

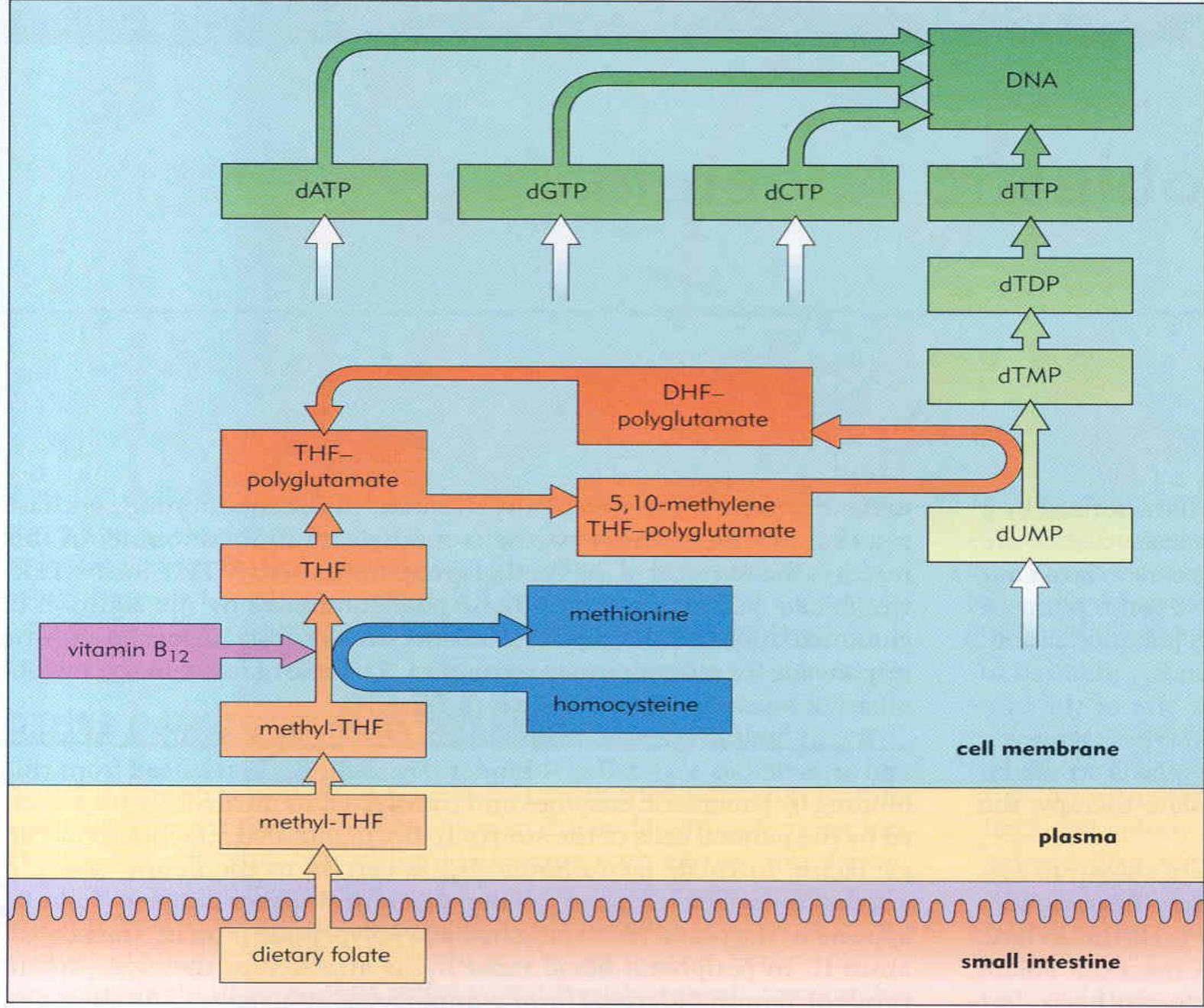
Megaloblastic Anemia

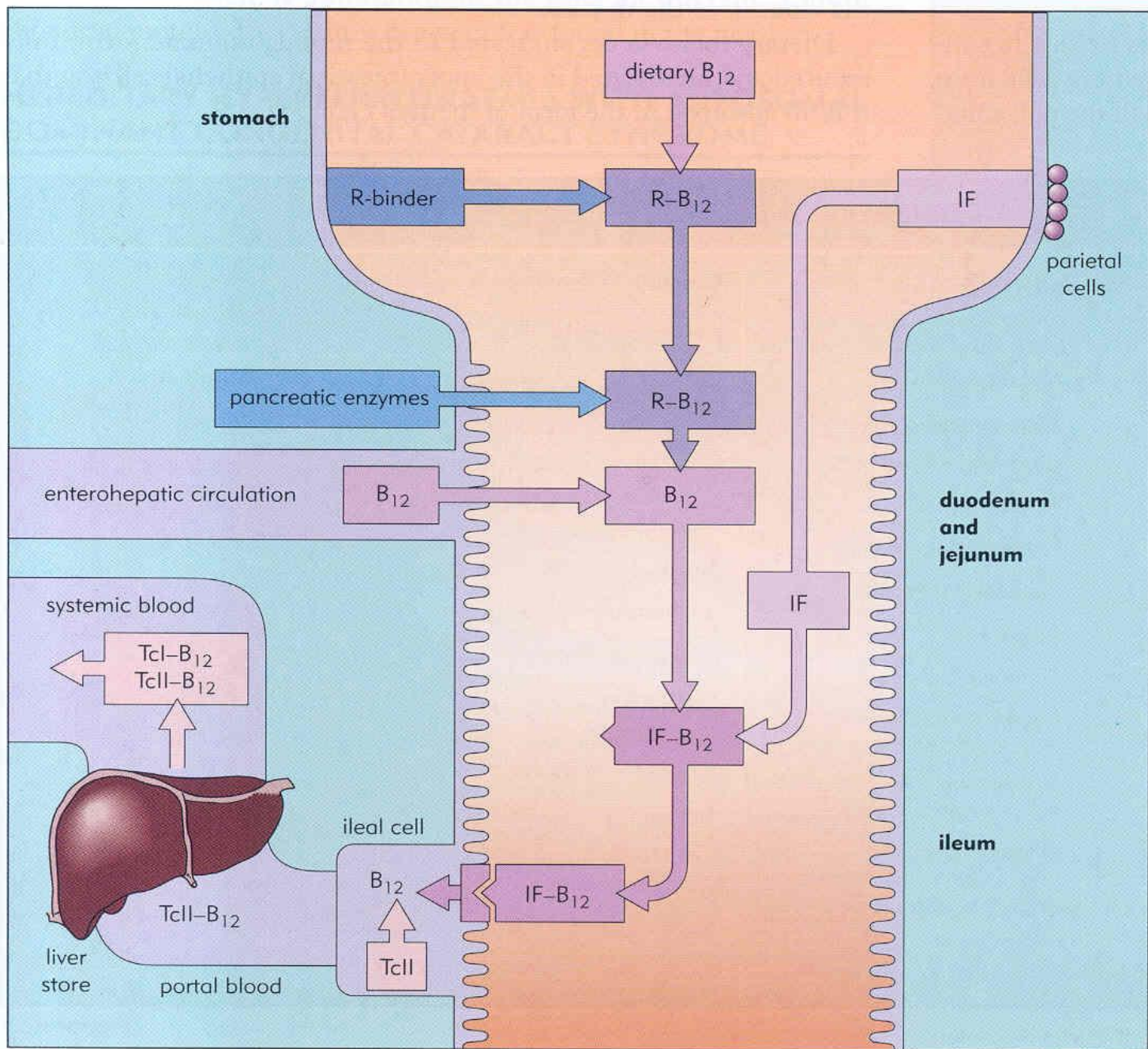
Macrocytic anemia

- Megaloblastic macrocytic anemia: Vitamin B12 or folate deficiency
- Normoblastic macrocytic anemia: Alcohol, liver disease, pregnancy (MCV not as high as the above group)

