# ALERT OR CRITICAL VALUES IN THE DAIDS SPONSORED LABORATORY

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# WHAT ARE ALERT OR CRITICAL VALUES?

- Alert or critical values represent those assay results that require prompt, rapid clinical attention to avert significant study-participant *morbidity* or *mortality*.

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# WHAT ARE THE REQUIREMENTS?

- The Laboratory Director must define alert or critical values in consultation with clinicians served.
- Complete procedures must be in place for immediate notification of key study personnel/responsible clinic staff when assay results fall within established alert or critical ranges.

42 CFR § 493.1291

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# WHAT ARE THE REQUIREMENTS?

- Communication logs must be maintained that show prompt notification of the appropriate clinical staff after obtaining test results that fall within a critical range.
- Documentation on these logs must include:
  - Date and time of notification,
  - Responsible laboratory individual performing notification,
  - Name and credentials of person notified at the clinic and test results given, and
  - Any problem encountered in accomplishing this task.

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# STRATEGIES TO MET THE REQUIREMENTS

- Lab Director defined critical values:
  1. Clinicians should inform the laboratory what critical value ranges to use for laboratory assays.
  2. Lab director signs off on ranges proposed by clinicians. Either through SOP or simple document with the critical value ranges signed by lab director.
  3. Critical values should be per gender and/or age group where appropriate.

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# STRATEGIES TO MET THE REQUIREMENTS

- Lab Director defined critical values:
  4. Critical values can have lower or upper limits or both.
  5. Not all assays would require critical values.
  6. Reference material should be available to clinicians to assist in critical values proposed.
  7. Primary Network Lab (PNL) can assist.

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# STRATEGIES TO MET THE REQUIREMENTS

- Complete procedures in place for immediate notification:
  1. SOP is document used to describe "complete" procedures.
  2. SOP should include instructions in clear language what to do for every scenario.
  3. Repeat Testing:
     - Same aliquot vs. new aliquot vs. new sample
     - Agreement criteria for repeat testing
     - Procedures if above criteria *not* met
     - Procedures if repeat testing cannot be performed
     - Documenting repeat testing performed and results
     - Supervisor Review
     - Archiving repeat testing results

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# STRATEGIES TO MET THE REQUIREMENTS

- Complete procedures in place for immediate notification:
  4. Notification:
     - Telephoning critical value instructions
       - Have receiver verbally read back PTID and critical value (assay, number and unit)
     - Telephone number list
     - Clinic staff priority list
     - Working hour telephone list vs. after work hours telephone list (weekend).
     - What is to be done if no one can be contacted?

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# STRATEGIES TO MET THE REQUIREMENTS

- Communication log and documentation
  1. Stand alone log book for critical values.
     - Clearly identifiable and always in same location
     - Phone list, priority list, procedure summary, etc.
  2. Required documentation.
     - PTID, date of collection
     - Protocol, visit
     - *Date and time of notification*
     - *Responsible laboratory individual performing notification*
     - *Name and credentials of person notified at the clinic*
     - *Test results reported (assay, value, unit)*
     - *Any problem encountered in accomplishing this task. (Comments)*

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# PROCEDURAL NOTES

- It is important to be suspicious of all results in the lab.
- Critical results should be scrutinized even more to ensure accuracy of results as reporting of inaccurate critical values can have a disastrous effect on patient care.

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# PROCEDURAL NOTES

- Specimen Quality:
  - Specimens should be evaluated for any conditions that may have produced the critical results. Review rejection criteria for the appropriate test assay.
    - Is the specimen clotted, lipemic, icteric or hemolyzed?
    - Is the specimen tube filled to the correct level if an anticoagulant is used?
    - Will any of the above specimen conditions affect my results?
    - Are any of the above conditions causes for specimen rejection?

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# PROCEDURAL NOTES

- Instrument Flags:
  - Instruments have error detection capabilities; they can be either hardware or software by design. You must understand the meaning of all flags, codes, etc. an instrument may produce for each report.
    - Some flags may require you to review a peripheral smear, specimen quality, instrument condition or other action detailed by the operators manual or SOP.
    - Some flags alert you to a condition during analysis that caused the analyzer to not have confidence in its own result.

