The Geneva Statement on Heritable Human Genome Editing: a criticism

1.- Introduction

In January 2019, an international group comprising public interest advocates, policy experts, bioethicists, and scientists, met at the Brocher Foundation near Geneva, Switzerland, to assess and discuss public engagement and the governance of heritable human genome editing. The outcome of this meeting was a statement (the "Geneva Statement on Heritable Human Genome Editing: The Need for Course Correction") that has been published recently by Trends in Biotechnology [1]. According to its signatories, this new document is aimed at reorienting the conversation around heritable human genome editing *"by identifying misrepresentations and misunderstandings that muddy the discourse and by encouraging a robust consideration of the social, historical, and commercial contexts that would influence the development of heritable human genome editing and shape its societal effects."*

Reading these laudable intentions, I could not help but feel pleased. The debate about germline gene editing is indeed riddled with confusion. That a group of colleagues as highly qualified as those who signed it set out to resolve these issues seemed hopeful to me. Unfortunately, my expectations were soon frustrated. In my opinion, this new declaration not only fails to achieve its objective but, rather, contributes significantly to maintaining and even increasing the problems it seeks to alleviate. In this short comment I justify my criticism by exposing the weaknesses that can be found in the fundamental basis of the Statement, this is, the main assumptions made in its "Clarifying Misconceptions" section.

2.- Does heritable human genome editing "treat, cure or prevent disease in any existing matter"?

The first bullet point of the "Clarifying Misconceptions" section reads: "*Heritable human genome editing would not treat, cure, or prevent disease in any existing person*

(...)[It] should be understood not as a medical intervention, but as a way to satisfy parental desires for genetically related children or for children with specific genetic traits." However, this paragraph does not accommodate well with reality.

To begin with, the first phrase sounds quite enigmatic to me. What does it really mean? At first glance, it seems to take for granted that the embryos subjected to germline gene editing (GEE onwards) are not "existing" persons. However, there are millions of people who would disagree with a statement that is supposed to be "consensual". I am, of course, thinking about those people who believe that human life starts at fecundation. Moreover, this belief constitutes, for instance, a crucial point for institutions such as the Catholic Church (Indeed, do all the signatories really share the idea that embryos are not people?). Therefore, it seems to me that this statement is somewhat extreme to constitute a kind of common basis to build upon.

Moreover, even if this were not the case, that is, even if we were to accept that the GGE would not treat, cure, or prevent disease in any existing person because embryos cannot be considered as such, this does not mean that it would not produce this result in people who will exist in the future. In fact, if it ever works in the way it is expected, GGE might reduce someone's genetic predisposition to some types of cancer or prevent a person from transmitting hemophilia or suffering from Huntington Disease. Are these reasons not strong enough to support an intervention? Are they not, in fact, the reasons that justify the use of preimplantation genetic diagnosis (PGD), or that make in utero interventions to improve the health of a fetus (which is also not an existing person by the way) a moral obligation? [2,3] But if this is so, what is the sense in concluding - as this part of the Statement does -that *"Heritable human genome editing should be understood not as a medical intervention, but as a way to satisfy parental desires for genetically related children or for children with specific genetic traits"*? Is this really the case in all circumstances? I, frankly, do not share this idea, and I would safely assume that I am not the only one. Therefore, trying to build a consensus on these statements does not seem to be in any way constructive.

3.- Risk and Prospective parents' choices

The following bullet points in the "Clarifying Misconceptions" section are also very unconvincing. The second states that *"Modifying genes in early embryos, gametes,*

or gamete precursor cells could produce unanticipated biological effects in resulting children and in their offspring, creating harm rather than preventing it." This is true, of course. That is why it is deeply inmoral to implement these techniques right now. However, what the statement does not say is that one day that particular risk may be much lower than it is today. So much so, in fact, that what may constitute harm, in this case produced by omission, will be the failure to modify the genome of a human being who will, as a consequence, be much more susceptible to suffer from cancer [4].

Similarly, the third bullet point states that *"Prospective parents at risk of transmitting a genetic condition already have several options to avoid doing so, should they find them acceptable. For example, prospective parents may seek to have unaffected children via third-party gametes or adoption."* This quite naïve statement raises two important issues. First, such alternatives would never serve to provide genetically related descendance to all those people who suffer from the impossibility to reach this aim without using biotechnology. Indeed, in some -certainly scarce- cases their disability could only be solved through GGE [5]. Second, if we hold the signatories' suggestion, we should also claim for a general avoidance of PGD, since it is pretty clear that third-party gametes or adoption would also serve for this same purpose. I cannot find any substantial difference in both cases. However, is this really what some of the signatories of this Statement are willing to claim? Are they therefore claiming for a general ban of PGD? This might be the case, but I do not think we would find a general consensus on this either.

3.- GE and PGD

However, it is the final bullet point, in the section that I am commenting on, that concerns me the most, since it involves a substantial number of misunderstandings and half-truths. It is true, of course, that *"prospective parents at risk of transmitting a genetic condition who wish to avoid doing so and to have genetically related children can accomplish this with the existing embryo screening technique preimplantation genetic diagnosis (PGD)"*. What is not so true is that PGD and GGE are (or might be) equally useful [5,6]. GGE might allow us to obtain results that PGD could never provide, such as reducing predisposition to certain diseases or improving our immune system, for example. Omitting this information means omitting a fundamental part of the basis to debate the issues at stake.

Furthermore, even though the signatories state the opposite, it is not so clear that *"Genome editing cannot be considered an alternative to PGD, because PGD would remain a necessary step in any embryo editing procedure."* If one day GGE proves to be truly efficient and safe, we could edit all our embryos preventively, without having to examine them afterwards through PGD. Thus, for example, a family carrying a gene expression that predisposes to Huntington Disease could modify all their embryos and then proceed to direct implantation, without any PGD involved. Moreover, even if this were not the case, in a scenario in which GGE becomes real, PGD would lose all the eugenic component it currently has [7] because it would be executed to decide which embryos should be cured, not which ones should be destroyed. This, in my view, is another fundamental issue that the Statement completely ignores .

4.- Conclusion

From all that I have pointed out in the previous sections, I must conclude that the Geneva Statement on Heritable Human Genome Editing will hardly be able to reach a reasonable consensus on the issues involved in the GGE of human beings. Unfortunately, the description of the facts included in the document is very far from reflecting the consensus that we could all share. It neither shows the therapeutic possibilities of GGE nor describes well how it could improve the performance of PGD or alter its eugenic character, just to summarize some of its fundamental flaws. Therefore, even though I totally share the thought that *"we need to address and clarify several misrepresentations that have distorted public understanding of heritable human genome modification",* I do not share the idea that this document could serve for this purpose. We will, unfortunately, have to wait and see the fruit of future, and hopefully better balanced efforts.

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