Overview

Useful For
Detection of nonacute arsenic, mercury, and lead exposure using hair specimens

Profile Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Reporting Name</th>
<th>Available Separately</th>
<th>Always Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASHA</td>
<td>Arsenic, Hair</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PBHA</td>
<td>Lead, Hair</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>HGHAR</td>
<td>Mercury, Hair</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

Necessary Information
Indicate source of hair (axillary, head, or pubic), if known

Specimen Required

Supplies: Hair and Nails Collection Kit (T565)

Specimen Volume: 0.2 g

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

Specimen Minimum Volume
0.05 g

Reject Due To

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

Specimen Stability Information
Clinical and Interpretive

Clinical Information

Arsenic

Arsenic circulating in the blood will bind to protein by formation of a covalent complex with sulphydryl 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 hairs are used to document long-term (6 months-1 year) exposure.

Mercury

Once absorbed and circulating, mercury becomes bound to numerous proteins, including keratin. The concentration of mercury in hair correlates with the severity of clinical symptoms. If the hair can be segregated by length, such an exercise can be useful in identifying the time of exposure.

Lead

Hair analysis for lead can be used to corroborate blood analysis or to document past lead exposure. If the hair is collected and segmented in a time sequence (based on length from root), the approximate time of exposure can be assessed.

Reference Values

ARSENIC

0-15 years: not established
> or =16 years: <1.0 mcg/g of hair

LEAD

<4.0 mcg/g of hair

Reference values apply to all ages.

MERCURY

0-15 years: not established

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
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</thead>
<tbody>
<tr>
<td>Hair</td>
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</table>
> 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.

**ARSENIC**

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, which was the cause of death.

**MERCURY**

Normally, hair contains less than 1 mcg/g of mercury; any amount more than this indicates that exposure to more than normal amounts of mercury may have occurred.

**LEAD**

Normal hair lead content is below 4.0 mcg/g. While hair lead content above 10.0 mcg/g may indicate significant lead exposure, hair is also subject to potential external contamination with environmental lead and contaminants in artificial hair treatments (eg, dyeing, bleaching, or permanents). Ultimately, the hair lead content needs to be interpreted in addition to the overall clinical scenario including symptoms, physical findings, and other diagnostic results when determining further actions.

**Cautions**

No significant cautionary statements

**Clinical Reference**


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

Day(s) and Time(s) Test Performed
Tuesday; 3 p.m.

Analytic Time
2 days

Maximum Laboratory Time
7 days

Specimen Retention Time
14 days

Performing Laboratory Location
Rochester

Fees and 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 Regional Manager. 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. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information
82175-Arsenic

83655-Lead

83825-Mercury

LOINC® Information

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<th>Test Order Name</th>
<th>Order LOINC Value</th>
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Document generated September 25, 2020 at 9:16am CDT
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