

GENETIC CONTROL OF BONE REMODELING

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Bone remodeling is the physiologic process used by vertebrates to maintain a constant bone mass between the end of puberty and gonadal failure.

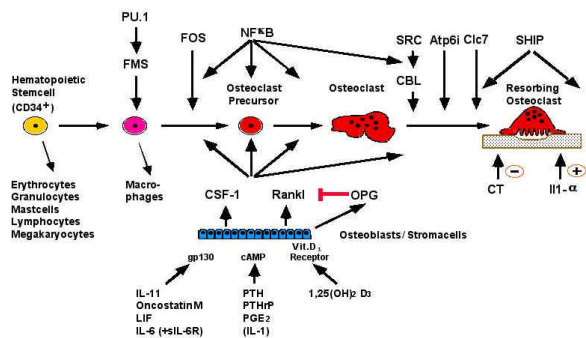


Fig. 1: Bone Resorption. The osteoclast is the only cell capable of resorbing bone. This cartoon presents the essential from the hematopoietic stem cell to the functional active multinucleated osteoclast.

Bone mass is of critical importance for skeletal integrity and skeletal function. A sufficient bone stock is required for locomotion, for protection of inner organs, as a reservoir of vital ions, and as the scaffold for skeletal repair and osteosynthesis. A molecular understanding of this process is therefore of paramount importance for almost all aspects of skeletal physiology and many facets of bone diseases. Besides the well characterized and critical local regulation of bone remodeling, recent genetic studies have shown that there is a central control of bone formation, one aspect of bone remodeling^{1,2,3,4,5}.

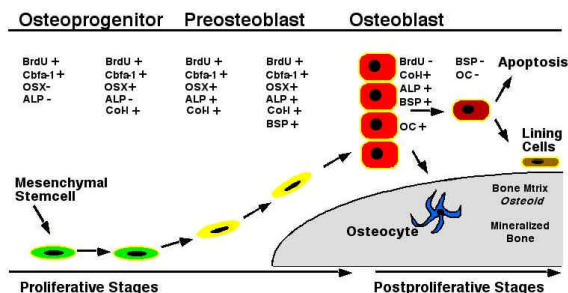


Fig. 2: Bone Formation. New bone is synthesized by osteoblasts that differentiate from the mesenchymal lineage.

This central regulation involves leptin, an adipocyte secreted hormone that controls body weight, reproduction and bone remodeling following binding to its receptor located on hypothalamic nuclei. This novel physiologic concept may shed light on the etiology of

osteoporosis and help to identify new therapeutic strategies for osteoporosis and its associated clinical problems like delayed fracture healing.

The overall goal of this review is to show how the dialogue of medicine and mouse genetics helped to uncover a new concept in skeleton physiology that in turn opens a new direction of research and offers potentially novel therapeutic avenues.

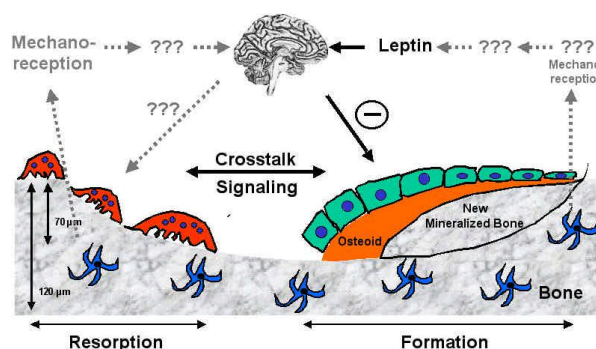


Fig. 3: Bone Remodeling. Presentation of the different levels that control bone remodeling.

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