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# PROCEDURAL NOTES

- Hematology Issues:
  - Inadequate filling of EDTA tube will result in dilution of all CBC parameters. This will cause the instrument to report low values. Recollect specimen.
  - Specimen clotting is usually due to slow-filling or over-filling of the EDTA tube. All cellular counts will be affected. Especially platelet counts. Recollect specimen.

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# PROCEDURAL NOTES

- Hematology Issues:
  - White Blood Cell Count
    - Nucleated RBCs will cause a falsely elevated WBC. Review on peripheral smear. Perform corrected WBC count.
    - Platelet aggregates can cause an elevated WBC. Review on peripheral smear.
  - Hemoglobin
    - Lipemic specimens can affect hemoglobin values. Note specimen quality on report and use a plasma blank to achieve a more accurate result. Remember the rules of 3s.

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# PROCEDURAL NOTES

- Hematology Issues:
  - Platelet Count
    - Very small RBCs (microcytes), fragments (schizocytes) may cause elevated platelet counts
    - Hemolysed specimens contain RBC stroma which may elevate platelet counts.
    - Platelet Agglutination causes a decreased platelet count.

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# PROCEDURAL NOTES

- Coagulation Issues
  - PT
    - Coumadin therapy can cause longer times.
    - Hematocrit volumes of greater than 55% can cause longer times.
  - PTT
    - Heparin therapy can cause longer times.
    - Hematocrit volumes of greater than 55% can cause longer times.

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# PROCEDURAL NOTES

- Chemistry Issues
  - Hemolysis
    - Hemolysis causes the release of RBC cellular contents and turbidity of the serum specimen.
    - Depending on the degree of hemolysis the turbidity may or may not interfere with the analysis of certain analytes. Refer to your analyte SOP.
    - RBC cellular ions and enzymes will falsely elevate serum K+, ALT, AST and others. Refer to your analyte SOP.

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# PROCEDURAL NOTES

- Chemistry Issues
  - Lipemia
    - Lipemia causes turbidity of the serum specimen interfering with analysis. Refer to your analyte SOP.
    - Excessive lipids will cause elevated Triglyceride values.
  - Icteric
    - Excessive bilirubin causes interference at certain wavelengths. Compromising the accuracy of certain analytes. Refer to your analyte SOP.

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# PROCEDURAL NOTES

- Summary Sheets
  - Each instrument should have an easy to read summary of specimen rejection criteria.
  - This strategy can greatly improve detection of false critical values.
  - Examples to follow;

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# HEMOLYZED SPECIMEN POLICY FOR CX-PRO

Many test on the Beckman CX-PRO instrument are affected by hemolysis. Outlined below is a description of the terms used, and the action that needs to be taken when you have a hemolyzed specimen. The information below is based on the recommendations made by Beckman in the CX-PRO Test Methodology Sheets.

## DEFINITIONS

**Slight Hemolysis:** Serum is slightly red-orange in color.

**Moderate Hemolysis:** Serum is bright red in color.

**Gross Hemolysis:** Serum is dark (cherry) red in color.

| SLIGHT HEMOLYSIS | ACTION |
|---|---|
| **Tests Affected:** ALB, ALT, AMY, AST, BIL-T, CK, K+ | Do not report the tests affected. Attempt to get a recollected specimen. |

| MODERATE HEMOLYSIS | ACTION |
|---|---|
| **Tests Affected:** ALKP, ALT, AMY, AST, BIL-D BIL-T, CK, GGT, LAC, K+ | Do not report the tests affected. Attempt to get a recollected specimen. |

| GROSS HEMOLYSIS | ACTION |
|---|---|
| **Test Affected:** ALKP, ALT, AMY, AST, BIL-D BIL-T, CK, GGT, GLU, LAC TRIG, K+ | Do not report the tests affected. Attempt to get a recollected specimen. |

