



The luteinizing hormone (LH) is a glycoprotein secreted by the gonadotropic cells of the adenohypophysis, under the control of hypothalamic GnRH. It acts in synergy with FSH to regulate the menstrual cycle, playing a key role in the final maturation of the dominant follicle, the triggering of ovulation, and the formation of the corpus luteum. LH is also involved in the synthesis of androgens by the cells of the internal theca of the follicle.

At the beginning of the follicular phase, LH levels are relatively low, allowing the growth and maturation of follicles under the predominant influence of FSH. However, as the dominant follicle develops, it acquires more LH receptors on the granulosa cells, making it more sensitive to this hormone. LH then stimulates the synthesis of androgens (androstenedione and testosterone) by the internal theca cells, which are then converted into oestrogens by the granulosa cells, thanks to the action of the aromatase induced by FSH.

The gradual increase in the levels of oestrogens secreted by the dominant follicle exerts a positive feedback on the hypothalamo-pituitary axis, causing a massive release of LH called "ovulatory peak" or "ovulatory discharge". This LH peak usually occurs 24 to 36 hours before ovulation and can reach values 10 to 20 times higher than basal rates. It is triggered when estradiol levels reach a critical threshold for a sufficient duration (about 200 pg/mL for 50 hours), stimulating the pulsatile secretion of GnRH by the hypothalamus.

The ovulatory peak of LH is essential to induce the final stages of oocyte maturation and follicular rupture. Under the effect of LH, the oocyte resumes its meiosis and progresses to metaphase II, at which stage it will remain blocked until possible fertilization. LH also stimulates the production of prostaglandins and proteolytic enzymes by follicular cells, leading to localized digestion of the follicular wall and allowing the expulsion of the mature

oocyte during ovulation.

After ovulation, the residual follicular cells differentiate into luteal cells under the action of LH, forming the corpus luteum. LH stimulates the synthesis of progesterone by the luteal cells, which acts in synergy with oestrogens to prepare the endometrium for possible embryonic implantation. The secretion of progesterone by the corpus luteum is maintained by LH for about 14 days, constituting the luteal phase of the menstrual cycle. In the absence of fertilization and implantation, the corpus luteum involutes, resulting in a fall in progesterone levels and the triggering of menstruation.

Abnormalities of LH secretion or action can disrupt ovulation and luteal function, leading to menstrual cycle disorders and infertility. An insufficient LH secretion, for example in the context of hypothalamic or pituitary failure, can prevent the triggering of ovulation and induce chronic anovulation. Conversely, an oversecretion of LH, observed in some cases of polycystic ovary syndrome, can cause premature luteinization of the follicle and luteal insufficiency.

LH dosing in mid-cycle (around the 14th day for a 28-day cycle) is used to detect the ovulatory peak and predict the timing of ovulation. Urinary ovulation tests detect the occurrence of the LH peak, allowing the fertile period to be targeted in order to optimize the chances of conception. In case of ovarian stimulation for IVF, the administration of hCG (human chorionic gonadotropin), mimicking the action of LH, is used to trigger final oocyte maturation and schedule oocyte retrieval 36 hours later.

Understanding the role of LH in regulating the menstrual cycle is essential to grasp the mechanisms of ovulation and luteal function, as well as to manage ovulation disorders and infertility. The dosage of LH and the interpretation of the ovulatory peak are valuable tools for assessing gonadotropic function and optimizing the chances of conception, whether it be spontaneous or in the context of assisted reproductive techniques.

Key points to remember:

1. Luteinizing hormone (LH) is secreted by the adenohypophysis and works in synergy with FSH to regulate the menstrual cycle.
2. LH plays a key role in the final maturation of the dominant follicle, triggering ovulation, and the formation of the corpus luteum.
3. The dominant follicle acquires more LH receptors on the granulosa cells, making it more sensitive to this hormone.
4. An increase in estrogen levels secreted by the dominant follicle leads to a massive release of LH, known as the "ovulatory peak", which is essential for inducing oocyte maturation and

follicular rupture.

5. After ovulation, LH stimulates the formation of the corpus luteum and the synthesis of progesterone, preparing the endometrium for possible embryonic implantation.

6. Abnormalities in LH secretion or action can disrupt ovulation and luteal function, leading to menstrual cycle disorders and infertility.

7. The dosage of LH in mid-cycle is used to detect the ovulatory peak and predict the timing of ovulation, while administration of hCG is used to trigger final oocyte maturation in case of IVF.