

## Overview

### Useful For

Detection of nonacute arsenic exposure in hair specimens

### Special Instructions

- [Collecting Hair and Nails for Metals Testing](#)

### Method Name

Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)

### NY State Available

No

## Specimen

### Specimen Type

Hair

### Specimen Required

**Supplies:** Hair and Nails Collection Kit (T565)

**Specimen Volume:** 0.2 g

**Collection Instructions:** Prepare and transport specimen per the instructions in the kit or see [Collecting Hair and Nails for Metals Testing](#) in Special Instructions.

**Additional Information:** If known, indicate source of hair (axillary, head, or pubic).

### Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

### Specimen Minimum Volume

0.05 g

### Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Hair	Ambient (preferred)		

	Frozen		
	Refrigerated		

## Clinical & Interpretive

### Clinical Information

Arsenic circulating in the blood will bind to protein by formation of a covalent complex with sulfhydryl groups of the amino acid cysteine. Keratin, the major structural protein in hair and nails, contains many cysteine residues and, therefore, is one of the major sites for accumulation of arsenic. Since arsenic has a high affinity for keratin, the concentration of arsenic in hair is higher than in other tissues.

Arsenic binds to keratin at the time of exposure, "trapping" the arsenic in hair. Therefore, hair analysis for arsenic is not only used to document that an exposure occurred, but when it occurred. Hair collected from the nape of the neck can be used to document recent exposure. Axillary or pubic hair is used to document long-term (6 months-1 year) exposure.

### Reference Values

0-15 years: not established

> or =16 years: <1.0 mcg/g of hair

### Interpretation

Hair grows at a rate of approximately 0.5 inch/month. Hair keratin synthesized today will protrude through the skin in approximately 1 week. Thus, a hair specimen collected at the skin level represents exposure of 1 week ago, 1 inch distally from the skin represents exposure 2 months ago, etc.

Hair arsenic levels above 1.00 mcg/g dry weight may indicate excessive exposure. It is normal for some arsenic to be present in hair, as everybody is exposed to trace amounts of arsenic from the normal diet.

The highest hair arsenic observed at Mayo Clinic was 210 mcg/g dry weight in a case of chronic exposure that was the cause of death.

### Clinical Reference

1. Sthiannopkao S, Kim K-W, Cho KH, et al: Arsenic levels in human hair, Kandal Province, Cambodia: The influences of groundwater arsenic, consumption period, age and gender. *Applied Geochemistry* 2010;25:81-90
2. Pearse DC, Dowling K, Gerson AR, et al: Arsenic microdistribution and speciation in toenail clippings of children living in a historic gold mining area. *Sci Total Environ* 2010;408:2590-2599

**Performance****Method Description**

Arsenic, mercury, and lead in hair are analyzed by inductively coupled plasma-mass spectrometry (ICP-MS) in kinetic energy discrimination (KED) mode using gallium, iridium, and lutetium as internal standards, and a salt matrix calibration. (Unpublished Mayo method)

**PDF Report**

No

**Specimen Retention Time**

14 days

**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**

82175

**LOINC® Information**

Test ID	Test Order Name	Order LOINC Value
ASHA	Arsenic, Hair	5584-8

Result ID	Reporting Name	LOINC®
31896	Arsenic, Hair	5584-8
ASHSC	Specimen Source	31208-2