

A.M. Joussen · T.W. Gardner · B. Kirchhof · S.J. Ryan (Eds.)
Retinal Vascular Disease

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With 565 Figures in 1043 Parts and 330 Tables

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Foreword

Angiogenesis inhibitors comprise a new class of drugs that have recently received FDA approval for use in age-related macular degeneration. They are currently in clinical trials for the treatment of diabetic retinopathy. These new drugs emerged after more than three decades of cancer research. This journey was driven by the hypothesis that tumor growth is angiogenesis dependent, and sustained by experimental demonstrations that antiangiogenic therapy could become a fourth modality to help control neoplastic disease.

At the dawning of this new field of angiogenesis research, animal models of corneal neovascularization became the test tube for discovery of angiogenesis regulatory molecules. It seems more than a coincidence that the two implantable polymers still employed by scientists today for slow release of angiogenesis regulatory molecules into the avascular cornea as a bioassay, originated from soft contact lenses or from a wearable device to treat glaucoma. In this sense, two distinct specialties of medicine, oncology and ophthalmology, are now linked. Angiogenesis has become the organizing principle.

Over the years, numerous ophthalmologists have studied in a cancer biology lab and have gone on to distinguished careers in ophthalmology. Without their contributions it is unlikely that an oncologist's armamentarium would today contain approved anti-cancer drugs that inhibit angiogenesis directly or indirectly.

It is as exciting that these new drugs have begun to increase survival for the three common cancers, colon, breast and lung, as it is that eyesight has been improved in patients with age-related macular degeneration ("A very effective treatment for neovascular macular degeneration," E.M. Stone, *N Engl J Med* 2006 355:1493).

The editors and authors of this book have brought the field of retinal vascular disease up to date, as the principles of antiangiogenic therapy are rapidly being translated to clinical practice. This book is also very valuable because it inspires the reader to think about possible future improvements in the management of retinal vascular diseases. Can biomarkers in the blood or urine be developed to detect recurrence of retinal neovascularization before symptoms or before detection by ophthalmoscopy? Can oral angiogenesis inhibitors maintain suppression of neovascular macular degeneration after sight has been improved by repeated intravitreal injections of antiangiogenic drugs? Because platelets are now known to carry high concentrations of angiogenesis regulatory molecules stored and segregated in alpha granules, will it become possible to therapeutically instruct platelets to release antiangiogenic proteins? Beyond these questions it is possible to anticipate that angiogenesis research will continue to bring new insights into the biology and molecular mechanisms of retinal vascular disease.

Judah Folkman, MD

Preface

Great progress has been made in the treatment of vascular disease in recent years, and we hope and expect this is a prelude to even greater progress in the near future. The advent of clinically applicable anti-VEGF therapies is only the “tip of the iceberg” of future additions to the clinical armamentarium. However, there is no unique formula for angiogenesis. Our understanding of complex disease specific interactions is dependent on a knowledge of the basic mechanisms involved in the vascular reactions specific to different disease entities. Despite these new treatments and the explosion of knowledge on the basic mechanisms of vascular biology, vascular disease of the retina remains to date a major cause of blindness in all age groups.

The topics covered by this book range from fundamental concepts of molecular biology to basic clinical appearance, specific pathology and treatment of retinal vascular disease.

In the first part, the current thinking in vascular biology is discussed in relation to retinal vascular disease. The emphasis is on general pathogenic concepts including ischemia, inflammation and their associated pathology. Experimental approaches are reviewed as well as animal models which might help in the investigation of the diseases.

The second part includes modern diagnostic features and general treatment strategies. Diagnostic procedures are discussed with respect to their relevance for clinical decision making. Similarly, treatment procedures are described stepwise by schematic graphics.

The third part describes each disease in a comprehensive manner including demographics, clinical course and treatment. Clinical image series including illustrated single case follow-ups are given major emphasis and provide an atlas like presentation. The book includes topics which are not currently found in other textbooks of retinal disease including case reports and clinical follow-ups. Furthermore, all the treatment procedures are explained in detail to facilitate their use by ophthalmologists in training.

More than 50 experts in the field contributed to this state of the art review of basic and clinical science, which aims to enhance our understanding of retinal vascular disease and to help the clinician in the evaluation of current and future treatment approaches. The authors are internationally recognized leaders in clinical ophthalmology, including the areas of medical retina, vitreoretinal surgery, and uveitis. In a unique way leaders and experts in their fields of molecular mechanisms and general concepts of vascular surgery have contributed to this book even though their previous major focus has not necessarily been on ophthalmic disease.

Nevertheless, the field of vascular biology and retinal vascular disease is so broad and the evolution of knowledge so rapid that the work cannot be comprehensive and the information given only resembles the current knowledge at the time of printing.

As a multiauthored text, there are many literary styles, and the editors have not sacrificed the originality and the style of the individual authors. Although

there will be some aspects that are discussed in more than one chapter, the unique interpretation by each author justifies some overlap and is an attractive feature.

The editors gratefully acknowledge the support of the contributing authors who, in addition to their large clinical load and scientific research efforts, found the time to make such a large contribution to the completion of this project. In particular, Andrew P. Schachar, MD, and his team at The Wilmer Eye Institute were of invaluable help.

At Springer, Marion Philipp and Martina Hemberger helped to create this book and its unique combination of basic science and clinical application.

We hope that *Retinal Vascular Disease* will help to inspire clinicians and scientists in the future to making further efforts and advances in this field.

Düsseldorf, Hershey, Cologne, Los Angeles

August 2007

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Contents

Section I: Pathogenesis of Retinal Vascular Disease

1 Functional Anatomy, Fine Structure and Basic Pathology of the Retinal Vasculature

D.B. ARCHER, T.A. GARDINER, A.W. STITT	3
1.1 Anatomical Organization of the Retinal Vasculature	3
1.1.1 Microvascular Arrangement	3
1.1.2 Nature of the Retinal Vasculature	6
1.2 Responses of the Retina and Its Vasculature to Stress and Disease:	
Histological and Pathological Consequences	7
1.2.1 Hemodynamic Changes	7
1.2.2 Oxygen Saturation Changes	11
1.2.3 Occlusion – Ischemia	12
1.2.4 Repair and Remodeling	13
1.2.5 Metabolic Stresses	14
1.2.6 Trauma	17
1.2.7 Drug Toxicity	18
1.2.8 Inflammation	18
1.2.9 Retinal-Choroidal Tumors	20
1.2.10 Primary Neuropile Atrophy and Degeneration	22
1.2.11 Remote Effects of Retinal Vascular Pathology	22
References	22

2 Retinal Vascular Development

M.I. DORRELL, M. FRIEDLANDER, L.E.H. SMITH	24
2.1 Introduction	24
2.1.1 General Vascular Development	24
2.1.2 Basis of Clinical Identification of Blood Vessels	24
2.1.3 Major Cellular Components of Vessel Formation	25
2.2 Endothelial Cells	25
2.2.1 Vascular Heterogeneity (Morphological Classification of Vessels)	25
2.3 Mural Cells	25
2.4 Vascular Patterning	26
2.5 Retinal Vascular Development	27
2.5.1 The Role of Astrocytes	29
2.5.2 The Role of Subcellular Endothelial Processes	31
2.6 Development of the Deep Retinal Vascular Plexuses	32
2.7 Vascular Maturation	32
2.8 Vascular Pruning Mechanisms	34
2.9 Mouse Retinal Vascular Development as a Model for General Vascular Development	34
2.10 Use of Retinal Vascular Development as Models for Clinical Ocular Neovascularization	35

