

## **HUMAN NORMAL IMMUNOGLOBULIN FOR I.M & IV USE**

**CLASS:** Blood Product Derivative; Immune Globulin

### **INDICATIONS:**

Treatment of primary humoral immunodeficiency syndromes (congenital agammaglobulinemia, severe combined immunodeficiency syndromes [SCIDS], common variable immunodeficiency, X-linked immunodeficiency, Wiskott-Aldrich syndrome) (Bivigam, Carimune NF, Flebogamma DIF, Gammagard Liquid, Gammagard S/D, Gammaked, Gammaplex, Gamunex-C, Hizentra, Octagam, Privigen)

Treatment of acute and chronic immune thrombocytopenia (ITP) (Carimune NF, Gammagard S/D, Gammaked, Gammaplex [chronic only], Gamunex-C, Privigen [chronic only])

Treatment of chronic inflammatory demyelinating polyneuropathy (CIDP) (Gammaked, Gamunex-C)

Treatment of multifocal motor neuropathy (MMN) (Gammagard Liquid)

Prevention of coronary artery aneurysms associated with Kawasaki syndrome (in combination with aspirin) (Gammagard S/D)

Prevention of bacterial infection in patients with hypogammaglobulinemia and/or recurrent bacterial infections with B-cell chronic lymphocytic leukemia (CLL) (Gammagard S/D)

Prevention of serious infection in immunoglobulin deficiency (select agammaglobulinemias) (GamaSTAN S/D)

Provision of passive immunity in the following susceptible individuals (GamaSTAN S/D):

Hepatitis A: Pre-exposure prophylaxis; postexposure: within 14 days and/or prior to manifestation of disease

Measles: For use within 6 days of exposure in an unvaccinated person, who has not previously had measles

Rubella: Postexposure prophylaxis to reduce the risk of infection and fetal damage in exposed pregnant women who will not consider therapeutic abortion

Varicella: For immunosuppressed patients when varicella zoster immune globulin is not available

### **AVAILABLE DOSAGE FROM THE HOSPITAL:**

HUMAN NORMAL IMMUNOGLOBULIN FOR I.M USE

HUMAN NORMAL IMMUNOGLOBULIN FOR I.V ( I.V IG) 1GM/20ML

HUMAN NORMAL IMMUNOGLOBULIN FOR I.V 10GM/100ML VIAL

HUMAN NORMAL IMMUNOGLOBULIN FOR I.V 2.5GM/50ML VIAL

HUMAN NORMAL IMMUNOGLOBULIN FOR I.V 5GM/100 ML VIAL

### **TRADE NAMES:**

### **DOSAGE:**

- **Dosing: Adult**

**Note: Some clinicians may administer IVIG formulations FDA approved only for intravenous administration as a subcutaneous infusion based on clinical judgment and patient tolerability.**

**B-cell chronic lymphocytic leukemia (CLL) (Gammagard S/D): I.V.:** 400 mg/kg every 3-4 weeks

**Chronic inflammatory demyelinating polyneuropathy (CIDP) (Gammaked, Gamunex-C): I.V.:** Loading dose: 2000 mg/kg (given in divided doses over 2-4 consecutive days); Maintenance: 1000 mg/kg every 3 weeks. Alternatively, administer 500 mg/kg/day for 2 consecutive days every 3 weeks.

**Hepatitis A (GamaSTAN S/D): I.M.:**

Pre-exposure prophylaxis upon travel into endemic areas (hepatitis A vaccine preferred):

0.02 mL/kg for anticipated risk of exposure <3 months

0.06 mL/kg for anticipated risk of exposure ≥3 months; repeat every 4-6 months.

Postexposure prophylaxis: 0.02 mL/kg given within 14 days of exposure and/or prior to manifestation of disease; not needed if at least 1 dose of hepatitis A vaccine was given at ≥1 month before exposure

**Immunoglobulin deficiency (GamaSTAN S/D): I.M.:** 0.66 mL/kg (minimum dose should be 100 mg/kg) every 3-4 weeks. Administer a double dose at onset of therapy; some patients may require more frequent injections.

**Immune thrombocytopenia (ITP):**

Carimune NF: I.V.: Initial: 400 mg/kg/day for 2-5 days; Maintenance: 400 mg/kg as needed to maintain platelet count ≥30,000/mm<sup>3</sup> and/or to control significant bleeding; may increase dose if needed (range: 800-1000 mg/kg)

Gammagard S/D: I.V.: 1000 mg/kg; up to 3 additional doses may be given based on patient response and/or platelet count. Note: Additional doses should be given on alternate days.

Gammaked, Gamunex-C: I.V.: 1000 mg/kg/day for 2 consecutive days (second dose may be withheld if adequate platelet response in 24 hours) or 400 mg/kg once daily for 5 consecutive days

Gammaplex, Privigen: I.V.: 1000 mg/kg/day for 2 consecutive days

**Kawasaki syndrome (Gammagard S/D): I.V.:**

Gammagard S/D: 1000 mg/kg as a single dose or 400 mg/kg/day for 4 consecutive days. Begin within 7 days of onset of fever.

