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13

Refractive Surgery

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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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BCSC® volumes are designed to increase the physician's ophthalmic knowledge through study and review. Users of this activity are encouraged to read the text and then answer the study questions provided at the back of the book.

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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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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.

Videos

This edition of Section 13, *Refractive Surgery,* includes videos related to topics covered in the book. The videos were selected by members of the BCSC faculty and are available to readers of the print and electronic versions of Section 13. Mobile-device users can scan the QR code below (a QR-code reader must already be installed on the device) to access the video content.

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 a 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 13, *Refractive Surgery,* the reader should be able to

- state the contributions of the cornea's shape and tissue layers to the optics of the eye and how these components are affected biomechanically by different types of keratorefractive procedures
- describe the basic concepts of wavefront analysis and its relationship to different types of optical aberrations
- identify the general types of lasers used in refractive surgeries
- explain the steps—including medical and social history, ocular examination, and ancillary testing—in evaluating whether a patient is an appropriate candidate for refractive surgery
- for incisional keratorefractive surgery (radial keratotomy, transverse keratotomy, arcuate keratotomy, and limbal relaxing incisions), describe the history, patient selection, surgical techniques, outcomes, and complications
- list the various types of corneal onlays and inlays that have been used for refractive correction
- for surface ablation procedures, describe patient selection, epithelial removal, refractive outcomes, and complications
- describe patient selection, surgical techniques, outcomes, and complications for laser in situ keratomileusis (LASIK)
- describe the different methods for creating a LASIK flap using a microkeratome or a femtosecond laser as well as the instrumentation and possible complications associated with each
- explain recent developments in the application of wavefront technology to surface ablation and LASIK

- for conductive keratoplasty, state a brief overview of history, patient selection, and safety issues
- describe how intraocular surgical procedures, including refractive lens exchange with intraocular lens (IOL) implantation or phakic IOL implantation, can be used in refractive correction, with or without corneal intervention
- describe the different types of IOLs used for refractive correction
- explain the leading theories of accommodation and how they relate to potential treatment of presbyopia
- describe nonaccommodative and accommodative approaches to the treatment of presbyopia
- state considerations for, and possible contraindications to, refractive surgery in patients with preexisting ocular and/or systemic disease
- list some of the effects of prior refractive procedures on later IOL calculations, contact lens wear, and ocular surgery