Pharmacology and Vitreoretinal Surgery
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Arnd Gandorfer Munich

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List of Contributors

Paul N. Bishop  
University of Manchester  
Manchester Royal Eye Hospital  
Oxford Road  
Manchester M13 9WH (UK)

David G. Charteris  
Moorfields Eye Hospital  
City Road  
London EC1V 2PD (UK)

Carlos E. Cury, Jr.  
Vision Institute, Department of Ophthalmology  
Federal University of Sao Paulo  
Rua Presidente Coutinho 579 conj 501  
Florianópolis  
SC 88015–300 (Brazil)

Kimberly A. Drenser  
Eye Research Institute, University Oakland  
3535 West 13 Mile Road, Suite 344  
Royal Oak, MI 48073 (USA)

Kirsten H. Eibl  
University Eye Hospital LMU  
Ludwig-Maximilians-University  
Mathildenstr. 8  
DE-80336 Munich (Germany)

Michel E. Farah  
Vision Institute, Department of Ophthalmology  
Federal University of Sao Paulo  
Rua Presidente Coutinho 579 conj 501  
Florianópolis  
SC 88015–300 (Brazil)

Steven K. Fisher  
Neuroscience Research Institute  
University of California  
Santa Barbara, CA 93106-5060 (USA)

Patrice E. Fort  
Penn State Hershey Eye Center and  
Department of Cellular and Molecular Physiology  
Penn State College of Medicine  
500 University Drive, HU097  
Hershey, PA 17033 (USA)

Arnd Gandorfer  
Vitreoretinal and Pathology Unit  
Augenklinik der Ludwig-Maximilians-Universität  
Mathildenstrasse 8  
DE–80336 Munich (Germany)

Thomas W. Gardner  
Penn State Hershey Eye Center and  
Department of Cellular and Molecular Physiology  
Penn State College of Medicine  
500 University Drive, HU097  
Hershey, PA 17033 (USA)

David T. Goldenberg  
3535 W. 13 Mile Rd., Suite 344  
Royal Oak, MI 48073 (USA)
<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hisanori Imai</td>
<td>Penn State Hershey Eye Center and Department of Cellular and Molecular Physiology</td>
<td>Penn State College of Medicine, 500 University Drive, HU097, Hershey, PA 17033 (USA)</td>
</tr>
<tr>
<td>Motohiro Kamei</td>
<td>Department of Ophthalmology</td>
<td>Osaka University Medical School, 2–2 Yamadaoka, Suita, 565-0871 (Japan)</td>
</tr>
<tr>
<td>Baruch Kuppermann</td>
<td>UC Irvine Medical Center</td>
<td>Ophthalmology Clinic, 101 The City Drive South, Orange, CA 92697 (USA)</td>
</tr>
<tr>
<td>Geoffrey P. Lewis</td>
<td>Neuroscience Research Institute</td>
<td>University of California, Santa Barbara, CA 93106-5060 (USA)</td>
</tr>
<tr>
<td>Carsten H. Meyer</td>
<td>Department of Ophthalmology</td>
<td>University of Bonn, Ernst-Abbe-Strasse 2, DE–53127 Bonn (Germany)</td>
</tr>
<tr>
<td>Raja Narayanan</td>
<td>Smt Kanuri santhamma Vitreoretina center</td>
<td>L.V. Prasad Eye Institute, L.V. Prasad Marg, Banjara Hills, Hyderabad 500034 (India)</td>
</tr>
<tr>
<td>Eduardo B. Rodrigues</td>
<td>Vision Institute, Department of Ophthalmology</td>
<td>Federal University of Sao Paulo, Rua Presidente Coutinho 579 conj 501, Florianópolis, SC 88015–300 (Brazil)</td>
</tr>
<tr>
<td>Ravi S.J. Singh</td>
<td>Penn State Hershey Eye Center and Department of Cellular and Molecular Physiology</td>
<td>Penn State College of Medicine, 500 University Drive, HU097, Hershey, PA 17033 (USA)</td>
</tr>
<tr>
<td>Yasuo Tano</td>
<td>Department of Ophthalmology</td>
<td>Osaka University Medical School, 2–2 Yamadaoka, Suita, 565-0871 (Japan)</td>
</tr>
<tr>
<td>Michael T. Trese</td>
<td>3535 W. 13 Mile Rd., Suite 344</td>
<td>Royal Oak, MI 48073 (USA)</td>
</tr>
<tr>
<td>Louisa Wickham</td>
<td>Moorfields Eye Hospital</td>
<td>City Road, London EC1V 2PD (UK)</td>
</tr>
</tbody>
</table>
In memoriam of Professor Yasuo Tano, who suddenly passed away on 31 January 2009.
Preface

More than 35 years have passed since the advent of pars plana vitrectomy, and vitreoretinal surgery has developed to highly sophisticated techniques to treat retinal diseases. Removal of the vitreous gel and hemorrhage not only clears the optical axis of the eye, but enables the surgeon to approach the retina and the vitreoretinal interface directly, thereby relieving traction and removing pathological tissue, such as epiretinal membranes. Peeling off the internal limiting membrane has proven to be a safe and effective technique in macular surgery, resulting in macular hole closure. Twenty years ago, nobody would have imagined this. Today, final success rates beyond 90% can be achieved in macular and reattachment surgery.

However, there are limitations of current vitreoretinal surgery techniques, which are mechanically based. Removal of the vitreous is incomplete, especially at the vitreo retinal interface and at the vitreous base. This may lead to persistent or recurrent traction on the retina, resulting in retinal tear formation or reproliferation. More aggressive removal of the vitreous by mechanical means, however, carries the risk of damaging the retina. When epiretinal membranes are removed in PVR cases and in diabetic eyes with traction retinal detachment, gliotic scar tissue is removed but neural retina is not treated. Thus, despite anatomical reattachment, visual results are often disappointing.

Pharmacology-assisted vitreoretinal surgery can help to overcome these limitations. There are enzymes which cleave the vitreoretinal junction without damaging the retina, and those for liquefaction. Thereby, vitreolysis and induction of posterior vitreous detachment has become possible without the need for vitrectomy. Recent results from clinical trials show that up to 40% of eyes achieve release of traction without surgery.

Pharmacologic vitreolysis will change our current indications and concepts in treating retinal and macular diseases, and earlier intervention might save visual function before advanced stages have destroyed the retinal cytoarchitecture. In diabetic eyes, for example, enzymatic PVD induction at an early stage of the disease might inhibit fibrovascular and fibrocellular proliferations at the vitreoretinal interface, thereby preventing progression to proliferative disease.
Neuroprotective and antiproliferative agents may hold the promise of preserving neuronal function when the retina is detached or when PVR has developed. This again may change the time point of intervention from currently advanced stages to an earlier disease stage with less pathology. Fibrinolytic and antiproliferative agents help to treat disasters in ophthalmology such as massive submacular hemorrhage or retinal detachment in retinopathy of prematurity.

It is now time to combine pharmacological concepts and vitreoretinal surgery. World renowned experts and opinion leaders in their field have contributed their knowledge and skills to make this book the first summary on pharmacology-assisted vitreoretinal surgery. I am greatly indebted to the authors, and my hopes are that this book was a basis and motivation for clinicians and researchers who want to bring retinal surgery further by introducing pharmacology-assisted vitreoretinal surgery.

Arnd Gandorfer
Munich, 2009