

Concise Textbook of Pathology

presents the vast information on the subject in a student-friendly manner. The book has been written in a simple and lucid style and includes illustrations for the benefit of both the intelligent as well as ordinary students studying pathology in various fields of medical sciences, including MBBS, dental, AYUSH, medical laboratory technology, allied health science courses.

The salient features of the book

1. The book is divided into four main sections, namely •Hematology and Blood Banking, •General Pathology, •Systemic Pathology I and •Systemic Pathology II. Important chapters are covered in each part.
2. The book emphasizes on theory as well as the practical skills.
3. The book covers most of the competencies laid down by MCI.
4. The book is also useful for the students in preparation of examination to answer long answers, short essays and short answers and to face viva voce in Pathology.
5. After the main text, there are sections like •Similes in Pathology, •Know your Scientists, •Pearls to Know and •MCQs given at the end of each chapter covering various topics which will help the students in their preparation for MBBS II pathology as well as other competitive examinations in medical sciences.
6. The book contains gross and microscopic illustrations with original as well as schematic and line diagrams.
7. Many experts have contributed important topics and chapters, significantly enhancing the value of the textbook as a valuable resource.

Editor

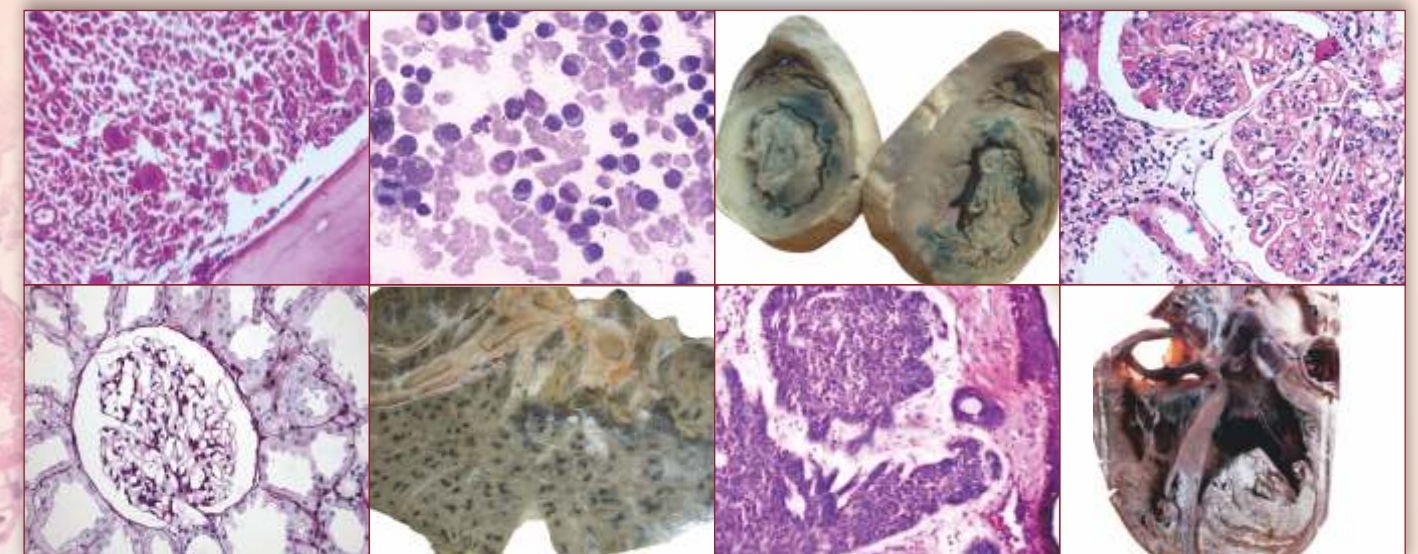
Ganga S Pilli MD, PhD is currently Professor, Department of Pathology, JN Medical College, Belagavi, under KLE Academy of Higher Education and Research (Deemed to be University). She has teaching experience of 35 years to undergraduate students and 26 years to postgraduate students.

She has been instrumental in starting CPCs to undergraduate students, CME in transfusion medicine and continuing CME and PG course in pathology. She has published papers in national and international journals.

She has undergone training in oncopathology at Cancer Centre, Indiana, USA, fellowship in cytology from Indian Academy of Cytology (IAC), short training course in neuropathology at National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, and a course in basics of molecular biology techniques at NIRRH, Mumbai. She is actively involved in research, academics as well as extracurricular activities. She is highly motivated and enthusiastic personality. Due to inspiring and positive attitude she is loved by her students.

Concise Textbook of Pathology

Concise Textbook of Pathology



Dedicated to Education
CBS

CBS Publishers & Distributors Pvt Ltd

4819/XI, Prahlad Street, 24 Ansari Road, Daryaganj, New Delhi 110 002, India
E-mail: delhi@cbspd.com, cbspubs@airtelmail.in; Website: www.cbspd.com
New Delhi | Bengaluru | Chennai | Kochi | Kolkata | Mumbai
Hyderabad | Jharkhand | Nagpur | Patna | Pune | Uttarakhand



ISBN: 978-93-89688-57-3



Editor
Pilli



Dedicated to Education

CBS Publishers & Distributors Pvt Ltd

Editor

Ganga S Pilli

The background of the cover features a detailed, light-colored microscopic image of tissue, likely showing cellular structures and possibly a blood vessel. The image is overlaid with a dark red vertical bar on the left side and a horizontal bar at the top, both in a dark red color. The text is positioned in the upper left quadrant of the cover.

Concise Textbook of

Pathology

Concise Textbook of

Pathology

Editor

Ganga S Pilli MD, PhD

Professor

Department of Pathology

JN Medical College

KLE Academy of Higher Education and Research

(A Deemed to be University)

Belagavi, Karnataka, India



CBS Publishers & Distributors Pvt Ltd

New Delhi • Bengaluru • Chennai • Kochi • Kolkata • Mumbai

Hyderabad • Jharkhand • Nagpur • Patna • Pune • Uttarakhand

Disclaimer

Science and technology are constantly changing fields. New research and experience broaden the scope of information and knowledge. The author has tried her best in giving information available to her while preparing the material for this book. Although, all efforts have been made to ensure optimum accuracy of the material, yet it is quite possible some errors might have been left uncorrected. The publisher, the printer and the author will not be held responsible for any inadvertent errors, omissions or inaccuracies.

Concise Textbook of Pathology

ISBN: 978-93-89688-57-3

Copyright © Author and Publisher

First Edition: 2021

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system without permission, in writing, from the author and the publisher.

Published by **Satish Kumar Jain** and produced by **Varun Jain** for

CBS Publishers & Distributors Pvt Ltd

4819/XI Prahlad Street, 24 Ansari Road, Daryaganj, New Delhi 110 002

Ph: 23289259, 23266861, 23266867

Fax: 011-23243014

Website: www.cbspd.com

e-mail: delhi@cbspd.com; cbspubs@airtelmail.in

Corporate Office: 204 FIE, Industrial Area, Patparganj, Delhi 110 092

Ph: 011-4934 4934

Fax: 011-4934 4935

e-mail: publishing@cbspd.com; publicity@cbspd.com

Branches

- **Bengaluru:** Seema House 2975, 17th Cross, K.R. Road, Banasankari 2nd Stage, Bengaluru 560 070, Karnataka
Ph: +91-80-26771678/79 Fax: +91-80-26771680 e-mail: bangalore@cbspd.com
- **Chennai:** 7, Subbaraya Street, Shenoy Nagar, Chennai 600 030, Tamil Nadu
Ph: +91-44-26260666, 26208620 Fax: +91-44-42032115 e-mail: chennai@cbspd.com
- **Kochi:** 42/1325, 1326 Power House Road, Opp. KSEB, Ernakulam 682018, Kochi, Kerala
Ph: +91-484-4059061-67 Fax: +91-484-4059065 e-mail: kochi@cbspd.com
- **Kolkata:** No. 6/B, Ground Floor, Rameswar Shaw Road, Kolkata-700014 (West Bengal), India
Ph: +91-33-2289-1126, 2289-1127, 2289-1128 e-mail: kolkata@cbspd.com
- **Mumbai:** 83-C, Dr E Moses Road, Worli, Mumbai-400018, Maharashtra
Ph: +91-22-24902340/41 Fax: +91-22-24902342 e-mail: mumbai@cbspd.com

