
DBL™ HEPARIN SODIUM INJECTION BP
Heparin Sodium (Porcine Mucous) Injection 1,000IU/mL, 5,000IU/mL and 25,000IU/mL

Presentation

DBL™ Heparin Sodium Injection B.P. is a colourless or straw coloured sterile solution of Heparin Sodium B.P. in Water for Injections B.P. It is prepared from porcine intestinal mucosa and is free from pyrogenic substances. The pH of the injection ranges between 5.0 and 8.0.

Uses**Actions**

Anticoagulant.

Pharmacology

Heparin is a naturally occurring mucopolysaccharide which inhibits the clotting of blood in vitro and in vivo. It enhances the rate at which antithrombin III neutralises thrombin and activated factor X (X_a). Antithrombin III also neutralises other activated coagulation factors, e.g. factors IX, XI, XII and plasmin.

With low-dose heparin therapy, anticoagulation appears to result from neutralisation of X_a which prevents the conversion of prothrombin to thrombin. With full dose heparin therapy, anticoagulation appears to result primarily from neutralisation of thrombin which prevents the conversion of fibrinogen to fibrin. Full-dose heparin therapy also prevents the formation of a stable fibrin clot by inhibiting activation of fibrin stabilising factor.

Pharmacokinetics

Heparin is not absorbed from the gastrointestinal tract and must be administered parenterally. Its onset of action is immediate following I.V. administration. There may be considerable variation among patients in the extent of absorption following deep subcutaneous injection of heparin; however, the onset of activity usually occurs within 20-60 minutes.

Heparin is extensively bound to plasma proteins. It does not cross the placenta and is not distributed into milk.

The metabolic fate of heparin is not fully understood. No biotransformation in plasma or liver, nor any renal excretory mechanism has been identified as primarily responsible for elimination of the drug. It has been suggested that transfer and storage in the reticuloendothelial system may play a role, or that heparin may be partially metabolised in the liver. After administration of large doses intravenously, a small fraction of unchanged drug is excreted in the urine.

Indications

Heparin is indicated for the prophylaxis and treatment of thromboembolic disorders such as thrombophlebitis, pulmonary embolism and occlusive vascular disease.

It is also used to prevent thromboembolic complications arising from cardiac and vascular surgery, frostbite, dialysis and other perfusion procedures.

Heparin is also used as an anticoagulant in blood transfusions.

Contraindications

It should not be used in the following cases:

- in the presence of actual or potential haemorrhagic states, eg. haemophilia, ascorbic acid deficiency, increased capillary fragility, hiatus hernia, neoplasms, retinopathy, bleeding haemorrhoids or other organic lesions likely to bleed;

- haemorrhagic vascular accident;
- threatened abortion;
- immediate postpartum period;
- subacute bacterial endocarditis or acute infectious endocarditis;
- severe hypertension;
- gastric or duodenal ulcers or other ulcerative conditions which may have a tendency to haemorrhage, eg. ulcerative colitis;
- advanced renal or hepatic disease;
- during and immediately after spinal or major surgery, especially those involving the brain, eye or spinal cord;
- shock;
- severe thrombocytopenia or a history of thrombocytopenia with any kind of heparin or with pentosan polysulfate;
- patients in whom suitable blood coagulation tests, eg whole blood clotting time, partial thromboplastin time, etc, cannot be performed at appropriate intervals (this contraindication refers to full-dose heparin; there is usually no need to monitor coagulation parameters in patients receiving low-dose heparin).

Heparin Injection vials contain benzyl alcohol as a preservative, and should not be administered to premature or low birth-weight neonates. Benzyl alcohol has been associated with deaths in these patients. Heparin Injection ampoules do not contain benzyl alcohol.

Warnings and Precautions

Heparin should not be given by intramuscular injection, due to the risk of haematoma formation.

Heparin therapy should be monitored carefully. Adequate monitoring of therapy reduces the risk of overdosage and consequent risk of haemorrhage and is an important guide to the development of serious adverse reactions such as delayed onset thrombocytopenia.

Platelet counts should be monitored in patients receiving heparin for more than a few days, since heparin may cause thrombocytopenia with severe thromboembolic complications. Heparin should be discontinued if thrombocytopenia develops.

