

Pseudohyperkalemia

Severe hyperkalemia is a potentially life-threatening condition requiring immediate medical intervention. **Pseudohyperkalemia** can be misleading and result in incorrect interpretation and inappropriate patient management. In these cases, falsely increased potassium (K) results can occur during, or after, blood draw (a pre-analytical error).

Reverse pseudohyperkalemia is defined as a plasma potassium that is falsely high while the serum concentration is normal. This can occur in leukemia or lymphoma patients where plasma potassium results are greater than the serum results because of heparin-induced cell membrane damage. In these cases, it is preferred to measure *serum* potassium.

Pre-analytical factors that can cause Pseudohyperkalemia:

- **Hemolysis**
 - Vigorous mixing, traumatic venipuncture, small-gauge needle resulting in release of K from RBCs
- **Prolonged tourniquet** (causes hemo concentration & hemolysis)
- **Fist clenching/pumping** during phlebotomy (releases K into blood from muscle)
- **Leukocytosis**
 - In leukemic patients with high WBCs, cell lysis or leakage can occur, releasing K
- **Thrombocytosis**
 - In patients with high platelet counts, excessive release of K can occur
- **Specimen stored at 4 degrees C** (K leakage from cells)
- **Collection in wrong tube** (i.e. K-EDTA lavender tube)
 - K-EDTA will falsely increase K; beware individuals that realize their mistake, but then pour the K-EDTA collection into the proper serum/plasma tube
- **Contaminants** at blood draw
 - K containing IV fluids; drawing above intravenous infusion site
 - K-EDTA contamination via inappropriate order of draw
- **Unappreciated differences between serum and plasma draws**
 - Platelets release K upon clotting (serum) resulting in +0.2-0.5 mmol/L higher K compared to plasma on the same patient
- **Pneumatic tubes**
 - Potentially; IQMH requires validation of pneumatic tubes, and leukemic patients may be more susceptible due to fragile WBCs
- **Time** (delay processing, increase K leakage across cell membranes)
- **Familial Pseudohyperkalemia**
 - Inherited condition of “leaky red cell syndrome” that results in temperature-dependent potassium leakage when stored at room temperature (2-4 hours)

Questions to consider during investigation of a critical high potassium:

- Is the sample hemolyzed?
- Tube inappropriately drawn, handled, mixed, or stored?
- Measure a whole blood sample on the BG machine; how do the results compare?
- Measure a serum sample, how do results compare?
- Does the patient have symptoms of hyperkalemia?
- Is the ECG normal?

Work-up for Pseudohyperkalemia & Reverse Pseudohyperkalemia

