

Index

Note: page numbers in *italics> refer to figures, those in **bold> refer to tables.***

- activated partial prothrombin time (APPT) 62
activated protein C 64
acute lymphoblastic leukaemia (ALL) 33, 34, 34
 children 33, 34, 38
 clinical features 34–35,
 diagnosis 35–37
 epidemiology 34
 treatment 38–39
acute myeloid leukaemia (AML) 33, 34, 34
 clinical features 34–35
 diagnosis 35–37, 36
 epidemiology 34
 hyperviscosity 85, 85
 relapse management 38
 treatment 37–38
acute promyelocytic leukaemia (APL) 35
acute T-cell leukaemia/lymphoma (ATLL) 68
ADAMTS13 deficiency 45, 90
alemtuzumab 91
Alport syndrome 43
amyloid deposition in multiple myeloma 58
anaemia 4
 acute leukaemia 34
 chronic disease 82
 hereditary 13–18
 hypochromic 3
 older adults 81–82, 82
 see also specific types
anagrelide 23, 25
anencephaly 9
angiogenesis inhibitors 72
antibiotics 91
anticoagulation 88–89
antiphospholipid antibodies 64
antiphospholipid syndrome 45
 α_2 -antiplasmin 62
antithrombin 64
anti-X inhibitors 88–89
apixaban 65
aplastic anaemia, macrocytosis 10
apoptosis modulators 96
aspirin
 platelet dysfunction 45, 89
 polycythaemia vera 22
 thrombocythaemia 25
Auer rods 34
autoantibodies, macrocytic anaemia 10
autoimmune disease 68
azacitidine 39, 54
azathioprine 10, 47
B-cell signalling 72, 72
 inhibitors 72
BCR–ABL mutations 29, 29, 31, 96
Bcr–Abl transcript numbers 30
Bernard–Soulier syndrome 43, 43
Blackfan–Diamond anaemia 19
bleeding 88–90
 acute leukaemias 35
 anticoagulation 88–89
 causes **88**
 hyperviscosity syndrome 85
 infants/neonates 46
 platelet disorders 45, 46–47, 89–90
 uraemic patients 45
bleeding disorders 61–63
 acquired 63
 congenital 62–63
 history 61–62
 investigations 62
 see also coagulation abnormalities;
 coagulopathy
bleeding time, platelet disorders 46, 62
blinatumumab 96
blood count 3
blood transfusion
 disseminated intravascular coagulation 47, 90
 iron deficiency anaemia 5
myelodysplastic syndromes 52, 54
myelofibrosis 26
post-transfusion purpura 44
sickle cell crises 15, 87
thalassaemias 18
thrombocytopenia 45
blood viscosity 85, 85, 86,
bone marrow
 acute leukaemias 35
 aspiration 35
 biopsy 24, 35, 68
 CML 27, 29
 cytogenetic analysis 24
 examination 11, 11
 failure/suppression 33, 34, 43, 83
 fibrosis 25–26
 lymphoproliferative disorders 68, 70
 megaloblastic 7, 8, 11
 multiple myeloma 55, 58
 myelodysplastic syndromes 11, 50
 stem cell collection 75
bone marrow transplantation 26, 47
bortezomib 59
bosutinib 31
Bruton tyrosine kinase (BTK) 96
Burkitt lymphoma 67, 73
calreticulin 21
cardiovascular disease 10, 22, 23, 25, 31
 folate deficiency 10
central nervous system (CNS)
 acute leukaemias 37
 lymphoproliferative disorders 71
chelating agents, thalassaemia 18
chemotherapy
 acute leukaemia 37–39, 86
 chronic lymphocytic leukaemia 73
 CML 32
 hyperviscosity 86

