**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>
Test Definition: CERAM
MI-Heart Ceramides, P

Gross icterus | OK

Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
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<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>
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</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

Ceramide (16:0): 0.19-0.36 mcmol/L
Ceramide (18:0): 0.05-0.14 mcmol/L
Ceramide (24:1): 0.65-1.65 mcmol/L
Ceramide (16:0)/(24:0): <0.11
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**


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**Test Definition: CERAM**

**MI-Heart Ceramides, P**

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**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) Performed**

Tuesday, Friday

**Report Available**

2 to 9 days

**Specimen Retention Time**

14 days

**Performing Laboratory Location**

Rochester

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**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 US Food and Drug Administration.

**CPT Code Information**

0119U

**LOINC® Information**

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