SIEMENS Healthineers

Intact Parathyroid Hormone (PTH)

Current Revision and Date[a]	Rev. 05, 2021-03	
Product Name	Atellica IM Intact Parathyroid Hormone (PTH)	REF 10995621 (190 tests) REF 10995622 (950 tests)
Abbreviated Product Name	Atellica IM PTH	
Test Name/ID	PTH	
Systems	Atellica IM Analyzer	
Optional Materials	Atellica IM PTH QC	REF 10995626
	Atellica IM Multi-Diluent 13	REF 10995643
	Atellica IM PTH MCM	REF 10995625
Specimen Types	Serum, EDTA plasma, lithium heparin plasma, sodium heparin plasma	
Sample Volume	25 µL	
Measuring Interval	6.3–2000.0 pg/mL (0.7–212.0 pmol/L)	

[a] A vertical bar in the page margin indicates technical content that differs from the previous version.

Intended Use

The Atellica® IM Intact Parathyroid Hormone (PTH) assay is for *in vitro* diagnostic use in the quantitative determination of intact parathyroid hormone in human serum and plasma using the Atellica® IM Analyzer.

This assay is intended to be used to aid in the differential diagnosis of hyperparathyroidism, hypoparathyroidism, or disorders of calcium metabolism. This assay can be used intra-operatively.

Summary and Explanation

Parathyroid hormone (also known as parathormone or parathyrin) is secreted by the chief cells of the parathyroid glands as a polypeptide that contains 84 amino acids. PTH has a molecular weight of 9.4 kDa and is excreted through the kidneys with a half-life of approximately 4 minutes. PTH is the most important endocrine regulator of circulating calcium and phosphorus concentrations. Its contribution to calcium homeostasis is accomplished through its effects on bone, kidney, and intestine.

Abnormally low ionized calcium concentrations trigger the secretion of PTH. The hormone stimulates osteoclastic bone resorption and transcellular calcium reabsorption from the renal tubules. Additionally, PTH indirectly stimulates calcium absorption in the small intestine by stimulating synthesis of 1,25-dihydroxyvitamin D in the kidney.[1-4] Conversely, if calcium levels are abnormally elevated, the parathyroid glands reduce PTH production through a negative feedback mechanism.[4]

Quantification of circulating intact PTH assists in the differential diagnosis of hypercalcemia and hypocalcemia. In conjunction with the measurement of ionized calcium, intact PTH evaluations can be used to distinguish between patients with hyperparathyroidism, hypoparathyroidism, or hypercalcemia of malignancy. The diagnosis of primary hyperparathyroidism, a common cause of hypercalcemia, is confirmed by elevated ionized calcium concentrations and normal or elevated PTH concentrations.

Intact PTH levels are also used to assess and manage other metabolic bone disorders, including osteoporosis and renal osteodystrophy.[5,6] Additionally, intra-operative PTH measurement can be used, in conjunction with improved pre-operative localization methods (ultrasound and Sesta-MIBI scan), to control the success of parathyroidectomy for both primary and renal hyperparathyroidism.

The National Academy of Clinical Biochemistry[7] recommends the use of intra-operative parathyroid hormone testing for:

- Patients undergoing initial surgery for primary hyperparathyroidism
- Patients undergoing re-operative hyperparathyroidism
- During pre-operative localization in patients with primary hyperparathyroidism.

PTH values can vary depending on the testing procedure used. When monitoring patients over time, PTH values obtained with different methods should not be used interchangeably.

Principles of the Procedure

The Atellica IM PTH assay is a 2-site sandwich immunoassay using direct chemiluminescent technology, which uses constant amounts of 2 anti-human PTH antibodies. The first antibody, in the Lite Reagent, is a mouse monoclonal anti-human PTH (N-terminal) antibody labeled with acridinium ester. The second antibody is a biotinylated mouse monoclonal anti-human PTH (C-terminal) antibody that is bound to streptavidin-coated paramagnetic latex particles in the Solid Phase.

A direct relationship exists between the amount of intact PTH present in the patient sample and the amount of relative light units (RLUs) detected by the system.

