MAYO CLINIC LABORATORIES

Test Definition: INS

Insulin, Serum

Overview

Useful For

Diagnosing insulinoma, when used in conjunction with proinsulin and C-peptide measurements

Management of diabetes mellitus

Method Name

Electrochemiluminescence Immunoassay (ECLIA)

NY State Available

No

Specimen

Specimen Type

Serum

Ordering Guidance

Patients on insulin therapy may develop anti-insulin antibodies. These antibodies may interfere in the assay system, causing inaccurate results. In such individuals, measurement of free insulin INSFT / Insulin, Free and Total, Serum should be performed.

Specimen Required

Patient Preparation:

1. Fasting: 8 hours, required

2. **For 12 hours before specimen collection do not** take multivitamins or dietary supplements containing biotin (vitamin B7), which is commonly found in hair, skin, and nail supplements and multivitamins.

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

Specimen Volume: 1 mL

Collection Instructions:

1. Avoid hemolysis
2. Label specimens with corresponding collection times.
3. Within 2 hours of collection centrifuge and aliquot serum into a plastic vial.

Additional Information: If multiple specimens are drawn, send separate order for each specimen.

Specimen Minimum Volume

0.75 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Autopsy specimen	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Frozen (preferred)	180 days	
	Refrigerated	7 days	

Clinical & Interpretive

Clinical Information

Insulin is a hormone produced by the beta cells of the pancreas. It regulates the uptake and utilization of glucose and is also involved in protein synthesis and triglyceride storage.

Type 1 diabetes (insulin-dependent diabetes) is caused by insulin deficiency due to destruction of insulin-producing pancreatic islet (beta) cells. Type 2 diabetes (noninsulin-dependent diabetes) is characterized by resistance to the action of insulin (insulin resistance).

Insulin levels may be increased in patients with pancreatic beta cell tumors (insulinoma).

Reference Values

2.6-24.9 mcIU/mL

For International System of Units (SI) conversion for Reference Values, see www.mayocliniclabs.com/order-tests/si-unit-conversion.html.

Interpretation

During prolonged fasting, when the patient's glucose level is reduced to less than 40 mg/dL, an elevated insulin level plus elevated levels of proinsulin and C-peptide suggest insulinoma.

Insulin levels generally decline in patients with type 1 diabetes mellitus.

In the early stage of type 2 diabetes, insulin levels are either normal or elevated. In the late stage of type 2 diabetes, insulin levels decline.

In normal individuals, insulin levels parallel blood glucose levels.

To compare insulin and C-peptide concentrations (ie, insulin to C-peptide ratio):
-Convert insulin to pmol/L: insulin concentration in mcIU/mL x 6.945 = insulin concentration in pmol/L.
-Convert C-peptide to pmol/L: C-peptide concentration in ng/mL x 331 = C-peptide concentration in pmol/L.

Cautions

In rare cases, some individuals can develop antibodies to mouse or other animal antibodies (often referred to as human anti-mouse antibodies [HAMA] or heterophile antibodies), which may cause interference in some immunoassays. The presence of antibodies to streptavidin or ruthenium can also rarely occur and may also interfere in this assay. Caution should be used in interpretation of results, and the laboratory should be alerted if the result does not correlate with the clinical presentation.

Hemolysis interferes with this assay, as insulin-degrading peptidases are released from erythrocytes.

This assay has 100% cross-reactivity with recombinant human insulin (Novolin R and Novolin N). It does not recognize other commonly used analogues of injectable insulin (ie, insulin lispro, insulin aspart, and insulin glargine).

Clinical Reference

1. Threatte GA, Henry JB. Carbohydrates. In: Henry JB, ed. Clinical Diagnosis and Management by Laboratory Methods. 19th ed. WB Saunders Company; 1996:194-207
2. Sacks DB. Diabetes mellitus. In: Rifai N, Horvath AR, Wittwer CT, eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018:1160-1200

Performance

Method Description

Insulin from the sample, a biotinylated monoclonal insulin-specific antibody, and a monoclonal insulin-specific antibody labeled with a ruthenium complex form a sandwich complex. After addition of streptavidin-coated microparticles, the complex becomes bound to the solid phase via interaction of biotin and streptavidin. The reaction mixture is aspirated into the measuring cell where the microparticles are magnetically captured onto the surface of the electrode. Unbound substances are then removed with ProCell. Application of a voltage to the electrode then induces chemiluminescent emission, which is measured by a photomultiplier. Results are determined via a calibration curve that is instrument specifically generated by 2-point calibration and a master curve provided via the cobas link.(Package insert: Elecsys Insulin. Roche Diagnostics; V 2.0, 10/2022)

PDF Report

No

Day(s) Performed

Monday through Saturday

Report Available

1 to 3 days

Specimen Retention Time

7 days

Performing Laboratory Location

Mayo Clinic Jacksonville Clinical Lab

Fees & 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 account representative. For assistance, contact Customer Service.

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

83525

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
INS	Insulin, S	27873-9

Result ID	Test Result Name	Result LOINC® Value
INS	Insulin, S	27873-9