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SPECIMEN COLLECTION

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Specimen Collection and Preparation

Analytical Errors Resulting from Improper Blood Collection

We supply our clients with BD Vacutainer tubes for the collection of blood samples that are sent to us for testing. These tubes contain pre-measured vacuum and pre-measured additives; therefore it is very important that these tubes are filled to the “stated fill” volume. If you under-fill or over-fill your collection tube, there is the potential for incorrect analytical results being reported.

The manufacturer of these Vacutainer tubes has tested them to meet expectations of drawing +/- 10% of the “stated fill”. The additives in them are either a clotting agent, anti-clotting agent, or a surfactant (which prevents cells from sticking to the sides of the tube and then causing hemolysis). The manufacturers of our instruments and reagents continue to improve their products to deliver the best test performance with the greatest possible sensitivity. A partially filled tube can impact the high sensitivity of these tests.

We provide test information in this manual for the amount of serum, plasma, or blood required for the tests we do. The amount stated is what we need for the analysis and is independent of the assumption that you are drawing the correct amount into the Vacutainer tube. We will reject specimens submitted that do not meet the manufacturers recommendations for proper filling of the tubes.

If you are having difficulty drawing a patient, try using a smaller volume tube in order to meet the “stated fill” volume requirements to give the appropriate blood to additive ratio. Proper specimen collection and specimen handling is critically important to provide the most meaningful and accurate results to the physician.

Patient Preparation and Identification

Blood collection (phlebotomy) is an invasive procedure and patients can be fearful. With proper preparation of the patient and the health care worker who will perform the procedure, the anxiety of the situation can be removed. Following are some suggestions and some requirements of steps to take prior to performing any type of specimen collection.

The health care worker should have all protective equipment, phlebotomy supplies, test requisitions and labels, writing pen and appropriate patient information ready. He/she will need to know which collection tubes are needed, any specific requirements for drawing and any additional questions to ask the patient. Please see our Alphabetical Test Listing for specific requirements.

Approach the patient with a professional appearance and behavior, as well as exercising good communication skills, both as a listener and a speaker. Introduce yourself and let the patient know you will be collecting a specimen. It may be necessary to explain that the physician has ordered the laboratory test(s) or to answer their questions concerning the procedure.

Proper positioning is important to both the health care worker and the patient for a successful venipuncture or skin puncture. Efforts should be made to ensure that the patient is comfortable and positioned safely. Patients should not stand or sit on high stools during the procedure. The patient should be in a reclining (supine) position or seated in a sturdy, comfortable chair with arm supports.

A blood-drawing chair is preferred because they are designed for maximum safety and comfort of the patient plus easy accessibility to either arm of the patient. The armrest should lock in place so that the patient cannot fall from the chair if he or she becomes faint.
Two forms of identification are required.
Prior to any specimen collection, the patient must be correctly identified by using a two-step process. First, the patient should be asked to state his/her first and last names and to spell their last name. A second form of identification (a confirmatory match) needs to be made with the test requisition, such as an armband, identification card, or by having the patient verbally state their birth date.

Blood Collection
Most laboratory tests are performed on anticoagulated whole blood, plasma, or serum. In general, specimens should be refrigerated until placed in the courier box for transport to the laboratory. Please see our Alphabetical Test Listing for specific requirements.

- **Plasma**: Collect plasma specimen in the appropriate blood collection tube as stated in the Alphabetical Test Listing. Immediately mix well by gentle inversion of the tube 5-10 times and centrifuge. **Transfer** the cell-free plasma using a disposable pipette to a plastic transport tube supplied by HealthEast Medical Laboratory (HML). Cap securely. Label tubes with appropriate patient identifiers. Indicate type of plasma on the aliquot tube. **Refrigerate** or **freeze** immediately according to test requirements. **Freeze specimens for individual tests in separate tubes. To protect specimen from light,** wrap the specimen tube in aluminum foil or use amber aliquot tube.

- **Serum**: Do not use serum separator tubes (SST®) (red/black-top tube) for the following tests: Blood Bank specimens, therapeutic drug monitoring, toxicology tests, Direct LDL or Lipid Cascade.
  Draw a sufficient amount of blood to yield the necessary serum volume. Serum specimens should be collected in plain, red-top tubes or red/black-top tubes (serum separator) unless otherwise specified. Allow the blood to clot for 30 minutes at room (ambient) temperature. Tubes should be maintained in an upright position to promote clot formation and reduce the possibility of hemolysis. Centrifuge in a stoppered tube within 1 hour of draw at 3,000 - 4,000 rpms for 10 minutes. Transfer the cell-free serum to a plastic transport tube supplied by HML. Label tube with appropriate patient identifiers. **Refrigerate** or **freeze** immediately according to test requirements. **Freeze specimens for individual tests in separate tubes. To protect specimen from light,** wrap the specimen tube in aluminum foil or use amber aliquot tube.

- **Whole Blood**: Draw a sufficient amount of blood with the indicated anticoagulant. **Gently** mix the blood collection tube by inverting 5-10 times immediately after collection. Label tube with appropriate patient identifiers and store according to test requirements.

- **HML Tests that require an SST Tube**:
  - ABE  
  - BEA  
  - GAL  
  - GHC  
  - HBQ  
  - HCQ  
  - TLV  
  - LVC  
  - Hepatitis Be AB  
  - Hepatitis Be AGN  
  - Aspergillus AG  
  - Hepatitis C Genotype  
  - Hepatitis B DNA QT  
  - Hepatitis C RNA QT  
  - HTLV-I/II Antibody Cascade  
  - HTLV-I/II ABY Confirmatory
Fasting Blood Specimens
An overnight fast (water permitted) is required for a number of tests listed in the Alphabetical Test Listing. Lipid studies require a 12-14 hour fast (water permitted). No alcohol should be ingested at least 24 hours prior to fasting specimen collection.

Blood Collection Tube Drawing Order
To prevent contamination of the specimen with additives from the previous tube, collect in the following order:

- Blood cultures
- Plain, red-top tube (no additives) (“glass tubes”, not supplied by HML)
- Blue-top (sodium citrate) tube
- Red top (with clot activator) (“plastic tubes”)
- Red/black-top tube
- Green-top (lithium or sodium heparin) tube
- Lavender-top (EDTA) tube
- Grey-top (potassium oxalate/sodium fluoride) tube

Specimen Labeling Requirements
All specimens submitted to HML must include two patient identifiers. These may include:

- First and last name (must match request form)
- Date of birth
- Other clinic / client ID

Note that the same two identifiers must be on the requisition as well.

Specimen Collection Tubes Available
The following is a list of tubes referred to in HML’s specimen requirements. For a quick reference guide see “Blood Collection Tube Color Guide” (B11).

- **Blue-Top Tube (Sodium Citrate):**
  This tube contains sodium citrate as an anticoagulant - used for collection of blood for coagulation studies.
  **NOTE:** It is imperative that the tube be completely filled. The ratio of blood to anticoagulant is critical for valid prothrombin time results. Immediately after draw, invert the tube 5-10 times in order to activate the anticoagulant.
  Coagulation studies may require platelet-free plasma (see instructions on page B6).

- **Green-Top Tube (Lithium Heparin):**
  This tube contains lithium heparin used for the collection of heparinized plasma or whole blood for Ammonia, Plasma K, etc.
  **NOTE:** After the tube has been filled with blood, immediately invert the tube several times in order to prevent coagulation.

- **Green-Top Tube (Sodium Heparin):**
  This tube contains sodium heparin used for the collection of heparinized plasma or whole blood for special tests.
  **NOTE:** After the tube has been filled with blood, immediately invert the tube several times in order to prevent coagulation.

- **Grey-Top Tube (Potassium Oxalate/ Sodium Fluoride):**
  This tube contains potassium oxalate as an anticoagulant and sodium fluoride as a preservative used to preserve glucose in whole blood and for some special chemistry tests.
NOTE: After the tube has been filled with blood, immediately invert the tube several times in order to prevent coagulation.

- **Lavender-Top Tube (EDTA-sodium metabisulfite):**
  This tube contains EDTA-sodium metabisulfite solution as an anticoagulant - used for plasma catecholamines test.
  NOTE: After the tube has been filled with blood, immediately invert the tube several times in order to prevent coagulation.

