

Lab Error Control

Quick Reference: Control variables at the vein, tube, and bench.

Three Types of Lab Error

1. PRE-ANALYTICAL (BEFORE ANALYZER)

- **Patient:** Fasting status, timing vs treatments.
- **Collection:** Vein choice, technique, needle size.
- **Tube:** Correct anticoagulant, fill volume, ratio.
- **Transport:** Mixing, temp, separation time.

2. ANALYTICAL (ON ANALYZER)

- Instrument/reagent issues, calibration, QC.
- Interferences: Lipemia, Hemolysis, Icterus.

3. POST-ANALYTICAL (AFTER RESULT)

- Transcription errors, wrong ref intervals.
- Ignoring flags or miscommunication.

Impact Reality:

- ~70% of errors are pre-analytical (human med).
- ~52-70% pre-analytical in vet reference labs.

Your leverage is Pre-analytical.

Pre-Analytical Checklist

Mental check at the draw station:

A. PATIENT & TIMING

- Fasting status confirmed?
- Timing correct relative to meds/meals?

B. COLLECTION

- Atraumatic draw?
- Appropriate vein/site for test?

C. TUBE & ANTICOAGULANT

- Correct tube type selected?
- Tube in date? Vacuum intact?
- Filled to correct volume line?

D. LABELING

- Patient ID, Date, Time, Initials?
- Request matches tube type?

E. HANDLING

- Mixed gently (inverted, not shaken)?
- Separated promptly?

If results don't fit the patient, re-check this list before diagnosing.

Common Pitfalls

- **Non-fasted:** Lipemia → Interference.
- **Traumatic Draw:** Hemolysis → False values.
- **Underfilled Tube:** Bad anticoagulant ratio.
- **Delayed Separation:** K+ shift.
- **Mislabeled:** One of the most dangerous errors.

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Order of Draw & Contamination

Preventing EDTA carryover and sequence errors.

Suggested Order of Draw (to reduce EDTA carryover)

1 ● Serum / Red / Tiger (Chem)

2 ● Heparin / Green (Plasma)

3 ● Citrate / Blue (Coag)

4 ● EDTA / Purple (CBC) **LAST**

Why? EDTA is a potassium salt that chelates calcium. Even a tiny drop carried over into a chemistry tube causes high K+ and low Ca2+.

EMERGENCY WORK-AROUND (SMALL VEINS)

If you **must** attach EDTA first (e.g., butterfly on tiny patient):

1. Fill EDTA tube first.
2. **Discard** a plain "waste" tube to flush line.
3. Attach Chemistry tube.

Suspecting EDTA Contamination

THE "EDTA SIGNATURE"

- Marked Hyperkalemia (High K+)
- Hypocalcemia (Low Ca²⁺)
- Often Low Mg/Zn as well.
- Patient looks fine (no bradycardia/ECG changes).

DECISION PATH

1. Does it make sense?

e.g., If patient is blocked cat or Addisonian, treat. If healthy dog, suspect error.

2. Verify

Run K+ on fresh heparinized blood gas sample OR redraw with clean stick.

3. Result

If normal on recheck, suspect contamination, likely not Addisons.

Strange value + Questionable collection = Check for EDTA before treating.

Preventing Contamination

COMMON CAUSES

- Reusing needle from EDTA to Chem tube.
- Syringe filling: EDTA first, then Chem.
- "Topping off" EDTA then moving to others.

Rule: *Never go backwards from Purple top to Red/Green top.*

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