Fundamentals and Principles of Ophthalmology

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Contents

General Introduction ........................................................ xxi

Objectives ........................................................................... 1

PART I  Anatomy .................................................................... 3

1  Orbit and Ocular Adnexa .................................................. 5
  Orbital Anatomy ................................................................. 5
  Orbital Volume ................................................................. 5
  Bony Orbit ........................................................................ 5
  Orbital Margin .................................................................... 5
  Orbital Roof ........................................................................ 5
  Medial Orbital Wall ........................................................... 6
  Orbital Floor ........................................................................ 6
  Lateral Orbital Wall ............................................................ 7
  The Facial Skeleton and Aging ............................................. 7
  Orbital Foramina, Ducts, Canals, and Fissures ..................... 7
  Periorbital Sinuses ............................................................... 10
  Cranial Nerves ..................................................................... 11
  Ciliary Ganglion ................................................................... 11
  Branches of the Ciliary Ganglion ......................................... 11
  Short Ciliary Nerves ........................................................... 12
  Extraocular Muscles ............................................................ 13
  Extraocular Muscle Insertions ............................................ 13
  Extraocular Muscle Distribution in the Orbit ....................... 15
  Extraocular Muscle Origins ................................................ 16
  Blood Supply to the Extraocular Muscles ............................... 17
  Innervation of the Extraocular Muscles ................................. 17
  Fine Structure of the Extraocular Muscles ............................. 18
  Eyelids ............................................................................... 18
  Anatomy ............................................................................ 19
  Vascular Supply of the Eyelids .............................................. 25
  Lymphatics of the Eyelids ..................................................... 27
  Accessory Eyelid Structures ............................................... 27
  Lacrimal Gland and Excretory System ................................. 28
  Lacrimal Gland ................................................................... 28
  Accessory Glands ............................................................... 29
  Lacrimal Excretory System ................................................ 29
  Conjunctiva ......................................................................... 30
  Tenon Capsule ..................................................................... 31
## Contents

Vascular Supply and Drainage of the Orbit .......................... 32
Posterior and Anterior Ciliary Arteries ............................ 32
Vortex Veins ........................................ 35

### 2 The Eye ........................................ 37
Topographic Features of the Globe .................................. 37
Precorneal Tear Film ....................................... 38
Cornea .................................................. 38
- Characteristics of the Central and Peripheral Cornea .......... 38
- Epithelium and Basal Lamina ................................ 39
- Nonepithelial Cells ..................................... 40
- Bowman Layer ........................................ 40
- Stroma ................................................ 40
- Descemet Membrane ..................................... 41
- Endothelium .......................................... 41
Sclera .................................................. 43
Limbus .................................................. 44
Anterior Chamber ........................................... 45
Trabecular Meshwork .......................................... 48
- Uveal Trabecular Meshwork ................................ 49
- Corneoscleral Meshwork ................................... 49
- Pericanalicular Connective Tissue ............................. 49
- Schlemm Canal ........................................ 50
- Collector Channels ..................................... 51
Uveal Tract .............................................. 53
Iris ...................................................... 53
- Stroma ................................................ 54
- Vessels and Nerves ..................................... 55
- Posterior Pigmented Layer .................................. 55
- Dilator Muscle ........................................ 55
- Sphincter Muscle ....................................... 56
Ciliary Body ............................................. 57
- Ciliary Epithelium and Stroma ................................ 57
- Ciliary Muscle ........................................ 58
Choroid .................................................. 59
- Bruch Membrane ...................................... 60
- Choriocapillaris ....................................... 61
Lens ...................................................... 63
- Capsule ............................................... 64
- Epithelium ............................................. 64
- Fibers .................................................. 64
- Zonular Fibers (Suspensory Ligaments) ......................... 66
Retina .................................................... 67
- Retinal Pigment Epithelium ................................. 67
- Neurosensory Retina ..................................... 69
Macula .................................................... 75
Ora Serrata .............................................. 78
Vitreous .................................................. 78
3 Cranial Nerves: Central and Peripheral Connections .......................... 83
  Cranial Nerve I (Olfactory Nerve) ........................................ 83
  Cranial Nerve II (Optic Nerve) .......................................... 83
  Intraocular Region ....................................................... 86
  Intraorbital Region ..................................................... 87
  Intracanalicular Region .................................................. 89
  Intracranial Region ..................................................... 90
  Blood Supply of the Optic Nerve ........................................ 90
  Chiasm ................................................................. 92
  Optic Tract ............................................................ 93
  Lateral Geniculate Body .................................................. 93
  Optic Radiations ........................................................ 93
  Visual Cortex ........................................................... 93
  Cranial Nerve III (Oculomotor Nerve) ................................... 93
  Pathways for the Pupil Reflexes ........................................ 96
  Cranial Nerve IV (Trochlear Nerve) ..................................... 96
  Cranial Nerve V (Trigeminal Nerve) .................................... 97
  Mesencephalic Nucleus ................................................. 97
  Main Sensory Nucleus .................................................... 97
  Spinal Nucleus and Tract ................................................ 97
  Motor Nucleus ........................................................... 99
  Divisions of Cranial Nerve V ............................................ 100
  Cranial Nerve VI (Abducens Nerve) .................................... 101
  Cranial Nerve VII (Facial Nerve) ....................................... 102
  Cavernous Sinus ........................................................ 105
  Other Venous Sinuses .................................................... 105
  Circle of Willis ........................................................ 105

