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Introduction - IVIG

Intravenous Immune Globulin, often called IVIG. The active ingredient is immunoglobulin G (also known as IgG or gamma globulin). Immunoglobulins, or antibodies, are complex Y-shaped molecules that play key roles in the immune response to infection, and also regulate the immune system. There are 5 classes of normal human immunoglobulins, including IgG – the others are IgM, IgA, IgE, and IgD – with different structures, functions and concentrations in serum. All are present in varying amounts in commercially prepared IVIG preparations, but IgG is the main component.

IVIG is used to treat a number of immunodeficiency and autoimmune conditions, including:

- Primary Immune Deficiency
- Chronic, Variable Immune Deficiency
- Graft vs. Host Disease
- Kawasaki Syndrome
- Idiopathic Thrombocytopenia Purpura (ITP)
- Neurological conditions, such as multiple sclerosis, chronic inflammatory demyelinating polyneuropathies, Guillain-Barré Syndrome, multifocal motor neuropathy
- Infections in low-birth weight, premature infants
- Dermatomyositis

Some of the uses of IVIG discussed in this article fall outside of the FDA-approved labeling. Before administering IVIG, you should consult the manufacturer's labeling for the approved indications and use of the product being administered, since these do vary by brand. In practice, though, it has been estimated that up to 70% of patients who receive IVIG infusions do so for an off-label indication.

How does IVIG work?

The immune system recognizes and attacks foreign substances, called "antigens". Antigens are molecules on the surface of viruses, fungi, or bacteria. Some non-living substances such as toxins, chemicals, and drugs can be antigens, too. For each new antigen encountered, the immune system forms a defense that is specific to that antigen, allowing the body to destroy it. Immunoglobulins are an important part of that defense. Each immunoglobulin attaches to its specific, matching antigen and makes it easier for phagocytes (a type of white blood cell which engulfs and digests antigens) to destroy the antigen. Binding of the immunoglobulin to an antigen also activates a set of proteins

called the "complement" system, which ruptures bacteria and viruses.

When the immune system is too immature (as in the case of a young infant) or does not otherwise have the ability to form its own antibodies, "passive immunity" can protect against infection. Passive immunity involves antibodies that are produced in someone's body other than your own. Infants have passive immunity because they are born with antibodies that are transferred through the placenta and in breast milk from the mother. IVIG confers similar passive immunity through antibodies present in pooled donor plasma, harvested from carefully screened donors through plasmapheresis. Paradoxically, immunoglobulins can also down-regulate an immune response, which is why IVIG is used to treat some autoimmune diseases.

IVIG Products

IVIG is derived from pooled donor plasma, so there is a theoretical risk of bloodborne pathogen transmission from its infusion. However, the risk is low, since every donor is screened at the time of donation, and the product itself undergoes a variety of viral inactivation processes, including pasteurization, washing with solvent/detergent to remove most of the IgA, which can cause an adverse reaction in some people, and filtration.

At this writing, there are 9 different brands and formulations of commercially-available IVIG products. Since reconstitution, storage, and specific administration protocols may vary by product, it’s important to follow the manufacturer’s instructions for the product you’re going to administer. Although some products require refrigeration and others may be stored at room temperature, IVIG should not be frozen.

Administration of IVIG

IVIG should be administered through a designated intravenous line, and should not be mixed with other medications or piggybacked into other infusions. Some powdered (lyophilized) products must be reconstituted prior to administration. Since sterility of the IVIG is a concern, do not reconstitute the solution until IV access has been established and it’s ready to be administered. After adding the appropriate diluent to the powder, do not shake the vials to mix the solution, since the immunoglobulin proteins may be damaged by doing so. Instead, allow the diluent to dissolve the powder and gently roll vials between your palms and gently swirl them to admix the solution. It will take someplace between 5 minutes and 20 minutes for the powder to completely be absorbed into solution. Depending on the brand, IVIG may only be stable in solution for 2 – 3 hours.

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If IV tubing is included with the product packaging, use it to administer the IVIG. Some formulations will also require filtration. A special filter with a product-specific pore size may be required, since immunoglobulin particles tend to be large.

Prior to administering the infusion, review the indications, what to expect, and possible symptoms of complications with the patient, and ask them to let you know if they feel anything unusual during the infusion. Administer any premedications (sometimes diphenhydramine, acetaminophen, and/or solumedrol). Premedications are sometimes ordered as a precaution, even though anaphylactic events are rare (<5%). When they do occur they are usually caused by IgA immunoglobulins in the product.

Because IVIG tends to be a relatively concentrated solution, try to use a large vein for infusion to avoid reactions at the administration site, or use a central line. Peripheral infusion of concentrated solutions increases the likelihood of phlebitis. Patients with life-long infusion needs may benefit from early placement of permanent central venous access, like a subcutaneous infusion port.

Assess the patient's heart and lung sounds, and get a baseline set of vital signs before beginning the infusion. Some agencies require the presence of an emergency drug kit and airway.

Patients beginning IVIG therapy will usually start on the lowest concentration until patient tolerance is assessed. Some patients may not tolerate the high volumes of fluid associated with large doses of IVIG, so some formulations are available in more concentrated forms.

Most IVIG infusions are performed over 2 – 4 hours. Follow the manufacturer's recommendations for maximum rates of administration. Rates may vary based on the dose to be administered, patient diagnosis, size, and medical history.!