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Gene Editing and the New Eugenics

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Note: The views expressed in this article are those of the author and do not necessarily reflect the positions of the professional organisations with which he is affiliated.

The possibility of editing the genome of living beings is set to revolutionize many areas of biological research.¹ For the first time, scientists can now efficiently, precisely, and selectively edit parts of these genomes by removing or inserting genetic material.

This is especially the case with the CRISPR-Cas9 editing system which is relatively easy and inexpensive to use while only requiring two components to work.² These components are a guide RNA genetic sequence (a kind of a homing mechanism) and a Cas enzyme (a protein that works as a sort of molecular scissors), with Cas9 being the enzyme that is most used to cut the DNA strands.

In this way, the guide RNA with a certain genetic code seeks out the specific genetic target of the DNA strand of the genome and then forms a complex with the Cas9

enzyme. This cleaves the DNA strand and enables a specific genetic sequence to be taken out. The strand can then be rejoined or, alternatively, a new genetic sequence inserted.

As a result, gene editing can be used in research with, for example, specific gene sequences being disabled or replaced in early animal embryos in order to better understand embryonic development. In addition, it is suggested that it will be possible, in the future, to inactivate disordered genes which may be responsible for a disease and replace them with healthy ones. The prevention of genetic disorders and even new treatments could then be considered.³

Biomedical trials using gene editing on human cells are already underway, such as in the use of edited immune cells to treat cancer.⁴ But two important

milestones were achieved when Chinese scientists became the first to gene edit a human embryo in 2015⁵ and bring to birth twin girls who were gene edited as single cell fertilised eggs in 2018.⁶ Other studies have also been reported using either existing human embryos and genetically editing them after fertilization (post-conception)⁷ or injecting the gene editing system at the same time as fertilization (peri-conception).⁸ A third possibility would be to edit the genes of the sperm or egg cell before conception (pre-conception). In these last two procedures, it is expected that the embryo would develop in such a way that every cell, and every subsequent organ, would contain the edited DNA, including the reproductive cells, enabling a more efficient, uniform gene editing to take place in the individual.

In the UK, all these different kinds of gene editing procedures in human embryos were approved by the Human Fertilisation and Embryology Authority in 2016, but only for research embryos

which are not intended to be used for reproductive purposes.⁹

Ethical Perspective

From an ethical perspective, some general comments have already been expressed elsewhere highlighting the many advantages and benefits to humankind arising from the possibility of manipulating the genes of possible future or existing persons.¹⁰

However, some concerns relating to safety exist. For example, inserting or deleting specific genes in the correct location of the genome of a developing embryo without upsetting the biological equilibrium of the cell(s) is a difficult operation.

A particular gene may influence a number of different characteristics which means that even if a gene was modified to influence a specific dysfunction, this could give rise to unexpected consequences. The overall result would be a modification that may be less than beneficial.¹¹

In addition, during the research and development stages of human embryonic gene editing it is unavoidable that a significant number of embryos will be destroyed in the process. Since such embryos may be considered as full persons, made in the image of God, this means that their destruction can be seen, by many, as being just as offensive and immoral as the destruction of any other person.¹²

Another ethical concern is that, if the gene editing is inheritable, it would alter the genetic makeup of an individual's children and future generations, which may have unforeseeable effects. Moreover, if it is eventually possible to alter a person's genes and those of his or her descendants to remove or change

attributes such as predisposition to disorders, it may also be possible to change just about any other attribute.

Because of this, grave concerns have been expressed as to the consequences for society when it becomes possible to decide what kinds of children are brought into existence.¹³ Ever since the English writer and philosopher Aldous Huxley published his science fiction book *Brave New World* in 1932, considerable anxiety has existed relating to the prospect of creating a society in which the genetic heritage of individuals could be manipulated. In this regard, though the book was set in the year 2540, gene editing has brought Huxley's dystopian future a whole lot

closer, meaning that the ethical implications of such a world now need to be considered.

To do this, more specific ethical issues concerning gene editing must be examined relating to the extent of the changes being contemplated, and these will be examined in turn. But before doing this it is necessary to examine the different kinds of personal identities that may exist in order to make a difference between procedures which are either therapeutic and those which actually create a new individual who is different to the one who would otherwise have existed.

