

## **On the Opinions of Genetic Engineering**

University of Ottawa iGEM Human Policy and Practices

Dear reader,

In recent years, genetic engineering and manipulation have been receiving increased attention from the media and the public. While much of the attention has not been positive, it has generated a conversation between scientists and non-scientists and has highlighted the need for this type of communication. This same communication is needed between scientists and members of parliament. The government is responsible for keeping the public safe, but is also responsible for maintaining the limits of what scientists are allowed to do. The government must keep in mind the interests of both the public and the scientists, but when the media is the largest mediator of information, it is no surprise things can get twisted, even when the work scientists are doing is largely in the interest of the public as well. Indeed, the relationship between the government, scientists and the public can become complicated. While genetic engineering has been around for thousands of years<sup>1</sup>, the technology has become increasingly complicated and scientists have been able to achieve things never thought imaginable. The more complicated these technologies become however, the less people understand about them, and the more hostile they are likely to be. So how do we begin to thwart these misconceptions?

This is where my passion for science policy began. I noticed even within my own family how heavily the news and other social media platforms can influence people's opinions. When the media has to translate scientific research, often it can become construed, and when the public is misinformed, the government and companies can feel pressure. In this age of information knowledge is readily accessible but ironically, it is easier than ever for misinformation to spread. Unsupported claims and "bad" science get thrown around in flashy videos and are forwarded by people that don't know to check for sources. It is my belief that scientists have a greater responsibility to share their own research in a way that is accessible to all. It is also my belief that education and engaging youth are the best way to combat this. This is why I chose to participate on the University of Ottawa's Human Policy and Practices team; being in the nation's capital, the official status resonates throughout the city. Ottawa is also a research hub, home to extraordinary facilities that generate immense amounts of private and public research. It is here where such unique events take place, such as Genomics on the Hill, which is hosted by Genome Canada that I had the honour of attending. Scientists created a conference on parliament where the science minister herself, the Honourable Kirsty Duncan, joined by several other members of government, came to learn about the research being done right at home. These are the kinds of events that inspire me and that I hope become more widespread to encourage people to learn about the research being done in their community.

Our journey began with a series of talks with a local group called Let's Talk Science. This organization sends out students to schools and other events to talk to students, the public or just engage with passer-by's. These talks are designed to inspire, generate intrigue and start a conversation. It is the hope then that the people who were engaged go home and are more interested than before and spread these ideas with others. We also had a wonderful opportunity to work with Adventures in Science, a camp run by the University of Ottawa that teaches science to youth during the summer in fun and engaging experiments. We spoke to our class about iGEM and the wonders of genetic engineering, and performed DNA extractions on strawberries with them. There was no better feeling than seeing the looks on their faces when they saw the DNA precipitate before their eyes! This sense of wonderment is exactly what I believe we need to create the scientists of tomorrow. These students however are usually already interested in science, which is great, but how do we engage those that

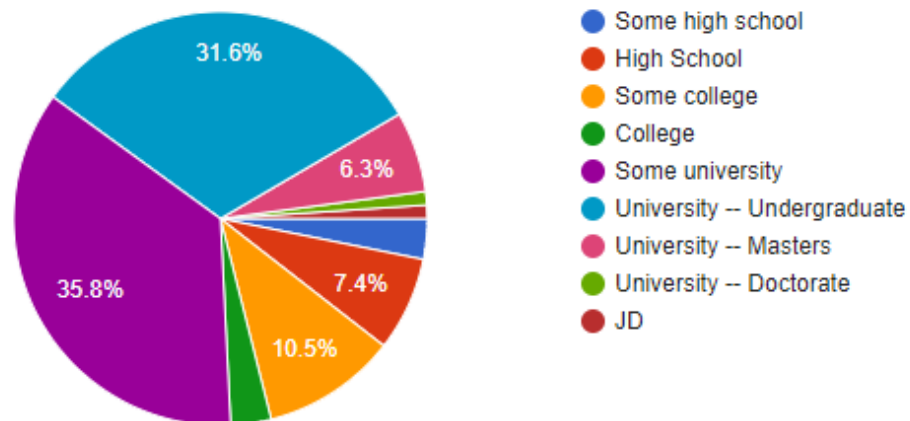
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<sup>1</sup> Ranger, Gabriel. *From Corgis to Corn: A Brief Look at the Long History of GMO Technology*. Harvard University. Science in the News. August 9, 2015.

