Dev. Reprod. Vol. 13, 2009 (Suppl. 1). pp 22

Clinical Application of Stem Cells with Scaffold in Orthopaedic Field

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In orthopaedic field, bone defects occurs commonly after fracture, osteomyelitis, bone tumor excision, and after deformity correction with limb lengthening for congenital diseases.

Segmental bone defects more than 6 cm can be treated by various procedures, including cancellous bone grafting, vascularized fibular grafting, and internal bone transport with an external fixator. Problems associated with bone grafting include resorption of the graft, delayed consolidation, stress fracture, and nonunion.

Internal bone transport using Ilizarov method has problems including long duration of consolidation, pin-tract infection, joint contracture, and long period of external fixator application.

Cultured osteoblast or bone marrow cells or mesenchymal stem cells from the iliac crest have been used fortreatment of atrophic nonunion. However, these stem cell therapy is not effective without scaffold which holds the cells until new bone formation at the bone defect site.

Our department performed reconstructive bony procedures for bone defects and shortening more than 1,000 cases and reported many complications of these procedures.

Recently we are investigating possiblility of usingscaffold to reduce these complications in orthopaedic field.

We reviewed our results using PCL-TCP combined withcord blood stem cells for bone defect of rabbits and mini-pigs.