Overview

Useful For
Preferred enzymatic test for detection of arylsulfatase A deficiency

This test is not suitable for carrier detection.

Genetics Test Information
This is the preferred test to rule-out metachromatic leukodystrophy.

Metachromatic leukodystrophy (MLD) is caused by deficient activity of arylsulfatase A (ARSA) enzyme and is characterized by progressive neurologic changes and leukodystrophy with variable age of onset.

Pseudodeficiency of arylsulfatase A (ARSA) enzyme has been recognized with increasing frequency among patients with other apparently unrelated neurologic conditions as well as among the general population.

Additional studies, such as molecular genetic testing of ARSA (ARSAZ / ARSA Gene, Full Gene Analysis, Varies), urinary excretion of sulfatides (CTSA / Ceramide Trihexosides and Sulfatides, Urine), and/or histological analysis for metachromatic lipid deposits in nervous system tissue are recommended to confirm a diagnosis.

Testing Algorithm
See Lysosomal Storage Disorders Diagnostic Algorithm, Part 2 in Special Instructions.

Special Instructions
- Informed Consent for Genetic Testing
- Biochemical Genetics Patient Information
- Informed Consent for Genetic Testing (Spanish)
- Lysosomal Storage Disorders Diagnostic Algorithm, Part 2

Method Name
Colorimetric Enzyme Assay

NY State Available
Yes

Specimen

Specimen Type
Whole Blood ACD

Shipping Instructions
For optimal isolation of leukocytes, it is recommended the specimen arrive refrigerated within 96 hours of collection to be stabilized. Collect specimen Monday through Thursday only and not the day before a holiday. Specimen should be collected and packaged as close to shipping time as possible.

Specimen Required

Container/Tube:
Preferred: Yellow top (ACD solution B)
Test Definition: ARSAW
Arylsulfatase A, Leukocytes

Acceptable: Yellow top (ACD solution A)

Specimen Volume: 6 mL

Collection Instructions: Send specimen in original tube. Do not transfer blood to other containers.

Forms
1. New York Clients-Informed consent is required. Document on the request form or electronic order that a copy is on file. The following documents are available in Special Instructions:
   - Informed Consent for Genetic Testing (T576)
   - Informed Consent for Genetic Testing-Spanish (T826)
2. Biochemical Genetics Patient Information (T602) in Special Instructions.
3. If not ordering electronically, complete, print, and send an Inborn Errors of Metabolism Test Request (T798) with the specimen.

Specimen Minimum Volume
5 mL

Reject Due To
| Gross hemolysis | Reject |

Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Blood ACD</td>
<td>Refrigerated (preferred)</td>
<td>4 days</td>
<td>YELLOW TOP/ACD</td>
</tr>
<tr>
<td></td>
<td>Ambient</td>
<td>4 days</td>
<td>YELLOW TOP/ACD</td>
</tr>
</tbody>
</table>

Clinical and Interpretive

Clinical Information
Metachromatic leukodystrophy (MLD) is a lysosomal storage disorder caused by a deficiency of the arylsulfatase A (ARSA) enzyme, which leads to the accumulation of sulfatides (both galactosyl and lactosyl sulfatide) in the white matter of the central nervous system, the peripheral nervous system, and to a lesser extent, in visceral organs including the kidney and gallbladder. Cells that produce myelin are especially affected causing the characteristic leukodystrophy seen in MLD. Patients with MLD excrete excessive amounts of sulfatides in their urine.

The 3 clinical forms of MLD are late-infantile, juvenile, and adult, depending on age of onset. All forms result in progressive neurologic changes and leukodystrophy demonstrated on magnetic resonance imaging. Late-infantile MLD is the most common (50%-60% of cases) and usually presents before 30 months of age with hypotonia, clumsiness, diminished reflexes, and slurred speech. Progressive neurodegeneration occurs and unless successfully treated, most patients do not survive past childhood. Juvenile MLD (20%-30% of cases) is characterized by onset between 30 months to 16 years. Presenting features are behavior problems, declining school performance, clumsiness, and slurred speech. Neurodegeneration occurs at a somewhat slower and more variable rate than the
lute-infantile form. Adult MLD (15%-20% of cases) has an onset after puberty and can be as late as the fourth or fifth decade. Presenting features are often behavior and personality changes, including psychiatric symptoms. Clumsiness, neurologic symptoms, and seizures are also common. The disease course has variable progression and may occur over 2 to 3 decades. The disease prevalence is estimated to be approximately 1 in 100,000.

