Hereditary angioedema. For a mention of fresh frozen plasma being used in hereditary angioedema, see p.1081.

Neonatal intraventricular haemorrhage. Plasma volume expansion in preterm neonates has been thought to help prevent neonatal intraventricular haemorrhage (p.1050). However, a study using plasma or gelatin as plasma volume expanders,[1,2] found no evidence of a decreased risk of such haemorrhage or subsequent death or disability.

1. The Northern Neonatal Nursing Initiative Trial Group. A randomized trial comparing the effect of prophylactic intravenous fresh frozen plasma, gelatin or glucose on early mortality and morbidity in preterm babies. *Eur J Pediatr* 1996; **155:** 580–8.
2. Northern Neonatal Nursing Initiative Trial Group. Randomised trial of prophylactic early fresh-frozen plasma or gelatin or glucose in preterm babies: outcome at 2 years. *Lancet* 1996; **348:** 229–32.

Plasma exchange. Therapeutic plasma exchange or plasmapheresis are procedures in which plasma is selectively removed from the body while the cellular constituents of blood are retained. Although the two terms are commonly used synonymously, plasmapheresis generally involves the removal of small volumes of plasma, whereas plasma exchange removes larger volumes which must be replaced with a suitable fluid.

They have been tried in a number of disorders, including many with an immunological basis, when conventional treatment has not been successful. The aim is removal or reduction of those constituents of plasma causing or aggravating a disease or replacement of deficient plasma factors if the deficiency is the cause of the disorder.

Volume and frequency of plasma exchange is determined by the pathophysiology of the undesirable plasma constituent. For example, removal of antibody usually requires exchange of 1.5 times the estimated plasma volume (3 to 4 litres) repeated daily or on alternate days until the desired reduction is obtained. The replacement fluid used depends on the volume and the condition being treated; albumin solutions, plasma expanders, or sodium chloride 0.9% are frequently used, whereas in conditions where there is deficiency of a plasma factor replacement of blood components such as immunoglobulins may be required. Fresh frozen plasma has been used as a replacement fluid but is associated with a high incidence of adverse effects and is generally reserved for the management of thrombotic thrombocytopenic purpura.

Technological developments, such as the use of specific adsorbents and the use of multiple filters with different pore sizes, may enable removal of only the desired constituent and avoid removal and subsequent replacement of total plasma.

References.

1. Urbaniak SJ, Robinson EA. Therapeutic apheresis. In: Contreras M, ed. *ABC of transfusion*. 3rd ed. London: BMJ Books, 1998: 67–70.
2. Michaud D, *et al.* Therapeutic plasma exchange. *Dynamics* 2001; **12:** 18–24.
3. Madore F. Plasmapheresis: technical aspects and indications. *Crit Care Clin* 2002; **18:** 375–92.
4. McLeod BC. Therapeutic apheresis: use of human serum albumin, fresh frozen plasma and cryosupernatant plasma in therapeutic plasma exchange. *Best Pract Res Clin Haematol* 2006; **19:** 157–67.

Thrombotic microangiopathies. Thrombotic thrombocytopenic purpura and haemolytic-uraemic syndrome are both syndromes characterised by intravascular platelet clumping.[1-6] Thrombocytopenia also occurs and fragmentation of erythrocytes, partly caused by the red cells passing through areas of the microvasculature occluded by the platelet aggregation, leads to microvascular haemolytic anaemia. In **thrombotic thrombocytopenic purpura** (TTP) the platelet aggregation is extensive and obstructs the vessels of various organs producing ischaemia or even infarction. The CNS, notably the brain, is often the area predominantly affected although some degree of renal involvement may occur. It is an uncommon disorder; adult women, in whom the condition presents as a chronic relapsing illness, are slightly more frequently affected. It may be associated with abnormalities of von Willebrand factor due to deficiency or impaired activity of a protease, ADAMTS-13.[5,6]

In **haemolytic-uraemic syndrome** (HUS) the platelet aggregation is relatively less widespread and less severe and mainly affects the renal microvasculature although extra-renal manifestations may also occur. The primary consequences are hypertension and acute renal insufficiency or ultimately, if untreated, renal failure. Most cases of HUS occur in early childhood and follow a diarrhoeal illness caused by *Shigella dysenteriae* or *Escherichia coli*. However, the condition is becoming increasingly recognised in adults, particularly the elderly. Some cases may be drug induced. With appropriate symptomatic therapy HUS is typically a self-limiting disease with spontaneous recovery although fatalities have been known.

