SPECIMEN COLLECTION, PREPARATION & HANDLING

TWO PATIENT IDENTIFIERS REQUIRED ON ALL SPECIMEN TUBES AND CONTAINERS

Per College of American Pathologist (CAP) regulations GEN. 40491 AND COM.06000 all primary specimen containers (the innermost container submitted to Laboratory Sciences of Arizona (LSA) laboratories that contains the specimen to be tested) MUST be labeled with two patient identifiers. Submitted slides must also contain two patient identifiers. If two patient identifiers are not provided, testing may be delayed until such information is obtained by LSA Laboratories. These patient identifiers include (in order of preference) but are not limited to:

- FULL PATIENT NAME (FIRST AND LAST)
- REQUISITION NUMBER OR BAR CODE LABEL
- PATIENT DATE OF BIRTH
- UNIQUE PATIENT IDENTIFIER

Patient identifiers on the specimen container and the laboratory order form must match in order for the specimen to be processed. Patient identifiers on specimen bags or container lids do not satisfy CAP requirements and cannot be used by LSA Laboratories.

1. Our online Test Directory presents instructions for proper submission of specimens to maintain specimen stability. It is essential that these instructions be followed exactly to assure delivery of a specimen that is adequate for testing. This enables the laboratory to report reliable results back to you. Please be sure to submit the quantity of sample designated in this manual. The laboratory depends upon your care, skill, and knowledge when preparing the patient and the specimen for testing.
2. The laboratory has established standards for specimen integrity to provide optimal reliability of patient test results. Prior to specimen collection, review the specimen requirements in our online Test Directory. Note the proper specimen to be collected, the collection procedures, and handling required. If there are any questions, please contact the laboratory prior to specimen collection.
3. **Specimen Preparation Requirements:**
   Always refer to our online test directory for the most accurate specimen collection containers and transport temperatures. The link can be found at: https://jdos.nicholsinstitute.com/dos/Noco/, and this link can be saved on all portable devices. Please make sure the required storage and transport temperature is clearly marked on the specimen transport bag. ***please separate specimens according to temperature requirements and indicate on the biohazard bag the correct temperature***

Lockbox and Temperature Extremes:
All specimens placed in the lockbox after hours should be adequately protected from extreme temperatures by wrapping in a towel or placing in a secondary container with ice packs when needed. A better alternative is to hold the specimen at appropriate transport temperature and dispatch for courier the next business day if possible. Review specimen requirements and forward time sensitive tests to the lab as a STAT.

Courier Pickup Requests: STAT (within 1 hour) pick up can be requested when necessary
https://www.lablogistics.com/
All requests for a pickup require the following information:

- Physician Office Location/address
- Contact person name
- Specimen temperature requirements
- Location of specimen

Contact Laboratory Staff: when the situation requires special attention or there is uncertainty of the best process to safely transport a specimen 970-810-6400

Peripheral Blood Collection:

1. Collection of a blood sample is obtained by using the usual venipuncture technique. New gloves must be worn for each and every venipuncture procedure.
    a. Apply a tourniquet to the patient's extended arm and select the best vein. Cleanse the site with an alcohol prep pad (sterile alcohol 70%) (there are a few exceptions to the use of alcohol prep pads,

such as alcohol testing. Please see the specimen requirements of the test if you have any questions). Allow the site to air dry after cleaning – do not wipe clean or blow to dry, as this contaminates the draw site.

b. Anchor the vein in position using one finger below the draw site and with the needle at an acute angle, quickly penetrate the skin and vein. Puncture the tube stopper by pushing the tube forward. This initiates the vacuum suction.

c. The tourniquet should be released as soon as possible. Never leave the tourniquet on for more than 60 seconds. Otherwise, hemoconcentration will occur. Tests such as cholesterol, proteins, and hematology values increase significantly from 3-5 minutes of tourniquet application.

d. Allow the tube to fill until the vacuum is exhausted before withdrawing the tube from the holder.

e. If only a single collection tube is required, allow the tube to exhaust its vacuum, remove tube then the entire assembly from the arm. Place a dry gauze pad over the venipuncture site and withdraw the needle carefully. Immediately activate the safety device to prevent injury from an exposed needle.

f. When multiple specimens are required, follow the proper order of draw:

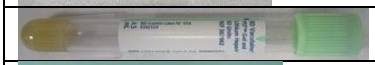
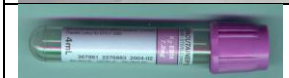
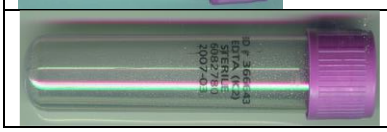
   i. Sterile blood culture specimens

   ii. Coagulation studies (blue-top tubes)

   iii. Specimens that require no preservatives (serum separator tubes (SSTs))

   iv. Specimens with additives, (for example, green, lavender, gray, yellow-top tubes); mix all tubes containing additives as soon as each is filled.

