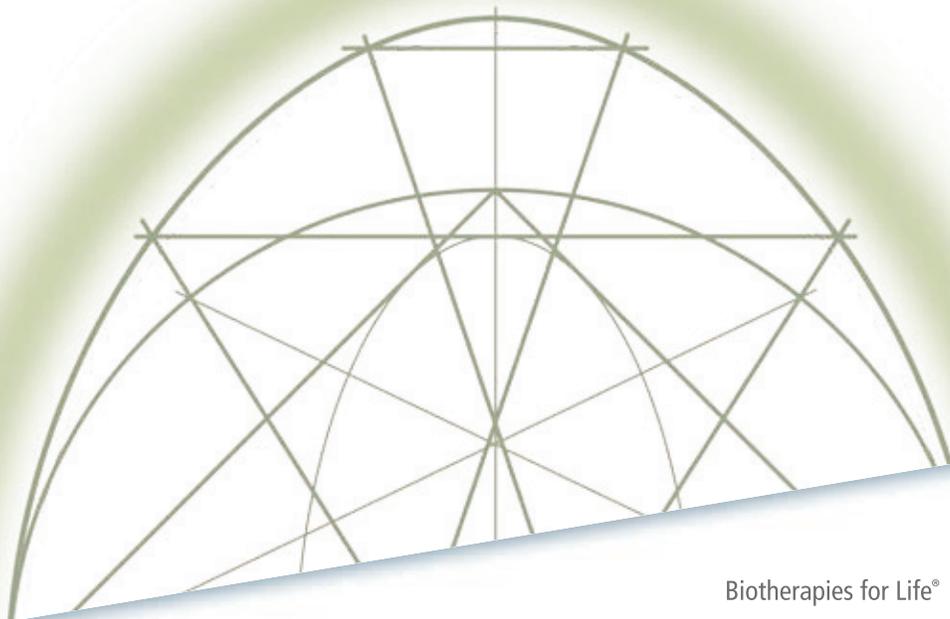


Privigen

Coding Information

Diagnosis and ICD-10-CM¹
billing codes for IVIg therapy



Biotherapies for Life® **CSL Behring**

Please see full Important Safety Information on
back and enclosed full prescribing information
for Privigen, including boxed warning.

Privigen Coding Information

This resource provides information from a complex and evolving medical coding system. The treating physician is solely responsible for diagnosis coding and determination of the appropriate ICD-10-CM codes¹ that describe the patient's condition and are supported by the medical record. All codes listed in this guide are for informational purposes and are not an exhaustive list. The CPT^{®2}, HCPCS,³ and ICD-10-CM codes provided are based on AMA or CMS guidelines. The billing party is solely responsible for coding of services (eg, CPT coding). Because government and other third-party payer coding requirements change periodically, please verify current coding requirements directly with the payer being billed.

Most insurers cover Privigen for the medically necessary treatment of primary immunodeficiency disease (PIDD) and chronic immune thrombocytopenic purpura (ITP). Medicaid coverage varies by state, and coverage by other payers varies by plan and by contract.

Medicare coverage and billing requirements are dependent in part on where the patient is treated.

ICD-10-CM Diagnosis Codes [For claims with a date of service on or after October 1, 2015]

The following ICD-10-CM codes¹ may be used to identify patient medical conditions typically associated with primary immunodeficiency disease.

D69 Purpura and other hemorrhagic conditions

D69.3 Immune thrombocytopenic purpura
Hemorrhagic (thrombocytopenic) purpura
Idiopathic thrombocytopenic purpura
Tidal platelet dysgenesis

D80 Immunodeficiency with predominantly antibody defects

D80.0* Hereditary hypogammaglobulinemia
Autosomal recessive agammaglobulinemia (Swiss type)
X-linked agammaglobulinemia [Bruton]
(with growth hormone deficiency)

D80.1 Nonfamilial hypogammaglobulinemia
Agammaglobulinemia with immunoglobulin-bearing B-lymphocytes
Common variable agammaglobulinemia [CVAgamma]
Hypogammaglobulinemia NOS

D80.2 Selective deficiency of immunoglobulin A [IgA]

D80.3 Selective deficiency of immunoglobulin G [IgG] subclasses

D80.4 Selective deficiency of immunoglobulin M [IgM]

D80.5* Immunodeficiency with increased immunoglobulin M [IgM]

D80.6 Antibody deficiency with near-normal immunoglobulins or with hyperimmunoglobulinemia

D80.7 Transient hypogammaglobulinemia of infancy

D80.8 Other immunodeficiencies with predominantly antibody defects
Kappa light chain deficiency

D80.9 Immunodeficiency with predominantly antibody defects, unspecified

D81 Combined immunodeficiencies

D81.0* Severe combined immunodeficiency [SCID] with reticular dysgenesis

D81.1* Severe combined immunodeficiency [SCID] with low T- and B-cell numbers

D81.2* Severe combined immunodeficiency [SCID] with low or normal B-cell numbers

D81.4 Nezelof's syndrome

D81.6* Major histocompatibility complex class I deficiency
Bare lymphocyte syndrome

D81.7* Major histocompatibility complex class II deficiency

D81.89* Other combined immunodeficiencies

D81.9* Combined immunodeficiency, unspecified
Severe combined immunodeficiency disorder [SCID] NOS

D82 Immunodeficiency associated with other major defects

Excludes: ataxia telangiectasia [Louis-Bar] (G11.3)

D82.0* Wiskott-Aldrich syndrome
Immunodeficiency with thrombocytopenia and eczema

D82.1 Di George's syndrome
Pharyngeal pouch syndrome
Thymic aplasia or hypoplasia
Thymic aplasia or hypoplasia with immunodeficiency

D82.2 Immunodeficiency with short-limbed stature

D82.3 Immunodeficiency following hereditary defective response to Epstein-Barr virus
X-linked lymphoproliferative disease

D82.4 Hyperimmunoglobulin E [IgE] syndrome

D82.8 Immunodeficiency associated with other specified major defects

D82.9 Immunodeficiency associated with major defect, unspecified

D83 Common variable immunodeficiency

D83.0* Common variable immunodeficiency with predominant abnormalities of B-cell numbers and function

D83.1 Common variable immunodeficiency with predominant immunoregulatory T-cell disorders

D83.2* Common variable immunodeficiency with autoantibodies to B- or T-cells

D83.8* Other common variable immunodeficiencies

D83.9* Common variable immunodeficiency, unspecified

CPT[®] and HCPCS Codes

(Healthcare Common Procedural Coding System)

CPT/HCPCS Code ^{2,3}	Description
S9338 [†]	Home infusion therapy, immunotherapy, administrative services, professional pharmacy services, care coordination, and all necessary supplies and equipment (drugs and nursing visits coded separately)
J1459	Injection, immune globulin (Privigen), intravenous, non-lyophilized (eg, liquid), 500 mg
96365	Intravenous infusion, for therapy, prophylaxis, or diagnosis (specify substance or drug); initial, up to 1 hour
96366	Each additional hour (list separately in addition to code for primary procedure)

Privigen Vial Sizes

Ready-to-Use Privigen Vial Sizes

Protein	Fill Size	NDC Number [‡]
5 g	50 mL	44206-0436-05
10 g	100 mL	44206-0437-10
20 g	200 mL	44206-0438-20
40 g	400 mL	44206-0439-40

CPT=Current Procedural Terminology.

*Privigen is covered by Medicare Part B for treatment in the patient's home only for these diagnoses. Other diagnoses treated in the home may be covered by Medicare Part D.
[†]S-codes are HCPCS codes used by some private health plans for billing and reimbursement. Medicaid plans may use S-codes as well, but Medicare does not use them.
[‡]11-digit number for billing purposes.

Please see full Important Safety Information on back and enclosed full prescribing information for Privigen, including boxed warning.



A Field 21

Enter all appropriate ICD-10-CM diagnosis codes, starting on Field 21, Line A. This field allows the entry of 1 character indicator and 12 diagnosis codes at a maximum of 7 characters in length.

B Field 24D (CPT/HCPCS)

- ▶ Enter HCPCS code J1459 for Privigen
- ▶ Include CPT codes for infusion:
96365, infusions first hour
96366, infusion each additional hour

C Field 24D (Shaded Area)

For Medicaid claims, and for Medicare claims that will cross over to Medicaid as the secondary payer, NDC information in a specific format is required in the shaded area above the line on which Privigen is reported in 24D. **The various Medicaid plans and Medicare have different reporting formats for this information.** In general, the billing entity will need to supply the NDC (in HIPAA-compliant 11-digit format) preceded by the Modifier N4 (eg, N499999999999). This is typically followed by the NDC unit of measure (F2 [international unit], GR [gram], ML [milliliter], or UN [unit]) and the numeric quantity of the NDC that was dispensed.

