MAYO CLINIC LABORATORIES

# Test Definition: ASMW

Acid Sphingomyelinase, Leukocytes

## Overview

### Useful For

Investigation of possible diagnosis of Niemann-Pick disease types A and B

This test is **not recommended** for carrier detection because of the wide range of enzymatic activities observed in carriers and noncarriers.

### Genetics Test Information

This test provides diagnostic testing for patients with decreased acid sphingomyelinase activity on newborn screen or with clinical signs and symptoms suspicious for Niemann-Pick type A or B.

### Testing Algorithm

For more information see Newborn Screen Follow-up for Acid Sphingomyelinase Deficiency

If the patient has abnormal newborn screening results for Niemann-Pick disease, refer to the appropriate American College of Medical Genetics and Genomics Newborn Screening ACT Sheet.(1)

### Special Instructions

- Informed Consent for Genetic Testing
- Biochemical Genetics Patient Information
- Informed Consent for Genetic Testing (Spanish)
- Newborn Screen Follow-up for Acid Sphingomyelinase Deficiency

### Method Name

Flow Injection Analysis-Tandem Mass Spectrometry (FIA-MS/MS)

### 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 6 days of collection to be stabilized**. Pre-analytical processing is performed Monday through Friday and Sunday. This test may be canceled if specimens are outside of stability when processing occurs. Collect and package specimens for arrival on days when processing is performed.

### Specimen Required

**Container/Tube:**
**Preferred:** Yellow top (ACD solution B)
**Acceptable:** Yellow top (ACD solution A) or lavender top (EDTA)
**Specimen Volume:** 6 mL
**Collection Instructions:** Send specimen in original tube. **Do not aliquot**.

## 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:
-Informed Consent for Genetic Testing (T576)
-Informed Consent for Genetic Testing-Spanish (T826)
2. Biochemical Genetics Patient Information (T602)
3. If not ordering electronically, complete, print, and send a Biochemical Genetics Test Request (T798) with the specimen.

## Specimen Minimum Volume

4 mL

## Reject Due To

| | |
|---|---|
| Gross hemolysis | Reject |

## Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Whole Blood ACD | Refrigerated (preferred) | 6 days | |
| | Ambient | 6 days | |

# Clinical & Interpretive

## Clinical Information

Niemann-Pick disease (NPD) types A (NPA) and B (NPB) are autosomal recessive lysosomal storage disorders affecting metabolism of specific lipids within cells. NPA and NPB are caused by a deficiency of sphingomyelinase, which results in extensive storage of sphingomyelin and cholesterol in the liver, spleen, lungs, and, to a lesser degree, brain. NPA disease is more severe than NPB and is characterized by early onset with feeding problems, dystrophy, persistent jaundice, development of hepatosplenomegaly, neurological deterioration, deafness, and blindness, leading to death by age 3. NPB disease is limited to visceral symptoms with survival into adulthood. Some patients have been described with intermediary phenotypes. Large lipid-laden foam cells are characteristic of the disease. Approximately 50% of cases have cherry-red spots in the macula.

The combined prevalence of NPA and NPB is estimated to be 1 in 250,000. NPA and NPB are inherited in an autosomal recessive manner and are caused by variants in the *SMPD1* gene. Although there is a higher frequency of type A among the Ashkenazi Jewish population, both types are panethnic. Individuals with NPD types A and B typically have elevations

of lyso-sphingomyelin and lyso-sphingomyelin 509 combined with elevations of the oxysterols cholestane-3 beta, 5 alpha, 6 beta-triol (COT) and 7-ketocholesterol (7-KC). (OXNP / Oxysterols, Plasma; OXYWB / Oxysterols, Blood; OXYBS / Oxysterols, Blood Spot). Molecular genetic testing for NPA and NPB disease is also available (CGPH / Custom Gene Panel, Hereditary, Next-Generation Sequencing, Varies; specify *SMPD1* Gene List ID: IEMCP-W6S9XD).

### Reference Values

> or =0.32 nmol/hour/mg protein
An interpretative report will be provided.

### Interpretation

Values below the reference range are consistent with a diagnosis for Niemann-Pick types A and B.

When abnormal results are detected, a detailed interpretation is given, including an overview of the results and of their significance, a correlation to available clinical information, elements of differential diagnosis, recommendations for additional biochemical testing, and in vitro, confirmatory studies (enzyme assay, molecular analysis), name and phone number of key contacts who may provide these studies, and a phone number to reach one of the laboratory directors in case the referring physician has additional questions.

### Cautions

This test can give false-positive acid sphingomyelinase results. OXYBS / Oxysterols, Blood Spot may be ordered as a confirmatory test.

Additional biochemical or molecular testing is recommended to confirm a diagnosis if an enzyme deficiency is detected by this screening test.

### Clinical Reference

1. Newborn Screening ACT Sheet [Decreased acid sphingomyelinase] Acid Sphingomyelinase Deficiency (ASMD). American College of Medical Genetics and Genomics; 2022. Revised May 2022. Accessed July 22, 2025. Available at www.acmg.net/PDFLibrary/Niemann-Pick.pdf
2. Elliott S, Buroker N, Cournoyer JJ, et al. Pilot study of newborn screening for six lysosomal storage diseases using Tandem Mass Spectrometry. Mol Genet Metab. 2016;118(4):304-309
3. Matern D, Gavrilov D, Oglesbee D, Raymond K, Rinaldo P, Tortorelli S. Newborn screening for lysosomal storage disorders. Semin Perinatol. 2015;39(3):206-216
4. Schuchman EH, Desnick RJ. Niemann-Pick disease types A and B: acid sphingomyelinase deficiencies. In: Valle DL, Antonarakis S, Ballabio A, Beaudet AL, Mitchell GA, eds. The Online Metabolic and Molecular Bases of Inherited Disease. McGraw-Hill; 2019. Accessed July 22, 2025. Available at https://ommbid.mhmedical.com/content.aspx?sectionid=225545671&bookid=2709
5. Wasserstein MP, Schuchman EH. Acid sphingomyelinase deficiency. In: Adam MP, Feldman J, Mirzaa GM, et al, eds. GeneReviews. [Internet]. University of Washington, Seattle; 2006. Updated April 27, 2023. Accessed July 22, 2025. Available at www.ncbi.nlm.nih.gov/books/NBK1370/
6. Schuchman EH, Desnick RJ. Types A and B Niemann-Pick disease. Mol Genet Metab. 2017;120(1-2)27-33

## Performance

### Method Description

The specimens are incubated with a mix of substrate and internal standard for acid sphingomyelinase, beta-glucocerebrosidase, acid alpha-glucosidase, alpha-galactosidase, galactocerebrosidase and alpha-L-iduronidase. The sample is then purified by liquid-liquid extraction. The extract is evaporated and reconstituted before analysis by tandem mass spectrometry.(Unpublished Mayo method)

### PDF Report

No

### Day(s) Performed

Preanalytical processing: Monday through Friday, Sunday
Assay performed: Monday, Thursday

### Report Available

2 to 5 days

### Specimen Retention Time

White blood cell homogenate: 1 month

### Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

## 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

82657

### LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| ASMW | Acid Sphingomyelinase, Leukocytes | 24101-8 |

| Result ID | Test Result Name | Result LOINC® Value |
|---|---|---|
| 606264 | Acid Sphingomyelinase, Leukocytes | 24101-8 |
| 606265 | Interpretation | 59462-2 |
| 606266 | Reviewed By | 18771-6 |