

REF



AU242033

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Intended Use

The Aurora Parathyroid Hormone Assay is a chemiluminescent microparticle immunoassay (CMIA) for the quantitative determination of Parathyroid Hormone (PTH) in human serum and plasma. This assay is intended for in vitro diagnostic use.

Summary

Parathyroid hormone (PTH) is a polypeptide that is synthesized and cleaved into an active form within the parathyroid gland. The initial structure formed is a pre-pro-PTH, a 115 amino acid polypeptide that is cleaved to form pro-PTH comprised of 90 amino acids. It is then cleaved a second time, again at the amino-terminal portion, to form active parathyroid hormone comprised of 84 amino acids. This is the primary hormone that is stored, secreted, and functions in the body.

Parathyroid hormone controls and regulates the levels of calcium in the blood and raise their levels when they are too low. This gland performs its function through its actions on the bones, intestine, and the kidneys. Elevated PTH levels usually associated with primary hyperparathyroidism, pseudohypoparathyroidism (Secondary hyperparathyroidism), Vit. D deficiency (hereditary) and rickets, Zollinger Ellison syndrome, chronic renal failure, Hypocalcemia and malabsorption. Decreased PTH levels may occur in Grave's disease (Hypoparathyroidism), non-Parathyroid hypercalcemia, Sarcoidosis, metastatic bone tumors, Vit. D intoxication, milk-alkali syndrome and DiGeorge syndrome.

Test Principle

The Aurora Parathyroid Hormone assay is a quantitative sandwich immunoassay to determine the presence of PTH in human serum and plasma using CMIA technology with flexible assay protocols.

1. Sample, and paramagnetic anti-PTH coated microparticles are mixed, PTH present in the sample binds to anti-PTH coated microparticles, forming an antigen antibody complex.
2. After incubation, a conjugate containing

acridinium-labeled anti-PTH is added to the reaction mixture and binds to unoccupied binding sites of the anti-PTH coated microparticles.

3. After further incubation and washing, Pre-Trigger and Trigger Solutions are added to the reaction mixture.
4. The resulting chemiluminescent reaction is measured as relative light units (RLUs). There is a relationship between the amount of PTH in the sample and the RLUs detected by the Optical system. Results are calculated automatically based on the previously established calibration curve.

Reagents

R1	3.0 mL
R2	3.0 mL
CAL	Contains 3 levels, 1.0 mL each level
CON	Contains 2 levels, 1.0 mL each level
R1:	<p>Microparticles. Anti-PTH coated microparticles. Preservative: 0.05% ProClin 300</p>
R2:	<p>Conjugate. Acridinium-labeled anti-PTH. Preservative: 0.05% ProClin 300</p>
CAL:	<p>Calibrator. Solutions of different concentrations of PTH. Preservative: 0.05% ProClin 300</p>
CON:	<p>Control. Tris buffer solution for quality control of Parathyroid Hormone (PTH)</p>

Required Materials

- Pre-Trigger Solution: Hydrogen peroxide solution.
- Trigger Solution: Sodium hydroxide solution.
- Wash Buffer: Phosphate buffered saline solution with 0.05% ProClin 300.

Safety Precautions

- Exercise the normal precautions required for handling all laboratory reagents.
- Disposal of all waste material should be in accordance with local guidelines.
- Wear gloves when handling specimens or reagents.
- Clean and disinfect all spills of specimens or reagents using a suitable disinfectant.
- Trigger solution contains sodium hydroxide (NaOH) and should be avoided contact with eyes.

Warning (Contains Proclin 300)

Hazardous Component: 0.05% Proclin 300

- Reaction mass of:
5-chloro-2-methyl-4-isothiazolin [EC no. 247-500-7]
and 2-methyl-4-isothiazolin-3-one [EC no.
200-239-6] (3:1)

Hazard Statement

- H317: May cause an allergic skin reaction.
- H319: Causes serious eye irritation.
- H410: Very toxic to aquatic life with long-lasting effects.