are older and maybe don't have much scientific background? To get a better understanding of the opinions in our community, we created and circulated a survey about genetic manipulation. People with a range of careers and education levels participated. Here are some of the results:

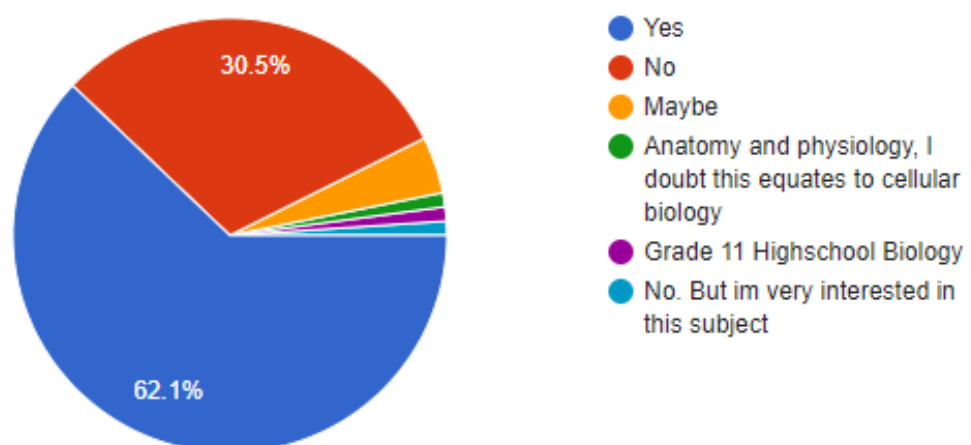
## What level of education do you have?

95 responses



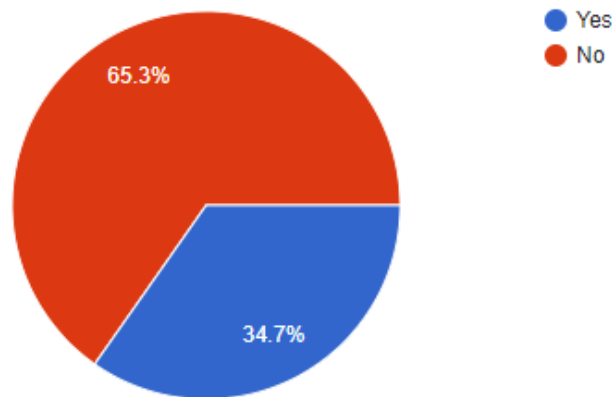
## Have you ever taken a class on cellular biology, genetics, or engineering?

95 responses



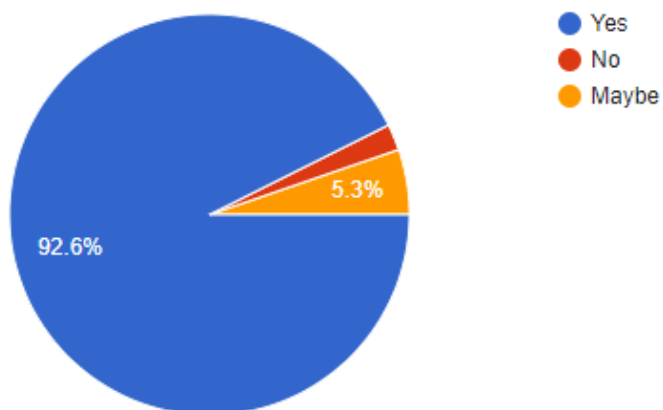
Have you ever heard of the iGem program before?

