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ORIGINAL RESEARCH

Gene Editing, the Mystic Threat to Human Dignity

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Abstract Many arguments have been made against gene editing. This paper addresses the commonly invoked argument that gene editing violates human dignity and is ultimately a subversion of human nature. There are several drawbacks to this argument. Above all, the concept of what human dignity means is unclear. It is not possible to condemn a practice that violates human dignity if we do not know exactly what is being violated. The argument's entire reasoning is thus undermined. Analyses of the arguments involved in this discussion have often led to the conclusion that gene editing contravenes the principle of genetic identity (genetic immutability) thereby subverting a requisite of human dignity and ultimately threatening human nature. This paper refutes these arguments and shows that any opposition to gene editing cannot rely on the human dignity argument.

Keywords Gene editing · Human dignity · Instrumentalization · Genetic immutability · Human nature

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Introduction: The Relation Between Human Dignity and Gene Editing

Article 11/1 of the Universal Declaration on the Human Genome and Human Rights (UDHG) states: "Practices which are contrary to human dignity, such as reproductive cloning of human beings, shall not be permitted." Although the UDHG does not expressly forbid gene editing, it is generally understood that the practice violates human dignity (Rolston 2002). Thus, it is considered banned by this norm, whose reference to cloning is merely exemplificative, and some even advocate the reformulation of this norm to include an express reference to gene editing (Melillo 2017).

"Gene editing" refers to the most recently developed procedures used to perform genetic manipulation, mostly using the technique CRISPR-Cas9, which provides higher guarantees of safety and efficiency due to its precision. In this study I will use the term gene editing based on the assumption that all forms of genetic engineering that take place in the future will be performed using CRISPR-Cas9. Many of the studies quoted still use the term genetic engineering or genetic manipulation (mostly because they were written before the consolidation of this new technique). However, the arguments therein referred to are also valid in terms of gene editing because they are not related to the safety and efficiency of this practice but to other considerations.

Most international documents incorporating genetic issues include imperatives requiring human rights and dignity to be respected during genetic interventions, as if genetic practices are an inherent threat to this value. This

has led some to argue for the criminalization of genetic interventions as crimes against humanity (Annas 2005). Both allegations are connected and converge in a common conclusion: to change the human genome is undignified. This conviction—shared by Leon Kass, Francis Fukuyama, and Jurgen Harbermas, among others—is challenged by this paper. There are several other arguments against gene editing (safety risks, discrimination), but our paper only deals with the human dignity argument and matters derived therefrom.

This paper will maintain that gene editing for health-related purposes does not violate human dignity. The expression "health-related purposes" is intended to encompass genetic interventions aimed to cure or prevent illnesses and interventions to make human beings immune to illnesses (therefore, not only therapeutic interventions *sensu stricto,* but also health-related enhancements). The concept of illness also raises questions. It is open to debate whether some conditions—such as deafness or daltonism—are illnesses or mere particularities. Nonetheless, this study will not discuss this question and will assume that there is a clear concept of illness.

The Concept of Human Dignity

The conclusion stated supra—that changing the human genome is undignified—requires the a prior definition of human dignity, which is far from clear. Accordingly, it requires an assessment of how gene editing violates human dignity.

Human dignity is a polymorphic concept. Even though our culture is shaped by the Kantian concept of human dignity (Baertschi 2014), the fact is that this idea goes way back in time and still today there are different interpretations of this concept.

The first proper conceptualization of human dignity comes from Kantian philosophy. In the eighteenth century, Immanuel Kant presented the idea of the person not as a means but as an end in himself. Thus, human dignity expressed the prohibition on using the person as a mere means rather than an end: "Act so that you use humanity, as much in your own person as in the person of every other, always at the same time as end and never merely as means" (Kant 1996 [1785], 429).

Nowadays scholars talk about dignity as a refusal of objectification/commodification (Resnik 1998), as empowerment (Brownsword and Beyleveld 2001), as a safeguard against barbarian acts (Benda 2000, referring to the interpretation of article 1 of the *Grundgesetz*), as a protection against "torture, inhuman or degrading treatment" (article 3 of the European Convention of Human Rights), and as the respect due to all individuals because of their equal standing as humans (Waldron 2009)—just to list some interpretations.

In spite of so many different concepts, two main understandings have arisen: dignity as a constraint and dignity as autonomy. In fact, all the above-mentioned definitions of human dignity can be reduced to one of these two conceptualizations: either we believe that respecting human dignity is all about protecting the person or we agree that human dignity involves the possibility of the individual making his/her own decision autonomously.

