TEST ID: LHPED
LUTEINIZING HORMONE (LH), PEDIATRICS, SERUM

USEFUL FOR
Diagnosis of precocious puberty and delayed puberty in children

CLINICAL INFORMATION
Luteinizing hormone (LH) is a glycoprotein hormone consisting of 2 noncovalently bound subunits (alpha and beta). LH is produced by the anterior pituitary gland under regulation of the hypothalamic gonadotropin releasing hormone (GnRH) and feedback from gonadal steroid hormones. In children, LH, along with follicle-stimulating hormone (FSH), is used to diagnose precocious (early) and delayed puberty.

Precocious puberty refers to the appearance of physical and hormonal signs of pubertal development at an earlier age than is considered normal (before 8 years in girls and 9 years in boys). Evaluation of precocious puberty includes measurement of LH and FSH to determine whether gonadotropins are increased in relation to chronologic age (gonadotropin-dependent) or whether sex steroid secretion is occurring independent of LH and FSH (gonadotropin-independent). In gonadotropin-dependent precocious puberty, basal LH levels are often elevated into the pubertal range and show a pubertal (heightened) response to GnRH stimulation. In gonadotropin-independent precocious puberty, the LH level is low at baseline and fails to respond to GnRH stimulation.

Delayed puberty is defined clinically by the absence or incomplete development of secondary sexual characteristics by 14 years in boys and by 12 years in girls. Delayed puberty usually results from inadequate gonadal steroid secretion that, in turn, is most often caused by a defective gonadotropin secretion from the anterior pituitary, due to defective production of GnRH from the hypothalamus. Random measurements of LH and FSH, together with estradiol (females) or testosterone (males), are useful to distinguish between primary and secondary causes of delayed puberty.

INTERPRETATION
In young children, high levels of luteinizing hormone (LH) and follicle-stimulating hormone (FSH), along with the development of secondary sexual characteristics at an unusually young age, are an indication of gonadotropin-dependent precocious puberty (also called central precocious puberty). Prepubertal levels of LH and FSH in children exhibiting some signs of pubertal changes may be an indication of gonadotropin-independent precocious puberty (also refer as precocious pseudopuberty). In precocious pseudopuberty the signs and symptoms are the result of elevated levels of estrogen in girls or testosterone in boys.

In delayed puberty, LH and FSH levels can be normal or below what is expected for a youth within this age range. The test for LH response to gonadotropin releasing hormone in addition to other testing may help to diagnose the reason for the delayed puberty.
REFERENCE VALUES

FEMALES

<1 year: <0.02–18.3 IU/L
1–8 years: <0.02–0.3 IU/L
9–10 years: <0.02–4.8 IU/L
11–13 years: <0.02–11.7 IU/L
14–17 years: <0.02–16.7 IU/L

Tanner Stages*

Stage I (1–8 years): <0.02–0.3 IU/L
Stage II: <0.02–4.1 IU/L
Stage III: 0.6–7.2 IU/L
Stage IV-V: 0.9–13.3 IU/L

*Puberty onset (transition from Tanner stage I to Tanner stage II) occurs for girls at a median age of 10.5 (+/- 2) years. There is evidence that it may occur up to 1 year earlier in obese girls and in African-American girls. Progression through Tanner stages is variable. Tanner stage V (adult) should be reached by age 18.

MALES

<1 year: <0.02–5.0 IU/L
1–8 years: <0.02–0.5 IU/L
9–10 years: <0.02–3.6 IU/L
11–13 years: 0.1–5.7 IU/L
14–17 years: 0.8–8.7 IU/L

Tanner Stages*

Stage I (1–8 years): <0.02–0.5 IU/L
Stage II: 0.03–3.7 IU/L
Stage III: 0.09–4.2 IU/L
Stage IV-V: 1.3–9.8 IU/L

*Puberty onset (transition from Tanner stage I to Tanner stage II) occurs for boys at a median age of 11.5 (+/- 2) years. For boys there is no proven relationship between puberty onset and body weight or ethnic origin. Progression through Tanner stages is variable. Tanner stage V (adult) should be reached by age 18.