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Obtaining good quality osteoclasts from mesenchymal stem cells for bone regeneration using aqueous plant extracts

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Background and Aim: The bone cells (osteocytes and osteoclasts) do not replicate and thus the maintenance of a healthy bone must rely on an exogenous source of cells. Currently, bone fracture management is effectively done by surgeons and the healing process post-operation relies mostly on self-recovery. In view of the aforementioned inadequacies regarding bone regeneration, we opted to test the efficacy of the known African native traditional medicinal plants used post-operation to assist in bone healing.

Methods: Rat adipose-derived mesenchymal stem cells (MSCs) were purchased and cultured for 7 and 14 days. The cells were treated with different concentrations of the chosen plant extracts in vitro. Markers of osteoblast differentiation were measured using RT-PCR, ELISA, histology, and immunohistochemistry.

Results: Treatment of MSCs with the plant extracts induced early expression of bone markers mRNA levels in relation to untreated control. Some of the plant extracts had a higher induction capacity on bone markers compared to the positive control BMP-2. Immunostaining and histological assays were in support of the bone markers in quantitative assays.

Conclusion: The existence of traditional and complementary medicine is known to be an invaluable source for the formulation of new therapeutic drugs. The study findings prove the hypothesis that our native medicinal plants used for bone rehabilitation have the capacity to induce osteoblast differentiation from MSCs, and these cells may be used during transplantation in bone defects.

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