Chapter 15

ANEMIAS AND OTHER BLOOD DISORDERS

15.1.1 IRON DEFICIENCY ANEMIA

Iron deficiency is the most common nutritional disorder in Bangladesh. Two main reasons are low dietary intake, and low biological availability of dietary iron. These are often accentuated by the prevalence of intestinal worms, especially hookworm. The most vulnerable groups are pregnant and lactating women, young children, and adolescent girls.

The widespread prevalence of iron deficiency anemia makes it almost mandatory to provide iron prophylaxis for pregnant and lactating women. In fact, iron requirements of pregnant women cannot be met through dietary intake. It may also be worthwhile to provide iron prophylaxis for adolescent girls to prepare them to meet the iron demand of future pregnancies.

Treatment of choice for iron deficiency is oral preparation. In severe cases of iron deficiency anemia or in those cases that are inaccessible or non-compliance parenteral preparation of iron can be given through intramuscular route or IV preparations in a single dose repletion.

In addition to administration of iron, it is important to increase the dietary intake of haem sources of iron (iron from animal foods) which are better absorbed than non haem sources (iron from vegetable sources). Increased consumption of iron rich animal food would also assist absorption of dietary iron.

In the presence of demonstrable Iron Deficiency State, treatment is only justifiable. It is important to exclude only serious underlying causes of anemia, e.g. gastric erosion, colon carcinoma, before starting treatment.

Prophylactic treatment is justifiable in pregnancy only for women who have additional risk factors for iron deficiency e.g. poor diet, menorrhagia, after subtotal or total gastrectomy, and in the management of low birth weight infants such as premature babies, twins and in infants delivered by caesarian section.

15.1.1.1 ORAL IRON

Until there are good reasons for using another route, iron salts should be given by mouth.

Ferric salts are much less well absorbed than ferrous salts. Choice of preparation is usually decided by incidence of side effects and cost, Haemoglobin regeneration rate is little affected by the type of salts used provided sufficient iron is given and in most patients the time factor is not critical.

For iron deficiency the oral dose of elemental iron should be 100mg to 200mg daily. Usually it is given as dried Ferrous sulfate 200mg then 3 times daily (200mg dried Ferrous Sulfate = 65mg elemental iron). A dose of 200mg of ferrous sulfate once or twice daily is used in prophylaxis and for mild iron deficiency anemia. If side effects develop, dose is reduced or alternate iron salt may be used. Side effect of ferrous sulfate is not greater than with another iron salt when compared on the basis of equivalent amount of elemental iron.

Table: Iron content of different iron salts:

Iron salt	Amount (mg)	Content of Ferrous Iron (mg)
Ferrous fumarate	200mg	65mg
Ferrous gluconate	300mg	35mg.
Ferrous succinate	100mg	35mg
Ferrous sulfate	300mg	60mg
Ferrous sulfate, dried	200mg	65mg

Therapeutic Response

The haemoglobin concentration should rise by about 100mg to 200 mg per 100ml over 3 to 4 weeks (or 1-2 g per liter). Treatment will be continued after the haemoglobin concentration has risen to normal for a further 3 months in order to maintain the iron stores.

Compound Preparations: There is no theoretical or clinical justification for the inclusion of other therapeutically active ingredients such as the B group of Vitamins (Except folic acid- for pregnant women). Some oral preparations are available in the form of chelate and some contain ascorbic acid, which can be shown experimentally to produce increase absorption of iron. However the therapeutic advantage is minimum and cost may be increased.

MODIFIED RELEASE CAPSULE AND TABLETS

It is claimed that each dose unit contains enough iron for 24 hours, thus permitting once daily dose.

These preparations are likely to carry the iron in the first part of the duodenum into an area of the gut where conditions of iron absorption are poor. So, small amount of iron is available in these circumstances and the incidence of side effects is also low. These preparations have no therapeutic advantage.

FERROUS FUMARATE[ED]

Indications*:* iron-deficiency anemia (prophylaxis and treatment)

Cautions: history of peptic ulcer

Interactions: *see Appendix. 2*

Side-effects*:* large doses may produce gastrointestinal irritation, vomiting, diarrhoea; continued administration may result in constipation

Dose: ADULT Therapeutic-Ferrous iron, 120-180mg in single or divided doses; Prophylaxis-60 mg iron daily

CHILD*:* Therapeutic- upto 1 year 36 mg;1-5yrs,72 mg; 6-12yrs,120 mg iron daily in divided doses.
Indications of (iron preparations with) folic acid-see under folic acid under vitamins

Proprietary preparations
Irofol *(General),* Susp., 2 gm/100 ml, Tk. 32.18/200 ml
Ferrous fumarate +Folic acid
Fer *(Organic),* Cap. , Tk. 2.50/Cap.

FERROUS GLUCONATE[ED]

Indication: iron deficiency anemia

Cautions, Interactions, Side-effects: *see under Ferrous Sulfate*

Dose: two tablets (300mg Ferrous Gluconate/tab. = 35mg iron) daily before food for prophylactic purpose.

4-6 tablets daily in divided doses before food in adults for therapeutic purpose.

CHILD : 6-12 years, 1-3 tablets daily for prophylactic & therapeutic purpose

Proprietary preparation
Feridex *(ACI),* Syrup 300mg/5ml Tk.32/200ml

FERROUS SULPHATE[ED]

Indications: iron deficiency anemia

Cautions: pregnancy, history of peptic ulcer

Interactions: *see Appendix- 2*

Side-effects*:* nausea, vomiting, abdominal discomfort or pain, diarrhoea and constipation

Dose*:* 100 to 200mg elemental iron/day in kg/day as a liquid preparation in infants and children

DURATION OF THERAPY: To restore normal level 4 - 5 weeks is required

For replenishment of iron stores further 3-6 months therapy with smaller doses is required.

