

Vitamin D Total (VitD)

Current Revision and Date ^a	Rev. 04, 2022-10	
Product Name	Atellica IM Vitamin D Total (VitD)	REF 10995719 (100 tests)
		REF 10995720 (500 tests)
Abbreviated Product Name	Atellica IM VitD	
Test Name/ID	VitD	
Systems	Atellica IM Analyzer	
Optional Materials	Atellica IM VitD QC	REF 10995724
	Atellica IM VitD DIL	REF 10995721
	Atellica IM VitD MCM	REF 10995723
Specimen Types	Serum, EDTA plasma, lithium heparin plasma, sodium heparin plasma	
Sample Volume	20 μL	
Measuring Interval	4.20-150.00 ng/mL (10.50-375.00 nmol/L)	

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

Intended Use

The Atellica[®] IM Vitamin D Total (VitD) assay is for *in vitro* diagnostic use in the quantitative determination of total 25(OH)vitamin D in human serum and plasma (EDTA, lithium heparin, sodium heparin) using the Atellica[®] IM Analyzer.

The Atellica IM VitD assay is intended as an aid in the determination of vitamin D sufficiency.

Summary and Explanation

Vitamin D is a steroid hormone involved in the intestinal absorption of calcium and the regulation of calcium homeostasis. Vitamin D is essential for the formation and maintenance of strong, healthy bones.

Vitamin D deficiency can result from inadequate exposure to the sun, inadequate alimentary intake, decreased absorption, abnormal metabolism, or vitamin D resistance.¹ Recently, many chronic diseases such as cancer,²⁻⁴ high blood pressure,⁵ osteoporosis,^{6,7} and several autoimmune diseases⁸⁻¹⁰ have been linked to vitamin D deficiency.

Whether consumed or produced, both forms of vitamin D (D_2 and D_3) are metabolized by the liver to 25(OH)vitamin D, and then converted in the liver or kidney into

1,25-dihydroxyvitamin D.¹¹ Vitamin D metabolites are bound to a carrier protein in the plasma and distributed throughout the body. The most reliable clinical indicator of vitamin D status is 25(OH)vitamin D because serum and plasma 25(OH)vitamin D levels reflect the body's storage levels of vitamin D, and 25(OH)vitamin D correlates with the clinical symptoms of vitamin D deficiency.¹²

Principles of the Procedure

The Atellica IM VitD assay is a competitive immunoassay that uses an anti-fluorescein mouse monoclonal antibody covalently bound to paramagnetic particles (PMP), an anti-25(OH)vitamin D mouse monoclonal antibody labeled with acridinium ester (AE), and a vitamin D analog labeled with fluorescein.

An inverse relationship exists between the amount of vitamin D 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 VitD ReadyPack [®] primary reagent pack Lite Reagent	Unopened at 2–8°C	Until expiration date on product
5.0 mL/reagent pack Mouse monoclonal anti-25(OH)vitamin D antibody labeled with acridinium ester (~0.8 µg/mL) in buffer; bovine serum albumin; mouse IgG; sodium azide (< 0.1%) Solid Phase 10.0 mL/reagent pack Mouse monoclonal anti-fluorescein-coated paramagnetic particles (~0.60 mg/mL) in buffer; bovine serum albumin; surfactant; sodium azide (< 0.1%) Ancillary Well Reagent 5.0 mL/reagent pack Vitamin D-analog conjugated to fluorescein (~0.2 µg/mL) and 1-anilinonaphthalene-8-sulfonic acid in buffer; bovine serum albumin; sodium azide (< 0.1%)	Onboard	28 days
Atellica IM VitD ReadyPack ancillary reagent pack Ancillary Reagent	Unopened at 2–8°C	Until expiration date on product
20.0 mL/reagent pack Releasing agent in buffered saline; stabilizers; sodium azide (< 0.1%); preservatives	Onboard	28 days
Atellica IM VitD CAL 2.0 mL/vial; lyophilized	Lyophilized at 2–8°C	Until expiration date on product
buffered, defibrinated human plasma; bovine serum albumin;	Reconstituted at 2–8°C	28 days
cholesterol; preservatives; sodium azide (< 0.1%)	Reconstituted at ≤ -20°C	120 days
	Reconstituted at room temperature	10 hours

Material Description	Storage	Stability ^a
Atellica IM VitD DIL ^b 25.0 mL/pack	Unopened at 2-8°C	Until expiration date on product
Phosphate buffer; bovine serum albumin; cholesterol; sodium azide (< 0.1%)	Onboard	28 days

^a Refer to Storage and Stability.

