Strontium chloride promotes cell proliferation in a human osteoblast cell line

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Strontium ranelate (SrRan) is the active component of drugs currently used for reducing the risk of fractures in patients suffering from osteoporosis. Despite extensive use, the underlying mechanisms of action of Sr^{2+} are not fully understood. In the present study, we assess the impact of $SrCl_2$ on human osteoblast activity and proliferation.

Cultures of the human osteoblast-like cell line MG63 were treated for 72 h in presence of 0.1 mM, 1 mM, 5 mM and 10 mM $SrCl_2$ or vehicle, used in control groups. Cells were counted manually using a Bürker chamber. Total protein content was determined by colorimetric analysis performed by a microplate reader using Bio-Rad protein assay. Alkaline phosphatase (ALP) activity was determined enzymatically and normalized to total protein content in each sample. Cell viability was assessed using the MTT assay.

Treatment with 5 mM $SrCl_2$ for 72 h enhanced total MG63 cell protein content by 37% compared to controls ($p<0.01$). A lower concentration (0.1 mM) of $SrCl_2$ had no effect on total protein. Incubation with 5 mM $SrCl_2$ for 72 h increased MG63 cell number by 38% compared to controls ($p<0.001$). The $SrCl_2$-induced increase in cell number was associated with enhanced (+14% compared to controls, $p<0.05$) cell viability. Treatment with a higher concentration (10 mM) of $SrCl_2$ enhanced cell number similar to 5 mM $SrCl_2$ (+54% compared to controls, $p<0.05$). Treatment with 0.1 or 5 mM $SrCl_2$ for 72 h had no effect ($p>0.05$) on MG63 cell ALP activity, while 1 mM $SrCl_2$ reduced ALP activity as well as total protein content by about 25% compared to controls ($p<0.05$).

The current results demonstrate that treatment with $SrCl_2$ for 72 h, at concentrations higher than 1 mM promotes cell proliferation in human osteoblast-like cells, suggesting that Sr^{2+} may enhance bone formation through this mechanism.

Keywords: Alkaline Phosphatase, Cell Division/Drug effects, *In vitro*, Osteoblasts, Strontium, Strontium Chloride.