Test Definition: CERAM

MI-Heart Ceramides, P

Overview

Useful For

Evaluation for 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 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 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

Gross hemolysis	Reject
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Plasma EDTA	Frozen (preferred)	30 days	
	Refrigerated	24 hours	
	Ambient	8 hours	

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,(1) ischemic heart disease, myocardial infarction,(2,3) hypertension,(4) stroke,(5) type 2 diabetes mellitus, insulin resistance, and obesity.(6)

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.(3,7)

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.

Ceramide Score	Relative Risk	Risk Category
0-2	1.0	Lower
3-6	1.5	Moderate
7-9	2.2	Increased
10-12	3.5	Higher

Score is based on trial data including >4,000 subjects.

Cautions

No significant cautionary statements.

Clinical Reference

1. Cheng JM, Suoniemi M, Kardys I, et al: Plasma concentrations of molecular lipid species in relation to coronary plaque characteristics and cardiovascular outcome: Results of the ATHEROREMO-IVUS study. Atherosclerosis 2015;243:560-566

2. Pan W, Yu J, Shi R, et al: Elevation of ceramide and activation of secretory acid sphingomyelinase in patients with acute coronary syndromes. Coron Artery Dis 2014;25:230-235

3. Tarasov K, Ekroos K, Suoniemi M, et al: Molecular lipids identify cardiovascular risk and are efficiently lowered by simvastatin and PCSK9 deficiency. J Clin Endocrinol Metab 2014;99:E45-52

4. Spijkers LJ, van den Akker RF, Janssen BJ, et al: Hypertension is associated with marked alterations in sphingolipid biology: a potential role for ceramide. PLoS One 2011;6:e21817

5. Yu RK, Tsai YT, Ariga T, Yanagisawa M: Structures, biosynthesis, and functions of gangliosides--an overview. J Oleo Sci 2011;60:537-544

6. Bergman BC, Brozinick JT, Strauss A, et al: Serum sphingolipids: relationships to insulin sensitivity and changes with exercise in humans. Am J Physiol Endocrinol Metab 2015;309:E398-408

7. Ng TW, Ooi EM, Watts GF, et al: Dose-dependent effects of rosuvastatin on the plasma sphingolipidome and phospholipidome in the metabolic syndrome. J Clin Endocrinol Metab 2014;99:E2335-2340

8. Laaksonen R, Ekroos K, Sysi-Aho M, et al: Plasma ceramides predict cardiovascular death in patients with stable coronary artery disease and acute coronary syndromes beyond LDL-cholesterol. Eur Heart J [epub ahead of print]

April 28th, 2016. DOI:10.1093/eurheartj/ehw148

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

Test ID	Test Order Name	Order LOINC Value
CERAM	MI-Heart Ceramides, P	93883-7

Result ID	Test Result Name	Result LOINC Value
42434	MI-Heart Ceramide Risk Score	93876-1

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Result ID	Test Result Name	Result LOINC Value
42428	Ceramide (16:0)	93882-9
42429	Ceramide (18:0)	93881-1
42430	Ceramide (24:1)	93880-3
42431	Ceramide (16:0)/(24:0) ratio	93879-5
42432	Ceramide (18:0)/(24:0) ratio	93878-7
42433	Ceramide (24:1)/(24:0) ratio	93877-9