2.10.1	Mouse Retinal Angiogenesis Model	35
2.10.2	Oxygen-Induced Retinopathy	35
	References	35

3 Retinal Angiogenesis and Growth Factors

3.1	General Concepts of Angiogenesis and Vasculogenesis	
	C. RUIZ DE ALMODOVAR, A. NY, P. CARMELIET	38
3.1.1	General Introduction	38
3.1.2	Angiogenic Disorders	38
3.1.3	Modes of Vessel Growth	40
3.1.4	Vasculogenesis	40
3.1.4.1	Role of Endothelial Progenitors in the Embryo	41
3.1.4.2	Role of Endothelial Progenitors in the Adult	42
3.1.4.3	The Endothelial/Hematopoietic Connection – An Emerging Theme	44
3.1.4.4	Arterial, Venous and Lymphatic Cell Fate Specification	44
3.1.4.5	Tissue-Specific EC Differentiation	45
3.1.5	Angiogenesis	46
3.1.5.1	Vascular Permeability and Extracellular Matrix Degradation	46
3.1.5.2	Endothelial Budding and Sprouting	48
3.1.5.3	Vascular Lumen Formation	49
3.1.5.4	Guided Navigation of Vessels	50
3.1.5.5	Vessel Maintenance	51
3.1.6	Arteriogenesis	52
3.1.6.1	Smooth Muscle Progenitor Cells	52
3.1.6.2	Smooth Muscle Cell Recruitment, Growth and Differentiation	53
3.1.7	Therapeutic Implications	54
	References	56
3.2	Vascular Endothelial Growth Factor in Retinal Vascular Disease	
	G.L. KING, K. SUZUMA, J.K. SUN	66
3.2.1	VEGF Regulation and Receptors	66
3.2.1.1	VEGFR2, PKC, PI3-kinase	66
3.2.2	Vascular Endothelial Growth Factor	67
3.2.3	VEGF and Systemic Diseases	68
3.2.4	VEGF and Retinal Vascular Disease	68
3.2.4.1	VEGF and Other Growth Factors	68
3.2.4.2	VEGF and Diabetic Retinopathy	69
3.2.4.3	Hypertension As an Aggravating Factor in Diabetes-Induced Activation of VEGF	70
3.2.4.4	VEGF in Neovascularization Secondary to Retinal Vascular Occlusions	70
	References	70
3.3	Involvement of the Ephrin/Eph System in Angioproliferative Ocular Diseases	
	H. AGOSTINI, G. MARTIN	73
3.3.1	First Studies: Ephrins in Retinotectal Projection	73
3.3.2	Ephrins in Vascular Development	74
3.3.3	Ephrins and Ocular Angiogenesis	75
3.3.4	Ephrins in Retinal and Subretinal Animal Models	75
3.3.5	Therapeutic Potential	76
	References	76

4 Hematopoietic Stem Cells in Vascular Development and Ocular Neovascularization

N. SENGUPTA, M.B. GRANT, S. CABALLERO, M.E. BOULTON	78
4.1 Background	78
4.2 Developmental Origins of HSCs	78
4.2.1 HSCs Lack Regional Patterning	79
4.3 Defining the Adult HSC	79
4.3.1 HSC Self-Renewal	79
4.3.2 HSC Pluripotency/Plasticity	81
4.4 The HSC Niche	82
4.4.1 Molecular Mechanisms for Maintenance in the Niche	82
4.5 HSC Mobilization	82
4.5.1 The SDF-1/CXCR4 Axis	84
4.6 Surface Marker Expression – HSC Identification	84
4.7 Surface Marker Expression – HSC Isolation	84
4.8 Methodologies	85
4.8.1 Extraction of HSC from Donor Mice	85
4.8.2 Reconstitution of Bone Marrow-Ablated Recipient Mice	85
4.8.3 EPC Culture	86
4.9 Mouse Models of HSC Involvement in Ocular Neovascularization	88
4.9.1 Preretinal Neovascularization	88
4.9.2 Iris Neovascularization	89
4.9.3 Choroidal Neovascularization	90
4.10 Conclusion	90
References	91

5 Inflammation as a Stimulus for Vascular Leakage and Proliferation

A.M. JOUSSEN, A.P. ADAMIS	97
5.1 Evidence for Inflammation in the Pathogenesis of Diabetic Retinopathy	97
5.1.1 Upregulation of Inflammatory Mediators in Diabetic Retinopathy	97
5.1.2 Diabetic Retinal Pathology Can Be Inhibited by Anti-inflammatory Agents	98
5.1.3 VEGF Is a Key Mediator of Inflammatory Changes in the Diabetic Retina: General Considerations	99
5.1.4 Angiopoietin-1 Regulates Vascular Permeability and Expression of Inflammatory Mediators in Diabetic Retinopathy	99
5.2 Cellular and Molecular Mechanisms Mediating Diabetes-Associated Vascular Damage and the Neovascularizing Response to Ischemia	101
5.2.1 Leukocytes Mediate Retinal Vascular Remodeling During Development and Vaso-obliteration in Disease	101
5.2.2 VEGF and Leukocyte Invasion Are Important Factors in Regulating Both Ischemia-Mediated Ocular Neovascularization and Vascular Damage in Diabetic Retinopathy	102
5.2.3 Regulation of Ischemia-Mediated Retinal Vascularization	102
5.2.4 Diabetes Associated Vascular Damage Is Accelerated by Leukostasis and Fas-FasL-Mediated Apoptosis	103
5.3 Conclusions	103
References	104

6 The Neuronal Influence on Retinal Vascular Pathology

A.J. BARBER, H.D. VAN GUILDER, M.J. GASTINGER	108
6.1 Introduction	108
6.2 The Phenotype of the Retinal Vasculature Is Determined by the Tissue It Serves	109

6.3	Diabetes Causes a Loss of the Blood-Retinal Barrier Phenotype ...	109
6.4	The Increase in Vascular Permeability Is Likely Due to an Increase in the Expression of VEGF	109
6.5	VEGF Originates from the Neural Tissue of the Retina in Diabetes	110
6.6	Injury and Neurodegeneration in the Brain Are Accompanied by Increased VEGF Expression and Vascular Abnormalities	110
6.7	Diabetes Increases Neural Apoptosis, Leading to a Cumulative Reduction in the Thickness of the Inner Layers of the Retina	111
6.8	Specific Neurons Are Lost by Apoptosis in Diabetes	113
6.9	Neurons in the Retina Have Morphological Characteristics of Neurodegeneration	113
6.10	The Glial Cells of the Retina React to Diabetes As if an Injury Has Occurred	114
6.11	There is a Loss of Function in Diabetic Retinopathy that Begins soon After the Onset of Diabetes	115
6.12	Conclusions	115
6.13	Methodology	115
	References	116

