



Laboratory Catalogue

L-Asparaginase

Client Services

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Monday-Friday 8am-5pm EST



What is Asparaginase?

Asparaginase is an enzyme produced by some plants, animals, and bacteria that hydrolyzes the amino acid asparagine to aspartic acid. It is commonly produced in native forms from *Escherichia coli* or *Erwinia chrysanthemi* and has a molecular weight of 138-141 kDa. PEG-modified *E. coli* has a MW of 145 kDa.

Asparagine Depletion Treatment in Patients with ALL

Asparaginase was revealed to effectively treat lymphomas since the 1950's¹. It has since been utilized in the treatment of Acute Lymphoblastic Lymphomas (ALL). The primary mechanism of action is asparagine depletion in patient plasma. Lymphoblastic leukemia cells lack the enzyme asparagine synthetase; therefore, they are unable to produce asparagine on their own². At sufficient activity levels, the asparaginase enzyme depletes plasma asparagine and eventually leads to leukemic cell death. Some patients develop hypersensitivity to native asparaginase forms; PEG-conjugated *E. coli* derived asparaginase (Oncaspar®) has been widely used as a result of its apparent decreased immunogenicity and increased half-life³. In some cases, the asparaginase is rapidly inactivated in patients without clinical signs of hypersensitivity which is termed "silent inactivation"⁴. IM administration is most commonly utilized within the U.S., having been associated with a lower incidence of immune reaction vs IV⁵.

Granger Genetics offers two assays for monitoring Asparaginase. One assay is the activity assay which reports the drug level of asparaginase based on which drug is given to the patient (Asparlas, Erwinaze, Oncaspar, or Rylaze). The second is the antibody assay which reports if a sample is positive or negative for antibodies against asparaginase.

Specimen Collection & Transport

Supplies

Standard phlebotomy materials and centrifugation is required at the collection site and is not provided by Granger Genetics. Upon request, we can provide the necessary collection kits to submit specimens for analysis to the laboratory. To order supplies, please contact Client Services at **844-347-2643** or <https://www.grangergenetics.com/asparaginase/supply-order-form/>

Specimen Identification

All specimens and requisitions must be labeled at the time of collection with at least two patient identifiers, which must also be indicated on the requisition.

1. The patient's First & Last name or a unique ID code is required
2. The second patient identifier may be one of the following:
 - Date of birth
 - Other unique patient identifier, e.g. medical record number, social security number
 - Barcode labels can be used if barcode matches the unique identifiers on the printed requisition.
3. Time & date of collection

Test Requisition

Minimum requisition requirements:

All specimen tubes must be labeled with at least a minimum of 2 patient identifiers. A single tube of serum (containing a minimum of 0.5 mL of sample volume) may be submitted for use for both assays.

Specimens must be labeled at the time of collection with at least 2 patient identifiers, which must also be indicated on the requisition.

The following items must be on the submitted requisition:

- Two patient identifiers (e.g., full name and DOB)
- Patient gender
- Patient date of birth
- Sample ID and/or MRN (for billing purposes)
- Institutional Billing Only, provide complete information for billing purposes to including address and contact information
- Ordering Physician name
- Date/Time of specimen collection
- Test(s) requested (Asparaginase Activity, or Asparaginase Panel)
- Type of L-asparaginase drug administered, if known
- Fax number in which to send the results or sign up for the web portal for e-delivery.

Shipping

The specimen transport bags have two pouches: place the specimen in the larger sealable pouch with absorbent material. Insert the requisition into the rear pocket.

- Specimens should be frozen for transport and shipped in an insulated container surrounded by an ample amount of dry ice or frozen cold packs to keep the specimen at proper storage condition until arrival to the laboratory.
- Specimens received internationally must be shipped using dry ice.
- It is also recommended that samples shipped during the summer months be shipped frozen on dry ice due to the potential exposure to high temperatures during shipment.

Specimens that arrive outside of indicated storage conditions are unsuitable for analysis; sample will be reported as not performed and a resubmission will be requested.

Note: We do not accept shipments during the weekend. Maintain appropriate specimen temperature as indicated in the sample storage chart below. Samples should be sent via Priority Overnight Express; First AM shipping is NOT necessary.

**ATTN: Clinical Accessioning
Granger Genetics
601 Biotech Dr. Suite 301
North Chesterfield, VA 23235
(844) 347-2643**

Test Information for L-Asparaginase

Purpose:

Used to monitor Asparaginase therapy for sufficient enzyme activity, to assess silent inactivation by patient sensitization (activity assay). To assess if a patient is producing antibodies against asparaginase (antibody assay).

Methodology:

Spectrophotometry/absorbance-based enzyme-coupled kinetic reaction. Results are reported in IU/mL (activity assay).