AHA guidelines (2004): 2000 mg/kg as a single dose within 10 days of disease onset

**Note:** Must be used in combination with aspirin: 80-100 mg/kg/day orally, divided every 6 hours for up to 14 days (until fever resolves for at least 48 hours); then decrease dose to 3-5 mg/kg/day once daily. In patients without coronary artery abnormalities, give lower dose for 6-8 weeks. In patients with coronary artery abnormalities, low-dose aspirin should be continued indefinitely.

**Measles:**

GamaSTAN S/D: I.M.:

Immunocompetent: 0.25 mL/kg given within 6 days of exposure

Immunocompromised children: 0.5 mL/kg (maximum dose: 15 mL) immediately following exposure

Postexposure prophylaxis, any nonimmune person (unlabeled): 0.5 mL/kg (maximum dose: 15 mL) within 6 days of exposure (CDC, 2013)

Gammaked, Gamunex-C, Octagam: I.V.:

Prophylaxis in patients with primary humoral immunodeficiency (ONLY if routine dose is <400 mg/kg): ≥400 mg/kg immediately before expected exposure

Treatment in patients with primary immunodeficiency: 400 mg/kg administered as soon as possible after exposure

Postexposure prophylaxis, any nonimmune person (unlabeled population): 400 mg/kg within 6 days of exposure (CDC, 2013)

Hizentra: SubQ infusion: Measles exposure in patients with primary humoral immunodeficiency: Weekly dose: ≥200 mg/kg for 2 consecutive weeks for patients at risk of measles exposure (eg, during an outbreak; travel to endemic area). In patients who have been exposed to measles, administer the minimum dose as soon as possible following exposure.

ACIP recommendations: The Advisory Committee on Immunization Practices (ACIP) recommends postexposure prophylaxis with immune globulin (IG) to any nonimmune person exposed to measles. The following patient groups are at risk for severe measles complications and should receive IG therapy: Infants <12 months of age, pregnant women without evidence of immunity; severely compromised persons (eg, persons with severe primary immunodeficiency; some bone marrow transplant patients; some ALL patients; and some patients with AIDS or HIV infection [refer to guidelines for additional details]). IGIM is recommended for infants <12 months of age. IGIV is recommended for pregnant

women and immunocompromised persons. Although prophylaxis may be given to any nonimmune person, priority should be given to those at greatest risk for measles complications and also to persons exposed in settings with intense, prolonged, close contact (eg, households, daycare centers, classrooms). Following IG administration, any nonimmune person should then receive the measles mumps and rubella (MMR) vaccine if the person is  $\geq 12$  months of age at the time of vaccine administration and the vaccine is not otherwise contraindicated. MMR should not be given until 6 months following IGIM or 8 months following IGIV administration. If a person is already receiving IGIV therapy, a dose of 400 mg/kg I.V. within 3 weeks prior to exposure (or 200 mg/kg SubQ for 2 consecutive weeks prior to exposure if previously on SubQ therapy) should be sufficient to prevent measles infection. IG therapy is not indicated for any person who already received one dose of a measles-containing vaccine at  $\geq 12$  months of age unless they are severely immunocompromised (CDC, 2013). Primary humoral immunodeficiency disorders:

**Multifocal motor neuropathy (MMN) (Gammagard liquid):** I.V.: 500-2400 mg/kg/month based upon response

**Primary humoral immunodeficiency disorders:**

I.V. infusion dosing:

Bivigam, Gammaplex: I.V.: 300-800 mg/kg every 3-4 weeks; dose adjusted based on monitored trough serum IgG concentrations and clinical response

Carimune NF: I.V.: 400-800 mg/kg every 3-4 weeks

Flebogamma DIF, Gammagard Liquid, Gammagard S/D, Gammaked, Gamunex-C, Octagam: I.V.: 300-600 mg/kg every 3-4 weeks; dose adjusted based on monitored trough serum IgG concentrations and clinical response

Privigen: I.V.: 200-800 mg/kg every 3-4 weeks; dose adjusted based on monitored trough serum IgG concentrations and clinical response

Switching to weekly subcutaneous infusion dosing:

Gammagard Liquid, Gammaked, Gamunex-C: SubQ infusion: Begin 1 week after last I.V. dose. Use the following equation to calculate initial dose:

Initial weekly dose (g) =  $[1.37 \times \text{IGIV dose (g)}]$  divided by  $[\text{I.V. dose interval (weeks)}]$

**Note:** For subsequent dose adjustments, refer to product labeling.

Hizentra: SubQ infusion: Begin 1 week after last I.V. dose. Note: Patient should have received an I.V. immune globulin routinely for at least 3 months before switching to SubQ. Use the following equation to calculate initial dose:

Initial weekly dose (g) =  $[1.53 \times \text{IGIV dose (g)}]$  divided by  $[\text{I.V. dose interval (weeks)}]$

