Overview

Useful For
Evaluating for the risk of major adverse cardiovascular events within the next 1 to 5 years

Highlights
Plasma ceramides predict risk of myocardial infarction, coronary revascularization, acute coronary syndrome hospitalization and mortality within 5 years.

Risk conferred by plasma ceramides is independent of low-density lipoprotein (LDL) cholesterol, C-reactive protein, LDL particles, and lipoprotein-associated phospholipase A2.

Plasma ceramides can be lowered by diet, exercise, simvastatin, rosuvastatin, and proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors.

Method Name
Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)

NY State Available
Yes

Specimen

Specimen Type
Plasma EDTA

Specimen Required

Patient Preparation: Patients should not be receiving Intralipid because it may cause false-elevations in measured ceramides

Collection Container/Tube: Lavender top (EDTA)

Submission Container/Tube: Plastic vial

Specimen Volume: 1 mL

Collection Instructions: Centrifuge, aliquot at least 1 mL of plasma into a plastic vial, and freeze within 8 hours.

Forms
If not ordering electronically, complete, print, and send a Cardiovascular Test Request Form (T724) with the specimen.

Specimen Minimum Volume
0.5 mL

Reject Due To

<table>
<thead>
<tr>
<th>Gross hemolysis</th>
<th>Reject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross lipemia</td>
<td>OK</td>
</tr>
</tbody>
</table>
Gross icterus | OK

### 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>Plasma EDTA</td>
<td>Frozen (preferred)</td>
<td>30 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refrigerated</td>
<td>24 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambient</td>
<td>8 hours</td>
<td></td>
</tr>
</tbody>
</table>

### Clinical and Interpretive

#### Clinical Information

MI-Heart Ceramides is a blood test that measures risk for adverse cardiovascular events and quantifies plasma ceramides. Plasma ceramides are predictors of adverse cardiovascular events resulting from unstable atherosclerotic plaque. Ceramides are complex lipids that play a central role in cell membrane integrity, cellular stress response, inflammatory signaling, and apoptosis. Synthesis of ceramides from saturated fats and sphingosine occurs in all tissues. Metabolic dysfunction and dyslipidemia results in accumulation of ceramides in tissues not suited for lipid storage. Elevated concentrations of circulating ceramides are associated with atherosclerotic plaque formation, ischemic heart disease, myocardial infarction, hypertension, stroke, type 2 diabetes mellitus, insulin resistance, and obesity.

Three specific ceramides have been identified as highly linked to cardiovascular disease and insulin resistance: Cer16:0, Cer18:0, and Cer24:1. Individuals with elevated plasma ceramides are at higher risk of major adverse cardiovascular events even after adjusting for age, gender, smoking status, and serum biomarkers such as low-density lipoprotein (LDL) and high-density lipoprotein (HDL) cholesterol, C-reactive protein (CRP) and lipoprotein-associated phospholipase A2 (Lp-PLA2). Ceramide concentrations are reduced by current cardiovascular therapies including diet, exercise, statins, and proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors.

#### Reference Values

MI-Heart Ceramide Risk Score:

- 0-2 Lower risk
- 3-6 Moderate risk
- 7-9 Increased risk
- 10-12 Higher risk

<table>
<thead>
<tr>
<th>Ceramide Type</th>
<th>Reference Range</th>
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</thead>
<tbody>
<tr>
<td>Ceramide (16:0)</td>
<td>0.19-0.36 mcmol/L</td>
</tr>
<tr>
<td>Ceramide (18:0)</td>
<td>0.05-0.14 mcmol/L</td>
</tr>
<tr>
<td>Ceramide (24:1)</td>
<td>0.65-1.65 mcmol/L</td>
</tr>
<tr>
<td>Ceramide (16:0)/(24:0)</td>
<td>&lt;0.11</td>
</tr>
</tbody>
</table>
Ceramide (18:0)/(24:0): <0.05
Ceramide (24:1)/(24:0): <0.45

Reference values have not been established for patients who are <18 years of age.

**Note:** Ceramide (24:0) alone has not been independently associated with disease and will not be reported.

### Interpretation

Elevated plasma ceramides are associated with increased risk of myocardial infarction, acute coronary syndromes, and mortality within 1 to 5 years.

<table>
<thead>
<tr>
<th>Ceramide Score</th>
<th>Relative Risk</th>
<th>Risk Category</th>
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<tbody>
<tr>
<td>0-2</td>
<td>1.0</td>
<td>Lower</td>
</tr>
<tr>
<td>3-6</td>
<td>1.5</td>
<td>Moderate</td>
</tr>
<tr>
<td>7-9</td>
<td>2.2</td>
<td>Increased</td>
</tr>
<tr>
<td>10-12</td>
<td>3.5</td>
<td>Higher</td>
</tr>
</tbody>
</table>

Score is based on trial data including >4000 subjects.

### Cautions

No significant cautionary statements.

### Clinical Reference


Test Definition: CERAM
MI-Heart Ceramides, P


Performance

Method Description
Ceramides are separated and quantified by liquid chromatography-tandem mass spectrometry (LC-MS/MS). (Unpublished Mayo method)

PDF Report
No

Day(s) and Time(s) Test Performed
Tuesday, Friday; 7 a.m.

Analytic Time
2 days

Maximum Laboratory Time
9 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
0119U

LOINC® Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Test Order Name</th>
<th>Order LOINC Value</th>
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<tbody>
<tr>
<td>CERAM</td>
<td>MI-Heart Ceramides, P</td>
<td>93883-7</td>
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<td>Result ID</td>
<td>Test Result Name</td>
<td>Result LOINC Value</td>
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<tr>
<td>42434</td>
<td>MI-Heart Ceramide Risk Score</td>
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<tr>
<td>42428</td>
<td>Ceramide (16:0)</td>
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<td>42429</td>
<td>Ceramide (18:0)</td>
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<td>Ceramide (24:1)</td>
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<td>42431</td>
<td>Ceramide (16:0)/(24:0) ratio</td>
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<tr>
<td>42432</td>
<td>Ceramide (18:0)/(24:0) ratio</td>
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</tr>
<tr>
<td>42433</td>
<td>Ceramide (24:1)/(24:0) ratio</td>
<td>93877-9</td>
</tr>
</tbody>
</table>