

Genes/Embryos/Stem Cells: Bioethics

READING: pp. 313-321

website: <http://en.wikipedia.org/wiki/Bioethics>

Ethics - The study of right vs wrong, good vs bad, moral judgment, etc.

Bioethics - Ethical questions that arise in the relationships among life sciences, biotechnology, medicine, politics, law, philosophy, and theology.

Eugenics (obvious) - Genetic racism
Humans should practice selective reproduction to improve the species.

Genocide

Gene Therapy (less obvious ethical problem)
Devastating genetic defect at birth.
No effective alternative treatments.
Replace or repair targeted genes. What is the problem here?

Stem Cell research, embryos, cloning
Many issues, few of them black and white

Very Obvious:



What about:

Immigration act of 1924: the threat of "inferior stock" from eastern and southern Europe.

preimplantation genetic diagnosis

Female Infanticide/abortion



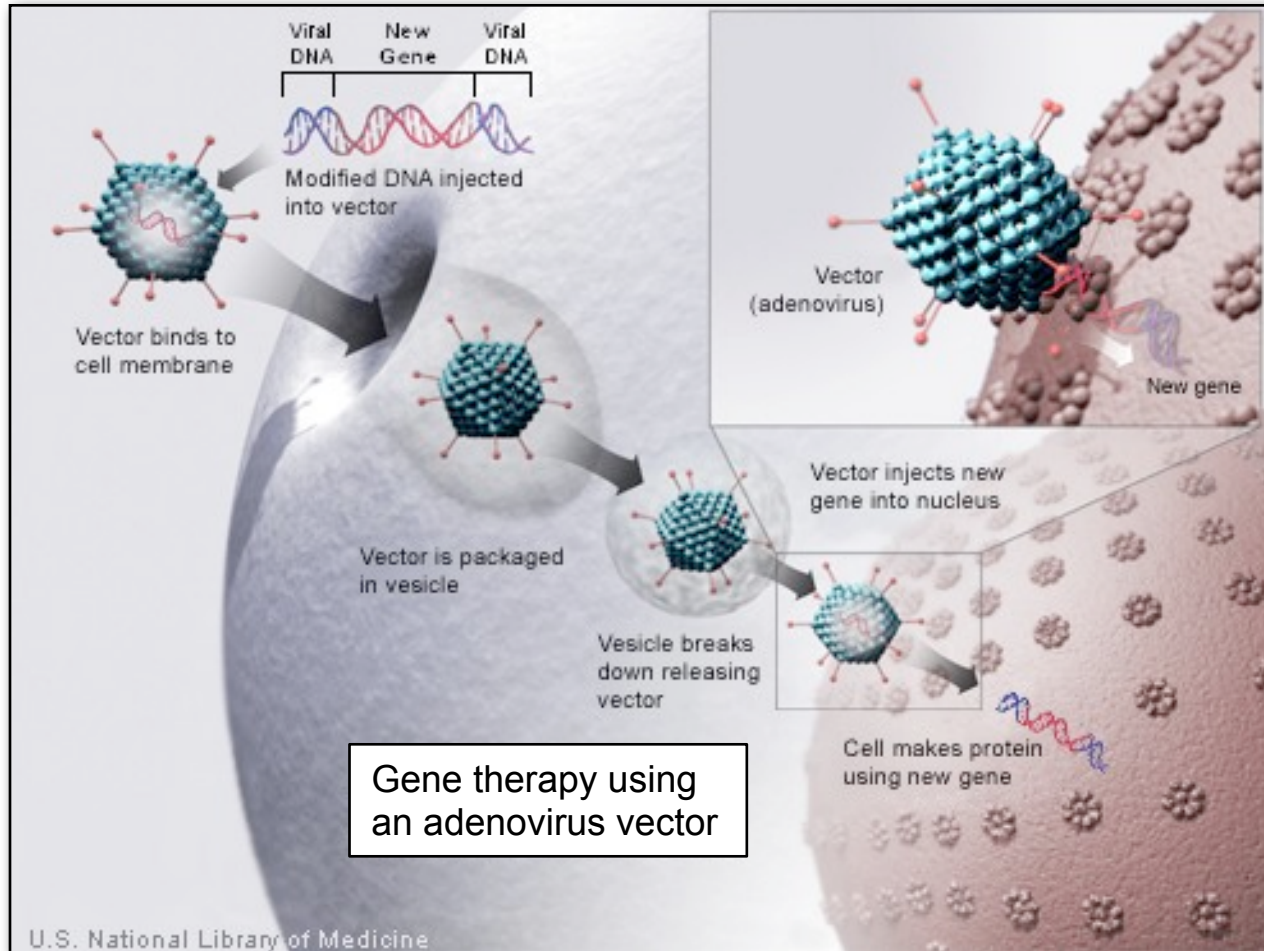
Bioethical Analyses

- Abortion
- Animal rights
- Artificial insemination
- Artificial life
- Artificial womb
- Assisted suicide
- Biopiracy
- Blood (trade)
- Body modification
- Brain-computer (interface)
- Chimeras
- Circumcision
- Cloning
- Confidentiality (med records)
- Consent
- Contraception
- Cryonics
- Eugenics
- Euthanasia (human)
- Euthanasia (animal)

- Feeding tube
- Gene therapy
- Genetically modified food
- Genomics
- Great Ape Project
- Human cloning
- Human enhancement