Representatives

- | | | | | | |
|-------------|--------------|-------------|--------------|---------------|--------------|
| • Hyderabad | 0-9885175004 | • Jharkhand | 0-9811541605 | • Nagpur | 0-9421945513 |
| • Patna | 0-9334159340 | • Pune | 0-9623451994 | • Uttarakhand | 0-9716462459 |

Printed at Goyal Offset Printers, GT Karnal Road, Industrial Area, Delhi, India

to
My parents,
My family members,
and
My dear students
for their
constant encouragement

Foreword

Knowledge of pathology is very important for successful medical practitioner. It is rightly said that to be a good clinician, the knowledge of basic subjects is very essential. Those who are good in understanding the pathophysiology of a disease can treat the patient better with confidence. Subject of pathology which is learnt in II MBBS curriculum forms the basis for understanding the disease process. For any physician, to give the appropriate care for his patients, an appropriate diagnosis has to be made. Sound knowledge of the basic subjects and investigations form an important component in the whole process, may be in subjects of pathology, microbiology or biochemistry.

There are many voluminous books in the subject of pathology which are difficult for the undergraduate students to go through them and assimilate the knowledge. The present book is dealt in a simple and lucid style with easily understandable diagrams and flow charts.

The book is divided into four main sections namely, Haematology, General Pathology, Systemic Pathology I and Systemic Pathology II covering different important chapters with emphasis on theory as well as some practical skills and covers the MCI identified competencies. The book is also useful for the MBBS phase II students in preparation of examination in pathology as well as other phase students in competitive examinations in medicine. There are many original and schematic diagrams of gross and microscopic pictures and line diagrams.

The author Dr Ganga S. Pilli has already got the experience of writing textbook for medical subjects and her books are in demand by the medical and paramedical students, so much that the editions of these books are being brought out. She has a rich experience in the field of pathology for having worked as Lecturer, Assistant Professor, Associate Professor and Professor of Pathology for a period of almost 35 years in a reputed department of our college. She was heading of the department during the years 2012 to 2014. The knowledge of pathology gained through this book will be of a real benefit to the undergraduate students of medical, dental, allied health science courses including medical laboratory technology course, nursing and AYUSH courses. The necessary theory and practical material provided in this book will enrich the knowledge and will improve the skills of the students. I am sure this book will be accepted by all the students and teaching fraternity of pathology.

I congratulate Dr Ganga S. Pilli for the bold venture and hope she will continue to bring out more books for the benefit of the students and wish her all the success in her future endeavors.

Prof. VD Patil

Ex-Registrar, KLE Academy of Higher Education and Research
(KLE University)

and

Former Principal, JN Medical College, Belagavi

Preface

Pathology is a medical speciality concerned with the study of diseases which leads to the structural and functional changes in the human body. Pathology is basis for all the practicing physicians and surgeons. Knowledge of pathology plays a very important role in the field of medicine for accurate diagnosis and patient care. The subject of pathology which is learnt in MBBS course forms the basis for this. There are many voluminous books dealing extensively with various aspects of pathology written by foreign and Indian authors. Subject of pathology has grown to a great extent especially in molecular and cytogenetic areas, the identification of these abnormalities has led to personalized treatment in many of the diseases. There is a need for concise textbook with updated information, to meet the academic requirements of all undergraduate students studying pathology.

The idea of bringing out this book was evolved while teaching pathology to the undergraduate and postgraduate students over a period of 35 years. The *Practical Pathology and Quick Review*, which has seen second edition, has made my job easier. This book has been written in an easy language and in a simple and lucid style with the help of illustrations for the benefit of wise as well as ordinary students studying pathology in various fields of medicine (medical, dental, laboratory technology, other allied health sciences, nursing and AYUSH courses).

The salient features of the book are:

1. The book is divided into four main sections namely, Haematology, General Pathology, Systemic Pathology I and Systemic Pathology II.
2. In each section, different important chapters are covered.
3. The book emphasizes on theory as well as some practical skills.
4. The book covers the recent MCI competencies.
5. The book is also useful for the students in preparation of examination to answer long answers, short essays and short answers and to face viva-voce in pathology.
5. After main four sections, at the end has "Similes in Pathology", "Know your Scientists", and "Pearls to Know".
6. MCQs covering various topics which will help the students in preparation for MBBS II pathology as well as competitive examinations in medicine are also included at the end of each chapter.
7. The book is designed with illustrations of gross and microscopic pictures with original as well as schematic diagrams and line diagrams.

The book has seen its first edition through CBS Publishers who have made the book to reach the students studying Pathology nationwide.

The legacy of authoring a book is to follow the footprints of my father (Prof. SS Nanjannavar) who is a retired professor from Karnatak University, Dharwad and a noted author of many books in the field of geography. He is the main source of inspiration for me to continue this noble task of writing a book in order to serve the cause of student community in particular and medical education in general. It is hoped that this book would be of great help to the students and serve as a ready reference book to those who are studying pathology.

I will be failing in my duty if I do not express my sincere gratitude to Dr Prabhakar Kore, Chancellor and Dr Vivek Saoji, Vice-chancellor of KLE University, Belgaum for providing me all the facilities. I extend my grateful thanks to Dr VD Patil, Ex-registrar, KAHER (Deemed to be University), Belgaum for writing a foreword to this book and constantly encouraging for this difficult task of authoring books. I also thank our present registrar of KAHER, Dr VA Kotiwale. I sincerely thank my Principal, Dr Niranjana Mahantshetti and my colleagues at the department.

I offer my special thanks to Dr (Mrs) AV Dhaded, former Professor of Pathology, JN Medical College, Belagavi and to Dr Bhagyashri Hungund, Professor of Pathology, JN Medical College, Belgaum for giving valuable suggestions. I am grateful to all my co-authors who have reduced my work pressure. I thank Prof. Uday V Kokatnur, who inspite of his busy schedule, stood next to me for drawing nice diagrams. I also thank Mahantesh Nanjannavar for editing the pictures. I am thankful to my postgraduate students for their timely help.

I am grateful to my husband Dr Sharanabasava C Pilli, for his constant encouragement and support. Similarly, I appreciate the patience and co-operation of my children—Vijay and Veena and daughter-in-law and son-in-law during the preparation of this book.

Constructive suggestions from the teachers and students of pathology are most welcome for the improvement of this book in the subsequent editions.

Ganga S Pilli

Acknowledgements

1. I acknowledge the help rendered by all the co-authors in preparation of the manuscript.
2. I am thankful to CBS Publishers and Distributors. I would like to put on record the sincere efforts of Mr YN Arjuna (Senior Vice-President Publishing, Editorial and Publicity) and his team comprising of Ms Ritu Chawla (GM Production), Mr Tarun Rajput, Mr Surendra Jha and Ms Baljeet Kaur, for bringing out book in the present form.

