Synthesis and characteristics of a new thermo-setting calcium phosphate cement

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Abstract

Due to their excellent biological properties such as biocompatibility, bioresorbability, and osteoconductivity as well as their ease of use by injection, self-setting calcium phosphate cements (CPCs) are one of the most important artificial bone filling materials currently available. However, current products suffer from long setting times and thus are easily washed out. This washout phenomenon is the result of the slow formation of hydroxyapatite (HA), mainly caused by magnesium ions which exist in the body fluid and blood. To reach our goal of the preparation of an anti-washout CPC, a temperature-sensitive hydrogel, composed of amorphous calcium phosphate (ACP), dicalcium phosphate dihydrate (DCPD), β-glycerol-phosphate, and chitosan, was prepared with the mixture composition of 1 g:1 ml of solid: liquid. Our results showed that with the formation of a 3D network structure, the prepared samples were self-contained and resisted collapse and dissolution. With this improved anti-washout property, a better degree of hydration of the CPC was achieved.