Other payers may require similar information. Check with your payer for specific requirements related to reporting the information required in the shaded areas of Field 24.

D Field 24E (Diagnosis Pointer)

Enter the line letter(s) from Field 21 that best describes the medical necessity for the service listed in Field 24D. For Medicare claims, only one line letter from Field 21 should be entered in Field 24E for each HCPCS code reported in Field 24D.

E Field 24G (Days or Units)

Enter the total number of 500-mg billing units. For example, if 40 grams are dispensed, the number of billing units would equal 80.

CMS-1500 Claim Example

HEALTH INSURANCE CLAIM FORM
APPROVED BY NATIONAL UNIFORM CLAIM COMMITTEE (NUCC) 02/12

Annotations:

- A:** Points to Field 21 (Diagnosis Codes).
- B:** Points to Field 24D (CPT/HCPCS codes).
- C:** Points to the shaded area in Field 24D (NDC information).
- D:** Points to Field 24E (Diagnosis Pointer).
- E:** Points to Field 24G (Days or Units).

Form Sections:

- CARRIER:** 1. MEDICARE, 2. MEDICAID, 3. TRICARE, 4. CHAMPVA, 5. GROUP HEALTH PLAN, 6. FECA BLK LUNG, 7. OTHER.
- PATIENT AND INSURED INFORMATION:** 2. PATIENT'S NAME, 3. PATIENT'S BIRTH DATE, 4. INSURED'S NAME, 5. PATIENT'S ADDRESS, 6. PATIENT RELATIONSHIP TO INSURED, 7. INSURED'S ADDRESS, 8. RESERVED FOR NUCC USE, 9. OTHER INSURED'S NAME, 10. IS PATIENT'S CONDITION RELATED TO:, 11. INSURED'S POLICY GROUP OR FECA NUMBER, 12. PATIENT'S OR AUTHORIZED PERSON'S SIGNATURE, 13. INSURED'S OR AUTHORIZED PERSON'S SIGNATURE, 14. DATE OF CURRENT ILLNESS, INJURY, or PREGNANCY (LMP), 15. OTHER DATE, 16. DATES PATIENT UNABLE TO WORK IN CURRENT OCCUPATION, 17. NAME OF REFERRING PROVIDER OR OTHER SOURCE, 17a. QUAL, 17b. NPI, 18. HOSPITALIZATION DATES RELATED TO CURRENT SERVICES, 19. ADDITIONAL CLAIM INFORMATION, 20. OUTSIDE LAB?, 21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY, 22. RESUBMISSION CODE, 23. PRIOR AUTHORIZATION NUMBER.
- PHYSICIAN OR SUPPLIER INFORMATION:** 24. A. DATE(S) OF SERVICE, B. PLACE OF SERVICE, C. EMG, D. PROCEDURES, SERVICES, OR SUPPLIES, E. DIAGNOSIS POINTER, F. \$ CHARGES, G. DAYS OF UNITS, H. PSYCH PLAN, I. ID. QUAL., J. RENDERING PROVIDER ID. #, 25. FEDERAL TAX I.D. NUMBER, 26. PATIENT'S ACCOUNT NO., 27. ACCEPT ASSIGNMENT?, 28. TOTAL CHARGE, 29. AMOUNT PAID, 30. Rsvd for NUCC Use, 31. SIGNATURE OF PHYSICIAN OR SUPPLIER, 32. SERVICE FACILITY LOCATION INFORMATION, 33. BILLING PROVIDER INFO & PH #.

Please see full Important Safety Information on back and enclosed full prescribing information for Privigen, including boxed warning.





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1-877-355-IGIQ (4447) Monday–Friday, 8 AM to 8 PM ET

Important Safety Information

Privigen is indicated as replacement therapy for patients with primary immunodeficiency (PI) associated with defects in humoral immunity, including but not limited to common variable immunodeficiency (CVID), X-linked agammaglobulinemia, congenital agammaglobulinemia, Wiskott-Aldrich syndrome, and severe combined immunodeficiencies. Privigen is also indicated to raise platelet counts in patients with chronic immune thrombocytopenic purpura (ITP).

WARNING: THROMBOSIS, RENAL DYSFUNCTION AND ACUTE RENAL FAILURE

- **Thrombosis may occur with immune globulin products, including Privigen. Risk factors may include advanced age, prolonged immobilization, hypercoagulable conditions, history of venous or arterial thrombosis, use of estrogens, indwelling vascular catheters, hyperviscosity, and cardiovascular risk factors.**
- **Renal dysfunction, acute renal failure, osmotic nephrosis, and death may occur with the administration of human immune globulin intravenous (IGIV) products in predisposed patients. Renal dysfunction and acute renal failure occur more commonly in patients receiving IGIV products that contain sucrose. Privigen does not contain sucrose.**
- **For patients at risk of thrombosis, renal dysfunction or renal failure, administer Privigen at the minimum dose and infusion rate practicable. Ensure adequate hydration in patients before administration. Monitor for signs and symptoms of thrombosis and assess blood viscosity in patients at risk for hyperviscosity.**

See full prescribing information for complete boxed warning.

Privigen is contraindicated in patients with history of anaphylactic or severe systemic reaction to human immune globulin, in patients with hyperprolinemia, and in IgA-deficient patients with antibodies to IgA, who have had hypersensitivity reactions. Patients with IgA deficiency and antibodies to IgA are at greater risk of severe hypersensitivity and anaphylactic reactions.

In patients at risk for developing acute renal failure, monitor urine output and renal function, including blood urea nitrogen and serum creatinine; discontinue if renal function deteriorates. Ensure that patients with preexisting renal insufficiency or otherwise predisposed are not volume-depleted and administer Privigen at the minimum rate of infusion practicable.

References: **1.** US Department of Health & Human Services, Centers for Medicare & Medicaid Services. International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). 2016 Code Tables and Index. Available at: <https://www.cms.gov/Medicare/Coding/ICD10/2016-ICD-10-CM-and-GEMs.html>. Accessed June 22, 2016. **2.** American Medical Association. Medicine/hydration, therapeutic, prophylactic, diagnostic injections and infusions, and chemotherapy. In: American Medical Association, ed. *CPT 2016*. Chicago, IL: American Medical Association; 2016:650-651. **3.** US Department of Health & Human Services, Centers for Medicare & Medicaid Services. HCPCS Release & Code Sets. 2015 Table of Drugs. Available at: <https://www.cms.gov/Medicare/Coding/HCPCSReleaseCodeSets/Alpha-Numeric-HCPCS-Items/2015-Alpha-Numeric-HCPCS-File-%C2%A0.html>. Accessed June 22, 2016. **4.** HIPAA Space Healthcare Procedure Coding System Codes Lookup S9338. Available at: http://www.hipaaspace.com/Medical_Billing/Coding/Healthcare_Common_Procedure_Coding_System/HCPCS_Codes_Lookup.aspx. Accessed June 22, 2016.

Thrombosis might occur with Privigen, even in the absence of known risk factors. Patients could also experience hyperproteinemia, increased serum viscosity, or hyponatremia; infrequently, aseptic meningitis syndrome (AMS) may occur—more frequently with high doses (2 g/kg) and/or rapid infusion.

Hemolysis, either intravascular or due to enhanced red blood cell sequestration, can develop subsequent to treatment. Risk factors include non-O blood group, underlying inflammation, and high doses. Closely monitor patients for hemolysis and hemolytic anemia. Consider the relative risks and benefits before prescribing high-dose regimen for chronic ITP in patients at increased risk of thrombosis, hemolysis, acute kidney injury or volume overload. Monitor patients for pulmonary adverse reactions and signs of transfusion-related acute lung injury (TRALI).

Privigen is derived from human plasma. The risk of transmission of infectious agents, including viruses and, theoretically, the Creutzfeldt-Jakob disease (CJD) agent, cannot be completely eliminated.

In clinical studies of patients being treated with Privigen for PI, the most common adverse reactions observed in >5% of subjects were headache, fatigue, nausea, chills, vomiting, back pain, pain, elevated body temperature, abdominal pain, diarrhea, cough, stomach discomfort, chest pain, joint swelling/effusion, influenza-like illness, pharyngolaryngeal pain, urticaria, and dizziness. Serious adverse reactions were hypersensitivity, chills, fatigue, dizziness, and increased body temperature.

In clinical studies of patients being treated with Privigen for chronic ITP, the most common adverse reactions seen in >5% of subjects were headache, elevated body temperature, positive DAT, anemia, nausea, epistaxis, vomiting, increases in conjugated and unconjugated bilirubin, decreased hematocrit, and increased blood lactate dehydrogenase. A serious adverse reaction was aseptic meningitis syndrome (AMS).

