MAYO CLINIC LABORATORIES

Test Definition: VITAE

Vitamin A and Vitamin E, Serum

Overview

Useful For

Assessment of vitamin A and vitamin E status

Monitoring vitamin A and vitamin E therapy

Evaluating individuals with intestinal malabsorption of lipids

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
VITAP	Vitamin A, S	Yes, (Order VITA)	Yes
VITE	Vitamin E, S	Yes	Yes

Method Name

Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS)

NY State Available

Yes

Specimen

Specimen Type

Serum

Shipping Instructions

Ship specimen in amber vial to protect from light.

Specimen Required

Patient Preparation:

1. Fasting: 12 hours, required; infants should have specimen collected before next feeding.

2. Patient **must not** consume any alcohol for 24 hours before specimen collection.

Supplies: Amber Frosted Tube, 5 mL (T915)

Collection Container/Tube:

Preferred: Red top

Acceptable: Serum gel

Submission Container/Tube: Amber vial

Specimen Volume: 1 mL serum

Collection Instructions: Within 2 hours of collection, centrifuge and aliquot serum into a light protected plastic vial.

Specimen Minimum Volume

Serum: 0.5 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	Reject
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	28 days	LIGHT PROTECTED
	Ambient	7 days	LIGHT PROTECTED
	Frozen	28 days	LIGHT PROTECTED

Clinical & Interpretive

Clinical Information

Vitamin A:
The level of vitamin A in the plasma or serum is a reflection of the quantities of vitamin A and carotene (provitamin A) ingested and absorbed by the intestine (carotene is converted to vitamin A by intestinal absorptive cells and hepatocytes).

Vitamin A plays an essential role in the function of the retina (adaptation to dim light), is necessary for growth and differentiation of epithelial tissue, and is required for growth of bone, reproduction, and embryonic development. Together with certain carotenoids, vitamin A also plays a critical role in immune function, with deficiency associated with increased susceptibility and severity of some infectious diseases.

Degenerative changes in eyes and skin are commonly observed in vitamin A deficiency. In developing countries, vitamin A deficiency is the principal preventable cause of blindness. Poor adaptation of vision to darkness (nyctalopia, night blindness) is an early symptom that may be followed by degenerative changes in the retina. Severe or prolonged deficiency leads to xerophthalmia, which can result in dry eye, corneal ulcers, Bitot spots, keratomalacia, and ultimately blindness. Skin changes such as dry skin, generalized xerosis, and phrynoderma are commonly observed in conjunction with vision disorders caused by vitamin A deficiency.

Vitamin A in excess can be toxic. In particular, chronic vitamin A intoxication is a concern in normal adults who ingest more than 15 mg per day and children who ingest more than 6 mg per day of vitamin A over a period of several months. Manifestations are various and include dry skin, cheilosis, glossitis, vomiting, alopecia, bone demineralization and pain, hypercalcemia, lymph node enlargement, hyperlipidemia, amenorrhea, and features of pseudotumor cerebri with increased intracranial pressure and papilledema. Liver fibrosis with portal hypertension may also result. Congenital malformations, like spontaneous abortions, craniofacial abnormalities, and valvular heart disease have been described in pregnant women taking vitamin A in excess. Consequently, in pregnancy, the daily dose of vitamin A should not

exceed 3 mg.

Vitamin E (alpha-tocopherol):
Vitamin E is the generic term for two different groups of methylated phenol compounds with a chromane alcoholic core linked to poly-carbon chains (tocopherols and tocotrienols).

These vitamins are all free radical scavengers, with a-Tocopherol being the most potent one in humans, as most of the related compounds are not re-secreted by the liver, thus leading to much lower circulating concentrations.

Vitamin E deficiency is very rare and mostly seen in patients with extreme malabsorption of fat and in patients with abetalipoproteinemia, a rare inborn error of metabolism. Patients with these conditions may develop hemolytic anemia, peripheral neuropathy, myopathy, retinopathy, and immune deficiency.

There is a large body of scientific studies that indicates positive effects on outcomes of various diseases if regular Vitamin E supplementation is provided; however, several trials have shown evidence of increasing bleeding risks at high Vitamin E doses. Therefore, tables of tolerable doses in children and adults have been established, which should not be exceeded.

Deficiencies of vitamins A and E may arise from poor nutrition or from intestinal malabsorption. Individuals at risk, especially children, include those with bowel disease, pancreatic disease, chronic cholestasis, celiac disease, cystic fibrosis, and intestinal lymphangiectasia. Infantile cholangiopathies that may lead to malabsorption of vitamins A and E include intrahepatic dysplasia and rubella-related embryopathy.

Reference Values

VITAMIN A (RETINOL)
0-6 years: 11.3-64.7 mcg/dL
7-12 years: 12.8-81.2 mcg/dL
13-17 years: 14.4-97.7 mcg/dL
> or =18 years: 32.5-78.0 mcg/dL

VITAMIN E (ALPHA-TOCOPHEROL)
0-17 years: 3.8-18.4 mg/L
> or =18 years: 5.5-17.0 mg/L

Interpretation

Vitamin A:
The World Health Organization recommends supplementation when vitamin A levels fall below 20.0 mcg/dL. Severe deficiency is indicated at levels less than 10.0 mcg/dL. There is no widely accepted serum vitamin A level associated with toxicity.

Vitamin E (alpha-tocopherol):
Vitamin E levels below the reference interval suggest deficiency

Conversely, Vitamin E concentrations significantly above the upper healthy reference population range might indicate that Vitamin E intake exceeds the tolerable upper daily intake level(s).

The rare occurrence of low Vitamin A and E levels might correlate with potential deficiency and investigation of potential fat malabsorptions should be considered.

Cautions

Acute alcohol ingestion may result in increased serum vitamin A levels. Patients should abstain from alcohol for 24 hours prior to collection.

Testing of nonfasting specimens or the use of vitamin supplementation can result in elevated serum vitamin concentrations. Reference values were established in patients who were fasting.

Clinical Reference

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Performance

Method Description

Deuterated vitamin A (d6-all-trans retinol) and vitamin E (d6-alpha-tocopherol) are added to serum as an internal standards. Vitamin A (all-trans retinol), vitamin E (alpha-tocopherol), and the deuterated internal standards are extracted from the specimens and analyzed by liquid chromatography tandem mass spectrometry.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday through Friday, Sunday

Report Available
2 to 5 days

Specimen Retention Time
14 days

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Superior Drive

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information
84446
84590

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
VITAE	Vitamin A and Vitamin E, S	96600-2

Result ID	Test Result Name	Result LOINC® Value
2350	A-Tocopherol, Vitamin E	1823-4
605124	Vitamin A	2923-1