Reagents

Material Description	Storage	Stability[a]
Atellica IM PTH ReadyPack® primary reagent pack **Lite Reagent** 9.5 mL/reagent pack Acridinium ester-labeled mouse monoclonal anti-human PTH antibody (~0.6 mg/L) in buffered saline; mouse gamma globulin; bovine serum albumin; preservatives **Solid Phase** 19.0 mL/reagent pack Biotinylated mouse monoclonal anti-human PTH antibody bound to streptavidin-coated paramagnetic particles (~0.4 g/L) in buffered saline; bovine gamma globulin; bovine serum albumin; preservatives	Unopened at 2–8°C Onboard	Until expiration date on product 60 days

Material Description	Storage	Stability[a]
Atellica IM PTH CAL 1.0 mL/vial; lyophilized After reconstitution, low or high levels of intact PTH synthetic peptide; buffered saline; human EDTA plasma (10%); serine protease inhibitor; surfactants; preservatives	Lyophilized at 2–8°C	Until expiration date on product
	Reconstituted at ≤ -20°C	60 days; thaw 1 time
	Reconstituted at room temperature	8 hours
	Atellica® Sample Handler[b]	
Atellica IM Multi-Diluent 13 ReadyPack ancillary reagent pack[c] 10.0 mL/pack Buffer; surfactant; sodium azide (< 0.1%)	Unopened at 2–8°C	Until expiration date on product
	Onboard	28 days

[a] Refer to *Storage and Stability*.

[b] Refer to the supplementary document "Atellica Sample Handler Calibrator and QC Storage and Stability" for information about storage and stability of materials in the Cal-QC tube storage area.

[c] Refer to *Optional Materials*.

Warnings and Precautions

For *in vitro* diagnostic use.

For Professional Use.

CAUTION

Federal (USA) law restricts this device to sale by or on the order of a licensed healthcare professional.

Safety data sheets (SDS) available on siemens.com/healthineers.

H411
P273, P391, P501

Toxic to aquatic life with long lasting effects.
Avoid release to the environment. Collect spillage. Dispose of contents and container in accordance with all local, regional, and national regulations.
Contains: 2-methyl-2H-isothiazol-3-one (in Atellica IM PTH CAL)

Contains: 2-methyl-2H-isothiazol-3-one. May produce an allergic reaction.
(Atellica IM PTH CAL)

CAUTION POTENTIAL BIOHAZARD

Contains human source material. Each donation of human blood or blood component was tested by FDA-approved methods for the presence of antibodies to human immunodeficiency virus type 1 (HIV-1) and type 2 (HIV-2), as well as for hepatitis B surface antigen (HBsAg) and antibody to hepatitis C virus (HCV). The test results were negative (not repeatedly reactive). No test offers complete assurance that these or other infectious agents are absent; this material should be handled using good laboratory practices and universal precautions.[8–10]

CAUTION

This device contains material of animal origin and should be handled as a potential carrier and transmitter of disease.

Contains sodium azide as a preservative. Sodium azide can react with copper or lead plumbing to form explosive metal azides. On disposal, flush reagents with a large volume of water to prevent buildup of azides. Disposal into drain systems must be in compliance with prevailing regulatory requirements.

Dispose of hazardous or biologically contaminated materials according to the practices of your institution. Discard all materials in a safe and acceptable manner and in compliance with prevailing regulatory requirements.

Note For information about reagent preparation, refer to *Preparing the Reagents* in the *Procedure* section.

Note For information about calibrator preparation, refer to *Preparing the Calibrators*.

Storage and Stability

Store reagents in an upright position. Protect the product from heat and light sources. Unopened reagents are stable until the expiration date on the product when stored at 2–8°C.

Store calibrators in an upright position. Lyophilized calibrators are stable until the expiration date on the product when stored at 2–8°C. Freeze reconstituted product at ≤ -20°C for up to 60 days; thaw 1 time. Reconstituted calibrators are stable for 8 hours at room temperature.

Store Atellica IM Multi-Diluent 13 in an upright position. Unopened Atellica IM Multi-Diluent 13 is stable until the expiration date on the product when stored at 2–8°C.

Do not use products beyond the expiration date printed on the product labeling.

Onboard Stability

Reagents are stable onboard the system for 60 days. Discard reagents at the end of the onboard stability interval.

Note Refer to the supplementary document "Atellica Sample Handler Calibrator and QC Storage and Stability" for information about storage and stability of materials in the Cal-QC tube storage area.

Atellica IM Multi-Diluent 13 is stable onboard the system for 28 days.

Do not use products beyond the expiration date printed on the product labeling.

Specimen Collection and Handling

Serum and plasma (EDTA, lithium heparin, and sodium heparin) are the recommended sample types for this assay.

Collecting the Specimen

- Observe universal precautions when collecting specimens. Handle all specimens as if they are capable of transmitting disease.[10]
- Follow recommended procedures for collection of diagnostic blood specimens by venipuncture.[11]
- Follow the instructions provided with your specimen collection device for use and processing.[12]
- Allow blood specimens to clot completely before centrifugation.[9]
- Keep tubes capped at all times.[9]
- For serum specimens, complete clot formation should take place before centrifugation. Serum should be physically separated from cells as soon as possible with a maximum limit of 2 hours from the time of collection.[9]
- Centrifuge samples at ≥ 1000 x g for 15–20 minutes.