The supportive **management** of both syndromes follows similar lines.[1,3,4] In HUS, or TTP with renal symptoms, special attention needs to be directed towards the prevention of renal failure. Hypovolaemia should be corrected, with careful control of fluid and electrolyte balance and hypertension. Haemodialysis will be needed if renal failure develops. Severe anaemia requires blood transfusion, but platelet transfusion should be avoided.

Plasma exchange (see above) is considered to be the mainstay of therapy for TTP.[1-6] The optimal regimen has not been determined, but it is usually performed daily. There is also some debate about the preferred fluid replacement; plasma exchange using cryosupernatant (the plasma remaining after cryoprecipitate is prepared, and which is depleted of von Willebrand factor) may be more efficacious than fresh frozen plasma.[3] When plasma exchange is not available, infusion of fresh frozen plasma may be used.[1,3] In HUS, there is some debate over the use of plasma exchange or infusion. Some consider that these have no proven benefit in HUS[2,3] but others[1] have challenged this belief.

Antiplatelet therapy and corticosteroids are often given, although neither has been adequately investigated and antiplatelets such as ticlopidine and clopidogrel have been reported to cause TTP (see p.1411). Aspirin and dipyridamole have been used, but are not recommended when profound thrombocytopenia is present because of the potential bleeding risk, without proven benefit. However, low-dose aspirin may be used when platelet counts have recovered after plasma exchange in TTP.[1,3] Some reports have described improved outcome in both syndromes with corticosteroids.[7] They are often used with plasma exchange in TTP.[1,3,4] However, a randomised, double-blind trial[8] in children with HUS failed to show any difference between oral corticosteroids and placebo in terms of haematological or neurological recovery, although renal function appeared to improve more rapidly in those receiving corticosteroids.

Other drugs may also be tried, particularly in refractory TTP. Some treatments that have been reported to be beneficial in case reports or small series include normal immunoglobulin,[1,4] azathioprine,[1] ciclosporin,[1,3] cyclophosphamide,[3] and vincristine.[1-4] The monoclonal antibody, rituximab, is under investigation.[2] The use of a protein-A immuno-adsorption column may be considered in the management of TTP associated with malignancy or bone marrow transplantation.[3] Epoprostenol may be tried in order to inhibit platelet-endothelial interactions but again has not been subject to controlled studies; anecdotal evidence presents both favourable and negative results.[9] Alteplase has been used successfully in one patient with HUS.[10] Splenectomy may also be considered.[1,3,4]

1. Elliott MA, Nichols WL. Thrombotic thrombocytopenic purpura and hemolytic uremic syndrome. *Mayo Clin Proc* 2001; **76:** 1154–62.
2. Moake JL. Thrombotic microangiopathies. *N Engl J Med* 2002; **347:** 589–600.
3. British Society for Haematology. Guidelines on the diagnosis and management of the thrombotic microangiopathic haemolytic anaemias. *Br J Haematol* 2003; **120:** 556–73. Also available at: http://www.bcshguidelines.com/pdf/BJH556.pdf (accessed 27/10/05)
4. Nabhan C, Kwaan HC. Current concepts in the diagnosis and management of thrombotic thrombocytopenic purpura. *Hematol Oncol Clin North Am* 2003; **17:** 177–99.
5. Mayer SA, Aledort LM. Thrombotic microangiopathy: differential diagnosis, pathophysiology and therapeutic strategies. *Mt Sinai J Med* 2005; **72:** 166–75.
6. George JN. Thrombotic thrombocytopenic purpura. *N Engl J Med* 2006; **354:** 1927–35.
7. Bell WR, *et al.* Improved survival in thrombotic thrombocytopenic purpura-hemolytic uremic syndrome: clinical experience in 108 patients. *N Engl J Med* 1991; **325:** 398–403.
8. Perez N, *et al.* Steroids in the hemolytic uremic syndrome. *Pediatr Nephrol* 1998; **12:** 101–4.
9. Bobbio-Pallavicini E, *et al.* Intravenous prostacyclin (as epoprostenol) infusion in thrombotic thrombocytopenic purpura: four case reports and review of the literature. *Haematologica* 1994; **79:** 429–37.
10. Kruez W, *et al.* Successful treatment of haemolytic-uraemic syndrome with recombinant tissue-type plasminogen activator. *Lancet* 1993; **341:** 1665–6.