Causes of megaloblastic anaemia

Causes of megaloblastic anaemia I	Causes of megaloblastic anaemia II		Causes of megaloblastic anaemia III	
Vitamin B ₁₂ deficiency	Folate deficiency		Abnormalities of	
Inadequate diet	Inadequate diet	Malabsorption	Vitamin B ₁₂ metabolism	DNA synthesis
Veganism	Poverty	Gluten-induced enteropathy	Congenital:	Congenital:
Malabsorption	Institutions	Dermatitis herpetiformis	transcobalamin II deficiency	orotic aciduria
Gastric: pernicious anaemia, acquired (autoimmune) and congenital partial or total gastrectomy	Goat's milk	Tropical sprue	homocystinuria with methylmalonic aciduria	Lesch-Nyhan syndrome
	Special diets	Congenital specific	Acquired:	dyserythropoietic anaemia
Intestinal: stagnant-loop syndrome (e.g. jejunal diverticulosis, ileocolic fistulae) chronic tropical sprue ileal resection and Crohn's disease congenital-specific malabsorption with proteinuria (Imerslund-Gräsbeck) fish tapeworm drugs (e.g. metformin)	Excess losses	Increased utilization	nitrous oxide anaesthesia	thiamine-responsive
	Dialysis	Pregnancy	Folate metabolism	etc.
	Congestive heart failure	Prematurity		Acquired:
	Drugs	Excess marrow turnover (e.g. in haemolytic anaemias)	Congenital:	Acquired:
	Anticonvulsants	Malignancy (e.g. myeloma, carcinoma)	inborn errors (e.g. 5-methyltetrahydrofolate transferase deficiency)	drugs (e.g. hydroxyurea, cytosine, arabinoside, 6-mercaptopurine, 5-azacytidine)
	Barbiturates	Inflammatory disease (e.g. Crohn's, rheumatoid arthritis, widespread eczema)	Acquired:	
	Mixed		antifolate drugs (e.g. methotrexate, pyrimethamine)	
Alcohol				
Liver disease				





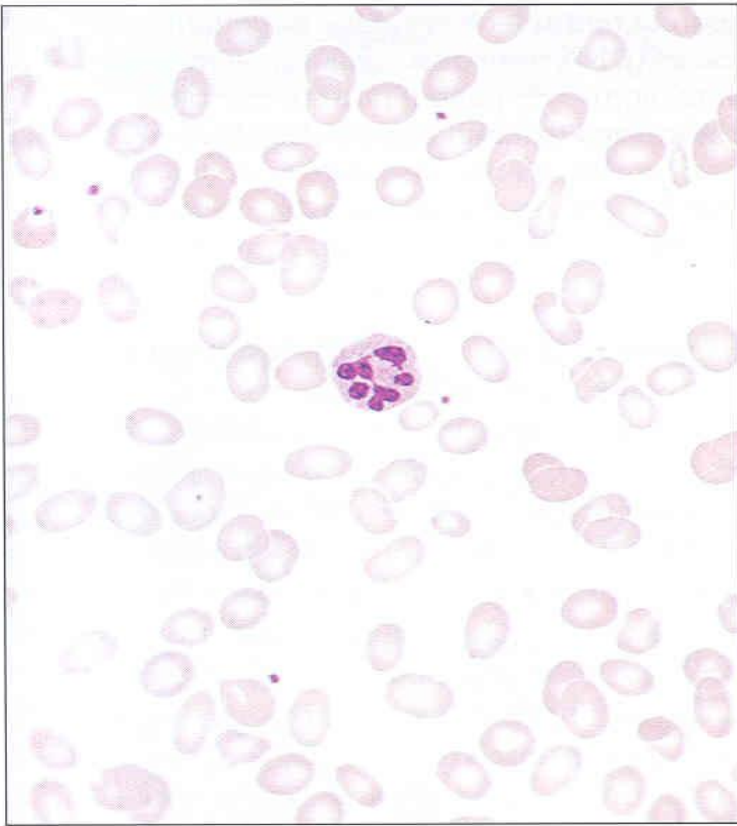


Fig. 3.12 Megaloblastic anaemia: peripheral blood film in a severe case, showing oval macrocytes, marked anisocytosis and poikilocytosis. There is a neutrophil with a hypersegmented nucleus (more than five lobes). (Hb, 5.1 g/dl; MCV, 129 fl.)