Storing the Specimen

Correct handling of patient samples is critical to ensure the integrity of the intact PTH molecule. Intact PTH has been demonstrated to be labile and is susceptible to fragmentation. This instability depends on both time and temperature. Patient sample stability is outlined in the following table:

		Plasma Stability		
Temperature	**Serum Stability**	**EDTA**	**Lithium Heparin**	**Sodium Heparin**
25°C	8 hours	25 hours	9 hours	9 hours
2–8°C	8 hours	14 days	72 hours	72 hours
≤ -20°C	1 month	Not recommended	Not recommended	Not recommended

Note Thawed frozen specimens must be clarified by centrifugation prior to testing.

The handling and storage information provided here is based on data or references maintained by the manufacturer. It is the responsibility of the individual laboratory to use all available references and/or its own studies when establishing alternate stability criteria to meet specific needs.

Transporting the Specimen

Package and label specimens for shipment in compliance with applicable federal and international regulations covering the transport of clinical specimens and etiological agents.

Preparing the Samples

This assay requires 25 µL of sample for a single determination. This volume does not include the unusable volume in the sample container or the additional volume required when performing duplicates or other tests on the same sample. For information about determining the minimum required volume, refer to the online help.

The sample volume required to perform onboard dilution differs from the sample volume required to perform a single determination. Refer to *Dilutions*.

Note Do not use specimens with apparent contamination.

Before placing samples on the system, ensure that samples are free of:

- Bubbles or foam.
- Fibrin or other particulate matter.

Note Remove particulates by centrifugation according to CLSI guidance and the collection device manufacturer's recommendations.[9]

Note For a complete list of appropriate sample containers, refer to the online help.

Procedure

Materials Provided

The following materials are provided:

REF	Contents	Number of Tests
10995621	1 ReadyPack primary reagent pack containing Atellica IM PTH Lite Reagent and Solid Phase Atellica IM PTH master curve and test definition MC TDEF 1 vial Atellica IM PTH CAL low calibrator CAL L 1 vial Atellica IM PTH CAL high calibrator CAL H Atellica IM PTH CAL calibrator lot-specific value sheet CAL LOT VAL	190
10995622	5 ReadyPack primary reagent packs containing Atellica IM PTH Lite Reagent and Solid Phase Atellica IM PTH master curve and test definition MC TDEF 2 vials Atellica IM PTH CAL low calibrator CAL L 2 vials Atellica IM PTH CAL high calibrator CAL H Atellica IM PTH CAL calibrator lot-specific value sheet CAL LOT VAL	950

Materials Required but Not Provided

The following materials are required to perform this assay, but are not provided:

REF	Description
	Atellica IM Analyzer[a]

[a] Additional system fluids are required to operate the system: Atellica IM Wash, Atellica IM Acid, Atellica IM Base, and Atellica IM Cleaner. For system fluid instructions for use, refer to the Document Library.

Optional Materials

The following materials may be used to perform this assay, but are not provided:

REF	Description	
10995626	Atellica IM PTH QC (quality control material)	2 x 1.0 mL quality control level 1 CONTROL 1 2 x 1.0 mL quality control level 2 CONTROL 2 2 x 1.0 mL quality control level 3 CONTROL 3 Quality control lot-specific value sheet CONTROL LOT VAL
10995643	Atellica IM Multi-Diluent 13 (diluent)	2 ReadyPack ancillary reagent packs containing 10.0 mL/pack DIL
10995625	Atellica IM PTH MCM (master curve material)	5 x 1.0 mL levels of master curve material MCM

Assay Procedure

The system automatically performs the following steps:

1. Dispenses 25 µL of sample into a cuvette.
2. Dispenses 50 µL of Lite Reagent and 100 µL of Solid Phase, then incubates for 8 minutes at 37°C.

3. Separates, aspirates, then washes the cuvette with Atellica IM Wash.
4. Dispenses 300 µL each of Atellica IM Acid and Atellica IM Base to initiate the chemiluminescent reaction.
5. Reports results.

Preparing the Reagents

All reagents are liquid and ready to use. Before loading primary reagent packs onto the system, mix them by hand and visually inspect the bottom of the reagent pack to ensure that all particles are resuspended. For information about preparing the reagents for use, refer to the online help.

Preparing the System

Ensure that the system has sufficient reagent packs loaded in the reagent compartment. The system automatically mixes reagent packs to maintain homogeneous suspension of the reagents. For information about loading reagent packs, refer to the online help.

For automated dilutions, ensure that Atellica IM Multi-Diluent 13 is loaded on the system.