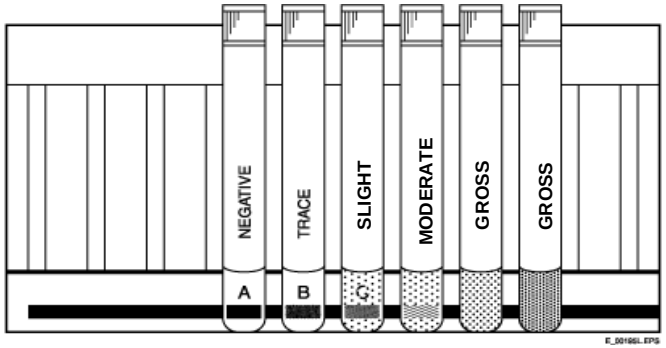
# LIPEMIC SPECIMENS POLICY FOR CX-PRO

Several tests on the Beckman CX-PRO Instrument are affected by Lipemia. Outlined below is the action that needs to be taken to correct for Lipemia. The information below is based on the recommendations made by Beckman in the CX-PRO Test Methodology Sheets.

## DEFINITIONS

Slight to Moderate Lipemia: Lipid content of serum causes distortion of black line or letters.

Gross Lipemia: Lipid content of serum causes black line or letters to become opaque.




| SLIGHT TO MODERATE LIPEMIA | ACTION |
|---|---|
| **Tests Affected:** None | None |

| GROSS LIPEMIA | ACTION |
|---|---|
| **Tests Affected:** | |
| ALB, ALKP, AMY, AST, BIL-D BIL-T, CREA, GGT, GLU, UREA(BUN) CK, Calcium, Cl-, $CO^2$, K+, Na+, | Should be ultra-centrifuged and the analysis performed on the infranate. |
| TRIG | Dilute the sample (1:10) with saline. |

# Coagulation Summary for Sysmex CA-1500

## CAP Instrument Code: 1167

| Reagent | Store °C | Open Stability | CAP Code |
|---|---|---|---|
| Dade Innovin | 2 -8°C | 10 days | 2145 |
| Dade Actin FSL | 2 -8°C | 7 days | 1520 |
| Calcium Chloride | 2 - 25°C | 8 weeks | NA |
| CA Clean I (store in dark) | 2 -8°C | 30 days | NA |
| CA Clean II | 5 -35°C | 60 days | NA |

| Parameter | AMR | Unit |
|---|---|---|
| PT | 9 – 63 | Sec |
| aPTT | 21 – 124 | Sec |

| Calibrator | Store °C | Open Stability |
|---|---|---|
| CA CAL S | 2 -8°C | 1 day |

| Control Name | Store Unopened °C | Expiration | Store Opened | Open Expiration |
|---|---|---|---|---|
| Dade Ci-Trol | 2 – 8 °C | Date on tube | 2 – 8 °C | 16 hours |

| Flags | Possible Cause | Action to be followed |
|---|---|---|
| * | Error occurred | Repeat |
| < | Data exceeded lower AMR | Review specimen rejection criteria. Repeat or recollect sample. Report as less than AMR. |
| > | Data exceeded upper AMR | Review specimen rejection criteria. Repeat or recollect sample. Report as greater than AMR. |
| Slight Coagulation | Detected reaction is extremely small | Visually verify delivery of sample and reagent. Reanalyze sample. |

**Rejection Criteria:**

- Under-filled or over-filled tubes
- Hemolysis (moderate or higher)
- Plasma stored greater than 12 hours.
- Clotted tubes
- Use of incorrect anticoagulant tube
- Specimens with a hematocrit (Hct) of greater than 55%.

# REFERENCES


1. HPTN-MTN Laboratory Manual; version 1.0, Nov. 15, 2006.
2. Beckman Coulter Synchron CX Chemistry Manual; 467000-AE, October 2003.
3. Sysmex CA-1500 Operator's Manual; July 2000
4. Quality and reliability of routine coagulation testing: can we_trust that sample? Blood Coagul Fibrinolysis 17:00–00 _ 2006.
5. DAIDS Guidelines for Good Clinical Laboratory Practice Standards. Oct 12, 2006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