

Regenerative Potential of Bone Marrow and Bone Marrow-derived Mesenchymal Stem Cells in a Radiation-induced Bone Marrow-damage Animal Model

Jitendra Kumar Chaudhary

Ph.D (JNU) Department of Zoology Shivaji College, University of Delhi
E-mail: jnujitendra@gmail.com

Abstract—Bone marrow possesses rich repertoire of undifferentiated Mesenchymal Stem Cells (MSCs). These MSCs are studied for various underlying processes, including cell proliferation, self-renewal, chemotactic mobilization, immunomodulation, multiple lineage differentiation, tissue regeneration and repair. In our work, MSCs were first isolated from bone marrow, and then characterized by scanning electron microscopy and using fluorescently labeled-antibodies for specific cell surface markers, e.g., CD29 ($98.94 \pm 0.67\%$), CD44 ($84.27 \pm 7.77\%$), Sca-1 ($92.70 \pm 3.81\%$) along with HSC-specific markers, such as CD45 ($0.40 \pm 0.10\%$), CD34 ($0.15 \pm 0.05\%$) and CD11b ($0.45 \pm 0.15\%$). Besides, MSCs were functionally characterized by differentiating them into adipocytes, osteocytes and chondrocytes. Furthermore, these cells were probed for some relevant transcription factors like Interferon regulatory factors (IRF-1 and IRF-2) which are, in non-MSCs, reported to play very important role for genes encoding type 1 interferons (IFNs), including IFN- α and IFN- β as well as their target genes. IRF-1 induces expression of IFN-stimulated genes, e.g., iNOS, Cox-2, MHC class I etc., and is also involved in differentiation, maturation and function of the immune cells. Expression of four stem cell transcription factors like Oct-4, Nanog, Sox-2 and Myc were also looked. We also carried out cell transplantation into an experimental radiation-induced mouse model in order to evaluate the bone marrow regenerative potential of the transplanted bone marrow cells by CFU-Fs assay and expression analysis of various relevant genes.

Acknowledgement: Research work was carried out at School of Life Sciences, JNU under the guidance of Prof. Pramod C. Rath.