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SEX HORMONES 101

your trusty guide to hormones



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Intro

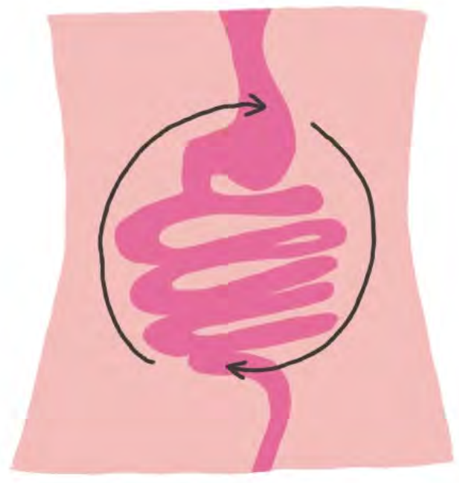
Welcome to your new hormone bible, "Sex Hormones 101: The Modern Woman’s Guide To Hormones."

In this comprehensive guide, we embark on a journey to decode the intricate world of sex hormones. Whether you're TTC, prioritizing your overall well-being, or simply trying to understand the changes your body undergoes, this guide is your compass. Empower yourself with knowledge, dispel uncertainties, and embrace the fascinating role hormones play in our lives.











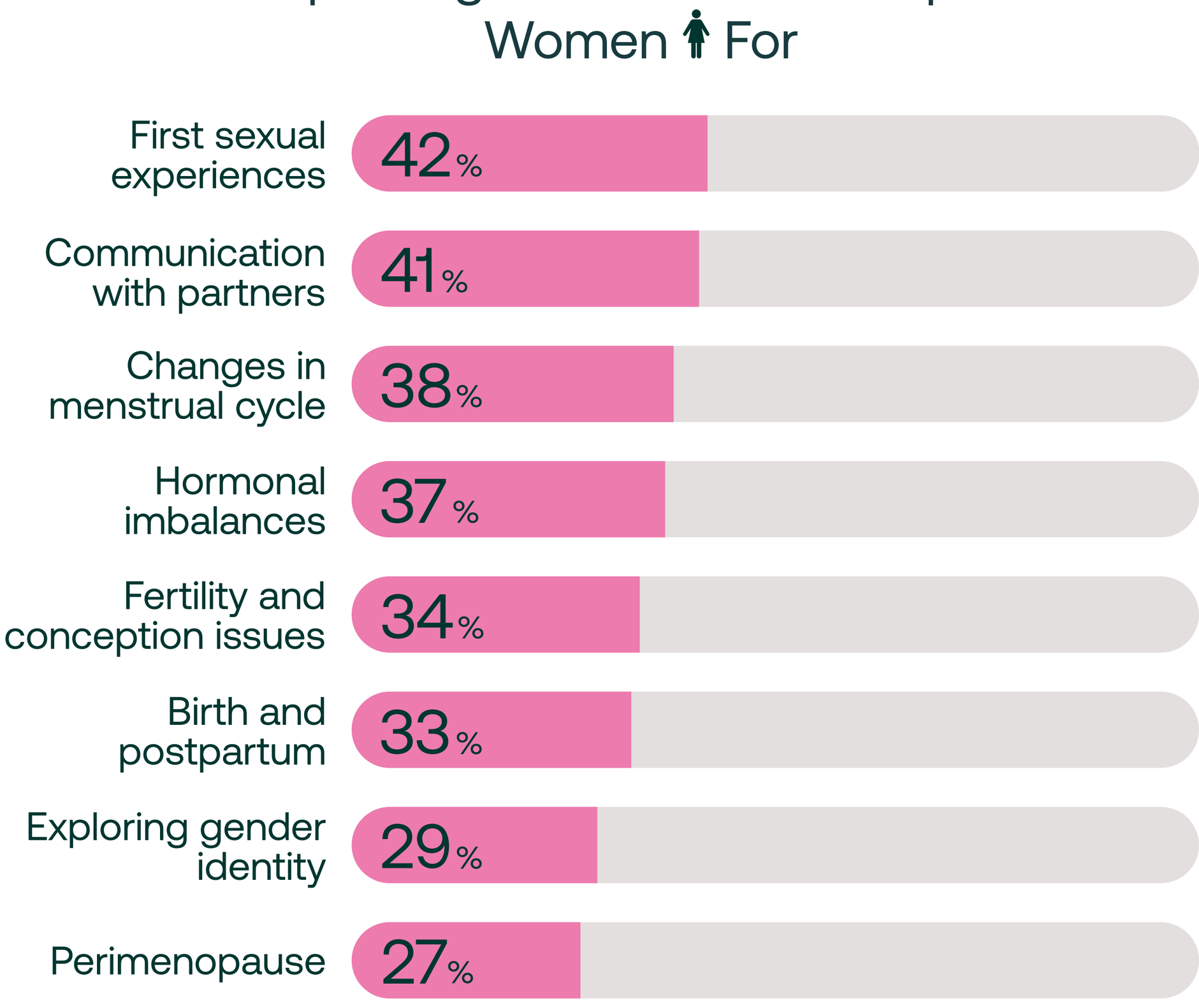
Education Gap Numbers from the latest Mira Survey

Based on our recent 2023 Mira survey involving over 1,500 Americans between the ages of 18-44:

90% of Americans say that sex education hasn't prepared them for real life.

Insight: A significant portion of women expressed feeling unprepared for hormonal imbalances (37%), fertility and conception issues (34%), perimenopause (27%), and more.

Top Things Sex Ed Didn't Prepare Women For



Based on a Survey of 1,500 Americans conducted in 2023 by Mira

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30% of Americans say that sex education hasn't prepared them for real life.

Insight: The lack of foundational knowledge about sex hormones is prevalent among a considerable portion of the population.

The Goal of the Guide

We want to help bridge the education gap, bringing awareness and understanding to women at every life stage. Regardless of your current reproductive goals or life phase, let's navigate the intricacies of sex hormones together.



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Section 1

Why Should I Care about Sex Hormones?

Explore how your hormones are your partners.

Trying for a Baby

Starting the journey towards parenthood? Your hormones are the ultimate guides that optimize your fertility. They tell you everything you need to know about your fertility chances. Technological advancements like the Mira Hormone Monitor elevate your understanding, offering insights beyond traditional methods.



