
Copyright © 2008 by SLACK Incorporated

All rights reserved. No part of this book may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without written permission from the publisher, except for brief quotations embodied in critical articles and reviews.

The procedures and practices described in this book should be implemented in a manner consistent with the professional standards set for the circumstances that apply in each specific situation. Every effort has been made to confirm the accuracy of the information presented and to correctly relate generally accepted practices. The authors, editor, and publisher cannot accept responsibility for errors or exclusions or for the outcome of the material presented herein. There is no expressed or implied warranty of this book or information imparted by it. Care has been taken to ensure that drug selection and dosages are in accordance with currently accepted/recommended practice. Due to continuing research, changes in government policy and regulations, and various effects of drug reactions and interactions, it is recommended that the reader carefully review all materials and literature provided for each drug, especially those that are new or not frequently used. Any review or mention of specific companies or products is not intended as an endorsement by the author or publisher.

SLACK Incorporated uses a review process to evaluate submitted material. Prior to publication, educators or clinicians provide important feedback on the content that we publish. We welcome feedback on this work.

Contact SLACK Incorporated for more information about other books in this field or about the availability of our books from distributors outside the United States.

Published by: SLACK Incorporated
6900 Grove Road
Thorofare, NJ 08086 USA
Telephone: 856-848-1000
Fax: 856-853-5991
www.slackbooks.com

Library of Congress Cataloging-in-Publication Data

Mastering refractive IOLs : the art and science / chief editor, David F. Chang.

p. ; cm.
Includes bibliographical references and index.
1. Intraocular lenses. I. Chang, David F., 1954-
[DNLM: 1. Lens Implantation, Intraocular--methods. WW 358 M423 2008]
RE988 M37 2008
617.7'1--dc22

2008002676

For permission to reprint material in another publication, contact SLACK Incorporated. Authorization to photocopy items for internal, personal, or academic use is granted by SLACK Incorporated provided that the appropriate fee is paid directly to Copyright Clearance Center. Prior to photocopying items, please contact the Copyright Clearance Center at 222 Rosewood Drive, Danvers, MA 01923 USA, phone: 978-750-8400, website: www.copyright.com, email: info@copyright.com

Printed in the United States of America.

Last digit is print number: 10 9 8 7 6 5 4 3 2 1
Dedication

This textbook highlights the latest advances in refractive IOL technology and surgery. No longer satisfied with simply treating cataracts, our efforts are now focused on reversing lens aging through the pseudophakic correction of presbyopia. Amidst such exciting advances, it is easy to forget that the greatest challenge in the field of cataract and IOL surgery continues to be the staggering and increasing backlog of cataract blindness in developing countries.

Modern phacoemulsification machines are expensive to purchase and maintain, incur relatively high disposable costs, and require extensive surgical training. Furthermore, for the more advanced and mature cataracts typical of underserved populations, performing phacoemulsification becomes more difficult and complication prone. What is needed is a high-volume, cost-effective, “low tech” procedure that can treat the most advanced of cataracts with a low complication rate in the shortest amount of time.

This very goal is being achieved in a handful of international programs that are providing a hopeful paradigm for overcoming cataract blindness worldwide. I have had the privilege of visiting and collaborating with doctors at both the Aravind Eye Hospital network in Southern India, and the Tilganga Eye Center in Kathmandu, Nepal. Observing first-hand how these 2 systems provide low-cost, high-volume and quality cataract surgery is an awe-inspiring experience for any visiting ophthalmologist.

Founded in 1976 by the legendary Dr. G. Venkataswamy, Aravind Eye Hospital has grown into a network of 5 regional eye hospitals providing high-level ophthalmic care to the poor population of Southern India. Private paying patients comprise approximately 30% of their patient base. This revenue funds the 70% of Aravind’s services that are provided at no cost to the indigent via a financially self-sustaining program that receives minimal government reimbursement. In terms of cataract surgery, this means that of the approximately 200,000 procedures performed annually in the Aravind system, 70% are provided for free.

While private cataract patients at Aravind may pay anywhere from $200 to $300 to undergo phacoemulsification with foldable IOLs imported from the United States, the nonpaying cataract patients are treated for less than $15 per case, including the IOL. This is accomplished by performing a manual, sutureless, small incision extracapsular procedure with reusable equipment and supplies. Their IOL manufacturing facility, Aurolab, produces PMMA IOLs for less than $5 per lens. Following a retrobulbar block, the nucleus is expressed through a capsulorrhexis and a temporal, self-sealing 6.0- to 6.5-mm scleral pocket incision. Manual cortical cleanup precedes capsular bag implantation of a square edge PMMA IOL. The technique is commonly abbreviated as manual SICS (small incision cataract surgery).

While the procedure itself seems straightforward, it is the stunning speed, skill, and efficiency with which it is performed that must literally be seen to be believed. By alternating between 2 parallel operating room tables, a single surgeon is able to perform over 15 cases per hour by consistently completing sub-5-minute procedures on the densest of cataracts with no intervening turnover time. To ensure efficiency across different surgical teams, every aspect of the procedure is standardized, from preoperative patient and instrument preparation to the surgical steps themselves. Having been screened in outlying rural eye camps, as many as 300 to 400 cataract patients will be bused to a regional Aravind eye hospital where they will all undergo their surgery on one single day. After several days of in-house follow-up, they are transported back to their rural villages where a local postoperative visit and refraction are performed 1 month later by the Aravind staff.

Founded in 1994 by Dr. Sanduk Ruit, the Tilganga Eye Center is a shining example of an efficient eye care delivery system on a smaller scale. Dr. Ruit has developed his own variation of the manual, sutureless SICS. Our prospective randomized trial comparing phaco and manual, sutureless SICS in a camp population showed that the latter method produces excellent results at
a fraction of the cost. Tilganga Eye Center is also financially self-sustaining wherein private care subsidizes charity care. They also have their own IOL manufacturing facility, which, like that at Aravind, is able to supply low-cost IOLs to other developing countries. Because the rural population in Nepal is so widely scattered amongst mountain villages that are accessible only by foot, the Tilganga system strives to deliver portable cataract care by transporting the necessary staff and equipment to remote eye camps. Using a single portable operating table, the Tilganga surgeons can also perform more than 10 cataract surgeries per hour. As at Aravind, the high-volume, cost-effective Tilganga surgical techniques and protocols are standardized across their surgical teams. Since 1994 when Dr. Ruit and Dr. Geoff Tabin co-founded the Himalayan Cataract Project, Tilganga ophthalmologists and staff have provided mobile cataract surgical care and physician training in numerous developing countries across mountainous Asia.

Though of a different scale and serving different types of communities, Aravind and Tilganga are complimentary models of how best to address the world’s backlog of cataract blindness. They demonstrate that the solution requires not only a cost-effective surgical technique, but also an entire system of efficient and financially self-sustaining cataract care delivery. Beyond the impressive productivity of these 2 institutions, equally important has been their mission to train surgical teams from other developing countries in their methods of cataract surgery. An efficient, high-volume system utilizing low cost, sub-5-minute procedures to tackle advanced cataracts with minimal complications is clearly the best way to leverage the scarcest and most precious asset of the system—the cataract surgeon.

I consider this work to be the most inspiring and impressive accomplishment in our field of cataract surgery and it is with great respect and admiration that I dedicate this textbook to my friends at the Aravind and Tilganga Eye Hospitals. They are the unsung but true heroes in our field, and as we struggle to meet the high refractive expectations of our premium IOL patients, we must remember and salute our colleagues in developing countries that are on the frontlines of the most important surgical battlefield.

Reference


In addition to his AMO, Alcon, and Visiogen consulting fees, Dr. Chang will also donate any royalties from this book to the Himalayan Cataract Project.
## Contents

**Dedication** ............................................................................................................................................................................................................ iii

**Acknowledgments** ................................................................................................................................................................................................ xix

**About the Chief Editor** .................................................................................................................................................................................................. xx

**About the Associate Editors** ................................................................................................................................................................................................... xxi

**Contributing Authors** ............................................................................................................................................................................................ xxiii

**Foreword by Spencer P. Thornton, MD, FACS** ........................................................................................................................................ xxxiv

**Preface** ............................................................................................................................................................................................................ xxxxv

### Section I Why Offer Premium IOLs? ................................................................................................................................. 1

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Birth of the Premium IOL Channel</td>
<td>Jim Denning, BS</td>
</tr>
<tr>
<td>2</td>
<td>Refractive IOLs—Economic Demographics</td>
<td>David Harmon</td>
</tr>
<tr>
<td>3</td>
<td>Refractive IOLs—Economic Demographics</td>
<td>Geoff Charlton</td>
</tr>
<tr>
<td>4</td>
<td>Refractive Surgery and IOLs—Future Trends</td>
<td>I. Howard Fine, MD</td>
</tr>
<tr>
<td>5</td>
<td>Refractive Surgery and IOLs—Future Trends</td>
<td>Richard L. Lindstrom, MD</td>
</tr>
<tr>
<td>6</td>
<td>Refractive Surgery and IOLs—Future Trends</td>
<td>Lee T. Nordan, MD</td>
</tr>
<tr>
<td>7</td>
<td>What Is a Premium IOL Worth?</td>
<td>J. Andy Corley</td>
</tr>
<tr>
<td>8</td>
<td>What Is a Premium IOL Worth?</td>
<td>Kay Coulson, MBA</td>
</tr>
<tr>
<td>9</td>
<td>Understanding Who the Premium IOL Patients Are</td>
<td>Shareef Mahdavi, BA</td>
</tr>
<tr>
<td>10</td>
<td>Premium IOLs—Re-Engineering Your Practice</td>
<td>Darrell E. White, MD</td>
</tr>
<tr>
<td>11</td>
<td>The Refractive IOL Patient’s Journey</td>
<td>Stephen S. Lane, MD</td>
</tr>
<tr>
<td>12</td>
<td>Premium IOLs—External Marketing</td>
<td>Michael W. Mulley, BA</td>
</tr>
<tr>
<td>13</td>
<td>Premium IOLs—External Marketing</td>
<td>Shareef Mahdavi, BA</td>
</tr>
<tr>
<td>14</td>
<td>Premium IOLs—Internal Marketing</td>
<td>Kay Coulson, MBA</td>
</tr>
<tr>
<td></td>
<td>Internal Marketing</td>
<td>Jim Denning, BS</td>
</tr>
<tr>
<td>15</td>
<td>Lessons learned From Marketing Cosmetic Surgery</td>
<td>Marie Czenko Kuechel, MA</td>
</tr>
</tbody>
</table>
Contents

Chapter 16 Premium IOLs and the Role of Your Staff ................................................................. 51
  R. Bruce Wallace, III, MD, FACS

Chapter 17 Premium IOLs and the Role of Your Staff ................................................................. 53
  Kevin L. Waltz, OD, MD

Chapter 18 ASCRS Presbyopia Education Task Force—Challenge Ahead .................................. 55
  John Ciccone

Section II Transitioning to Presbyopia-Correcting IOLs ................................................................. 58

Chapter 19 Lessons Learned From Keratorefractive Surgery ..................................................... 59
  Louis Probst, MD and John Lehr, OD

Chapter 20 Transitioning From Cataract to Refractive IOL Surgery .......................................... 63
  Kevin Denny, MD

Chapter 21 Transitioning From Cataract to Refractive IOL Surgery .......................................... 66
  Sandra Yeh, MD

Chapter 22 Transitioning From Cataract to Refractive IOL Surgery .......................................... 68
  Timothy B. Cavanaugh, MD

Chapter 23 Transitioning From Keratorefractive to Refractive IOL Surgery ............................... 71
  Jay Bansal, MD

Chapter 24 Transitioning From Keratorefractive to Refractive IOL Surgery ............................... 73
  Marguerite B. McDonald, MD, FACS

Chapter 25 Transitioning From Keratorefractive to Refractive IOL Surgery ............................... 75
  Jose L. Güell, MD, Merce Morral, MD, Oscar Gris, MD, and Felicidad Manero, MD

