| **Albumin BCG** |
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| **Purpose** | This procedure provides instructions for ALBUMIN BROMCRESOL GREEN (BCG) ON ABBOTT INSTRUMENTATION. The Albumin BCG method is an *in vitro* diagnostic test for the quantitative measurement of albumin in human serum and plasma on the Abbott Architect c4000 or Abbott Alinity c automated chemistry analyzers. |
| **Policy Statements** | This procedure applies to all personnel responsible for operating the Abbott Architect c4000 or Abbott Alinity c at Children’s Minnesota Laboratory.  |
| **Principle** | The Albumin BCG procedure is based on the binding of bromcresol green specifically with albumin to produce a colored complex. The absorbance of the complex at 628 nm is directly proportional to the albumin concentration in the sample. Methodology: Colorimetric (Bromcresol Green) |
| **Clinical Significance** | Measurements of albumin are used in the diagnosis and treatment of numerous diseases involving primarily the liver or kidneys.Albumin is the most abundant protein in human serum/plasma. Elevated serum albumin levels are usually the result of dehydration. Decreased albumin levels are found in a wide variety of conditions, including kidney disease, liver disease, malabsorption, malnutrition, severe burns, infections, and cancer.  |
| **Analyzer** | **Minneapolis: Abbott Alinity c (Sunquest method code: MALIC) and Abbott Alinity ci (Sunquest method code: MALCI; MACC for c-side.)****St. Paul: Abbott Architect c4000 (Sunquest method code: ARCH4) and Abbott Alinity c (Sunquest method code: SALIC)** |
| **Sunquest Test Codes** | ALB: Albumin in serum and plasma |
| **Specimen** | Sample: Plasma (lithium heparin with or without gel) preferred. Sodium heparin plasma or serum (with or without gel) also acceptable. Refer to specimen collection procedures.**Minimum sample volume:** 200 µL preferred, 150 µL minimum**Stability when separated from cells/gel:** RT / 60 days, 2-8 °C / 5 months , < -20°C / 3 months**Rejection criteria:** Unlabeled tube, sample type other than serum or heparinized plasma**Patient Preparation:** Levels are posture dependent, increasing up to 10% to 15% if the individual is standing.Draw while patient is seated whenever possible. Suggest a redraw if falsely low results are suspected due to supine draw. **Preparation:** 1. Whole blood specimens should be centrifuged following complete clot formation, according to Specimen Processing procedures prior to analysis.
2. Serum or plasma should be physically separated from cells as soon as possible with a maximum limit of two hours from the time of collection.
3. Specimens should be free of particulate matter.
4. Transfer serum or plasma to a properly labeled pilot tube, sendout tube, or Abbott sample cup. Architect and Alinity systems utilize a specimen level detect mechanism, so special racks specific to tube-type are not required. Very low volumes should be pipetted into an Abbott sample cup and placed on top of a pilot or sendout tube. Both sample cup and carrier tube must be properly labeled. After testing, if there is any volume left, pipette the remaining amount into the sendout or pilot tube and cap tightly.
5. Minimum labeling includes sample accession ID, and/ or patient name, medical record number, collection date and time.
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| **Reagents** | **Alinity c and Architect c4000:****Reagent Handling** Upon receipt, place reagent cartridges in an upright position for 8 hours before use to allow bubbles that may have formed to dissipate. If a reagent cartridge is dropped, place in an upright position for 1 hour before use to allow bubbles that may have formed to dissipate. Reagents are susceptible to the formation of foam and bubbles. Bubbles may interfere with the detection of the reagent level in the cartridge and cause insufficient reagent aspiration that may adversely affect results. Use a pipette to remove all bubbles prior to loading on the Alinity or Architect system.* Do not use reagents beyond the expiration date.
* Do not pool reagents within a kit or between kits.
* Do not use components from one lot with components from another lot.

**Alinity c:**Reagents may be stored on or off the system. If removed from the system, store reagents with new replacement caps in an upright position at 2 to 8°C. For reagents stored off the system, it is recommended that they be stored in their original trays or boxes to ensure they remain upright.**Alinity c:**

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| ***Product Description*** | ***Product Code*** | ***Stability*** |
| Abbott Alinity c Albumin BCG ReagentCHC# 32618 | 08P02-20 | **Store at:** 2 – 8 °C**Unopened:** Manufacturer’s printed expiration date**On-board: 42 days****Opened, off the analyzer (with clean caps):** Manufacturer’s printed expiration date. (Reagents may be stored on or off the system. The system tracks time onboard.) |
| Abbott Alinity c Multiconstituent CalibratorCHC# 32633 | 08P60-01 | **Store at:** 2 – 8 °C**Unopened:** Manufacturer’s printed expiration date**On board expiration: 5 days when stored onboard.** The Alinity c tracks time on the system.**Opened expiration: 7 days** when opened and stored off the system. |