Different Kinds of Identities

In discussing the concept of identities, it is important to first emphasise the various ways in which identity can be distinguished. Though a degree of overlap may exist, and there is no consensus in literature, it is possible to differentiate between:¹⁴

- **Numerical identity** which examines the number of persons who exist and

whether they are distinct. For example, it considers whether the continuous sense of a living being remains one and the same being throughout his or her life trajectory in the three dimensions of space and over time. In this case, two perspectives are generally presented, namely:

- A *biological perspective* which reflects the continuous biological being remaining one and the same whole being over time as a biological entity in space despite some qualitative changes such as those arising from the replication and division of cells making up this being.¹⁵

- A *psychological or biographical perspective* which reflects the relationship a living being has to itself as remaining one and the same whole individual over time despite some qualitative changes. This generally includes continuity of consciousness, experiential contents or the maintaining of psychological connections or capacities, such as memories.¹⁶

On this account, a psychosomatic numerical identity would exist for most individuals which brings together the biological and psychological perspectives.

- **Qualitative identity** which examines similarities between the same individual in different settings or between distinct individuals. For example, two beings may be similar from a biological perspective but exist in different settings of space and/or time. In this way, identical twins are qualitatively but not numerically identical. Each twin exists in a different setting of the three dimensions of space though they generally live at the same time.¹⁷

This means that if a procedure results in numerical identity changes, then a new individual is brought into existence who would not otherwise have existed. On the other hand, if a procedure results in qualitative identity changes, then the original individual continues to exist.

Somatic Gene Editing

To begin with, if the editing takes place with the aim of addressing a genetic

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disorder on a mature embryo, foetus, child, or adult, this could be considered in a similar manner to already existing somatic gene therapy procedures which do not affect descendants and have generally been accepted by society. This form of therapy would then correspond to the aims of classical medicine in the restoration of health to the patient. As the Christian physician and ethicist John Wyatt indicates: “the task of the health professionals is to protect and restore the masterpieces [of human bodies] entrusted to [their] care, in line with the original creator’s intentions.”¹⁸

Such applications of gene editing for therapeutic purposes, therefore, would not raise many new significant ethical problems, apart from safety and efficacy. The numerical identity would remain the same though the qualitative identity would be changed.

Germline Gene Editing

Using gene editing with the aim of germline gene modifications (intentionally changing the genes of children and descendants), on the other hand, raises significant ethical concerns. This is because proposed germline modifications are inherently eugenic in nature. The word *eugenics*, which derives from two Greek roots “*eu*” (good) and “*genesis*” (birth), describes selection strategies or decisions aimed at affecting, in ways which are considered to be positive, the genetic heritage of a child, a community, or humanity in general.¹⁹

It was the Englishman Sir Francis Galton

who first coined the term *eugenics* in 1883 as he sought to implement into human beings selection procedures for inherited characteristics which had already been used, with success, in animal breeding programs.

At the beginning of the 20th century, eugenic ideas were actually being considered by many prominent personalities. Sir Winston Churchill, wartime Prime Minister of the UK, was openly disappointed when Britain resisted eugenic action on the grounds of civil liberties. In 1910, he wrote to the then UK Prime Minister expressing his support for legislation that proposed to introduce a compulsory sterilization program in the UK saying:

The unnatural and increasingly rapid growth of the feeble-minded and insane classes, coupled as it is with a steady restriction among all the thrifty, energetic and superior stocks, constitutes a national and race danger which it is impossible to exaggerate. . . . I feel that the source from which the stream of madness is fed should be cut off and sealed up before another year has passed.²⁰

It was only because a deep reaction of aversion took place towards the atrocities implemented by Nazi Germany during World War II that eugenic ideology was discarded. A number of international legal texts condemned the ideology, including the United Nations Educational, Scientific and Cultural Organization’s (UNESCO) 1997 *Universal Declaration on the Human Genome and Human Rights* which indicates in Article 24 that germline interventions could be considered as a practice that would be “contrary to human dignity.”²¹ Additionally, the Council of Europe’s 1997 *Convention on Human Rights and Biomedicine* states

in Article 13, regarding “interventions on the human genome,” that “an intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants.”²²

This means, according to paragraph 91 of the *Explanatory Report* to this Convention, that “interventions seeking to introduce any modification in the genome of any descendants are prohibited. Consequently, in particular genetic modifications of spermatozoa or ova for fertilisation are not allowed.”²³

The reasons why such texts rejected germline modifications, and thereby eugenic procedures, was because unacceptable discrimination is inevitably associated with selection strategies, thereby undermining the equality in worth and value of all human beings—an equality which is the very basis of civilized society.²⁴ Thus, deliberate germline and eugenic procedures were not only seen as wrong because a degree of coercion existed in some of the past reproductive practices, but also because they undermined the very basis of equality between all existing or possible future persons.