Chapter 26 Refractive IOLs in a Residency Program—Can It Work? ........................................... 78
  Thomas A. Oetting, MD, Jeffrey J. Caspar, MD, Bonnie An Henderson, MD, and Terry Kim, MD

Chapter 27 Refractive IOLs in a Managed Care Setting ................................................................. 82
  William Jerry Chang, MD

Chapter 28 Refractive IOLs in a Comanaged Optometric Network ............................................... 85
  Paul Ernest, MD

Section III Transitioning to Presbyopia-Correcting IOLs: Quick Start Guides ............................. 87

Chapter 29 How Do I Get Started With the ReZoom? ................................................................. 88
  George Beiko, BM, BCh, FRCS(C)

Chapter 30 How Do I Get Started With the ReSTOR? ............................................................... 97
  Richard Tipperman, MD

Chapter 31 How Do I Get Started With the Tecnis Multifocal? .................................................... 100
  Julian D. Stevens, MRCP, FRCS, FRCOphtb

Chapter 32 How Do I Get Started With the Crystalens? ............................................................... 105
  D. Michael Colvard, MD, FACS

Section IV Presbyopia-Correcting IOLs Today ............................................................................. 111

Chapter 33 AMO ReZoom Multifocal—Clinical Pearls ............................................................... 112
  R. Bruce Wallace III, MD, FACS
Section V  Presbyopia-Correcting IOLs in the Future ............................................................... 191

Chapter 54  Overview of Accommodating IOLs ................................................................. 192
George Beiko, BM, BCh, FRCS(C)

Chapter 55  Overview of Accommodating IOLs ................................................................. 200
John A. Vukich, MD

Chapter 56  Visiogen Synchrony—Clinical Pearls .......................................................... 202
Ivan L. Ossma, MD, MPH and Andrea Galvis, MD
Pearls for Implanting the Visiogen Synchrony IOL .......................................................... 207
David F. Chang, MD

Chapter 57  Visiogen Synchrony—Clinical Pearls .......................................................... 210
George Beiko, BM, BCh, FRCS(C)

Chapter 58  Lenstec Tetraflex—Clinical Pearls ................................................................. 215
Paul Dougherty, MD

Chapter 59  Lenstec Tetraflex—Clinical Pearls ................................................................. 218
Conall F. Hurley, MB, BCh, BAO, FRCSI

Chapter 60  Shape-Changing IOLs: PowerVision ............................................................ 220
Louis D. “Skip” Nichamin, MD and John A. Scholl, MS

Chapter 61  Shape-Changing IOLs: NuLens ..................................................................... 223
Jorge L. Alió, MD, PhD, Joshua Ben-Nun, MD, and Paul Kaufman, MD

Chapter 62  Calhoun Light Adjustable Lens—Presbyopia Correction .......................... 229
Arturo Chayet, MD, Federico Badala, MD, Christian Sandstedt, PhD, Shiao Chang, PhD, Paul Rhee, OD, and Daniel M. Schwartz, MD

Chapter 63  Calhoun Light Adjustable Lens—Presbyopia Correction .......................... 232
Jose L. Güell, MD, Merce Morral, MD, Felicidad Manero, MD, Maite Sisquella, OPT, and Daniel M. Schwartz, MD

Chapter 64  Acritec IOL ................................................................................................. 236
José F. Alfonso, MD, PhD

Chapter 65  Vision Membrane IOL .................................................................................. 239
Lee T. Nordan, MD and David Castillejos, MD

Chapter 66  New Bioprics: Refractive IOLs Combined With Intracorneal Lenses .......... 242
Kevin L. Waltz, OD, MD

Section VI  Refractive IOLs—Quality of Vision ................................................................. 244

Chapter 67  Measuring Our IOL Outcomes .................................................................. 245
Pietro Giardini, MD and Nicola Hauranieh, MD

Chapter 68  Presbyopia-Correcting IOLs—Interpreting Clinical Data ....................... 250
Kerry D. Solomon, MD, Luis E. Fernández de Castro, MD, Helga P. Sandoval, MD, MSCR, and David T. Vroman, MD

Chapter 69  Multifocal IOLs: Measuring Aberrations .................................................. 256
W. Andrew Maxwell, MD, PhD and Jim Schwiegerling, PhD

Chapter 70  Multifocal IOLs: Comparing Aberrations .................................................. 261
Lana J. Nagy, BS, Geunyoung Yoon, PhD, and Scott MacRae, MD
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>Pseudoaccommodation and Spherical Aberration</td>
<td>264</td>
</tr>
<tr>
<td></td>
<td>Marc A. Michelson, MD</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>Understanding Multifocal Haloes</td>
<td>267</td>
</tr>
<tr>
<td></td>
<td>Carlos Vergés, MD, PhD</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>Understanding Multifocal Haloes</td>
<td>273</td>
</tr>
<tr>
<td></td>
<td>Kevin L. Waltz, OD, MD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pearls for Managing Halos</td>
<td>276</td>
</tr>
<tr>
<td></td>
<td>Dwayne Logan, MD</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>Aspheric IOLs—Matching Corneal and IOL Wavefront</td>
<td>278</td>
</tr>
<tr>
<td></td>
<td>George Beiko, BM, BCh, FRCS(C)</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>Aspheric IOLs—Matching Corneal and IOL Wavefront</td>
<td>282</td>
</tr>
<tr>
<td></td>
<td>Mark Packer, MD, FACS; I. Howard Fine, MD, and Richard S. Hoffman, MD</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>Aspheric IOLs—Matching Corneal and IOL Wavefront</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td>Roberto Bellucci, MD</td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>Monovision With Aspheric IOLs</td>
<td>291</td>
</tr>
<tr>
<td></td>
<td>J. E. “Jay” McDonald II, MD and David J. Deitz, MPhil</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Neuroadaptation to Monovision</td>
<td>295</td>
</tr>
<tr>
<td></td>
<td>J. E. “Jay” McDonald II, MD and David J. Deitz, MPhil</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Neuroadaptation and Multifocal IOLs</td>
<td>302</td>
</tr>
<tr>
<td></td>
<td>Robert M. Kershner, MD, MS, FACS</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Neuroadaptation and Multifocal IOLs</td>
<td>305</td>
</tr>
<tr>
<td></td>
<td>Pablo Artal, MD</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>Visual Function Training for Multifocal Patients</td>
<td>308</td>
</tr>
<tr>
<td></td>
<td>Hakan Kaymak MD and Ulrich Mester MD</td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>Adapting to My Own Multifocal Halos</td>
<td>315</td>
</tr>
<tr>
<td></td>
<td>Guy E. Knolle, MD, FACS</td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>How I see With the ReZoom</td>
<td>317</td>
</tr>
<tr>
<td></td>
<td>Tom M. Coffman, MD</td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>How I See With the ReSTOR</td>
<td>319</td>
</tr>
<tr>
<td></td>
<td>Daniel Vos, MD</td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>How I See With the ReSTOR</td>
<td>321</td>
</tr>
<tr>
<td></td>
<td>Jess C. Lester, MD, FACS</td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>How I See With the Crystalens</td>
<td>323</td>
</tr>
<tr>
<td></td>
<td>Harvey Zalaznick, MD</td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>How I See With the Crystalens</td>
<td>324</td>
</tr>
<tr>
<td></td>
<td>Brian D. Laeth, MD</td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>How I See With the Tecnis MF and Rezoom</td>
<td>326</td>
</tr>
<tr>
<td></td>
<td>R. Lee Harman, MD, FACS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>How I See With Mixed Multifocals</td>
<td>329</td>
</tr>
<tr>
<td></td>
<td>Anonymous</td>
<td></td>
</tr>
</tbody>
</table>
### Section VII  Patient Selection and Education ................................................................. 331

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>89</td>
<td>The Mindset of the Refractive IOL Patient</td>
<td>Kerry K. Assil, MD and William K. Christian, MD</td>
</tr>
<tr>
<td>90</td>
<td>The Mindset of the Refractive IOL Patient</td>
<td>Alan Aker</td>
</tr>
<tr>
<td>91</td>
<td>The Mindset of the Refractive IOL Surgeon</td>
<td>Alan Aker</td>
</tr>
<tr>
<td>92</td>
<td>Screening and Counseling Refractive IOL Patients</td>
<td>Steven J. Dell, MD</td>
</tr>
<tr>
<td>93</td>
<td>Screening and Counseling Refractive IOL Patients</td>
<td>David F. Chang, MD</td>
</tr>
<tr>
<td>94</td>
<td>Screening and Counseling Refractive IOL Patients</td>
<td>Mark Packer, MD, FACS</td>
</tr>
<tr>
<td>95</td>
<td>Screening and Counseling Refractive IOL Patients</td>
<td>Robert J. Cionni, MD</td>
</tr>
<tr>
<td>96</td>
<td>Managing Patient Expectations</td>
<td>David F. Chang, MD</td>
</tr>
<tr>
<td>97</td>
<td>Managing Patient Expectations</td>
<td>Jay S. Pepose, MD, PhD</td>
</tr>
<tr>
<td>98</td>
<td>Managing Patient Expectations</td>
<td>Richard S. Hoffman, MD</td>
</tr>
<tr>
<td>99</td>
<td>Managing Patient Expectations</td>
<td>Richard Tipperman, MD</td>
</tr>
<tr>
<td>100</td>
<td>Managing Patient Expectations</td>
<td>Frank A. Bucci, Jr, MD</td>
</tr>
<tr>
<td>101</td>
<td>Managing Patient Expectations</td>
<td>Kenneth J. Rosenthal, MD, FACS</td>
</tr>
<tr>
<td>102</td>
<td>The Role of the Refractive IOL Counselor</td>
<td>James D. Dawes, MHA, CMPE, COE</td>
</tr>
<tr>
<td>103</td>
<td>Who Is a Premium IOL Candidate?</td>
<td>Alan Shiller</td>
</tr>
<tr>
<td>105</td>
<td>Refractive Candidates—Who Is good? Who Is Not?</td>
<td>Weldon W. Haw, MD and Edward E. Manche, MD</td>
</tr>
<tr>
<td>106</td>
<td>Refining My Indications for Multifocal IOLs</td>
<td>James A. Davison, MD, FACS</td>
</tr>
<tr>
<td>107</td>
<td>Refractive IOLs and Patient Office Flow</td>
<td>William D. Gaskins, MD, FACS</td>
</tr>
<tr>
<td>Chapter</td>
<td>Title</td>
<td>Author(s)</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>108</td>
<td>Multifocal IOLs and Glaucoma—How Much Is Too Much?</td>
<td>Iqbal Ike K. Ahmed, MD, and Joshua Teichman, MD</td>
</tr>
<tr>
<td>109</td>
<td>Multifocal IOLs and Glaucoma—How Much Is Too Much?</td>
<td>Parag D. Parekh, MD, MPA and Thomas W. Samuelson, MD</td>
</tr>
<tr>
<td>110</td>
<td>Multifocal IOLs and Maculopathy—How Much Is Too Much?</td>
<td>Martin A. Mainster, PhD, MD, FRCOphth and Patricia L. Turner, MD</td>
</tr>
<tr>
<td>111</td>
<td>What if Multifocal IOL Patients Develop ARMD?</td>
<td>Johnny L. Gayton, MD</td>
</tr>
<tr>
<td>112</td>
<td>Premium IOLs in Post-LASIK Eyes</td>
<td>Uday Devgan, MD, FACS</td>
</tr>
<tr>
<td>113</td>
<td>Premium IOLs in Post-LASIK Eyes</td>
<td>Jeffrey D. Horn, MD</td>
</tr>
<tr>
<td>114</td>
<td>Premium IOLs in Post-LASIK Eyes</td>
<td>Renée Solomon, MD and Eric Donnenfeld, MD</td>
</tr>
<tr>
<td>115</td>
<td>Patient Education—Using the IOL Counselor</td>
<td>Robert D. Watson</td>
</tr>
<tr>
<td>116</td>
<td>Patient Education—Using Eyemaginations</td>
<td>Michael Sopher</td>
</tr>
<tr>
<td>117</td>
<td>Ethics of Refractive IOL Counseling</td>
<td>Charles M. Zacks, MD</td>
</tr>
<tr>
<td>118</td>
<td>Ethics of Refractive IOL Counseling</td>
<td>David F. Chang, MD</td>
</tr>
<tr>
<td>119</td>
<td>Ethics of Refractive IOL Counseling</td>
<td>Lisa Brothers Arbiser, MD</td>
</tr>
<tr>
<td>120</td>
<td>Risk Management and Informed Consent</td>
<td>Richard L. Abbott, MD</td>
</tr>
<tr>
<td>121</td>
<td>Risk Management and Informed Consent</td>
<td>James J. Salz, MD</td>
</tr>
<tr>
<td></td>
<td><strong>Section VIII Presbyopia-Correcting IOL Selection</strong></td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>Why Offer Multiple Premium IOLs?</td>
<td>David F. Chang, MD</td>
</tr>
<tr>
<td>123</td>
<td>Why Offer Multiple Premium IOLs?</td>
<td>Joel K. Shugar, MD, MSEE</td>
</tr>
<tr>
<td>124</td>
<td>Why Offer Multiple Premium IOLs?</td>
<td>Audrey Talley-Rostov, MD</td>
</tr>
<tr>
<td>125</td>
<td>Why Offer Multiple Premium IOLs?</td>
<td>Sheri L. Rowen, MD, FACS</td>
</tr>
<tr>
<td>126</td>
<td>Monovision With Monofocal IOLs</td>
<td>William F. Maloney, MD</td>
</tr>
</tbody>
</table>
Chapter 127 Monovision With Monofocal IOLs ................................................................. 450
  Graham D. Barrett, MBCh, FRANZCO, FRACS

