Stem Cells: Transplantation, Implications And Justification

Stem cells have been an essential part of the human body due to their remarkable ability to develop into various types of cells during the life and growth of both humans and animals. These cells have the aptitude to serve as an internal repair system to the tissues within our body by dividing throughout the body system without limitation to other cells. When a stem cell divides itself, it has the capability to either remain in its original form or, to develop into another cell with more particular functioning cells like; brain cells, muscle cells and/or red blood cells. Stem-cells are recognized and differentiated by two important characteristics; first, they are non-specialized cells that are able to replenish themselves, sometimes after extensive intervals of inoperativeness, through cell division. Second, they may be caused to become tissue or organ-specific cells with different functions within certain physiological or experimental circumstances. The rapid growth of technology in stem-cell allows helping combine the attempts of cell biologists, geneticists and clinicians and provides hope for efficient therapy of a variety of malignant and non-malignant illnesses. The first non-official breakthrough for stem-cell were back in the early 1850s where Leroy Stevens while conducting cancer research on mice came across large tumors on their scrotums which later helped them in 1868 where they successfully conducted bone marrow transplant. After an estimate of 13 years of the researcher in 1981 the official beginning of stem cells began when Martin Evans became the first to find methods of obtaining embryonic stem cells from early embryos of the mouse. Later on, Dominique Bonnet and John Dick identified cancer stem cells in leukemia in 1997. Within a year in 1998, human embryonic stem-cell was introduced to the world as a way to simplify and create easier curable methods for diseases. The use of stem-cell has become such an improvement that in 2012 it was able to cure blindness to many visions impaired.

Process of Stem Cell Transplant

Stem cells assist to eliminate the cause of illnesses that, based on the initial condition, lead to symptom decrease or complete recovery for (predominantly) autoimmune disorders and/or tissue damage-related illnesses. The process of stem-cell replacement can be conducted on anyone; however, it is essential to realize that stem cells for every disease are not a guaranteed cure. Stem cell processes may be refused to the patient for multiple reasons. The stem-cell transplant can be conducted in two different ways, both with their own advantages and disadvantages. The first is called Autologous transplant; it is when stem cells are gathered, harvested, frozen and stored by the patient themselves and then infused back into the patient after a thorough treatment. The second is called Allogeneic transplant; it is when stem cells are gathered from a corresponding donor in an allogeneic transplant and transplanted into the patient in order to suppress the disease and restore the immune system of the patient.

Examples of Stem Cells

In such areas like research organizations, universities, and hospitals around the world, stem cell research is still enduring. Currently, researchers are focused on finding ways to control how stem cells become other cell types. An example of stem cells researches includes cell-based therapies. With the assistance of previous data, it has been showcased that if researchers are able to find a reliable way to direct embryonic stem cell differentiation, they can use the cells to

cure certain illnesses. For example, they may be able to transplant the cells into humans with category 1 diabetes by guiding the embryonic stem cells to become insulin-producing cells. Other such diseases like traumatic spinal cord injury, stroke, heart disease, hearing loss, retinal disease, Huntington's disease and Parkinson's disease and other such illnesses have possibilities of being cured at a much easier rate if research for cell-based therapies continues at a constant rate. Another such example of Stem-cell research is using stem cells to test new drugs; recently it has been discovered that we can prevent drug testing on animals. An assistant professor of animal science at the University of Wisconsin-Madison named Gabriela Cezar, turned to human embryonic stem cells to find a better way to predict noxiousness in certain drugs. A new way of testing drugs in the present issue of Stem Cells and Development was revealed by Cezar and her colleagues, the method was to monitor the behavior of embryonic stem cells which are exposed to a drug aspirant compound. They study how future drugs influence embryonic stem cells could provide a far more detailed forecast of the future toxicity of a drug than typical animal models.

Level of biological understanding Before stem cell

With the use and research about stem cells growing at a rapid rate, it is important to know what thoughts were put on before the official creation began. A stem cell has been an interesting topic throughout human history, largely inclusive of debates and controversy. It wasn't until the mid-1800s when it was discovered that cells were essentially the building blocks of life as many cells had the ability to produce other cells. In the early 1900s, it was discovered that by attempting to fertilize mammal eggs outside a human body showcasing that some cells were capable of producing blood cells. However, as time passed the knowledge and understanding about stem cells has been improving due to the research that is currently ongoing. It was evident that there was a major improvement in the understanding of stem cells and ways to use them from the first data to what understanding we have now.

