GP CE IVD

Vitamin B12 Fast Test Kit (Immunofluorescence Assay)

Instructions for use

INTENDED USE

Vitamin B12 Fast Test Kit (Immunofluorescence Assay) is intended for *in vitro* quantitative determination of vitamin B12 in serum samples. This test is mainly used for the auxiliary diagnosis of vitamin B12 deficiency related diseases. For professional and laboratory use only.

SUMMARY

Vitamin B12 is a water-soluble vitamin that is naturally present in some foods. Methylcobalamin and 5-deoxyadenosylcobalamin are the metabolically active forms of vitamin B12. However, two other forms, hydroxycobalamin and cyanocobalamin, become biologically active after they are converted to methylcobalamin or 5-deoxyadenosylcobalamin [1-3].

Vitamin B12 is required for the development, myelination, and function of the central nervous system; healthy red blood cell formation; and DNA synthesis [1,4,5]. Vitamin B12 functions as a cofactor for two enzymes, methionine synthase and L-methylmalonyl-CoA mutase [1-3,5]. Methionine synthase catalyzes the conversion of homocysteine to the essential amino acid methionine [1,2]. Methionine is required for the formation of S-adenosylmethionine, a universal methyl donor for almost 100 different substrates, including DNA, RNA, proteins, and lipids [3,5]. L-methylmalonyl-CoA mutase converts L-methylmalonyl-CoA to succinyl-CoA in the metabolism of propionate, a short-chain fatty acid [2].

The effects of vitamin B12 deficiency can include the hallmark megaloblastic anemia (characterized by large, abnormally nucleated red blood cells) as well as low counts of white and red blood cells, platelets, or a combination; glossitis of the tongue; fatigue; palpitations; pale skin; dementia; weight loss; and infertility [2,5,6]. Neurological changes, such as numbness and tingling in the hands and feet, can also occur [6]. These neurological symptoms can occur without anemia, so early diagnosis and intervention is important to avoid irreversible damage [7]. In addition, some studies have found associations between vitamin B12 deficiency or low vitamin B12 intakes and depression [8-10]. In pregnant and breastfeeding women, vitamin B12 deficiency might cause neural tube defects, developmental delays, failure to thrive, and anemia in offspring [6].

PRINCIPLE

Vitamin B12 Fast Test Kit (Immunofluorescence Assay) is a lateral flow immunoassay in a competitive design. After the sample is applied to the test strip, the fluorescence-labelled intrinsic factor binds to the vitamin B12 in the sample, forming a marked antigen-intrinsic factor complex. Any unbound fluorescence-labelled intrinsic factor then binds to the vitamin B12 on the test line. The fluorescence intensity of the test line decreases proportionally to the amount of vitamin B12 in the sample. Fluorescent signals intensity can be analyzed by applicable device thus the vitamin B12 in sample be detected quantitatively.

APPLICABLE DEVICE

Getein 1100 Immunofluorescence Quantitative Analyzer
Getein 1160 Immunofluorescence Quantitative Analyzer
Getein 1180 Immunofluorescence Quantitative Analyzer

CONTENTS

Materials provided	Getein 1100/Getein 1160/Getein 1180	
	10 T/kit	25 T/kit
Vitamin B12 test card*	10 pcs	25 pcs
Disposable pipet	10 pcs	25 pcs
Sample diluent A**	10 tubes	25 tubes
Sample diluent B***	10 tubes	25 tubes
Reaction tube	10 pcs	25 pcs
Instructions for use	1 pc	1 pc
SD card	1 pc	1 pc

Vitamin B12 test card*

A test card consists of: Fluorescence-labelled intrinsic factor, Fluorescence-labelled Chicken immunoglobulin Y natural protein, vitamin B12 antigen and Goat anti chicken immunoglobulin Y polyclonal antibody.

Sample diluent A**

-Sample diluent A mainly consists of: sodium hydroxide (1mol/L), NaN_3 (<0.1%).

Sample diluent B***

-Sample diluent B mainly consists of: phosphate buffer (20 mmol/L), NaN_3 (<0.1%).

Note:

1. The standard curve data can be written to RFID card in the kit. According to the function of RFID card, we define it as "Standard Curve Data Card", short for "SD Card".
2. Do not mix or interchange different batches of kits.

STORAGE AND STABILITY

Realtime stability:

Store the kit at 4~30°C with a valid period of 24 months. The test kits are stable until the expiry date printed on the labels.

