

医学生复习指南丛书

Mc
Graw
Hill Education

英文影印版

病理学基本要点

BASIC CONCEPTS

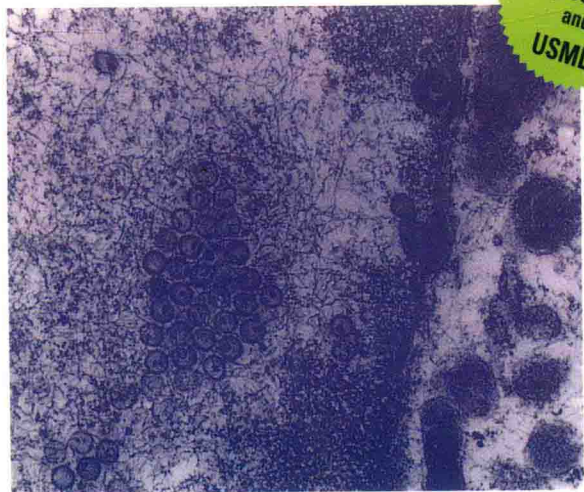
IN

Pathology

A STUDENT'S SURVIVAL GUIDE

Earl Brown

Great for
Course Prep
and
USMLE



Mc
Graw
Hill

 北京大学医学出版社

医学生复习指南丛书

英文影印版

病理学基本要点

BASI

TS

Pathology

EARL BROWN, MD

Department of Physiology
James A. Quillen Medical Center
Johnson City Tennessee

Series Editor

Hiram F. Gilbert, PhD

北京大学医学出版社

Earl Brown

Basic Concepts in Pathology: a student's survival guide

ISBN 0 - 07 - 008321 - 5

Copyright©1998 by The McGraw - Hill Companies, Inc.

Original language published by The McGraw - Hill Companies, Inc. All Rights reserved. No part of this publication may be reproduced or distributed in any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

Authorized English language reprint edition jointly published by McGraw - Hill Education (Asia) Co. and Beijing Medical University Press (Peking University Medical Press). This edition is authorized for sale in the People's Republic of China only, excluding Hong Kong, Macao SAR and Taiwan. Unauthorized export of this edition is a violation of the Copyright Act. Violation of this law is subject to Civil and Criminal Penalties.

本书英文影印版由北京医科大学出版社(北京大学医学出版社)和美国麦格劳 - 希尔教育出版(亚洲)公司合作出版。此版本仅限在中华人民共和国境内(不包括香港、澳门特别行政区及台湾)销售,未经许可之出口,视为违反著作权法,将受法律之制裁。未经出版者书面许可,不得以任何方式复制或抄袭本书的任何部分。

本书封面贴有 McGraw - Hill 公司防伪标签,无标签者不得销售。

北京市版权局著作权合同登记号:01 - 2002 - 4784

图书在版编目(CIP)数据

病理学基本要点 = Basic Concepts in Pathology/
(美)布朗恩主编. —北京:北京大学医学出版社,
2002.10

(医学生复习指南丛书)

ISBN 7 - 81071 - 389 - 2

I. 病… II. 布… III. 病理学 - 医学院校 - 教学
参考资料 - 英文 IV. R36

中国版本图书馆 CIP 数据核字(2002)第 076126 号

北京大学医学出版社出版

(北京海淀区学院路 38 号北京大学医学部院内 100083)

莱芜市圣龙印务书刊有限责任公司印刷 新华书店经销

* * *

开本:787mm × 1092mm 1/16 印张:28.75 字数:615 千字

2002 年 10 月第 1 版 2002 年 10 月山东第 1 次印刷

印数:1 - 3000 册 定价:45.00 元

Notice

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required. The author and the publisher of this work have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication. However, in view of the possibility of human error or changes in medical practice, neither the author nor the publisher nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from use of such information. Readers are encouraged to confirm the information contained herein with other sources. For example and in particular, readers are advised to check the product information sheet included in the package of each drug they plan to administer to be certain that the information contained in this book is accurate and that changes have not been made in the recommended dose or in the contraindications for administration. This recommendation is of particular importance in connection with new or infrequently used drugs.