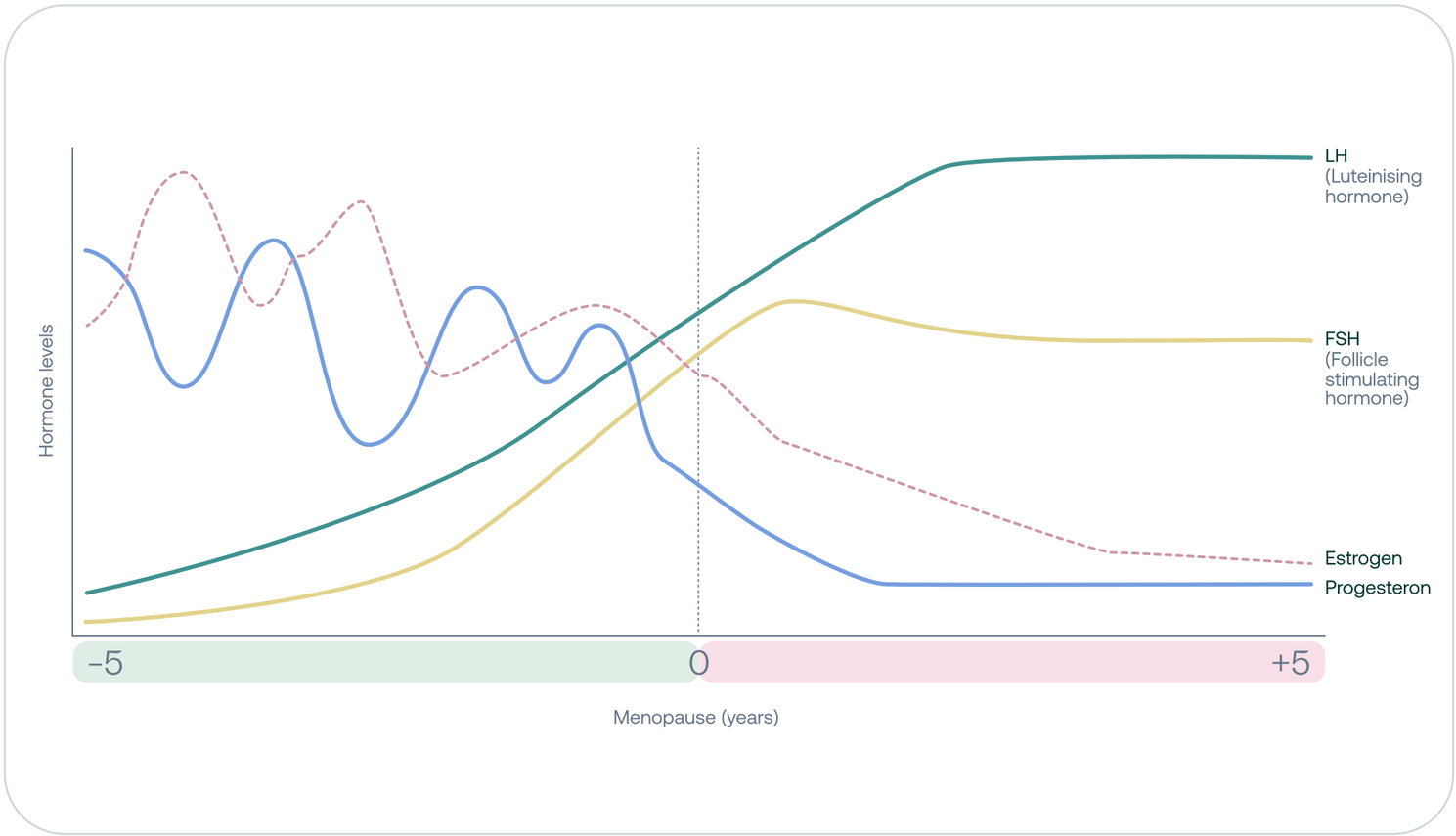
Health & Physical Well-being



Fertility isn't just a path to parenthood; it's a barometer of your overall well-being. Your hormones, acting as messengers, provide signals about your body's health, making it essential to decipher their language. When hormones are imbalanced, health issues can arise like diabetes, thyroid disorders, reproductive disorders, and metabolic conditions.

Aging

Your hormones are with you through all of life's chapters—from the beginnings of adolescence to the stability of adulthood and onto the golden years. Your hormones will change as you age, and having a consistent reading of them, along with your egg reserve is crucial.





Mood and Mental Health

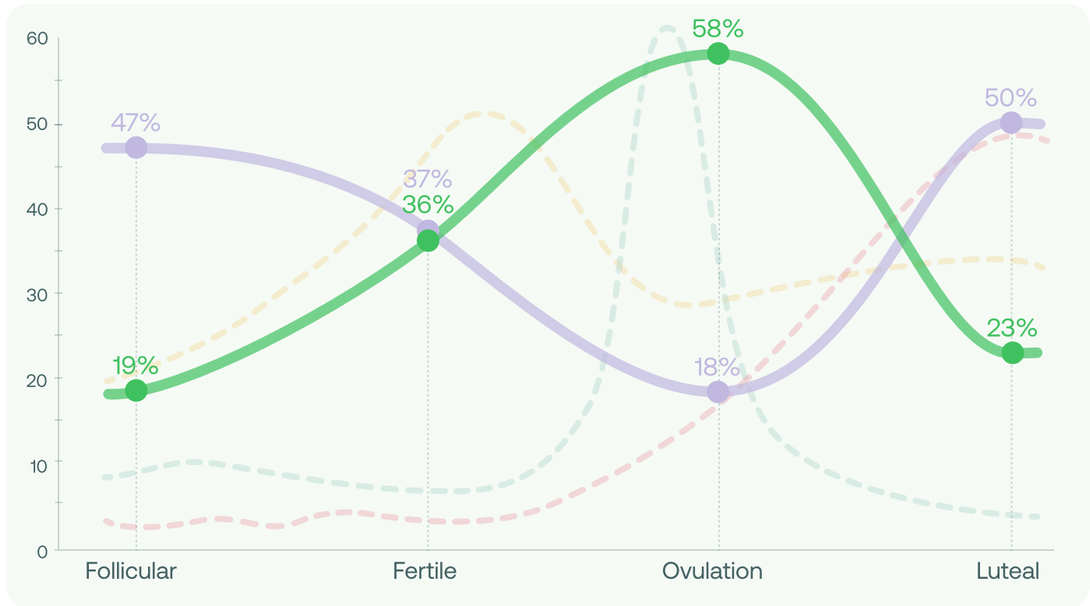
Ever experienced emotional fluctuations and wondered why? Your hormones are powerful influencers on your mood and mental well-being. Unravel the connection between hormonal shifts and emotional rollercoasters.



