Ovarian reserve and fertility

What ovarian reserve means

Ovarian reserve describes the remaining pool of eggs in the ovaries and the functional activity of the follicles that contain them. A person is born with all the oocytes they will ever have. The number declines steadily from fetal life onward through a natural process called atresia. By reproductive age, only a small fraction of the original pool remains, and in each menstrual cycle a group of small follicles begins to grow, although usually only one becomes dominant and ovulates.

In clinical practice, ovarian reserve is not measured by counting every egg. Instead, clinicians use indirect markers. These markers reflect the activity of small growing follicles and the hormonal feedback between the ovary, pituitary gland, and brain. They are helpful, but they are estimates rather than exact inventories.

It is also important to separate egg quantity from egg quality. Quantity refers to the number of remaining follicles; quality refers largely to an egg's ability to mature normally, be fertilized, form a chromosomally competent embryo, and support a pregnancy. Egg quality is strongly age-related and cannot be fully assessed by AMH or FSH alone. This distinction is central: someone may

have a lower-than-expected reserve for their age and still conceive, while someone with reassuring ovarian reserve markers may still face other fertility barriers.

The main ovarian reserve tests

The most commonly used ovarian reserve tests include AMH, basal FSH with estradiol, and antral follicle count. Each captures a different aspect of ovarian physiology, and none should be interpreted without the person's age, cycle history, ultrasound findings, medical background, and reproductive goals.

Anti-Mˆ…llerian hormone \(AMH\): AMH is produced by granulosa cells in small growing follicles. In general, higher AMH suggests a larger pool of recruitable follicles, and lower AMH suggests fewer recruitable follicles. AMH is often convenient because it can usually be measured on many days of the cycle, though values may vary between laboratories and can be influenced by assay differences, hormonal contraceptive use, ovarian surgery, and conditions such as polycystic ovary syndrome.
Follicle-stimulating hormone \(FSH\): FSH is typically measured early in the menstrual cycle, often around cycle day 2 to 4. As the follicle pool declines, the ovary produces less inhibin B and estradiol feedback, and the pituitary may increase FSH output to stimulate follicle growth. Elevated early-cycle FSH can suggest reduced ovarian reserve, but FSH fluctuates between cycles.
Estradiol: Estradiol is often checked alongside FSH. A high early-cycle estradiol may suppress FSH and make the FSH appear deceptively normal. This is why clinicians commonly interpret the two together.
Antral follicle count \(AFC\): AFC is measured by transvaginal ultrasound, usually early in the cycle. It counts the small visible follicles, commonly about 2 to 10 mm, in both ovaries. AFC can help predict the number of eggs that may be retrieved in an IVF cycle, but it depends on ultrasound quality, timing, and the observer's technique.

Other tests have been used historically, such as clomiphene challenge testing, but modern practice often relies most on AMH, AFC, and early-cycle FSH/estradiol. The best test panel varies by clinical setting.

What ovarian reserve tests can and cannot predict

One of the most important messages from reproductive medicine guidelines is that ovarian reserve tests are better at predicting ovarian response to stimulation than predicting natural fertility in people without known infertility. For example, AMH and AFC can help estimate whether someone may produce a low, expected, or high number of eggs during an IVF cycle. This can guide medication dosing, counseling, and risk reduction, such as avoiding excessive stimulation in people at risk for ovarian hyperstimulation syndrome.

However, these tests do not reliably answer the question many people most want answered: "Can I get pregnant naturally this month or this year?" Natural conception depends on ovulation, egg and sperm meeting in a patent fallopian tube, fertilization, embryo development, uterine receptivity, and implantation. Ovarian reserve is only one part of that system.

A low AMH may suggest fewer eggs are available for recruitment, and it may mean time is more clinically relevant, particularly if pregnancy is desired soon. But low AMH alone does not diagnose infertility. Similarly, a reassuring AMH does not guarantee fertility or delay the age-related decline in egg quality. This is why fertility specialists often combine ovarian reserve testing with a broader assessment, including menstrual history, ovulation evaluation, semen analysis, uterine and tubal assessment when indicated, and review of medical conditions.

Age, egg quality, and ovarian reserve

Age is deeply intertwined with ovarian reserve but is not identical to it. As age increases, the number of remaining follicles declines, and the proportion of eggs with chromosomal abnormalities tends to rise. This age-related change in chromosomal competence is a major reason miscarriage risk increases and pregnancy rates decline with time, especially in the late 30s and 40s.