7 Hypoxia in the Pathogenesis of Retinal Disease

	V. POULAKI	121
7.1	Introduction	121
7.2	The HIF Pathway and Its Role in Hypoxia Signaling	121
7.2.1	Structure of the HIF Transcription Factor Complex and Regulation of Its Activity	122
7.2.2	Downstream Targets of HIF	123
7.2.3	Activation of HIF by Non-hypoxic Stimuli	124
7.2.4	VHL and Its Role in Retinal Angiogenesis	124
7.3	VEGF	125
7.4	Retinal Hypoxia and Retinopathy of Prematurity	126
7.4.1	Introduction	126
7.4.2	Pathophysiology of Retinopathy of Prematurity	126
7.5	Retinal Hypoxia and Diabetic Retinopathy	129
7.5.1	Introduction	129
7.5.2	Pathophysiology of Diabetic Retinopathy	129
7.6	Retinal Hypoxia and Vascular Occlusive Disease	131
7.7	Other Diseases	132
7.7.1	Cystoid Macular Edema	132
7.7.2	Retinal Degeneration	132
7.7.3	Glaucoma	133
7.7.4	Retinal Detachment	134
7.8	Conclusions	134
	References	134

8 Blood Retinal Barrier

8.1 Blood-Retinal Barrier, Retinal Vascular Leakage and Macular Edema

	B.E. PHILLIPS, D.A. ANTONETTI	139
8.1.1	Introduction	139
8.1.2	Characteristics of the Blood-Retinal Barrier	139
8.1.2.1	Blood-Retinal Barrier Physiology	139
8.1.2.2	Fenestrations	140
8.1.2.3	Endocytosis and Facilitated Diffusion	140
8.1.2.4	Water Transport	140

8.1.2.5	Tight Junctions	141
8.1.2.6	P-Glycoprotein	141
8.1.3	Diabetic Retinopathy	142
8.1.3.1	Permeability and Macular Edema	142
8.1.3.2	Vascular Endothelial Growth Factor	142
8.1.3.3	Apoptosis and Cell Loss	143
8.1.3.4	Routes of Paracellular Flux	143
8.1.4	The Structure and Role of the Tight Junctions	144
8.1.4.1	Tight Junction	144
8.1.4.2	Polarity and Tight Junction Assembly	144
8.1.4.3	Tight Junction Structure	144
8.1.4.4	Occludin	145
8.1.4.5	Claudins	146
8.1.4.6	Zonula Occludens	147
8.1.5	Summary	147
	References	147
8.2	MRI Studies of Blood-Retinal Barrier: New Potential for Translation of Animal Results to Human Application	
	B.A. BERKOWITZ	154
8.2.1	Introduction	154
8.2.2	Magnetic Resonance Imaging	155
8.2.3	Conclusions	164
	References	164
9	Retinal Blood Flow	
	L. SCHMETTERER, G. GARHÖFER	167
9.1	Anatomy	167
9.2	Quantification of Retinal Blood Flow	168
9.3	Blood Flow Regulation	170
9.4	Blood Flow in Retinal Vascular Disease	173
	References	174
10	Genetic Approach to Retinal Vascular Disease	
10.1	Gene Therapy for Proliferative Ocular Disease	
	T.J. MCFARLAND, J.T. STOUT	175
10.1.1	Introduction	175
10.1.2	Delivery Systems	175
10.1.2.1	Retroviral	177
10.1.2.2	Adenovirus	177
10.1.2.3	AAV	178
10.1.2.4	Non-viral	179
10.1.2.5	Physical	179
10.1.3	Target Diseases	180
10.1.3.1	Retinopathy of Prematurity	180
10.1.3.2	Age Related Macular Degeneration	181
10.1.3.3	Proliferative Diabetic Retinopathy	181
10.1.3.4	Retinal Vaso-occlusive Disorders	181
10.1.4	Fundamentals of Gene Therapy	182
10.1.4.1	In Vitro	182
10.1.4.2	Ex Vivo Versus In Vivo	182
10.1.4.3	Somatic Cells Versus Stem Cells	183
10.1.5	Genes as Drugs/Clinical Trials	183
10.1.6	Ethical/Safety Concerns	184
	References	184

10.2	Norrin and Its Role During Angiogenesis of the Retina	
	M. SCHOLZ, E.R. TAMM	186
10.2.1	Introduction	186
10.2.2	Norrie Disease	186
10.2.3	Norrie Disease Mutant Mice	186
10.2.4	In Vivo Overexpression of Norrin	187
10.2.5	Conclusion	188
	References	188

Section II: General Concepts in the Diagnosis and Treatment of Retinal Vascular Disease

11	A Practical Guide to Fluorescein Angiography	
	H. HEIMANN, S. WOLF	193
11.1	History	193
11.2	Concept	194
11.3	Performing Fluorescein Angiography	194
11.4	Interpretation of Fluorescein Angiography	195
11.5	Quantitative Evaluation of Fluorescein Angiography	203
11.6	Avoiding Unnecessary Angiographies	203
	References	204

12	Optical Coherence Tomography in the Diagnosis of Retinal Vascular Disease	
	A. WALSH, S. SADDHA	205
12.1	Overview	205
12.2	Evaluation	205
12.2.1	Optical Coherence Tomography	206
12.2.2	Biomicroscopic Examination	207
12.2.3	Stereoscopic Fundus Photography	208
12.2.4	Fluorescein Angiography	208
12.2.5	Ultrasound	209
12.3	Diagnosis	209
12.3.1	Intraretinal Edema	209
12.3.2	Cystoid Macular Edema	210
12.3.3	Serous Retinal Detachment	212
12.3.4	Vitreomacular Traction Syndrome	213
12.3.5	Miscellaneous Findings	214
12.4	Management	216
12.4.1	Focal and Panretinal Photocoagulation	217
12.4.2	Pharmacologic Therapy	217
12.4.3	Surgery	218
12.5	Future Directions	219
12.5.1	Current OCT Limitations	219
12.5.2	Clinical Applications	221
12.5.3	The Future of OCT Hardware	222
12.5.4	The Future of OCT Software	223
	References	224

13	General Concepts in Laser Treatment for Retinal Vascular Disease	
	F. RÜFER, J. ROIDER	228
13.1	History of Laser Treatment	228
13.2	Laser Sources	228
13.2.1	Histological Findings After Light and Laser Coagulation	229

13.2.2	Mechanisms of Treatment	231
13.3	Standards and Indications for Panretinal Laser Coagulation	232
13.3.1	Full Scatter Panretinal Laser Coagulation	232
13.3.2	Mild Scatter Panretinal Laser Coagulation	233
13.4	Focal Laser Application	234
13.5	Subthreshold Laser Coagulation for Retinal Disease	234
	References	236