Preparations

Proprietary Preparations (details are given in Part 3)
Austria: Octaplas; ***Cz.:*** Octaplas; ***Fin.:*** Octaplas; ***Ger.:*** Octaplas; ***Ital.:*** Octaplas; Plasmasafe; ***Mex.:*** Octaplas; ***Neth.:*** Octaplas; ***Norw.:*** Octaplas; ***NZ:*** Octaplas; ***Port.:*** Novoplas; Octaplas; ***Swed.:*** Octaplas; ***Switz.:*** Octaplas; ***UK:*** Octaplas.

Multi-ingredient: ***Port.:*** Quixil.

Plasma Protein Fraction ⊗

Fracción proteica del plasma.

Pharmacopoeias. Many pharmacopoeias have monographs, including *US*.

USP 31 (Plasma Protein Fraction). A sterile preparation of serum albumin and globulin obtained by fractionating material (blood, plasma, or serum) from healthy human donors, the source material being tested for the absence of hepatitis B surface antigen. It contains 5% of protein; not less than 83% of the total protein is albumin; not more than 17% is alpha and beta globulins; not more than 1% has the electrophoretic properties of gamma globulin. It contains sodium acetyltryptophanate with or without sodium caprylate as a stabilising agent but no antimicrobial preservative. It contains 130 to 160 mmol/litre of sodium, and not more than 2 mmol/litre of potassium. A solution in 0.15M sodium chloride containing 1% protein has a pH between 6.7 and 7.3. It should be used within 4 hours of opening the container.

Profile

Plasma protein fraction consists mainly of albumin with a small proportion of globulins; it does not contain blood-clotting factors. It has properties and uses similar to those of other albumin solutions (p.1052). It is given intravenously as a solution containing 5% of total protein. The amount of plasma protein fraction given will depend upon the clinical condition of the patient. For hypovolaemic shock an initial infusion of up to 500 mL for adults has been suggested at a rate not normally exceeding 10 mL/minute. A suggested dose in infants and small children for shock with dehydration is up to 33 mL/kg given at a rate of up to 5 to 10 mL/minute. In hypoproteinaemia, 1 to 1.5 litres of a 5% solution will provide 50 to 75 g of protein. Patients with normal blood volume may require slow infusion to prevent excessive volume expansion.

As with other albumin solutions, plasma protein fraction should not be used for parenteral nutrition.

Preparations

USP 31: Plasma Protein Fraction.

Proprietary Preparations (details are given in Part 3)
Austria: Biseko; ***Cz.:*** Biseko†; ***Ger.:*** Biseko; ***Gr.:*** Alburex; ***Hung.:*** Biseko; ***Indon.:*** Plasmanate; ***Israel:*** Plasmanate; ***Ital.:*** Haimaserum†; PPS; Uman-Serum; ***Malaysia:*** Plasmanate†; ***Philipp.:*** Plasmanate; ***S.Afr.:*** Bioplasma FDP; ***Thai.:*** Biseko; ***USA:*** Plasma-Plex; Plasmanate; Protenate.

Multi-ingredient: ***Fin.:*** Tisseel Duo Quick; ***Ger.:*** Tissucol Duo S; Tissucol-Kit; ***Hung.:*** Tissucol-Kit; ***Ital.:*** Tissucol; ***Swed.:*** Tisseel Duo Quick; ***Switz.:*** Tissucol Duo S.

Platelets

Plaquetas.

Pharmacopoeias. Many pharmacopoeias have monographs, including *US*.

USP 31 (Platelets). The portion of blood that contains platelet cells derived from human whole blood from which red blood cells and a portion of the plasma are removed by centrifugation, sedimentation, or apheresis. Platelets derived from whole blood may be pooled from multiple donors to form one dose of platelets. The source blood for platelets must be tested for syphilis, hepatitis B, human T-cell lymphotropic virus (HTLV) Type I and Type II, hepatitis C, and HIV Type 1 and Type 2.

