

Ebook free Mechanics of cellular bone remodeling coupled thermal electrical and mechanical field effects Copy

bone remodeling replaces old and damaged bone with new bone through a sequence of cellular events occurring on the same surface without any change in bone shape bone remodeling is the continuous lifelong coupled process of bone resorption and bone formation 1 4 it is the prerequisite for repairing bony microdamage during daily physical activities the adaption of bone architecture to meet different mechanical demands and the prevention of aging effects and accumulation of old bone 2 4 ablation of ng2 lineage impaired bone remodeling and concurrently diminished metastatic colonization in cocultures ng2 bmscs especially when undergoing osteodifferentiation enhanced cancer cell proliferation and migration in osteology bone remodeling or bone metabolism is a lifelong process where mature bone tissue is removed from the skeleton a process called bone resorption and new bone tissue is formed a process called ossification or new bone formation ng2 cells are a common participant in bone metastasis initiation and bone remodeling in both homeostatic and fractured conditions ng2 bone mesenchymal stem stromal cells bmsc often colocalize with dtcs in the perivascular niche both dtcs and ng2 bmscs are recruited to remodeling sites bone remodeling is a lifelong process that gives rise to a mature dynamic bone structure via a balance between bone formation by osteoblasts and resorption by osteoclasts this paper aims to construct a general framework of coupling tumor bone remodeling processes in order to produce plausible outcomes of the effects of tumors on the number of osteoclasts osteoblasts and the frequency of the bone turnover cycle in this document komarova s model has been extended to include the effect of tumors on the bone near bone surface bone resorption by osteoclasts red arrow and bone formation by osteoblasts green arrow are spatially and temporally coupled bone remodeling is initiated when osteoclast precursor cells are recruited to the altered bone surface black stellate cells and fuse to form mature bone resorbing osteoclasts red cells that attach bone remodeling is a process in which bone resorption ensues providing calcium phosphorus or carbonate and bicarbonate salts to the extracellular medium a pathway that is coupled to bone synthesis so that total bone mass is preserved qin qing hua mechanics of cellular bone remodeling coupled thermal electrical and mechanical field effects crc press taylor francis group boca raton london new york 35 citations 10 altmetric metrics abstract long term bone healing adaptation after a dental implant treatment starts with diffusion of mesenchymal stem cells to the wounded region and the aim of this paper is to develop a multiscale hierarchical hybrid model based on finite element analysis and neural network computation to link mesoscopic scale trabecular network level and macroscopic whole bone level to simulate the process of bone remodelling bone homeostasis is maintained by the sophisticated coupled actions of bone resorbing osteoclasts and bone forming osteoblasts g protein coupled receptor gpcr 48 gpr48 lgr4 a newly discovered member of the glycoprotein hormone receptor subfamily of gpcrs is an orphan gpcr of unknown function using a knockout

mouse model we have characterized the essential roles of gpr48 in bone formation and remodeling these findings indicate that the trabecular bone s remodeling and the condyle s shape are likely independent and do not reflect biologically coupled tissue level response to injury instead ptoa mediated bony remodeling is local specific multimodal and complex in some cases responding to the external geometry of the tissue and in other these cytokines disrupt bone remodeling by promoting bone resorption or inhibiting bone formation similarly both adiponectin and leptin have the potential to affect bone remodeling either through endocrine actions or by influencing the hypothalamic centers that regulate sympathetic activity 206 207 208 the release of sympathetic impulses this paper aims to construct a general framework of coupling tumor bone remodeling processes in order to produce plausible outcomes of the effects of tumors on the number of osteoclasts osteoblasts and the frequency of the bone turnover cycle ng2 cells are a common participant of bone metastasis initiation and bone remodeling in both homeostatic and fractured conditions ng2 bone mesenchymal stromal cells bmscs often co localize with dtcs in the perivascular niche both dtcs and ng2 bmscs are recruited to remodeling sites bone remodeling the function affected in osteoporosis the most common of bone diseases comprises two phases bone formation by matrix producing osteoblasts and bone resorption by osteoclasts studying bone development as well as bone remodeling involves mechanically stimulating the cells says doris zauchner a doctoral student in qin s group and lead author of the research paper

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near bone surface bone resorption by osteoclasts red arrow and bone formation by osteoblasts green arrow are spatially and temporally coupled bone remodeling is initiated when osteoclast precursor cells are recruited to the altered bone surface black stellate cells and fuse to form mature bone resorbing osteoclasts red cells that attach

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