MAYO CLINIC LABORATORIES

# Test Definition: VITAP

Vitamin A, Serum

## Overview

### Useful For

Diagnosing vitamin A deficiency or toxicity as part of a profile

Monitoring vitamin A therapy as part of a profile

### Method Name

Only orderable as part of a profile. For more information see VITAE / Vitamin A and Vitamin E, Serum.

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

### NY State Available

Yes

## Specimen

### Specimen Type

Serum

### Specimen Required

Only orderable as part of a profile. For more information see VITAE / Vitamin A and Vitamin E, Serum.

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

### Specimen Minimum Volume

Serum: 0.25 mL

### Reject Due To

| | |
|---|---|
| Gross hemolysis | OK |

| | |
|---|---|
| Gross lipemia | OK |
| 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

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.

### Reference Values

Only orderable as part of a profile. For more information see VITAE / Vitamin A and Vitamin E, Serum.

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

### Interpretation

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.

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 using specimens from individuals who were fasting.

### Clinical Reference

1. Sodi R, Taylor A. Vitamins and trace elements. In: Rifai N, Horvath AR, Wittwer CT, eds. Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics. 8th ed. Elsevier; 2020:466-487
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4. Tanumihardjo SA, Russell RM, Stephensen CB, et al. Biomarkers of Nutrition for Development (BOND)-Vitamin A Review. J Nutr. 2016;146(9):1816S-48S. doi:10.3945/jn.115.229708
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6. Penniston KL, Tanumihardjo SA. The acute and chronic toxic effects of vitamin A. Am J Clin Nutr. 2006;83(2):191-201. doi:10.1093/ajcn/83.2.191
7. Mehta S, Fawzi W. Effects of vitamins, including vitamin A, on HIV/AIDS patients. Vitam Horm. 2007;75:355-83. doi:10.1016/S0083-6729(06)75013-0
8. Fawzi WW, Msamanga GI, Spiegelman D, Wei R, Kapiga S, Villamor E, Mwakagile D, Mugusi F, Hertzmark E, Essex M, Hunter DJ. A randomized trial of multivitamin supplements and HIV disease progression and mortality. N Engl J Med. 2004;351(1):23-32. doi:10.1056/NEJMoa040541
9. Wong CY, Chu DH. Cutaneous signs of nutritional disorders. Int J Womens Dermatol. 2021;7(5Part A):647-652. doi:10.1016/j.ijwd.2021.09.003

## Performance

### Method Description

Deuterated vitamin A (d6-all-trans retinol) is added to serum as an internal standard. Vitamin A (all-trans retinol) and the deuterated internal standard 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
84590

### LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| VITAP | Vitamin A, S | 2923-1 |

| Result ID | Test Result Name | Result LOINC® Value |
|---|---|---|
| 605124 | Vitamin A | 2923-1 |