MAYO CLINIC LABORATORIES

Test Definition: FL

Fluoride, Plasma

Overview

Useful For

Assessing accidental fluoride ingestion

Monitoring patients receiving sodium fluoride for bone disease or patients receiving voriconazole therapy

Method Name

Ion-Selective Electrode (ISE)

NY State Available

Yes

Specimen

Specimen Type

Plasma Heparin

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube: Green top (sodium heparin)
Submission Container/Tube: Plastic vial
Specimen Volume: 3 mL Plasma
Collection Instructions: Centrifuge and aliquot plasma into a plastic vial. Glass tubes **are not** acceptable.

Specimen Minimum Volume

Plasma: 1.2 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Plasma Heparin	Refrigerated (preferred)	14 days	
	Ambient	14 days	
	Frozen	14 days	

Clinical & Interpretive

Clinical Information

Fluoride induces bone formation by stimulating osteoblasts. Because fluorides increase bone density, they are used in dental preparations and as an anti osteoporotic agent. However, prolonged high exposure to fluoride produces changes in bone morphology consistent with osteomalacia, including prolonged mineralization lag time and increased osteoid thickness. The adverse skeletal effects of fluoride are associated with plasma fluoride greater than 4 mcmol/L. Chronic fluorosis may produce osteosclerosis, periostitis, calcification of ligaments and tendons, and crippling deformities.

Prolonged exposure to the fluoride-containing antifungal agent voriconazole can produce high plasma fluoride concentrations and bone changes (periostitis). Several other medicines also contain fluoride are used for treating skin diseases (eg, flucytosine, an anti-fungal) and some cancers (eg, fluorouracil, an anti-metabolite).

Reference Values

<4.1 mcmol/L

Interpretation

Humans exposed to fluoride-treated water typically have plasma fluoride in the range of 1 to 4 mcmol/L. Those who are not drinking fluoride-treated water have plasma fluoride less than 1 mcmol/L. Plasma fluoride values greater than 4 mcmol/L indicate excessive exposure and are associated with periostitis.

Cautions

In solutions below pH 5, hydrogen ion (H[+]) complexes with the fluoride ion, thus reducing the free fluoride ion concentration and giving a falsely low reading.

At higher pH (>9), the hydroxyl ion (OH[-]) will interfere with electrodes, giving a falsely elevated reading.

Clinical Reference

1. Cardos VES, Whitford GH, Aoyama H, et al. Daily variations in human plasma fluoride concentrations. J Fluorine Chem. 2008:129;1193-1198
2. Wermers RA, Cooper K, Razonable RR, et al. Fluoride excess and periostitis in transplant patients receiving long-term voriconazole therapy. Clin Infect Dis. 2011;52(5):604-611
3. Agency for Toxic Substances and Disease Registry: Toxicological profile for fluorides, hydrogen fluoride, and fluorine. US Department of Health and Human Services 2003. Accessed April 21, 2026. Available at www.atsdr.cdc.gov/ToxProfiles/tp11.pdf
4. Sodi R: Vitamins and trace elements. In: Rifai N, Chiu RWK, Young I, Burnham CD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 39

Performance

Method Description

The fluoride electrode consists of a single-crystal lanthanum fluoride membrane and an internal reference bonded into an epoxy body. The crystal is an ionic conductor in which only fluoride ions are mobile. When the membrane is in

contact with a fluoride solution, potential develops across the membrane. This potential depends on the level of free fluoride ions in solution and is measured against an external constant reference potential with a digital pH/mV meter.(Instruction manual: Fluoride Ion Selective Electrode User Guide. Thermo Scientific; 09/2016)

PDF Report
No

Day(s) Performed
Tuesday

Report Available
2 to 8 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
82735

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
FL	Fluoride, P	14726-4

Result ID	Test Result Name	Result LOINC® Value
8641	Fluoride, P	14726-4