Ganga S Pilli

List of Contributors

Chhatre A

Consultant Pathologist
Chhatre Diagnostics
Belagavi, Karnataka, India

Hawal M

Former Assistant Professor
Department of Pathology
USM Medical College and Consultant Pathologist
Belagavi

Hemanth V

Assistant Professor of Pathology
Shimoga Institute of Medical Sciences
Shimoga, Karnataka, India

Kanetkar SR

Professor and Head
Department of Pathology
Krishna Institute of Medical Sciences
Karad, Maharashtra, India

Kanodia KV

Professor
Department of Pathology, Lab. Medicine, Transfusion Services
and Immunohematology, GR Doshi and KM Mehta Institute of
Kidney Diseases and Research Centre and Dr HL Trivedi Institute
of Transplantation Sciences, Civil Hospital Campus
Asarwa, Ahmedabad, India

Kavita GU

Professor
Department of Pathology
SS Institute of Medical Sciences and Research Centre
Davangere, Karnataka, India

Kini U

Retd. Professor
St. John's Medical College
Bengaluru

Nigam LA

Assistant Professor
Department of Pathology, Lab. Medicine, Transfusion Services
and Immunohematology, GR Doshi and KM Mehta Institute of
Kidney Diseases and Research Centre and Dr HL Trivedi Institute
of Transplantation Sciences, Civil Hospital Campus
Asarwa, Ahmedabad, India

Panduranga C

Associate Professor
Department of Pathology, ESI Medical College and PGIMS
Rajaji Nagar, Bengaluru, Karnataka

Patel RD

Professor
Department of Pathology, Lab. Medicine, Transfusion Services
and Immunohematology, GR Doshi and KM Mehta Institute of
Kidney Diseases and Research Centre and Dr HL Trivedi Institute
of Transplantation Sciences, Civil Hospital Campus
Asarwa, Ahmedabad, India

Patil PV

Former Professor and HOD
Department of Pathology
JN Medical College
Belagavi, Karnataka, India

Pattanashetti M

Assistant Professor
Kodagu Institute of Medical Sciences
Madikeri

Pilli GS

Professor
Department of Pathology
JN Medical College
KLE Academy of Higher Education and Research
(A Deemed to be University)
Belagavi, Karnataka, India

Pruthvi D

Professor
Department of Pathology
SS Institute of Medical Sciences and Research Centre
Davangere, Karnataka, India

Shashikala P

Professor and HOD
Department of Pathology
SS Institute of Medical Sciences and Research Centre
Davangere, Karnataka, India

Shukla D

Former Assistant Professor
Department of Pathology
Krishna Institute of Medical Sciences
Karad, Maharashtra, India

Sridevi HB

Associate Professor
Department of Pathology
Kasturba Medical College, Mangalore
Manipal Academy of Higher Education
Manipal, Karnataka, India

Suresh PK

Associate Professor
Department of Pathology
Kasturba Medical College, Mangalore
Manipal Academy of Higher Education
Manipal, Karnataka, India

Susmitha MS

Associate Professor
Department of Pathology
Shimoga Institute of Medical Sciences
Shimoga, Karnataka, India

Suthar KS

Associate Professor
Department of Pathology, Lab. Medicine, Transfusion Services
and Immunohematology, GR Doshi and KM Mehta Institute of
Kidney Diseases and Research Centre and Dr HL Trivedi Institute
of Transplantation Sciences, Civil Hospital Campus
Asarwa, Ahmedabad, India

Vanikar AV

Professor and Head
Department of Pathology, Lab. Medicine, Transfusion Services
and Immunohematology, GR Doshi and KM Mehta Institute of
Kidney Diseases and Research Centre and Dr HL Trivedi Institute
of Transplantation Sciences, Civil Hospital Campus
Asarwa, Ahmedabad, India

Wani R

Consultant Obstetrician and Gynaecologist
KLE Dr Prabhakar Kore Hospital and Research Centre
Belagavi, Karnataka, India

Contents

Foreword

vii

Preface

ix

List of Contributors

xiii

SECTION 1: HAEMATOLOGY AND BLOOD BANKING

1. Bone Marrow and Haemopoiesis	3
Formation of blood elements from gestational life to adult life	3
Haematopoietic marrow architecture	3
Erythroid series	3
Myeloid series	4
Lymphoid series	5
Monocyte series	6
Magakaryotic series	6
2. Red Blood Cell Disorders	7
Red blood cells	7
Structure of red cell membrane	7
Red cell indices	8
Anaemias	8
Iron deficiency anaemia	9
Megaloblastic anaemia	12
Haemolytic anaemias	16
Thalassaemia	22
Hereditary spherocytosis	23
Sickle cell anaemia	24
Other haemolytic anaemias	25
Pancytopenia, aplastic anaemias and bone marrow failure syndromes	27
Anaemia of chronic diseases	29
Sideroblastic anaemia	30
3. Disorders of White Blood Cells	32
Leucocytosis and leukopenia—causes	32
Leukaemias	33
Acute leukaemias	34
Chronic myeloid leukaemia	36
Chronic lymphocytic leukaemia	38
4. Plasma Cell Disorders	40
Multiple myeloma/plasma cell dyscrasias	40
Waldenstorm's macroglobulinaemia	42
Monoclonal gamopathy of undetermined significance	42
Smouldering MM	43

5. Myeloproliferative/Chronic Myeloproliferative Disorders

44

Primary myelofibrosis	44
Polycythemia vera	45
Essential thrombocytosis	46
Mastocytosis	46

6. Myelodysplastic Syndrome (MDS)

47

7. Bleeding Disorders

50

Platelet abnormalities	50
Idiopathic thrombocytopenic purpura	51
Inherited thrombocytopenias	52
Coagulation disorders	53
Haemophilia A and B	54
Von Willebrand disease	55
Fibrinogen deficiency	55

8. Blood Groups and Transfusion Reactions

57

Blood groups	57
Universal donors and recipients	58
ABO subgroups	58
Laboratory tests done on a unit of blood donated	59
Crossmatching	59
Coomb's test	60
Transfusion reactions	60

SECTION 2: GENERAL PATHOLOGY

9. Introduction and History of Pathology

69

Introduction to pathology	69
History of pathology	69

10. Cell Injury and Cell Death

73

Cell injury and cell death: Mechanisms	73
Cellular adaptations	76
Reversible cell injury (degenerations)	79
Cloudy degeneration	79
Hydropic degeneration	79
Hyaline degeneration	80
Mucoid degeneration	80

Fatty change	81		
Amyloidosis	82		
Apoptosis	85		
Necrosis	87		
Gangrene	90		
11. Inflammation		93	
Definitions, causative agents and cardinal signs	93		
Changes in acute inflammation	93		
Vascular changes	93		
Cellular changes	94		
Chemical mediators	97		
Chronic inflammation	100		
Granulomatous inflammation	101		
Morphological patterns of inflammation	102		
Different types of giant cells	102		
12. Regeneration and Repair		104	
Normal cell cycle	104		
Cutaneous wound healing	105		
Fracture bone healing	107		
13. Haemodynamic Disorders		109	
Chronic venous congestion	109		
Thrombosis	111		
Normal haemostasis	111		
Embolism	115		
Thromboembolism	115		
Pulmonary embolism	115		
Fat embolism	117		
Air embolism	118		
Amniotic fluid embolism	120		
Infarction	120		
Myocardial infarction	121		
Pulmonary/lung infarction	122		
Oedema	123		
Shock	128		
Cardiogenic shock	129		
Hypovolaemic shock	130		
Septic shock	131		
14. Infectious Diseases		134	
Tuberculosis	134		
Actinomycosis	135		
Rhinosporidiosis	136		
Rhinoscleroma	137		
Leprosy	137		
Syphilis	139		
Acquired immunodeficiency syndrome	142		
Typhoid fever	145		
Diarrhoea and dysentery (infectious enterocolitis)	145		
Cholera	146		
Shigellosis	146		
Whipple disease	147		
Viral infections	147		
Parasitic infections	147		
Amoebiasis	147		
15. Pathological Calcification			148
Dystrophic calcification	148		
Metastatic calcification	149		
16. Pigment Disorders			150
Exogenous pigments	150		
Endogenous pigments	150		
17. Environmental Pathology			152
Alcoholism	152		
Tobacco and its health hazards	154		
Radiation	155		
Air pollution	156		
Pneumoconiosis	158		
Printing chemicals	158		
Heavy metal poisoning (lead, mercury, arsenic and cadmium)	158		
Climate change	159		
Noise pollution	159		
18. Nutritional Disorders			161
Protein energy malnutrition	161		
Marasmus	161		
Kwashiorkar	162		
Vitamin deficiencies	163		
Vitamin A	163		
Vitamin D	165		
Vitamin K	167		
Vitamin B	168		
19. Hypersensitivity Reactions			172
Type I. Immediate/IgE mediated	172		
Type II. Antibody-mediated cell destruction	173		
Type III. Immune complex mediated	175		
Type IV. Hypersensitivity (T cell-mediated/ delayed hypersensitivity)	176		
20. Diseases of Immune System			177
Autoimmune diseases: Mechanism	177		
Systemic lupus erythematosus	179		
Rheumatoid arthritis	183		
Sjögren syndrome	184		
Systemic sclerosis (scleroderma)	184		
Inflammatory myopathies	185		
21. Genetic Disorders			187
Trisomy 21 (Down syndrome)	187		
Trisomy 13 (Patau syndrome)	188		

