

“The Beneficial Impact of Stem Cloning on Diabetic Patients and How its Efficiency can be Improved” - LOGBOOK

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February 18th- We brainstormed the different topics that we might base our project on:

- **Treating damaged nerves using gene therapy.**
Genetic Engineering Makes Paralyzed Mice Walk Again (futurism.com) (2021)
Explain how gene therapy/gene editing works
How gene editing can heal damaged nerves
Extreme risks gene editing poses(for example introducing foreign genes)
Ethical Concerns
Improving gene engineering efficiency
- **The beneficial effects of stem cloning on aid treatment for diabetes:**
Cloning used to make stem cells from adult humans in diabetes breakthrough | Daily Mail Online (2014)
Discuss that cloned stem cells are able to produce insulin that could offer a potential cure for diabetes.
Talk about the dangers of cloning and the low success rate: Dolly the Sheep
Talk about ethical concerns:
Op-ed: The dangers of cloning - Fung Institute for Engineering Leadership (berkeley.edu)
Talk about how cloning efficiency could be improved
- **Skin grafting using genetic engineering**
Gene Therapy Skin Grafts Save Boy With Rare Disease (nbcnews.com)(2017)
Gene therapy provides hopeful treatment for EB
Research of EB (Epidermolysis Bullosa)
Also known as butterfly skin,(condition where the body lacks the ‘glue’ to keep skin attached securely.
Blisters, scabs, and deep wounds can form just by hitting a corner)
Access to Gene Therapy (scu.edu)
How gene therapy can correct cells to produce the ‘glue’ which allows the healing of skin cells.
Dangers of gene therapy in skin grafting
Ethical concerns

February 21- We decided that we wanted to do “The Beneficial Effects of Stem Cloning on Aid Treatment for Diabetes.” Additionally, we did some research on the different types of diabetes:

Type 1 diabetes is a long-term condition in which the pancreas creates minimum amounts of insulin. There are various factors which contribute to type 1 diabetes, such as genetics or viruses. Despite the research dedicated to type 1 diabetes, this chronic condition has **no cure**. However, treatment aims to prevent further complications by managing glucose levels in the bloodstream via insulin.

Prediabetes refers to high concentration levels of glucose in the bloodstream. However, the blood sugar level isn’t excessive enough to be identified as type 2 diabetes. If you are diagnosed with prediabetes, long-term complications of diabetes may already be affecting your body. However, progression from prediabetes to type 2 diabetes can be avoided.

Type 2 diabetes results in excessive amounts of sugar in the bloodstream. This can lead to further complications of the circulatory and nervous systems. Potential problems leading to type 2 diabetes can be that the pancreas is not producing the required amount of insulin needed, or that the cells are not taking in as much sugar.

February 22- We researched various studies and clinical trials that were done on the topic and researched stem cells.

- [Stem Cells Made From Cloning Diabetic Woman \(nbcnews.com\)](#)
- [Clinical Trial Tests Stem Cell Therapy to Cure People with Type 1 Diabetes | diaTribe](#)
- [Stem cell cloning may be aid treatment for diabetes - CBS News](#)

Stem Cells are the cells from which specialized cells are produced. Stem cells often divide to form more cells, identified as “daughter cells.” These daughter cells now become specialized cells, for varied functions such as blood cells, nerve cells, muscle cells etc. Stem cells are the only cells in the body capable of generating new specialized cells.

February 24- We started doing our slides. Firstly, we did some background research on the different types of diabetes, diagnostic methods, and current treatment. Secondly, we did research on the important roles of insulin and glucose. Lastly, we provided different statistics that depicted the results of a 2017 survey (Statistics Canada).

February 27- We completed the Basic Information section on the CYSF Portal.

February 28- We came up with a problem/testable question and formulated a hypothesis.

Problem/Testable Question: *“Can stem cloning offer a potential cure for diabetic patients? If so, could cloning efficiency be increased to support a higher success rate?”*

Hypothesis: If stem cloning efficiency is increased, then stem cloning could provide a potential cure for diabetic patients, because stem cells can be grown in labs and modified to become islet cells (groups of endocrine cells scattered throughout a tissue in the pancreas responsible for secreting insulin and glucagon) that can produce insulin (these cells can be transplanted into someone with Type 1 diabetes).

We also did some general stem cell research:

Where do stem cells originate from? Over the years, researchers have determined several sources from which stem cells originate from.

Embryonic stem cells: Embryonic stem cells develop from embryos (“unborn offspring in the process of development”) usually embryos that are 3-5 days old. Embryonic stem cells are very versatile, and have the potential to divide and become various types of cells in the body. Since embryonic stem cells are pluripotent, they can be utilized to regenerate damaged tissue or organs in the body.

March 4- We wrote down the process of curing diabetes by stem cloning. In addition, we discussed what SCNT was (Somatic Cell Nuclear Transfer). We also discussed VX-880 therapy which offered treatment for T1D patients with extreme hypoglycemia.

VX-880 Therapy: This was the first stem-cell derived therapy that was found successful in clinical trials and could be offered as a treatment to T1D patients that are diagnosed with severe hypoglycemia (blood sugar levels drop below 4 mmol/L).

March 9- We researched the history of cloning, ethical concerns, the low efficiency rate of cloning, as well as how cloning efficiency could be improved.

Stem cloning efficiency rates are low due to certain barriers in the SCNT method preventing successful cloning. One of the factors contributing to the low efficiency rate of SCNT, is gene activation. Through an experiment conducted by Yi Zhang, he found that many embryonic genes in the donated nucleus were inactivated.

March 10- We finished writing the conclusion for our project.

March 16-18- We worked on filling out all the sections in the CYSF portal and wrapped up the project.