Proprietary preparations
Aristoferon *(Beximco),* Syrup, 200 mg/5 ml, Tk. 26.75/200 ml
Bioron *(Biopharma),* Syrup, 200 mg/5 ml, Tk.26.10/200 ml
Dicalat *(Albion),* Syrup, 200 mg/5 ml, Tk.24.50/200 ml; Tk. 15.00/100 ml
Feroplus *(Pacific),* Syrup, 200 mg/5 ml, Tk.19.55/200 ml
Ferreton-S *(Supreme),* Syrup, 200 mg/5 ml, Tk. 26.00/200 ml
Ferroglobin *(Acme),* Syrup, 200 mg/5 ml, Tk.40.13/200 ml
G-Iron *(Gonoshasthaya),* Syrup, 200 mg/5 ml, Tk. 25.10/200 ml
Ironic *(Bios Pharma),* Syrup, 200 mg/5 ml, Tk. 25.00/200 ml
Irotrex *(Amico Lab),* Syrup, 200 mg/5 ml, Tk.25.90/200 ml
Makferon *(Maks),* Syrup, 200 mg/5 ml, Tk.25.00/200 ml
Sinaferon *(Ibn Sina),* Syrup, 200 mg/5 ml, Tk.26.75/200 ml

IRON (III) HYDROXIDE POLYMALTOSE COMPLEX

Indications*:* iron deficiency anemia (prophylaxis and treatment)

Contraindications: Haemochromatosis, thalassemia or haemosiderosis; hypersensitivity to iron

Side-effects*:* Nausea, vomiting, abdominal discomfort or pain, diarrhoea and constipation

Dose: ADULT 10ml daily.
CHILD*:* 6-12 years 10ml daily; 2-6years 5 ml daily. Premature infants and infants 1.11 mg elemental iron/kg body weight

Proprietary preparations
Iron Polymaltose Complex
Compiron *(Incepta),* Syrup, 200 mg/5 ml, Tk. 20.00/50 ml; Tk. 50.00/200 ml; Paed. dropTk. 30.00/30 ml
Hemofix *(Beximco),* Tab., Tk. 4.00/Tab.
Ipec *(Aristo),* Syrup, 200 mg/5 ml, Tk. 40.00/100 ml
Iromia *(Opsonin),* syrup, Tk. 37.59/200 ml
Polimine *(Asiatic),* Syrup, 200 mg/5 ml, Tk. 20/50ml
Polyron *(ACI),* Syrup, Tk. 40.00/100 ml ; 20.00/50 ml

Iron (III) Hydroxide Polymaltose Complex, Folic Acid, Thiamine Hydrochloride, Riboflavin, Pyridoxine Hydrochloride, Nicotinamide, Zinc Sulphate Monohydrate
Alneed Gold *(Incepta),* Cap. , Tk. 6.00/Cap.
Bicozin-I *(Square),* Syrup, Tk. 50.20/100 ml
Biozinc-I *(Ibn Sina),* Syrup, Tk. 50.19/100 ml
Feviz *(Popular),* Syrup, Tk. 50.19/100 ml
Feziplex *(Acme),* Syrup, Tk. 50.20/100 ml
Ipec Super *(Aristo),* Cap. Tk. 6.00/Cap.
Irobest *(Nipro JMI),* Tab. , Tk. 3.00/Tab.
Irotrex Plus *(Amico),* Syrup, Tk. 50.00/100 ml
Itop-BZ *(Pharmasia),* Syrup, Tk. 50.19/100 ml
Reoplex Plus *(Rephco),* Syrup, Tk. 30/50 ml; Tk. 50/100 ml; Tk. 85/200 ml;Tk.180/450 ml Tk. 90.34/200 ml

Zepiron *(Ibn Sina),* Tab. Tk. 3.50/Tab.
Zeprion Plus *(Ibn Sina),* Cap. Tk. 5.00/Cap.
Ziliron *(Square),* Tab. Tk. 3.01/Tab.
Ziliron-B *(Square),* Cap. Tk. 4.52/Cap.

IRON AND FOLIC ACID[ED]

These preparations are used for the prevention of iron and folic acid deficiencies in pregnancy. They should be distinguished from those used for the prevention of neural tube defects in women planning a pregnancy.

COMPOUND PREPARATION

Ferrous Sulphate 150 mg + Folic Acid 500 microgram
Fecon-TR*(Alco),* Cap.,Tk. 2.40/Cap.
Fero TR *(Amico),* Cap., Tk. 2.37/Cap.
Feroplus TR *(Pacific),* Cap., Tk. 1.78/Cap.
Folin SR *(Somatec),* Cap.,Tk. 2.38/Cap.
Hemofol- TR *(Benham),* Cap.,Tk. 2.36/Tab.
Itop *(Pharmasia),* Cap.,Tk. 2.01/Cap.
Suprafol TR *(Supreme),* Cap., Tk. 2.30/Cap.

Iron+ Folic Acid + Zinc
Animet *(Asiatic),* Cap., Tk. 3.00/Cap.
Apefol-TR *(APC)*,Cap.,Tk. 2.90/Cap.
Biofez *(Jayson),* Cap., Tk. 3.01/Cap.
Cap., Tk. 2.91/Cap.
Defaz CI *(Acme),* Cap., Tk. 3.00/Cap.
Fecon-Z *(Alco),* Cap.,Tk. 2.90/Cap.
Feraz *(Amico),* Cap., Tk. 2.50/Cap.
Ferix *(Renata),* Cap., Tk. 3.00/Cap.
Ferocit-Z *(Acme),* Cap., Tk. 2.94/Cap.
Ferofol-Z *(Central),* Cap., Tk. 2.90/Cap.
Ferol TR *(Opsonin),* Cap., Tk. 2.04/Cap.
Feroplus Z *(Pacific),* SR Cap., Tk. 2.18/Cap.
Feropreg *(Amico),* Cap., Tk. 3.00/Cap.
Ferrolin TR *(Orion),* Cap., 150 mg + 500 Tk. 2.91/Cap
Fezin *(Rephco),* CR Cap., Tk. 3.00/Cap.
Folized *(General),* Cap., Tk. 3.11/Cap.
Glory *(Orion),* Cap., Tk. 3.01/Cap.
Hemo Z *(Astra),* Cap., Tk. 2.18/Cap.
Hemofix FZ *(Beximco,),* Tab. , Tk. 5.00/Tab.
Ifozin-SR*(Ibn Sina),* Cap. , Tk. 3.05/Cap.
Ipec-Plus *(Aristo),* Tab., Tk. 3.50/Tab.
Itop-Z *(Pharmasia),* Cap., Tk. 3.02/Cap.; Tk.3.51/Cap.
Makferon *(Maks),* TR Cap. , Tk. 2.90/Cap.
Maxiron *(Apex),* Cap. , Tk. 3.50/Cap.
Orofer *(Unimed),* Tab., Tk. 3.50/Tab.
Zeefol CI *(Eskayef),* Cap., Tk. 3.00/Cap.
Zif *(Square),* Cap., Tk. 3.01/Cap.
Zif-CI *(Square),* Cap.,Tk. 3.01/Cap.

COMBINATION PREPARATION SPECIALLY DESIGNED FOR PREGNANCY & LACTATION

Indications: for the treatment and prophylaxis of iron, folic acid and zinc deficiency especially during pregnancy and lactation.