How do Sex Hormones Affect Your Mood?

Mood — Happy & Excited — Tired, Irritable, Sad

Estradiol (E3G) — Luteinizing hormone (LH) — Pregnanediol 3 Glucuronide (PdG)



Percentage of participants reporting productivity changes in daily logs.

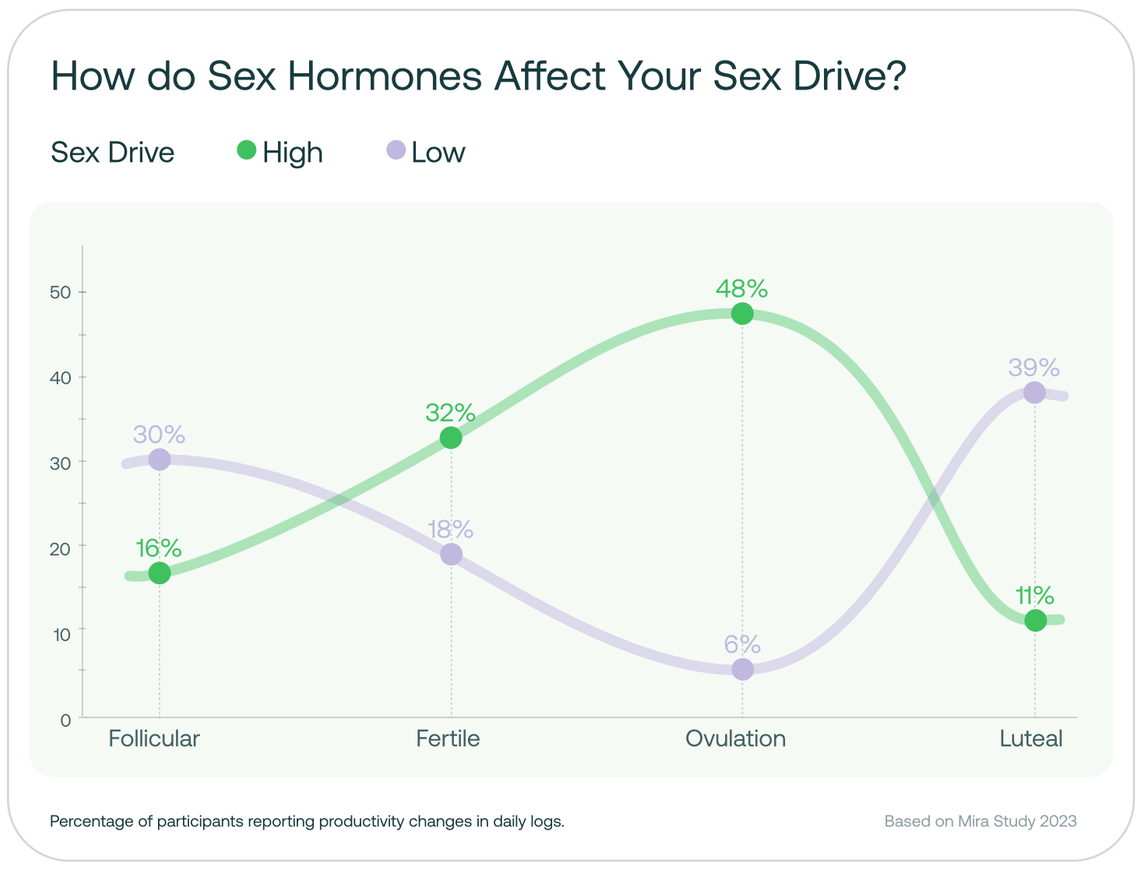
Based on Mira Study 2023

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Sex Drive

Libido, a vital aspect of intimate relationships, is intricately linked to hormones. Explore the profound impact hormones have on your sex drive and overall sexual wellness.





Percentage of participants reporting productivity changes in daily logs.

