



Research with embryos and pre-embryos as well as therapeutic cloning concerns scientists' freedom to investigate human biology as well as patients' freedom to access regenerative medicine treatments that may be developed as a result of research with human embryonic stem cells. Since the early 2000s, research with embryos has been at the center of an often-polarized debate about the nature and scope of scientific freedom.

Approach

To measure the freedom of research with pre-embryos and embryos, we identified key restrictions concerning the legality of research and on the sources from which embryonic stem cells from can be lawfully be derived.

These sources are supernumerary IVF embryos (also known as "orphan" embryos, that is, embryos originally created in vitro to be then transferred in an infertile woman's womb and no longer destined not to be transferred), imported cell lines, and embryos created at hoc for research by using somatic cell nuclear transfer involving either human or non-human animal tissue.



Data sources

Data were collected from the following sources:

Elstner, A., et al. (2009). "The changing landscape of European and international regulation on embryonic stem cell research." *Stem Cell Res* 2(2): 101-107. <https://doi.org/10.1016/j.scr.2008.10.003> | Australia. "Prohibition of Human Cloning for Reproduction." | Canada. "Assisted Human Reproduction Act." 2004. | European Human Embryonic Stem Cell Registry. "The Status of Hesc Research Legislation Throughout Europe." | Isasi, R. M., and B. M. Knoppers. "Mind the Gap: Policy Approaches to Embryonic Stem Cell and Cloning Research in 50 Countries." *Europea Journal of Health Law* 13, no. 1 (2006): 9-25. | Jones, Howard W., and Jean Cohen. "Chapter 4: Marital Status." *Fertility and sterility* 87, no. 4 (2007): S17-S18. | Rugg-Gunn, Peter J., Ubaka Ogbogu, Janet Rossant, and Timothy Caulfield. "The Challenge of Regulating Rapidly Changing Science: Stem Cell Legislation in Canada." *Cell Stem Cell* 4, no. 4 (2009): 285-88. | The Hixton Group. "World Stem Cells Policies." | UNESCO International Bioethics Committee. "Report of the Working Group of IBC on Human Cloning and International Governance ", 1-20. Paris: UNESCO, 2008.

Measurement questions

- Basic research using germline modification in human embryos/gametes is?
- Pre-clinical research using germline modification technologies in animals is?
- Clinical research using germline modification technologies in humans is?
- Clinical applications of research using germline modification technologies (i.e., to initiate a pregnancy with edited embryos or with edited gametes) are?



Research with Embryo

List Nations	Tot	%
Australia	4	100,00%
Belgium	13	100,00%
Canada	3	100,00%
China	13	100,00%
France	8	100,00%
Germany	5	100,00%
Israel	4	100,00%
Italy	7	100,00%
Japan	5	100,00%
South Korea	5	100,00%
Mexico	6	100,00%
Netherlands	6	100,00%
Spain	6	100,00%
Sweden	7	100,00%
Switzerland	3	100,00%
United Kingdom	8	100,00%
United States	8	100,00%

