Overview

Useful For
Monitoring patients with monoclonal gammopathies using 24-hour urine specimens

Profile Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Reporting Name</th>
<th>Available Separately</th>
<th>Always Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTU</td>
<td>Protein, Total, U</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PEU</td>
<td>Protein Electrophoresis, U</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>IFXU</td>
<td>Immunofixation, U</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Testing Algorithm

The following algorithms are available in Special Instructions:

- Laboratory Approach to the Diagnosis of Amyloidosis
- Laboratory Screening Tests for Suspected Multiple Myeloma

Special Instructions

- Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens
- Laboratory Approach to the Diagnosis of Amyloidosis
- Laboratory Screening Tests for Suspected Multiple Myeloma

Method Name

PTU: Turbidimetry

PEU: Agarose Gel Electrophoresis

IFXU: Immunofixation

NY State Available

Yes

Specimen

Specimen Type
Urine

Shipping Instructions
Refrigerate specimen during collection and send refrigerated.

Necessary Information
24-Hour volume is required.

Specimen Required
**Supplies:**

Urine Container, 60 mL (T313)

Aliquot Tube, 5 mL (T465)

**Submission Container/Tube:**

Plastic, 60-mL urine bottle and plastic, 5-mL tube

**Specimen Volume:** 50 mL

**Collection Instructions:**

1. Collect urine for 24 hours.

2. Aliquot at least 25-mL specimen in plastic, 60-mL urine bottle and at least 1-mL of specimen in plastic, 5-mL tube.

3. Label specimens appropriately (60-mL bottle for protein electrophoresis and 5-mL tube for protein, total).

**Additional Information:** See Urine Preservatives-Collection and Transportation for 24-Hour Urine Specimens in Special Instructions for multiple collections.

**Forms**

If not ordering electronically, complete, print, and send a Renal Diagnostics Test Request (T830) with the specimen.

**Urine Preservative Collection Options**

**Note:** The addition of preservative or application of temperature controls must occur within 4 hours of completion of the collection.

<table>
<thead>
<tr>
<th>Preservative</th>
<th>Status</th>
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<tbody>
<tr>
<td>Ambient</td>
<td>OK</td>
</tr>
<tr>
<td>Refrigerate</td>
<td>Preferred</td>
</tr>
<tr>
<td>Frozen</td>
<td>OK</td>
</tr>
<tr>
<td>50% Acetic Acid</td>
<td>No</td>
</tr>
<tr>
<td>Boric Acid</td>
<td>No</td>
</tr>
<tr>
<td>Diazolidinyl Urea</td>
<td>No</td>
</tr>
<tr>
<td>6M Hydrochloric Acid</td>
<td>No</td>
</tr>
<tr>
<td>6M Nitric Acid</td>
<td>No</td>
</tr>
<tr>
<td>Sodium Carbonate</td>
<td>No</td>
</tr>
<tr>
<td>Thymol</td>
<td>OK</td>
</tr>
<tr>
<td>Toluene</td>
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</table>

**Specimen Minimum Volume**

25 mL
Reject Due To

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

Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
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</thead>
<tbody>
<tr>
<td>Urine</td>
<td>Refrigerated (preferred)</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frozen</td>
<td>5 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambient</td>
<td>72 hours</td>
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Clinical and Interpretive

Clinical Information
Urine proteins can be grouped into 5 fractions by protein electrophoresis:
- Albumin
- Alpha-1
- Alpha-2
- Beta-globulin
- Gamma-globulin

The urine total protein concentration, the electrophoretic pattern, and the presence of a monoclonal immunoglobulin light chain may be characteristic of monoclonal gammopathies such as multiple myeloma, primary systemic amyloidosis, and light chain deposition disease.

The following algorithms are available in Special Instructions:
- Laboratory Approach to the Diagnosis of Amyloidosis
- Laboratory Screening Tests for Suspected Multiple Myeloma

Reference Values

PROTEIN, TOTAL

<229 mg/24 hours

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

Reference value applies to 24-hour collection.

