Anti-VEGF

Volume Editors

F. Bandello  Milan
M. Battaglia Parodi  Milan

Co-Editors

A.J. Augustin  Karlsruhe
P. Iacono  Rome
R.O. Schlingemann  Amsterdam
U. Schmidt-Erfurth  Vienna
F.D. Verbraak  Amsterdam

12 figures, 5 in color, and 13 tables, 2010
Contents

VII  List of Contributors
IX  Preface
    Bandello, F. (Milan)

1  Angiostatic and Angiogenic Factors
   de Groot, H.; Schmit-Eilenberger, V.; Kirchhof, J.; Augustin, A.J. (Karlsruhe)

4  Mechanisms of Ocular Angiogenesis and Its Molecular Mediators
   Siemerink, M.J. (Amsterdam); Augustin, A.J. (Karlsruhe);
   Schlingemann, R.O. (Amsterdam)

21 Antivascular Endothelial Growth Factors in Age-Related Macular
    Degeneration
   Schmidt-Erfurth, U.; Pollreisz, A.; Mitsch, C.; Bolz, M. (Vienna)

39 Antivascular Endothelial Growth Factor in Diabetic Retinopathy
   Iacono, P. (Rome); Battaglia Parodi, M.; Bandello, F. (Milan)

54 Retinal Vein Occlusions
   Buehl, W.; Sacu, S.; Schmidt-Erfurth, U. (Vienna)

73 Antivascular Endothelial Growth Factor for Choroidal Neovascularization in
    Pathologic Myopia
   Battaglia Parodi, M. (Milan); Iacono, P. (Rome); Bandello, F. (Milan)

84 Antivascular Endothelial Growth Factors for Inflammatory Chorioretinal
    Disorders
   Battaglia Parodi, M. (Milan); Iacono, P. (Rome); Verbraak, F.D. (Amsterdam);
   Bandello, F. (Milan)

96 Antivascular Endothelial Growth Factor Treatment in Pseudoxanthoma
    Elasticum Patients
   Verbraak, F.D. (Amsterdam)
107 Antivascular Endothelial Growth Factor in Hereditary Dystrophies
   Battaglia Parodi, M. (Milan); Iacono, P. (Rome); Bandello, F. (Milan)
111 Antivascular Endothelial Growth Factor as an Approach for Macular Edema
   Buchholz, P.M.; Buchholz, A.P.; Augustin, A.J. (Karlsruhe)
123 Angiogenesis and Vascular Endothelial Growth Factors in Intraocular Tumors
   Missotten, G.S. (Leuven/Amsterdam); Schlingemann, R.O. (Amsterdam);
   Jager, M.J. (Leiden)
133 Antivascular Endothelial Growth Factors in Anterior Segment Diseases
   Scholl, S.; Kirchhof, J.; Augustin, A.J. (Karlsruhe)
140 Author Index
141 Subject Index
List of Contributors

A.J. Augustin, Prof.
Augenklinik
Moltkestrasse 90
DE–76133 Karlsruhe (Germany)
E-Mail albertjaugustin@googlemail.com

F. Bandello, Prof.
Department of Ophthalmology
University Vita-Salute Scientific Institute
San Raffaele
Via Olgettina, 60
IT–20132 Milano (Italy)
E-Mail bandello.francesco@hsr.it

M. Battaglia Parodi, Dr.
Department of Ophthalmology
University Vita-Salute Scientific Institute
San Raffaele
Via Olgettina, 60
IT–20132 Milano (Italy)
E-Mail battagliaparodi.maurizio@hsr.it

M. Bolz, Dr.
Department of Ophthalmology and Optometry
Medical University Vienna
Waehringer Guertel 18-20
AT–1090 Vienna (Austria)
E-Mail matthias.bolz@meduniwien.ac.at

A. Buchholz, Dr.
Augenklinik
Moltkestrasse 90
DE–76133 Karlsruhe (Germany)
E-Mail Andreas.Buchholz@klinikum-karlsruhe.de

P. Buchholz, Dr.
Augenklinik
Moltkestrasse 90
DE–76133 Karlsruhe (Germany)
E-Mail apkbuchholz@yahoo.de

W. Buehl, Dr.
Department of Ophthalmology and Optometry
Medical University Vienna
Waehringer Guertel 18-20
AT–1090 Vienna (Austria)
E-Mail wolf.buehl@meduniwien.ac.at

H. de Groot, Dr.
Augenklinik
Moltkestrasse 90
DE–76133 Karlsruhe (Germany)
E-Mail developments@dr-de-groot.de

P. Iacono, Dr.
Fondazione G.B. Bietti per l'Oftalmologia
IRCCS (Istituto di Ricovero e Cura a Carattere Scientifico)
Via Livenza 3
IT–00198 Rome (Italy)
E-Mail pierluigi.iacono@libero.it

