



Selenium and Body Health

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Abstract

Selenium is one of body micronutrients, which has a very close relationship with body health. Selenium is blessed with many important functions on biology, to certain category, such as protecting cells complete, keeping cells functions of physiology and biochemistry normal, improving the synthesis of cell DNA and RNA, participating the synthesis of ubiquinone and improving antibody developing, and effecting endocrine function in body. Selenium is closely connected with many diseases, mainly cancer, kashin-beck disease and keshan disease with deep study. Here, the relationship of selenium and body health is being reviewed.

Keywords: Selenium, Microbe, Body health, Disease, Control

It had been thought that selenide was toxic by old chemistry, but after 1970's, the fact that selenium could provide body with essential trace nutrients was found. After that, the study on selenium was paid more attention. Nutrition and toxicity of selenium mainly depends on its category of biological concentration. The experiments proved that selenium within 0.1 ppm can do well to body, while beyond 10 ppm may be bring about carcinogenesis. For taking selenium, at least 2-4PPm can result in death once. Normal body must reserve 14-21 mg selenium within, but about 0.5 mg selenium is expelled out of body in a single day. Therefore, human body is badly in need of selenium supplementation. Otherwise, disease will be brought about easily.

Yangguangyin laboratory of National Preventive Medicine Science College got the safety limit of selenium for body-needing by more investigations and body experiments, and it was proposed in the fourth international selenium symposium held in Xide on July in 1988 that the selenium intake for meal is 50-250ug in a single day, the safe intake is 500ug in a single day, and toxic intake is 750ug in a single day.

Suitable Concentration Category: Selenium within human body is of many important functions of biology, which has a close relationship with body health.

1. Biological Functions of Selenium

In recently years, the study on biological functions of selenium has been developed much further, and the below aspect is concluded:

1.1 to protect the completeness of cell membrane

The experiments proved that the lack of human erythrocyte and selenium content will result in the decrease of Na/k⁺---ATP enzyme activity and membrane fluidity, and the two functions will be enhanced if adding up trace sodium selenate. Obviously, selenium can affect the structure and function of red cell membrane to protect the completeness of cell membrane.

1.2 to keep normal physiological and biochemical function of cell

Selenium is the essential component of GSHPx. Peroxide reaction of GSHPx catalytic tanimitsu peptide; superoxide dismutase and catalase cleanse O₂ and H₂O₂ in course of cell respiratory metabolism together to prevent forming hydroxyl radical and peroxide, so as to make cells keeping normal physiological and biochemical functions.

1.3 to promote the synthesis of cell DNA and RNA

Selenium can promote the synthesis of cell DNA and RNA, regulating nucleic acid and protein metabolism. Selenium lack will make GSHPx activity and its mRNA decreased. Selenium supplementation can increase GSHPX---mRNA to make GSHPx activity upper, which can prove that selenium, plays an important role against GSHPx gene rotor degradation. Selenium is also two kinds of RNA's specific component of glutamate and lysine accepted by colibacillus.

RNA with selenium is in some mammalian body, and they can improve mRNA's playing function in acylation.

1.4 participating composition of ubiquinone

Selenium can improve formation of anti-body, and also can adjust the absorption of vitamin A, C, E and K and consume biosynthesis of ubiquinone. Coenzyme Q is the key one in living creature, which is not only capture agent of excessing free radical, but also can keep normal cellular respiration and promote immune. Coenzyme Q10 is blessed with abilities of anti-infectious disease, cancer, heart disease, periodic disease and hypertension, whose functions are evident.

Selenium can stimulate formation of immunoglobulin and anti-body, so as to affect body's immune function. Selenium's influence on immune system and GSHPx's metabolism participated nut olefine acid can affect synthesis of prostaglandin and leukotriene.

1.5 affected endocrine function

Thyroxine5---deiodinase (T45---D) found lately is a kind of selenium-contained enzyme. T45---D can catalysis thyroxine (T4) to triiodothyronine (T3) of more biological activity, so as to affect physiological function of thyroid hormone.

In addition, result of hormone test showed that selenium lack could result in decrease of rat testis ketone secretion, and selenium of toxic dose would disturb secretion of prostaglandin, leading to damage of kidney function possibly. Selenium lack also results in increase of rat plasma thyroid hormone. Adding selenium into high fat diet of rabbit can increase thyroid hormone, insulin and cortisone in plasma.

1.6 other functions

Selenide is capture agent, which brings about too much biochemical matter to lead to carcinogenesis and free radical of too much senility, so as to play an important function in courses of cancer prevention and anti-aging. Selenium can also keep sperm activity functional and pancreas function to ensure lipid absorption. Selenium controls parts of ion in cell membrane flowing out to perfect keratin, avoiding hyperkeratosis and formation of cataract. Selenium is blessed with functions of antagonizing physiological antagonize and so on by adaptability of affected brown adipose tissue to bring about heat, so as to affect anti-cold ability of body.

2. Selenium and Certain Diseases

It was confirmed by great more studies that selenium is blessed with wide biological function. Selenium lack can result in a series of such diseases as cancer, AIDS, liver and pancreas disease, hypertension, diabetes mellitus, anemia, keshan disease, infertility, cataract, depression, asthma, arthritis, many kinds of dysarthrosis and so on. What is paid more attention is the prevention of selenium and diseases below.

2.1 selenium and cancer

In recently years, the study of selenium and cancer was developed constantly and showed that selenium lack was connected with cancer. Meanwhile, VA and VE lack can lead to disease of some degree. If selenium and VE are lacked in body, H₂O₂ and ROOH will appear and lead to degradation and variation.