- Human genetic engineering
- In vitro fertilization
- Infertility (treatments)
- Life extension
- Life support
- Lobotomy
- Medical research
- Medical torture
- Moral obligation
- Nanomedicine
- Organ donation (fair allocation, class/race bias)
- Pain management

- Parthenogenesis
- Patients' Bill of Rights
- Placebo
- Population control
- Prescription drugs (prices in the US)
- Procreative beneficence
- Procreative liberty
- Psychosurgery
- Recreational drug use
- Reproductive rights
- Reprogenetics
- Sperm and eggs (donation)
- Spiritual drug use
- Stem cell research
- Suicide
- Surrogacy
- Transsexuality
- Transplant trade

Gene Therapy



Normal gene inserted, non-specific location. Replaces a non-functional endogenous gene.

Other possibilities more and more likely

- * Abnormal gene repaired via homologous recombination.
- * Abnormal gene could be repaired by reverse mutation.
- * The regulation (turning on or off) of particular gene could be altered.

GENE THERAPY

Ethical questions: potential benefits and harms

In Favor of Gene Therapy

Desperately ill patients.
GT the only hope;
Other treatment failures.

Obligation to treat patients if we can.
Scientific community: right to free inquiry
within bounds of acceptable research

Slippery slope: are we getting
into something that we won't
be able to control?

Against Gene Therapy

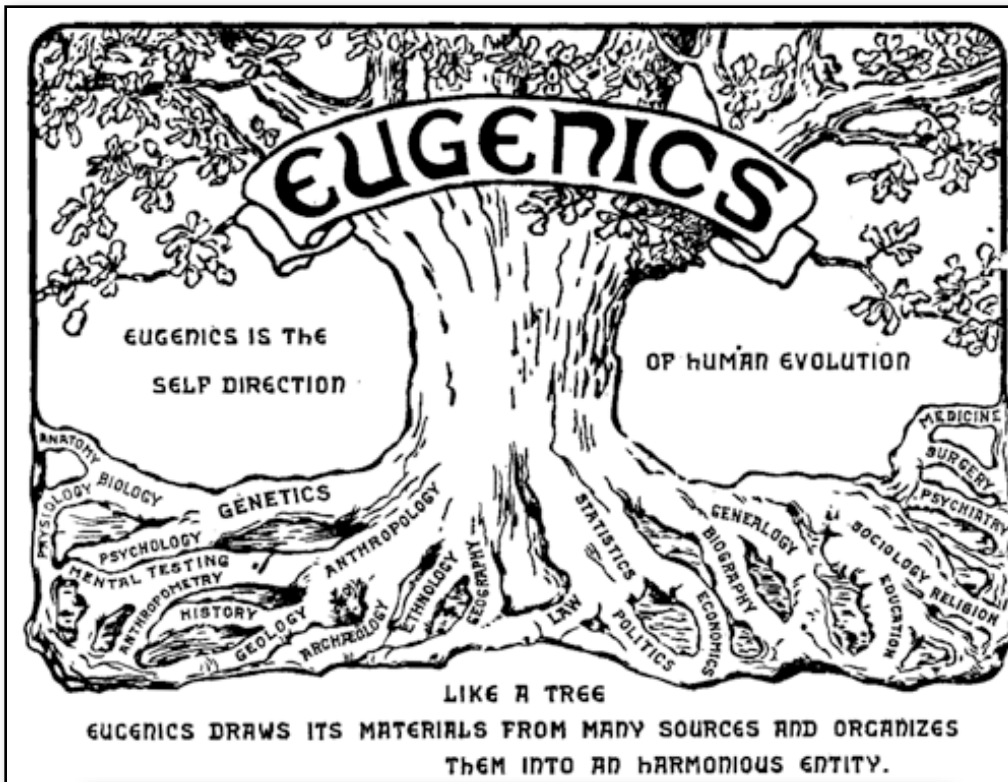
Are there "good" and "bad" uses of gene modification?

