

---

## Contents

<b>CHAPTER 1</b>		
<b>Autologous Serum Eyedrops for Ocular Surface Disorders</b>		
GERD GEERLING, DIRK HARTWIG		
1.1 Introduction .....	2	
1.1.1 The Rationale for Using Serum in Ocular Surface Disorders .....	2	
1.1.2 Legal Aspects .....	3	
1.2 Production and Application .....	4	
1.2.1 Important Parameters of the Production Process .....	4	
1.2.2 Current Standard Operating Procedures Used at the University of Lübeck .....	6	
1.2.3 Quality Control .....	8	
1.3 Clinical Results .....	8	
1.3.1 Persistent Epithelial Defects .....	8	
1.3.2 Dry Eye .....	10	
1.3.3 Other Indications .....	13	
1.4 Complications .....	15	
1.5 Alternative Blood Products for the Treatment of Ocular Surface Disease .....	16	
1.5.1 Umbilical Chord Serum .....	16	
1.5.2 Albumin .....	17	
1.5.3 Plasma and Platelets .....	17	
References .....	18	
<b>CHAPTER 2</b>		
<b>Controversies and Limitations of Amniotic Membrane in Ophthalmic Surgery</b>		
HARMINDER S. DUA, V. SENTHIL MAHARAJAN, ANDY HOPKINSON		
2.1 Introduction .....	21	
2.2 Proposed Mechanisms of Action of the Amniotic Membrane .....	22	
2.2.1 Amnion Structure .....	22	
2.2.2 Amnion Composition .....	22	
2.3 Intra and Inter Donor Variations of the Membrane .....	24	
2.4 Processing and Preservation of the Membrane .....	25	
2.5 Clinical Studies and Outcomes (Definitions of Success and Grading of Disease Severity) .....	27	
2.6 Efficacy of Membrane in Relation to Other Established Techniques and Options .....	30	
References .....	31	
<b>CHAPTER 3</b>		
<b>Transplantation of Limbal Stem Cells</b>		
HARMINDER S. DUA		
3.1 Introduction .....	36	
3.2 Stem Cells .....	36	
3.2.1 Definition .....	36	
3.2.2 Characteristics of Stem Cells .....	36	
3.2.3 The Stem Cell 'Niche' .....	37	
3.3 Limbal Stem Cells .....	37	
3.3.1 The Clinical Evidence .....	37	
3.3.2 The Scientific Evidence .....	39	
3.4 Limbal Stem Cell Deficiency .....	41	
3.4.1 Causes of Limbal Stem Cell Deficiency .....	41	
3.4.2 Effects of Limbal Stem Cell Deficiency .....	41	
3.4.3 Diagnosis of Stem Cell Deficiency .....	44	
3.5 Limbal Transplant Surgery .....	45	
3.5.1 Principles .....	45	
3.5.2 Preoperative Considerations .....	45	
3.6 Surgical Techniques .....	46	
3.6.1 Sequential Sector Conjunctival Epitheliectomy (SSCE) .....	46	
3.6.2 Auto-limbal Transplantation .....	48	
3.6.3 Allo-limbal Transplantation .....	49	
3.6.4 Adjunctive Surgery .....	51	
3.6.5 Postoperative Treatment .....	52	
References .....	53	

## CHAPTER 4

**Limbal Stem Cell Culture**

JOSÉ L. GÜELL, MARTA TORRABADILLA,  
MARTA CALATAYUD, OSCAR GRIS,  
FELICIDAD MANERO, JAVIER GAYTAN

4.1	Introduction .....	57
4.2	Epithelial Phenotype .....	58
4.3	Preparation of Human Amniotic Membrane .....	58
4.4	Culture of Explanted Tissue .....	59
4.5	Tissue Procurement .....	59
4.6	Preliminary Clinical Experience ...	60
4.6.1	Principles for Taking the Biopsy ...	60
4.6.2	Advantages of Limbal Stem Cell Culture .....	61
4.7	Case Report .....	61
4.8	Future Standard Staging Approach for Ocular Surface Reconstruction .	64
	References .....	64

## CHAPTER 5

**Deep Anterior Lamellar Keratoplasty**

GERRIT R.J. MELLES

5.1	Introduction .....	65
5.2	Main Drawbacks of Conventional DALK .....	65
5.3	Different Concepts .....	65
5.4	Important Preoperative Considerations .....	66
5.5	Psychological Preparation of the Patient .....	67
5.6	Choice of DALK Surgical Technique .....	67
5.7	Clinical Results .....	68
	References .....	70

## CHAPTER 6

**Corneal Transplant Rejection**

T.P.A.M. SLEGGERS, M.K. DALY, D.F.P. LARKIN

6.1	Introduction .....	73
6.2	Incidence .....	74
6.3	Factors Predisposing to Corneal Graft Rejection .....	74
6.4	Clinical Features .....	75
6.5	Histopathology .....	75

