

Enhanced Osteogenesis of Canine Allogenic Umbilical Cord Blood-derived Mesenchymal Stem Cells Associated with Beta-tricalcium Phosphate in Ectopic Implantation

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Introduction: This study was performed to evaluate the osteogenesis of allogenic canine umbilical cord blood derived mesenchymal stem cells (cCB-MSCs) in ectopic implantation mixed with beta-tricalcium phosphate (β -TCP).

Materials and methods: Five hundred miligram of β -TCP mixed with 1×10^7 cCB-MSCs (CM), 500 μ l of bone marrow(BM) and the same volume of saline as control (C), respectively. Each mixed materials were implanted subcutaneously. The implants were harvested 1, 2, 4 and 8 weeks after implantation. Decalcified sections were prepared for histological analysis. Alkaline phosphatase (ALPase) activity of the harvested implants was also evaluated.

Results: The ALPase activity in the CM group maintained significantly higher in 1, 2, 4 and 8 weeks than in 0 week. The ALPase activity in the BM and C groups did not yet increased until 4 week, but increased at 8 week. In histological findings, at 2 week, fibrous connective tissue and osteoblast-like cell were found around the implants in the CM group. At 4 week after implantation, osteoblasts, bone mineral deposits and osteoclast-like multinucleated giant cells could be observed in direct apposition to the surface of the implants in the CM group. More obvious bone formation and resorption of β -TCP granules could be detected in the CM group at 8 week after implantation. In other groups, few osteogenic features could be observed until 2 week after implantation, and there were less and slower osteogenic response than that in the CM group at 4 and 8 weeks.

Clinical relevance: The present study suggested that allogenic cCB-MSCs implanted with β -TCP could differentiate into osteogenic cells.

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