

# Infertility Research Progress

## *Advancing Reproductive Health Through Knowledge of Fertility and Treatments for Infertility*

### What is infertility?

Infertility is clinically defined as an inability to achieve pregnancy after one year of regularly having unprotected intercourse or after six months if the woman is older than age 35 years. In 2023, the American Society for Reproductive Medicine expanded this definition to include anyone who needs medical intervention to achieve a successful pregnancy as an individual or with a partner. The word is also used to describe an inability to carry a pregnancy to term.

There are several causes of infertility, including health conditions, age, genetics, and other factors. In many cases, the exact cause remains unexplained. Infertility is equally likely to affect women and men. In some couples, both partners have factors that reduce their fertility.

### How does NICHD support infertility research?

Addressing factors related to infertility is an important part of NICHD's mission. NICHD conducts and supports research to identify the causes of infertility in females and males and to develop treatments that may allow more people to achieve pregnancy and deliver a healthy baby. Other areas of interest include demographics of infertility and its treatments, efficacy of treatments, and understanding conditions and disorders that cause, contribute to, or are associated with infertility. Fertility serves as an important indicator of overall health, and infertility can be a sign of current or future health issues.

## Success Snapshots

### Mapping Gene Expression in the Ovaries

Ovulation, when an egg leaves the ovary and travels into the fallopian tube, is essential for a healthy pregnancy. Many women experience infertility because their ovaries do not routinely produce or release healthy, mature eggs. To better understand factors that drive ovulation and egg quality, researchers mapped gene expression changes in different ovarian cell types during the ovulatory cycle in a mouse model. The resulting, detailed data resource enhances knowledge of ovarian function and holds promise for treatments to improve ovulation and fertility in humans.

### Enhancing Fertility in Hyperprolactinemia

People with hyperprolactinemia have high levels of the hormone prolactin in their blood because of overgrowth or overstimulation of the pituitary gland, which produces the hormone. Females with hyperprolactinemia may experience infertility because the prolactin suppresses the hormone cascade that regulates ovulation. NICHD-funded researchers found that administering another hormone, called kisspeptin, restarts the cascade and allows ovulation to occur, thereby improving the chances of conception.

# Selected NICHD-Funded Infertility Projects

## Knowledge Advances

### Elucidating the Role of Lifestyle on Fertility

Environment, lifestyle, and other factors can affect a couple's fertility. A large NICHD study found that working in a physically demanding job or taking two or more medications was linked to lower sperm counts. Other research is examining how a female partner's diet, exercise, and other lifestyle factors affect pregnancy outcomes among couples undergoing fertility treatments.

### Mapping the Genetics of Pregnancy Loss

An estimated 5% of U.S. couples experience recurrent pregnancy loss. In about one-half of cases, the cause remains unexplained. NICHD-funded research seeks to better understand risk factors by delving into the underlying genetics. Investigators created a searchable database of genetic variants that may be linked to recurrent pregnancy loss, helping further knowledge about the condition and inform strategies to prevent it.

### Identifying the Genetics of Sperm Production

Expanding knowledge about sperm production and quality may help improve fertility treatments. An NICHD-funded analysis of more than 2,000 men with very low sperm counts revealed the involvement of multiple X-chromosome genes in sperm production, including 21 genetic variants strongly linked to very low sperm levels.

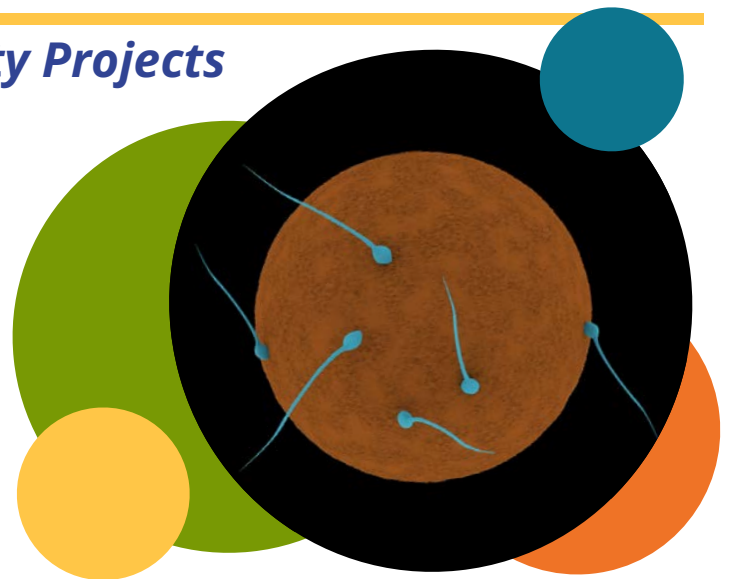
## Factors & Treatments

### Viewing Fertility as a Sign of Overall Health

Fertility can be an indicator of overall health, even for those not trying to conceive. One study found that women with infertility were at greater risk for coronary heart disease than those not affected by infertility. Other research showed that men with very low sperm counts were at higher risk for certain cancers. Awareness of these risks may enable more timely care.

### Treating Ectopic Pregnancy

Non-surgical treatments for ectopic pregnancy, a life-threatening condition in which a pregnancy implants outside the uterus, are not always effective. In mice, a nanoparticle delivery system brought medication directly to the ectopic pregnancy site, stopping pregnancy development and allowing the animals to later conceive and give birth to healthy offspring. Similar technology could help treat ectopic pregnancy in humans.



## Factors & Treatments (Continued)

### Tailoring Treatments for Infertility

Personalized infertility treatments may improve success and reduce unnecessary treatments. Sperm extraction surgery is the primary option for helping men with no detectable sperm in their semen to conceive, but it is often unsuccessful. NICHD-funded research is exploring noninvasive ways to identify those most likely to benefit from the surgery. Other NICHD-funded work seeks to measure a sperm's ability to fuse with an egg, information that could improve diagnoses and treatment success.

### Preserving Future Fertility

Researchers are exploring ways to preserve fertility among children and adolescents likely to experience infertility because of cancer treatments, genetic disorders, or other factors. Current options involve freezing ovarian tissue, in girls too young for egg-freezing procedures, and freezing testicular tissue in boys who may later be unable to make sperm. Researchers also are developing methods to produce sperm outside of the body using pre-pubertal testicular tissue samples.

**Learn More About NICHD  
Infertility Projects**



**NICHD Infertility Website:  
<https://go.nih.gov/x0U0fsl>**



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