Vitamin B12

infinosis™

Vitamin B12 (FIA)

REF: IN067707 Σ 25

Intended use
The Infinosis™ Vitamin B12 is a fluorescence immunoassay for the in vitro quantitative determination of vitamin B12 in Human Serum or Plasma.
For professional use only.

Summary
References[1-6]
Vitamin B12 is a water-soluble vitamin that has a key role in the normal functioning of the nervous system via the synthesis of myelin (myelinogenesis), and in the maturation of developing red blood cells in the bone marrow. It is involved in the metabolism of every cell of the human body: it is a cofactor in DNA synthesis, fatty acid metabolism, and amino acid metabolism. Vitamin B12 deficiency can potentially cause severe and irreversible damage, especially to the brain and nervous system. At levels only slightly lower than normal, a range of symptoms such as fatigue, lethargy, depression, poor memory, breathlessness, headaches, and pale skin, among others, may be experienced, especially in elderly people (over age 60) who produce less stomach acid as they age, thereby increasing their probability of B12 deficiencies. Vitamin B12 deficiency can also cause symptoms of mania and psychosis. Vitamin B12 deficiency is most commonly caused by low intakes, but can also result from malabsorption, certain intestinal disorders, low presence of binding proteins, and use of certain medications. Vitamin B12 is rare from plant sources, so vegetarians are more likely to suffer from vitamin B12 deficiency. Infants are at a higher risk of vitamin B12 deficiency if they were born to vegetarian mothers. The elderly who have diets with limited meat or animal products are vulnerable populations as well. Vitamin B12 deficiency may occur in between 40% to 80% of the vegetarian population who are not also consuming a vitamin B12 supplement.

Test principle
Competition principle. Total duration of assay: **23 minutes**
Sample is added to the sample well of the test, the fluorescence-labeled detector VB12 antibodies bind to VB12 antigens in blood specimen and form immune complexes. As the complexes migrate on the nitrocellulose matrix by capillary action, it can't be captured by VB12 antigens that have been immobilized on test strip, otherwise the excess unbound fluorescence-labeled detector VB12 antibodies are captured. Thus the more VB12 in blood, the less unbound fluorescence-labeled antibodies accumulated on test strip. Signal intensity of detector VB12 antibodies reflect the amount of antigens and are processed in the instrument for infinosis™ tests to determine the VB12 concentration in blood.

Reagents
Materials provided
- **Test Cartridge**, 25 pcs, individually packaged
- **ID Chip** or **QR code of Calibration Curve**, 1 pcs
- **Sample Buffer A,** 1 x 1.2 mL
- **Sample Buffer B,** 1 x 4.2 mL
- **Detector Tube (lyophilized):** 25 pcs **NOTE: Once the lid is opened, it must be used immediately**
- **Sample Mixing Tube,** 25 pcs
- **IFU**, 1 copy

Materials required (but not provided)
- Infinosis™ FIA analyzer
- Single use disposable lancing device
- Transfer pipette set
- Timer

Precautions and warnings
- For in vitro diagnostic use only.
- Carefully follow the instructions and procedures described in this instructions before testing.
- The Test cartridge should remain in its original sealed pouch until ready to use. Do not use it if the pouch is damaged or the seal is broken.
- Do not use reagents beyond the labeled expiry date.
- Do not mix or use components from kits with different Lots.
- Don't use Test cartridge if its Lot does not match with ID Chip that is inserted onto the instrument.
- The Infinosis™ Vitamin B12 assay should be used only in conjunction with the instrument for infinosis™ tests.
- The tests should be applied by professionally trained staff working in certified laboratories at some remove from the patient and clinic at which the sample is taken by qualified medical personnel.
- Infinosis™ Vitamin B12 assay is single use only. Do not re-use it.
- The Test cartridge and Analyzer should be used away from vibration and magnetic field. During normal usage, the Test cartridge may introduce minute vibration, which should be regarded as normal.
- Use separate clean pipette tips and detector buffer vials for different specimens. The pipette tips and detector buffer vials should be used for one specimen only.
- Do not smoke, eat, or drink in areas in which specimens or kit reagents are handled.
- Blood specimens, used Test cartridges, pipette tips and detector buffer vials are potentially infectious. Proper laboratory safety techniques, handing and disposal methods should be followed in accordance with standard procedures and relevant regulations observed by microbiological hazard materials.
- The results should be interpreted by the physician along with clinical findings and other laboratory test results.