- chemotherapy (*cont'd*)
 lymphoproliferative disorders 71
 multiple myeloma 59
 myelodysplastic syndromes 50, 54
 side-effects 37
 stem cell transplantation and 75, 76
- children
 ALL 33, 34, 38
 iron deficiency 3
 stem cell transplantation 76
see also infants; neonates
- chimeric antigen receptor T cells 96
- chromosome, 5q deletion 50
- chronic lymphocytic leukaemia (CLL) 68, 68, 71, 73
 infections 91, 91
 older adults 83
 staging 69, 70
- chronic myeloid leukaemia (CML) 27–31
 blast crisis 27, 31–32, 31
 diagnosis 29
 pathophysiology 28–29
 phases 27, 27, 28
 treatment 29–31
 tyrosine kinase inhibitors 30, 30
- chronic myelomonocytic leukaemia (CMML) 50, 51
- cleft palate 9
- clonality studies 69
- clopidogrel 45, 89
- coagulation abnormalities 35, 62, 63
 acute leukaemias 35
 inherited 61
see also bleeding disorders; coagulopathy
- coagulation cascade 62, 62
- coagulation factors 64, 93
 recombinant 63
see also named factors
- coagulation screening tests 62
- coagulopathy 61–63
 acquired 63
 differential diagnosis 62
see also bleeding disorders; coagulation abnormalities
- cobalamin *see* vitamin B
- coeliac disease (gluten-induced enteropathy) 8, 11
 autoantibodies 10, 11
- computed tomography (CT), lymphoproliferative disorders 70, 70
- corticosteroids 47
 graft-versus-host disease 78
 spinal cord compression 88
- cytogenetics
 acute leukaemias 36, 36
 lymphoproliferative disorders 69
 multiple myeloma 55
 myelodysplastic syndromes 50
- cytomegalovirus (CMV) 77
 allogeneic stem cell transplantation 77
 CLL 91
- dabigatran 65, 88
- danazol 26
- decitabine 54
- deep vein thrombosis (DVT) 63, 63
 diagnosis 63, 64
- deferasirox 18
- deferiprone 18
- desferrioxamine 18
- dasatinib 31
- desmopressin 47, 63, 89
- diffuse large B-cell lymphoma (DLBCL) 73
- Dikkopf homologue 1 (DKK1) 55
- direct thrombin inhibitors 88–89
- disseminated intravascular coagulation (DIC) 63, 89–90–
 acute leukaemias 35
 causes 89
 clinical features 89
 investigations 89
 thrombocytopenia 45, 89–90
 treatment 47, 89–90
- DNA chips 94
- DNA methylation 96
- DNA methyltransferase inhibitors 96
- dysplastic features 50, 51
see also myelodysplastic syndromes (MDS)
- elderly people 81–84
 anaemia 81–82, 82