According to the notion that dignity is a constraint, every human being has intrinsic value and the right to be respected and protected from the attacks of others and self. This understanding is grounded in the value of the person and the concept of public order. It imposes prohibitions on some practices, even when they are authorized or requested by the person, every time the State (as a kind of omniscient being) considers the practices detrimental to the individual (Andorno 2009; Fabre-Magnan 2005).

In contrast, dignity as autonomy is associated with the idea that the individual is an independent being capable of self-determination, free to make his/her own decisions and consciously determine his/her own life (Brownsword and Beyleveld 2001).

> [W]ith the concept of human dignity in its specifically modern interpretation, the human being defines its own essence as subjectivity. Neither God, nor Fate, nor Nature tell the human being what to think or what to do. The human being is its own master (Bayertz 1996, 77).

Although the two understandings of dignity have formed the basis of all remaining concepts seen in the literature, there have been as many definitions of it as there have been authors who define it.

Surprisingly, we do not really know what human dignity is. Thus, with so many contradictory definitions, it is difficult to rely on human dignity to assess gene editing. Likewise, it is difficult to create a biomedical legal framework grounded in an undefined concept of human dignity.

Even international documents purporting to be based on human dignity lack a proper definition, as is the case of the Oviedo Convention (Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine). Although article 1 of this Convention states that the "[p]arties to this Convention shall protect the dignity and identity of all human beings …," an idea repeatedly stated in its explanatory report (Council of Europe 1997), any explanation of its basic concept is missing (Raposo 2016).

It is true that human dignity is not the only vague concept in bioethics and law. The same can be said about many other concepts, including the concept of human rights. However, I find human dignity one of the most poorly defined legal (and ethical) concepts, much more than human rights. Most declarations and charters of rights provide some content for the rights therein (even though scholars can disagree on the content provided by those legal documents or have doubts about its meaning). In contrast, there is no legal document describing human dignity or identifying what it includes Legal documents simply use human dignity for grounding a legal regime or, more specifically, for forbidding conduct, but without ever defining it.

For this reason, human dignity has been used to sustain every kind of legal solution regarding gene editing, with the same concept serving to ban or promote it, depending on the author's perspective. In this regard, Macklin (2003, 1419) was right when she proclaimed human dignity to be a useless concept. It became so handy that it can be used for any given purpose. In this sense, it is so frequently invoked that it has lost any meaning.

There are some criticisms that can be pointed at the concept of human dignity: its vagueness, the fact that it can used to sustain completely opposite solutions (a consequence of this vagueness), and the frequency with which it is invoked which results in the concept losing its value. However, in spite of these remarks, human dignity cannot be ignored in legal-ethical reasoning. It is not that dignity is, in itself, a useless concept; but rather that the way it is used today is fraught with uncertainties and contradictions, rendering it useless.

Gene Editing as a Violation of Human Dignity

Human dignity has been used by both religious and secular scholars to attack gene editing (Calo 2012). Most of these criticisms are based on the concept of human dignity as a constraint and invoke a range of different arguments.

First, it hierarchizes human life, separating the ones with good genes from the ones with bad genes. Secondly, it contravenes genetic immutability. Thirdly, by changing the human genetic pool, it undermines human nature.

The Hierarchization of Human Life Argument

Human enhancement, including enhancement for health-related purposes, is rejected by many under the accusation that it led to the Nazi horrors and to other procedures to eliminate the unfit.

What these measures have in common is that they are all eugenic measures (Paor and Blanck 2016), but the mistake is to consider all eugenics as pernicious. The Nazi Holocaust and the sterilization of mentally impaired people represented the negative side of eugenics, characterized by discrimination, hierarchization of human life, and ultimately the killing of those perceived as weak in our species (Bachruch 2004; Finkelstein and Stuart 1996). Conversely, the kind of human enhancement that we pursue today by means of gene editing (and artificial reproductive treatments) aims to promote the well-being of the existing generations (somatic genetic interventions) and of future generations (germinal genetic interventions). The assimilation between these two scenarios, so different from each other, rest on a misunderstanding about eugenics as being necessarily harmful (Caplan et al. 1999).