Incident report
Any suspected serious incidents related to this assay shall be immediately reported to DiaSino, DiaSino's Authorized Representative in the EU, and the national competent authorities of the Member States where the users and/or patients are located.

Storage and stability
- Store the test kit at 2-30°C, the stability is up to the expiration date printed on package.
- Test cartridge and sample buffer should be used within 1 hour after opening the pack.

Specimen collection and preparation
- The test can be performed with Human Serum or Plasma.
- Collect serum samples in accordance with correct medical practices.
- Separate the serum/plasma from blood as soon as possible to avoid hemolysis.
- Test should be performed immediately after the specimens have been collected. Do not leave the specimens at room temperature for prolonged periods. Specimens may be stored at 2-8°C for up to 3 days. For long-term storage, specimens should be kept below -20°C.

Calibration
The instrument automatically reads in the lot-specific calibration data from the QR code information printed on the Test cartridge, eliminating the need for calibration by the user.

Quality control
- Quality control tests are a part of the good testing practice to confirm the expected results and validity of the assay and should be performed at regular intervals.
- The control tests should be performed immediately after opening a new test lot to ensure the test performance is not altered.
- Quality control tests should also be performed whenever there is any question concerning the validity of the test results.
- Control materials are provided on demand with Infinosis™ tests. For more information regarding obtaining the control materials, contact DiaSino Laboratories Co., Ltd for assistance.

Test setup
- Ensure that the lot number of the cartridge matches that of the sample buffer, and the ID Chip.
- If the sealed cartridge and sample buffer have been stored in refrigerator, place them at room temperature (18-25 °C) at least 30 minutes before measurement.
- Turn on the instrument for infinosis™ tests.
  Refer to the *'instrument for infinosis™ tests Operation Manual'* for the complete information and operating instructions.

Test procedure
1. Insert ID Chip into the instrument for infinosis™ tests or Scan the QR code to read the calibration curve.
2. Using a pipette to transfer **40 µL** of **Sample Buffer A** and **40 µL** of **sample (Human serum or plasma)** to the **Sample Mixing Tube** provided in the kit. Close the lid of the sample mixing tube and mix the sample thoroughly for

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5-10 seconds by tapping or inverting the tube, **then incubate at 37°C for 10 minutes**.

3. Using a pipette to transfer **150 µL** of **Sample Buffer B** to the **Sample Mixing Tube on Step 2**. Close the lid of the sample mixing tube and mix the sample thoroughly for 5-10 seconds by tapping or inverting the tube.
4. Pipette out **200 µL** of **sample mixture** from the **Sample Mixing Tube on Step 3** and load it into the **Detector Tube (lyophilized),** mix thoroughly, **then incubate at 37°C for 3 minutes.**
5. Pipette out **100 µL of sample mixture** and load it onto the sample well on the cartridge, leave the sample-loaded cartridge at **room temperature** for **10 minutes.**
6. Insert the sample-loaded cartridge into the cartridge holder of instrument for infinosis™ tests.
   Ensure proper orientation of the cartridge before pushing it all the way inside the cartridge holder.
7. Press **"Test"** button on the instrument for infinosis™ tests.
8. Instrument for infinosis™ tests will start scanning the sample-loaded cartridge immediately.
9. Read the test result on the display screen of the instrument for infinosis™ tests.
10. Print out the testing results when press **"Print"** button on the instrument for infinosis™ tests.