Treatment with Privigen might interfere with a patient's response to live virus vaccines and could lead to misinterpretation of serologic testing. Use in pregnant women only if clearly needed. In patients over 65 or in any patient at risk of developing renal insufficiency, do not exceed recommended dose and infuse Privigen at the minimum rate practicable.

Please see enclosed full prescribing information for Privigen, including boxed warning.



privigen[®]
Immune Globulin Intravenous
(Human), 10% Liquid

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use PRIVIGEN safely and effectively. See full prescribing information for PRIVIGEN .

Privigen®, Immune Globulin Intravenous (Human), 10% Liquid
Initial U.S. Approval: 2007

WARNING: THROMBOSIS, RENAL DYSFUNCTION AND ACUTE RENAL FAILURE

See full prescribing information for complete boxed warning.

- **Thrombosis may occur with immune globulin products, including Privigen. Risk factors may include: advanced age, prolonged immobilization, hypercoagulable conditions, history of venous or arterial thrombosis, use of estrogens, indwelling vascular catheters, hyperviscosity, and cardiovascular risk factors.**
- **Renal dysfunction, acute renal failure, osmotic nephrosis, and death may occur with immune globulin intravenous (IGIV) products in predisposed patients. Renal dysfunction and acute renal failure occur more commonly in patients receiving IGIV products containing sucrose. Privigen does not contain sucrose.**
- **For patients at risk of thrombosis, renal dysfunction or renal failure, administer Privigen at the minimum dose and infusion rate practicable. Ensure adequate hydration in patients before administration. Monitor for signs and symptoms of thrombosis and assess blood viscosity in patients at risk for hyperviscosity.**

RECENT MAJOR CHANGES

Boxed Warning	09/2013, 11/2013
Dosage and Administration (2)	09/2013
Warnings and Precautions (5.2, 5.3)	09/2013, 11/2013

INDICATIONS AND USAGE

Privigen is an Immune Globulin Intravenous (Human), 10% Liquid indicated for the treatment of:

- Primary humoral immunodeficiency (PI) (1.1)
- Chronic immune thrombocytopenic purpura (ITP) (1.2)

DOSAGE AND ADMINISTRATION

Intravenous Use Only

Indication	Dose	Initial Infusion Rate	Maintenance Infusion Rate (as tolerated)
PI	200-800 mg/kg (2-8 mL/kg) every 3-4 weeks	0.5 mg/kg/min (0.005 mL/kg/min)	Increase to 8 mg/kg/min (0.08 mL/kg/min)
ITP	1 g/kg (10 mL/kg) for 2 consecutive days	0.5 mg/kg/min (0.005 mL/kg/min)	Increase to 4 mg/kg/min (0.04 mL/kg/min)

- Ensure that patients with pre-existing renal insufficiency are not volume depleted, and discontinue Privigen if renal function deteriorates (2.4, 5.2).
- For patients at risk of renal dysfunction or thrombosis, administer Privigen at the minimum dose and infusion rate practicable (2.4, 5.2, 5.3).

DOSAGE FORMS AND STRENGTHS

Privigen is a liquid solution containing 10% IgG (0.1 g/mL) (3).

CONTRAINDICATIONS

- History of anaphylactic or severe systemic reaction to human immune globulin (4)

- Hyperprolinemia (Privigen contains the stabilizer L-proline) (4)
- IgA-deficient patients with antibodies to IgA and a history of hypersensitivity (4)

WARNINGS AND PRECAUTIONS

- IgA-deficient patients with antibodies to IgA are at greater risk of developing severe hypersensitivity and anaphylactic reactions (5.1).
- Monitor renal function, including blood urea nitrogen and serum creatinine, and urine output in patients at risk of developing acute renal failure (5.2).
- Thrombosis may occur with immune globulin products, including Privigen (5.3).
- Hyperproteinemia, increased serum viscosity, and hyponatremia may occur (5.4).
- Aseptic meningitis syndrome (AMS) may occur, especially with high doses or rapid infusion (5.5).
- Hemolysis that is either intravascular or due to enhanced red blood cell sequestration can develop subsequent to Privigen treatments. Risk factors for hemolysis include high doses and non-O blood group. Closely monitor patients for hemolysis and hemolytic anemia (5.6).
- Monitor patients for pulmonary adverse reactions (transfusion-related acute lung injury [TRALI]) (5.7).
- Carefully consider the relative risks and benefits before prescribing the high dose regimen (for chronic ITP) in patients at increased risk of thrombosis, hemolysis, acute kidney injury, or volume overload (5.8).
- Privigen is made from human blood and may contain infectious agents, e.g., viruses and, theoretically, the Creutzfeldt-Jakob disease (CJD) agent (5.9).

ADVERSE REACTIONS

- **PI** – The most common adverse reactions, observed in >5% of study subjects, were headache, fatigue, nausea, chills, vomiting, back pain, pain, elevated body temperature, abdominal pain, diarrhea, cough, stomach discomfort, chest pain, joint swelling/effusion, influenza-like illness, pharyngolaryngeal pain, urticaria, and dizziness. Serious adverse reactions were hypersensitivity, chills, fatigue, dizziness, and increased body temperature (6).
- **Chronic ITP** – The most common adverse reactions, observed in >5% of study subjects, were headache, elevated body temperature, positive direct antiglobulin test (DAT), anemia, nausea, epistaxis, vomiting, blood bilirubin unconjugated increased, blood bilirubin conjugated increased, blood total bilirubin increased, hematocrit decreased, and blood lactate dehydrogenase increased. A serious adverse reaction was aseptic meningitis (6).

To report SUSPECTED ADVERSE REACTIONS, contact CSL Behring Pharmacovigilance at 1-866-915-6958 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS

The passive transfer of antibodies may:

- Lead to misinterpretation of the results of serological testing (5.10).
- Interfere with the response to live virus vaccines (7.1).

USE IN SPECIFIC POPULATIONS

- **Pregnancy:** No human or animal data. Use only if clearly needed (8.1).
- **Geriatric:** In patients over age 65 or in any patient at risk of developing renal insufficiency, do not exceed the recommended dose, and infuse Privigen at the minimum rate practicable (8.5).

See 17 for PATIENT COUNSELING INFORMATION.

Revised: November 2013

FULL PRESCRIBING INFORMATION: CONTENTS*

WARNING: THROMBOSIS, RENAL DYSFUNCTION AND ACUTE RENAL FAILURE

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- 2.4 Administration

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17 PATIENT COUNSELING INFORMATION

* Sections or subsections omitted from the full prescribing information are not listed.

Privigen® , Immune Globulin Intravenous (Human), 10% Liquid

- The Privigen vial is for single-use only. Promptly use any vial that has been entered. Privigen contains no preservative. Discard partially used vials or unused product in accordance with local requirements.
- Infuse Privigen using a separate infusion line. Prior to use, the infusion line may be flushed with Dextrose Injection, USP (D5W) or 0.9% Sodium Chloride for Injection, USP.
- Do not mix Privigen with other IGIV products or other intravenous medications. However, Privigen may be diluted with Dextrose Injection, USP (D5W).
- An infusion pump may be used to control the rate of administration.
- If large doses of Privigen are to be administered, several vials may be pooled using aseptic technique. Begin infusion within 8 hours of pooling.

WARNING: THROMBOSIS, RENAL DYSFUNCTION AND ACUTE RENAL FAILURE

- Thrombosis may occur with immune globulin products¹⁻³, including Privigen. Risk factors may include: advanced age, prolonged immobilization, hypercoagulable conditions, history of venous or arterial thrombosis, use of estrogens, indwelling central vascular catheters, hyperviscosity, and cardiovascular risk factors. Thrombosis may occur in the absence of known risk factors [see *Warnings and Precautions (5.3), Patient Counseling Information (17)*].
- Renal dysfunction, acute renal failure, osmotic nephrosis, and death may occur with immune globulin intravenous (IGIV) products in predisposed patients. Patients predisposed to renal dysfunction include those with any degree of pre-existing renal insufficiency, diabetes mellitus, age greater than 65, volume depletion, sepsis, paraproteinemia, or patients receiving known nephrotoxic drugs.
- Renal dysfunction and acute renal failure occur more commonly in patients receiving IGIV products containing sucrose.⁴ Privigen does not contain sucrose.
- For patients at risk of thrombosis, renal dysfunction or failure, administer Privigen at the minimum dose and infusion rate practicable. Ensure adequate hydration in patients before administration. Monitor for signs and symptoms of thrombosis and assess blood viscosity in patients at risk for hyperviscosity [see *Dosage and Administration (2.3), Warnings and Precautions (5.2, 5.3)*].

1 INDICATIONS AND USAGE

Privigen is an Immune Globulin Intravenous (Human), 10% Liquid indicated for the treatment of the following conditions.

