硫酸鈣對 U-2 骨肉瘤細胞骨橋素基因及蛋白質表現之影響.

The effect of calcium sulfate on the gene and protein expressions of osteopontin in U-2 osteosarcoma cells

中文摘要

硫酸鈣(Calcium sulfate)用於口腔醫學中的骨頭再生已經有多年歷史，骨橋素(Osteopontin)是一種被骨母細胞(Osteoblsts)分泌且在人體扮演重要多重角色的標的分子，然而，硫酸鈣在骨母細胞分泌硫酸鈣上的影響仍未明朗，在本實驗之中，培養 U-2 骨肉瘤類骨母細胞(U-2 osteosarcoma osteoblastic cells)於 0、0.5、1、10 μM 的硫酸鈣之中，在細胞數目的複製上，四種硫酸鈣濃度並無影響，顯示出 U-2 骨肉瘤類骨母細胞培養於 10 μM 的硫酸鈣仍是生物相容性的。本研究中的細胞與培養液分別收集 6 天，並用之來測反轉錄聚合酶鏈鎖反應(reverse-transcription polymerase chain reaction，RT-PCR)及西方墨點法(Western blot)，結果顯示低濃度的硫酸鈣(<1 μM)會增加骨橋素 mRNA 階段基因表現，但是，培養的 U-2 骨肉瘤類骨母細胞卻隨著硫酸鈣濃度的增加，其骨橋素蛋白質表現是下降的，它顯示出溶解的的鈣離子和硫酸根離子可能改變不同培養液之中骨橋素的結構。總而言之，硫酸鈣能調節骨橋素 mRNA 及蛋白質的表現，控制植入人體硫酸鈣的降解有助於調節骨頭的形成，本研究可以提供牙醫師使用硫酸鈣來當骨頭缺損的支架更加有效率。

英文摘要

Calcium sulfate has been used for bone regenation in oral medicine. Osteopontin, a marker molecule, expressed by osteoblast, plays multiple roles in human body. However, the effect of calcium sulfate on osteopontin expressed in osteoblasts is unclear. In this study, U-2 osteosarcoma osteoblastic cells were cultured in 0, 0.5, 1, or 10 μM calcium sulfate hemihydrate. There was no effect in the proliferation of cells, suggesting that calcium sulfate up to 10 μM is biocompatible. The cells and conditioned media were collected for analyzing mRNA and protein levels of osteopontin by reverse-transcription polymerase chain reaction (RT-PCR) and Western blot, respectively. The results showed that lower concentration of calcium sulfate (< 1 μM) upregulated the mRNA level of osteopontin. However, the protein expression of osteopontin was downregulated as the concentration of calcium sulfate was increased in the cultured U-2 OS osteoblastic cells. It suggests that the dissolved Ca2+ and SO42- from calcium sulfate hemihydrates may alter the structure of osteopontin secreted in the cultured medium. In summary, calcium sulfate can regulate the mRNA and protein expressions of osteopontin. Control of the degradation of calcium sulfate implant is important to regulate bone formation. It may provide

more information for dentists to use calcium sulfate as scaffold in bone defect efficiently.