Master Curve Definition

Before initiating calibration on each new lot of reagent, load the assay master curve and test definition values by scanning the MC TDEF 2D barcodes. For loading instructions, refer to the online help.

Performing Calibration

For calibration of the Atellica IM PTH assay, use the calibrators provided with each kit.

Calibration Frequency

Perform a calibration if one or more of the following conditions exist:

- When changing lot numbers of primary reagent packs.
- At the end of the lot calibration interval, for a specified lot of calibrated reagent on the system.
- At the end of the pack calibration interval, for calibrated reagent packs on the system.
- When indicated by quality control results.
- After major maintenance or service, if indicated by quality control results.

At the end of the onboard stability interval, replace the reagent pack on the system with a new reagent pack. Recalibration is not required, unless the lot calibration interval is exceeded.

Stability Interval	Days
Lot Calibration	91
Pack Calibration	60
Reagent Onboard Stability	60

For information about lot calibration and pack calibration intervals, refer to the online help.

Follow government regulations or accreditation requirements for calibration frequency. Individual laboratory quality control programs and procedures may require more frequent calibration.

Preparing the Calibrators

Prepare calibrators using the following steps:

1. Add 1.0 mL of special reagent water into each vial using a precision pipet. Replace cap.

   Note For information about special reagent water requirements, refer to the online help.

2. Let the vials stand for 30 minutes at room temperature to allow the lyophilized material to dissolve.
3. Gently mix and invert the vials to ensure homogeneity of the material.
4. For extended storage, aliquot and seal tightly. Store reconstituted material according to stability limits specified in *Storage and Stability*. Do not store in a frost-free freezer.

   Note Before using frozen calibrators, allow the material to completely thaw. Gently mix and invert the vials to ensure homogeneity of the material. Use immediately and discard any remaining material.

Note Use calibrators within the stability limits specified in *Storage and Stability* and discard any remaining material.

Calibration Procedure

The required sample volume for testing depends on several factors. For information about sample volume requirements, refer to the online help.

Use the following lot-specific materials to perform calibration:

- For the master curve and assay test definitions, refer to the lot-specific master curve and test definition sheet MC TDEF provided with the assay reagents.
- Calibrators provided in an assay kit must only be used with reagents from that assay kit lot. Do not use calibrators from one assay kit with reagents from a different assay kit lot.
- For the calibrator definitions, refer to the lot-specific value sheet CAL LOT VAL provided with the calibrator materials.
- Generate lot-specific barcode labels to use with the calibrator samples.

For instructions about how to perform the calibration procedure, refer to the online help.

Performing Quality Control

For quality control of the Atellica IM PTH assay, use the Atellica IM PTH QC or an equivalent product of known analyte concentration at least once during each day that samples are analyzed. Use the quality control material in accordance with the quality control instructions for use.

For the assigned values, refer to the lot-specific value sheet CONTROL LOT VAL provided. A satisfactory level of performance is achieved when the analyte values obtained are within the expected control interval for the system or within your interval, as determined by an appropriate internal laboratory quality control scheme. Follow your laboratory's quality control procedures if the results obtained do not fall within the acceptable limits. For information about entering quality control definitions, refer to the online help.

Follow government regulations or accreditation requirements for quality control frequency. Individual laboratory quality control programs and procedures may require more frequent quality control testing.

Test quality control samples after a successful calibration.

Taking Corrective Action

If the quality control results do not fall within the assigned values, do not report results. Perform corrective actions in accordance with established laboratory protocol. For suggested protocol, refer to the online help.

Results

Calculation of Results

The system determines the result using the calculation scheme described in the online help. The system reports results in pg/mL (common units) or pmol/L (SI units), depending on the units defined when setting up the assay.

Conversion formula: 1 pg/mL (common units) = 0.106 pmol/L (SI units)

For information about results outside the specified measuring interval, refer to *Measuring Interval*.

Dilutions

The assay measuring interval for serum and plasma is 6.3–2000.0 pg/mL (0.7–212.0 pmol/L). For information about dilution options, refer to the online help.

Patient samples that have total intact PTH levels > 2000.0 pg/mL (> 212.0 pmol/L) must be diluted and retested to obtain accurate results.

For automated dilutions, ensure that Atellica IM Multi-Diluent 13 is loaded on the system. Ensure that sufficient sample volume is available to perform the dilution and that the appropriate dilution factor is selected when scheduling the test, as indicated in the table below.

For automatic dilutions, enter a dilution setpoint ≤ 2000 pg/mL (212 pmol/L).

Sample	Dilution	Sample Volume (µL)
Serum and plasma	1:5	40

When diluted samples result in intact PTH concentrations > 10,000 pg/mL (1060 pmol/L), report results as > 10,000 pg/mL (1060 pmol/L).

