



STEM CELLS: REVIEW ARTICLE

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ABSTRACT

Stem cells therapy used in the modern development of medical technology. The two defining characteristics of a stem cell are perpetual self-renewal and the ability to differentiate into a specialized adult cell type. There are two major classes of stem cells: pluripotent that can become any cell in the adult body, and multi potent that are restricted to becoming a more limited population of cells. Cell sources, characteristics, differentiation and therapeutic applications are discussed.

Key words:- Stem cells, medical technology, therapeutic applications.

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INTRODUCTION

Stem cells therapy is a boom in the modern medical science and the developing technology. The current world moves to stem cell therapy in all the corners of innovative medicines. Many researchers work on this field for the global

Stem cells are master cells in the body that have the potential to differentiate into different types of cells example blood cell, nerve cells, bone cells and cardiac cells. The stem cell serves as an internal repair system of the body. Stem are first seen during early embryonic development and also distributed in different parts of the body in adult.[1]

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Types of stem cells

Stem cells are of three types they are

1. Embryonic stem cells

These stem cells come from embryos that are three to six days old.

2. Adult stem cells

These type of stem cells are found in the developed organs and tissues of the human body. They also found in the children. These stem cells are found in small numbers in most adult tissues, such as bone marrow. Adult stem cells are also found in children and in placentas and umbilical cords.[2]

3. Induced pluripotent stem cells

These are regular adult cells that are not stem cells but are induced to exhibit pluripotent properties , to act like embryonic stem cells.

Stem cell therapy

Doctors are extremely enthusiastic about stem cell therapy, it can be called as regenerative medicine, it is replacement of diseased or Injured cells or their derivatives. This procedure is somewhat similar to the organ transplant process but uses cells instead of organs.

Stem cell can be grown in the labs. These stem cells are redefined to make them specialize into specific types of cells, such as muscles of heart cells, bone cells, nerve cells. The specialized cells could then be implanted into a person. For example, if the person had heart disease, the cell could be injected into heart muscle, the healthy transplanted heart cells could then contribute to repairing defective heart muscle.[3]

The main reason for storing stem cells are 1.Treat the service as sort of biological insurance. 2.it is chosen to store stem cells because their family has specific history or risk factors that prompt them to consider all potential options available. 3. The field of stem cells growing rapidly and they do not want to miss the opportunity to keep the cells now.4. Most agree, that there are limited opportunities to safely and painlessly acquire and save these valuable stem cells in case they are ever needed.[4]

Stem cell transplants

They are Allogeneic and Autologous

Allogeneic stem cell transplant uses donor cell from public cell bank.

Autologous stem cell transplant uses the patient's own stem cells. There are many uses of autologous transplant includes, no immune reaction and tissue rejection of the cells, no immunosuppressive therapy needed, and significantly reduced risk of communicable diseases.

The organs derived from the stem cells are perfectly normal and similar to other tissues , because they have grown from the same person. Stem cells offer the hope of cure of the damage such as that suffered by spinal trauma victims. Stem cells could be important to any disease to their unique property being forever young and being responsive to change.[5]

Umbilical cord stem cell banking is being mainly used today to treat blood diseases. Stem cells for every child in the family should be banked, unless the children are identical twins, their cell will not be a perfect immunological match.

Storing of stem cells

If the viable cells are present, they will be cryogenically stored and supervised until needed. The stem cell bank authority's will issue a certificate of banking, that can be used for future use. The stem cells are stored by cryopreservation technology with high scientific standards in such a way that one can receive his own stem cells whenever required.[6]

Cryopreservation is the process of preserving cells or whole tissues by cooling them to sub-zero at minus 156 degree Celsius temperatures. At the freezing temperature biological activity is stopped, as are any cellular process lead to cell death. Stem cells can be successfully stored for very long time with cryopreservation and still viable for use. These cells can be cryopreserved for an extended period of time, and when it is needed it can be thawed to maintain its viability.

The stem cells can be stored for the life. The stored stem cell from the bank cannot be given to others except the owner. All the stem cell samples are bar-coded and tracked at all times during the entire process by using good logistics systems.

Dental stem cells

Dental stem cells or dental pulp are found in deciduous teeth as well as the permanent tooth. Studies have proved that dental pulp stem cells have the ability to develop into more types of body tissue than other type of stem cells. These cells contain mesenchymal cells, which have been shown to differentiate into bone , neural tissue, dental tissue, cartilage and muscle. Future potential of dental stem cells are by generating new bone structure for fractures, weak bones. To generate cartilage for arthritis used for repairing damaged cells after heart attack, to generate cells of nerves and brain. To repair muscles in muscle weakness and also for the liver cell regeneration.

Dental stem cells are used for autologous transplants. But they can be used for treatment for the first degree relatives. The dental pulp stem cells can be taken from the children from 6=12 age group and also for adult the extraction of wisdom tooth serves as the dental stem cell. . Dental stem cells have demonstrated interactivity with biomaterials, making them for tissue reconstruction.

The deciduous teeth incisor and canine and permanent third molars are rich stem cells. The right time to recover the deciduous teeth is before the teeth become very loose, as the cell in the dental pulp will remain more viable if they continue to have a blood supply. More than one tooth can be stored in the bank. For the collection dental stem cells well equipped instruments and skilled technicians are necessary. For the collection of deciduous tooth the local anesthetics can be used. The owner of the child's tooth cells belong to the parents or the guardian until the child's birthday, then the full ownership passes to the child.[3]

CONCLUSION

The promises of cures for human ailments by stem cells have been much touted but many obstacles must still be overcome. First, more human pluripotent and multipotent cell research is needed since stem cell biology differs in mice and men. Second, the common

feature of unlimited cell division shared by cancer cells and pluripotent stem cells must be better understood in order to avoid cancer formation. When it comes to stem

cells, knowing they exist is a long way from using them therapeutically.

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