ALMA MATER STUDIORUM
UNIVERSITÀ DI BOLOGNA

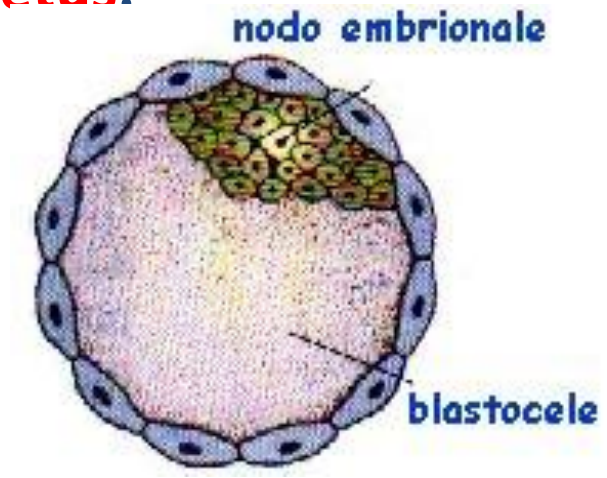
Bioethics

Silvia Zullo

Department of Legal Studies
– CIRSFID - silvia.zullo@unibo.it

Ethical use of human embryonic stem cells in research and therapy

Since embryonic stem cells (as pluripotent cells), which might be used for research and therapeutic purposes, can, at present (especially in Italy) only be obtained either from aborted fetuses or from preimplantation embryos, their recovery and use for current practical purposes turns crucially on the moral status of the embryo and the fetus.



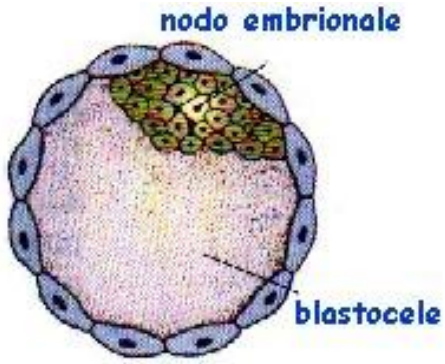
Ethical use of human embryonic stem cells in research and therapy

There are three possible solutions to the ethical problems of using human embryonic stem cells. The first is the use of cells from the early embryo, which survives the removal of such cells. The second is the deployment of arguments about the moral status of the embryo. This is the line take for example by the United Kingdom Expert Group which relies on a moral distinction between the early embryo prior to the development of the primitive steak at around 14 days' development,

and later stages of embryonic

Development. The third solution is a reminder

about the role of embryo loss in reproduction



Embryo Selection
as a form of Genetic Engineering

Designer babies or a cure for genetically inherited diseases?

What if you could screen embryos for diseases before they became babies?

What if you had the power to choose the traits your baby would have?

Would you use it?

Embryo Selection as a form of Genetic Engineering

In April 2008, Dartmouth College ethics professor Ronald M. Green's essay, **"Building Baby from the Genes Up"** was published in the Washington Post. Green presented his case in support of the genetic engineering of embryos, arguing that tinkering with genes could eliminate disease or confer desirable features onto our future progeny. "Why not improve our genome?" he asked. Two days later, Richard Hayes, executive director of the Center for Genetics and Society, rebutted, warning of a **"neo-eugenic future"** and "the danger of genetic misuse."

These practically polar opposite opinions are two sides of a debate taking place around the world. The controversy revolves around what scientists are calling **reprogenetics**: the combined use of reproductive and genetic technologies to select, and someday even genetically modify, embryos before implantation—not for health reasons, but for the sake of "improvement."

