MAYO CLINIC LABORATORIES

Test Definition: INHB

Inhibin B, Serum

Overview

Useful For

Aiding in the diagnosis of granulosa cell tumors and mucinous epithelial ovarian tumors

Monitoring of patients with granulosa cell tumors and epithelial mucinous-type tumors of the ovary known to overexpress inhibin B

As an adjunct to follicle-stimulating hormone testing during infertility evaluation

Method Name

Enzyme-Linked Immunosorbent Assay (ELISA)

NY State Available

Yes

Specimen

Specimen Type

Serum

Ordering Guidance

For the initial evaluation of patients suspected of having a granulosa cell tumor of the ovary, order INHAB / Inhibin A and B, Tumor Marker, Serum. If the results of the profile show that either inhibin A or B are elevated, consider monitoring the patient with the individual tests, INHA / Inhibin A, Tumor Marker, Serum or INHB / Inhibin B, Serum.

Specimen Required

Supplies: Sarstedt Aliquot Tube 5 mL (T914)
Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 0.5 mL Serum
Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Forms

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

Specimen Minimum Volume

Serum: 0.4 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	14 days	
	Ambient	7 days	
	Frozen	90 days	

Clinical & Interpretive

Clinical Information

Inhibins are heterodimeric protein hormones secreted by granulosa cells of the ovary and Sertoli cells of the testis. Inhibins selectively suppress secretion of pituitary follicle-stimulating hormone (FSH) and have local paracrine actions in the gonads. The inhibins consist of a dimer of 2 homologous subunits, an alpha subunit and either a beta A or beta B subunit, to form inhibin A and inhibin B, respectively.

In female individuals, inhibin A is primarily produced by the dominant follicle and corpus luteum, whereas inhibin B is primarily produced by small developing follicles. Serum inhibin A and B levels fluctuate during the menstrual cycle. Inhibin A is low in the early follicular phase and rises at ovulation to maximum levels in the mid-luteal phase. In contrast, inhibin B levels increase early in the follicular phase to reach a peak coincident with the onset of the mid-follicular phase decline in FSH levels. Inhibin B levels decrease in the late follicular phase. There is a short-lived peak of the hormone 2 days after the midcycle luteinizing hormone (LH) peak. Inhibin B levels remain low during the luteal phase of the cycle. The timing of the inhibin B rise suggests that it plays a role in regulation of folliculogenesis via negative feedback on the production of FSH. At menopause, with the depletion of ovarian follicles, serum inhibin A and B decrease to very low or undetectable levels.

Ovarian cancer is classified into 3 types: epithelial (80%), germ cell tumors (10%-15%), and stromal sex-cord tumors (5%-10%). Epithelial ovarian tumors are further subdivided into serous (70%), mucinous (10%-15%), and endometrioid (10%-15%) types. Granulosa cell tumors represent the majority of stromal sex-cord tumors.

Elevations of serum inhibin A and B are detected in some patients with granulosa cell tumors. Inhibin B elevations have been reported in 89% to 100% of patients with granulosa cell tumors. In these patients, inhibin B levels tend to be elevated about 60-fold over the reference range value. The frequency of elevated levels varies amongst studies, likely due to the different specificities of the antibodies used in the immunoassays. Inhibin B also appears to be a suitable serum marker for epithelial tumors of the mucinous type with about 55% to 60% having elevated inhibin B levels. In contrast, inhibin is not a very good marker in non-mucinous epithelial tumors. At best, total inhibin is elevated in 15% to 35% of non-mucinous epithelial ovarian cancer cases.

Inhibin seems to be complementary to cancer antigen 125 (CA 125) as an ovarian cancer marker. CA 125 is not as good

of a tumor marker for mucinous and granulosa ovarian cell tumors. Inhibin shows a better performance in those 2 types of ovarian cancer.

The majority of studies for inhibin A and B as ovarian cancer markers have been limited to postmenopausal women where the levels of inhibin are normally very low. Inhibin levels vary in relation to the menstrual cycle and, therefore, are difficult to interpret in premenopausal women.

Inhibin B has also been used as a marker of ovarian reserve. Every female is born with a specific number of follicles containing oocytes, a number that steadily and naturally declines with age. The number of follicles remaining in the ovary at any time is called the ovarian reserve. As ovarian reserve diminishes, it is increasingly more difficult for the hormones used for in vitro fertilization (IVF) to stimulate follicle development and, thus, the likelihood of successful oocyte retrieval, fertilization, and embryo transfer decreases, all leading to a lower chance of conceiving. As part of an infertility evaluation, attempts are made to estimate a woman's ovarian reserve. Tests to assess ovarian reserve include the following: day 3 FSH, day 3 inhibin B, and anti-mullerian hormone levels. The amount of inhibin B measured in serum during the early follicular phase of the menstrual cycle (day 3) directly reflects the number of follicles in the ovary. Therefore, the higher the inhibin B, the more ovarian follicles present. The level of inhibin B that predicts a poor response to IVF treatment has not been established with this assay.

