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Stem Cell Therapy

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OPINION

The use of stem cells to treat or prevent a disease or condition is known as stem-cell therapy. Hematopoietic stem cell transplantation is the only established stem cell therapy as of 2016. Bone marrow transplantation is the most common method; however cells can also be extracted from umbilical cord blood. Stem Cell Therapy (SCT) is the use of stem cells to treat a variety of illnesses ranging from minor to life-threatening. These stem cells can be obtained from a variety of sources and utilised to treat more than 80 diseases that have been approved by the Food and Drug Administration (FDA). Hematopoietic disorders (such as leukaemia, thalassemia, aplastic anaemia, sickle cell anaemia, and storage disorders) affect the bone marrow and result in a variety of systemic consequences. Stem cells from a donor (either cord blood or bone marrow) have been shown to restore the faulty bone marrow and cure the condition permanently. The deterioration or wear and tear of bone, cartilage, muscle, fat, or any other tissue, cell, or organ causes degenerative illnesses. This can happen for a variety of causes, but the most common cause is the ageing process, also known as growing old. 'The illnesses have a delayed and sneaky onset, but once contracted, they can be long-term, painful, and life-threatening. Any organ in the body can be affected by these illnesses. Diabetes, osteoarthritis, stroke, chronic renal failure, congestive heart failure, myocardial infarction, Alzheimer's disease, Parkinson's disease, and other degenerative conditions are frequent. At present, many of these conditions have ineffective traditional treatments; nevertheless, stem cell therapy has shown encouraging outcomes all around the world. Because of the wonderful and unique characteristics of stem cells, this is conceivable. The procedure is painless, quick, and usually takes only a day or two to complete. Nonetheless, the results are considerably superior to the unsuccessful and lengthy conventional therapy. It may surprise you to learn that, since 1988, stem cells from numerous sources, including bone marrow and umbilical cord, have been effectively employed to treat a variety of life-threatening disorders with good results. A growing number of successful stem cell treatments have emerged in recent years as a result of expanded research and development activity. It has grown to be one of the most interesting areas of medicine, incorporating all aspects of modern medicine. Stem cell therapy has grown rapidly in India, and it is not overly optimistic to assume that it may one day replace expensive, time-consuming, and ineffectual conventional medicine for treating a variety of acute and chronic disorders in India and around the world. Haematopoietic stem cells are a somatic cell population capable of self-renewal and differentiation into various cell lineages with much specialised homing capabilities. Human haematopoietic progenitor cells, like stromal cell precursors in bone marrow, express the antigen, a transmembrane cell surface glycoprotein that the monoclonal antibody recognises. The best method to characterise haematopoietic stem cells is to look at how they function. In lethally cytoablated hosts, they have been shown to restore multiline age, long-term haematopoietic cell differentiation, and maturation. Bone marrow, peripheral blood, umbilical cord blood, and foetal liver are all good sources of haematopoietic stem cells. Because peripheral blood stem cells may be harvested on an outpatient basis and facilitate consistent acceleration in haematopoietic reconstitution after engraftment, they have become commonplace in both autologous and allogeneic transplantation. Umbilical cord blood stem cells from related and unrelated human leukocyte antigen-matched donors have gradually been employed in paediatric patients. Fast engraftment is necessary in recipients with severe T cell immunodeficiency diseases, as is a low risk of graft versus host illness and a low viral transmission rate. Umbilical cord blood stem cells have been employed in clinical trials for both autologous and allogeneic haematopoietic stem cell transplantation because they may be grown in vitro or frozen for storage in cell banks. Bone marrow is a mesenchyme-derived tissue

with a complex haematopoietic cellular component and a stromal cell milieu integrated in a complex extracellular matrix. Extracellular matrix has a crucial part in cell-cell interaction, as well as a more sophisticated involvement in cytokine binding and presentation to haematopoietic progenitor cells. The combination between cytokine milieu and extracellular matrix provides a road map for stem cell maturation and differentiation, which could be useful for in vitro manipulation prior to therapeutic usage. Dendritic cells, the most powerful antigen-presenting cells, can be generated in vitro using haematopoietic stem cells, for example. Dendritic cells are assumed to be the sole antigen-presenting cells capable of priming native T cells and play a key role in the elicitation and regulation of antigen-specific, major histocompatibility complex-restricted T cell responses. In vitro produced dendritic cells transduced with genes coding for tumour specific antigens or pulsed with a tumour specific antigen or peptide may be beneficial for inducing cytotoxic T cell responses. Dendritic cell tumour vaccines could be key therapeutic tools in the future; phase II clinical trials are now underway, with little success. The migration and function of dendritic cells produced from the liver in an allogeneic environment, on the other hand, may be crucial in the development of donor specific tolerance. Dendritic cell genetic engineering to express immunosuppressive or immune-regulatory molecules could be a new way to increase graft tolerance while lowering the need for systemic immunosuppression.