95 responses



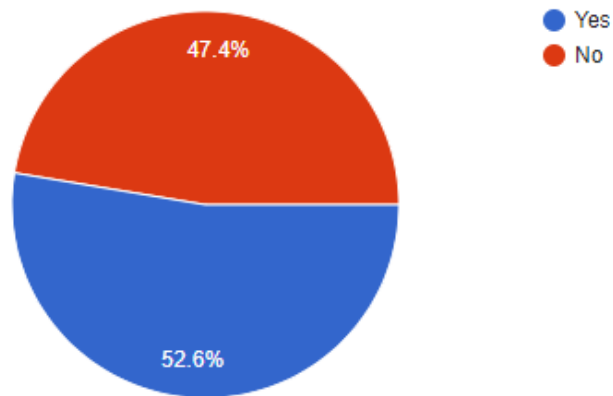
Do you think science outreach programs directed at students (k-highschool) are beneficial?

95 responses



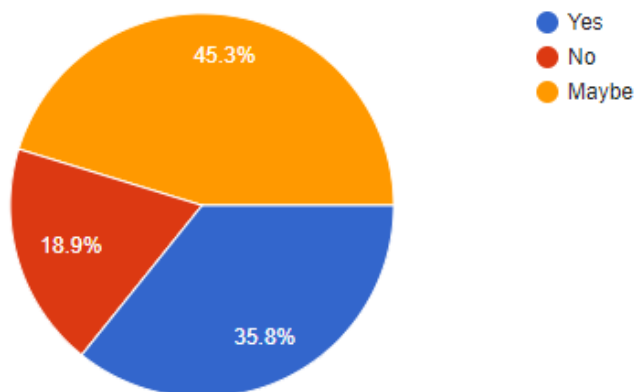
## Have you heard of CRISPR before?

95 responses



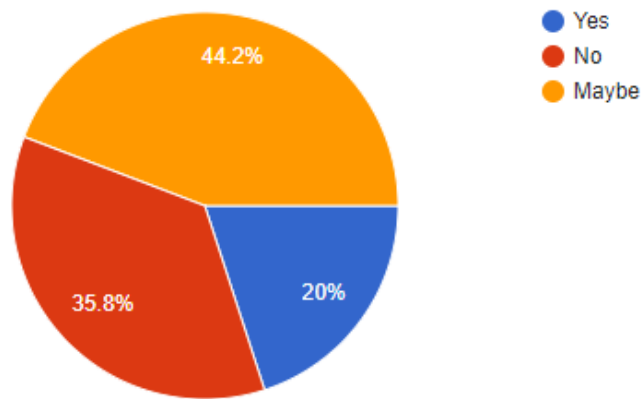
## Do you think genetic manipulation should be allowed on adults?

95 responses



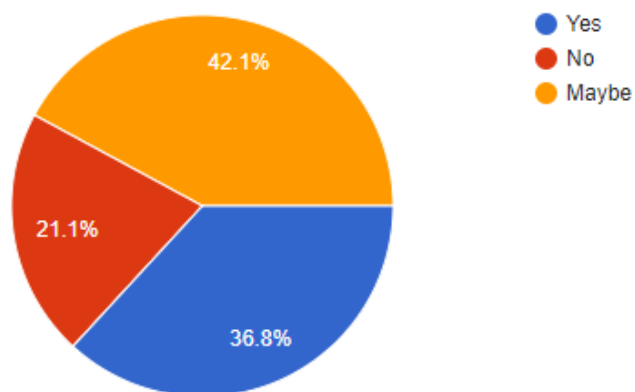
Do you think genetic manipulation should be allowed on children?