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|  | **Architect c4000:**

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| ***Product Description*** | ***Product Code*** | ***Stability*** |
| Abbott Architect Albumin BCG ReagentCHC# 32522 | 07D53-23 | **Store at:** 15 - 30°C**Unopened:** Manufacturer’s printed expiration date.**On-board:** 42 Days |
| Abbott Architect Multiconstituent CalibratorCHC# 32557 | 01E65-05 | **Store at:** 2 – 8°C**Unopened:** Manufacturer’s printed expiration date**Opened:** 7 Days |

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| **Risk and Safety** |

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| **CAUTION:** For in vitro diagnostic use. This product requires the handling of human specimens. It is recommended that all human sourced materials be considered potentially infectious and be handled in accordance with the OSHA Standard on Bloodborne Pathogens. Appropriate Personal Protective Equipment (PPE) must be worn according to Children’s Minnesota Laboratory policies. Current SDSs are kept on the [Children’s StarNet](https://msdsmanagement.msdsonline.com/a07dc954-23d8-42a9-b591-ef5763cdfd33/ebinder/?nas=True) pageR1 reagent: Contains sodium azide. Does not require special disposal due to amount. Dispose of used reagent in normal trash. Unused (expired) reagents and Multiconstituent Calibrator should be disposed of in Regulated Medical Waste (red trash). |

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| **Calibration** | **Alinity c:**

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| Assay Range: | 0.6 g/dL-9.5 g/dL |
| Reference Material: | Abbott Alinity Multiconstituent Calibrator |
| Suggested Calibration Levels: |  See lot-specific assay set point documentation |
| Calibration Scheme: | 2 levels, Linear data reduction method |
| Calibration Frequency: | 41 Days |
| AMR | AMR is verified twice annually using the Maine Standards GC1 Product # 1100ab by running all applicable levels in triplicate. Assay results are submitted to Maine Standards for compilation and comparison to peers. Results are reviewed and approved by the Technical Specialist. Any questionable results are investigated and corrective actions documented.  |

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|  | **Architect c4000:**

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| Assay Range: | 0.6 g/dL-9.5 g/dL |
| Reference Material: | Abbott Architect Multiconstituent Calibrator |
| Suggested Calibration Levels: | See lot-specific assay set point documentation |
| Calibration Scheme: | 2 Levels, Linear data reduction method |
| Calibration Frequency: | 41 Days |
| AMR | AMR is verified twice annually using the Maine Standards GC1 Product # 1100ab by running all applicable levels in triplicate. Assay results are submitted to Maine Standards for compilation and comparison to peers. Results are reviewed and approved by the Technical Specialist. Any questionable results are investigated and corrective actions documented. |

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| **Quality Control** | **Alinity c and Architect c4000:** Bio-Rad Liquid Multiqual™ Unassayed Chemistry Control (Human) Levels 1 & 3**Frequency:** Two levels each day of use**Stability:** Once thawed, opened, and stored tightly capped at 2 to 8°C, this product will be labeled with an expiration date equal to the shortest stability of the included analytes, which is **7 days.****Preparation**: This product should be treated the same as patient specimens and run in accordance with the instructions accompanying the instrument, kit, or reagent being used. * To thaw the product, allow it to stand at room temperature (18° to 25°C) until completely thawed, approximately one (1) hour.
* After thawing, the product **MUST** be gently swirled and inverted several times to ensure homogeneity.
* For optimal analyte stability in the thawed state, promptly return to 2 to 8°C storage after each use and minimize the time at room temperature to no more than 20 minutes daily.
* **Before each use**, allow to come to room temperature. Gently swirl the contents until homogeneous with no visible signs of precipitate. Avoid bubbles; do not shake.

**Acceptable ranges:** * Non-Bio-Rad controls will utilize manufacturer ranges and 2 SD Westgard rules.
* New lots of Bio-Rad controls should be run for 20 days in parallel with the current lot whenever possible prior to switching to the new lot.
* Refer to the [Westgard Rules in Chemistry](https://starnet.childrenshc.org/References/labsop/chem/quality/ch-2.18-westgard-rules-in-chemistry.pdf) procedure for current Westgard rules in place for each analyte.
* **Acceptable ranges are current in Unity Real Time only.** Quality Control results must be rejected in Sunquest when the results cross the interface.
* In the event of a QC failure, refer to the [Unity Real Time QC Review, General User](https://starnet.childrenshc.org/References/labsop/chem/quality/ch-2.17-unity-real-time-qc-review-general-user.pdf) and navigate to the QC Troubleshooting section.
* Do not load or release patients until QC is acceptable in Unity Real Time.
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| **Interferences** | **All analyzers:** **Hemolysis, Icterus & Lipemia (HIL) Index Values:**