Trisomy 18 (Edward syndrome)	188		
Deletion of chromosome 22q11.2 (Di George's syndrome)	188		
Sex chromosomal disorders	188		
Single gene disorders with atypical pattern of inheritance: Fragile X syndrome	189		
Genomic imprinting	189		
Mandelian disorders	190		
Diseases with mutations in structural proteins	190		
Diseases with mutation in receptor proteins	190		
Diseases with mutation in enzymes	191		
Lysosomal storage diseases	192		
Glycogen storage disease	193		
Maple syrup urine disease	193		
Cystic fibrosis	193		
22. Neoplasia		195	
Preneoplastic lesions	199		
Paraneoplastic syndromes	201		
Immunology and the immune response to cancer	208		
SECTION 3: SYSTEMIC PATHOLOGY I			
23. Lymph Node Lesions		213	
Normal structure	213		
Reactive lymphadenitis	213		
Acute non-specific lymphadenitis	213		
Chronic non-specific lymphadenitis	213		
Follicular hyperplasia	213		
Paracortical hyperplasia	214		
Sinus histiocytosis	214		
Cat-scratch disease	214		
Kikuchi-Fujimoto disease (histiocytic necrotising lymphadenitis)	214		
Kimura disease	214		
Hodgkin disease (Hodgkin lymphoma)	215		
Non-Hodgkin lymphoma (malignant lymphoma)	218		
Small lymphocytic lymphoma/chronic lymphocytic leukaemia	218		
Follicular lymphoma	219		
Mantle cell lymphoma	220		
Marginal zone lymphoma	220		
Diffuse large B cell lymphoma	221		
Burkitt lymphoma	221		
Anaplastic large cell lymphoma/ KI-1 lymphoma (ALK positive)	222		
Lymphoblastic lymphoma	222		
Adult T cell lymphoma/leukaemia	222		
Mycosis fungoides/sezary syndrome	222		
Metastasis to lymph nodes	223		
24. Respiratory Pathology			225
Normal anatomy and histology	225		
Atelectasis (collapse)	225		
Acute lung injury	226		
Acute respiratory distress syndrome	226		
Pneumonia	227		
Lobar pneumonia	227		
Bronchopneumonia	227		
Pulmonary tuberculosis	228		
Obstructive pulmonary disease	230		
Chronic bronchitis	230		
Emphysema	231		
Bronchial asthma	233		
Bronchiectasis	234		
Restrictive lung diseases	235		
Idiopathic pulmonary fibrosis/cryptogenic fibrosing alveolitis	236		
Non-specific interstitial fibrosis	236		
Cryptogenic organizing pneumonitis	236		
Lung in collagen vascular diseases	236		
Pneumoconiosis	236		
Granulomatous diseases of lung	236		
Diseases of vascular origin	236		
Goodpasture syndrome	236		
Lungs in Wegener's granulomatosis	237		
Lung carcinoma	237		
Occupational lung diseases	239		
Coal workers' pneumoconiosis	240		
Silicosis	241		
Asbestosis	242		
25. Cardiovascular Pathology: Vascular Lesions			245
Atherosclerosis	245		
Hypertensive vascular disease	247		
Aneurysms	248		
Saccular aneurysms	249		
Fusiform aneurysms	249		
Aortic dissection	249		
Raynaud's phenomenon	249		
Vasculitis	250		
Giant cell arteritis	250		
Takayasu arteritis	250		
Polyarteritis nodosa	251		
Kawasaki disease	251		
Wegener disease (granulomatosis)	251		
Churg-Strauss syndrome	251		
Microscopic angiitis	251		
Thromboangiitis obliterans/ Buerger's disease	251		

- 26. Cardiovascular Pathology: Heart Lesions 253**
 Congenital heart diseases 253
 Carcinoid heart disease 255
 Heart failure 255
 Ischaemic heart diseases 256
 Angina pectoris 256
 Myocardial infarction 256
 Chronic ischaemic heart disease 257
 Sudden cardiac death 257
 Hypertensive heart disease 257
 Valvular heart diseases 258
 Calcific aortic stenosis 258
 Myxomatous mitral valve 258
 Prosthetic cardiac valves 259
 Infective endocarditis 259
 Rheumatic fever and rheumatic heart disease 261
 Myocarditis 264
 Cardiomyopathies 264
 Dilated cardiomyopathy 264
 Hypertrophic cardiomyopathy 265
 Restrictive cardiomyopathy 266
 Pericarditis 266
 Pericardial effusion 266
- 27. Gastrointestinal Pathology: Salivary Gland Lesions 268**
 Normal salivary gland 268
 Inflammatory lesions 268
 Xerostomia 268
 Sjögren syndrome 268
 Mucocele 268
 Sialolithiasis 269
 Sialadenitis 269
 Tumours 269
 Pleomorphic adenoma 269
 Warthin tumour (papillary cystadenoma lymphomatosum/adenolymphoma) 270
 Mucoepidermoid carcinoma 271
 Adenoid cystic carcinoma 271
 Acinic cell carcinoma 271
- 28. Gastrointestinal Pathology: Oral Cavity and Esophagus 273**
 Premalignant conditions of oral cavity 273
 Oral submucous fibrosis 273
 Xeroderma pigmentosum 273
 Premalignant lesions of oral cavity 273
 Leukoplakia 274
 Erythroplakia 274
 Carcinoma *in situ* 274
 Nicotine stomatitis 274
 Carcinoma of oral cavity 275
 Achalasia cardia 275
 Mallory-Weiss syndrome 275
 Barrett esophagus 275
 Esophageal tumours 276
 Squamous cell carcinoma 276
 Adenocarcinoma 276
 Malignant melanoma 277
- 29. Gastrointestinal Pathology: Stomach and Intestinal Lesions 278**
 Gastritis 278
 Peptic ulcer 278
 Gastric ulcer 280
 Duodenal ulcer 280
 Gastric carcinoma 282
 Inflammatory lesions of intestine 283
 Typhoid ulcer 283
 Tuberculous ulcer 284
 Inflammatory bowel diseases 284
 Acute and chronic appendicitis 287
 Tumours of intestine 289
 Intestinal polyps 289
 Carcinoma colon 290
 Carcinoid tumours 293
 Gastrointestinal stromal tumour 293
- 30. Liver and Hepatobiliary System 295**
 Jaundice 295
 Neonatal jaundice 296
 Other rare causes of jaundice 296
 Laboratory work-up to differentiate between various types of jaundice 296
 Viral hepatitis 297
 Hepatitis A virus 297
 Hepatitis B virus 298
 Hepatitis C virus 299
 Hepatitis D virus 299
 Hepatitis E virus 300
 Clinical features and outcomes in viral hepatitis 300
 Alcoholic liver diseases 301
 Alcoholic steatosis 302
 Alcoholic hepatitis 302
 Alcoholic cirrhosis 303
 Cirrhosis 303
 Portal hypertension 305
 Neoplasms of liver 306
 Hepatocellular carcinoma 306
 Fibrolamellar variant of HCC 307
 Hepatoblastoma 307
 Cholangiocarcinoma 308