14 The Role of Photodynamic Therapy in Retinal Vascular Disease

	B. JURKLIES, N. BORNFIELD	239
14.1	Introduction	240
14.2	Photodynamic Therapy	240
14.2.1	Effects of Light on Biological Tissue	240
14.2.2	Differences Between PDT and Laser Coagulation	242
14.2.3	Mechanisms of Photodynamic Therapy	242
14.3	Verteporfin in PDT	244
14.3.1	Characteristics	244
14.3.2	Effects of PDT in Animal Experiments	244
14.3.3	Effects of PDT in (Normal) Human Tissue	245
14.3.4	Toxic Effects and Adverse Effects of PDT with Verteporfin	247
14.4	Current Treatment Recommendations	248
14.5	Verteporfin in Retinal Vascular Disease	248
14.5.1	Retinal Capillary Hemangioma	248
14.5.2	Vasoproliferative Tumor	251
14.5.3	Parafoveal Telangiectasis	251
14.6	Conclusions	252
	References	252

15 Cryosurgery in Retinal Vascular Disease

	B. KIRCHHOF, A.M. JOUSSEN	256
15.1	Technique of Cryotherapy and Equipment	257
15.2	Indications of Cryosurgery in Retinal Vascular Disease	258
15.2.1	Cryotherapy for Retinopathy of Prematurity	258
15.2.2	Cryotherapy for Diabetic Retinopathy and Retinal Ischemic Disease	258
15.2.3	Cryotherapy for Vascular Abnormalities and Exudative Retinopathies: Coats' Disease, FEVR and Small Peripheral Hemangiomas	258
	References	259

16 Vitrectomy in Retinal Vascular Disease: Surgical Principles

	A.M. JOUSSEN, B. KIRCHHOF	260
16.1	Introduction	260
16.2	Prerequisites for Vitreoretinal Surgery in Retinal Vascular Disease: Microscope Requirements and Wide-Angle Viewing Systems	260
16.3	Surgical Techniques	261
16.3.1	Three-Port Vitrectomy	261
16.3.2	"Chromovitrectomy"	262
16.3.3	Heavy Liquids	262
16.3.4	Vitreous Tamponades	263
16.3.5	Endolaser Coagulation	266
16.3.6	Lens Management and Compartmentalization	266
16.4	Indications for Vitreoretinal Surgery in Retinal Vascular Disease ..	267
16.4.1	Destruction of Ischemic Retina and Pathological Vessels	267

16.4.2	Removal of Dense Vitreous Hemorrhages	267
16.4.3	Release of Traction	267
References		270

17 Treatment of Rubeotic Secondary Glaucoma

	T. SCHLOTE, K.U. BARTZ-SCHMIDT	274
17.1	Definition and Classification	274
17.2	Prognosis	275
17.3	Treatment	275
17.3.1	Early Rubeotic Secondary Glaucoma (Open Angle Type)	275
17.3.2	Advanced Rubeotic Secondary Glaucoma (Angle Closure Type)	278
17.3.3	Blind Painful Eye with Rubeotic Secondary Glaucoma	279
17.3.4	Treatment Options Under Investigation	280
References		281

18 Intravitreal Injections: Guidelines to Minimize the Risk of Endophthalmitis

	I.U. SCOTT, H.W. FLYNN, JR	283
18.1	Introduction	283
18.2	Risk of Endophthalmitis Associated with the Intravitreal Injection Procedure	283
18.3	Injection Procedure Guidelines	284
18.4	Guidelines for Follow-up	286
18.5	Non-infectious Endophthalmitis	287
18.6	Summary	287
References		287

Section III: Pathology, Clinical Course and Treatment of Retinal Vascular Diseases

19 Grading of Diabetic Retinopathy

	M. LARSEN, W. SOLIMAN	291
19.01	Early Treatment Diabetic Retinopathy Study Grading – An Extension of the Modified Airlie House Classification	292
19.02	EURODIAB Grading	293
19.03	International Clinical Diabetic Retinopathy Severity Scale	301
References		301

19.1 Nonproliferative Diabetic Retinopathy

19.1.1 Nonproliferative Stages of Diabetic Retinopathy: Animal Models and Pathogenesis

	T.S. KERN, S. MOHR	303
19.1.1.1	Early Stages of Diabetic Retinopathy: Histopathology	303
19.1.1.2	Animal Models of the Early Stages of Diabetic Retinopathy	305
19.1.1.3	Insulin Therapy to Inhibit Development of Retinopathy	306
19.1.1.4	Is Diabetic Retinopathy a Chronic Inflammatory Disease?	307
19.1.1.5	Therapies	307
19.1.1.6	Summary	311
References		311

19.1.2 Pharmacological Approach and Current Clinical Studies

19.1.2.1 Protein Kinase C Inhibitors

	A. GIRACH, D.S. FONG	317
19.1.2.1.1	Introduction	317

19.1.2.1.2	Protein Kinase C Family of Isoenzymes	317
19.1.2.1.3	PKC Activation and Diabetic Retinopathy	318
19.1.2.1.4	PKC- β Inhibitor – Ruboxistaurin	318
19.1.2.1.5	PKC-DRS Trial	320
19.1.2.1.6	PKC-DMES (MBBK) Trial	320
19.1.2.1.7	PKC-DRS2 (MBCM) Trial	321
19.1.2.1.8	Safety of Ruboxistaurin	322
19.1.2.1.9	Conclusion	323
	References	323
19.1.2.2	<i>Somatostatin Analogues</i>	
	G.E. LANG	324
19.1.2.2.1	Pathogenesis of Diabetic Retinopathy	324
19.1.2.2.2	Somatostatin and Somatostatin Analogues	324
19.1.2.2.3	Current Clinical Use of Octreotide	327
	References	329
19.2	Proliferative Diabetic Retinopathy	
19.2.1	A Surgical Approach to Proliferative Diabetic Retinopathy	
	H. HELBIG	330
19.2.1.1	Rationale for Surgery in Diabetic Retinopathy	330
19.2.1.2	Indications for Surgery in Diabetic Retinopathy: A Practical Approach	330
19.2.1.3	Surgical Principles	338
	References	340
19.2.2	Laser Coagulation of Proliferative Diabetic Retinopathy	
	W. SOLIMAN, M. LARSEN	342
19.2.2.1	History of Photocoagulation	342
19.2.2.2	Mechanisms of Action	343
19.2.2.3	Clinical Trials and Indications for Retinal Photocoagulation Treatment	343
19.2.2.4	Clinical Practice	344
19.2.2.5	Preparations for Photocoagulation: Information and Consent ..	345
19.2.2.6	Consent to Treatment	348
19.2.2.7	Photocoagulation Protocol	348
19.2.2.8	Complications of Photocoagulation for PDR	351
	References	351
19.3	Diabetic Macular Edema	
19.3.1	Therapeutic Approaches to (Diabetic) Macular Edema	
	A.M. JOUSSEN	353
19.3.1.1	Macular Edema as a Result of Various Disease Mechanisms	353
19.3.1.2	Diagnosis and Current Imaging Modalities	359
19.3.1.3	Treatment of Macular Edema	360
19.3.1.4	Discussion: Open Questions and Technical Aspects	370
19.3.1.5	Summary	371
	References	371
19.3.2	Pegaptanib for Diabetic Macular Edema	
	A.P. ADAMIS, B. KATZ	377
19.3.2.1	Background	377
19.3.2.2	Phase 2 Trial – Intravitreal Pegaptanib as a Treatment for DME	380
19.3.2.3	Conclusions	383
	References	383