   v. Specimens for QuantiFERON® TB Gold testing

Bottle/Tube Stopper	Color	Additive	Additional Information
	Culture Bottles	See bottle label	Special Collection Requirements
	Light Blue	Citrate	Tube must be filled completely (when using a butterfly one tube must be wasted first)
	Gold	Gel, serum	To the lab within 2 hours (unless centrifuged on site)
	Red	No gel, serum	To the lab within 2 hours
	Green	Heparin	No gel
	Light Green	Heparin	Gel
	Lavender	EDTA 4mLs	Whole blood, not to be separated
	Lavender Lg	EDTA 10mLs	Blood Bank whole blood

g. All specimens submitted to the laboratory must be properly identified by indicating the patient's name or identification code on every specimen tube, slide, or container submitted, along with a second patient identifier as referenced above.

h. Ensure bleeding has completely stopped before applying the bandage and remind patients to limit exercise or bending of the arm to avoid bruising at the venipuncture site.

2. When serum is the required specimen, use of the barrier tube will provide the most accurate results, except for drug levels where barrier tubes cannot be used. Gentle inversion of the tube 8-10 times after venipuncture is essential. **Allow blood to clot for at least 30 minutes in a vertical position.** Centrifuge at full speed (1000-1300 RCF-Relative Centrifugal Field) for 15 minutes. **Centrifuge specimens when fully clotted between 45 minutes and 2 hours after collection.** Also see the Serum Separator Tube (SST) Troubleshooting Guide below. Serum from non-barrier tubes must be separated from the cells within 30 minutes by transferring to another tube.

Finger Stick Collection Procedure

NOTE: The depth of any finger stick device must not exceed 2.0mm. Puncturing the finger of an infant less than 1 year of age is not recommended. Puncturing of the heel is more suitable for these children. See below.

1. Prior to blood collection process, put on disposable examination gloves. Have the patient wash his/her hands with soap and warm water and dry with a paper towel.

2. Cleanse the site with alcohol and allow to air dry.

3. Use the middle or ring finger and puncture slightly to the left or right of center with a sterile lancet. Immediately turn the patient's hand over so that the blood drop forms towards the floor (gently massaging the finger will promote better blood flow).

4. Wipe away the first drop of blood to prevent the contamination of tissue fluid in the blood specimen.

5. Apply moderate pressure while collecting sample (do not squeeze or milk the site). Touch the collection device to the drop of blood formed on the surface of the skin. Avoid scraping the surface of the skin with the tube. Blood will flow freely through the FloTop collector and down the tube wall. To help the blood flow to the bottom, gently tap the tube.

6. After blood specimen has been collected, apply cap to top of tube. Gently invert tubes containing additives 8-10 times to thoroughly mix and prevent clotting. Be sure to hold cap in place during mixing.

7. Label tube with patient's name/identification and a second patient identifier.

8. Apply pressure to site until bleeding stops

Heel Puncture Collection Procedure

NOTE: The depth of any device used for a heel stick must not exceed 1.00 mm.

1. If necessary, warming of the heel for three minutes prior to puncture may be performed ensuring all materials used do not exceed 42°C. Warming increases the blood flow to the area by seven-fold.

2. Prior to the blood collection process, put on disposable examination gloves. Cleanse the site with alcohol and allow to air dry.

3. Hold the heel with a moderately firm grip. Using an approved heel stick device, perform the puncture on the most medial (inner edge) or lateral (outer edge) portion of the plantar surface of the heel. Do not puncture the arch or the curvature of the heel.

4. Wipe away the first drop of blood to prevent the contamination of tissue fluid in the blood specimen. Maintain the foot in a downward position.

5. Gently apply continuous pressure to the heel while collecting sample (do not squeeze or milk the site). Touch the collection device to the drop of blood formed on the surface of the heel. Avoid scraping the surface of the skin with the tube. Blood will flow freely through the FloTop collector and down the tube wall. To help the blood flow to the bottom, gently tap the tube.

6. After blood specimen has been collected, apply cap to top of tube. Gently invert tubes containing additives 8-10 times to thoroughly mix and prevent clotting. Be sure to hold cap in place during mixing.

7. Label tube with patient's name/identification and a second patient identifier.

8. Apply pressure to site until bleeding stops.

Specimen Interference

The degrees of potential interference (Serum Indexes) caused by bilirubin (icterus), hemoglobin, and lipemia (intralipid) is measured automatically and objectively on each sample that has a Chemistry panel of eight tests or more ordered. A comment will be generated in the event a specimen is slightly, moderately, or grossly icteric, hemolyzed or lipemic. The following is a description of how to interpret each comment.

