Specificity

This assay has high sensitivity and excellent specificity for detection of FA/VB9 . No significant cross-reactivity or interference between FA/VB9 and analogues is observed.

References: Brown RD et al. (2011) Med. J. Aust. 194(2), 65-67; Bukowski R et al. (2009) PLOS Med. 6(5), e1000061.

ELISA kits available from ADI (see details at the web site)

#0010	Human Leptin		
#200-120-AGH	Human globular Adiponectin (gAcrp30)		
#0700	Human Sex Hormone Binding Glob (SHBG)		
#0900	Human IGF-Binding Protein 1 (IGFBP1)		
#1000	Human C-Reactive Protein (CRP)		
#1190	Human Serum Albumin	#1200	Human Albumin (Urinary)
#1750	Human IgG (total)	#1760	Human IgM
#1800	Human IgE	#1810	Human Ferritin
#1210	Human Transferrin (Tf)	#0020	Beta-2 microglobulin
#1600	Human Growth Hormone (GH)		
#0030	Human Insulin	#0040	Human C-peptide
#0100	Human Luteinizing Hormone (LH)		
#0200	Human Follicle Stimulating Hormone (FSH)		
#0300	Human Prolactin (PRL)		
#0400	Human Chorionic Gonadotropin (HCG)	#0410	HCG-free beta
#0600	Human Thyroid Stimulating Hormone (TSH)		
#1100	Human Total Thyroxine (T4)	#1110	Human Free T4 (fT4)
#1650	Human free triiodothyronine (fT3)	#1700	Human T3 (total)
#1850	Human Cortisol	#1860	Human Progesterone
#1865	Human Pregnolone	#1875	Human Aldosterone
#1880	Human Testosterone	#1885	Human free Testosterone
#1910	Human Androstenedione	#1920	Human Estradiol
#1925	Human Estrone	#1940	Dihydrotestosterone (DHT)

Instruction Manual No. M-0365-0B9

Vitamin B9/Folic Acid (FA) ELISA Kit

Cat # 0365-0B9, 96 Tests

For Quantitative determination of vitamin B9 (VB9) in Human Serum

For In Vitro Research Use Only (RUO)

ALPHA DIAGNOSTIC INTERNATIONAL

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DRAFT MANUAL: PLEASE CONSULT THE MANUAL SUPPLIED WITH THE KIT FOR ANY LOT SPECIFIC CHNAGES.

Vitamin B9 ELISA Kit Cat # 0365-0B9

Kit Components	96 tests
FA/VB9 coated **strip plate** (96 wells), #0365B9-1	1 plate
Lyophilized Standard #0365B9-2	2 Vials
Sample / Standard dilution buffer, #0365B9-3, **20 ml**	1 Bottle
Vitamin B9 **Biotin- detection antibody 60ul**, #0365B9-4	1 Vial
Antibody dilution buffer #0365B9-5, **10 ml,**	1 Bottle
HRP-**Streptavidin Conjugate**, #0365B9-6, **120 ul**	1 Vial
HRP-**Streptavidin Conjugate dilution buffer** #0365B9-7, **10ml**,	1 Bottle
Wash buffer (25X) , #VB9-WB, **30 ml**	1 Bottle
TMB substrate, # VB9-TMB, **10 ml**	1 Bottle
Stop solution, # VB9-ST, **10 ml**	1 Bottle
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Intended Use

Vitamin B9 ELISA kit is used for the quantitative detection of vitamin B9/ Folic acid (FA) in human serum, plasma, tissue homogenates and other biological fluids.. For in vitro research use only (RUO).

Introduction

Vitamin B9, more commonly known as folate or folic acid, is a water-soluble vitamin that is part of the B vitamin family. B vitamins and folate help support adrenal function, help calm and maintain a healthy nervous system, and are necessary for key metabolic processes. The name folate comes from the Latin word folium meaning 'leaf' since it is found in many leafy plants. The best dietary sources of folate are green leafy vegetables, citrus fruit juices, and legumes. Vitamin B9 is essential for human growth and development, encourages normal nerve and proper brain functioning, and may help reduce blood-levels of the amino acid homocysteine (elevated homocysteine levels have been implicated in increased risk of heart disease and stroke). Folic acid or folate may also help protect against cancers of the lung, colon, and cervix, and may help slow memory decline associated with aging. Pregnant women have an increased need for folic acid: it supports the growth of the placenta and fetus, and helps to prevent several types of birth defects, especially those of the brain and spine.

