Perspective

Research on Chronic Diseases

Molecular Mechanism of Barley Functional Components to Combat Chronic Diseases in Humans

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Introduction

Barley played an important role in the health and civilization of humans who migrated from Africa to Asia and then Eurasia. We demonstrated the systematic mechanism of functional components of barley against chronic diseases, based on the PubMed, CNKI and ISI Web of science databases from 2004 to 2020. Barley and its extracts are rich in 30 ingredients that help fight more than 20 chronic diseases, including 14 chronic diseases that are the same and 9 chronic diseases that differ between cereals and grasses, due to the main molecular mechanism of six functional components of barley grass (GABA, flavonoids, SOD, K-Ca, vitamins and tryptophan) and cereal grains (β-glucans, polyphenols, arabinoxylan, phytosterols, tocols and resistant starch). The antioxidant activities of barley grass and barley seeds have similar and different functional components. These results support the findings that barley grain and its grass are the best functional foods, promoting the ancient Babylonian and Egyptian civilizations and suggest that functional components depend on diet of pliocene hominids in Africa and Neanderthals in Europe to modern humans around the world. This review not only reveals the formation mechanism and effects of barley diet to overcome chronic diseases in humans, but also provides a scientific basis for the development of medical products and drugs. For the prevention and treatment of chronic diseases in humans. Global costs to treat five chronic diseases (diabetes, cardiovascular disease, mental illness, chronic respiratory disease and cancer) will amount to $47 trillion between 2011 and 2030. High sodium with low fruit and whole grains is a leading dietary risk factor for disability adjusted mortality and life expectancy globally and in many countries. Diabetes in 11 regions producing high glycemic index polished rice caused the largest decline in health-adjusted life expectancy at birth in 21 regions of 187 countries between 1990 and 2013. The micronutrients with the highest risk of deficiency are Fe, Zn and vitamins (VB_1, VB_2, VB_{12} and VC). The chronic epidemic of human disease is caused by the pursuit of healthy eating preferences changing taste, that is, the ancients switched from brown rice (high in K and rich in micronutrients) and barley or grass meal of it as staple food to modern polished rice and white flour with low micronutrient content and low as staple food.

Description

Barley grass is not only the best functional food in terms of cellular nutrition and detoxification in the human body, but also contains the most biologically active substances for many beneficial health effects. It can fight more than 20 chronic diseases thanks to GABA, flavonoids, SOD, K-Ca, vitamins and tryptophan mechanism in barley grass.

Key food support+barley grass meal can meet WHO low sodium (<2g) target with high potassium (>3.5g) per day. More than 30 functional components in barley grass can prevent more than 20 chronic diseases, and 15 functional components in barley grain can prevent 11 chronic diseases. Barley improved sterol accumulation by the activity of the

LTP2 gene involved in abiotic stress responses that mediate intracellular lipid transport. Barley straw (2.0~8.0g/L) to degrade phenolic acids inhibited algal bloom (*M. aeruginosa*) causing aquatic eutrophication due to impaired cellular metabolism. Shrinkage and degradation of fluorescent chlorophyll. Therefore, barley grass powder plays an important role in solving chronic human diseases. Barley grain has the highest functional value (low GI with high amount of β-glucans and resistant starch) and antioxidant properties among cereals. Soluble fiber β-glucans are a group of polysaccharides found in barley, oats, mushrooms, yeast and algae. Bark less barley variety zangqing 320 has a sequence of 4.84 Gb with 46,787 genes in 7 chromosomes; three HvCslF genes involved in the synthesis of (1,3; 1,4)-β-glucan. Qingke (shelled barley) is the staple food of Tibetans and an important fodder for livestock in the Qinghai Tibet plateau, where many gene families are involved in stress response, especially, the antioxidant capacity is different due to some polysaccharide components and phytochemicals. Regular daily intake of whole wheat flour can prevent chronic diseases, especially diabetes, colon cancer, hyperlipidemia, high blood pressure and gallstones. Although barley grain has played an important role in human health, its contribution to health and various key mechanisms for the prevention of chronic diseases in humans and the functional part of barley grain remains unclear. Barley is not only a staple food and malt and staple food in several countries around the world, but also the richest source of cereals in functional ingredients and the richest functional food crop. Barley seeds are rich in nutritional functional components. Whole grain barley and its outer bran layer are rich in functional ingredients, especially dietary fiber, phenolic acids, flavonoids, phytosterols, alkylresorcinols, benzoxazinoids, lignans, tocol and folate, which have antidiabetic, anti-inflammatory, and antidiabetic properties. cancer, anti-obesity, prevention of cardiovascular disease, antioxidant, anti-proliferative and cholesterol lowering ability, such as β-glucan (2.40~7.42%) and total tocol number (39.9~81.6 μg/g); The 64 compounds in barley are 27 anthocyanins, 9 flavanols, 9 flavone glycosides and 19 phenolic acids and aldehydes. Antioxidants are compounds that remove reactive oxygen species from cells, playing a dual role in aggravating and preventing disease. The main antioxidants in barley are phenolic compounds (phenolic acids, flavonoids and anthocyanins), tocols (vitamin E), polysaccharides (arabinoxylan), dietary fiber and phytic acid. The antioxidant effects of barley polyphenols are flavanol>flavonol (quercetin)>hydroxycinnamic acid (ferulic, caffeic and coumaric acids). Malt has a higher phenolic content (sinapinic acid and epicatechin) than barley grain, which plays a major role in the antioxidant stability of beer. The antioxidant activity of anthocyanins in barley bran was significantly higher than in whole grain flour. Five of the seven associations in barley involved markers close to genes involved in the tocochromanol pathway (vitamin E with the strongest antioxidant). Overexpression of barley homogentisate geranylgeranyl transferase enhanced tocotrienol concentrations (δ-, β- and γ-tocotrienol 10%-15%) and antioxidant capacity (17%-18% free radical scavenging activity) in barley grain.

Conclusion

The antioxidant effect of dietary fiber in hullless barley bran is related to total phenolic concentrations, with DPPH (base 1,1-diphenyl-2-picrylhydrazyl 2,2-diphenyl-1-(2) ,4,6-trinitrophenyl-hydrazyl) free radical scavenger and antioxidant capacity to reduce iron. GABA induces the accumulation of proline and total phenolic compounds and enhances the antioxidant system of germinated bare barley under pressure of NaCl. The quality score of chapatti decreased by 15% and its phenolic concentration increased from 23.7 to 28.7 mg/100 g, while the cookie spread coefficient decreased by 33% and its concentration in β-glucan increased from 0.60% to 2.4% as well as the phenol content increased from 6.3 to 13.5 mg/100 g after mixing 30% barley flour, especially increasing antioxidant activity.