Traditional antigen-capture ELISA assay. Results are reported as positive or negative for antibodies (antibody assay).

Limitations:

Interferences: Gross hemolysis; gross lipemia; icteremia (activity assay).

Measurement of samples are made against a standard curve generated from E. coli L-asparaginase with each run. Calculations for Erwinaze[®], Oncaspar[®], Asparlas, and Rylaze[®] were empirically derived and utilize a correction factor that has been correlated to the E. coli L-asparaginase activity.

Sample Stability (Sample storage stability prior to shipping)

| Temperature | Timeframe (Activity Assay) | Timeframe (Antibody Assay) |
|--------------------|----------------------------|----------------------------|
| Room temperature | 1 day | 1 day |
| Refrigerated | 3 days | 3 days |
| Frozen | 30 days | 30 days |
| Freeze/thaw cycles | 3 cycles | 3 cycles |

Reference Interval:

None. Physician established therapeutic range.

Special Information:

CPT Code: 82657 for the activity assay (If the drug administered is not specified then results will be reported for Oncaspar, Erwinaze, Asparlas, and Rylaze which warrants 4 units). The CPT Code for the antibody assay is 83516. Indicate date and time of last injection on the submitted requisition. (This information when provided will appear on the report.)

Specimen Requirements:

Specimen:

Serum

Collection:

Venous Collection, Red-top tube or gel-barrier tube (tiger or gold top). Let the sample rest for at least 30 minutes, to allow clotting to occur, but no more than 2 hours. Then separate serum from the RBC's and collect the serum in the plastic tube for transport. Freeze serum immediately.

Volume:

0.5 – 2 mL

Storage Instructions:

Freeze prior to transport. Sample may be refrigerated at 2°C to 8°C, see stability above.

When sending out to Granger Genetics for an Asparaginase Test with one of their kits:

1. Draw 2 mL (or as much as possible depending on the patient) in a red, gold or tiger top SS tube. Label the tube with the Patient's information. If possible, make sure the draw date and time are listed.
2. Let the sample rest for at least 30 minutes but no more than 2 hours, then separate serum from the RBC's and collect the serum in the plastic tube provided in our kit. Label the tube with the Patient's information. If possible, make sure the draw date and time are listed. Freeze the sample immediately after separating. We have provided shipping materials in the kit.
3. When shipping the sample: Freeze the sample and cold pack prior to packaging the sample for shipment. Using the shipping materials provided, ship the sample to Granger Genetics Monday – Thursday. Do not ship samples on Friday. The laboratory is closed Saturday and Sunday and there are NO WEEKEND DELIVERIES. If the specimen is collected on a Friday, it should be separated and frozen for shipment on Monday. Include the Sample Requisition form with the specimen.

The Granger Genetics kit contains a shipping cooler inside a cardboard sleeve. There is a cold pack inside the cooler to be frozen along with the specimen for shipping. Also included in the kit are: a biohazard bag, a FedEx Clinical Bag, FedEx shipping air bill, 2 transfer pipettes, 2 cryo tubes (for serum collection) and a requisition form. The transfer pipettes are used to transfer the serum to the cryo tubes. Affix a sample label to the cryo tubes and freeze the specimen. Prior to shipment, place the frozen specimen and the completed requisition form in the biohazard bag. Place the biohazard bag and FROZEN cold pack in the cooler. Place the cooler in the cardboard sleeve and place inside the FedEx Clinical Bag for shipping. Affix the air bill to the outside of the FedEx Bag.

References:

1. Kidd, JG. Regression of transplanted lymphomas induced in vivo by means of normal guinea pig serum—course of transplanted cancers of various kinds in mice and rats given guinea pig serum or rabbit serum. *J Exp Med.* 1953; 98: 565–582 PMID: [13109110](#)
2. Müller, H.J. et al. Use of l-asparaginase in childhood ALL *Critical Reviews in Oncology / Hematology*, Volume 28, Issue 2, 97 – 113 PMID: [9768345](#)
3. Asselin, B, Gelber, R, and Sallan, S. Relative toxicity of *E. coli* l-asparaginase (ASP) and PEGasparaginase (PEG) in newly diagnosed childhood acute lymphoblastic leukemia (ALL). *Med Pediatric Oncol.* 1993; 21: 556
4. Ahlke, E, Nowak-Göttl, U, Schulze-Westhoff, P et al. Dose reduction of asparaginase under pharmacokinetic and pharmacodynamic control during induction therapy in children with acute lymphoblastic leukaemia. *Br J Hematol.* 1997; 96: 675–681 PMID: [9074406](#)
5. Evans WE, Tsiatis A, Rivera G , et al . Anaphylactoid reactions to *Escherichia coli* and *Erwinia* asparaginase in children with leukemia and lymphoma. *Cancer* 1982; 49: 1378– 1383.