ELECTROPHORESIS, PROTEIN
The following fractions, if present, will be reported as a percent of the protein, total.

- Albumin
- Alpha-1-globulin
- Alpha-2-globulin
- Beta-globulin
- Gamma globulin

**Interpretation**

A characteristic monoclonal band (M-spike) is often found in the urine of patients with monoclonal gammopathies. The initial identification of an M-spike or an area of restricted migration is followed by immunofixation to identify the immunoglobulin heavy chain and/or light chain.

Immunoglobulin free light chains as well as heavy chain fragments may be seen in the urine of patients with monoclonal gammopathies. The presence of a monoclonal light chain M-spike of greater than 1 g/24 hours is consistent with a diagnosis of multiple myeloma or macroglobulinemia.

The presence of a small amount of monoclonal light chain and proteinuria (total protein >3 g/24 hours) that is predominantly albumin is consistent with primary systemic amyloidosis (AL) or light chain deposition disease (LCDD).

Because patients with AL or LCDD may have elevated urinary protein without an identifiable M-spike, urine protein electrophoresis is not considered an adequate screen for these disorders and immunofixation is also recommended.

**Cautions**

Monoclonal gammopathies are rarely seen in patients younger than 30 years of age.

Hemolysis may cause a discrete band on protein electrophoresis, which will be negative on immunofixation.

Penicillin may split the albumin band.

Radiographic agents may produce an uninterpretable pattern.

**Clinical Reference**


**Method Description**

Electrophoresis:
Urine proteins are separated in an electric field according to their size, shape, and electric charge (Helena SPIFE 3000). The separation is performed on agarose gels (Helena SPIFE SPE Vis Gel). The proteins are visualized by staining with acid blue and the intensity of staining is quantitated by densitometry (Helena Quick Scan Touch). Multiplying by the urine protein concentration (benzethonium chloride) converts the percentage of protein in each fraction into urine concentration. (Instruction manual: Helena SPIFE 3000; package insert: Helena SPIFE SPE Vis Gel, 2001; Abraham RS, Barnidge DR: Protein analysis in the clinical immunology laboratory. In: Detrick BD, Hamilton RG, Schmitz JL eds. Manual of Molecular and Clinical Laboratory Immunology. 8th ed. 2016:chap 4)

Immunofixation:

Urine proteins are separated in an electric field according to their size, shape, and electric charge. The separation is performed on agarose gels (Helena SPIFE Immunofix-15). The proteins are anchored in situ following electrophoresis. Antisera specific for gamma, alpha, mu, kappa, and lambda immunoglobulin heavy and light chains are applied to the gel forming insoluble complexes with any immunoglobulin present. The proteins are visualized by staining with acid violet. (Abraham RS, Barnidge DR: Protein analysis in the clinical immunology laboratory. In: Detrick BD, Hamilton RG, Schmitz JL eds. Manual of Molecular and Clinical Laboratory Immunology. 8th ed. 2016:chap 4)

**PDF Report**

No

**Day(s) and Time(s) Test Performed**

Protein, total: Monday through Sunday; Continuously

Electrophoresis, protein: Monday through Friday; 12 p.m.

Immunofixation: Monday through Friday; 8 a.m.

**Analytic Time**

Same day/1 day

**Maximum Laboratory Time**

3 days

**Specimen Retention Time**

See Individual Unit Codes

**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 has been cleared, approved or is exempt by the U.S. Food and Drug Administration and is used per manufacturer’s instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.
**Test Definition: MPSU**
Monoclonal Protein Study, U

### CPT Code Information

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### LOINC® Information

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<tr>
<td>MPSU</td>
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<td>2776</td>
<td>Albumin</td>
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<td>TP2</td>
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<td>TM23</td>
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<td>2777</td>
<td>Alpha 1-Globulin</td>
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<td>2779</td>
<td>Alpha 2-Globulin</td>
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<td>2781</td>
<td>Gamma-Globulin</td>
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