Folate deficiency is one of the commonest vitamin deficiencies. It can result from inadequate intake, defective absorption, abnormal metabolism or increased requirements such as when pregnant or breastfeeding. Folic Acid Deficiency has been linked to birth defects, low birth weight, pregnancy loss, depression, memory loss, and cervical dysplasia. Alcoholics, pregnant women, and people living in institutional settings are at a higher risk of vitamin B9 or folate deficiency.

For valid test results, adequate controls and other parameters must be within the listed ranges and assay requirements.

3. If test kits are altered, such as by mixing parts of different kits, which could produce false test results, or if results are incorrectly interpreted, ADI shall have no liability.

4. If computer controlled data reduction is used to interpret the results of the test, it is imperative that the predicted values for the calibrators fall within 10% of the assigned concentrations.

PERFORMANCE CHARACTERISTICS

Precision

The within and between assay precision of the Vitamin B9 ELISA Test System were determined by analyses on three 3 samples with low, middle and high level FA/VB9.

CV (%) = SD/meanX100
Intra-Assay: CV<8%
Inter-Assay: CV<10%

Sensitivity

The Vitamin B9 ELISA Test System has a sensitivity of <46.875pg/ml.

Detection Range

78.125-5000 pg/ml

Recovery

Matrices listed below were spiked with certain level of FA/VB9 and the recovery rates were calculated by comparing measured value to the expected amount of FA/VB9 in samples.

Matrix	Recovery range (%)	Average (%)
Serum (n=5)	89-102	96
EDTA plasma (n=5)	87-104	99
Heparin plasma (n=5)	91-104	98

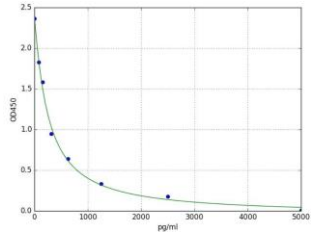
Linearity
The linearity of the kit was assayed by testing samples spiked with appropriate concentration of FA/VB9 and their serial dilutions. The results were demonstrated by the percentage of calculated concentration to the expected.

Sample	1:2	1:4	1:8	1:16
Serum (n=5)	89-105%	85-102%	87-105%	87-100%
EDTA plasma (n=5)	86-94%	83-99%	82-100%	83-101%
Heparin plasma (n=5)	80-99%	82-93%	81-94%	80-98%

WORKSHEET OF TYPICAL ASSAY

Wells	Stds/samples	Mean A450nm
A1, A2	Std. A (0 pg/ml)	2.02
B1, B2	Std. B (78.125 pg/ml)	1.65
C1, C2	Std. C (156.25 pg/ml)	1.48
D1, D2	Std. D (312.5 pg/ml)	1.35
E1, E2	Std. E (625 pg/ml)	1.03
F1, F2	Std. F (1250 pg/ml)	0.67
G1, G2	Std. G (2500 pg/ml)	0.40
H1, H2	Std. H (5000 pg/ml)	0.22
	Sample 1	1.53

NOTE: These data are for demonstration purpose only. A complete standard curve must be run in every assay to determine sample values. Each laboratory should determine their own normal reference values.



7_ADI-ELISA-graph

Calculation of results:

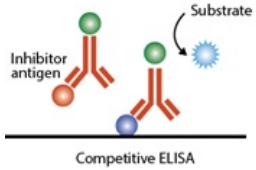
A dose response curve is used to ascertain the concentration of Vitamin B9 in unknown specimens.

1. Record the A450 obtained from the printout of the microplate reader as outlined in Example 1.
2. Plot the A450 for mean duplicate calibrator versus the Vitamin B9 concentration in pg/ml on linear graph paper. Connect the points with a best-fit curve.
3. To determine the concentration of Vitamin B9 for an unknown, locate the average A450 of the duplicates for each unknown on the vertical axis of the graph, find the intersecting point on the curve, and read the concentration (in pg/ml) from the horizontal axis of the graph (the duplicates of the unknown may be averaged as indicated). In the following example, the average absorbance (1.53) intersects the dose response curve at 72.44 pg/ml Vitamin B9 concentration (See Figure 1).

Interpretation

1. *Measurements and interpretation of results must be performed by a skilled individual or trained professional.*
2. Laboratory results alone are only one aspect for determining patient care and should not be the sole basis for therapy, particularly if the results conflict with other determinants.
   The reagents for the test system procedure have been formulated to eliminate maximal interference; however, potential interaction between rare serum specimens and test reagents can cause erroneous results. Heterophilic antibodies often cause these interactions and have been known to be problems for all kinds of immunoassays. For diagnostic purposes, the results from this assay should be used in combination with clinical examination, patient history, and all other clinical findings.