6.6	Immunopathological Mechanisms	76
6.6.1	Immune Privilege and Its Breakdown .....	76
6.6.2	Afferent Arm of the Allogeneic Response .....	76
6.6.3	Efferent Arm of the Allogeneic Response .....	77
6.7	Treatment of Rejection .....	77
6.8	Prevention of Rejection .....	77
6.8.1	Immunosuppression .....	77
6.8.2	HLA Matching .....	78
6.9	Future Prospects .....	78
	References .....	79

## CHAPTER 7

**New Aspects of Angiogenesis in the Cornea**

CLAUS CURSIEFEN, FRIEDRICH E. KRUSE

7.1	Introduction .....	83
7.2	“Angiogenic Privilege of the Cornea” or “How Does the Normal Cornea Maintain Its Avascularity?” .....	84
7.3	Corneal (Hem)angiogenesis .....	85
7.3.1	General Mechanisms of Corneal (Hem)angiogenesis .....	85
7.3.2	Common Causes of Corneal (Hem)angiogenesis ....	86
7.3.3	Clinical Consequences of Corneal Hemangiogenesis ....	86
7.3.4	Corneal Hemangiogenesis After Keratoplasty .....	87
7.3.5	Corneal Angiogenesis Due to Contact Lens Wear .....	90
7.3.6	Angiogenesis as a Cause of Disease Progression, not a Sequel (Herpetic Keratitis) ..	91
7.3.7	Surgery in Vascularized Corneas ..	91
7.4	Corneal Lymphangiogenesis .....	91
7.4.1	Mechanisms of Corneal Lymphangiogenesis .....	91
7.4.2	Importance of Lymphangiogenesis for Induction of Alloimmunity After Keratoplasty .....	94
7.4.3	Non-immunological Effects of Corneal Lymphangiogenesis ...	94
7.5	Antiangiogenic Therapy at the Cornea .....	95
7.5.1	Established and Novel Antiangiogenic Therapies .....	95

7.5.2	Novel Antihemangiogenic and Antilymphangiogenic Therapies to Improve Graft Survival After Keratoplasty .....	98
	References .....	98

## CHAPTER 8

### Histocompatibility Matching in Penetrating Keratoplasty

DANIEL BÖHRINGER, RAINER SUNDMACHER, THOMAS REINHARD

8.1	Introduction .....	101
8.1.1	Immune Reactions Constantly Threaten Graft Survival .....	101
8.1.2	Major Transplantation Antigens (HLA) .....	102
8.1.3	Minor Transplantation Antigens ..	105
8.2	Time on the Waiting List Associated with Histocompatibility Matching ..	106
8.2.1	Waiting Time Variance Has Been a Barrier to Histocompatibility Matching .....	106
8.2.2	Algorithm for Predicting the Time on the Waiting List .....	106
8.3	Recommended Clinical Practice ...	107
	References .....	108

## CHAPTER 9

### Current Systemic Immunosuppressive Strategies in Penetrating Keratoplasty

ALEXANDER REIS, THOMAS REINHARD

9.1	Introduction .....	109
9.2	Immunology .....	109
9.2.1	Acute Rejection .....	110
9.2.2	Major Histocompatibility Complex ..	110
9.2.3	Chronic Rejection .....	110
9.3	Normal-Risk Versus High-Risk Transplantation .....	111
9.3.1	Normal-Risk Transplantation .....	111
9.3.2	High-Risk Transplantation .....	111
9.3.3	Rationale for Systemic Immunosuppression .....	111
9.3.4	Why Is Immunomodulation with Topical Steroids Not Sufficient To Prevent Immunologic Graft Rejection in High-Risk Patients? ..	111

9.4	Immunosuppressive Agents .....	112
9.4.1	History .....	112
9.4.2	Corticosteroids .....	114
9.4.3	Cyclosporine A (CSA, Sandimmun, Sandimmun Optoral, Sandimmun Neoral) .....	114
9.4.4	Tacrolimus (FK506, Prograf) .....	114
9.4.5	Mycophenolate Mofetil (MMF, CellCept, Myfortic) .....	115
9.4.6	Rapamycin (Sirolimus, Rapamune) ..	115
9.4.7	RAD (Everolimus, Certican) .....	116
9.4.8	FTY 720 .....	116
9.4.9	Biologic Agents .....	117
9.5	Guidelines for Practitioners .....	117
9.5.1	Preoperative Evaluation .....	117
9.5.2	How To Use Cyclosporine in High-Risk Corneal Transplantation .....	118
9.5.3	How To Use MMF in High-Risk Corneal Transplantation .....	118
9.5.4	How To Use Rapamycin in High-Risk Corneal Transplantation .....	118
9.5.5	How To Use Tacrolimus in High-Risk Corneal Transplantation .....	118
9.5.6	Combination Therapies .....	119
9.6	Conclusion .....	119
	References .....	119

## CHAPTER 10

### Trephination in Penetrating Keratoplasty

BERTHOLD SEITZ, ACHIM LANGENBUCHER, GOTTFRIED O.H. NAUMANN

10.1	Introduction .....	123
10.2	Astigmatism and Keratoplasty ....	124
10.2.1	Definition of Post-keratoplasty Astigmatism .....	124
10.2.2	Reasons for Astigmatism After Keratoplasty .....	125
10.2.3	Prevention/Prophylaxis of Astigmatism After Keratoplasty ..	129
10.3	Trephination Techniques .....	130
10.3.1	Principal Considerations .....	131
10.3.2	Conventional Mechanical Trephines ..	139
10.3.3	Nonmechanical Laser Trephination ..	144
10.4	Concluding Remarks .....	148
	References .....	149

