

Barley Leaf Extract (BLE), an Excellent Health Food

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1) BLE is an excellent health food from the nutritional point of view.

It contains high concentrations of protein and vitamins such as vitamin C, E, B1, folate and provitamin A.

It contains a lot of minerals such as potassium, calcium and magnesium.

2) BLE is a growth promoter.

BLE obviously promoted the growth rate in mice. Two possibilities are considered as to the action of BLE. One is due to the rich nutrients in BLE, and the other is due to the stimulation of the release of growth hormone from anterior pituitary cells by tocopherol succinate contained in BLE.

3) BLE is a prophylactic against cancer.

BLE decomposed various mutagens such as Trp-P1 and P2 both of which are contained in grilled meat. A peroxidase in BLE is responsible for the decomposition of mutagens. The peroxidase from BLE has a characteristic that works more effectively in acidic media. This fact suggests that BLE can decompose mutagens even in the stomach. Therefore BLE is highly recommended to those who like barbecue.

Further, according to Dr. Goldstein, BLE contains tocopherol succinate that inhibits the growth of cancer cells.

4) BLE is an antiatherosclerotic agent.

BLE lowered serum cholesterol level in rats. The effect of BLE is due to hexacosanol or hexacosyl alcohol and β -sitosterol that are plentifully contained in BLE. The anticholesterolemic effect of BLE is due to the inhibition of the absorption of cholesterol from the intestine and the promotion of the conversion of hepatic cholesterol to bile acids. Thus BLE is especially useful for hyperlipemic people.

5) BLE is a good prophylactic against peptic ulcer.

BLE inhibited the formation of stress-induced ulcer and accelerated the healing of acetic acid-induced ulcer, a chronic ulcer model in rats, by oral administration.

What substances in BLE are responsible for the antiulcer action remain unclear at present. BLE do not inhibit acid production in the stomach.

BLE seems to enhance the defense ability of the stomach against ulceration factors.

BLE must be very useful especially for those who are suffering from the stress-related stomach ulcer.

6) BLE is a good stamina enhancer.

BLE elevated endurance in mice, and acted as a stamina enhancer in human.

BLE increased the number of the revolution of a rotary cage revolved by mice and prolonged the distance of forced running of mice on a treadmill.

The substances in BLE responsible for this action are likely to be hexacosanol and potassium. The elevation of endurance by BLE was also found in human.

BLE is recommended to have before exercise.

7) BLE is an antiinflammatory agent.

BLE revealed potent anti-inflammatory activity in rats. The two fractions, P4-D1 and D1-G1, isolated from BLE significantly inhibited the rat hind paw edema at such a low dose as 0.1 mg/kg via a parenteral route.

The two fractions are water soluble and proteinaceous in nature. The mechanisms of their antiinflammatory action are unclear. They are ineffective via an oral route.

8) BLE is a prophylactic against thrombosis.

BLE inhibited the aggregation of the platelets *in vitro* and *in vivo*. The chemical properties and the mechanism of action of the constituents in BLE responsible for this action remain unclear. Since the platelet aggregation is one of the major courses of infarction, daily intake of BLE may serve for the prevention against heart attack and dementia.

9) BLE may act as a tranquilizer.

BLE contains benzodiazepines. Benzodiazepines have been widely used as an antianxiety agent and a hypnotic. They can exert an antianxiety effect at very low doses. BLE contains only a trace amount of benzodiazepines such as desmethyldiazepam, but daily intake of BLE may be possible to stabilize emotional instability. The emotional instability can result in disorders such as peptic ulcer.

10) BLE lowered the blood glucose level in the alloxan-induced diabetes in mice at intravenous doses of 40 to 70 mg/kg. The fraction was ineffective via an oral route. Although the chemical profile of the fraction has not yet been clarified, it is water-soluble and heat-stable and appears to be a kind of polysaccharides. In the alloxan-treated rats pancreatic B-cells secreting insulin have been destroyed, suggesting that the fraction directly lower the blood glucose level via similar mechanisms as those of insulin.

11) BLE is a good scavenger against reactive oxygen species.

Reactive oxygen species have been claimed to be a major cause of aging.

They injure DNA with leading to cancer formation, kill various cells with leading to disorders such as cirrhosis, dementia and diabetes, and oxidize LDL with leading to atherosclerosis.

One of the reactive oxygens is a superoxide anion radical that is scavenged by an enzyme of superoxide dismutase. Since BLE contains superoxide dismutase in a large amount, BLE is considered to be a good scavenger of the superoxide anion.

BLE also contains various flavons such as 2'-O-glucosylisovitexin and a large amount of β -carotene both of which have been known to nonspecifically remove reactive oxygen species. Recently American Academy of Science has recommended that people should take more amounts of carotenes as an antioxidant.

BLE must contribute to prevent aging and protect human against various geriatric diseases caused by reactive oxygen species.

12) BLE is one of the best resources of hexacosanol.

BLE contains hexacosanol (hexacosyl alcohol) that reveals many useful effects.

Hexacosanol is a kind of a higher alcohol and a wax like substance that distributes widely in plants. BLE has been found to be the best natural source of hexacosanol. Interestingly hexacosanol was found also as a wax like material in the plasma membrane of the sperm.

The biological effects of hexacosanol so far known are as follows: It enhances endurance ability both in mice and human, and acts as an anticholesterolemic agent through inhibiting the absorption of cholesterol from the intestine as noted above. In addition, it has been found literarily that hexacosanol protects nerve cells against the cell death induced by glutamate, an intrinsic neurotransmitter, and has a beauty effect, having been used as a cosmetic in a form of lotion.

Therefore BLE should act as a stamina enhancer, a preventive agent against atherosclerosis and an antidementia agent.

18) Conclusion

Since BLE contains various kinds of nutritional elements in good balance and reveals many biological effects, BLE should be useful for preventing human from various geriatric diseases, and let people stay not only healthy but also younger and more powerful.

Supplementary

- 1) The mechanism of peptic ulcer formation
- 2) The mechanism and significance of platelet aggregation
- 3) How is the atherosclerosis induced?
- 4) What are reactive oxygen species?