PRINCIPLE OF THE TEST



Vitamin B9 ELISA kit uses Competitive-ELISA as the method. The microtiter plate provided in this kit has been pre-coated with FA/VB9. During the reaction, FA/VB9 in the sample or standard competes with a fixed amount of FA/VB9 on the solid phase supporter for sites on the Biotinylated Detection Ab specific to FA/VB9. Excess conjugate and unbound sample or standard are washed from the plate, and Horseradish Peroxidase (HRP) -Streptavidin conjugate is added to each microplate well and incubated. Then a TMB substrate solution is added to each well. The enzyme-substrate reaction is terminated by the addition of diluted sulphuric acid solution (stop solution) and the color change is measured spectrophotometrically at a wavelength of 450 nm. The concentration of FA/VB9 in the samples is then determined by comparing the OD of the samples to the standard curve.

MATERIALS AND EQUIPMENT REQUIRED

Adjustable micropipette (50-200 μl) and multichannel pipet with disposable plastic tips. Reagent troughs, plate shaker (orbital shaker), plate washer (recommended) and ELISA plates Reader.

SPECIMEN COLLECTION AND STORAGE

The specimens shall be blood, serum in type, and taken with the usual precautions in the collection of venipuncture samples. For accurate comparison to establish normal values, a fasting morning serum sample should be obtained. The blood should be collected in a redtop (with or without gel additives) venipuncture tube(s) with no anti-coagulants. Allow the blood to clot for serum samples. Centrifuge the specimen to separate the serum from the cells. Samples may be refrigerated at 2-8oC for a maximum period of five (5) days. If the specimen(s) cannot be assayed within this time, the sample(s) may be stored at temperatures of -20oC for up to 30 days. Avoid use of contaminated devices. Avoid repetitive freezing and thawing. When assayed in duplicate, 0.100ml (100μl) of the specimen is required.

Notes:

1. Samples should be used within 7 days when stored at 2-8℃, otherwise samples must be divided and stored at -20℃ (≤1month) or -80℃ (≤6months) to avoid the loss of bioactivity and contamination. Avoid repeated freeze-thaw cycles.
2. Please take the samples to room temperature (18-25℃) without extra heating before performing the assay.
3. Please predict the concentration before assaying. If the sample concentration is not within the range of the standard curve, users must determine the optimal sample dilutions for their particular experiments.

Assay Performance

1. It is important that the time of reaction in each well is held constant to achieve reproducible results.
2. Pipetting of samples should not extend beyond ten (10) minutes to avoid assay drift.
3. Highly lipemic, hemolyzed or grossly contaminated specimen(s) should not be used.
4. If more than one (1) plate is used, it is recommended to repeat the dose response curve.
5. The addition of substrate solution initiates a kinetic reaction, which is terminated by the addition of the stop solution. Therefore, the substrate and stop solution should be added in the same sequence to eliminate any time-deviation during reaction.
6. Plate readers measure vertically. Do not touch the bottom of the wells.
7. Failure to remove adhering solution adequately in the aspiration or decantation wash step(s) may result in poor replication and spurious results.
8. Use components from the same lot. No intermixing of reagents from different batches.
9. Accurate and precise pipetting, as well as following the exact time and temperature requirements prescribed, is essential. Any deviation from ADI's IFU may yield inaccurate results.
10. All applicable national standards, regulations and laws, including, but not limited to, good laboratory procedures, must be strictly followed to ensure compliance and proper device usage.
11. It is important to calibrate all the equipment e.g. Pipettes, Readers, Washers and/or the automated instruments used with this device, and to perform routine preventative maintenance.

REAGENTS PREPARATION FOR THE ASSAY:

Wash Buffer (25X): Dilute the wash buffer with distilled water (dissolve content of 1 bottle (30 ml) into 750 ml deionized or distilled water. Some buffer components may crystallize in wash concentrate. These redissolve at room temperature. Store diluted wash buffer at 2-8oC.

Standard: 1) 5000 pg/ml of standard solution: Add 1 ml of Sample / Standard dilution buffer into one Standard tube, keep the tube at room temperature for 10 minutes and mix them thoroughly.
2) 2500 pg/ml→78.125 pg/ml of standard solutions: Label 6 Eppendorf tubes with 2500 pg/ml, 1250 pg/ml, 625 pg/ml, 312.5 pg/ml, 156.25 pg/ml, 78.125 pg/ml , respectively. Aliquot 0.3 ml of the Sample/Standard dilution buffer into each tube. Add 0.3 ml of the above 5000 pg/ml standard solution into 1st tube and mix them thoroughly. Transfer 0.3 ml from 1st tube to 2nd tube and mix them thoroughly. Transfer 0.3 ml from 2nd tube to 3rd tube and mix thoroughly, and so on.
Note: The standard solutions are best used within 2 hours. The standard solution should be at 4°C for up to 12 hours. Or store at -20 °C for up to 48 hours. Avoid repeated freeze-thaw cycles.