Icteric: Creatinine, Triglycerides, GGT, HDL, Total Protein, Uric Acid and Aldolase may be artificially decreased. Fructosamine and Ammonia may be increased.

- **Slightly Lipemic:** Direct Bilirubin and TIBC may be artificially increased.
- **Moderately Lipemic:** Direct Bilirubin, Ammonia, TIBC, and Prealbumin may be artificially increased. Carbon Dioxide and Aldolase may show a decrease. Magnesium and Alcohol may show variable results.
- **Grossly Lipemic**: Digoxin, Direct Bilirubin, Ammonia, TIBC, Total Protein, and Prealbumin may be artificially increased. Carbon Dioxide and Aldolase may show a decrease. Magnesium and Alcohol may show variable results.
- **Slightly Hemolyzed:** Aldolase, Ammonia, Creatine Kinase (CK), Direct Bilirubin, Haptoglobin, Iron, Lactic Dehydrogenase (LD), Potassium (K), Magnesium, ALT, Total Protein, CSF Protein, and AST may be artificially increased due to erythrocyte contamination.
- **Moderately Hemolyzed:** Aldolase, Lactic Dehydrogenase (LD), Potassium (K), Phosphorus (PO4), Creatine Kinase (CK), ALT, AST, Ammonia, Iron, Magnesium, Lipase, Alkaline Phosphatase, Direct Bilirubin, GGT, CSF Protein, Triglycerides, Alcohol, Prealbumin, Amylase, Microalbumin, Fructosamime, LDL, Direct and Total Protein may be artificially increased. T4, UIBC, and Carbon Dioxide may be artificially decreased.
- **Grossly Hemolyzed:** Aldolase, Lactic Dehydrogenase (LD), Potassium (K), Phosphorus (PO4), Creatine Kinase (CK), ALT, AST, Ammonia, Iron, Magnesium, Cholesterol, Alkaline Phosphatase, Direct Bilirubin, Fructosamine, Amylase, GGT, CSF Protein, Triglycerides, Alcohol, Prealbumin, and Total Protein may be artificially increased. T4, and Carbon Dioxide may be artificially decreased.

Serum Separator Tube (SST) Troubleshooting Guide

Symptoms Affecting Test Quality (If correct technique is not used)

Poorly-Sealed Barrier Containing Red Cells	No Gel Flow	Partial Gel Flow	Tube Breakage in Centrifuge	Red Cells on Top of Barrier	Fibrin in Serum	
✓	✓			✓	✓	After collecting sample, invert tube gently 8-10 times. This allows the clot activator to mix properly. Vigorous inversion may damage red cells and promote leakage of cell contents into the serum.
✓	✓			✓	✓	Allow tube to clot for at least 30 minutes in a vertical position. This ensures complete clot formation for specimens. An incomplete clot will allow latent fibrin to contaminate the serum and inhibit flow of gel, at which point a redraw will be necessary.
✓	✓	✓				Centrifuge for 15 minutes (after 30 minute clotting time). This is needed to provide complete barrier formation.
			✓			Check centrifuge sleeves for debris and remove if detected. This may cause the tube to break.
✓	✓	✓				Centrifuge sleeves should be balanced to assure proper performance. Place an equivalent size tube filled to the same level in the sleeve opposite the patient's specimen.

Processing Citrated Plasma

1. Draw blood into a buffered sodium citrate tube and fill by vacuum. The tube must be completely filled by vacuum to preserve the 9:1 ratio of blood to anticoagulant. The sodium citrate used should only be 0.109 molar (3.2%) sodium citrate. Use of other anticoagulants may cause discrepant or invalid results.
2. Carefully invert tubes 8-10 times to mix. Failure to mix completely may lead to clotted specimens.
3. The specimens should be centrifuged at 2000 rpm for 15 minutes. This step will provide platelet-free plasma (<10,000 platelets/mm3) for testing.
4. Using a plastic pipette, remove only the top 2/3 of the plasma so as not to disturb the platelets or buffy-coat layer on top of the red cells. Note: This step should be strictly adhered to and is extremely important. Should you accidentally withdraw any of the buffy-coat or red cells, the specimen must be re-centrifuged, and the supernatant plasma removed to ensure the validity of testing.
5. Dispense the plasma into plastic aliquot tubes following the specimen requirements for the tests being ordered.
6. Cap with plastic caps and label the tubes with patient's name, a second patient identifier, date of draw, your initials, and specimen type.
7. For Lupus Anticoagulant testing and the Lupus portion of the APS Panel, it is strongly recommended that the sample be "double spun" to ensure that the plasma is platelet free. LSA Laboratories – 2020 General Information the College of American Pathologists requires that all samples include 2 FORMS of patient identification on EVERY container at time of collection. The information provided in this General Information section is for informational purposes only and is subject to change. Please contact our laboratories to confirm any of the information presented within.