19.3.3	Ranibizumab for the Treatment of Diabetic Macular Edema	
	D.V. DO, QUAN DONG NGUYEN, S.M. SHAH, J.A. HALLER	386
19.3.3.1	Introduction	386
19.3.3.2	Pathogenesis	386
19.3.3.3	Vascular Endothelial Growth Factor	386
19.3.3.4	Ranibizumab	387
19.3.3.5	Ranibizumab in Diabetic Macular Edema	387
19.3.3.6	Summary	390
	References	390

20 Retinopathy of Prematurity

20.1	Retinopathy of Prematurity: Pathophysiology of Disease	
	L.E.H. SMITH	392
20.1.1	History of Retinopathy of Prematurity	392
20.1.2	ROP: Disruption of Normal Vascular Development	392
20.1.3	Pathogenesis: Two Phases of ROP	393
20.1.4	ROP: Phase I	393
20.1.5	ROP: Phase II	393
20.1.6	Mouse Model of ROP	393
20.1.7	Oxygen Regulated Factors: Vascular Endothelial Growth Factor in ROP	393
20.1.8	VEGF is Critical to Phase II of ROP	395
20.1.9	VEGF in Phase I of ROP	395
20.1.10	VEGF Role in Retinal Vessel Loss	395
20.1.11	VEGF Role in Cessation of Normal Vascular Development	395
20.1.12	Other Growth Factors in ROP	396
20.1.13	IGF-1 Deficiency in the Preterm Infant	396
20.1.14	Growth Hormone and IGF-1 in Phase II of ROP	396
20.1.15	IGF-1 and VEGF Interaction	396
20.1.16	Low Levels of IGF-I and Phase I of ROP	397
20.1.17	Clinical Studies: Low IGF-1 is Associated with the Degree of ROP	397
20.1.18	Low IGF-1 is Associated with Decreased Vascular Density	398
20.1.19	IGF-1 and ROP	398
20.1.20	IGF-1 and Brain Development	399
20.1.21	Conclusion: A Rationale for the Evolution of ROP	399
20.1.22	Possible Medical Intervention to Prevent ROP	399
	References	399

20.2 Clinical Course and Treatment

	C. JANDECK, M.H. FOERSTER	403
20.2.1	Historical Developments and Epidemiology	403
20.2.2	Explanation of Important Terms, The International Classification and the Cryo-ROP Study	404
20.2.2.1	Terms Used to Describe Age	404
20.2.2.2	International Classification	404
20.2.2.3	Cryo-ROP Study	406
20.2.3	Guidelines for Screening	406
20.2.3.1	Examination Technique	408
20.2.4	Indications for Coagulation Treatment	408
20.2.5	Incidence of ROP and Incidence of Treatment	409
20.2.6	Zone I Disease	409
20.2.7	Treatment Modalities	409
20.2.7.1	ROP Stage 3+	409
20.2.7.2	Treatment Principles	410

20.2.7.3	Treatment in Stages 4 and 5	411
20.2.8	Conservative Therapy	411
20.2.8.1	Vitamin E	411
20.2.8.2	STOP-ROP Study	411
20.2.8.3	Light-ROP Study	411
20.2.8.4	Surfactant	411
20.2.9	Late Changes	412
20.2.9.1	Risk of Myopia	412
20.2.9.2	Visual Acuity	412
20.2.9.3	Strabismus	412
20.2.9.4	Glaucoma	413
20.2.9.5	Regressive Late Changes in the Retina	413
20.2.9.6	Differential Diagnosis	413
20.2.9.7	Outlook	413
20.2.9.8	Future Treatment Possibilities	414
	References	414
20.3	Surgical Management of Retinopathy of Prematurity	
	P. QUIRAM, M. LAI, M. TRESE	418
20.3.1	Introduction: Preoperative Evaluation and Timing of Surgical Intervention	418
20.3.2	Eyes with Peripheral Ablation	419
20.3.3	Eyes Without Peripheral Ablation	419
20.3.4	Treatment of Retinal Detachment	419
20.3.4.1	Scleral Buckling	419
20.3.4.2	Lens-Sparing Vitrectomy	419
20.3.4.3	Management of Stage 4B Retinopathy of Prematurity	421
20.3.4.4	Management of Stage 5 Retinopathy of Prematurity	421
20.3.4.5	Follow-up Care	422
	References	422
21	Vascular Occlusive Disease	
21.1	Plasma Proteins – Possible Risk Factors for Retinal Vascular Occlusive Disease	
	E. TOURVILLE, A.P. SCHACHAT	424
21.1.1	Introduction	424
21.1.2	Homocysteine Metabolism and the Role of MTHFR	426
21.1.2.1	Homocysteine	427
21.1.2.2	Methylenetetrahydrofolate Reductase Gene 677 CT Polymorphism: The Thermolabile Form (TT MTHFR)	427
21.1.2.3	Literature Evidence on Homocysteine	427
21.1.2.4	Literature Evidence Concerning MTHFR	429
21.1.3	Antiphospholipid Antibodies (APA): Lupus Anticoagulant and Anticardiolipin Antibodies	430
21.1.4	Disorders of Coagulation and Anti-coagulation	432
21.1.4.1	Factor V Leiden (FVL) and Activated Protein C (aPC) Resistance	432
21.1.4.2	Natural Anticoagulants Deficiency: Protein C, S and Antithrombin III	436
21.1.4.3	Prothrombin G20210A Gene Mutation	437
21.1.4.4	Lipoprotein A	438
21.1.4.5	Other Factors	438
21.1.5	Conclusions	439
	References	440

21.2 Central Retinal Vein Occlusion

L.L. HANSEN	443
21.2.1 Background	443
21.2.2 Epidemiology	443
21.2.3 Etiology and Pathogenesis	444
21.2.3.1 Systemic Risk Factors	444
21.2.3.2 Local Risk Factors	445
21.2.3.3 Pathogenesis of CRVO	446
21.2.4 Clinical Features	447
21.2.4.1 Symptoms and Fundusoscopic Features	448
21.2.4.2 Classification of CRVO	450
21.2.4.3 Diagnosis	452
21.2.4.4 Differential Diagnosis	453
21.2.4.5 Natural Course	454
21.2.5 Treatment	456
21.2.5.1 Early Treatment	457
21.2.5.2 Late Treatment	461
References	461

