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Chitosan-strontium scaffolds for bone tissue engineering

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Until now the best strategy for the reconstruction and repair of bone defects remains using bone cells or tissues from the same person. To avoid its drawbacks, such as limited availability and invasive harvesting, bone tissue engineering (BTE) would be a better approach. In BTE, cells derived from stem cells are combined with a scaffold, which is made from specific biomaterials like chitosan. Chitosan has almost all the properties that a scaffold should have like excellent biodegradability, biocompatibility, tissue regeneration stimulation characteristic and antimicrobial activity. In many articles, the focus has been on the interactions between metal ions and chitosan, such as with the ferric ion, the zinc ion, or the copper ion. Each combination has its advantages and disadvantages. Disadvantages being their toxicity in the body. Combining chitosan with strontium would be a better option as studies have shown strontium has a particular ability to cause catabolic and anabolic effects during bone remodelling. An anabolic effect leads to bone formation, and a catabolic effect leads to bone resorption. Together it produces bone and causes the body to absorb it. However, the mechanism by which strontium affects the signalling pathways leads to differentiation in human mesenchymal stem cells, which is a drawback. Although it has been demonstrated that adsorption of strontium by chitosan is possible, the proposed mechanism requires the existence of a moderate interaction involving chitosan, carbonate ions, and cations. Overall, it is a promising combination to look into, and might provide quite fruitful results.

Keywords: Chitosan, Strontium, Tissue engineering, Scaffolds

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