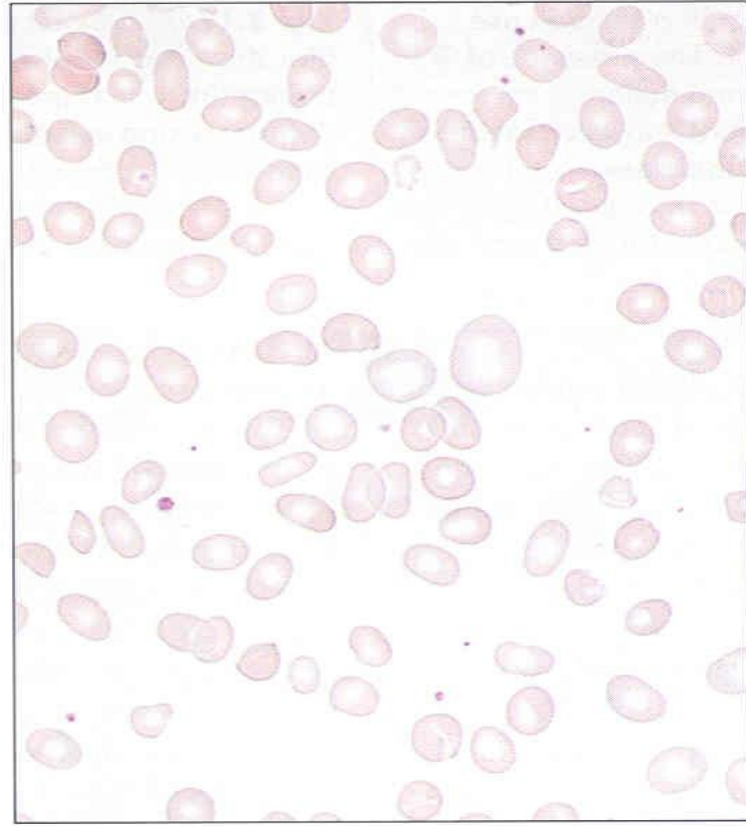


Fig. 3.13 Megaloblastic anaemia: peripheral blood film showing marked oval macrocytosis, anisocytosis and poikilocytosis. (Hb, 5.4 g/dl; MCV, 130 fl.)