In-use stability:

Use the test card within 1 hour once the foil pouch is opened.

PRECAUTIONS

1. For *in vitro* diagnostic use only.
2. For professional and laboratory use only, not for near-patient test and self-testing.
3. Do not use the test card if the foil pouch or the cartridge is damaged.
4. Do not open pouches until performing the test.
5. Handle all specimens as potentially infectious. Proper handling and disposal methods should be followed in accordance with local regulations.
6. Carefully read and follow instructions for use to ensure proper test performance.

SPECIMEN COLLECTION AND PREPARATION

1. Serum can be used as samples in the assay.
2. Hemolyzed specimens should not be used.
3. This assay is designed and validated for use with human blood, other specimens or body fluids may not get accurate results.
4. It is recommended to test the sample within 2 hours after collection. Stable in serum for 2 days at 2~8°C and 2 months at -20°C.
5. Refrigerated or frozen sample should reach room temperature and be homogeneous before testing. Avoid multiple freeze-thaw cycles.

TEST PROCEDURE

1. User must carefully read and operate in strict accordance with the instructions for use before testing, otherwise reliable results cannot be guaranteed.
2. Test kit and sample should be brought to room temperature before testing.
3. Sample Pretreatment

a) Use disposable pipet or pipette, deliver **100 μL** of sample into one tube of **sample diluent A**, mix thoroughly and wait **10 minutes**.

b) Use the same disposable pipet or pipette, deliver the liquid from last step/step(a) completely and add it to **sample diluent B**, mix thoroughly.

c) Use the same disposable pipet or pipette, deliver **200 uL** from last step/step(b) and add it to **Reaction tube**, mix thoroughly and wait **3 minutes**.

Note: Reach the black scale line of the pipette when deliver **100 μL** of liquid.

For Getein 1100:

1) Confirm SD card lot No. in accordance with test kit lot No. Perform calibration using the SD card when necessary.
2) Select serum/plasma sample type on the analyzer (see the user manual of analyzer for details).
3) Remove the test card from the sealed pouch before use. Horizontally place the test card.
4) Use the same disposable pipet or pipette, drop **100 μL** of sample mixture into the sample well on the test card.
5) Reaction time: **15 minutes**. After reaction time is elapsed, insert the test card into Getein 1100 and press "ENT" button or click on “Start” icon. The result will be shown on the screen and printed automatically.

For Getein 1160/Getein 1180:

1) Confirm SD card lot No. in accordance with test kit lot No.. Perform calibration using the SD card when necessary.
2) Select serum/plasma sample type on the analyzer (see the user manual of analyzer for details).
3) Remove the test card from the sealed pouch before use. Horizontally place the test card.
4) Use the same disposable pipet or pipette, drop **100 μL** of sample mixture into the sample well on the test card.

5) Insert the test card into Getein 1160/Getein 1180 immediately after sample loading. The analyzer will count down the reaction time (15 minutes) and automatically test the card after reaction time is elapsed. The result will be shown on the screen and displayed automatically.

RESULTS

Vitamin B12 Fast Test Kit (Immunofluorescence Assay) results are provided in pg/mL.

Results in pg/mL may be converted to pmol/L as shown with an example below:

pg/mL x 0.738 = pmol/L

pmol/L x 1.36 = pg/mL

Others: Measuring range of the Vitamin B12 Fast Test Kit is 100.0-2000.0 pg/mL or 73.8 -1476.0 pmol/L. Samples initially outside the measuring range may be diluted with fetal bovine serum, measuring range can be up to 4000.0 pg/mL or 2952.0 pmol/L through 2-fold dilution.

LIMITATIONS

1. The test results of this kit are only for clinical reference and cannot be used as the basis for confirming or excluding cases alone. In order to achieve the purpose of diagnosis, this test result should be used in combination with clinical examination, medical history and other examination results.
2. Some substances in blood as listed below may interfere with the test and cause erroneous results. The maximum allowance concentration of each is as follows:

Interferent	Concentration (Max)
Triglyceride	1500 mg/dL
Hemoglobin	1000 mg/dL
Bilirubin	65 mg/dL
Biotin	50 ng/dL
Rheumatoid Factor	1500 IU/mL

EXPECTED VALUE

The expected normal value for vitamin B12 was determined by testing samples from 300 apparently healthy individuals. The reference range of vitamin B12 is 197.0-771.0 pg/mL or 145.4 -569 pmol/L calculated by using normal distribution methods giving a level of confidence of approximately 95%.

