Butyrate stimulates the early process of the osteogenic differentation but inhibits the biomineralization in dental follicle cells (DFCs)

Abstrak

Dental stem cells, especially dental follicle cells (DFCs) as precursor cells for the periodontium have interesting prospects for regenerative dentistry. During periodontitis, butyrate as a bacterial metabolite and inflammatory agent is often found in milimolar concentrations in periodontal pockets. This study evaluates the effects of butyrate on the proliferation and osteogonic differentation of DFCs. We assessed cell viability/proliferation (BCA assay) and osteogonic differentation (ALP activity, alizarin staining and RT PCR) of DFCs in vitro after butyrate supplementation. Butyrate concentrations of 20 mM or higher are toxic for DFCs. At a non-toxic concentration, butyrate promotes the expression of alkaline phosphatase and collagen type-1 but inhibits the information of calcified nodules and the induction of RUNX2 and osteocalcin under osteogenic differentation conditions.In conclusion, DFCs are resistant to physological high concentrations of butyrate. Butyrate facilitates the osteogenic differentation of DFCs in early stages but inhibites calcification at later stages of the differentation process.