**Note:** For subsequent dose adjustments, refer to product labeling.

**Rubella (GamaSTAN S/D):** I.M.: Prophylaxis during pregnancy: 0.55 mL/kg

**Varicella (GamaSTAN S/D):** I.M.: Prophylaxis: 0.6-1.2 mL/kg (varicella zoster immune globulin preferred) within 72 hours of exposure

**Unlabeled uses: I.V.:**

**Acquired hypogammaglobulinemia secondary to malignancy (unlabeled use):**

Adults: 400 mg/kg/dose every 3 weeks; reevaluate every 4-6 months (Anderson, 2007)

**Guillain-Barré syndrome (unlabeled use): Children and Adults:** Various regimens have been used, including:

400 mg/kg/day for 5 days (Hughes, 2003)

or

400 mg/kg/day for 6 days (Patwa, 2012)

or

2000 mg/kg in divided doses administered over 2-5 days (Feasby, 2007)

**Hematopoietic stem cell transplantation with hypogammaglobulinemia (CDC guidelines, 2000; unlabeled use):**

Children: 400 mg/kg per month; increase dose or frequency to maintain IgG levels >400 mg/dL

Adolescents and Adults: 500 mg/kg/week

**HIV-associated thrombocytopenia (unlabeled use):** Adults: 1000 mg/kg/day for 2 days (Anderson, 2007)

**Lambert-Eaton myasthenic syndrome (LEMS) (unlabeled use):** Adults: 1000 mg/kg/day for 2 days (Bain, 1996; Patwa, 2012)

**Multiple sclerosis (relapsing-remitting, when other therapies cannot be used) (unlabeled use):** Children and Adults: 1000 mg/kg per month, with or without an induction of 400 mg/kg/day for 5 days (Feasby, 2007)

**Myasthenia gravis (severe exacerbation) (unlabeled use):** Children and Adults: 2000 mg/kg per treatment course over 2-5 days (Feasby, 2007; Patwa, 2012)

**Refractory dermatomyositis/polymyositis (unlabeled uses):** Children and Adults: 2000 mg/kg per treatment course administered over 2-5 days (Feasby, 2007)

- **Dosing: Geriatric**  
Refer to adult dosing.

- **Dosing: Renal Impairment**

I.V.: Use with caution due to risk of immune globulin-induced renal dysfunction; the rate of infusion and concentration of solution should be minimized.

I.M., SubQ infusion: No dosage adjustment provided in the manufacturer's labeling; risk of immune globulin-induced renal dysfunction has not been identified with I.M. and SubQ infusion administration.

- **Dosing: Hepatic Impairment**

I.M., I.V., SubQ infusion: No dosage adjustment provided in manufacturer's labeling.

- **Dosing: Obesity**

Some clinicians dose IVIG on ideal body weight or an adjusted ideal body weight in morbidly-obese patients (Siegel, 2010).

### **COMMON SIDE EFFECT:**

Frequency not always defined.

Cardiovascular: Chest tightness (7%), hypertension (5% to 6%), angioedema, edema, flushing of the face, hypotension, palpitation, tachycardia

Central nervous system: Headache (16% to 48%), fever (6% to 16%), chills (3% to 6%), dizziness (1% to 6%), malaise (1%), anxiety, aseptic meningitis syndrome, drowsiness, fatigue, irritability, lethargy, lightheadedness, migraine, pain

Dermatologic: Bruising, contact dermatitis, eczema, erythema, hyperhidrosis, petechiae, pruritus, purpura, rash, urticaria

Endocrine & metabolic: Hyperglycemia (neuromuscular disease: 1%) dehydration

Gastrointestinal: Nausea (3% to 18%), anorexia (neuromuscular disease: 1%), abdominal cramps, abdominal pain, diarrhea, discomfort, dyspepsia, gastroenteritis, sore throat, toothache, vomiting

Hematologic: Anemia, autoimmune hemolytic anemia, hematocrit decreased, hematoma, hemolysis (mild), hemorrhage, thrombocytopenia

Hepatic: Bilirubin increased, LDH increased, liver function test increased

Local: Muscle stiffness at I.M. site; pain, swelling, redness or irritation at the infusion site

Neuromuscular & skeletal: Muscle spasm (MMN 7%), weakness (1%; MMN: 7%), arthralgia (1%), back or hip pain, leg cramps, muscle cramps, myalgia, neck pain, rigors

Ocular: Conjunctivitis

Otic: Ear pain

Renal: Acute renal failure, acute tubular necrosis, anuria, BUN increased, creatinine increased, oliguria, proximal tubular nephropathy, osmotic nephrosis

Respiratory: Oropharyngeal pain (7%), asthma aggravated, bronchitis, cough, dyspnea, epistaxis, nasal congestion, pharyngeal pain, pharyngitis, rhinitis, rhinorrhea, sinus headache, sinusitis, upper respiratory infection, wheezing

Miscellaneous: Anaphylaxis, diaphoresis, flu-like syndrome, hypersensitivity reactions, infusion reaction, thermal burn

**PREGNANCY RISK FACTORS: C**