Cautions: care should be taken in patients who may develop iron overload, such as, those with haemochromatosis, haemolytic anemia or red cell aplasia. Failure to respond to treatment may indicate other causes of anemia and should be further investigated. Iron and zinc chelates with tetracycline and absorption of all three agents may be impaired. The absorption of zinc may be reduced in the presence of iron. Absorption of iron may be impaired by penicillamine and by antacids. Separating administration of each product by several hours, interval can reduce such potential interactions. In patients with renal failure, a risk of zinc accumulation could exist.

Use in pregnancy: administration of iron during the first trimester requires definite evidence of iron deficiency. Prophylaxis of iron deficiency where in adequate diet calls for supplementary zinc and folic acids justified during the remainder of pregnancy.

Contraindications: patients hypersensitive to the product or those with iron overload

Side-effects: dark stools are usual during iron therapy, and nausea and other symptoms of gastrointestinal irritation, such as anorexia, vomiting, discomfort, constipation, and diarrhea is sometimes encountered. Zinc may also produce gastrointestinal upset. These sustained or timed-release capsules are designed to reduce the possibility of gastrointestinal irritation. There have been rare reports of allergic reactions

Dose: 1 capsule a day, in more severe cases, 2 capsule a day

Proprietary preparations

Activit Z *(Delta),* Syrup, Tk. 85.00/200 ml ;Tk. 45.00/100 ml ;Tk. 50.00/100 ml
Al-fol TR*(Albion),* Cap. , Tk. 2.93/Cap.
Alneed *(Incepta),* Cap. , Tk. 3.00/Cap
Alneed Plus *(Incepta),* Cap. , Tk. 3.50/Cap.
Apevit- Z *(APC),* Syrup, Tk. 45.00/100 ml
Aristofol Fe *(Beximco),* Tab. , Tk. 0.47/Tab.
Aritone-Z *(Incepta),* Syrup, Tk. 45.00/100 ml ;
Aritone Z *(Incepta),* Syrup, Tk. 90.00/200 ml; Tk. 50.00/100 ml; Tk. 30.00/100 ml
Asivit ZI *(Asiatic),* Syrup, Tk. 50.00/100 ml; Tk. 90/200 ml
Astra-Z *(Astra),* Tablet, Tk. 2.00/Tab.
Aztrum-I *(Apex),* Cap. , Tk. 8.00/Cap.
Beconex-Z *(Renata),* Syrup,Tk.50.19/50 ml;Tk.30.11/30ml
Becosules *(Renata),* Cap. , Tk. 2.50/Cap.
Becosules Gold *(Renata),* Cap. , Tk. 3.02/Cap.
Bic-F*(General),* Cap., Tk. 3.51/Cap.
Biovit Plus *(Biopharma),*Syrup,Tk. 50.19/100ml
Biozinc-B *(Ibn Sina),* Syrup, Tk. 45.17/100 ml
Carbomet *(Somatec),* Cap. , Tk. 3.01/Cap.
Efol ER *(Beximco),* Cap. , Tk. 3.34/Cap.
Fbc *(Pacific),* Cap., Tk. 2.26/Cap.
Fecon-BC *(Alco),* Cap. , Tk. 3.00/Cap.
Feofol CI *(Eskayef),* Cap, Tk. 2.50/Cap.
Feona Z *(Delta),* Cap. , Tk. 3.50/Cap.
Fer V *(Organic),* Cap. , Tk. 3.50/Cap.
Fer Z *(Organic),* Cap. , Tk. 3.00/Cap.
Fivita *(Biopharma),* Cap. , Tk. 3.51/Cap.
Folic-Z *(Opsonin)* Tab. , Tk. 1.14/Tab
Folneed *(Incepta),* Tab. , Tk. 2.00/Tab.
Folvit CI *(Eskayef),* Cap, Tk. 3.25/Cap.
Folvit TR *(Eskayef),* Cap, Tk. 3.00/Cap.
Folzin *(Pacific),* Tab., Tk. 1.43/Tab.
Heptamin *(Orion),* Cap. , Tk. 3.01/Cap.
Ifol Plus *(Albion),* Cap. , Tk. 2.40/Cap.
Ironic-P *(Bios),* Cap. , Tk. 3.00/Cap.
Itop CI *(Pharmasia),* Cap. , Tk. 3.00/Cap
Itop-BZ *(Pharmasia),* Cap. , Tk. 3.51/Cap.
ITOP-Z *(Pharmasia),* Cap. , Tk. 3.02/Cap.
Karbon-5 *(Central),* Cap. , Tk. 3.50/Cap.
Leozinc-B *(Leon),* Syrup, Tk. 45.00/100 ml
Livita *(ACI),* Syrup, Tk. 50.19/100 ml
Merivit *(Sharif),* Cap. , Tk. 3.50/Cap.
Momneed *(Acme),* Cap., Tk. 3.51/Cap.
Mylovit *(ACI),* Cap., Tk. 3.01/Cap.
Mylovit-Z *ACI),* Cap., Tk. 3.51/Cap.
Mymix *(Square)* Oral Powder, Tk. 2.01/Sachet
Opsovit Z *(Opsonin),* Tab., Tk. 1.50/Tab.; Syrup, Tk. 75.06/100 ml
Orofer *(Unimed),* Syrup, Tk. 50.00/100 ml
Ost *(Central),* Tab. , Tk. 4.00/Tab.
Polyneed *(Albion),* Cap. , Tk. 3.00/Cap.
Polyneed Plus *(Albion),* Cap. , Tk. 3.50/Cap.
Polyron Plus *(ACI),* Cap. , Tk. 2.76/Cap.
Polytamin *(Nipro JMI),* Syrup, Tk. 50/100 ml
Polyvit *(Albion),* Cap. , Tk. 2.00/Cap.
Polyvit Gold *(Albion),* Cap. , Tk. 3.02/Cap.; Syrup, Tk. 45.00/100 ml
Pregnacare *(Amico),* Cap. , Tk. 3.00/Cap.
Servin *(Square),* Cap. , Tk. 3.01/Cap.
Supra-Z *(Drug Int.,)* Syrup Tk. 50.00/100 ml
Totalex *(Amico),* Cap. , Tk. 3.00/Cap
V4Z *(Nipro JMI),* Syrup, Tk. 45.00/100 ml
Vitaron Plus *(Popular),* Tab. , Tk. 3.61/Cap.
Vitazin-I *(Aristo),* Syrup, Tk. 50.00/100 ml
Vizicon Gold *(Opsonin),* Cap., Tk. 4.51//Cap.
Vizinc *(Popular),* Syrup, Tk. 45.17/100 ml
Zeefol TR*(Eskayef),* Cap, Tk. 2.93/Cap.
Zico Plus *(Genera),* Syrup, Tk. 45.17/100 ml
Zifolet *(Square),* Tab., 20 mg + 5 mg, Tk. 1.50/Tab.
Zimplex *(Orion),* Syrup, Tk. 50.19/100 ml
Z-Plex *(Acme),* Syrup, Tk. 45.16/100 ml

15.1.1.2 PARENTERAL IRON

When oral iron therapy fails due to lack of patient co-operation or there is severe gastrointestinal side effects or continuing severe blood loss or mal absorption iron is administered parenterally. **Iron sorbitol citrate:** (only by Intramuscular route) is a colloidal solution of a complex of Iron, sorbitol and citric acid, stabilized with dextran and sorbitol contain 5% (50mg/ml.) Of iron. **Iron sucrose** (iron hydroxide sucrose complex): a complex ferric hydroxide with sucrose containing 2% (20mg/ml) of iron given in severe iron deficiency anemia.