It is recommended that each laboratory determine the applicability of the reference ranges through experimentation and establish their own laboratory-specific reference ranges if necessary.

PERFORMANCE CHARACTERISTICS

Measuring Range	100.0-2000.0 pg/mL or 73.8 -1476.0 pmol/L
Limit of Detection	≤100.0 pg/mL(73.8 pmol/L)
Within-Run Precision	≤10%
Between-Lot Precision	≤15%

REFERENCES

1. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B (6), Folate, Vitamin B (12), Pantothenic Acid, Biotin, and Choline. Washington, DC: National Academies Press; 1998.
2. Carmel R. Cobalamin (vitamin B12). In: Ross AC, Caballero B, Cousins RJ, Tucker KL, Ziegler TR, eds. Modern Nutrition in Health and Disease. 11th ed. Baltimore, MD: Lippincott Williams & Wilkins; 2014:369-89.
3. Allen LH. Vitamin B12. In: Coates PM, Betz JM, Blackman MR, et al., eds. Encyclopedia of Dietary Supplements. 2nd ed. London and New York: Informa Healthcare; 2010:812-20.
4. Allen LH. Vitamin B-12. Adv Nutr 2012; 3:54-5.
5. Stabler SP. Vitamin B12. In: Marriott BP, Birt DF, Stallings VA, Yates AA, eds. Present Knowledge in Nutrition. 11th ed. Washington, DC: Elsevier; 2020:257-71.
6. Langan RC, Goodbred AJ. Vitamin B12 deficiency: Recognition and management. Am Fam Physician 2017; 96:384-389.
7. Clarke R. B-vitamins and prevention of dementia. Proc Nutr Soc 2008; 67:75-81.
8. Laird E, O'Halloran AM, Molloy AM, Healy M, Hernandez B, O'Connor D, Kenny RA, Briggs R. Low vitamin B12 but not folate is associated with incident depressive symptoms in community-dwelling older adults: a 4-year longitudinal study. Br J Nutr. 2021 Dec 13:1-22.
9. Mikkelsen K, Stojanovska L, Apostolopoulos V. The Effects of Vitamin B in Depression. Curr Med Chem. 2016;23(38):4317-4337.
10. Wu Y, Zhang L, Li S, Zhang D. Associations of dietary vitamin B1, vitamin B2, vitamin B6, and vitamin B12 with the risk of depression: a systematic review and meta-analysis. Nutr Rev. 2022 Feb 10;80(3):351-366.

DESCRIPTION OF SYMBOLS USED

The following graphical symbols used in or found on Vitamin B12 Fast Test Kit (Immunofluorescence Assay) are the most common ones appearing on medical devices and their packaging. They are explained in more detail in the European Standard EN ISO 15223-1:2021.

Key to symbols used			
	Manufacturer		Use-by date
	Do not re-use		Date of manufacture
	Consult *instructions for use* or consult electronic *instructions for use*	LOT	Batch code
	Temperature limit	IVD	*In vitro* diagnostic medical device
	Contains sufficient for <n> tests	EC REP	Authorized representative in the European Community/European Union
CE	CE mark		Do not use if package is damaged and consult *instructions for use*
REF	Catalogue number		

Thank you for using Vitamin B12 Fast Test Kit (Immunofluorescence Assay). Please read the instructions for use carefully before operating to ensure proper use.

Version: WIF78-S-03

Getein Biotech, Inc.
Add: No.9 Bofu Road, Luhe District, Nanjing, 211505, China
Tel: +86-25-68568508
Fax: +86-25-68568500
E-mail: tech@getein.com.cn
overseas@getein.com.cn
Website: www.getein.com

EC REP CMC Medical Devices & Drugs S.L.
Add: C/ Horacio Lengo Nº 18, CP 29006, Málaga, Spain
Tel: +34951214054

Catalogue number	Applicable analyzer	Package specification
IF1070-10T	Getein 1100	10 T/kit
IF1070	Getein 1100	25 T/kit
IF5070-10T	Getein 1160	10 T/kit
IF5070	Getein 1160	25 T/kit
IF3070-10T	Getein 1180	10 T/kit
IF3070	Getein 1180	25 T/kit