But, as the abuses which took place in the first half of the 20th century slowly become an ever older memory, pressures are now returning for a new eugenics. For example, American Nobel Prize Laureate and co-discoverer of the structure of the DNA molecule James Watson wrote in 1995:

But diabolical as Hitler was, and I don’t want to minimize the evil he perpetuated using false genetic arguments, we should not be held in hostage to his awful past. For the genetic dice will continue to inflict cruel fates on all too many individuals and their families who do not deserve this damnation. Decency demands that someone must rescue them from genetic hells. If we don’t play God, who will?²⁵

Moreover, in a report published in 2017, the U.S. National Academies of Sciences,

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Engineering, and Medicine actually recommended the use of germline gene editing in human beings in certain specific circumstances. This happened even though the above international regulations had previously condemned such a possibility²⁶ and a 2015 UNESCO International Bioethics Committee report had clearly highlighted the eugenic dangers of germline procedures. This indicated that if any intentional germline selection was accepted (such as with gene editing), this would “jeopardize the inherent and therefore equal dignity of all human beings and renew eugenics, disguised as the fulfilment of the wish for a better, improved life.”²⁷

Indeed, it was in order to address such a danger that Article 3 of the EU *Charter of Fundamental Rights* was drafted in 2000, which explicitly states that “in the fields of medicine and biology . . . the prohibition of eugenic practices, in particular those aiming at the selection of persons” must be respected.²⁸

At this stage, however, it is important to examine which gene editing procedures could be considered as eugenic. This is because there may be distinct categories dependent upon the stage of development at which the editing is being considered.

Gene Editing of Very Early Embryos

If gene editing takes place on a very early post-conception human embryo (such as a two-cell embryo), a number of ethical challenges arise. Indeed, it would be difficult to know whether any significant genetic change would bring about a completely new individual or whether the original embryonic individual continues to exist and is simply modified.²⁹ In other words, whether the procedure would

have a numerical or only a qualitative effect on identity.

In a way, this philosophical conundrum is not new and comes in many different forms. It is similar to the one mentioned by the Greek historian Plutarch (c. 46–120 A.D.) in his *Life of Theseus* (the mythical founder-king of Athens). In this, Plutarch questions in a thought experiment whether a ship which is restored by replacing every one of its wooden parts remains the same ship. This is especially relevant if the old parts are then used to build another ship. In the same way, it is possible to ask whether an embryo in which a certain number of genes have been edited remains the same embryo or whether a change in numerical identity has taken place.

From an ethical perspective, if the genetic modification does not give rise to any significant change in the already existing embryo, it would no doubt be seen as similar to somatic gene therapy in which the original individual remains and the masterpiece is restored.

However, if the gene editing procedure substantially modifies the genome of a very early embryo, more questions relating to the continued existence of the original embryonic individual could be asked. Genetic modification may then be considered to end the life of the original embryo (a form of death) while creating another. Indeed, if this did happen, then a clear eugenic element would exist since it would mean preferring one new being over another based on the quality of his or her genome.

Gene Editing of Sperm, Eggs, and During Fertilisation

On the other hand, if a genetic

modification takes place either on the sperm and egg cells before they are used for conception or during fertilisation resulting in the formation of a one-cell embryo, a new individual, who would not otherwise have existed, is being brought into being. This would happen because any change (no matter how small) of any of the variables in bringing an individual into existence would result in a very different individual existing in time. In other words, any individual brought into existence through these procedures would be a totally different person, from a numerical identity perspective, to the one who would, otherwise, have existed.³⁰

If such a conclusion is accepted then this again has a clear eugenic element since a new individual is being brought into existence in preference to another who may, for example, have qualities which were seen as less valuable than the ‘new’ individual. What is being proposed, therefore, is not a form of therapy. No existing person is being treated for a disorder. Instead, it is making sure that only certain persons are brought into existence based on the quality of their genomes.

Discussion

Of course, it is possible to ask what is ethically wrong in deciding to make sure that only healthy, and not disabled, children are brought into existence. Why not make sure that children who will have a short and difficult life of suffering are not brought into existence?

In response to these questions, it is important to recognize that it is difficult to see how parents can decide not to have certain kinds of children without making a value judgement that some children are less desirable. It follows that when parents make a decision that only a certain kind of child should be brought into existence, based solely on genetics factors, this can only mean making a eugenic choice and preferring one possible future child over another. In other words, this decision contradicts the important principle that the lives of all human beings have the

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same worth and value, regardless of their state of health or characteristics.³¹

From a Christian perspective this is very important since the inherent and equal value of each human life is based on the reality that every human being is created in the image of God and is called to a future eternal destiny with him.³² Thus, from God's perspective, every person has the same value and worth no matter how long or short a person lives, no matter how self-aware he or she is, and no matter how much suffering or pleasure this person experiences during life on earth. As John Wyatt explains, "our creation in

God's image implies . . . a radical equality. . . . In the human community, we are surrounded by other reflections of God who are different but fundamentally equal in dignity to ourselves."³³

This radical equality of human beings, which exists because they all reflect the image of God, also resonates in Article 1 of the UN's 1948 *Universal Declaration of Human Rights* which states that "all human beings are born free and equal in dignity."³⁴ Thus, if all persons are equal in value and worth, how can a choice between two supposedly equal future persons ever be made?

