

Laboratory Catalogue

Canine L-Asparaginase

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Monday-Friday 8am-5pm EST

GRANGER GENETICS

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

Asparaginase was revealed to effectively treat lymphomas since the 1950's[1]. It has since been utilized in the treatment of lymphoma in human and canine patients. The primary mechanism of action is asparagine depletion in patient plasma. Cancer cells lack the enzyme asparagine synthetase; therefore, they are unable to produce asparagine on their own[2]. At sufficient activity levels, the asparaginase enzyme depletes plasma asparagine and eventually leads to cancer cell death. In some cases, the asparaginase is rapidly inactivated in patients without clinical signs of hypersensitivity which is termed "silent inactivation" [4].

Granger Genetics offers an activity assay for monitoring asparaginase. The activity assay reports the drug level of 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 visit our website at**:**
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 one patient identifier (patient's first and last name), which must also be indicated on the requisition.

Test Requisition

Minimum requisition requirements:
All specimen tubes must be labeled with the canine's first & last name which must also be indicated on the requisition. A single tube of serum (containing a minimum of 0.5 mL of sample volume) should be submitted for analysis.

The following items must be on the submitted requisition:

- Canine's first & last name
- Name and address of physician or facility ordering the test.
- Date/Time of specimen collection.
- Provide complete instructions for direct bill including address and contact information.

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 at the laboratory.
- Specimens shipped 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. The 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. Samples should be sent via Priority Overnight Express; First AM shipping is NOT necessary.

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Test Information for L-Asparaginase

Purpose:

Used to monitor Asparaginase therapy for sufficient enzyme activity, to assess silent inactivation by patient sensitization.

Methodology:

Spectrophotometry/absorbance-based enzyme-coupled kinetic reaction. Results are reported in mIU/mL.

Limitations:

Interferences: Gross hemolysis; gross lipemia; icteremia.

Measurement of samples are made against a standard curve generated from E. coli L-asparaginase with each run.

Sample Stability

Temperature	Timeframe
Refrigerated	3 days
Frozen	23 days
Freeze/thaw cycles	3 cycles

Reference Interval:

None. Physician established therapeutic range.

Specimen Requirements:

Specimen:
Serum

Collection:
Venous Collection, Red-top tube or gel-barrier tube, allow clotting to occur, separate serum from RBCs within 2 hours, 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.

Sample submission using kits supplied by Granger Genetics:

1. Draw 2 mL (or as much as possible depending on the patient) in a red or tiger top SS tube.
2. Let the sample rest for at least 30 minutes but no more than 2 hours, then separate the 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, ensure the draw date and time are listed. Freeze the sample immediately after separating. Shipping materials are provided in the kit.
3. When shipping the sample: Freeze the sample and cold pack prior to packaging the sample for shipment. The cold pack must be completely frozen prior to shipping to maintain sample integrity. Using the shipping materials provided, ship the sample to Granger Genetics Monday – Thursday. 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 plastic shipping bag, FedEx shipping air bill, two transfer pipettes, two 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 plastic bag for shipping. Affix the air bill to the outside of the plastic 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 pharmacokinetik 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.

6. Botta V, Camerino M, Bicanová L, et al. Pilot study investigating the intravenous administration of monomeric L-asparaginase to dogs with multicentric lymphoma. Veterinary Oncology. 2024;1:10. doi:10.1186/s44356-024-00010-3.