Precautionary Statement

- P261: Avoid breathing dust/fume/gas/mist/vapors/spray.
- P264: Wash hands thoroughly after handling.
- P272: Contaminated work clothing should not be allowed out of the workplace.
- P280: Wear protective gloves/protective clothing/eye protection/face protection.
- P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P337+P313: If eye irritation persists: Get medical advice/attention.
- P333+P313: If skin irritation or rash occurs: Get medical advice/attention.
- P302+P352: IF ON SKIN: Wash with plenty of soap and water.
- P321: Seek immediate care from a doctor.
- P363: Wash contaminated clothing before reuse.
- P273: Avoid release to the environment.
- P391: Collect spillage.
- P501: Dispose of contents/container in a safe way.

Reagent Handling

- Do not use reagent kits beyond the expiration date.
- Do not pool reagents within a kit or between kits.
- Before loading the reagent kit on the system for the first time, the microparticle bottle requires mixing to resuspend microparticles that may have settled during shipment.
- Septums MUST be used to prevent reagent

evaporation and contamination and to ensure reagent integrity. Reliability of assay results cannot be guaranteed if septums are not used according to the instructions in this package insert.

- To avoid contamination, wear clean gloves when placing a septum on an uncapped reagent bottle.
- Once a septum has been placed on an open reagent bottle, do not invert the bottle as this will result in reagent leakage and may compromise assay results.

Reagent Storage

REAGENT	Storage Temperature	Maximum Storage Time
Unopened	2°C~8°C Do not freeze.	12 months
On board/Opened	2°C~8°C Do not freeze.	28 days

- Reagents may be stored on or off the chemiluminescence immunoassay analyzer. If reagents are removed from the analyzer, store them at 2-8°C (with septums and replacement caps) in an upright position. For reagents stored off the system, it is recommended that they be stored in their original trays and boxes to ensure they remain upright. If the microparticle bottle does not remain upright (with a septum installed) while in refrigerated storage off the system, the reagent kit must be discarded.

Calibrator & Control Storage

CAL	CON	Storage Temperature	Maximum Storage Time
Unopened		2°C~8°C	12 months
Opened		2°C~8°C	30 days

Applicable Analyzer

Automatic Chemiluminescence Immunoassay Analyzer (model: Aurora S-01 System).

Specimen Types

Verified specimen types to be used with this assay:

Specimen Types	Collection Tubes
Serum	Serum separator tubes (SST)
Plasma	Dipotassium EDTA Tripotassium EDTA Sodium heparin

Lithium heparin powder Plasma separator tubes (PST) -lithium heparin gel
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- Other specimen collection tube types have not been tested with this assay.
- Liquid anticoagulants may have a dilution effect resulting in lower concentrations for individual patient specimens.
- The instrument does not provide the capability to verify specimen type. It is the responsibility of the operator to verify that the correct specimen types are used in the assay.

Specimen Conditions

Do not use specimens with the following conditions:

- Heat-inactivated
- Pooled
- Grossly hemolyzed (> 500 mg/dl hemoglobin)
- Obvious microbial contamination
- Fungal growth
- 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.
- To prevent cross contamination, use of disposable pipettes or pipette tips is recommended.

Preparation for Analysis

- Follow the tube manufacturer’s processing instructions for collection tubes. Gravity separation is not sufficient for specimen preparation.
- Mix thawed specimens thoroughly by low speed vortexing or by inverting 10 times. Visually inspect the specimens. If layering or stratification is observed, continue mixing until specimens are visibly homogeneous.
- Avoid more than 1 freeze/thaw cycles.
- To ensure consistency in results, specimens must be transferred to a centrifuge tube and centrifuged for a minimum of 30,000 g-minutes before testing if they contain fibrin, red blood cells, or other particulate matter, they were previously frozen.
- Examples of acceptable time and force ranges that meet this criterion are listed in the table below.