^b 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-healthineers.com.

H412	Harmful to aquatic life with long lasting effects.
r273, r301	accordance with all local, regional, and national regulations. Contains: sodium azide (in Atellica IM VitD CAL)



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Warning! Potential Biohazard

Contains human source material.

No known test method can ensure that products derived from human source materials will not transmit infection. These materials should be handled using good laboratory practices and universal precautions.¹³⁻¹⁵

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 $2-8^{\circ}$ C.

Store calibrators in an upright position. Lyophilized calibrators are stable until the expiration date on the product when stored at 2–8°C. Reconstituted calibrators are stable for 28 days at 2–8°C or 10 hours at room temperature. Freeze reconstituted product at \leq -20°C for up to 120 days.

Store Atellica IM VitD DIL in an upright position. Unopened Atellica IM VitD DIL is stable until the expiration date on the product when stored at $2-8^{\circ}$ C.

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

Onboard Stability

Reagents are stable onboard the system for 28 days. Discard reagents at the end of the onboard stability interval. Do not use products beyond the expiration date printed on the product labeling.

Atellica IM VitD DIL is stable onboard the system for 28 days.

Specimen Collection and Handling

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

Collecting the Specimen

- Observe universal precautions when collecting specimens. Handle all specimens as if they are capable of transmitting disease.¹⁵
- Follow recommended procedures for collection of diagnostic blood specimens by venipuncture.¹⁶
- Follow the instructions provided with your specimen collection device for use and processing.¹⁷
- Allow blood specimens to clot completely before centrifugation.¹⁴
- Keep tubes capped at all times.¹⁴
- Test samples as soon as possible after collecting.
- Do not use samples that have been stored at room temperature for longer than 24 hours.

Storing the Specimen

- Tightly cap and refrigerate specimens at 2–8°C for up to 7 days if the assay is not completed within 24 hours. Specimens may be stored on the clot for up to 6 days.¹⁸
- Freeze samples at \leq -20°C if the sample is not assayed within 7 days. Freeze samples up to 4 times, and mix thoroughly after thawing.¹⁸
- Do not store samples in a frost-free freezer.

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 20 μ L 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.¹⁴

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
10995719	 ReadyPack primary reagent pack containing Atellica IM VitD Lite Reagent, Solid Phase, and Ancillary Well Reagent ReadyPack ancillary reagent pack containing Atellica IM VitD Ancillary Reagent ANC Atellica IM VitD master curve and test definition MCTDEF vial Atellica IM VitD CAL low calibrator CAL L vial Atellica IM VitD CAL high calibrator CAL H Atellica IM VitD calibrator lot-specific value sheet CAL LOT VAL 	100
10995720	 5 ReadyPack primary reagent packs containing Atellica IM VitD Lite Reagent, Solid Phase, and Ancillary Well Reagent 5 ReadyPack ancillary reagent packs containing Atellica IM VitD Ancillary Reagent ANC Atellica IM VitD master curve and test definition MCTOFF 2 vials Atellica IM VitD CAL low calibrator CAL L 2 vials Atellica IM VitD CAL high calibrator CAL H Atellica IM VitD calibrator lot-specific value sheet CAL LOT VAL 	500

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	
10995724	Atellica IM VitD QC (quality control material)	3 x 2.0 mL quality control level 1 CONTROL 1 3 x 2.0 mL quality control level 2 CONTROL 2 Quality control lot-specific value sheet CONTROL LOT VAL
10995721	Atellica IM VitD DIL (diluent)	2 ReadyPack ancillary reagent packs containing 25.0 mL/pack
10995723	Atellica IM VitD MCM (master curve material)	5 x 2.0 mL levels of master curve material MCM

Assay Procedure

The system automatically performs the following steps:

- 1. Dispenses 20 µL of sample into a cuvette.
- 2. Dispenses 200 μ L of Ancillary Reagent, then incubates for 1 minute at 37°C.
- 3. Dispenses 50 μL of Lite Reagent, then incubates for 5 minutes at 37°C.
- 4. Dispenses 100 μL of Solid Phase and 50 μL of Ancillary Well Reagent, then incubates for 5 minutes at 37°C.
- 5. Separates, aspirates, then washes the cuvette with Atellica IM Wash.
- 6. Dispenses 300 μL each of Atellica IM Acid and Atellica IM Base to initiate the chemiluminescent reaction.
- 7. 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.