Oval macrocyte; hypersegmented PMNs

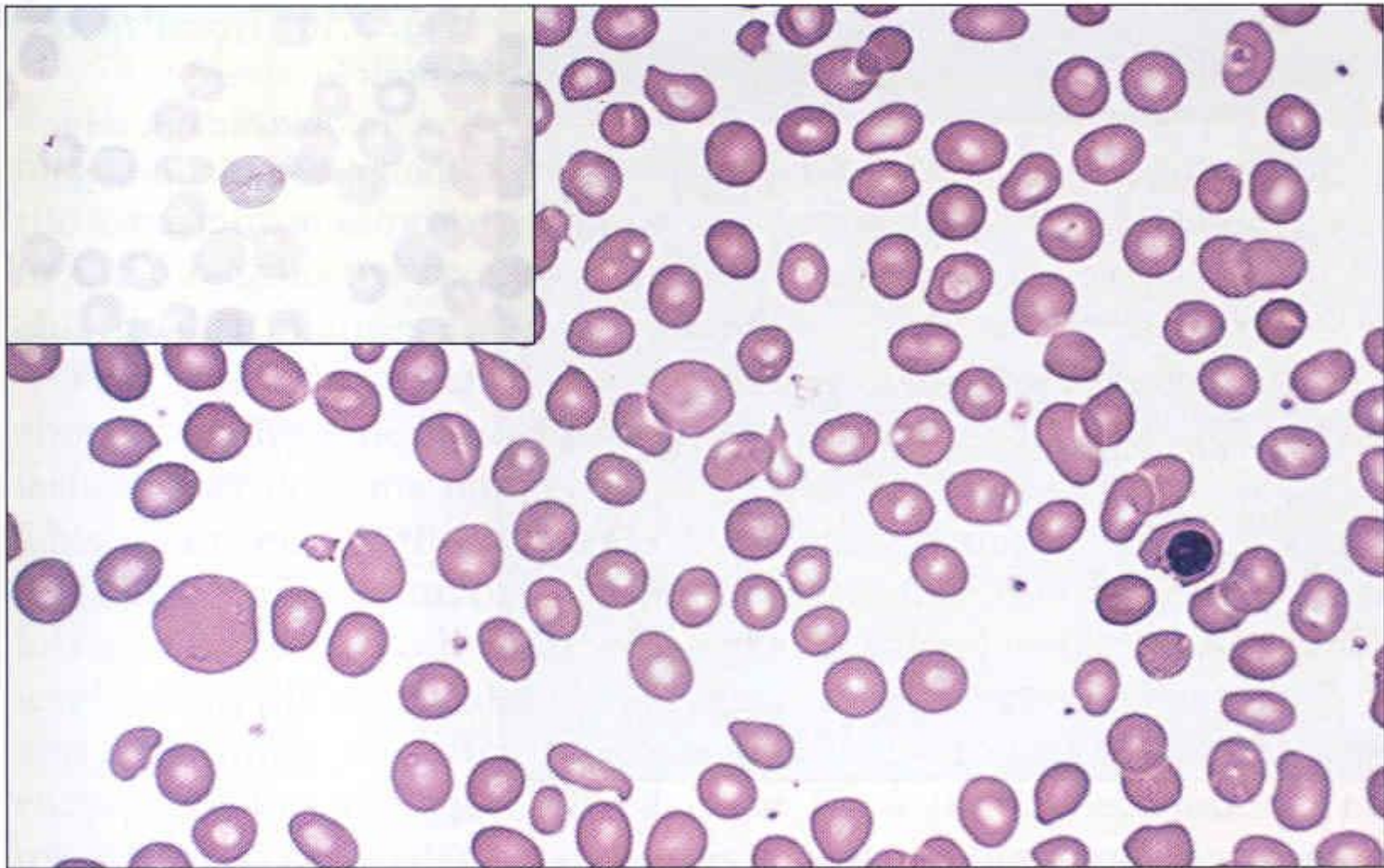
