

## **Mesenchymal stem cells-biomaterial tissue engineering constructs for tissue regeneration and repair in animal species**

**Swapan Kumar Maiti**

Indian Veterinary Research Institute, India

Mesenchymal stem cells represent an attractive cell population for tissue engineering purposes. Mesenchymal stem cells (MSC) are self-renewing capacity with multi-differentiation potential of progenitor cell. Furthermore, MSC are described as immune privileged. The purpose of this study was to isolate, proliferation and characterization of MSC obtained from different animal species and preparation of novel stem cell-bioceramic tissue engineering construct for tissue regeneration. Bone marrow aspiration was collected from the iliac crest of sheep, goat, dog and rabbit, whereas, in pig, it was collected from the sternum under general anesthesia and aseptic condition. Rat bone marrow was collected from harvested long bones. Isolation technique was based on the adherent properties of the MSC. The cells were repeatedly passage and expanded in optimal cultivation conditions in defining culture medium until a pure culture was produced. Primary colonies were observed on day 3-5 post seeding, the majority of cells were round, oval-shaped growth; after 7-9 days, adherent cells were increased and gradually extended to the growth of the polygon, star or spindle-shaped and a colony formation unit (CFU) was observed. 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 canine and porcine MSC was much higher than other species. MSCs were characterized morphologically by crystal violet stain. *In vitro* osteogenic, adipogenic and chondrogenic differentiation of MSCs was performed and evaluated by Alizarin and alkaline phosphatase staining. Tissue engineering construct of HA-TCP-Si bioceramic seeded with animal MSCs was developed and *in vivo* osteogenesis of this construct was evaluated in critical bone defect. Tissue engineering construct of acellular porcine small intestine/urinary bladder/fish swim bladder/chitosan seeded with animal MSC was developed and *in vivo* tissue regeneration was evaluated in animal skin wound and corneal repair.

swapanivri@gmail.com  
maiti\_62@rediffmail.com