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Study of a Novel Hybrid Bone Cement Composed of γ -Polyglutamic Acid and Tricalcium Silicate

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Abstract

Tricalcium silicate (C_3S) has been used for biomedical materials. It has good biocompatibility and the ability to self-set, allowing it to serve as a bone cement. After setting, C_3S demonstrates some mechanical strength but is easily broken. γ -Polyglutamic acid (γ -PGA) is a natural, non-toxic, highly biocompatible and edible polymer. To improve the physical properties of tricalcium silicate cement, in this study, we prepared a γ -PGA/ C_3S composite bone cement and tested its properties. The C_3S powder was synthesized by the sol-gel method and then mixed with different proportions of γ -PGA to form the solid agent. Moderate 10 wt% NaH_2PO_4 solution was subsequently added to form the composite bone cement. After characterizing the material and evaluating its biocompatibility *in vitro*, the potential of the composite to improve bone cement was investigated.

Keywords

Sol-gel processes; Composites; Silicate; Biomedical applications

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