Biological Enhancement

With humankind taking a leap in technology, stem cell research also underwent serval major improvements that helped enhance ways to help humans treat diseases. The improvements are not only scientific but also have impacts on politics, in August 9th, 2001, George W. Bush (the president of the USA at the time) signed an order saying federal funds could only be used to study human embryonic stem cell lines that already existed. Not only Bush but President Barack Obama in 2009 signed an official executive order to repeal certain restraints on human embryonic stem cell research funds that were set by the previous government. Stem cell technology has helped improve treatments methods for various diseases over time, today with the use of stem cells the possibilities of recovering from damages in the spinal cord injury, stroke, and other such illnesses has become easier.

Conclusion

To conclude, it is evident that stem cell technology has had a major impact on the improving treatments that are given to patients. A stem cell is a very unique aspect of the growing world due to the possible solutions that can be made with its help, without the discovery of such a technology, it would've been much difficult to find a cure to deadly illnesses like leukemia, strokes heart diseases or any other such problems. As stem cells have the ability to divide into

other muscle cells, brain cells and/or red blood, it was recorded that several visions impaired were able to gain back their visions in 2012. If the research towards this topic continues at the same rate it will not be long till scientists will be able to find solutions to major issues like cancer which is killing many around the world.

Evaluation

Positive and Negative impacts of stem cells

Stem cells have been in the medical field since the 1850s and ever since, have come in use to numerous treatments holding countless positive impacts such as giving an understanding to scientists and doctors of how certain diseases occur. Due to stem cells scientists and doctors benefit the ability to watch cells mature into organs, tissues, bones and heart muscles. Stem cells not only benefit doctors but also have a major impact on patients as the stem cells can convert into other healthy cells to replace diseased cells- known as regenerative medicine- to improve patient’s health as well as cure diseases like spinal cord injuries, Parkinson’s disease and many others. This technology not only aids humans but prevents certain animals from dying due to drug testing as stem cells have the aptitude to react to numerous drugs helping researchers to create new medication for various illnesses. However, with a range of positives, there are certain negative impacts that can be led due to stem cells, an example is that with many cures, the expenses for the patients can be a handful, although this treatment is used for various diseases it has certain costs that not all patients can afford. Stem Cells take several months to harvest and to grow, it takes an estimate of 7 months for the cells to obtain its full size, while some adult stems cells from bone marrow can be very painful to obtain. Last but not least many stem cell treatments are still unproven leading to a high chance of rejections and there are many chances that treatment may not work on everyone according to their age or other factors.

Ethical Implications

A moral dilemma posed by the embryonic stem cell forces us to decide between 2 moral principles; first being, the obligation of avoiding or alleviating pain and the second being the duty to respect human life's value. However, it is impossible to regard both moral principles as the early embryo has to be destroyed in order to achieve embryonic stem cells. Another is the confidentiality of the patient and how they would want to share their personal information. Not everyone prefers to share their personal details to any other person.

Social Implications

Stem cells involve large factors of social implication due to the numerous issues that are involved for certain areas. A specific implication is the expenses of the stem cell treatment; the treatment itself costs in the thousands and not many patients are able to afford it therefore lack of the treatment will increase the risk of their death at over 60% more than the normal death rate. Such diseases like leukemia are highly likely to spread so it is very important to treat them as soon as possible. However, due to financial problems, some patients would be unable to afford the fees of the treatment causing them to other inefficient cures or would fall into deep depth after the transplant. Another social issue would be that not everyone has the accessibility to such efficient treatment, in developing counties around the world people lack such important

necessities like food and stem cell treatment is farfetched from their convenience therefore deaths have been thoroughly increasing overtime nonetheless many people around the world volunteer to help the underprivileged population.

Conclusion and Justification

In conclusion, from the research provided it is clear that stem cells consist of both good and bad aspects, the ethical implications clarify the moral principles and how both are unable to be implied at the same time however, no good comes from any. Nevertheless, stem cells can also be affected socially as not everyone has the accessibility to gain such treatments around the world due to the costs and other finical issues. In the future if the research continues to exceed at the same rate, we will be able to find solutions to numerous other diseases and cure them much easily then we do now.