# Test Definition: C5OHU

C5-OH Acylcarnitine, Quantitative, Random, Urine

## Overview

### Useful For
Evaluation of patients with an abnormal newborn screen showing elevations of 3-hydroxyisovaleryl-/2-methyl-3-hydroxybutyryl-carnitine

### Genetics Test Information
Elevated 3-hydroxyisovaleryl-/2-methyl-3-hydroxy acylcarnitine (C5-OH) in plasma or newborn screening blood spots is due to one of several biochemical genetic diagnoses: 3-methylcrotonylglycinuria, 3-hydroxy 3-methylglutaryl-CoA lyase deficiency, beta-ketothiolase deficiency, 2-methyl 3-hydroxybutyryl-CoA dehydrogenase deficiency, 3-methylglutaconic aciduria, biotinidase deficiency or holocarboxylase deficiency.

Urine C5OH is useful in differentiating patients with 3-methylcrotonylglycinuria and with 3-methylglutaconic aciduria as they typically excrete larger amounts of C5-OH in urine compared to patients with the other diagnoses.

### Highlights
Elevated 3-hydroxyisovaleryl-/2-methyl-3-hydroxy acylcarnitine (C5-OH in plasma or newborn screening blood spots is due to one of several biochemical genetic diagnoses: 3-methylcrotonylglycinuria, 3-hydroxy 3-methylglutaryl-(HMG)-CoA lyase deficiency, beta-ketothiolase deficiency, 2-methyl 3-hydroxybutyryl-CoA dehydrogenase deficiency, 3-methylglutaconic aciduria, biotinidase deficiency or holocarboxylase deficiency.

Urine C5OH is useful in differentiating patients with 3-methylcrotonylglycinuria and with 3-methylglutaconic aciduria as they typically excrete larger amounts of C5-OH in urine compared to patients with the other diagnoses.

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

### NY State Available
Yes

## Specimen

### Specimen Type
Urine

### Ordering Guidance
This second-tier test is used specifically to evaluate a newborn screening elevation of 3-hydroxyisovaleryl-/2-methyl-3-hydroxy acylcarnitine and **must not** be ordered with either C4U / C4 Acylcarnitine, Quantitative, Random, Urine or C5DCU / C5-DC Acylcarnitine, Quantitative, Random, Urine.

# Test Definition: C5OHU

C5-OH Acylcarnitine, Quantitative, Random, Urine

For general screening for metabolic disorders, see OAU / Organic Acids Screen, Random, Urine; ACRN / Acylcarnitines, Quantitative, Plasma; and AAQP / Amino Acids, Quantitative, Plasma.

## Necessary Information

**Include patient's age, family history, clinical condition (asymptomatic or acute episode), diet, and drug therapy information.**

## Specimen Required

**Patient Preparation:** If clinically feasible, discontinue L-carnitine supplementation at least 72 hours before specimen collection.

**Supplies:** Urine Tubes, 10 mL (T068)

**Collection Container/Tube:** Clean, plastic urine collection container

**Submission Container/Tube:** Plastic, 10-mL urine tube

**Specimen Volume:** 5 mL

**Collection Instructions:**

1. Collect a random urine specimen.
2. Freeze specimen immediately.

## Forms

If not ordering electronically, complete, print, and send a Biochemical Genetics Test Request (T798) with the specimen.

## Specimen Minimum Volume

1 mL

## Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

## Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Urine | Frozen (preferred) | 7 days | |
| | Refrigerated | 24 hours | |

## Clinical & Interpretive

### Clinical Information

The differential diagnosis of an isolated elevation of 3-hydroxyisovaleryl-/2-methyl-3-hydroxy acylcarnitine (C5-OH) in plasma or (newborn screening) blood spots includes the following disorders:

-3-Methylcrotonyl-CoA carboxylase deficiency (common name: 3-methylcrotonylglycinuria), either infantile or maternal

-3-Hydroxy 3-methylglutaryl-CoA lyase deficiency

-Beta-ketothiolase deficiency

-2-Methyl 3-hydroxybutyryl-CoA dehydrogenase deficiency

-3-Methylglutaconic aciduria type I

-Biotinidase deficiency
-Holocarboxylase deficiency

Confirmatory and diagnostic testing are necessary to differentiate these clinical entities. This test can be used to differentiate patients with 3-methylcrotonylglycinuria and with 3-methylglutaconic aciduria as they typically excrete larger amounts of C5-OH in urine compared to patients with the other diagnoses.

The American College of Medical Genetics and Genomics Newborn Screening Work Group published diagnostic algorithms for the follow-up of infants who had positive newborn screening results. For more information, see the Practice Resources: ACT Sheets and Algorithms at www.acmg.net.

### Reference Values
<2.93 millimoles/mole creatinine

### Interpretation
Preliminary data showed that an elevated excretion in urine and concentration in plasma of 3-hydroxyisovaleryl-/2-methyl-3-hydroxy acylcarnitine can be the only biochemical abnormalities in patients with 3-methylcrotonylglycinuria.

### Cautions
The results of urine acylcarnitines are typically not informative when the patient is receiving L-carnitine supplements.

### Clinical Reference
1. Wolfe LA, Finegold DN, Vockley J, et al. Potential misdiagnosis of 3-methylcrotonyl-coenzyme A carboxylase deficiency associated with absent or trace urinary 3-methylcrotonylglycine. Pediatrics. 2007;120(5):e1335-1340
2. Miller MJ, Cusmano-Ozog K, Oglesbee D, Young S; ACMG Laboratory Quality Assurance Committee: Laboratory analysis of acylcarnitines, 2020 update: a technical standard of the American College of Medical Genetics and Genomics (ACMG). Genet Med. 2021;23(2):249-258

## Performance

### Method Description
Acylcarnitines, including 3-hydroxy isovalerylcarnitine, are determined in urine by flow injection analysis tandem mass spectrometry using acetyl-d3-carnitine, propionyl-d3-carnitine, butyryl-d3-carnitine, octanoyl-d3-carnitine, dodecanoyl-d3-carnitine, and palmitoyl-d3-carnitine as internal standards. The supernatant is evaporated and the residue treated with n-butanolic hydrochloric acid yielding the acylcarnitines for analysis as their n-butyl esters.(Tortorelli S, Hahn SH, Cowan TM, Brewster TG, Rinaldo P, Matern D. The urinary excretion of glutarylcarnitine is an informative tool in the biochemical diagnosis of glutaric acidemia type I. Mol Genet Metab. 2005;84(2):137-143)

### PDF Report
No

### Day(s) Performed

Monday, Wednesday, Friday

### Report Available
2 to 5 days

### Specimen Retention Time
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
82017

### LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| C5OHU | C5-OH Acylcarnitine, QN, U | 50091-8 |

| Result ID | Test Result Name | Result LOINC® Value |
|---|---|---|
| 88830 | C5-OH Acylcarnitine, QN, U | 50091-8 |
| 28125 | C5-OH  Interpretation | 59462-2 |
| 34469 | Reviewed By | 18771-6 |