PART II Embryology ....................................................... 109

4 Ocular Development ....................................................... 111
  General Principles ....................................................... 111
  Eye Development ........................................................ 115
  Lens and Anterior Segment Formation .................................. 117
  Uvea ........................................................................ 122
  Retina and Posterior Segment .......................................... 122
  Sclera .......................................................................... 124
  Orbit and Extraocular Muscles .......................................... 124
  Genetic Cascades and Morphogenic Gradients ....................... 126
  Homeobox Gene Program ............................................... 126
  Growth Factors, Diffusible Ligands, and Morphogens ............. 127
  Future Directions ........................................................ 127
## PART III  Genetics ............................................ 129

**Introduction** ............................................. 131
Terminology ................................................. 131
Glossary ...................................................... 131

### 5  Molecular Genetics .................................... 147
Gene Structure ............................................. 147
The Cell Cycle ............................................. 148
Noncoding DNA ............................................. 150
DNA Damage and Repair ..................................... 154
Apoptosis .................................................... 155
Mutations and Disease ....................................... 155
Mitochondrial Disease ....................................... 157
Chronic Progressive External Ophthalmoplegia .......... 158
Leber Hereditary Optic Neuropathy ......................... 158
Neuropathy, Ataxia, and Retinitis Pigmentosa .......... 158
MELAS and MIDD ........................................... 159
The Search for Genes in Specific Diseases ................ 159
Genetic Markers ............................................. 159
Gene Dosage ................................................. 159
Linkage and Disease Association ............................ 160
Candidate Gene Approaches ................................ 161
Mutation Screening .......................................... 161
Direct Sequencing ........................................... 161
Genome-Wide Association Studies ........................... 163
Gene Therapy ................................................ 169
Replacement of Absent Gene Product in X-Linked and Recessive Disease .................................. 169
Strategies for Dominant Diseases ............................ 169

### 6  Clinical Genetics ....................................... 171
Pedigree Analysis ........................................... 172
Patterns of Inheritance ...................................... 173
Dominant Versus Recessive ................................. 173
Autosomal Recessive Inheritance ............................ 174
Autosomal Dominant Inheritance ............................ 177
X-Linked Inheritance ................................................. 178
Maternal Inheritance .............................................. 181
Terminology: Hereditary, Genetic, Familial, Congenital .............. 181
Genes and Chromosomes ........................................... 184
  Alleles .................................................................. 184
  Mitosis .................................................................. 185
  Meiosis ................................................................ 186
  Segregation .......................................................... 186
  Independent Assortment ......................................... 187
  Linkage ............................................................... 187
Chromosomal Analysis ............................................... 187
  Indications for Chromosome Analysis ......................... 188
  Aneuploidy of Autosomes ..................................... 189
  Mosaicism .......................................................... 190
Ophthalmically Important Chromosomal Aberrations ............... 192
Mutations .................................................................. 193
  Polymorphisms ..................................................... 194
  Genome, Genotype, Phenotype ................................ 194
  Single-Gene Disorders ......................................... 194
  Anticipation ........................................................ 194
  Penetrance .......................................................... 195
  Expressivity ......................................................... 196
  Pleiotropism ........................................................ 196
Racial and Ethnic Concentration of Genetic Disorders ............... 196
Lyonization ................................................................ 197
Complex Genetic Disease:
  Polygenic and Multifactorial Inheritance ....................... 200
Pharmacogenetics ....................................................... 201
Clinical Management of Genetic Disease ......................... 202
  Accurate Diagnosis ............................................. 202
  Complete Explanation of the Disease ....................... 202
  Treatment of the Disease Process ............................ 202
Genetic Counseling ................................................... 204
  Issues in Genetic Counseling .................................. 205
  Reproductive Issues ............................................. 206
  Referral to Providers of Support for Persons With Disabilities 207
  Recommendations for Genetic Testing of Inherited Eye Disease 207

