



Laboratory Catalogue

L-Asparaginase

Client Services
(844) 947-2643
clientservices@grangergenetics.com
Monday-Friday 8am-5pm EST



Introduction & Significance

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. 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. The type and quantity of items must correlate with the number of specimens submitted to our facility. To order supplies, please contact Client Services at **844-947-2643** or **clientservices@grangergenetics.com**

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, including our provided barcode or requisition # where applicable.
3. Time & date of collection

Test Requisition

Minimum requisition requirements:

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. Please feel free to use your facility labels for including patient identifiers on sample tubes. Tubes must be labeled with at least a minimum of two patient identifiers. If not, then use the labels enclosed in the kit to label the tube. A single tube of serum (containing a minimum of 0.5 mL of sample volume) may be submitted for use for both assays.

- Two patient identifiers (e.g., full name and DOB, medical record number, or social security number)
- Patient gender
- Patient date of birth
- Name and address of physician or facility ordering the test
- Test(s) requested (activity, antibody, or both)
- Date/Time of specimen collection
- Source and type of specimen
- Provide complete instructions for direct bill including address and contact information.
- Enter ICD-10 codes that reflect symptoms, conditions, or diagnoses; provide medical justification for the tests ordered as appropriate

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.

Frozen or refrigerated specimens must be transported in insulated containers surrounded by an ample amount of dry ice(frozen) or frozen cold packs (refrigerated) to keep the specimen at 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 test catalogue.

ATTN: Clinical Accessioning
 Granger Genetics
 601 Biotech Dr. Suite 301
 North Chesterfield, VA 23235
 (844) 947-2643

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® and Oncaspar® were empirically derived and utilize a correction factor that has been correlated to the E. coli L-asparaginase activity.

Temperature	Timeframe (activity assay)	Timeframe (antibody assay)
Room temperature	1 day	4 hours
Refrigerated	3 days	3 days
Frozen	30 days	7 days
Freeze/thaw cycles	3 cycles	3 cycles

Reference Interval:

None. Physician established therapeutic range.

Special Information:

CPT Code: 82657*2 for the activity assay. 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, separate serum from RBCs within 2 hours, freeze/refrigerate 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.

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 Pediatr 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.