The Genetic Modification of Embryos for Desired Traits and Genetic Diseases

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Introduction

Genetics is a branch of biology that studies genes, heredity, and genetic variations. The research enables scientists to understand the genetic makeup of cells. (World Health Organization, 2021) This has resulted in many positive and negative impacts on the medical industry, leading us to our research topic. Is the genetic modification of embryos and genetic diseases worth the benefit? (National Academies of Sciences, Engineering, and Medicine, 2023) Genetic modification of embryos means changing embryo genes to introduce a new trait that would not occur in reality or turn off undesirable genes to make the organism healthier and fit. (The Royal Society, 2023) This process makes it possible to determine the characteristics of an organism by altering its genome. The process involves turning off the defective gene, silencing an undesirable gene, or introducing a foreign gene into the genetic makeup of an organism to come up with the most desirable trait. (National Institutes of Health, 2024)

So, is genetic modification worth the benefit? The process could have its good and bad sides. Genetic modification of embryos is yet to be legalised in most countries. Though it could amount to the greater good, some critics argue that this amounts to playing God. There are also significant concerns about possible high prices involved in the process, and there are fears that only the rich will be able to pay the prices. Based on this topic, I believe genetic modification is the way to go. The argument that nature is inherently good is based on a fallacy because, over the years, we have witnessed generational diseases that affect millions of people, which could be treated through genetic modification. According to scientists from the Institute of Hope, the same opinion has been raised that embryo development could lead to safer and more successful treatments in fertility, for example. If well managed, genetic modification could reduce widespread human suffering globally by lowering diseases and introducing more desirable traits among humans and other living organisms.

Is the genetic modification of embryo attributes and genetic diseases worth the benefit

Genetic modification of embryos is on trial in some countries, especially the U.S. As seen earlier, the process involves altering the DNA code of embryos to eradicate or correct some genes. To support these, genetic modification has many advantages such as protection from inherited diseases, a healthier and prolonged lifespan, a better manageable future, and better looks. They are as discussed

below:

Protection from inherent diseases

Genetic engineering has largely contributed to the elimination of diseases. This has been possible as a result of gene manipulation through the use of biotechnology. The most recent technology is CRISPR, where a human embryo's DNA can be improved. According to a report from the National Academy of Medicine, U.S. (2017), the genetic changes that are made are inherited by the subsequent generation which, if done well, may result in future positive traits in humans. However, it also argues that the results could have contentious impacts and may not be ethically right. It proposes that gene editing should be considered when no other alternatives exist in treating serious genetic disorders. Inherent diseases are passed from parents to offspring. Genetic engineering can, therefore, prevent the flow of these disorders and result in a generation free of inherited diseases. Getting rid of these disorders could be the biggest achievement in the history of medical science. Treating genetic mutations could be among the solutions to treating genetic disorders, as they are known to cause many diseases and syndromes. Among the illnesses that can be managed by genetic modification are some types of genetic blindness, heart attacks, Sickle cell anaemia, HIV, and Haemophilia.

Healthier and prolonged lifespan

Biomedical gerontology is the science behind the study of slowing or reversing the ageing process. In his efforts, Craig Venter(2014), founded a company, Human Longevity Inc., which is concerned with scientific studies and research to end ageing through cell therapy and genomics. The ageing process is characterised by damage to tissues, cells, and macromolecules initiated by genomic instability. To solve this, gene therapy to reverse the ageing process has largely expanded the lifespan. With reduced disease inherent diseases, on the other hand, it has led to increased lifespan among children as they don't face premature deaths and the society at large. Genetic engineering has also resulted in improved immunity, making humans less vulnerable to diseases. With better immunity, improved life resulting from anti-ageing care, and healthier bodies, gene editing is the key to prolonged life.

Manageable future

Through genetic modification, the future is made better. The future of any society or country is based on its future generation. Genetic engineering technology has made it possible to screen children before birth. In this way, potential disorders can be detected and treated accordingly before birth, protecting the children from the harsh realities of the future. The result is a healthy population that can rapidly develop. The biggest possible growth in genetic engineering, much-awaited, is where a fetus with genetic defects can be treated through genetic therapy to come up with a Designer baby.