95 responses



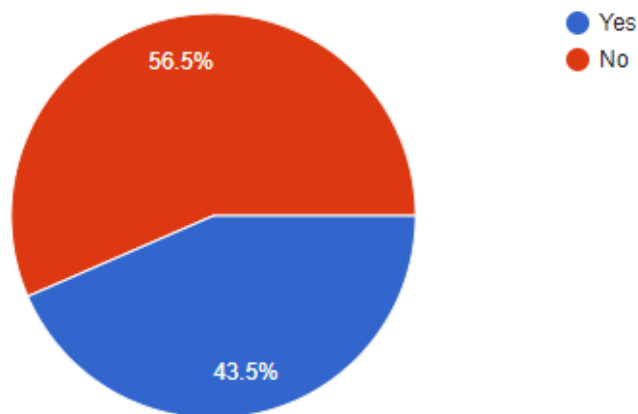
Do you think genetic manipulation should be allowed on embryos?

95 responses



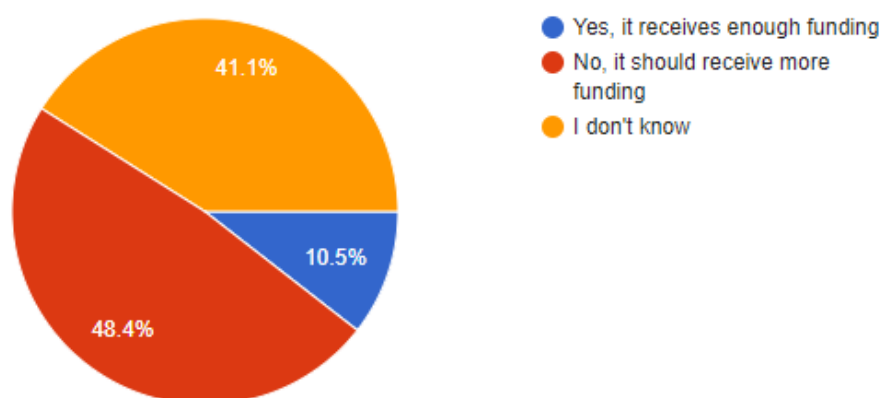
Do you think the Canadian government is doing a good enough job keeping up with the discoveries of the scientific community?

92 responses



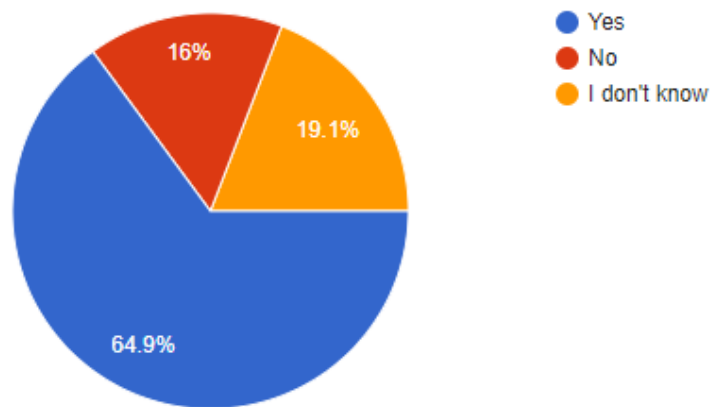
Genetic manipulation techniques have the potential to help many people but there is a lot of research that needs to be done. Do you think it is being funded well?

95 responses



Do you think that this is an area that should receive more attention, from the media for example?

94 responses

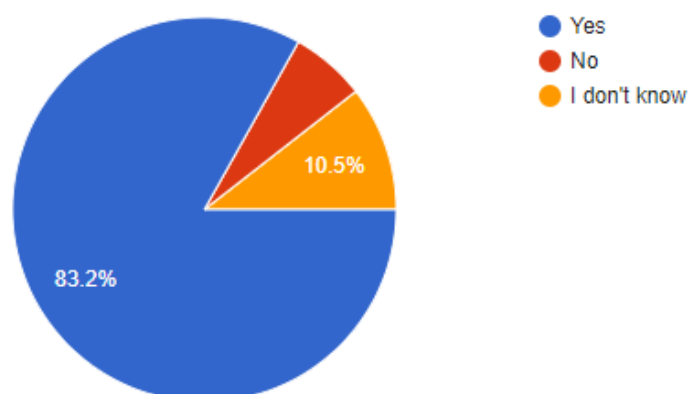


“In regards to the question about the media, I believe that the media tends to skew results in an attempt to generate rating. Knowing the stigma that genetic manipulation might have in certain communities I believe that the media might misrepresent results.”

