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Members of Congress, I invite you to welcome the beginning of the end. An end of a disease ridden nation, of pain and suffrage. An end to healthcare debt, and most importantly an end to substandard beings. Genome editing, also known as genetic engineering is pushing boundaries and could be as prevalent as vaccines, perhaps even replace them. This technology has the potential of dissipating hereditary diseases such as muscular dystrophy, autoimmune disorders, cancers, acute and chronic illness, the list goes on. Though it is not possible without the support and backing of government funding. The National Institutes of Health, (NIH), the largest biomedical institution in the world has already partaken in a somatic cell program for the improvement of genome editing techniques. This step in the right direction requires additional patronage if rapid progress is to be made. I challenge you, to explore the realm of a future in which healthcare costs are diminished for the simple reason that new generations will be healthier; A world of low crime and high IQs. This may sound far-fetched, something out of a sci-fi film, but in reality, its right around the corner, we just have to give it the green light.

The Humble Beginnings

Paul Berg, an American biochemist and Nobel Prize winner, known as the father of genetic engineering, was the first person to create a method of gene-splicing and joining the DNA from two different organisms in 1973. His technique although a triumph was too laborious, as are most blueprints for brand-new developments. Within the year, revisions were made by Hubert

Boyer at UCSF and Stanley Cohen of Stanford University, when the discovery of an enzyme increased productivity immensely developing into what is now the foundation for modern gene editing (The Science History Institute, 2017). This is a mere example of evolutionary breakthroughs that are only possible through initiative. These scientists didn't stop there, they explored complex cloning experiments, recognizing the possibility of using bacteria to duplicate the body's fighting mechanisms to remedy birth disorders (Science History Institute, 2017), leading to the birth of the biotech industry. Fast-forward eleven years, synthetic insulin, made from bacteria containing human insulin gene was approved by the FDA. Deeming it, the very first genetically engineered human drug (Jacobsen, 2018).

Just in the past 40 years, technology has hit mile stones that no one could have fathomed. We have explored space and the ocean, mastered compact communication in an index-seize device that sits comfortably on our person everywhere we go. We have created countless vaccines that have eradicated disease that once wiped out entire populations, and continue to successfully increase life-expectancy. What once seemed mere fiction is now our reality.

CRISPR the Feared Science

A new form of eugenics is receiving the attention of the world. Clustered Regularly Interspaced Short Palindromic Repeats, CRISPR-Cas9, is a versatile technology pertaining to single-celled prokaryotic microorganisms composed of guide strands of RNA and the Cas9 enzyme, responsible for removing, or cutting the identified problematic cells (Thulin, 2019). In short, it is a cut-and-paste technique in which scientists sever a section of germline

mutations to replace it with a desired gene. What the somatic cell program is focused on is the alteration of adult cells, ones that only affect that one individual and not their offspring. The creation of coined term, designer babies, is a separate but just as important matter. The focus is to impact the structure of new embryos so the newly crafted DNA will be part of the composition of their future bloodline. Through the process of in-vitro fertilization, the RNA acts as a guide for the added enzyme to travel to the nucleus of a cell which is responsible for genetic information within DNA. It targets the repair or discharge of a specific gene and “ unzips it”, the cell then goes into repair mode and mends the interruption. At this point the cells are customized to desire and the process is complete (Hesman-Saey, 2017).

A consequential factor to this miracle tool embraces longer, dramatically healthier lives. “ From 1991 to 2004, life-expectancy in US improved by 2. 33 years, mostly by medical innovation (discovery and availability of new drugs) but also addressing problems like smoking and obesity” (Mishra, 2016). If improvements for longevity exist today, how far can we be from factoring out the genetic predisposition to obesity? If we got it right, it would mean less people would suffer of diabetes, arthritis, cardiovascular/respiratory disease and even cancers.

The NIH awarded an approximate of eighty-six million dollars to improve somatic cell genome editing techniques. The director of NCATS, Christopher Austin said, “ Human genome editing technologies have opened up many far-reaching possibilities to treat disease…the intent is that these newly funded initiatives will help speed the translation of genome editing to the

clinic and to a greater number of patients with what are currently intractable illnesses and conditions” (NIH, 2018).

This action shows that we do not shy away from murky waters, but instead, dive headfirst. The obvious interest in this technology opens the door for new legislation in the near future. Like immunizations, we could prevent a child from attending public school without genetic modification. In theory, the enhancements being made are heritable, ensuring that following generations are cleared from ancestral diseases and pass along desired traits.