Chapter 128 Multifocal IOL in One Eye? ................................................................. 454
  Frank A. Bucci, Jr, MD
  IOL Selection: Can I Implant a Multifocal IOL in Just One Eye? .........................
  Richard J. Mackool, MD

Chapter 129 Mixing IOLs—What Are the Options? ................................................... 457
  Elizabeth A. Davis, MD, FACS and Richard L. Lindstrom, MD

Chapter 130 Bilateral Multifocals—Mixing Versus Matching .................................. 461
  Con Meshegos, MD, FRANZCO, FRACS

Chapter 131 Which IOL Combination? Clinical Results ........................................... 465
  Jay S. Pepose, MD, PhD

Chapter 132 Mixing IOLs—How Do I Get Started? .................................................... 467
  John F. Doane, MD, and Randolph T. Jackson, MD

Chapter 133 Mixing Multifocal IOLs—Clinical Results ........................................... 472
  Frank A. Bucci, Jr, MD

Chapter 134 Mixing Tecnis and ReZoom Multifocal IOLs ............................................ 475
  Michael C. Knorz, MD

Chapter 135 Mixing Multifocal IOLs—Staged Implantation .................................... 478
  Kerry K. Assil, MD and William K. Christian, MD

Chapter 136 Pearls for Mixing Multifocal IOLs ........................................................... 480
  Angel López Castro, MD

Chapter 137 Pearls for Mixing Multifocal IOLs ........................................................... 487
  Matteo Piovella, MD

Chapter 138 Mixing Accommodating and Multifocal IOLs ....................................... 491
  J. Trevor Woodhams, MD

Chapter 139 Mixing or Matching IOLs—Why I Do Not Mix ..................................... 494
  Richard Tipperman, MD

Chapter 140 Mixing Versus Matching—Who Is More Satisfied? ............................... 498
  Paul Mann, MD

Chapter 141 Matching Versus Mixing IOLs—Clinical Comparison ............................ 500
  Richard J. Mackool, MD and Richard J. Mackool Jr, MD

Chapter 142 Refractive IOL Selection –European Perspective ................................ 504
  H. Burkhard Dick, MD

Chapter 143 Refractive IOL Selection –South American Perspective ....................... 519
  Leonardo Akaishi, MD

Chapter 144 Refractive IOL –Asian Perspective ......................................................... 523
  Jerry Tan Tiang Hin, MBBS, FRCS, FRCOphth

Chapter 145 Case Studies—What Would You Do? How Would You Counsel These Patients Seeking Maximum Spectacle Independence ........................................... 528
  David F. Chang, MD, Steven J. Dell, MD, Warren E. Hill, MD, FACS, Richard L. Lindstrom, MD, and Kevin Waltz, MD
Section IX  Preoperative Ocular Assessment ................................................................. 532

Chapter 146  Hitting Emmetropia ............................................................................... 533
Warren E. Hill, MD, FACS

Chapter 147  Biometry Pearls .................................................................................. 535
Steven J. Dell, MD

Chapter 148  Measuring Axial Length ....................................................................... 536
Warren E. Hill, MD, FACS and Thomas C. Prager, PhD, MPH

Chapter 149  Intraocular Lens Power Calculations for Multifocal Lenses ............... 539
Jack T. Holladay, MD, MSEE, FACS

Chapter 150  Refining Your A-constant ..................................................................... 543
Guy M. Kezirian, MD, FACS

Chapter 151  IOL Calculation After Prior Refractive Surgery .................................. 546
Kenneth J. Hoffer, MD, FACS

Chapter 152  Pupil Assessment for Refractive IOLs ................................................... 554
Mujtaba A. Qazi, MD and Jay S. Pepose, MD, PhD

Chapter 153  Corneal Topography—Is It Necessary? ................................................. 557
Matthew C. Caldwell, MD and Natalie A. Afshari, MD

Chapter 154  Corneal Topography and Refractive IOLs—What to Look For ............ 559
Ming Wang, MD, PhD, and Tracy Schroeder Swartz, OD, MS, FAAO

Chapter 155  Corneal Topography and Refractive IOLs—What to Look For ............ 564
David R. Hardten, MD

Chapter 156  Corneal Topography and Refractive IOLs—Case Studies .................... 568
William Trattler, MD and Carlos Buznego, MD

Chapter 157  Optimizing the Ocular Surface Preoperatively .................................... 571
Sherman W. Reeves, MD, MPH and Richard L. Lindstrom, MD

Chapter 158  Retina Assessment for Refractive IOL Patients—What Do I Do? ........ 575
David F. Chang, MD, Jay S. Pepose, MD, PhD, and Olga Konykhkova, MD, Warren E. Hill, MD, FACS, and Kerry D. Solomon, MD, Luis E. Fernández de Castro, MD, and Helga P. Sandoval, MD, MSCR

Section X  Managing Astigmatism .............................................................................. 580

Chapter 159  Measuring Astigmatism ....................................................................... 581
Noel Alpins, FRACO, FRCOphth, FACS, and George Stamatelatos, BSc Optom

Chapter 160  LRIs—How Do I Get Started? .............................................................. 586
Jonathan B. Rubenstein, MD, and Vanee Virash, MD

Chapter 161  LRIs and Refractive IOLs—My Way .................................................... 588
Louis D. "Skip" Nichamin, MD

Chapter 162  LRIs and Refractive IOLs—my way ..................................................... 592
James P. Gills, MD, and Pit Gills, MD

Chapter 163  Peripheral Corneal Relaxing Incisions and Refractive IOLs—My Way  597
Kevin M. Miller, MD
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>164</td>
<td>LRIs and Refractive IOLs—My Way</td>
<td>601</td>
</tr>
<tr>
<td></td>
<td><em>Eric Donnenfeld, MD, and Renée Solomon, MD</em></td>
<td></td>
</tr>
<tr>
<td>165</td>
<td>CRI and Terry-Schanzlin Astigmatome</td>
<td>606</td>
</tr>
<tr>
<td></td>
<td><em>Allan M. Robbins, MD, FACS</em></td>
<td></td>
</tr>
<tr>
<td>166</td>
<td>LRIs: An Alternative to Free-Hand Incisions</td>
<td>612</td>
</tr>
<tr>
<td></td>
<td><em>Randall J Olson, MD</em></td>
<td></td>
</tr>
<tr>
<td>167</td>
<td>LRI Pearls</td>
<td>615</td>
</tr>
<tr>
<td></td>
<td><em>R. Bruce Wallace, III, MD, Jonathan B. Rubenstein, MD, and Steven J. Dell, MD</em></td>
<td></td>
</tr>
<tr>
<td>168</td>
<td>Laser Enhancement for Astigmatism—Bioptics</td>
<td>619</td>
</tr>
<tr>
<td></td>
<td><em>Johnny L. Gayton, MD</em></td>
<td></td>
</tr>
<tr>
<td>169</td>
<td>Toric IOLs—How Do I Get Started?</td>
<td>622</td>
</tr>
<tr>
<td></td>
<td><em>Jeffrey D. Horn, MD</em></td>
<td></td>
</tr>
<tr>
<td>170</td>
<td>STAAR Toric IOLs</td>
<td>624</td>
</tr>
<tr>
<td></td>
<td><em>Stephen Bylsma, MD</em></td>
<td></td>
</tr>
<tr>
<td>171</td>
<td>Toric IOLs—Staar Versus Acrysof</td>
<td>627</td>
</tr>
<tr>
<td></td>
<td><em>David F. Chang, MD</em></td>
<td></td>
</tr>
<tr>
<td>172</td>
<td>Acrysof Toric IOL Technique</td>
<td>632</td>
</tr>
<tr>
<td></td>
<td><em>Edward Holland, MD</em></td>
<td></td>
</tr>
<tr>
<td>173</td>
<td>When Do I Use LRIs Versus Toric IOLs?</td>
<td>634</td>
</tr>
<tr>
<td></td>
<td><em>David F. Chang, MD</em></td>
<td></td>
</tr>
<tr>
<td>174</td>
<td>When Do I Use LRIs Versus Toric IOLs?</td>
<td>637</td>
</tr>
<tr>
<td></td>
<td><em>Richard A. Lewis, MD, Louis D. “Skip” Nichamin, MD, Edward Holland, MD, and Kerry D. Solomon, MD, and Luis E. Fernández de Castro, MD</em></td>
<td></td>
</tr>
<tr>
<td>175</td>
<td>Can I Combine Toric IOLs and LRIs?</td>
<td>641</td>
</tr>
<tr>
<td></td>
<td><em>Kevin M. Miller, MD</em></td>
<td></td>
</tr>
<tr>
<td>176</td>
<td>Pearls for Improving Your Cataract Surgical Skills</td>
<td>645</td>
</tr>
<tr>
<td></td>
<td><em>David F. Chang, MD</em></td>
<td></td>
</tr>
<tr>
<td>177</td>
<td>Pearls for Improving Your Cataract Surgical Skills</td>
<td>646</td>
</tr>
<tr>
<td></td>
<td><em>Uday Devgan, MD, FACS</em></td>
<td></td>
</tr>
<tr>
<td>178</td>
<td>Pearls for Improving Your Cataract Surgical Skills</td>
<td>650</td>
</tr>
<tr>
<td></td>
<td><em>Brian Little, FRCS, FRCOphth, FHEA</em></td>
<td></td>
</tr>
<tr>
<td>179</td>
<td>Pearls for Improving Your Cataract Surgical Skills</td>
<td>654</td>
</tr>
<tr>
<td></td>
<td><em>Rosa Braga-Mele, MD, MEd, FRCSC</em></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>Pearls for Improving Your Cataract Surgical Skills</td>
<td>659</td>
</tr>
<tr>
<td></td>
<td><em>William J. Fishkind, MD, FACS</em></td>
<td></td>
</tr>
<tr>
<td>181</td>
<td>Pearls for Improving Your Cataract Surgical Skills</td>
<td>662</td>
</tr>
<tr>
<td></td>
<td><em>Lisa Brothers Arbisser, MD</em></td>
<td></td>
</tr>
<tr>
<td>182</td>
<td>Sizing the Capsulorrhexis</td>
<td>668</td>
</tr>
<tr>
<td></td>
<td><em>David F. Chang, MD, Steven Dewey, MD, Richard Tipperman, MD, and Barry S. Seibel, MD</em></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 183  Improving the Corneal Incision Seal
Michael Y. Wong, MD