Platelets derived from whole blood should have a minimum of 5.5×10^{10} platelet cells suspended in a volume of 40 to 70 mL of original plasma. Platelets produced by apheresis should have a minimum of 3.0×10^{11} platelet cells suspended in 100 to 500 mL of original plasma or in an approved additive solution.

Platelets derived from whole blood or by apheresis may be further processed by filtration for removal of leucocytes, or by irradiation to inactivate lymphocytes.

The names of the different platelet preparations are:

- Platelets—prepared from a single unit of whole human blood within 8 hours of collection
- Platelets, Pooled—individual platelet units derived from whole human blood and pooled by aseptic techniques, labelled with a unique identifying number related to the number of individual units pooled, and with an expiry date of 4 hours after pooling of the individual units
- Platelets, Pheresis—prepared by apheresis from a single donor
- Platelets, Leukocyte Reduced—prepared from whole blood, either by centrifugation or by sedimentation, and filtered to yield less than 8.3×10^5 white blood cells in the final container
- Platelets, Pheresis, Leukocyte Reduced—contains less than 5×10^6 white blood cells, prepared by apheresis, with or without a filter

Platelets may be stored in plasma or in an approved additive solution at 20° to 24° with continuous gentle agitation for no more than 5 days after date of preparation. The pH must be greater than 6.2 throughout the storage period.

USP 31 (Platelet Concentrate). It contains the platelets taken from plasma obtained, in a single procedure, by whole blood collection, plasmapheresis, or plateletpheresis from a single suitable human donor. The platelets are suspended in a specified volume (20 to 30 mL, or 30 to 50 mL) of the original plasma. The suspension contains not less than 5.5×10^{10} platelets per unit in not less than 75% of the units tested. It should be stored in hermetically-sealed sterile containers at 20° to 24° (30 to 50 mL volume), or at 1° to 6° (20 to 30 mL volume) except during transport when the temperature may be 1° to 10°. The expiration time is not more than 72 hours from the time of collection of the source material. Continuous gentle agitation must be maintained if stored at 20° to 24°. The suspension must be used within 4 hours of opening the container and should be administered with equipment that contains a filter.

Adverse Effects and Precautions

Transmission of infection has been associated with the transfusion of blood products including platelets (p.1056). Since platelets are stored at room temperature there is increased risk of bacterial infection after transfusion. Transfusion reactions including fever and urticaria are not uncommon. Recipients of multiple transfusions of platelet concentrates from random donors may develop antibodies to HLA which result in impaired responsiveness to subsequent transfusions.

Use of leucocyte-depleted platelet concentrates reduces the incidence of transfusion reactions and of HLA sensitisation. Platelet concentrates prepared from Rh(D)-positive donors should generally not be given to Rh(D)-negative women of child-bearing potential. Ideally platelet concentrates should also be ABO-compatible with the recipient.

ABO compatibility. Platelets express the ABO blood group antigens and the plasma component of platelet concentrates may contain alloantibodies from the donor (see Blood Groups, p.1057). Ideally, ABO-identical platelet concentrates should be used, but ABO-compatible concentrates are often used and incompatible concentrates may be used in an emergency. However, the use of ABO-mismatched platelets can reduce the efficacy of the platelet transfusion. Also, acute haemolytic reactions can occur after infusion of mismatched platelets if the infused plasma contains high antibody titres or the volume of plasma infused is large. Some have suggested that screening donors for high antibody titres should be routine in order to avoid this, but there is no consensus as to the definition of critical titre. There have been mixed reports on whether the use of ABO-mismatched platelets has an effect on the recipient's long-term clinical course.

Reviews.

1. Lozano M, Cid J. The clinical implications of platelet transfusions associated with ABO or Rh(D) incompatibility. *Transfus Med Rev* 2003; **17:** 57–68.

