MAYO CLINIC LABORATORIES

Test Definition: PLPMA

Prolactin, Pituitary Macroadenoma

Overview

Useful For

Quantifying prolactin in serum specimens where the high-dose hook effect is suspected (eg, presence of pituitary tumor with symptoms of prolactinoma, and lower than expected serum prolactin concentration)

Testing Algorithm

A pituitary adenoma should be identified by imaging studies prior to ordering this test.

Method Name

Electrochemiluminescent Immunoassay

NY State Available

Yes

Specimen

Specimen Type

Serum

Ordering Guidance

For initial patient assessment; order PRL / Prolactin, Serum as the screening test.

Necessary Information

Patient's age and sex are required.

Specimen Required

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

Specimen Volume: 2 mL

Forms

If not ordering electronically, complete, print, and send an Oncology Test Request (T729) with the specimen.

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	OK

Specimen Minimum Volume

1.75 mL

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	7 days	
	Frozen	90 days	
	Ambient		

Clinical & Interpretive

Clinical Information

Prolactin-secreting macroadenomas (>10 mm in diameter) can sometimes produce exceedingly high serum prolactin concentrations that may paradoxically result in falsely low prolactin concentrations when measured by immunometric assays. In such situations, very high concentrations of prolactin saturate both the capture and signal antibodies in the assay, block formation of the capture antibody-prolactin-signal antibody "sandwich," and result in falsely decreased prolactin results (referred to as the high-dose hook effect). With such tumors, serum prolactin levels may be falsely decreased into the normal reference interval, potentially resulting in inappropriate patient management. Dilution of the specimen eliminates the analytic artifact in these cases.

Prolactin is secreted by the anterior pituitary gland and controlled by the hypothalamus. The major chemical controlling prolactin secretion is dopamine, which inhibits prolactin secretion from the pituitary. Prolactin is released from the pituitary in response to thyrotropin-releasing hormone and other factors.

Prolactin is the principal hormone that controls the initiation and maintenance of lactation. In normal individuals, prolactin concentrations increase in response to physiologic stimuli such as sleep, stress, exercise, sexual intercourse, and hypoglycemia, and are also elevated during pregnancy, lactation, postpartum, and in the newborn infant.

Hyperprolactinemia is the most common hypothalamic-pituitary disorder encountered in clinical endocrinology. Pathologic causes of hyperprolactinemia include prolactin-secreting pituitary adenoma (prolactinoma, which is more frequent in females than males, and accounts for approximately 40% of all pituitary tumors), functional and organic disease of the hypothalamus, primary hypothyroidism, compression of the pituitary stalk, chest wall lesions, renal insufficiency, polycystic ovarian disease, and ectopic tumors.

In general, serum prolactin concentrations parallel tumor size in patients with prolactinomas. Macroadenomas (>10 mm in diameter) are typically associated with serum prolactin concentrations >250 ng/mL and a concentration >500 ng/mL is diagnostic of a macroprolactinoma. Moderately increased concentrations of serum prolactin are not a reliable guide for determining whether a prolactin-producing pituitary adenoma is present.

Multiple medications can cause increased prolactin concentration including estrogens, dopamine receptor blockers (eg, phenothiazines), dopamine antagonists (eg, metoclopramide, domperidone), alpha-methyldopa, cimetidine, opiates, antihypertensive medications, and other antidepressants and antipsychotics.

Hyperprolactinemia often results in loss of libido, galactorrhea, oligomenorrhea or amenorrhea, and infertility in premenopausal females; and loss of libido, impotence, infertility, and hypogonadism in males. Postmenopausal and premenopausal women, as well as men, can also suffer from decreased muscle mass and osteoporosis.

Prolactinomas may rarely present in childhood or adolescence. In girls, disturbances in menstrual function and galactorrhea may be seen, whereas in boys, delayed pubertal development and hypogonadism are often present. The treatment options are the same as in adult patients.

Reference Values

Males

<18 years: not established

> or =18 years: 4.0-15.2 ng/mL
Females:
<18 years: not established
> or =18 years: 4.8-23.3 ng/mL

Interpretation

If no high-dose hook effect is observed, the following report comment will be included with the prolactin result: 10-, 100-, and 400-fold dilutions produced results consistent with the absence of high-dose hook effect. Total prolactin was measured using the Roche Cobas e immunoassay analyzer.
If a high-dose hook effect is observed, which is demonstrated by significantly increasing concentrations of prolactin obtained after dilution of the serum, an interpretive comment will be included with the prolactin result.
The Roche Cobas Prolactin II assay should demonstrate no high-dose hook effect at prolactin concentrations up to approximately 12,500 ng/mL).

Cautions

A macroadenoma may be nonfunctional and not secrete prolactin.
Infrequently, a patient may have a nonfunctional macroadenoma but apparent hyperprolactinemia caused by the presence of macroprolactin (prolactin bound to immunoglobulin). To determine this, order MCRPL / Macroprolactin, Serum.
For assays employing antibodies, the possibility exists for interference by human antianimal antibodies (ie, heterophile antibodies) in the patient sample. Patients who have been regularly exposed to animals or have received immunotherapy or diagnostic procedures utilizing immunoglobulins or immunoglobulin fragments may produce antibodies, eg, HAMA, that interfere with immunoassays. This may falsely elevate or falsely decrease the results. Interference due to extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium can occur.

Clinical Reference

1. Winter WE, McCormack A, Bertholf RL: Chapter 65: Pituitary function and pathophysiology. In Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. Sixth edition. Edited by N Rafai, AR Horvath, CT Wittwer. Elsevier, 2018, pp 1492-1529
2. Schoft C, Schofl-Siegert B, Hinrich Karstens J, et al: Falsely low serum prolactin in two cases of invasive macroprolactinoma. Pituitary 2002;5:261-265
3. Casaneuva FF, Molitch ME, Schlecte JA, et al: Guidelines of the Pituitary Society for the diagnosis and management of prolactinomas. Clin Endocrinol 2006;65:265-273
4. Melmed S, Casanueva FF, Hoffman AR, et al: Diagnosis and treatment of hyperprolactinemia: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab 2011 Feb;96(2):273-288

Performance

Method Description

The Roche Cobas e immunoassay Prolactin II method employs 2 monoclonal antibodies specifically directed against prolactin. A biotinylated monoclonal antibody and a second monoclonal antibody labeled with a ruthenium complex react with prolactin in the sample to form a sandwich complex. After the addition of streptavidin-coated microparticles, the complex becomes bound to the solid phase via interaction of biotin and streptavidin. Application of a voltage to the

electrode then induces chemiluminescent emission, which is measured.(Package insert: Roche E170/Cobas e601/e602 Prolactin II)
Dilution of serum sample is performed (10-, 100-, and 400-fold dilution) using manufacturer-recommended diluent and recovery of prolactin is compared to the prolactin concentration in neat sample. Acceptable recovery is defined as 100 + or - 20% recovery after dilution of serum.

PDF Report
No

Specimen Retention Time
6 days

Performing Laboratory Location
Rochester

Fees & Codes

Test Classification
This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
84146