MLD is an autosomal recessive disorder and is caused by variants in the ARSA gene coding for the ARSA enzyme. This disorder is distinct from conditions caused by deficiencies of arylsulfatase B (Maroteaux-Lamy disease) and arylsulfatase C (steroid sulfatase deficiency). Saposin B deficiency is a rare autosomal recessive disorder with symptoms that mimic MLD; however, the ARSA enzyme level is normal. Like MLD, patients with saposin B deficiency can also excrete excessive amounts of sulfatides in their urine. Individuals with multiple sulfatase deficiency, which is clinically distinct from MLD, will also have deficiency of arylsulfatase A, however, other sulfatase enzymes will also be deficient.

Individuals with "pseudodeficiency" of ARSA have very low levels of ARSA activity, but are otherwise healthy. Pseudodeficiency is being recognized with increasing frequency among patients with other apparently unrelated neurologic conditions as well as among the general population, therefore a diagnosis of MLD cannot be based upon reduced ARSA activity alone. Additional studies, such as molecular genetic testing of ARSA (ARSAZ / ARSA Gene, Full Gene Analysis, Varies), urinary excretion of sulfatides (CTSA / Ceramide Trihexosides and Sulfatides, Urine), and/or histological analysis for metachromatic lipid deposits in nervous system tissue are recommended to confirm a diagnosis.

Current treatment options for MLD are focused on managing disease manifestations such as seizures, decline in mobility and cognitive ability, and feeding difficulties. Hematopoietic stem cell transplantation (HSCT) is an option but outcomes are dependent on the clinical stage and the presence of neurologic symptoms.

**Reference Values**

> or = 62 nmol/h/mg

**Note:** Results from this assay may not reflect carrier status because of individual variation of arylsulfatase A enzyme levels. Low normal values may be due to the presence of pseudodeficiency gene variant or carrier gene variant. Patients with these depressed levels may be phenotypically normal.

**Interpretation**

Reduced levels of arylsulfatase A are seen in patients with metachromatic leukodystrophy (MLD).

Individuals with pseudodeficiency of arylsulfatase A can have results in the affected range, but are otherwise unaffected with MLD.

Abnormal results should be confirmed using CTSA / Ceramide Trihexosides and Sulfatides, Urine. If molecular confirmation is desired, consider molecular genetic testing ARSAZ / ARSA Gene, Full Gene Analysis, Varies.

**Cautions**

This test is not reliable in identifying carriers due both to analytical variation and unusual genetic variants.

Arylsulfatase A is also deficient in individuals with multiple sulfatase deficiency.

This disorder is distinct from conditions caused by deficiencies of arylsulfatase B (Maroteaux-Lamy disease) and arylsulfatase C (steroid sulfatase deficiency).

**Clinical Reference**

Test Definition: ARSAW
Arylsulfatase A, Leukocytes

Performance

Method Description


PDF Report
No

Day(s) and Time(s) Test Performed
Specimens are processed Monday through Sunday.

Assay is performed: Friday

Analytic Time
8 days

Maximum Laboratory Time
15 days

Specimen Retention Time
WBC homogenate stored 1 month

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...
Test Definition: ARSAW
Arylsulfatase A, Leukocytes

CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information
82657

LOINC® Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Test Order Name</th>
<th>Order LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARSAW</td>
<td>Arylsulfatase A, Leukocytes</td>
<td>24078-8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result ID</th>
<th>Test Result Name</th>
<th>Result LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>8779</td>
<td>Arylsulfatase A, Leukocytes</td>
<td>24078-8</td>
</tr>
<tr>
<td>32437</td>
<td>Interpretation</td>
<td>59462-2</td>
</tr>
<tr>
<td>32438</td>
<td>Reason for referral</td>
<td>42349-1</td>
</tr>
<tr>
<td>32439</td>
<td>Reviewed by</td>
<td>18771-6</td>
</tr>
</tbody>
</table>