Intragam®P

Singapore

NAME OF THE MEDICINE

Human Normal Immunoglobulin, solution for intravenous infusion.

DESCRIPTION

Intragam® P is a sterile, preservative free solution containing 6 g of human protein and 10 g of maltose in each 100 mL. The solution has a pH of 4.25. Isotonicity is achieved by the addition of maltose. At least 98% of the protein has the electrophoretic mobility of immunoglobulin G (IgG). At least 90% of the protein is IgG monomer and dimer. Based on three preclinical and four clinical batches, the distribution of IgG subclasses present in Intragam® P is, on the average, 61% IgG_1, 36% IgG_2, 3% IgG_3 and 1% IgG_4. Intragam® P contains only trace amounts of IgA (nominally <0.025 mg/mL). Intragam® P is intended for intravenous administration.

Intragam® P is manufactured from human plasma donated by Singapore's voluntary and non-remunerated donors. Intragam® P is made by chromatographic fractionation of large pools of human plasma. The protein has not been chemically or enzymatically modified. The manufacturing process contains dedicated steps to reduce the possibility of virus transmission including pasteurisation (60°C for 10 hours) and incubation at low pH.

PHARMACOLOGY

Pharmacokinetics

The steady-state kinetic parameters for serum IgG were determined in 11 patients (9 male, age 28–76 years) with primary immunodeficiency disorders, following the administration of monthly intravenous infusions of Intragam® P for six months. The dose of Intragam® P was individualised in the range 0.35–0.53 g/kg. The mean serum IgG concentration ranged from a trough of 7.4±1.1 g/L to a peak of 15.8±1.7 g/L, the mean clearance was 4.1±0.8 mL/h and the mean half-life 39.7±7.8 days. Mean recovery, the increase in serum IgG concentration as a percentage of the expected concentration after an Intragam® P infusion, was 44.0±2.0% (see **CLINICAL TRIALS**)

Mechanism of action

Intragam® P contains functionally intact IgG present in the donor population, with a broad spectrum of antibodies against infectious agents. Adequate doses of intact IgG restore abnormally low IgG levels to

the normal range in patients. The mechanism of action in indications other than replacement therapy is not fully elucidated, but includes immunomodulatory effects.

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CLINICAL TRIALS

Primary Immune Deficiency (PID)

The efficacy of Intragam® P was assessed in 35 patients (age 6–76 years; 21 male) with primary immune deficiency disorders, following the administration of monthly intravenous infusions of Intragam® P for six months. The dose of Intragam® P was individualised in the range 0.2–0.67 g/kg. The mean number of days of hospitalisation over the six month period was 2.8±9.0 and the mean number of days absent from work or school due to illness was 5.3±6.4. These figures were similar to historical data relating to other intravenous immunoglobulins (IVIg).

Idiopathic Thrombocytopenic Purpura (ITP)

The efficacy of Intragam® P was assessed in 17 patients (age 21–72 years; 5 male) with ITP (6 acute, 11 chronic), following intravenous infusion of Intragam® P once daily for 1– 3 consecutive days. The dose of Intragam® P was individualised up to a maximum total cumulative dose of 2 g/kg body weight. Following administration of Intragam® P, a total of 13 patients (76.5%) achieved platelet count responses which were good (50 x 10^9/L– 150 x 10^9/L) or excellent (>150 x 10^9/L). Platelet counts were maintained at ≥50 x 10^9/L for up to 35 days with a median of 17.24 days (95% CI 10.35, 24.12). These figures were similar to historical data relating to other IVIg.

Adverse events encountered during both clinical trials are outlined in **ADVERSE EFFECTS**.

INDICATIONS

Intragam® P is indicated for replacement IgG therapy in:

- primary immunodeficiency
- myeloma and chronic lymphocytic leukaemia with severe secondary hypogammaglobulinaemia and recurrent infections
- congenital or acquired immune deficiency syndrome with recurrent infections.