Centrifugation time using alternate Relative Centrifugal Force values (RCF) can be calculated using the following formula:

Centrifugation Time (Minutes)	RCF (xg)	g × minutes
10	3,000	30,000
15	2,000	30,000
20	1,500	30,000

- Transfer clarified specimen to a sample cup or secondary tube for testing. For centrifuged specimens with a lipid layer, transfer only the clarified specimen and not the lipemic material.
- Inspect all specimens for bubbles. Remove bubbles with an applicator stick before analysis. Use a new applicator stick for each specimen to prevent cross contamination.

Specimen Storage

Specimen Type	Storage Temperature	Maximum Storage Time
Serum/Plasma	Room temperature	≤ 8 hours
	2°C~8°C	≤ 3 days
	-20°C	≤ 90 days

- Remove serum or plasma from the clot, red blood cells, or separator gel if stored longer than the maximum room temperature storage time.
- Remove serum or plasma from the clot, red blood cells, or separator gel if stored longer than the maximum 2-8°C storage time and store frozen.
- Frozen specimens must be mixed thoroughly after thawing.
- Use caution in handling patient specimens to prevent cross-contamination.
- Do not exceed the storage limitations listed above.

Assay Procedure

- Refer to the system operating instruction or the online help system for detailed information on preparing the system.
- Before loading the reagent kit on the system for the first time, the microparticle bottle requires mixing to resuspend microparticles that may have settled during shipment. After the first time the

microparticles have been loaded, no further mixing is required.

- Invert the microparticle bottle 30 times. Visually inspect the bottle to ensure microparticles are resuspended. If microparticles are still adhered to the bottle, continue to invert the bottle until the microparticles have been completely resuspended. If the microparticles do not resuspend, DO NOT USE. Once the microparticles have been resuspended, place a septum on the bottle.
 - Load the reagent kit on the chemiluminescence immunoassay analyzer.
 - Verify that all necessary reagents are present.
 - Verify adequate sample volume is present prior to running the test.
 - Sample volume for first test: 250 µL
 - Sample volume for each additional test from same sample cup: 50 µL
 - The test-specific parameters stored in barcode on the reagent pack are read in. In cases the barcode cannot be read, enter the sequence numbers
 - Order calibration, if necessary.
 - Prepare Parathyroid Hormone Calibrators and Controls.
 - Mix calibrator(s) and controls by gentle inversion before use.
 - Hold bottles vertically and dispense recommended volumes into each respective sample cup.
 - Place the calibrators in the calibrator rack in the sample zone.
 - Calibration.
 - Load samples. For information on loading samples, refer to the Analyzer's Operations Manual.
 - Press RUN.
 - The chemiluminescence immunoassay analyzer performs all the functions automatically and calculates the results.
- For optimal performance, it is important to perform routine maintenance as described in the Analyzer's Operations Manual. Perform maintenance more frequently when required by laboratory procedures.

Sample Dilution Procedures

- Samples with a PTH value exceeding 5000 pg/mL

may be diluted using the Manual Dilution Procedure.

Manual Dilution Procedure

Suggested dilution: 1:10

- Add 100 µL of the sample to 900 µL of Stroke physiological saline solution or dilutions.
- The operator must enter the dilution factor in the Patient or Control order screen. The system will use this dilution factor to automatically calculate the concentration of the sample before dilution and report the result.

Calibration

- Traceability: This assay has been standardized against the NIBSC 79/500.
- Every PTH assay kit has a two-dimension code label containing the predefined master curve of the particular reagent lot.
- Test Calibrators in duplicate. The calibrators should be priority loaded. A replicate of each control level must be tested to evaluate the assay calibration. Ensure that assay control values are within the ranges specified in the respective control package insert.
- Once calibration is accepted and stored, all subsequent samples may be tested without further calibration unless:
 - After 28 days when using the same lot reagent.
 - A reagent kit with a new lot number is used.
 - Controls are out of range.
 - Required by pertinent regulations.
 - Assay may also need to be recalibrated after specified service procedures have been performed or maintenance to critical part or subsystems that might influence the performance of the assay. For detailed information on how to perform an assay calibration, refer to the Analyzer's Operations Manual.
- Calibration Range: 2.5 pg/mL ~ 5000 pg/mL.

