

Abstract

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Project Title : Effects of nacre water-soluble matrix on osteoblasts in the elevated extracellular glucose condition

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Nacre is a calcified structure that forms the lustrous inner layer of some molluskan shells. Its organic matrix has been classified as “water-soluble matrix, WSM” and “water-insoluble matrix”, based on its solubility in aqueous solutions. The WSM of nacre is believed to be intimately involved in guiding crystal nucleation and growth through molecular interactions between matrix macromolecules and minerals. In diabetic bone, the osteoblastic bone deposition is decreased whereas the osteoclastic bone resorption is increased resulting in delay matrix mineralization. The purpose of this study was to evaluate whether the WSM from the nacre of *Pinctada maxima* enhances the *in vitro* osteoblastic mineralization in the diabetic condition. MC3T3-E1, an osteoblastic cell line, and primary human bone cells were cultured under normal and intermittent high extracellular glucose conditions for 4 weeks. The mineralized nodules were determined by Alizarin Red S staining and the bone matrix markers were analyzed by real-time PCR. With the presence of the WSM in normal medium condition, MC3T3-E1 cells produced slightly more matrix mineralization than that of control. At day 29, under the intermittent high extracellular glucose condition, the mineralized nodules were more abundant and the bone sialoprotein expression significantly increased, compared to those groups without glucose. However, the effect of WSM under diabetic condition was not significantly different from those of the controls. In conclusion, nacre WSM could enhance matrix mineralization of osteoblastic cell line under normal glucose level. Under the intermittent high extracellular glucose, matrix mineralization was delayed but it was accelerated in the late mineralization with highly expressed bone sialoprotein, a marker of osteoblastic differentiation.

Keywords : nacre of *Pinctada maxima*, mineralization, osteoblast, diabetes, high glucose