Chapter 184  Diffractive Multifocal IOL Centration
Paolo Vinciguerra, MD, and Fabrizio I. Camesasca, MD

Chapter 185  Why Use topical NSAIDs?
John R. Wittpen, MD

Chapter 186  Maintaining Patient Satisfaction Postoperatively
Richard Tipperman, MD
Premium IOL Surgery Pearls for Postoperative Management
Kevin L. Waltz, OD, MD

Chapter 187  Maintaining Patient Satisfaction Postoperatively
Uday Devgan, MD, FACS

Chapter 188  Creating a Premium Refractive Patient Environment
James D. Dawes, MHA, CMPE, COE

Chapter 189  The Premium Patient Experience
Darrell E. White, MD

Section XII Refractive Lens Exchange

Chapter 190  The PRELEX Story
R. Bruce Wallace, III, MD, FACS

Chapter 191  Patient and Surgeon Mindset—What Is Different?
Avery Alexander, MD

Chapter 192  Presbyopic Refractive Patients—LVC or IOL?
Y. Ralph Chu, MD and Dan Davis, OD

Chapter 193  Presbyopic Refractive Patients—LVC or IOL?
Sheraz M. Daya, MD, FACP, FACS, FRCS(Ed), FRCOphth

Chapter 194  RLE With Multifocal IOLs—Bioptics Approach
José F. Alfonso, MD, PhD

Chapter 195  RLE—Lens Removal: What Is Different?
I. Howard Fine, MD, Richard S. Hoffman, MD, and Mark Packer, MD, FACS

Chapter 196  RLE—Lens Removal: What Is Different?
Steven Dewey, MD

Chapter 197  RLE—Lens Removal: What Is Different?
Barry S. Seibel, MD

Chapter 198  Optimizing the Cornea and the IOL With RLE
Michael B. Brenner, MD, FICS

Chapter 199  Retinal Detachment Risk in Myopes
Barry S. Seibel, MD

Chapter 200  Retinal Detachment Risk in Myopes
Jorge L. Alió, MD, PhD and Mohamed H. Shabayek, MD, PhD
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 201</td>
<td>Retinal Detachment Risk in Myopes</td>
<td>735</td>
</tr>
<tr>
<td></td>
<td>Kerry D. Solomon, MD, and Luis E. Fernández de Castro, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 202</td>
<td>Retinal Detachment Risk With Refractive Surgery</td>
<td>739</td>
</tr>
<tr>
<td></td>
<td>Yachna Ahuja and Suber S. Huang, MD, MBA</td>
<td></td>
</tr>
<tr>
<td><strong>Section XIII</strong></td>
<td><strong>Enhancements</strong></td>
<td>742</td>
</tr>
<tr>
<td>Chapter 203</td>
<td>Approaching Astigmatism in Presbyopia IOL Patients</td>
<td>743</td>
</tr>
<tr>
<td></td>
<td>Jason E. Stahl, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 204</td>
<td>Approaching Astigmatism in Presbyopia IOL Patients</td>
<td>745</td>
</tr>
<tr>
<td></td>
<td>Rick Milne, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 205</td>
<td>Tolerance of Residual Refractive Error After ReSTOR</td>
<td>748</td>
</tr>
<tr>
<td></td>
<td>Luis Fernández-Vega, MD, PhD, José F. Alfonso, MD, PhD, Robert Montés-Micó, PhD, and Hussein Ambaz, MD, PhD</td>
<td></td>
</tr>
<tr>
<td>Chapter 206</td>
<td>Should I Learn PRK/LASIK or Refer These Out?</td>
<td>752</td>
</tr>
<tr>
<td></td>
<td>Helen Wu, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 207</td>
<td>Should I Learn PRK/LASIK or Refer These Out?</td>
<td>755</td>
</tr>
<tr>
<td></td>
<td>Leonard Yuen, MD, MRCPsych, MPH, and Brian S. Boxer Wachler, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 208</td>
<td>Teaming Up With a LVC Surgeon</td>
<td>758</td>
</tr>
<tr>
<td></td>
<td>Michael T. Furlong, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 209</td>
<td>Differentiating Enhancements From Complications</td>
<td>761</td>
</tr>
<tr>
<td></td>
<td>Kevin L. Waltz, OD, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 210</td>
<td>Indications and Timing for Laser Enhancement</td>
<td>763</td>
</tr>
<tr>
<td></td>
<td>Michael Lawless, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 211</td>
<td>Laser Enhancement—What Cataract Surgeons Should Know</td>
<td>768</td>
</tr>
<tr>
<td></td>
<td>Elizabeth A. Davis, MD, FACS, and David R. Hardten, MD, FACS</td>
<td></td>
</tr>
<tr>
<td>Chapter 212</td>
<td>Laser Enhancement—What Cataract Surgeons Should Know</td>
<td>771</td>
</tr>
<tr>
<td></td>
<td>Jose. L. Guell, MD, Javier A. Gaytan Melicoff, Natalia Pelaez, MD, Merce Morral, MD, and Felicidad Manero, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 213</td>
<td>Post-Multifocal IOL Wavefront: Are the Readings Reliable?</td>
<td>775</td>
</tr>
<tr>
<td></td>
<td>Charles Campbell</td>
<td></td>
</tr>
<tr>
<td>Chapter 214</td>
<td>Mini-RK: Indications and Technique</td>
<td>779</td>
</tr>
<tr>
<td></td>
<td>Richard L. Lindstrom, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 215</td>
<td>Mini-RK: Indications and Technique</td>
<td>786</td>
</tr>
<tr>
<td></td>
<td>Frank A. Bucci, Jr., MD</td>
<td></td>
</tr>
<tr>
<td>Chapter 216</td>
<td>Refractive Enhancement With Piggybacking IOLs</td>
<td>789</td>
</tr>
<tr>
<td></td>
<td>Richard S. Hoffman, MD, I. Howard Fine, MD, and Mark Packer, MD, FACS</td>
<td></td>
</tr>
<tr>
<td>Chapter 217</td>
<td>Refractive Enhancement With Piggybacking IOLs</td>
<td>792</td>
</tr>
<tr>
<td></td>
<td>Warren E. Hill, MD, FACS</td>
<td></td>
</tr>
<tr>
<td><strong>Section XIV</strong></td>
<td><strong>Complications—Avoidance and Management</strong></td>
<td>794</td>
</tr>
<tr>
<td>Chapter 218</td>
<td>Troubleshooting Symptoms After Refractive IOL Implantation</td>
<td>795</td>
</tr>
<tr>
<td></td>
<td>Roger Steinert, MD</td>
<td></td>
</tr>
<tr>
<td>Chapter</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Chapter 236</td>
<td>Do Multifocal Optics Compromise Retinal Treatments?</td>
<td>866</td>
</tr>
<tr>
<td>Appendix A</td>
<td>Dell Questionnaire</td>
<td>870</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Dell Questionnaire—Coulson Modification</td>
<td>871</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Dell Questionnaire—Chang Modification</td>
<td>872</td>
</tr>
<tr>
<td>Appendix D</td>
<td>Preconsultation Handout</td>
<td>873</td>
</tr>
<tr>
<td>Appendix E</td>
<td>Multifocal IOL FAQ Handout</td>
<td>876</td>
</tr>
<tr>
<td>Appendix F</td>
<td>Crystalens FAQ Handout</td>
<td>879</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Patient Information Sheet for Advanced Elective Options With Cataract Surgery</td>
<td>882</td>
</tr>
<tr>
<td>Appendix H</td>
<td>OMIC Informed Consent for Refractive Lensectomy</td>
<td>884</td>
</tr>
<tr>
<td>Appendix I</td>
<td>LRI Instrumentation</td>
<td>892</td>
</tr>
<tr>
<td>Financial Disclosures</td>
<td></td>
<td>893</td>
</tr>
</tbody>
</table>
Compiling this textbook was a colossal venture and adventure that was completed in record time. I first approached SLACK Incorporated with the idea during the 2007 ASCRS meeting where, judging from attendance at symposia and instruction courses, interest in refractive IOLs was rising along a steep trajectory. The need for more physician-to-physician education on the subject was very obvious. However, whether it was a symposium, instruction course, booth presentation, or users meeting, there was always far too much material to cover in the available time. So many of the pearls I learned were beyond the realm of evidence-based medicine. Where could all of this information be found or collected? Recognizing the pressing and unmet need for a comprehensive textbook, we established the ambitious goal of completing this book in time for the 2008 ASCRS meeting—a 9-month publishing cycle.

My initial plan was to assemble a manual for transitioning to refractive IOLs. So many colleagues have yet to embark on this odyssey and the number of hurdles for the beginning refractive IOL surgeon is daunting. It soon became obvious, however, that the educational process is far more than a series of “transitioning” steps because there really is no endpoint. Regardless of our experience, we are all continually learning new insights and approaches in our quest to improve. What began as a modest beginner’s manual therefore morphed into a comprehensive 236-chapter textbook on mastering the multidisciplinary and multidimensional skills necessary for success as a refractive IOL surgeon.

I am truly grateful to my 4 associate editors, Steven J. Dell, Warren E. Hill, Richard L. Lindstrom, and Kevin L. Waltz, each of whom is among the most influential innovators, opinion leaders, and educators in the refractive IOL field. Whether as authors, editors, or as a collective sounding board for selecting topics and authors, their influence and guidance is evident throughout the book. I have enjoyed creating a lasting testament to our collaboration and friendship.

I particularly want to thank the more than 200 authors who have written original chapters for this textbook. To possess the expertise that makes each of them an effective teacher means that they are all very busy clinicians. Writing and illustrating chapters during weekends under tight deadlines is a thankless job. I hope you readers appreciate the generosity of their time in sharing their personal experiences and lessons with you.

Finally, this was a project that put SLACK Incorporated’s fine Book Division to the ultimate test. I am fortunate to have such an excellent working relationship with John Bond and Jennifer Briggs, who gave me the freedom and flexibility to steer this, our third textbook project, in the direction that I wanted. They are truly dedicated professionals who managed the entire process from pilot concept to final deadline. With the support of Managing Editor, Kimberly Shigo, Senior Project Editor, April Billick, turned in another unbelievable job with the layout and the editing process. Managing so much material from so many authors under such tight deadlines is a testament to April’s organizational skills and excellence as an editor. That I would even consider undertaking such an ambitious project is a measure of my respect and high regard for the SLACK Incorporated team.

Finally, writing on behalf of my 4 associate editors and our more than 200 coauthors, we would like to thank our families for allowing us to devote our precious time and energy toward compiling a resource that we hope will help all refractive IOL surgeons and their patients worldwide.

David F. Chang, MD
David F. Chang, MD is a Summa Cum Laude graduate of Harvard College and earned his M.D. at Harvard Medical School. He completed his ophthalmology residency at the University of California, San Francisco (UCSF) where he is now a clinical professor. Dr. Chang is Chairman of the American Academy of Ophthalmology (AAO) Annual Meeting Program Committee, having previously chaired the Cataract Program Subcommittee. He organized and was the program cochair for the first 7 AAO ‘Spotlight on Cataracts’ Symposia. He is also on the program committees for the ASCRS Annual Meeting and the OSN Hawaiian Eye Meeting.

He has been selected to deliver the following named lectures: Transamerica Lecture (UCSF), Williams Lecture (UCSF), Wolfe Lecture (University of Iowa), DeVoe Lecture (Columbia-Harkness), Gettes Lecture (Wills Eye Hospital), Helen Keller Lecture (University of Alabama), Kayes Lecture (University of Washington, St. Louis), Thorpe Lecture (Pittsburgh Ophthalmology Society), Schutz Lecture (New York University Medical Center), Wallace-Evan Lecture (Casey Eye, Oregon), Proctor Lecture (UCSF/Proctor Foundation), and the keynote address at the Chinese American Ophthalmological Society’s 20th anniversary meeting. He is a 3-time AAO Secretariat Award recipient (2003, 2006, 2007). He was the inaugural recipient of the UCSF Department of Ophthalmology’s Distinguished Alumni Award (2005) and in 2006 became only the third ophthalmologist to ever receive the Charlotte Baer Award honoring the outstanding clinical faculty member at the UCSF Medical School. He was the third recipient of the Strampelli Medal from the Italian Ophthalmological Society (2007).

