



Genetic Manipulation: Right or Wrong?

Genomic technologies already allow for certain genetic modifications to be made in living organisms (transgenic plants and animals; gene therapy); but with the advent of CRISPR biotechnology, the door is opened to other possibilities.

Think of CRISPR as a very precise pair of “genetic scissors” that can cut a fragment of DNA to correct a mutation or even remove a gene to replace it with another. With this revolutionary tool, it becomes theoretically possible to manipulate individual genes in order to cure genetic diseases, which as of yet have been incurable. While this new option for modifying genes is fast, accurate and cost effective, it nevertheless raises its share of ethical, legal and social issues.

Using this technology, researchers can now modify the cells of any living organism, including its germ cells (sperm and egg). This is where the technology becomes contentious. Unlike other



cells, germ cells pass on their genetic material to future generations. In other words, children could inherit the genetic modifications made using their parents' germ cells.

WHAT DOES THE LAW HAVE TO SAY?

In Canada and Québec, there are no regulations or guidelines specifically pertaining to genetic modification for clinical, therapeutic purposes.

However, according to the *Assisted Human Reproduction Act* (2004), the genetic modification of the human germline and embryonic cells is criminally banned across Canada, both for clinical and research purposes.

While the United States does not currently ban genome editing, the National Institutes of Health (NIH) recently stated that it would not be providing funding for research involving the use of genome editing technologies on human embryos.

HOW FAR CAN SCIENTISTS GO?

From an ethical standpoint, most countries accept the practice of modifying somatic cells (those not passed on to future generations) if it involves curing or preventing genetic diseases (i.e. therapeutic purposes), and if the clinical trials are strictly monitored by a scientific and ethics committee.

In many cases, there are no laws specifically dealing with the genetic modification of the human germline. However, its use for reproductive or therapeutic purposes is generally banned in most countries since the modifications may affect future generations in unpredictable ways.

WHERE'S THE DEBATE?

Ironically, the criminal ban on certain forms of genetic manipulations set out in the 2004 *Assisted Human Reproduction Act* ended up foreclosing further debate in Canada until the advent of CRISPR. Yet debate is precisely what we need. The ability to alter the human genome raises important social justice issues, such as equitable access to the technology, and potential problems involving new forms of discrimination, inequality and social conflict.

Few studies have addressed this topic. The ones that do exist focus primarily on the situation in the United States. These studies indicate that most Americans seem to agree with genetic modification if it is done to cure people or to prevent disabling or potentially deadly diseases, including for future generations. But they are against using the technology for non-medical purposes, such as the improvement of physical traits (e.g. enhancement).

In Québec, public perceptions and attitudes regarding genome editing technologies have yet to be studied.



To learn more about the subject, consult the [policy brief](#) prepared by the Centre of Genomics and Policy of McGill University commissioned by Génome Québec.