Patients on heparin may rarely develop Heparin-induced Thrombosis-Thrombocytopenia Syndrome (HITTS or “white clot syndrome”): new thrombus formation in association with thrombocytopenia, as a result of irreversible platelet aggregation. This may lead to severe thromboembolic complications such as skin necrosis, gangrene of the extremities, myocardial infarction, pulmonary embolism and stroke. Heparin administration should therefore be discontinued if a patient develops new thrombosis in association with thrombocytopenia. These effects are probably of immuno-allergic nature, and occur mostly between the 5th and 21st day of treatment in patients being treated with heparin for the first time.

Delayed Onset of HIT and HITT

Heparin-induced Thrombocytopenia and Heparin-induced Thrombocytopenia and Thrombosis can occur up to several weeks after the discontinuation of heparin therapy. Patients presenting with thrombocytopenia or thrombosis after discontinuation of heparin should be evaluated for HIT and HITT.

As heparin is derived from animal tissue, it should be used with caution in patients with a history of allergy or asthma. Before a therapeutic dose is given to such a patient, a trial dose of 1,000 units may be advisable.

Heparin should be used with extreme caution in patients with continuous tube drainage of the stomach or small intestine.

Any action which may cause vascular injury, with the exception of necessary intravenous or subcutaneous injections, should be avoided where possible.

Outpatients should be warned of the haemorrhagic risks in case of possible trauma.

Heparin should be administered with caution to patients with hepatic or renal disease, hypertension, a history of ulcers, or with vascular diseases of the chorio-retina. Dosage reduction may be necessary in patients with advanced renal or hepatic disease.

Increased resistance to heparin is frequently encountered with fever, thrombosis, thrombophlebitis, infections with thrombosing tendencies, myocardial infarction, cancer and in post-surgical patients.

Heparin therapy increases the risk of localised haemorrhage during and following oral surgical (dental) procedures. Temporary heparin dosage reduction or withdrawal may therefore be advisable prior to oral surgery.

Use in Pregnancy

Category C. The use of heparin in pregnancy has the usual risks for the mother, in particular osteoporosis and thrombocytopenia. Although heparin does not cause malformations, an increased incidence of human foetal loss and prematurity associated with haemorrhage has been reported.

Use in Lactation

Heparin is not distributed into milk and heparin therapy is therefore not contraindicated in women who are breast-feeding. However, administration to breast-feeding women has rarely been reported to cause rapid (within 2 to 4 weeks) development of severe osteoporosis and vertebral collapse.

Use in children

DBL™ Heparin Sodium Injection BP vials contain benzyl alcohol as a preservative, and should not be administered to premature or low birth-weight neonates (see Contraindications). DBL™ Heparin Sodium Injection ampoules do not contain benzyl alcohol.

Use in geriatrics

Dosage should be reduced in elderly people. Patients aged 60 years or over, especially women, may be more susceptible to haemorrhage during heparin therapy.

Incompatibilities

Incompatibility has been reported between heparin and alteplase, amikacin sulphate, amiodarone, ampicillin sodium, benzylpenicillin sodium, cephalothin sodium, ciprofloxacin lactate, cytarabine, dacarbazine, daunorubicin hydrochloride, diazepam, dobutamine hydrochloride, doxorubicin hydrochloride, droperidol, erythromycin lactobionate, gentamicin sulphate, haloperidol lactate, hyaluronidase, hydrocortisone sodium succinate, kanamycin sulphate, methicillin sodium, netilmicin sulphate, opioid analgesics, oxytetracycline hydrochloride, polymyxin B sulphate, promazine hydrochloride, promethazine hydrochloride, streptomycin sulphate, sulphafurazole diethanolamine, tetracycline hydrochloride, tobramycin sulphate, vancomycin hydrochloride and vinblastine sulphate. Heparin sodium has also been reported to be incompatible with cisatracurium besylate, labetalol hydrochloride and nicardipine hydrochloride. Admixture with glucose can have variable effects. Incompatibility has been reported between heparin and fat emulsion.

Interactions

Heparin may prolong the one-stage prothrombin time. Therefore, when heparin is given with oral anticoagulants such as warfarin, a period of at least 5 hours after the last intravenous dose, or 24 hours after the last subcutaneous dose of heparin, should elapse before blood is drawn for a valid prothrombin time to be obtained.