1.1 Primary Humoral Immunodeficiency

Privigen is indicated as replacement therapy for primary humoral immunodeficiency (PI). This includes, but is not limited to, the humoral immune defect in congenital agammaglobulinemia, common variable immunodeficiency (CVID), X-linked agammaglobulinemia, Wiskott-Aldrich syndrome, and severe combined immunodeficiencies.

1.2 Chronic Immune Thrombocytopenic Purpura

Privigen is indicated for the treatment of patients with chronic immune thrombocytopenic purpura (ITP) to raise platelet counts.

2 DOSAGE AND ADMINISTRATION

Table 1: Recommended Dosage and Administration for Privigen

Indication	Dose	Initial infusion rate	Maintenance infusion rate (as tolerated)
Primary Immunodeficiency	200-800 mg/kg (2-8 mL/kg) every 3-4 weeks	0.5 mg/kg/min (0.005 mL/kg/min)	Increase to 8 mg/kg/min (0.08 mL/kg/min)
Chronic Immune Thrombocytopenic Purpura	1 g/kg (10 mL/kg) for 2 consecutive days	0.5 mg/kg/min (0.005 mL/kg/min)	Increase to 4 mg/kg/min (0.04 mL/kg/min)

2.1 Dosage for Primary Humoral Immunodeficiency (PI)

As there are significant differences in the half-life of IgG among patients with PI, the frequency and amount of immunoglobulin therapy may vary from patient to patient. The proper amount can be determined by monitoring clinical response.

The recommended dose of Privigen for patients with PI is 200 to 800 mg/kg (2 to 8 mL/kg), administered every 3 to 4 weeks. If a patient misses a dose, administer the missed dose as soon as possible, and then resume scheduled treatments every 3 or 4 weeks, as applicable.

Adjust the dosage over time to achieve the desired serum IgG trough levels and clinical responses. No randomized, controlled trial data are available to determine an optimal trough level in patients receiving immune globulin therapy.

2.2 Dosage for Chronic Immune Thrombocytopenic Purpura (ITP)

The recommended dose of Privigen for patients with chronic ITP is 1 g/kg (10 mL/kg) administered daily for 2 consecutive days, resulting in a total dosage of 2 g/kg.

Carefully consider the relative risks and benefits before prescribing the high dose regimen (e.g., 1 g/kg/day for 2 days) in patients at increased risk of thrombosis, hemolysis, acute kidney injury, or volume overload [see *Warnings and Precautions (5.8)*].

2.3 Preparation and Handling

- Privigen is a clear or slightly opalescent, colorless to pale yellow solution. Inspect parenteral drug products visually for particulate matter and discoloration prior to administration, whenever solution and container permit. Do not use if the solution is cloudy, turbid, or if it contains particulate matter.
- DO NOT SHAKE.
- Do not freeze. Do not use if Privigen has been frozen.
- Privigen should be at room temperature (up to 25°C [77°F]) at the time of administration.
- Do not use Privigen beyond the expiration date on the product label.

2.4 Administration

Privigen is for intravenous administration only.

Monitor the patient's vital signs throughout the infusion. Slow or stop the infusion if adverse reactions occur. If symptoms subside promptly, the infusion may be resumed at a lower rate that is comfortable for the patient.

Ensure that patients with pre-existing renal insufficiency are not volume depleted. For patients judged to be at risk for renal dysfunction or thrombosis, administer Privigen at the minimum dose and infusion rate practicable, and discontinue Privigen administration if renal function deteriorates [see *Boxed Warning, Warnings and Precautions (5.2, 5.3)*].

The following patients may be at risk of developing systemic reactions (mimicking symptoms of an inflammatory response or infection) on rapid infusion of Privigen (greater than 4 mg/kg/min [0.04 mL/kg/min]): 1) those who have never received Privigen or another IgG product or who have not received it within the past 8 weeks, and 2) those who are switching from another IgG product. These patients should be started at a slow rate of infusion (e.g., 0.5 mg/kg/min [0.005 mL/kg/min] or less) and gradually increase as tolerated.

3 DOSAGE FORMS AND STRENGTHS

Privigen is a liquid solution containing 10% IgG (0.1 g/mL) for intravenous infusion.

4 CONTRAINDICATIONS

- Privigen is contraindicated in patients who have a history of anaphylactic or severe systemic reaction to the administration of human immune globulin.
- Privigen is contraindicated in patients with hyperprolinemia because it contains the stabilizer L-proline [see *Description (11)*].
- Privigen is contraindicated in IgA-deficient patients with antibodies to IgA and a history of hypersensitivity [see *Warnings and Precautions (5.1)*].

5 WARNINGS AND PRECAUTIONS

5.1 Hypersensitivity

Severe hypersensitivity reactions may occur [see *Contraindications (4)*]. In case of hypersensitivity, discontinue the Privigen infusion immediately and institute appropriate treatment. Medications such as epinephrine should be available for immediate treatment of acute hypersensitivity reactions.

Privigen contains trace amounts of IgA (≤25 mcg/mL) [see *Description (11)*]. Individuals with IgA deficiency can develop anti-IgA antibodies and anaphylactic reactions (including anaphylaxis and shock) after administration of blood components containing IgA. Patients with known antibodies to IgA may have a greater risk of developing potentially severe hypersensitivity and anaphylactic reactions with administration of Privigen. Privigen is contraindicated in patients with antibodies against IgA and a history of hypersensitivity.

5.2 Renal Dysfunction and Acute Renal Failure

Renal dysfunction, acute renal failure, osmotic nephrosis, and death may occur with immune globulin intravenous (IGIV) products in predisposed patients. Renal dysfunction and acute renal failure occur more commonly in patients receiving IGIV products containing sucrose.⁴ Privigen does not contain sucrose. Ensure that patients are not volume depleted and assess renal function, including measurement of blood urea nitrogen (BUN) and serum creatinine, before the initial infusion of Privigen and at appropriate intervals thereafter.

Periodic monitoring of renal function and urine output is particularly important in patients judged to be at increased risk of developing acute renal failure.⁴ If renal function deteriorates, consider discontinuing Privigen. For patients judged to be at risk of developing renal dysfunction because of pre-existing renal insufficiency, or predisposition to acute renal failure (such as those with diabetes mellitus or hypovolemia, those who are obese, those who use concomitant nephrotoxic medicinal products, or those who are over 65 years of age), administer Privigen at the minimum rate of infusion practicable [see *Boxed Warning, Administration (2.4)*].

5.3 Thrombosis

Thrombosis may occur following treatment with immune globulin products¹⁻³, including Privigen. Risk factors may include: advanced age, prolonged immobilization, hypercoagulable conditions, history of venous or arterial thrombosis, use of estrogens, indwelling central vascular catheters, hyperviscosity, and cardiovascular risk factors. Thrombosis may occur in the absence of known risk factors.

Consider baseline assessment of blood viscosity in patients at risk for hyperviscosity, including those with cryoglobulins, fasting chylomicronemia/markedly high triacylglycerols (triglycerides), or monoclonal gammopathies. For patients at risk of thrombosis, administer Privigen at the minimum dose and infusion rate practicable. Ensure adequate hydration in patients before administration. Monitor for signs and symptoms of thrombosis and assess blood viscosity in patients at risk for hyperviscosity [see *Boxed Warning, Dosage and Administration (2), Patient Counseling Information (17)*].

5.4 Hyperproteinemia, Increased Serum Viscosity, and Hyponatremia

Hyperproteinemia, increased serum viscosity, and hyponatremia may occur following treatment with IGIV products, including Privigen. The hyponatremia is likely to be a pseudohyponatremia, as demonstrated by a decreased calculated serum osmolality or elevated osmolar gap. It is critical to distinguish true hyponatremia from pseudohyponatremia, as treatment aimed at decreasing serum free water in patients with

pseudohyponatremia may lead to volume depletion, a further increase in serum viscosity, and a possible predisposition to thromboembolic events.⁵

5.5 Aseptic Meningitis Syndrome (AMS)

AMS may occur infrequently following treatment with Privigen [see *Adverse Reactions* (6)] and other human immune globulin products. Discontinuation of treatment has resulted in remission of AMS within several days without sequelae.⁶ AMS usually begins within several hours to 2 days following IGIV treatment.

AMS is characterized by the following signs and symptoms: severe headache, nuchal rigidity, drowsiness, fever, photophobia, painful eye movements, nausea, and vomiting. Cerebrospinal fluid (CSF) studies are frequently positive with pleocytosis up to several thousand cells per cubic millimeter, predominantly from the granulocytic series, and with elevated protein levels up to several hundred mg/dL, but negative culture results. Conduct a thorough neurological examination on patients exhibiting such signs and symptoms, including CSF studies, to rule out other causes of meningitis.

AMS may occur more frequently in association with high doses (2 g/kg) and/or rapid infusion of IGIV.

