

Review

## The Human Rights Implications of Scientific Progress: A Case Study on Gene Editing and Disability Rights

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### ABSTRACT

Gene editing tools like CRISPR-Cas9 hold great promise for treating genetic diseases but also raise important ethical concerns, especially regarding disability rights. While gene editing can eliminate inherited diseases, it could also worsen ableism and widen social divides by reinforcing discrimination against people with disabilities. This article will talk about the ethical challenges of gene editing, focusing on the impact on marginalized groups, such as the Deaf community, who see their conditions as part of their identity rather than something to be fixed. The research will focus on practical examples, like gene therapy for sickle cell disease and editing embryos for hearing impairments, and highlight the limited access to these technologies, which could deepen inequality. It calls for stronger global guidelines that include input from disability communities to prevent the technology from reinforcing social divisions. The results show that without clear limits, gene editing may lead to a society that values genetic traits over diversity and human dignity, urging policies that promote fairness and inclusion.

**Keywords:** Gene Editing; Human Rights; Disability Ethics; Genetic Discrimination; Bioethics and Regulation

### 1. Introduction

Throughout history, scientific advancements have profoundly shaped human society [1]. In modern history, each scientific breakthrough created advantages and problems for society. Scientists use CRISPR, and Cas9 effectively to make accurate changes to genes through their advanced DNA modification system [2]. CRISPR technology shows promise in treating genetic disorders through its ability to help patients with sickle cell anemia, cystic fibrosis, and some types of vision disorders. Powerful technologies always present potential dangers to their users. Misusing gene editing tools can harm human rights by favouring certain groups while neglecting others, especially people with disabilities. Human rights experts see gene editing as a contradictory process. Through gene-editing people with disabilities can enjoy better health by ending the pain from their specific diseases. The system may promote the idea that being normal is better than being disabled. Our approach to disability acceptance affects how society evaluates life value in the future. The use of gene editing methods leads to complex ethical and legal problems [3]. When parents

choose to edit their child's genes, do the children have any power over this decision? Who gets to make choices about which disabilities and traits need change? Should countries control genetic technologies or should the business sector make its own decisions about these practices?

Our society needs a strong ethical and legal system to protect human dignity while safely advancing scientific research. Key objectives of this article are:

1. The scientific advancements in gene editing, particularly CRISPR, Cas9.
2. The human rights implications focus on disability rights, genetic discrimination, and consent.
3. Real-world case studies that illustrate both the promises and risks of gene editing.
4. Existing legal frameworks and the need for more inclusive regulations.

### 2. Scientific Progress and Gene Editing

Our readiness to face the possible outcomes becomes critical as we develop the ability to change human genetic material. A

basic gene editing technique lets scientists make exact DNA modifications to fix disease problems or insert beneficial qualities. The widely recognized tool CRISPR Cas9 functions as DNA scissors to edit specific gene locations [4]. Scientists now use prime and base editing techniques to make precise DNA changes by inserting single genetic letters without altering the DNA strand. Current scientific findings show we can stop inherited diseases from developing by making necessary changes to DNA before a child is even conceived. Scientists worry they may delete undesired traits if they can currently remove disease-related problems. Scientists agree that gene editing offers major benefits to medical research. Scientists can use this method to fix hereditary diseases and fight cancer yet make specific changes to genes while also building virus resistance. Through time, scientists have found new ways to use their research that were never intended before. Will gene editing remain a tool for disease prevention, or will it be used to create a "perfect" version of humanity? Parents could select a child's height intelligence and eye colour with this technology. Scientists compare genetic editing to other reproductive choices including IVF and genetic testing. There are concerns that genetic selection will create divisions between those who can afford genetic enhancements and those who cannot. When gene editing serves profits instead of ethical values it may deepen social disparities rather than fixing them. Organizations need to establish rules for who decides how gene editing will be applied. When doctors and scientists choose which genes to alter, does that imply they judge disabilities as defective organs for removal? Advocates for disability rights oppose genetic editing because they believe it reduces the value of disabled people and promotes beliefs that they should be modified instead of embraced. Take deafness as an example. Parents who have this genetic trait often select gene editing to improve their child's life. In the Deaf community, deafness forms their cultural heritage while they reject the notion that they should be cured. If society starts eliminating genetic conditions based on what is seen as "normal" or "better," where do we draw the line?

