

GPR40 reveals the good side of deleterious diets

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In the current context of longer life expectancy, the prevalence of age-related diseases such as osteoporosis is increasingly important. The cost of treatment of these diseases is a major public health problem and the implementation of strategies tailored nutritional prevention appears to be an excellent alternative to conventional treatments. However, the study of biological activities of nutrients is too marginal for some tissues and certain types of molecules; this is particularly the case of bone and lipids, especially fatty acids. They are however capable of modulating the fate of bone either indirectly or directly by systemic mechanisms at the bone cell.

Descriptions of the direct effects of fatty acids at the cellular level by activating specific receptors are becoming increasingly common in the literature. Recently, the membrane receptor GPR40 (G Protein Coupled Receptor 40) was highlighted for its interaction with the free long-chain fatty acids as well as the existence of an osteoporotic phenotype in mice invalidated for GPR40. We formerly demonstrated that GPR40 prevents from osteoporosis establishment using synthetic agonist. Here, we questioned whether stimulation of GPR40 by fatty acids, the natural ligands for GPR40, may parallel with its described beneficial effects on bone. In this study we demonstrated for the first time that GPR40 limits bone loss induced by ovariectomy upon high fat diet. Taken together, our results demonstrate that GPR40 mediates beneficial effects of high fat diets mainly by targeting the bone cell coupling and subsequent osteoclastic bone resorption.