

Molecular biological evaluation and mechanisms of Danggui Buxue Tang on bone tissue regeneration

Wen-Ling Wang^{1,4}, Yueh-Sheng Chen^{1,3}, Shung-Te Kao^{1,4},
Chung-Hsien Yang^{2,4}, Mao-Feng Sun^{1,5}, Chun-Hsu Yao^{1,3*}

¹ School of Chinese Medicine, China Medical University, Taichung, Taiwan.

² School of Post Baccalaureate Chinese Medicine, China Medical University, Taichung, Taiwan.

³ Department of Biomedical Imaging and Radiological Science, China Medical University, Taichung, Taiwan.

⁴ Department of Chinese Internal Medicine, China Medical University Hospital, Taichung, Taiwan.

⁵ Department of Acupuncture, China Medical University Hospital, Taichung, Taiwan.

Introduction

A new biodegradable and osteoconductive GGT composite containing β -tricalcium phosphate and genipin cross-linked gelatin, which has an excellent biocompatibility and capability to enhance bone tissue regeneration, has been prepared and confirmed in our previous studies. The traditional Chinese medicine for clinical application has been anecdotally reported to enhance bone healing. In this current work, *Danggui Buxue Tang* (DBT) with tonify qi and engender blood function was used and investigated in vitro the efficacy and safety on bone healing.

Materials and Methods

1. Preparation of Tradition Chinese Medicine

The traditional Chinese medicines used in this study were obtained from a local Chinese medicine store (Chuang Song Zong Pharmaceutical Co., Ltd, Kaohsiung, Taiwan, ROC) in extracted and concentrated form.

2. Effect of Chinese Medicine on Bone Cells Activities

We determined the optimal concentration of DBT for regenerative activity in bone cells via MTT, alkaline phosphatase (ALP), nodule formation and TRAP assays, and designed and tested a DBT-rich bone composite material. The composite was fabricated by mixing GGT composite with the predetermined concentration of Danggui Buxue Tang (GGT-DBT). Additionally, Western blot and PCR were used to determine the possible signal transduction pathway of DBT inducing these biological effects of bone cells.

3. Statistical Analyses

All quantitative data were obtained in triplicate and presented as mean \pm standard deviations. Statistical differences among samples were evaluated by one-way analysis of variances. The post hoc test was the Student's *t* test. The levels of statistical significance were set to $p < 0.05$ and $p < 0.01$.

Results and Discussion

In this study, we evaluated the effect of DBT on the activity of bone cells. As a result, the most effective concentration of DBT was F $\mu\text{g/ml}$, which significantly increased osteoblast numbers, intracellular ALP levels and nodule numbers, with inhibiting osteoclast activity. Therefore, this study also showed that DBT could has dual effects on regenerating bones.