Intragam® P is indicated for immunomodulatory therapy in:

- Idiopathic Thrombocytopenic Purpura (ITP), in adults or children at high risk of bleeding or prior to surgery to correct the platelet count
- allogeneic bone marrow transplantation
- Kawasaki disease.

Comprehensive evidence-based guidelines describing appropriate clinical use of intravenous immunoglobulin in ITP have been published and should be followed wherever possible to avoid the inappropriate utilisation of this blood product[1, 2].

CONTRAINDICATIONS

Intragam P is contraindicated in patients:

- Who have had a true anaphylactic reaction to a human immunoglobulin preparation
- Who are IgA-deficient with antibodies to IgA and a history of hypersensitivity
- With a history of hypersensitivity to the excipient maltose.

SPECIAL WARNINGS AND PRECAUTIONS FOR USE

Intragam® P should only be administered intravenously. Other routes of administration have not been evaluated.

General

Reactions to IVIg tend to be related to the infusion rate and are most likely to occur during the first hour of the infusion. It is recommended that the patient's vital signs and general status are monitored regularly throughout the infusion. In case of adverse reaction, either the rate of administration must be reduced or the infusion stopped.

Certain adverse reactions may occur more frequently:

- in case of high rate of infusion,

- in patients with hypogammaglobulinaemia or agammaglobulinaemia with or without IgA deficiency
- in patients who receive human immunoglobulin for the first time or, in rare cases, when the human normal immunoglobulin product is switched, or when there has been a long interval since previous infusion.

Hypersensitivity

Intragam® P contains trace amounts of IgA which may provoke anaphylaxis in patients with IgA antibodies, such as those with IgA deficiency.

Rarely, human normal immunoglobulin can induce a precipitous fall in blood pressure with anaphylactic reaction, even in patients who had tolerated previous treatment with human normal immunoglobulin. In case of anaphylactic reaction, the infusion should be stopped immediately. Adrenaline (epinephrine) and oxygen should be available for the treatment of such an acute reaction.

Aseptic meningitis syndrome

An Aseptic Meningitis Syndrome (AMS) has been reported to occur infrequently in association with IVIg treatment. The syndrome usually begins within several hours to two days following IVIg treatment. It is characterised by symptoms and signs including severe headache, nuchal rigidity, drowsiness, fever, photophobia, painful eye movements, and nausea and vomiting. Cerebrospinal fluid (CSF) studies are frequently positive with pleocytosis, predominantly from the granulocytic series, and elevated protein levels. Patients exhibiting such symptoms and signs should receive a thorough neurological examination, including CSF studies, to rule out other causes of meningitis. AMS may occur more frequently in association with high dose (2 g/kg) IVIg treatment. Discontinuation of IVIg treatment has resulted in remission of AMS within several days without sequelae.

Acute renal failure

There have been occasional reports of renal dysfunction and acute renal failure in patients receiving IVIg products. Patients at increased risk are those with pre-existing renal insufficiency, diabetes mellitus, age greater than 65 years, volume depletion, sepsis and paraproteinaemia, and those taking concomitant nephrotoxic drugs.While these reports of renal dysfunction and acute renal failure have been associated with the use of many of the licensed IVIg products containing various excipients such as sucrose, glucose and maltose, those containing sucrose as a stabilizer accounted for a disproportionate share of the total number. Intragam P contains maltose but it does not contain sucrose.

The following precautions should be followed: Patients should be adequately hydrated prior to the initiation of the IVIg infusion and the recommended dose should not be exceeded. Renal function should be monitored in patients at increased risk of developing acute renal failure. If renal function deteriorates, discontinuation of IVIg should be considered.

In patients at risk of acute renal failure, IVIg products should be administered at the minimum rate of infusion and dose possible based on clinical judgement

Haemolytic anaemia

Positive direct antiglobulin tests and red cell haemolysis have been reported following high dose infusion of IVIg due to the presence of blood group antibodies (e.g. anti-A, anti-B, and occasionally anti-D or other erythrocyte antibodies in the product. Such red blood cell sensitisation may cause crossmatching difficulties and transient haemolytic anaemia.