PARENTERAL IRON PREPARATIONS

Iron can be administered parenterally as iron dextran,iron sucrose, ferric carboxymaltose,

Indications: intolerance to oral iron, gastrointestinal disease e.g. ulcerative colitis or Crohn's disease, peptic ulceration

Impaired iron absorption: gastrec-tomy, gastroenterostomy, sprue and coeliac disease

When rapid replenishment of iron stores is required (severe iron deficiency anemia in late pregnancy)

Chronic blood disease e.g. persistent menorrhagia and repeated epistaxis of hereditary haemorrhagic telangiectasia.

Side effects*:* flushing, nausea, urticaria

shivering, general aches and pains, dyspnoea and syncope

Delayed reactions: arthralgia, fever, lymphadenopathy, exacerbation of rheumatoid arthritis

Contraindications: patients with history of asthma, cardiac abnormalities e.g. angina, arrhythmia, acute renal failure, severe liver disease

IRON DEXTRAN

Iron dextran is a colloid of ferric dihydroxide with dextran supplied in 2.5ml and 20ml. ampoule. Each ml contains the equivalent of 50mg of elemental iron.

From all parenteral preparations the iron complex is taken up by macrophages of the reticuloendothelial system, from where iron is released to circulating transferrin which then takes it to the marrow.

Indications, Contraindications and Side effects: *see notes above*
IM Injection: given into the upper outer quadrant of the buttock alternating the sides on successive injection;
Administered daily to weekly until the total amount required is given. Each dose should not exceed 2ml;
The skin is moved aside at the site of injection and kept taut to prevent leakage back of the dark staining fluid

I.V. Injection

Undiluted method

The total iron dextran dose is given as a single bolus in a series of injection in a manner similar to I/M administration

A prior test dose of 5ml-iron dextran diluted with 4-5 ml of patient blood injected slowly and absorbed for 30 minutes for any reaction;

Then a therapeutic dose of up to 5ml is given as slow IV injection at a rate not exceeding 1ml /min

Total dose infusion method

The dose is diluted in a liter of isotonic saline or dextrose. The maximum concentration of iron used should not exceed 2.5g (50ml iron dextran/100ml diluent)

The infusion is initially run slowly e.g. at the rate of 15 drops/min. If there is no reaction, then the dose can be increased to 45 to 60 drops/min, until the infusion is completed.

Side-effects: Anaphylactic reactions; Delayed reactions: pyrexia, arthralgia, myalgia, regional lymphadenopathy, exacerbation of joint pain in rheumatoid arthritis

Generic preparation
Injection, 50 mg/ml

IRON SUCROSE

A complex of ferric iron and isomaltosides containing10% (100 mg/ml) of iron

Indications: iron deficiency anaemia, see notes above
Dose: *By deep intramuscular injection* into the gluteal muscle or by slow intravenous injection or by intravenous infusion, calculated according to body-weight and iron deficit, consult product literature. CHILD under 14 years, not recommended

Proprietary preparations
Defiron *(Square),* Inj., 20 mg/ml, Tk. 350/amp.
Feroven *(Orion),* Inj., 20 mg/ml, Tk. 301.14/amp.
Hemofer*(Popular),*Inj.,20mg/ml,Tk.325/amp.
Inofar *(Aristo),* Inj., 20 mg/ml, Tk. 300/amp.
Veniron *(Beximco),*Inj.,20mg/ml, Tk. 300/amp.
Xenofer *(Beacon),* Inj., 20 mg/ml, Tk.325/amp.

15.1.2. DRUGS USED IN MEGALOBLASTIC ANEMIA

The cause of most Megaloblastic anemia is either lack of B_{12} or folic acid. Before starting treatment it is essential to establish the cause of megaloblastosis as administration of folic acid may precipitate the onset of subacute combined degeneration of spinal cord. In cases of undiagnosed megaloblastic anemia, it will be better to start combined therapy with both B_{12} and folic acid.

B_{12} deficiency leading to pernicious anemia is usually due to a lack of intrinsic factor caused by autoimmune gastritis causing malabsorption of vitamin B_{12}. Megaloblastic anemia due to B_{12} deficiency may occur after total or partial gastrectomy or total ileal resection. Vitamin B_{12} should be given as a prophylaxis after these operations to prevent B_{12} deficiency. Dietary deficiency of vitamin B_{12} is very uncommon with persons consuming a mixed diet. It may, however, occur in persons consuming completely vegetarian diet.

Apart from dietary intake, all other causes of B_{12} deficiency are attributable to malabsorption. There is little place of oral administration of Vitamin B_{12} in the treatment. Vitamin B_{12} should be administered by injection.

The commonest cause of megaloblastic anemia in Bangladesh is folic acid deficiency particularly during pregnancy and occurs combined with iron deficiency. As folate is heat labile most of the folic acid present in common food is destroyed during cooking. In folate induced megaloblastic anemia due to poor nutrition and pregnancy, standard treatment, to bring about a haematological remission and repletion of body store, is to administer a daily dose of 5 mg of folate for about 4 months. Up to 15 mg may be necessary in malabsorption states.

For prophylaxis in haemolytic states or in renal dialysis, it will be sufficient to give 5 mg daily or even weekly depending on the diet and the state of haemolysis. For prophylaxis during pregnancy, the dose of folic acid should be 200-500 microgram daily.

To prevent recurrence of neural tube defect in a child with spina bifida or if there is a history of neural tube defect in a previous child, women who wish to become pregnant or who are at risk of becoming pregnant should be advised to take folic acid supplements at a dose of 5mg daily. Supplementation should be continued up to 12 weeks pregnancy. Women receiving antiepileptics therapy need individual counseling before starting folic acid therapy.

To prevent first occurrence of neural tube defect, women who are planning first pregnancy should be advised to take 400microgram of folic acid before becoming pregnant as medicinal supplement and continue for the first 12 weeks of pregnancy, women who has not started supplement should start supplement as soon as they become pregnant and continue up to 12 weeks of pregnancy.