Interpretation of Results

Results of this assay should always be interpreted in conjunction with the patient's medical history, clinical presentation, and other findings.

Limitations

The following information pertains to limitations of the assay:

- Interpretation of intact PTH values should always take into account serum calcium results and the interrelationship between these 2 elements in various disorders involving PTH and calcium. It is recommended that the intact PTH results should always be interpreted with caution and with consideration of the overall clinical manifestations even when used in conjunction with calcium values.
- Some overlap of intact PTH values does exist for patients with various parathyroid disorders. Measurement of intact PTH is useful in differentiating between hypercalcemia due to hyperparathyroidism and hypercalcemia of malignancy. However, the assay is not intended as, and should not be relied upon as, a diagnostic indicator of malignancy.
- It is extremely important to ensure that patient samples have been handled and stored correctly. Incorrect handling of samples will result in a loss of intact PTH.

- The Atellica IM PTH assay will detect non-intact PTH, such as PTH fragment (7-84). PTH fragment (7-84) may cause falsely elevated PTH results in patients with abnormal renal function because these patients may have various concentrations of PTH fragment (7-84) in their blood. In patients with abnormal renal function, interpret the PTH result with caution, and do not make patient management decisions on the PTH result alone. A study of characterized PTH fragments is provided in Lopez et al "Selected Reaction Monitoring-Mass Spectrometric Immunoassay Responsive to Parathyroid Hormone and Related Variants."[13]
- Patient samples may contain heterophilic antibodies that could react in immunoassays to give falsely elevated or depressed results. This assay is designed to minimize interference from heterophilic antibodies.[14,15] Additional information may be required for diagnosis.

Expected Values

The reagent formulations used on the Atellica IM Analyzer are the same as those used on the ADVIA Centaur® system. Expected values were established using the ADVIA Centaur system and confirmed by assay comparison. Refer to *Assay Comparison*.

Matched EDTA plasma and serum samples were obtained from 142 apparently healthy individuals with normal levels of calcium, creatinine, vitamin D, and TSH.

The expected results (from 95% of the values) are:

- Plasma: 18.4–80.1 pg/mL (1.95–8.49 pmol/L)
- Serum: 18.5–88.0 pg/mL (1.96–9.33 pmol/L)

As with all *in vitro* diagnostic assays, each laboratory should determine its own reference interval for the diagnostic evaluation of patient results.[16] Consider these values as guidance only.

Performance Characteristics

The reagent formulations used on the Atellica IM Analyzer are the same as those used on the ADVIA Centaur system. Some performance characteristics for the Atellica IM assay were established using the ADVIA Centaur system.

Measuring Interval

The Atellica IM PTH assay provides results from 6.3–2000.0 pg/mL (0.7–212.0 pmol/L). Report results below the measuring interval as < 6.3 pg/mL (0.7 pmol/L). The low end of the measuring interval is constrained by the low end of the measuring interval of the predicate assay. When sample results exceed the measuring interval, refer to *Dilutions*.

Specificity

Cross-reactivity was determined in accordance with CLSI Document EP07-A2[17] using the Atellica IM Analyzer. Samples were spiked with the PTH fragments and compounds listed below at the indicated levels. The following results were obtained:

Substance	Substance Test Concentration pg/mL	Analyte Concentration pg/mL (pmol/L)	Cross-Reactivity (%)
β-Cross Laps	10,000	0.0 (0.0)	< 0.1
	10,000	12.0 (1.3)	< 0.1
Calcitonin	100,000	0.0 (0.0)	< 0.1
	100,000	11.9 (1.3)	< 0.1

Substance	Substance Test Concentration pg/mL	Analyte Concentration pg/mL (pmol/L)	Cross-Reactivity (%)
Osteocalcin	50,000	0.0 (0.0)	< 0.1
	50,000	11.7 (1.2)	< 0.1
PTH (1-34)	12,000	0.0 (0.0)	< 0.1
	12,000	12.0 (1.3)	< 0.1
PTH (39-68)	100,000	0.0 (0.0)	< 0.1
	100,000	12.3 (1.3)	< 0.1
PTH (39-84)	100,000	0 (0.0)	< 0.1
	100,000	14.1 (1.5)	< 0.1
PTH (44-68)	100,000	0 (0.0)	< 0.1
	100,000	14 (1.5)	< 0.1
PTH (53-84)	100,000	0 (0.0)	< 0.1
	100,000	11.7 (1.2)	< 0.1
PTH (7-84)	300	0 (0.0)	< 0.1
	300	12.3 (1.3)	7.3
PTH RP (1-34)	100,000	0 (0.0)	< 0.1
	100,000	12.6 (1.3)	< 0.1

Assay results obtained at individual laboratories may vary from the data presented.

