



KSRCT IEEE-EMBS Student Chapter Newsletter

*(K.S.Rangasamy College of Technology
Institute of Electrical & Electronics Engineers
Engineering in Medicine and Biology Society)*



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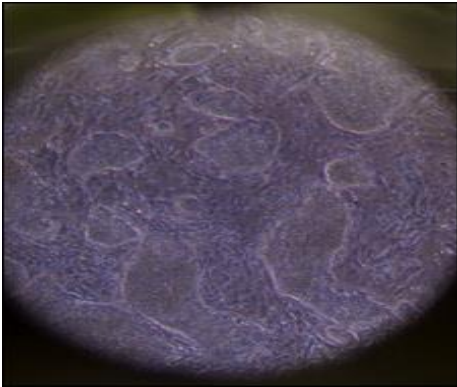
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Editors Desk

It gives us immense pleasure to present the first issue of KSRCT IEEE-EMBS Newsletter, the measure of progress. We, the editorial board members of the KSRCT IEEE- EMBS Student Chapter are rejoiced to present the Newsletter published by the Department of Biotechnology, KSRCT.

We owe our special thanks to our Chairman Lion Dr.K.S. Rangasamy MJF, Principal Dr.K.Thyagarajah and the members of the various committees for their whole-hearted support .We also thank Shri.R.Srinivashaan, Secretary and Smt.Kavitha Srinivashaan, Assistant Secretary, K.S.R. Educational and Charitable Trust, Tiruchengode for their excellent support and constant encouragement in brining out this magazine successfully every semester.

Stem Cell Therapy – A Miracle.....

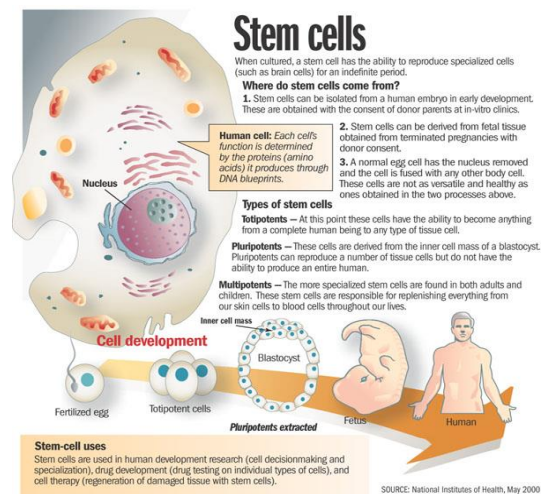


Introduction:

Human stem cell research holds enormous potential for contributing to our understanding of fundamental human biology. Although it is not possible to predict the outcomes from basic research, such studies will offer the real possibility for treatments and ultimate cure for many diseases to which adequate therapies do not exist. The benefits to individuals and to society gain by the introduction of new drugs or medical technologies are difficult to estimate. The introductions of antibiotics and vaccines, for example, have dramatically increased life span and improved the health of people all over the world. Despite these and other advances in the prevention and treatment of human diseases, devastating illnesses such as heart disease, diabetes, cancer, and diseases of the nervous system such as Alzheimer's disease Parkinson's disease present continuing

challenges to the health and well-being of people everywhere. The science deals with to the development of techniques for culturing human stem cells could lead to unprecedented treatments and even cures for these and other diseases, it is the most important proof that stem cell therapy is a medical miracle.

What is stem cell therapy?



Stem cell therapy is to repair a damaged tissue that can't heal itself. This might be accomplished by transplanting stem cells in to the damaged area and directing them to grow new, healthy tissue. It may also be possible to coax stem cells already in the body to work overtime and produce new tissue.

Goal of stem cell therapy:-

The three major goals usually cited for pursuing stem cell therapy are:

- Gaining of important scientific knowledge about embryonic development and its application to related fields;
- Curing debilitating diseases, e.g., Parkinson's, Alzheimer's, diabetes, stroke, spinal cord injuries, bone diseases, etc
- Screening drugs for pharmaceutical companies, instead of having to rely on animal models.

Area cited for Stem cell therapy

- **Diabetes**, in which insulin-producing cells in the pancreas are destroyed, impairing the body's ability to metabolize sugar
- **Neurodegenerative diseases**, such as **Parkinson's disease**, which destroys neurons in the brain, and spinal cord injury
- **Blood diseases**, including leukemia, in which abnormal blood cells are produced, and immune diseases such as AIDS
- **Cardiovascular disease**, where heart muscle tissue is destroyed during heart attacks;

- **Musculoskeletal diseases**, such as muscular dystrophy.