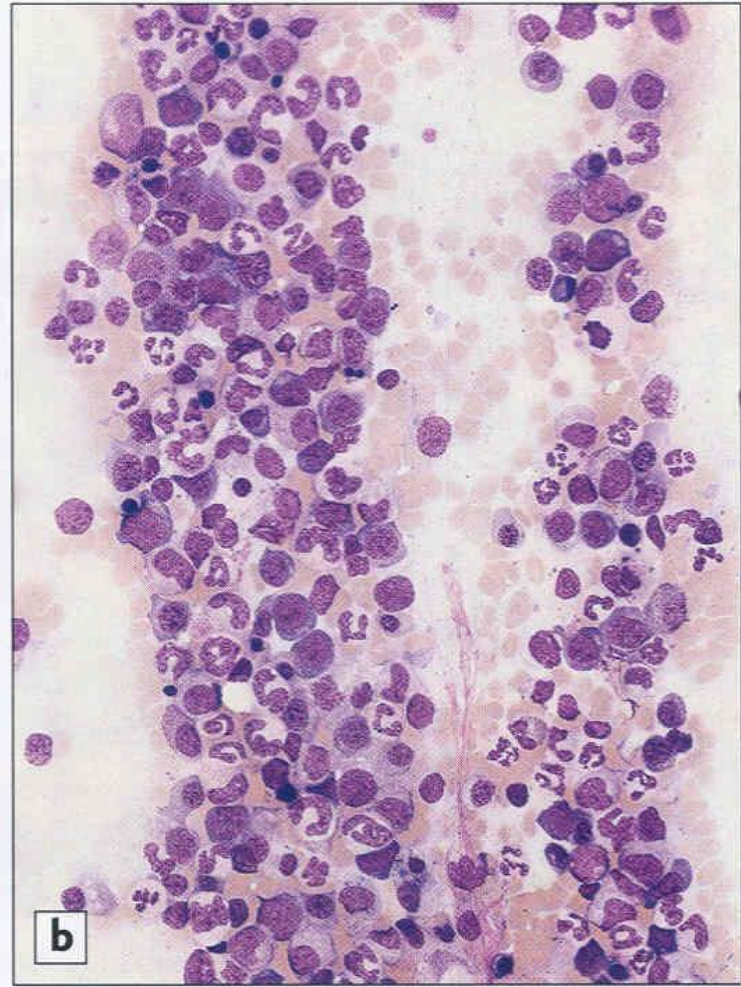
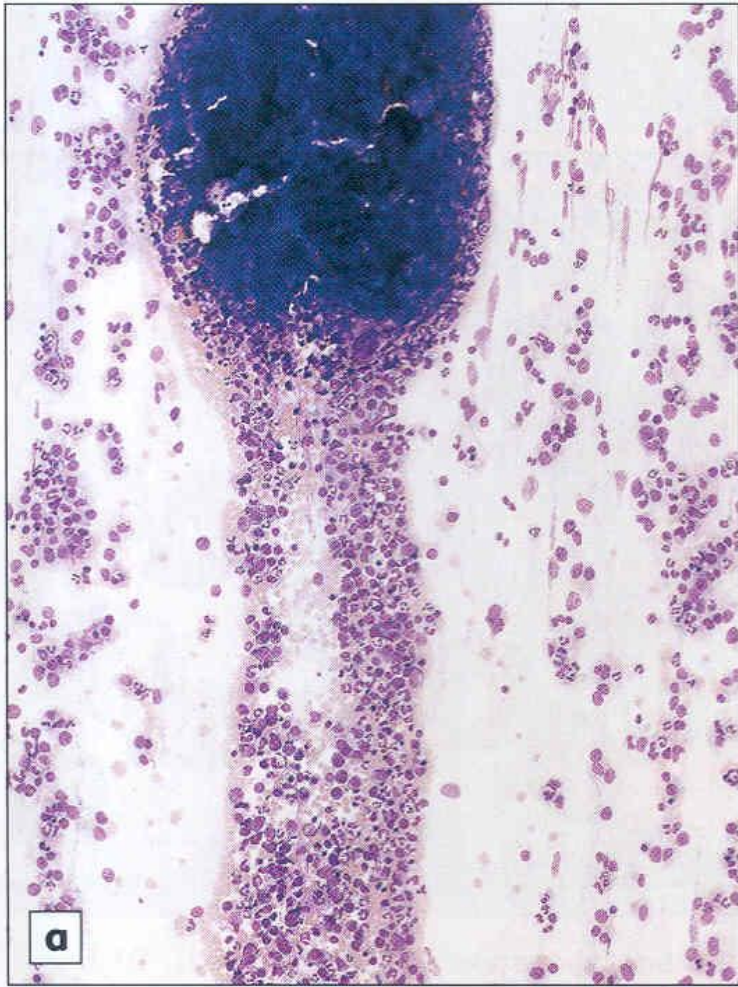


