Overview

Useful For
Monitoring therapy to ensure adequate blood levels and avoid over-immunosuppression

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

NY State Available
Yes

Specimen

Specimen Type
Serum Red

Specimen Required

Patient Preparation: Collect specimen just prior to next dose (ie, trough)

Container/Tube: Red top

Specimen Volume: 1 mL

Forms
If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
- Renal Diagnostics Test Request (T830)
- Therapeutics Test Request (T831)

Specimen Minimum Volume
0.25 mL

Reject Due To

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

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>Serum Red</td>
<td>Refrigerated (preferred)</td>
<td>28 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frozen</td>
<td>28 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambient</td>
<td>21 days</td>
<td></td>
</tr>
</tbody>
</table>
Clinical and Interpretive

Clinical Information

Mycophenolate mofetil (CellCept) is a new immunosuppressive agent useful in organ transplantation. It is approved for use in renal, hepatic, and cardiac transplants. When mycophenolate mofetil enters the blood, it is immediately metabolized to the active drug, mycophenolic acid (MPA), which inhibits inosine monophosphate dehydrogenase and interferes with the de novo pathway of guanosine nucleotide synthesis selectively in lymphocytes. MPA inhibits proliferative responses of T- and B-lymphocytes to both mitogenic and allospecific stimulation. MPA acts in the same fashion as azathioprine, and MPA is suggested as replacement therapy for azathioprine. The drug is deactivated by the hepatic enzyme, uridine diphosphate glucuronyltransferase to form mycophenolic acid glucuronide (MPA-G).

The principle clinical problem encountered in MPA therapy is excessive immunosuppression, which predisposes the patient to systemic infection. Measurement of the blood level of MPA and MPA-G can be useful to guide therapy.

Monitoring is recommended immediately after transplant up to 3 weeks after therapy is initiated to evaluate dosing adequacy. Additional monitoring is indicated if the MPA level is not in the therapeutic range or if a major change in health status occurs.

Reference Values

MYCOPHENOLIC ACID (MPA)

1.0-3.5 mcg/mL

MPA GLUCURONIDE

35-100 mcg/mL

Interpretation

Trough serum levels of mycophenolic acid (MPA) at steady-state (>2 weeks at the same dose) in the range of 1.0 to 3.5 mcg/mL indicate adequate therapy. Mycophenolic acid glucuronide (MPA-G) levels in the range of 35 to 100 mcg/mL indicate that the patient has normal uridine diphosphate glucuronosyltransferase (UGT) metabolic capacity. MPA-G levels are typically in the range of 100 to 250 mcg/mL during the 2 weeks following transplantation. MPA-G typically decreases after this initial post-transplant phase.

Trough steady-state serum MPA levels over 4.0 mcg/mL indicate that the patient is over-immunosuppressed and susceptible to systemic infections. Decreased dosages may be indicated in these cases.

Low MPA levels and high MPA-G levels suggest that the patient has an active UGT metabolic capability; higher doses may be required to maintain therapeutic levels of MPA. Some patients have a high UGT metabolic capacity. These patients may require 1 gram or more 3 times a day to maintain trough serum MPA levels in the range of 1.0 mcg/mL to 3.5 mcg/mL. They are likely to have MPA-G levels over 100 mcg/mL. MPA-G is inactive; MPA-G levels only describe the patient's metabolic status.

Patients who have low UGT conjugating capability may become over-immunosuppressed, indicated by a trough steady-state serum MPA level over 4.0 mcg/mL and a MPA-G level below 40 mcg/mL. Dose reduction or interval prolongation is indicated in this case.

Cautions

Correct interpretation requires a trough serum specimen (just before the next regular dose). Specimens collected at other times in the dosing cycle are likely to have higher mycophenolic acid levels. In these cases, the reference
range does not apply.

**Clinical Reference**

2. Rifai N, Horvath AR, Wittwer CT, eds: Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018

**Performance**

**Method Description**
Liquid chromatography-tandem mass spectrometry is used to quantify the serum concentration of mycophenolic acid (MPA) and mycophenolic acid glucuronide (MPA-G). The test involves direct measurement of serum for MPA and MPA-G. (Unpublished Mayo method)

**PDF Report**
No

**Day(s) and Time(s) Test Performed**
Monday through Sunday; Varies

**Analytic Time**
Same day/1 day

**Maximum Laboratory Time**
3 days

**Specimen Retention Time**
2 weeks

**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**
80180

**LOINC® Information**
<table>
<thead>
<tr>
<th>Test ID</th>
<th>Test Order Name</th>
<th>Order LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPA</td>
<td>Mycophenolic Acid, S</td>
<td>87432-1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result ID</th>
<th>Test Result Name</th>
<th>Result LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>15226</td>
<td>Mycophenolic Acid</td>
<td>23905-3</td>
</tr>
<tr>
<td>15227</td>
<td>MPA Glucuronide</td>
<td>23906-1</td>
</tr>
</tbody>
</table>