Note The Ancillary Reagent provided in this kit is matched to the Solid Phase, Lite Reagent, and Ancillary Well Reagent. Do not mix Ancillary Reagent lots with different lots of Solid Phase, Lite Reagent, and Ancillary Well Reagent.

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 VitD DIL 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 MCTORF 2D barcodes. For loading instructions, refer to the online help.

Performing Calibration

For calibration of the Atellica IM VitD 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	28
Pack Calibration	28
Reagent Onboard Stability	28

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 2.0 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 MCTOFF 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 VitD assay, use the Atellica IM VitD QC or an equivalent product at least once during each day that samples are analyzed.

For the assigned values, refer to the lot-specific value sheet CONTROL LOT VAL provided.

Additional quality control material can be used at the discretion of the laboratory. Use the quality control material in accordance with the quality control instructions for use.

In addition, perform quality control:

- Following a valid calibration
- With use of a new lot of reagent
- When troubleshooting test results that do not match clinical conditions or symptoms

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

Acceptable performance is achieved when the analyte values obtained are within the expected control interval for the system, as indicated by the manufacturer of the control material or within the interval determined by an internal laboratory quality control procedure.

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 system online help.

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 ng/mL (common units) or nmol/L (SI units), depending on the units defined when setting up the assay.

Conversion formula: 1 ng/mL (common units) = 2.5 nmol/L (SI units)

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

Dilutions

The measuring interval is 4.20–150.00 ng/mL (10.50–375.00 nmol/L). For information about dilution options, refer to the online help.

Samples with 25(OH)vitamin D levels > 150.00 ng/mL (375.00 nmol/L) must be diluted and retested to obtain accurate results.

For automated dilutions, ensure that Atellica IM VitD DIL 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 of 150 ng/mL (375 nmol/L).

Sample	Dilution	Sample Volume (µL)
Serum	1:2	100

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:

• Do not use samples that contain fluorescein. Fluorescein levels > 0.10 µg/mL can produce falsely elevated results in this assay. Interference testing with varying levels of sodium fluorescein as high as 3.13 µg/mL at clinically relevant concentrations of 25(OH)vitamin D (~25–50 ng/mL) can result in 25(OH)vitamin D concentrations > 150 ng/mL.

Evidence suggests that patients undergoing retinal fluorescein angiography can retain amounts of fluorescein in the body for up to 72 hours post-treatment. In cases of patients with renal insufficiency, including many diabetics, retention could be longer. Such samples can produce falsely elevated values when tested with this assay, and should not be tested.¹⁹

- Do not use hemolyzed samples. Hemoglobin at concentrations > 155 mg/dL will cause falsely depressed values.
- 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.^{20,21} Additional information may be required for diagnosis.

Expected Values

A review of the available literature^{1,22-25} suggests recommendations for 25(OH)vitamin D levels shown in the following table. Consult the listed references for a discussion of vitamin D toxicity levels.^{26,27}

Vitamin D Status	Range, Adult ^{1,22-24} ng/mL (nmol/L)	Range, Pediatric ²⁵ ng/mL (nmol/L)
Deficiency	< 20 ng/mL (50 nmol/L)	< 15 ng/mL (37.5 nmol/L)
Insufficiency	20– < 30 ng/mL (50– < 75 nmol/L)	15– < 20 ng/mL (37.5– < 50 nmol/L)
Sufficiency	30–100 ng/mL (75–250 nmol/L)	20–100 ng/mL (50–250 nmol/L)

Observed Reference Values

The reagent formulations used on the Atellica IM Analyzer are the same as those used on the ADVIA Centaur[®] system. Reference interval testing was performed using the ADVIA Centaur system and confirmed by assay comparison. Refer to *Assay Comparison*.

Reference values were established in accordance with CLSI guideline EP28-A3c²⁸ using adult and pediatric serum samples.

The adult serum population consisted of 291 apparently healthy male and female subjects of light and dark skin types who ranged in age from 21–93 years.

The pediatric serum population consisted of 237 apparently healthy male and female subjects of light and dark skin types with 32 subjects between the ages of 1–3 years, 114 subjects from 3–12 years, and 91 subjects from 13–21 years.

The adult and pediatric serum samples were collected in different seasons and from different geographical regions of the United States. Adult samples from subjects not taking supplements containing vitamin D > 2000 IU per day, and with normal values for PTH, calcium, and TSH were included in this study. Pediatric serum samples with normal values for PTH and TSH were included in this study. Based on the 95% confidence interval, the following values were obtained.