### 3. Human Rights Concerns in Gene Editing

Technology provides impressive outcomes but creates tough moral dilemmas to solve [5]. Which groups will benefit from gene editing, and which will be excluded? Should we edit the genetic makeup of future populations when future people have no say in that decision? This critical issue drives the conversation among different stakeholders.

#### 3.1. Right to Health vs. Right to Identity

Initial analysis shows that gene editing helps human rights by treating genetic illnesses while making people healthier [6]. Since medical experts can now treat cystic fibrosis and sickle cell anemia, why would anyone want to stop this progress? Doctors recognize this development as a significant improvement in healthcare. From an ethical and social viewpoint gene editing technology creates comprehensive challenges. People with disabilities regard gene editing that removes their conditions as an attack on their fundamental sense of self. Many individuals do not view their disabilities as medical problems that require treatment. Members of the Deaf community identify deafness as their cultural background rather than an illness. When parents use gene editing to prevent deafness in their children, it raises the question of whether this intervention heals or erases an important aspect of the Deaf community. When people focus on creating better genes what will happen to people who currently live with a disability? They will encounter either more prejudice or need to explain why they exist. Disability rights advocates push social inclusion and better access over deleting disabilities because that is how they want to boost health.

#### 3.2. Genetic Discrimination: A New Form of Inequality?

People with certain genetic traits might be treated unfairly because of this new form of discrimination. A future world will see enhanced genetic traits become financially exclusive to the wealthy class giving them permanent health, intelligence, and physical benefits over other people [7]. People with their original genes may experience diminished status compared to those who received genetic enhancements. Previous events demonstrate how harmful these beliefs proved to be. The concept of eugenics led people to enforce sterilization programs while discriminating against racial groups and performing genocidal actions to cleanse certain bloodlines. The techniques used to edit our genes might reactivate obsolete practices in a technologically advanced form. How might employers or health insurers respond when making decisions based on genetic traits? Laws like the Genetic Information Nondiscrimination Act currently help defend against genetic preferences but their strength will need to increase to protect people in an environment of routine genetic enhancement [8]. Without clear rules, the use of gene editing techniques may exacerbate social disparities rather than reduce them.

#### 3.3. Consent and Future Generations: Who Owns Their DNA?

The issue of agreeing to genetic modifications creates strong disagreement among experts. The modifications made to an embryo's DNA will affect the whole life of a child who did not agree to these modifications. Researchers question whether people born through gene editing will later demand control over their genetics. People who support gene editing claim that when it helps decrease suffering it should be employed as a medical tool. Since parents make medical choices for their children to improve their health every day, they already determine their well-being. While gene editing changes DNA permanently having long-lasting effects on future generations. Our understanding of the long-term effects of gene removal may prove to be incorrect. How could the changed gene produce medical problems during the adult years? We cannot foresee the full consequences of such genetic changes. People wonder who should determine what qualifies as an undesirable genetic trait. Our present concern targets life-threatening medical issues but stakeholders will decide in the future which traits humans can edit. Where should we establish our boundaries regarding this genetic editing?

### 4. Case Studies: Gene Editing & Disability Rights

Real examples demonstrate how gene editing already changed our social practices [9]. Despite its life-saving medical potential, this technology generates strong moral questions about human rights. Which people obtain these medical treatments? Should medical science be permitted to eliminate specific impairments from our bodies? Will these advanced techniques remain limited to high-income groups or open for everyone to use? The real-life examples demonstrate that gene editing affects disability rights in multiple ways with both positive and negative results

#### 4.1. Case Study 1: CRISPR Treatment for Sickle Cell Disease, a Medical Breakthrough, But for Whom?

Sickle cell disease creates debilitating health risks for African descent patients. Research shows that CRISPR-based gene therapy helps scientists fix the genetic problem behind this condition [10]. People celebrate this breakthrough as it marks the first practical solution to end a persistent medical challenge. Each patient who needs gene therapy treatment pays steep costs that reach hundreds of thousands of dollars. Most people who need treatment for sickle cell disease live in low-income areas without access to

high-quality medical care. Our efforts to cure sickle cell disease through medical treatment will create a new social imbalance when only rich people can access these treatments. These case forces us to determine if life-saving gene treatments should belong to everyone's basic human entitlement or remain confined to wealthy patient access only. The potential health divide might grow bigger when gene editing becomes available since disadvantaged individuals may still lack proper medical care.

