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The influence of magnesium deficiency on bone remodeling cells

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It is still not clear how magnesium (Mg^{2+}) deficiency affects bone remodeling system. Bone marrow cells from long bone of mice were seeded on plastic and on bone in medium containing different concentrations of Mg^{2+} (0.8 mM which is 100% of the normal value, 0.4, 0.08 and 0 mM). The effect was evaluated on osteoclasts precursors to its viability and proliferation rate after 3 and 6 days, as was mRNA expression of osteoclastogenesis-related genes and Mg^{2+} -related genes. After 6 days of incubation, the number of tartrate resistant acid phosphatase-positive multinucleated cells (TRACP⁺-MNCs) was determined, and the TRACP activity of the medium was measured. Osteoclastic activity was assessed at 8 days by resorption pit analysis. Also it was evaluated, *in vivo*, Mg^{2+} deficiency on mandibular bone loss associated with ligature-induced periodontitis. For this study, ten rats were randomly divided into two groups: control - animals fed a standard diet; Mg - animals fed with 90% of Mg^{2+} deficiency diet. After 60 days on the diets, all animals received ligature, and were euthanized after 30 days. The lumbar vertebrae were collected for micro-CT evaluation. The mandibles were collected for immunohistochemistry analysis. The *in vitro* study showed that Mg^{2+} deficiency resulted in increased numbers of osteoclast-like cells. Increased osteoclastogenesis due to Mg^{2+} deficiency was reflected in higher expression of osteoclast-related genes. However, resorption per osteoclast as well as TRACP activity were lower in the absence of Mg^{2+} . The *in vivo* study demonstrated a bone mass loss in Mg^{2+} deficiency rats. The immunohistochemistry showed an increased expression of INOs⁺ cells and decreased OCN⁺. In conclusion our data suggest that Mg^{2+} deficiency *in vitro* altered osteoclast numbers and activity. *In vivo* studies suggests that the inflammation stimulus during Mg^{2+} deficiency may play an important role not only on osteoclasts but also on osteoblasts cells and oxidative stress.

Biography

Marina M Belluci graduated at School of Dentistry at Araraquara - UNESP (2006). Master in Periodontics, School of Dentistry at Araraquara - UNESP (2008) and Doctorate in Dentistry from the Universidade School of Dentistry at Araraquara - UNESP (2012). Held part of her doctorate degree at Vrije Universiteit - Netherlands (2010-2011). Postdoctoral at School of Dentistry at Araraquara - UNESP (2013).

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