Here, a couple can choose the features of the unborn baby. According to Carolyn A. 2012, recent developments have made it possible to scan and test for every embryonic cell for harmful and defective cells, for example, addiction to alcohol, obesity, lactose intolerance, heart problems, and genes linked to intelligence. These genes can be technically altered to create the fittest human species.

Better looks, health, and intelligence

Genetic engineering has greatly assisted in correcting defects in looks and intelligence for offerings. Through CRISPR-Cas9, longer stretches of DNA can be altered to delete, add, or replace any sequence of desired DNA. Genetic engineering has also made it possible for parents to refine the genetic content in their DNA to change their looks, mental power, and physical capabilities and change skin, eyes, and hair colour through a simple injection.

Counter position

Considering the many positive impacts associated with genetic modification of the embryo, there are significant concerns on the ethical grounds of the process. There are also negative impacts as far as the process is concerned. Many researchers have questioned the well-being of the genetic engineering of embryos, and the following concerns have been raised.

On ethical grounds, genetic modification has raised more concerns than good. First and foremost, it has been attributed to playing God. According to the England Journal of Medicine(2015), there is a need for caution in implementing this transformative research. Playing God here means that scientists perform roles meant for God and God alone. This has resulted in fears; people fear the impacts that this knowledge would lead us to. Genetic modification has also been significantly attributed to the loss of genetic diversity among humans.

On intelligence, intelligence is a vague concept. Studies have shown that intelligence does not solely depend on genes. It has, therefore, proven hard to identify genes associated with intelligence, and for that matter, it’s easier to facilitate the growth of neurons and modify chemical levels, but it is very hard to alter the connections inside the brain. This has shown that it is next to impossible to improve the intelligence level of an adult. However, intelligence levels could be considerably raised in embryonic fetuses, hence the designer babies. But is this fair? Most people or parents would object to this because it would result in a genius generation. This would make parents look pathetic and also create a generation where people think the same.

The embryonic genetic modification could result in severe impacts on the area of immunity. Our genome is enormous, consisting of approximately 4 billion base pairs. Out of these, only a few have been linked to diseases, resistance and traits. It would, therefore, take so many years before scientists can conclusively agree on the rest. This means that gene modification could backfire and

result in adverse impacts. For example, in the event of a disease or disorder, we could introduce something new, a deadly disease that could prove hard to eliminate. In the case of Designer babies, this could lead to other complications associated with pregnancies like stillbirth, miscarriage, or premature births. According to the journal on Energy Conserve For The Future(2016), if some diseases exist by luck, and we don't, the world will be overpopulated. In fact, currently, living longer is already causing problems in the world. In the long run, this could lead to unsolvable problems.

According to the Major Report(2017), most scientists are in agreement that much is needed before clinical trials on "Germline" therapies can be done on a human. The report also stresses the importance of educating the public, scientists, and patients on the benefits and risks involved in the process. Genetic modification of the embryo is a topic full of controversy. Most people are a bit worried, and the question of it going too far in the future occurs. However, with the increased rates of genetic disorders, genetic engineering will go far.

Most countries around the globe have laws governing the genetic modification of embryos. These laws govern and highlight what is allowed as far as genetic embryonic modification is concerned. However, the laws vary depending on the countries.

Conclusion

Embryonic genetic modification involves altering the genetic makeup of an embryo to make it more desirable in terms of genetic content. This will assist the embryo in being more immune to diseases. The process can also involve other aspects such as intelligence, looks, the colour of the skin, and eyes, among other traits that could be enhanced. The process has yet to be legalised in most countries because of the many ethical concerns that have been raised regarding it. Morally, some critics argue in support of the process, while other parties, especially the religious leaders, criticise the process, saying it amounts to playing God.

As far as I am concerned, genetic modification is here to stay. With the increased rates of genetic disorders, scientists are spending more time studying genetics so that they can assist in solving this menace, which has affected families globally. The process is characterised by some benefits, ranging from increased immunity to a healthier and longer lifespan. Despite the minimal challenges, genetic embryonic modification has proven to be the best achievement in the medical fraternity. Various killer diseases have been solved with parents getting genetic advice based on their future offspring. Governments should uphold this science and assist their citizens in solving various medical problems associated with genetics. However, laws and acts governing the process should be strictly followed to minimise risks associated with this process, which could be detrimental if not checked.

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