Drugs which affect platelet function, eg aspirin, other salicylates and other non-steroidal anti-inflammatory agents, dextran, dipyridamole and systemic corticosteroids, may increase the risk of haemorrhage and

should be used with caution in patients receiving heparin. Where concomitant use cannot be avoided, careful clinical and biological monitoring should be undertaken.

Other drugs which may potentiate the effect of heparin include hydroxychloroquine, sulphinpyrazone, probenecid, ethacrynic acid, vitamin K antagonists, cytostatic agents, cephamandole, cefotetan, plicamycin, valproic acid and propylthiouracil. High doses of penicillins, some contrast media, asparaginase and epoprostenol may also affect the coagulation process and increase the risk of haemorrhage.

Concomitant use of thrombolytic agents such as alteplase, anistreplase, streptokinase or urokinase may also increase the risk of haemorrhage.

Antihistamines, digitalis glycosides, tetracyclines, nicotine, ascorbic acid and quinine may reduce the anticoagulant effect of heparin.

Glyceryl trinitrate has been reported to reduce the activity of heparin when both drugs are administered simultaneously intravenously. This effect may be due to the presence of propylene glycol as a solvent in many glyceryl trinitrate parenteral preparations. No interaction has been reported when the glyceryl trinitrate was administered immediately after the heparin. Adjustment of heparin dosage during and following administration of intravenous glyceryl trinitrate may be required.

Heavy alcohol drinkers are at greater risk of major heparin-associated bleeding than moderate or non drinkers.

Experimental evidence suggests that heparin may antagonise the actions of ACTH, corticosteroids and insulin.

Heparin is incompatible with certain substances in aqueous solution. Reference to specialised literature should be made to verify in which solution the incompatibility was noted. The following incompatibilities have been reported: hydrocortisone; hyaluronidase; hydroxyzine; some antihistamines, narcotic analgesics, phenothiazines and antibiotics.

Effects on laboratory tests

Significant elevations of AST and ALT levels have occurred in a high percentage of patients (and healthy subjects) who have received heparin. Since AST determinations are important in the differential diagnosis of myocardial infarction, liver disease and pulmonary embolism, rises that might be caused by drugs (like heparin) should be interpreted with caution.

Adverse Effects

Haemorrhage is the major risk of heparin therapy and may range from minor local ecchymoses to major haemorrhagic complications. An overly prolonged clotting time or minor bleeding can usually be controlled by discontinuing the heparin (see **Overdosage**). The occurrence of significant gastrointestinal or urinary tract bleeding during heparin therapy may indicate the presence of an underlying occult lesion.

Bleeding can occur at any site, but some specific haemorrhagic complications can be difficult to detect.

- a) Adrenal haemorrhage with resultant acute adrenal insufficiency has occurred during anticoagulant therapy. Anticoagulant treatment should be discontinued in patients who develop signs and symptoms of acute adrenal haemorrhage and insufficiency. Plasma cortisol levels should be measured immediately. Corticosteroid therapy should be initiated promptly, before laboratory confirmation of the diagnosis, as any delay in treatment may result in the patient's death.
- b) Ovarian (corpus luteum) haemorrhage may be fatal if unrecognised.
- c) Retroperitoneal haemorrhage.

Thrombocytopenia has been reported to occur in up to 30% of patients receiving heparin. Although the thrombocytopenia is often mild and of no obvious clinical significance, it may be accompanied by severe thromboembolic complications such as skin necrosis, gangrene of the extremities, myocardial infarction,

pulmonary embolism and stroke (see **Warnings and Precautions**). Certain episodes of painful, ischaemic and cyanosed limbs have in the past been attributed to allergic vasospastic reactions; however these reactions may instead be complications of thrombocytopenia.

Delayed onset thrombocytopenia is also a possible complication of heparin therapy. If this occurs, the drug should be withdrawn immediately.

Skin necrosis has infrequently been reported at injection sites. It is thought to be a localised manifestation of heparin-induced platelet aggregation and thrombosis, and should be taken as a warning sign in patients who develop it. Heparin should be discontinued immediately.

Local irritation, erythema, mild pain, haematoma or ulceration may follow deep subcutaneous injection. The emergence of firm nodules may be noted in some cases; however, these nodules usually disappear after a few days.

