SIEMENS Healthineers

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.

CE 0197

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, and 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 diseases[8-10] 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]

As part of its Vitamin D Initiative, NIH Office of Dietary Supplements (ODS) established the Vitamin D Standardization Program (VDSP) in November 2010. ODS is leading a collaborative effort with the Centers for Disease Control and Prevention (CDC) and the National Institute for Standards and Technology (NIST) to standardize the laboratory measurement of vitamin D status in national health surveys worldwide. The VDSP is also in collaboration with the NIST, the CDC, and the University of Ghent.

The objectives of the VDSP are to:

- Standardize the measurement of serum total 25(OH)vitamin D in national health surveys by linking them to the NIST reference measurement procedure.
- Study similarities and differences in total 25(OH)vitamin D among national health surveys.
- Expand standardization services from national surveys to include assay manufacturers and clinical and research laboratories.
- Enable the use of standardized data in public health activities and patient care.[13]

The University of Ghent has developed an ID-LC/MS/MS 25(OH)vitamin D Reference Measurement Procedure (RMP) for Vitamin D in human serum that is traceable to NIST Standard SRM2972.[14,15] This reference method was used by the NIH and CDC to develop the standards used in the VDSP and the CDC Vitamin D Certification Program (VDSCP).[16] The CDC VDSCP should help laboratories with lab-developed tests and assay manufacturers with calibration. This program assesses the assay performance (bias and imprecision) of the lab or assay manufacturer throughout a 1-year period.

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** 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 with 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%)	Unopened at 2–8°C Onboard	Until expiration date on product 28 days
Atellica IM VitD ReadyPack ancillary reagent pack **Ancillary Reagent** 20.0 mL/reagent pack Releasing agent in buffered saline; stabilizers; sodium azide (< 0.1%); preservatives	Unopened at 2–8°C Onboard	Until expiration date on product 28 days
Atellica IM VitD CAL 2.0 mL/vial; lyophilized After reconstitution, low or high levels of 25(OH)vitamin D; buffered, defibrinated human plasma; bovine serum albumin; cholesterol; preservatives; sodium azide (< 0.1%)	Lyophilized at 2–8°C Reconstituted at 2–8°C Reconstituted at ≤ -20°C Reconstituted at room temperature	Until expiration date on product 28 days 120 days; thaw up to 4 times 10 hours
Atellica IM VitD DIL[b] 25.0 mL/pack Phosphate buffer; bovine serum albumin; cholesterol; sodium azide (< 0.1%)	Unopened at 2–8°C Onboard	Until expiration date on product 28 days

[a] Refer to *Storage and Stability*.

[b] Refer to *Optional Materials*.

Warnings and Precautions

For *in vitro* diagnostic use.

For Professional Use.

For Prescription Use Only.

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.
P273, P501	Avoid release to the environment. Dispose of contents and container in accordance with all local, regional, and national regulations. **Contains:** sodium azide (Atellica IM VitD CAL)

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.[17-19]

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. Reconstituted calibrators are stable for 28 days at 2–8°C or 10 hours at room temperature. Freeze reconstituted product at ≤ -20°C for up to 120 days; thaw up to 4 times.

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°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.[19]
- Follow recommended procedures for collection of diagnostic blood specimens by venipuncture.[21]
- Follow the instructions provided with your specimen collection device for use and processing.[22]
- Allow blood specimens to clot completely before centrifugation.[20]
- Keep tubes capped at all times.[20]
- 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.[23]
- Freeze samples at ≤ -20°C if the sample is not assayed within 7 days. Freeze samples up to 4 times, and mix thoroughly after thawing.[23]
- 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 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.[20]

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	1 ReadyPack primary reagent pack containing Atellica IM VitD Lite Reagent, Solid Phase, and Ancillary Well Reagent 1 ReadyPack ancillary reagent pack containing Atellica IM VitD Ancillary Reagent ANC Atellica IM VitD master curve and test definition MC TDEF 1 vial Atellica IM VitD CAL low calibrator CAL L 1 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 MC TDEF 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 DIL
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 µL 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 MC TDEF 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 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 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 ≤ 150.00 ng/mL (≤ 375.00 nmol/L).

Sample	Dilution	Sample Volume (µL)
Serum and plasma	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.[24]

- 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.[25,26] Additional information may be required for diagnosis.

Expected Values

A review of the available literature[1,27-30] 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.[31,32]

Vitamin D Status	Range, Adult[1,27-29] ng/mL (nmol/L)	Range, Pediatric [30] 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-A3c[33] using adult and pediatric serum samples.

The adult 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 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 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 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.[33] 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). 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 D_3	30	100.7
Paricalcitol	24	0.1
3-epi-25(OH)vitamin D_3	100	1.1
Vitamin D_2	1000	0.5
Vitamin D_3	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.[34] The assay is designed to have a limit of blank (LoB) ≤ 1.70 ng/mL (4.25 nmol/L), a limit of detection (LoD) ≤ 3.20 ng/mL (8.00 nmol/L), and a limit of quantitation (LoQ) ≤ 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 ≤ 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.[35] 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 ≤ 1.5 ng/mL (3.75 nmol/L) SD for samples ≤ 12.00 ng/mL (30.00 nmol/L), ≤ 12% CV for samples from 12.00–18.99 ng/mL (30.00–47.48 nmol/L), and ≤ 10% CV for samples from 19.00–150.00 ng/mL (47.50–375.00 nmol/L).

