Age-related Macular Degeneration
Diagnosis and Treatment
Few ocular diseases are so prevalent and devastating to daily life as age-related macular degeneration (AMD). Yet, very little is known about its pathogenesis and treatment. Given the expanding geriatric population, AMD is assuming epidemic proportion, prioritizing the disorder at the pinnacle of critical medical-retinal disease in need of better management.

Fortunately, considerable research has made notable advances in attempting to unravel the biochemical, immunologic, epidemiological and genetic complexities associated with this maculopathy. As a result, there is a wealth of burgeoning knowledge, led by discoveries in molecular biology, genetics, biochemical vasogenic and atrophic pathways, and imaging technology, which specifically displays the microabnormalities related to its pathogenesis. Many of these advances have also led to new opportunities for improved treatment modalities with a better visual prognosis than in the past. It is important to recall that knowledge in any field of medicine relates to a point in time, particularly for a complex disease such as AMD which is constantly under investigation which has led to converging lines of experimental and clinical evidence that modifies established ideas and new treatment concepts.

Over the course of years, several comprehensive textbooks and atlases have been written to compile this encyclopedic changing and expanding knowledge related to AMD. The authors of this text have tried to provide a current comprehensive and systemic documentation of the practical and timely analysis of AMD for retinal specialists, comprehensive ophthalmologists, and patients alike. Given the wide range of related disciplines, the authors have engaged an elite corps of experts as contributing authors. They are all leaders in the field with specialized interest in one or more of the principal issues related to the diagnosis and treatment of the disorder. Each section of this text discusses the nature and visual expectations associated with treatment today, including the limitations and potential adverse effects and the anticipated benefits. A review of the ophthalmic literature leading to standards of care based on evidenced-based medicine, specifically the randomized clinical trial, is also incorporated into these discussions. In essence, all new information on retinal genetics, molecular biology, risk factors, and diagnostic testing and imaging have been compiled in this text in a comprehensive format not found in any previous publication.

Thanks to advances from anti-VEGF treatment and enhanced imaging, progress has been made in recent years in the management of neovascular AMD, but very little progress has been made to prevent, retard, and treat the
mounting population of patients who suffer vision loss from apoptotic programmed cell loss or atrophy. Accordingly, they have also evaluated possibilities for future new forms of therapy for both the neovascular and non-neovascular forms of the disease. This text has examined all of the current concepts under investigation for management of this critical issue in AMD. It also presents a very erudite discussion on the economic impact of AMD to patients and our society realized by successful treatment. The authors do not fail to present an analysis of the complexities, and controversies and challenges in the study of AMD, assimilating information into logical explanations on the mechanisms of the related patho-physiological manifestations in the fundus, the array of future considerations for accelerating our understanding of the disease, and providing practical means for prevention and treatment.

Essentially, this new comprehensive text on AMD represents a labor of love by an elite corps of expert retinal specialists and clinical scientists. Their monumental efforts will be rewarded by the gratitude of clinicians and patients who will receive incalculable pleasure whether a casual or discerning reader.

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Preface

The field of ophthalmology has witnessed an unparalleled degree of progress over the last decade in the diagnosis and management of age-related macular degeneration (AMD). Before ten years ago, diagnostic techniques consisted of only fundus angiography and treatment was limited to laser photocoagulation for neovascular AMD. Unfortunately, many people suffered severe and irreversible loss of visual acuity from advanced AMD, both neovascular and atrophic or nonneovascular.

A new era began around 1990 with the introduction of photodynamic therapy, which effectively limited vision loss due to certain angiographic classes of neovascular AMD but generally did not afford significant visual gains. More recently, injectable vascular endothelial growth factor (VEGF) inhibiting pharmacotherapeutics have transformed the therapy of all types of neovascular AMD by giving patients a high likelihood of visual stability and a real chance of meaningful visual improvement. Frequent intravitreal injections of anti-VEGF medicines remains the standard of care for neovascular AMD; however, there is still room for improvement since only the minority of patients experience significant visual gains and the treatment burden of frequent injections is high. The pace of finding even better therapies for neovascular AMD has quickened and new comparative information on anti-VEGF therapies will play a major role in treatment decision making.

Although the nutritional interventions established by the Age Related Eye Disease Study (AREDS) have incrementally improved the prognosis of patients with significant drusen and nonneovascular AMD, we have not yet witnessed a sea change event. This is about to change as our expanding understanding of the pathobiology of nonneovascular AMD points us toward new therapeutic strategies and targets. While all these therapeutic advances were emerging, our ability to diagnose AMD-related atrophy and exudation improved with the advent of fundus autofluorescence and optic coherence tomography (OCT). These invaluable tools have become essential for day-to-day patient care but also generate and measure important quantitative data in nearly all ongoing AMD clinical trials. Lastly, our understanding of disease has leaped forward with the discovery of various genetic factors and inflammatory mechanisms that are associated strongly with AMD.

This book aims to provide – for the retina specialist, general eye care professional, vision scientist, and those training in these areas – an update on the current understanding of AMD pathophysiology, the use of diagnostic tests, and the management of both nonneovascular and neovascular AMD. It also
looks into the future with potential treatment options that are now under investigation in clinical trials. Finally, it covers the medical economics and societal impact of this major public health issue.

To cover this large array of topics in AMD, the editors are fortunate to have leading authorities in the field of retina to author the chapters of this book. We are grateful to the authors for all their time and efforts. We wish to acknowledge the ongoing support and inspiration of our associates at Mid Atlantic Retina and our ophthalmology colleagues, residents, and fellows at Wills Eye Institute. We also wish to thank our editors at Springer, Rebekah Amos, Shelley Reinhardt, Barbara Lopez-Lucio, and Catherine Paduani for their dedicated guidance and editorial expertise.

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