Allergic reactions to heparin occur rarely. Hypersensitivity may be manifested by pruritus, urticaria, chills, fever, asthma-like symptoms, rhinitis, lacrimation, headache, nausea, vomiting and anaphylactoid reactions, including angioedema and shock. The most common manifestations are urticaria, chills and fever. Itching and burning, especially on the plantar side of the feet, may occur.

Osteoporosis complicated by spontaneous bone fracture has been reported with prolonged use of large doses of heparin.

Alopecia and priapism have occurred rarely in patients treated with heparin.

Suppression of aldosterone synthesis with hyperkalaemia and/or metabolic acidosis have been noted in patients at risk (eg. diabetes, renal failure).

Suppression of renal functions has occurred following long-term, high dose administration of heparin.

Significant elevations of AST and ALT levels have occurred in a high percentage of subjects who have received heparin (see **Effects on laboratory tests**).

Hypereosinophilia, which is reversible on discontinuation of heparin treatment, has occurred.

Rebound hyperlipidaemia has been reported following discontinuation of heparin therapy has also been reported.

Dosage and Administration

Heparin may be given by intermittent intravenous injection, intravenous infusion or deep subcutaneous injection. It should not be given intramuscularly because of the danger of haematoma formation.

Low dose prophylaxis against postoperative venous thromboembolism: The usual dose is 5,000 units by deep subcutaneous injection 2 hours before surgery and repeated every 8 to 12 hours for 7 days or longer until the patient is fully ambulatory.

Adults:

Treatment of established venous thrombosis or pulmonary embolism. Treatment may be given by the following routes:

1. Continuous intravenous infusion: a bolus dose of 5,000 units may be given initially followed by an infusion of 20,000 to 40,000 units in 1 litre of sodium chloride intravenous infusion or glucose intravenous infusion over 24 hours.
2. Intermittent intravenous injection: an initial dose of 10,000 units followed by 5,000 to 10,000 units every 4 to 6 hours may be given.

3. Deep subcutaneous injection: the usual dose is 5,000 units injected intravenously followed by subcutaneous injection of 10,000 units 8 hourly or 15,000 units 12 hourly. A concentrated form of heparin injection should be used (eg. 25,000 units/mL).

Children:

A suggested dosage is 50 units/kg bodyweight initially by I.V. infusion followed by 100 units/kg bodyweight every 4 hours according to the clotting time.

Overdosage

Symptoms

The main complication associated with heparin overdose is over-anticoagulation and hemorrhage. Examples of types of bleeding observed in patients receiving heparin sodium following subcutaneous administration include melanemia, haematoma, hematuria, ecchymoses, epistaxis, haematemesis, intracranial hemorrhages, pulmonary hemorrhage and other hemorrhage.

Treatment

Slight haemorrhage due to overdosage can usually be treated by withdrawing the drug. Severe bleeding may be reduced by the administration of protamine sulphate. Protamine sulphate should be administered intravenously. To avoid circulatory side effects, the injection should be given slowly at a rate of 5mL over a period of about 10 minutes. Not more than 50mg should be given at any one time. The dose of protamine sulphate required is governed by the amount of heparin that has to be neutralised; approximately 1mg of protamine sulphate neutralises 110 units of heparin (mucous) that has been injected in the previous 15 minutes. Since heparin is being continuously excreted, the dose should be reduced as more time elapses after the heparin injection. Ideally, the dose of protamine sulphate required should be accurately determined by titration methods as the antagonist itself, in gross excess, acts as an anticoagulant.

For further detailed information, advice may be sought from the Poisons Information Centre. In New Zealand call 0800 764 766.

Special Precautions for Storage

Store below 25°C.

Medicine Classification

Prescription Medicine

Package quantities

Ampoules (bacteriostat free):

DBL™ Heparin Sodium Injection BP	
Strength	Pack
1,000 I.U./1mL	5's and 50's
5,000 I.U./0.2mL	5's and 50's
5,000 I.U./1mL	5's and 50's
5,000 I.U./5mL	5's and 50's
25,000 I.U./5mL	50's

Vials (with 1.0% v/v benzyl alcohol as bacteriostat)

DBL™ Heparin Sodium Injection BP	
Strength	Pack
35,000 I.U./35mL	1's

Name and Address

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