影印出版说明

“医学生复习指南丛书”是美国医学生所用的基础医学阅读参考书系列之一，也是参加“美国医生执照考试”（United States Medical Licensing Examination, USMLE）考前复习的主要参考书。由《生理学基本要点》、《生物化学基本要点》、《免疫学基本要点》、《药理学基本要点》、《病理学基本要点》、《医学遗传学基本要点》、《细胞生物学与组织学基本要点》、《胚胎学基本要点》、《神经科学基本要点》等组成。

本丛书内容主要为基础医学各核心课程中的基本概念及重点内容，涵盖了“美国医生执照考试”（USMLE）的主要考点内容，并用容易理解与掌握的方式对各个学科的难点内容进行了讲解。在编写方式上，作者用简明易懂的文字和大量的图表进行解释，便于学生掌握学科的重点内容，可使学生用最少的时间对学科的内容有一个完整的概念与基本了解。在取材上经过作者的精心取舍，注重知识的系统性和相关知识的联系，加强了临床应用必需的内容，因而在内容的深度和广度上比较适合医学本科教育的需要，也符合医学基础服务于临床的宗旨。例如：“细胞生物学与组织学基础教程”中不仅讲述了从细胞膜至细胞核的基本知识，还介绍了各种组织和各个器官的结构和功能；“医学遗传学基础教程”从遗传学的基础概念联系到大量的临床遗传性疾病；“胚胎学基础教程”讲述了许多先天性畸形的发生机制和危险因子……这样的编排不仅使医学基础知识紧扣临床实际，还会增强学生运用知识的能力。当然，在相互联系中更能巩固所学知识的记忆。

本丛书写作文字流畅，可读性强；条理清晰，方便查阅。对于中国的医学生来说，使用本丛书不仅能使他们掌握各学科的专业基础知识和基本概念，同时，在学习过程中，还能学到更加地道的英语表达方式，提高其专业外语水平。本丛书可作为医学基础课双语教学的英语教学参考书，也是参加美国“医生执照考试”（USMLE）的中国医学生和医生考前复习的必备参考书。

• A C K N O W L E D G M E N T S •

I would like to express my appreciation to my colleagues in the Department of Pathology for their support and help over the past decade that I have been director of our sophomore pathology course. I would like to especially thank Dr. Philip S. Coogan, the chairman of our department, who has supported my efforts over the years and has enabled me to progress as a teacher. It is because of Dr. Coogan's support and effort that our department has entered the new age of computer-based instruction. This book is due in large part to that evolution of teaching. I cannot express my deeply felt thanks to all of my many students who over the years have inspired me with their spirit, their common sense, and their enthusiasm. They have showed me time and time again different and better ways to explain concepts and organize material. They have taught me much. Finally, I would like to thank my family, my wife, Janet, and my two children, Kevin and Heather, who have supported me through way too many late night and weekend typing sessions. Without them this book would never have been written.

• • • • •

• C O N T E N T S •

Prologue

CHAPTER 1 HOW TO USE THIS BOOK 1

Organization of the Chapters of This Book	1
Organization of Pathology	1
Purpose of This Book	2
How to Use This Book	2

CHAPTER 2 CELL INJURY 3

Cause of Disease	3
Causes of Cell Membrane Injury	4
Free Radicals	5
Mechanisms to Clear and Control Free Radicals	5
Bacterial Toxins	6
Impaired Energy Production	7
Results of Decreased Energy Production	7
Reversible Cell Injury	8
Irreversible Cell Injury	8
Cell Death	9
Apoptosis	9
Examples of Apoptosis	10
Necrosis	10
Patterns of Cellular Necrosis	11

CHAPTER 3 CELL ORGANELLES 14

Cell Membranes	15
Abnormalities of Red Cell Membrane	16
Abnormalities of Mitochondria	17
Reye's Syndrome	18
Lysosomes	19
Heterophagy and Autophagy	19
Abnormalities of Lysosomes	20
Lysosomal Storage Diseases	21
Mucopolysaccharidoses	23
Niemann-Pick Disease	23
Cherry-Red Macula	24
Tay-Sachs Disease	24

Gaucher Disease	25
Peroxisomes	26
Cytoskeleton	26
Abnormalities Involving Microtubules	27
Intermediate Filaments	28
Abnormalities Involving Intermediate Filaments	28

CHAPTER 4 CELL DEPOSITS AND ACCUMULATIONS 29

Hydropic Change	31
Fatty Change (Steatosis)	31
Fatty Change of the Liver	31
Protein-Energy Malnutrition	33
Fatty Change of the Heart	34
Accumulations in the GI Mucosal Cells	34
Protein Deposits	35
Amyloid	35
Amyloidosis	36
Alpha-1-Antitrypsin Deficiency	37
Hyaline Change	38
Viral Changes	38
Hyaline Membranes of the Lungs	40
Acute Respiratory Distress Syndrome (ARDS)	40
Hyaline Membrane Disease	41
Glycogen	42
Glycogen Storage Diseases	42
Calcium Deposits	44
Psammoma Bodies	45
Hypercalcemia	45
Hyperparathyroidism	47
Iron Deposits	48
Abnormal Deposits of Hemosiderin	49
Sideroblastic Anemia	50
Hypochromic Microcytic Anemias	51
Systemic Iron Overload	51
Primary Hemochromatosis ("Bronze" Diabetes)	52
Bilirubin	53
Bilirubin Deposits	54
Causes of Hyperbilirubinemia	54
Hereditary Hyperbilirubinemia	56

