| **Gentamicin** |
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| **Purpose** | This procedure provides instructions for performing GENTAMICIN on ABBOTT INSTRUMENTATION. The Alinity c Gentamicin assay is used for the quantitative determination of gentamicin in human serum or plasma on the Alinity c analyzer. The results obtained are used in the diagnosis and treatment ofgentamicin overdose and in monitoring levels of gentamicin to help ensure appropriate therapy.  |
| **Policy Statements** | This procedure applies to all personnel responsible for operating the Alinity c at Children’s Minnesota Laboratory in Minneapolis. |
| **Principle** | The Alinity c Gentamicin assay is a homogeneous particle-enhanced turbidimetric inhibition immunoassay (PETINIA). The assay is based on competition between drug in the sample and drug coated onto a microparticle for antibody binding sites of the gentamicin antibody reagent. The gentamicin-coated microparticle reagent is rapidly agglutinated in the presence of the anti-gentamicin antibody reagent and in the absence of any competing drug in the sample. The rate of absorbance change is measured photometrically and is directly proportional to the rate of agglutination of the particles. When a sample containing gentamicin is added, the agglutination reaction is partially inhibited, slowing down the rate of absorbance change. A concentration-dependent classic agglutination inhibition curve can be obtained with maximum rate of agglutination at the lowest gentamicin concentration, and the lowest agglutination rate at the highest gentamicin concentration.**Methodology:** Particle-enhanced turbidimetric inhibition immunoassay (PETINIA)For additional information on system and assay technology, refer to the Alinity ci-series Operations Manual, Section 3. |
| **Clinical Significance** | Gentamicin is used in the treatment of serious infections involving aminoglycoside-sensitive organisms. Monitoring gentamicin concentration in serum or plasma, along with careful clinical assessment, is the most effective means of ensuring adequate therapy. Gentamicin concentration correlates better with antibacterial activity than dosage. A standard dose of gentamicin does not always yield a predictable concentration because the drug’s concentration also depends on the patient’s volume of distribution and on the drug elimination. These factors are influenced by the mode of administration, the volume of extracellular fluid, renal retention, and physiological changes during therapy. Gentamicin has a narrow range of safe and effective concentration. Exposure to high concentrations for a prolonged period may cause renal impairment or ototoxicity. Patients with impaired renal function should be monitored closely while on gentamicin therapy because nephrotoxicity caused by gentamicin may be difficult to distinguish from symptoms of underlying renal disease. |
| **Analyzer** | **Minneapolis: Abbott Alinity c (Sunquest method code: MACC)****BACKUP:** Abbott Alinity c (Sunquest method code: MALIC) |
| **Sunquest Test Codes** | **GENT** |
| **Specimen** | Sample: Plasma or Serum (with or without gel barrier)**Preferred:** Lithium Heparin**Alternative:** SST, Sodium Heparin, K2-EDTA (plastic tube), K3-EDTA (glass tube)**Suggested Patient Preparation:**Samples should be drawn just prior to a dose (trough level) to confirm that an adequate dose has been prescribed. Peak specimen should be drawn 30 minutes after a 30 minute IV infusion.See Limitations section for more information.**Minimum sample volume:** 0.6 mL blood, 0.2 mL serum/plasma**Stability when separated from cells/gel:** **2 to 8°C:** 7 days**-10°C:** 14 days**Rejection criteria:** Unlabeled tube, sample type other than serum or acceptable plasma**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 directly to a properly labeled pilot tube.
5. Architect and Alinity systems utilize a specimen level detect mechanism, so special racks specific to tube-type are not required.
6. Minimum labeling includes sample accession ID, and/ or patient name, medical record number, collection date and time.
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|  | **Reagent Handling** Reagents are shipped refrigerated or on wet ice/cold packs. Upon receipt, place reagent cartridges in an upright position for 1 hour 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.**Immediately prior to loading on the analyzer, gently invert the cartridge 5 times. Check to ensure there are no bubbles.**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.
* Do not freeze.
* Do not expose reagents to temperatures above 32°C.
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| ***Product Description*** | ***Product Code*** | ***Stability*** |
| Abbott Alinity c Gentamicin Reagent Kit | 08P5520 | **Store at:** 2 to 8°C**Unopened:** Until manufacturer’s printed expiration Date**On-board**: 53 days |
| Abbott Alinity c TDM Multiconstituent Calibrator Kit | 08P7403 | **Store at:** 2 to 8°C**Unopened:** Until manufacturer’s printed expiration date**Opened expiration:** 60 Days |

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| **Risk and Safety** | **CAUTION:** This product contains human-sourced and/or potentially infectious components\**.* No known test method can offer complete assurance that products derived from human sources or inactivated microorganisms will not transmit infection. Therefore, all human sourced materials should be considered potentially infectious. It is recommended that these reagents and human specimens be handled in accordance with the OSHA Standard on Bloodborne Pathogens. Biosafety Level 2 or other appropriate biosafety practices should be used for materials that contain or are suspected of containing infectious agents.2-5 The human-sourced material used in Reagent 2 has been tested and found to be nonreactive for HBsAg, HCV RNA, HIV-1 Ag or HIV-1 RNA, anti-HCV and anti-HIV-1/HIV-2. *The following warnings and precautions apply to:* **R1****WARNING** Contains tris hydroxymethyl aminomethane\* and sodium azide. Causes mild skin irritation. Contact with acids liberates very toxic gas.*The following warnings and precautions apply to:* **R2** Contains sodium azide. Contact with acids liberates very toxic gas.No special disposal is required. Safety data sheets (MSDS/SDS) available on [Children’s Intranet](https://starnet.childrenshc.org/emergency-and-safety/) |
| **Calibration** |