5.6 Hemolysis

Privigen may contain blood group antibodies that can act as hemolysins and induce *in vivo* coating of red blood cells (RBCs) with immunoglobulin, causing a positive direct antiglobulin test (DAT) (Coombs' test) result and hemolysis.⁷⁻⁹ Delayed hemolytic anemia can develop subsequent to Privigen therapy due to enhanced RBC sequestration, and acute hemolysis, consistent with intravascular hemolysis, has been reported.¹⁰ Cases of severe hemolysis-related renal dysfunction/failure or disseminated intravascular coagulation have occurred following infusion of Privigen.

The following risk factors may be associated with the development of hemolysis: high doses (e.g., ≥ 2 g/kg), given either as a single administration or divided over several days, and non-O blood group.¹¹ Other individual patient factors, such as an underlying inflammatory state (as may be reflected by, for example, elevated C-reactive protein or erythrocyte sedimentation rate), have been hypothesized to increase the risk of hemolysis following administration of IGIV,¹² but their role is uncertain. Hemolysis has been reported following administration of IGIV for a variety of indications, including ITP and PI.⁹

Closely monitor patients for clinical signs and symptoms of hemolysis, particularly patients with risk factors noted above. Consider appropriate laboratory testing in higher risk patients, including measurement of hemoglobin or hematocrit prior to infusion and within approximately 36 to 96 hours post infusion. If clinical signs and symptoms of hemolysis or a significant drop in hemoglobin or hematocrit have been observed, perform additional confirmatory laboratory testing. If transfusion is indicated for patients who develop hemolysis with clinically compromising anemia after receiving IGIV, perform adequate cross-matching to avoid exacerbating on-going hemolysis.

5.7 Transfusion-Related Acute Lung Injury (TRALI)

Noncardiogenic pulmonary edema may occur following treatment with IGIV products, including Privigen.¹³ TRALI is characterized by severe respiratory distress, pulmonary edema, hypoxemia, normal left ventricular function, and fever. Symptoms typically appear within 1 to 6 hours following treatment.

Monitor patients for pulmonary adverse reactions. If TRALI is suspected, perform appropriate tests for the presence of anti-neutrophil antibodies and anti-human leukocyte antigen (HLA) antibodies in both the product and the patient's serum.

TRALI may be managed using oxygen therapy with adequate ventilatory support.

5.8 Volume Overload

Carefully consider the relative risks and benefits before prescribing the high dose regimen (for chronic ITP) in patients at increased risk of thrombosis, hemolysis, acute kidney injury, or volume overload.

5.9 Transmissible Infectious Agents

Because Privigen is made from human blood, it may carry a risk of transmitting infectious agents (e.g., viruses and, theoretically, the Creutzfeldt-Jakob disease [CJD] agent). The risk of infectious agent transmission has been reduced by screening plasma donors for prior exposure to certain viruses, testing for the presence of certain current virus infections, and including virus inactivation/removal steps in the manufacturing process for Privigen.

Report any infection thought to be possibly transmitted by Privigen to CSL Behring Pharmacovigilance at 1-866-915-6958.

5.10 Interference with Laboratory Tests

Various passively transferred antibodies in immunoglobulin preparations may lead to misinterpretation of the results of serological testing.

6 ADVERSE REACTIONS

Adverse reactions (ARs), as presented below and in Clinical Trials Experience (6.1), are defined as adverse events at least possibly related or events occurring during or within 72 hours of a Privigen infusion or treatment cycle (for ITP).

Primary Humoral Immunodeficiency

The most serious adverse reaction observed in clinical study subjects receiving Privigen for PI was hypersensitivity in one subject [see *Warnings and Precautions* (5.1)]. The most common adverse reactions observed in $>5\%$ of clinical study subjects with PI were headache, fatigue, nausea, chills, vomiting, back pain, pain, elevated body temperature, abdominal pain, diarrhea, cough, stomach discomfort, chest pain, joint swelling/effusion, influenza-like illness, pharyngolaryngeal pain, urticaria, and dizziness.

Chronic Immune Thrombocytopenic Purpura

The most serious adverse reactions observed in clinical study subjects receiving Privigen for chronic ITP were aseptic meningitis syndrome in one subject and hemolysis in two subjects [see *Warnings and Precautions* (5.5, 5.6)]. A total of 8 subjects (14%) in the ITP study experienced hemolysis as documented from clinical laboratory data. The most common adverse reactions observed in $>5\%$ of clinical study subjects with chronic ITP were headache, elevated body temperature, positive DAT, anemia, nausea, epistaxis, vomiting, blood bilirubin unconjugated increased, blood bilirubin conjugated increased, blood total bilirubin increased, hematocrit decreased, and blood lactate dehydrogenase increased.

6.1 Clinical Trials Experience

Because different clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in clinical practice.

Treatment of Primary Humoral Immunodeficiency

In a prospective, open-label, single-arm, multicenter clinical study (pivotal study), 80 subjects with PI (with a diagnosis of XLA or CVID) received Privigen every 3 or 4 weeks for up to 12 months [see *Clinical Studies* (14.1)]. All subjects had been on regular IGIV replacement therapy for at least 6 months prior to participating in the study. Subjects ranged in age from 3 to 69; 46 (57.5%) were male and 34 (42.5%) were female.

The safety analysis included all 80 subjects, 16 (20%) on the 3-week schedule and 64 (80%) on the 4-week schedule. The median dose of Privigen administered was 428.3 mg/kg (3-week schedule) or 440.6 mg/kg (4-week schedule) and ranged from 200 to 888 mg/kg. A total of 1038 infusions of Privigen were administered, 272 in the 3-week schedule and 766 in the 4-week schedule.

Routine premedication was not allowed. However, subjects who experienced two consecutive infusion-related ARs that were likely to be prevented by premedication were permitted to receive antipyretics, antihistamines, NSAIDs, or antiemetic agents. During the study, 8 (10%) subjects received premedication prior to 51 (4.9%) of the 1038 infusions administered.

Table 2 summarizes the most frequent ARs (defined as adverse events at least possibly related or events occurring during or within 72 hours of a Privigen infusion) that occurred in $>5\%$ of subjects.

Table 2: PI Pivotal Study – ARs* Occurring in $>5\%$ of Subjects

AR	Number (%) of Subjects [n=80]	Number (Rate) of Infusions with AR [n=1038]
Headache	36 (45.0)	100 (0.096)
Fatigue	13 (16.3)	29 (0.028)
Nausea	11 (13.8)	23 (0.022)
Chills	9 (11.3)	15 (0.014)
Vomiting	9 (11.3)	15 (0.014)
Back pain	8 (10.0)	15 (0.014)
Pain	7 (8.8)	14 (0.013)
Elevated body temperature	7 (8.8)	12 (0.012)
Diarrhea	6 (7.5)	6 (0.006)
Cough	5 (6.3)	5 (0.005)
Stomach discomfort	5 (6.3)	5 (0.005)

* Excluding infections.

Of the 192 ARs reported (including 5 serious, severe ARs described below) 91 were mild (awareness of sign, symptom or event, but easily tolerated), 81 were moderate (discomfort enough to cause interference with usual activity and may have warranted intervention), 19 were severe (incapacitating with inability to do usual activities or significantly affected clinical status, and warranted intervention), and 1 was of unknown severity.

The five serious ARs (hypersensitivity, chills, fatigue, dizziness, and increased body temperature, all severe) were related to Privigen, occurred in one subject, and resulted in the subject's withdrawal from the study. Two other subjects withdrew from the study due to ARs (chills and headache in one subject; vomiting in the other).

Seventy-seven of the 80 subjects enrolled in this study had a negative DAT at baseline. Of these 77 subjects, 36 (46.8%) developed a positive DAT at some time during the study. However, no subjects showed evidence of hemolytic anemia.

During this study, no subjects tested positive for infection due to human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), or B19 virus (B19V).

An extension of the pivotal study was conducted in 55 adult and pediatric subjects with PI to collect additional efficacy, safety, and tolerability data. This study included 45 subjects from the pivotal study who were receiving Privigen and 10 new subjects who were receiving another IGIV product prior to enrolling in the extension study. Subjects ranged in age from 4 to 81 years; 26 (47.3%) were male and 29 (52.7%) were female.

Subjects were treated with Privigen at median doses ranging from 286 to 832 mg/kg per infusion over a treatment period ranging from 1 to 27 months. Twelve (21.8%) subjects were on a 3-week treatment schedule with the number of infusions per subject ranging from 4 to 38 (median: 8 infusions); 43 (78.2%) subjects were on a 4-week schedule with the number of infusions ranging from 1 to 31 (median: 15 infusions). A total of 771 infusions were administered in this study.