	Specimen Type	Observed Values, Adult	Observed Values, Pediatric (12 months up to 21 years)
Median 25(OH)vitamin D	Serum	22.5 ng/mL (56.3 nmol/L)	23.8 ng/mL (59.5 nmol/L)
Observed Range 2.5th to 97.5th Percentile	Serum	7.4–44.0 ng/mL (18.5–110.0 nmol/L)	11.4–45.8 ng/mL (28.5–114.5 nmol/L)

As with all *in vitro* diagnostic assays, each laboratory should determine its own reference interval for the diagnostic evaluation of patient results.²⁸ 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 VitD assay measures 25(OH)vitamin D concentrations of 4.20–150.00 ng/mL (10.50–375.00 nmol/L). The lower end of the measuring interval is defined by the design requirement for the limit of quantitation (LoQ). Report results below the measuring interval as < 4.20 ng/mL (10.50 nmol/L). When sample results exceed the measuring interval, refer to *Dilutions*.

Specificity

The assay shows high specificity for 25(OH)vitamin D_2 and 25(OH)vitamin D_3 . The following compounds were tested with total 25(OH)vitamin D concentrations of 35 and 115 ng/mL. Percent change is calculated as:

Percent cross-reactivity = (corrected assay value / amount of compound spiked) x 100

The following results were obtained:

Compound	Concentration (ng/mL)	Cross-Reactivity (%)
$1,25(OH)_2$ vitamin D ₂	100	4.0
$1,25(OH)_2$ vitamin D ₃	100	1.0
25(OH)vitamin D ₂	30	104.5
25(OH)vitamin D₃	30	100.7
Paricalcitol	24	0.1
3-epi-25(OH)vitamin D₃	100	1.1

Compound	Concentration (ng/mL)	Cross-Reactivity (%)
Vitamin D ₂	1000	0.5
Vitamin D₃	1000	0.3

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

Detection Capability

Detection capability was determined in accordance with CLSI Document EP17-A2.²⁹ The assay is designed to have a limit of blank (LoB) \leq 1.70 ng/mL (4.25 nmol/L), a limit of detection (LoD) \leq 3.20 ng/mL (8.00 nmol/L), and a limit of quantitation (LoQ) \leq 4.20 ng/mL (10.50 nmol/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 VitD assay is 1.26 ng/mL (3.15 nmol/L).

The LoD corresponds to the lowest concentration of vitamin D that can be detected with a probability of 95%. The LoD for the Atellica IM VitD assay is 2.73 ng/mL (6.83 nmol/L) and was determined using 184 determinations, with 120 blank and 64 low-level replicates, and an LoB of 1.26 ng/mL (3.15 nmol/L).

The LoQ corresponds to the lowest amount of vitamin D in a sample at which the within-laboratory precision is \leq 20% CV. The LoQ of the Atellica IM VitD assay is 2.73 ng/mL (6.83 nmol/L), and was determined using multiple patient samples in the interval 0.51–10.71 ng/mL (1.28–26.75 nmol/L). All samples were assayed in duplicate in each of 2 runs per day using 3 reagent lots, over a period of 10 days.

Precision

Precision was determined in accordance with CLSI Document EP05-A3.³⁰ 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 \leq 1.5 ng/mL (3.75 nmol/L) SD for samples \leq 12.00 ng/mL (30.00 nmol/L), \leq 12% CV for samples from 12.00–18.99 ng/mL (30.00–47.48 nmol/L), and \leq 10% CV for samples from 19.00–150.00 ng/mL (47.50–375.00 nmol/L).

	M	ean	Repeatability		Within-Laboratory		cision	
			S	Da	CVb	SD /b		CV
Sample Type	(ng/mL)	(nmol/L)	(ng/mL)	(nmol/L)	(%)	(ng/mL)	(nmol/L)	(%)
Serum A	6.08	15.2	0.77	1.93	12.6	1.17	2.93	19.3
Serum B	13.1	32.8	0.76	1.90	5.8	1.27	3.18	9.7
Serum C	18.7	46.8	1.54	3.85	8.2	1.99	4.98	10.6
Serum D	23.7	59.3	1.26	3.15	5.3	1.96	4.90	8.3
Serum E	28.8	72.0	1.26	3.15	4.4	2.03	5.08	7.1
Serum F	62.0	155	1.96	4.90	3.2	2.69	6.73	4.3
Serum G	80.1	200	2.13	5.33	2.7	3.28	8.20	4.1