Fig. 3.16 Megaloblastic anaemia: peripheral blood film in a severe case showing a circulating orthochromatic nucleated red cell. The presence of such circulating megaloblasts may be the result of extramedullary haemopoiesis in the spleen and liver. The inset (upper left) shows a Cabot ring, which is occasionally seen in the peripheral blood in severe megaloblastic anaemia.



Erythroid hyperplasia; erythroid dysplasia;
giant bands and metamyelocytes

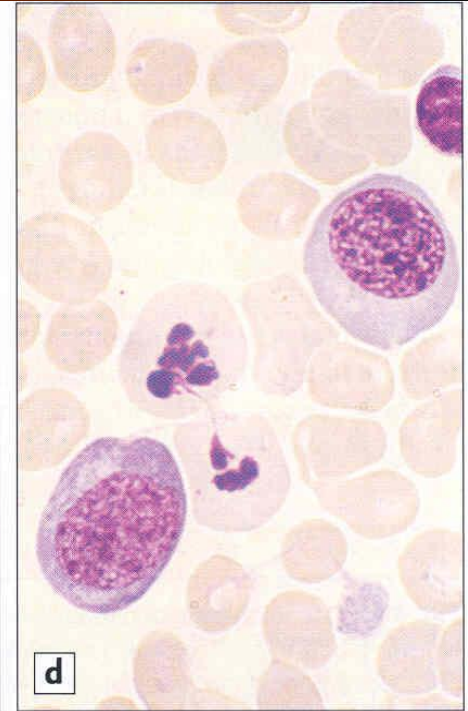
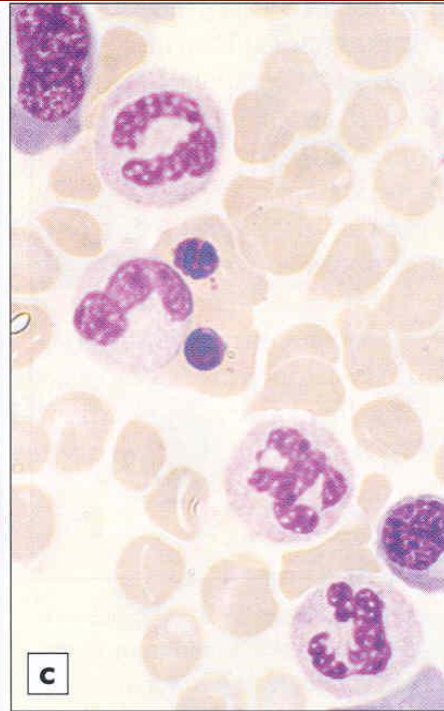
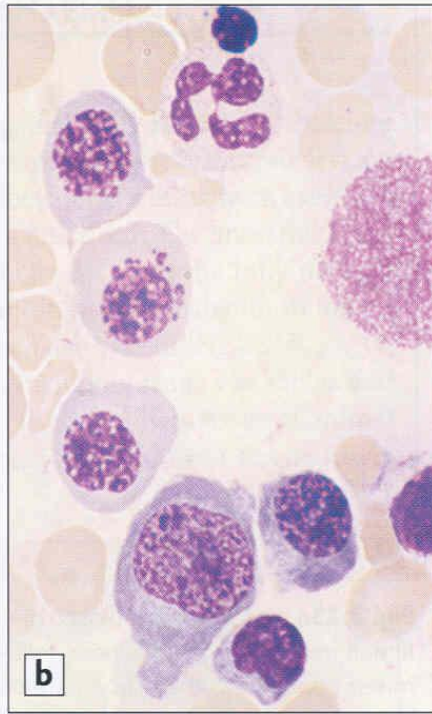
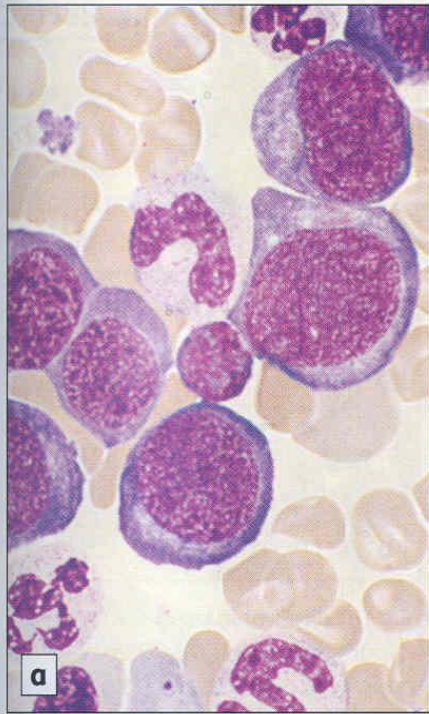


Fig. 3.19a–d Megaloblastic anaemia: high power views showing (a) accumulation of early cells, mainly promegaloblasts; (b) megaloblasts at all stages; the nuclei have primitive open (lacy) chromatin patterns despite maturation of the cytoplasm with haemoglobinization (pink staining) and two

cells have nuclear (DNA) fragments (Howell–Jolly bodies) in their cytoplasm; (c) two late megaloblasts with fully orthochromatic (pink-staining) cytoplasm – two large band-form neutrophils are also present; (d) the central orthochromatic cells have karyorrhectic pyknotic nuclei linked by a thin chromatin bridge.

- Vit B12 or folate def may lead to pancytopenia
- In B12 or folate def there is increase in intramedullary destruction (increased LDH 1&2); young RBCs have LDH1; therefore more increase in LDH1