Embryo Screening and Genetic Alterations to Human Embryos

But since there are no legal restrictions on PGD,

http://genomemag.com/embryo-screening/#.WW1cOojyvIU

in Australia, all research performed on human embryos is tightly regulated by the [NHMRC](https://www.nhmrc.gov.au/about/nhmrc-committees/embryo-research-licensing-committee), which prohibits human cloning as well as many other technologies

http://theconversation.com/worlds-first-genetically-modified-human-embryo-raises-ethical-concerns-40766

The Licensing Committee oversees the Research Involving Human Embryos Act 2002 (RIHE Act) and the Prohibition of Human Cloning for Reproduction Act 2002 (PHCR Act). It regulates research activities that involve the use of human embryos created by assisted reproductive technology (ART) or by other means.

https://www.nhmrc.gov.au/about/nhmrc-committees/embryo-research-licensing-committee

Lanner is attempting to edit genes in human embryos to learn more about how the genes regulate early embryonic development. He hopes the work could lead to new ways to treat infertility and prevent miscarriages. He also hopes to help scientists learn more about embryonic stem cells so they can someday use them to treat many diseases.

The fear is that Lanner's work could open the door to others attempting to use genetically modified embryos to make babies.

http://www.npr.org/sections/health-shots/2016/09/22/494591738/breaking-taboo-swedish-scientist-seeks-to-edit-dna-of-healthy-human-embryos

British scientists have been given the green light to genetically modify human embryos, for the first time in the nation's history.

The[landmark decision](https://www.crick.ac.uk/news/science-news/2016/02/01/hfea-decision/) means scientists will now be allowed to alter the DNA of embryos, for research purposes only.

It remains illegal for these genetically altered embryos to be implanted in a woman.

https://www.hfea.gov.uk/

going beyond health improvements and modifying everything from a child's eye color to intelligence.

http://www.cnn.com/2016/02/01/health/genetically-modified-embryos-dna-uk-scientists/index.html

https://www.nih.gov/about-nih/who-we-are/nih-director/statements/statement-nih-funding-research-using-gene-editing-technologies-human-embryos

Reprogenetics is the use of [reproductive](https://en.wikipedia.org/wiki/Reproductive_technology) and [genetic](https://en.wikipedia.org/wiki/Human_genetic_engineering) technologies to select and genetically modify embryos with [germinal choice technology](https://en.wikipedia.org/wiki/Germinal_choice_technology) for the purpose of [human enhancement](https://en.wikipedia.org/wiki/Human_enhancement)

https://www.nature.com/scitable/topicpage/embryo-screening-and-the-ethics-of-human-60561

**Preimplantation genetic diagnosis (PGD)** is a procedure used prior to implantation to help identify genetic defects within embryos. This serves to prevent certain genetic diseases or disorders from being passed on to the child. The embryos used in PGD are usually created during the process of [in vitro fertilization](http://americanpregnancy.org/infertility/in-vitro-fertilization/) (IVF).

Introduced into clinical care in the early 1990s, PGD was first used for determining the sex of embryos to minimize the likelihood of transmitting fatal [sex-linked disease](https://www.nature.com/scitable/topicpage/Sex-linked-Diseases-the-Case-of-Duchene-800) genes to offspring. If there were afamily history of Duchenne muscular dystrophy (DMD), for example, parents might choose to undergo embryo screening to identify female versus male embryos and then have only the female embryos implanted.

http://americanpregnancy.org/infertility/preimplantation-genetic-diagnosis/

- screenings are expanding to traits less and less medically important, and more cosmetic. The expand is difficult to regulate once the genetic alterations begin to take place

https://www.cma.ca/Assets/assets-library/document/en/advocacy/assisted-reproduction-in-canada-e.pdf

Canadian act that regulates human embryo type activities: AHR Act

* introduced in 2004
* prohibits: human cloning; creating embryos for any purpose other than creating a human being or improving or providing instruction in assisted human reproduction (AHR) procedures; creating an embryo from any part of the cell of an embryo or fetus for the purpose of creating a human being; maintaining an embryo for more than 14 days outside the body of a female person; sex selection for any purpose other than preventing, diagnosing or treating sex-linked disorders or disease; germ-line genetic alteration; and, using or transplanting any reproductive material from a non-human being or creating a chimera or hybrid, in order to create a human being.
* **It is not illegal to undergo genetic testing** in order to assess viability of an embryo (such as with PGS) or, for example, to determine whether embryos carry a genetic trait that is known to be carried by one or both of the gamete donors (usually with PGD). Under the exception allowed in this prohibition, it is recognized that there are many devastating genetic diseases and disorders that are linked to the sex chromosomes. For instance, Duchenne muscular dystrophy is caused by a mutation on the X chromosome, which makes males more likely to express the disease since they do not have a second X chromosome to "mask" the condition.
* This prohibition prevents people from using genetic technologies to alter the DNA of embryos before transferring them to a uterus. In the case of genetic testing, DNA may be removed from an embryo for the tests, but the rest of the embryo's DNA is not changed. It would be against the law if different DNA was knowingly put back into the embryo before transferring the embryo to attempt a pregnancy. This prohibition is in place to prevent, for example, so-called "designer babies" that would be made to have specific genetic traits that the intended parent(s) consider to be desirable. It also prohibits embryo "gene therapy" that is intended to remove a disease-causing gene. This prohibition makes it illegal in Canada to knowingly create embryos that have nuclear DNA from two people and mitochondrial DNA from a third person.
* Any person in Canada who breaks the law under the AHR Act is committing a crime. If found guilty, the person could be fined up to $500,000 or jailed for up to ten years, or both.
* As with any criminal act, if a person is actively helping or advising another person who has committed an offense under the AHR Act, the person giving the help could be considered an accomplice to the crime. This judgment would be based on the particular facts of the situation and the level of knowledge of the person giving the help.
* this prohibition also prevents the use of technologies intended to replace defective mitochondrial DNA in a woman's eggs
* https://www.canada.ca/en/health-canada/services/drugs-health-products/biologics-radiopharmaceuticals-genetic-therapies/legislation-guidelines/assisted-human-reproduction/prohibitions-scientific-research-clinical-applications.html

The laws right now inhibit 'gene therapy' which would be for the purpose of removing a disease-causing gene.

Canadian association in charge of overlooking regulations: Assisted Human Reproduction Canada (AHRC), a federal agency with broad power to introduce and enforce regulations on matters governed by the Act.

great resource: https://www.cagc-accg.ca/?page=187

about AHR act: https://embryo.asu.edu/pages/assisted-human-reproduction-act-2004