MAYO CLINIC LABORATORIES

# Test Definition: VITK1

Vitamin K1, Serum

## Overview

### Useful For
Assessment of circulating Vitamin K1 concentration

### 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 or wrapped to protect from light.

### Specimen Required
**Patient Preparation:**
**Fasting: 12 hours, required;** Infants should have specimen collected before next feeding
**Supplies:** Amber Frosted Tube, 5 mL (T915)
**Collection Container/Tube:**
**Preferred:** Red top
**Acceptable:** Serum gel
**Submission Container/Tube:** Amber vial
**Specimen Volume:** 2 mL Serum
**Collection Instructions:**
1. Within 2 hours of collection, centrifuge the specimen.
2. For red-top tubes:
Preferred: Immediately aliquot serum into an amber or light-protected plastic vial.
Acceptable: Serum may be on whole blood cells a maximum of 2 hours before aliquoting. Protect the collection tube from light.
3. For serum-gel tubes:
Preferred: Immediately aliquot serum into an amber or light-protected plastic vial.
Acceptable: Serum may be aliquoted into an amber or light-protected plastic vial within 24 hours of collection when kept at ambient temperature and protected from light or within 7 days of collection if kept refrigerated and protected from light.

### Forms

If not ordering electronically, complete, print, and send a General Request (T239) with the specimen.

### Specimen Minimum Volume

Serum: 0.75 mL

### Reject Due To

| | |
|---|---|
| Gross hemolysis | OK |
| Lipemia | Reject |
| Gross icterus | OK |

### Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Serum | Refrigerated (preferred) | 14 days | |
| | Ambient | 24 hours | |
| | Frozen | 30 days | |

## Clinical & Interpretive

### Clinical Information

Vitamin K1, or phylloquinone, is part of a group of similar fat-soluble vitamins in which the 2-methyl-1,4-naphthoquinone ring is common. Phylloquinone is found in high amounts in leafy green vegetables and some fruits (avocado, kiwi). It is a required cofactor involved in the gamma-carboxylation of glutamate residues of several proteins. Most notably, the inactive forms of the coagulation factors prothrombin (factor II), factors VII, IX, and X, as well as protein S and protein C are converted to their active forms by the transformation of glutamate residues to gamma-carboxyglutamic acid (Gla). Other proteins, such as those involved in bone metabolism, cell growth and apoptosis also undergo this Gla transformation. Thus, vitamin K plays a critical role in hemostasis (blood clotting) and acute deficiency is characterized by defective blood coagulation.

In neonates, low vitamin K levels in breast milk, inadequate placental transport, and hepatic immaturity leading to insufficient synthesis of coagulation proteins can result in the bleeding disorder, hemorrhagic disease of the newborn. To minimize this risk, Vitamin K is commonly administered prophylactically immediately after birth. Other at-risk groups for vitamin K deficiency include those with insufficient dietary intake, malabsorption disorders, cystic fibrosis, cholestasis, alcoholism, as well as liver and pancreatic disease. Several drugs such as coumarin anticoagulants (ie, warfarin) and antibiotics (ie, cephalosporin) have also been shown to interfere with vitamin K metabolism. High doses of vitamin K have not been shown to produce toxicity. Direct measurement of vitamin K1 by liquid chromatography tandem mass spectrometry has been established as a highly effective strategy to assess status and intake.

### Reference Values

<18 years: Not established

> or =18 years: 0.10-2.20 ng/mL

### Interpretation

Low vitamin K1 concentrations in the serum are indicative of insufficiency and poor vitamin K1 status.

### Cautions

Testing of nonfasting specimens or the use of vitamin K1 supplementation can result in elevated serum vitamin K1 concentrations.

### Clinical Reference

1. Vitamin K-Fact Sheet for Health Professionals. US Department of Health and Human Services, National Institutes of Health. Office of Dietary Supplements. Updated March 29, 2021. Accessed April 17, 2026. Available at: https://ods.od.nih.gov/factsheets/VitaminK-HealthProfessional/
2. Zhang Y, Bala V, Mao Z, Chhonker YS, Murry DJ. A concise review of quantification methods for determination of vitamin K in various biological matrices. J Pharm Biomed Anal. 2019;169:133-141. doi:10.1016/j.jpba.2019.03.006
3. 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
4. Booth SL. Vitamin K: food composition and dietary intakes. Food Nutr Res. 2012;56 :10.3402/fnr.v56i0.5505. doi:10.3402/fnr.v56i0.5505
5. Shearer MJ, Newman P. Metabolism and cell biology of vitamin K. Thromb Haemost. 2008;100(4):530-547
6. Mladenka P, Macakova K, Kujovska Krcmova L, et al. Vitamin K - sources, physiological role, kinetics, deficiency, detection, therapeutic use, and toxicity. Nutr Rev. 2022;80(4):677-698. doi:10.1093/nutrit/nuab061
7. Card DJ, Gorska R, Harrington DJ. Laboratory assessment of vitamin K status. J Clin Pathol. 2020;73(2):70-75. doi:10.1136/jclinpath-2019-205997

## Performance

### Method Description

Deuterated stable isotope (vitamin K1-d7) is added to a serum sample as an internal standard. Protein is precipitated from the mixture by the addition of ethanol. Vitamin K1 and internal standard are extracted from the resulting supernatant by solid-phase extraction. Vitamin K1 and internal standard are then separated utilizing high-throughput liquid chromatography with analysis on a tandem mass spectrometer equipped with a heated nebulizer ion source using multiple-reaction monitoring.(Unpublished Mayo method)

### PDF Report

No

### Day(s) Performed

Monday through Friday

### 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

84597

### LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| VITK1 | Vitamin K1, S | 9622-2 |

| Result ID | Test Result Name | Result LOINC® Value |
|---|---|---|
| 62167 | Vitamin K1, S | 9622-2 |