21.3 Branch Retinal Vein Occlusion

H. HOERAUF	467
21.3.1 History, Epidemiology and Classification	467
21.3.2 Anatomy and Histopathology	469
21.3.3 Pathogenesis	471
21.3.4 Clinical Appearance and Symptoms	472
21.3.4.1 Early Findings	472
21.3.4.2 Late Findings and Complications	476
21.3.5 Clinical Evaluation and Diagnostic Methods	478
21.3.5.1 Visual Function and Perimetry	478
21.3.5.2 Angiographic Features	479
21.3.5.3 Optical Coherence Tomography	480
21.3.5.4 General Medical Examination and Laboratory Parameters	481
21.3.6 Natural Course	481
21.3.7 Associated Systemic Disorders and Risk Factors	483
21.3.7.1 Systemic Risk Factors	483
21.3.7.2 Local Risk Factors	484
21.3.7.3 Hematologic Risk Factors	484
21.3.8 Treatment	485
21.3.8.1 Improvement of Hemodynamic Properties and Secondary Prevention	485
21.3.8.2 Reduction of Macular Edema	486
21.3.8.3 Treatment of Neovascular Related Complications	495
21.3.9 Conclusions	498
21.3.9.1 Recommendations for Therapy	498
References	499

21.4 Retinal Arterial Occlusion

M. BURTON, Z. GREGOR	507
21.4.1 Epidemiology	507
21.4.2 Mechanisms of Retinal Arterial Obstruction	507
21.4.2.1 Emboli	507
21.4.2.2 Thrombosis	508
21.4.2.3 Thrombophilia	508
21.4.2.4 Vasculitis	509
21.4.2.5 Infectious	509
21.4.2.6 Other Causes	509

21.4.2.7	Retinal Arterial Occlusion in the Young	510
21.4.3	Clinical Features	510
21.4.3.1	Anatomical Classification	510
21.4.3.2	History	510
21.4.3.3	Examination	510
21.4.4	Differential Diagnosis	512
21.4.5	Systemic Clinical Assessment	513
21.4.6	Investigations	513
21.4.6.1	Investigations to Confirm the Diagnosis of Retinal Arterial Occlusion	513
21.4.6.2	Investigations of the Cause of Retinal Arterial Occlusion	513
21.4.7	Pathology	514
21.4.8	Management	514
21.4.8.1	Lie Patient Flat	514
21.4.8.2	Ocular Massage	514
21.4.8.3	Anterior Chamber Paracentesis	514
21.4.8.4	Pharmacological Reduction of Intraocular Pressure	515
21.4.8.5	Pharmacological Vasodilatation	515
21.4.8.6	Carbogen	515
21.4.8.7	Hyperbaric Oxygen	515
21.4.8.8	Steroids for Temporal Arteritis	515
21.4.8.9	Thrombolysis	515
21.4.8.10	Secondary Prevention	516
21.4.9	Outcome and Follow-up	516
	References	516
21.5	The Ocular Ischemic Syndrome	
	G.C. BROWN, M.M. BROWN	519
21.5.1	Pathophysiology	519
21.5.2	Demography	520
21.5.3	Clinical Features	520
21.5.4	Ancillary Diagnostic Studies	524
21.5.5	Systemic Associations	524
21.5.6	Therapeutic Modalities	525
21.5.7	Differential Diagnosis	526
	References	526
22	Vascular Abnormalities	
22.1	Idiopathic Juxtafoveolar Retinal Telangiectasis	
	D. PAULEIKHOFF, B. PADGE	528
22.1.1	History	528
22.1.2	Clinical Course of the Disease	528
22.1.3	Electron Microscopic and Light Microscopic Changes	532
22.1.4	Natural Course of IJRT	532
22.1.5	Association with Systemic Diseases and Differential Diagnosis	532
22.1.6	Therapy	533
	References	533
22.2	Congenital Arteriovenous Communications and Wyburn-Mason Syndrome	
	A. WESSING	535
22.2.1	History	535
22.2.2	Classification	536
22.2.3	Clinical Features	536
22.2.4	Fluorescein Angiography	538

22.2.5	Differential Diagnosis	538
22.2.6	Natural Course	539
22.2.7	Histopathology	539
22.2.8	Systemic Involvement	539
22.2.9	Genetics	540
22.2.10	Therapy	540
	References	540
22.3	Retinal Arterial Macroaneurysms	
	S. BOPP	543
22.3.1	Clinical Presentation	543
22.3.1.1	Typical Clinical Findings	543
22.3.1.2	Special Clinical Findings	544
22.3.1.3	Clinical Symptoms	544
22.3.2	Epidemiologic Data and Risk Factors	545
22.3.3	Pathogenesis and Pathomorphology	545
22.3.4	Natural History	545
22.3.5	Terminology and Classification	547
22.3.6	Diagnosis and Imaging	547
22.3.7	Differential Diagnosis	548
22.3.8	Therapy	549
22.3.8.1	Exudative Complications	549
22.3.8.2	Hemorrhagic Complications	550
22.3.8.3	Pearls and Pitfalls of Surgery for Hemorrhagic RAMs	552
22.3.9	Conclusions and Practical Recommendations	557
22.3.10	Personal Approach to Symptomatic RAM	558
	References	558
22.4	Coats' Disease	
	A. SCHUELER, N. BORNFELD	561
22.4.1	Introduction	561
22.4.2	Classification	562
22.4.3	Differential Diagnosis	563
22.4.4	Treatment	564
22.4.5	Future Prospects	565
	References	565
22.5	Familial Exudative Vitreoretinopathy	
	A.M. JOUSSEN, B. KIRCHHOF	567
22.5.1	History	567
22.5.2	Special Pathological Features	567
22.5.3	Genetics and Molecular Mechanisms	570
22.5.4	Clinical Course of the Disease	571
22.5.5	Differential Diagnosis	574
22.5.6	Treatment Recommendations Including Follow-up	576
22.5.6.1	General Recommendations for Laser Photocoagulation in FEVR	576
22.5.6.2	Indications for Vitrectomy in FEVR	577
22.5.6.3	General Recommendations for Vitrectomy in FEVR	577
22.5.6.4	Surgical Approach to Falciform Detachment in FEVR	579
22.5.7	Treatment Options Under Investigation	580
	References	580
23	Vasculopathy After Treatment of Choroidal Melanoma	
	B. DAMATO	582
23.1	Uveal Melanoma	582
23.2	Radiotherapy	583

23.2.1	Radiotherapy Techniques	583
23.2.2	Radiation Vasculopathy	583
23.2.3	Treatment of Radiation Vasculopathy	584
23.3	Phototherapy	588
23.3.1	Phototherapy Techniques	588
23.3.2	Vasculopathy After Phototherapy	588
23.3.3	Treatment of Vasculopathy After Phototherapy	589
23.4	Local Resection	589
23.4.1	Local Resection Techniques	589
23.4.2	Vasculopathy After Local Resection	589
23.4.3	Treatment of Vasculopathy After Local Resection	590
23.5	Conclusion	590
	References	591

24 Vasculopathies with Acute Systemic Diseases

24.1	Purtscher's Retinopathy	
	D.V. DO, A.P. SCHACHAT	592
24.1.1	History	592
24.1.2	Special Pathologic Features	592
24.1.3	Clinical Course of the Disease	593
24.1.4	Differential Diagnosis	593
24.1.5	Treatment Recommendations Including Follow-up	594
	References	594