Detection Capability

Detection capability was determined in accordance with CLSI Document EP17-A2.[18] The assay is designed to have a limit of blank (LoB) < 6.0 pg/mL (0.64 pmol/L), a limit of detection (LoD) ≤ 6.0 pg/mL (0.64 pmol/L), and a limit of quantitation (LoQ) ≤ 6.0 pg/mL (0.64 pmol/L).

Representative detection capability data are shown below. Assay results obtained at individual laboratories may vary from the data presented.

The LoB corresponds to the highest measurement result that is likely to be observed for a blank sample. The LoB of the Atellica IM PTH assay is 1.4 pg/mL (0.15 pmol/L).

The LoD corresponds to the lowest concentration of PTH that can be detected with a probability of 95%. The LoD for the Atellica IM PTH assay is 1.5 pg/mL (0.16 pmol/L), and was determined using 120 determinations, with 60 blank and 60 low-level replicates, and an LoB of 1.4 pg/mL (0.15 pmol/L).

The LoQ corresponds to the lowest amount of PTH in a sample at which the within laboratory CV is ≤ 20%. The LoQ of the Atellica IM PTH assay is 2.3 pg/mL (0.24 pmol/L), and was determined using multiple patient samples in the interval 1.5–12.4 pg/mL (0.16–1.31 pmol/L). All samples were assayed in replicates of 10 in each of 2 runs per day using 2 reagent lots, over a period of 3 days.

Precision

Precision was determined in accordance with CLSI Document EP05-A3.[19] Samples were assayed on an Atellica IM Analyzer in duplicate in 2 runs per day for 20 days. The assay was designed to have within-laboratory precision of ≤ 1.0 pg/mL (0.1 pmol/L) SD for samples < 10.0 pg/mL (1.1 pmol/L), ≤ 10% CV for samples from 10.0–20.0 pg/mL (1.1–2.12 pmol/L), ≤ 8% CV for samples > 20.0–700.0 pg/mL (2.12–74.2 pmol/L), and ≤ 10% CV for samples > 700.0 pg/mL (74.2 pmol/L). The following results were obtained:

		Mean		Repeatability			Within-Laboratory Precision		
				SD[b]		CV[c]	SD		CV
Sample Type	N[a]	(pg/mL)	(pmol/L)	(pg/mL)	(pmol/L)	(%)	(pg/mL)	(pmol/L)	(%)
Serum A	80	3.8	0.4	0.53	0.10	N/A[d]	0.99	0.10	N/A
Serum B	80	20.7	2.2	0.70	0.10	3.4	1.60	0.20	7.8
Control 1	80	42.0	4.4	1.91	0.20	4.6	1.99	0.20	4.7
Control 2	80	240.7	25.5	3.99	0.40	1.7	7.01	0.70	2.9
Control 3	80	868.7	92.1	12.24	1.30	1.4	20.12	2.10	2.3

[a] Number of samples tested.
[b] Standard deviation.
[c] Coefficient of variation.
[d] Not applicable.

Assay results obtained at individual laboratories may vary from the data presented.

Assay Comparison

The Atellica IM PTH assay is designed to have a correlation coefficient of ≥ 0.95 and a slope of 1.0 ± 0.10 compared to the ADVIA Centaur PTH assay. Assay comparison was determined using the weighted Deming regression model in accordance with CLSI Document EP09-A3.[20] The following results were obtained:

Specimen	Comparative Assay (x)	Regression Equation	Sample Interval	N[a]	r[b]
Serum	ADVIA Centaur PTH	y = 1.03x - 1.08 pg/mL (y = 1.03x - 0.11 pmol/L)	6.8–1749.3 pg/mL (0.7–185.4 pmol/L)	168	1.00

[a] Number of samples tested.
[b] Correlation coefficient.

Agreement of the assays may vary depending on the study design, comparative assay, and sample population used. Assay results obtained at individual laboratories may vary from the data presented.

Specimen Equivalency

The assay was evaluated using different specimen matrices and tube collection types. The assay is designed to have a correlation of coefficient ≥ 0.95 and a slope of test tube type vs. reference of 1.0 ± 0.1.

