Social isolation alters bone homeostasis in drug-naïve rats

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Chronic psychosocial stress is a determining risk factor in the onset and aggravation of several mental diseases, such as psychosis. Evidence from humans and rodent models have shown a strong association between mental disorders and health problems, including obesity, sexual dysfunctions, cardiovascular diseases, hepatitis and alterations in skeletal status. Although recent interest is focusing towards psychosocial stress-induced comorbidities, few data about the correlation between psychosis and bone metabolism dysregulation are actually available, and pathophysiological mechanisms of altered bone homeostasis among psychotic patients are only beginning to be examined.
The aim of this study was to investigate whether chronic psychosocial stress induced by 4 or 7 weeks of social isolation in drug-naïve rats could alter bone homeostasis in terms of bone thickness, mineral density and content, as well as markers of either bone formation and resorption (sclerostin, cathepsin K, cross-linking telopeptide of type I collagen, CTX-I).
We found that bone mineral density was increased in rats exposed to 7 weeks of social isolation, while no differences were detected in bone mineral content and area. Moreover, 7 weeks of social isolation lead to increase of femur thickness with respect to controls, suggesting the possible development of a hyperostosis condition. Isolated rats showed no changes in sclerostin levels, a marker of bone formation, compared to grouped animals. Conversely, bone resorption markers were significantly altered after 7 weeks of social isolation in terms of decrease in cathepsin K and increase of CTX-I. No alterations were found after 4 weeks of isolation rearing.
Our observations suggest that chronic psychosocial stress importantly affects bone homeostasis, independently from drug treatment. Thus, the social isolation model would help to define potential new therapeutic targets for treating the burden of chronic psychosocial stress and to address a better therapy choice.