In this study, subjects who continued from the pivotal study were permitted to receive infusions of Privigen at a rate up to 12 mg/kg/min (as opposed to the maximum of 8 mg/kg/min allowed in the pivotal study) at the discretion of the investigator based on individual tolerability. Twenty-three (51%) of the 45 subjects from the pivotal study (41.8% of the 55 subjects in the extension study) received 265 (38.4%) infusions at a maximum rate greater than the recommended rate of 8 mg/kg/min [see *Administration* (2.4)]. The median of the maximum infusion rate in this subset was 12 mg/kg/min. However, because the study was not designed to compare infusion rates, no definitive conclusions regarding

tolerability could be drawn for infusion rates higher than the recommended rate of 8 mg/kg/min.

Table 3 summarizes the ARs that occurred in >5% of subjects.

Table 3: PI Extension Study – ARs* Occurring in >5% of Subjects

AR*	Number (%) of Subjects [n=55]	Number (Rate) of Infusions with AR [n=771]
Headache	18 (32.7)	76 (0.099)
Nausea	6 (10.9)	10 (0.013)
Elevated body temperature	4 (7.3)	12 (0.016)
Abdominal pain†	4 (7.3)	7 (0.009)
Chest pain	3 (5.5)	4 (0.005)
Chills	3 (5.5)	7 (0.009)
Joint swelling/effusion	3 (5.5)	7 (0.009)
Pain	3 (5.5)	6 (0.008)
Fatigue	3 (5.5)	5 (0.006)
Influenza-like illness	3 (5.5)	5 (0.006)
Pharyngolaryngeal pain	3 (5.5)	4 (0.005)
Urticaria	3 (5.5)	4 (0.005)
Dizziness	3 (5.5)	3 (0.004)

Note: The AR rates in this study cannot be compared directly to the rates in other IGIV studies, including the original pivotal study described earlier in this section, because (1) the extension study used an enriched population and (2) the selective use of higher infusion rates at the investigators' discretion in a subset of subjects may have introduced bias.

* Excluding infections.

† Includes abdominal pain, abdominal pain upper, and abdominal pain lower.

Of the 125 reported ARs, 76 were mild (does not interfere with routine activities), 40 were moderate (interferes somewhat with routine activities), and 9 were severe (impossible to perform routine activities).

Three subjects experienced ARs that were considered to be at least possibly related to Priviligen: dyspnea and pancytopenia in one subject, a transient ischemic attack 16 days after the infusion in one subject, and mild urticaria in one subject, resulting in the subject's withdrawal from the study.

Treatment of Chronic Immune Thrombocytopenic Purpura

In a prospective, open-label, single-arm, multicenter clinical study, 57 subjects with chronic ITP and a platelet count of $20 \times 10^9/L$ or less received a total of 2 g/kg dose of Priviligen administered as 1 g/kg infusions daily for 2 consecutive days [see *Clinical Studies (14.2)*]. Subjects ranged in age from 15 to 69; 23 (40.4%) were male and 34 (59.6%) were female.

Concomitant medications affecting platelets or other treatments for chronic ITP were not allowed. Thirty-two (56.1%) subjects received premedication with acetaminophen and/or an antihistamine.

Table 4 summarizes the most frequent ARs (adverse events at least possibly related to events occurring during or within 72 hours after the end of a treatment cycle [two consecutive infusions]) that occurred in >5% of subjects with chronic ITP.

Table 4: Chronic ITP Study – ARs Occurring in >5% of Subjects

AR	Number (%) of Subjects [n=57]	Number (Rate) of Infusions with AR [n=114]
Headache	37 (64.9)	52 (0.456)
Elevated body temperature	21 (36.8)	23 (0.202)
Positive DAT	7 (12.3)	8 (0.070)
Anemia	6 (10.5)	6 (0.053)
Nausea	6 (10.5)	8 (0.070)
Epistaxis	6 (10.5)	8 (0.070)
Vomiting	6 (10.5)	7 (0.061)
Blood bilirubin unconjugated increased	6 (10.5)	6 (0.053)
Blood bilirubin conjugated increased	5 (8.8)	5 (0.044)
Blood total bilirubin increased	3 (5.3)	3 (0.026)
Hematocrit decreased	3 (5.3)	3 (0.026)
Blood lactate dehydrogenase increased	3 (5.3)	3 (0.026)

Of the 149 non-serious ARs, 103 were mild (awareness of sign, symptom or event, but easily tolerated), 37 were moderate (discomfort enough to cause interference with usual activity and may have warranted intervention), and 9 were severe (incapacitating with inability

to do usual activities or significantly affected clinical status, and warranted intervention). One subject experienced a serious AR (aseptic meningitis).

Eight subjects, all of whom had a positive DAT, experienced transient drug-related hemolytic reactions, which were associated with elevated bilirubin, elevated lactate dehydrogenase, and a decrease in hemoglobin level within two days after the infusion of Priviligen. Two of the eight subjects were clinically anemic but did not require clinical intervention; these cases resolved uneventfully.

Four other subjects with active bleeding were reported to have developed anemia without evidence of hemolysis.

In this study, there was a decrease in hemoglobin after the first Priviligen infusion (median decrease of 1.2 g/dL by Day 8) followed by a return to near baseline by Day 29.

Fifty-six of the 57 subjects in this study had a negative DAT at baseline. Of these 56 subjects, 12 (21.4%) developed a positive DAT during the 29-day study period.

6.2 Postmarketing Experience

Because adverse reactions are reported voluntarily post-approval from a population of uncertain size, it is not always possible to reliably estimate the frequency of these reactions or establish a causal relationship to product exposure.

Priviligen

The following adverse reactions have been identified during postmarketing use of Priviligen.

This list does not include reactions already reported in clinical studies with Priviligen [see *Adverse Reactions (6.1)*].

- *Infusion reactions:* Changes in blood pressure, dyspnea, tachycardia, flushing
- *Hematologic:* hemoglobinuria/hematuria/chromaturia, renal failure
- *Neurological:* photophobia
- *Integumentary:* pruritus, rash

General

In addition, the following adverse reactions have been identified and reported during the post-approval use of immune globulin products.¹⁴

- *Infusion Reactions:* Tachycardia, malaise, flushing, rigors
- *Renal:* Acute renal dysfunction/failure, osmotic nephropathy
- *Respiratory:* Apnea, Acute Respiratory Distress Syndrome (ARDS), TRALI, cyanosis, hypoxemia, pulmonary edema, bronchospasm
- *Cardiovascular:* Cardiac arrest, thromboembolism, vascular collapse, hypotension
- *Neurological:* Coma, loss of consciousness, seizures, tremor
- *Integumentary:* Stevens-Johnson syndrome, epidermolysis, erythema multiforme, bullous dermatitis
- *Hematologic:* Pancytopenia, leukopenia
- *Gastrointestinal:* Hepatic dysfunction

7 DRUG INTERACTIONS

7.1 Live Virus Vaccines

The passive transfer of antibodies with immunoglobulin administration may interfere with the response to live virus vaccines such as measles, mumps, rubella, and varicella [see *Patient Counseling Information (17)*].¹⁵

Inform the immunizing physician of recent therapy with Priviligen so that appropriate measures can be taken.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Category C. Animal reproduction studies have not been conducted with Priviligen. It is not known whether Priviligen can cause fetal harm when administered to a pregnant woman or can affect reproduction capacity. Priviligen should be given to pregnant women only if clearly needed. Immunoglobulins cross the placenta from maternal circulation increasingly after 30 weeks of gestation.^{16,17}

8.3 Nursing Mothers

Use of Priviligen in nursing mothers has not been evaluated.

8.4 Pediatric Use

Treatment of Primary Humoral Immunodeficiency

Priviligen was evaluated in 31 pediatric subjects (19 children and 12 adolescents) with PI (pivotal study). There were no apparent differences in the safety and efficacy profiles as compared to those in adult subjects. No pediatric-specific dose requirements were necessary to achieve the desired serum IgG levels. The safety and effectiveness of Priviligen have not been established in pediatric patients with PI who are under the age of 3.

Treatment of Chronic Immune Thrombocytopenic Purpura

The safety and effectiveness of Priviligen have not been established in pediatric patients with chronic ITP who are under the age of 15.

8.5 Geriatric Use

Clinical studies of Priviligen did not include sufficient numbers of subjects age 65 and over to determine whether they respond differently from younger subjects.

Use caution when administering Priviligen to patients age 65 and over who are judged to be at increased risk of developing acute renal insufficiency and thrombosis [see *Boxed Warning, Warnings and Precautions (5.2, 5.3)*]. Do not exceed recommended doses, and administer Priviligen at the minimum dose and infusion rate practicable.

10 OVERDOSAGE

Overdose may lead to fluid overload and hyperviscosity, particularly in the elderly and in patients with impaired renal function.