Potential for harmful abuse of technology in future?
Possible unknown long-term effects - future generations?

Patients Rights

GT candidates children too young to understand ramifications of treatment.
Fairness in selection of recipients:
Who should receive GT: socioeconomic/ethnic group bias.

Expensive therapy: strain on health care system.
Recipients' privacy/confidentiality interests vs interests of health insurance companies.



Eugenics - social philosophy improvement of human hereditary traits through various forms of intervention

Methods

Historical: selective breeding, sterilization, rape, genocide

Modern: prenatal testing/screening genetic counseling, birth control, IVF, genetic engineering

Incarceration?

"Eugenics is the self-direction of human evolution"
Logo: 2nd Intl Congress of Eugenics 1921.
A tree which unites a variety of different fields.

Goals

- 1) Creation of healthier, more intelligent people
- 2) Save society's resources, and lessen human suffering
- 3) Racially based goals or desires to breed for qualities, like fighting abilities.

Early eugenicists - intelligence correlated with social class
Inspired: breeding animals (purebreds) analogy for improving human society.
(note the irony of modern society)

Mixing of races to be avoided (Racial Purity, Scientific Racism)
(note the irony of modern society/presidency)

Contentious issue until better understanding of genetics led to scientific consensus: division of human species into **unequal** races is unjustifiable

Alexander Graham Bell (1881) no marriage for the deaf (deaf wife)
US Eugenics Record Office (1910) no marriage for epileptic, imbecile, feeble-minded.
Virginia law (US Supreme Court, 1927) sterilize mental patients. (last incident: 1981)
Alberta Canada Eugenics Board (1928) sterilize "moron" status individuals.

Nazi Germany (1940) Holocaust, sterilizations, Aryan women forced pregnancy, adopt "racially valuable" children

"genius sperm bank" (1980–99).
230 children conceived

Genetic screening
China (1993-present) genetic disease, mental disease
Cyprus (1970-present) thalassemia

(In)famous quotes:

"We do not believe that human beings should ever be sacrificed for the benefit of another. We thought we left that at Nuremberg more than fifty years ago." Colleen Parro, Republican National Coalition for Life (6/01).

"I just cannot equate a child living in the womb, with moving toes and fingers and a beating heart, with a frozen embryo sitting in a lab somewhere." Sen. Orrin Hatch (R-UT) NBC Meet the Press.

