Overview

Useful For
Diagnosis of precocious puberty and delayed puberty in children

Highlights
This assay is sensitive to 0.02 IU/L and is more appropriate for use in children.

This method offers a 10-fold increase in analytical sensitivity over existing automated immunoassays.

In children, luteinizing hormone, along with follicle-stimulating hormone, is used to diagnose delayed and precocious (early) puberty.

Method Name
Electrochemiluminescent Immunoassay

NY State Available
Yes

Specimen

Specimen Type
Serum

Specimen Required
Container/Tube:
Preferred: Red top
Acceptable: Serum gel

Specimen Volume: 0.25 mL

Collection Instructions:
1. Red-top tubes should be centrifuged and aliquoted within 2 hours of collection
2. Serum gel tubes should be centrifuged within 2 hours of collection.

Specimen Minimum Volume
0.13 mL

Reject Due To

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<tr>
<th>Condition</th>
<th>Acceptance</th>
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<tbody>
<tr>
<td>Hemolysis</td>
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</tr>
<tr>
<td>Lipemia</td>
<td>Mild OK; Gross reject</td>
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<tr>
<td>Icterus</td>
<td>Mild OK; Gross reject</td>
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<td>Other</td>
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Specimen Stability Information

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<tr>
<th>Specimen Type</th>
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<tr>
<td>Serum</td>
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Clinical and Interpretive

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.

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
**Test Definition: LHPED**

**LH, Pediatrics, S**

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.

**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.

**Cautions**

No clinically significant cross-reactivity has been demonstrated with follicle-stimulating hormone, human chorionic gonadotropin, free alpha subunit of pituitary glycoprotein hormones, or free beta subunit of luteinizing hormone. Cross-reactivity with thyroid-stimulating hormone (TSH) (<5%) might be observed at TSH concentrations of 500 mlU/L.
Some patients who have been exposed to animal antigens, either in the environment or as part of treatment or imaging procedures, may have circulating antianimal antibodies present. These antibodies may interfere with the assay reagents to produce unreliable results.

In rare cases, interference due to extremely high titers of antibodies to ruthenium or streptavidin can occur.

Clinical Reference


Performance

Method Description
Sequential 2-site electrochemiluminescent immunoassay. The assay uses a monoclonal biotinylated luteinizing hormone (LH) capture antibody and a SULFO-TAG labeled detection antibody. A Meso Scale Discovery instrument is used to quantitate the concentration of LH in the sample. Assay calibration is traceable to WHO 2nd International Standard, Human Pituitary LH 80/552. (Vidal-Folch N, Grebe SK, Singh RJ, Algeciras-Schimnich A: Ultrasensitive Luteinizing Hormone Assay on the MesoScale Discovery Platform. Clin Chem 2014;60[10S]:S63)

PDF Report
No

Day(s) and Time(s) Test Performed
Tuesday and Friday; 1 p.m.

Analytic Time
2 days

Maximum Laboratory Time
9 days

Specimen Retention Time
14 days

Performing Laboratory Location
Rochester

Fees and Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact Customer Service.

Test Classification
This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.
Test Definition: LHPED
LH, Pediatrics, S

CPT Code Information
83002

LOINC® Information

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