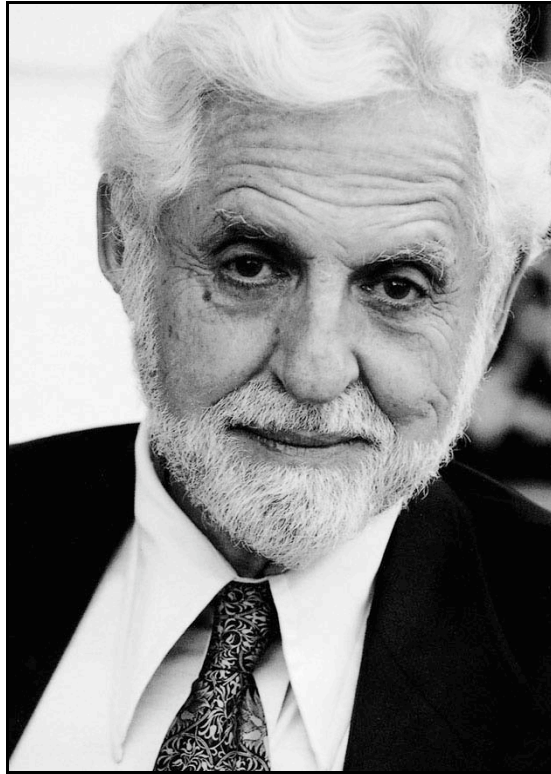


## **Biology and Society**

### **Unit Five: Human Reproduction**

#### **Topic Four: Assisted Reproductive Technologies (ART)**



**Carl Djerassi (1923 - )**

Excerpt from **Sex in an Age of Mechanical Reproduction**  
by Carl Djerassi

“With continuous improvements in assisted reproductive technologies (ART), we are seeing a gradual separation of sex and fertilization, with sex taking place “in bed” and fertilization under the microscope. This separation is shifting the balance of reproductive power into the domain of women.”

Djerassi is a professor of chemistry at Stanford University. In 1951 he and his team synthesized the first steroid oral contraceptive, norethindrone, which is still today one of the active ingredients of the oral contraceptive that is taken by millions of women.

## **Terms and Definitions to Know**

**Assisted Reproductive Technology (ART)**—Fertility treatments that involve a laboratory handling eggs or embryos, such as in vitro fertilization.

**In vitro**—Done outside the body.

**In vivo**—Done within the living body.

**Super-Ovulation** -- During a natural menstrual cycle, usually, only one follicle develops to maturity, although many may started in the initial 'cohort' of primordial follicles destined for that cycle. Superovulation with hormones can result in many follicles developing to maturity producing an average of 8-12 eggs—sometimes many more—that can then be harvested in vivo for artificial fertilization.

**Egg retrieval**—The egg is removed from the ovary by one of two methods. One uses an ultrasound probe and a suction device inserted through the vagina. The other, laparoscopy, uses a thin, optical tube inserted through an incision near the navel. The egg is removed by suction.

## **ART Techniques**

In Vitro Fertilization (IVF) developed in 1977

Used to treat female infertility

300,000 babies since 1977

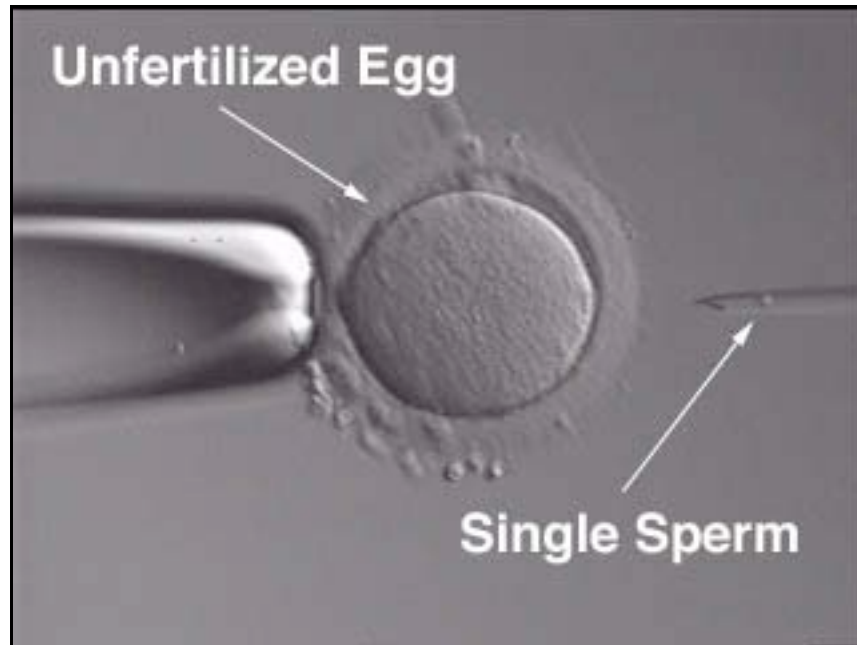


**In Vitro Fertilization (IVF)**

Intracytoplasmic Sperm Injection (ICSI) developed in 1992

Used to treat male infertility

10,000 babies since 1992



**Intracytoplasmic sperm injection (ICSI)**

**What are the ethical issues raised by assisted reproductive technologies?**

- Post-Menopause Reproduction
- Unequal Access to Technologies
- The separation of traditional procreation from reproduction
  - Gender (Sex) Selection