#### **4.2. Case Study 2: The Ethics of Editing Embryos for Deafness, Curing a Condition or Erasing an Identity?**

When parents edit their child's genes to prevent deafness, they do it hoping for a better future. Many see this as a natural choice because they want their child to hear. Members of the Deaf community strongly oppose this approach, viewing it as a threat to their cultural identity. Deafness stands apart from other disabilities because its cultural traits create an identity through language and social bonds. Deaf people strongly oppose gene editing because they fear it tells society their way of life should not exist. Parents need to answer whether they should get to make decisions about which genetic traits are unacceptable in their offspring. The beginning of editing deafness suggests we can eliminate other undesirable physical traits. Do parents today plan to pick their children's genes based on IQ levels and physical stature plus character traits? The case shows how gene editing presents a risk of treating people with disabilities as if they need curing instead of supporting their unique characteristics. As society permits more editing of disability-related genes how will it affect human diversity representation of disabled people and their right to self-identify?

#### **4.3 Case Study 3: Global Disparities in Gene Editing, A Future Divided by Genetics.**

The use of gene editing for human enhancement might increase the gap between wealthy and poor people. Wealthy families can choose genetic enhancements for their children, granting them better health and intelligence, which lower-income groups cannot access. People with altered genes could step above economic elites to gain control in education classrooms and work arenas. This issue extends beyond financial concerns, as it challenges fundamental ethical standards. Medical researchers have unfairly used Indigenous and marginalized populations for testing in history. Will people from these underserved communities influence technology companies when they handle gene-editing powers? Who holds the authority to define what DNA is important and what is detrimental? This example shows that we need to make sure gene editing becomes available to everyone instead of giving it solely to individuals of high status. Global participation in gene editing ethical reviews and universal access to technology can prevent the spread of genetic inequity.

### **5. Legal and Ethical Frameworks: Who Controls Gene Editing and Why It Matters**

To prevent unethical applications of gene editing, scientists must establish strong ethical and legal frameworks that safeguard fundamental human rights [11]. Human rights laws at an international level protect people from having their dignity violated as science develops further. Major disability rights organizations at UNESCO and the UNCRPD support ethical gene editing by insisting that all procedure decisions must respect human dignity, create social equality, and prevent rights violations [12]. Under UNESCO's Human Genome Declaration, everyone has equal rights to their genetic makeup and people should not harm their basic human rights [13]. The statement did not create a law because countries can choose to follow or ignore its recommendations. The

UNCRPD handles disabled individuals' rights differently by making them essential members of policy decisions [14]. Despite established policies, people with disabilities have limited involvement in discussions about gene editing although they will experience its effects more than others will. The lack of disabled community involvement in policy decisions creates doubt about the intent of gene editing to help people with disabilities or to get rid of disabilities to maintain a discriminatory mindset towards disability.

Many international regions handle gene editing differently through varying levels of legal control, which creates scattered worldwide regulations today. The United States lets scientists perform gene editing studies yet blocks genetic changes that can pass from one generation to the next. Private US biotech organizations are challenging current regulations by pushing experimental research that worries experts about ethical problems. British scientists may edit genes in embryos for scientific research under approved conditions but cannot use these methods for creating babies. The UK regulates gene editing to keep the technology within acceptable ethical limits. In China, the infamous case of *Dr He Jiankui*, who genetically edited twin embryos to make them resistant to HIV, exposed major loopholes in the country's regulatory framework [15]. The judge's decision to send *Dr He* to prison showed that some nations have become more willing to try controversial gene editing experiments even without proper restrictions. The European Union follows a strict policy by banning germline editing while permitting medical studies within strict conditions. The world lacks a single set of laws governing gene editing which permits countries to progress quickly or slow down their efforts. When one nation or company dominates genetic editing they create an unfair distribution of healthcare benefits and human improvement opportunities. When countries do not work together to set rules for gene editing it will make genetic enhancements available only to those who already have power.

The primary ethical challenge lies in which groups will determine policies for gene editing. Scientists and businesses dominate gene editing discussions, but they leave out disabled people, ethicists, and marginalized communities. Disability rights activists see gene editing as a tool that strengthens ableist views about fixing individuals who have disabilities. The lack of participation by disabled people in gene editing development increases the risk that rules will focus on removing impairments instead of building an accepting society for diverse abilities. As parents, they might remove certain genetic elements that can result in Down syndrome or neurodevelopmental conditions to enhance their child's life. The theory overlooks important social and cultural aspects of health conditions. Deaf community members consider deafness not an illness needing treatment but a cultural heritage with its language and customs. Medical enhancement policies need to consider the ethical risks that gene editing poses to specific human identities.

