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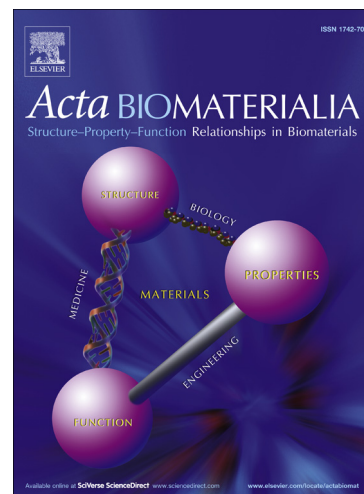
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Comparative studies on ectopic bone formation in porous HA scaffolds with complementary pore structures

Hao Wang¹, Wei Zhi¹, Xiong Lu¹, Xiaohong Li¹, Ke Duan¹, Rongquan Duan¹,
Yandong Mu², Jie Weng^{1*}

¹*Key Laboratory of Advanced Technologies of Materials (Ministry of Education),*

School of Materials Science and Engineering, Southwest Jiaotong University, Chengdu, 610031, PR China

²*Dental Department, Sichuan Province People's Hospital, Chengdu 610072, PR China*

**Corresponding Author: jweng@swjtu.edu.cn (Prof. J. Weng)*

Abstract

Vascularized bone grafts were constructed by implanting hydroxyapatite (HA) scaffolds with complementary macro-pore structures into the dorsal muscle of dogs. The relationship between pore structures and ectopic bone formation properties were investigated. Two types of scaffolds with complementary porous structures were fabricated by spherulite-accumulating and porogen-preparing methods, which were named as spherulite HA-positive and porogen HA-negative, respectively. After 1 month implantation, histological observation showed that all the scaffolds were encapsulated by normal muscle tissue and multiple vascular net with cells, indicating excellent biocompatibility and pore interconnectivity of the scaffolds. In the spherulite HA-positive scaffolds, a number of osteoclasts and osteoblasts coupled with new bone tissues were found after 3 and 6 months implantations, which was better than those in the porogen HA-negative scaffolds. Similarly, the improvement of mechanical properties and the reconstruction of materials in the spherulite HA-positive scaffolds were superior to those in the porogen-HA negative scaffolds. The different ectopic bone formation induced by different macro-pore structures after intramuscular implantation demonstrated the significant effect of macro-pore structures of scaffolds on osteoinduction and vascularisation.

Key words: Osteoinduction; Vascularization; Hydroxyapatite porous scaffold; Macro-pore structure

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