

Factors Contributing to Hemolysis

Factors	Possible Consequences	Corrective Actions
Collection		
Venipuncture	Hand veins are fragile and easily traumatized.	Veins in the antecubital area of the arm are the veins of choice. If blood is drawn below this area, a 22g or 23g needle used with a partial draw tube is suggested. A partial draw tube has reduced vacuum and causes less trauma. Make sure this partial draw tube has enough volume to maintain proper blood-to-additive ratio.
Prolonged tourniquet time	Hemoconcentration can affect water balance of cells causing rupture of the red blood cells.	Release the tourniquet as soon as blood flow is established in the first tube, if possible.
Cleansing procedure with isopropyl alcohol	If venipuncture is performed before alcohol is allowed to dry, red cells will rupture.	Allow alcohol to dry thoroughly.
Needle placement	Vein trauma may result when needle placement is not accurate.	The needle should be parallel to the vein. Enter at a 30° angle or less. Reposition the needle forward or backward vertically. Avoid probing.
Needle occlusion	Needle occlusion may cause blood to flow slowly and initiate RBC shearing.	Needle bevel may be positioned against the vein wall. Pull back slightly on the needle. Avoid rotating or changing the angle of the needle.
Tube choice	Tube vacuum might cause blood to enter the tube forcefully and may cause cell rupture.	If a partial draw tube is not acceptable for the test (e.g., protime), there may be smaller tubes available.
Hematoma	Specimens collected by penetrating through a hematoma may cause erroneous results.	Select another site. If another site is not available, collect distally to the hematoma.

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Processing, Handling, and Transport		
Vigorous mixing of tubes	Vigorous mixing may cause the red blood cells to rupture.	Use gentle inversion only.
Centrifuging specimens before 30 minutes after collection	If the clot is not completely formed, serum separation from the red blood cells is incomplete.	Allow the specimen tube to remain vertical in a rack for a minimum of 30 minutes.
Prolonged contact of serum/plasma with cells	Hemoglobin released from hemolyzed cells will contaminate serum or plasma.	Centrifuge the specimen after clotted, but within 2 hours after collection.
Temperatures - elevated or decreased	RBC membrane may rupture.	<p>Do not centrifuge specimens longer than 20 minutes. The heat generated in the centrifuge may cause red cells to lyse.</p> <p>Do not place the tubes or centrifuge on a counter exposed to extreme temperature variations (e.g. next to autoclave).</p> <p><u>Never</u> refrigerate the specimen before it is centrifuged.</p> <p>When placing specimen boxes on outside of building, place in an area that is not exposed to extreme hot and cold temperatures. If the weather is hot, place an ice pack in box, being careful that specimens are not directly touching it.</p>