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At HIL levels at or above the specified cutoff value, append the appropriate comment AFTER visually confirming presence of interferent: -HP for “Hemolysis present, may affect results.” -BIN for “Bilirubin Interference”-LINT for “Lipid Interference”Interference studies were conducted by Abbott Diagnostics Division using NCCLS EP7-P. Interference effects were assessed by Dose Response and Paired Difference methods, at the medical decision level of the analyte. Interference is less than 10% at an Albumin concentration level of 4 g/dL for:* Hemoglobin: up to 750 mg/dL
* Bilirubin: up to 60 mg/dL
* Lipemia (Intralipid®): up to 1000 mg/dL

Interferences from medication or endogenous substances may affect results.For accurate results, serum and plasma specimens should be free of fibrin, red blood cells, and other particulate matter. Serum specimens from patients receiving anticoagulant or thrombolytic therapy may contain fibrin due to incomplete clot formation.  |
|  | **All analyzers:**  |
| **Reference Intervals** |

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| Age | Albumin |
| 0 - 14 days | 3.3 – 4.5 g/dL |
| 15 days - 1 year | 2.8 – 4.7 g/dL |
| 1 - 7 years | 3.8 - 4.7 g/dL |
| 8 - 14 years | 4.1 – 4.8 g/dL |
| 15 – 18 years female | 4.0 – 4.9 g/dL |
| 15 – 18 years male | 4.1 – 5.1 g/dL |
| Adult | 3.0 – 5.2 g/dL |
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| **Critical Values** | None specified. |
| **Limitations** | The instrument reporting system contains flags and comments to provide the user with information regarding instrument processing errors, instrument status information and potential errors in albumin results. Refer to the [Abbott Architect](https://starnet.childrenshc.org/References/labsop/chem/operator/abbott-architect-operations-manual.pdf) or [Alinity](https://starnet.childrenshc.org/References/labsop/chem/operator/alinity-ci-series-operations-manual.pdf) Operator’s Guides for the meaning of report flags and comments, and instructions for addressing them. Do not report results until a report containing flags and/or comments is resolved.Albumin levels are posture dependent, increasing up to 10% to 15% if the individual is standing.Draw while patient is seated whenever possible. Suggest a redraw if falsely low results are suspected due to supine draw.For accurate results, serum and plasma specimens should be free of fibrin, red blood cells, and other particulate matter. Serum specimens from patients receiving anticoagulant or thrombolytic therapy may contain fibrin due to incomplete clot formation.  |
| **Dilutions** | Do not dilute. |
| **Result Reporting** | **All analyzers:** * Results between 0.6 - 9.5 g/dL without error messages are released
* Results below 0.6 g/dL: report as < 0.6 g/dL instead of the numerical value.
* Results >9.5 g/dL without error messages are reported as > 9.5 g/dL
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| **Specimen Storage** | Promptly stopper tested specimen and store upright in a specimen rack. Every 8 hours, remove specimens to refrigerator/freezer storage. Samples are retained 7 days in specimen storage freezer. |
| **References** | 1. Jacobs & DeMott Laboratory Test Handbook, Lexi-Comp, Inc., Hudson, OH, 5th Edition, 2001
2. Architect Albumin BCG Package Insert, Abbott Laboratories Diagnostics Division, Abbott Park, IL 60064, December 2015.
3. Alinity Albumin BCG Package Insert, Abbott Laboratories Diagnostics Division, Abbott Park, IL 60064, December 2017.
4. CALIPER pediatric reference range database. (2019). Retrieved October 3, 2019, from https://caliper.research.sickkids.ca/#/
5. Alinity c Multiconstituent Calibrator Package Insert, Abbott Laboratories Diagnostics Division, Abbott Park, IL 60064, December 2017.
6. Architect Multiconstiuent Calibrator Package Insert, Abbott Laboratories Diagnostics Division, Abbott Park, IL 60064, August 2017.
7. Bio-Rad Liquid Multiqual 1,2,3 Chemistry Control Product Insert, Bio-Rad Laboratories, Irvine, CA 92618
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| **Historical Record** | **Version** | **Written/Revised by:** | **Effective Date:** | **Summary of Revisions** |
| 1 | Erin Bartos | 10/15/2019 | New Procedure for Abbott analyzers |
| 2 | Elauteria Earnhardt, Erin Bartos | 10/28/2020  | Added St. Paul Alinity c as an analyzer |
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