Hereditary Unconjugated Hyperbilirubinemia	56
Hereditary Conjugated Hyperbilirubinemia	57
Gallstones	57
Copper Deposits	58
Urate Deposits	59
Gout	59
Lipofuscin Deposits	60
Black Pigments	61
Abnormalities Involving Melanocytes	61
Nevi	63
Carbon Deposits	65
Homogentisic Acid	65
Routine Stain (H&E)	66
Special Stains	66

CHAPTER 5 CELL ADAPTATIONS 67

Cell Adaptation (Terms)	67
Types of Dividing Cells	69
Causes of Hypertrophy	69
Cardiac Hypertrophy	70
Hypertrophic Cardiomyopathy	72
Hyperplasia	73
Erythroid Hyperplasia	74
Hyperplasia Involving Lymph Nodes	75
Hyperplasia Involving Blood Vessels	76
Hyperplasia of the Breast	76
Causes of Gynecomastia	77
Hyperplasia of the Endometrium	78
Hyperplasia of the Prostate	78
Hyperplasia of the Lung	79
Hyperplasia of the Skin	80
Human Papillomavirus	80
Psoriasis	81
Lichen Planus	81
Hyperplasia of the Adrenal Glands	83
21-hydroxylase Deficiency	83
11-hydroxylase Deficiency	84
17-hydroxylase Deficiency	85
Metaplasia	85
Myelofibrosis with Myeloid Metaplasia	87

CHAPTER 6 CELL SIGNALING 88

Cell Signaling	89
Receptors	90
Normal Processes Involving Intracellular Receptors	90
Examples of Second Messengers	90
Protein Kinases	91
G Proteins	91
Forms of G Proteins	92
Second Messengers of G Proteins	92
Infections Associated with G Proteins	94
Cytoplasmic Calcium Regulation	95
Calcium-Binding Proteins	96
Substances That Use Gs Protein Receptors	98
Substances That Use Gi Protein Receptors	98
Substances That Use Gq Protein Receptors	98
Substances That Use Gt Protein Receptors	99
Processes Involving Second Messengers	99
Adrenergic Receptors	100
Adrenergic Effects	100
Abnormal Processes Involving Gs Protein Receptors	101
Abnormal Processes Involving Gi Protein Receptors	101
Abnormal Processes Involving Gq Protein Receptors	102
Asthma	104
Arachidonic Acid	104
Normal Processes Involving Arachidonic Acid Products	106
Leukotrienes	107
Prostaglandins	108
Tyrosine Kinases	109
Ion Channels	110
Cystic Fibrosis	110

CHAPTER 7 CELL GROWTH 112

Cell Growth	112
Growth Factors	113
Abnormalities Involving Growth Factors	114
Second Messenger Systems of Growth Factors	115
Control of Cell Growth	118
Normal Oncogene Expression	118
Abnormal Oncogene Expression	119
Cancer Suppressor Genes	120
Abnormal Functioning of Cancer Suppressor Genes	122
Neurofibromatosis	123

CHAPTER 8 CELL DEGENERATIONS 124

Atrophy	125
Abnormalities of Regression of Tissue	125
Examples of Pathologic Atrophy	126
Renal Artery Stenosis	126
Atrophy of the Stomach	127
Atrophy of the Small Intestines	128
Atrophy Involving the Nervous System	129
Alzheimer's Disease	129
Atrophy Involving the Striatum	130
Huntington's Disease	131
Parkinson's Disease	132
Degeneration of Myelin	133
Atrophy of Muscle	134
Muscle Fiber Types	134
Denervation Atrophy	135
Amyotrophic Lateral Sclerosis	135
Degeneration of Muscle	136
Degeneration of Bone	137

CHAPTER 9 DEVELOPMENTAL ABNORMALITIES 139

Abnormal Organ Development	140
Renal Agenesis	140
Aplasia of the Bone Marrow	141
Aplastic Anemia	142
Pure Red Cell Aplasia	143
DiGeorge's Syndrome	143
Hypoplasia of Ganglia	144
Neural Tube Developmental Defects	144
Spina Bifida	145
Hypoplasia Involving the Posterior Fossa	145
Arnold-Chiari Malformation	146
Dandy-Walker Malformation	147
Syringomyelia	147
Hypoplasia of the Gonads	147
Atresia	148
Coarctation of the Aorta	149
Atresia of the Gastrointestinal Tract	149
Developmental Abnormalities of the Heart	151
Ventricular Septal Defects (VSD)	152