Dr. Chang is chairman of the AAO Practicing Ophthalmologists’ Curriculum Panel for Cataract and Anterior Segment, which developed the American Board of Ophthalmology knowledge base for the MOC examination. He is also on the AAO Cataract Preferred Practice Pattern Panel and the AAO Revitalization Study Group. Dr. Chang is chair of the ASCRS Cataract Clinical Committee and is a member of the ASCRS Eye Surgery Education Council Presbyopia Task Force. He is on the Board of Directors for the Pan American Association of Ophthalmology. He is on the scientific advisory board for the UCSF Collaborative Vision Research Group, American Medical Optics, Allergan ATLAS, Calhoun Vision, Medennium, Peak Surgical, and Visiogen, and is the medical monitor for the Visiogen Synchrony accommodating IOL FDA monitored trial. He is cochief medical editor for *Cataract and Refractive Surgery Today* and developed the *CRSToday Virtual Textbook of Cataract Surgery*. He is the cataract editor for 2 online educational sites: the AAO’s “Specialty Clinical Updates” and the *Ocular Surgery News* “Ophthalmic Hyperguides.” He is an associate editor for the 3rd edition of *Cataract Surgery* (Elsevier 2008, Roger F. Steinert, editor). He was the chief editor for *Curbside Consultation in Cataract Surgery* (SLACK Incorporated, 2007), the series editor for the 7 SLACK Incorporated Curbside Consultation in Ophthalmology textbooks, and the principal author of *Phaco Chop* (SLACK Incorporated, 2004), which was the first ophthalmic textbook with a paired DVD featuring instructional surgical video. Finally, his coauthored 2005 report on IFIS and tamsulosin is one of the 5 most cited papers from the *Journal of Cataract and Refractive Surgery* (Source: Editorial, JCRS 1/08).
About the Associate Editors

Steven J. Dell, MD is Medical Director of Dell Laser Consultants and Director of Refractive and Corneal Surgery at Texan Eye in Austin, Texas. He serves on the Refractive Surgery Clinical Committee of the American Society of Cataract and Refractive Surgery and is a popular lecturer at meetings worldwide. He is the inventor of several popular surgical instruments and medical devices. Dr. Dell serves on the editorial boards of Ocular Surgery News, Cataract and Refractive Surgery Today, The Video Journal of Ophthalmology, and Cataract and Refractive Surgery Today—Europe. Dr. Dell is a board-certified member of the American Board of Ophthalmology, a Fellow of the American Academy of Ophthalmology, and a member of the American Society of Cataract and Refractive Surgery. He works closely with a variety of ophthalmic companies in the development of new products and technologies and serves as a consultant to several major companies in the industry.

Warren E. Hill, MD has served as the Medical Director of East Valley Ophthalmology in Mesa, Arizona for the past 22 years, specializing in consultative ophthalmology, challenging anterior segment surgery and intraocular lens power calculations.

Dr. Hill received BS and BA undergraduate degrees at the University of Maryland, a Doctor of Medicine from the University of Arizona, and completed an ophthalmology residency at the University of Rochester, in Rochester, New York. Dr. Hill is also a member of the International Intra-Ocular Implant Club, a Fellow of the American College of Surgeons, the American Academy of Ophthalmology, the International College of Surgeons, and the American College of Eye Surgeons.

Dr. Hill has devoted much of his professional activities to the mathematics of intraocular lens power calculations in complex and unusual clinical situations. He is a consultant to industry in the field of intraocular lens mathematics, intraocular lens design, and optical coherence biometry. He has published many scientific articles, served as visiting professor for numerous grand rounds, and has delivered more than 200 presentations to ophthalmic societies in both the United States and internationally in 20 countries and on 6 continents.

Aside from his interest in ophthalmology, Dr. Hill is a multi-engine, instrument-rated commercial pilot.

Richard L. Lindstrom, MD, founder and attending surgeon of Minnesota Eye Consultants and Adjunct Professor Emeritus at the University of Minnesota Department of Ophthalmology, is a board-certified ophthalmologist and internationally recognized leader in corneal, cataract, refractive, and laser surgery. He has been at the forefront of ophthalmology's evolutionary changes throughout his career, as a recognized researcher, teacher, inventor, writer, lecturer, and highly acclaimed physician and surgeon.

After graduating Magna Cum Laude from the College of Liberal Arts at the University of Minnesota, Dr. Lindstrom completed his doctorate degree in medicine in 1972. He conducted research, residency, and fellowship training in cornea at the University of Minnesota and affiliated hospitals and extended his anterior segment surgery fellowship training at Mary Shiels Hospital in Dallas and was a Heed Fellow in Glaucoma at University Hospital in Salt Lake City. In 1980, Dr. Lindstrom returned to the University of Minnesota, where he spent 10 years on the faculty of the Department of Ophthalmology, the last two as a full professor and the Harold G. Scheie Research Chair. He continues as Adjunct Professor Emeritus, Chairman of the Vision Foundation, and Associate Director of the Minnesota Lions Eye Bank at the University of Minnesota. He entered private practice in 1989 and has led the growth and expansion of Minnesota Eye Consultants, serving as managing partner for 15 years. He is also medical director of TLC Vision, Midwest Surgical Services, and Refractec. He is Chief Medical Editor of the USA and International editions of Ocular Surgery News, which reaches 82,000 ophthalmologists worldwide.

Dr. Lindstrom currently served as President (2007-2008) of the American Society of Cataract and Refractive Surgeons; he also serves on the Executive Committee and is the Chair of the Corporate Gifts Committee for the ASCRS Foundation. He has in the past served as the President of the International Society of Refractive Surgery, the International Intraocular Implant Club, and the International Refractive Surgery Club. He is the Global Education Liaison of the International Society of Refractive Surgery of the American Academy of Ophthalmology.

He is Chairman and CEO of Lindstrom Cleaning and Construction, a three-generation family business. He has endowed funds supporting the University of Minnesota Department of Ophthalmology, the Eye Bank Association of America, and the University of Minnesota Tennis Team.
Dr. Lindstrom holds over 30 patents in ophthalmology and has developed a number of solutions, intraocular lenses, and instruments that are used in clinical practices globally. He serves on the Board of Directors of AcuFocus, Inc, TLC Vision, Occulogix, Eyeonics, Refractec, the Minnesota Medical Foundation, and Inner City Tennis.

A frequent lecturer throughout the world on cornea, cataract, and refractive surgery, he has presented over 37 named lectures and keynote speeches before professional societies in the United States and abroad, most recently giving the Blumenthal Memorial lecture in Jerusalem, Israel, the Benedetto Strampelli Medal Lecture in Rome, Italy, and the Albrecht von Garefre-Vorlesung Innovator's Lecture in Nuremberg, Germany.

Dr. Lindstrom serves on a number of journal editorial boards, including Journal of Cataract and Refractive Surgery, Journal of Refractive Surgery, and Ophthalmic Surgery. He is the Honorary Editor-in-Chief of the US/Chinese Journal of Ophthalmology. He has coedited 7 books, published over 350 peer-reviewed journal articles, and 60 book chapters. His professional affiliations are extensive, including Liaison of the International Society of Refractive Surgery of the American Academy of Ophthalmology.

He is the recipient of numerous awards for distinguished service by national and international ophthalmology associations, including the LANS, Barraquer and the first lifetime achievement award from the International Society of Refractive Surgery in October 1995 and also was honoured with another lifetime achievement award in October 2002, the Binkhorst Lecture Award from the American Society of Cataract and Refractive Surgery, the Bausch and Lomb Lifetime Achievement Award, April 2005, and the Paton Award and NACT from the Eye Bank Association of America.

Kevin L. Waltz, OD, MD was a founding partner of Eye Surgeons of Indiana in Indianapolis in 1993. He has a long-standing interest in refractive surgery as one of the few doctors who was trained in both optometry and ophthalmology. He graduated from the Indiana University School of Optometry in 1981 and the Meharry Medical College in 1987. He completed a 2-year fellowship at the Southern College School of Optometry in 1983. He completed an internship at Vanderbilt University in 1988 and his residency in ophthalmology at the University of Florida in 1991. He completed a 1-year fellowship in ophthalmic plastic and reconstructive surgery in 1992. He was the first ophthalmologist in the world to receive the Array Multifocal IOL as a patient in 1998 and one of the first ophthalmologists in the world to implant the Array in refractive surgery patients. He coined the name PRELEX or presbyopic lens exchange to describe refractive lens surgery. He has taught other doctors from around the world how to successfully incorporate PRELEX into their practice. He first described accommodative arching of the Crystalens in 2004. He remains actively involved in the research and development of surgical eye care.
Contributing Authors

Richard L. Abbott, MD
Thomas W. Boyden Health Sciences Clinical Professor of Ophthalmology
Beckman Vision Center
University of California San Francisco
Research Associate
Francis I. Proctor Foundation
San Francisco, CA
Board Member
Chairman of Underwriting Committee
Ophthalmic Mutual Insurance Company
San Francisco, CA

Natalie A. Afshari, MD
Associate Professor of Ophthalmology
Cornea and Refractive Surgery
Duke University Eye Center
Duke University Medical Center
Durham, NC

Iqbal Ike K. Ahmed, MD
University of Toronto
Toronto, Ontario

Yachna Ahuja

Leonardo Akaishi, MD
Member of the Editorial Board of Ofthalmologia em FOCO
Director of HOB
Brasilia Ophtalmologic Hospital

Alan Aker

Avery Alexander, MD
Theda Clark Medical Center
Neenah, WI
Appleton Medical Center
Appleton WI

José F. Alfonso, MD, PhD
Instituto Oftalmológico Fernández-Vega
Oviedo, Spain
Surgery Department, School of Medicine
University of Oviedo
Oviedo, Spain

Jorge L. Alió, MD, PhD
Department of Ophthalmology
Miguel Hernández University School of Medicine
VISSUM- Instituto Oftalmológico de Alicante
Department of Cornea and Refractive Surgery
Alicante, Spain

David Allen, BSc, FRCS, FRCOphth
Consultant Ophthalmologist, Sunderland Eye Infirmary
Sunderland, England

Noel Alpins, FRACO, FRCOphth, FACS
Associate Fellow
University of Melbourne
Victoria, Australia

Hussein Amhaz, MD, PhD
Instituto Oftalmológico Fernández-Vega
Oviedo, Spain

Lisa Brothers Arbisser, MD
Eye Surgeons Associates, PC
Iowa and Illinois Quad Cities
Adjunct Associate Clinical Professor
University of Utah Moran Eye Center
Salt Lake City, UT

Pablo Artal, PhD
Laboratorio de Optica
Centro de Investigacion en Optica y Nanofisica (CiOyN)
Universidad de Murcia
Campus de Espinardo
Murcia, Spain

Kerry K. Assil, MD
CEO and Medical Director
Assil Eye Institute
Beverly Hills, CA

Federico Badala, MD
Fellow, CODET Aris Vision Institute
Toluco, Mexico

Jay Bansal, MD
Medical Director, LaserVue Eye Center
Santa Rosa, CA

Graham D. Barrett, MBBCh, FRANZCO, FRACS
Lions Eye Institute
Perth, Australia

George Beiko, BM, BCh, FRCS(C)
Assistant Prof, McMaster University
Hamilton, Ontario, Canada
Lecturer, University of Toronto
Toronto, Ontario, Canada

Roberto Bellucci, MD
Chief of the Hospital Ophthalmic Unit
Hospital and University of Verona
Verona, Italy

Joshua Ben-Nun, MD
Vitro-retinal specialist
NuLens Founder & CSO
Hertzliya-Pituach, Israel
Contributing Authors

Abdhish R. Bhavsar, MD
Director, Clinical Research, Retina Center, PA
Minneapolis, MN
Attending Surgeon, Phillips Eye Institute
Minneapolis, MN
Adjunct Associate Professor, University of Minnesota
Minneapolis, MN