31. Gallbladder	310	Endometrial hyperplasia	341
Cholecystitis	310	Leiomyoma	342
Gallstones (cholelithiasis)	311	Endometrium carcinoma	343
Gallbladder neoplasms	313	Gestational trophoblastic diseases	344
32. Pancreas	315	Hydatidiform mole (vesicular mole)	344
Pancreatitis	315	Invasive hydatidiform mole	346
Acute pancreatitis	315	Placental site trophoblastic tumours	346
Chronic pancreatitis	317	Choriocarcinoma	346
Pancreatic carcinoma	318	36. Female Genital System: Ovarian Lesions	349
SECTION 4: SYSTEMIC PATHOLOGY II			
33. Lesions of Breast	323	Normal ovary	349
Normal anatomy and histology of breast	323	Ovarian tumors	349
Congenital anomalies	323	Serous cystadenoma ovary	350
Inflammatory and related conditions	323	Mucinous cystadenoma ovary	351
Male breast and gynaecomastia	323	Mucinous borderline or low malignant potential tumours	351
Fibrocystic disease	324	Mucinous adenocarcinomas	351
Ductal hyperplasia/usual ductal hyperplasia	324	Endometrioid tumours of the ovary	351
Atypical ductal hyperplasia	324	Clear cell tumours	351
Atypical lobular hyperplasia	325	Brenner and transitional cell tumours	352
Intraductal papilloma	325	Carcinosarcoma ovary	352
Fibroadenoma	325	Mature cystic teratoma ovary	352
Phyllodes tumour	325	Immature teratoma	352
Paget's disease of nipple	326	Monodermal (specialized) teratoma	352
Non-invasive breast carcinomas	326	Dysgerminoma	353
Breast carcinoma	327	Yolk sac tumour	353
Infiltrating (invasive) carcinoma	327	Embryonal carcinoma	353
34. Female Genital System: Cervix	331	Choriocarcinoma	353
Gross anatomy	331	Sex cord stromal tumours	353
Non-neoplastic lesions	331	Granulosa cell tumour	354
Inflammations	331	Thecomas	354
Cervicitis: Acute and chronic	331	Fibromas	354
Endocervical polyp	332	Sertoli-Leydig cell tumour (androblastoma, arrhenoblastoma)	354
Premalignant and malignant lesions of cervix	332	Leydig cell tumours	354
Cervical intraepithelial neoplasia	332	Gynandroblastoma	354
Glandular intraepithelial neoplasia	333	Lipid cell tumours	355
Carcinoma of cervix	333	Metastatic tumours	355
Invasive squamous cell carcinoma	334	Krukenberg tumour	355
Adenocarcinoma cervix	335	37. Male Genital System: Scrotum, Testis, Epididymis, Penile Lesions and Prostate	358
35. Female Genital System: Uterus, and Gestational Trophoblastic Diseases	339	Scrotum	358
Uterus	339	Testis and epididymis	358
Endometrial changes during menstrual cycle	339	Cryptorchidism	358
Functional endometrial disorders	340	Inflammatory lesions	358
Anovulatory cycles	340	Testicular tumours	358
Endometritis	340	Germ cell neoplasia <i>in situ</i>	359
Endometriosis	340	Seminoma testis	359
Adenomyosis	341	Spermatocytic seminoma	360
		Teratoma testis	360

- Embryonal carcinoma 361
- Yolk sac tumour 361
- Choriocarcinoma 361
- Mixed germ cell tumours 361
- Penile lesions 361
 - Neoplasms of penis 362
 - Penile carcinoma 362
- Lesions of prostate 363
 - Prostatitis 363
 - Nodular hyperplasia of prostate 363
 - Prostatic intraepithelial neoplasia 364
 - Prostatic carcinoma 364
- 38. Endocrine Pathology 367**
 - Thyroid lesions 367
 - Thyroid gland 367
 - Formation of thyroid hormones 367
 - Thyroiditis 367
 - Thyrotoxicosis 369
 - Hypothyroidism 370
 - Neoplasms of thyroid 371
 - Parathyroid gland 373
 - Primary hyperparathyroidism 373
 - Secondary hyperparathyroidism 373
 - Tertiary hyperparathyroidism 373
 - Hypoparathyroidism 374
 - Diabetes mellitus 374
 - Adrenal gland 378
 - Neoplasms of adrenal gland 378
 - Multiple endocrine neoplasia syndromes 378
 - Cushing's syndrome (hypercortisolism) 379
 - Pheochromocytoma (chromaffin tumour) 380
 - Hyperaldosteronism 381
 - Pituitary gland 381
- 39. Diseases of Renal System 384**
 - Introduction 384
 - Structure and function of nephron 384
 - Glomerular diseases 385
 - Nephritic syndrome 390
 - Crescentic glomerulonephritis/rapidly progressive glomerulonephritis 393
 - Nephrotic syndrome 395
 - Chronic glomerulonephritis 400
 - Tubulointerstitial nephritis 401
 - Acute pyelonephritis 401
 - Chronic pyelonephritis (PN) and reflux nephropathy 401
 - Drug-induced interstitial nephritis 403
 - Analgesic nephropathy 403
 - Acute tubular necrosis 403
 - Diseases involving blood vessels 404
 - Benign nephrosclerosis 404
 - Malignant nephrosclerosis 405
 - Cystic diseases of kidney 405
 - Polycystic kidney 405
 - Medullary cystic kidney 406
 - Urinary tract obstruction 406
 - Kidney stones 406
 - Hydronephrosis 407
 - Tumors of kidney 407
 - Benign tumours 407
 - Malignant tumours 488
 - Lower urinary tract 412
 - Urinary bladder 412
 - Tumours of urinary bladder 413
 - Urothelial carcinoma 413
- 40. Bone Lesions 417**
 - Normal structure of bone 417
 - Osteomyelitis 417
 - Pyogenic osteomyelitis 417
 - Granulomatous osteomyelitis (mycobacterial osteomyelitis/tuberculous osteomyelitis) 418
 - Developmental abnormalities 419
 - Achondroplasia 419
 - Osteogenesis imperfecta (brittle bone disease) 419
 - Osteopetrosis 419
 - Osteoporosis 419
 - Paget's disease of bone (osteitis deformans) 420
 - Rickets and osteomalacia 420
 - Renal osteodystrophy 421
 - Brown tumour 422
 - Bone tumours 422
 - Classification of bone tumours 422
 - Bone-forming tumours 422
 - Cartilage-forming tumours 424
 - Ewing sarcoma family tumour 425
 - Giant cell tumour 425
 - Ameloblastoma 426
- 41. Skeletal Muscle Lesions 428**
 - Skeletal muscle atrophy 428
 - Inherited disorders 428
 - Duchenne muscular dystrophy 428
 - Becker muscular dystrophy 429
 - Other inherited muscle disorders 429
- 42. CNS Lesions 430**
 - Berry aneurysms/saccular aneurysms 430
 - Subarachnoid haemorrhage 430
 - Intracerebral haemorrhage 431

Meningitis	431	
Tuberculosis of central nervous system	433	
Central nervous system tumours	433	
Classification of CNS tumours	433	
Astrocytoma	433	
Subependymal giant cell astrocytoma	434	
Oligodendroglioma	436	
Ependymoma	436	
Choroidal plexus tumours	437	
Embryonal/undifferentiated tumours	437	
Medulloblastoma	437	
Newer molecular classification of embryonal/ undifferentiated tumours	437	
Atypical teratoid/rhabdoid tumour	437	
CNS lymphomas	437	
Germ cell tumour	438	
Meningioma	438	
Craniopharyngioma	438	
Pituitary adenoma	439	
Metastatic tumours	439	
43. Skin Lesions	440	
Viral infections	440	
Molluscum contagiosum	440	
Viral warts	440	
Inflammatory dermatosis	440	
Psoriasis	440	
Lichen planus	441	
Adenexal tumours	441	
Tumours arising from the stratified epithelium	442	
Seborrhoeic keratosis	442	
Squamous cell papilloma	442	
Squamous cell carcinoma	442	
Basal cell carcinoma	443	
Merkel cell carcinoma	443	
Melanocytic lesions	444	
Naevus	444	
Malignant melanoma	444	
44. Eye Lesions	448	
Trachoma	448	
Chalazion/tarsal/meibomian cyst	448	
Stye/external hordeolum	449	
Internal hordeolum	449	
Retinitis pigmentosa	449	
Meibomian gland carcinoma/sebaceous gland carcinoma of eyelid	449	
Retinoblastoma	449	
Malignant melanoma of eye	450	
Addendum	451	
Similes	456	
Pearls to Know	462	
Know Your Scientists	483	
INDEX	487	