Two people of the same age can have different ovarian reserve markers, and two people with similar AMH levels can have different chances of pregnancy depending on age. A 32-year-old and a 42-year-old with the same AMH value may have different embryo quality expectations because egg quality is strongly age-dependent. This is why clinicians usually interpret ovarian reserve tests alongside chronological age rather than replacing age with a lab result.

Regular periods can be reassuring that ovulation is occurring, but they do not guarantee a high ovarian reserve. Conversely, irregular cycles can occur for reasons unrelated to diminished reserve, including polycystic ovary syndrome, thyroid disease, hyperprolactinemia, hypothalamic dysfunction, and other hormonal conditions. A careful evaluation helps distinguish among these possibilities.

Factors that may lower ovarian reserve

Ovarian reserve naturally declines with age, but some people experience diminished ovarian reserve earlier than expected. Sometimes no clear cause is found. In other cases, medical history provides clues.

Ovarian surgery: Surgery involving the ovary, such as removal of ovarian cysts or endometriomas, can reduce functional ovarian tissue, depending on the condition, technique, and extent of surgery.
Chemotherapy or pelvic radiation: Some cancer treatments can damage ovarian follicles. Fertility preservation counseling before treatment is important when time and clinical circumstances allow.
Endometriosis: Endometriosis, especially ovarian endometriomas, may be associated with reduced ovarian reserve and can also affect fertility through inflammation, anatomy, and pelvic factors.
Genetic or chromosomal factors: Fragile X premutation and Turner mosaicism are examples of conditions that can be associated with earlier ovarian insufficiency in some individuals.
Autoimmune and metabolic conditions: Some autoimmune disorders and medical conditions may affect ovarian function, though the relationship varies.
Smoking and environmental exposures: Cigarette smoking is associated with earlier menopause and reduced reproductive potential. The effect of other exposures is more complex and often harder to quantify.

If a result suggests low reserve, it is reasonable to feel worried. It is also reasonable to ask for confirmation, context, and a plan. A single unexpected value may need repeat testing or correlation with ultrasound and clinical history before major decisions are made.

Ovarian reserve in infertility evaluation and IVF planning

In an infertility evaluation, ovarian reserve testing helps clinicians estimate prognosis and design treatment. In IVF, AMH and AFC are particularly useful for anticipating how many follicles may respond to injectable gonadotropins. Someone with low reserve may produce fewer eggs despite appropriate stimulation; someone with high reserve, such as many patients with PCOS, may be at higher risk of an excessive response.

For people considering egg freezing, ovarian reserve markers help estimate how many eggs might be retrieved per cycle and whether more than one cycle may be needed to reach a target number. The decision to freeze eggs also depends heavily on age, because the probability that a frozen egg may later result in a live birth is linked to the age at which the egg was frozen.

Ovarian reserve testing may also help with timing. For example, if someone in their mid-30s has low AMH and wants more than one child, a clinician may discuss shorter timelines, embryo banking, egg freezing, or earlier referral to reproductive endocrinology. These are not one-size-fits-all recommendations; they are conversations that incorporate values, finances, medical risks, relationship status, and emotional readiness.

How to interpret results without losing hope

Fertility testing can feel vulnerable because the results seem to speak about the future. Yet ovarian reserve markers are probabilities and planning tools, not moral judgments or absolute predictions. Many people with diminished ovarian reserve conceive, and many people with normal markers still need help for other reasons.

Helpful questions to ask a healthcare professional include:

How does this result compare with expected values for my age and lab assay?
Should the test be repeated, or interpreted with an antral follicle count?
Does this result change my timeline for trying to conceive?
Are there other factors we should evaluate, such as ovulation, semen parameters, fallopian tubes, thyroid function, prolactin, or uterine anatomy?
If I pursue IVF or egg freezing, what response would you expect, and what are the realistic success ranges?

It is also worth protecting your emotional wellbeing. Online AMH charts and fertility forums can be useful for community, but they can also amplify fear. Your numbers need interpretation by someone who understands your whole clinical picture.

When to seek fertility advice

General guidance often suggests seeking evaluation after 12 months of regular, unprotected intercourse if under 35, after 6 months if 35 or older, and sooner if 40 or older or if there are known risk factors. Earlier consultation is also appropriate with irregular or absent periods, known endometriosis, prior ovarian surgery, chemotherapy or pelvic radiation, recurrent pregnancy loss, suspected premature ovarian insufficiency, or a known sperm factor.

Seeking advice does not commit you to treatment. A consultation can simply clarify where you stand, what testing is appropriate, and which options fit your goals. For some, that means continuing to try naturally with better timing. For others, it may mean ovulation induction, intrauterine insemination, IVF, fertility preservation, donor eggs, or choosing not to pursue medical treatment. Supportive care should respect both medical realities and personal values.