

Cytotoxic and the proliferative effect of cuttlefish bone on MC3T3-E1 osteoblast cell line

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ABSTRACT

Objective: To evaluate the cytotoxic and the proliferative effect of cuttlefish bone on MC3T3-E1 osteoblast cell line. **Materials and Methods:** MC3T3-E1 cells were treated with 0.5, 1, 5, 25, 50, 100, or 200 µg/ml cuttlefish bone powder (CBP). Cytotoxicity was evaluated using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide assay. This assay was also used to determine cell proliferation over 16 days of treatment with 0.5, 25, or 100 µg/ml CBP. **Results:** CBP was not cytotoxic to MC3T3-E1 cells at any concentration. The percentage of cell viability in the 0.5–200 µg/ml CBP groups dose dependently decreased from 107.52 ± 11.03 to $92.48 \pm 5.60\%$; however, the differences between the groups or the negative control group were not significant. At 16 days, 0.5, 25, and 100 µg/ml CBP groups showed $123.19 \pm 10.07\%$, $126.02 \pm 15.69\%$, and $133.33 \pm 11.74\%$ proliferation, respectively, that were significantly higher than that of the control group. **Conclusion:** These results indicate that CBP promotes osteoblast proliferation and may be a potential material to increase the number of osteoblasts in a bone defect in the oral cavity.

Key words: Cuttlefish bone powder, cytotoxicity, osteoblast cell culture, proliferation

INTRODUCTION

Cuttlefish bone (CB) is a natural biomaterial source from the chamber of the cuttlefish that can be ground into a powder. CB is a brittle structure found in all members of the cephalopod family and is a chambered, gas-filled shell used to control floating.^[1] A gas and liquid mixture osmotically regulates the pressure inside the CB.^[2,3] The main chemical CB components are 87.3%–91.75% calcium carbonate and chitin. In addition, CB also contains trace amounts of silicon, aluminum, titanium, manganese, barium, and copper.^[4] CB is a traditional Chinese medicine that is effectively used in treating gastritis and frequently used as a hemostatic agent after tooth extraction or rhinoplasty.^[4] Moreover, the synthesis

of Hydroxyapatite (HAp) from natural biomaterials, such as eggshell,^[5] coral,^[6] and CB^[7] has been reported.

Materials that enhance bone regeneration have a wide range of potential clinical applications, from treating nonunion fractures to spinal fusion. The use of porous material scaffolds with bioceramic and polymer components to support bone cell and tissue growth is a popular research topic. Current challenges include engineering materials that can match the mechanical and biological properties of the bone tissue matrix and support the vascularization of large tissue constructs.^[8] The most common biomaterials used for

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How to cite this article: Vajrabhaya Lo, Korsuwannawong S, Surarit R. Cytotoxic and the proliferative effect of cuttlefish bone on MC3T3-E1 osteoblast cell line. *Eur J Dent* 2017;11:503-7.

DOI: 10.4103/ejd.ejd_159_17

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