COMPETENCIES

<i>Competency</i>	<i>Chapter</i>	<i>Page No.</i>
Topic: Introduction to Haematology		
1. Describe haemopoiesis.	1	3
Topic: Red Cell Disorders–Anaemia: General aspects, Microcytic and Macrocytic Anaemia, Haemolytic and Others		
1. Define and classify anaemia.	2	8
2. Enumerate and describe the investigations of anaemia.	2	9–30
3. Describe iron metabolism.	2	9
4. Describe the etiology, investigations and differential diagnosis of microcytic hypochromic anaemia.	2	9
5. Identify and describe the peripheral smear in microcytic anaemia.	2	9
6. Describe the metabolism of vitamin B ₁₂ and the etiology and pathogenesis of vitamin B ₁₂ deficiency.	2	12
7. Describe laboratory investigations of macrocytic anaemia.	2	12
8. Identify and describe the peripheral blood picture of macrocytic anaemia.	2	12
9. Enumerate the differences and describe the etiology and distinguishing features of megaloblastic and non-megaloblastic macrocytic anaemia.	2	12
10. Define and classify haemolytic anaemia.	2	16
11. Describe the pathogenesis and clinical features and haematologic indices of haemolytic anaemia.	2	16
12. Describe the pathogenesis, features, haematologic indices and peripheral blood picture of sickle cell anaemia and thalassaemia.	2	22, 24
13. Describe the etiology pathogenesis, haematologic indices and peripheral blood picture of acquired haemolytic anaemia.	2	25
14. Describe the peripheral blood picture in different haemolytic anaemias.	2	22–25
15. Prepare a peripheral blood smear and identify haemolytic anaemia from it.	2	16
16. Describe a correct technique to perform crossmatch.	8	52
17. Enumerate the etiology, pathogenesis and findings in aplastic anaemia.	2	27
Topic: Disorders of White Blood Cells		
1. Enumerate and describe the causes of leucocytosis, leucopenia, lymphocytosis and leukemoid reaction.	3	32
2. Describe the etiology, genetics, pathogenesis classification, features, haematologic features of acute and chronic leukaemia.	3	33–38
Topic: Plasma Cell Disorders		
1. Describe the features of plasma cell myeloma.	4	40
Topic: Disorders of Haemostasis		
1. Describe normal haemostasis.	13	111
2. Classify and describe the etiology, pathogenesis and pathology of vascular and platelet disorders including ITP and haemophilias.	7	50–52
3. Differentiate platelet from clotting disorders based on the clinical and haematologic features.	7	50–55
Topic: Blood Groups and Transfusion Reactions		
1. Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion.	8	57
2. Classify and describe blood group systems (ABO and RH).	8	57, 58
3. Enumerate blood components and describe their clinical use.	Addendum	451
Topic: Introduction to Pathology		
1. Enumerate common definitions and terms used in pathology.	9	69
2. Describe the history and evolution of pathology.	9	69
3. Describe the role of a pathologist in diagnosis and management of disease.	Addendum	451

<i>Competency</i>	<i>Chapter</i>	<i>Page No.</i>
Topic: Cell Injury and Adaptation		
1. Demonstrate knowledge of the causes, mechanisms, types and effects of cell injuries and their clinical significance.	10	73
2. Describe the etiology of cell injury. Distinguish between reversible-irreversible injury: Mechanisms; morphology of cell injury.	10	73
3. Intracellular accumulation of fats, proteins, carbohydrates, pigments.	10, 16	79–81, 150, 193
4. Describe and discuss cell death—types, mechanisms, necrosis, apoptosis (basic as contrasted with necrosis), autolysis.	10	85, 87
5. Describe and discuss pathologic calcifications.	15	148, 149
6. Define, describe and discuss gangrene.	10	90
7. Describe and discuss cellular adaptations: Atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia.	10	76
8. Describe and discuss the mechanisms of cellular aging and apoptosis.	10, Addendum	85, 451
9. Identify and describe various forms of cell injuries, their manifestations and consequences in gross and microscopic specimens.	10	79, 90
10. Describe the pathogenesis and pathology of amyloidosis.	10	82
11. Identify and describe amyloidosis in a pathology specimen.	10	82
Topic: Inflammation		
1. Define and describe the general features of acute and chronic inflammation including stimuli, vascular and cellular events.	11	93, 94
2. Enumerate and describe the mediators of acute inflammation.	11	97
3. Define and describe chronic inflammation including causes, types—non-specific and granulomatous and enumerate examples of each.	11	100, 101
Topic: Regeneration and Repair		
1. Define and describe the process of repair and regeneration including wound healing and its types.	12	105, 107
Topic: Haemodynamic Disorders		
1. Define and describe normal haemostasis and the etiopathogenesis and consequences of thrombosis.	13	111
2. Define and describe embolism and its causes and describe common embolisms.	13	115–200
3. Define and describe oedema, its types, pathogenesis and clinical correlations, how to differentiate clinically between pitting and non-pitting oedema.	13	123
4. Define and describe hyperaemia, congestion, haemorrhage.	13	109
5. Define and describe shock, its pathogenesis and its stages, clinical features of shock, basic management of shock.	13	128–131
6. Define and describe ischaemia/infarction, its types, etiology, morphologic changes and clinical effects.	13	120–122
7. Identify and describe the gross and microscopic features of infarction in a pathologic specimen.	13	120–122
Topic: Infectious Diseases and AIDS		
1. Describe pathogenesis and pathology of tuberculosis.	14	134
2. Define and describe the pathogenesis and pathology of leprosy.	14	137
3. Define and describe the pathogenesis and pathology of common bacterial, viral, protozoal and helminthic diseases.	14	142–147
4. Define and describe the pathogenesis and pathology of HIV and AIDS.	14	142
Topic: Pathological Calcification		
1. Describe and discuss pathologic calcification.	15	148
Topic: Pigment Disorders		
1. Intracellular (endogenous and exogenous) pigments.	16	150
Topic: Nutritional Disorders		
1. Describe the pathogenesis of disorders caused by protein calorie malnutrition and starvation.	18	161, 162
2. Describe the pathogenesis of obesity and its consequences.	Addendum	451

<i>Competency</i>	<i>Chapter</i>	<i>Page No.</i>
Topic: Environmental Pollution		
1. Enumerate and describe the pathogenesis of disorders caused by air pollution, tobacco and alcohol.	17	154
Topic: Hypersensitivity Reactions		
1. Describe the mechanism of hypersensitivity reactions.	19	172–176
Topic: Diseases of Immune System		
1. Describe the principles and mechanisms involved in immunity.	20	177
2. Describe the mechanism of hypersensitivity reaction.	20	177
3. Define autoimmunity. Enumerate autoimmune disorder.	20	177
4. Define and describe the pathogenesis of systemic lupus erythematosus.	20	179
5. Define and describe the pathogenesis of other common autoimmune diseases.	20	179–185
6. Classify and describe the etiology, immunology, pathogenesis, manifestations, radiologic and laboratory features, diagnostic criteria and complications of rheumatoid arthritis.	20	183
Topic: Genetic Disorders		
1. Describe the pathogenesis and features of common cytogenetic abnormalities and mutations in childhood.	21	187–191
2. Describe the pathogenesis and pathology of tumour and tumour-like conditions in infancy and childhood.	Addendum	451
3. Describe the pathogenesis of common storage disorders in infancy and childhood.	21	192, 193
Topic: Neoplastic Disorders		
1. Define and classify neoplasia. Describe the characteristics of neoplasia including gross, microscopy, biologic behaviour and spread. Differentiate between benign from malignant neoplasm.	22	195
2. Describe the molecular basis of cancer.	22	199
3. Enumerate carcinogens and describe the process of carcinogenesis.	22	195
4. Describe the effects of tumour on the host including paraneoplastic syndrome.	22	201
5. Describe immunology and the immune response to cancer.	22	208
Topic: Lymph Nodes and Spleen		
1. Enumerate the causes and describe the differentiating features of lymphadenopathy.	23	213
2. Describe the pathogenesis and pathology of tuberculous lymphadenitis.	14	134
3. Identify and describe the features of tuberculous lymphadenitis in a gross and microscopic specimen.	14	134
4. Describe and discuss the pathogenesis, pathology and the differentiating features of Hodgkin's and non-Hodgkin's lymphoma.	23	215–223
5. Identify and describe the features of Hodgkin's lymphoma in a gross and microscopic specimen.	23	215
6. Enumerate and differentiate the causes of splenomegaly.	Addendum	451
7. Identify and describe the gross specimen of an enlarged spleen.	10, 13	82, 109
Topic: Respiratory System		
1. Define and describe the etiology, types, pathogenesis, stages, morphology and complications of pneumonia.	24	227
2. Describe the etiology, gross and microscopic appearance and complications of lung abscess.	Addendum	451
3. Define and describe the etiology, types, pathogenesis, morphology and complications and evaluation of obstructive airway disease and bronchiectasis.	24	230–234
4. Define and describe the etiology, types, pathogenesis, stages, morphology, microscopic appearance and complications of tuberculosis.	24	228
5. Define and describe the etiology, types, exposure, environmental influence, pathogenesis, stages, morphology, microscopic appearance and complications of occupational lung diseases.	24	239–442
6. Define and describe the etiology, types, exposure, genetics environmental influence, pathogenesis, stages, morphology, microscopic appearance, metastases and complications of tumours of the lung and pleura.	24	237
7. Define and describe the etiology, types, exposure, genetics, environmental influence, pathogenesis, morphology, microscopic appearance and complications of mesothelioma.	24	243