11 DESCRIPTION

Priviligen is a ready-to-use, sterile, 10% protein liquid preparation of polyvalent human immunoglobulin G (IgG) for intravenous administration. Priviligen has a purity of at least 98% IgG, consisting primarily of monomers. The balance consists of IgG dimers ($\leq 12\%$),

small amounts of fragments and polymers, and albumin. Privigen contains ≤ 25 mcg/mL IgA. The IgG subclass distribution (approximate mean values) is IgG₁, 67.8%; IgG₂, 28.7%; IgG₃, 2.3%; and IgG₄, 1.2%. Privigen has an osmolality of approximately 320 mOsmol/kg (range: 240 to 440) and a pH of 4.8 (range: 4.6 to 5.0).

Privigen contains approximately 250 mmol/L (range: 210 to 290) of L-proline (a nonessential amino acid) as a stabilizer and trace amounts of sodium. Privigen contains no carbohydrate stabilizers (e.g., sucrose, maltose) and no preservative.

Privigen is prepared from large pools of human plasma by a combination of cold ethanol fractionation, octanoic acid fractionation, and anion exchange chromatography. The IgG proteins are not subjected to heating or to chemical or enzymatic modification. The Fc and Fab functions of the IgG molecule are retained. Fab functions tested include antigen binding capacities, and Fc functions tested include complement activation and Fc-receptor-mediated leukocyte activation (determined with complexed IgG). Privigen does not activate the complement system or prekallikrein in an unspecific manner.

All plasma units used in the manufacture of Privigen have been tested and approved for manufacture using FDA-licensed serological assays for hepatitis B surface antigen and antibodies to HCV and HIV-1/2 as well as FDA-licensed Nucleic Acid Testing (NAT) for HBV, HCV and HIV-1 and found to be nonreactive (negative). In addition, the plasma has been tested for B19 virus (B19V) DNA by NAT. Only plasma that passed virus screening is used for production, and the limit for B19V in the fractionation pool is set not to exceed 10⁴ IU of B19V DNA per mL.

The manufacturing process for Privigen includes three steps to reduce the risk of virus transmission. Two of these are dedicated virus clearance steps: pH 4 incubation to inactivate enveloped viruses and virus filtration to remove, by size exclusion, both enveloped and non-enveloped viruses as small as approximately 20 nanometers. In addition, a depth filtration step contributes to the virus reduction capacity.

These steps have been independently validated in a series of *in vitro* experiments for their capacity to inactivate and/or remove both enveloped and non-enveloped viruses.

Table 5 shows the virus clearance during the manufacturing process for Privigen, expressed as the mean log₁₀ reduction factor (LRF).

Table 5: Virus Inactivation/Removal in Privigen*

	HIV-1	PRV	BVDV	WNV	EMCV	MVM
Virus property						
Genome	RNA	DNA	RNA	RNA	RNA	DNA
Envelope	Yes	Yes	Yes	Yes	No	No
Size (nm)	80-100	120-200	50-70	50-70	25-30	18-24
Manufacturing step		Mean LRF				
pH 4 incubation	≥ 5.4	≥ 5.9	4.6	≥ 7.8	nt	nt
Depth filtration	≥ 5.3	≥ 6.3	2.1	3.0	4.2	2.3
Virus filtration	≥ 5.3	≥ 5.5	≥ 5.1	≥ 5.9	≥ 5.4	≥ 5.5
Overall reduction (log₁₀ units)	≥ 16.0	≥ 17.7	≥ 11.8	≥ 16.7	≥ 9.6	≥ 7.8

HIV-1, human immunodeficiency virus type 1, a model for HIV-1 and HIV-2; PRV, pseudorabies virus, a nonspecific model for large enveloped DNA viruses (e.g., herpes virus); BVDV, bovine viral diarrhea virus, a model for hepatitis C virus; WNV, West Nile virus; EMCV, encephalomyocarditis virus, a model for hepatitis A virus; MVM, minute virus of mice, a model for a small highly resistant non-enveloped DNA virus (e.g., parvovirus); LRF, log₁₀ reduction factor; nt, not tested.

* The virus clearance of human parvovirus B19 was investigated experimentally at the pH 4 incubation step. The estimated LRF obtained was ≥ 5.3 .

The manufacturing process was also investigated for its capacity to decrease the infectivity of an experimental agent of transmissible spongiform encephalopathy (TSE), considered a model for CJD and its variant vCJD.¹⁸ Several of the production steps have been shown to decrease TSE infectivity of an experimental model agent. TSE reduction steps include octanoic acid fractionation (≥ 6.4 log₁₀), depth filtration (2.6 log₁₀), and virus filtration (≥ 5.8 log₁₀). These studies provide reasonable assurance that low levels of vCJD/CJD agent infectivity, if present in the starting material, would be removed.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

Treatment of Primary Humoral Immunodeficiency

Privigen is a replacement therapy for primary humoral immunodeficiency, and supplies a broad spectrum of opsonic and neutralizing IgG antibodies against bacterial, viral, parasitic and mycoplasma agents and their toxins. The mechanism of action in PI has not been fully elucidated.

Treatment of Chronic Immune Thrombocytopenic Purpura

The mechanism of action of high doses of immunoglobulins in the treatment of chronic ITP has not been fully elucidated.

12.3 Pharmacokinetics

Treatment of Primary Humoral Immunodeficiency

In the clinical study (pivotal study) assessing the efficacy and safety of Privigen in 80 subjects with PI [see *Clinical Studies* (14.1)], serum concentrations of total IgG and IgG subclasses were measured in 25 subjects (ages 13 to 69) following the 7th infusion for the 3 subjects on the 3-week dosing interval and following the 5th infusion for the 22 subjects on the 4-week dosing interval. The dose of Privigen used in these subjects ranged from 200.0 mg/kg to 714.3 mg/kg. After the infusion, blood samples were taken until Day 21 and Day 28 for the 3-week and 4-week dosing intervals, respectively.

Table 6 summarizes the pharmacokinetic parameters of Privigen, based on serum concentrations of total IgG.

Table 6: PI Pivotal Study - Pharmacokinetic Parameters of Privigen in Subjects

Parameter	3-Week Dosing Interval (n=3)		4-Week Dosing Interval (n=22)	
	Mean (SD)	Median (Range)	Mean (SD)	Median (Range)
C _{max} (peak, mg/dL)	2,550 (400)	2,340 (2,290-3,010)	2,260 (530)	2,340 (1,040-3,460)
C _{min} (trough, mg/dL)	1,230 (230)	1,200 (1,020-1,470)	1,000 (200)	1,000 (580-1,360)
t _{1/2} (days)	27.6 (5.9)	27.8 (21.6-33.4)	45.4 (18.5)	37.3 (20.6-96.6)
AUC _{0-t} (day × mg/dL)*	32,820 (6,260)	29,860 (28,580-40,010)	36,390 (5,950)	36,670 (19,680-44,340)
AUC _{0-∞} (day × mg/dL)*	79,315 (20,170)	78,748 (59,435-99,762)	104,627 (33,581)	98,521 (64,803-178,600)
Clearance (mL/day/kg)*	1.3 (0.1)	1.3 (1.1-1.4)	1.3 (0.3)	1.3 (0.9-2.1)
Mean residence time (days)*	38.6 (8.1)	39.5 (30.1-46.2)	65.2 (24.7)	59.0 (33.2-129.6)
Volume of distribution at steady state (mL/kg)*	50 (13)	44 (40-65)	84 (35)	87 (40-207)

C_{max}, maximum serum concentration; C_{min}, trough (minimum level) serum concentration; t_{1/2}, elimination half-life; AUC_{0-t}, area under the curve from 0 hour to last sampling time; AUC_{0-∞}, area under the curve from 0 hour to infinite time. * Calculated by log-linear trapezoidal rule.

The median half-life of Privigen was 36.6 days for the 25 subjects in the pharmacokinetic subgroup.

Although no systematic study was conducted to evaluate the effect of gender and age on the pharmacokinetics of Privigen, based on the small sample size (11 males and 14 females) it appears that clearance of Privigen is comparable in males (1.27 ± 0.35 mL/day/kg) and females (1.34 ± 0.22 mL/day/kg). In six subjects between 13 and 15 years of age, the clearance of Privigen (1.35 ± 0.44 mL/day/kg) is comparable to that observed in 19 adult subjects 19 years of age or older (1.29 ± 0.22 mL/day/kg).

The IgG subclass levels observed in the pharmacokinetic study were consistent with a physiologic distribution pattern (mean trough values): IgG₁, 564.91 mg/dL; IgG₂, 394.15 mg/dL; IgG₃, 30.16 mg/dL; IgG₄, 10.88 mg/dL.

Treatment of Chronic Immune Thrombocytopenic Purpura

Pharmacokinetic studies with Privigen were not performed in subjects with chronic ITP.