**PART IV  Biochemistry and Metabolism** ....................... 209

**Introduction** ....................................................... 211

7  **Tear Film** ......................................................... 213
  Lipid Layer .......................................................... 214
  Aqueous Layer ...................................................... 215
  Mucin Layer ........................................................ 217
  Tear Secretion ...................................................... 217
  Tear Dysfunction .................................................. 220
# Contents

## 8 Cornea
- Epithelium .......................................................... 223
- Bowman Layer ......................................................... 224
- Stroma ................................................................. 225
- Descemet Membrane and Endothelium ....................... 227

## 9 Aqueous Humor, Iris, and Ciliary Body
- Introduction to the Aqueous Humor ......................... 229
- Dynamics of the Aqueous Humor ............................. 229
- Composition of the Aqueous Humor ......................... 230
  - Inorganic Ions .................................................. 232
  - Organic Anions ................................................. 232
  - Carbohydrates .................................................. 232
  - Glutathione and Urea ........................................ 232
  - Proteins ........................................................ 233
  - Growth-Modulatory Factors ............................... 234
  - Vascular Endothelial Growth Factors ..................... 235
  - Oxygen and Carbon Dioxide ............................... 235
  - Clinical Implications of Breakdown ....................... 236
  - of the Blood–Aqueous Barrier ........................... 236
- Introduction to the Iris and Ciliary Body .................. 236
- Eicosanoids ......................................................... 237
  - Types and Actions ........................................... 237
  - Synthesis ........................................................ 238
  - Prostaglandin Receptors .................................... 239
  - Ocular Receptors ............................................. 240

## 10 Lens
- Structure of the Lens ............................................. 241
  - Capsule ........................................................ 241
  - Epithelium ....................................................... 242
  - Cortex and Nucleus .......................................... 242
- Chemical Composition of the Lens ............................ 243
  - Membranes ....................................................... 243
  - Lens Proteins .................................................. 243
- Physiologic Aspects of the Lens .............................. 245
- Lens Metabolism and Formation of Sugar Cataracts .... 246
  - Energy Production ............................................. 246
  - Carbohydrate Cataracts ..................................... 246

## 11 Vitreous
- Composition ........................................................ 249
  - Collagen ........................................................ 249
  - Hyaluronan ....................................................... 250
  - Soluble and Fibril-Associated Proteins .................... 251
  - Zonular Fibers and Low-Molecular-Weight Solutes ....... 252
12 Retina .......................................................... 257
   Neural Retina—The Photoreceptors .................. 257
      Rod Phototransduction ................................ 257
      Cone Phototransduction ............................... 261
   Rod-Specific Gene Defects ............................... 263
   Cone- and Rod-Specific Gene Defects .................. 264
   Cone-Specific Gene Defects ............................. 264
   RPE-Specific Gene Defects .............................. 264
   Ubiquitously Expressed Genes Causing Retinal Degenerations .... 265
   Inner Nuclear Layer ..................................... 266
   Retinal Electrophysiology ............................... 268

13 Retinal Pigment Epithelium ............................ 271
   Anatomical Description ................................ 271
   Biochemical Composition ................................ 273
      Proteins .............................................. 273
      Lipids .............................................. 274
      Nucleic Acids ...................................... 274
   Major Physiologic Roles of the RPE .................... 274
      Visual Pigment Regeneration ......................... 274
      Phagocytosis of Shed Photoreceptor Outer-Segment Discs .... 276
      Transport ........................................... 277
      Pigmentation ....................................... 278
      Retinal Adhesion .................................... 278
      The RPE in Disease .................................. 278