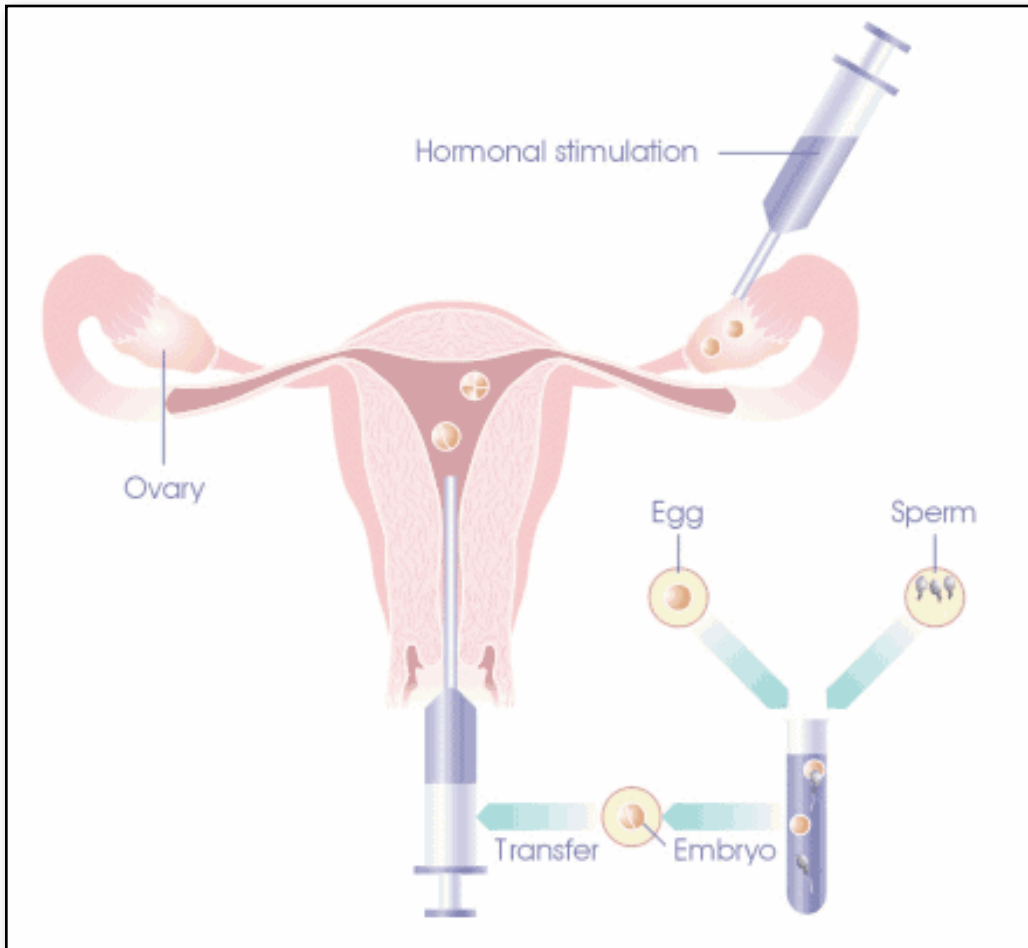
"Do I want to see again? Dance again? Hear like I once did? I do not want those things at the cost of any living person and I consider live embryos to be people." Disabled woman, Congressional hearing.

"I am acutely aware of the ethical sensitivities that have been expressed regarding the sources of stem cell lines. But, surely, obtaining cells from legally obtained abortants or from early stage embryos that are destined to be discarded in the course of IVF procedures and making them available for potentially life-saving purposes would be viewed as ethically permissible if not a moral imperative."
Paul Berg, Cahill Professor of Biochemistry, Emeritus.

"In embryonic stem cells may lie the key to healing within the human body..."
Yvette Cooper, Junior health minister, British government, 12/00.

"Stem cell research holds the promise of hope for 100 million people living with incurable diseases from diabetes to heart conditions to Alzheimer's to Parkinson's, ALS, MS, and spinal cord injury. It will affect the entire American family. I believe this is why we find in this new survey such strong support from people with such diverse religious and ethical beliefs." Christopher Reeve, spinal cord injury '95, died 10/04

In Vitro Fertilization Procedure



Hormone Stimulation

FSH injections (7d) (multiple follicle maturation)
Gonadotropin-RH agonist injections suppress LH surge & ovulation until follicles mature

Gonadotropin (HCG) injections (5d) for final follicle maturation

Oocyte Collection

general anesthesia (30min)
aspiration needle via vagina
w/ ultrasound or laparoscopy
(3-4h total)

Fertilization (24h) +
Tissue Culture (2d)

Embryo Transfer (4h total)

Hormone Treatment

supplemental progesterone (14d)