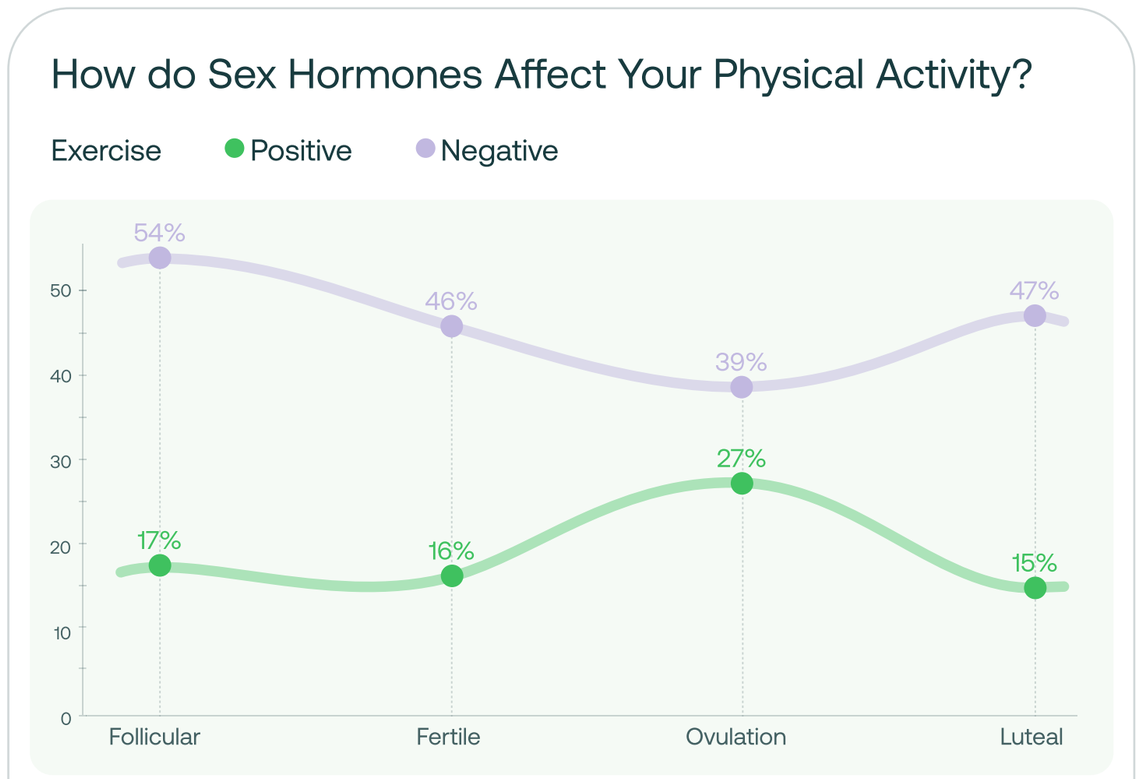
Based on Mira Study 2023



Work, Workout, and Activity Levels

Your hormones act as energetic companions, influencing your work productivity, workout performance, and overall activity levels. Discover the dynamic interplay between hormones and your daily vitality.





Percentage of participants reporting productivity changes in daily logs.

Based on Mira Study 2023

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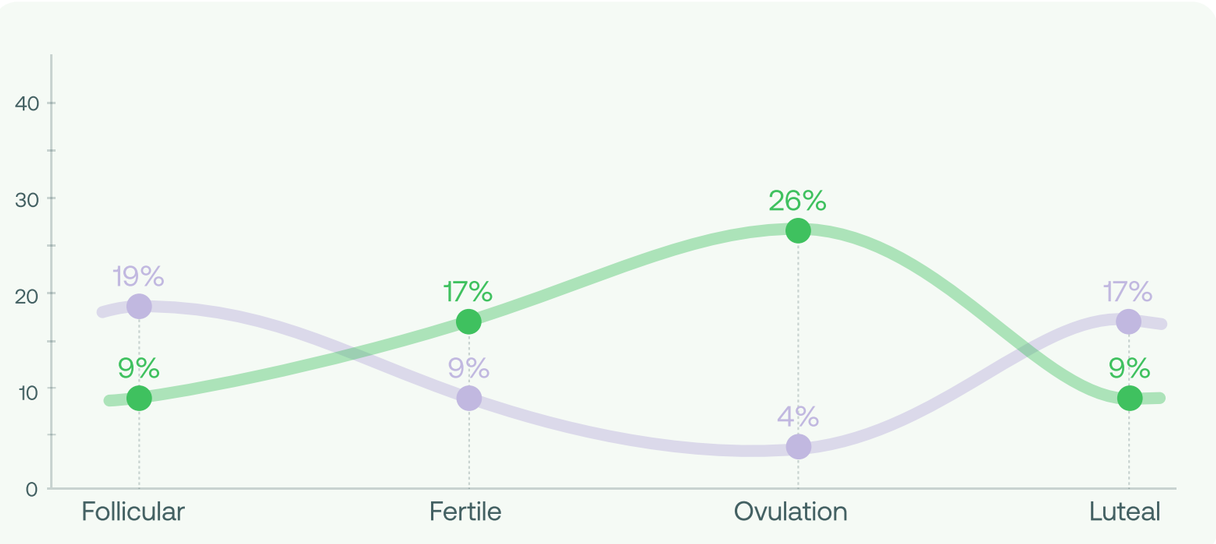
Mirror Reflection

Hormones play a transformative role in your physical appearance, affecting your skin, hair, and weight. Find out how the hormonal cues reflect in your outer appearance.



How do Sex Hormones Affect your Self-Perception?

How do you feel about your looks — Positive — Negative



Percentage of participants reporting productivity changes in daily logs.

Based on Mira Study 2023

Fertility & Society

Promoting sex hormone awareness contributes to creating a society that values and supports reproductive well-being. By understanding and prioritizing fertility, we can foster a more supportive community.



Section 2

Well, What Are The Sex Hormones?

Navigating hormones may seem complex at first, but let's bring some clarity to it. We've organized the 9 key sex hormones to simplify your understanding. They are grouped based on how frequently one should monitor them: continuously, annually, and during pregnancy.



Top 9 Sex Hormones You Need to..

