Blood products and plasma substitutes

Plasma substitutes

Dextran 70 and **polygeline** are macromolecular substances which are metabolized slowly; they may be used to expand and maintain blood volume in shock arising from conditions such as burns or septicaemia. They are rarely needed when shock is due to sodium and water depletion as, in these circumstances, the shock responds to water and electrolyte repletion.

Plasma substitutes should not be used to maintain plasma volume in conditions such as burns or peritonitis where there is loss of plasma protein, water and electrolytes over periods of several days. In these situations, plasma or plasma protein fractions containing large amounts of albumin should be given.

Plasma substitutes may be used as an immediate short-term measure to treat massive haemorrhage until blood is available, but large volumes of some plasma substitutes can increase the risk of bleeding by depleting coagulation factors. Dextran may interfere with blood group cross-matching or biochemical measurements and these should be carried out before the infusion is started.

Dextran 70

Dextran is a representative plasma substitute. Various preparations can serve as alternatives

Infusion (Solution for infusion), dextran 70 6% in glucose intravenous infusion 5% or sodium chloride intravenous infusion 0.9%

Uses:

short-term blood volume expansion

Contraindications:

severe congestive heart failure, renal failure; bleeding disorders such as thrombocytopenia and hypofibrinogenaemia

Precautions:

cardiac disease or renal impairment; monitor urine output; avoid haematocrit falling below 25–30%; where possible, monitor central venous pressure; can interfere with blood group cross-matching and biochemical tests—take samples before start of infusion; monitor for hypersensitivity reactions; pregnancy (Appendix 2)

Dosage:

Short-term blood volume expansion, *by rapid intravenous infusion* , **adult** 500–1000 ml initially, followed by 500 ml if necessary; total dosage should not exceed 20 ml/kg during the initial 24 hours; if required 10 ml/kg daily may be given for a further 2

days (treatment should not continue for longer than 3 days); **child** total dosage should not exceed 20 ml/kg

Adverse effects:

hypersensitivity reactions including fever, nasal congestion, joint pains, urticaria, hypotension, bronchospasm—rarely severe anaphylactoid reactions; transient increase in bleeding time

Polygeline

Polygeline is a representative partially degraded gelatin. Various preparations can serve as alternatives

Infusion (Solution for infusion), polygeline 3.5% with electrolytes, 500-ml bottle

Uses:

correction of low blood volume

Contraindications:

severe congestive heart failure; renal failure

Precautions:

blood samples for cross-matching should be taken before infusion; haemorrhagic diasthesis; congestive heart failure, renal impairment, hypertension, oesophageal varices; **interactions:** Appendix 1

Dosage:

Correction of low blood volume, *by intravenous infusion* , initially 500–1000 ml of a 3.5% solution

Adverse effects:

hypersensitivity reactions including urticaria—rarely severe anaphylactoid reactions; transient increase in bleeding time

Plasma fractions for specific use

Factor VIII is essential for blood clotting and the maintenance of effective haemostasis; von Willebrand factor is a mediator in platelet aggregation and also acts as a carrier for factor VIII. Blood coagulation factors VII, IX, and X are essential for the conversion of factor II (prothrombin) to thrombin. Deficiency in any of these factors results in haemophilia. Bleeding episodes in haemophilia require prompt treatment with replacement therapy. **Factor VIII** , used for the treatment of haemophilia A, is a sterile freeze-dried powder containing the blood coagulation

factor VIII fraction prepared from pooled human venous plasma. Standard factor VIII preparations also contain von Willebrand factor and may be used to treat von Willebrand disease. Highly purified preparations, including recombinant factor VIII, are available; they are indicated for the treatment of haemophilia A but do not contain sufficient von Willebrand factor for use in the management of von Willebrand disease.

Factor IX Complex is a sterile freeze-dried concentrate of blood coagulation factors II, VII, IX and X derived from fresh venous plasma. Factor IX complex which is used for the treatment of haemophilia B may also be used for the treatment of bleeding due to deficencies of factor II, VII, and X. High purity preparations of factor IX which do not contain clinically effective amounts of factor II, VII, and X are available. A recombinant factor IX preparation is also available.

Factor VIII concentrate

Plasma fractions should comply with the WHO Requirements for the Collection, Processing and Quality Control of Blood, Blood Components and Plasma Derivatives (Revised 1992). WHO Technical Report Series, No. 840, 1994, Annex 2

Factor VIII concentrate is a complementary preparation and a representative coagulation factor preparation. Various preparations can serve as alternatives

Infusion (Powder for solution for infusion), factor VIII 250–1500 units

Uses:

control of haemorrhage in haemophilia A

Precautions:

intravascular haemolysis after large or frequently repeated doses in patients with blood groups A, B, or AB (less likely with high potency, highly purified concentrates)

Dosage:

Haemophilia A, *by slow intravenous infusion* , **ADULT** and **CHILD** according to patient's needs

Adverse effects:

allergic reactions including chills, fever

Factor IX complex (coagulation factors II, VII, IX, X) concentrate

Plasma fractions should comply with the WHO Requirements for the Collection, Processing and Quality Control of Blood, Blood Components and Plasma Derivatives (Revised 1992). WHO Technical Report Series, No. 840, 1994, Annex 2

Factor IX complex concentrate is a complementary preparation and a representative coagulation factor preparation. Various preparations can serve as alternatives

Infusion (Powder for solution for infusion), factor II, VII, IX, and X 500–1500 units

Uses:

replacement therapy for factor IX deficiency in haemophilia; bleeding due to deficiencies of factors II, VII or X

Contraindications:

disseminated intravascular coagulation

Precautions:

risk of thrombosis (probably less risk with highly purified preparations)

Dosage:

Haemophilia B, *by slow intravenous infusion* , **ADULT** and **CHILD** according to patient's needs and specific preparation used

Treatment of bleeding due to deficiencies in factor II, VII or X as well as IX, *by slow intravenous infusion* , **ADULT** and **CHILD** according to patient's needs

Adverse effects:

allergic reactions including chills, fever