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| Assay Range: | 0.5 to 10.0 µg/mL |
| Reference Material: | Abbott Alinity c TDM Multiconstituent Calibrator |
| Suggested Calibration Levels: | Approximate values:CAL 1: 0CAL 2: 0.5CAL 3: 1.5CAL 4: 3.0CAL 5: 6.0 CAL 6: 10.0 |
| Calibration Scheme: | 6 Levels |
| Calibration Frequency: | 28 Days, every new lot, if QC indicates a need for calibration, and may be necessary after maintenance to critical parts or after service procedures have been performed, as directed by Field Service rep. |
| AMR | AMR is verified with every calibration |

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| **Quality Control** | **QC Material:** Bio-Rad Liquichek™ Therapeutic Drug Monitoring Control Levels 1 and 3**Frequency:** Two levels each day of use**Stability:** Stable until the expiration date when stored frozen between -20 and -40°C. Once thawed, opened, and stored tightly capped at 2 to 8°C, this product is stable for 5 days in Minneapolis (due to estradiol in this control). **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 but no longer than 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**, gently swirl the contents until homogeneous with no visible signs of precipitate.

**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 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** | **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” No endogenous substances resulted in interference at a clinically significant level (less than 10%).Patient samples containing rheumatoid factor levels above 1240 IU/mL may produce erroneous results with this assay. |
| **Reference Intervals** | **Therapeutic ranges:****Trough level:** <2 µg/mL**Peak level**: 4-8 µg/mLThe physician must determine the most appropriate therapeutic range for each patient See Limitations section for important information. |
| **Critical Values** | >10 µg/mL, Critical results call result according to the Critical Values Policy |
| **Limitations** | * The aminoglycoside sisomicin cross-reacts with the Gentamicin assay due to their structural similarity. Therefore, the results of this assay cannot be used to accurately quantitate gentamicin serum or plasma levels in patients receiving sisomicin in combination with gentamicin.
* In very rare cases, patient samples may contain heterophile antibodies, which may produce low results with the Alinity c Gentamicin assay. Interfering heterophile antibodies occur at a low frequency in the general population. These antibodies can cause autoagglutination of the microparticle reagent leading to undetected erroneously low results.
* For diagnostic purposes, the test findings should always be assessed in conjunction with the patient’s medical history, clinical examinations, and other findings.
* Patient samples which contain the drug sisomicin will yield falsely elevated values for gentamicin. Refer to the Analytical Specificity section of this package insert for further explanation. However, this drug is not usually co-administered with gentamicin. High concentrations of penicillins or cephalosporins have been shown to inactivate gentamicin in vitro. The degree of inactivation is dependent on the particular aminoglycoside being measured, the type and concentration of the penicillin or cephalosporin that is also present, and the storage conditions of the sample. Samples from patients receiving additional antibiotics of these types should be assayed immediately or stored frozen.
* The susceptibility of the infecting organism, the severity of the infection, and the general health of the patient should be considered when determining an adequate drug level for individual patients.
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| **Dilutions** |

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| Max Auto Dilution: | 1:2 |
| Maximum Manual Dilution: | Not specified |
| Diluent: | Onboard diluent |
| Automated Dilution: | Follow Abbott [Alinity Operator’s Manual](https://starnet.childrenshc.org/References/labsop/chem/operator/alinity-ci-series-operations-manual.pdf) instructions for programming automated dilutions. The system will automatically calculate the concentration of the sample and report the result. If a diluted sample result is less than the lower value of the measuring interval of 0.5 µg/mL, do not report the result. Rerun and/or investigate for other possible causes of error. |

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| **Result Reporting** | * Results between 0.5 and 10.0 µg/mL without error messages are released
* Results below 0.5 without error messages are reported as < 0.5 µg/mL
* Results > 10.0 should be diluted using the onboard automated 1:2 dilution. Release results without error messages following this dilution and called according to the critical values policy.
* Results > 20.0 following automated dilution are reported as > 20.0 µg/mL and called according to the critical values policy.
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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 14 days in specimen storage freezer. |
| **References** | 1. Abbott Alinity c Gentamicin Reagent Kit Instructions for Use, Abbott Diagnostics Division, Abbott Park, IL USA. Revised September 2019
2. Abbott Alinity c TDM Multiconstituent Calibrator Package Insert, Abbott Diagnostics Division, Abbott Park, IL USA. Revised July 2018
3. Bio-Rad Liquichek Immunoassay Plus Package Insert, Bio-Rad Laboratories, Irvine CA USA.
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| **Historical Record** | **Version** | **Written/Revised by:** | **Effective Date:** | **Summary of Revisions** |
|  | Elauteria Earnhardt | April 24, 2020 | New Procedure for Abbott analyzers |
| 1 | Erin Bartos | October 28, 2020 | Added reference intervals, critical values, calibrators, AMR, fixed title, added dilutions, etc for new procedure. |