- **Lavender-Top Tube (K2 EDTA):**
  This tube contains EDTA - as an anticoagulant used for collection of EDTA plasma or whole blood.
  NOTE: After the tube has been filled with blood, immediately invert the tube several times in order to prevent coagulation.

- **Navy-Top Tube:**
  There are four types of navy blue-top tubes – one with the anticoagulant Sodium Heparin, one with red-band for metal free serum, one with no additive and one with EDTA anticoagulant. These are used in the collection of whole blood or serum for trace element analysis. Refer to the individual metals in the individual test listings to determine the tube type necessary.

- **Red/Black Top Tube (SST®):** This tube contains a clot activator and serum gel separator - used for various laboratory tests.
  NOTE: Invert the tube to activate the clotting; let stand for 20-30 minutes before centrifuging for 10 minutes. If frozen serum is required, transfer serum using a disposable pipette, and place serum into plastic vial and freeze.

- **Red-Top Tube (plastic):**
  This tube contains a clot activator - used for collection of serum for chemistry tests as well as clotted blood for immunohematology. Serum tubes are coated with silicone and micronized silica particles to accelerate clotting. Particles in the white film on the interior surface activate clotting when tubes are mixed 5-10 times by inversion.
  NOTE: Transfer serum using a disposable pipette and place serum into plastic vial. Store according to test requirements.

- **Special Collection Tubes:**
  Some tests require specific tubes for proper analysis. Please contact HML prior to patient draw to obtain the correct tubes for metal analysis or other tests as identified in the individual test listings.

- **Yellow-Top Tube (ACD):**
  This tube contains ACD - used for the collection of whole blood for special tests.

**Blood Smear Preparation Guidelines**

Place a drop of capillary or well-mixed EDTA blood in the center of one end of a slide. Immediately place a spreader slide just in front of the drop of blood. Draw the spreader slide back into the drop of blood, lower to about a 30° angle, and allow drop to flow evenly across the spreader slide edge. Push the spreader slide quickly over the length of the specimen slide in one even motion. Dry immediately and completely with gentle fanning or waving. Label with two patient identifiers (for example, first and last name, date of birth, other clinic / client ID) using a #2 lead pencil. Do not place slides in refrigerator or freezer. Place slides in slide transport holder inside of biohazard bag for transport.
Coagulation Studies - Platelet Free Plasma

Accurate results can only be obtained on properly-prepared specimens. The physician interpreting results may be misled by abnormal results obtained from mishandled specimens.

To ensure the best possible specimen, follow collection requirements as closely as possible.

1. **Patient should be fasting**, if possible; for certain tests, the patient cannot be receiving anticoagulant medication (heparin or warfarin/Coumadin®).

2. **Draw blood from the patient into blue-top (sodium citrate) vacuum tube(s)** (those used for prothrombin time / activated partial thromboplastin time containing 3.2% sodium citrate). If the patient’s hematocrit is ≥55%, the volume of anticoagulant in the tube should be adjusted. Use the following formula to determine the correct anticoagulant volume: \textit{anticoagulant volume = (100 - hematocrit)/595 - hematocrit} x volume of specimen. The tubes must fill completely.

A clean venipuncture is essential to avoid activation of coagulation by tissue thromboplastin. Specimens containing fibrin clots will be rejected.

3. The **specimen must be double-centrifuged to prepare a platelet-free-plasma specimen**. Immediately centrifuge at 7,200 RPM for 3 minutes or at 3,200 RPM for 10 minutes, at 4°C, if possible. Carefully remove plasma from cells, avoiding the platelet/buffy coat. Dispense into a labeled plastic tube and centrifuge the plasma in the plastic tube at 7,200 RPM for 3 minutes or at 3,200 RPM for 10 minutes, at 4°C, if possible. Remove the top portion of plasma, leaving approximately 250µL in the bottom to discard. The double-centrifuged plasma should be aliquoted (0.5-1.0 mL each) into clearly labeled plastic tubes (glass vials will not be accepted). The number of tests ordered will determine the aliquots needed, generally one aliquot per test.

4. **Patient specimens should be frozen at < -4°C** if possible, and sent together in the same container. They must arrive in a frozen state.

5. **Please include the requested information** (see individual test descriptions) as the testing and interpretations are dependent on clinical history in many of the more complex abnormalities.

6. Careful specimen handling will most often ensure acceptable specimens and valid results.

Fetal Fibronectin

NOTE: Do not perform test on asymptomatic women with any of the following conditions: multiple fetuses, partial or complete placenta previa, cervical cerclage, or sexual intercourse in the preceding 24 hours. Do not perform test on symptomatic women with any of the following conditions: cervical dilation >3 cm, ruptured amniotic membranes, moderate or gross vaginal bleeding, multiple fetuses, partial or complete placenta previa, cervical cerclage, or sexual intercourse in the preceding 24 hours.

**Specimen Required:** Adeza specimen refrigerated. Specimen stable 8 hours at room temperature, 3 days refrigerated, or 3 months frozen. IF TEST NEEDS TO BE PERFORMED ON A WEEKEND, INCLUDE PHYSICIAN’S PHONE NUMBER OR PAGER NUMBER AND PATIENT’S DIAGNOSIS.

Using an Adeza biomedical specimen collection kit (available from HealthEast Medical Laboratory) collect the specimen as follows:
1. Specimen should be obtained prior to digital cervical examination or vaginal probe ultrasound examination as manipulation of the cervix may cause the release of fetal fibronectin. Specimen should not be collected after microbial culture specimens.

2. For an asymptomatic woman, during a sterile speculum examination, insert the Dacron swab into the vagina and lightly rotate across the posterior fornix or around the ectocervical region of the external cervical os for about 10 seconds to absorb the cervicovaginal secretions. Carefully remove swab and place into buffer tube provided. Do not contaminate swab with lubricants, soaps, creams, or disinfectants.

3. For symptomatic women, follow step 2 but only sample from the posterior fornix.

4. Send specimen refrigerated. **NOTE:** INCLUDE WEEKS GESTATION ON REQUEST FORM.

**Glucose Tolerance Test, 3-Hour (LAB 164) or 2-Hour Gestational (LAB 2150)**

**Specimen Required:** Collect specimens as follows:

1. Draw blood in a grey-top (potassium oxalate/sodium fluoride) tube following an overnight (8-14 hour) fast. Spin down and send 2.0 mL of potassium oxalate/sodium fluoride plasma refrigerated. Indicate the type of plasma on the aliquot label.

**NOTE:** For a patient with a fasting blood glucose >140 mg/dL, HealthEast Medical Laboratory recommends pathologist’s consultation before giving glucose tolerance beverage.

2. Have the patient drink a 100 g dose for a 3-hour gestational tolerance, or a 75 g dose for a 2-hour gestational tolerance. Ingestion should be completed within 10 minutes. Record the time the dosage is completed.

3. Draw blood 1 hour after glucose tolerance beverage is given in a grey-top (potassium oxalate/sodium fluoride) tube. Spin down and send 2.0 mL of potassium oxalate/sodium fluoride plasma refrigerated.

4. Draw the additional specimens at 2 hour and 3 hour intervals (3-hour gestational tolerance only) for the duration of the test.

**NOTE:**
- Patient should be maintained on a >150 g/day carbohydrate diet (“unrestricted”) for three days prior to this test and have unlimited physical activity.
- Patient is not allowed to smoke or drink for duration of test. Sips of water are allowed if needed.
- Patient must remain seated throughout the test.
- Vomiting negates the test.
- Label specimens with the time of collection.

**Glucose Tolerance Test (Non-Gestational)(LAB 169)**

**2 Hour**

**Specimen Required:** Collect specimens as follows:

**NOTE:** Obtain a weight if the patient is a child for calculation of the glucose loading dose.

1. Draw blood in a grey-top (potassium oxalate/sodium fluoride) tube following an overnight (8-14 hour) fast. Spin down and send 2.0 mL of potassium oxalate/sodium fluoride plasma refrigerated. Indicate the type of plasma on the aliquot label.

**NOTE:** For a patient with a fasting blood glucose >140 mg/dL, HealthEast Medical Laboratory recommends pathologist’s consultation before giving loading dose of glucose tolerance beverage.
2. Non-pregnant adults receive a 75 g dose of the glucose tolerance beverage.
   NOTE: Children receive 1.75 g of glucose/kg of body weight not to exceed 75 g
   (1 kg = 2.2 lbs.).

