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Arrest of the reversal phase is a critical mechanism involved in Glucocorticoid-induced bone loss

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Foredrag Pia Rosgaard Jensen

Formål Maintenance of healthy bones is highly dependent on constant renewal of the bones through bone remodelling – a tightly regulated process involving coordinated bone resorption and formation. Classical histomorphometry generally focuses on these two events whereas only little attention is given to the intermediate phase, known as the reversal phase. This phase might actually play an important role in the preparation of resorbed surfaces for the subsequent formation and might thus be essential for coordinating resorption and formation. Uncoordinated activities might result in bone loss as observed in Glucocorticoid (GC)-treatment. GCs are known to exert negative effects on especially bone formation including direct effects on osteoblastic cells. However, to understand the precise mechanism behind the negative effects on bone further investigation is still needed. In this study special attention was given to the reversal phase to elucidate whether remodelling is affected at the reversal level in GC-treated patients.

Metode Masson Trichrome-stained sections of cancellous bone from 15 GC-treated patients and 10 sex- and age-matched controls were assessed for conventional parameters including the proportion of eroded (ES/BS), osteoid (OS/BS), osteoclast (Oc.S/BS), and osteoblast (Ob.S/BS) to total bone surface were assessed. Additionally, special attention was here given to the reversal surfaces (Rv.S) where a discrimination was made between active Rv.S (Ac.Rv.S) defined as Rv.S flanking OC or OS and arrested Rv.S (Ar.Rv.S) defined as Rv.S away from OC or OS.

Resultater No difference in ES/BS, Oc.S/BS, or OS/BS was observed between controls and GC-treated patients. Similarly Rv.S/BS was also unaffected. Interestingly, when distinguishing between Ac.Rv.S/BS and Ar.RvS/BS a clear difference was observed. The extent of Ac.Rv.S/BS was at the same level in the two groups (6.6% in control vs. 5.9% in GC-treated patients) whereas the extent of Ar.Rv.S/BS was significantly increased (1.1% vs. 4.9%). Additionally, GC-treated patients showed significantly less Ob.S/BS (21.6% vs. 15.3%). These results indicate that, in addition to bone forming osteoblast, “reversal cells”, which are commonly considered as preosteoblast, also are negatively affected by GCs. Reversal cells might be prevented in their differentiation into bone forming cells whereby the transition from resorption to formation is aborted thus resulting in an accumulation of Ar.Rv.S.

Konklusion Arrest of Rv.S seems to be a critical mechanism involved in GC-induced bone loss.