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OF OPHTHALMOLOGY

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Fundamentals and Principles of Ophthalmology

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BCSC
Basic and Clinical Science Course™

Protecting Sight. Empowering Lives.™

Published after collaborative review with the European Board of Ophthalmology subcommittee

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Cover image: From BCSC Section 5, *Neuro-Ophthalmology.* Fundus photograph showing an arteriovenous malformation (racemose angioma) of the retina in a patient with Wyburn-Mason syndrome. *(Courtesy of Mark J. Greenwald, MD.)*

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Basic and Clinical Science Course

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Contents

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