> Eugenics has been vilified because of its abuses during the early 20th century, particularly Germany's choice to murder people with perceived disabilities. But the origin of eugenics was simply a desire to increase the odds that a child would be born healthy. Today we consider such measures as prenatal care, eating sensibly during pregnancy, avoiding use of alcohol or other drugs, and choosing your partner carefully to be the minimum that the pregnant woman should do and that the healthcare system should offer. Yet these practices are the very basis of "eugenics." (Root 2000, 873).

It has become common to use eugenics as a kind of bogeyman and for every intervention with connotations

of human improvement to be at risk of being banned. However, we should not be afraid of eugenics.

To be healthy and to have a good quality of life is a goal to be praised. I am not maintaining that a healthier life is the only value that matters. I am not arguing that every aspect of human life should be "medicalized"; thus, Crawford's argument (Crawford 1980) is not relevant to this discussion. Neither am I saying that every aspect of our life should be ruled by medicine or by biomedicine, to invoke Clarke's theories (Clarke et al. 2003). This paper defends something much more trivial: that being healthy is better than being unhealthy and that if we have the chance of being healthy by means of gene editing we should use it.

It is possible to use gene editing for negative purposes (creation of armies composed by super human beings, deliberate genetic interventions to cause diseases), but if we create strict regulations, as most countries are doing today, genetic procedures will be controlled and the offenders will be punished. As long as it is properly used, gene editing is a useful and very efficient mechanism to cure and prevent diseases and spare people (including future generations) pain (Raposo 2017a, 2017b).

Health-related genetic improvement is not about considering some human lives (the ones that were intervened with) better than the others but about improving the existence of humankind. We cannot reject genetic ameliorations that promote human health based on the idea that they are disrespectful to those who still suffer from diseases, just as we cannot reject medical treatments (drugs, surgical interventions) just because some people cannot be cured.

As vague as human dignity is, it necessarily must embrace measures that promote human relief from pain and sickness, and it cannot be invoked to prevent measures aimed to that purpose.

The Genetic Identity Argument

The Right to Genetic Identity

The genetic identity argument is based on a fourth-generation right (Falcón y Tella 2007), the right to genetic identity, that is, the right to have (and arguably to receive, in the case of future generations when it concerns germinal gene interventions) a non-manipulated genetic heritage.

This right has been affirmed in some national constitutions (article 26/3 of the Portuguese Constitution; article 5/1 of the Greek Constitution) and international documents, such as bullet 4/a of Recommendation 934 (1982) from the Council of Europe on genetic engineering (January 26, 1982),[1] and bullet 12/b of the Resolution of the European Parliament on the ethical and legal problems of genetic engineering (March 16, 1989).[2]

The exact content of this right is still under discussion (De Miguel Beriain 2017). Scholars still discuss whether the modification of the expression of a gene changes our genetic identity, whether genetic identity is changed by modifying the mitochondrial DNA, or whether that only happens when nuclear DNA is changed; in particular, it is discussed whether the right to genetic identity precludes any modification of the human genome or only those that will be passed on to future generations.

When it comes to modifying the genetic code of offspring or future generations (germinal genetic interventions), the level of discretion is more restricted. Issues exist that are otherwise unknown when genetic modification involves only the person. For example, there is the eventual right to an open future, formulated by Joel Feinberg in the 1980s (Feinberg 1980), then developed by Dena Davies (1997) and more recently by Millum (2014), and the argument of the instrumentalization of the future person (Habermas 2006) by modifying the genome without his or her consent. According to Habermas (2006, 125–126), damage emanates from the unilateral and irreversible intervention of a third party in the formation of a person's identity. The future person must divide the authorship of his or her own destiny with another. Furthermore, the ultimate result of germline gene editing inevitably involves substantial changes to the human gene pool (Committee on Science, Technology, and Law 2016).

A question associated with the right to genetic identity pertains to the nature of the genetic intervention forbidden by this right. It remains to be seen whether the prohibition against changing the human genome is complete and absolute or whether it leaves room for therapeutic interventions. The distinction between treatment and enhancement (So et al. 2017) is actually very unclear and artificial, as is the distinction between pathologic features and mere characteristics. However, this

[1] http://assembly.coe.int/nw/xml/XRef/Xref-XML2HTML-en.asp?fileid=14968&lang=en

[2] http://www.codex.vr.se/texts/EP-genetic.html

study will not analyse this distinction; instead, it will assume that it is possible to differentiate therapeutic interventions from others. In either case, it appears to ban any genetic enhancement.