In 1998, according to his study, Xiangboge proposed a great deal of cancer and death in sub-selenium districts once. According to the survey in Qidong town, high risk area of liver cancer of Jiangsu province, the death of liver cancer had a close relationship with blood selenium. Serum selenium of patients suffering from nasopharyngeal carcinoma is lower than that of healthy people obviously in Sihui town in Guangdong province. Zhuyajun reported that blood selenium of lung cancer patients is lower than that of healthy people obviously. Study team of medical college in Arizona University investigated and studied selenium englobement's influence on cancer among patients in sub-selenium districts in America. During four years and a half, one group of patients was intaken 200ug selenium every day, while another was given control agent. It lasted six years for tracking follow-up. That selenium englobement decreased kinds of cancer incidence obviously was reported, among which prostate cancer incidence decreased 60%, lung cancer 46%, colon rectal cancer 58% on December in 2001, and the death of selenium englobement group suffering from kinds of cancers decreased 50%.

Selenium's anti-cancer theory is that it can decrease certain hydroxylase activating carcinogenesis sources and the activity of aryl hydrocarbon hydroxylase to improve the system of detoxifying enzymes, such as glucose aldehyde group can move the activity of enzyme and take effect in early stage carcinogenesis, possibly related to the activity effecting DNA polymerase and nucleoside kinase, or to repair DNA function by mutagenicity decreased.

2.2 selenium and kashin-beck disease

Kashin-beck disease is a kind of endemic osteoarthritis with main pathology of endostosis disorder. Many researchers thought that the fundamental reason is disproportionality among elements, while sub-selenium is the essential factor. Practice showed that to control kashin-beck disease with selenium can do a good job. Selenium plays an important role in cartilage histocyte development, and can prevent deterioration of epiphysis end lesion to repair to prevent bone

atrophy, degeneration, and retrogradation and so on. Therefore, selenium can prevent kashin-beck disease. Moreover, selenium can also inhibit toxicity of organic compound humic acid to prevent kashin-beck disease, avoiding damage to chondrocyte.

In 1996, it was reported that selenium had a close relationship with rheumatism arthritis. Within serum, mercapto lack is the main feature of arthritis, while selenium can develop disulfide bond to mercapto in protein synthesis, which can become more along with VE increase. Therefore, selenium supplementation along with VE supplementation plays an important role against rheumatoid arthritis.

2.3 selenium and cardiovascular disease

Selenium lack is connected with keshan disease, hypertension, coronary heart disease and cardiovascular disease. Selenium supplementation in drinking water or oral sodium selenite can make a remarkable effect against keshan disease. Keshan disease is a kind of endemic disease, chiefly myocardial lesions. Selenium lack is one of the reasons leading to diseases. According to multi-year study, it was found by domestic experts that keshan disease never appeared in districts with selenium. Contrarily, keshan disease had great incidence rate in sub-selenium district. It had been surveyed and tested in China Academy of Preventive Medicine, Shenyang Medical University, Yunnan, Sichuan and Guizhou provinces successively. The results confirmed that selenium had a good function against preventing keshan disease.

The main principle of selenium supplementation against keshan disease is that selenium supplementation can increase activity of decomposing peroxide in vivo to prevent the damaging function to cell membrane system. Selenium is one of the components of human cell pigment C protein, which plays an important role in course of cell biological oxidation. Selenium can improve biosynthesis of coenzyme A, and physiological function of coenzyme A to heart maintenance is essential. Selenium can enhance immunologic function, so as to decrease invasion of keshan disease virus. Therefore, selenium supplementation increased protecting function to myocardial cells.

Selenium can also prevent hypertension and thrombus. Clinically, selenium is used to prevent angina pectoris and myocardial infarction, along with VE.

2.4 selenium and AIDS

Study on relationship of selenium and AIDS have newly developed further. AIDS is immune system by immune defecting virus invades body to lead to immune defect, secondarily infection appears to become AIDS syndrome and AIDS by chance. Serum selenium of asymptomatic HIV infected people kept normal, while selenium of ARC and AIDS patients decreased obviously. Selenium lack will increase along with getting worse disease.

Theory of selenium lack is thought that due to damaging immune function, kinds of virus are infected very easily to lead to gastrointestinal dysfunction. Thus, exogenous selenium will be malabsorbed and endogenous selenium will be lost. Meanwhile, related kidney function will be damaged to make selenium expelled from urine, in addition to insufficient uptake of diet will lead to failure of selenium food gradually. Along with gradually worse disease, selenium lack will be severe, but sub-selenium will lead to decrease of immune function of T cell and decrease of oxidation defensive system will make AIDS worse and immune function lower to form vicious circle. Selenium supplementation food can promote serum selenium content and improve disease syndrome, which has an important meaning in AIDS adjuvant therapy.

2.5 selenium and thyroid disease

In recently years, the relationship of selenium and thyroid disease was found and it was reported that selenium lack had a close relationship with myxedema-typed cretinism. Cretinism is a kind of disease with severe iodine lack. Iodine lack makes thyroid hormone within body decreased. If selenium is lacked, it will result in decrease of T3 content further and accelerate forming endemic goiter and cretinism. In certain district, such case was still existed after iodine supplementation, possibly which is connected with selenium lack. If at the time of iodine supplementation with meanwhile selenium supplementation, T4 activity will be enhanced, which can do work to promotion of thyroid hormone and its prevention and treatment.

Besides the above deeper study on relationship of selenium and diseases, selenium lack is also connected with liver disease, skin disease, cataract, acne vulgaris, rheumatoid arthritis and so on. Theory of selenium lack's influence on diseases is under deep clinical experiment with selenium against disease.

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