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Expression of parathyroid hormone receptor 1 (PTH1-Rc) in bone marrow derived mesenchymal stem cells (MSC)

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PTH is an effective anabolic agent of bone in patients with osteopenia. Recently, the presence of PTH1-Rc was demonstrated during early stages of antler bone regeneration. We also found that PTH1-Rc is present in mesenchymal cells derived from fresh marrow transplanted into demineralized bone matrix cylinder (DBM) in a rat ectopic bone regeneration model, during early stage of endochondral bone formation. Elevated expression of PTH1-Rc was detected at days 3 and 7 where mesenchymal cells from bone marrow are adhering on the DBM surface, proliferate and produce osteo and chondro progenitors. At later stages, the level of PTH1-Rc expression is relatively reduced. We further studied the temporal expression of PTH1-Rc in marrow derived MSC in culture. Bone marrow was obtained from 2 month old DA rat femurs and plated at 9x10⁵ cell/cm². After 4 days in culture, 10⁻⁸M dexamethasone was added to half of the dishes. Immunostaining of PTH1-Rc was performed after 7, 14 and 21 days in culture. We observed that at day 7 most of the cultured cells expressed PTH1-Rc. At 14 and 21 days, PTH1-Rc was expressed mostly in small, round cells while in the more differentiated fibroblast-like cells the receptor was not detected. In dexamethasone treated cultures the expression of PTH1-Rc declined. Taken together, we propose that PTH and PTHrP increase the pool of osteo-progenitors by activating the PTH1-Rc on MSCs.