Article 5/a of the UDHG seems to support therapeutic interventions because it allows actions affecting an individual's genome if the person is benefited more than disadvantaged:

> Research, treatment or diagnosis affecting an individual's genome shall be undertaken only after rigorous and prior assessment of the potential risks and benefits pertaining thereto and in accordance with any other requirement of national law.

The norm only refers to "treatment or diagnosis," that is, therapeutic interventions *sensu stricto* it is not clear if this provision also includes health-related enhancements, such as interventions that increase our resistance to disease (as happens with vaccinations). Even if this hypothesis is not expressly referred in the text I believe it can be embraced by the spirit of the norm.

This interpretation is reinforced by article 5/b, referring to a "person's best interests":

> In all cases, the prior, free and informed consent of the person concerned shall be obtained. If the latter is not in a position to consent, consent or authorisation shall be obtained in the manner prescribed by law, guided by the person's best interest.

Obviously, treating or preventing a severe medical condition complies with this imperative.

This same rationale can be found in article 13 of the Oviedo Convention (this idea is confirmed by paragraphs 89 and 90 of the Convention's Explanatory Report (Council of Europe 1997):

> 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 to the genome of any descendants.

I do not agree with Baylis and Ikemoto's (2017, 2084) conclusion that "[t]he Oviedo Convention as currently worded prioritises human rights and human dignity over scientific ambition and the technological imperative," as if these two vortices were in contradiction between themselves. Science and technology are also ways to comply with human rights and human dignity; it all depends on how they are used. Human rights and human dignity are not to be viewed as obstacles to scientific development but as mechanisms that spare people from pain and suffering. In this regard, Pinker (2008) talks about an "obstructionist bioethics."

Some authors argue that the human genome as it is (i.e., the genome what we are born with) represents a kind of harmonious equilibrium. Any change, even for the better, deprives one's genetic identity of valuable characteristics associated with the eliminated or corrected feature (Fukuyama 2002). However, it remains to be determined whether a genetic upgrade necessarily carries with it a parallel genetic downgrade. Although it may occur in some situations, this equilibrium does not depend on any particular genetic characteristics.

The right to an unaltered genetic heritage cannot be taken as an absolute goal; the genetic code isn't something divine and immutable. Even though detrimental traits are part of human heritage, there is no reason to keep them unmodified. Genetic immutability is not the only guide for genetic decisions or even the more beneficial to humankind. If this were so, we would be prevented from defending ourselves against the caprices of nature and biology based on a supposed duty to respect nature or "God-given gifts." Surgical interventions, vaccinations, or even something as simple as taking an aspirin would be banned.

The right to an immutable genetic heritage based on a genetic identity must be contrasted with another right of even greater importance: the right to have a healthy genetic code (Raposo 2012). Legal standards have established only the first right, not the second. However, the general proclamation of the right to health—as a right to receive medical treatments able to cure, or at least to alleviate, our illnesses and thus reduce pain and suffering—may be taken as a legal base for the right to be subject to gene editing technologies or to benefit from gene-editing technologies used in our ancestors for health related purposes.

When someone is suffering from a serious medical condition, there is certainly little comfort in the knowledge that his or her genetic code is unmodified. Under such circumstances, he or she would certainly prefer a fully manipulated genetic code to an intact one if it allowed him or her to enjoy a life without pain. As Sykora and Caplan (2017), 1872), "it is unethical to hold hostage patients with severe genetic diseases due

to fears of a distant dystopian future." To live a healthy life should be more important than the origin of the person's genetic code, that is, whether it was randomly created by nature or instead predefined by someone.

Human dignity and the various rights and principles therein derived should not prohibit but encourage the eradication of pathological genetic features. Making use of the Kantian prohibition of instrumentalization (Baertschi 2014), we can even conclude that to forbid the correction of a genetic mutation in the name of genetic identity will be an instrumentalization of the person suffering from that mutation, turning him/her into the means to achieve genetic immutability.

To interpret the right to genetic identity as a crude prohibition of any genetic modification goes against its raison d'être. What this right guarantees is that no genetic code can be changed without the person's consent. But it does not ban genetic interventions authorized, or even requested, by the person.