- **MONITOR** on a regular basis

E3G

identifies your fertile window



LH

triggers ovulation



PdG

confirms ovulation occurred



FSH

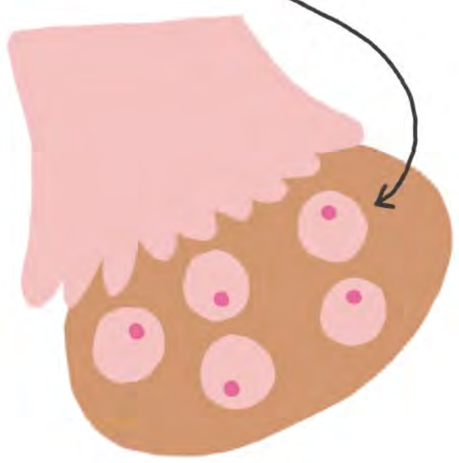
stimulates the ovarian follicles



- **CHECK-UP** annually or if you have symptoms

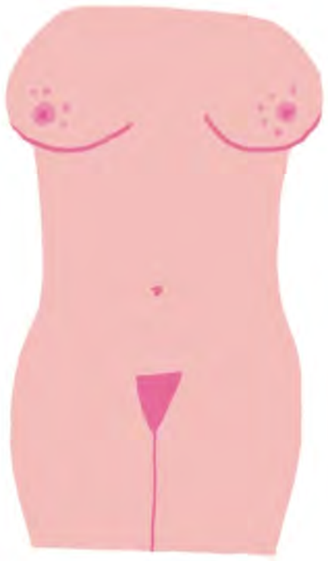
AMH

indicates how many eggs you have



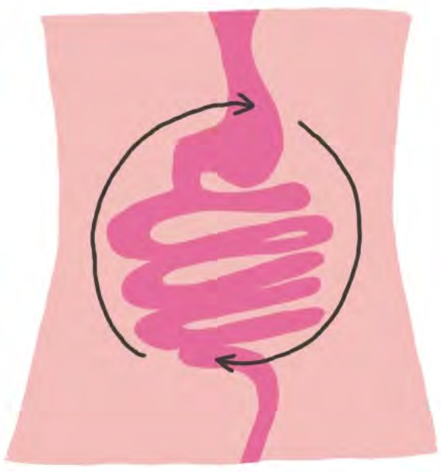
Prolactin

can affect your menstrual cycle



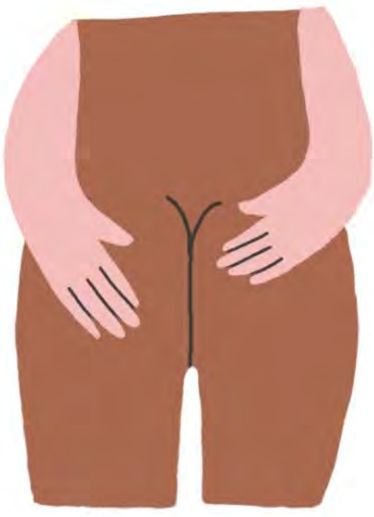
TSH, T3, T4

regulate metabolism



Testesterone

plays a role in sex drive



- **TEST** to confirm and monitor pregnancy

hCG



*The frequency of testing also depends on factors including the individual's health status, age, gender, and any existing medical conditions.

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A Deeper Dive: Understand each hormone and its cyclical pattern

Hormones that you should monitor regularly to see your cyclical pattern and dynamic

ESTROGEN



Roles:

Estrogen is the key sex hormone in women: it powers the menstrual cycle. In the ovaries, it’s primary role is to signalduring the fertile window that a follicle has grown, developed, and ready to release an egg; this then helps stimulate a surge in luteinizing hormone (LH), which triggers ovulation. Estrogen also helps maintain the thickness of the vaginal wall and has a role in lubrication, uterine mucus secretions, and strength and thickness of the lining of the uterus each month.



Why should you track it?

You can track E3G (a metabolite of estradiol E2, a type of estrogen found in urine) to identify your fertile window days. You need to monitor this hormone early on in your cycle to pinpoint ovulation and identify your 6-day fertile window.



What are average E3G levels?

Follicular phase	Ovulatory phase	Luteal phase
80-120 ng/mL	120 – 400 ng/mL	100-350 ng/mL

High or low E3G levels: what do they mean?

High levels: can be linked to reproductive health conditions like endometriosis PCOS, obesity, ovarian tumors, liver disorders, and the effect of antibiotics or birth control pills. Symptoms: Weight gain in the hips and thighs; heavier periods than usual; worsening of premenstrual syndrome; uterine fibroids and/or fibrocystic breasts; fatigue, loss of sex drive and/or mood changes.

Low levels: can be linked to eating disorders, or excessive exercise. Symptoms: painful sex because of little or no vaginal lubrication; Increase in the number of UTIs; Mood swings; irregular or absent periods; headaches; hot flashes; depression; decreased bone density.



What does the E3G pattern look like?

E3G levels rise approximately 1-3 days before an LH surge. Its rise often overlaps with the start of the fertile window.

E3G may fluctuate in the days after your period but before ovulation (i.e. the follicular phase), meaning you may notice small peaks of E3G before the main peak ahead of ovulation.

After ovulation, E3G levels will drop. However, there will be another small surge in E3G in the middle of the luteal phase (i.e. the time after ovulation but before your period). This is a sign that the corpus luteum is working properly and can support potential implantation. At the same time, it also indicates that the body is in an infertile period.

LUTEINIZING HORMONE (LH)



Roles:

In women, LH plays a crucial role in the menstrual cycle by triggering ovulation. It works in conjunction with follicle-stimulating hormone (FSH) to stimulate the release of an egg from the ovaries.



Why should you track it?

LH surge trigger ovulation, making it important for tracking your fertile days; consider monitoring daily when trying to conceive during your fertile window.



What are average LH levels?

Follicular phase	Ovulatory phase	Luteal phase
1-6 mIU/mL	7-25 mIU/mL	2-5 mIU/mL

High or low LH levels: what do they mean?

High levels: you're not ovulating, you have an underlying hormone condition like PCOS, or you have an underlying genetic disorder that affects the production of hormones. High LH levels could also mean you are entering perimenopause. Symptoms: Periods have stopped; your periods aren't regular; unexplained infertility.

Low levels: Low LH levels can prevent ovulation and may impact whether you even get your period. Low LH levels are often found in women with eating disorders, female athletes, those under a lot of stress, and women with disorders that affect the pituitary gland or hypothalamus. Symptoms: unable to get pregnant after 12 months of trying; decreased sex drive; irregular menstrual cycle; fatigue; weakness; unexplained weight loss; decreased appetite.



What does the LH pattern look like?

Midway through the cycle, LH levels surge dramatically to trigger ovulation. This hormone level tends to increase and decrease very sharply (an entire surge can disappear within 24-36 hours!). Ovulation typically occurs within 24-36 hours of an LH surge. Very rarely, some may have an anovulatory cycle, meaning LH surges, but there's no ovulation.

PROGESTERONE

Roles:

Progesterone, produced mainly by the ovaries and in smaller amounts by the adrenal glands, prepares your body for pregnancy.

Why should you track it?

Monitoring Progesterone urine metabolite, PdG (Pregnanediol glucuronide) will let you understand if ovulation has occurred in any given cycle.

What are average PdG levels?

Follicular phase	Ovulatory phase	Luteal phase
1-5 ug/mL	3-7.5 ug/mL	5-25 ug/mL

High or low PdG levels: what do they mean?

High levels: High progesterone may impact fertility by causing a disrupted ratio of estrogen to progesterone. in comparison, resulting in a hormone imbalance called “functional estrogen deficiency” that may affect your ability to conceive. Symptoms: Sleepiness; Bloating; Dizziness; Yeast infections; Depression; Reduced sex drive; Weight fluctuations.