Rosa Braga-Mele, MD, MEd, FRCSC
Associate Professor, University of Toronto
Director of Cataract Unit, Mt. Sinai Hospital
Director of Clinical Research, Kensington Eye Institute
Toronto, Canada

Michael B. Brenner, MD, FICS
Clinical Adjunct Professor
Southern California College of Optometry
Surgical Director, Presbyopic Services
TLC Laser Eye Center
Torrance, CA

Frank A. Bucci, Jr, MD
Medical Director
Bucci Laser Vision Institute and Ambulatory Surgery Center
Wilkes Barre, PA

Carlos Buznego, MD
President and Anterior Segment Surgeon
Center for Excellence in Eye Care
Miami, FL
Voluntary Assistant Professor of Ophthalmology
Bascom Palmer Eye Institute
Miami, FL

Stephen Bylsma, MD

Matthew C. Caldwell, MD
Cornea and Refractive Surgery Fellow
Duke University Eye Center
Durham, NC

Charles Campbell

Fabrizio I. Camesasca, MD
Department of Ophthalmology
Istituto Clinico Humanitas
Rozzano, Milano, Italy

Harvey Carter, MD
LSU Medical School
New Orleans, LA
Presbyterian Hospital of Dallas, North Dallas Surgicenter
Dallas, TX

Jeffrey J. Caspar, MD
Associate Professor
Residency Program Director
University of California Davis Medical Center
Sacramento, CA

David Castillejos, MD
Chula Vista, CA

Timothy B. Cavanaugh, MD
President and Medical Director, Cavanaugh Eye Center and Laser Vision Center
Kansas City, KS
Director, Deer Creek Surgery Center
Kansas City, KS

Shiao Chang, PhD
V.P. Materials
Calhoun Vision
Pasadena, CA

William Jerry Chang, MD
Chief, Department of Ophthalmology
Kaiser Permanente Medical Group
Redwood City, CA

Geoff Charlton
Eye Care Business Advisor
Allergan
Irvine, CA

Arturo Chayet, MD
Director CODET Aris Vision Institute
Toluco, Mexico

William K. Christian, MD
Associate Cataract and Refractive Surgeon
Assil Eye Institute
Beverly Hills, CA

Y. Ralph Chu, MD
Founder and Medical Director, Chu Vision Institute, PA
Edina, MN
Adjunct Assistant Professor of Ophthalmology
University of Minnesota
Minneapolis, MN
Professor of Ophthalmology
University of Utah (Moran Eye Institute)
Salt Lake City, UT

John Ciccone
Director of Communications
American Society of Cataract and Refractive Surgery
Fairfax, VA

Robert J. Cionni, MD
Medical Director
Cincinnati Eye Institute
Cincinnati, OH
The Eye Institute of Utah
Salt Lake City, UT
Adjunct Professor of Ophthalmology
The University of Cincinnati
Cincinnati, OH
The John Moran Eye Center
The University of Utah
Salt Lake City, UT
Tom M. Coffman, MD  
Clinical Assistant Professor  
Nova Southeastern University  
Ft. Lauderdale, FL  
Private practice, Visual Health  
Palms Springs, FL  

D. Michael Colvard, MD, FACS  
Associate Clinical Professor  
Doheny Eye Institute  
Keck School of Medicine  
University of Southern California  
Encino, CA  

J. Andy Corley  
Chairman and CEO  
Eyeonics, Inc  
Aliso Viejo, CA  

Kay Coulson, MBA  
President  
Elective Medical Marketing  
Boulder, CO  

Alan S. Crandall, MD  
Professor and Senior Vice Chair of Ophthalmology & Visual Sciences,  
Director of Glaucoma and Cataract  
John A. Moran Eye Center  
University of Utah  
SALT Lake City, Utah  

William W. Culbertson, MD  
Professor of Ophthalmology,  
Bascom Palmer Eye Institute  
University of Miami Miller School of Medicine  
Miami, Florida  

James A. Davies, MD, FACS  
InnoVision EyeCare Centers  
Medical Director, Surgical Eye Care Center/Ambulatory Surgical Center  
Carlsbad, CA  

Dan Davis, OD  
Clinical Associate, Chu Vision Institute, PA  
Edina, MN  

Elizabeth A. Davis, MD, FACS  
Adjunct Clinical Assistant Professor of Ophthalmology  
University of Minnesota Department of Ophthalmology  
Director, Minnesota Eye Laser and Surgery Center  
Minnesota Eye Consultants  
Minneapolis, MN  

James A. Davison, MD, FACS  
Wolfe Eye Clinic  
Marshalltown, IA  

James D. Davies, MHA, CMPE, COE  
Chief Administrative Officer, Center For Sight  
Venice, FL  

Sheraz M. Daya, MD, FACP, FACS, FRCS(Ed)  
Centre for Sight  
Corneoplastic Unit & Eye Bank  
Queen Victoria Hospital  
Sussex, United Kingdom  

David J. Deitz, MPhil  
McDonald Eye Associates  
Fayetteville AR  

Jim Denning, BS  
CEO, Discover Vision Centers  
Independence, MO  

Kevin Denny, MD  
Chief, Cataract and Anterior Segment Surgery  
Department of Ophthalmology  
California Pacific Medical Center  
San Francisco, CA  

Luis E. Fernández de Castro, MD  
Magill Research Center for Vision Correction  
Storm Eye Institute  
Medical University of South Carolina  
Charleston, SC  

Uday Droyan, MD, FACS  
Maloney Vision Institute  
Chief of Ophthalmology, Olive View—UCLA Medical Center  
UCLA School of Medicine  
Los Angeles, CA  

Steven Dewey, MD  
Private Practice  
Colorado Springs, CO  

H. Burkhard Dick, MD  
Professor and Chairman, Director  
Center for Vision Science  
Ruhr University Eye Hospital  
Bochum, Germany  

John F. Doane, MD  
Refractive Surgeon, Discover Vision Centers  
Kansas City, MO  
Associate Clinical Professor  
University of Kansas Department of Ophthalmology  
Lawrence, KS  
John F. Doane, M.D.  

Eric Donnenfeld, MD  
Ophthalmic Consultants of Long Island  
Long Island, NY  
Trustee, Dartmouth Medical School  
Hanover, NH
Contributing Authors

Paul Dougherty, MD
Clinical Instructor of Ophthalmology
Jules Stein Eye Institute
University of California, Los Angeles
Medical Director
Dougherty Laser Vision
Los Angeles and Camarillo, CA

Paul Ernest, MD
TLC Eyecare and Laser Center
Jackson, MI

Ahmad M. Fahmy, OD, FAAO
Attending Optometrist, Minnesota Eye Consultants
Minneapolis, MN

Luis Fernández-Vega, MD, PhD
Instituto Oftalmológico Fernández-Vega
Oviedo, Spain and
Surgery Department, School of Medicine,
University of Oviedo, Spain.

J. Howard Fine, MD
Clinical Professor
Oregon Health & Science University
Drs. Fine, Hoffman and Packer
Eugene, OR

William J. Fishkind, MD, FACS
Co-Director, Fishkind and Bakewell Eye Care and Surgery Center
Tucson, AZ
Clinical Professor of Ophthalmology
University of Utah
Salt Lake City, Utah
Clinical Instructor
University of Arizona
Tucson, AZ

Michael T. Furlong, MD
Medical Director, Furlong Vision Correction
San Jose, CA

Ron P. Gallemore, MD, PhD
Director and Founder
Retina Macula Institute
Torrance, CA
Assistant Clinical Professor
Jules Stein Eye Institute
UCLA School of Medicine
Los Angeles, CA

Andrea Galvis, MD

William D. Gaskins, MD, FACS
Gaskins Eye Care and Surgery Center
Naples, FL

Johnny L. Gayton, MD
Eyesight Associates
Warner Robins, GA

Pietro Giardini, MD
Polivisu
Brescia, Italy

James P. Gills, MD
Clinical Professor of Ophthalmology
University of South Florida
Tampa, FL
Consulting Professor of Ophthalmology
Duke University
Durham, NC
St. Luke’s Cataract and Laser Institute
Tampa Springs, FL

Bill Gills, MD
St. Luke’s Cataract and Laser Institute
Tampa Springs, FL

Frank Jozef Goes, MD
GOES Eye Centre
Antwerp, Belgium

Harry B. Grabow, MD
Clinical Assistant Professor, University of South Florida
Tampa, FL
Medical Director, Sarasota Cataract & Laser Institute
Center for Advanced Eye Surgery
Sarasota, FL

Oscar Gris, MD
Cornea and Refractive Surgery Unit
Instituto de Microcirugía Ocular
Barcelona, Spain

Jose L. Güell, MD
Associate Professor of Ophthalmology
Autonoma University of Barcelona
Director of Cornea and refractive Surgery Unit
Instituto Microcirugía Ocular de Barcelona
Barcelona, Spain

D. Rex Hamilton, MD, MS, FACS
Director, UCLA Laser Refractive Center
Assistant Professor of Ophthalmology
Jules Stein Eye Institute
Los Angeles, CA

David R. Hardten, MD
Adjunct Associate Professor of Ophthalmology
University of Minnesota Department of Ophthalmology
Director of Refractive Surgery
Minnesota Eye Consultants
Minneapolis, MN

R. Lee Harman, MD, FACS
President/CEO
The Harman Eye Clinic
Arlington, WA
Co-Owner, LEGACY Strategic Consultant, LLC
Camano Island, WA
Contributing Authors

David Harmon
President and Executive Editor
Market Scope

Nicola Hauranieh, MD
Polivisus
Brescia, Italy

Weldon W. Haw, MD
Associate Clinical Professor of Ophthalmology
Cornea, Cataract, and Refractive Surgery
UCSD School of Medicine
La Jolla, CA

Bonnie An Henderson, MD
Assistant Clinical Professor, Harvard Medical School
Partner, Ophthalmic Consultants of Boston
Boston, MA

Jerry Tan Tiang Hin, MBBS, FRCS, FRCOphth
Jerry Tan Eye Surgery
Singapore

Kenneth J. Hoffer, MD, FACS
Clinical Professor of Ophthalmology
UCLA
Los Angeles, CA

Richard S. Hoffman, MD
Clinical Associate Professor
Oregon Health & Science University
Drs. Fine, Hoffman and Packer
Eugene, OR

Jack T. Holladay, MD, MSEE, FACS
Clinical Professor of Ophthalmology
Baylor College of Medicine
Houston, TX

Edward Holland, MD
Jeffrey D. Horn, MD
Medical Director, Vision For Life
Nashville, TN

John A. Hovanesian, MD
Refractive Surgeon, Harvard Eye Associates
Laguna Hills, CA
Clinical Instructor, UCLA Jules Stein Eye Institute
Los Angeles, CA

Suber S. Huang, MD, MBA
Philip F. and Elizabeth G. Searle—Suber S. Huang Professor and Vice-Chairman
Director, Vitreoretinal Diseases and Surgery
Department of Ophthalmology
University Hospitals Case Medical Center
Cleveland, OH

Conall F. Hurley, MB, BCh, BAO, FRCSI
Director & Owner, The Ardfallen Eye Clinic
Cork, Ireland

Randolph T. Jackson, MD
Discover Vision Centers
Kansas City, MO

J. Michael Jumper, MD
Retina Service Chief
California Pacific Medical Center
West Coast Retina Medical Group
San Francisco, CA

Paul Kaufman, MD
University of Madison Wisconsin
Madison, WI

Hakan Kaymak, MD
Department of Ophthalmology
Knappschaft’s Hospital
Sulzbach, Germany

Robert M. Kershner, MD, MS, FACS
Clinical Professor of Ophthalmology
John A. Moran Eye Center
University of Utah School of Medicine
Salt Lake City, UT
IK HO Visiting Professor of Ophthalmology
Chinese University of Hong Kong
Adjunct Professor of Anatomy and Physiology
Palm Beach Community College
Palm Beach Gardens, FL

Guy M. Kezirian, MD, FACS
President, SurgiVision® Consultants, Inc.
Scottsdale, AZ