As a matter of principle, every genetic intervention requires the person's consent, but there are exceptions. In the case of children (born or as yet unborn), parents are entitled to make health-related genetic decisions. This scenario is not that different from what happens regarding medical treatments, which are decided by parents (or other legal guardians) based on their parental rights and duties. In both situations, the power to decide is transferred to someone else (although, just as in medical interventions, in genetic interventions mature minors shall be consulted). In any of these hypotheses a third party (parents or any other legal guardian) acts as the child's representative to protect their rights and their best interests. In regards to future generations, this reasoning is not applicable. Future generations are not entitled with rights (Nabais 2007); they do not have a right to genetic identity nor the right to consent. They do not have interests of their own. We have duties of protection towards future generations, based on the idea of intergenerational responsibility (Bifulco 2008), but those duties cannot overcome the well-being of present generations and the need to eradicate present diseases.

The Unmodified Human Genome as a Requisite of Human Dignity

This version of the genetic immutability argument suggests that human dignity resides in the genome we are born with.

One issue that can be discussed is whether human dignity is connected to the human genome in such a way that if one's genome is not one hundred per cent human (let us suppose the case of xenotransplantation) human dignity also suffers a reduction or completely disappears. However, this is not the problem under discussion but rather whether human dignity is linked to a particular (human) genome.

To conclude that the existence of a non-manipulated genetic code is linked to human dignity, we would have to assume that human dignity is based on a certain genetic code, not any human genetic code but the one every person is born with. If that were true, any change to that code would carry a diminution of dignity.

This conclusion is problematic because our genetic code changes during our lifetime. For instance, after a baby is born some fetal cells may be left behind in its mother's body. They can travel to different organs and be absorbed into the mother's tissues, changing her genetic composition,[3] but no one would say that the mother is less worthy of dignity. In the case of blood transfusions, depending on the amount of white blood cells (the only ones that contain nuclear DNA), some DNA is transferred from the donor to the recipient, even in small amounts, and it can survive for days in his or her body,[4] but this does not make the recipient less dignified during that transitory period. Furthermore, some diseases (such as cancer) can lead to acquired genetic mutations, creating the so-called genetic mosaics.[5] In addition to being sick, do these people become undignified? The same happens in organ (Olszewski et al. 2005) and bone narrow donations.[6] Both involve adding the donor's DNA to extracts of tissues from the recipient, but none of these situations diminishes the recipient's dignity. If the above thesis were true and if human dignity resided in a specific (human) genetic code, these examples would lead to the conclusion that some people lose their dignity during their lifetime due to changes (even if reduced and temporary) in their genomes, which obviously does not make any sense.

Human dignity cannot be reduced to a certain genetic code, nor the human being reduced to genetic

[3] Cf. http://www.nytimes.com/2013/09/17/science/dna-double-take.html?pagewanted=all&_r=0

[4] Cf. http://www.abc.net.au/science/articles/2009/02/05/2483400.htm

[5] Cf. http://www.nytimes.com/2013/09/17/science/dna-double-take.html?pagewanted=all&_r=0

[6] http://genetics.thetech.org/ask/ask208

characteristics. This same idea is stated by article 2 of the UDHG:

> (a) Everyone has a right to respect for their dignity and for their rights regardless of their genetic characteristics. (b) That dignity makes it imperative not to reduce individuals to their genetic characteristics and to respect their uniqueness and diversity.

If that is the case, there is no way that a change in the genetic features of a person will undermine his or her dignity.

The Human Nature Argument

The human nature argument is concerned with how genetic interventions in some individuals have consequences for the genetic pool of humankind. The premise is that changes to the genes of some people will undermine human nature in its totality.

Based on this understanding, Jurgen Habermas (2006) asserted that when people change their genetic code they are altering their human nature and turning themselves into instruments. According to Habermas, our genetic code is the basis of our human nature, as if changing it would make us less human. Kass (2002), for instance, referred to losing one part of being human.

This argument can be divided into two sub-arguments: a) genetic homogeneity can become a threat to the survival of the human species; and b) an overall ecological balance should be maintained, which depends on the existence of diverse species. Notwithstanding these assertions, it would take thousands of years and generations for one change to have repercussions for the genetic makeup of humanity as a whole. As McConnell (2010, 420) puts it:

> [T]here are more than six billion humans on the planet. Absent some kind of magic wand, it is initially difficult to see how any given genetic intervention could change human nature.

Even if the human nature argument were true, a certain number of genetically modified beings would still have to be established, after which we could conclude that human nature had changed (McConnell 2010). How many changes would be required for that conclusion? How many genes would have to be modified? Is it relevant if genes are added, modified, or supressed? None of the authors maintaining this argument has ever provided an answer to any of these questions.