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Stem cell therapy for Parkinson's diseases:

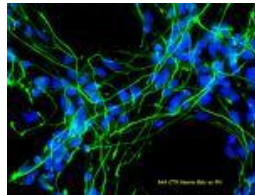
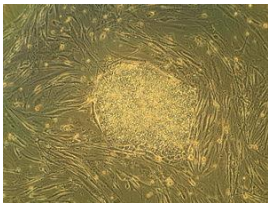
It involve more than simply transplanting cells into the body and waiting for them to go to work. A successful stem cell therapy requires an understanding of how stem cells work, combined with a reliable approach to ensuring that the stem cells perform the desired action in the body. The method for stem cell therapy to Parkinson's diseases can be categorized into five steps:

Step 1: Define the Problem

People who have Parkinson's disease experience difficulty with movement, balance and speech. These problems result from the death of specialized brain cells called dopamine neurons. These cells produce dopamine, a chemical that helps control muscle movements. The effects of the disease can be treated with drugs that help increase dopamine in the brain, but there is no known cure. Researchers studying Parkinson's disease knew that the problem was to replace the dead dopamine neurons with healthy dopamine-producing cells.

Step 2: Finding the Right Type of Stem Cell

Our body contains four different types of stem cell, based on the intensity of the disease, any one of the stem cells could they use. The types of Stem Cells are, (a) Blastocyst embryonic stem cells (b) Fetal stem cells (c) Umbilical cord blood stem cells (d) Adult stem cells. There are many different types of multipotent adult stem cells, each of which is responsible for developing into the cells of a certain type of tissue.



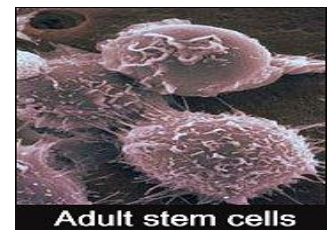
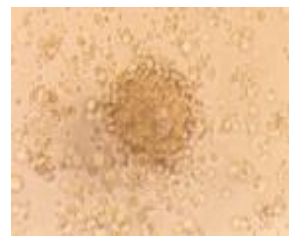
Step 3: Match the Stem Cells with the Transplant Recipient

Our immune systems attack things they don't recognize, including cells and tissues. As with organ transplants, stem cell transplants can be rejected by the recipient's immune system. Therefore, the transplanted stem cells must match the recipient closely enough that they won't be recognized as intruders and to determine whether the donor is a good immunological match with

the recipient, a tissue typing test is performed using blood samples from both individuals. This test identifies certain proteins, called HLA antigens, which reside on the surfaces of specific immune cells. If the donor and the recipient have identical HLA antigens, they are a good match.

Step 4: Put the Stem Cells in the Right Place

Delivering stem cells to the damaged tissue will usually require a surgical procedure. This procedure must get stem cells to their target destination while causing no further injury to the recipient. Surgeons placed the cells into the brains of patients by drilling small holes in the skull and injecting the cells through a needle. They used precise imaging procedures to

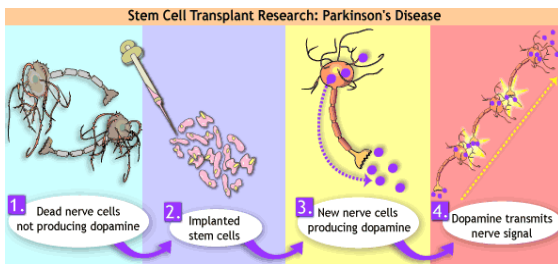
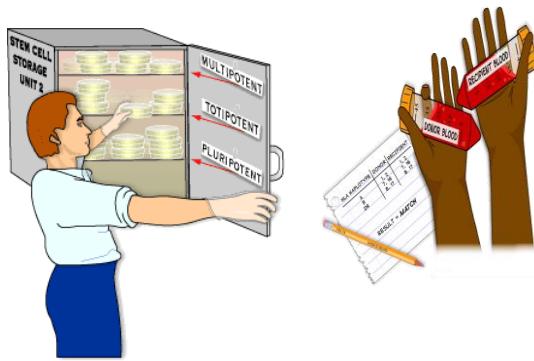


ensure that the injections reached the correct place in the brain.

