Embryonic Stem Cell Research

How the developments in your chosen technology has advanced biological understanding.

Embryonic stem cell research is defined as the specific area study that researches stem cells obtained from the undifferentiated inner mass cells of a human embryo and its potential use in medicine. Each embryonic stem cell can renew itself and can develop into more than 200 cell types of the human adult body if it is detailed to do so. The foremost goal of embryonic stem cell research is to use the information to treat diseases and injuries.

In 1981, Martin Evans, an English biologist from the University of Cambridge, and Matthew Kaufman discovered embryonic stem cells and removed them from mice. They grew embryonic stem cells in laboratory conditions. Embryonic stem-cell research was born. Seventeen years later, Americans James Thomson and John Gearhart isolated and cultured human embryonic stem cells and grew them in a science lab. In 2010, Geron from Menlo Park, California ran a trial for medical treatment derived from human embryonic stem cells. This resulted in a person becoming the first to be involved in the treatment of this kind. In 2013, led by Shoukhrat Mitalipov from Oregon National Primate Research Centre in Beaverton, he and his colleagues developed human embryonic stem cells from fetal cells.

Embryonic stem cells are valuable to the medical field. Most embryonic stem cells are unused embryos that develop from eggs which have been fertilized from IVF and then donated for research purposes. The other way in which scientists obtain embryonic stem cells is through therapeutic cloning, the technique creating multiple copies of the same stem cell. At three to five days, the embryo develops into a ball of cells called a blastocyst. Human embryonic stem cells are cultured by relocating cells from a blastocyst stage into a plastic Petri dish that contains a culture medium. The nutrition-rich culture medium contains agar. The culture medium is ideal for embryonic stem cells to grow and divide. The cells divide and spread over the surface of the dish. If the cells divide and multiply into large amounts, the cells are separated into new Petri dishes. The process of subculturing the cells is repeated many times and for many months, before it can be used for research purposes. If the cells continue to grow without differentiating, then the scientists have a stem cell line. Cells are not always placed into cell-lines. Cell lines can be frozen and shared between laboratories. The embryonic stem cells can be used for research after at least three months of culturing.

Cell-based therapies involve the use of embryonic stem cells. California’s Stem Cell Agency is conducting disease programs and medical trials currently ongoing in stem cell research. They use stem cells to replace damaged cells in the inner ear which would normally detect sound, helping to restore hearing and altering the genes of stem cells to make them resistant to diseases, such as AIDS, and then inserting them into people with the disease. Embryonic stem cells are also used to discover, screen and test the effectiveness of drugs. This means that animals don’t have to get wasted to test the effectiveness of drugs. This is because embryonic stem cells can produce similar tissues as humans.

Before embryonic stem-cell research was discovered, medicinal purposes could not be explored

to the same extent it is today. Scientists had limited or even no knowledge about embryonic stem-cells. Now embryonic stem-cell research has opened many possibilities of medicinal use to cure illness, diseases and run therapies. Cell-based therapies are now possible. Scientists have been able to find answers to some of their questions and more are yet to be answered. Scientists and researchers use embryonic steam-cells to understand genetic processes, discover and screen new drugs, learn about diseases in the lab, create cellular therapy application and increase understanding of how diseases occur. Embryonic stem cells have the flexibility to change into any cell in the human body.

In conclusion, the discovery of embryonic stem-cells has and will further positively impact the medical field and society. Cell-based therapies, treatments and medicine can be created in order to cure illness and other medical-related- problems.

Evaluate the social and ethical implications of your technology on society

Embryonic stem cell research is the study of five to seven-day-old human embryos and its potential use in medicine. Embryonic stem cells are intended for growth and repair and can transform into any type of cell if needed. Embryonic stem cell research positively impacts the medical field. Stem cell therapy is extremely expensive and not many patients can afford it. Ethics, morals and societal beliefs are challenged in order to research embryonic stem cells.

Embryonic stem cell research has an extremely positive impact on the medical industry. Out of all the types of stem cells, embryonic stem cells have the best potential and are most likely to be used for treating diseases due to their unique properties. Embryonic stem cells in culture dishes in a science laboratory replicate at a very fast rate. Thus, a limited number of cells can rapidly grow into a much larger amount in a substantial amount of time. This makes them useful sources of information for research and creating medicine. For instance, scientists could learn how to treat or prevent relevant illnesses by studying how stem cells develop into specific types of cells.

One of the main areas of interest for researchers and scientists is embryonic stem-cell treatment. Many birth defects, complications and other possible issues are caused due to unusual cell-division and differentiation, tend to develop during pregnancy. Embryonic stem cells have the possibility to be used as a treatment for several other medical disorders. For example, heart diseases, Parkinson’s disease, diabetes, cardiovascular diseases, spinal cord injury, Alzheimer’s and vision impairment as embryonic stem cells have the potential to produce insulin, replace neutrons and replace almost any tissue or organ in the human body. Studying embryonic stem cells could lead to a better understanding of how embryos develop and may even lead to treatments that can identify and solve potential problems before it happens. Embryonic stem-cell research is positive for the medical industry and for humans alike.

In contrast, embryonic stem-cell therapy is costly. American medical clinics charge roughly $USD10,000 per treatment, with many of the clients needing to have more than one medical procedure. Elsewhere, it is more even expensive, costing at least twice the amount. Sometimes, it costs ten times the amount. As a result, not many people can afford the treatment required. Most clients requiring embryonic-stem-cell research hold fundraisers to receive the essential

amount of money. In addition, profit levels are extremely high for practitioners as they take short cuts, endangering patients wellbeing and health. Embryonic stem-cell therapy is expensive, not enabling the accessibility for all patients.

Embryonic stem cell research is a big ethical dilemma as it forces us to choose between two moral principles, the duty to prevent or reduce the suffering of people and the duty to respect the value of human life. Embryonic stem-cell research makes it is extremely hard to respect both moralities. The two moral values of respecting human life and preventing or reducing the suffering of people are contradicted in the procedure of obtaining embryonic stem cells. The duty to respect human life is broken. Getting hold of an embryonic stem cell includes the embryo to be destroyed. This means losing a potential human life. Killing a human is not morally correct. Embryonic stem cell research is based on obtaining an embryo. On the other hand, embryonic stem cell research could lead to the finding of new medical treatments that would benefit many people, supporting the moral principle of the duty to prevent or lessen the suffering of individuals. Ethics are challenged for embryonic stem-cell research to take place.

Stem-cell research also faces many social implications. Some people argue that the process of obtaining embryonic stem-cells involves destroying embryos that have the potential to grow and develop into humans. Others support embryonic stem-cell research as the embryo hasn't yet developed into a foetus, meaning that life isn't wasted. Scientists say they have no proper evidence mentioning that they are potentially killing a foetus for research. For those who believe God created people, they don't think it's correct to make or create lives through lab-fertilized human eggs. The people who are against stem-cell research think that an embryo deserves the same amount of respect as any human. They question if science is being taken too far and if it is a priority over potential human lives. Society can be very opinionated regarding embryonic stem-cell research.

To conclude, although there are positives and negatives of embryonic stem cell research, the positives research vastly outweighs the extent of negatives. Embryonic stem cell research is significantly beneficial for society as embryonic stem cells can be studied for medical purposes, ultimately curing diseases and implications. Further research will improve scientists' knowledge of embryonic stem-cells and related illnesses while providing more clarity into the success of stem-cell in the medical field. Scientists will have a better understanding as to how diseases and conditions develop, eventually helping humanity.

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