

# Ethical Issues and Attribution of Gene Editing Technology

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## ABSTRACT

Humans are in an era of high-tech development, a new era of biology based on genetic technology. Gene editing technology is a science and technology with broad application prospects and great development space, but it not only brings scientific and technological progress, but also causes a series of ethical conflicts due to its immaturity and uncertainty. This paper analyzes the ethical problems brought by gene editing technology from the perspective of ethics, and attributes them from a certain angle. In order to assess the possible risks of gene editing technology in advance, further identify the current ethical problems, and pay attention to and improve the work in related fields as soon as possible.

**Keywords:** Gene technology, Gene editing, Gene ethics research, Medical ethics

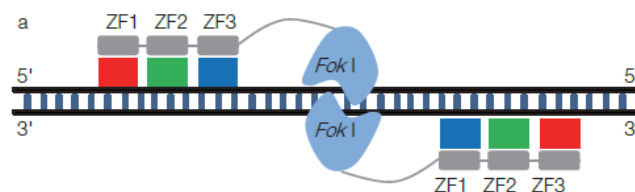
## 1. INTRODUCTION

Gene editing is a new and relatively accurate genetic engineering technology that can modify specific target genes in the genome of organisms. With the continuous progress of gene editing technology, it has played an important role in the diagnosis and treatment of diseases, but at the same time, the ethical issues exposed by it have also attracted wide attention from all walks of life at home and abroad. At present, about 30 countries in the world have enacted legislation that directly or indirectly prohibits all clinical use of gene editing technology [1]. International organizations and academic circles have also called for greater regulation of the application of gene editing technology. From this, we can see that gene editing technology is a double-edged sword, which has both advantages and disadvantages for human society, and has also exposed many problems in the past practical

cases. In this paper, the ethical problems exposed by gene editing technology are analyzed, and the reasons for the ethical dilemma of gene editing technology are attributed, and some opinions and suggestions are put forward for the existing problems, hoping to further promote the healthy development of gene editing technology in research and application.

## 2. INTRODUCTION TO THE MECHANISM OF GENE EDITING

Gene editing technology is the application of the phenomenon of DNA breakage and its repair mechanism. At present, there are three well-known gene editing technologies, namely ZNF technology, TALEN technology and CRISPR-Cas RGNs. The following Figure 1 is a simple flow chart of the three technologies [4].



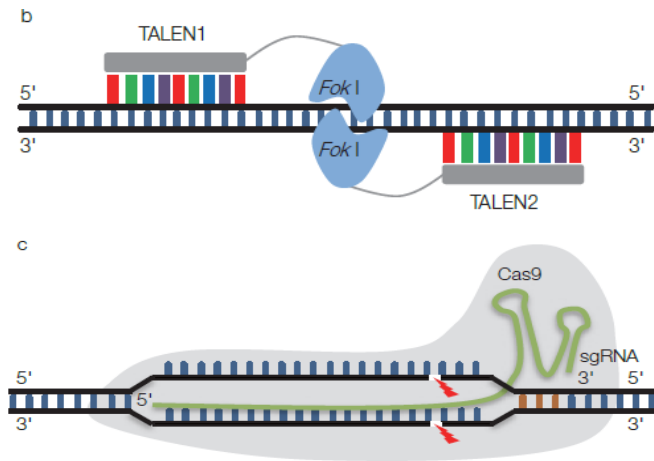


Figure 1. Flow chart of the three technologies

### 3. ETHICAL CONFLICTS CAUSED BY GENE EDITING TECHNOLOGY

#### 3.1. Violations of human rights

Take the right to privacy and the right to life. The right of privacy refers to the specific personality right of a natural person to enjoy the peace of private life and to independently control and control the private space, private information and other private life security interests that he does not want to be known by others, and not to be disturbed by others. The privacy involved in gene editing technology is mainly reflected in genetic information. Genetic information is the decisive factor of human body structure and human body characteristics. It can also be said that we are actually an external manifestation of genetic information. When our genetic information is obtained and edited by people, it means that our privacy has been violated. With the continuous development of gene editing technology, such as in human embryo gene editing technology, it is necessary to detect and identify genes in human embryos, which undoubtedly indicates that the genetic information carried by the genes will be leaked, and may further cause security problems [3]. The right to life is the right of citizens to protect their lives from illegal infringement according to law. Due to various reasons, gene editing technology has always been a hot research topic, but the current gene editing technology is not yet mature, and there are still many unknown and uncontrollable. In the process of research and experiment, there is still a high probability of failure. If the target gene is not modified, but the non-target gene is modified, it will bring adverse effects to the individual to a large extent, and its future development will also have unknown mutation. Moreover, the genes retained by human beings at present come from long-term evolution and evolution, which can better adapt to the environment. If we devote ourselves to changing them, it may affect the evolution and development of human population in the future.

