# Test Definition: FL

Fluoride, P

## 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

**Collection Container/Tube:** Green top (sodium heparin)

**Submission Container/Tube:** Plastic vial

**Specimen Volume:** 3 mL

**Collection Instructions:** Centrifuge and aliquot plasma into a plastic vial. Glass tubes **are not** acceptable.

### Reject Due To

| | |
|---|---|
| Gross hemolysis | OK |
| Gross lipemia | OK |
| Gross icterus | OK |

### Specimen Minimum Volume

1.2 mL

### 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 antiosteoporotic 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 antifungal) and some cancers (eg, fluorouracil, an antimetabolite).

### 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 Mar 1;52(5):604-611

3. Rifai N, Horvath AR, Wittwer CT, eds: Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018

4. Agency for Toxic Substances and Disease Registry: Toxicological profile for fluorides, hydrogen fluoride, and fluorine. US Department of Health and Human Services 2003. Accessed March 2020. Available at www.atsdr.cdc.gov/ToxProfiles/tp11.pdf

## 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

### Specimen Retention Time

2 weeks

### Performing Laboratory Location

Rochester

## Fees & Codes

### Test Classification

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

### CPT Code Information

82735

# Test Definition: FL

Fluoride, P

## LOINC® Information

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

| Result ID | Reporting Name | LOINC® |
|---|---|---|
| 8641 | Fluoride, P | 14726-4 |