Low levels: when progesterone levels are too low, estrogen levels are too high in comparison, resulting in a condition called “estrogen dominance” that can make it harder for you to get pregnant. Low progesterone can also result from PCOS. Symptoms: Irregular or heavy menstrual bleeding; Spotting between periods; Decreased sex drive; Hot flashes; Development of new anxiety and/or depression; Miscarriage or early labor; No spike in basal body temperature.



What does the PdG pattern look like?

When you see a rapid surge of PdG for three consecutive days, it means that ovulation has occurred. PdG, indeed, should rise 1-2 days after your LH peak.

A slight increase of PdG may be noticed in some cases 2-3 days before ovulation, but it doesn’t mean that ovulation will happen.

If conception does not occur, PdG tends to peak around 6-8 days after ovulation; If conception occurs, PdG continues to rise to maintain a healthy pregnancy.

FOLLICLE-STIMULATING HORMONE (FSH)

Roles:

FSH stimulates the recruitment, growth, and development of ovarian follicles. FSH also helps ramp up the production of estrogen during the follicular phase, to thicken the uterine lining, which in turn helps to support the implantation process. FSH is also commonly used in medical practice to assess ovarian function and confirm the transition to menopause.

Why should you track it?

Monitoring FSH is important because it can give your doctor insight into various health and fertility concerns, including the functioning of the ovaries, pituitary, or hypothalamus; the potential effectiveness of certain fertility treatments, and the likelihood of pregnancy. FSH can help predict ovulation.

What are average FSH levels?

Follicular phase	Ovulatory phase	Luteal phase
3-10 mIU/mL	10-30+ mIU/mL	2-5 mIU/mL

High or low FSH levels: what do they mean?

High levels: one possible cause of high FSH that may impact your fertility is premature ovarian failure or primary

ovarian insufficiency (POI), a condition in which the ovaries stop working before the age of 40. Symptoms: Irregular periods; hot flashes; headaches; vaginal dryness; increase in the number of UTIs; decreased libido.

Low levels: it may mean your pituitary gland or hypothalamus is not working properly; It can also signify you're underweight or doing excessive physical activity. Symptoms: Muscle weakness; excessive fatigue; Sleep disturbances; Mood swings



What does the FSH pattern look like

There are typically 3 FSH surges within the menstrual cycle.

The first one is at the beginning of the cycle (typically on day 3 of the cycle) to stimulate follicles to grow.

The second one occurs around ovulation (on average 2 hours before ovulation, according to recent studies) along with LH peak to trigger ovulation.

The third one occurs 2-3 days before the menstrual period to recruit follicles for the next cycle. If pregnancy does not occur, FSH levels begin to rise again, marking the start of a new menstrual cycle.

Interactions between these 4 sex hormones throughout the cycle



An idealized menstrual cycle can be broken down into two phases: follicular and luteal. Your period and fertile window are stages that happen within the follicular phase.

1

During the first half of the cycle, Estrogen levels start low and rise during the follicular phase before a sharp drop and slight rise again.

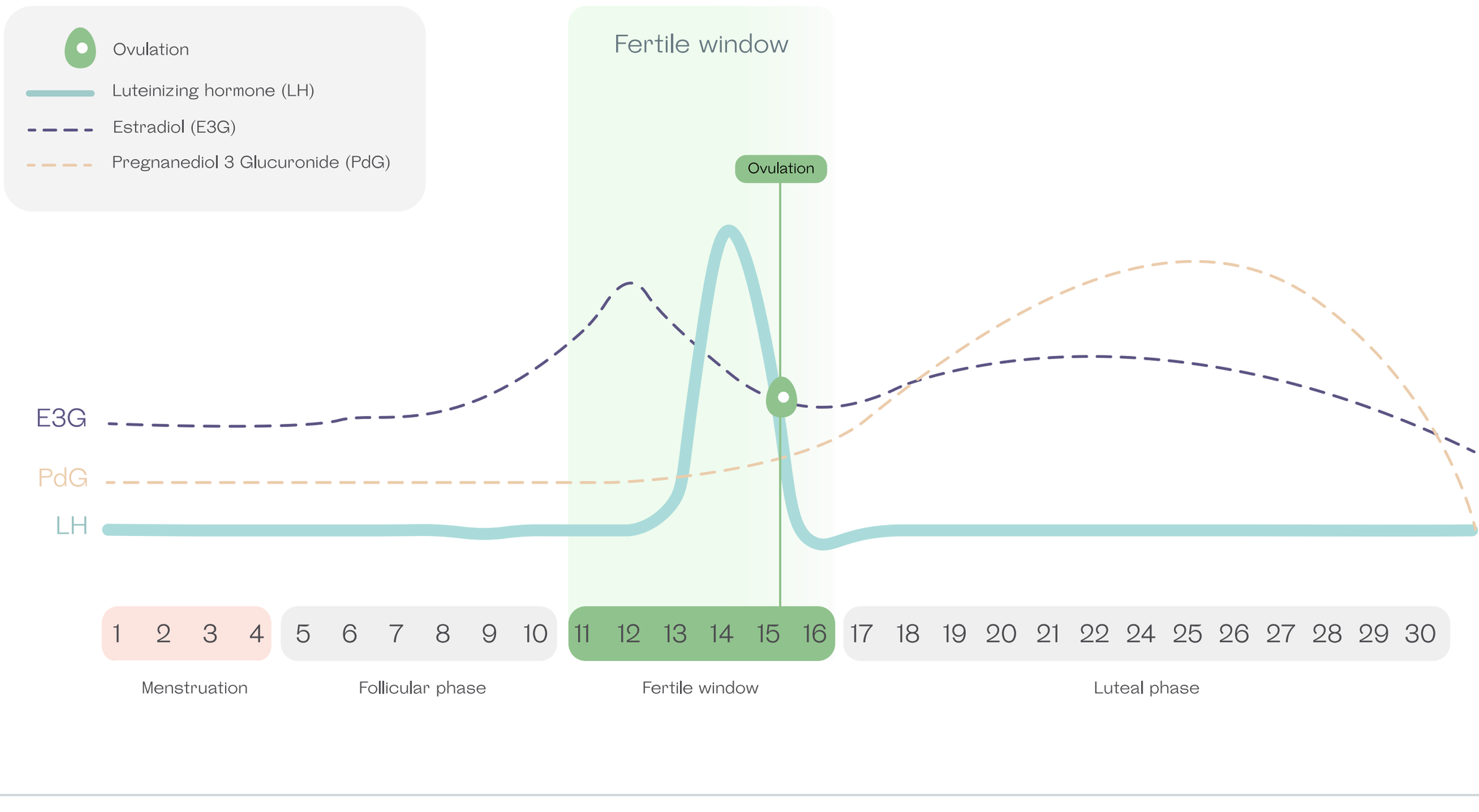
When estrogen levels peak, it also causes LH levels to rise, kicking off ovulation.