14 CLINICAL STUDIES

14.1 Treatment of Primary Humoral Immunodeficiency

A prospective, open-label, single-arm, multicenter study (pivotal study) assessed the efficacy, safety, and pharmacokinetics of Privigen in adult and pediatric subjects with PI, who were treated for 12 months at a 3-week or 4-week dosing interval. Subjects ranged in age from 3 to 69; 46 (57.5%) were male and 34 (42.5%) were female; 77.5% were Caucasian, 15% were Hispanic, and 7.5% were African-American. All subjects had been on regular IGIV replacement therapy for at least 6 months prior to participating in the study. The efficacy analysis included 80 subjects, 16 (20%) on the 3-week dosing interval and 64 (80%) on the 4-week dosing interval. Doses ranged from 200 mg/kg to 888 mg/kg per infusion. The median dose for the 3-week interval was 428.3 mg/kg per infusion; the median dose for the 4-week interval was 440.6 mg/kg per infusion. Subjects received a total of 1038 infusions of Privigen, 272 for the 3-week dosing regimen and 766 for the 4-week dosing regimen. The maximum infusion rate allowed during this study was 8 mg/kg/min with 715 (69%) of the infusions administered at a rate of 7 mg/kg/min or greater. The primary analysis for efficacy was based on the annual rate of acute serious bacterial infections (aSBIs), defined as pneumonia, bacteremia/septicemia, osteomyelitis/septic arthritis, bacterial meningitis, and visceral abscess, per subject per year. Secondary analyses were based on the annual rate of other infections, antibiotic use, days out of work/school/day care or unable to perform normal activities due to illness, and days of hospitalization. During the 12-month study period, the aSBI rate was 0.08 (with an upper 1-sided 99% confidence interval of 0.203), which met the predefined success rate of less than one aSBI per subject per year. Six subjects experienced an aSBI, including three cases of pneumonia and one case each of septic arthritis, osteomyelitis, and visceral abscess. All six subjects completed the study.

The rate of other infections was 3.55 infections per subject per year. The infections that occurred most frequently were sinusitis (31.3%), nasopharyngitis (22.5%), upper respiratory tract infection (18.8%), bronchitis (13.8%), and rhinitis (13.8%). Among the 255 infections, 16 (6.3%) occurring in 10 subjects were considered severe.

Table 7 summarizes the efficacy results for all 80 subjects.

Table 7: PI Pivotal Study – Summary of Efficacy Results in Subjects

Number of Subjects	80
Results from Case Report Forms	
Total Number of Subject Days	26,198
Infections	
Annual rate of confirmed aSBIs*	0.08 aSBIs/subject year†
Annual rate of other infections	3.55 infections/subject year
Antibiotic use	
Number of subjects (%)	64 (80%)
Annual rate	87.4 days/subject year
Results from Subject Diaries	
Total Number of Diary Days	24,059
Out of work/school/day care or unable to perform normal activities due to illness	
Number of days (%)	570 (2.37%)
Annual rate	8.65 days/subject year
Hospitalization	
Number of days (%)	166 (0.69%)
Annual rate	2.52 days/subject year

* Defined as pneumonia, bacterial meningitis, bacteremia/septicemia, osteomyelitis/septic arthritis, and visceral abscess.
 † Upper 1-sided 99% confidence interval: 0.203.

14.2 Treatment of Chronic Immune Thrombocytopenic Purpura

A prospective, open-label, single-arm, multicenter study assessed the efficacy, safety, and tolerability of Privigen in 57 subjects with chronic ITP and a platelet count of $20 \times 10^9/L$ or less. Subjects ranged in age from 15 to 69; 23 (40.4%) were male and 34 (59.6%) were female; all were Caucasian.

Subjects received a 2 g/kg dosage of Privigen administered as 1 g/kg (10 mL/kg) intravenous infusion daily for 2 consecutive days, and were observed for 29 days. Fifty-three (93%) subjects received Privigen at the maximum infusion rate allowed (4 mg/kg/min [0.04 mL/kg/min]).

The primary analysis was based on the response rate defined as the percentage of subjects with an increase in platelet counts to at least $50 \times 10^9/L$ within 7 days after the first infusion (responders). Secondary analyses were based on the increase in platelet counts and the time to reach a platelet count of at least $50 \times 10^9/L$ at any point within the study period, the duration of that response, and the regression (decrease in the severity) of hemorrhage in subjects who had bleeding at baseline. Platelet counts were measured on Days 1, 2, 4, 6, 8, 15, 22, and 29. Additional measurements on Days 57 and 85 occurred in subjects with a platelet count of at least $50 \times 10^9/L$ at the previous visit.

Of the 57 subjects in the efficacy analysis, 46 (80.7%) responded to Privigen with a rise in platelet counts to at least $50 \times 10^9/L$ within 7 days after the first infusion. The lower bound of the 95% confidence interval for the response rate (69.2%) is above the predefined response rate of 50%.

The highest median increase in platelet counts was seen 7 days after the first infusion ($123 \times 10^9/L$). The median maximum platelet count achieved was $154 \times 10^9/L$. The median time to reach a platelet response of more than $50 \times 10^9/L$ was 2.5 days after the first infusion. Twenty-five (43%) of the 57 subjects reached this response by Day 2 prior to the second infusion and 43 (75%) subjects reached this response by Day 6.

The duration of platelet response was analyzed for the 48 subjects who achieved a response any time after the first infusion. The median duration of platelet response in these subjects was 15.4 days (range: 1 to >82 days). Thirty-six (75%) of the 48 subjects maintained the response for at least 8.8 days and 12 (25%) of them for at least 21.9 days. Five (9%) subjects maintained a response up to Day 29 and two (4%) up to Day 85.

A decrease in the severity of hemorrhage from baseline was observed in the following bleeding locations: skin (31 of 36 subjects), oral cavity (11 of 11 subjects), and genitourinary tract (7 of 9 subjects). This decrease was not sustained in all subjects up to the end of the 29-day study period.

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16 HOW SUPPLIED/STORAGE AND HANDLING

16.1 How Supplied

- Privigen is supplied in a single-use, tamper-evident vial containing the labeled amount of functionally active IgG.

Each product presentation includes a package insert and the following components:

Presentation	Carton NDC Number	Components
50 mL	44206-436-05	Vial containing 5 grams of protein (NDC 44206-436-90)
100 mL	44206-437-10	Vial containing 10 grams of protein (NDC 44206-437-91)
200 mL	44206-438-20	Vial containing 20 grams of protein (NDC 44206-438-92)
400 mL	44206-439-40	Vial containing 40 grams of protein (NDC 44206-439-93)

16.2 Storage and Handling

- Keep Privigen in its original carton to protect it from light.
- Each vial has an integral suspension band and a label with two peel-off strips showing the product name, lot number, and expiration date.
- When stored at room temperature (up to 25°C [77°F]), Privigen is stable for up to 36 months, as indicated by the expiration date printed on the outer carton and vial label.
- Do not freeze.
- The Privigen packaging components are not made with natural rubber latex.

17 PATIENT COUNSELING INFORMATION

Inform patients of the early signs of hypersensitivity reactions to Privigen (including hives, generalized urticaria, tightness of the chest, wheezing, hypotension, and anaphylaxis), and advise them to notify their physician if they experience any of these symptoms.

Inform patients to immediately report the following signs and symptoms to their physician:

- Decreased urine output, sudden weight gain, fluid retention/edema, and/or shortness of breath, which may suggest kidney problems
- Instruct patients to immediately report symptoms of thrombosis. These symptoms may include: pain and/or swelling of an arm or leg with warmth over the affected area, discoloration of an arm or leg, unexplained shortness of breath, chest pain or discomfort that worsens on deep breathing, unexplained rapid pulse, numbness or weakness on one side of the body.
- Severe headache, neck stiffness, drowsiness, fever, sensitivity to light, painful eye movements, nausea, and vomiting, which may suggest aseptic meningitis syndrome
- Fatigue, increased heart rate, yellowing of skin or eyes, and dark-colored urine, which may suggest hemolysis
- Severe breathing problems, lightheadedness, drops in blood pressure, and fever, which may suggest TRALI (a condition typically occurring within 1 to 6 hours following transfusion)

Inform patients that Privigen is made from human blood and may contain infectious agents that can cause disease (e.g., viruses and, theoretically the CJD agent). Explain that the risk that Privigen may transmit an infectious agent has been reduced by screening the plasma donors, by testing donated plasma for certain virus infections, and by inactivating or removing certain viruses during manufacturing, and counsel patients to report any symptoms that concern them.

Inform patients that administration of IgG may interfere with the response to live virus vaccines (e.g., measles, mumps, rubella, and varicella), and instruct them to notify their immunizing physician of recent therapy with Privigen.

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