It is possible to argue, as does the 2017 U.S. report *Human Genome Editing*, that "unconditional love for a disabled child once born and respect for all people who are born with or who develop disabilities are not incompatible with intervening to avert disease and disability prior to birth or conception."³⁵ But the report does not explain how or why any deliberate discrimination can be seen as acceptable before birth while suddenly becoming unacceptable after birth. As Hans Reinders explains, it is more than likely that "in any given case, the only reasonable answer to the question of why a disabled child should not be born is by reference to what one thinks about the lives of people living with the same disorder."³⁶

In other words, if parents do decide to avoid having a child affected by a serious genetic disorder, based solely on genetics factors, there is a very real sense that

such a decision is based on the perceived quality of life of people who already exist and not on the worthiness and inherent dignity of their lives. Moreover, the indirect message being given to persons, who have already been born with the same disorder, would be that they should also not have existed.³⁷ This is clearly discriminatory and would undermine the inherent equality of all human persons in society.

Suggesting that choice should be available to make sure that certain kinds of children are not brought into existence may also mean that there is such as thing as a "life unworthy of life" in society.³⁸ As Roberto Andorno explains:

In reality eugenic ideology presupposes stepping from a "worthiness of life" culture to a "quality of life" culture, in other words, to the idea that not every life is worthy of being lived, or to put it more bluntly, that there are some lives that do not have any worth.³⁹

In a Christian understanding of procreation, moreover, the unconditional and sacrificial love of the parents towards each other and towards God should also expand onto the child. This means that every child brought into existence from this love should, in the same way, be unconditionally loved and accepted by his or her parents.

However, if certain genetic preconditions are laid down relating to the procreation of a possible future child—thus excluding persons with certain conditions, then this can no longer reflect the Christian basis of unconditional procreative love. Moreover, this child when brought into existence will always know that his or her very existence was not unconditional but conditional on having certain genes which may give rise to very significant existential anxiety.

Naturally, it is difficult not to have a lot of sympathy towards parents who have children affected by severe disability and suffering or to know the extent of the anguish they are going through. But, if one asks these parents, it is always the disorder and not the very existence of the



child with the disorder that has been the cause of so much heartache. Most would never say that they wished their specific child had not existed. On no occasion, would they indicate that they would have preferred to exchange their child for another, healthier, one. They just want to find a treatment for their child.

Certainly, the advancement of autonomy, the reduction of suffering, and the increase in flourishing of human persons are very important goals in any Christian ethical appraisal. But these aims do not give any true value or worth to human life, at least not the kind of value and worth that is equal to all persons. In actual fact, if only autonomy or the lack of suffering were the basis of the value and worth of an existing or possible future person, then every human being could be classified on a scale—classified as having a different value and worth. This would then come into opposition with the very concept of an egalitarian and civilized society.

It is, thus, imperative for Christians to always be prepared to equally value, without selection and preconditions, each and every human individual. In the same way, it is the reason why a Christian civilized society must welcome into existence all possible future persons independently of their biological or other characteristics such as their genetic qualities or disorders.

Of course, it is possible to challenge this statement by emphasising that certain forms of prenatal selection are already taking place, including in preimplantation genetic selection, whereby, following IVF, only the ‘best’ embryos are selected for implantation. Moreover, it can be argued that such procedures have not given rise to any perceived damage to the equality between persons. But these procedures are, in effect, already sending the message that all persons are not equal in value and worth and that some should not be brought into existence. And the more the vulnerable edifice of equality in civilized society is undermined by decisions that weaken its very foundations, the more likely it is that this equality may

eventually disappear.

In conclusion, gene editing can be used in a very positive medical manner in helping to restore the masterpiece of human bodies. This would then be comparable to other somatic gene therapy procedures already in existence which should be welcomed.

But, at the same time, society is now before a crossroads with germline genome editing and some forms of prenatal selection procedures. It can either choose to make sure that certain persons are not brought into existence because the value of their lives is considered to be unacceptable. This would then mean that society would begin to classify the worth of all lives and start going down a eugenic road. Or, it can choose to believe that all lives are equal in worth and value, making any selection and classification meaningless, which is the very basis of civilized Christian society.

God will never prefer some persons over others no matter how able or disabled they may be or how much pleasure or suffering they experience during their lives. Instead, each one will be created with his amazing image expressing the wonderful, immeasurable and unconditional love which exists in God.⁴⁰

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