3. Have the patient drink the appropriate amount of the glucose tolerance beverage.
   Ingestion should be completed within 10 minutes. Record the time the dosage is completed.

4. Draw additional specimen at 2 hours post ingestion.
   NOTE:
   a. Patient should be maintained on a >150 g/day carbohydrate diet
      (“unrestricted”) for three days prior to this test and have unlimited physical activity.
   b. Patient is not allowed to smoke or drink for duration of test. Sips of water are allowed if
      needed.
   c. Patient must remain seated throughout the test.
   d. Vomiting negates the test.
   e. Label specimens with the time of draw.

Catecholamine Fractionation, Free Plasma
Collection Requirements: 1 Prechilled Catecholamine Tube
Days Test Performed: Mon Tue Wed Thu Fri
SUBMIT: 3 mL plasma (EDTA-Na metabisulfite) FROZEN immediately. Specimen must be
collected from indwelling catheter.
UNACCEPTABLE: Specimen not collected through indwelling catheter. Markedly hemolyzed
specimen. Suggest Metanaephrines, plasma as a substitute.
NOTE: Discontinue drugs that release epinephrine, norepinephrine or dopamine. No tobacco,
caffeine or food for 4 hours.

Collection Instructions:
1. Drawing from a catheter is required.
2. Unless the purpose of the measurement is drug monitoring, discontinue any epinephrine,
norepinephrine or dopamine injections or infusions at least 12 hours before specimen draw.
3. Discontinue drugs that release epinephrine, norepinephrine, or dopamine or hinder their
metabolism for at least 1 week before obtaining the specimen. If this is not possible for
medical reasons, contact the laboratory and discuss whether a shorter drug withdrawal
period may be possible in a particular case.
4. Do not perform the test on patients withdrawing from legal or illegal drugs known to cause
rebound plasma catecholamine release during withdrawal.
5. The patient must refrain from eating, using tobacco, and drinking caffeinated beverages for
at least 4 hours before the specimen is drawn.
6. Calm the patient by giving complete instructions and reassurance regarding the procedure.
7. Insert an indwelling intravenous catheter. Flush with 3mL of NaCl, using positive pressure
8. Have the patient rest for 30 minutes in the supine position in a quiet room.
9. At the end of the 30 minutes, withdraw and discard a minimum of 3 mL of blood to remove
the saline out of the catheter.
10. If provocative sampling (e.g., standing specimen) is required, perform provocative
maneuver immediately after obtaining supine specimen. Obtain standing specimen
immediately.
11. For each specimen, draw 10 mL of blood into the chilled EDTA-sodium metabisulfite 10 mL
tube.
12. Specimens must remain at refrigerated temperature during processing and transport.
13. Separate plasma in a refrigerated centrifuge within 30 minutes of draw.
14. Freeze specimen immediately.

Cautions:
Catecholamines in plasma are chemically labile and the specimens must be handled carefully, both because of rapid specific metabolism and rapid oxidation on exposure to air. For example, plasma-free norepinephrine has a half-life of approximately 2 minutes. To enhance accuracy, one must pay careful attention to the circumstances of specimen collection and to the preparation of the patient (see Collection Required).

Many alterations in physiologic and pathologic states can profoundly affect catecholamine concentrations.

Any environmental factor that may increase endogenous catecholamine production should be avoided. These include noise, stress, discomfort, body position, and the consumption of food, caffeinated beverages, or nicotine. Caffeine and nicotine effects are short term, a few minutes to hours only.

Other substances and drugs that may also affect the results include:

1. Substances that result in increased release or diminished metabolism of endogenous catecholamines.
   a. Monoamine oxidase inhibitors (MOIs): a class of antidepressants with marked effects on catecholamine levels, particularly if the patient consumes tyrosine rich foods, such as nuts, bananas, or cheese.
   b. Catecholamine reuptake inhibitors including cocaine and synthetic cocaine derivatives, such as many local anesthetics, some of which are also antiarrhythmic drugs (e.g., lidocaine).
   c. Some anesthetic gasses, particularly halothane.
   d. Withdrawal from sedative drugs, medical or recreational, in particular alcohol, benzodiazepines (e.g., Valium), opioids and some central-acting antihypertensive drugs, particularly clonidine, but generally not cannabis or other hallucinogens such as lysergic acid diethylamide (LSD), mescal, or peyote.
   e. Vasodilating drugs (e.g., calcium antagonists, alpha-blockers).
   f. Tricyclic antidepressants usually exert a negligible effect.

2. Substances that reduce or increase plasma volume acutely (e.g., diuretics, radiographic contrast media, synthetic antidiuretic hormone (e.g., desmopressin 1-deamino-8-d-argininne vasopressin: DDAVP)).

3. Drugs that metabolized to endogenous catecholamines. In the main, this concerns carbidopa and L-dopa. These drugs are converted to dopamine, and dopamine measurements in patients taking these drugs will artifactually elevated. Since isolated dopamine elevations are extremely rare, they should always be viewed with suspicion. A review of the HPLC trace should be requested. On a careful review, the methodology usually, but not always, allows the identity of the unmetabolized parent drug, alongside dopamine.

Historically, a third category of potentially interfering substances was represented by molecules that are either similar in chemical structure, antibody epitopes, or chromatographic migration pattern to the catecholamines, or have metabolites that can be mistaken for the catecholamines.
The current HPLC-based assay is not subject to any significant direct interference of this kind. In particular, the following drugs, which used to be considered potential interferences, do not cause problems that cannot be resolved, in most cases, with the current assay: acetaminophen, allopurinol, amphetamines and its derivatives (methamphetamine, methylphenidate (Ritalin), fenfluramine, methylenedioxymethamphetamine (MDMA:ecstasy), atropine, beta-blockers (atenolol, labetolol, metoprolol, sotalol), buspirone, butalbital, carbamazepine, chlorazepate, clordiazepoxide, chlorpromazine, chlorothiazide, chlorthalidone, clonidine, codeine, diazepam, digoxin, dimethindene, diphenydramine, diphenoxylate, dobutamine, doxycycline, ephedrine and pseudoephedrine, fludrocortisone, flurazepam, guanethidine, hydralazine, hydrochlorothiazide, hydroflumethiazide, indomethacin, insulin, isoprenaline, isosorbide dinitrate, L-Dopa, methenamine mandelate (mandelic acid), methylpentoxy, methylprednisolone, nitrofurantoin, nitroglycerine, oxazepam, pentazocine, phenacetin, phenformin, phenobarbital, phenytoin, prednisone, probenecid, progesterone, propxyphene, propanolol, quinidine, spironolactone, tetracycline, thyroxine and tripelennamine.

On occasion, when interference cannot be resolved, an interference comment will be reported.
# Blood Collection Tube Color Guide

<table>
<thead>
<tr>
<th>Color</th>
<th>Additive</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Top</td>
<td>Sodium Citrate, 3.2%</td>
<td>INR, APTT, Lupus Anticoagulant, Protein C, Protein S, Antithrombin III, other coagulation tests, Platelet Function test.</td>
</tr>
<tr>
<td>Grey Top</td>
<td>Potassium Oxalate / Sodium Fluoride</td>
<td>Alcohol, Glucose, Lactic Acid</td>
</tr>
<tr>
<td>Green Top</td>
<td>Lithium Heparin</td>
<td>Ammonia, Carboxyhemoglobin</td>
</tr>
<tr>
<td>Green Top</td>
<td>Sodium Heparin</td>
<td>Chromosome Analysis</td>
</tr>
<tr>
<td>Lavender Top</td>
<td>EDTA (Whole Blood or Plasma)</td>
<td>Hemograms, Hemoglobins, White Blood Count, Glycosylated Hemoglobin, Homocysteine, Morphology studies, Factor V Leiden, Prothrombin Gene 90210, MTHFR, HIV-1 Viral Load, T-cell Helper/Suppressor, Blood Bank specimens (ABO/Rh, Antibody Screen, DAT and Antibody Titer)</td>
</tr>
<tr>
<td>Lavender Top</td>
<td>EDTA (Sodium Metabisulfite solution)</td>
<td>Plasma Catecholamines only</td>
</tr>
<tr>
<td>Navy Blue Top</td>
<td>EDTA</td>
<td>Heavy Metal Screen (Blood) Arsenic, Mercury,Magnesium (RBC),Lead</td>
</tr>
<tr>
<td>Navy Blue Top</td>
<td>No additive (serum)</td>
<td>Chromium, Cobalt, Copper, Selenium, Zinc</td>
</tr>
<tr>
<td>Red/Black Top</td>
<td>SST® Gel and Clot Activator (Serum)</td>
<td>Basic Metabolic, Comprehensive Metabolic, Electrolytes, Lipid Profile, other chemistry tests. DO NOT USE FOR: Blood Bank specimens, Therapeutic Drug Monitoring, Toxicology</td>
</tr>
<tr>
<td>Red Top</td>
<td>No additive (serum). (Plastic tubes contain a clot activator)</td>
<td>Basic Metabolic, Comprehensive Metabolic, Electrolytes, Lipid Profile, other chemistry tests, Immunology specimens, Therapeutic Drug Monitoring, Toxicology</td>
</tr>
<tr>
<td>Yellow Top</td>
<td>ACD Solution B</td>
<td>PI-Linked Antigen Cascade</td>
</tr>
</tbody>
</table>

* See “Alphabetic Test Listing” for specific tube(s) requested.