		Mean		Repeatability			Within-Laboratory Precision		
				SD[b]		CV[c]	SD		CV
Sample Type	N[a]	(ng/mL)	(nmol/L)	(ng/mL)	(nmol/L)	(%)	(ng/mL)	(nmol/L)	(%)
Serum A	80	10.75	26.88	0.84	2.10	N/A[d]	1.42	3.55	N/A
Serum B	80	24.76	61.90	0.85	2.13	3.4	1.71	4.28	6.9
Serum C	80	28.40	71.00	1.00	2.50	3.5	1.48	3.70	5.2
Serum D	80	58.16	145.40	2.23	5.58	3.8	3.24	8.10	5.6
Serum E	80	64.33	160.83	2.35	5.88	3.7	3.99	9.98	6.2
Serum F	80	86.67	216.68	1.42	3.55	1.6	2.58	6.45	3.0
Serum G	80	122.18	305.45	2.67	6.68	2.2	3.38	8.45	2.8
Control 1	80	24.14	60.35	1.19	2.98	5.0	1.93	4.83	8.0
Control 2	80	90.76	226.90	1.65	4.13	1.8	2.87	7.18	3.2

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

Based on internal testing on the Atellica IM Analyzer, the overall reproducibility is estimated to be ≤ 12% CV for samples tested and includes multiple reagent lots, instruments, days, and replicates. Performance of the assay at individual laboratories may vary.

Assay Comparison

The Atellica IM VitD assay is designed to have a correlation coefficient of ≥ 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.[36] 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.

The relationship between the ADVIA Centaur VitD assay and the ID-LC/MS/MS 25(OH)vitamin D Reference Measurement Procedure (RMP)[14,15] is described using Deming regression:

Specimen	Comparative Assay (x)	Regression Equation	Sample Interval	N[a]	r[b]
Serum	ID-LC/MS/MS 25(OH)vitamin D RMP	y = 0.93x + 2.89 ng/mL (y = 0.93x + 7.23 nmol/L)	7.8–148.1 ng/mL (19.5–370.3 nmol/L)	122	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 system in accordance with CLSI Document EP09-A3.[36]

Tube (y) vs. Serum (x)	Regression Equation	Sample Interval	N[a]	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
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 ≥ 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.[37]

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

Potential interference from hemoglobin, triglycerides, bilirubin, cholesterol, uric acid, human immunoglobulin, and fluorescein is designed to be ≤ 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

Specimens that are	Demonstrate ≤ 10% change in results up to...
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. Assay results obtained at individual laboratories may vary from the data presented.

Dilution Recovery

Five serum samples in the range of 145.0–163.0 ng/mL (362.5–407.5 nmol/L) of total 25(OH)vitamin D were diluted 1:2 with VitD Diluent and assayed for recovery and parallelism. The recoveries ranged from 95.0%–104.0% with a mean of 97.8%.

		Observed		Expected		Recovery
Sample	Dilution	ng/mL	nmol/L	ng/mL	nmol/L	(%)
1	1:2	69.5	173.8	72.7	181.8	96.0
2	1:2	72.8	182.0	74.5	186.3	98.0
3	1:2	72.9	182.3	75.1	187.8	97.0
4	1:2	82.6	206.5	79.7	199.3	104.0
5	1:2	77.4	193.5	81.6	204.0	95.0
Mean						**97.8**

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

Standardization

The Atellica IM VitD assay is standardized using internal standards that are traceable to the ID LC/MS/MS 25(OH)vitamin D RMP.[14,15] The ID-LC/MS/MS is traceable to the National Institute of Standards and Technology Standard Reference Material 2972.

Technical Assistance

According to EU regulation 2017/746, any serious incident that has occurred in relation to the device shall be reported to the manufacturer and the competent authority of the EU Member State in which the user and/or patient is established.

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

siemens-healthineers.com

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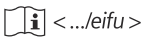
Definition of Symbols

The following symbols may appear on the product labeling:

Symbol	Symbol Title	Source	Symbol	Symbol Title	Source
	Manufacturer	5.1.1[a]		Authorized representative in the European Community	5.1.2[a]
	Use-by date	5.1.4[a]		Authorized representative in Switzerland	Proprietary
	Catalog number	5.1.6[a]		Batch code	5.1.5[a]
	Consult Instructions for Use	5.4.3[a]		Contains sufficient for <n> tests	5.5.5[a]
	Internet URL address to access the electronic instructions for use	Proprietary		Version of Instructions for Use	Proprietary
	*In vitro* diagnostic medical device	5.5.1[a]		Revision	Proprietary
RxOnly	Prescription device (US only)	FDA[b]		Unique Device Identifier	5.7.10[c]
	CE Marking with Notified Body	EU IVDR[d]		CE Marking	EU IVDR[d]
	Temperature limit	5.3.7[a]		Keep away from sunlight	5.3.2[a]
	Upper limit of temperature	5.3.6[a]		Lower limit of temperature	5.3.5[a]
	Do not re-use	5.4.2[a]		Do not freeze	Proprietary
	Recycle	1135[e]		This way up	0623[e]
	Biological risks	5.4.1[a]		Caution	5.4.4[a]
	Common Units	Proprietary		International System of Units	Proprietary
YYYY-MM-DD	Date format (year-month-day)	N/A	**YYYY-MM**	Date format (year-month)	N/A
	Document face up[f]	1952[e]		Handheld barcode scanner	Proprietary
	Target	Proprietary		Mixing of substances	5657[g]

Symbol	Symbol Title	Source	Symbol	Symbol Title	Source
CHECKSUM	Variable hexadecimal number that ensures the Master Curve and Calibrator definition values entered are valid.	Proprietary	←→	Interval	Proprietary
MATERIAL ID	Unique material identification 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
[g] International Electrotechnical Commission (IEC). IEC 60417-1 Graphical symbols for use on equipment – Part 1: Overview and Application

Legal Information

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