The following risk factors are associated with the development of haemolysis: high dose IVIg (>0.4 g/kg every 4 weeks), non-O blood group, and underlying inflamatory state, especially in patients with reduced bone marrow reserve or post haemopoietic stem cell transplantation.Patients receiving high dose IVIg (>0.4 g/kg every 4 weeks) should have a pre-infusion ABO blood group determined and have their haemoglobin monitored in the days following therapy for evidence of clinically significant haemolysis.

If signs and/or symptoms of haemolysis develop during or after an IVIg infusion, discontinuation of the IVIg treatment should be considered by the treating physician.

Thromboembolic events

Thrombotic events have been reported in association with IgG therapy. Risk factors include advanced age, immobility, oestrogen use, in-dwelling vascular catheters, acquired or inherited hypercoagulable states, a history of venous or arterial thrombosis, cardiovascular risk factors (including history of atherosclerosis and/or impaired cardiac output), and conditions associated with increased plasma viscosity, such as fasting chylomicronaemia and/or hypertriglyceride levels, cryoglobulins and monoclonal gammopathies.Patients at risk for thrombotic events should receive IVIg products at the minimum infusion rate and dose practicable and dose possible based on clinical judgement, and should be monitored for thromboembolic complications. Consideration should also be given to measurement of baseline blood viscosity in individuals at risk for hyperviscosity.

Acid load

In patients with a normal acid-base compensatory mechanism, the acid load delivered by the largest dose of the preparation would be neutralised by the buffering capacity of whole blood alone, even if the dose were to be infused instantaneously. In patients with limited or compromised

acid-base compensatory mechanisms including neonates, consideration should be given to the effect of the additional acid load that the preparation might present.

Thrombophlebitis

Prolonged administration (over 6 hours) using large doses (greater than 0.4 g/kg) may result in thrombophlebitis at the infusion site.

Transfusion-Related Acute Lung Injury (TRALI)

There have been reports of noncardiogenic pulmonary edema [Transfusion-Related Acute Lung Injury (TRALI)] in patients administered IGIV. TRALI is characterized by severe respiratory distress, pulmonary edema, hypoxemia, normal left ventricular function, and fever and typically occurs within 1-6 hrs after transfusion. Patients with TRALI may be managed using oxygen therapy with adequate ventilatory support.

IGIV recipients should be monitored for pulmonary adverse reactions. If TRALI is suspected, appropriate tests should be performed for the presence of anti-neutrophil antibodies in both the product and patient serum.

PATHOGEN SAFETY

This product is made from human plasma. Products made from human plasma may contain infectious agents, such as viruses and theoretically Creutzfeldt-Jakob Disease (CJD) agents, that can cause disease. The risk that such products will transmit an infectious agent has been reduced by screening plasma donors for prior exposure to certain infectious agents and by testing for the presence of certain viral markers.

In addition, virus removal and inactivation procedures are included in the manufacturing process. The current procedures applied in the manufacture of this product are effective against enveloped viruses such as HIV (human immunodeficiency virus), hepatitis B and hepatitis C viruses, and the non-enveloped virus, hepatitis A. These procedures may be of limited value against the non-enveloped virus, parvovirus B19. However, the product contains specific antibodies directed against parvovirus B19.

Despite these measures, such products may still potentially transmit disease. There is also the possibility that other known or unknown infectious agents may be present in such products.

Vaccination for patients in receipt of medicinal products from human plasma should be considered where appropriate.

Paediatric use

The use of Intragam® P in the paediatric population has not been established in clinical studies.

Use in the elderly

Clinical studies of Intragam® P did not include sufficient numbers of subjects aged 65 years and over to determine whether they respond differently to younger subjects.

Effects on fertility

No fertility studies have been conducted with Intragam® P. Clinical experience with immunoglobulins suggests that no harmful effects on fertility are to be expected.