**Blood Collection Tube Drawing Order**

To prevent contamination of the specimen with additives from the previous tube, collecting the following order:

- Blood Cultures
- Plain, red-top tube (no additives)("glass tubes")
- Blue-top (sodium citrate tube)
- Red top (with clot activator)("plastic tubes")
- Red/black-top tube
- Green-top (lithium or sodium heparin) tube
- Lavender-top (EDTA) tube
- Grey-top (potassium oxalate/sodium fluoride) tube
Urine Collections

24-Hour Urine Collections: HML provides 24-hour urine collection containers which contain the proper preservative. See next page for a urine preservative list. Use the following procedure for the correct specimen collection and preparation.

- Warn the patient of the presence of potentially hazardous preservatives in the collection container.
- Do not discard any liquid or powder in the bottle. If the powder or liquid comes in contact with patient’s skin, wash right away. If blisters develop, call patient’s doctor.
- Instruct the patient to discard the first-morning specimen and to record the time of voiding.
- The patient should collect all subsequent voided urine for the remainder of the day and night.
- Collect the first-morning specimen on day two at the same time as noted on day one. This collection must be included to complete the 24-hour collection.
- If a second container is necessary to complete the 24-hour collection, additional preservative is necessary.
- Keep the collection refrigerated or in a container on ice until taking it to the laboratory or doctor’s office.
- Please mix well before aliquoting and provide the total volume of the 24-hour urine collection.
- Label the container clearly with two patient identifiers, date, time span of collection, total volume, and test(s) requested.

Patient instructions for timed urine collections are provided with the container. Measure the total volume of the urine specimen and record the amount and collection time on the test requisition. Submit measured aliquot(s) of a well-mixed specimen according to test requirements. Never freeze entire collection.

Random Collections: For routine analysis and microscopic evaluation, have the patient void into a clean container. The specimen should be capped, labeled, and refrigerated until courier pickup time. A clean-catch or midstream specimen is preferred. The patient should first void a small amount of urine which is discarded. Some of the urine should then be collected in a clean container before voiding is completed.

Urine Collection
A. Midstream Urine
   Males
   1. Wash hands.
   2. If not circumcised, hold the foreskin back before cleansing.
   3. Wash urethral meatus with Clinipad® or cleansing towelette.
   4. Urinate a small amount into the toilet or bedpan and stop.
   5. Urinate the rest of the urine stream into a screw-capped, sterile urine container.
   6. Place the cap on the cup and TIGHTEN SECURELY.
   7. Label container with patient’s full name and date of birth.

   Females
   1. Wash hands.
   2. Use Clinipad® or cleansing towelette to cleanse genital area.
   3. Use free hand to spread labia apart during urination.
   4. Keep the labia separated, urinate a small amount into the toilet or bedpan, and stop.
   5. Place the cup under the stream and continue to urinate into the screw-capped, sterile urine container.
   6. Finish voiding into toilet or bedpan.
7. Place the cap on the cup and TIGHTEN SECURELY.
8. Label container with patient's full name and date of birth.

B. Catheterized Specimen.
   1. Clean catheter at juncture with an alcohol sponge.
   2. Work fresh urine down tubing and aspirate 1 - 20 mL into a screw-capped, sterile urine container.
   3. Label container with patient's full name and date of birth.

**Timed Collection:**
- Instruct patient to discard first voided specimen and to record the time of voiding.
- The patient should collect all subsequent voided urine for the remainder of the timed collection.
- Example: First voided urine which was discarded at 0800. Collect all urine through 1000 for a 2-hour collection. Collect all urine through 1600 for an 8-hour collection.
- Keep the collection refrigerated or in a container on ice until taking it to the laboratory or doctor's office.
- Please mix well before aliquoting and provide the total volume of the timed urine collection.
- Label the container clearly with two patient identifiers, date, time span of collection, total volume, and test(s) requested.

Patient instructions for timed urine collections are provided with the container. Measure the total volume of the urine specimen and record the amount and collection time on the test requisition. Submit measured aliquot(s) of a well-mixed specimen according to test requirements. **Never freeze entire collection.**

Note: Refer to Patient Instruction section of this manual for instructions in some foreign language.
## Urine Preservatives – HealthEast Medical Laboratory

<table>
<thead>
<tr>
<th>Test Name</th>
<th>Refrigerate during Collection</th>
<th>No preservative <em>required</em></th>
<th>50% Acetic Acid</th>
<th>Boric Acid</th>
<th>Na₂CO₃</th>
<th>6N HCl</th>
<th>Final pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldosterone</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Amylase (2 or 8 hour)</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Calcium, Urine - 24 hour</td>
<td>P</td>
<td>X</td>
<td>No **</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NA</td>
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<tr>
<td>Catecholamines</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Chloride</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
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<tr>
<td>Citrate</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<td>Copper</td>
<td>P</td>
<td>X</td>
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<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
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<tr>
<td>Cortisol, Urine</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Creatinine Clearance</td>
<td>P</td>
<td>X</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Creatinine, Urine - 24 hour</td>
<td>P</td>
<td>X</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Electrophoresis, Urine, 24 Hr</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>5 HIAA</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Heavy Metals (Lead, Mercury, Arsenic)</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>HVA &amp; VMA, Urine</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
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<tr>
<td>Immunofixation, Urine, 24 Hr</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Light Chains, Quantitative, Urine</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Magnesium, Urine, 24-hour</td>
<td>P</td>
<td>X</td>
<td>No **</td>
<td>Yes</td>
<td>Yes</td>
<td>P</td>
<td>2.0</td>
</tr>
<tr>
<td>Metanephrines</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Microalbumin, Urine, 24-hour</td>
<td>P</td>
<td>X</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>NA</td>
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<tr>
<td>N-Telopeptide (NTX), Urine</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Osmolality, Urine, 24-hour</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
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<tr>
<td>Oxalate</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<td>2.0</td>
</tr>
<tr>
<td>Porphyrins ***</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Potassium, Urine, 24-hour</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Protein, Urine</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Sodium, Urine, 24-hour</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Sulfate FREEZE ALIQUOT</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Urea Nitrogen, Urine, 24-hour</td>
<td>P</td>
<td>X</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Uric Acid, Urine, 24-hour</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Stone Formation, 24 Hour Urine</td>
<td>FREEZE ALIQUOT</td>
<td>REQ</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>VMA (Vanillymandelic Acid), Urine</td>
<td>P</td>
<td>X</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes *</td>
<td>NA</td>
</tr>
</tbody>
</table>

P = Preferred condition or preservative.

REQ = Preservative or refrigeration must be added at start of collection.

** = Acceptable as preservatives if 24 hour total volume ≥500 ml.

Yes * = Alternate preservative must be added at start of collection.

*** Protect from light

▲ If pH is >8.0, credit assay and notify client to recollect.

**Note:** This is also on the website: [www.healtheast.org/hml](http://www.healtheast.org/hml)

**NOTE:** If Boric Acid is used as the preservative, and final pH needs to be adjusted, use the preferred preservative to adjust.

