



Stem Cells: Medical Jack of all Trades

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Abstract

Rumor has it, stem cells have been used to make the blind see and the disabled walk. We explore how stem cells may be used to cure cancer, correct spinal injuries, treat Parkinson's Disease, delay aging, and more. While stem cells have the potential to save lives, there are many ethical issues surrounding their use in research or in clinical trials, prompting society to question when moral lines must be drawn. Many conflicts arise from the use of embryonic stem cells, and we will investigate how new developments in genetic engineering may solve this dilemma.

Background

Properties of stem cells

- Undifferentiated
- Can become specialized
- Can replicate indefinitely

Totipotent:

- This cell can differentiate to become a new organism
- e.g., a zygote, or fertilized egg

Pluripotent:

- This type can differentiate into any tissue or body cell
- e.g., an embryonic stem cell

Multipotent:

- This cell type can differentiate into specific tissue types, depending on its location in the body
- e.g., a stem cell found in the stomach lining

Justification

1. The blastocyst must be treated with respect appropriate to early human embryonic tissue.
2. Women/couples donating blastocysts produced in the process of in vitro fertilization must give full and informed consent for the use of the blastocyst in research and in the development of cell lines from that tissue.
3. The research will not involve any cloning for purposes of human reproduction, any transfer to a uterus, or any creation of chimeras.
4. Acquisition and development of the feeder layer necessary for the growth of human embryonic stem cell lines in vitro must not violate accepted norms for human or animal research.
5. All such research must be done in a context of concern for global justice.
6. All such research should be approved by an independent Ethics Advisory Board in addition to an Institutional Review Board.

Pros

- We have a moral obligation to use our medical expertise to save existing humans, even if it means destroying the potential for life in embryos.
- Supporters argue that as long as the mother or parental figure gives consent for the fetus to be used for medical research, then the ethical problem is resolved.
 - If in the case of an abortion, the mother gives consent for the fetal tissue to be used for research, then there is no direct correlation between her donating her fetal tissue and the abortion.
 - If there are spare cells after an IVF treatment is performed, then either the cells must be preserved indefinitely, destroyed, or used for research purposes. If they are preserved indefinitely, then their purpose is delayed and their identity is changed. If the cells are destroyed, then the potential for human life is destroyed, and the potential benefits that may have arisen from the research done on them is terminated.
- Another popular argument is that embryonic stem cells aren't embryos, and therefore don't have the potential to become a human.
 - Scientifically, this argument is valid, since zygotes are totipotent and embryonic stem cells are only pluripotent.
 - While a fetus must be destroyed to obtain embryonic stem cells, the actual use of the cells is not unethical, since they don't have the potential for human life.

Potential Applications

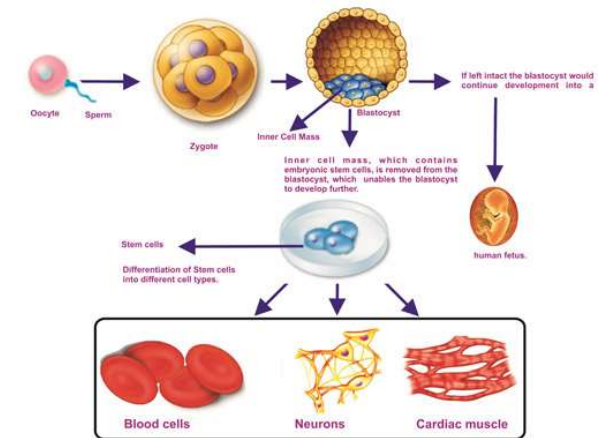
Stem cell research has unlimited potential for the medical community

- Curing cancer
- Curing Cardiovascular Disease (CVD)
- Replacing organs
- Helping burn victims
- Treating Alzheimer's Disease and Parkinson's Disease
- Bioengineering limbs
- Curing diabetes
- Helping those with genetic disorders
- Repairing or replacing damaged neurons
- Treating spinal chord injuries

Cons

Cons/reasons its unethical

- Fetuses have the potential for life, and an "identity"
- Religious reasons
- Consent was not obtained from the fetus itself
- Cloning is unethical



Conclusion

There still remains no clear solution for ethically performing embryonic stem cell research without compromise. Both sides will believe that their morals are compromised, so since there are immediate issues that need to be solved, we are forced to choose the best option for the time being. Since genetic modification and Induced Pluripotent Stem Cell research are not advanced enough, we must continue on with embryonic stem cell research. Of course, this must be done with the utmost respect and for the betterment of humanity.