MAYO CLINIC LABORATORIES

# Test Definition: IMMG

Immunoglobulins (IgG, IgA, and IgM), Serum

## Overview

### Useful For

Detecting or monitoring of monoclonal gammopathies and immune deficiencies

### Testing Algorithm

See Celiac Disease Diagnostic Testing Algorithm

### Special Instructions

- Celiac Disease Diagnostic Testing Algorithm

### Method Name

Nephelometry

### NY State Available

Yes

## Specimen

### Specimen Type

Serum

### Specimen Required

**Supplies:** Sarstedt Aliquot Tube, 5 mL (T914)
**Collection Container/Tube:**
**Preferred:** Serum gel
**Acceptable:** Red top
**Submission Container/Tube:** Plastic vial
**Specimen Volume:** 1 mL
**Collection Instructions:** Centrifuge and aliquot serum into a plastic vial.

### Forms

If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:
-Kidney Transplant Test Request
-Gastroenterology and Hepatology Test Request (T728)

### Specimen Minimum Volume

0.5 mL

### Reject Due To

| | |
|---|---|
| Gross | OK |

| | |
|---|---|
| hemolysis | |
| Gross lipemia | Reject |
| Gross icterus | OK |

### Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---|---|---|---|
| Serum | Refrigerated (preferred) | 28 days | |
| | Ambient | 14 days | |
| | Frozen | 28 days | |

## Clinical & Interpretive

### Clinical Information

Immunoglobulins are formed by plasma cells as a humoral immune response to contact of the immune system with antigens. The primary reaction after initial contact is formation of antibodies of the IgM class, followed later by IgG and IgA antibodies. Quantitative determination of immunoglobulins can provide important information on humoral immune status. Decreased serum immunoglobulin concentrations occur in primary immunodeficiency conditions as well as in secondary immune insufficiencies (eg, in advanced malignant tumors, lymphatic leukemia, multiple myeloma, and Waldenstrom disease).

Monoclonal immunoglobulin proliferations in the serum are found in plasmacytomas, Waldenstrom disease, and heavy-chain disease. Monoclonal immunoglobulinemia requires detailed differential diagnostic investigations in addition to the quantitative determination. Local immune reactions result in elevated immunoglobulin levels, particularly IgG, in the cerebrospinal fluid. IgA increases with asparaginase treatment, during pregnancy, with exercise, and in people with alcohol use disorder. It falls with prolonged exposure to benzene and after a 1 year abstinence from drinking alcohol. Diphenylhydantoin, dextran, methyl prednisolone, toluene, xylol, and oral contraceptives may also lower IgA levels. IgM may rise in those with narcotic addiction and after various drug use, as with IgA and IgG.

The gamma globulin band as seen in conventional serum protein electrophoresis consists of 5 immunoglobulins. In normal serum, about 80% is IgG, 15% is IgA, 5% is IgM, 0.2% is IgD, and a trace is IgE.

Elevations of IgG, IgA, and IgM may be due to polyclonal immunoglobulin production.

Monoclonal gammopathies of all types may lead to a spike in the gamma globulin zone seen on serum protein electrophoresis. Monoclonal elevations of IgG, IgA, IgD, and IgE characterize multiple myeloma. Monoclonal elevations of IgM occur in macroglobulinemia.

Decreased immunoglobulin levels are found in patients with congenital deficiencies.

### Reference Values

IgG
0-<5 months: 100-334 mg/dL
5-<9 months: 164-588 mg/dL

9-<15 months: 246-904 mg/dL
15-<24 months: 313-1,170 mg/dL
2-<4 years: 295-1,156 mg/dL
4-<7 years: 386-1,470 mg/dL
7-<10 years: 462-1,682 mg/dL
10-<13 years: 503-1,719 mg/dL
13-<16 years: 509-1,580 mg/dL
16-<18 years: 487-1,327 mg/dL
> or =18 years: 767-1,590 mg/dL

IgA
0-<5 months: 7-37 mg/dL
5-<9 months: 16-50 mg/dL
9-<15 months: 27-66 mg/dL
15-<24 months: 36-79 mg/dL
2-<4 years: 27-246 mg/dL
4-<7 years: 29-256 mg/dL
7-<10 years: 34-274 mg/dL
10-<13 years: 42-295 mg/dL
13-<16 years: 52-319 mg/dL
16-<18 years: 60-337 mg/dL
> or =18 years: 61-356 mg/dL

IgM
0-<5 months: 26-122 mg/dL
5-<9 months: 32-132 mg/dL
9-<15 months: 40-143 mg/dL
15-<24 months: 46-152 mg/dL
2-<4 years: 37-184 mg/dL
4-<7 years: 37-224 mg/dL
7-<10 years: 38-251 mg/dL
10-<13 years: 41-255 mg/dL
13-<16 years: 45-244 mg/dL
16-<18 years: 49-201 mg/dL
> or =18 years: 37-286 mg/dL

### Interpretation

Increased serum immunoglobulin concentrations occur due to polyclonal or oligoclonal immunoglobulin proliferation in hepatic disease (eg, hepatitis, liver cirrhosis), connective tissue diseases, acute and chronic infections, as well as in the cord blood of neonates with intrauterine and perinatal infections.