	М	ean	Repeatability			Within-Laboratory Precision		ecision		
			SDª		SDª		CVp		SD	CV
Sample Type	(ng/mL)	(nmol/L)	(ng/mL)	(nmol/L)	(%)	(ng/mL)	(nmol/L)	(%)		
Serum H	129	323	2.32	5.80	1.8	3.92	9.80	3.0		
Plasma A	25.0	62.5	1.42	3.55	5.7	1.85	4.63	7.4		

^a Standard deviation.

^b Coefficient of variation.

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

Assay Comparison

The Atellica IM VitD assay is designed to have a correlation coefficient of \geq 0.95 and a slope of 1.0 ±0.1 compared to the ADVIA Centaur VitD assay. Assay comparison was determined using the weighted Deming regression model in accordance with CLSI Document EP09-A3.³¹ The following results were obtained:

Specimen	Comparative Assay (x)	Regression Equation	Sample Interval	N ^a	r ^b
Serum	ADVIA Centaur VitD	y = 1.05x + 2.16 ng/mL (y = 1.05x + 5.40 nmol/L)	5.79–134.54 ng/mL (14.48–336.35 nmol/L)	118	0.99

^a Number of samples tested.

^b Correlation coefficient.

Assay comparison was determined with the Deming regression model using the ADVIA Centaur XP system in accordance with CLSI Document EP09-A3.³¹

Specimen	Comparative Assay (x)	Regression Equation	Sample Interval	Nª	r ^b
Serum	commercial vitamin D total assay	y = 1.03x + 0.85 ng/mL (y = 1.03x + 2.13 nmol/L)	5.9–130.8 ng/mL (14.8–327.0 nmol/L)	126	0.99

^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

Specimen equivalency was determined with the weighted Deming regression model using the ADVIA Centaur XP system in accordance with CLSI Document EP09-A3.³¹

Tube (y) vs. Serum (x)	Regression Equation	Sample Interval	Nª	r ^b
gel-barrier tube (serum)	y = 0.97x + 0.87 (y = 0.97x + 2.18)	13.03–142.85 ng/mL (32.57–357.11 nmol/L)	74	0.99
dipotassium EDTA (plasma)	y = 0.97x + 0.64 (y = 0.97x + 1.61)	13.03–142.85 ng/mL (32.57–357.11 nmol/L)	74	0.99
tripotassium EDTA (plasma)	y = 0.96x + 0.68 (y = 0.96x + 1.70)	13.03–142.85 ng/mL (32.57–357.11 nmol/L)	74	0.99

Tube (y) vs. Serum (x)	Regression Equation	Sample Interval	Nª	r ^b
lithium heparin (plasma)	y = 0.99x - 0.18 (y = 0.99x - 0.44)	13.03–142.85 ng/mL (32.57–357.11 nmol/L)	74	0.99
sodium heparin (plasma)	y = 1.02x - 1.13 (y = 1.02x - 2.83)	13.03–142.85 ng/mL (32.57–357.11 nmol/L)	74	0.99

^a Number of samples tested.

^b Correlation coefficient.

The assay is designed to have a correlation coefficient \ge 0.95, a slope of 0.90–1.10, and an intercept ± 5 ng/mL

Agreement of the specimen types may vary depending on the study design and sample population used. Results obtained at individual laboratories may vary from the data presented.

Interferences

Interference testing was performed in accordance with CLSI Document EP7-A2.32

Hemolysis, Icterus, Lipemia (HIL), and Other Interferences

Potential interference from hemoglobin, triglycerides, bilirubin, cholesterol, uric acid, human immunoglobulin, and fluorescein is designed to be \leq 10%. Interfering substances were tested at the levels indicated in the table below.

Specimens that are	Demonstrate ≤ 10% change in results up to
hemolyzed	155 mg/dL of hemoglobin
icteric	40 mg/dL of conjugated bilirubin
icteric	40 mg/dL of unconjugated bilirubin
lipemic	540 mg/dL of triglycerides

Specimens that contain	Demonstrate ≤ 10% change in results up to
cholesterol	350 mg/dL
uric acid	20 mg/dL
human immunoglobulin	12 g/dL
fluorescein	0.1 μg/mL

Results were established using the ADVIA Centaur system.

