

Clinical Pathology Laboratory

Getting the Most out of Your Blood Samples

Sample acquisition (**citrate**, **EDTA**, and **heparin** tubes)

- Do not use expired tubes. Expired tubes may contain ineffective anticoagulant or have lost their vacuum or sterility.
- Atraumatic venipuncture and sampling of free-flowing blood are essential for optimal results, especially for coagulation and CBC testing. Traumatic venipuncture can hemolyze RBCs, activate platelets, and contaminate plasma with tissue factor.
- Fill tubes **to the fill line**. The fill line is indicated by a small line or mark on the tube label. *Under-filling or over-filling the tube WILL cause erroneous results, especially for coagulation testing (but also for some CBC measurands). Over-filling tubes also creates a risk of clotting.*
- Optimally, blood should be drawn using a Vacutainer™ system, so blood flows from vein → needle → sample tube. Use of Vacutainer™ needles may not be possible in patients having small veins.
- If a syringe and needle are used to draw the blood: Immediately after venipuncture, remove the needle from the syringe and GENTLY place blood in the sample tube, filling the tube **to the fill line**. (Take care not to spill the sample; use of personal protective equipment such as disposable gloves and a lab coat are advised.) Immediately cap the sample tube and GENTLY invert it 8 to 10 times through a 180° arc to mix the contents. Label the tube with patient information (see [tube labeling below](#)).

Sample acquisition (**clot** tubes)

- Fill these tubes as indicated above – except that there is no fill line, and these tubes can accommodate varying amounts of blood.
- (These tubes do have expiration dates.)

Tube filling order when taking multiple sample types

- **Citrate** tubes should always be filled following another tube type or a discard volume of blood, to prevent contamination of the plasma with tissue factor.
- Suggested tube order is: **clot tube → citrate → heparin → EDTA**.
- If drawing from an IV catheter, take care that heparin flush does not contaminate citrate tubes for coagulation testing.

Sample handling

- **EDTA** tubes for CBC determination should be refrigerated at 4 to 5 °C. If mailed to the laboratory, these should be sent by overnight mail on an ice pack. For CBCs, make a blood smear at the time of sample collection and send the air-dried, unstained smear along with the EDTA tube (blood smears should not be refrigerated).
- **Citrate** and **heparin** tubes should be centrifuged and plasma harvested within 30 minutes of blood collection. After centrifugation, gently aspirate the plasma (without disturbing the cell button) using a plastic transfer pipette and transfer it to a clot (red-top) tube or other, appropriate, sterile, anticoagulant-free test tube with cap. After transfer, immediately cap the tube and label with patient information. Refrigerate the plasma at 4 to 5 °C. (The cell button and original sample tube should be disposed of as appropriate for biological waste). If mailed to the laboratory, these should be sent by overnight mail on an ice pack.
- Blood and plasma specimens transported to the UTCVM by your hospital staff may either be brought directly to the laboratory's accessioning area (if during regular business hours) or placed in the sample drop-off refrigerator in the hallway outside pharmacy (large animal hospital side).

Tube labeling

- *All patient specimens must be labeled using two unique patient identifiers.* E.g., patient name and owner name, or patient name and medical record #.
- *Each specimen must be individually labeled.* E.g., a group of tubes taped together with one tape label are NOT acceptable and will be rejected by the laboratory.