7 Questions with Jennifer Doudna

By Alice Park

She co-developed a game-changing technique that allows scientists to edit any human gene. Now the field just needs to agree on when it's O.K. to use it

It might sound far off, but the day has come when doctors, spotting an undesirable bit of DNA in a fetus, could–in theory–simply pluck it from the genome. That's thanks in part to Jennifer Doudna, a molecular biologist at the University of California, Berkeley, and Emmanuelle Charpentier from the Max Planck Institute, who created the most precise set of molecular scissors ever made. Called CRISPR-Cas9, it gives scientists nearly free rein to fix and manipulate the human genome. And that's why its creators are calling for caution.

Gene editing makes people nervous–some say it's like playing God. What do you think?

Every technology has the potential to be used in ways that are beneficial for humanity and also potentially problematic. It's no different here.

What scientific nightmare scenario keeps you up at night?

That with all the excitement that's been generated around this, that somewhere, someone will do something with the technology that is perceived to be dangerous or that is really dangerous. If that happens anywhere in the world, it could put a real damper on the field. There would potentially be public backlash and a rejection of this technology, even if we all agree that for certain applications, it's likely to be safe. This is my fear.

How are scientists addressing the ethical issues raised by CRISPR?

I've been involved in the last year in thinking about the ethical implications of CRISPR and how it's used. There are two areas where there's been a lot of discussion: one is using this in organisms that might be released into the environment, where they could have an ecological effect. The other is the use of CRISPR to make changes in egg or sperm, which can create a person where changes to their genome are translated to future generations.

Do you think CRISPR should be used on egg and sperm cells?

We need more broad societal consensus before moving forward with that kind of application.

Do you see any new treatments coming in 2016 thanks to CRISPR?

There are a number of things on the horizon. There is already a lot of work being done to apply CRISPR to genetic diseases of the blood, like sickle-cell anemia, where we can repair the mutation that causes it. I don't know if it will happen this year, but soon we'll see the first clinical trial for sickle-cell. That seems astounding, but it's what I'm expecting.

Do you think it's a good time for women in science?

As I've gone further in my career, it's really come home to me that there actually still is discrimination against women and other underrepresented groups in science. It's not intentional, but it's very real for me. It bothers me deeply.

Is a Nobel Prize in your future?

CRISPR is powerful in part only because we have access to many other resources and tools in science. Beyond that, one can never speculate about these sorts of prizes.

This appears in the December 28, 2015 issue of TIME.