<i>Competency</i>	<i>Chapter</i>	<i>Page No.</i>
Topic: CVS: Blood Vessels/Vascular Pathology		
1. Distinguish arteriosclerosis from atherosclerosis. Describe the pathogenesis and pathology of various causes and types of arteriosclerosis.	25	245
2. Describe the etiology, dynamics, pathology, types and complications of aneurysms including aortic aneurysms.	25	248
Topic: CVS: Heart		
1. Describe the etiology, pathophysiology, pathology, gross and microscopic features, criteria and complications of rheumatic fever.	26	261
2. Describe the epidemiology, risk factors, etiology, pathophysiology, pathology, presentations, gross and microscopic features, diagnostic tests and complications of ischaemic heart disease.	26	256
3. Describe the etiology, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of infective endocarditis.	26	259
4. Describe the etiology, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of pericarditis and pericardial effusion.	26	266
5. Classify and describe the etiology, types, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of cardiomyopathies.	26	264–266
6. Describe the etiology, pathophysiology, pathology features and complications of syphilis on the cardiovascular system.	14	139
Topic: Oral Cavity and Esophagus		
1. Describe the etiology, pathogenesis, pathology and clinical features of oral cancer.	28	275
Topic: Stomach and Intestine		
1. Describe the etiology, pathogenesis, pathology, microbiology, clinical and microscopic features of peptic ulcer disease.	29	278–280
2. Describe and identify the microscopic features of peptic ulcer.	29	279, 280
3. Describe the etiology, pathogenesis and pathologic features of carcinoma of the stomach.	29	282
4. Describe the etiology, pathogenesis and pathologic features of tuberculosis of the intestine.	29	284
5. Describe the etiology and pathogenesis and pathologic and distinguishing features of inflammatory bowel disease.	29	284
6. Describe the etiology, pathogenesis, pathology and distinguishing features of carcinoma of the colon.	29	290
Topic: Liver and Hepatobiliary System		
1. Describe bilirubin metabolism, enumerate the etiology and pathogenesis of jaundice, distinguish between direct and indirect hyperbilirubinaemia.	30	296
2. Describe the pathophysiology and pathologic changes seen in hepatic failure and their clinical manifestations, complications and consequences.	30	305
3. Describe the etiology and pathogenesis of viral and toxic hepatitis: Distinguish the causes of hepatitis based on the clinical and laboratory features. Describe the pathology, complications and consequences of hepatitis.	30	297
4. Describe the pathophysiology, pathology and progression of alcoholic liver disease including cirrhosis.	30	301–303
5. Describe the etiology, pathogenesis and complications of portal hypertension.	30	305
Topic: Breast		
1. Classify and describe the types, etiology, pathogenesis, pathology and hormonal dependency of benign breast disease.	33	323–325
2. Classify and describe the epidemiology, pathogenesis, classification, morphology, prognostic factors, hormonal dependency, staging and spread of carcinoma of the breast.	33	327
3. Describe and identify the morphologic and microscopic features of carcinoma of the breast.	33	327
4. Enumerate and describe the etiology, hormonal dependency and pathogenesis of gynecomastia.	33	323

<i>Competency</i>	<i>Chapter</i>	<i>Page No.</i>
Topic: Female Genital Tract: Cervix		
1. Describe the etiology and morphologic features of cervicitis.	34	331
2. Describe the epidemiology, pathogenesis, etiology, pathology, screening, diagnosis and progression of carcinoma of the cervix.	34	333
Topic: Female Genital Tract: Endometrium and Uterus, Trophoblastic Diseases		
1. Describe the etiology, hormonal dependence and morphology of endometrial hyperplasia.	35	341
2. Describe the pathogenesis, etiology, pathology, diagnosis and progression and spread of carcinoma of the endometrium.	35	343
3. Describe the pathogenesis, etiology, pathology, diagnosis of leiomyoma.	35	342
4. Describe the etiology, hormonal dependence, features and morphology of endometriosis.	35	340
5. Describe the etiology and morphologic features of adenomyosis.	35	341
6. Describe the etiology, pathogenesis, pathology, morphology, clinical course, spread and complications of gestational trophoblastic neoplasms.	35	344–346
Topic: Female Genital Tract: Ovaries		
1. Classify and describe the etiology, pathogenesis, pathology, morphology, clinical course, spread and complications of ovarian tumours.	36	349–355
Topic: Male Genital System		
1. Classify testicular tumours and describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of testicular tumours.	37	358
2. Describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the penis.	37	362
3. Describe the pathogenesis, pathology, hormonal dependency presenting and distinguishing features, urologic findings and diagnostic tests of benign prostatic hyperplasia.	37	363
4. Describe the pathogenesis, pathology, hormonal dependency presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the prostate.	37	364
5. Describe the etiology, pathogenesis, pathology and progression of prostatitis.	37	363
Topic: Endocrine Pathology		
1. Enumerate, classify and describe the etiology, pathogenesis, pathology and iodine dependency of thyroid swellings.	38	367–370
2. Describe the etiology, cause, iodine dependency, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis.	38	369
3. Describe the etiology, pathogenesis, manifestations, laboratory and course of thyrotoxicosis/hypothyroidism.	38	367–370
4. Classify and describe the epidemiology, etiology, pathogenesis, pathology, clinical and laboratory features, complications and progression of diabetes mellitus.	38	374
5. Describe the etiology, genetics, pathogenesis, manifestations, laboratory and morphologic features of hyperparathyroidism.	38	373
6. Describe the etiology, pathogenesis, manifestations laboratory and morphologic features, complications and metastases of pancreatic cancer.	32	318
7. Describe the etiology, pathogenesis, manifestations, laboratory and morphologic features, and complications of adrenal insufficiency.	38	378
8. Describe the etiology, pathogenesis, manifestations, laboratory and morphologic features, and complications of Cushing's syndrome.	38	379
9. Describe the etiology, pathogenesis, clinical manifestations, laboratory and morphologic features of adrenal neoplasms.	38	378, 380
Topic: Renal System		
1. Describe the normal histology of the kidney.	39	384
2. Define, classify and distinguish the clinical syndromes.	39	390, 395
3. Define and classify glomerular diseases. Enumerate and describe the etiology, pathogenesis, mechanisms of glomerular injury, pathology, distinguishing features and clinical manifestations of glomerulonephritis.	39	390, 395
4. Define and describe the etiology, pathogenesis, pathology, laboratory and urinary findings, progression and complications of IgA nephropathy.	39	392

