

These are the countries where it's 'legal' to edit human embryos (hint: the US is one)

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Alessia Pierdomenico / Reuters

News broke on Wednesday that a team of Chinese scientists had [edited the genes of human embryos for the first time ever](#), confirming long-swirling rumors that such ethically dicey experiments were underway and flouting [recent calls to put a stop to them](#).

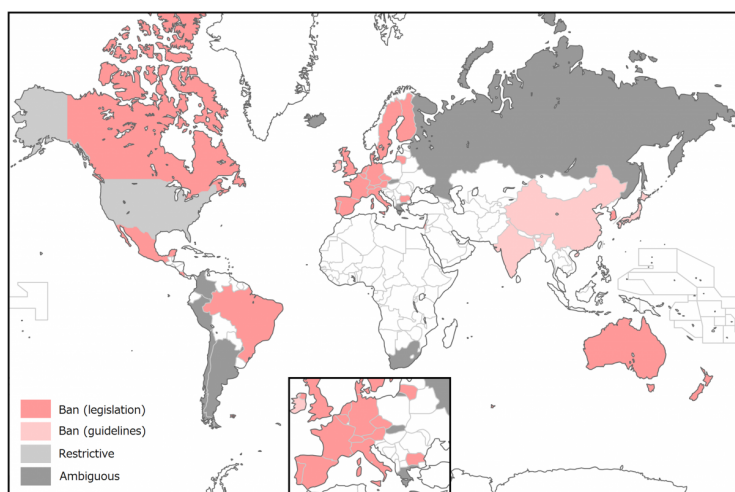
Around the world, the laws governing what's allowed when it comes to "editing the human germ line," the technical name for what the Chinese scientists did, are a mixed bag. That means that while the technology still has a long way to go before people can actually make genetically engineered babies, in many places there are no laws

Doctor is silhouetted as he walks past a poster in a Rome fertility clinic.

preventing a scary "[Gattaca](#) scenario," where designer babies become routine — just some loose guidelines and a variable sense of ethics.

Despite researchers urging caution — stating that this work needs to be "on hold pending a broader societal discussion of the scientific and ethical issues surrounding such use," an inventor of the technology that made it possible [told National Geographic](#) — it seems that while the Chinese scientists ruffled some feathers, they did not actually break any laws.

In [a study published in 2014](#), Motoko Araki and Tetsuya Ishii of Hokkaido University in Japan looked at the rules in 39 countries and found that 29 of them (lighter pink on the map below) had a ban on such research. Of those, 25 (darker pink) had legally binding bans; the other four, including China, had guidelines banning the practice but not exactly enforceable laws. In the remaining 10 countries (dark gray on the map), the rules were "ambiguous." They set aside the US as a special case: no outright ban, but rules that are very restrictive. (The FDA and NIH have, at least for now, [a moratorium on such research](#).)



Araki and Ishii, Reproductive Biology and Endocrinology

The fact that the first published research showing the editing of an embryonic genome — an attempt to alter the DNA that would be passed on to future generations — happened in a country with an ostensible ban on such research should raise some alarm.

The complex regulatory environment that's clear on the map above means there are plenty of loopholes — even in the countries that have tried to anticipate the coming wave of ethically questionable experimentation.

Was this research allowed?

In China, for example, the Guidelines on Human Assisted Reproductive Technologies say, [according to](#)

Araki and Ishii, that "using human egg plasma and nuclear transfer technology for the purpose of reproduction, and manipulation of the genes in human gametes, zygotes or embryos for the purpose of reproduction are prohibited."

There are at least two possible reasons the Chinese team, led by Junjiu Huang of Sun Yat-sen University, might have been able to undertake their research anyway.



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First, and probably most importantly, [their experiment](#) was in non-viable embryos: eggs that had been fertilized by two sperm and so [would never develop into humans](#), genetically modified or otherwise.

The Guidelines on Human Assisted Reproductive Technologies forbid "the manipulation of the genes in... embryos for the purpose of reproduction." But these experiments were certainly for research, not for reproduction, which was not even a possibility with such embryos.

Second, as Araki and Ishii's study makes clear, there is an important distinction between legal bans and guidelines.

A [report from the Medical Research Council in the UK](#) notes that China's regulations governing research ethics "consist mostly of guidelines promulgated by the relevant ministries, which could be considered to constitute 'soft law'" and that "the sanctions for breaching ministry guidelines are often unclear." Researchers violating the Guidelines on Human Assisted Reproductive Technologies in particular have lost their licenses, the report notes, which would make it illegal for them to continue their research. But such enforcement appears to be inconsistent, as it's left largely up to local governments.

Around the world

Internationally, most of these rules were drafted before the technology that made the recent Chinese experiment possible became widely available, and that technology is still too inaccurate and unpredictable to be used clinically on viable embryos that could become genetically modified humans.

As for the rest of the world, there's a patchwork of laws addressing the possibility of editing the genomes of human embryos. In Russia, the Japanese researchers note, "germline gene modification for reproduction is not considered" by the relevant legislation. In Canada and many European countries, the bans are quite strict; in Austria, for example, "any intervention involving the human germline is prohibited."

Along with China, India, Ireland, and Japan also have guidelines that are not legally binding; those countries, as well as the US, "might permit it," the researchers predict, once such techniques become safer.

Already, in China, a source [told Nature News](#), "at least four groups... are pursuing gene editing in human embryos."