Manual

VDBP ELISA

For the in vitro determination of VDBP (vitamin D binding protein) in serum, plasma and urine

Valid from 2019-01-01

REF KR2314

Σ 96

+8 °C
+2 °C

RUO

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1. INTENDED USE

This Immundiagnostik AG assay is an enzyme immunoassay intended for the quantitative determination of free and not actin complex bound vitamin D binding protein (VDBP) in serum, plasma and urine. For research use only. Not for use in diagnostic procedures.

2. INTRODUCTION

Vitamin D binding protein (VDBP, also known as group-specific component / Gc protein) is a multifunctional serum protein which is formed in the liver. High estrogen levels, caused e.g. by pregnancy or hormonal birth control, stimulate its synthesis. VDBP can be found in plasma, ascites, liquor, urine and at the surface of various cell types.

In the blood, VDBP binds the bigger part of the circulating 25-OH vitamin D and brings it to the kidneys, where it is transformed into the hormone 1,25-$(OH)_2$ vitamin D.

In addition, VDBP binds monomeric actin at the ratio of 1:1. Actin is an intracellular protein which is available as monomer or filament. Massive tissue destruction or cell death cause the plasma level of actin to rise significantly, whereupon VDBP-actin complexes are formed which are removed quickly.

Furthermore VDBP is a precursor of the immunomodulating protein Gc-MAF (Gc protein-derived macrophage activating factor) which increases the activity of macrophages against tumours.

3. MATERIAL SUPPLIED

Cat. No.	Label	Kit components	Quantity
KR2314	PLATE	Microtiter plate, pre-coated	12 x 8 wells
KR0001.C.100	WASHBUF	Wash buffer concentrate, 10 x	2 x 100 ml
KR2314	CONJ	Conjugate concentrate, peroxidase-labelled (rabbit-anti-VDBP)	1 x 200 µl
KR2314	STD	Calibrators, lyophilised (60; 20; 6,6; 2,2; 0 ng/ml)	2 x 5 vials
KR2314	STDBUF	Standard dilution buffer, ready-to-use	1 x 20 ml
KR2314	CTRL1	Control, lyophilised (see specification for range)	2 x 1 vial

Cat. No.	Label	Kit components	Quantity
KR2314	CTRL2	Control, lyophilised (see specification for range)	2 x 1 vial
KR2314	SAMPLEBUF	Sample dilution buffer, ready-to-use	2 x 100 ml
KR0002.15	SUB	Substrate (tetramethylbenzidine), ready-to-use	1 x 15 ml
KR0003.15	STOP	Stop solution, ready-to-use	1 x 15 ml

For reorders of single components, use the catalogue number followed by the label as product number.

4. MATERIAL REQUIRED BUT NOT SUPPLIED

- Ultrapure water*
- Calibrated precision pipettors and 10–1000 µl single-use tips
- Foil to cover the microtiter plate
- Horizontal microtiter plate shaker
- Multi-channel pipets or repeater pipets
- Centrifuge
- Vortex
- Standard single-use laboratory glass or plastic vials, cups, etc.
- Microtiter plate reader (required filters see chapter 7)

* Immundiagnostik AG recommends the use of ultrapure water (water type 1; ISO 3696), which is free of undissolved and colloidal ions and organic molecules (free of particles > 0.2 µm) with an electrical conductivity of 0.055 µS/cm at 25 °C (≥ 18.2 MΩ cm).

5. STORAGE AND PREPARATION OF REAGENTS

- To run the assay more than once, ensure that reagents are stored at the conditions stated on the label. **Prepare only the appropriate amount necessary for each run.** The kit can be used up to 4 times within the expiry date stated on the label.

- Reagents with a volume less than **100 µl** should be centrifuged before use to avoid loss of volume.
- **Preparation of the wash buffer:** The **wash buffer concentrate (WASHBUF)** has to be diluted with ultrapure water **1:10** before use (100 ml WASHBUF + 900 ml ultrapure water), mix well. Crystals could occur due to high salt concentration in the concentrate. Before dilution, the crystals have to be redissolved at room temperature or in a water bath at 37 °C. The **WASHBUF** is stable at **2–8 °C** until the expiry date stated on the label. **Wash buffer** (1:10 diluted WASHBUF) can be stored in a closed flask at **2–8 °C for 1 month**.
- The **lyophilised standards (STD)** and **controls (CTRL)** are stable at **2–8 °C** until the expiry date stated on the label. Before use, the STD and CTRL have to be reconstituted with **500 µl of standard dilution buffer (STDBUF)** and mixed by gentle inversion to ensure complete reconstitution. Allow the vial content to dissolve for 10 minutes and then mix thoroughly. **Standards and controls** (reconstituted STD and CTRL) **can be stored at 2–8 °C for 4 weeks or at -20 °C for 4 weeks.**
- **Preparation of the conjugate:** Before use, the **conjugate concentrate (CONJ)** has to be diluted **1:101** in wash buffer (100 µl CONJ + 10 ml wash buffer). The CONJ is stable at **2–8 °C** until expiry date stated on the label. **Conjugate** (1:101 diluted CONJ) **is not stable and cannot be stored.**
- All other test reagents are ready-to-use. Test reagents are stable until the expiry date (see label) when stored at **2–8 °C**.

