Globulin

Globulin is one of the two types of serum proteins, the other being albumin. This generic term encompasses a heterogeneous series of families of proteins, with larger molecules and less soluble in pure water than albumin, which migrate less than albumin during serum electrophoresis.

It is sometimes used synonymously with globular protein. However, albumin is also a globular protein, but not a globulin. All other serum globular proteins are globulins.

Protein electrophoresis is used to categorize globulins into the following four categories:

- Alpha 1 globulins
- Alpha 2 globulins
- Beta globulins
- Gamma globulins (one group of gamma globulins are immunoglobulins, that function as antibodies)

Gamma globulin, also called *immunoglobulin* is a class of blood plasma proteins, most notably including the antibodies that help fight infections and disease. Abnormal amounts of gamma globulin can have adverse effects on health or can be indicative of disease. In medicine, gamma globulin injections are used to treat certain conditions.

Gamma globulin injections can help boost a patient's immune system temporarily, so they are sometimes administered after a patient has been exposed to a contagious illness, though this practice is less common than it once was. This type of gamma globulin injection was formerly common for measles and hepatitis A, but vaccines currently exist for both conditions. Gamma globulin injections may also be given to patients who do not produce enough antibodies on their own as the result of a genetic disorder or an acquired condition.

Gamma globulin may also be used to treat immunological diseases other than deficiencies. For example, in immunological thrombocytopenia purpura, the patient's antibodies attack his or her own platelets, interfering with the blood's ability to clot. Gamma globulin injections are useful in treating this condition, though the mechanism by which they work is not fully understood. The injections may cause the spleen to ignore signals to destroy the antibody-tagged platelets, or they may cause the malfunctioning gamma globulin to degrade at an increased rate. In any case, the extra gamma globulin counteracts the malfunctioning antibodies that attack platelets and allows the platelets to thrive.

Since antibodies are used to fight infection, an unusually high amount of gamma globulin in the body, a condition known as *hypergammaglobulinemia*, is often a sign of infection. A proliferation of abnormal gamma globulin, or *paraproteins*, is likewise a sign of immune malfunction. Diseases of the gamma globulin such as this are called *gammopathy*. Gammopathy in itself may not be harmful, but it may be the sign of a serious immune condition, such as AIDS, or progress to a dangerous condition, such as nerve damage or plasma cell cancer. Therefore, close monitoring is advised.

Minor increases can occur with a variety of infections. If the levels are high and stay high, it would be important to consider such things as liver disease, chronic inflammation, autoimmune diseases and paraproteinaemia (a type of cancer). Sometimes globulin levels are low, as occurs in immune deficient states, nephrotic syndrome (a kidney disease) and diseases of the bowel which result in protein loss.

What is Immune globulin treatment?

Immune globulin (Ig) is a sterilized solution obtained from pooled human blood plasma, which contains the immunoglobulins (or antibodies) to protect against the infectious agents that cause various diseases. Antibodies are substances in the blood plasma that fight infections. Our bodies create antibodies (or immunity) against

disease-causing agents when infections occur. These antibodies can protect us from becoming ill if we are exposed to the same infectious agents sometime in the future. When someone is given IG, that person is using other people's antibodies to help fight off or prevent an illness from occurring. This protection is temporary and should not be confused with getting an immunization, which provides longer-term protection. Special Ig formulations are produced from donors with high levels of antibodies against hepatitis B (Hepatitis B Immune Globulin-HBIG), rabies (Rabies Immune Globulin-RIG), tetanus (Tetanus Immune Globulin-TIG) and varicella (chickenpox) (Varicella Zoster Immune Globulin-VZIG). Immune globulins are sometimes called gamma globulins or immune serum globulins. Prior to use, each unit of Ig is tested for evidence of the virus that causes acquired immune deficiency syndrome (AIDS), hepatitis B & C, and many other blood-borne viruses and bacteria. Units that carry these viruses and/or bacteria are eliminated. In addition, several chemical processes are used to sterilize the product to eliminate other disease-causing germs. There is no evidence that Ig causes disease, despite several studies that have looked into this. No cases of AIDS have been due to the receipt of Ig. Immune globulin administered in the United States is a very safe and effective preventive against disease.