Quality Control Procedures

- Order Control, if necessary.
- The recommended control requirement for the PTH assay is that a single replicate of each control level be tested:

- Once every 24 hours or each day of use
- After performing calibration
- After instrument service procedures or maintenance that may affect assay performance have been performed.
- If the quality control procedures in your laboratory require more frequent use of controls to verify test results, follow your laboratory-specific procedures.
- Each laboratory should establish control ranges to monitor the acceptable performance of the assay. If a control is out of its specified range, the associated sample results are invalid and the samples must be retested. Recalibration may be indicated.
- These results should be applied to your laboratory's quality control practices. In addition, the laboratory must ensure that the matrix of the control material is suitable for use in the assay per the assay package insert.
- Unless specified, target values and ranges provided with the commercial control product insert are guidelines only and should not be used for quality control purposes.
- Refer to Clinical and Laboratory Standards Institute (CLSI) Document C24-A3, or other published guidelines for general quality control recommendations.

Results

Calculation

- The analyzer automatically calculates the concentration of each sample. The results are given in pg/mL.

Alternate Result Units

- The default result unit for the PTH assay is pg/mL. When the alternate result unit, pmol/L, is selected, the conversion factor used by the system is 0.106.
- Conversion Formula:
- $(\text{Concentration in pg/mL}) \times (0.106) = \text{Concentration in pmol/L}$.

Limits

- Results should be used in conjunction with other data; e.g., symptoms, results of other tests, and clinical impressions.

- If the PTH results are inconsistent with clinical evidence, additional testing is recommended.
- Specimens from patients who have received preparations of mouse monoclonal antibodies for diagnosis or therapy may contain human anti-mouse antibodies (HAMA). Such specimens may show either falsely elevated or depressed values when tested with assay kits that employ mouse monoclonal antibodies. Additional information may be required for diagnosis.
- Heterophilic antibodies in human serum can react with reagent immunoglobulins, interfering with in vitro immunoassays. Patients routinely exposed to animals or to animal serum products can be prone to this interference, and anomalous values may be observed. Additional information may be required for diagnosis.
- Rheumatoid factor (RF) in human serum can react with reagent immunoglobulins, interfering with in vitro immunoassays. Additional information may be required for diagnosis.
- The Aurora Parathyroid Hormone assay is susceptible to interference effects from triglycerides at > 500 mg/dL.
- There is no high-dose HOOK effect at PTH concentrations up to 500000 pg/mL.

Expected Values

- It is recommended that each laboratory establish its own reference range, which may be unique to the population it serves depending upon geographical, season, patient, dietary, or environmental factors. A study was performed based on guidance from Clinical and Laboratory Standards Institute (CLSI) C28-A3c.
- Human serum specimens from apparently healthy individuals were collected the 124 specimens, 62 were female and 62 were male, age between 21 and 90 years.

The population	n	Reference range*
Apparently healthy individuals	124	16.8 pg/mL~68.9 pg/mL

*According to the 2.5th~97.5th percentile.

*Representative data; results in individual laboratories and in different geographical areas may

vary from these data.

Specific Performance Characteristics

- Data in this section were generated using the Aurora S-01 System.
- Assay results obtained in individual laboratories may vary from data presented.

Limit of Blank (LoB) and Limit of Detection (LoD)

- The Limit of Blank and The Limit of Detection were determined in accordance with the CLSI (Clinical and Laboratory Standards Institute) EP17-A requirements.
- The Limit of Blank is the 95th percentile value from $n \geq 20$ measurements of analyte-free samples over several independent series. The Limit of Blank corresponds to the concentration below which analyte-free samples are found with a probability of 95 %.
- The observed LoB value was ≤ 1.5 pg/mL.
- The observed LoD value was ≤ 2.5 pg/mL.

Accuracy

Intra Assay Variation

- Within run variation was determined by replicate determination ($n=10$) of three different control sera in one assay. The within assay variability is $\leq 8.0\%$.

Inter Assay Variation

- Between run variation was determined by replicate measurements ($n=10$) of three different control sera in 3 different lots. The between assay variability is $\leq 15.0\%$.