<i>Competency</i>	<i>Chapter</i>	<i>Page No.</i>
5. Enumerate and describe the findings in glomerular manifestations of systemic disease.	39	387, 395
6. Enumerate and classify diseases affecting the tubular interstitium.	39	401
7. Define and describe the etiology, pathogenesis, pathology, laboratory and urinary findings, progression and complications of acute tubular necrosis.	39	403
8. Describe the etiology, pathogenesis, pathology, laboratory findings, distinguishing features progression and complications of acute and chronic pyelonephritis and reflux nephropathy.	39	401
9. Define, classify and describe the etiology, pathogenesis pathology, laboratory and urinary findings, distinguishing features, progression and complications of vascular disease of the kidney.	39	404, 405
10. Define, classify and describe the genetics, inheritance, etiology, pathogenesis, pathology, laboratory and urinary findings, distinguishing features, progression and complications of cystic disease of the kidney.	39	405, 406
11. Define, classify and describe the etiology, pathogenesis, pathology, laboratory and urinary findings, distinguishing features, progression and complications of renal stone disease and obstructive uropathy.	39	406, 407
12. Classify and describe the etiology, genetics, pathogenesis, pathology, presenting features, progression and spread of renal tumours.	39	408
13. Describe the etiology, genetics, pathogenesis, pathology, presenting features and progression of urothelial tumours.	39	413
Topic: Bone		
1. Classify and describe the etiology, pathogenesis, pathology, clinical manifestations, radiologic findings and complications of osteomyelitis.	40	417
2. Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications and metastases of bone tumours.	40	422
3. Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of Paget's disease of the bone.	40	420
Topic: CNS		
1. Describe the etiology, types, pathogenesis, differentiating factors, CSF findings in meningitis.	Addendum	451
2. Classify and describe the etiology, genetics, pathogenesis, pathology, presentation sequelae and complications of CNS tumours.	42	433
Topic: Skin Lesions		
1. Describe the risk factors, pathogenesis, pathology and natural history of squamous cell carcinoma of the skin.	43	442
2. Describe the risk factors, pathogenesis, pathology and natural history of basal cell carcinoma of the skin.	43	443
3. Describe the distinguishing features between a nevus and melanoma. Describe the etiology, pathogenesis, risk factors, morphology, clinical features and metastases of melanoma.	43	444
4. Identify, distinguish and describe common tumours of the skin.	43	441-444
Topic: Eye Lesions		
1. Describe the etiology, genetics, pathogenesis, pathology, presentation, sequelae and complications of retinoblastoma.	44	449
Addendum		
Following competencies which are not covered in the text are listed here and described at the end of the book.		
1. Disseminated extravascular coagulation (DIC)	Addendum	451
2. Blood components and their clinical use	Addendum	451
3. Role of a pathologist in diagnosis and management of disease	Addendum	451
4. Cellular aging	Addendum	452
5. Obesity and its consequences	Addendum	453
6. HLA system and immune principles in transplant and transplant rejection	Addendum	453
7. Tumour like lesions, benign and malignant diseases of infancy and childhood	Addendum	454
8. Causes of splenomegaly	Addendum	454
9. Lung abscess	Addendum	454
10. CSF findings in meningitis	Addendum	455

ABBREVIATIONS

ADCC	Antidody dependent cell mediated cytotoxicity	HD	Hodgkin disease
ADH	Antidiuretic hormone	HDL	Heavy density lipoproteins
AD	Autosomal dominant	HDN	Haemolytic disease of newborn
ADP	Adenosine diphosphate	HELLP	Hemolysis, elevated liver enzymes, low platelet count
AIHA	Autoimmune haemolytic anaemia	HLA	Human leucocyte antigen
AFP	Alpha-fetoproteins	HNPCC	Hereditary non-polyposis colorectal cancer
ALIP	Abnormal localisation of immature precursors	HPV	Human papilloma virus
ANCA	Antineutrophil cytoplasmic antibodies	HS	Hereditary spherocytosis
APLA/APS	Antiphospholipid antibody	HSIL	High grade squamous intraepithelial lesion
APTT	Activated partial thromboplastin time	HT	Hypertension
AR	Autosomal recessive	IC	Integrated circuit
AS	Aortic stenosis	IDL	Intermediate density lipoproteins
Beta 2M	Beta 2 microglobulin (β 2 microglobulin)	IL	Interleukin
BCC	Basal cell carcinoma	IM	Infectious mononucleosis
BM	Bone marrow	INF	Interferon
CCF	Congestive cardiac failure	IHC	Immunohistochemistry
CaCl ₂	Calcium chloride	IHD	Ischaemic heart disease
CIN	Carcinoma <i>in situ</i>	ITP	Idiopathic thrombocytopenic purpura
CFTR	Cystic fibrosis transmembrane conductance regulator	KOH	Potassium hydroxide
CMMI	Chronic myelomonocytic leukaemia	LCA	Left coronary artery
CMP	Cardiomyopathy	LDH	Lactate dehydrogenase
CMV	Cytomegalovirus	LDHD	Lymphocyte depleted Hodgkin disease
CNS	Central nervous system	L and H	Lymphocytic and histiocytic
CRAB	Calcium (elevated), renal failure, anaemia, bone lesions	LDL	Low density lipoproteins
CT	Computerised tomography	LN	Lymph node
CV	Cardiovascular	LSIL	Low grade squamous intraepithelial lesion
DCIS	Duct carcinoma <i>in situ</i>	MCD	Minimal change disease
DIC	Disseminated intravascular coagulation	MCHC	Mean corpuscular haemoglobin concentration
DVT	Deep vein thrombosis	MCV	Mean corpuscular volume
EBV	Epstein-Barr virus	MDS	Myelodysplastic syndrome
ECM	Extracellular matrix	MGN	Mesangial glomerulonephritis
ER	Estrogen receptors	MEN	Multiple endocrine neoplasia
FH	Familial hypercholesterolemia	MGG stain	May-Grunwald-Giemsa stain
fl	Femtolitres	MI/MR	Mitral incompetence/mitral regurgitation
FSGS	Focal segmental glomerulosclerosis	MA	Macrocytic anaemia
GCT	Giant cell tumour	MHA	Microcytic hypochromic anaemia
GERD	Gastroesophageal reflux disease	MM	Multiple myeloma
GGT	Gamma glutamyl transpeptidase	MPGN	Membranoproliferative glomerulonephritis
G6PD	Glucose-6-phosphate dehydrogenase	NaOH	Sodium hydroxide
HA	Haemolytic anaemia	NADPH	Nicotinamide adenine dinucleotide phosphate
Hb	Haemoglobin		
HCC	Hepatocellular carcinoma		
HCG	Human chorionic gonadotropin		
HCl	Hydrochloric acid		

NAIT	Neonatal autoimmune thrombocytopenia	RARS	Refractory anaemia with ring sideroblasts
NNA	Normocytic normochromic anaemia	RAEB	Refractory anaemia with excess blasts
NO	Nitric oxide	RBC	Red blood cell
NP	Niemann-Pick disease	RCA	Right coronary artery
OD	Optical density	ROS	Reactive oxygen species
OS	Osteosarcoma	RPGN	Rapidly progressive glomerulonephritis
PCV	Packed cell volume	RS cells	Reed-Sternberg cells
PAS stain	Periodic acid-Schiff stain	SBC	Simple bone cyst
PLAP	Placental alkaline phosphatase	SIADH	Syndrome of inappropriate secretion of ADH
POEMS	Polyneuropathy, organomegaly, endocrinopathy, myeloma protein and skin changes	SLE	Systemic lupus erythematosus
PNH	Paroxysmal nocturnal hemoglobinuria	TLR	Toll-like receptor
PRCA	Pure red cell aplasia	TNF	Tumour necrosis factor
PSGN	Post-streptococcal glomerulonephritis	US	Ultrasound
PT	Prothrombin time	V	Voltage
PV-B19	Parvovirus B19	VLDL	Very low density lipoproteins
RA	Refractory anaemia	vWD disease	von Willebrand disease