In male patients, inhibin B levels are higher in those with apparently normal fertility than in those with infertility and abnormal spermatogenesis. Serum inhibin B, when used in combination with FSH, is a more sensitive marker of spermatogenesis than FSH alone. However, the optimal level of inhibin B to assess male infertility has not been established.

Reference Values

Males
<15 days: 68-373 pg/mL
15-180 days: 42-516 pg/mL
6 months-7 years: 24-300 pg/mL
8-30 years: 47-383 pg/mL
31-72 years: <358 pg/mL
>72 years: Not established

Females
< or =12 years: <183 pg/mL
13-41 years Regular Cycle (Follicular Phase): <224 pg/mL
42-51 years Regular Cycle (Follicular Phase): <108 pg/mL
13-51 years Regular Cycle (Luteal Phase): <80 pg/mL
>51 years (Postmenopausal): <12 pg/mL

Interpretation

Inhibin B levels are elevated in approximately 89% to 100% of patients with granulosa cell tumors and in approximately 55% to 60% of patients with epithelial ovarian tumors. A normal inhibin B level does not rule out a mucinous or granulosa ovarian cell tumor. Testing for inhibin A in these cases might be informative. Consider ordering INHAB / Inhibin A and B, Tumor Marker, Serum.

For monitoring of patients with known ovarian cancer, inhibin B levels decrease to very low or undetectable levels

shortly after surgery. Elevations of inhibin B after treatment are suggestive of residual, recurrent, or progressive disease. In patients with recurrent disease, inhibin B elevation seems to be present earlier than clinical symptoms. Patients in remission show normal levels of inhibin B.

For infertility evaluation, an inhibin B level in the postmenopausal range is suggestive of a diminished or depleted ovarian reserve.

Cautions

Inhibin values fluctuate during the menstrual cycle. Inhibin levels in premenopausal women should be interpreted with caution.

Do not interpret serum inhibin levels as absolute evidence of the presence or the absence of malignant disease. Use results in conjunction with information from the clinical evaluation of the patient and other diagnostic procedures.

Tumor markers are not specific for malignancy and values may vary by testing methodology. The same method should be used to serially monitor patients.

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. Caution should be used in interpretation of results and the laboratory should be alerted if the result does not correlate with the clinical presentation.

Clinical Reference

1. Mom CH, Engelen MJA, Willemse PHB, et al. Granulosa cell tumors of the ovary: the clinical value of serum inhibin A and B levels in a large single center cohort. Gynecol Oncol. 2007;105(2):365-372
2. Robertson DM, Pruysers E, Jobling T. Inhibin as a diagnostic marker for ovarian cancer. Cancer Lett. 2007;249(1):14-17
3. Jamieson S, Fuller PJ. Management of granulosa cell tumour of the ovary. Curr Opin Oncol. 2008;20(5):560-564
4. Sturgeon C. Tumor markers. In: Rifai N, Horvath AR, Wittwer CT, eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018:436-478
5. Yarbrough ML, Stout M, Gronowski AM. Pregnancy and its disorders. In: Rifai N, Horvath AR, Wittwer CT, eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018:1655-1696
6. Makanji Y, Zhu J, Mishra R, et al. Inhibin at 90: from discovery to clinical application, a historical review. Endocr Rev. 2014;35(5):747-794. doi:10.1210/er.2014-1003
7. Walentowicz P, Krintus M, Sadlecki P, et al. Serum inhibin A and inhibin B levels in epithelial ovarian cancer patients. PLoS One. 2014;9(3):e90575. doi:10.1371/journal.pone.0090575

Performance

Method Description

The ultra-sensitive inhibin B enzyme-linked immunosorbent assay is a quantitative three-step sandwich type immunoassay. Sample is incubated in wells that have been coated with inhibin B antibody. After incubation and washing, the wells are incubated with biotinylated inhibin B antibody. After a second incubation and washing step, the wells are incubated with streptavidin horseradish peroxidase conjugate. After the third incubation and washing step, the wells are incubated with substrate solution. After incubation, an acidic stopping solution is added. Antibody-analyte complex is detected by dual wavelength absorbance measurement at 450 nm

as the primary test filter and 620 nm as the reference filter. The absorbance measured is directly proportional to the concentration of inhibin B in the samples and calibrators.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday, Wednesday, Friday

Report Available
2 to 4 days

Specimen Retention Time
3 months

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Superior Drive

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 was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information
83520

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
INHB	Inhibin B, S	56940-0

Result ID	Test Result Name	Result LOINC® Value
88722	Inhibin B, S	56940-0