

## A Poly (D, L-lactide) /Allogenic Bone Composite for Bone Tissue Engineering

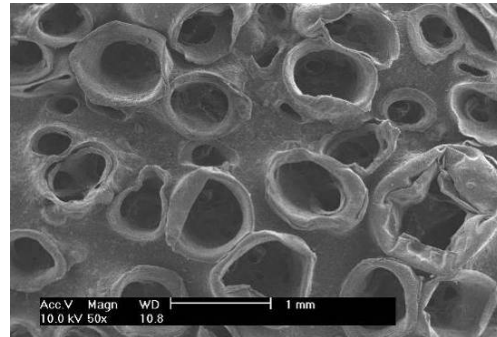
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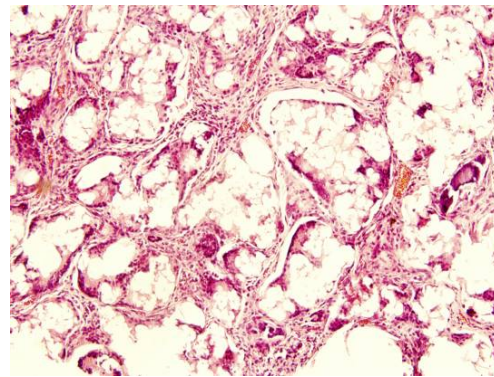
**INTRODUCTION:** Porous polymer composites are one of the most heated research topics for bone tissue engineering. In vitro and vivo tests demonstrated that porous composites can be used as the matrices for bone cell growth and differentiation, and showed that composites had better osteoconductivity compared with the porous polymers alone<sup>1</sup>. Allogenic bone has been used very widely for the bone defect treatments. In this study, a novel PLA (poly D, L-lactide) /allogenic bone composite was prepared by a novel method—supercritical carbon dioxide fluid technology ((SC-CO<sub>2</sub>-FT).

**METHODS:** The PLA (poly D, L-lactide) /allogenic bone composite was prepared with PLA (Mn=1 ×10<sup>4</sup>, diameter=150μm-200μm) and allogenic bone (diameter=80μm-100μm) mixed with NaCl(diameter=100μm -200μm ).After PLA, allogenic bone and NaCl were homogeneously mixed ,the mixture was placed in a disk mold and then put into supercritical carbon dioxide equipment at 20mpa,35° for 30 minutes, with the exposure time of less than 15 minutes. The NaCl was subsequently removed from the composites by leaching the composite in the distilled water with shaking for 48 hours, with the water changed every 8 hours, and then the composites were dried under the vacuum.

**RESULTS:** The composites were determined by scanning electron microscopy, porosity analysis and vivo implantation studies. The results showed that the pore formed by SC-CO<sub>2</sub> technique was appropriate to be used as materials, the materials had a interconnected porous structure, the porosity was over 80%, furthermore, the most outstanding virtues of these composites were that a large number of micropores (diameter=10-20μm) were generated on the tri-dimensional pores surface while avoiding the use of organic solvent. The vivo tests results also showed that the well-formed tissue grown homogeneously in the composite, in addition the allogenic bone of the composite had been absorbed slowly along with the PLA degrading.



*Fig. 1: SEM of the PLA/allogenic bone composites*



*Fig. 2: Histological studies of PLA /allogenic bone composite explanted from the mice at 4 weeks.*

**DISCUSSION & CONCLUSIONS:** The results indicated that the processes and the novel composites were both feasible, and the results also demonstrated that the composites had the potential for integration with bone. The clinic use of the novel PLA/allogenic bone composites biomaterial prepared by SC-CO<sub>2</sub>-FT will be awaited for the further research.

**REFERENCES:** <sup>1</sup> Kai Zhang, Yunbing Wang, Marc A. Hill Myer, Lorraine F. Francis. Processing and properties of porous poly (D, L-lactide)/ bioactive glass composites. *Biomaterials* 2004; 25: 2489-250

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