SECONDARY OSTEOPOROSIS – THE RELATIONSHIP OF BONE METABOLISM TO OTHER DISEASES – OWN RESULTS

© Heinrich Resch

Head, Medical Department (Rheumatology/Bone Diseases & Gastroenterology KH Barmherzige Schwestern, St. Vincent Hospital, Vienna Academic Teaching Hospital Medical University Vienna
Stumpergasse 13, 1060 Vienna
Chair Bone Diseases, School of Medicine, Sigmund Freud University Vienna Sigmund Freud Platz 1, 1020 Vienna

A large number of heterogeneous causes metabolic, inflammatory, autoimmune, vascular, renal diseases and even drugs, collectively grouped as„ secondary causes of osteoporosis„ may also lead to a weakening of bone strength followed by bone loss or damage of architecture through a number of mechanisms, independently of age or estrogen deficiency. Secondary causes of osteoporosis can be found in about 60% of males, in more than half of premenopausal females, and in about 20% of postmenopausal women. Those causes range from easily identifiable specific disease states such as systemic inflammatory disorders, malignancy, endocrinopathies, and use of medication, particularly glucocorticoids, to more hidden conditions such as vitamin D deficiency, hypercalciuria and hyperparathyroidism.
Although these latter secondary causes of osteoporosis are the most frequently observed causes of unexpexted bone loss, they can only be diagnosed by a high degree of suspicion, and clinical experience, performing the appropriate investigations they can then easily confirmed.
In inflammatory disorders, T cell activation leads to increased expression of T-cell derived RANKL. The RANKL/OPG ratio is thought to be the primary determinant of osteoclast recruitment and production and therefore of the maintenance of bone mass. Glucocorticoids, often used to control disease activity, decrease the osteoblasts in number and function and additionally inhibt OPG expression. In these diseases the underlying mode of action and activity influences the RANKL/OPG ratio, and this is further pronounced by the use of glucocorticoids to manage inflammatory processes. The combined effect leads potentially to tremendous bone loss. Inhibition of bone formation in GIOP is the dominant mechanism for weakening the skeleton, which is different from primary and most other secondary osteoporosis. Increased osteoclast formation also leads to enhanced and prolonged bone resorption, contributing to decreased osteoblast function and bone formation.
Glucocorticoids increase expression of RANKL and decrease expression of osteoprotegerin, leading to increased genesis and survival of osteoclasts
Fractures occur in 30%–50% of patients taking chronic glucocorticoid therapy
In glucocorticoid users compared to non-users: up to 2.3-fold higher hip fracture risk
up to 5.2-fold higher vertebral fracture risk. The risk is independent of underlying disease, age, and gender.
Among inflammatory disorders rheumatoid arthritis represents the prototype of a systemic disease in which the cascade of proinflammatoric cascades trigger the expression of RANKL from activated Tcells and from synovial fibroblasts, which is not balanced by OPG, followed in local and generalized bone loss. Additionally, the combined effect of high GC doses, used continuously over long durations, can increase the relative risk of hip fractures by 7-fold, and vertebral fractures by 17-fold.
In Crohns disease the changes in bone metabolism are multifactoriell, including the effect of inflammatory cytokines mediating disease activity (IL-6/1, TNFalpha) intestinal malabsorption due to disease activity or intestinal resection, the use of steroids, low peak bone mass, malnutrition, immobilisation, low BMI, smoking and hypogonadism
IBD patients develop significant cortical bone loss, impairing bone strength. Trabecular bone
loss is limited to CD patients, who exhibit a more severe bone phenotype compared with UC patients. Detailed studies from our study group on bone composition in IBD patients by
HR-pQCT revealed a significant decrease of both cortical and trabecular
volumetric bone mineral density associated with an impairment of bone microstructure in IBD. Bone changes in CD were generally more severe than in UC and affected virtually all bone compartments.
The ubiquitous occurence of secondary chasnges in bone metabolism implies that numerous medical disciplines need to interact. Screening for secondary causes for osteoporosis should present a substatial part in the osteoporosis management. The following presentation focuses on the results of own scientific work and typical case presentations.

KEYWORDS: Secondary osteoporosis; bone metabolism; fractures.