Change does not come Without Controversy

Sharon Duchesneau and Candy McCullough, a deaf lesbian couple asked for a unique trait when conceiving their embryo from a deaf sperm donor and that was, to create a deaf child. Because both women had lived with this impairment their entire lives, they considered deafness a culture and not a disability (Savulescu, J., 2002). Even in modern times, changing your God-given body internally or externally is a topic of taboo. The aim for medicine has always been used to improve quality of life, not impair it. But is a child raised in a loving home, able to communicate with both parents even up for debate? Similarly, are parents that request a darker skinned child to reduce the risk of melanoma. (Savulescu, J., 2002)

With any medical procedure, drug or treatment, there are risks involved, yet people continue to accept them for the sake of improvement. If we tippy toe around the controversy in fear of the gray area of ethics, we could be missing out on the most powerful movement in history.

Where America Stands

Some of the first genetic therapy trials were without success, such as the 1999 experimentation involving an eighteen-year-old by the name of Jesse Gelsinger. Jesse underwent a procedure to correct his inherited metabolic disorder, ornithine transcarbamoylase deficienty, which meant he lacked the ammonia-digestive gene. A dose of it was inserted via injection directly into his liver and his body rejected it, causing multiple organ failure and ultimately death. Investigators faulted the team of not providing the patient and family sufficient information on the risks and side effects. His death got the attention of the FDA who put a halt on this and over sixty other gene-therapy trials for " citing a failure to train staff adequately, develop basic operating procedures and obtain informed consent". It resulted in a lawsuit, but most notably paved the road for the creation of new regulations for all gene-therapy trials in the U. S. (Sibbald, 2001). Today, gene therapy is limited to the research setting and only a few licensed products are available for purchase. The genetic interference of embryos is strictly forbidden at this time, leaving lead way to countries like China, Japan, Russia, India Ireland and recently the UK.

When reviewing polls of American public opinion, there is no doubt there are apprehensions in the amendment of genes, but even with mixed feelings, " seven in ten favor one day using this technology to prevent an incurable or fatal disease a child otherwise would inherit" (Neergaard, 2018). Such positive feedback is the determining factor of whether or not greater efforts should be made to open human trials. After all, it is what the people want.

The all time influencer, Media

Anticipating this topic on news networks, political debates and social media is a certainty. Where infertility used to be a private and shameful matter, celebrities today are unapologetically speaking out about reproductive concerns and are sharing their test tube journeys publicly. The influence television and the internet have on people of all ages truly impacts their acceptance for plastic surgery, fashion, and even health topics.

Genetically modified organisms are within the territory of genetic engineering. Living organisms are artificially manipulated to be bigger, brighter and tastier. They are resistant to toxic herbicides, grow in lenient conditions and have a longer shelf life compared to organic foods. The catch? We don’t yet know the long-term consequences, but that doesn’t stop Stars from shaming the products. The results have been an increase of sales of organic food.

Once genetic editing becomes available for the public, popularity and demand are sure to increase via spotlight coverage.

Benefits Outweigh Cost

There are approximately 10 percent of women and seven percent of men facing infertility in the United States alone. The ones that choose the assistance of IVF account for one to two percent of all national births, that is about four million per year. If the introduction of CRISPR was made to these patients as a government aid to combat disease, we could estimate a successful decrease of hereditary disease by 89 percent. Numbers like these

are irrefutably worth it. In comparison to the ethical concerns of future generations not having a say in their own genetic composition, this argument is frivolous, as efforts to reduce illness is an overall contribution to the quality of life for these families. The possibilities are truly endless when altering genetic composition. Sure, physical traits could also be tweaked, but that would be stepping into non-government funding trajectories. Instead, focusing on an immunity to HIV, HPV, Measles, cystic fibrosis, lupus, and conditions such as blindness have life altering magnitudes that no other treatment has to offer.

By detaching mental illness, it means to provide families with a second chance for generations to come. Crime and suicide rates would plummet. There are two million people booked in jails at any given time with mental illness. That accounts for fifteen percent of men and thirty percent of women in national jail population (National Alliance on Mental Illness, 2019). Keeping in mind the average annual cost per incarcerated individual is thirty-one thousand dollars. These numbers are unacceptable, unfortunate but can be changed.

Conclusion

It is too early to decide if this manipulation of genes will become an acceptable way of disease prevention globally, but the efforts are undefinably positive. I anticipate in the foreseeable future, a total government participation for the exposure of genome editing in order to offer an alternative future for its people. The progress science has made over

a handful of decades is nothing in comparison to the potential is has to become. Allow our nation to lead in example as we always have.

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