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A RECKLESS EXPERIMENT: ON GENE-EDITED BABIES

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

The saga of the Chinese scientist who created the world's first gene-edited babies last November has forced researchers everywhere to take a hard look at the ethics of gene-editing. Chinese authorities have since condemned the researcher, He Jiankui, with a government report this week saying he violated both ethics and laws. But though Mr. He's actions drew international outrage, they weren't revolutionary in technological terms. Editing DNA to correct disease mutations has been possible for a while now, which means others can also do what Mr. He did. The promises of such gene-editing are boundless; over a dozen clinical trials are currently on to treat diseases like HIV, multiple myeloma and other forms of cancer, using the Crispr-Cas9 editing system. But none of them involve editing the so-called human germ-line; instead, they have restricted themselves to fixing genetic flaws in sick adults. In contrast, Mr. He deactivated a gene in two human embryos, which means that the changes he made could be inherited by the next generation. In doing so, he violated the widely held ethical consensus that it is too early for germline editing, for we simply don't know enough yet about the risks of such fiddling.

The boundaries of ethics

One pitfall of embryo gene-editing is that it is not as precise as we need it to be today. Studies have shown that the technology can result in unintended mutations, which in turn can cause cancers. Then there is the danger of mosaicism, in which some cells inherit the target mutation, while others don't. To be sure, the error-rates of Crispr are falling with each passing year. But we aren't in the clear yet. What is more, even when gene-editing becomes fool-proof, the decision to edit embryos will still be a weighty one. This is because, today, scientists are far from understanding how exactly individual genes influence phenotypes, or the visible traits of people. Every gene likely influences multiple traits, depending on the environment it interacts with. This makes it hard to predict the ultimate outcome of an embryo-editing exercise without decades of follow-up. This uncertainty became evident in Mr. He's experiment, in which he sought to immunise a pair of twins from HIV by tinkering with a gene called CCR5. The problem is that while protecting against HIV, a deactivated CCR5 gene can also make people more susceptible to West-Nile Fever. Every gene influences such trade-offs, which scientists barely understand today. This is why several scientific societies have advised abundant caution while fiddling with the human germline. In a 2017 report, the U.S.'s National Academies of Sciences, Engineering, and Medicine said such an intervention would be defensible only in very rare situations, where no alternative exists. The He Jiankui incident shows it is time to translate these advisories into regulations. Unless this happens, the Crispr revolution could well go awry.

The Meghalaya government must urgently ensure that all illegal mines are shut down

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