6. STORAGE AND PREPARATION OF SAMPLES

Serum and plasma samples

Dilute all plasma and serum samples 1:40 000 with sample dilution buffer (SAMPLEBUF). For example:

- **20 µl** sample + **980 µl** SAMPLEBUF, mix well = **1:50** (**dilution I**)
- **20 µl** dilution I + **980 µl** SAMPLEBUF, mix well = **1:50** (**dilution II**)
- **20 µl** dilution II + **300 µl** SAMPLEBUF, mix well = **1:16** (**dilution III**). This results in a final dilution of 1:40 000.

For analysis, pipet **100 µl** of **dilution III** per well.

Other sample collectives should be diluted according to the expected VDBP concentration.

Serum and plasma samples can be stored for 3 months at -20 °C. Avoid more than 3 freeze thaw cycles.

Urine

Urine samples have to be diluted 1:10 with sample dilution buffer (SAMPLEBUF). For example:

100 µl sample + **900 µl** SAMPLEBUF, mix well = **1:10**

For testing in duplicates, pipette **2 x 100 µl** of each prepared sample per well.

Other sample collectives should be diluted according to the expected VDBP concentration.

7. ASSAY PROCEDURE

Principle of the test

This enzyme immunoassay is a sandwich assay for the quantitative determination of VDBP in serum, plasma and urine samples. The wells of the microtiterplate are coated with polyclonal anti-VDBP antibodies. In a first incubation step, the VDBP in the samples is bound to the coated polyclonal rabbit antibodies (in excess). To remove all unbound substances, a washing step is carried out. In a second incubation step, a polyclonal peroxidase-labeled rabbit anti-VDBP antibody is added. After another washing step, to remove all unbound substances, the solid phase is incubated with the substrate, tetramethylbenzidine. An acidic stopping solution is then added. The colour converts to yellow. The intensity of the yellow colour is directly proportional to the VDBP concentration in the sample. A dose response curve of the absorbance unit (optical density, OD at 450 nm) vs. concentration is generated, using the values obtained from the standard. VDBP, present in the samples, is determined directly from this curve.

Test procedure

Bring all **reagents and samples to room temperature** (15–30 °C) and mix well.

Mark the positions of standards/controls/samples on a protocol sheet.

Take as many microtiter strips as needed from the kit. Store unused strips together with the desiccant bag in the closed aluminium packaging at 2–8 °C. Strips are stable until expiry date stated on the label.

For automated ELISA processors, the given protocol may need to be adjusted according to the specific features of the respective automated platform. For further details please contact your supplier or Immundiagnostik AG.

We recommend to carry out the tests in duplicate.

1.	**Before use**, wash the wells **5 times** with **250 µl wash buffer**. After the final washing step, remove residual wash buffer by firmly tapping the plate on absorbent paper.
2.	Add each **100 µl standards/controls/diluted samples** into the respective wells.
3.	Cover the strips and incubate for **1 hour** at room temperature (15–30 °C) on a **horizontal shaker***.
4.	Discard the content of each well and wash **5 times** with **250 µl wash buffer**. After the final washing step, remove residual wash buffer by firmly tapping the plate on absorbent paper.
5.	Add **100 µl conjugate** (diluted CONJ) into each well.
6.	Cover the strips and incubate for **1 hour** at room temperature (15–30 °C) on a **horizontal shaker***.
7.	Discard the content of each well and wash **5 times** with **250 µl wash buffer**. After the final washing step, remove residual wash buffer by firmly tapping the plate on absorbent paper.
8.	Add **100 µl substrate** (SUB) into each well.
9.	Incubate for **10–20 min**** at room temperature (15–30 °C) in the **dark**.
10.	Add **100 µl stop solution** (STOP) into each well and mix well.
11.	Determine **absorption immediately** with an ELISA reader at **450 nm** against 620 nm (or 690 nm) as a reference. If no reference wavelength is available, read only at 450 nm. If the extinction of the highest standard exceeds the range of the photometer, absorption must be measured immediately at **405 nm** against 620 nm as a reference.

* We recommend shaking the strips at 550 rpm with an orbit of 2 mm.

** The intensity of the colour change is temperature sensitive. We recommend observing the colour change and stopping the reaction upon good differentiation.

