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L. Lee Chou

Boston University, USA

Human bone tissue engineering

Tissue engineering by autologous osteoprogenitor cell transplantation with biodegradable and osteogenic materials has been used to regenerate human bone tissue in clinic. Several major breakthroughs have been made in this area: 1) Novel 3-D designs of the scaffolds offer a simultaneous control over macroscopic shape, oriented channels and microporosity to meet the distinct geometric requirements for the events of cell attachment, differentiation, vascularization, and new bone formation; 2) Novel composite materials possess programmed biodegradation and osteogenic bioactivity to regenerate bone tissue, as well as sufficient mechanical strength to maintain the shape of 3-D structures to guide bone formation; 3) State of the art fabrication methods proceed one step further to include both functionally graded materials and computer-designed 3D geometry to facilitate bone formation; 4) Delivery of autologous transplanted osteogenic cells meets functional requirements, technical feasibility and economic considerations. *In vitro* and *in vivo* studies have yielded significant data leading to successful clinical applications on selected challenging patients with severe bone defects.

Biography

L. Lee Chou, D.M.D., PhD, is a Professor of Biomaterials, Director of Molecular Biocompatibility Laboratory, Professor and Director of Oral Medicine, Goldman School of Dental Medicine, Boston University.

lchou@bu.edu