Progesterone levels stay low with a gradual steady rise in the follicular phase before they reach their peak in the second half of the cycle.

FSH peaks in the follicular phase as it stimulates the growth and maturation of the follicles until a dominant follicle emerges. Maturing follicles produce estrogen which is why these peaks are closely related.

2

The last half of the cycle sees Estrogen levels rising again, this time with a Progesterone peak. These two levels fall during the premenstrual phase, which is coincidentally when most women experience a worsening of chronic disease and premenstrual mood and physical symptoms. In the absence of a pregnancy, progesterone and estrogen start to decrease and along with other key hormonal changes, the inner lining of the uterus is shed, or in other words, your period begins.



Hormones that you should screen annually, or when experiencing specific symptoms

TESTOSTERONE

Roles:

Testosterone plays crucial roles in both men and women. In women, it’s instrumental for physical and psychological well-being, contributing to a healthy circulatory system, brain, and more. It helps keep their sex drive healthy and strengthens their bones, muscles, and skin collagen production. Testosterone can also be turned into estrogen.

Why should you test it?

The blood test of Free Testosterone (the portion of Testosterone not bound to proteins in our blood) can assist in diagnosing various health conditions. Because the symptoms linked to low or high testosterone are so common, your doc will look for signs of other issues or conditions before making a diagnosis.

High or low Testosterone levels: what do they mean?

High levels of testosterone can be associated with typical PCOS symptoms, including irregular or absent periods, excess facial and body hair growth, blood sugar imbalances, difficulty getting pregnant, obesity, thinning hair on the scalp, and excessive acne.

Low levels of testosterone in women (linked mainly to menopause and aging, or problems with the ovaries, pituitary or adrenal glands) can lead to symptoms such as sluggishness, mood swings, muscle weakness, fatigue, sleep disturbances, lack of concentration, reduced sex drive and sexual satisfaction, weight gain, hair thinning, fertility issues, irregular menstrual cycles, and vaginal dryness.

PROLACTIN



Roles:

Prolactin, produced by the pituitary gland, is a hormone that prepares the breast tissue for lactation and milk production. It's released in response to various stimuli, such as nursing, stress, and sexual activity. It also affects various body systems—including the reproductive system, behavior, the nervous system, and the immune system. After childbirth, prolactin levels rise while estrogen levels decrease, facilitating milk production.



Why should you test it?

Testing prolactin levels is crucial for understanding symptoms like irregular menstrual cycles, difficulty getting pregnant, breast tenderness, headaches, changes in vision, vaginal dryness, hot flashes, decreased libido, and osteoporosis.

High or low Prolactin levels: what do they mean?

High levels can be attributed to hyperprolactinemia, a condition characterized by elevated prolactin levels that can affect menstrual function. When this happens, a woman might experience irregular periods and trouble getting pregnant, her breasts may start producing milk outside of pregnancy (galactorrhea) or they may feel tender throughout the menstrual cycle. No cause is found in about a third of all cases of hyperprolactinemia.

Low levels do not usually cause medical issues, but they may reduce immune responses to some infections.

ANTI-MULLERIAN HORMONE (AMH)

Roles:

AMH is a hormone secreted by the ovarian follicles, so the higher your level, the more follicles (potential eggs) you're expected to have. Unlike other reproductive hormones, AMH is relatively stable throughout the menstrual cycle and is not significantly influenced by the menstrual phase. However, it changes with age.

Why should you test it?

It's helpful to test this hormone together with FSH. Why: to identify the number of follicles in the ovaries (ovarian reserve) and your overall egg count (that's why AMH is a crucial hormone to test if you're trying to conceive); to check

the reasons behind early menopause (+ predict the start of menopause), the possible causes for amenorrhea, and to assist in a possible diagnosis of PCOS.



High or low AMH levels: what do they mean?

High AMH levels (greater than 4 ng/mL): this may mean you have more time to get pregnant since your ovarian reserve is greater. But in some cases, dramatically high AMH levels can indicate PCOS condition, which causes many (extra) follicles to grow on the ovaries that don't ovulate and turn into ovarian cysts, causing infertility issues.

Low AMH levels (less than 1 ng/mL): this may mean that you have fewer eggs than other women in your age group. This condition—known as diminished ovarian reserve—can create challenges with infertility. It doesn't exactly mean that you have no chance of getting pregnant. Other parameters like the number of antral follicles on ultrasound should also be evaluated. Low AMH levels may also increase your risk of having a miscarriage once you are pregnant.

Comprehensive evaluation of thyroid function (TSH, T4, T3)

Roles:

Thyroid Stimulating Hormone (TSH), produced by the pituitary gland, controls your thyroid gland by telling it to produce two main hormones known as T4 (thyroxine) and T3 (triiodothyronine). These hormones play a role in your body's metabolism and can also affect your menstrual cycle and fertility indirectly.

Why should you test thyroid hormones

To assess thyroid and pituitary gland function; to diagnose and monitor the treatment of thyroid disorder; to determine if thyroid function affects fertility health.

High or low TSH levels: what do they mean?

High TSH levels: this means that your thyroid hormone levels (T3 and T4) are low (hypothyroidism or underactive thyroid gland)—which can cause symptoms like weight gain, fatigue, dry skin, constipation, feeling cold, irregular periods, and difficulties getting pregnant.

Low TSH levels: this means that your thyroid hormone levels (T3 and T4) may be high (hyperthyroidism)—which can cause symptoms such as weight loss, rapid heart rate, nervousness, and difficulty getting pregnant.

High or low fT4 levels: what do they mean?