People exposed to or in danger of being exposed to certain infectious diseases (i.e., hepatitis, measles, rabies, tetanus and varicella) may be offered injections with the appropriate Ig. Ig recipients should realize that, although the product is highly effective, it is not 100% effective in preventing disease. Some individuals may develop the infection they were exposed to in spite of having received Ig. That is why additional precautions may need to be taken to further protect the person or others from disease. For example, if you were exposed to hepatitis B, you would want to avoid donating blood for six months after receiving Ig in case the Ig wasn't effective in preventing the disease from occurring.

Ig should not be given to individuals who are known to have had **serious** allergic reactions to thimerosal (for example, a generalized

body rash, difficulty breathing, and swollen lips), or other immune globulins. Individuals with blood clotting disorders that would prevent them from safely obtaining an injection and those with IgA deficiency (a rare blood disorder) should not receive Ig.

Shock-like reactions to intramuscularly administered Ig are rare. Recipients are encouraged to wait 20 minutes in the clinic after the injection.

Because Ig may interfere with development of good protection after measles, mumps, rubella or varicella vaccination, people who have received Ig should not receive these vaccines for the next three months. If Ig is given during the two-week period following an immunization against measles, mumps, rubella or varicella, the immunization should be repeated three months after the Ig was received.

Ig is given by injection into a muscle. The dosage and the site for the injection vary according to the amount of Ig required and the size of the person (typically this is in the buttocks for adults, and the leg or arm for children.)

What are the side effects of the treatment

Local pain, tenderness, itching, and swelling at the injection site is to be expected and typically goes away within a day. Non-prescription medications such as aspirin or acetaminophen can be used to lessen any discomfort.

If your blood is tested after receiving Ig, it may show evidence of the antibodies to various diseases during the three months after injection. Be sure to let any health care provider you see in the next three months know you have received Ig.

Ig administered by injection persists in the body for several months. The protective effect of the injection disappears after approximately

three months. If risk of exposure to disease continues individuals may require additional Ig.

GLOBULINS, Total serum

Globulins are proteins that include gamma globulins (antibodies) and a variety of enzymes and carrier/transport proteins. The specific profile of the globulins is determined by protein electrophoresis (SPEP), which separates the proteins according to size and charge. There are four major groups that can be identified: gamma globulins, beta globulins, alpha-2 globulins, and alpha-1 globulins. Once the abnormal group has been identified, further studies can determine the specific protein excess or deficit. Since the gamma fraction usually makes up the largest portion of the globulins, antibody deficiency should always come to mind when the globulin level is low. Antibodies are produced by mature B lymphocytes called plasma cells, while most of the other proteins in the alpha and beta fractions are made in the liver.

Optimal Range: 2.8-3.2 g/dL

Optimal Range (Alpha Globulin): 0.2-0.3 g/L

Optimal Range (Beta Globulin): 0.7-1.0 g/L

The globulin level may be **elevated** in:

- Chronic infections (parasites, some cases of viral and bacterial infection)
- Liver disease (biliary cirrhosis, obstructive jaundice)
- Carcinoid syndrome
- Rheumatoid arthritis
- Ulcerative colitis
- Multiple myelomas, leukemias, Waldenstrom's macroglobulinemia
- Autoimmunity (Systemic lupus, collagen diseases
- Kidney dysfunction (Nephrosis)

The serum globulin level may be **decreased** in:

- Nephrosis (A Condition in which the kidney does not filter the protein from the blood and it leaks into the urine)
- Alpha-1 Antitrypsin Deficiency (Emphysema)
- Acute hemolytic anemia
- Liver dysfunction
- Hypogammaglobulinemia/Agammaglobulinemia

A/G (ALBUMIN/GLOBULIN) RATIO

The liver can function adequately on 20% of liver tissue, thus early diagnosis by lab methods is difficult. A reversed A/G Ratio may be a helpful indicator. With severe liver cell damage, the prolonged prothrombin time will not change with ingestion of Vitamin K. The proper albumin to globulin ratio is 2:1. When <1.7, there is may be a need for increasing stomach acidity. When >3.5 there may be a need for stomach acidity and pepsin.

Optimal Range: 1.7

The AG ratio may be **elevated** in:

- Hypothyroidism
- High protein/high carbohydrate diet with poor nitrogen retention
- Hypogammaglobulinemia (low globulin)
- Glucocorticoid excess (can be from taking medications with cortisone effect, the adrenal gland overproducing cortisol, or a tumor that produces extra cortisol like compounds, low globulin)

The AG ratio may be **decreased** in:

Liver dysfunction