Forum Minireview

Pharmacological Topics of Bone Metabolism: Preface

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This Forum Minireview contains the proceedings of the symposium at the 80th Annual meeting of The Japanese Pharmacological Society (March 27, 2007). With the growing incidence of fragility fractures, bone loss and osteoporosis have become active areas of research in clinical and experimental pharmacology. The symposium aimed to summarize recent advances and trends in elucidating the pathophysiological significance of bone metabolism and considered the important targets for drug development strategies. In the symposium, the clinical and basic research discussed may provide new types of therapeutic drugs and contribute to the development of treatments for the pathologies associated with modifications of bone remodeling such as osteoporosis.

Suzuki et al. described the recent progress in diagnosis of these disorders and showed that treatments with new drugs seem to have some efficacy to reduce osteoporotic fracture. They summarized the present pharmacological management of osteoporosis by estrogen, selective estrogen receptor modulators (SERMs), bisphosphonate, cathepsin K inhibitors, the modulator of RANK-RANKL system, parathyroid hormone, and strontium ranelate. Then, on the basis of these evidences, the future perspectives are demonstrated.

Takarada and Yoneda identified a glutamatergic signaling in bone similar to that of the central nervous system and demonstrated that glutamate receptors can regulate bone cell function, suggesting an important role for this neuromediator in bone metabolism. The neural modulation in bone may, therefore, present a major therapeutic impact for treatment of pathologies associated with modifications of bone remodeling such as osteoporosis.

Togari and Arai demonstrated the increased sympathetic nervous activity causes bone loss via increase in bone resorption. The increase is based on the stimulation of both osteoclast formation and osteoclast activity. These effects are associated with β²-adrenergic activity toward both osteoblastic and osteoclastic cells. Such findings indicate that β-blockers may be effective against osteoporosis, in which case there is increased sympathetic activity.

Woo et al. discovered new types of antiresorptive agents, such as reveromycin A, destruxins, statins, FK506, cyclosporine A, symbioimine, and prodigiosins, by screening for microbial natural compounds that regulate osteoclast differentiation, function, and/or survival. They discuss the cellular and molecular mechanisms of the action of these compounds on osteoclasts.

Shinoda et al. reported that TRK-530, a novel synthetic bisphosphonate showing both anti-inflammatory and anti–bone-resorbing effects, efficiently prevented experimentally induced alveolar bone resorption in animals with periodontitis, and this compound could be effective for the treatment of diseases with excessive bone resorption accompanied by inflammation. They suggest that TRK-530 might be useful for the treatment of alveolar bone loss in periodontitis.

Finally, we would be happy if these reviews can stimulate further theoretical debate and be carried to the bench towards new directions of osteoporosis research.

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