Step 5: Make the Transplanted Stem Cells Perform

After the injection, it was up to the cells to survive in their new environment and produce dopamine. There was no guarantee

that transplanted stem cells would behave as desired. If they didn't receive or respond to the proper signals from their environment, they might have malfunctioned, formed tumors or died. The researchers measured the patients progress in a couple of ways. First, they used brain imaging to determine whether the implanted cells were surviving and producing dopamine. Second, they interviewed patients to see if they experienced any changes in their symptoms.



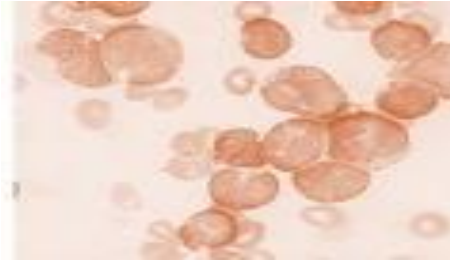
Step 1: Define the Problem

Step 2: Finding the Right Type of Stem Cell

Step 3: Match the Stem Cells Step with the Transplant Recipient

Step 4: Put the Stem Cells in the Right Place

Step 5: Make the Transplanted Stem Cells Perform



Stem Cell Therapy for Cancer.....

One defining feature of cancer is the rapid creation of abnormal cells which grow beyond their usual boundaries, that can invade adjoining parts of the body and spread to other organs, a process referred to as metastasis. Now a days different types of cancer therapy are available of which Stem cell Therapy is most emerging field.

Leukaemia cells

Protocol: There are four main steps in the process stem cell therapy for cancer

Step:1 The first step is to reduce the leukemia or cancer to as low a level as possible, using chemotherapy and/or radiotherapy. Ideally you should have no

detectable cancer, this is known as being in remission at the time of your high-dose treatment. This gives the best possible chance for the treatment to work. However, it may also be done if there is only a small amount of cancer still present.

Step:2 The second step is the collection of the stem cells from you or your donor. This is known as the harvest

Step:3 The third step is the high-dose treatment. The aim is to remove any remaining cancer cells from the body and may be treated with chemotherapy alone. Sometimes radiotherapy is given as well. This intensive treatment will completely destroy all the normal bone marrow. This step is sometimes called the conditioning regimen.

Step:4 The fourth step is to give the stem cells to the patient through a drip. This is a bit like having a blood transfusion. It will be 2–4 weeks before the cells find their way through the bloodstream into the bone marrow and start to make new blood cells.

Problems associated with stem cell therapy:

Of course it is not possible to fully anticipate side effects without actually testing procedures in humans. However as with any treatment there are potential risks involved:

- During any transplantation procedure, there is the possibility of excessive surgical damage occurring to the eye.
- As previously mentioned unspecialized stem cells, especially embryonic stem cells, have the potential to cause tumors when transplanted.
- As with any transplant procedure, there is always the possibility of the cells acting as vectors for infectious diseases.
- High cost of treatment

Stem cell therapy in India.....

Stem cell therapy and research in the country have been formulated by the Department of Biotechnology under Ministry of Science and Indian Council for Medical research. They enhanced the scientists, clinicians and the industry about stem cell research. Clinical research are being promoted by several science agencies of the Government in various institutions and hospitals.

Conclusion

The Stem Cell Therapy is a highly interactive field of life sciences and it requires close interaction of basic researchers, clinicians and the industry for the overall growth and development. Keeping in view its potential therapeutic applications, the need was felt to initiate programmes on stem cell therapy in the world level. Now stem cell therapy optimistically they are achieving better compared to the other conservative therapies.

If you want to succeed in the world you must make your own opportunities as you go. -

Quotes

Nothing can bring you peace but yourself-
Ralph Waldo

If a man wants his dreams to come true, he must wake up
- **Ronald John Britto**

Blame yourself if you have no branches or leaves, don't accuse the sun of partiality.

The man who cannot believe in himself cannot believe in anything else- **Roy L. Smith**

For they conquer who believe they can- **John Dryden**

Fear is the most damnable, damaging thing to human personality in the whole world-
William Faulkner

He that fears not the future may enjoy the present- **Thomas Fuller**

The great virtue in life is real courage that knows how to face facts and live beyond them- **D.H. Lawrence**

Health corner

Breakfast is an important meal that gives you the energy to start the day.

A healthy breakfast can include a granola bar and milk, scrambled eggs with vegetables, low-fat yoghurt with fruit, or oatmeal with raisins and nuts.

Eating a healthy breakfast will help you concentrate in class and give you energy throughout the day.

Add more physical play throughout the day.

Try to replace one hour of TV or video game time with your favourite physical activity

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