Biotin- labeled Antibody Working Solution: Prepare it within1 hour before experiment. Dilute the Biotin- labeled Antibody with Antibody Dilution Buffer at 1:100 and mix them thoroughly. (i.e. Add 1µl of Biotin- labeled Antibody into 99µl of Antibody Dilution Buffer)

HRP-Streptavidin Conjugate Working Solution: Prepare it within 30 minutes before experiment. Dilute the HRP-Streptavidin Conjugate with HRP-Streptavidin Conjugate dilution buffer at 1:100 and mix thoroughly. (i.e. Add 1µl of HRP-Streptavidin Conjugate into 99µl of HRP-Streptavidin Conjugate dilution buffer)

STORAGE AND STABILITY

The microtiter well plate and all other reagents, if unopened, are stable at 2-8^{o}C until the expiration date printed on the label. The whole kit stability is usually 6 months from the date of shipping under appropriate storage conditions. Do not freeze and thaw.

Quality Control:

Each laboratory should assay controls at levels in the low, normal and high range for monitoring assay performance. These controls should be treated as unknowns and values determined in every test procedure performed. Quality control charts should be maintained to follow the performance of the supplied reagents. Pertinent statistical methods should be employed to ascertain trends. The individual laboratory should set acceptable assay performance limits. In addition, maximum absorbance should be consistent with past experience. Significant deviation from established performance can indicate unnoticed change in experimental conditions or degradation of kit reagents. Fresh reagents should be used to determine the reason for the variations.

TEST PROCEDURE *(ALLOW ALL REAGENTS TO REACH ROOM TEMPERATURE, 25-28oC, BEFORE USE). Prepare working solutions of biotin-antibody, HRP conjugate, Standard and wash buffer (see page 3). Bring all reagents and solutions to room temp. (25-28oC).*

1. Organize the microplates' wells for each serum reference standard, control and patient specimen to be assayed in duplicate. Replace any unused microwell strips back into the aluminum bag, seal and store at 2-8°C.
2. It's recommended to measure each standard and sample in duplicate. **Wash plate 2 times with 350 ul wash buffer before adding standard**, sample and control (blank) wells.
3. Pipette **50 µl of Vitamin B9 standard, Blank or Sample** into the assigned well. (The blank well is added with Sample/Standard dilution buffer)
4. Add **50 µl of the Vitamin B9 Biotin- labeled antibody** to all wells.
5. Mix the microplate gently for 20-30 seconds by gentle tapping against the palm. Cover and **incubate for 45 minutes** at 37°C.
6. Wash plate 3 times with 350 ul wash buffer. After the last wash, remove any remaining Wash Buffer by aspirating or decanting. An automatic or manual plate washer can be used. Follow the manufacturer's instruction for proper usage. If a squeeze bottle is employed, fill each well by depressing the container (avoiding air bubbles) to dispense the wash. Decant the wash and repeat two (2) additional times.
7. Add **100 µl of HRP-Streptavidin Conjugate** to all wells. Mix the microplate gently for 20-30 seconds by tapping against the palm of your hand..
8. Cover and **incubate for 30 minutes** at 37°C.
9. Wash plate 5 times with 350 ul wash buffer. After the last wash, remove any remaining Wash Buffer by aspirating or decanting.
10. Add **90 µl of TMB substrate** reagent to all wells. Note: Always add reagents in the same order to minimize reaction time differences between wells. DO NOT SHAKE THE PLATE AFTER SUBSTRATE ADDITION.
11. **Incubate at 37°C in dark within 15-20 minutes.**
12. Add **50 µl of stop solution** to each well and gently mix for 15-20 seconds. Always add reagents in the same order to minimize reaction time differences between wells.
13. **Read the absorbance in each well at 450nm**. The results should be read within fifteen (15) minutes of adding the stop solution.

Note: Dilute the samples suspected of concentration range 50000-500000pg/ml at 1:100, 5000-50000pg/ml at 1:10, 78.125-5000pg/ml at 1:2 and ≤78.125pg/ml not necessary to dilute, or dilute at 1:2.