 chronic disease 82
 iron deficiency 82
 megaloblastic 82
 haematological malignancies 82–84, 83
 myelodysplastic syndromes 49
- encephalocele 9
- end-organ damage, multiple myeloma 58
- endoscopy 11
- epigenetic expression modulation 96
- erythroblasts, megaloblastic 8
- erythrocytosis 22, 22
 apparent 23
 causes 22
 secondary 23
- erythropoietin
 myelodysplastic syndromes 52
 polycythaemia 22
- essential thrombocythaemia (ET) 21, 24–25, 24
- factor V 64
- factor V Leiden 64
- factor VIIa, recombinant 47
- factor VIII 62, 64
 deficiency 62, 94
 gene therapy 94
- factor IX
 deficiency 62
 gene therapy 93
- factor XIII deficiency 62
- Fanconi anaemia 19, 42
- ferritin, serum levels 3, 82
- ferrous salts 4
- fetal haemoglobin (Hb F) 13
- fibrinogen 41, 62, 89–90
- flow cytometry 68, 69, 83
- FLT3 mutation 36
- fludarabine 91
- fluorescent *in situ* hybridization (FISH) 69
- folate
 assay 10
 deficiency 8, 9, 11, 82
 pregnancy 8, 9
 prophylaxis 12
 treatment 12
 dietary intake 8
- folic acid supplementation, 12
 in pregnancy 9
- follicular lymphoma (FL) 73
- fresh frozen plasma (FFP) 47, 90, 91
- gastrectomy 11
- gastritis, atrophic 8, 11
- gene expression profiling 69, 94
- gene therapy 93–94
 haemoglobinopathies 94
 haemophilia 93–94, 94
 strategies 94
- genome editing 95–96
- genomics 94–95
- Glanzmann thrombasthenia 43, 47, 89
- glossitis 9, 9
- glucose-6-phosphatase deficiency (G6PD) 18
- glycoprotein Ib–IX complex 41
- glycoprotein IIb/IIIa antagonists 45
- glycoproteins 41
- graft-versus-host disease (GVHD) 76, 77
 acute 77–78, 77, 78
 donor T cells 77
 chronic 77, 78–79, 78
- graft-versus-leukaemia (GVL) effect 76, 77, 79–
- granulocyte colony-stimulating factor (G-CSF) 54
- grey platelet syndrome 43
- haemoglobin 13
 genetic control 14
 developmental changes 13
 normal ranges 81
- haemoglobinopathies 13–18
 gene therapy 94
- haemolytic anaemia 12, 18
 autoimmune 68
 thrombotic thrombocytopenic purpura 45, 90
- haemolytic disease of the newborn 44
- haemolytic uraemic syndrome 45
- haemophilia 62–63, 63
 gene therapy 93–94, 94
 haemophilia A 62–63, 93–94
 haemophilia B 62–63, 93
- haemostasis 41–42, 61
- Hashimoto's thyroiditis 67
- Hb Bart's hydrops fetalis 15, 17