-Anonymous response from survey

Do you think the government should try harder to keep up with advances made in genetic manipulation?

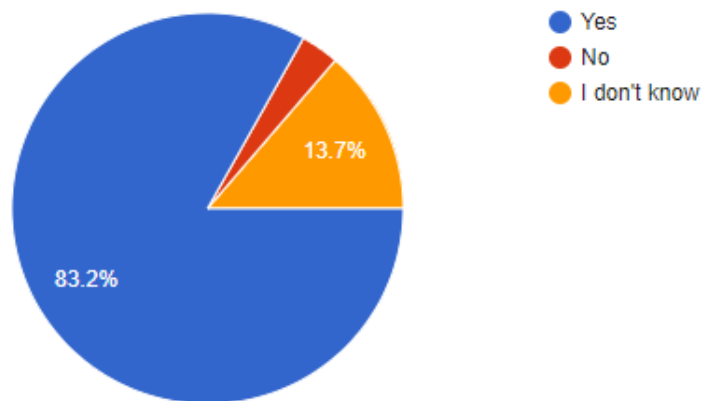
95 responses





## Do you think scientists need to do a better job at communicating their research to the general public?

95 responses



Clearly, people have an interest in the work researchers are doing, and believe that the government needs to play a bigger role. But this is hard when there is not enough coverage on platforms that non-scientists rely on, and the public has an equal responsibility to show the scientists that they care what is going on, and likewise for the scientists. It can be difficult to open up about one's research in a field that is so competitive, but when the end goal is for the benefit of the people, scientists need to be more open about their work. Facebook groups such as I F\*\*\*\*\* Love Science and the popular podcast RadioLab have made excellent headway and spreading science culture on different platforms in easily digestible forms. These are the kinds of programs that need to be funded more to engage people that cannot access education.

From the survey:

“This is such an important conversation!!!! I think better conversation/information between scientists actually doing front-line research and the public would be extremely valuable, especially to avoid miscommunication and rumours about what is occurring in the scientific community. This particular aspect of research is tied in with so many ethical issues, and I think besides letting the public know what is happening research-wise, researchers should hear what the public has to say about the ethical aspects. Thank you for this survey.”

“Not entirely sure what role the government should have in these kinds of scientific studies. Things often get messy when the government starts funding projects. Regulations and expectations from people who know very little about the subject could be a potential road block in the future of studies like genetic engineering. It would be nice if they paid for most of it and didn't interfere with anything, but that seems unlikely. Maybe if funding came from private sources or universities put more from their budgets into genetic engineering and similar scientific studies than we would see more results faster, but that also seems unlikely. I doubt there's a perfect solution. Whatever turns out the most accurate science in the shortest amount of time, whatever way that is.”

“Public education seems to frequently backfire. I support availability of knowledge, but fear that increased visibility of genetic modification in humans will be treated much like GMO foods - with hysteria and uneducated paranoia. I'd prefer to have the information available to those who are interested and continue to do research / testing as we learn more about the improvements we can make.”

The next steps are to continue the survey to even broader audiences and to take these responses to scientists and government officials themselves. Seeing firsthand the effects of their actions are one of the ways to develop this dialogue between public, government and scientists. Some further actions may include easier ways for people to generate suggestions to government and scientists such as online forms. While conferences are engaging, they are time-consuming and expensive. Even something as simple as a city-council meeting with scientists can be inconvenient for the busy people of today.

Thank-you reader, for your interest in our work. Genetic engineering, manipulation, synthetic biology, molecular biology; however you want to say it, the research and the laws surrounding it affects us all, and I wish nothing more than this research to inspire others as it has me. There are great things this research can accomplish, but only with the cooperation of all these groups.

-Raeesa Matadar