic acid bacteria from among numerous strains and developed a technique to produce GABA in an efficient manner.

GABA is an inhibitory neurotransmitter that suppresses excessive secretion of excitatory neurotransmitters such as

adrenaline and dopamine and is said to have an anti-stress effect that helps people get calm and relaxed. There is also a finding that GABA enhances learning effectiveness and improves insomnia. Besides these benefits, it is considered that GABA inhibits the secretion of noradrenaline and alleviates the constriction of blood vessels to lower the blood pressure, so the effect of improving hypertension can be expected.

Synergistic effects brought by blending adlay

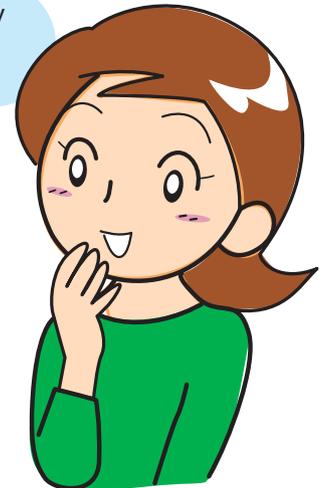
Adlay contain an abundance of high-quality proteins, whose amino-acid composition is rated as "excellent" in grains. It is a well-known fact that adlay also contain plenty of vitamin B1, vitamin B2, calcium, iron, and dietary fiber, speeding up the metabolism. Therefore, blending adlay, rich in these nutritional ingredients, with lactic acid fermented black sesame seeds, which contain an abundance of anti-oxidant substances, can produce synergistic effects. The benefits that can be expected with adlay alone are the improvement in atopic dermatitis, rough skin, dry skin, skin care, wart removal, swelling, and so on (due to their diuretic effect). They have long been used through the ages as a potion for normalizing gastrointestinal functions.

In addition, it is said that coixenolide, one of the ingredients of adlay, has an anti-tumor potency and properties to inhibit carcinoma growth are identified. As described above, adlay can provide diverse effects. However, the most important point is that it improves the flow of moisture in the body by speeding up the metabolism. It seems that this facilitates the discharge of excessive heat and moisture from the body, leading to pus discharge, detoxification, intestinal regulation, skin purification, and other benefits.

**Improvement in skin care, dry skin,
rough skin, swelling,
and normalization of gastrointestinal functions**

With the expectation of the above benefits, adlay have been utilized since ancient times as a crude drug called "yokuinin."

It seems that adlay provide benefits appreciated by women...



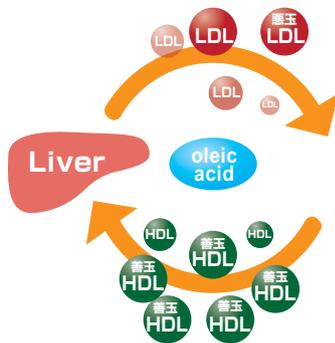
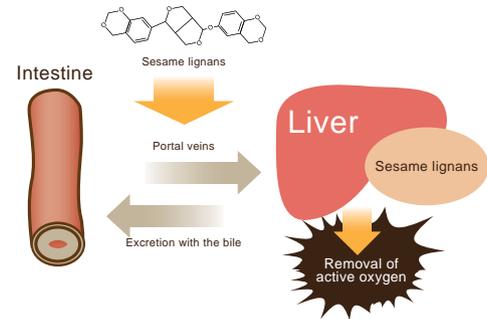


Daily life to health Black sesame is health benefits

Anti-oxidant properties of sesame lignans

It is said that sesame lignans (sesamin, sesamol, sesamolin, episesamin, etc.) have a high anti-oxidative property and are effective for lifestyle disease prevention and anti-aging. Moreover, for drinkers, sesame lignans facilitate the decomposition of acetaldehyde (a hangover cause) due to the effect of improving liver functions. This allows smooth

decomposition of alcohol to ease strain on the liver.



Getting rid of bad cholesterol

The lipids of sesame seeds are mainly composed of fatty acids called linoleic acid and oleic acid. Linoleic acid, one of the essential fatty acids, is an important component of cell membranes. It is said that linoleic acid helps lower the blood cholesterol level and therefore is effective for prevention and improvement of lifestyle diseases. By contrast, oleic acid is a monounsaturated fatty acid and not essential. Oleic acid is attracting people's attention because it was revealed that the acid helps reduce LDL cholesterol (the bad cholesterol) and increase HDL cholesterol (the

good cholesterol).

Enhanced skin care

Since ancient times, women have eaten sesame seeds also for the purpose of skin care. They believed that, because of anti-oxidant substances, taking sesame seeds helps prevent aging and allows them to maintain beautiful skin and rich hair. It is said that the properties of sesame lignans, sesame-specific ingredients, not only allow for the skin to regain moisture, oil, and its elasticity for enhanced skin care, but also improve liver functions to facilitate skin metabolism. In addition, blending sesame seeds with adlay can produce synergistic effects with the benefits specific to adlay. In this way, people have eaten sesame seeds since ancient times, with an expectation of various health

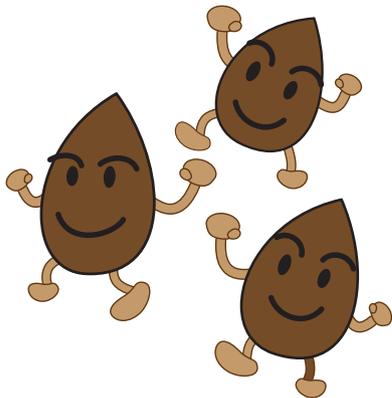


benefits.

Black sesame is a treasure house of health benefits

In addition to those described above, the nutritional ingredients of black sesame also provide a number of benefits. For example, it is considered that the abundance of dietary fiber helps prevent constipation and sweep carcinogens out of your body. A polyphenol called "anthocyanin," which is a pigment of black sesame, works to reduce gray and white hair by facilitating the synthesis of melanin pigment. Other examples include vitamin E for hair loss prevention, iron for anemia prevention, calcium for osteoporosis prevention, and more.

As described above, black sesame is a treasure house of health benefits. Why don't you eat it daily and make use of it for your health?



known since ancient times

Health benefits of sesame

Listed below are the sesame ingredients and the health benefits of sesame lignans.
All of these are essential for health and skin care. Effects and efficacy of sesame have been known since ancient times.

Anti-oxidant properties

Getting rid of active oxygen to protect the body's cells

Anti-aging and skin care

Anti-aging and skin care benefits due to sesamin's anti-oxidant properties

Cholesterol oxidation and hypertension prevention

Reduction of bad cholesterol in the body to prevent lifestyle diseases

Supplement for the loss of female hormone

Improvement of menopause symptoms due to sesamin's female hormone-like properties

Hangover prevention

Improvement of liver functions for smooth decomposition of alcohol

Cancer prevention

Properties of sesamin to inhibit carcinoma growth

Improvement of hair growth and gray hair

Sesame-specific ingredients that improve the hair condition from inside the body.

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