- HELLP syndrome 45
 heparin, venous thromboembolism treatment 65
 heparin-induced thrombocytopenia 44-45, 47
 hepatosplenomegaly 68
 hereditary anaemias 13-18
 hereditary spherocytosis 18
 herpes zoster 91
 histone deacetylases (HDACs) 96
 Hodgkin's lymphoma (HL) 72-73
 treatment 71, 72
 stem cell transplantation 76
 homocysteine serum assay 10
 human platelet antigen (HPA-1a) 44
 hydrops fetalis 17
 hydroxycobalamin 11
 hydroxycarbamide (hydroxyurea) 15, 23, 25, 26, 29
 macrocytosis 10, 11
 hypercalcaemia 68
 hyperviscosity syndrome 85-86, 85, 86
 symptoms and signs 86
 hypochromic anaemia 3
 hypogammaglobulinaemia 91
 hypoparathyroidism 7
 hyperviscosity 68
- ibrutinib 72, 96
 ileal resection 11
 imatinib mesylate 30, 31
 immune stimulation, chronic 67
 immune thrombocytopenia 44, 44, 47
 immunoglobulin
 hyperviscosity 85
 intravenous 47
 multiple myeloma 55
 immunoglobulin A (IgA) 55, 57
 immunoglobulin G (IgG) 44
 immunomodulatory therapy 96
 lymphoproliferative disorders 71-72
 immunophenotyping 31, 35, 83
 immunosuppression
 lymphoproliferative disorders 67
 myelodysplastic syndromes 54
 stem cell transplantation 76
- infants
 bleeding disorders 46
 iron deficiency 3
 platelet disorders 46
 sickle cell anaemia 15
 thalassaemias 17
- infections 90-91, 90
 acute leukaemias 35
 allogeneic stem cell transplantation 77, 79
 CLL 91, 91
 impaired immunity 90-91
 neutropenia 35, 91
- infertility 76
 folate deficiency 9
 vitamin B₁₂ deficiency 9
- inflammation, chronic 67
 insertional mutagenesis 93
- interferon α (IFN- α)
 CML treatment 29
 polycythaemia vera 23
 thrombocytopenia 25
- international normalised ratio (INR) 88
- intravenous immunoglobulin 91
 thrombocytopenia 47
- iron 1
 chelation 54
 daily requirements 2
 intravenous preparations 4, 5
 metabolism 1
 replacement therapy 4, 4, 4
 supplementation 4, 4, 4
 failure to respond 4-5
 prophylactic 5
- iron deficiency anaemia 1-3, 3
 blood transfusion 5
 causes 2
 diagnosis 1-2, 2, 3
 elderly people 82
 infants 3
 laboratory investigations 2, 3-4
 management 4, 4, 4
 prevention 5
- iron loading 54
- JAK2 gene 21, 96
 inhibitors 26, 96
 mutations 21, 22, 24
- jaundice
 G6PD deficiency 18
 megaloblastic anaemia 8, 9
- koilonychia 2, 2
- lenalidomide 54, 59
- leucoerythroblastic blood film 25, 25, 26
- leucostasis, acute leukaemias 35
- leukaemia
 acute 33-39
 classification 34
 clinical features 34-35
 diagnosis 35-37
 differential diagnosis 34
 epidemiology 34
 genetic basis 33
 risk factors 33
 supportive care 37, 37
 treatment 37-39, 37
 see also specific types
 chronic *see* chronic lymphocytic leukaemia (CLL); chronic myeloid leukaemia (CML)
 hyperviscosity 85, 85
 myelofibrosis transformation 26
 polycythaemia transformation 23
- leukapheresis 86
- liver disease 63
- lumbar puncture 37
- lymph nodes 68
 biopsy 68
- lymphadenopathy 68
- lymphocytosis, incidental 68
- lymphoma
 Burkitt 67, 73
 diffuse large B-cell (DLBCL) 73
 follicular (FL) 73
 mantle cell (MCL) 73
 radiotherapy 71
 small lymphocytic 73
 staging 69, 70
 stem cell transplantation 76
 T-cell 73
- lymphoproliferative disorders (LPD) 67-73
 classification 67, 72
 diagnosis 68-69
 familial predisposition 67
 genetic causes 70
 heavy chain 69
 imaging 70
 low grade 69, 72, 73
 presentation 68
 prognosis 70-71, 71
 staging 69-71, 70
 supportive care 72
 treatment 71-72
- M protein 59
- macrocytic anaemias 7-12
- macrocytosis 7
 causes 7-10, 10
 diagnosis 10-11
 treatment 11-12
- macrothrombocytopenia 43
- malabsorption, vitamin B₁₂ 7
- malaria 15, 18, 67
- mantle cell lymphoma (MCL) 73
- May-Hegglin anomaly 43, 43
- mean cell volume (MCV) 82
 macrocytosis 7, 10
- megaloblastic anaemia 8-9, 11
 causes 8
 elderly people 82
- melphalan 59
- menorrhagia 61, 63
- mental retardation in α -thalassaemia 17
- metamyelocytes 8
- methotrexate 38, 76, 77
- methylmalonic acid 10, 82
- micro RNAs 94
- microangiopathic thrombocytopenia 45
- microarray technology 69, 94, 95
- monoclonal antibodies 96
 lymphoproliferative disorders 71
- monoclonal gammopathy of undetermined significance (MGUS) 55, 59
 diagnosis 57, 57
 older adults 83
- mucosa-associated lymphoid tissue (MALT) 67, 72
- multiple myeloma 55-59, 56
 clinical features 55-57, 56, 56, 57
 diagnosis 57, 57, 58

