

## Invited Speaker Abstract

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### **The osteocyte: the cell within**

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Osteocytes are the end stage differentiation state of the osteoblast lineage, and are incorporated in the bone matrix during bone formation, by processes that are beginning to be understood. In doing so, osteocytes control the mineralisation of osteoid by the secretion of specific proteins. In particular, DMP-1 appears to be involved and deletion of the gene encoding DMP-1 leads to deranged mineral apposition in bone. Osteocytes form a dense network of cell bodies and cell processes, whose viability depends on interstitial fluid flow along the osteocyte canaliculi, believed to be driven by pulsatile blood flow and the strains imposed on the skeleton by normal movement. Maintenance of the density and viability of osteocytes are essential for bone health because osteocytes perform many important functions in bone. Osteocytes appear to initiate bone repair in response to microcracks. Osteocytes almost certainly initiate new bone formation in response to increased loading of bone. Osteocytes are able to regulate the amount of new bone formation in bone remodelling cycles, at least in part by the production of a molecule called sclerostin. Production of a mutant form of sclerostin has been associated with particularly dense, fracture resistant bones, and this information has led to development of anti-sclerostin antibodies as a potential anabolic therapy for bones. Osteocytes may also comprise a bone endocrine organ *via* their production of FGF-23, which in turn controls the renal production of 1,25 (OH)<sub>2</sub> vitamin D. Reduced osteocyte viability and/or density has been reported in association with osteoporotic fracture, and may be the result of reduced skeletal loading, estrogen withdrawal at menopause, reduced blood flow to bone and therefore relative hypoxia, and pharmacobiology, such as chronic exposure to glucocorticoids. Because of the important roles of osteocytes in bone, new approaches to bone health may well involve the identification of agents to protect these cells from harmful influences in disease and ageing.