High fT4 levels: this can indicate Thyrotoxicosis—a condition that speeds up your metabolism and can lead to symptoms like weight loss, increased appetite despite eating more, rapid or irregular heartbeat, nervousness, irritability, difficulty sleeping, fatigue, shaky hands, muscle weakness, and many others.

Low fT4 levels: this can be linked to Hypothyroidism, caused by an underactive thyroid gland. Individuals with hypothyroidism may experience symptoms such as weight gain, fatigue, sensitivity to cold temperatures, and irregular or heavy menstrual periods.

Pro tip



A full, comprehensive check-up

With Mira Panorama Fertility Lab Test you can screen all these 5 hormones, from the comfort of your home. Get the FULL picture of your fertility health with 5 detailed reports about your ovarian reserve, thyroid function, fertility health, hormonal balance, and menstrual cycle rhythm.

The Pregnancy hormone

Human Chorionic Gonadotrophin (hCG)

Roles:

Released during pregnancy by the emerging placenta, hCG is the hormone that home pregnancy tests detect and measure in your urine to determine a positive result. It's produced exclusively by your placenta once an embryo implants in the uterus. The real role of hCG is to tell your body to keep producing progesterone from the corpus luteum until the placenta can take over.

Why should you test it?

To both confirm and monitor a pregnancy. A blood test is the most accurate way to detect and track hCG levels.

What are average hCG levels?

Pregnancy Week (weeks since last menstrual period)	Standard hCG Range
Non-pregnant	0 - 5 mIU/mL
3 weeks	5 - 50 mIU/mL
4 weeks	5 - 426 mIU/mL
5 weeks	18 - 7,340 mIU/mL
6 weeks	1,080 - 56,500 mIU/mL
7-8 weeks	7,650 - 229,000 mIU/mL
9-12 weeks	25,700 - 288,000 mIU/mL
13-16 weeks	13,300 - 254,000 mIU/mL
17-24 weeks	4,060 - 165,400 mIU/mL
25-40 weeks	3,640 - 117,000mIU/mL

What does the hCG pattern look like -

hCG production is at its highest during the first trimester of pregnancy, and typically follows an exponential rise. Typically, hCG levels doubles every 72 hours and peaks around 8-10 weeks, before leveling off then decreasing and remaining constant until the end of the pregnancy.

Don’t forget

Appreciating Individual Patterns

Each person’s cycle is different and everyone’s hormones are unique. It’s key to look at the big picture and how these hormones impact your life!

Mira helps with this, leveraging our AI trained on 11 million data points, monitoring 850,000 cycles, and involving 92,000 users, providing a wealth of hormonal insights.

Caution on Test Results

Your hormonal level test results should not be considered a replacement for medical advice. While they offer valuable information for building your fertility plan, understanding each hormone level is just one part of the puzzle. Always consult with your healthcare provider for comprehensive guidance.

How to test hormones

Testing hormones at home or in a lab each has its own set of pros and cons. The choice between the two depends on various factors, including the type of hormone being tested, the purpose of the testing, and individual preferences.

Testing at Home



Pros

1. Convenience: Testing at home provides the convenience of not having to travel to a lab, which can be beneficial for people with busy schedules or who live in remote areas.
2. Privacy: Doing your hormone tests at home provides privacy that you may prefer, especially for sensitive issues or conditions.
3. Cost: Depending on the type of test, home testing kits may be more cost-effective than visiting a healthcare provider or a lab.
4. Quick Results: Home testing kits often provide relatively quick results, and people may have direct access to their results without the need for a healthcare professional's involvement.

Cons

1. Accuracy: The accuracy of home hormone tests may vary depending on the specific kind of test you choose, as well as on how you perform the test. The most accurate tests, like Mira's, require precision and consistency.
2. Limited Range of Hormones: Some home testing kits may be available for a limited range of hormones, and not all hormones may be suitable for at-home testing.
3. Expert Interpretation: Interpreting hormone test results may require medical expertise. Without professional guidance, individuals may misinterpret results or fail to understand the broader context of their hormonal health.

Testing at a Lab



Pros

1. Comprehensive Testing: Healthcare providers can order a comprehensive panel of hormone tests, providing a more complete picture of hormonal health.
2. Professional Guidance: Healthcare professionals can interpret the results, provide context, and recommend appropriate actions based on the findings.
3. Follow-up Care: If abnormalities or imbalances are detected, healthcare providers can offer guidance on potential treatments or further investigations.

Cons

1. With a single blood test you might be capturing your hormone levels at a peak or somewhere in between. But with urine at-home testing, you can capture a more comprehensive view of your hormones by tracking their metabolites. Firstly, because a single urine result covers a longer span of time. Secondly, because our hormones pulse.
2. Inconvenience & Waiting Time: Visiting a lab for testing may be inconvenient for some individuals, especially those with busy schedules or limited access to healthcare facilities. Results from lab tests may take some time to be processed and reported, leading to a potential delay in obtaining information.
3. Cost: Lab testing may be more expensive than at-home testing, especially if insurance coverage is limited.

Section 3

Taking Charge of Your Hormonal Health

Four steps to a happy hormonal journey



How can I care about my hormones?

Self-Education Is Key!

Knowledge is power! Empower yourself with knowledge about hormones, through a plethora of resources that you can find online.

Explore Mira's rich content, ranging from free blogs, webinars, and ebooks, to paid comprehensive education.



Hormones Testing

Embark on a transformative journey by testing and monitoring your hormones at home. Make it a habit to get consistent and accurate results, tailored to your unique cycle.

Try the Mira Max Starter Kit





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Better Lifestyle Choices

Elevate your well-being with fertility-friendly habits: eating a balanced diet, staying hydrated, moving your body, and trying to lower stress levels.

Stay hydrated and keep your hormones balanced with Mira Fertility Tea; boost your fertility with Mira Prenatal Multi-Vitamins.



Seek Professional Advice

Connect with certified professionals to navigate all your hormone-related concerns, regardless of your fertility goal.



Consider the personalized guidance you can get from one of Mira Fertility Coaches: get warm support, your questions about hormones answered, lifestyle improvement tips, and a plan for reaching your goals.

Share this guide and spread the hormone love! 💚

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