

OSTEOSCOOP

News on current events in osteoporosis and rheumatology

Cross-talk between bone cells includes chondrocytes and puts vitamin D into play

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Genomic actions induced by the active form of vitamin D, 1 α 25-dihydroxyvitamin D3 [1,25(OH)2D3] are crucial for normal bone metabolism, mainly because they regulate active intestinal calcium transport. To evaluate whether the vitamin D receptor (VDR) has a specific role in growth-plate development and endochondral bone formation, the group of G Carmeliet [1] investigated mice with conditional inactivation of VDR in chondrocytes. Surprisingly, growth-plate chondrocyte development was not affected by the lack of VDR. Yet vascular invasion was impaired, and osteoclast number was reduced in juvenile mice, resulting in increased trabecular bone mass. In vitro experiments confirmed that VDR signaling in chondrocytes directly regulated osteoclastogenesis by inducing RANKL expression by these cells.

Mineral homeostasis was also affected in chondrocyte-specific VDR-null mice, as serum phosphate and 1,25(OH)2D levels were increased in young mice, in whom growth-plate activity is important. VDR inactivation in chondrocytes reduced the expression of fibroblast growth factor 23 (FGF23), an osteoblast-borne hormone known to induce phosphaturia by inhibiting a renal phosphate transporter and to reduce the synthesis of 1,25(OH)2D3. Accordingly, increased levels of renal expression of 1 α -hydroxylase, the limiting step enzyme for calcitriol synthesis, and of sodium-phosphate cotransporter type IIa were found.

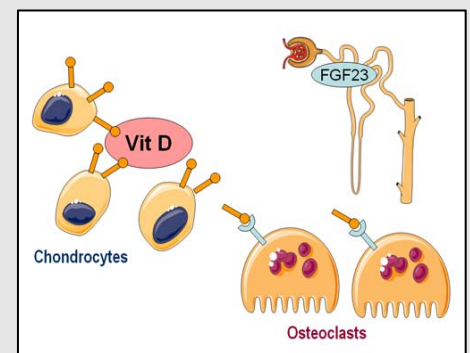
These findings provide evidence that VDR signaling in chondrocytes is required for timely osteoclast formation during bone development and for the endocrine action of bone in phosphate homeostasis. How chondrocytes alert other bone cells, especially osteoblasts, remains to be elucidated.

1. Masuyama R et al. *J Clin Invest.* 2006;116:3150-3159.

Chondrocyte-osteoclast crosstalk is mediated by Vitamin D

Chondrocytes are responsive to vitamin D because they express vitamin D receptors. Upon stimulation by vitamin D, chondrocytes express RANKL which activates osteoclasts.

Vitamin D also stimulates expression of FGF23 by chondrocytes. FGF23 reduces renal synthesis of vitamin D in its active form.



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