The conditions and concentrations of urine preservatives are defined for 24-hour collections as follows:

- **Room Temperature:** 15° - 25°C
- **Refrigerated:** 1° - 9°C
- **6N HCl:** 20 mL per 24-hour collection (Pediatric 15 mL)
- **Acetic Acid 50%:** 25 mL per 24-hour collection (Pediatric 15 mL)
- **Na₂CO₃ (crystals):** 5 g per 24-hour collection
- **Boric Acid (crystals):** 10 g per 24-hour collection
**Stool Collection**

A. **Containers and Transport:**

Special containers and 100 mL white polypropylene aliquot containers for the collection and processing of fecal specimens are supplied by HealthEast Medical Laboratory.

Please check the specific test listing for preferred transport temperature.

B. **Container Label and Required Information:**

1. Each container has the following label affixed.

   ![MML Stool Collection Container](image)

2. At the time the container is given to the patient, please:
   a. Fill in the patient name and date of birth.
   b. Review the test to be done and specimen requirements with the patient.
      - Collection duration
      - Diet requirements
      - Collection and storage of the specimen until it is returned to you
      - Four containers should be provided for a timed collection
      - One aliquot container should be provided for a random collection
      - Provide patient with information on how to obtain additional containers from you should that be necessary
   c. Instruct patient to not fill any container more than ¾ full (to the indicated line on the label).

3. At the time the patient returns the container to you, complete the following information on the label:
   a. Duration of collection should have the appropriate box checked. If timed duration is other than those listed, please list it on the line provided following □ Other _______.
   b. Indicate if the entire collection is contained in one container or in multiple containers. Indicate total number of containers sent.
   c. Label each container with the patient name, date of birth, and date of collection from the appropriate request form.
Aptima® unisex swab kit
Female collection procedure guide
Collection for endocervical swab specimens

Use cleaning swab (white shaft swab with red printing) to remove excess mucus from cervical os and surrounding mucosa. Discard this swab.

Insert collection swab (blue shaft swab with green printing) into endocervical canal. Gently rotate swab clockwise for 10 to 30 seconds to help ensure adequate sampling. Withdraw swab carefully; avoid any contact with vaginal mucosa.

While holding swab in hand, unscrew the tube cap. Do not spill tube contents. If the tube contents are spilled, discard and replace with a new Aptima unisex swab transport tube. Carefully break the swab shaft at the score line against the side of the tube. Discard top portion of swab shaft.

Re-cap swab specimen transport tube tightly.

Specimen Transport and Storage
• After collection, transport and store swab in unisex specimen transport tube between 2°C to 30°C until tested.
• Specimens must be assayed with the Aptima assay for CT/GC within 60 days of collection.
• If longer storage is needed, freeze between -20°C to -70°C for up to 12 months after collection in the Aptima assay for CT and/or GC.

Swab specimen collection guide for:
- Chlamydia trachomatis (CT)
- Neisseria gonorrhoeae (GC)
Aptima® unisex swab device
Male collection procedure guide
Collection for male urethral swab specimens

Patient should not have urinated for at least 1 hour prior to specimen collection.

Discard cleaning swab (white shaft with red print on label). The cleaning swab is NOT needed for male specimen collection.

Insert specimen collection swab (blue shaft swab with green printing) 2 cm to 4 cm into urethra. Gently rotate swab clockwise for 2 to 3 seconds into urethra to help ensure adequate sampling. Withdraw swab carefully.

While holding swab in hand, unscrew tube cap. Do not spill tube contents. If tube contents are spilled, discard and replace with a new Aptima unisex swab transport tube. Carefully break the swab shaft at the score line against the side of the tube. Discard top portion of swab shaft.

Re-cap swab specimen transport tube tightly.

Specimen Transport and Storage
- After collection, transport and store swab in unisex specimen transport tube between 2°C to 30°C until tested.
- Specimens must be assayed with the Aptima assay for CT and/or GC within 60 days of collection.
- If longer storage is needed, freeze between -20°C to -70°C for up to 12 months after collection.

Hologic provides this collection procedure guide as a general informational tool only; it is not an affirmatory instruction or guarantee of performance. It is the sole responsibility of the laboratory to read and understand the appropriate package insert and comply with applicable local, state and federal rules and regulations.

hologic.com | info@hologic.com | +1.781.999.7300
Aptima® vaginal swab device
Clinician collection procedure guide

Collection for vaginal swab specimens

- Partially open swab package and remove the swab. Do not touch the soft tip or lay the swab down. **If the soft tip is touched, laid down, or dropped, discard and get a new Aptima vaginal swab specimen collection kit.** Hold swab, placing thumb and forefinger in the middle of the swab shaft covering the black score line. Do not hold the swab shaft below the score line.

- Carefully insert swab into vagina about 2 inches (5 cm) past the introitus and gently rotate the swab for 10 to 30 seconds. Make sure the swab touches the vagina walls so that moisture is absorbed by the swab. Withdraw swab without touching the skin.

- While holding the swab in hand, unscrew the tube cap. Do not spill tube contents. **If the tube contents are spilled, discard and replace with a new Aptima vaginal swab specimen collection kit.** Immediately place swab into transport tube so the black score line is at the top of the tube. Align the score line with the top edge of the tube and carefully break swab shaft. Swab will drop to bottom of the vial. Discard the top portion of the swab shaft.

Swab specimen collection guide for:
- *Chlamydia trachomatis* (CT)
- *Neisseria gonorrhoeae* (GC)
- *Trichomonas vaginalis* (TV)

Hologic provides this collection procedure guide as a general informational tool only. It is not an authoritative instruction or guarantee of performance. It is the sole responsibility of the lab to read and understand the appropriate package insert and comply with applicable local, state and federal rules and regulations.
Aptima® urine collection kit
Collection procedure guide
Collection for male and female urine specimens

Patient should not have urinated for at least 1 hour prior to specimen collection.

Direct patient to provide first-catch urine (approximately 20 to 30 mL of initial urine stream) into urine collection cup free of any preservatives. Collection of larger volumes of urine may result in specimen dilution that may reduce test sensitivity. Female patients should not cleanse labial area prior to providing specimen.

Remove cap from urine specimen transport tube and transfer 2 mL of urine into urine specimen transport tube using the disposable pipette provided. The correct volume of urine has been added when the fluid level is between the black fill lines on urine specimen transport tube label.

Re-cap urine specimen transport tube tightly. This is now known as the “processed urine specimen.”

Specimen transport and storage
- After collection, transport and store processed urine specimen in the Aptima urine specimen transport tube between 2°C to 30°C until tested.
- Processed urine specimens should be assayed with the Aptima assay for CT/GC within 30 days of collection.
- If longer storage is needed, freeze between -20°C to -70°C for up to 12 months after collection in the Aptima assay for CT and/or GC.
- Urine samples still in primary collection container must be transported to the lab between 2°C to 30°C.
- Transfer urine sample into Aptima urine specimen transport tube within 24 hours of collection.
- Store between 2°C to 30°C and last within 30 days of collection.

Hologic provides this collection procedure guide as a general informational tool only; it is not an affirmative instruction or guarantee of performance. It is the sole responsibility of the laboratory to read and understand the appropriate package insert and comply with applicable local state and federal rules and regulations.

hologic.com | info@hologic.com | +1.781.999.7300
Aptima® vaginal swab device
Patient collection procedure guide

Collection for vaginal swab specimens

Wash hands before starting. If you have any questions about this procedure, please ask your doctor, nurse, or care provider.

Partially peel open swab package and remove the swab. Do not touch the soft tip or lay the swab down. If the soft tip is touched, laid down, or dropped, request a new Aptima vaginal swab specimen collection kit. Hold swab, placing thumb and forefinger in the middle of the swab shaft over the black score line.

Carefully insert swab into the opening of the vagina, about two inches, and gently rotate swab for 10 to 30 seconds. Make sure swab touches the walls of the vagina so that moisture is absorbed by the swab. Withdraw swab without touching skin.

While holding the swab in your hand, unscrew the tube cap. Do not spill tube contents. If the tube contents are spilled, request a new Aptima vaginal swab specimen collection kit. Immediately place swab into transport tube so the black score line is at the top of the tube. Align the score line with the top edge of the tube and carefully break swab shaft. Swab will drop to bottom of the vial. Discard the top portion of the swab shaft.