Dilution Recovery

Five serum samples in the range of 103.6–111.2 ng/mL (259.0–278.0 nmol/L) of total 25(OH)vitamin D were diluted 1:2 with ADVIA Centaur VitD Diluent and assayed for recovery and parallelism using the ADVIA Centaur XP system. The recoveries ranged from 101.0%–114.0% with a mean of 108.0%.

		Observed	Expected	Recovery
Sample	Dilution	(ng/mL)	(ng/mL)	(%)
1	1:2	103.6	97.5	106.0
2	1:2	103.6	93.0	111.0

		Observed	Expected	Recovery
Sample	Dilution	(ng/mL)	(ng/mL)	(%)
3	1:2	111.2	103.5	107.0
4	1:2	106.6	105.5	101.0
5	1:2	106.2	93.5	114.0
Mean				108.0

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

Traceability

The internal standards for the Atellica IM VitD assay are traceable to the ID-LC/MS/MS 25(OH)vitamin D RMP.^{33,34} The ID-LC/MS/MS is traceable to the National Institute of Standards and Technology Standard Reference Material 2972.

To establish traceability, for 120 samples in the range of 5.6–153.2 ng/mL (14.0–383.0 nmol/L), the relationship between the ADVIA Centaur VitD assay (y) and the ID-LC/MS/MS 25(OH)vitamin D RMP (x) is described using Weighted Deming regression: ADVIA Centaur VitD = 0.95 (ID-LC/MS/MS) - 0.18 ng/mL, r = 0.98

Technical Assistance

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

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Definition of Symbols

Symbol Symbol Title Source Symbol Symbol Title Source Manufacturer 5.1.1ª Authorized representative 5.1.2ª EC REP in the European Community Authorized representative Use-by date 5.1.4ª Proprietary CH REP in Switzerland Batch code Catalog number 5.1.5ª 5.1.6ª REF LOT Consult Instructions for Contains sufficient for <n> 5.4.3ª 5.5.5ª i Use tests Internet URL address to Version of Instructions for []**i**] < .../eifu > Proprietary Proprietary access the electronic Use Rev. XX instructions for use In vitro diagnostic medical Revision Proprietary 5.5.1ª Rev. IVD device REVISION Prescription device (US Unique Device Identifier **RxOnly FDA**^b 5.7.10^c UDI only) CE Marking with Notified **CE Marking** EU IVDR^d EU IVDR^d CE Body XXXX Temperature limit 5.3.7ª Keep away from sunlight 5.3.2ª Upper limit of tempera-Lower limit of temperature 5.3.6ª 5.3.5ª ture Do not re-use 5.4.2ª Do not freeze Proprietary Recycle 1135^e This way up 0623^e **Biological risks** 5.4.1ª Caution 5.4.4ª

The following symbols may appear on the product labeling:

Symbol	Symbol Title	Source	Symbol	Symbol Title	Source
UNITS C	Common Units	Proprietary	UNITS SI	International System of Units	Proprietary
YYYY-MM-DD	Date format (year-month- day)	N/A	ҮҮҮҮ-ММ	Date format (year-month)	N/A
	Document face up ^f	1952 ^e		Handheld barcode scanner	Proprietary
→∎←	Target	Proprietary	$\mathbf{\hat{c}}$	Mixing of substances	5657 ^g
CHECKSUM	Variable hexadecimal number that ensures the Master Curve and Cali- brator definition values entered are valid.	Proprietary	← →	Interval	Proprietary
MATERIAL ID	Unique material identifica- tion number	Proprietary	MATERIAL	Material	Proprietary
CONTROL TYPE	Type of control	Proprietary	CONTROL NAME	Name of control	Proprietary
CONTROL LOT VAL	Quality control lot value	Proprietary	CAL LOT VAL	Calibrator lot value	Proprietary

- ^a International Standard Organization (ISO). ISO 15223-1 Medical Devices- Symbols to be used with medical device labels, labelling and information to be supplied.
- ^b Federal Register. Vol. 81, No 115. Wednesday, June 15, 2016. Rules and Regulations: 38911.
- ^c ISO 15223-1:2020-04
- ^d IVDR REGULATION (EU) 2017/746
- ^e International Standard Organization (ISO). ISO 7000 Graphical symbols for use on equipment.
- f Indicates Assay-eNote

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International Electrotechnical Commission (IEC). IEC 60417-1 Graphical symbols for use on equipment – Part 1: Overview and Application

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