Different Vitamin B_{12} preparations (see section 16.2.3.2)

CYANOCOBALAMIN

(see section 16.2.3)

Indications: B_{12} responsive megaloblastic anemia and pernicious anemia, prophylaxis in total gastractomy or total ileal resection, malabsorbtion syndrome, coeliac disease and tropical sprue

Contraindications*:* Leber's disease, tobacco amblyopia

Dose: ADULT 250-1000 microgram IM on alternate days for 1-2 weeks or for 10 days, then 250microgram weekly until blood picture is normal. For maintenance, 1000 microgram every month.

CHILD ***:*** initially as for adult; subsequent doses according to hematological response.

Proprietary preparations

Cynomin *(Jayson),* Inj., 250 microgram/ml, Tk. 3.51/1 ml amp.; 1 mg/ml, Tk. 3.03/1ml amp; Tk. 32.00/10 ml amp
G-Vitamin *(Gonoshasthaya),* Inj., 1 mg/ml, Tk.4.00/1 ml amp
Vitamin *(Rephco),* Inj.,1 mg/ml, Tk. 6/1ml amp.

FOLIC ACID[ED]

Folate deficiency is a common complication of diseases of the small intestine, which interfere with the absorption of folate from food and the

recirculation of folate through the enterohepatic cycle. Hemolytic anemia may be complicated by folate deficiency. Drugs that inhibit dihydrofolate reductase such as methotrexate, trimethoprim or that interfere with the absorption and storage of folate in tissues such as certain anticonvulscents, oral contraceptives are capable of lowering the concentration of folate in plasma and at times may cause a megaloblastic anemia.

Indications*:* Folate deficient megaloblastic anemia. Standard treatment to bring about a hematological remission and replenish body stores; prophylaxis in chronic haemolytic states or in renal dialysis

Interactions: *see Appendix -2*

Side-effects*:* oral folic acid is usually is not toxic even with the doses as high as 15 mg/day. Nausea, anorexia, abdominal distension and flatulence may develop

Cautions : should never be given alone in pernicious anemia and other vitamin B_{12} deficiency states; because it may precipitate sub acute combined degeneration of the spinal cord

Contraindications*:* pernicious anemia and other vitamin B_{12} deficiency states

Dose: Initially 5mg daily for 4 months. Maintenance dose, 5mg every 1-7 days depending on underlying disease. Child upto 1 year, 500 microgram/kg daily over 1year as ADULT dose.

ADULT Initially 5 mg daily for 4 months or until a hematological response has been obtained maintenance 5mg every 1-7 days.

Prophylaxis in chronic haemolytic states or in renal dialysis, 5mg daily or even weekly depending on the diet and the rate of haemolysis.

For prophylaxis in pregnancy 200-500 microgram daily.

CHILD**:** initially daily for 2 days, upto 1 year 500microgram /kg body wt., 1-5 years 5 mg, 6-12 years, 10mg; maintenance half the initial dose

Proprietary preparations
Folac *(Ambee)* , Tab., 5 mg, Tk.0.24/Tab
Folicasia *(Pharmasia),* Tab., 5 mg, Tk.0.27/Tab.
Folate *(Ad-din),* Tab., 5mg, Tk. 0.30/Tab.
Folison *(Jayson),* Tab., 5 mg, Tk. 0.34/Tab.

FOLINIC ACID

It is a synthetic tetrahydrofolic acid. Folinic acid is converted much more rapidly to the polyglutamate form (*see also section 14.1*).

Indication*:* the principal use of folinic acid is to circumvent the action of inhibitors of dihydrofolate reductase, such as methotrexate.

Cautions: Never be used for the treatment of pernicious anemia or other megaloblastic anemias secondary to a deficiency of vitamin B_{12}. It is not indicated in folic acid deficiency.

Contraindications: Pernicious anemia or other megaloblastic anemia secondary to a deficiency of vitamin B_{12}

Side-effects: it's use can result in an apparent response of the hematopoietic system, but neurological damage may occur or progress if already present.

Proprietary preparations
(see section 14.1.1)

15.1.3 DRUGS USED IN HYPOPLASTIC, HAEMOLYTIC AND RENAL ANEMIAS

Pyridoxine, antilymphocyte immuno-globulin and various corticosteroids are used in hypolastic and hemolytic anemia. Antilymphocyte globulin given by intravenous infusion produces a response in 50% of acquired cases. Higher response rates have been reported when ciclosporin is given as well. Pyridoxine is indicated in both idiopathic, acquired and hereditary sideroblastic anemias. Corticosteroids indicated in the management of a wide variety of haematological disorders. They include conditions with an immune basis such as autoimmune haemolytic

anemia, immune thrombocytopenias, neutrope-nias and major transfusion reactions.

EPOETIN BETA AND ALFA

Indications: anemia associated with erythropoietin deficiency in chronic renal failure, to increase the yield of autologous blood in normal individuals and to shorten the period of anemia in patients receiving platinum-containing chemotherapy

Cautions*:* Patient with depression or psychiatric disorder, epilepsy, severe renal or hepatic impairment; cardiac disorder, myelosuppression, poorly controlled thyroid dysfunction. Monitor closely blood pressure, haemoglobin and electrolytes. Interrupt treatment if blood pressure uncontrolled. Sudden stabbing migraine like pain is warning of hypertensive crisis. Exclude other causes of anemia e.g. folic acid or vitamin B_{12} deficiency. Monitor platelet count for 1st 8 weeks, convulsions, malignant disease, liver failure, pregnancy and breast-feeding

Contraindication*:* uncontrolled hypertension

Interactions: *see Appendix -2*

Side-effects*:* hypertensive crisis, generalized tonic clonic seizures, dose dependent increase in platelet count, convulsions, skin reactions, anaphylaxis.

