HORMONAL IMBALANCE OF GONADOTROPINS (LH AND FSH)

Gonadotropin Imbalance

Abnormal levels of one of the gonadotropin hormones, LH and FSH.

♀ Symptom ♂ Female

About Hormonal imbalance of gonadotropins (LH and FSH)

Hormonal imbalance of gonadotropins is the condition of significant alteration of the levels of gonadotropin hormones, LH (luteinising hormone) and FSH (follicle-stimulating hormone). Luteinizing hormone and follicle-stimulating hormone are the two principal gonadotropins in humans, although during pregnancy, a third gonadotropin, called human chorionic gonadotropin (hCG), is produced. Gonadotropins are produced by the pituitary gland, and stimulate sex hormones production in the gonads (testes and ovaries). The manner of gonadotropin secretion is significantly different in men and in women. During a woman’s menstrual cycle, the levels of FSH and LH rise and fall in a specific manner to ensure production of mainly two other hormones, estrogen and progesterone (Pic. 1).

The first half of the ovarian cycle is the follicular phase. Slowly rising levels of FSH and LH cause the growth of follicles (small pouches containing eggs) on the surface of the ovary. This process prepares the egg for ovulation. As the follicles grow, they begin releasing estrogens and a low level of progesterone. Just prior to the middle of the cycle (approximately day 14), the high level of estrogen causes FSH and especially LH to rise rapidly, then fall. The spike in LH causes ovulation: the most mature follicle ruptures and releases its egg. The follicles that did not rupture degenerate and their eggs are lost. The level of estrogen decreases when the extra follicles degenerate. Following ovulation, the ovarian cycle enters its luteal phase which runs from about day 15 to 28. The cells in the follicle undergo physical changes and produce a structure called a corpus luteum. The corpus luteum produces estrogen and progesterone. The progesterone facilitates the regrowth of the uterine lining and inhibits the release of further FSH and LH. The uterus is being prepared to accept a fertilized egg, should it occur during this cycle. The inhibition of FSH and LH prevents any further eggs and follicles from developing, while the progesterone is elevated. If no fertilized egg is implanted into the uterus, the corpus luteum degenerates and the levels of estrogen and progesterone decrease. The endometrium (the innermost lining of the uterine cavity) begins to degenerate as the progesterone levels drop, initiating the next menstrual cycle. The decrease in progesterone also allows the pituitary to release FSH and LH and starts the cycles again.

Imbalance of gonadotropins, strictly speaking, refers only to the condition when the LH/FSH ratio, the ratio of levels of both gonadotropins, is altered compared to normal physiologic state. Normally premenopausal LH:FSH ratio is 1:1. Many conditions cause either abnormally high or low levels of both gonadotropin hormones, but these should be referred to as too low or too high levels of gonadotropins. Conditions causing hormonal imbalance of gonadotropins have different underlying causes than conditions of low or high levels of both gonadotropins.

Hormonal imbalance of gonadotropins may be associated with several conditions, including:

Luteinized unruptured follicle syndrome

Luteinized unruptured follicle syndrome, or LUFS, stands for the luteinisation of ovulatory follicle without releasing an oocyte (Pic. 2). As it is a disorder united with the start of so called luteal phase, it may be also characterized as luteal phase defect (LPD). It seems that LUFS is related to hormonal imbalance causing the detention of oocyte within the follicle even though the follicle itself transforms under LH (luteinizing hormone) influence into corpus luteum. The oocyte detention prohibits the conception, yet menstrual cycle is in any other
aspect undergoing normally without any side effects. LUFS is observed in 10% of natural menstrual cycles in fertile women, but in stimulated cycles it is higher. The incidence of LUFS has been reported to be 25–43% in infertile women. Hormonal imbalance of gonadotropins is regarded as a possible risk factor for LUFS.

**Polycystic ovary syndrome**

Polycystic ovaries develop when the ovaries are stimulated to produce excessive amounts of male hormones (androgens), in particular testosterone. The syndrome acquired its most widely used name due to the common sign on ultrasound examination of multiple (poly) ovarian cysts. These “cysts” are actually immature follicles not cysts. The follicles have developed from primordial follicles, but the development has stopped (“arrested”) at an early stage due to the disturbed ovarian function. Women with PCOS experience an increased frequency of hypothalamic GnRH pulses, which in turn results in an increase in the LH/FSH ratio. Luteinizing hormone levels are usually elevated, whereas follicle-stimulating hormone levels remain normal or can be decreased. In healthy premenopausal women, the LH:FSH ratio should be 1:1. In patients with polycystic ovary syndrome, it can be >2:1 or 3:1.

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#### Diagnoses

**Luteinised unruptured follicle syndrome**
The luteinisation of ovulatory follicle without a release of an oocyte.
Learn more at: www.fertilitypedia.org/therapy/diag/luteinised-unruptured-follicle-syndrome

### Gallery

**Pic**
A diagram of pituitary and ovarian hormone levels during the menstrual cycle.

**Pic**
Diagram showing FSH (1), oestrogen (2), LH (3) and progesterone (4) levels in relation to ovulation and creation of corpus luteum. Follicle changes (A) and hormone levels (B) in 1 show normal menstrual cycle, in 2 they represent anovulation.