M.J. Jager, Prof.
Department of Ophthalmology
LUMC
PO Box 9600
NL–2300 RC Leiden (The Netherlands)
E-Mail m.j.jager@lumc.nl
J. Kirchhof, Dr.
Augenklinik
Moltkestrasse 90
DE–76133 Karlsruhe (Germany)
E-Mail jannakirchhof@googlemail.com

G.S. Missotten, Prof.
Department Ophthalmology
Academic Medical Center
Meibergdreef 9
NL–1100DD Amsterdam (The Netherlands)
E-Mail guy.missotten@uzleuven.be

C. Mitsch, Dr.
Department of Ophthalmology and Optometry
Medical University Vienna
Waehringer Guertel 18-20
AT–1090 Vienna (Austria)
E-Mail christoph.mitsch@meduniwien.ac.at

A. Pollreisz, Dr.
Department of Ophthalmology and Optometry
Medical University Vienna
Waehringer Guertel 18-20
AT–1090 Vienna (Austria)
E-Mail andreas.pollreisz@meduniwien.ac.at

S. Sacu, Dr.
Department of Ophthalmology and Optometry
Medical University Vienna
Waehringer Guertel 18-20
AT–1090 Vienna (Austria)
E-Mail stefan.sacu@meduniwien.ac.at

R.O. Schlingemann, Prof.
Medical Retina Unit and Ocular Angiogenesis Group
Department of Ophthalmology
Academic Medical Center
University of Amsterdam, A2-122
NL–1100 DD Amsterdam (The Netherlands)
E-Mail r.schlingemann@amc.uva.nl

U. Schmidt-Erfurth, Prof.
Department of Ophthalmology and Optometry
Medical University Vienna
Waehringer Guertel 18-20
AT–1090 Vienna (Austria)
E-Mail ursula.schmidt-erfurth@meduniwien.ac.at

V. Schmit-Eilenberger, Dr.
Augenklinik
Moltkestrasse 90
DE–76133 Karlsruhe (Germany)
E-Mail dr.schmit-eilenberger@email.de

S. Scholl, Dr.
Augenklinik
Moltkestrasse 90
DE–76133 Karlsruhe (Germany)
E-Mail s-scholl@gmx.de

M.J. Siemerink, Dr.
Medical Retina Unit and Ocular Angiogenesis Group
Department of Ophthalmology
Academic Medical Center
University of Amsterdam, A2-122
NL–1100 DD Amsterdam (The Netherlands)
E-Mail m.j.siemerink@amc.uva.nl

F.D. Verbraak, Dr.
Departments of Ophthalmology and Biomedical Engineering & Physics
Academic Medical Center
Meibergdreef 9
NL–1105 AZ Amsterdam (The Netherlands)
E-Mail f.d.verbraak@amc.nl
The development of vascular endothelial growth factor inhibitors for the treatment of ocular neovascularization and macular edema can be regarded as the beginning of a new era in ophthalmological therapy. Before the year 2000, the treatment of any vascular abnormality in the macular region was merely restricted to conventional laser photocoagulation. Indubitably, laser treatment represents a destructive procedure which leads to a permanent scar and brings about a retinal sensitivity deterioration in all cases. Since 2000, photodynamic therapy with verteporfin has been introduced as the first attempt to couple laser energy with a light-sensitive drug in an attempt to treat choroidal neovascularization through a relatively non-destructive form of therapy. Nevertheless, photodynamic therapy can provide only a very limited visual acuity improvement, especially in choroidal neovascularization secondary to age-related macular degeneration and pathologic myopia.

In an attempt to improve the functional outcomes, many researchers have studied the potential application of anti-angiogenic agents on ocular diseases. Previous investigations have demonstrated that vascular endothelial growth factor plays an important role in promoting angiogenesis and vascular leakage in several ocular pathologic conditions. The main goals of antivascular endothelial growth factor therapy are the inhibition of growth and development of new vessels, along with the reduction of vascular permeability.

The encouraging results of the most important randomized clinical trials regarding the efficacy of ranibizumab and pegaptanib on subfoveal choroidal neovascularization in relation to age-related macular degeneration have greatly influenced current medical practice. As a result, in the last few years, many applications have been proposed in an effort to treat several vascular diseases of the eye.

This aim of this book is to help update residents, general ophthalmologists, and retina specialists on the latest applications of antivascular endothelial growth factor
therapy in ocular diseases. After an outline of the treatment principles, it covers a large number of topics, including age-related macular degeneration, pathologic myopia, angioid streaks, inflammatory diseases, hereditary dystrophies, retinal vein occlusions, diabetic retinopathy, ocular tumors, and anterior segment neovascularizations. We hope that each chapter will stimulate the interest of readers working in this field.

Francesco Bandello, Milan