Limitations - interference

- The assay is unaffected by icterus (bilirubin ≤ 1112 µmol/L or ≤ 65 mg/dL), hemolysis (Hb ≤ 0.025 mmol/L or ≤ 0.04 g/dL), lipemia (Intralipid ≤ 17.1 mmol/L or ≤ 1500 mg/dL), biotin (≤ 205 nmol/L or ≤ 50 ng/mL), IgG ≤ 28 g/L, IgA ≤ 16 g/L and IgM ≤ 10 g/L.
- Criterion: Recovery within ± 10 % of initial value with samples > 200 pg/mL and ≤ ± 20 pg/mL with samples ≤ 200 pg/mL.
- Samples should not be taken from patients receiving therapy with high biotin doses (i.e. > 5 mg/day) until at least 8 hours following the last biotin administration.
- No interference was observed from rheumatoid factors up to a concentration of 1500 IU/mL.
- Samples with extremely high total protein concentrations (hyperproteinemia) are not suitable for use in this assay.
- In rare cases, interference due to extremely high titers of antibodies to analyte-specific antibodies, streptavidin or ruthenium can occur. These effects are minimized by suitable test design.
- For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

Measuring range

100-2000 pg/mL (defined by the lower detection limit and the maximum of the master curve). Values below the detection limit are reported as < 100 pg/mL. Values above the measuring range are reported as > 2000 pg/mL

Lower detection limit

100 pg/mL

Expected values

The values shown below were performed on samples from an apparently healthy population, using the Porrima Vitamin B12 assay. The calculation is based on 98 sera (31 men, 67 women). The age range was between 20 and 65 years. Pregnant women were excluded. The reference population was selected according to normal homocysteine values.

N	Median		Range (2.5th-97.5th percentile)	
	pg/mL	pmol/mL	pg/mL	pmol/mL
98	418	302	189-777	139-573

Each laboratory should investigate the transferability of the expected values to its own patient population and if necessary determine its own reference ranges.

Specific performance data

Representative performance data are given below. Results obtained in individual laboratories may differ.

Precision

Intra-assay

Determined by using 10 tests in the same batch to test with Vitamin B12 control, CV ≤ 15%

Inter-assay

Determined by using 3 tests in 3 random and continuous batches to test with Vitamin B12 control, CV ≤ 20%

Method comparison

A comparison of the Infinosis™ Vitamin B12 assay (y) with the Elecsys Vitamin B12 assay (x) using 78 clinical samples gave the following correlations:
y = 0.9151x + 47.397
r = 0.9507
The sample concentrations were between approx. 110 and 1280 pg/mL.

References

1. Miller A, Korem M, Almog R, Galboiz Y (June 2005). "Vitamin B12, demyelination, remyelination and repair in multiple sclerosis". Journal of the Neurological Sciences. 233 (1–2): 93–7. doi:10.1016/j.jns.2005.03.009. PMID 15896807.
2. Yamada K (2013). "Chapter 9. Cobalt: Its Role in Health and Disease". In Sigel A, Sigel H, Sigel RK. Interrelations between Essential Metal Ions and Human Diseases. Metal Ions in Life Sciences. 13. Springer. pp. 295–320. doi:10.1007/978-94-007-7500-8_9.
3. van der Put NM, van Straaten HW, Trijbels FJ, Blom HJ (April 2001). "Folate, homocysteine and neural tube defects: an overview". Experimental Biology and Medicine. 226 (4): 243–70. doi:10.1177/153537020122600402. PMID 11368417.
4. "Vitamin B12". Micronutrient Information Center, Linus Pauling Institute, Oregon State University. 2014.
5. "Vitamin B12 or folate deficiency anaemia - Symptoms". National Health Service, England. May 16, 2016.
6. "Dietary Supplement Fact Sheet: Vitamin B12". Office of Dietary Supplements, National Institutes of Health.

Symbols

IVD In vitro diagnostic medical device	2°C–30°C Temperature limit	Consult instructions for use	REF Catalog number
LOT Batch code	Date of manufacture	Use-by date	Σ Contains sufficient for <n> tests
Manufacturer	Do not re-use	Do not use if package is damaged and consult instructions for use	CE European Conformity
EC REP Authorized representative in the European Community			

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