Use in pregnancy

The safety of Intragam® P for use in human pregnancy has not been established in controlled clinical trials. Intragam® P should therefore only be given with caution to pregnant women. Clinical experience with immunoglobulins suggests that no harmful effects on the course of pregnancy, or on the foetus are to be expected.

Use in lactation

The safety of Intragam® P for use in lactation has not been established in controlled clinical trials. Intragam® P should therefore only be given with caution to breast feeding mothers. Immunoglobulins are excreted in breast milk. Clinical experience with immunoglobulins suggests that no harmful effects on the neonate are to be expected.

Effects on ability to drive and use machines

The ability to drive and operate machines may be impaired by some adverse reactions associated with Intragam ®P. Patients who experience adverse reactions during treatment should wait for these to resolve before driving or operating machines.

Genotoxicity

No genotoxicity studies have been conducted with Intragam® P.

Carcinogenicity

No carcinogenicity studies have been conducted with Intragam® P.

EFFECT ON LABORATORY TESTS

Interference with serological testing

After immunoglobulin infusion the transitory rise of the various passively transferred antibodies in the patient's blood may result in misleading positive results in serological testing.

Passive transmission of antibodies to erythrocyte antigens (e.g. anti-A, Anti-B, anti-D) may interfere with some serological tests for red cell allo-antibodies (e.g. Coombs' test).

Interference with glucose estimations

The maltose present in Intragam® P may interfere with some blood glucose measurements, resulting in the overestimation of blood glucose results. If this glucose measurement is used to guide treatment, hypoglycaemia may occur. Only certain glucose tests using glucose dehydrogenase have been implicated, so when monitoring glucose levels in patients receiving Intragam® P, information from the manufacturer of the glucose meter and/or test strips, should be reviewed to ensure that maltose does not interfere with the blood glucose reading.
Infusion of Intragam® P may also result in transient glucosuria.

Recording during treatment

It is recommended that every time that Intragam® P is administered to a patient, the name and batch number of Intragam® P are recorded in order to maintain a link between the patient and the batch of the product.

INTERACTIONS WITH OTHER MEDICINES

The interaction of Intragam® P with other medicines has not been established in appropriate studies.

Live attenuated virus vaccines

Passively acquired antibody can interfere with the response to live, attenuated vaccines. Therefore, administration of such vaccines, e.g. poliomyelitis, mumps, rubella, measles and varicella/chickenpox vaccines, should be deferred until approximately three months after passive immunisation. By the same token, immunoglobulins should not be administered for at least two weeks after a vaccine has been given. In the case of measles vaccinations, the decrease in efficacy may persist for up to a year. Patients given measles vaccine should therefore have their antibody status checked.

ADVERSE EFFECTS

Patients naive to immunoglobulin may experience a higher frequency of adverse events, including those of a minor nature. Reactions to IVIg tend to be related to the infusion rate and are most likely to occur during the first hour of the infusion. It is recommended that the patient's vital signs and general status are monitored regularly throughout the infusion.

REACTIONS ASSOCIATED WITH INTRAGAM® P IN CLINICAL TRIALS

Primary Immune Deficiency (PID)

The following adverse reactions occurred in 35 PID patients receiving Intragam® P during the clinical trial (expressed as the number of patients experiencing the adverse reaction):
headache (8), migraine (2), anaemia (2), nausea (2), vertigo (1), neutropenia (1), thrombocytopenia (1) and fatigue (1). The dose of Intragam® P ranged from 0.2 to 0.67 g/kg body weight/month.

Idiopathic Thrombocytopenic Purpura (ITP)

The following adverse reactions occurred in 17 ITP patients receiving Intragam® P during the clinical trial (expressed as the number of patients experiencing the adverse reaction):
headache (10), positive direct Coombs test (5), haemolysis (4), nausea (3), rigors (3), fever (2), myalgia (1), somnolence (1), abdominal pain (1), vomiting (1), hypertension (1), flushing (1), haemolytic anaemia (1), leucopenia (1), reticulocytosis (1), lymphopenia (1), allergic reaction (1), hot flushes (1) and injection site inflammation (1). The dose of Intragam® P ranged from 0.66 to 2 g/kg body weight received via infusion once daily over 1– 3 consecutive days.

