



PREBIOTICS FOR OSTEOPOROSIS?

AND YET, THEY ARE THE MOST IMPORTANT ALLY!

The terms probiotics and prebiotics may be confused in your mind. You may also have heard of osteoporosis but not wondered further about it. Maybe someone of yours suffers from this disease, who either knows it or not. But what does all this have to do with each other?

So let's put things in order. According to the definition given in 2013 by ISAPP (International Scientific Association for Probiotics and Prebiotics), probiotics are living microorganisms that when administered in sufficient quantities promote the health of the host organism, which in our case is the human body. Prebiotics, as defined by ISAPP in 2016, are the substrate used selectively by the host organism's microorganisms to promote its health. More specifically, they are indigestible compounds that are selectively metabolized by the intestinal microbiome and regulate the composition and activity of beneficial intestinal bacteria by enhancing not only the overall health of the body [1] but also the absorption of calcium and bone health [2].

A typical example of prebiotics that contributes to bone health are fructooligosaccharides (FOS).

And what is osteoporosis? It is defined as a systemic skeletal disorder characterized by low bone mass and alteration of bone tissue microarchitecture, with consequent increase in bone fragility and greater susceptibility to fractures [5]. It is also referred to as a "silent disease" since a fracture is the first sign of the disease.

How do prebiotics help with bone health? Intake of FOS leads to the production of short chain fatty acids (SCFAs) as products of microbial fermentation. SCFAs, such as butyric and acetic acid, contribute to the increased absorption of calcium ions and consequently to their bioavailability in the body through the following mechanisms [3] [4]:

They reduce the pH in the gut environment resulting in increased calcium solubilization
They affect signaling pathways that induce structural changes in the intestinal epithelium leading to a larger contact surface for increased calcium absorption

Prebiotics, especially FOS, are found in many fruits and vegetables [6], but most of the time the amount taken in through food is not enough. In addition, it is important to remember that an adequate intake of calcium and vitamin D plays an important role in complete bone protection. Among the available forms of calcium, calcium citrate is absorbed 25% more than calcium carbonate regardless of food intake. That is why it is the ideal form to be taken at any time while it is preferred in cases of stomach disorders and nephrolithiasis [7] [8] [9]. In addition, co-administration of vitamin D helps to absorb calcium more efficiently, reducing the risk of vertebral fractures and falls in the elderly [10]. [10].

Osteoporosis may be "silent" but guidance, prevention and help from experts give "ears" to everyone! To protect ourselves and those we love!



Tip 1: Nutrition plays the most important role in our health! Consumption of fruits and vegetables rich in prebiotics such as nectarines, bananas, pears, cherries, chicory, onions, garlic, leeks, white and red cabbage, broccoli, radishes, etc. will help in obtaining the necessary amount of them. Respectively consumption of foods rich in calcium such as skim milk, yogurt, kefir, almonds, spinach, etc. as well as foods rich in vitamin D such as salmon, sardines, mushrooms, etc. is also important for bone health. Beware of dietary sodium intake, which should not exceed 2300 mg per day [11].

Tip 2: More walks in the sun! 15 minutes of daily exposure is enough, always with the most appropriate sunscreen index depending on the skin tone!

Tip 3: Running, dancing, walking! Exercise helps reduce the risk of osteoporosis!

Tip 4: For more information, support or active participation you can contact the “Butterfly”, a skeletal health club!skeletal health club!

*Tip 5: A modern and innovative choice, in any case, considered appropriate to administer calcium and vitamin D is Bone-Vio, the only formulation containing 1200 IU Vitamin D along with 600 mg of calcium citrate and 2 g of fructose oligosaccharides (FOS) as prebiotics for the positive effect on the intestinal microbiome. * 1 sachet dissolved in a glass of water between meals is recommended.*

Bibliography

[1]. Carlson, J. L., Erickson, J. M., Lloyd, B. B., & Slavin, J. L. (2018). Health Effects and Sources of Prebiotic Dietary Fiber. *Current Developments in Nutrition*, 2(3), 1–8. doi:10.1093/cdn/nzy005

[2]. Whisner, C. M., & Castillo, L. F. (2018). Prebiotics, Bone and Mineral Metabolism. *Calcified Tissue International*, 102(4), 443–479. doi:10.1007/s00223-017-0339-3

[3]. C. M. Weaver, Diet, Gut Microbiome, and Bone Health, *Curr Osteoporos Rep* (2015) 13:125–130, DOI 10.1007/s11914-015-0257-0

[4]. U. Krupa-Kozak, D. Świątecka, N. Bączek and M. M. Brzóska, Inulin and fructooligosaccharide affect in vitro calcium uptake and absorption from calcium-enriched gluten-free bread, *Food and Function*, 4, 2016 DOI: 10.1039/c6fo00140h

[5]Munez-Torres M., Varsavsky M., Aviles Perez, Endocrinología, M. S. De, & Universitario, H.

(2010). Osteoporosis. Definition. *Epidemiology*, 2(Supl 3), 7–9.

[6]. Jovanovic-Malinovska, R., Kuzmanova, S., & Winkelhausen, E. (2014). Oligosaccharide profile in fruits and vegetables as sources of prebiotics and functional foods. *International Journal of Food Properties*, 17(5), 949–965. doi:10.1080/10942912.2012.680221

[7]. Committee to Review Dietary Reference Intakes for Vitamin D and Calcium, Food and Nutrition Board, Institute of Medicine. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: National Academy Press, 2010.

[8]. Reinwald S, Weaver CM, Kester JJ. The health benefits of calcium citrate malate: a review of the supporting science. *Adv Food Nutr Res* 2008;54:219-346.

[9]. Calcium and Calcium Salts, Abhijit Trailokya, Amrisha Srivastava, Milind Bhole, Nitin Zalte, *Journal of The Association of Physicians of India*, 65, 2017

[10]. Hou, Y. C., Wu, C. C., Liao, M. T., Shyu, J. F., Hung, C. F., Yen, T. H., ... Lu, K. C. (2018). Role of nutritional vitamin D in osteoporosis treatment. *Clinica Chimica Acta*, 484, 179–191. doi:10.1016/j.cca.2018.05.035

[11] Dietitians of Canada. (2009). Eating guidelines to prevent osteoporosis: It's never too late!, 1–6. Retrieved from www.healthcanada.gc.ca/foodguide

[12] Whisner C.M., Weaver C.M. (2017). Understanding the Gut-Bone Signaling Axis, *Advances in Experimental Medicine and Biology* 1033, doi: 10.1007/978-3-319-66653-2_10

Contributor

OSTEOME Research Team

