Retinal Angiography and Optical Coherence Tomography

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Edited by

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To my parents:

Who gave me a wonderful life, and all the support and opportunities

To my wife, Oly:

Who has taught me how to be a better human being, who has beared with me for so many years, and has shared the good and the bad

To my son, Fernando Andrés:

Who has taught me how much my parents loved me, and for all the happiness he has brought to us

Preface

After more than 40 years since the introduction of fluorescein angiography (FA), more than 20 years after the introduction of indocyanine green angiography (ICGA), and more than 10 years since the introduction of optical coherence tomography (OCT), it is time for a comprehensive presentation of the current technical and clinical aspects of these diagnostic methods, which is contained in this book. Recent technologic developments in digital video imaging have allowed ICGA and FA better resolution and offer new opportunities to investigate the dynamics of the normal choroid circulation and correlate them with the retinal counterpart in a variety of choroidal abnormalities and retinal diseases. In addition, since the invention of OCT, this technology has emerged to become a widely used tool that has already revolutionized the diagnosis and therapy of eye disease. Optical coherence tomography has already produced wide changes in the way the eye is examined and in the way patients are treated. It is only natural to combine the topics of retinal angiography and OCT for the diagnosis and follow-up of eye diseases.

This book includes contributions from an internationally renowned group of experts from the United States, Spain, Mexico, Costa Rica, Italy, and Venezuela, and has been divided into three parts. Part I, Fluorescein and Indocyanine Green Angiography, includes nine chapters on retinal photography and angiography via film and digital imaging techniques, fluorescein, and ICGA, and discusses general aspects and interpretation; angiography of macular diseases, retinal vascular diseases, inflammatory diseases, optic nerve diseases, and retinal and choroidal tumors; and retinal angiography in pharmacologic retinal toxicity. Part II, Optical Coherence Tomography, includes 12 chapters on how OCT works; the basic principles of OCT; OCT in macular diseases, diabetic retinopathy, and age-related macular degeneration; the role of OCT imaging in the evaluation of ocular photodynamic therapy and antiangiogenic therapy; OCT in tractional maculopathies, ocular inflammatory diseases, glaucoma, optic nerve diseases, and intraocular tumors; and limitations in the evaluation of OCT images. Part III, Ophthalmic Imaging, Spectral Domain, and New Technologies, includes six chapters on ophthalmic fundus imaging, ultrawide-angle fluorescein angiography, fundus autofluorescence, ultrahigh-resolution OCT, high-speed Fourier domain OCT, and spectral OCT/scanning laser ophthalmoscope (SLO).

The impetus to edit this book has come from my students and my colleagues. In addition, I have felt the need for a book on a combination of topics that I have been working on for a long time, including courses at the American Academy of Ophthalmology. I call this book a hybrid of angiography and optical coherence tomography. I think, as a retina specialist, that this combination will be very appealing to my colleagues and students throughout the ophthalmic community. Furthermore, ICGA (an important topic in the angiography part of this book) has been the topic of very few books. The book is intended for retina and vitreous specialists, retina and vitreous fellows, ophthalmology residents, and comprehensive ophthalmologists.

The principal objective of this text is to present current information on retinal and choroidal angiography as well as OCT imaging interpretation from leading experts in the field. We hope their knowledge and experience will assist ophthalmologists and retina specialists approach a level of knowledge about angiography and OCT to benefit the patients in their clinical practice.

J. Fernando Arevalo, MD, FACS

Foreword

The field of ophthalmic fundus angiography is not new. Many articles and textbooks have been written on the subject. The field of optical coherence tomography, on the other hand, is still very much in its infancy. To bring these two critically important imaging techniques together in one comprehensive textbook was a monumental task. J. Fernando Arevalo set out to write a textbook whose principal objective was “to present current information on retinal and choroidal angiography as well as OCT imaging interpretation.” This outstanding vitreoretinal specialist has clearly achieved his goal in the publication of this superbly organized and comprehensive text.

The techniques of fluorescein angiography and indocyanine green angiography are well known to all of us. The nuances of these techniques, however, require constant study and refinement. We are continually learning new things about the many disease states we study and treat on a day-to-day basis from our understanding of FA and ICG. Further clarification is always needed and always appreciated by those interested in these important areas of study. In the first section of this textbook the authors take us through a complete educational voyage of these imaging techniques. They begin with the very basics of both FA and ICG in very clear and eloquently written chapters. Choroidal, retinal vascular, and optic disc conditions are described and beautifully illustrated for the readers. For the novice this proves to be invaluable, while for the more advanced reader, the information is concise and serves as a wonderful resource for future reference.

The second section of the book deals with the new and exciting field of optical coherence tomography. The authors take this new field of imaging and, in a wonderfully orchestrated sequence of topics and chapters, develop and discuss OCT from the most basic principles needed to understand how OCT works to how it is applied to different disease states. Again, choroidal, retinal, and optic disc diseases are comprehensively discussed. Understanding that a picture is worth a thousand words and that images help the reader understand the concepts being described in the written text, the chapters contain a generous number of illustrations.

Finally, this textbook’s last section deals with ophthalmic imaging, spectral domain, and new technologies, which to me is another way of saying computer processed imaging. If it were not for computers and their ability to process data, we would still be using film based FAs and ICGs. The authors delve into the difficult topic of fundus imaging and provide us today with a foundation for understanding ophthalmic imaging in the future.

Fernando Arevalo has assembled an excellent list of contributors who represent the “Who’s Who” in their areas of expertise. With such a list of authors we have no reason to expect anything but the most current information in each of the chapters presented in this textbook. We are not disappointed in the result of their endeavors. We are pleased that Fernando and his coauthors have achieved their goal of producing a comprehensive text that brings together FA, ICG, and OCT in a single textbook that brings to us the most current knowledge on the topics discussed.

We have come a long way since the first photographic image of the retinal fundus. The authors of this book are distinguished authorities in their fields of interest, and have been given an opportunity to discuss and illustrate current topics of extreme importance in our care of patients and our understanding of the diseases that affect them. We are the beneficiaries of their experience and their willingness to share their knowledge and expertise with us. This textbook will be an important part of any library.

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