14 Free Radicals and Antioxidants ....................... 281
   Cellular Sources of Active Oxygen Species .......... 281
   Mechanisms of Lipid Peroxidation .................... 282
   Oxidative Damage to the Lens .......................... 283
   Vulnerability of the Retina to Free Radicals ......... 285
   Antioxidants in the Retina and RPE .................... 286
      Selenium, Glutathione, Glutathione Peroxidase, and .... 287
      Glutathione-S-Transferase ........................... 287
      Vitamin E .......................................... 287
      Superoxide Dismutase and Catalase ................... 287
      Ascorbate .......................................... 288
      Carotenoids ........................................ 288
PART V  Ocular Pharmacology ........................................... 291

15 Pharmacologic Principles ............................................ 293
   Introduction .......................................................... 293
   Pharmacokinetics .................................................... 293
   Pharmacodynamics ................................................... 293
   Pharmacotherapeutics ............................................... 294
   Toxicity ................................................................. 294
   Pharmacologic Principles in Elderly Patients ................. 295
   Pharmacokinetics: The Route of Drug Delivery ............... 295
   Topical Administration ............................................. 295
   Local Administration ............................................... 299
   Systemic Administration ........................................... 300
   Methods of Ocular Drug Design and Delivery ................ 301
   Pharmacodynamics: The Mechanism of Drug Action .......... 304

16 Ocular Pharmacotherapeutics .......................... 305
   Legal Aspects of Medical Therapy ............................. 305
   Compounding Pharmaceuticals .................................. 306
   Cholinergic Drugs ................................................... 307
      Muscarinic Drugs ................................................. 308
      Nicotinic Drugs .................................................. 314
   Adrenergic Drugs .................................................... 316
      α-Adrenergic Drugs .............................................. 317
      β-Adrenergic Drugs .............................................. 321
   Carbonic Anhydrase Inhibitors .................................. 323
   Prostaglandin Analogues .......................................... 327
   Combined Medications ............................................. 328
   Osmotic Drugs ........................................................ 328
      Actions and Uses .................................................. 328
      Specific Osmotic Drugs .......................................... 328
   Anti-inflammatory Drugs ......................................... 329
      Glucocorticoids .................................................... 329
      Nonsteroidal Anti-inflammatory Drugs ....................... 334
      Antiallergic Drugs: Mast-Cell Stabilizers and Antihistamines 337
      Antifibrotic Drugs ................................................. 340
   Medications for Dry Eye ............................................ 341
   Ocular Decongestants ................................................. 342
   Antimicrobial Drugs ................................................ 343
      Penicillins and Cephalosporins ................................ 343
      Other Antibacterial Drugs ....................................... 346
      Antifungal Drugs .................................................. 354
      Antiviral Drugs .................................................... 356
      Medications for Acanthamoeba Infections ..................... 361
   Local Anesthetics ..................................................... 362
      Overview ............................................................ 362
      Topical Anesthetics in Anterior Segment Surgery .......... 365
Purified Neurotoxin Complex ............................................. 366
Hyperosmolar Drugs ..................................................... 366
Irrigating Solutions ....................................................... 367
Diagnostic Agents ......................................................... 367
Viscoelastic Agents ....................................................... 368
Fibrinolytic Agents ....................................................... 369
Thrombin ................................................................. 369
Antifibrinolytic Agents ................................................... 369
Vitamin Supplements and Antioxidants .............................. 370
Interferon ................................................................. 370
Growth Factors .......................................................... 371

Basic Texts .............................................................. 373
Related Academy Materials ............................................. 375
Requesting Continuing Medical Education Credit .................. 377
Study Questions .......................................................... 379
Answer Sheet for Section 2 Study Questions ......................... 385
Answers ................................................................. 387
Index ................................................................. 391
General Introduction

The Basic and Clinical Science Course (BCSC) is designed to meet the needs of residents and practitioners for a comprehensive yet concise curriculum of the field of ophthalmology. The BCSC has developed from its original brief outline format, which relied heavily on outside readings, to a more convenient and educationally useful self-contained text. The Academy updates and revises the course annually, with the goals of integrating the basic science and clinical practice of ophthalmology and of keeping ophthalmologists current with new developments in the various subspecialties.