#### 3.2. Genetic Discrimination and Eugenics

"If we have the ability to use genetic material like fingerprints to identify a person, then we have the same reason to discriminate against some people on the basis of their genes", Roy of the American Biological Center said [2]. With the development of gene prediction, people can infer a person's IQ, strengths and weaknesses, as well as what he is good at and what he is not good at by studying genetic information. The emergence of gene editing technology has once again pushed this issue to the forefront. On the one hand, people with such resources can use gene editing technology to change their own shortcomings and achieve gene enhancement, which is conducive to enhancing their competitiveness. However, people who lack such resources will not be able to achieve genetic enhancement, which will also lead to genetic discrimination in job hunting, marriage, daily life and so on. On the other hand, from the perspective of eugenics, the emergence of gene editing technology will satisfy some people's desire to "optimize" their offspring. If human embryo gene editing technology is used to modify the genes of offspring in a direction conducive to the development of the individual, it will give the individual a greater advantage. But who has the right to decide? This will undoubtedly further widen the gap between the rich and the poor, between the highly intelligent and ordinary people, further aggravate the problem of social equity, and even increase the gap between developed and developing countries, breaking human equality from the technical level. At present, the technology is not yet mature, and the final result may run counter to "eugenics".

#### 3.3. Exposed to anti-naturalism

From the point of view of the evolution of life, life has developed in a long-term natural process, and will continue to develop naturally in the future. Whether it is illness, aging, death or becoming longer and healthier, it should follow the objective laws of nature. However, the

use of gene editing technology to edit human embryos or enhance human genes has changed the natural process of life and violated the laws of nature. This has a great impact on employers, family formation and social stability. For employers, what they need is employees who can create more benefits for them. With gene editing technology, companies can choose people who become more in line with their requirements through this technology, instead of preferring those who strive to improve their abilities to win the position, because the gap between the two is hard to make up. This is contrary to the values we know and accept. For families, from family formation to reproduction, two people who should be based on emotional, personality, values and other adaptations may develop to give priority to genetic adaptation because of the existence of gene editing technology, which also breaks the traditional understanding. As far as society is concerned, the harmonious coexistence of people may no longer be based on the goodwill between people, but on the premise of realizing the harmonious communication between people. The society in which everyone is equal is easy to widen the gap between each other, which is inconsistent with the moral concept we advocate [9].

#### **4. AN ANALYSIS OF THE CAUSES OF THE EXISTING ETHICAL PROBLEMS**

##### ***4.1. There is no ethical regulation in this field***

Gene editing technology is a controversial science and technology. On the one hand, it has brought about the progress of human science and technology, on the other hand, it has also brought human beings into an ethical dilemma. Therefore, in the process of its research and application, if we cannot effectively carry out ethical regulation, it will constantly expose the ethical anomie problem which is contrary to moral cognition. For example, He Jiankui, a Chinese scholar, publicly claimed that after the birth of a human embryo gene editing baby, the embryo gene editing operation for the purpose of reproduction violated the recognized ethical norms and was condemned by public opinion from all walks of life [7]. The reason is closely related to the lack of ethical regulation in this field. Therefore, the relevant departments in China should constantly improve the level of ethical governance, promote the further improvement of the ethical governance system, and form effective ethical regulations and guidelines, so as to ensure the healthy development of gene editing technology within a reasonable range.

##### ***4.2. Researchers' understanding of gene editing technology is not comprehensive enough***

From the technical point of view, gene editing technology is still in its infancy, researchers do not have a comprehensive understanding of gene editing

technology, and it is easy to ignore the risks it brings, which also makes it difficult for technicians to effectively control the ethical issues caused by gene editing technology, and further aggravates the impact of ethical issues. From an ethical point of view, researchers are the main body to master the technology, they must have a certain degree of ethical awareness, and be able to clarify their rights and obligations, but most of the ethical subjects are not aware of the ethical problems in the application of gene editing technology, and do not have ethical awareness, which leads to the formality of ethical norms. Therefore, researchers should continue to deepen the research and mastery of this technology, but at the same time, it should be clear that the research of gene editing technology must be based on the premise of ethical regulation, and be able to consciously abide by it, otherwise the important role of ethical and moral norms will be difficult to play.

##### ***4.3. Affected by the social and economic development and the continuous improvement of human requirements for the quality of life***

At first, gene editing technology was mainly used for medical purposes, bringing convenience to human health and disease treatment. However, with the continuous improvement of people's living standards and economic capacity, people's requirements for the quality of life are also constantly improving, which makes people have higher expectations for gene editing technology. As the saying goes, "no one is perfect", the human body is always defective, whether it is the internal structure of the body or the external performance, but the great prospects of gene editing technology make people hope to continuously optimize the body, based on this, there are also many technologists who excessively pursue economic interests, thus further disrupting the social ethical situation. Therefore, it is necessary to strengthen the popularization of knowledge and let the public know that the current gene editing technology is not yet mature and still has a high risk. At the same time, we should strengthen its ideological education and accept the imperfection of the human body reasonably. In addition, we should improve relevant laws and regulations to avoid social panic caused by such incidents.

#### **5. CONCLUSION**

Human beings are in and will be in an era of continuous development and wide application of gene editing technology for a long time. The ethical conflicts caused by gene editing technology affect not only individuals, but also the human community including families, society, the whole country and even the whole world. Therefore, we should explore and pay attention to the ethical problems exposed by gene editing technology as early as possible, the relevant research departments should always maintain a high degree of ethical

awareness, and the relevant governance departments should further improve the relevant ethical governance system, form effective ethical regulations, and formulate practical laws and regulations according to the actual situation. Jointly safeguard the long-term healthy development of gene editing technology.

### **AUTHORS' CONTRIBUTIONS**

This paper is independently completed by Rui Yang.

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