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Phenotypic characterization of the mononucleated cells appearing during the reversal phase of bone remodelling

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Formål Osteoporosis is characterized by a reduction in bone mass and altered bone remodelling. This alteration is usually ascribed to bone resorption by osteoclasts (OC) exceeding bone formation by osteoblasts (OB). However, the histology of bone surfaces does not show only OCs and OBs, but also mononucleated cells lining eroded surfaces next to the OCs. These cells received only little attention, but were called reversal cells (RVC) because they represent the stage where the bone surface switches from "resorbing" to the opposite property. It is not known whether they result from fragmentation of OCs, or represent macrophages, or OB precursors. Our earlier studies in mouse show that RVCs prepare bone surfaces for bone formation both by cleaning matrix left over by the OCs and by depositing osteopontin and thin collagen fibers on the bone surface.

The aim is to characterize phenotypically RVCs and more specifically to determine whether they belong to the OB or the macrophage lineage.

Metode We used iliac crest biopsies from control, postmenopausal osteoporosis and primary hyperparathyroidism patients. We obtained serial sections, used one for identifying the bone surface events as revealed by Mason staining, and the adjacent ones for immunostaining of eight osteoblastic markers, three macrophage markers and TRAcP as an OCs marker.

Resultater RVCs on eroded surfaces stained with the osteoblastic markers, but not with macrophage markers nor with TRAcP. The signals showed however some heterogeneity depending on whether the cells were close to OC or to osteoid.

Konklusion RVCs are a heterogenic population derived from osteoblast lineage cells and not from the macrophage lineage. This means that they may represent OB precursors performing a sequence of different activities, starting with cleaning debris left over by OCs and preparing the reversal line for deposition of new matrix, and later differentiating progressively into bone forming OBs.