The BCSC incorporates the effort and expertise of more than 90 ophthalmologists, organized into 13 Section faculties, working with Academy editorial staff. In addition, the course continues to benefit from many lasting contributions made by the faculties of previous editions. Members of the Academy Practicing Ophthalmologists Advisory Committee for Education, Committee on Aging, and Vision Rehabilitation Committee review every volume before major revisions. Members of the European Board of Ophthalmology, organized into Section faculties, also review each volume before major revisions, focusing primarily on differences between American and European ophthalmology practice.

Organization of the Course

The Basic and Clinical Science Course comprises 13 volumes, incorporating fundamental ophthalmic knowledge, subspecialty areas, and special topics:

1. Update on General Medicine
2. Fundamentals and Principles of Ophthalmology
3. Clinical Optics
4. Ophthalmic Pathology and Intraocular Tumors
5. Neuro-Ophthalmology
6. Pediatric Ophthalmology and Strabismus
7. Orbit, Eyelids, and Lacrimal System
8. External Disease and Cornea
9. Intraocular Inflammation and Uveitis
10. Glaucoma
11. Lens and Cataract
12. Retina and Vitreous
13. Refractive Surgery

In addition, a comprehensive Master Index allows the reader to easily locate subjects throughout the entire series.

References

Readers who wish to explore specific topics in greater detail may consult the references cited within each chapter and listed in the Basic Texts section at the back of the book.
These references are intended to be selective rather than exhaustive, chosen by the BCSC faculty as being important, current, and readily available to residents and practitioners.

**Study Questions and CME Credit**

Each volume of the BCSC is designed as an independent study activity for ophthalmology residents and practitioners. The learning objectives for this volume are given on page 1. The text, illustrations, and references provide the information necessary to achieve the objectives; the study questions allow readers to test their understanding of the material and their mastery of the objectives. Physicians who wish to claim CME credit for this educational activity may do so by following the instructions given at the end of the book.

**Conclusion**

The Basic and Clinical Science Course has expanded greatly over the years, with the addition of much new text, numerous illustrations, and video content. Recent editions have sought to place greater emphasis on clinical applicability while maintaining a solid foundation in basic science. As with any educational program, it reflects the experience of its authors. As its faculties change and medicine progresses, new viewpoints emerge on controversial subjects and techniques. Not all alternate approaches can be included in this series; as with any educational endeavor, the learner should seek additional sources, including Academy Preferred Practice Pattern Guidelines.

The BCSC faculty and staff continually strive to improve the educational usefulness of the course; you, the reader, can contribute to this ongoing process. If you have any suggestions or questions about the series, please do not hesitate to contact the faculty or the editors.

The authors, editors, and reviewers hope that your study of the BCSC will be of lasting value and that each Section will serve as a practical resource for quality patient care.
Objectives

Upon completion of BCSC Section 2, Fundamentals and Principles of Ophthalmology, the reader should be able to

- identify the bones making up the orbital walls and the orbital foramina
- identify the origin and pathways of cranial nerves I–VII
- identify the origins and insertions of the extraocular muscles
- describe the distribution of the arterial and venous circulations of the orbit and optic nerve
- summarize the structural-functional relationships of the outflow pathways for aqueous humor of the eye
- delineate the events of early embryogenesis that are important for the subsequent development of the eye and orbit
- identify the roles of growth factors, homeobox genes, and neural crest cells in the genesis of the eye
- describe the sequence of events in the differentiation of the ocular tissues during embryonic and fetal development of the eye
- draw a simple pedigree and recognize the main patterns of inheritance
- describe the organization of the human genome and the role of genetic mutations in health and disease
- demonstrate how appropriate diagnosis and management of genetic diseases can lead to better patient care
- understand the role of the ophthalmologist in the provision of genetic counseling as well as the indications for ordering genetic testing
- identify the biochemical composition of the various parts of the eye and the eye's secretions
- list the varied functions of the retinal pigment epithelium such as phagocytosis and vitamin A metabolism
- summarize the role of free radicals and antioxidants in the eye
- describe the features of the eye that facilitate or impede drug delivery
- understand the basic principles underlying the use of autonomic therapeutic agents in a variety of ocular conditions
- list the indications, contraindications, mechanisms of action, and adverse effects of various drugs used in the management of glaucoma
- describe the mechanisms of action of antibiotic, antiviral, and antifungal medications
- discuss the anesthetic agents used in ophthalmology