Atrial Septal Defects (ASD)	152
Patent Ductus Arteriosus (PDA)	153
Tetralogy of Fallot	153
Transposition of the Great Vessels	154

CHAPTER 10 GENETICS 155

Inherited Disorders	156
Autosomal Dominant Inheritance	156
Examples of Autosomal Dominant Disorders	158
Autosomal Recessive Inheritance	158
Examples of Autosomal Recessive Disorders	159
Sickle Cell Anemia	160
Thalassemia	161
Abnormalities Involving Tyrosine Metabolism	163
Galactosemia	165
Fructose Intolerance	165
X-Linked Dominant Inheritance	166
Examples of X-Linked Dominant Disorders	166
X-Linked Recessive Inheritance	167
Examples of X-Linked Recessive Disorders	167
Glucose-6-phosphate Dehydrogenase Deficiency	168
Lesch-Nyhan Syndrome	169
Y Inheritance	169
Mitochondrial Inheritance	169
Chromosomes	170
Autosomal Trisomies	170
Mechanisms Producing Trisomy 21	172
Chromosomal Deletions	173
Abnormalities of Sex Chromosomes	175
Sexual Embryonic Development	176
Ambiguous Sexual Development	178
Abnormal Sexual Development in Males	179
Abnormal Sexual Development in Females	180
Disorders of Trinucleotide Repeats	182
Fragile X Syndrome	182

CHAPTER 11 INFLAMMATION—PART ONE 183

Inflammation	184
Inflammatory Cells	184
Neutrophils	184

Monocytes	185
Lymphocytes	186
Cardinal Signs of Inflammation	186
Vascular Component of Inflammation	186
Inflammatory Edema	187
Cellular Component of Inflammation	188
Cell Adhesion Molecules	189
Chemotaxis	191
Leukocyte Activation	191
Phagocytosis	192
Intracellular Microbial Destruction	193
Defects in Leukocyte Function	194
Chédiak-Higashi Syndrome	194
Chronic Granulomatous Disease	195
Chemical Mediators of Inflammation	195
Vasoactive Amines	195
Cytokines	196
Interleukin-1 and Tumor Necrosis Factor	196
Nitrous Oxide	197
Platelet Activating Factor	198
Arachidonic Acid	198
Complement Cascade	199
Deficiencies of the Complement Cascade Components	202
Components of the Kinin System	203
Chemical Mediators of Inflammatory Responses	204

CHAPTER 12 INFLAMMATION—PART TWO 206

Types of Inflammatory Reactions	207
Infectious Mononucleosis	208
Comparing Acute and Chronic Inflammatory Processes	209
Infections of the Lung	210
Infections of the Meninges	210
Infections of the Heart	211
Inflammation of the Gallbladder	212
Inflammation of the Pancreas	213
Inflammation of the Stomach	215
<i>Helicobacter Pylori</i>	216
Inflammation of the Endometrium	217
Inflammation of the Prostate	218
Inflammation of the Kidney	219
Morphologic Patterns of Inflammation	220

Pericarditis	222
Inflammation of the Colon	223
Inflammation of Blood Vessels	224
Large Vessel Vasculitis	225
Medium Vessel Vasculitis	226
Small Vessel Vasculitis	227
Granulomatous Inflammation	228
Tuberculosis	228
Mycobacteria Other Than Tuberculosis	229
Sarcoidosis	230
Fungal Infections	232
Systemic Mycoses	237

CHAPTER 13 REPAIR AND REGENERATION 236

Healing	236
Stages of Lobar Pneumonia	237
Steps in Scar Formation	238
Granulation Tissue	238
Components of Repair	239
Growth Factors	239
Extracellular Matrix	240
Collagen	240
Collagen Types	241
Abnormalities of Collagen Deposition	242
Scurvy	242
Decreased Vitamin D	243
Synthesis of Abnormal Collagen	243
Excessive Deposition of Collagen	244
Idiopathic Pulmonary Fibrosis	245
Cirrhosis	245
Elastin and Fibrillin	246
Marfan Syndrome	247
Basement Membranes	248
Diabetes Mellitus	248
Alport's Syndrome	249
Factors Involved in Wound Healing	249
Healing of the Skin	250
Healing of the Myocardium	251
Healing of the Central Nervous System	252
Healing of the Gastrointestinal Tract	253