Terry Kim, MD
Associate Professor of Ophthalmology
Duke University School of Medicine
Director of Fellowship Programs
Associate Director
Cornea and Refractive Surgery
Duke University Eye Center
Durham, NC

Guy E. Knolle, MD, FACS
Knolle & Young Associates
Austin, TX

Michael C. Knorz, MD
Professor of Ophthalmology
Medical Faculty Mannheim of the University of Heidelberg
Heidelberg, Germany

Olga Konykhov, M.D.
Fellow in Corneal and Refractive Surgery
Pepose Vision Institute
St. Louis, MO
Marie Czenko Kuechel, MA
President, Czenko Kuechel Consulting
Suburban Chicago, IL

George D. Kymionis, MD, PhD
Cornea Research Fellow
Bascom Palmer Eye Institute
University of Miami Miller School of Medicine
Miami, Florida

Stephen S. Lane, MD
Adjunct Clinical Professor
University of Minnesota
Managing Partner, Associated Eye Care
Stillwater, MN

Michael Lawless, MD
Medical Director, Vision Group
Ophthalmic Surgeon, The Eye Institute
Sydney Australia

Yunhee Lee, MD
Assistant Professor of Clinical Ophthalmology
Bascom Palmer Eye Institute
University of Miami Miller School of Medicine
Miami, FL

Robert P. Lehmann, MD, FACS
Clinical Associate Professor of Ophthalmology
Baylor College of Medicine
Houston, TX
Private practice
Nacogdoches and Southlake, TX

John Lehr, OD
Regional Clinical Director/Advisor
TLC The Laser Eye Centers
Chicago, IL

Jess C. Lester, MD, FACS
Atlanta, GA

Richard A. Lewis, MD
Consultant in glaucoma and cataract
Private practice
Sacramento, CA

Brian Little, FRCS, FRCOphth, FHEA
Consultant Ophthalmologist
Honorary Senior Lecturer
Royal Free Hospital NHS Trust
London, United Kingdom

Dwayne Logan, MD
Angel López Castro, MD
Laservision Eye Clinic
Madrid, Spain

Brian D. Lueth, MD
Physicians Eye Clinic
Everett, WA

Richard J. Mackool, MD
Director, The Mackool Eye Institute (Ambulatory Surgery Center)
Astoria, NY
Senior Attending Surgeon, New York Eye and Ear Infirmary
New York, NY

Richard J. Mackool, Jr, MD
The Mackool Eye Institute
Astoria, NY

Scott MacRae, MD
Departments of Ophthalmology and Biomechanical Engineering
University of Rochester
Rochester, NY

Shareef Mahdavi, BA
President, SM2 Strategic
Pleasanton, CA

Martin A. Mainster, PhD, MD, FRCOphth
Luther L. Fry Endowed Professor of Ophthalmology
University of Kansas School of Medicine
Kansas City, KS

Michael W. Malley, BA
President/Founder, CRM Group
Houston, TX

William F. Maloney, MD
Maloney Eye Center
Vista, CA

Edward E. Manche, MD
Director of Cornea and Refractive Surgery
Associate Professor of Ophthalmology
Stanford University School of Medicine
Stanford, CA

Felicidad Manero, MD
Cornea and Refractive Surgery Department
Instituto De Microcirugía Ocular De Barcelona (IMO)
Barcelona, Spain

Paul Mann, MD
Mann Eye Institute and Laser Center
Houston, TX

William Martin, MD
Assistant Professor and Section Chief for Ophthalmology
University of Toledo School of Medicine
Toledo, OH
Samuel Masket, MD
Clinical Professor, UCLA
Private Practice
Los Angeles, CA

W. Andrew Maxwell, MD, PhD
California Eye Institute
Fresno, CA

J. E. “Jay” McDonald II, MD
McDonald Eye Associates
Fayetteville AR

Marguerite B. McDonald, MD, FACS
Cornea/refractive/anterior segment specialist
Ophthalmic Consultants of Long Island
Lynbrook, NY

Adjunct Clinical Professor of Ophthalmology
Tulane University School of Medicine
New Orleans, LA

Clinical Professor of Ophthalmology
New York University (NYU)
Manhattan, NY

Staff physician
Manhattan Eye Ear and Throat Hospital
New York, NY

Staff physician
Island Eye Center
Carle Place, NY

Javier A. Gaytan Melicoff, MD
Cornea and Refractive Surgery Consultant
Angles Puebla Hospital, MOP Microcirugía Ocular De Puebl SC
Puebla, Mexico

Ulrich Mester, MD
Department of Ophthalmology
Knappschaft’s Hospital
Sulzbach, Germany

Marc A. Michelson, M.D.
Alabama Eye & Cataract Center, PC
Birmingham, AL

Clinical Associate Professor of Ophthalmology
University of Alabama School of Medicine
Birmingham, AL

Kevin M. Miller, MD
Kolokotrones Professor of Clinical Ophthalmology
David Gefen School of Medicine at UCLA
Jules Stein Eye Institute
Los Angeles, CA

Rick Milne, MD
Private practice
President, The Eye Center
Columbia, SC

Robert A. Mittra, MD
Assistant Clinical Professor University of Minnesota,
VitreoRetinal Surgery, P.A.
Minneapolis, MN

Satish Modi, MD, FRCS(C), CPI
Assistant Clinical Professor of Ophthalmology
Albert Einstein College of Medicine
Bronx, NY

Seeta Eye Centers
Poughkeepsie, NY

Robert Montés-Micó, PhD
Optics Department, Faculty of Physics
University of Valencia, Spain

Merce Morral, MD
Cornea and Refractive Surgery Consultant.
Instituto De Microcirugía Ocular De Barcelona (Imo)
Barcelona, Spain.

Robert Morris, MRCP, FRCS, FRCOphth
Southampton Eye Unit
Southampton University Hospitals NHS Trust
Southampton, England

Con Moshegov, MD, FRANZCO, FRACS
Medical Director, Perfect Vision Eye Surgery
Sydney, Australia
Consultant, Concord Hospital
Sydney, Australia

Lana J. Nagy, BS
Departments of Ophthalmology and Biomechanical Engineering
University of Rochester
Rochester, NY

Louis D. “Skip” Nichamin, MD
Medical Director
Laurel Eye Clinic
Brookville, PA.

Lee T. Nordan, MD
Assistant Clinical Professor of Ophthalmology
Jules Stein Eye Institute
UCLA
Los Angeles, CA

Terrence P. O’Brien, MD
Professor of Ophthalmology
Bascom Palmer Eye Institute
University of Miami Miller School of Medicine
Palm Beach Gardens, FL

Thomas A. Oetting, MD
Clinical Professor
Residency Program Director
University of Iowa
Iowa City, IA
Contributing Authors

Roger V. Ohanesian, M.D.
Founding Partner, Harvard Eye Associates
Laguna Hills, CA
Associate Clinical Professor, UC-Irvine Department of Ophthalmology
Irvine, CA

Randall J. Olson, MD
The John A. Moran Presidential Professor and Chair of Ophthalmology
CEO, John A. Moran Eye Center
Department of Ophthalmology and Visual Sciences
Salt Lake City, UT

Robert H. Osher, MD
Medical Director Emeritus
Cincinnati Eye Institute
Professor of Ophthalmology
University of Cincinnati
Cincinnati, OH

Ivan L. Ossma, MD, MPH
Department of Ophthalmology
Fundacion Clinica Valle del Lili
Cali, Colombia
Clinical Professor
School of Medicine
Santander Industrial University
Bucaramanga, Colombia

Mark Packer, MD, FACS
Clinical Associate Professor
Oregon Health & Science University
Drs. Fine, Hoffman and Packer
Eugene, OR

Natalia Pelaez, MD
Cornea And Refractive Surgery Fellow
Universidad Autónoma De Barcelona
Instituto De Microcirugía Ocular De Barcelona (Imo), Barcelona, Spain.

Parag D. Parekh, MD, MPA
Minnesota Eye Consultants
Minneapolis, MN

Jay S. Pepose, MD, PhD
Director, Pepose Vision Institute
Professor of Clinical Ophthalmology and Visual Sciences
Washington University School of Medicine
St. Louis, MO

Matteo Piovella, MD
Founder and Scientific Director
CMA, Centro Microchirurgia Ambulatoriale
Monza, Italy

John W. Potter, OD, FAAO
Vice President for Patient Services
TLC Laser Eye Centers
Dallas, TX

Thomas C. Prager, PhD, MPH
Louis Probst, MD
Medical Director, TLC The Laser Eye Centers
Chicago, IL

Mujtaba A. Qazi, MD
Pepose Vision Institute
Instructor of Clinical Ophthalmology and Visual Sciences
Washington University School of Medicine
St. Louis, MO

Sherman W. Reeves, MD, MPH
Corneal/Refractive Surgeon
Minnesota Eye Consultants, P.A.
Minneapolis, MN

Paul Rhee, OD
Calhoun Vision
Pasadena, CA

Allan M. Robbins, MD, FACS
Robbins Eye Associates
Assistant Clinical Professor at the University of Rochester
Rochester, NY

Kenneth J. Rosenthal, MD, FACS
Sheri L. Rowen, MD, FACS
Director of Ophthalmology
Mercy Medical Center, Baltimore, MD
Clinical Assistant Professor
University of Maryland

Jonathan B. Rubenstein, MD
James J. Salz, MD
Clinical Professor of Ophthalmology
University of Southern California
Los Angeles, CA

Thom W. Samuelson, MD
Minnesota Eye Consultants
Minneapolis, MN
Associate Clinical Professor of Ophthalmology
University of Minnesota
Minneapolis, MN

Helga P. Sandoval, MD, MSCR
Magill Research Center for Vision Correction
Storm Eye Institute
Medical University of South Carolina
Charleston, SC

Christian Sandstedt, PhD
Director Optics
Calhoun Vision
Pasadena, CA
John A. Scholl, MS
Vice President of Research & Development
PowerVision
Belmont, CA

Daniel M. Schwartz, MD
Shirley Reich Chair in Ophthalmology
Director Retina Service
University of California, San Francisco
San Francisco, CA

Jim Schwiegerling, PhD
Ophthalmology and Vision Sciences
University of Arizona
Tucson, AZ

Barry S. Seibel, MD
Clinical Assistant Professor of Ophthalmology
UCLA Medical School
Los Angeles, CA

Mohamed H. Shabayek, MD, PhD
Research Institute of Ophthalmology
Giza, Egypt

Alan Shiller

Joel K. Shugar, MD, MSEE
Medical Director
Nature Coast EyeCare Institute
Perry, FL

Jack A. Singer, MD
Private Practice
Randolph, VT

Maite Sisquella, OPT
Instituto Microcirugia Ocular de Barcelona
Barcelona, Spain

Stephen G. Slade, MD, FACS
Slade & Baker Vision
Houston, TX

Michael E. Snyder, MD
Specialist in Cataract, Cornea, and Refractive Surgery
Cincinnati Eye Institute
Volunteer Assistant Professor of Ophthalmology
University of Cincinnati
Cincinnati, OH

Kerry D. Solomon, MD
Magill Research Center for Vision Correction
Storm Eye Institute
Medical University of South Carolina
Charleston, SC

Renate Solomon, MD
Private Practice
New York, NY

Michael Sopher
VP of Business Development, Eyemaginations, Inc
Towson, MD

Jason E. Stahl, MD
Cataract and Refractive Surgery
Durrie Vision
Overland Park, KS
Assistant Clinical Professor of Ophthalmology
Kansas University Medical Center
Kansas City, KS

George Stamatelatos, BSc Optom
Senior Optometrist
NewVision Clinics
Melbourne, Australia

Roger F. Steinert, MD
Professor of Ophthalmology
Professor of Biomedical Engineering
Vice Chair of Clinical Ophthalmology
University of California Irvine
Irvine, CA

Julian D. Stevens, MRCP, FRCS, FRCOphth

Tracy Swartz, OD, MS, FAAO
Wang Vision Institute, Nashville, TN
Adjunct Faculty, Indiana University School of Optometry
Bloomington, IN