Dose: *see under preparations*

Note: Although epoiten alfa and beta are clinically indistinguishable the prescriber must specify which is required

EPOETIN ALFA

Proprietary preparations

Epoetin *(Incepta),* Inj.,(P.F Syringe), 2000 IU/0.2 ml, Tk. 900.00/Syringe; 3000 IU/0.3 ml, Tk. 1,250.00/ Syringe; 5000 IU/0.5 ml, Tk. 1,900.00/ Syringe

Eporen *(Square),* Inj., (P.F Syringe), 2000IU/0.5 ml, Tk. 1,100.00/ Syringe; 3000IU/0.3 ml , Tk. 1,450.00/ Syringe; 5000IU/0.5 ml, Tk. 2,100.00/ Syringe

Eposis *(Beacon),* Inj., (P.F Syringe), 2000 IU/0.2 ml, Tk. 900.00/ Syringe; 3000 IU/0.3 ml, Tk. 1,300.00/ Syringe; 4000 IU/0.4 ml, Tk. 1,700.00/ Syringe; 5000 IU/0.5 ml, Tk. 1,900.00/ Syringe

Eprex[(l)]*(Cilag)* Inj., (P.F Syringe), 2000 IU/0.5 ml, Tk. 1619.33/ Syringe; 3000 IU/0.3 ml, Tk. 1,647.74/ Syringe; 4000 IU/0.4 ml, Tk. 2982.98/ Syringe;

Nipotin *(Aristo),* Inj., (P.F Syringe), 2000 IU/0.5ml, Tk. 900.00/Syringe; 3000 IU/0.75ml, Tk. 1,250.00/Syringe; 4000 IU/0.5ml, Tk. 1,700.00/Syringe; 5000 IU/0.5ml, Tk. 1,900.00/Syringe

Dose: anemia in adults receiving cancer chemotherapy, by subcutaneous injection (max. 1 ml per injection site), initially 150 units/kg 3 times weekly, increased if appropriate rise in haemoglobin (or reticulocyte count) not achieved after 4 weeks to 300 units/kg 3 times weekly; discontinue if inadequate response after 4 weeks at higher dosel reduce dose by 25-50% if haemoglobin rise exceeds 2g/100ml per month; suspend if haemoglobin exceeds 14g/100ml until it falls below 12g/100ml; and reinstate with dose at 25% below previous dose; continue epoetin for 1 month after end of chemotherapy (consult also product literature).

Note: subcutaneous injection contra-indicated in patients with chronic renal failure.

EPOETIN BETA

Proprietary preparations

Mircera[(l)] *(Roche),* Inj., 75 microgram/0.3 ml, Tk. 15,417.51/0.3 ml Syringe; 100 microgram/0.3 ml, Tk. 17,875.32/0.3 ml Syringe ; 120 microgram/0.3 ml, Tk. 20,088.00/0.3 ml Syringe; 50 microgram/0.3 ml, Tk. 8,969.35/0.3 ml Syringe

Recormon[(l)] *(Roche),* Inj., 2000 IU, Tk. 1,676.44/Syringe; 5000 IU, Tk. 4,711.34/Syringe; 10000 IU, Tk. 8,599.98/Syringe

Dose: *subcutaneous injection,* Initially 60 units/kg weekly in 1-7 divided doses for 4 weeks. Adjust according to response at interval of 1-2 weeks maximum 720 units/kg weekly. IV injection over 2 minutes, initially 40 units/kg 3 times weekly for 4 weeks. Increased according

to response to 80 units/kg 4 times weekly max. 720 units/kg weekly (consult also product literature)

15.1.4 DRUGS USED IN NEUTROPENIA

Recombinant human granulocyte colony stimulation factor (rG-CSF) stimulates the production of neutrophils. It may reduce the duration of chemotherapy induced neutropenia and can reduce the incidence of associated sepsis.

FILGRASTIM

Indications: neutropenic fever, neutropenia in cytotoxic chemotherapy for malignancy, in myeloablative therapy followed by bone-marrow transplantation, idiopathic neutropenia and history of severe or recurrent infections; persistent neutropenia in advanced HIV infection (*see also section 14.1*)

Cautions: treatment should be discontinued if leucocytosis occur; monitoring of platelet count and haemoglobin and cytogenic bone marrow examinations recommended in severe congenital neutropenia; monitoring of spleen size, bone density is a must if given the drug for more than 6 months. Caution must be taken in case of pregnancy and breast-feeding

Contraindication: severe congenital neutropenia

Interactions: *see appendix -2*

Side-effects: musculoskeletal pain, disturbances in liver enzymes and serum uric acid, thrombocytopenia, dysuria, allergic reactions, haematuria, hepatomegaly, epistaxis, alopecia, osteoporosis

Dose: cytotoxic induced neutropenia, drug is to be administered by subcutaneous injection or intravenous infusion (over 30 minutes), ADULT and CHILD, 500,000 units/kg daily started not less than 24 hours after cytotoxic chemotherapy, continued until neutrophil count in normal range, usually for up to 14 days and up to 38 days in acute myeloid leukemia.

Proprietary preparations

Filastin*(Incepta),* Inj.,(P.F syringe) 300 microgram/0.5 ml, Tk. 2,890.00/Syringe
Filgrast *(Beacon),* Inj., (P.F syringe) 300 microgram/0.5 ml, Tk. 2,750.00/ Syringe
Grastim *(Square),* Inj.,(P.F syringe) 300 microgram/0.5 ml, Tk. 3,950.00/Syringe
Neufil *(Healthcare),* Inj.,(P.F syringe) 300 microgram/0.5 ml, Tk.3,920.00/ Syringe
Neupogen (I) *(Roche),* Inj., 30 MIU, Tk. 8,000.00/Vial
Zarzio(I) *(Sandoz),* Inj., 30 MIU/0.5 ml, Tk. 21,000.00/0.5 ml Prefilled Syringe

15.1.5 DRUGS USED IN AUTOIMMUNE THROMBOCYTOPENIC PURPURA (ITP)

First line treatment of ITP is corticosteroids. Prednisolone can be used with 1mg/kg daily. Dose must be gradually reduced over the subsequent weeks. Other therapy that has been tried in refractory cases. These drugs include **Azathioprine** *(see section 14.2.2)* **cyclophosphamide** *(see section 14.1.1)* **vincristine** *(see section 14.1.4),* **ciclosporin** *(see section 14.2.1),* **danazo**l *(see section 6.5.2)* Intravenous immunoglobulins *(see section13.3)* have also been used in refractory cases or where a temporary rapid rises in platelets in needed. For patients with chronic severe thrombocytopenia refractory to other therapy, tranaxaemic acid *(see section 3.11)* may be given to reduce the severity of haemorrhage.

15.1.6 THALASSAEMIA

Thalassaemia is an inherited impairment of hemoglobin production, in which there is partial or complete failure to synthesize a specific type of globin chain. Failure to synthesize beta chains is the most common type (beta-thalassaemia). The anemia is crippling and the probability of survival for more than a few years without transfusion is low.

Table: ***Treatment of beta – thalassaemia major (see below in the table)***

Problem	Management
Erythropoietic failure	Allogenic bone marrow transplantation from HLA compatible sibling Hypertransfusion to maintain Hb>100g/lit
Iron overload	Iron therapy forbidden; desferrioxamine therapy
Splenomegaly causing mechanical problems, excessive transfusion required	Splenectomy

Beta-thalassaemia minor is diagnosed by haemoglobin electrophoresis. This type of thalassaemia often does not need treatment.