Tightly screw cap onto tube. Return tube as instructed by the care provider.
**Microbiology Culture Instructions:**
(Deliver all culture specimens promptly to the Laboratory)

I. Blood Cultures

A. Peripheral Draws

1. Check patient identification using two forms of identification (full legal name and DOB).
2. Prepare venipuncture site.
   a. Clean site with Prevantics® Swab. Follow directions on back of package to clean skin for 15 seconds. Allow the prepped area to dry for 30 seconds. Do not blot or wipe dry.
   b. For infants under 2 months of age, clean venipuncture site with alcohol, let dry. Clean with Proviodione-Iodine Prep Pad. Let air dry up to 2 minutes. Clean iodine off arm with alcohol swab after performing venipuncture.
3. Clean palpating finger in same manner as arm site.
4. Snap plastic caps off Bactec culture vials. Clean rubber top with a separate 70% isopropyl alcohol pad and allow to dry.
5. Using a syringe, draw 17 mL of blood for an adult, or 3 mL for pediatric patients 4-13kg.
6. For adults: Using a blood transfer device, transfer 10 mL of blood to the Aerobic Vial and 7 ml of blood to the Anaerobic Vial.
   For pediatrics: Using a blood transfer device, transfer 3 mL of blood to the Peds Plus/F Vial (Pink Top)
7. Label each bottle with patient’s full name and date of birth.
8. If unable to obtain the optimum amount of blood please follow the chart below.

---

### Adult Blood Culture Volumes

<table>
<thead>
<tr>
<th>Amount per Venipuncture</th>
<th>Amount in BACTEC™ Aerobic Vial Optimum is 8-10ml</th>
<th>Amount in BACTEC™ Anaerobic Vial Optimum is 5-7ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimum: 17 ml</td>
<td>10ml</td>
<td>7ml</td>
</tr>
<tr>
<td>13 – 17 ml</td>
<td>8 –10 ml</td>
<td>5 – 7 ml</td>
</tr>
<tr>
<td>10 – 12 ml</td>
<td>5 – 7 ml</td>
<td>5 ml</td>
</tr>
<tr>
<td>5 – 9 ml</td>
<td>entire blood amount</td>
<td>0</td>
</tr>
<tr>
<td>&lt;5 ml</td>
<td>Venipuncture must be repeated or physician notified that you were unable to obtain enough blood. In extreme cases a volume of &lt;3ml may be put in a Peds Plus/F vial (pink top). <strong>Pediatric vials should not routinely be used for adult blood cultures.</strong></td>
<td></td>
</tr>
</tbody>
</table>

---
Pediatric Blood Culture Volumes

<table>
<thead>
<tr>
<th>Pediatric Patient Weight</th>
<th>Blood Volume Drawn</th>
<th>Blood Culture Vial(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4 kg</td>
<td>1 ml</td>
<td>Peds Plus/F (pink)</td>
</tr>
<tr>
<td>4-13 kg</td>
<td>3 ml</td>
<td>Peds Plus/F (pink)</td>
</tr>
<tr>
<td><strong>13-25 kg</strong></td>
<td><strong>Optimum: 10 ml</strong></td>
<td><strong>Plus Aerobic/F 5 ml</strong>&lt;br&gt;<strong>Anaerobic/F 5 ml</strong>&lt;br&gt;<strong>4-9 ml</strong>&lt;br&gt;<strong>1.5-3.9 ml</strong>&lt;br&gt;<strong>Peds Plus/F (pink)</strong>&lt;br&gt;<strong>Optimum: 17 ml</strong>&lt;br&gt;<strong>Plus Aerobic/F 10 ml</strong>&lt;br&gt;<strong>Anaerobic/F 7 ml</strong>&lt;br&gt;<strong>13.0-17 ml</strong>&lt;br&gt;<strong>Plus Aerobic/F 8-10 ml</strong>&lt;br&gt;<strong>Anaerobic/F 5-7 ml</strong>&lt;br&gt;<strong>10.0-12.9 ml</strong>&lt;br&gt;<strong>Plus Aerobic/F 5-7 ml</strong>&lt;br&gt;<strong>Anaerobic/F 5 ml</strong>&lt;br&gt;<strong>4.0-9.9 ml</strong>&lt;br&gt;<strong>Plus Aerobic/F</strong>&lt;br&gt;<strong>1.5-3.9 ml</strong>&lt;br&gt;<strong>Peds Plus/F (pink)</strong></td>
</tr>
<tr>
<td>&gt;25 kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Acid Fast Bacteria/Fungus blood culture (BTB/BFU): 3 - 5 ml in Myco/F vial.

B. Line Draws

1. Check patient identification using two forms of identification (full legal name and DOB).
2. Shut off IV fluids through line and clamp lumen.
3. Disinfect tops of blood culture bottles with alcohol and allow to dry.
4. Clean heparlock with Prevantic® Swab and let dry 30 seconds.
5. Do not touch site once disinfected.
6. Attach a 10 mL syringe containing 10 mL saline, unclamp lumen and flush briskly.
7. Aspirate 5 mL of blood for waste and discard.
8. Using a new syringe, aspirate 13 - 17 mL of blood.
9. Using a blood transfer device, inject 7 - 10 mL of blood to the aerobic bottle (blue cap) and 3 - 7 mL to the anaerobic bottle (yellow cap) bottle.
10. Attach a sterile syringe and flush lumen with heparin.
11. Uncap IV tubing, reconnect to central line, and resume any IV infusions.
12. Label each bottle with full name and date of birth.

II. Genital Collection.

A. Cervical Specimen.

2. Place swab in transport media.
3. Label container with patient’s full name and date of birth.

B. Group B Strep Collection (Vaginal/Rectal swab):

1. Use a CultureSwab™ to swab lower vagina and then lower rectum (through anal sphincter).
2. Do not collect by speculum examination.
3. Place swab in transport media.
4. Label with patient’s full name and date of birth.
C. Urethral Specimen.
   1. Insert mini-tip swab 2 cm into urethra and rotate.
   2. Place swab in transport media.
   3. Label container with patient’s full name and date of birth.

D. Vaginal Specimen.
   1. Swab mucous membranes of the vagina.
   2. Place swab in transport media.
   3. Label container with patient’s full name and date of birth.

E. Nasal Specimens.
   1. Insert swab at least 1 cm into the nares.
   2. Firmly sample the membrane by rotating the swab and leaving it in place for 10-15 seconds.
   3. Withdraw the swab and place in transport tube.
   4. Label swab with patient’s full name and date of birth.

III. Nasal Wash Collection

   Materials: Saline (sterile) or use a Nasal Wash Collection set
               Sterile tapered rubber bulb
               Sterile screw-top container (urine cup)

   Collection: Suction 1 - 3 mL saline into bulb.
               Insert bulb into one nostril until nostril is occluded.
               Squeeze bulb to instill saline into nostril; immediately release bulb to recover specimen.
               Empty bulb into sterile screw-top container.
               Repeat for second nostril.
   Label specimen with patient’s full name and date of birth.

IV. Nasopharynx (N/P) Collection
   A. Remove secretions or exudate from the anterior nares.
   B. Insert mini-tip swab through cleaned nasal passages until it just meets resistance at the posterior nasopharynx, taking care not to touch anterior nares.
   C. Gently rotate swab and hold for 10 - 15 seconds.
   D. Carefully remove swab and place in transport media.
   E. Label culture transport with patient’s full name and date of birth.

V. Scabies Collection
   A. Scrape only early papule or closed or unscratched burrow.
   B. Sterilize a sterile scalpel blade with alcohol.
   C. Place a drop of mineral oil on the blade, apply scalpel to papule so mineral oil goes into papule surface.
   D. Scrape vigorously with the blade to remove the entire top of the papule. (There will be flecks of blood in the oil.)
   E. Use blade to remove all the oil to a clean glass slide.
   F. Repeat with four or five papules.
   G. Gently place a coverslip on each slide.
   H. Place slides in slide holder and keep flat.
   I. Label each slide holder with patient’s full name and date of birth.
VI. Sputum Collection
A. The specimen should be a single, “deep-cough” sputum specimen.
B. Instruct patient to brush his/her teeth and/or rinse mouth well with water.
C. Have patient remove dentures.
D. Instruct the patient to take a deep breath, hold it momentarily, and cough deeply and vigorously into a tightly sealing, screw-capped, sterile container or into suction trap. Collect 0.5 mL or more of sputum.
E. Label container with patient’s full name and date of birth.