24.2	Terson Syndrome	
	F. KUHN, R. MORRIS, V. MESTER	595
24.2.1	History	595
24.2.2	Pathophysiology and Pathoanatomy	595
24.2.2.1	The Origin of the Intraocular Blood	595
24.2.2.2	The Type and Location of the Intraocular Blood	596
24.2.3	Epidemiology	597
24.2.4	Significance	598
24.2.4.1	Natural History of Vitreous Hemorrhage in Eyes with Terson Syndrome	598
24.2.4.2	Systemic Significance	598
24.2.4.3	Human Significance	598
24.2.5	Diagnosis	598
24.2.5.1	Differential Diagnosis	599
24.2.6	Treatment	599
24.2.6.1	Indication and Counseling	599
24.2.6.2	Surgery	599
24.2.6.3	Complications	599
24.2.6.4	Follow-up	600
24.2.7	Summary	600
	References	600

24.3	Disseminated Intravascular Coagulopathy	
	M.M. LAI, A. SCHACHAT	602
24.3.1	Introduction	602
24.3.2	History	602
24.3.3	Pathologic Features	603
24.3.4	Clinical Course	603
24.3.5	Differential Diagnosis	604
24.3.6	Treatment and Follow-up	605
	References	605

24.4	Bone Marrow Transplant Associated Retinopathy	
	H. TABANDEH, N. RAFIEI, A.P. SCHACHAT	606
24.4.1	Introduction	606
24.4.2	Pathophysiology	607
24.4.3	Bone Marrow Transplant Associated Retinopathy	608
24.4.3.1	Microvascular Retinopathy	608
24.4.3.2	Retinal Pigment Epitheliopathy and Choroidopathy	609
24.4.3.3	Hematologic Complications	609
24.4.3.4	Optic Neuropathy	610
24.4.3.5	Infectious Complications	610
24.4.3.6	Other Complications	610
24.4.4	Pathologic Features	611
24.4.5	Management	611
	References	611
25	Inflammatory Vascular Disease	
25.1	Eales' Disease	
	S. GADKARI	613
25.1.1	History	613
25.1.2	Epidemiology	613
25.1.3	Clinical Features	613
25.1.3.1	Signs of Inflammation	614
25.1.3.2	Signs of Ischemia	614
25.1.3.3	Signs of Neovascularization and Its Sequelae	616
25.1.3.4	Central Eales'	619
25.1.4	Natural Course	620
25.1.5	Differential Diagnosis	620
25.1.6	Systemic Associations Described in Eales' Disease	620
25.1.7	Attempts at Classification	621
25.1.8	Pathology	621
25.1.9	Etiopathology	621
25.1.10	Management	622
25.1.10.1	Fundus Fluorescein Angiography	622
25.1.10.2	Medical Treatment	622
25.1.10.3	Role of Laser Treatment	622
25.1.10.4	Vitreoretinal Surgery	623
	References	626
25.2	Ocular Manifestations of Systemic Lupus Erythematosus	
	J.T. ROSENBAUM, F. MACKENSEN	628
25.2.1	Epidemiology and Disease Criteria for SLE	628
25.2.2	Frequency and Prognostic Value of Ocular Findings in SLE	629
25.2.3	Special Pathological Features and Molecular Mechanisms	630
25.2.4	Retinopathy in SLE patients: Clinical Picture and Course of Disease	630
25.2.5	Differential Diagnosis	630
25.2.6	Treatment Recommendations, Follow-up and Recommendations for Ophthalmologic Screening of SLE Patients	632
	References	633
25.3	Behçet's Disease	
	M. ZIERHUT, N. STÜBIGER, I. KÖTTER, C. DEUTER	635
25.3.1	Epidemiology and Definition of Behçet's Disease	635
25.3.1.1	Definition	635

25.3.1.2	Epidemiology	635
25.3.2	Special Pathological Features	636
25.3.3	Genetics and Molecular Mechanisms	638
25.3.4	Course of the Disease	639
25.3.4.1	Extraocular Manifestations	639
25.3.4.2	Ocular Manifestations	640
25.3.5	Differential Diagnosis	642
25.3.6	Treatment	643
25.3.6.1	Corticosteroids	643
25.3.6.2	Immunosuppressive and Cytotoxic Agents	643
25.3.6.3	Novel Medical Treatment Approaches (Biologicals)	644
25.3.6.4	Surgical Treatment	644
25.3.6.5	Recommendations for the Clinician	645
	References	645
25.4	Vasculitis in Multiple Sclerosis	
	M.D. BECKER, U. WIEHLER, D.W. MILLER	650
25.4.1	History	650
25.4.2	Epidemiology	650
25.4.3	Pathogenesis	650
25.4.4	Intermediate Uveitis and Retinal Vasculitis as the Clinical Manifestations in MS-Associated Uveitis	651
25.4.5	Differential Diagnosis	653
25.4.6	Therapeutic Options	653
25.4.6.1	Corticosteroids and Immunosuppression	653
25.4.6.2	Immunomodulatory Therapy with Interferon for Cystoid Macular Edema	653
25.4.6.3	Laser Photocoagulation	654
25.4.6.4	Treatment Strategy	654
	References	655
25.5	Sarcoidosis	
	S. SIVAPRASAD, N. OKHRAVI, S. LIGHTMAN	657
25.5.1	Epidemiology	657
25.5.2	Etiology	657
25.5.3	Molecular Mechanisms	657
25.5.4	Pathology	657
25.5.5	Special Pathological Findings	658
25.5.5.1	Systemic Features	658
25.5.5.2	Ocular Sarcoidosis	658
25.5.5.3	Ocular Sarcoidosis in Children	662
25.5.6	Diagnosis of Sarcoidosis	663
25.5.6.1	Serum Angiotensin Converting Enzyme	663
25.5.6.2	Chest Radiographs	663
25.5.7	Clinical Course and Prognosis	663
25.5.7.1	Ocular Disease	663
25.5.7.2	Systemic Disease	664
25.5.8	Treatment of Ocular Sarcoidosis	664
25.5.9	Treatment of Systemic Sarcoidosis	664
25.5.10	Conclusion	665
	References	665
25.6	Necrotizing Vasculitis	
	J.L. DAVIS	668
25.6.1	Polyarteritis Nodosa and Microscopic Polyangiitis	668
25.6.1.1	Synonyms and Related Conditions	668

