GENETRACK Diagnostics

Folate

WHAT IS FOLATE?
Folate is an important nutrient that is naturally present in many foods. It functions as a coenzyme or cosubstrate in various reactions, including the formation of DNA and RNA, and metabolism of amino acids (1). Folate-mediated one-carbon metabolism is one of the most important biochemical reactions occurring in our cells (2).

SOURCES OF FOLATE
Folate is naturally present in a wide variety of foods, including vegetables, fruit, nuts, beans, seafood, eggs, dairy products, poultry, and grains. Folic acid is obtained as a dietary supplement and also from enriched bread, cereals, flours, cornmeal, pastas, rice, and other grain products, due to mandatory folic acid fortification programs in the United States (3).

FOLATE REQUIREMENTS
Folic acid is the form of folate found in fortified foods and supplements. Folic acid has higher bioavailability than food folate, which means that the body can utilize a larger proportion of folic acid compared to food folate. At least 85% of folic acid is estimated to be bioavailable, while only approximately 50% of food folate is bioavailable (4). For this reason, recommended folate intakes are listed as dietary folate equivalents (DFE). 1 mcg DFE is equal to 1 mcg of folate from a food source, or 0.5-0.6 mcg folic acid from fortified foods or supplements.

Folate requirements vary depending on age and pregnancy/breastfeeding status (1). Infants require 65 mcg DFE (under 6 months) and 80 mcg DFE (7-12 months). The recommended dietary allowance for 1-3 years is 150 mcg DFE with gradually increasing recommendations until the adult value of 400 mcg DFE by 14 years of age.

Pregnant women should obtain 600 mcg DFE each day, while breastfeeding women should obtain 500 mcg DFE each day. It is recommended that this added requirement be obtained from dietary supplements as folic acid alone or as part of a prenatal vitamin.

FOLATE DEFICIENCY
The total body content of folate is estimated to be 15-30 mg, with approximately half of this stored in the liver, and the remainder in blood and other tissues (4). Folate deficiency is typically associated with serum levels less than 3.5 ng/mL or whole blood levels less than 150 ng/mL. Folate deficiency usually occurs due to poor diet, alcoholism, and malabsorptive disorders (5).

The primary clinical sign of deficiency is megaloblastic anemia, which causes weakness, fatigue, difficulty concentrating, irritability, headaches, heart palpitations, and shortness of breath (1). Females with low folate intake are at increased risk of giving birth to infants with neural tube defects, low birth weights, preterm delivery, and fetal growth retardation (4).

RISK POPULATIONS
Individuals who consume high amounts of alcohol are at increased risk of folate deficiency, partly due to poor diets that are commonly associated with alcohol use disorder. In addition, alcohol inhibits proper folate absorption, accelerates folate breakdown, and increases its excretion from the body (4).

Pregnant women have an increased risk of folate deficiency, due to the increased demands for folate required for the developing fetus. The recommended daily intake increases from 400 mcg DFE/day for non-pregnant women to 600 mcg DFE/day during pregnancy. All pregnant women, as well as those trying to conceive, should take vitamin supplements that include folic acid to reduce the risk of neural tube defects and other complications (1).

Malabsorptive disorders, such as celiac disease and inflammatory bowel disease, can increase the risk of folate deficiency (5). A common genetic polymorphism in the MTHFR gene, known as 677C>T, is also associated with an increased risk of folate deficiency, due to an impaired ability to convert folate to its active form, 5-MTHF. Supplementation with the active form of folate may benefit these individuals (6).

SPECIAL INSTRUCTIONS
Avoid high doses of biotin consumption (e.g. vitamin B7 or B8, vitamin H, or coenzyme R) for at least 72 hours prior to specimen collection.

TEST PROCEDURE
Correct specimen collection and handling is required for optimal assay performance.

This test requires a blood sample from a finger prick. All supplies for sample collection are provided in this kit. First wash and dry hands. Warm hands aid in blood collection. Clean the finger prick site with the alcohol swab and allow to air dry. Use the provided lancet to puncture the skin in one quick, continuous and deliberate stroke. Wipe away the first drop of blood (as it may be contaminated with tissue fluid or skin debris). Massage finger to increase blood flow at the puncture site and hold in a position that gravity facilitates the collection of blood on the fingertip. Transfer the blood to the blood collection card or blood collection tube (microtainer).

Avoid squeezing or 'milking' the finger excessively. If blood flow stops, perform a second skin puncture on another finger if more blood is required.

Dispose of all sharps safely and return sample to the laboratory in the provided prepaid return shipping envelope.

Upon receipt at the laboratory, the blood sample is analyzed by the fully automated Alinity i Folate chemiluminescent microparticle immunoassay on the Alinity ci series analyzer. This assay measures folate levels by binding to folate binding protein (FBP) coated microparticles. The amount of folate in the blood sample is measured in relative light units by a chemiluminescent reaction.

TEST INTERPRETATION
This assay will provide an accurate folate level for the tested blood specimen. Healthy levels are typically at least 150 ng/mL (whole blood level) or 3.5 ng/mL (serum level). The diagnosis of folate deficiency cannot usually be based on only the folate measurement provided by this assay, and further testing may be required (8).

DISCLAIMERS/LIMITATIONS
These results should be interpreted in conjunction with other laboratory and clinical information. Further testing in addition to this assay may be required to diagnose folate deficiency.

Additional testing is recommended if folate levels are inconsistent with clinical evidence.

Assay interference may occur in specimens from individuals routinely exposed to animals or to animal serum products. Additional clinical or diagnostic information may be required for these specimens.

False results may occur in specimens from individuals that have received preparations of mouse monoclonal antibodies for diagnosis or therapy. These specimens should not be analyzed with this assay.

Specimens from individuals with renal impairment or failure may result in falsely depressed folate values. An alternative assay may be required (such as the Alinity i Folate RBC assay).

Some chemotherapeutic agents, including methotrexate, aminopterin, and folinic acid, cross react with folate binding protein in this assay.

Correct specimen collection and handling is required for optimal assay performance. Samples should be protected from light, as light accelerates the degradation of folate.

REFERENCES

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