A total of 56 matched EDTA plasma, serum, serum separator tube, lithium heparin, and sodium heparin samples that span the range of the assay were examined. The following results were obtained:

Comparison[a]	Regression Equation	r
Serum vs. EDTA plasma	Serum = 0.99 EDTA - 1.85 pg/mL Serum = 0.99 EDTA - 0.20 pmol/L	1.00
Serum separator tube vs. EDTA plasma	Serum separator tube = 1.03 EDTA + 0.20 pg/mL Serum separator tube = 1.03 EDTA + 0.02 pmol/L	1.00
Lithium heparin vs. EDTA plasma	Lithium heparin = 0.99 EDTA + 1.95 pg/mL Lithium heparin = 0.99 EDTA + 0.21 pmol/L	1.00
Sodium heparin vs. EDTA plasma	Sodium heparin = 1.00 EDTA + 1.03 pg/mL Sodium heparin = 1.00 EDTA + 0.11 pmol/L	1.00

[a] This study was performed using Becton Dickinson tubes. Siemens recommends that laboratories evaluate performance when using other manufacturers' tubes.

Results were established using the ADVIA Centaur system. Assay results obtained at individual laboratories may vary from the data presented.

Interferences

The assay is designed to have ≤ 10% interference from the interferents at the levels indicated in the table below. Interference testing was performed in accordance with CLSI Document EP07-A2[17]. The following results were obtained using the Atellica IM Analyzer.

Interferent	Concentration Tested	Observed Interference (%)
Aliskiren	up to 200 µg/mL	-0.3
Caffeine	up to 308 µmol/L	1.4
Calcitrol	up to 360 pg/mL	-1.8
Cholesterol	up to 500 mg/dL	-1.3
EDTA	up to 9 mg/mL	-1.2
Enalaprilat	up to 0.86 µmol/L	-0.9
Epoetin Alpha	up to 15 mIU/L	1.2
Fosrenol	up to 20 ng/mL	1.1
Furosemide	up to 181 µmol/L	-0.9
Heparin	up to 75 U/mL	0.3
IgG	up to 6 g/dL	-6.4
Protein	as low as 3.0 g/dL	-2.5
Protein	up to 12 g/dL	1.2
Biotin	up to 3500 ng/mL	1.8

Assay results obtained at individual laboratories may vary from the data presented.

Hemolysis, Icterus, and Lipemia (HIL)

The Atellica IM PTH assay is designed to have ≤ 10% interference from hemoglobin, bilirubin, and lipemia at the levels indicated in the table below.

Bias is the difference in the results between the control sample (does not contain the interferent) and the test sample (contains the interferent) expressed in percent. Results should not be corrected based on this bias.

Substance	Substance Test Concentration Common Units (SI Units)	Analyte Concentration pg/mL (pmol/L)	Bias (%)
Hemoglobin	500 mg/dL (0.3 mmol/L)	16.8 (1.8)	-3
	500 mg/dL (0.3 mmol/L)	407.2 (43.2)	-1
Bilirubin, conjugated	60 mg/dL (1023 µmol/L)	15.8 (1.7)	-3
	60 mg/dL (1023 µmol/L)	427.8 (45.3)	-6
Bilirubin, unconjugated	60 mg/dL (1023 µmol/L)	16.2 (1.7)	-1
	60 mg/dL (1023 µmol/L)	379.2 (40.2)	1
Lipemia (Intralipid®)	3275 mg/dL (37.0 mmol/L)	12.8 (1.8)	-4
	3275 mg/dL (37.0 mmol/L)	371.9 (42.9)	+2

Results were established using the Atellica IM Analyzer. Assay results obtained at individual laboratories may vary from the data presented.

Human Anti-Mouse Antibodies (HAMA)

Six human plasma samples containing human anti-mouse antibodies (HAMA) were tested using the ADVIA Centaur system at 2 PTH concentrations. Samples at a PTH concentration of 60 pg/mL (6.36 pmol/L) demonstrated a difference of -11.5% to 3.2% from the expected values. Samples at a PTH concentration of 340 pg/mL (36.04 pmol/L) demonstrated a difference of -3.8% to 2.4% from the expected values. Refer to *Limitations*.

Assay results obtained at individual laboratories may vary from the data presented.

Dilution Recovery

Five human plasma samples in the range of 1638.6–3183.1 pg/mL (173.7–337.4 pmol/L) of intact PTH were diluted 1:5 with Atellica IM Multi-Diluent 13 onboard the Atellica IM Analyzer. The recoveries ranged from 104%–106% with a mean of 105%.

Sample	Dilution	Observed (pg/mL)	Expected (pg/mL)	Observed (pmol/L)	Expected (pmol/L)	Recovery %
1	—	2101.0	—	222.7	—	—
	1:5	437.3	420.2	46.4	44.5	104
2	—	2872.5	—	304.5	—	—
	1:5	611.0	574.5	64.8	60.9	106
3	—	1638.6	—	173.7	—	—
	1:5	347.5	327.7	36.8	34.7	106
4	—	3183.1	—	337.4	—	—
	1:5	662.6	636.6	70.2	67.5	104

Sample	Dilution	Observed (pg/mL)	Expected (pg/mL)	Observed (pmol/L)	Expected (pmol/L)	Recovery %
5	—	1744.9	—	185.0	—	—
	1:5	363.4	349.0	38.5	37.0	104
Mean						**105**

Assay results obtained at individual laboratories may vary from the data presented.

