Secondary osteoporosis: the role of white and marrow adipose tissues

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In the last three decades, besides the gradual and persistent recognition of the role of the adipose tissue in metabolic homeostasis, it has become apparent that it has a relevant role in the modulation of bone remodeling. White adipose tissue (WAT) distribution in humans determines the body silhouette. However, more than shape, the adipose tissue location predicts health or disease. Subcutaneous fat is the ideal locale to store lipids, functioning as a containment barrier to hamper fat spillover. The development of subcutaneous fat is determined by multiple factors, including genetic predisposition, ethnicity, age, gender, nutrition, physical activity, medication and diseases. In comparison to WAT in subcutaneous tissue, visceral WAT directly forwards metabolites and cytokines to the liver, is highly responsive to lipolysis induced by catecholamine and less sensitive to insulin. Obesity, the contemporary epidemic disease, which emerges after a chronic excess of calorie consumption, generates insulin resistance and has a strong association with type 2 diabetes mellitus and cardiovascular disease. On the other hand, obesity has no detrimental effect on bone mass. Moreover, while caloric restriction and weight loss have positive effect on insulin sensitivity, glucose tolerance and blood pressure, they are also associated with bone loss. On the last decade, great interest emerged on the study of marrow adipose tissue. Previously thought to be a mere filler of bone marrow space, it is more likely to be a relevant player in the regulation of bone mass development and maintenance. In several conditions associated with bone loss, such as ageing, glucocorticoid therapy and caloric restriction, the marrow adipose tissue has a negative relationship with bone mass. However, there is no consensus in literature about the influence of insulin resistance and adipose tissue distribution on bone marrow fat and bone mass. These aspects will be the main target in the section "Secondary osteoporosis: the role of adipose tissue, including marrow adipose tissue" as part of the Symposium 6 – Diseases and their consequences in bone metabolism within the 2nd Latin American Symposium on the Molecular Mechanisms of Skeletal Mineralization.