- multiple myeloma (*cont'd*)
- epidemiology 55
 - investigations 58
 - management 59, 59
 - stem cell transplantation 76
 - pathogenesis 55
 - prognosis 58
 - spinal cord compression 55, 57, 88
 - staging 58, 58
- myelodysplasia 10, 11, 11
- macrocytosis 10
- myelodysplastic syndromes 49–54
- classification 50–51, 53
 - isolated 5q- associated syndromes 50
 - myelodysplastic/myeloproliferative neoplasms 51
 - genetic mutations 49, 49, 50
 - immune deregulation 49–50
 - investigations 50
 - management 52–54
 - future advances 54
 - older adults 83, 84
 - pathogenesis 49
 - presentation 50
 - prognosis 51–52, 53
 - supportive care 52–54
 - therapy-related 50
- myelofibrosis 21
- polycythaemia transformation 23
 - poor prognostic features 26
 - primary (PMF) 21, 25–26, 25
- myeloma 55, 83, 83
- clinical features 55–57
 - stem cell transplantation 76
 - see also multiple myeloma
- myeloproliferative disorders 21–26
- nails, iron deficiency anaemia 1–2, 2
- neonates
- alloimmune thrombocytopenia 44
 - bleeding disorders 46
 - macrocytosis 10
 - platelet disorders 46
 - sickle cell anaemia prevention 15
- neural tube defects 9
- neuropathy, vitamin B₁₂ 7
- neutropenia 91
- acute leukaemias 35
 - infections 91
- next generation sequencing (NGS) 94–95
- nilotinib 31
- non-Hodgkin's lymphoma (NHL) 72
- non-steroidal anti-inflammatory drugs (NSAIDs) 45, 89
- non-vitamin-K antagonist oral anticoagulants 65
- NPM mutation 36
- nuclear factor kappa β (NF-κB) 55, 96
- oesophageal webs 2
- oncolytic viruses 96
- oxymethalone 26
- parvovirus infection 14
- peripheral blood stem cell (PBSC) harvest 75
- pernicious anaemia 7, 10
- autoantibodies 10
- pharyngeal webs 2
- Philadelphia (Ph) chromosome 28, 28
- ALL 36
 - CML 28, 28, 29
- plasma cell leukaemia 59
- plasma cells, multiple myeloma 55, 56
- plasma exchange 90
- plasmacytoma 57, 59, 87
- plasmapheresis 86
- platelet count 89
- raised 24
 - investigation 24
 - reduction 25
- platelet disorders 42–47, 89
- acquired 43–45, 44
 - congenital 42–43, 42, 43
 - investigation 45–46, 46
 - management 46–47
 - storage pool diseases 43
- platelet transfusions 47, 54, 89
- disseminated intravascular coagulation 89–90
- platelets 41
- consumption increase 44
 - decreased production 43, 44
 - dense granules 41, 43
 - function 41–42, 42
 - microvascular thrombi 45, 63, 90
 - see also platelet count; platelet disorders; platelet transfusions
- Pneumocystis jirovecii* 91
- polycythaemia vera (PV) 21, 22–23, 22, 96
- ponatinib 31
- post-transfusion purpura 44
- prednisolone 47, 90
- preeclampsia 45
- pregnancy
- folate deficiency 8, 9
 - folic acid supplementation 9
 - iron deficiency anaemia 3
 - iron requirements 1
 - iron supplements 1
 - macrocytosis 10
 - microangiopathic thrombocytopenia 45
 - sickle cell anaemia 15
- primary myelofibrosis (PMF) 21, 25–26, 25
- diagnostic criteria 25
- polymphocytic leukaemia (PLL) 68
- proteasome inhibitors 59
- protein C 64
- protein S 64
- prothrombin complex concentrates (PCC) 88
- prothrombin gene mutation 64
- prothrombin time (PT) 62
- pulmonary embolism 63
- purpura 44
- post-transfusion 44
 - thrombotic thrombocytopenic (TTP) 45, 45, 90, 90
- pyruvate kinase deficiency 18
- radiotherapy
- lymphoproliferative disorders 71
 - myelofibrosis 26
- rational drug design 96
- receptor activator of nuclear kappa B (RANK-L) 55, 56
- recombinant coagulation factors 63
- red cells
- aplasia 14, 19
 - enzyme defects 18
 - folate assay 10
 - membrane defects 18
 - sickling 14
- Reed–Sternberg cells 72, 73
- renal failure, myeloma 57
- rituximab 96
- acquired platelet disorders 47
 - chronic lymphocytic leukaemia 73
 - lymphoproliferative disorders 67, 71
 - thrombotic thrombocytopenic purpura 90
- rivaroxaban 65, 88
- ruxolitinib 96
- sepsis 25, 35, 85
- sickle cell anaemia 13–15, 86, 87
- complications 15
 - diagnosis 14
 - infants 15
 - prevention 15
 - treatment 15
- sickle cell crises 13–14, 15, 86–87
- treatment 87
- sickle cell gene 13
- sickle cell trait 14
- sickling disorders 13–15, 86
- variants 15
- Sjögren's syndrome 67
- skin, iron deficiency 1–2
- small lymphocytic lymphoma 73
- spina bifida 9
- spinal cord compression 87–88
- multiple myeloma 55, 57, 88
- spleen, enlarged/splenomegaly
- CML 27, 28
 - lymphoproliferative disorders 68
 - thrombocytopenia 45
- splenectomy 18
- acquired platelet disorders 47
 - myelofibrosis 26
 - thalassaemia 18
- spliceosome mutations 50
- stem cell transplantation 75–79, 76
- ALL treatment 38
 - allogeneic 76
 - complications 77–79, 77, 78
 - AML treatment 38