Audrey Talley-Rostov, MD
Northwest Eye Surgeons
Seattle, WA

Joshua Trichman, MD
University of Toronto
Toronto, Ontario

Richard Tipperman, MD
Associate Surgeon/Active Staff
Wills Eye Institute
Philadelphia, PA

William Trattler, MD
Director of Cornea
Center for Excellence in Eye Care
Miami, FL
Voluntary Assistant Professor of Ophthalmology
Bascom Palmer Eye Institute
Miami, FL

Patricia L. Turner, MD
Clinical Assistant Professor of Ophthalmology
University of Kansas School of Medicine
Kansas City, KS

Farrell Tyson, MD, FACS
Director, Cape Coral Eye Center
Cape Coral, FL
Contributing Authors

Carlos Vergés, MD, PhD
Professor and Head Department of Ophthalmology CIMA
Universidad Politécnica de Cataluña
Barcelona, Spain

Paolo Vinciguerra, MD
Chairman, Department of Ophthalmology
Istituto Clinico Humanitas
Rozzano, Milano, Italy

Vaneer Virash, MD

Daniel Vos, MD
Wolfe Clinic
Ames, IA

David T. Vroman, MD
Magill Research Center for Vision Correction
Storm Eye Institute
Medical University of South Carolina
Charleston, SC

John A. Vukich, MD
Assistant Clinical Prof.
University of Wisconsin, Madison
School of Medicine
Director of the Davis Duehr Dean
Center for Refractive Surgery
Madison, WI

R. Bruce Wallace, III, MD, FACS
Clinical Professor of Ophthalmology
LSU Medical School
New Orleans, LA
Assistant Clinical Professor of Ophthalmology
Tulane Medical School
New Orleans, LA
Medical Director, Wallace Eye Surgery
Alexandria, LA

Ming Wang, MD, PhD
Medical Director of Refractive Surgery, Aier Eye Hospital System, PR China
Clinical associate professor of ophthalmology of University of Tennessee
Attending Surgeon, Saint Thomas Hospital
Director, Wang Vision Institute
Nashville, TN

Robert D. Watson
President, Patient Education Concepts, Inc
Houston, TX

Robert Jay Weinstock, MD
Director of Cataract and Refractive Surgery
The Eye Institute of West Florida
Associate Clinical Professor
University of South Florida
Tampa, FL

Darrell E. White, MD
President and CEO, Skyvision Centers
Westlake, OH

Jeffrey Whitman, MD
Key-Whitman Eye Center
Dallas, TX

Stephen Wiles, MD
Delgeorges & Wiles Eye Center
Kansas City, MO

John R. Wittmann, MD
Associate Clinical Professor
Department of Ophthalmology
State University of New York at Stony Brook
Stony Brook, NY
Partner, Ophthalmic Consultants of Long Island
Stony Brook, NY

J. Trevor Woodhams, MD
Surgical Director, Woodhams Eye Clinic
Atlanta, GA

Michael Y. Wong, MD
Private Practice
Princeton, NJ
Clinical Instructor
Robert Wood Johnson Medical School
New Brunswick, NJ
Medical Director
Wills Eye Laser
Princeton, NJ

John R. Wittmann, MD

Helen Wu, MD

Sandra Yeh, MD
Prairie Eye Center
Springfield, IL

Sonia H. Yoo, MD
Associate Professor of Clinical Ophthalmology
Bascom Palmer Eye Institute
University of Miami Miller School of Medicine
Miami, Florida

Geunyoung Yoon, PhD
Departments of Ophthalmology and Biomechanical Engineering
University of Rochester
Rochester, NY

Leonard Yuen

Charles M. Zacks, MD
Chair, Ethics Committee, American Academy of Ophthalmology
Partner, Maine Eye Center
Portland, ME
Harvey Zalaznick, MD  
Tenzel, Weiner, & Zalaznick, MDs, PA  
Practice to Ophthalmology  
Aventura, FL  

Brian S. Boxer Wachler, MD  
Boxer Wachler Vision Institute  
Beverly Hills, CA
Foreword

Ophthalmology is entering an exciting new era. The technology is rapidly changing, our boundaries are expanding, and today every cataract patient can expect to receive an intraocular lens that will not only replace their natural failing lens, but will, in the vast majority of cases, function safely, and at a better optical level, than the lens of a “normal” phakic individual of the same age.

The goal four or five decades ago was to restore useful vision after cataract removal without resorting to thick cataract spectacles; today we are able to provide clarity of vision unequaled even by the natural lens. The rapidly developing field of IOLs began with correction of basic power, then, aided by corneal surgery, astigmatism was conquered. Now a new frontier—presbyopia—has been targeted. In this monumental work, the editors and contributing authors, all active in clinical practice and research, have sought to bring the latest information to the reader. In Mastering Refractive IOLs: the Art and Science, Dr. David Chang and his coeditors, along with more than 200 contributors, have provided a comprehensive textbook on the art and science of refractive IOLs for the practicing ophthalmologist.

This new technology will continue to improve, and with it we share the joy, the excitement, and the sheer exhilaration of restoring sight to those who have never been able to see the world clearly. The premium IOL, the presbyopia-correcting IOL, offers a restoration of vision to pre-presbyopic levels with “better than ever” clarity.

Dr. Chang and his associate editors, Dr. Steven J. Dell, Dr. Warren E. Hill, Dr. Richard L. Lindstrom, and Dr. Kevin L. Waltz, present a comprehensive text, designed for surgeons wanting guidance from experts in making presbyopia-correcting IOLs part of their practice.

Covering everything from patient selection and education to management of complications, the text begins with the question, “Why Offer Premium IOLs?” In this section 16 authors share their experience and explain why they have transitioned from monofocal to premium presbyopia-correcting IOLs. Then other experts explain how to select the best IOL for patient needs.

Three things determine the outcome. 1) The patient potential (ie, the visual need and the health of the eye). 2) The technology, and 3) the skill and mind-set of the surgeon. The technology should be determined for the eye, not the eye for the technology. Premium IOLs are not “one size fits all.” The lens should be chosen to meet the patient’s needs and expectations.

It has been said that one who has a watch knows what time it is. If he has 2 watches, he is never sure. Optical characteristics of presbyopia-correcting lenses vary considerably, and the patient’s visual needs factor significantly in the decision of which lens to offer each patient. Each of these lenses has a unique combination of advantages and disadvantages.

Patients are much more interested in the visual outcome than a particular technology, and so the surgeon needs to make decisions that will meet their needs without confusing them with choices that only a scientist can understand. They are more interested in what you tell them about how they will be able to see.

Preoperative education and counseling is critical for success with any presbyopic IOL. Some lessons are clear. One should never promise the patient that he will not need glasses again, but tell him that he will need glasses at least “some of the time.” Then, if he does, you have prepared him and he is satisfied. But if he doesn’t need them, you are his hero.

That we have no universally perfect solution increases the importance of careful patient selection. The premium IOL appropriately allows surgeons to differentiate between refractive surgical goals. Understanding the differences between the available presbyopia IOL designs permits the surgeon to individualize his approach, which for some patients may include mixing different lenses.

This is one of the most thoroughly referenced texts to be published on the science, and the art, of vision correction with IOLs. It is truly a classic. I encourage any serious practitioner of refractive eye surgery to read this book to gain solid instruction in the use of presbyopia-correcting IOLs.

Spencer P. Thornton, MD, FACS
Preface

Prior to 2004, the distinction between refractive and cataract surgeons was straightforward. Our procedures, reimbursement process, and patient populations were entirely different. All of this changed with the introduction of new presbyopia-correcting IOLs and the landmark Center for Medicare and Medicaid Services (CMS) ruling allowing patients to pay out of pocket for them. Suddenly a major segment of refractive surgery was intraocular, and nearly everyone needing cataract surgery was a potential refractive patient. The following editorial, “A Day to Remember”, which I wrote for the June 2005 issue of Cataract and Refractive Surgery Today, recalls our initial sense at that time of just how much things were about to change.

In case there was any lingering doubt, recent events have made it official: cataract surgeons are also refractive surgeons. Patients have always wanted spectacle independence, and we’ve sought all along to reduce the size of incisions and improve biometry in order to approach this goal. However, as a group, we never effectively educated patients and payers about the difference between refractive and medical care for someone with cataracts. AMO’s Array and Staar’s toric IOLs were the first purely refractive IOL innovations. The new technology intraocular lens (NTIOL) designation for ASC reimbursement made by CMS allowed manufacturers an extra $50 of reimbursement, but the patient did not pay, nor did the surgeon receive any additional premium for this service. In hindsight, implanting advanced refractive IOL technologies for no additional charge was a mistake, because it diminished their perceived value and made it even harder for patients to differentiate between the capabilities of multifocal and toric IOLs and the benefits of standard cataract surgery. As a result, patient demand for these IOLs became almost nonexistent.

For me, May 10, 2005 (my 25th wedding anniversary), became a doubly memorable date because of the major announcement from the CMS permitting Medicare beneficiaries to choose presbyopia-reducing IOLs at their own expense. By establishing an economic delineation between cataract and refractive IOL technology, this decision is a defining event for us all. With the newsworthy availability of three competing premium technologies to tackle presbyopia (Alcon’s ReSTOR, AMO’s ReZoom, and Eyeonics’ Crystalens), the injustice of denying these options to Medicare patients was averted in the nick of time. That surgeons should receive greater reimbursement to provide these technologies seems clear, as the products do not automatically produce satisfied, spectacle-independent patients by themselves.

Relative to standard cataract surgery, success with refractive IOLs is much more reliant upon an ideal capsulorrhexis and pristine capsular bag, the avoidance of complications, the prevention of surgically induced astigmatism, the reduction of pre-existing astigmatism, and accurate biometry and IOL calculations. Proper patient selection is critical, and physicians must consider patients’ ocular and macular health, astigmatism, contralateral refractive error, lifestyle, and personality traits. Patients’ expectations and potential for disappointment are much higher with all refractive IOLs and increase pre- and postoperative chair time. In light of these higher demands, the lack of additional reimbursement for NTIOLs was undoubtedly a financial disincentive for many surgeons.

Indeed, hardly anyone noticed or complained when the NTIOL provision officially expired last month. Clearly, achieving a pseudo-accommodating emmetropic eye is a premium refractive service that requires more advanced IOL technology, flawless biometry and surgery, and more extensive patient evaluation and counseling.

Eyeonics blazed a trail with the premium IOL channel whereby non-Medicare cataract patients could pay a fair market, out-of-pocket premium for an uncovered refractive benefit. Thanks to the recent CMS ruling, Medicare patients will enjoy the same freedom of choice. It now behooves us ophthalmologists to properly and ethically educate our cataract patients about the difference between medical and refractive services. When asked what we recommend, we must clarify that refractive IOLs are discretionary—they address the inconvenience of eyeglasses but do not reduce complications or improve ocular health. We must take care not to abuse the economic freedom recently granted to our trusting cataract patients. It is their hard-earned and well-deserved right, and the promising future of refractive IOL technology depends on it.

Today, I think we would all agree that the CMS ruling and the new premium refractive IOLs have dramatically and permanently altered the clinical practice of every cataract and refractive surgeon. Ready or not, we are suddenly faced with the new challenge of educating patients about these multiple options, and then managing and meeting their expectations. Navigating these previously uncharted waters has been both interesting and intimidating, and we are still continually searching for better approaches.

Wouldn’t it be wonderful if we could glean the collective wisdom of more than 200 experienced refractive IOL colleagues? This nontraditional textbook seeks to provide such a compendium of practical advice and pearls, reflecting the consensus, controversy, and diversity of our varied opinions, approaches, and practices. To provide as much balance as possible between differing preferences and philosophies, the products and the most important and controversial topics are addressed by multiple different authors.

Refractive IOLs have provided surgeons and patients with exciting new opportunities that also entail different risks and the increased potential for dissatisfaction. For this reason, we must all improve our surgical proficiency, our understanding of clinical
optics, our communication skills, our clinical judgment, and our expertise in avoiding and managing complications. In short, we must all remain committed to mastering both the science and the art of refractive IOL surgery.

David F. Chang