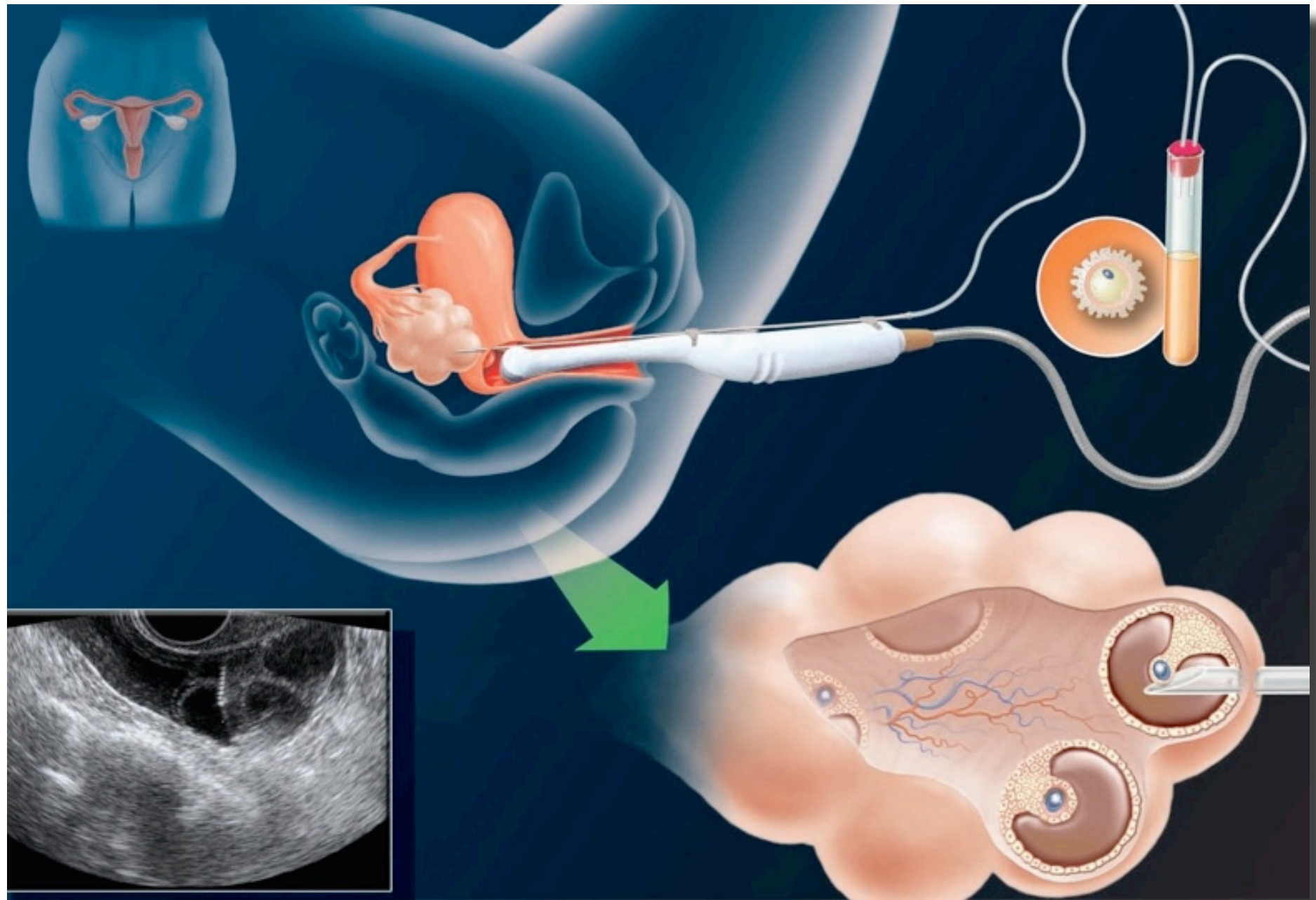
Pregnancy Test (2wk)

Ultrasound (4wk)