CHAPTER 11

**Infective Complications Following LASIK**

ADAM WATSON, SHERAZ DAYA

11.1	Introduction .....	153
11.2	Frequency and Presentation .....	153
11.3	Characteristics .....	154
11.4	Differential Diagnosis .....	154
11.4.1	Diffuse Lamellar Keratitis (DLK, "Sands of the Sahara") .....	154
11.4.2	Steroid-Induced Intraocular Pressure Elevation with Flap Oedema (Pseudo-DLK) .	155
11.5	Management .....	155
11.5.1	Flap Lift .....	155
11.5.2	Specimen Taking .....	155
11.5.3	Treatment .....	157
11.5.4	No Improvement .....	157
11.6	Special Considerations .....	158
11.6.2	Fungal Keratitis .....	158
11.6.3	Viral Keratitis .....	159
11.7	Visual Outcome .....	159
11.8	Management of Sequelae .....	159
11.9	Prevention .....	160
	References .....	160

CHAPTER 12

**Treatment of Adenoviral Keratoconjunctivitis**

JOST HILLENKAMP, RAINER SUNDMACHER,  
THOMAS REINHARD

12.1	Introduction .....	163
12.1.1	Etiology and Clinical Course of Ocular Adenoviral Infection ....	163
12.2	Socioeconomic Aspect .....	166
12.3	Treatment .....	166
12.3.1	Treatment of the Acute Phase .....	166
12.3.2	Treatment of the Chronic Phase ...	168
12.3.3	Prophylaxis .....	169
12.4	Conclusion and Outlook .....	170
12.5	Current Clinical Practice and Recommendations .....	170
	References .....	170

CHAPTER 13

**In Vivo Micromorphology of the Cornea:  
Confocal Microscopy Principles  
and Clinical Applications**

RUDOLF F. GUTHOFF, JOACHIM STAVE

13.1	Introduction .....	173
13.2	Principle of In Vivo Confocal Microscopy Based on the Laser-Scanning Technique .	174
13.2.1	Slit-Scanning Techniques .....	175
13.2.2	Laser-Scanning Microscopy and Pachymetry .....	176
13.2.3	Fundamentals of Image Formation in In Vivo Confocal Microscopy ...	179
13.3	General Anatomical Considerations .....	180
13.4	In Vivo Confocal Laser-Scanning Microscopy .....	181
13.4.1	Confocal Laser-Scanning Imaging of Normal Structures .....	182
13.5	Clinical Findings .....	190
13.5.1	Dry Eye .....	190
13.5.2	Meesmann's Dystrophy .....	190
13.5.3	Epithelium in Contact Lens Wearers .....	192
13.5.4	Epidemic Keratoconjunctivitis ....	195
13.5.5	Acanthamoeba Keratitis .....	196
13.5.6	Corneal Ulcer .....	199
13.5.7	Refractive Corneal Surgery .....	200
13.6	Future Developments .....	201
13.6.1	Three-Dimensional Confocal Laser-Scanning Microscopy .....	201
13.6.2	Functional Imaging .....	203
	References .....	206

## CHAPTER 14

**Allergic Eye Disease: Pathophysiology,  
Clinical Manifestations and Treatment**

BITA MANZOURI, THOMAS FLYNN,

SANTA JEREMY ONO

14.1	Introduction .....	209	14.3.2	Perennial Allergic Conjunctivitis ..	214
14.2	Pathophysiology .....	210	14.3.3	Vernal Keratoconjunctivitis .....	214
14.2.1	Type I Hypersensitivity .....	210	14.3.4	Atopic Keratoconjunctivitis .....	215
14.2.2	Ocular Inflammatory Reaction: Late Phase .....	211	14.3.5	Giant Papillary Conjunctivitis ....	217
14.2.3	Non-specific Conjunctival Hyperreactivity .....	211	14.4	Treatment of Allergic Eye Disease .	217
14.2.4	T-Cell-Mediated Hypersensitivity in Allergic Eye Disease .....	212	14.4.1	Antihistamines .....	218
14.3	Clinical Syndromes of Allergic Eye Disease .....	212	14.4.2	Mast Cell Stabilizing Agents .....	218
14.3.1	Seasonal Allergic Conjunctivitis ...	214	14.4.3	Dual-Acting Agents .....	219
			14.4.4	Non-steroidal Anti-inflammatory Drugs (NSAIDs) .....	219
			14.4.5	Topical Corticosteroids .....	219
			14.4.6	Calcineurin Inhibitors .....	220
			14.4.7	Future Drug Developments .....	220
			14.5	Conclusion .....	221
				References .....	222
				<b>Subject Index</b> .....	225

Cornea and External Eye Disease

Reinhard, Th.; Larkin, F. (Eds.)

2006, XVI, 229 p., Hardcover

ISBN: 978-3-540-22600-0