DESFERRIOXAMINE

Indications: Acute iron poisoning, iron overload with repeated blood transfusion e. g. thalassemia, aplastic anemia.
Side effects: gastrointestinal disturbances, arrhythmia, hypotension, anaphylaxis, dizziness, convulsion, skin reaction and pain on IM injection
Caution: impaired renal and hepatic function; eye and ear examinations required before
treatment and annually during treatment, pregnancy, breast feeding

Dose:subcutaneous infusions of desferrioxamine in a dose of 20-40 mg/kg over 12 hours are given on 5-7 nights each week; it may also be given through the infusion line at the time of blood transfusion upto 2g per unit of blood

Proprietary preparation
Desferal[(I)] *(Novartis),* Inj. 500 mg, Tk. 270.93/Vial

DEFERASIROX

Indications, Side effects, Caution: same as that of desferrioxamine
Dose: consult product literature

Proprietary preparation
Asunra[(I)] *(Novartis),* Dispersible Tab. 100 mg, Tk. 50.00/Tab.; Tk. 187.00/Tab.
Ferasirrox *(unimed)*Tab.250mgTk 85.00/Tab

15.2 BLOOD AND BLOOD COMPONENTS

Blood and blood components are considered drugs because of their use in treating diseases. The transfusion of blood cells is also transplantation in that the cells must survive and function after transfusion in order to have therapeutic effects. The modern transfusion service suggests very little use of whole blood for adult practice.

DECISION MAKING AND PRECAUTIONS REGARDING TRANSFUSION

Blood transfusion is necessary in medical, surgical and obstetrical practice to save life. Whatever the indication of blood transfusion, judicial and rational transfusion must be kept in mind. It is better to avoid transfusion unless otherwise necessary. Blood must be administered properly for patient's safety on the ground of clinical and laboratory findings. The proper identification of the patient, patient's blood specimen and the unit of blood for transfusion to be essential. Careful

identification procedure prevents transfusion-related hazards.

A clinician drawing blood for crossmatching has to identify the patient at the bed side; label the sample and has to write down the request form after identifying the patient; The clinician must be ensured that the information requested by the transfusion laboratory is to be given on both the sample and request form. The person administering blood should identify the patient at the bedside; must be ensured that the patient identification and the identification of the unit match; to be checked that the ABO and Rh D groups of the patient and units are identical; must inspect the units for evidence of damage; to be ensured that the checking procedures are validated by another member of the nursing or medical staff; to be completed the necessary documentation, indicating the detailed identification of the units transfused.

Tests to be performed before transfusion

('Save Blood Transfusion Act 2000' under approval of Government of Bangladesh suggest following tests to be performed before transfusion'*)*

1. ABO and Rh typing of patient and donor
2. Cross matching – major and minor crossmatch tests
3. Antibody screening
4. Screening for – malaria, syphilis, hepatitis B virus (HBV) hepatitis C virus (HCV) and human immunodeficiency virus (HIV)

FOLLOW-UP DURING AND AFTER TRANSFUSION

The blood pack from collection prior to transfusion cold chain should be strictly maintained. Before transfusion cold refrigerated blood should be left for half an hour to return to room temperature. It is remembered that blood unit must not be warmed by immersion in a water bath or by a microwave oven because uneven heating damage to the blood cells and blood protein may be denatured. The transfusion should be started with 5-6 drops for the initial 10-15 minutes and then 10-15 drops for next 10-15 minutes, if there is no reaction, then drops should be adjusted according to complete transfusion within 4-6 hours or as required. No drug or IV solution should be given by the same set during transfusion.

During transfusion, physician should be keen enough to find out signs and symptoms of immediate haemolytic transfusion reaction (IHTR) by observing fever, chills, facial flushing, pain at transfusion site, chest pain, back or flank pain, hypotension, abdominal pain, nausea, dyspnoea, vomiting, urticaria, haemoglobinaemia and haemoglobin-uria. During follow-up for delayed hemolytic transfusion reaction (DHTR) the physician has to monitor the patient constantly and to observe whether the patient has developed fever, anemia, mild jaundice, haemoglo-binemia, haemoglobinuria, shock and renal failure.

Complications and side-effects of transfusion

The decision to transfuse must be based on weighing the therapeutic benefits against potential risks to the recipient. Transfusion always carries increased risk of transmission of diseases transmitted by blood e.g. malaria, syphilis, HBV, HCV and HIV. All communicable diseases are not possible to be screened out e.g. kala-azar, filariasis, toxoplasmosis, brucellosis, trypansomiasis and certain viral infection-Epstein Bar Virus

(EBV), Cytomegalovirus (CMV) and HTLV. There is also limitation of test procedure, kits or reagents to detect diseases do not have less sensitivity and specificity.

Following transfusion of blood or its components there is a chance of immediate and delayed adverse effects, which may be immune or non-immune type. There are also adverse effects due to cold blood component transfusion e.g. hypothermia, painful venous spasm, cardiac arrhythmia, reduction in oxygen

carrying capacity and aggravation of citrate toxicity. Metabolic effects of transfusion are citrate toxicity, potassium toxicity, acid load and iron over load. Some of the immediate and delayed effects are listed below.

Immediate immune effects: IHTR, FNHTR, allergic reaction, anaphylaxis;

Immediate non-immune effects: bacterial contamination; circulatory over load; physical RBC damage; depletion and dilution of coagulation factors & platelet; air embolism and phlebitis;

Delayed immune effects: DHTR, alloimmunization; post transfusional purpura (PTP); GVH disease; delayed non-immune effect; iron overload

15.2.1 WHOLE BLOOD

Blood that is to be collected into a suitable container containing an anticoagulant preservative solution, which contains all the cellular and plasma constituents of blood and is not processed in any manner. Fresh whole blood contains all constituents of blood-RBC, Plasma, WBC, and Platelets and clotting factors but refrigeration causes depletion of WBC, platelet and clotting factor.

Indications*:* in massive acute hemorrhage where all components are required in large amounts; multiple injuries; road traffic accidents; severe gastrointestinal bleeding e.g. rupture esophageal varices, haematemesis and malena; obstetrical causes e.g. rupture uterus, rupture ectopic pregnancy, post partum hemorrhage

Cautions: avoid cold blood, micro aggregate or prolonged transfusion

Side effects: volume overload, acid overload, potassium toxicity, citrate toxicity, (*see also complications of transfusion*)

Note. exchange transfusion should be given in hemolytic disease in neonates (HDN); per operative blood loss

Contraindications*:* severe chronic anemia; anemia associated with risk of circulatory overload like chronic renal failure, heart failure, pregnancy at term

APPROXIMATE VOLUME*:* 500 ml per unit

STORAGE TEMPERATURE*:* 2º to 6ºC

SHELF LIFE*:* 14 days in ACD, 21 days in CPD, 35 days in $CPDA_1$

DOSAGE EFFECT: 1 unit whole blood raises the hemoglobin 10 g/L approximately.