Intra-Assay, n=10			Inter-Assay, n=10x3		
Sample	Mean (pg/mL)	CV	Sample	Mean (pg/mL)	CV
1	19.819	6.34%	1	19.536	6.64%
2	1089.743	2.92%	2	1021.414	5.37%

Linearity

- The linearity was determined in accordance with the CLSI (Clinical and Laboratory Standards Institute) EP6-A requirements.
- The linearity range was verified by more than 6 concentration levels which encompass or be equal

to the minimum and the maximum values of linearity range and duplicate assays ($n=3$) at all levels.

- The Aurora Parathyroid Hormone assay has been demonstrated to be linear from 2.5 pg/mL to 5000 pg/mL, regression ≥ 0.99 and max diff $\leq 15\%$ in this interval.

Specificity

Cross-Reactivity

- A study was performed based on guidance from CLSI EP7-A2.
- The cross-reactants listed below (Using PTH -free samples) were evaluated to determine whether PTH concentrations were affected when using the Aurora Parathyroid Hormone assay.

Cross-Reactant	Cross-Reactant Concentration	Results
PTH (1~34)	10000 pg/mL	≤ 6 pg/mL
PTH (39~84)	10000 pg/mL	≤ 6 pg/mL

Interference

- A study was performed based on guidance from CLSI EP7-A2.
- Potentially interfering substances were evaluated to determine whether PTH concentrations were affected when using the Aurora Parathyroid Hormone assay. Samples containing the potential interferents were prepared at two PTH concentrations. The samples were assayed, and the PTH concentrations of the spiked samples were compared to the reference samples.

Potential Interferent	Interferent Concentration	% Interferent Bias
Bilirubin	20 mg/dL	$\leq 10\%$
Hb	500 mg/dL	$\leq 10\%$
Intralipid	1000 mg/dL	$\leq 10\%$
Total protein	10 g/dL	$\leq 10\%$
RF	1000IU/mL	$\leq 10\%$
ANA	400AU/mL	$\leq 10\%$
HAMA	600ng/mL	$\leq 10\%$

Reference

1. Hans SK, Levine SN. StatPearls [Internet].

StatPearls Publishing; Treasure Island (FL): Jul 18, 2021. Hypoparathyroidism.

2. Goyal A, Anastasopoulou C, Ngu M, Singh S. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Aug 8, 2021. Hypocalcemia.

3. Lyu P, Li B, Li P, et al. Parathyroid Hormone 1 Receptor Signaling in Dental Mesenchymal Stem Cells: Basic and Clinical Implications. Front Cell Dev Biol. 2021; 9:654715.

4. Wein MN, Kronenberg HM. Regulation of Bone Remodeling by Parathyroid Hormone. Cold Spring Harb Perspect Med. 2018 Aug 1;8(8): a031237.

5. Lombardi G, Ziemann E, Banfi G, Corbetta S. Physical Activity-Dependent Regulation of Parathyroid Hormone and Calcium-Phosphorous Metabolism. Int J Mol Sci. 2020;21(15):5388.

6. Khan ZF, Lew JI. Intraoperative Parathyroid Hormone Monitoring in the Surgical Management of Sporadic Primary Hyperparathyroidism. Endocrinol Metab (Seoul). 2019;34(4):327-339.

7. Bastepe M, Turan S, He Q. Heterotrimeric G proteins in the control of parathyroid hormone actions. J Mol Endocrinol. 2017;58(4): R203-R224.

8. Pekkolay Z, Altun Tuzcu Ş. Importance of Parathyroid Hormone Needle Aspiration Washout in Adenoma Localization in Primary Hyperparathyroidism. Med Sci Monit. 2019; 25:1694-1698.

Symbols



Manufacturer



Date of manufacture



Use-by date



Contains sufficient for <n> tests



Consult instructions for use



Biological risks



Temperature limit



CE Marking



EU Representative



In Vitro diagnostic medical device



Catalogue Number



Batch code



Reagent



Microparticles



Conjugate



Calibrator



Control

Contact Information



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Release Date: Date of Manufacture: