International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 03-01-2019; Accepted: 07-02-2019
www.medicalsciencejournal.com
Volume 5; Issue 3; March 2019; Page No. 12-14

Stem cell therapy: An overview

Dr. P Shanthi Ida Sophia
Principal, Saraswathi College of Nursing, Udaipur, Rajasthan, India

Abstract
Stem cell therapy is the new technology used to collect stem cell from bone marrow, peripheral blood and umbilical cord of newborn and introduced into human body for treating various disorders. The newborn disorders like broncho-pulmonary dysplasia, intra ventricular hemorrhage, hypoxic ischemic encephalopathy can treat by stem cell therapy. For infant lymphoblastic leukemia, cerebral palsy, metabolic disorders like krabbe disorder, sanfillipoo syndrome can be treat with stem cell therapy. Childhood disorders like blood disorders, metabolic disorders, immune disorders, cancer (leukaemia, lymphoma, myeloma), myelodysplastic syndrome cure by stem cell therapy. Neurological disorders like Parkinson's disease, alzhemier`s disease, spinal cord injury, stroke, cerebral palsy, batterns disease, amyotrophic, lateral sclerosis are treated by stem cell therapy. Heart diseases, burns, diabetes also treat by stem cell therapy. Stem cell therapy used for anti aging therapy. Nowadays, it shows great promise for regenerative medicine.

Keywords: stem cell, bone marrow, regenerative medicine, mesenchymal cell, pluripotent

Introduction
Stem cells are biological cells that can be differentiate into other types of cell and can divide to produce more same type of cell. It is found in multicellular organism. It can be divided in to embryonic stem cell (inner cell mass of blastocyst), adult stem cell (tissue), mesenchymal stem cell (stroma of connective tissue), induced pluripotent stem cell (skin or blood cell in pluripotent state). Stem cell therapy is use to prevent and treat disorders from newborn to old age.

Definition
Stem cell therapy is also called as regenerative medicine; it helps to repair dysfunction, diseases and injured tissue by using stem cell.

History of stem cell therapy
1908: Russian histologist Alexander Maksimov described the term stem cell.
1956: Edward Donnall Thomas injected bone marrow stem cell into 3 years old leukaemia child, the stem cells harvested from identical healthy twins.
1968: University of Minnesota doctors cure X-linked lymphopenic immune deficiency and Wishkott-aldrich syndrome.
1969: Edward Donnall Thomas bone marrow transplants using stem cell harvesting from another person.
1978: Stem cells were discovered from umbilical cord of human.
1988: Thomas worn noble prize on bone marrow transplantation to treat cancer.
1998: James A. Thompson isolated cell from inner cell mass of early human embryo.
John D. Gearhart derived cells from gonad tissue.
2001: Human embryo cloned by early 4-6 cells
2006: Researchers reprogrammed and transferred the somatic cell into stem cells; it is called induced pluripotent stem cell
Now, so many researchers published more than 2000 research articles regarding stem cell therapies. Stem cells used to treat hundreds of conditions like leukemia, Hunter disease and heart diseases.

Types of Stem Cell Therapy
Classification based on sources of cells
Embryonic stem cells: It is derived from inner cell mass of blastocyst, an early stage of pre implantation embryo. It is taken by 5 - 7 days. It also derived from gonadal ridge at 6 weeks.

Non - embryonic stem cell: It includes
Fetal: Stem cells are derived from fetal abortus, fetal mesenchymal cell, it is isolated from stroma of connective tissue surrounding tissue or organ.
Infant: Stem cells are derived from umbilical cord blood and whartson's jelly .in umbilical cord blood stem cells are found. In whartson's jelly mark stem cells are found.
Adult: Adult stem cell therapy derived from germiline as well as somatic. In germiline, the stem cells taken from spermatogonia and oogonia. In somatic hemopoietic (bone marrow peripheral blood), mesenchymal (bonemarrow stroma), liver, epidermal, neuronal, eye, gut and pancreas.

Classification based on cell types
Totipotent: Toti potent cells are early fetal stem cell, because it have the ability to becomes any cell type.
Pluripotent: It originates from inner cell mass within blastocyst.
Multipotent: These stem cells are differentiating in to a number of cell types.
Oligopotent: These stem cells are derived from lymphoid or myeloid stem cells.
Unipotent: It can produce only one cell type, their own, but the property of self renewal which distinguishes from non-stem cells.

Types of stem cell transplantation

- **Autologous stem cell transplant:** Persons own healthy stem cells are collected from person`s own blood or bone marrow.
- **Allogenic stem cell transplant:** Donor healthy stem cells are collected and introduced needed person`s bone marrow.
- **Haploidentical stem cell transplant:** Genetic match of healthy stem cells from parents or related or unrelated donor.
- **Syngeneic stem cell transplant:** Transplant with identical twins.
- **Peripheral stem cell transplant:** Donor large vein introduced a flexible tube, selected stem cells by a machine and the remainder blood is returned to the patient.
- **Cord blood stem cell transplant:** Stem cells are collected from umbilical cord or placenta immediately following birth.

Diseases Treated with Stem Cells

Neurological condition

In adult Alzheimer disease, Parkinson's disease, spinal cord injury, stroke, cerebral palsy, battens disease, amylotrophic lateral sclerosis can treated by stem cell therapy. The sources of stem cells were obtained from embryos, adults, umbilical blood, amniotic fluid and placenta. Brain and spinal cord injury cause loss of nervous tissue and loss of motor and sensory function. Neuro protective and axon regeneration promoting effects occur due to stem cell transplantation. Autism also treated by stem cell therapy. This therapy may be effective in improving motor skills, social skills and cognition in patients with autism spectrum disorder. Autism treated with umbilical cord tissue - derived mesenchymal stem cell.