25.6.1.2	Histopathology	668
25.6.1.3	Systemic Course of PAN	668
25.6.1.4	Ocular Manifestations of PAN	669
25.6.2	Churg-Strauss Syndrome	670
25.6.2.1	Synonyms and Related Conditions	670
25.6.2.2	Histopathology	670
25.6.2.3	Systemic Course of Disease	670
25.6.2.4	Ocular Manifestations	670
25.6.3	Wegener Granulomatosis	670
25.6.3.1	Synonyms and Related Conditions	670
25.6.3.2	Histopathology	672
25.6.3.3	Systemic Course of Disease	672
25.6.3.4	Ocular Manifestations	672
25.6.4	Differential Diagnosis	673
25.6.5	Treatment	673
25.6.6	Prognosis	673
	References	673
25.7	Systemic Immunosuppression in Retinal Vasculitis and Rheumatic Diseases	
	J.J. HUANG, C.S. FOSTER	675
25.7.1	Introduction	675
25.7.2	Diagnosis, Imaging and Electrophysiology	676
25.7.2.1	Laboratory Tests	677
25.7.3	Treatment	678
25.7.3.1	Corticosteroids	678
25.7.3.2	Nonsteroidal Anti-inflammatory Drugs	678
25.7.3.3	Immunosuppressive Agents	679
25.7.4	Immunosuppressive Therapy in Children	685
25.7.5	Combination Therapy	686
25.7.6	Conclusion	686
	References	686
26	Hypertensive Retinopathies	
26.1	General Basics of Hypertensive Retinopathy	
	S. WOLF	688
26.1.1	Pathophysiology of the Retinal Vessels in Arterial Hypertension ..	688
26.1.2	Fundus Changes in Arterial Hypertension	689
26.1.3	Fundus Changes in Hypertensive Retinopathy	689
26.1.4	Clinical Diagnoses in Hypertensive Retinopathy	689
26.1.5	Classification of Fundus Changes in Arterial Hypertension	689
26.2	Pregnancy-Induced Hypertension (Preeclampsia/Eclampsia)	
	T.R. KLESERT, A.P. SCHACHAT	691
26.2.1	History	691
26.2.2	Hypertension in Pregnancy	691
26.2.3	Systemic Complications of PIH	692
26.2.4	Ocular and Neurologic Manifestations	693
26.2.5	Pathophysiology and Epidemiology	694
26.2.6	Diagnostic Evaluation	695
26.2.7	Treatment	696
26.2.8	Clinical Course and Outcomes	697
	References	698

27 Sickle Cell Retinopathy and Hemoglobinopathies

27.1 Histopathology of Sickle Cell Retinopathy

G.A. LUTTY	700
27.1.1 Introduction	700
27.1.2 Nonproliferative Changes	700
27.1.2.1 Retinal Vessel Occlusions and Remodeling	700
27.1.2.2 Causes of Vaso-occlusions	705
27.1.2.3 Hemorrhage, Schisis Cavities, Iridescent Spots, and Black Sunbursts	706
27.1.3 Proliferative Retinopathy	707
27.1.4 Choroidopathy	709
27.1.5 Conclusions	710
References	710

27.2 Retinal Vascular Disease in Sickle Cell Patients

J.C. VAN MEURS, A.C. BIRD, S.M. DOWNES	712
27.2.1 Introduction to Sickle Cell Disease	713
27.2.1.1 Normal Hemoglobin and Sickle Hemoglobin	713
27.2.1.2 Determinants of HbS Polymerization and Patient Categories	713
27.2.1.3 Combinations with Thalassemia	714
27.2.1.4 Current Concepts in the Pathogenesis of Vaso-occlusion	714
27.2.1.5 Pathophysiology of Ocular Vaso-occlusion	714
27.2.2 Retinal Vascular Disease in Sickle Patients	714
27.2.2.1 Introduction	714
27.2.2.2 Database	714
27.2.3 Choroid	715
27.2.3.1 Choriocapillary	715
27.2.4 Retinal Vessel Occlusions	715
27.2.4.1 Major Retinal Vessel Occlusions	715
27.2.4.2 Retinal Vein Occlusions	716
27.2.5 Retinal Hemorrhages, Salmon Patches, Iridescent Spots and Black Sunbursts	716
27.2.5.1 Reports	716
27.2.5.2 Course	717
27.2.5.3 Relevance to Function	718
27.2.6 Capillary Occlusions of the Posterior Pole	718
27.2.6.1 Natural History	718
27.2.6.2 Relevance of These Findings to Function	718
27.2.7 Peripheral Vessel Occlusions	718
27.2.7.1 Reports	718
27.2.7.2 Natural History	719
27.2.7.3 Relevance of These Findings to Function	719
27.2.8 Proliferative Sickle Retinopathy	719
27.2.8.1 Classification of Sickle Cell Retinopathy	719
27.2.8.2 Reports of Proliferative Sickle Retinopathy	719
27.2.8.3 Non-peripheral Proliferative Lesions	721
27.2.8.4 Natural History of Proliferative Sickle Retinopathy	721
27.2.8.5 Clinical Correlations	723
27.2.8.6 Differential Diagnosis of Proliferative Sickle Retinopathy	723
27.2.9 Prophylactic Treatment of PSR	725
27.2.9.1 Reports	725
27.2.10 Epiretinal Membranes	726
27.2.10.1 Etiology	726
27.2.10.2 Relevance to Function	726
27.2.11 Macular Holes	726

27.2.12	Treatment of Vitreous Hemorrhages and Retinal Detachments ..	727
27.2.12.1	Anterior Segment Ischemia	727
27.2.12.2	Surgical Reports	727
27.2.12.3	Comment	728
27.2.12.4	Measures to Consider in Vitreoretinal Surgery	728
27.2.13	Blindness Caused by Sickle Cell Disease	728
27.2.13.1	Reports	728
	References	732

28 Vascular Tumors of the Retina

28.1 Histopathology of Retinal Vascular Tumors and Selected Vascular Lesions

	M.A. CHANG, W.R. GREEN	735
28.1.1	Cavernous Hemangioma	735
28.1.2	Capillary Hemangioma	736
28.1.3	Retinal Vasoproliferative Tumors	739
28.1.4	Combined Hamartoma of the Retinal Pigment Epithelium and Retina	741
28.1.5	Racemose Hemangioma	743
28.1.6	Retinal Angiomatous Proliferation	744
	References	746

28.2 Retinal Capillary Hemangioma

	C.L. SHIELDS, J.A. SHIELDS	749
28.2.1	General Considerations	749
28.2.2	Definition and Incidence	749
28.2.3	Clinical Features	750
28.2.4	Differential Diagnosis	751
28.2.5	Pathology and Pathogenesis	751
28.2.6	Diagnostic Approaches	752
28.2.6.1	Fluorescein Angiography	753
28.2.6.2	Indocyanine Green Angiography	753
28.2.6.3	Ultrasonography	753
28.2.6.4	Optical Coherence Tomography	753
28.2.6.5	Color Doppler Imaging	754
28.2.6.6	Computed Tomography	754
28.2.6.7	Magnetic Resonance Imaging	754
28.2.7	Systemic Evaluation	754
28.2.8	Management	754
28.2.8.1	Ocular	754
28.2.8.2	Systemic	758
28.2.9	Prognosis	758
28.2.10	Summary	758
	References	758

28.3 Cavernous Hemangioma

	B. JURKLIES, N. BORNFELD	760
28.3.1	Introduction	760
28.3.2	History	760
28.3.3	Pathological Features	761
28.3.4	Clinical Findings and Characteristics of Cavernous Hemangioma	761
28.3.5	Differential Diagnosis	763
28.3.6	Treatment	763
28.3.7	Conclusions	763
	References	764

28.4	Vasoproliferative Retinal Tumor	
	B. DAMATO, J. ELIZALDE, H. HEIMANN	766
28.4.1	History	766
28.4.2	Histological Features	766
28.4.3	Pathogenesis	766
28.4.4	Clinical Features	767
28.4.5	Differential Diagnosis	768
28.4.6	Treatment	768
28.4.7	Prognosis	770
	References	770
	Subject Index	771

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