CHAPTER 14 FLUIDS AND HEMODYNAMICS 255

Edema	256
Cerebral Edema	256
Brain Herniations	257
Exudates	257
Triple Response of Lewis	259
Transudates	259
Congestive Heart Failure	260
Portal Hypertension	261
Nephrotic Syndrome	262
Causes of the Nephrotic Syndrome	263
Minimal Change Disease	264
Focal Segmental Glomerulosclerosis	265
Clinical Examples Comparing Transudates and Exudates	266
Pulmonary Edema	266
Pleural Effusions	267
Pericardial Effusions	268
Hyperemia and Congestion	269
Shock	269

CHAPTER 15 HEMOSTATSIS AND INFARCTION 271

Hemorrhage	272
Cerebral Hemorrhage	272
Thrombosis	273
Basic Steps of Thrombosis	273
Von Willebrand's Disease	274
The Yin-Yang of Prostacyclin and Thromboxane	276
Coagulation Cascade	276
Hemophilia	278
Thrombin	278
Anticoagulation	279
Endothelial Cells	280
Morphology of Thrombi	282
Thrombotic States	283
Arteriosclerosis	284
Atherosclerosis	284
Risk Factors for Atherosclerosis	285
Lipoproteins	286
Hyperlipidemia	289
Familial Hyperlipidemia	290

Pathogenesis of Atherosclerosis	292
Aneurysms	293
Infarction	294
Myocardial Infarction	295
Complications of Myocardial Infarction	296
Cerebral Infarction	297
Arteriosclerosis	298
Emboli	299
Nonthrombotic Emboli	300

CHAPTER 16 IMMUNOLOGY—PART ONE: CELLS OF THE IMMUNE SYSTEM 301

Cells of the Immune System	302
Lymphocytes	302
Cluster Domains	303
B Lymphocyte Development	304
Immunoglobulins	306
Multiple Myeloma	309
Waldenström's Macroglobulinemia	309
T Lymphocyte Development	310
T Cell Receptor	312
T Cell Receptor Subtypes	312
CD4-Positive T Cell Subtypes	314
Antigen-Presenting Cells	314
Langerhans Cell Histiocytosis (LCH)	315
Cytokines	316
Major Histocompatibility Complex	317
Class I Antigens	318
Class II Antigens	318
Diseases Associated with HLA Types	319

CHAPTER 17 IMMUNOLOGY—PART TWO: HYPERSENSITIVITY REACTIONS 321

Hypersensitivity Reactions	322
Type I Hypersensitivity Reactions	322
Mediators of Type I Hypersensitivity Reactions	324
Clinical Examples of Type I Hypersensitivity Reactions	325
Type II Hypersensitivity Reactions	325
Clinical Examples of Type II Hypersensitivity Reactions	326
Hemolytic Anemia	327

Mechanisms of Drug-induced Hemolytic Anemia	328
Cold Autoimmune Hemolytic Anemia	328
Transfusion Reactions	329
Hemolytic Disease of the Newborn	330
Goodpasture's Disease	331
Vesiculobullous Diseases of the Skin	332
Graves' Disease	333
Hypofunctioning Autoimmune Diseases	334
Type III Hypersensitivity Reactions	336
Clinical Examples of Type III Hypersensitivity Reactions	337
Glomerular Electron-Dense Deposits	338
Diffuse Proliferative Glomerulonephritis	340
Membranous Glomerulonephropathy	340
Membranoproliferative Glomerulonephritis	342
Focal Segmental Glomerulonephritis	342
Rapidly Progressive Glomerulonephritis	343
Type IV Hypersensitivity Reactions	344
Clinical Examples of Type IV Hypersensitivity Reactions	345
Transplant Pathology	345

CHAPTER 18 IMMUNOLOGY—PART THREE: AUTOIMMUNE AND IMMUNODEFICIENCY DISEASE 347

Autoimmune Diseases	347
Types of Autoantibodies	348
Antinuclear Antibodies (ANAs)	348
Antineutrophil Cytoplasmic Antibodies (ANCA)	348
Systemic Lupus Erythematosus	349
WHO Classification of Renal Disease in Patients with SLE	351
Sjögren's Syndrome	352
Progressive Systemic Sclerosis	353
CREST Syndrome	354
Inflammatory Myopathies	354
Rheumatoid Arthritis	355
Polyarteritis Nodosa	356
Immunodeficiency Diseases	356
Severe Combined Immunodeficiency Disease	357
X-Linked Agammaglobulinemia of Bruton	358
Common Variable Immunodeficiency	358
Isolated Deficiency of IgA	359
DiGeorge's Syndrome	359
AIDS	360