HLA antibodies. Platelets obtained from single donors have been used in patients receiving multiple transfusions of platelet concentrates to reduce the formation of antibodies to HLA. Some practitioners suggest[1] that patients who are likely to need long-term platelet support should be typed for HLA A and B antigens and screened for HLA antibodies. Leucocyte-depleted platelets and UVB-irradiated platelets have also been tried. A study[2] in 530 patients found that the incidence of platelet refractoriness was reduced from 13% of those patients receiving pooled platelet concentrates to 3% and 5% of those receiving leucocyte-depleted and UVB-irradiated platelets, respectively. A meta-analysis[3] of this and earlier small studies also concluded that leucocyte depletion reduced the risk of alloimmunisation and platelet refractoriness. Some guidelines[4] have nonetheless considered that there is no convincing evidence of clinical benefit from routine use.

1. Dan ME, Schiffer CA. Strategies for managing refractoriness to platelet transfusions. *Curr Hematol Rep* 2003; **2:** 158–64.
2. The Trial to Reduce Alloimmunization to Platelets Study Group. Leukocyte reduction and ultraviolet B irradiation of platelets to prevent alloimmunization and refractoriness to platelet transfusions. *N Engl J Med* 1997; **337:** 1861–9.
3. Vamvakas EC. Meta-analysis of randomized controlled trials of the efficacy of white cell reduction in preventing HLA-alloimmunization and refractoriness to random-donor platelet transfusions. *Transfus Med Rev* 1998; **12:** 258–70.
4. British Committee for Standards in Haematology, Blood Transfusion Task Force. Guidelines on the clinical use of leucocyte-depleted blood components. *Transfus Med* 1998; **8:** 59–71. Also available at: http://www.bcshguidelines.com/pdf/trans129.pdf (accessed 27/10/05)

Uses and Administration

Blood platelets assist in the haemostatic process (p.1045) by aggregating to form a platelet thrombus, and by releasing factors involved in initiating coagulation.

Transfusions of platelet concentrates are given to patients with thrombocytopenic haemorrhage (see p.1051). They are also given prophylactically to reduce the frequency of haemorrhage in thrombocytopenia associated with the chemotherapy of neoplastic disease (see p.640).

◊ References.

1. Fresh-frozen Plasma, Cryoprecipitate, and Platelets Administration Practice Guidelines Development Task Force of the College of American Pathologists. Practice parameter for the use of fresh-frozen plasma, cryoprecipitate, and platelets. *JAMA* 1994; **271:** 777–81.
2. Brozović B, *et al.* Platelet and granulocyte transfusions. In: Contreras M, ed. *ABC of transfusion.* 3rd ed. London: BMJ Books, 1998: 17–22.
3. Schiffer CA, *et al.* Platelet transfusion for patients with cancer: clinical practice guidelines of the American Society of Clinical Oncology. *J Clin Oncol* 2001; **19:** 1519–38. Also available at: http://www.jco.org/cgi/reprint/19/5/1519.pdf (accessed 27/10/05)
4. British Committee for Standards in Haematology, Blood Transfusion Task Force. Guidelines for the use of platelet transfusions. *Br J Haematol* 2003; **122:** 10–23. Also available at: http://www.bcshguidelines.com/pdf/platelettrans040703.pdf (accessed 27/10/05)
5. Heal JM, Blumberg N. Optimizing platelet transfusion therapy. *Blood Rev* 2004; **18:** 149–65.
6. Stroncek DF, Rebulla P. Platelet transfusions. *Lancet* 2007; **370:** 427–38.

Preparations

USP 31: Platelet Concentrate; Platelets.

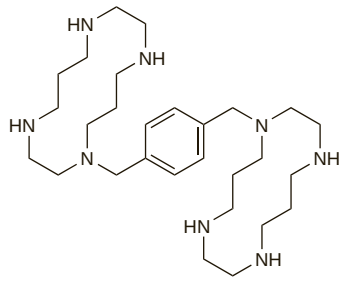
Plerixafor *(USAN, rINN)*

AMD-3100; JM-3100; Plérixafor; Plerixaforum; SDZ-SID-791; SID-791. 1,1′-(1,4-Phenylenebismethylene)bis(1,4,8,11-tetraazacyclotetradecane).

Плериксафор

$C_{28}H_{54}N_8$ = 502.8.

CAS — 110078-46-1 (plerixafor); 155148-31-5 (plerixafor hydrochloride).



Profile

Plerixafor is a CXCR4 receptor antagonist. It is under investigation for the mobilisation of haematopoietic stem cells for collection and subsequent autologous or allogeneic transplantation.