VII. Throat Collection
A. Obtain specimen using a CultureSwab™
B. Remove cap and swab from tube.
C. Tilt the patient’s head back to assist in opening of the mouth as wide as possible.
D. Depress the tongue with a tongue depressor so the swab does not touch the tongue, cheeks, or the lips.
E. If the patient has complained of one spot being sore, swab that area well.
F. In one continuous motion:
   1. Swab one tonsillar area up, then down.
   2. Move to the back of the throat as far down as possible and swab there.
   3. Move to the other tonsillar area and swab.
   4. Swab behind the uvula and over any areas of inflammation, exudation, or ulceration and remove the swab.
G. Place swab in CultureSwab™ transport.
H. Label tube with patient’s full name and date of birth.

VIII. Urine Collection
A. Midstream Urine
   Males
   1. Wash hands.
   2. If not circumcised, hold the foreskin back before cleansing.
   3. Wash urethral meatus with Clinipad® or cleansing towelette.
   4. Urinate a small amount into the toilet or bedpan and stop.
   5. Urinate the rest of the urine stream into a screw-capped, sterile urine container.
   6. Place the cap on the cup and TIGHTEN SECURELY.
   7. Label container with patient’s full name and date of birth.
   
   Females
   1. Wash hands.
   2. Use Clinipad® or cleansing towelette to cleanse genital area.
   3. Use free hand to spread labia apart during urination.
   4. Keep the labia separated, urinate a small amount into the toilet or bedpan, and stop.
   5. Place the cup under the stream and continue to urinate into the screw-capped, sterile urine container.
   6. Finish voiding into toilet or bedpan.
   7. Place the cap on the cup and TIGHTEN SECURELY.
   8. Label container with patient’s full name and date of birth.

   B. Catheterized Specimen.
   1. Clean catheter at juncture with an alcohol sponge.
   2. Work fresh urine down tubing and aspirate 1 - 20 mL into a screw-capped, sterile urine container.
   3. Label container with patient’s full name and date of birth.
IX. Culture, Bacterial (aerobic) - Wounds, Abscesses, Drainages:

A. Remove superficial flora by decontaminating the skin before collecting a specimen from advancing margin or base.

B. A closed abscess is the specimen of choice. Aspirate the abscess contents with a syringe. Remove needle, cap and send to Lab.

C. Specimen should be labeled to distinguish body area recovered. Do not label only as “wound”.

D. Label container with patient’s full name and date of birth.

E. An e-swab transport system can be used for both aerobic and anaerobic cultures.
**Microbiology Transport Media Guide**

<table>
<thead>
<tr>
<th>Transport Media</th>
<th>Specimen Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlamydia and/or GC (gonorrhea) by amplified DNA probe test (Aptima (Blue) Swab in Aptima UNISEX Specimen Collection Kit)</td>
<td>Approved for genital sources only.</td>
</tr>
<tr>
<td>Chlamydia and/or GC(gonorrhea) on non-genital sources (Aptima (Blue) Swab in Aptima UNISEX Specimen Collection Kit)</td>
<td>Eye, nasal, mouth, throat</td>
</tr>
<tr>
<td>CultureSwab™ (white cap)</td>
<td>Used to swab nares, throats, wounds, Group B strep, wet preps, Ureaplasma / mycoplasma</td>
</tr>
<tr>
<td>Charcoal CultureSwab Plus™ (orange cap)</td>
<td>GC (gonorrhea) culture and genital culture</td>
</tr>
<tr>
<td>E Swab (white cap)</td>
<td>Anaerobic culture AND Aerobic culture.</td>
</tr>
<tr>
<td>ETM™</td>
<td>Transport media for stool cultures.</td>
</tr>
<tr>
<td>Microtest M4</td>
<td>Use Dacron® tipped swab to collect specimen. Place swab in Microtest M4™ tube. Break off swab below fingers, leaving swab in liquid. Replace screw-top cover. (Can also be used for collection of viral and chlamydia cultures).</td>
</tr>
<tr>
<td>Mini-Tip ESwab™ (blue cap)</td>
<td>Nasopharyngeal collections, ear and eye cultures. Must use for Flu AB testing at HML May use for RSV testing</td>
</tr>
<tr>
<td>A.C.T.®1 Vial (Anaerobic)</td>
<td>Swab vial top with alcohol, put clean needle on syringe, and inject fluid.</td>
</tr>
<tr>
<td>Protofix™ CLR</td>
<td>Transport media for O&amp;P’s, Giardia detection, Cryptosporidium</td>
</tr>
<tr>
<td>Universal Viral Transport (red cap)</td>
<td>Bordetella pertussis and parapertussis by PCR, Legionella species by PCR, HSV 1 &amp; 2 Qual DNA by PCR, Respiratory Virus Panel by PCR, Varicella-Zoster Virus DNA by PCR</td>
</tr>
</tbody>
</table>

*(See Microbiology Container Chart for images of swab types on next page.)*
### Container Chart for Microbiology Specimen Collection

<table>
<thead>
<tr>
<th>Collection Container</th>
<th>Used</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.C.T.®1 Vial</td>
<td>• Anaerobic Cultures (CAN)</td>
<td>Aspirate fluid with needle and syringe, remove vial cover and place in vial through rubber top.</td>
</tr>
<tr>
<td></td>
<td>• Body Fluid Cultures (BFC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Aspirate Cultures (ASC)</td>
<td></td>
</tr>
</tbody>
</table>
| Sterile Screw-Top*   | • Sputum Cultures (SPU)                   | • Patient should rinse mouth, cough deeply and expectorate sputum into container.  
• Properly collect midstream or straight catheter urine specimens.  
• Small tissue pieces can also be placed in a 5 ml sterile saline tube.  
Aspirated material can also be sent in the syringe, needle removed and capped.                                                                                                                                                                                                                                               |
|                      | • Stool Testing                           |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                      | • Urine Cultures (UC)                     |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                      | • Tissues (TIS)                           |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                      | • Body Fluids (BFC)                       |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                      | • Aspirates (ASC)                         |                                                                                                                                                                                                                                                                                                                                                                                                      |
| E-Swab*              | • Anaerobic Cultures (CAN)                | Collect swabbed sample, place swab in tube, break at mark, and cap tube.  
Note: Routine Aerobic and Anaerobic testing can be done on one specimen/container if it is received in E-Swab transport, or is a fluid/aspirate.                                                                                                                                                                                                                                                   |
|                      | • Aerobic Surgical Wounds (ASW)           |                                                                                                                                                                                                                                                                                                                                                                                                      |
| ESwab Minitip (blue cap) | Influenza A/B (FAB) | Collect from nasopharynx, place swab in tube, break at mark and cap tube.  
• Nasal washes in sterile screw top also acceptable.                                                                                                                                                                                                                                                                                                                                 |
|                      | RSV Rapid Screen (RSV)                    |                                                                                                                                                                                                                                                                                                                                                                                                      |
| CultureSwab Routine (white cap) | • Throat Cultures (TC) | Collect swabbed sample, place swab in tube.                                                                                                                                                                                                                                                                                                                                                      |
|                      | • Non-surgical Wound Cultures (WD)        |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                      | • Wet Prep (WET)                          |                                                                                                                                                                                                                                                                                                                                                                                                      |
| Universal Viral Transport (red cap) | • Bordetella pertussis PCR (PPC) | Rotate gently and maintain in nasopharynx for 15 seconds.                                                                                                                                                                                                                                                                                                                                 | |
|                      | • Legionella species by PCR (LCR)         |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                      | • HSV 1 & 2 Qual DNA by PCR               |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                      | • Respiratory Virus Panel by PCR          |                                                                                                                                                                                                                                                                                                                                                                                                      |
|                      | • Varicella-Zoster Virus DNA by PCR        |                                                                                                                                                                                                                                                                                                                                                                                                      |
| CultureSwab (red cap) | MRSA screen (MRS)                        | Using same swab, insert into each nostril and roll against nasal membrane.                                                                                                                                                                                                                                                                                                                                                                                     |
| Charcoal Culture Swab Plus (orange cap) | • GC (gonorrhea) culture (GC) | Collect swabbed sample, place swab in tube.                                                                                                                                                                                                                                                                                                                                                     |
|                      | • Genital Culture (VCU)                   |                                                                                                                                                                                                                                                                                                                                                                                                      |

This chart does not list all sample types please refer to the Laboratory Manual on the HealthEast® Infonet for complete sample collection information. Any questions/comments regarding this chart can be directed to Microbiology at 651-232-3680.
OPTION 1: SurePath Brush/Spatula

1. Insert contoured end of plastic spatula into cervix and rotate 360 degrees around the entire exocervix (one entire rotation).