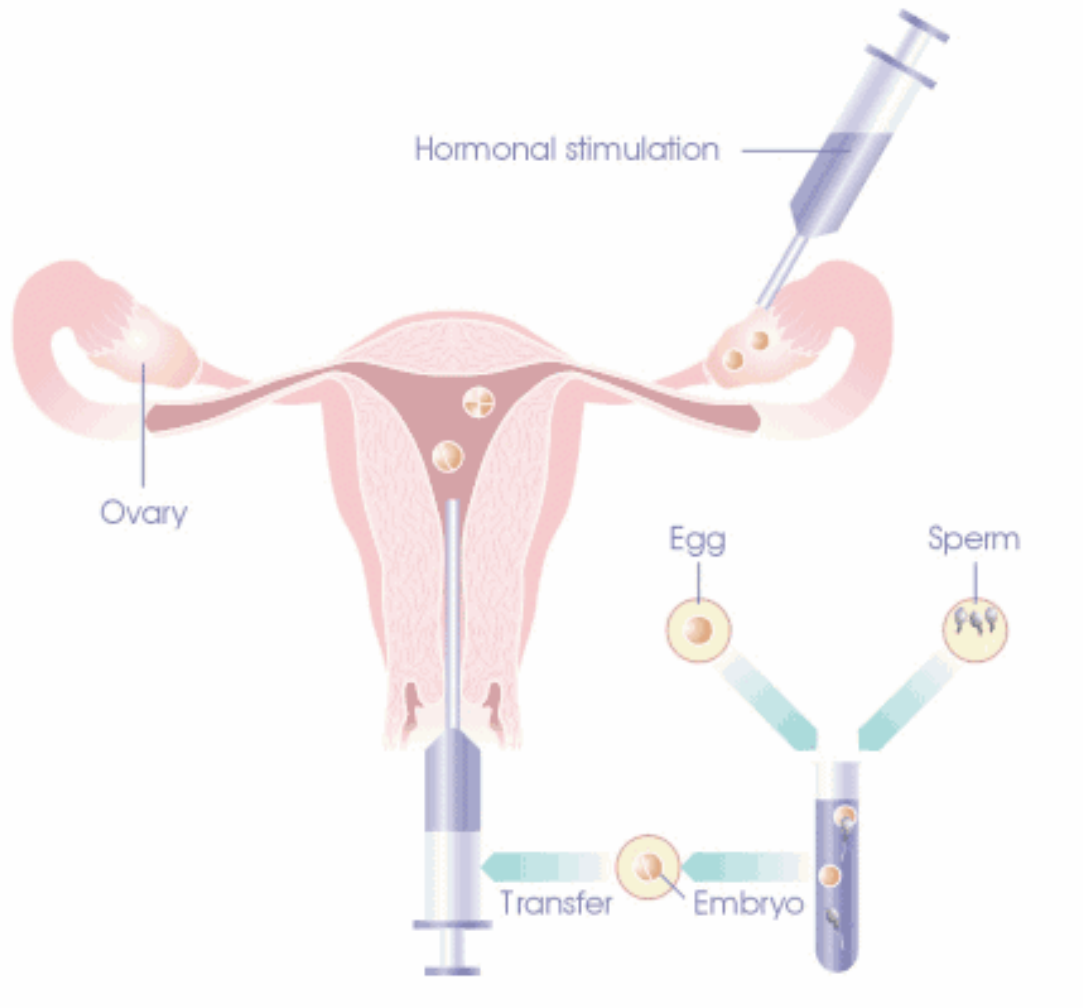
115,000 IVF (US)
babies born to date;
1% of total births

