

## **Prevention of Osteoporosis by Food Components**

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### **< Summary >**

Osteoporosis is defined as a skeletal disorder characterized by compromised bone strength predisposing to an increased risk of fracture. Since bone strength reflects the integration of two main features: bone density and bone quality, bone loss and change in bone architecture and turnover by aging causes osteoporosis. Bone mass is influenced many factors such as genetics, hormonal status, nutrition, exercise and life-style. Among these factors, nutrition and exercise are important in preventing osteoporosis. Thus, the nutrients and food components influencing skeletal health will be introduced in this article.

Bone tissue consists of two components: bone matrix proteins such as collagen and minerals. It is obvious that protein and minerals including calcium, phosphorus and magnesium are necessary for bone formation. Furthermore, vitamins also play crucial role in bone metabolism. For example, vitamin D stimulates calcium absorption in small intestine, vitamin K and C play important roles in syntheses of osteocalcin which has ability to bind to calcium and collagen, respectively, in bone matrix. Interestingly, it has been appeared that folic acid and B vitamins are important nutrients for bone health, since these are necessary for normal bridge-building of collagen.

On the other hand, food components affecting bone health has been approved as principal ingredients of the Food for Specified Health Uses (FOSHU) as targeted to the individuals who concerned about bone health by Japanese Ministry of Health, Labour and Welfare. These include soybean isoflavones having weak estrogenic activity and preserving bone minerals in postmenopausal women. Recently, it was also suggested that equol, a gut bacterial metabolite of isoflavones daidzein, may prove to be an important bioactive metabolite of isoflavones because of its greater binding affinity to estrogen receptors when compared with indicated parent compound. In fact, in our study, bone loss of the hip region in the equol producers was less than those in non-producers in isoflavone supplemented postmenopausal Japanese women. Milk basic protein has ability to stimulate bone formation and inhibit bone resorption, resulting increase in bone mineral density. The food ingredients such as fructooligosaccharides (FOS), casein phospho-peptide (CPP), calcium citrate malate (CCM), and polyglutamic acid which stimulate calcium absorption in the intestine have been approved as principal ingredients of FOSHU.

The most important thing for prevention of osteoporosis is to secure the high peak bone mass

during adolescence. Second is how to prevent bone loss in peri- and postmenopausal periods in women. Finally, the arrest of fall is effective for prevention of the incidence of the hip fracture in aged men and women. A balanced diet, adequate calories, minerals and vitamins, and appropriate use of foods with health claims for the life stages with exercise might be the foundation for prevention of osteoporosis.