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Animal mesenchymal stem cells: Isolation, proliferation, characterization and orthopedic application

Swapan Kumar Maiti

Surgery Division, Indian Veterinary research
Institute, India

The purpose of this study was to isolate, proliferate and application of stem cells (MSC) in bone defects to examine their osteogenic potentiality.

Mesenchymal stem cells were isolated from equine adipose tissues (hrs-AT-MSC) and rabbit bone marrow (r-MSC). The isolated cells were cultured and expanded in optimal cultivation conditions in define culture medium. MSCs were implanted in a bio-ceramic scaffold to repair critical bone defects in 18 New Zealand White adult rabbits (6 each in three groups). hrs-AT-MSC and r-MSC were implanted in groups A & B respectively, whereas, in group C, bone defect kept intact-without MSC. Radiographs were taken at 15 day's interval and histopathological observation was done on day 90 post-implantation.

Primary colonies were observed on day 3 post seeding and first subculture was done on day 7. Cellular morphology of stem cells varied between monolayer of round, elongated spindle-shaped with shorter/longer cytoplasmic extensions and they were grown in single cell or in cluster form. Proliferation capacity of hrs-AT-MSC was much higher than r-MSC. MSCs were characterized by crystal violet, alkaline phosphatase and Integrin alpha.

Radiographs and histopathological findings suggested that the osteogenesis and osseous callus formation to bridge the bone defect was faster and organized in the stem cell construct group of animals. In control group, the bone defect was remained unchanged even at day 90 post implantation.

Mesenchymal stem cells were successfully cultured, proliferate and characterized and finally they were applied in critical bone defect model. MSC possess osteogenic activity and they were immune-privileged.

Biography

Dr Swapan Kumar Maiti has completed his Ph.D from Indian Veterinary Research Institute (Deemed University), Izatnagar (UP) in Veterinary Surgery. He acted as "Visiting Scientist" at University of Leipzig and University of Köln, Germany. He selected two times in International Scientist's Bilateral Exchange Programme. He received prestigious Fellowship from German Research Foundation (DFG), Bonn, Germany (two times) for doing research on animal Stem Cell. Presently, he is engaged on therapeutic application of animal mesenchymal stem cell under a DBT (Directorate of Biotechnology, Govt. of India) project as Principal Investigator. He has published more than 110 research papers in reputed journals.