Present Day Cost:
about \$10,700

also: egg donors available



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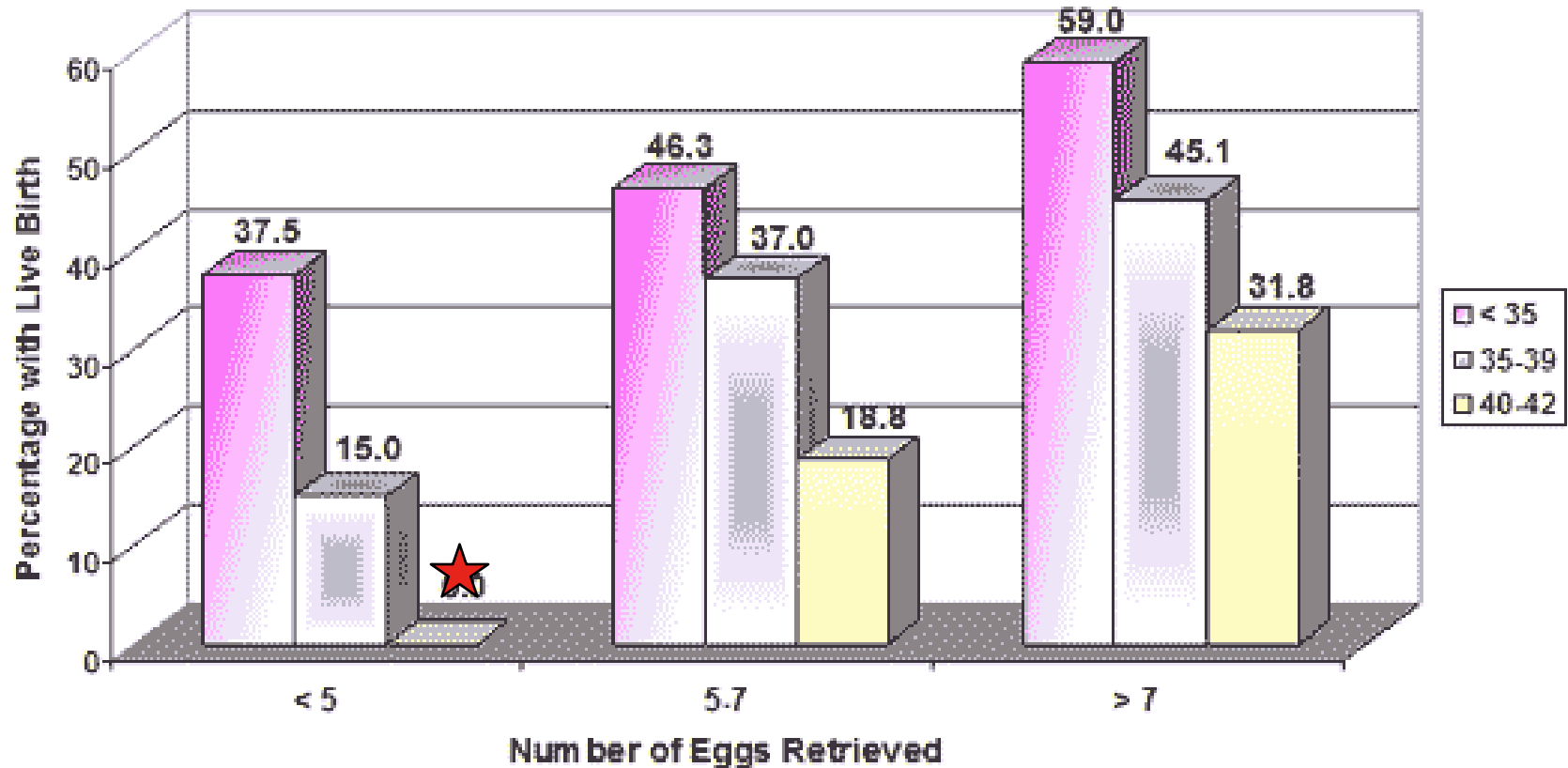
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Present Day IVF Cost:
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Cost of raising a child:
\$350,000

Live Birth Rates Per Egg Retrieval by # of Eggs & Age
All Cases with Own Eggs, Jan 2001 - June 2004
654 Egg Retrievals



IVF Clinic Guidelines

1. Collect 15 eggs after FSH treatment
2. Implant 2 high-grade embryos

est. > 1,000,000 frozen embryos
“extra” from procedures



Louise Joy Brown (born July 25, 1978)
Gave birth to son on Dec. 20 2006

Frozen Embryos

Are they a person?

Are they owned by the parents?

Who owns them after a divorce?

Can they be implanted after a divorce?

Is the biological father required to pay child support?

Can they be destroyed without donor consent?

Who is responsible for the storage costs?

Can they be given to infertile couples?

Can they be flushed down the sink?

Can they be turned into Stem Cells?

Sanctity of the human gene pool?

Gender Specific Abortion

Embryo Selection

IVF

Fact: the human gene pool has been interfered with,
(and we are just beginning)

The question is not if, but to what degree interfering with
the human gene pool is ethical

Draw the line at Germline transmission?