15.2.2 CONCENTRATE RED BLOOD CELLS (RCC) OR PACKED CELL

Packed cells are prepared by removing approximately 80 percent of the plasma from a unit of whole blood. RCC contains the same RBC mass and therefore the same oxygen carrying capacity as whole blood. Regulations require that the final haematocrit of an RCC unit not exceed 80%. Significant reduction in the levels of acid, citrate, and potassium in units prepared just before transfusion. This reduces the risk of acid level, citrate toxicity and potassium load in patients with cardiac, renal, or liver diseases.

Indications*:* RCC is indicated for increasing the RBC mass in patients who require increased oxygen carrying capacity and correction of anemia in patients with increased risks of volume overload like in pregnancy, heart failure (CCF), renal failure, elderly patient and thalassaemia.

APPROXIMATE VOLUME**:** 250-300 ml per unit

STORAGE TEMPERATURE*:* 2 to 6ºC

SHELF LIFE: 14 days in ACD, 21 days in CPD, 35 days in $CPDA_1$

DOSAGE EFFECT: One unit raises the haemoglobin 10 g/L approximately.

Side-effects*: see notes above*.

Cautions: potassium toxicity (*see notes above)*

15.2.3 WASHED RBC_S

The washing process removes about 90

percent of contaminating leukocytes due to febrile reactions and most of the allergic reactions. Preparation contains 60-80% RBCs and 20-40% saline.

Indications*:* prevention of febrile non-haemolytic transfusion reaction (FNHTR) caused by antibodies to leucocytes and HLA antigens in sensitized patients receiving multiple transfusions; prevention of sensitization of potential recipients of tissue transplantation who require blood transfusion; patient with IgA deficiency and anti-IgA antibodies.

APPROXIMATE VOLUME: 250-300 ml per unit

STORAGE TEMPERATURE: 2 to 6ºC

SHELF LIFE: 24 hours

DOSAGE EFFECT: one unit raises the hemoglobin 10 g/L approximately.

Cautions: *see notes above*

Side-effects: bacterial contamination and hyperkalaemia; *see also complication of transfusion*

15.2.4 FRESH PLASMA OR FRESH FROZEN PLASMA (FFP) [ED]

Prepared from the supernatant of one unit of whole blood by the process of centrifugation and fractionation. The plasma is then frozen within 6 hours of collection for FFP. The product is free from RBC and contains therapeutic levels of all the plasma clotting factors, including factors V and VIII, but no platelets. Transfusion is ABO and Rh group specific.

Indications*:* non specific hematological replacement after massive transfusion in Disseminated Intravascular Coagulation (DIC); after cardiopulmonary bypass; liver diseases; rapid anticoagulant reversal; to prevent or arrest bleeding; hemophilia; as volume expander in nephrotic syndrome and burns; acute liver disease

APPROXIMATE VOLUME: 150-250 ml per unit

STORAGE TEMPERATURE: below -20° to -30°C

Shelf life: one year when stored below -30°C, but when kept at −20°C its shelf-life is shorter than one year.

Dosage effect: increase factor levels 20–30% per dose of 10-15ml/kg of body weight

Cautions: FFP should be thawed at 37°C water bath with a stirrer, with frequent agitation by hand. It should never be thawed under hot water tap. Administer within half an hour after thawing as the activity of coagulation factors V and VIII is rapidly lost on standing. FFP is given intravenously through transfusion set, at a flow rate not greater than 10-ml/min. Special care to be taken in patients with history of bronchial asthma or previous severe reaction to plasma

Side-effects*:* urticaria and anaphylactoid reactions, circulatory overload, non-haemolytic febrile transfusion reaction, alloimmunisation to plasma protein, reactions produce by vasoactive substances and transmission of diseases

15. 2.5 PLATELETS CONCENTRATES

Platelet concentrates can be prepared manually or by using a blood cell processor; they can be obtained from a single donor or pooled from several donors. Manually prepared concentrates are available as single platelet concentrates harvested from one unit of blood or as pooled platelet concentrates harvested from four to six units of blood. Transfusion is ABO and Rh compatible. Concentrates contain platelets, plasma with negligible amount of RBC and WBC.

Indications*:* correction of thrombocytopenia due to decreased function, production or consumption of platelet; as in aplastic anemia; acute leukemia following chemotherapy or irradiation in malignancy; cardiopulmonary bypass; massive transfusion; exchange transfusion; neonatal thrombocytopenia; DIC; ITP; dengue haemorrhagic fever (DHF)

APPROXIMATE VOLUME: 50-70 ml per unit of whole blood

STORAGE TEMPERATURE: 20° to

24°C

DOSAGE EFFECT: increase count 5,000 –10,000 per unit

Cautions: require optimum temperature and constant agitation;transfusion must be within 6 hours

Side-effects*:* alloimmunisation to platelet antigens and platelet refractoriness, febrile reactions, allergic reactions, granulocytopenia; see also complications of transfusion

15.2.6 CRYOPRECIPITATE (ANTI HEMOPHILIC FACTOR)

Cryoprecipitate is the cold–precipitated concentration of factor VIII, the antihaemophilic factor. It is prepared from FFP thawed slowly at 4ºC. The product contains most of the factor VIII and part of the fibrinogen from the original plasma. Significant factors of cryoprecipitate are factor XIII and Von Willebrand factor. Transfusion is ABO compatible. A unit of cryoprecipitate contains on average 80 IU of factor VIII.

Indications: treatment of moderate to severe factor VIII deficiency (haemophilia A); afibrinogenemia; Von Willebrand disease; disfibrinogenemia; intractable bleeding in uraemia; factor XIII deficiency

APPROXIMATE VOLUME: 10-25 ml per unit of whole blood

STORAGE AND SHELF LIFE: stable for one year when kept at a temperature below –30°C

DOSAGE EFFECT: The dose of factor VIII for treatment of haemophilia A and IV Willebrand's disease is calculated using formula: D = BW × I/2; (D is the dose in IU, BW body weight in kg, and I the desired increment in i.u./dl).

Cautions: administer as soon as possible and not later than one hour after thawing.

Side-effects*:* urticaria and anaphylactoid reactions; bleeding tendency due to very high fibrinogen concentration achieved after infusion of a large number of cryoprecipitate units, reactions produced by vasoactive substances, transmission of diseases

Proprietary preparations

Alphanate[I] *(Grifols)* Inj., 250IU Tk.7,910.97/vial

Haemoctin[I] *(Biotest-pharma),*Inj. 10% 250 IU, Tk.5196.79/vial