From the Center for Phlebotomy Education's Educational Toolbox

Blood Collector's ATM

Abbreviated Teaching Modules for staff development, competency, and classroom

Hemolysis #3205

You just received another one of those calls. The specimen you collected on Mr. Smith this morning is hemolyzed, and you have to go back upstairs and explain to a very cranky patient why you have to draw him again. No healthcare worker likes to get those calls. No patient likes to get that kind of news, either. So, what happened? Why is Mr. Smith's specimen hemolyzed? Other than his crankiness, the collection was not particularly difficult, and you don't understand what went wrong.

There are a number of reasons a specimen can become hemolyzed. The good news is there are also a number of ways to prevent or reduce hemolysis in your specimens.

What is hemolysis? When you dissect that word, you come up with "hemo" or blood, and "lysis" which means cut or broken. So what is broken? The red blood cells (RBCs). RBCs are very fragile and don't tolerate much roughness. Think about a red blood cell being like a red balloon filled with water. It will easily rupture if it comes in contact with something rough or sharp. When the balloon ruptures, the contents of the balloon is released. A red blood cell is just like that. When ruptured, the red blood cell releases its contents into the liquid portion of the blood.

How do you know when a blood specimen has been hemolyzed? Hemolysis generally cannot be detected until after the tubes have been centrifuged. If hemolysis goes undetected, certain lab tests can be affected and the reported results will be inaccurate. When tubes have been spun, cells are separated from the serum or plasma, which should appear pale to golden yellow. Any hint of pink would indicate hemolysis. Remember, when red blood cells are ruptured, they spill their contents into the liquid portion of the blood, giving it a reddish appearance. Mild hemolysis will show up as pale pink serum or plasma. Red serum or plasma indicates gross hemolysis.

Why is hemolysis a problem? Samples with any degree of hemolysis should not be tested because results will be inaccurate. Red blood cells are rich in certain analytes. When red blood cells release their contents into the liquid portion of blood, it elevates the concentration of those analytes. Some analytes will show a falsely higher level, such as potassium, ammonia, magnesium, phosphorus, AST, ALT, LDH, and increased prothrombin time. Some values are falsely decreased, such as RBCs, HCT, and aPTT.

Hemolysis also causes delays in patient care. When a sample must be recollected, it extends the time in which the physician must wait to make a treatment decision. Laboratory results comprise 70% of the objective information physicians use to help them make patient care decisions. When test results are not available, physicians are unable to make those decisions, and when the patient is in critical condition, every minute counts. Patient satisfaction also suffers when they must be undergo yet another stick.

How is hemolysis prevented? Hemolysis usually occurs during sample collection or handling. Hemolysis is prevented by reducing the physical stress on the red blood cells. Here's how to prevent it:

1. Use only 23-gauge or larger needles. Just because 25-gauge needles are available does not mean they should be used. Their smaller diameter makes it difficult for red blood cells to pass through without physical damage.
2. When using a syringe for the collection, avoid pulling back hard on the plunger. A slower, steady pace is better.
3. Avoid slow draws from improperly positioned needles.
4. Do not shake tubes to mix the blood with the additive. Gently invert tubes completely down and then back up for the required number of inversions.
5. Fill tubes to their stated capacity. The additive in some tubes can cause cell rupture if the blood-to-anticoagulant ratio is incorrect.
6. Use partial-draw tubes that have a lesser vacuum.
7. When drawing from the hand or other small veins, use a winged collection device with a syringe attached to control the amount of vacuum exerted within the vein.
8. Do not force blood into tubes when using a syringe. Attach a transfer device and let the tube pull the blood from the syringe.

9. Avoid blood specimen collections during IV starts and from other VADs. Specimens collected during IV starts are notorious for hemolysis because the IV catheters were made for infusing fluids and blood, not withdrawing.

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Test your knowledge:

1. Name one analyte that is falsely increased in hemolyzed specimens.
   a) sodium
   b) RBCs
   c) potassium

2. Name one analyte that is falsely decreased in hemolyzed specimens.
   a) potassium
   b) RBCs
   c) prothrombin time

3. What is hemolysis?
   a) an inadequate amount of blood in the tube
   b) some of the red blood cells have broken apart in the specimen
   c) large cells and other analytes have accumulated in higher concentrations below the tourniquet

4. What does a hemolyzed specimen look like after it has been centrifuged?
   a) pink to red serum or plasma
   b) pale to golden yellow serum or plasma
   c) hemolyzed specimens cannot be recognized after they have been centrifuged

5. What techniques can be employed to prevent or reduce hemolysis?
   a) reduce the plunger pressure when using a syringe to collect the blood
   b) only use 23 gauge or larger needles
   c) both a and b

6. How else might you prevent or reduce hemolysis?
   a) encourage specimen collection during IV starts
   b) vigorously shake the tubes to insure the additive has mixed with the blood in the tube
   c) gently invert tubes after filling to proper capacity

7. True or False
   Blood specimens collected during IV starts have a higher rate of hemolysis.

Name: _____ Date: _____

Facility/Supervisor_____ Dept: _____