Elevations of IgG, IgA, or IgM may occur in monoclonal gammopathies such as multiple myeloma (IgG, IgA), macroglobulinemia (IgM), primary systemic amyloidosis, monoclonal gammopathy of undetermined significance, and related disorders.

Decreased levels are found in patients with primary or secondary immune deficiencies.

### Cautions

Electrophoresis is usually required to interpret an elevated immunoglobulin class as polyclonal versus monoclonal. Immunofixation is usually required to characterize a monoclonal protein.

If there is a discrete M-peak, the monoclonal protein can be monitored with quantitative immunoglobulins. If immunoglobulin quantitation is used to monitor the size of a monoclonal protein that is contained in a background of polyclonal immunoglobulins, changes in the immunoglobulin quantitation may reflect changes in the background immunoglobulins. In these situations, serum protein electrophoresis should therefore be used to monitor the monoclonal protein.

Results determined by assays using different manufacturers or methods may not be comparable.

Quantitation of specific proteins by nephelometric means may not be possible in lipemic sera due to the extreme light scattering properties of the specimen. Turbidity and particles in the specimen may result in extraneous light scattering signals, resulting in variable specimen analysis.

### Clinical Reference

1. Webster ADB. Laboratory Investigation of primary deficiency of the lymphoid system. In: Clinics in Immunology and Allergy. Vol 5. 3rd ed. WB Saunders Company; 1985:447-468
2. Pinching AJ. Laboratory investigation of secondary immunodeficiency. In: Clinics in Immunology and Allergy. Vol.5. 3rd ed. WB Saunders Company; 1985:469-490
3. Dispenzieri A, Gertz MA, Kyle RA. Distribution of diseases associated with moderate polyclonal gammopathy in patients seen at Mayo Clinic during 1991. Blood. 1997;90:353
4. Kyle RA, Greipp PR. 3. The laboratory investigation of monoclonal gammopathies. Mayo Clin Proc. 1978;53(11):719-739
5. Ballow M, O'Neil KM. Approach to the patient with recurrent infections. In: Middleton Jr E, Reed CE, Ellis EF, et al, eds. Allergy: Principles and Practice. Vol 2. 4th ed. Mosby-Year Book, Inc; 1993:1027-1058
6. Kyle RA. Detection of quantitation of monoclonal proteins. Clin Immunol Newsletter. 1990;10:84-86
7. Dietzen DJ, Willrich MAV. Amino acids, peptides, and proteins. In: Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 31

## Performance

### Method Description

In this Siemens Nephelometer II method, the light scattered onto the antigen-antibody complexes is measured. The intensity of the measured scattered light is proportional to the amount of antigen-antibody complexes in the sample under certain conditions. If the antibody volume is kept constant, the signal behaves proportionally to the antigen volume.

A reference curve is generated by a standard with a known antigen content on which the scattered light signals of the samples can be evaluated and calculated as an antigen concentration. Antigen-antibody complexes are formed when a sample containing antigen and the corresponding antiserum are put into a cuvette. A light beam is generated with a light

emitting diode, which is transmitted through the cuvette. The light is scattered onto the immuno-complexes that are present. Antigen and antibody are mixed in the initial measurement, but no complex is formed yet. An antigen-antibody complex is formed in the final measurement.

The result is calculated by subtracting the value of the final measurement from the initial measurement. The distribution of intensity of the scattered light depends on the ratio of the particle size of the antigen-antibody complexes to the radiated wavelength.(Instruction manual: Siemens Nephelometer II, Siemens, Inc.; Version 4, 07/2019)

### PDF Report
No

### Day(s) Performed
Monday through Friday

### Report Available
1 to 3 days

### Specimen Retention Time
14 days

### Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Superior Drive

## 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 has been cleared, approved, or is exempt by the US 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.

### CPT Code Information
82784 x 3

### LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| IMMG | Immunoglobulins IgG,A,M, S | 34550-4 |

| Result ID | Test Result Name | Result LOINC® Value |
|---|---|---|
| IGA | Immunoglobulin A (IgA), S | 2458-8 |

| | | |
|---|---|---|
| IGG | Immunoglobulin G (IgG), S | 2465-3 |
| IGM | Immunoglobulin M (IgM), S | 2472-9 |