



# **Autonomic Nervous System: Chapter 14. Autonomic control of bone formation: its clinical relevance (Handbook of Clinical Neurology)**

*He Ji-Ye, Zheng Xin-Feng, Jiang Lei-Sheng*

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Bone remodeling is thought to be regulated by many factors including nutritional status, humoral factors, and biomechanical stress. However, the involvement of the autonomic nervous system, mainly the sympathetic nervous system (SNS), in the modulation of bone remodeling is beginning to receive more attention. Neural innervation of bone has been demonstrated. Both experimental and clinical evidence has indicated the involvement of autonomic nervous system regulation in bone metabolism. The sympathetic neural pathway is so far the only identified link between the potent leptin-dependent central control and bone cells. An intact autonomic nervous system contributes to the maintenance of healthy bone tissue. Conversely, disturbance of the autonomic nervous system could induce abnormal bone remodeling. In this chapter, we review current knowledge about the role of the autonomic nervous system in abnormal bone formation and its association with clinical diseases such as heterotopic ossification, ossification of the posterior longitudinal ligament, postmenopausal osteoporosis, adolescent idiopathic scoliosis, complex regional pain syndrome, Charcot neuro-osteoarthropathy, unloading-induced osteoporosis, central or peripheral nervous system damage, and depression-induced osteoporosis. Understanding the mechanism of sympathetic neural signaling in bone remodeling may shed light on a potential treatment avenue for the prevention or reversal of bone loss.

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