REACTIONS ASSOCIATED WITH INTRAGAM® P USE POST-MARKETING

Haemolytic anaemia associated with the presence of anti-A and/or anti-B antibodies has been reported following high dose therapy with Intragam® P in patients of non-O blood group (blood group A, B or AB), particularly in recipients with reduced bone marrow reserve or post haemopoietic stem cell transplantation.

In addition to the reactions observed in clinical trials, the following were observed post-marketing:

Immune system disorders: Anaphylactic reactions/Hypersensitivity
Nervous system disorders: Meningitis aseptic, Paraesthesia, Tremor
Vascular disorders: Thromboembolism
Skin and subcutaneous tissue disorders: Exfoliative dermatitis

General disorders and administration site conditions: Infusion site reactions, Pain *Musculoskeletal and connective tissue disorders:* Arthralgia.

Reliable estimates of the frequency of these reactions or establishment of a causal relationship to product exposure are not possible because the reporting is voluntary and from a population of uncertain size.

GENERAL CLASS EFFECTS ASSOCIATED WITH INTRAVENOUS IMMUNOGLOBULINS

The types of reactions that may occur include: malaise, abdominal pain, headache, chest-tightness, facial flushing or pallor, erythema, hot sensations, dyspnoea or respiratory difficulty, non-urticarial skin rash, cutaneous vasculitis, pompholyx on hands/palms, itching, tissue swelling, change in blood pressure, nausea or vomiting. Should any of these reactions develop during infusion of Intragam® P, the infusion should be temporarily stopped until the patient improves clinically (5 to 10 minutes) and then cautiously recommenced at a slower rate.

Some patients may develop delayed adverse reactions to IVIg such as: nausea, vomiting, chest pain, rigors, dizziness, aching legs or arthralgia. These adverse reactions occur after the infusion has stopped but usually within 24 hours.

True hypersensitivity reactions to IVIg such as urticaria, angioedema, bronchospasm or hypotension occur very rarely. Should an anaphylactic reaction to Intragam® P develop, the infusion should be stopped and treatment instituted with adrenaline (epinephrine), oxygen, antihistamine and steroids.

Haemolytic anaemia and neutropenia have been reported in rare instances in association with IVIg treatment.

Mild and moderate elevations of serum transaminases (AST, ALT, gamma GT) have been observed in a small number of patients given IVIg. Such changes were transient and not associated with the transmission of hepatitis.

AMS and thrombophlebitis have occurred in patients receiving IVIg (see **SPECIAL WARNINGS AND PRECAUTIONS FOR USE**).

Thromboembolic events have been reported in association with IVIg therapy. Rarely, renal dysfunction and acute renal failure have been reported (see **SPECIAL WARNINGS AND PRECAUTIONS FOR USE**).

DOSAGE AND ADMINISTRATION

Dosage

Intragam® P may be infused undiluted. Intragam® P may also be infused diluted with up to

2 parts of 0.9% saline or 5% glucose.

The infusion should be commenced at the rate of

1 mL/minute (60 mL/hour). After 15 minutes the rate may be gradually increased to a maximum of 3–4 mL/minute (180 to 240 mL/hour) over a further 15 minutes. Consideration should be given to reducing the rate of infusion in patients naïve to Intragam P, patients switching from alternative IVIg, patients who have not received IVIg for a long time, paediatric and elderly patients and in patients with pre-existing renal disease (see **SPECIAL WARNINGS AND PRECAUTIONS FOR USE**).

A rate of infusion which is too rapid may cause flushing and changes in heart rate and blood pressure.

REPLACEMENT THERAPY

Replacement therapy should be commenced and monitored under the supervision of a healthcare professional experienced in the treatment of immunodeficiency.

