



Specimen Collections and Procurement – What’s in a Color?

Biopathology Center

The accuracy of laboratory testing depends on the quality of specimen submitted. The specimen collection table below is a summarized version of what is typically required by the reference laboratory in order to obtain the most accurate results from your specimen.

Collection Tube/Medium	Test/Determinations
 Red Top Tube – contains no additives or anticoagulants	Serum determinations in chemistry and serology. <u>COG Use:</u> Blood collected in a red top tube can be centrifuged and serum can be separated out. The serum will be a clear liquid with a yellowish tint.
 Red/Black Speckled Top - Serum Separator Tube	Clot activator and gel for serum separation <u>COG Use:</u> Some protocols will ask for blood collected in a serum separator tube instead of in a red top tube. (AHOD0031 for example)
 Purple/Lavender Top tube – contains EDTA anti-coagulant	Hematology - CBC, Diff, Plat, Retic. Could be used for blood banking studies and immunophenotyping. <u>COG Use:</u> Blood collected in a purple top tube can be centrifuged and plasma can be separated out. The plasma will be a clear liquid with a yellowish tint.
 Green Top Tube – contains Heparin anti-coagulant (either sodium or lithium)	For Plasma determinations in Chemistry and Most Drug Levels. Could be used for cytogenetics, FISH, immunophenotyping. <u>COG Use:</u> Unless otherwise specified, use Sodium Heparin Tubes
 Yellow Top Tube – contains Acid Citrate Dextrose (ACD) additive	For use in blood bank studies, HLA phenotyping, DNA and paternity testing. Could be used for immunophenotyping. <u>COG Use:</u> Used for blood collection in POG 9346.

TIP: Check the expiration dates on the tubes before you use them to make certain they have not passed their expiration date.

Whole Blood is collected in different tubes depending on the final product that is needed for testing or research.

TIP: The color of the lid of the tube is just a helpful tool to tell you what type of anti-coagulant or preservative (if any) is in the tube.

Red Top tubes contain no anticoagulants or additives. Red top tubes are usually used for research specimens that will be centrifuged so that the serum can be separated out. Tubes without an anticoagulant (such as red top tubes) are used when it is desirable to have the specimen clot.

Note: Samples collected in red top tubes cannot be used for CBC analysis as all the cellular components (WBC, platelets, etc) will be bound in the clot.

Purple (or lavender) Top tubes contain EDTA. EDTA is another kind of anticoagulant, but different from heparin in its effect on tissues' nucleic acids. EDTA is used for flow cytometry, molecular and hematology testing. Bone marrow and blood for most Acute Lymphoblastic Leukemia protocols should be sent in EDTA. Some older protocols might still ask for green top (sodium heparin) tubes, but the new protocols are moving toward using EDTA for blood and bone marrow specimens because it is better for DNA/RNA extractions.

Researchers are now able to get down into more of a molecular level and look at genes and DNA, where previously they did not have such an in-depth knowledge of the molecular makeup.

Green Top tubes contain heparin, which is an anticoagulant (to prevent clotting).

Sodium Heparin preserves the WBC better, but cannot be used for analyzing electrolytes.

Lithium Heparin is not used for collecting white blood cells. Lithium Heparin is usually used if you are looking at plasma rather than the cellular elements in the blood.

TIP: *If protocol does not specify either way, collect in sodium heparin. We rarely collect specimens in lithium heparin for research purposes.*

Yellow Top tubes contain an additive called Acid Citrate Dextrose (ACD).

Centrifuged Specimens

Often a protocol requests that a liquid specimen be spun down (or centrifuged). Spinning or centrifuging is the process of rotating a specimen at a high enough speed to separate the different components of the liquid specimen.

Blood collected in red top tubes can be centrifuged into two layers - white and red cells (bottom layer) and serum (top layer).

Blood collected in purple or green top tubes can be centrifuged into three layers - red cells (bottom layer), white cells (middle layer) and plasma (top layer).

The top layer (the serum or plasma) will be clear with a yellowish tint.

TIP: *Always include information about what type of specimen you are sending on the specimen labeling. Labs cannot differentiate between serum and plasma when they look at a specimen.*

Aliquot

Aliquot means to divide into equal parts. When a protocol asks you to aliquot serum or plasma into vials that means you should transfer the specimen among the vials in equal amounts.

Tissue Culture Media

Some protocols will request that a specimen be sent in tissue culture media. Tissue culture media (i.e. RPMI or DMEM) is a preservative. These preservatives feed the cells so that they do not die. In other words, they "preserve" the life of the cell. The viability of a specimen placed in tissue culture media varies depending on how soon the specimen is placed into the media, storage temperature, and length of time until it reaches the testing laboratory. The sooner a specimen is placed into the tissue culture media, the more viable it remains. Additionally, if a specimen in tissue culture media is stored in the refrigerator until shipment, it will maintain viability for a longer time. The length of time a specimen should remain in

tissue culture media before testing depends on the tests being performed. Refer to the protocol or call the laboratory directly for information on optimum specimen viability.

Specimen collected in the wrong tube

If a specimen is collected in the wrong tube (i.e. green top instead of purple top), do not pour it into another anticoagulated tube. The best thing to do is to call the laboratory and see if you should still send the specimen. For most protocols, the BPC will tell you to go ahead and send the specimen but clearly write on the transmittal form that the specimen was collected in the wrong tube (document what type of tube it was collected in).

Note about ALL specimens: The ALL Reference Laboratory wants bone marrow specimens in EDTA. If the bone marrow is accidentally collected in a green top tube, you can still send it and they will try to use the specimen.

If a specimen was collected in a red top but should have been collected in a tube with anticoagulant, it will already be clotted, so you should not try to transfer the specimen into a tube with anticoagulant. (The only exception would be if the person drawing the blood caught the error within 3 minutes of the blood draw – in that case the blood could be transferred to a tube with anticoagulant before it clots.) If a specimen was collected in a green top tube when a red top tube was requested, do not try to pour the specimen in a red top tube. It will have anticoagulant in it and will not clot.