8. RESULTS

The following algorithms can be used alternatively to calculate the results. We recommend using the 4 parameter algorithm.

1. **4 parameter algorithm**

   It is recommended to use a linear ordinate for the optical density and a logarithmic abscissa for the concentration. When using a logarithmic abscissa, the zero standard must be specified with a value less than 1 (e.g. 0.001).

2. **Point-to-point calculation**

   We recommend a linear ordinate for the optical density and a linear abscissa for the concentration.

3. **Spline algorithm**

   We recommend a linear ordinate for the optical density and a linear abscissa for the concentration.

The plausibility of the duplicate values should be examined before the automatic evaluation of the results. If this option is not available with the programme used, the duplicate values should be evaluated manually.

Serum/plasma samples

The obtained VDBP levels of plasma and serum samples have to be multplied with the dilution factor of 40 000.

Urine samples

The obtained VDBP levels of urine samples have to be multplied with the dilution factor of 10.

In case **another dilution factor** has been used, multiply the obtained result with the dilution factor used.

9. LIMITATIONS

Samples with concentrations above the measurement range can be further diluted and re-assayed. Please consider this greater dilution when calculating the results.

Samples with concentrations lower than the measurement range cannot be clearly quantified.

The upper limit of the measurement range can be calculated as:

highest concentration of the standard curve × *sample dilution factor to be used*

The lower limit of the measurement range can be calculated as:

Analytical sensitivity × *sample dilution factor to be used*

Analytical sensitivity see chapter "Performance Characteristics".

10. QUALITY CONTROL

Immundiagnostik AG recommends the use of external controls for internal quality control, if possible.

Control samples should be analysed with each run. Results, generated from the analysis of control samples, should be evaluated for acceptability using appropriate statistical methods. The results for the samples may not be valid if within the same assay one or more values of the quality control sample are outside the acceptable limits.

Reference range

We recommend each laboratory to establish its own reference range.

11. PERFORMANCE CHARACTERISTICS

Accuracy – Precision

Repeatability (Intra-Assay); n=16

The repeatability was assessed with 2 serum samples under constant parameters (same operator, measurement system, day and kit lot).

Sample	Mean value [mg/l]	CV [%]
1	242.4	5.0
2	429.0	3.3

Reproducibility (Inter-Assay); n=17

The reproducibility was assessed with a serum and a control sample under varying parameters (different operators, measurement systems, days and kit lots).

Sample	Mean value [mg/l]	CV [%]
1	128.3	13.9
2	383.2	3.3

Analytical sensitivity

The following values have been estimated based on the concentrations of the standard without considering possibly used sample dilution factors.

Limit of blank, LoB 0.154 ng/ml

12. PRECAUTIONS

- All reagents in the kit package are for research use only.
- Human materials used in kit components were tested and found to be negative for HIV, Hepatitis B and Hepatitis C. However, for safety reasons, all kit components should be treated as potentially infectious.
- Kit reagents contain sodium azide or ProClin as bactericides. Sodium azide and ProClin are toxic. Substrates for the enzymatic colour reactions are toxic and carcinogenic. Avoid contact with skin or mucous membranes.
- The stop solution consists of diluted sulphuric acid, a strong acid. Although diluted, it still must be handled with care. It can cause burns and should be handled with gloves, eye protection, and appropriate protective clothing. Any spill should be wiped up immediately with copious quantities of water. Do not breath vapour and avoid inhalation.

13. TECHNICAL HINTS

- Do not interchange different lot numbers of any kit component within the same assay. Furthermore we recommend not assembling wells of different microtiter plates for analysis, even if they are of the same batch.
- Control samples should be analysed with each run.
- Reagents should not be used beyond the expiration date stated on kit label.
- Substrate solution should remain colourless until use.
- To ensure accurate results, proper adhesion of plate sealers during incubation steps is necessary.
- Avoid foaming when mixing reagents.
- Do not mix plugs and caps from different reagents.
- The assay should always be performed according to the enclosed manual.

14. GENERAL NOTES ON THE TEST AND TEST PROCEDURE

- The guidelines for laboratories should be followed.
- Incubation time, incubation temperature and pipetting volumes of the components are defined by the producer. Any variation of the test procedure, which is not coordinated with the producer, may influence the results of the

test. Immundiagnostik AG can therefore not be held responsible for any damage resulting from incorrect use.

- Warranty claims and complaints regarding deficiencies must be logged within 14 days after receipt of the product. The product should be send to Immundiagnostik AG along with a written complaint.

15. REFERENCES

General literature

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Used symbols:


Temperature limitation

Catalogue Number

For research use only

To be used with


Manufacturer

Contains sufficient for <n> tests

Lot number


Use by


Attention


Consult instructions for use

Consult specification data sheet