Policresulen *(rINN)*

Acidum Metacresolsulfonicum c. Formaldehydo; *m*-Cresolsulphonic acid-formaldehyde condensation product; Dicresulene polymer; Dihydroxydimethyldiphenylmethanedisulphonic acid polymer; Formaldehydhaltig Metakresolsulfonsyra; Formaldehydipitoinen Metakresolisulfonihappo; Metacresolsulfonic Acid-Formaldehyde; Metacresolsulphonic Acid-Formaldehyde; Methylenebis(hydroxytoluenesulphonic acid) polymer; Policrésulène; Policresuleno; Policresulenum; Polikresuleeni; Polikresulen; Polímero de dicresuleno; Polycresolsulfonate. α-(4-Hydroxy-2-methyl-5-sulfobenzyl)-ω-(4-hydroxy-5-sulfo-*o*-tolyl)poly[(4-hydroxy-2-methyl-5-sulfo-*m*-phenylene)methylene]; 2-Hydroxy-*p*-toluenesulfonic acid, polymer with formaldehyde.

Поликрезулен

$(C_8H_9O_4S)(C_8H_8O_4S)_n(C_7H_7O_4S)$.

CAS — 9011-02-3; 101418-00-2.

ATC — D08AE02; G01AX03.

ATC Vet — QD08AE02; QG01AX03; QG51AD02.

Profile

Policresulen is used as a topical haemostatic and antiseptic. It is also used similarly in veterinary medicine.

Preparations

Proprietary Preparations (details are given in Part 3)
Arg.: Albocresil; ***Braz.:*** Albocresil; ***Chile:*** Albocresil†; ***Cz.:*** Vagothyl; ***Fr.:*** Negatol†; ***Ger.:*** Albothyl; ***Hong Kong:*** Albothyl; ***Hung.:*** Vagothyl; ***Indon.:*** Albothyl; ***Ital.:*** Emaftol; Negatol; ***Malaysia:*** Albothyl; ***Mex.:*** Albothyl; ***Philipp.:*** Albothyl; ***Pol.:*** Albothyl; Vagothyl; ***Port.:*** Nelex; ***Rus.:*** Vagothyl (Ваготил); ***S.Afr.:*** Nelex†; ***Singapore:*** Albothyl; ***Switz.:*** Negatol; Negatol Dental.

Multi-ingredient: ***Arg.:*** Proctyl; ***Braz.:*** Proctyl; ***Cz.:*** Faktu; ***Fin.:*** Faktu†; ***Ger.:*** Faktu; ***Hong Kong:*** Faktu; ***Indon.:*** Faktu; ***Mex.:*** Proctoacid; ***Philipp.:*** Faktu; ***Port.:*** Faktu; ***Singapore:*** Faktu†; ***Switz.:*** Faktu.

Polygeline *(BAN, pINN)* ⊗

Poligelina; Polygéline; Polygelinum.

Полигелин

CAS — 9015-56-9.

ATC — B05AA10.

Description. Polygeline is a polymer prepared by cross-linking polypeptides derived from denatured gelatin with a di-isocyanate to form urea bridges.

Incompatibility. Intravenous preparations of polygeline contain calcium ions and are incompatible with citrated blood.

Adverse Effects

As for Gelatin, p.1072.

Hypersensitivity. Fatal reactions after polygeline infusion have been reported in 2 patients with bronchial asthma.[1,2] Both patients were undergoing epidural analgesia with bupivacaine and polygeline was given to correct hypotension that had not responded to infusion of crystalloids. One patient developed focal seizures.[2] Both patients developed refractory bronchospasm and cardiac arrhythmias and died despite intensive resuscitation attempts.

Licensed drug information recommends that prophylaxis with histamine H_1- and H_2-antagonists should be given to patients with known allergic conditions such as asthma. Similar advice has been offered[3] for patients undergoing anaesthesia and receiving polygeline following findings of an increased incidence of severe histamine-related reactions in such patients. Nevertheless, severe respiratory distress developed in an asthmatic patient given polygeline under spinal anaesthesia despite premedication with bronchodilators and antihistamines.[4]

There is a possibility of cross reactivity between polygeline and succinylated gelatin (see Gelatin, p.1072).