Spiking Recovery

Varying amounts of intact PTH were added to 3 samples with endogenous intact PTH levels of 24.0–65.2 pg/mL (2.5–6.9 pmol/L). The recoveries ranged from 85%–109% with a mean of 95%.

Sample	Amount Added (pg/mL)	Observed (pg/mL)	Expected (pg/mL)	Amount Added (pmol/L)	Observed (pmol/L)	Expected (pmol/L)	Recovery (%)
1	86.7	142.7	149.3	9.2	15.1	15.8	96
	288.9	338.2	349.1	30.6	35.9	37.0	97
	520.1	532.3	580.3	55.1	56.4	61.5	92
	1155.7	1031.0	1209.9	122.5	109.3	128.2	85
	Mean						93
2	86.7	122.7	113.0	9.2	13.0	12.0	109
	288.9	310.5	314.1	30.6	32.9	33.3	99
	520.1	553.3	543.9	55.1	58.7	57.7	102
	1155.7	1058.1	1177.1	122.5	112.2	124.8	90
	Mean						100
3	86.7	109.0	110.9	9.2	11.6	11.8	98
	288.9	297.0	312.5	30.6	31.5	33.1	95
	520.1	515.9	542.5	55.1	54.7	57.5	95
	1155.7	1003.6	1177.1	122.5	106.4	124.8	85
	Mean						93
Mean							**95**

Results were established using the Atellica IM Analyzer. Assay results obtained at individual laboratories may vary from the data presented.

High-Dose Hook Effect

High intact PTH concentrations can cause a paradoxical decrease in the RLUs (high-dose hook effect). In this assay, patient samples with intact PTH concentrations as high as 100,000 pg/mL (10,600 pmol/L) will report > 2000.0 pg/mL (212.0 pmol/L).

Standardization

The Atellica IM PTH assay standardization is maintained with internal standards using purified human PTH (1-84). Assigned values for calibrators are traceable to this standardization.

Technical Assistance

For customer support, contact your local technical support provider or distributor.

siemens.com/healthineers

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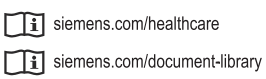
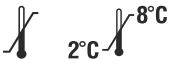
Definition of Symbols

The following symbols may appear on the product labeling:

Symbol	Symbol Title and Description
	Consult instructions for use
	Version of instructions for use
	Internet URL address to access the electronic instructions for use
Rev. REVISION	Revision
	Caution Consult instructions for use or accompanying documents for cautionary information such as warnings and precautions that cannot, for a variety of reasons, be presented on the medical device.
	Biological risks Potential biological risks are associated with the medical device.
	Corrosive
	Dangerous to environment
	Irritant Oral, dermal, or inhalation hazard
	Inhalation hazard Respiratory or internal health
	Flammable Flammable to extremely flammable

Symbol	Symbol Title and Description
	Oxidizing
	Explosive
	Toxic
	Compressed gas
	Keep away from sunlight Prevent exposure to sunlight and heat.
	Up Store in an upright position.
	Do not freeze
	Temperature limit Upper and lower limits of temperature indicators are adjacent to the upper and lower horizontal lines.
	Handheld barcode scanner
	*In vitro* diagnostic medical device
	Contains sufficient for <n> tests Total number of IVD tests the system can perform with the IVD kit reagents appears adjacent to the symbol.
RxOnly	Prescription device (US only) Applies only to United States-registered IVD assays. CAUTION: Federal (USA) law restricts this device to sale by or on the order of a licensed healthcare professional.
	Mixing of substances Mix product before use.
	Reconstitute and mix lyophilized product before use.
	Target
	Interval
	Legal Manufacturer

Symbol	Symbol Title and Description
EC REP	Authorized Representative in the European Community
	Use-by date Use by the designated date.
LOT	Batch code
REF	Catalog number
	Recycle
PRINTED WITH SOY INK	Printed with soy ink
CE	CE Mark
CE 0088	CE Mark with notified body ID number Notified body ID number can vary.
YYYY-MM-DD	Date format (year-month-day)
CHECKSUM	Variable hexadecimal number that ensures the Master Curve and Calibrator definition values entered are valid.
UNITS C	Common Units
UNITS SI	International System of Units
MATERIAL	Material
MATERIAL ID	Unique material identification number
CONTROL NAME	Name of control
CONTROL TYPE	Type of control

Legal Information

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