The optimal dose and frequency of administration of Intragam® P must be determined for each patient. Freedom from recurrent bacterial infections is usually achieved with a serum IgG level above 5 g/litre. Most patients receive a dose of 0.2–0.6 g IgG/kilogram body weight/month, either as a single dose or as two equal doses at fortnightly intervals. Following initial diagnosis, higher doses (0.4 to 0.6 g IgG per kilogram body weight per month) may be required for several months to provide rapid protection against recurrent infections. Adjustment of both dose and infusion interval is empirical and should be based on the patient's clinical state and the pre-infusion IgG level.

IMMUNOMODULATORY THERAPY

Idiopathic Thrombocytopenic Purpura (ITP)

The optimal dose and frequency of administration of Intragam® P must be determined for each patient. Patients may receive a dose of up to a maximum total cumulative dose of 2 g IgG/kilogram body weight, over two to five days. Adjustment of both dose and infusion interval is empirical and should be based on the patient's clinical state.

Kawasaki Disease

The optimal dose and frequency of administration of Intragam® P must be determined for each patient. Patients should receive 1.6–2.0 g IgG/kilogram body weight, administered in divided doses over two to five days or 2 g IgG/kilogram body weight as a single dose.

Patients should receive concomitant treatment with acetylsalicylic acid.

Allogeneic bone marrow transplantation

Treatment with Intragam® P may be used as part of the conditioning regime and after the transplant. The optimal dose and frequency of administration of Intragam® P should be individualised. A starting dose of 0.5 g IgG per kilogram body weight per week is recommended.

METHOD OF ADMINISTRATION

NOTE: Intragam® P contains no antimicrobial preservative. It must, therefore, be used immediately after opening the bottle. Use in one patient on one occasion only. Any unused portion should be discarded appropriately. Do not use if the solution has been frozen. If Intragam® P appears to be turbid or to contain any sediment, it must not be used. The unopened bottle should be returned to the Blood Services Group.

Intragam® P should be administered separately from other intravenous fluids or medications the patient might be receiving.

Intragam® P may be administered through any standard IV infusion giving set. The following procedure is recommended:

1. Allow the preparation to reach room temperature before use.
2. Remove the plastic cover from the seal.
3. Apply a suitable antiseptic to the exposed part of the rubber stopper and allow to dry.
4. Stand the bottle upright and insert the air vent needle vertically in one of the indentations of the stopper. It is preferable to use a long airway needle fitted with a filter. If not available, a short needle attached to a non-wettable filter may be used.
5. Clamp the tubing of the giving set and insert the needle at the upper end of the giving set vertically through another indentation of the stopper. Should the stopper become dislodged, do not use this bottle and discard the solution appropriately.
6. Invert the bottle and attach the hanger to a support approximately one metre above the patient.
7. Allow the tubing to fill by adjusting the clamp. Attach the giving set to the venous access device (cannula) and adjust the rate of flow.
8. When the bottle is empty, clamp the tubing and transfer the needle at the upper end of the giving set to a further bottle of Intragam® P.
9. Should leakage become evident during administration, cease the infusion and discard the solution appropriately. Recommence the infusion with a new bottle and giving set.

OVERDOSE

Overdosage may lead to fluid overload and hyperviscosity, particularly in the elderly and in patients with cardiac or renal impairment.

PRESENTATION AND STORAGE CONDITIONS

This product is available in 50 and 200 mL vials containing 3 and 12 g of IgG and 5 and 20 g of maltose respectively.

Store at 2°C to 8°C (Refrigerate. Do not freeze). Once removed from refrigeration, store below 25°C and use within 3 months. Protect from light.

Do not use after the expiry date.

REFERENCES

1. George, JN *et al*: Idiopathic Thrombocytopenic Purpura: A Practice Guideline Developed by Explicit Methods for The American Society of Hematology. Blood 88, 3–40, 1996.
2. The American Society of Hematology ITP Guideline Panel: Diagnosis and Treatment of Idiopathic Thrombocytopenic Purpura: Recommendations of The American Society of Hematology. Ann Intern Med 126, 319–326, 1997.

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