Gene editing needs international management to create fair and ethical medical solutions. Governments must work with disabled individuals and other marginalized groups to shape gene-editing technology since experts from corporate and government sectors dominate its current development. Making gene therapy available to all people equally protects us from building a system that lets money determine a person's life chances based on their social position. Individuals who can fund gene-editing treatment gain an unfair advantage that separates them from everyone else. International cooperation needs to create standards that balance edited genes with fair human rights treatment [16]. Lawmakers should create rules that help scientists make ethical decisions about gene editing while preventing these advances from harming social fairness through diversity maintenance.

Scientists must create updated rules and ethical standards to prevent gene editing technology from going wrong. When science

only cares about its wishes and money in gene editing, we will create systems that support current divisions instead of fixing them. Gene editing tools must follow ethical principles that include fairness and respect for diverse human groups besides achieving technical breakthroughs. Through united protection of human rights and inclusive practices, we can guide gene editing toward its purpose of making the world healthier.

## 6. Critical Analysis and Limitations of the Study

This article examines how gene editing affects Deaf people and individuals with disabilities but does not go into other related aspects. Deaf people see hearing loss as their cultural identity, which includes its own unique language expressions art, and events. When deafness gets fixed through gene, editing it destroys an entire social group that values signing as their cultural identity. Researchers study genetic elimination systems as new technology. People might someday edit genes to treat deafness and other disabilities yet view them as medical issues rather than human variations. The technique extends beyond medical practice to eliminate an entire culture. Our understanding of human experience would become less diverse when we remove traits people consider undesirable.

The article points out that genetic engineering technology creates unfair treatment between rich and poor countries. The article has limitations because it lacks an examination of how gene editing affects universal impartiality. Rich countries and individuals have exclusive access to expensive gene editing technology today. A future society will divide into groups based on their genetic luck when enhancements remain expensive. We must not see this as simply an economic issue because altering human genetic material creates a new type of market for body parts. When people use gene-editing methods to improve their intelligence or resistance against diseases, they may change themselves into marketable products [17]. Wealthy families can purchase high-quality genetic traits for their offspring yet ordinary people must use their natural genetic traits. The development of gene-based opportunities may establish differences between individuals whose life chances depend on their genetic code. This article explores how genetically enhanced people could dominate society, leaving others at a disadvantage.

The study discovers essential issues about consent relating to the genetic editing of embryos. Parents who pick genetic features for their babies begin to treat their offspring like custom-designed products. Our basic human identity faces important ethical challenges in such a situation. Our new concept studies Genetic Consumerism, which turns gene editing into a market-based service. Parents might look for genetics services while businesses supply desired traits to customers. Making this business model of genetics possible would create a society where people pursue specific genetic qualities excessively while treating human life as mere assets to trade.

The article mentions UNESCO and UNCRPD yet does not thoroughly examine why the international community cannot collaborate on gene editing policies. Multiple countries hold varying regulations about gene editing which leaves plenty of room for legal ambiguity. Multiple nations have separate rules about gene editing with certain countries permitting free use while others prohibit it. Countries that allow minimal gene editing restrictions create an open space for unethical companies and individuals to perform experimental work in those regions. This approach suggests that countries should implement genetic laws aligned with their cultural and ethical standards. Different nations will create separate standards for gene editing which could produce an unconnected network of rules across the globe.

Our ability to engineer life changes human nature and asks what it means to be human. Our technological influence over human evolution may eventually replace natural evolutionary processes. Our actions and discussions about modifying genes directly impact who we are as people and could affect our collective existence in deep ways. A concept of "Post-Human Ethics" would develop to address interactions between people machines and animals when distinctions fade between them. The process of gene editing may redefine how we understand human nature and produce beings that escape traditional human classification. Future studies should investigate how scientific developments change moral standards and examine the difference between making life naturally and making it through technology.

## 7. Conclusion

The important ethical consequences of gene editing along with laws and social concerns need proper consideration today. When we misuse genetic technology, it will create new gaps between rich and poor by giving advantages to rich families. Our priority with gene editing should be the enhancement of lives for all individuals rather than producing an ideal racial type. The focus should be on making life better without damaging individual diversity and human dignity. Our success depends on strong ethical standards, international cooperation, and policies that ensure all communities benefit from technology. Our main concern is not if we can edit genes but how we should perform genetic changes while supporting human rights and equal opportunities.

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