- applications 75, 76
- autologous 76
- CML treatment 29, 31
- conditioning regimens 76
- donor selection 76
- lymphoproliferative disorders 72
- multiple myeloma 59
- myelodysplastic syndromes 54
- stem cells 75
 - abnormal 50
 - collection 75
- Streptococcus pneumoniae* 15
- stroke 10, 15, 65
- surface membrane disorders 43

- T-cell lymphoma 73
- T cells, chimeric antigen receptor 96
- targeted therapy 96
- thalassaemias 13, 15–18
 - α -thalassaemias 15, 17
 - β -thalassaemias 15, 16–18, 16
 - genetics 15–17
 - infants 17
 - prevention 18
 - treatment 18
 - gene therapy 94
 - women 18
- thalidomide 54
- multiple myeloma 59

- thrombin inhibitors 88–89
- thrombin time (TT) 62
- thrombocytopenia 89–90
 - amegakaryocytic 42
 - heparin-induced 44–45, 47
 - immune 44, 44, 47
 - investigation 45–46
 - management 47
 - microangiopathic 45
 - MYH9-related 43, 43
 - neonatal alloimmune 44
 - with absent radii 42, 42
- thrombocytosis 24–25, 45, 46
 - essential 45
 - reactive 45
- thrombophilias, inherited 64–65, 64
- thrombotic thrombocytopenic purpura (TTP) 45, 45, 90, 90
 - subtypes 90
- tranexamic acid 47
- transferrin receptors 3, 5, 82
- tumour lysis syndrome 35
- tyrosine kinase gene 21
- tyrosine kinase inhibitors 30
 - CML treatment 30–31, 30
 - resistance to 31
 - second- and third-generation 31
 - treatment monitoring 30–31

- ultra-large von Willebrand factor (ULVWF)
 - multimers 90

- vascular endothelial growth factor (VEGF) 55
- vegans 7, 12
- venesection, polycythaemia 23
- venous thromboembolism (VTE) 63, 64
 - treatment 65
- viral vectors 93
- vitamin B₁₂
 - deficiency 7–8, 9, 82
 - malabsorption 7, 8
 - neuropathy 9
 - serum assay 10
 - treatment 11–12
- vitamin K
 - bleeding management 88
 - deficiency 63
- vitiligo 8
- von Willebrand disease 43, 62, 63
- von Willebrand factor (VWF) 41, 62, 63
 - bleeding disorders 62

- Waldenström's macroglobulinaemia 57, 58
- warfarin 47, 65, 88
- Wiskott–Aldrich syndrome 42–43

- zinc protoporphyrin assay 3