Endocrine conditions

Diabetes mellitus: The mesenchymal cells of postnatal organ and tissue that treat diabetes mellitus. Autoimmune thyroid dysfunction also treated by stem cell therapy.

Respiratory conditions

Chronic obstructive pulmonary disease: Chronic obstructive pulmonary disease treated with mesenchymal stem cells.

Cardiovascular conditions

Heart: Bone marrow derived progenitor cells to treat myocardial infarction.

Haematological system

Haemopoietic stem cell transplant helps to treat leukemia, lymphoma, thalassemia and sickle cell anemia.

Integumentary and sensory system

Baldness of head: Stem cells are separated from tissue and injected back to scalp in areas of hair loss.

Missing teeth: Exfoliated human deciduous tooth contains multipotent stem cell it induces bone formation and generates dentin.

Deafness: Surgically placed stem cells within cochlea to cure deafness.

Blindness and vision impairment: Age related muscular degeneration the leading cause of blindness it can treated by patch of stem cell treatment.

Wound: Healing progenitor stem cell helps to promote wound healing.

Reproductive system

Infertility: Male and female gametes used in reproductive medicine. Male germ cells are derived from pluripotent stem cells, ovarian regeneration strategies for ovary and oocytes production in regeneration and oocyte production have been proposed as future clinical therapies for treating infertility in women. In this view, current knowledge, present future perspectives and challenges regarding the use of stem cells in reproductive medicine.

Immune system

HIV /AIDS: HIV and AIDS weakens immune system stem cell approaches involves isolating blood stem cells from an HIV infected person modifying the cells to becomes resistant to HIV to infect cells at several stages and then reintroduced just engineered stem cell after a purification step.

Anti aging: Replenishing the supply of stem cells to allow the body to repair and rejuvenate cancer allogenic and autogenic stem cell therapy to treat cancer.

Musculoskeletal system

Orthopedic condition musculoskeletal injuries may be painful, troublesome global problem, stem cell therapy can treat fracture, bone defects, spinal injuries, osteoarthritis, cartilage defect, cartilage and tendon injuries, osteonecrosis, osteogenesis inferfecta, osteoarthritis and rheumatoid arthritis.

Stem cells in gynecology and obstetrics

Hematopoietic stem cells**:** treat ovarian cancer, umbilical cord blood transplantation - treat malignancies and inherited disease, tissue repair of maternal organs (feto-maternal cell traffic- stem cell from fetus) and prenatal transplantation to cure congenital problems of fetus.

Stem cell collection and storage

Stem cells are collected and stored in stem cell storage bank for future use. The main aim of collection and storage of stem cell is young cells with ability to regenerate, treat blood disorders and life saver.

Role of nurse in stem cell therapy

Educator: Nurse teaches the society regarding the importance of stem cell therapy.

Care giver: nurse provide care from the time of collection of stem cell to transplantation of stem cell.

Coordinator: Nurse act as the coordinator between the patient and health care team.

Researcher: Nurses published many research articles regarding stem cell transplantation.

Conclusion

For millions of people around the world who suffer from incurable diseases and injury in worldwide. So, California Institute of Regenerative Medicine October 11, 2017 announced at stem cell awareness day every year Second Wednesday of October we celebrate, on that day is an opportunity to make aware about scientific advance made to date and help draw the attention to the effect of stem cells.

References

1. Tewatie R, *et al*. Stem cell based therapies for spinal cord injury, Journal of hemato therapy and stem cell research. 2009; 12(3):15-114.
2. Shroff G. Human Embryonic Stem cells in the treatment of Autism: A case series, innovations in clinical neuroscience. 2017; 14(3-4):12-16.
4. Vladislav, *et al*. Stem cells as new agents for the treatment of infertility: current and future perspectives and challenges, biomedical research international, 2014.
5. Sekaran, *et al*. The current perceptive of stem cell therapy in orthopaedic surgery, Archives of trauma and research. 2016; 5:4.
6. Hassar A, Hassar G, Rasool Z. Role of stem cells in treatment of neurological disorder, International journal of health science. 2009; 8(2):227-233.
7. http://www.birthinjuryguide.org/cerebralpalsy/treatment/stemcellthrapy
8. Chang Y, Hhn S, Sung S, Park W. Stem cell therapy for neonatal disorder, Prospect and challenges, Yonsei medical journal. 2017; 58(2):266-271.
9. Bongso, A, Lee E. Stem cell their definition and sources embryonic, department of Obstertics, National university.
10. http://www regmednet.com
11. http://www.cirm.ca.gov
12. Harvard university science in news, January 2, 2014. sitn. hms. harward. ed.
13. Yenny Rojas. History of stem cell treatment national stem cell center, 2017, http//www.national stem cell centers.com
14. Shihadeh Hanna. History and recent advances of stem cell biology and the implication for human health, Senior honor project. 421. http://digital common .uni.edu
15. Skar, *et al*. Endocrine complications of pediatric stem cell transplantation, Frontiers in biosciences, 2014, 6-12.
16. Dutta, Textbook of gynecology, 5th edition, New central book agency, [p] lted, Kolkata, 2008, 406-11.
17. Tortora. Textbook of principles of anatomy and physiology. 8th edition. published by Harper Collins college publishers. Newyork - 43. p.no. 448.
18. Bhat, *et al*. Stem cells present status and future, JIACM. 2004; 5(2):149-56.
19. Bagher *et al*. Stem cell therapy in treatment of disease. Research gate. 2012; 50(2):79-96.
20. Rusa, *et al*. Current status of stem cell therapy opportunity and limitation, Turkish journal of biology. 2016; 40(50):955.
21. Trung S. Stem cell technology and engineering for cancer treatment, Biomedical research and therapy. 2015; 2(6):279-289.