Nonetheless, even if some beings (those subject to genetic modification) were altered, all the remaining humans would retain their original genetic code. Thus, human nature would not actually be changed; rather there would be the emergence of a new human species (Mcconnell 2010). We do not know what kind of species that would be, but it is fair to assume that probably it will be another version of the human being. It would be naive (and egocentric) to believe there can only be one "version" of a human and that this would be exactly the current one.

Some people fear the creation of so-called posthuman beings (Annas 2005) that will pose a threat to humans and eventually eliminate us, as Homo sapiens eliminated the Neanderthals (Annas et al. 2002; Brenner 2013). We have no reliable evidence that this will be the outcome. However, if that turns out to be the case, it may be an unavoidable moment in the evolution of humanity. To supplant ourselves, to change and become better, is inherent in human nature. This has occurred since the dawn of time, and it is this ancestral impulse that has allowed us to arrive at this stage of development. "We should be grateful that our ancestors were not swept away by the Kassian sentiment, or we would still be picking lice off each other's backs" (Bostrom 2005, 205).

The criticism based on human nature is particularly aimed at genetic interventions for human enhancement, based on the concern that such enhancements undermine the person by eroding his or her human nature (Fukuyama 2002; Mckibben 2003). However, our limits have constantly been enhanced and exceeded throughout human history. The aim of improving and going beyond our present condition is what explains the various revolutions (agrarian, industrial) that have taken place, the difference being that now we are experiencing a genetic revolution. We were created to always go further, surpass barriers, and enhance ourselves. We cannot avoid enhancing ourselves for the simple reason that it is our human nature that urges us to be better every time.

Genetic mistakes are part of human nature (otherwise we would have to restrict our notion of human being to the genetically perfect beings, a description that hardly suits any member of humankind), but the urge to correct such mistakes is also part of human nature. Therefore, gene editing might introduce some modifications in the genetic code we were born with, but it does not change human nature; instead it reaffirms our nature.

Conclusion: Gene Editing is not a Violation but a Confirmation of Human Dignity

Using human dignity as a reason to ban gene editing (or to ban any other practice) is seductive due to the simplicity of the argument. Human dignity has become an "umbrella" under which everything seems to fit. It has become trivialized by such extensive and inflated invocations (Birnbacher 1996).

Human dignity won't be an obstacle to gene editing once we achieve an understanding of human dignity able to do justice to its rich philosophical background and simultaneously able to meet our current needs. Such understanding of human dignity must be one that expresses a characteristic that inherently differentiates the human person from other creatures: the power to decide our own destiny and to develop in order to become the best version of ourselves. Thus, human dignity is respect for human autonomy. To be treated with dignity is to have one's decisions respected (as long as they do not violate the rights of third parties) and human autonomy is what shows utmost respect for the person.

In light of this understanding, gene editing does not violate human dignity; on the contrary, it offers the individual more possibilities to assert his/her status as a human person and, therefore, to assert his/her dignity.

The claim is unfounded that gene editing is a form of eugenics and therefore—ipso facto—repugnant. To be healthy, to live a life with less suffering, cannot be against human dignity. The accusation of eugenics has become commonplace—invoking the Nazi holocaust and the fear of gross violations of human rights. However, the fear of past mistakes cannot block genetic ameliorations that are able to relieve humanity from diseases that continue to kill so many people.

Critics also invoke the immutability of the genetic code, as a kind of "foundation" of human dignity. Nevertheless, the preservation of humankind's genetic pool cannot be more important than the other values and goals at stake here, such as eradicating the pathological features of people who are suffering. If the aim is to avoid human suffering in present and future generations, the hypothetical right to receive an unmodified genetic code (hypothetical because future generations do not have any rights) cannot prevail over the right to health.

On the other hand, an immutable genome cannot be viewed as a condition sine qua non for the dignity of the person. Scientific reports have shown that a person's genetic code changes throughout their existence, even if such changes are subtle and temporary. Certainly, these changes do not imply a diminution of an individual's dignity.

Another repeated argument pertains to the destruction of our intrinsic human nature. However, enhancement (becoming stronger and healthier) is natural to humanity; it is the defining note of the human species. Looking back in time, the story of humankind has been one of enhancement. We are always trying to supplant ourselves (Buchanan 2011). We cannot assume that human nature is something defined and fixed (Fenton 2006). On the contrary, we cannot avoid changing ourselves for the simple reason that we are human. Gene editing is just another way of being human.

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