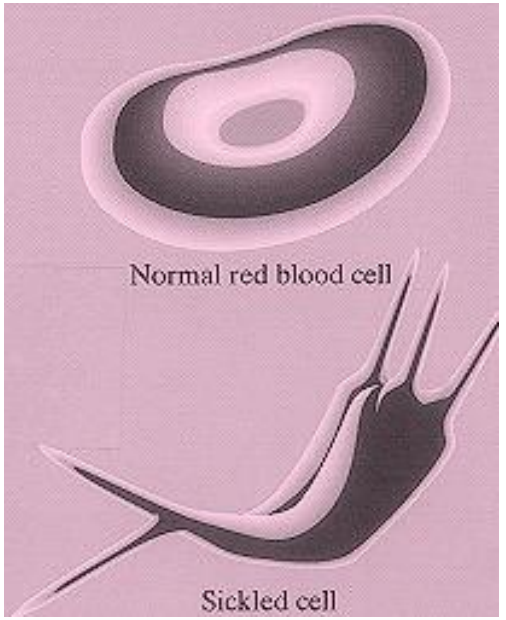
- Embryo Selection is a relatively simple process. An ovarian biopsy can yield many eggs which can be fertilized *in vitro* with the partner's sperm. The cells can be grown in culture, and at the eight cell stage, one of the cells can be removed for diagnosis.

Embryo Selection

- To the right is a picture of a glass micropipette used to remove the cell for diagnosis. The width of the pipette opening is one cell wide.

- **How is it done?**
- The removal of one cell allows DNA tests to be performed on the embryo. The embryo with the desired trait can then be selected.
- The final step is implanting the embryo into the uterus, and letting the pregnancy continue to term.
- This process is called *in vitro* fertilization.

Embryo selection is being done for certain select conditions, like cystic fibrosis, Huntington's disease, and **sickle cell anaemia.**

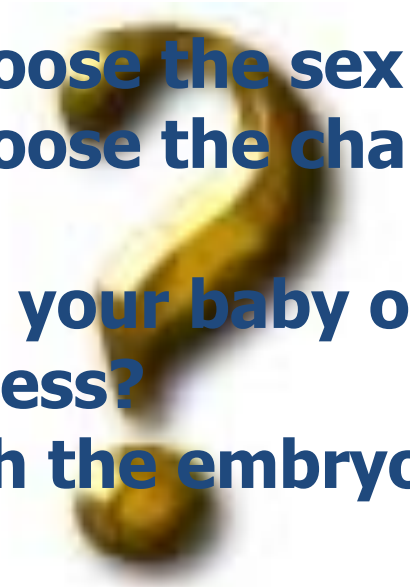


Questions raised by embryo selection

- What are the specifics of embryo selection, is there a limit?
- What are the benefits and consequences of embryo selection?
- What is the difference between embryo selection and genetic engineering?

Questions raised by embryo selection

Is embryo selection ethical?



- Is it ethical to choose the sex of your baby?
- Is it ethical to choose the characteristics of your baby?
- Is it ethical to rid your baby of diseases through this process?
- What is done with the embryos that are not selected?
- How do you store and dispose of the unused embryos?

What are the specifics of embryo selection, is there a limit?

- **Bioethicists generally find current practices of embryo selection not too problematic, because the elimination of debilitating diseases "justifies the intrusion." However, if embryo selection can be used to select deleterious traits, why couldn't it be used to select for other "enhancing" traits. Here bioethicists begin to find the procedure more problematic because it takes on eugenic nature.**

What are the benefits and consequences of embryo selection?

Benefits

- Many embryos are implanted back into the woman (greater chance of pregnancy)
- Child is without disease
- Other embryos can be cultured and frozen so they can be used again

What are the benefits and consequences of embryo selection?

Consequences

- Goes against nature
- Very expensive
- Not 100% guaranteed
- Not available to all women

Is Embryo Selection Ethical?

Some would say…

Embryo selection is ethical when

- looking for syndromes/diseases which later would cause the child to die within the first few years,
- would cause severe retardation,
- cases which would be a better choice than abortion, and to avoid emotional stress.

Embryo selection is not ethical when

- choosing specific sex,
- choosing character traits,
- killing discarded embryos.