2. Snap off head of SurePath spatula into the SurePath collection fluid.
   • Use the cap to assist in breaking off the head of the spatula at the scored edge or
   • Use a "two-handed snap" to break off the head at the scored edge.

3. Insert CytoBrush into the endocervix until only the bottom-most bristles are exposed at the os. Slowly rotate 1/4 to 1/2 turn in one direction. To avoid unnecessary bleeding, do not over-rotate.

4. Snap off head of CytoBrush into the SurePath collection fluid.
   • Use the cap to assist in breaking off the head of the brush at the scored edge or
   • Use a "two-handed snap" to break off the head of the brush at the scored edge.

5. Place the cap on the vial and tighten and send to the Lab for processing.

OPTION 2: SurePath Broom device (Rovers® Cervex® Brush)

1. Insert the SurePath Broom into the endocervix so that the tip of the broom is in the cervix and the bottom bristles are resting on the ectocervix.

2. Rotate the device five times in a clockwise direction.

3. Snap off the head of SurePath Broom into the SurePath collection fluid.
   • Use the cap to assist in pulling off the head of the broom or
   • Use your gloved hand to pull off the head of the broom.

4. Place the cap on the vial and tighten and send to the Lab for processing.

Questions or Concerns? Call HML Customer Service at 651-232-3500
Specimen Packaging and Courier Services

Courier Services
Scheduled courier service is available for specimen pickup and report and/or supply delivery, Monday through Friday, excluding holidays. Additional pickups and Saturday service are also available upon request. To reach HealthEast Medical Laboratory’s (HML) dispatcher regarding courier requests or questions, call 651-232-3500 (option 1). The dispatcher is in constant contact with all drivers and can keep you apprised of timeliness, especially in situations related to traffic delays and severe weather.

When calling for an on-call pickup, please specify the priority from one of the following:
• QUICK - Specimen picked up and delivered to HML within 60 minutes.
• NINETY - Specimen picked up and delivered to HML within 90 minutes.
• ECONOMY - Specimen picked up and delivered to HML within 3 hours.

Specimen Packaging
Laboratory test results are dependent on the quality of the specimen submitted. A written request from a physician is required for all laboratory testing. Any called-in or add-on orders must be confirmed in writing within 48 hours. The HML requisition serves as this request form. It is important to fill out the test requisition legibly, accurately, and completely. Complete patient information is important to ensure proper billing and correct interpretation of laboratory test values. Please see the Billing Section (pages A9 - A16) for more information.

All specimens should be labeled with two patient identifiers. Please label the container, not the container cover, lid, or biohazard bag. In addition, the identification on the labeled specimen must exactly match the identification provided on the requisition.

To ensure the safety of all personnel who handle specimens, please submit specimens in the appropriate containers. Enclose the specimens inside the biohazard bags provided by HML and place the requisition in the outside pocket. Use large zip-lock bags to collect the individually-bagged specimens according to temperature requirements: one bag for room temperature, one bag for refrigerate, or one for frozen. Please submit urine samples in a separate bag. Never transport specimens in syringes with needle attached. A syringe may be submitted only if a syringe cap is used and the needle is removed. Label bag with the temperature for transport and storage on the small and large zip-lock bags [frozen, refrigerate, or room (ambient) temperature].

To ensure accurate, reliable results, it is extremely important to store specimens according to the test requirements listed in the “Alphabetical Test Listing” section of this manual. The term “freeze” indicates that the specimen must be spun, separated, transferred into a second specimen transport tube, frozen, and then transported by our couriers on dry ice. Some test requirements state that the specimen should be frozen if it will be stored for 24, 48, or 72 hours. Freezing is not required if the specimen will be submitted to our laboratory within the stated time period. When one test in a group of tests requires freezing, only freeze a part of the specimen and then send us two specimens, one frozen and one not frozen. Each assay that requires freezing must have its own separate frozen vial.
To submit a request that has multiple specimens with different storage requirements:

- Mark the number of bags being submitted in the appropriate area on the top part of the requisition.
- Place a copy of the requisition with each specimen/bag being submitted.
- It is the client’s responsibility to make sure all specimens are handed over to the courier. Courier is not allowed to help themselves to specimens.

**STAT Bags**

In an effort to process our client’s STAT specimens in a more efficient manner, we provide red biohazard bags that boldly display STAT in dark lettering. In order to distinguish between routine priority specimens and STAT specimens, please place specimens in these bags only when they require STAT transport, processing, and analysis.
# Pediatric Minimum Volumes for Common Tests

<table>
<thead>
<tr>
<th>Panel Code</th>
<th>Panel Name</th>
<th>Minimum Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chem</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PB</td>
<td>Lead, Blood (EDTA whole blood)</td>
<td>250 ul</td>
</tr>
<tr>
<td>TSH</td>
<td>TSH (serum / heparin plasma)</td>
<td>300 ul</td>
</tr>
<tr>
<td>FT4</td>
<td>T4, Free (serum / heparin plasma)</td>
<td>145 ul</td>
</tr>
<tr>
<td>CMP</td>
<td>Comprehensive Metabolic Profile (serum / heparin plasma)</td>
<td>280 ul</td>
</tr>
<tr>
<td>CRP</td>
<td>C-Reactive Protein (serum / heparin plasma)</td>
<td>110 ul</td>
</tr>
<tr>
<td>T4</td>
<td>T4, Total (serum / heparin plasma)</td>
<td>125 ul</td>
</tr>
<tr>
<td>LIP</td>
<td>Lipid Profile (serum / heparin plasma)</td>
<td>116 ul</td>
</tr>
<tr>
<td>IGA</td>
<td>Immunoglobulin A (serum / heparin plasma)</td>
<td>130 ul</td>
</tr>
<tr>
<td>AST</td>
<td>AST (SGOT) (serum / heparin plasma)</td>
<td>115 ul</td>
</tr>
<tr>
<td>ALT</td>
<td>ALT (SGPT) (serum / heparin plasma)</td>
<td>115 ul</td>
</tr>
<tr>
<td>FER</td>
<td>Ferritin (serum / heparin plasma)</td>
<td>120 ul</td>
</tr>
<tr>
<td>TBL</td>
<td>Bilirubin, Total (serum / heparin plasma)</td>
<td>115 ul</td>
</tr>
<tr>
<td>GLU</td>
<td>Glucose (serum / heparin plasma)</td>
<td>210 ul</td>
</tr>
<tr>
<td><strong>Transf Med</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTY</td>
<td>ABO-RH Type (EDTA whole blood)</td>
<td>250 ul</td>
</tr>
<tr>
<td>DAG</td>
<td>DAT-Neonate (EDTA whole blood)</td>
<td>250 ul</td>
</tr>
<tr>
<td><strong>Heme</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESR</td>
<td>Erythrocyte Sed Rate (EDTA whole blood)</td>
<td>1 ml blood</td>
</tr>
<tr>
<td>HM1</td>
<td>Hemogram 1 (EDTA whole blood)</td>
<td>1 ml tube 0.4 ml capillary</td>
</tr>
<tr>
<td><strong>Serology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RO2</td>
<td>IgE Allergen Panel Respiratory with Total IgE (serum / heparin plasma)</td>
<td>0.75 ml</td>
</tr>
<tr>
<td>FOO</td>
<td>IgE Allergen Panel Food (serum / heparin plasma)</td>
<td>0.6 ml</td>
</tr>
<tr>
<td>CGL</td>
<td>Gluten (Celiac) Antibody Panel (serum only)</td>
<td>1.5 ml</td>
</tr>
<tr>
<td><strong>Sendouts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBV</td>
<td>EBV (Epstein-Barr Virus) Antibodies (serum only)</td>
<td>0.6 ml</td>
</tr>
</tbody>
</table>