   A. Perform steps #3, 4, 5, and 6 (above).

   B. Centrifuge the aliquot tubes a second time for 10 minutes at 2000 rpm.

   C. Once again remove the plasma into properly labeled plastic aliquot tubes, being careful not to pull up any platelets that may have pelleted at the bottom of the tube. Cap the tubes with plastic caps.
8. Freeze the tubes immediately. Package in specimen bag according to standard protocol. Include the completed test request form in the second pocket of the specimen bag and store frozen for transport**.**
9. Place only one patient's draw per specimen bag.

Processing Whole Blood Specimens

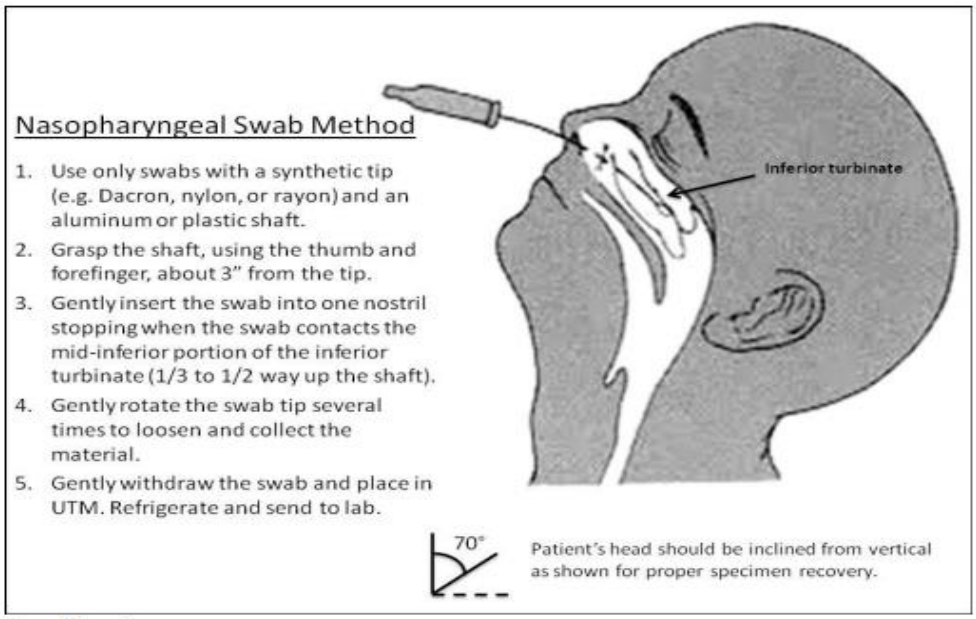
EDTA Samples

EDTA anticoagulant may be needed when ordering DNA tests such as the Prothrombin Gene Mutation or the Factor V Leiden. DNA tests should be as fresh as possible.

1. Fill tubes completely by vacuum.
2. Carefully invert the tubes 8-10 times to mix. Failure to mix completely may lead to clotted specimens.
3. Label the tubes with patient's name, a second patient identifier, date of draw, phlebotomist's initials, and specimen type.
4. Package samples in a specimen bag according to standard protocol. Place only one patient's draw in each bag and include the test request form in the second pocket of the bag.

Whole blood samples should be kept UN-CENTRIFUGED at REFRIGERATED TEMPERATURE (2-8° C). Unless otherwise noted in the online test catalog.

Nasopharyngeal Swab Collection



CRITICAL VALUES

Pursuant to federal regulation, LSA Laboratories must "immediately alert the individual or entity requesting the test and, if applicable, the individual responsible for using the test results when any test result indicates an imminently life-threatening condition or panic or alert values, (42CFR493.1291(g))". A policy implementing this regulation is required by the College of American Pathologists (CAP). Certain test results have been identified as potentially life threatening when their values fall outside established reference ranges. These results will be flagged a critical value and handled differently than abnormal or STAT test results. LSA Laboratories is responsible for effectively communicating critical value test results to the appropriate clinical individual immediately when such results are generated, 24 hours a day and 7 days a week. The laboratory is required to document the appropriate clinical individual receiving notice of critical value test results. When results are communicated verbally, laboratory personnel are also required to ask for a verification "read back" of the critical value test results to ensure clear communication.