Web Reference

<http://www.asrm.com/Media/Ethics/ethicsmain.html>

## **Post-Menopause Reproduction**

“In the first half of the 20th century, the onset of menopause was welcomed by many women as a release from continuous pregnancies caused by unprotected and frequently unwanted intercourse. But the arrival of the Pill and other effective contraceptives, together with many more women delaying childbirth until their late 30s or early 40s, raises the concern that menopause may prevent women from becoming mothers at all. Whereas technology’s gift to women (and men) during the latter half of the 20th century was contraception, the first 50 years of the new millennium may well be considered the decades of conception.”

“Now that people are living longer and healthier lives, a woman who becomes a mother at 45 could raise a child for much longer than was true for many 20-year-old mothers at the beginning of this century. Of course, motherhood at an older age is physically, psychologically, and economically suitable only for certain women, but at least the choice is now available in wealthy countries.”

A second issue involves the use of donated eggs and the use of in vitro fertilization to allow women who have gone through menopause to become pregnant and have children at even older ages beyond the mid-forties.

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### **What are the ethical issues raised by post-menopause reproduction?**

- Women, Education, and Professional Careers
- Child Rearing by older Parents

#### Web Reference

<http://www.asrm.com/Media/Ethics/postmemo.html>

## **Unequal Access to Technologies**

“The increased availability of ART is a characteristic of affluent, **geriatric societies** (such as those of Western Europe and Japan, where more than 20% of the population are over 60). But even within these countries, the cost of such reproductive technologies (frequently not covered by insurance) is such that only the more affluent citizens can afford them.”

“Three-quarters of the world’s population is represented by the **pediatric countries** of Africa, Asia, and much of Latin America, where more than 40% of the population may be below 15 years of age and where contraception rather than conception will be the catchword for decades to come.”

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### **What ethical issues arise because of the unequal access to assisted reproductive technologies?**

- Will the unequal access to reproductive technologies increase existing economic inequality in the U.S.?
- What are the reproductive needs of underdeveloped countries?

## **ART and Traditional Procreation**

“Although these scenarios will be considered by many as “unnatural”, the successful doubling of the average life expectancy during this century in many parts of the world, which now ensures that women live longer than men (at least in affluent societies), can be considered just as “unnatural”.

“Detaching the child from traditional procreation may well be the most fundamental ethical issue raised by ART. Neither science nor the humanities have so far adequately prepared us for the consequences of sex in an age of mechanical reproduction.”

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**What are the possible behavioral consequences of  
assisted reproductive technologies?**

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### **Gender Selection**

The artificial selection of the sex of an unborn child

Web Reference

<http://www.microsort.net/index.htm>



## Excerpt from **Fertility Ethics Authority Approves Sex Selection**

By Gina Kolata, NYT, September 28, 2001

In a letter that has stunned many leading fertility specialists, the acting head of their professional society's ethics committee says it is sometimes acceptable for couples to choose the sex of their children by selecting either male or female embryos and discarding the rest.

Couples would have to undergo in vitro fertilization, and then their embryos would be examined in the first few days when they consist of just eight cells.

The term "gender variety" was used to explain the acceptable uses of the sex selection technique. By that it's meant that a couple who already had a child of one sex could ethically select embryos that would guarantee them that the embryo selected was of the opposite sex. Embryo sex selection could be offered for gender variety when there is a good reason to think that the couple is fully informed of the risks of the procedure and are counseled about having unrealistic expectations about the behavior of children of the preferred gender.

The group's previous statement, in 1999, said that selecting embryos solely to have a child of a particular sex should be discouraged. Leading fertility specialists said they were taken aback by the new letter and could hardly believe its message.

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### **What are the ethical issues raised by gender selection?**

- Sex selection as sex discrimination

## References

Djerassi, C. (1999). Sex in an Age of Mechanical Reproduction. *Science*, 285(2 July), 53-54.

Djerassi, C. (1999). Under the covers or under a lens. *Nature*, 400(22 July), 327.  
[Review of Gosden 1999]

Gosden, R. (1999). *Designing Babies*. New York: W. H. Freeman

Kolata, G. (2001, 28 September). Fertility Ethics Authority Approves Sex Selection. *NYT*, pp. National Report, A14.

Silver, L. M. (1998). *Remaking Eden: How Genetic Engineering and Cloning Will Transform the American Family*. New York: Avon Books.

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