1. Freeman MK. Fatal reaction to haemaccel. *Anaesthesia* 1979; **34:** 341–3.
2. Barratt S, Purcell GJ. Refractory bronchospasm following "Haemaccel" infusion and bupivacaine epidural anaesthesia. *Anaesth Intensive Care* 1988; **16:** 208–11.
3. Lorenz W, *et al.* Incidence and clinical importance of perioperative histamine release: randomised study of volume loading and antihistamines after induction of anaesthesia. *Lancet* 1994; **343:** 933–40.
4. Kathirvel S, *et al.* Severe life threatening reaction to Haemaccel in a patient with bronchial asthma. *Eur J Anaesthesiol* 2001; **18:** 122–3.

Precautions

Precautions that should be observed with plasma expanders are described under Dextran 70, p.1060, and should be considered when polygeline is used for this purpose.

Polygeline preparations contain calcium ions and therefore should be used with caution in patients being treated with cardiac glycosides.

Pharmacokinetics

Like gelatin, polygeline is excreted mainly in the urine. The half-life is about 5 to 8 hours.

Renal impairment. In a study[1] in 52 patients with normal or impaired renal function given 500 mL of polygeline 3.5% about 50% of the dose was excreted in the urine within 48 hours in those with normal renal function. Excretion of polygeline in those with renal impairment, based on the patient's glomerular filtration rate (GFR), was found to be:

- GFR 31 to 90 mL/minute: unimpaired
- GFR 11 to 30 mL/minute: slightly reduced
- GFR 2 to 10 mL/minute: reduced to 27% in 48 hours
- GFR 0.5 to 2 mL/minute: reduced to 9.3% in 48 hours

The mean half-life of the elimination phase was 505 minutes in those with adequate renal function, increasing to 985 minutes in those with end-stage renal failure. Polygeline 500 mL of 3.5% solution could be given twice weekly for 1 to 2 months even in patients with total anuria.

1. Köhler H, *et al.* Elimination of hexamethylene diisocyanate cross-linked polypeptides in patients with normal or impaired renal function. *Eur J Clin Pharmacol* 1978; **14:** 405–12.

Uses and Administration

Polygeline is a plasma volume expander used as a 3.5% solution with electrolytes in the management of hypovolaemic shock (p.1183). The rate of infusion depends on the condition of the patient and does not normally exceed 500 mL in 60 minutes although it may be greater in emergencies. Initial doses for hypovolaemic shock usually consist of 500 to 1000 mL; up to 1500 mL of blood loss can be replaced by polygeline alone. Patients losing greater volumes of blood will require blood transfusion as well as plasma expanders.

Polygeline is also used in extracorporeal perfusion fluids, as a perfusion fluid for isolated organs, as fluid replacement in plasma exchange, and as a carrier solution for insulin. For plasma exchange, up to 2 litres of polygeline may be given as sole replacement fluid.

Preparations

Proprietary Preparations (details are given in Part 3)
Arg.: Haemaccel†; ***Austral.:*** Haemaccel; ***Austria:*** Haemaccel; ***Belg.:*** Haemaccel†; ***Braz.:*** Haemaccel; ***Chile:*** Haemaccel†; ***Cz.:*** Haemaccel†; ***Ger.:*** Haemaccel; ***Gr.:*** Haemaccel†; ***Hong Kong:*** Haemaccel†; ***India:*** Haemaccel; ***Indon.:*** Haemaccel; ***Irl.:*** Haemaccel†; ***Israel:*** Haemaccel†; ***Ital.:*** Emagel; Gelplex; ***Malaysia:*** Haemaccel†; ***Mex.:*** Haemaccel; Phygelin; ***Neth.:*** Haemaccel; ***Norw.:*** Haemaccel†; ***NZ:*** Haemaccel; ***Port.:*** Haemaccel; ***S.Afr.:*** Haemaccel; ***Singapore:*** Haemaccel; ***Switz.:*** Haemaccel†; ***Thai.:*** Haemaccel; Plasmax; ***UK:*** Haemaccel.

Protein C

Autoprothrombin IIA; Factor XIV; Proteína C.

ATC — B01AD12.

ATC Vet — QB01AD12.