



# What should be our community's Responsibility?

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## Opinion

Nearly everyone in the various fields of Bio Medical research is aware of emerging gene editing tools developed round the CRISPR-Cap9 system. What seems less clear, is now fully involved in the discussions of the associated ethical and societal issues is this research community. This is needed not just in the education of our students and other mentored, but with the general public. The importance of this is readily seen in the diversity of published opinions on both the utility of and implications of these new gene editing tools. For example, in the book "GMO Sapiens" by Paul Knoepfler and with *Nature's* [1] headlines: "Russian biologist plans more CRISPR-edited babies" scary views are being presented. In April 2019 the *ScienceDaily* news section [2] announced that Cornell University scientists used for the first time in human cells a new type of gene CRISPR system, which can erase large stretches of DNA, thus expanding the potential of gene editing. Recently the John Hopkins school of medicine Public Health magazine, featured a broader based forum discussion: "Should CRISPR be used to edit human genes to treat genetic diseases?" [3].

So, what does all of this suggest about our need, as biomedical researches, to be involved in discussions of the associated ethical and societal issues. First of all, there is a general lack of understand of some important facts. These include some basic genetic knowledge: such as the fundamental distinction between somatic and germ line cells; the long history of genome modification via domestications; and the degree of the complexity of multi gene networks and interactions. These are in addition to the fact that inherited genetic diseases fall into at least two distinct categories. In particular, there are those that arise from common single gene mutations, and those that do not. These single defective gene cases include many cancers and some lifelong disabilities, such a Sickle Cell and Cystic Fibrosis. How while the potential to improve human life in such cases with gene editing seems obvious, it is nearly as obvious, that there are still issues and the potential for misuses [4-6].

An obvious issue, even with editing to a fix common single gene inherited mutations, is whether can it be done without germ line effects. This is in itself not simple. Note, the use of Pre-implantation

genetic diagnosis (PGD) of an early embryo, for rejection if carrying the mutation. This is currently available to parents who feel strongly that they have an obligation to not to pass on, clearly understood defective disease genes to their children. Importantly PGD results in a changed the germ line! Thus, for some this is a mixed ethical problem, should they edit their own reproductive defective cell lines or select against a defective embryo. Such issues for many can becomes religious or moral issues.

Then there are those multiple defective gene cases. These raise additional issues. Some are technical, do we have tools for simultaneously or sequentially editing multiple sites. Do we even understand all of the defects or even their interplay with other genetic processes? The answers to all of these is currently no. Note, these are closely related to the larger gene editing ethical and societal issue: augmenting by editing our genes, for potential improvements affecting our future! Clearly in the case of enhancement gene editing, there is a clear general agreement, against among most medical ethicists, and current geneticists. Our ignorance of the full implications of such, is the obvious reason. We surely do not even understand the full complexity of the interactions between many different genetic networks let along their interactions with our current varying environments, to say nothing of the future. A useful analogy here is that of the automobile: normally when a good running car breaks down, your mechanic will fine a single part that needs fitting or replacement; however if you were to ask your mechanic to upgrade your VW or Ford to drive like a Ferrari, outside of thinking you were a bit crazy, he would note a require for complete understanding of how all your car's systems now work and how the upgraded enchantments might interact with them.

Now as members of the biomedical community we generally understand the great health potential of these new tools and both their limitation and potential of misuse, thus we have a responsibility to be part of the discussions and to help with the education of the issues involved. Many universities and medical schools are currently not providing comprehensive coverage or general education of these complex issues. This is part due by not understanding the lack of public trust in science, coupled with the

sense felt by many that we are playing “god”. This latter requires real collaborative efforts, involving many disciplines and a sense of history. That history includes human kinds long involvement in germ line modification in animals and plants for domestication, as well as in our very acts of mate selection. History includes the fact that (evolution) biology is a historical science, with all the complexities of dependence on the full historical time sequence.

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