Issues for Ethics

- **Personhood – the morality of discarding an embryo when it is considered a person.**
- **The right to life – what is done with spare embryos.**
- **The right to a child.**

Ethical Approaches
1. Natural or deontological Law

- The primary precept of the preservation of life leads to the secondary precept of no genetic selection as it destroys life.
- Also there is too much stress placed on being physically perfect… only genetic engineering which respects human life and rights would be permitted.
- Problems with treating people as a means to an end if an embryo is considered a person.
- BUT much genetic engineering can be seen to preserve life by curing diseases.

Ethical Approaches
2. Utilitarianism

- Each situation would be assessed on its own merits to promote the greatest happiness for all concerned.
- The pleasures of the cures would outweigh the cost to the embryos.
- BUT a Utilitarian would also consider the cost to the NHS and the likelihood of success.

Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine - Oviedo, 4.IV.1997

- Chapter IV – Human genome
- Article 11 – Non-discrimination Any form of discrimination against a person on grounds of his or her genetic heritage is prohibited.
- Article 12 – Predictive genetic tests Tests which are predictive of genetic diseases or which serve either to identify the subject as a carrier of a gene responsible for a disease or to detect a genetic predisposition or susceptibility to a disease may be performed only for health purposes or for scientific research linked to health purposes, and subject to appropriate genetic counselling.
- Article 13 – Interventions on the human genome An intervention seeking to modify the human genome may only be undertaken for preventive, diagnostic or therapeutic purposes and only if its aim is not to introduce any modification in the genome of any descendants.
- Article 14 – Non-selection of sex The use of techniques of medically assisted procreation shall not be allowed for the purpose of choosing a future child's sex, except where serious hereditary sex-related disease is to be avoided.

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- **Article 18 – Research on embryos in vitro 1 Where the law allows research on embryos in vitro, it shall ensure adequate protection of the embryo. 2 The creation of human embryos for research purposes is prohibited.**

Additional Protocol to the Convention on Human Rights and Biomedicine, concerning Genetic Testing for Health Purposes * Strasbourg, 27.XI.2008

- **Article 2 – Scope 1 This Protocol applies to tests, which are carried out for health purposes, involving analysis of biological samples of human origin and aiming specifically to identify the genetic characteristics of a person which are inherited or acquired during early prenatal development (hereinafter referred to as "genetic tests"). This Protocol does not apply: a to genetic tests carried out on the human embryo or foetus; to genetic tests carried out for research purposes.**

The Universal Declaration on the Human Genome and Human Rights was adopted unanimously and by acclamation at UNESCO's 29th General Conference on 11 November 1997.

Human dignity and the human genome

Article 1

The human genome underlies the fundamental unity of all members of the human family, as well as the recognition of their inherent dignity and diversity. In a symbolic sense, it is the heritage of humanity.

Article 2

(a) Everyone has a right to respect for their dignity and for their rights regardless of their genetic characteristics.

(b) That dignity makes it imperative not to reduce individuals to their genetic characteristics and to respect their uniqueness and diversity.

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Research on the human genome

Article 10

No research or research applications concerning the human genome, in particular in the fields of biology, genetics and medicine, should prevail over respect for the human rights, fundamental freedoms and human dignity of individuals or, where applicable, of groups of people.

Article 11

Practices which are contrary to human dignity, such as reproductive cloning of human beings, shall not be permitted. States and competent international organizations are invited to co-operate in identifying such practices and in taking, at national or international level, the measures necessary to ensure that the principles set out in this Declaration are respected.

Article 12

(a) Benefits from advances in biology, genetics and medicine, concerning the human genome, shall be made available to all, with due regard for the dignity and human rights of each individual.

(b) Freedom of research, which is necessary for the progress of knowledge, is part of freedom of thought. The applications of research, including applications in biology, genetics and medicine, concerning the human genome, shall seek to offer relief from suffering and improve the health of individuals and humankind as a whole.