

## Clinical Applications of Mesenchymal Stem Cells

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Human mesenchymal stem cells (MSC) have been isolated from various tissues including bone marrow, cord blood, periosteum, trabecular bone, adipose tissue, synovium, skeletal muscle and deciduous teeth. These cells have the capacity to differentiate into cells of connective tissue lineages, including bone, fat, cartilage and muscle. A great deal has been learned in recent years about the isolation and characterization of MSC. Several methods are currently available for isolation of the mesenchymal stem cells based on their characteristics. Because of the ease of their isolation, their multilineage potential and their extensive differentiation potential, mesenchymal stem cells are among the first stem cell types to be introduced in the clinic. MSC have generated a great deal of interest because of their potential use not only in regenerative medicine and tissue

engineering, but also in the treatment of autoimmune diseases or even as an adjuvants in hematopoietic stem cell transplantation. Various studies – pre-clinical and clinical - illustrate their therapeutic value. Furthermore, MSC seem to be hypoimmunogenic and modulate lymphocyte function. Therefore, allogenic mesenchymal stem cells transplantation seems possible. It is envisaged that mesenchymal stem cells can be used in systemic transplantation for generalized diseases, local implantation for local tissue defects, as a vehicle for genes in gene therapy protocols or to generate transplantable tissues and organs in tissue engineering protocols. The results of these initial trials are very encouraging and several clinical trials are under way to study the efficacy and long-term safety of therapeutics based on mesenchymal stem cells.