Genetic modification of babies

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 One of the most interesting biomedical advances brought by the new technologies is genetic engineering/modification. Designer babies are the term most commonly adopted for the babies whose gender has been altered with the aim to either include a gene or remove a particular gene linked with a disease. Genetically modified babies or designer babies are the product of rapid advancements in genetic technology. The 21st century has been marked as the period that made designer babies a real possibility. As a result, this was inserted officially to the *Oxford English Dictionary*, and it has also remained a hot topic of bioethical debate (“Ethics of Designer Babies | The Embryo Project Encyclopedia,” n.d.). Human gender modification takes place by utilizing the direct molecular engineering techniques for manipulation of the genome. These techniques have also been named as “gene editing.”

Designer babies are created by the technique using In Vitro Fertilization and Preimplantation genetic diagnosis (PGD). IVF is used to remove a certain cell from the embryo and utilizing PGD the cell is genetically tested. Grounded on the results parents make choices about which gene they want to remove and which one they wish to implant in the womb. Human gender modification can be used into two different means, “somatic genetic modification” and “germline genetic modification.” The former adds, cuts, or alters genes in few cells of a human to improve a medical disparity while the later deals with making alterations in the eggs, sperms and early embryos. It is also referred to as “gene editing for reproduction,” and appears in every cell of the person who is the product of that gene editing. This form of gene editing is prohibited by law in many states (“Human Genetic Modification | Center for Genetics and Society,” n.d.).

# Brief History of Designer Babies

The initial cases of human gender modification took place in the United States, England, and Australia. The foremost designer baby was produced in the year 2000 in the US named Adam Nash. The baby was produced by the Reproductive Genetics Institute in Chicago. Screening techniques were used by the physician to examine and test the embryos of parents. They selected the embryo to create an exact match for their six-year-old daughter Molly. Molly was involved from a genetic disease called Fanconi Anemia. This disease causes bone marrow deficiency and that is why they chose an embryo that was the perfect tissue match. After few unsuccessful attempts of IVF cycles, Adam finally took birth on 29 August. Blood from Adam’s umbilical cord was donated to Molly and relocated by the physician Dr. John Wagner’s team. Since, the creation of Adam, a baby created to save the life of her sister, many more parents created their designer babies to save and protect their offspring from the genetic diseases. Later in the year 2002, in the US the second case of the designer baby took place in order to save the child from diseases for an English couple.

The Human Fertilization and Embryology Authority authorized different couples to produce a designer baby and the first designer baby in the UK took birth in 2003 to protect a sibling by providing stem cells. In 2004, in Sweden, the authorization of designer babies was approved by the Swedish National Council of Medical Ethics in the cases where it is the only way to save a life.

# Benefits

Like any other scientific invention or technology, the technology of human modification comes with its own benefits and risks. There are many benefits of creating designer babies, such as parents can have a variety of choices regarding their babies and they can eliminate and include a specific trait in their babies. They also have a choice to select the gender of their babies. One of the biggest advantages is the elimination of genetic diseases from children before birth. To cure the potential diseases in unborn children was the primary purpose behind creating the designer babies. In this way, parents can protect themselves from the cost and trouble of having a child with some chronic and untreatable disease. Gene alteration also assists in preventing mitochondrial-related disorders and the likelihood of developing genetic disease in the future is also reduced.

It also enables infertile parents to have a baby and enhances the life expectancy of the child by removing the unhealthy genes and keeping healthy genes. It also creates a society of equality by eliminating children and people with disabilities who face discrimination and unfair treatment. Another goal of creating a designer baby is to create a positive influence on the child. Since this technology is used to eliminate health issues and enhance appearance, intellectual abilities and other factors boosting the self-confidence of the child. The technology of creating designer babies also improved human understanding of genetic engineering and the functioning of human genes.

# Risks

It is true that benefits do not come without peril. One of the dangers of genetic engineering highlighted in a study is, an ecological problem associated with the genetically engineered species. Any accident in genetic engineering can result in major medical issues and can lead to major issues like death. In addition, the repercussion of putting a functional gene in the human body are still anonymous. If some genetic gene is placed in the human body it can also lead to some chronic disease. Elimination of genes also reduces the diversity of genes and identical genomes can make the whole population vulnerable to some diseases (Patra & Andrew, 2015).

This technology still raises the questions of ethics and morality. There is a large population that considers it unethical to make genetic modifications in the babies. The question of ethics is also linked with the harmful effects and risks of using IVF. It is also proved that the children produced by the use of IVF show a higher risk of developing defects as compared to those conceived naturally. One study reports that genetically modified babies can be vulnerable to septal heart defects, cleft lip and other dangers (Reefhuis et al., 2008). This method is also associated with abortion and therefore it is considered illegal and unethical in most of the states. In addition, the technology is still progressing and in some cases, it could be practiced in a few cases for both the mother and child.

# Cost of Genetic Modification of Babies

 With the popularity of the technology of human gender modification, the demand for designer babies started to increase. The rise of demand in the market has created an expensive market. Though the cost depends upon the physician and the clinic the average cost of treatments linked with genetic modification is high. The market not only comprises of designer babies but also the biotechnology, preimplantation genetic diagnosis, IVF, surrogacy, sperm banks, and counseling services. The price of surrogacy in the US can range from $20,000-$120,000. Sperm banks also charge high for the specimen and generate a high profit by paying less to donors. In addition, the price of eggs can go up to $50,000. The high demand resulted in a highly profitable business for the money makers and an expensive and unaffordable process for many couples. Those who cannot afford such technology remain at a disadvantage and only rich can enjoy the benefits of this technology.

# References

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