

Contents

1	Epidemiology of Age-Related Maculopathy: A Review	1	3.1.1	Photoreceptors and Retinal Pigment Epithelium	32
	<i>C.C.W. Klaver, R. van Leeuwen, J.R. Vingerling, P.T.V.M. de Jong</i>		3.1.2	Bruch's Membrane and Drusen	41
1.1	Diagnosis	2	3.1.3	Choroid	42
1.1.1	Diagnostic Criteria	2	3.2	Choroidal Neovascularizations	42
1.1.2	Differential Diagnosis	3	3.3	Detachment of the Retinal Pigment Epithelium	43
1.2	Frequency	3	3.4	Geographic Atrophy	43
1.2.1	Prevalence	3	3.5	Macular vs Peripheral Retina	44
1.2.2	Incidence	7		References	44
1.3	Natural Course	7	4	Histopathology	47
1.3.1	Functional Consequences Without Therapy	8		<i>D. Pauleikhoff, P. Hermans, F.G. Holz, A.C. Bird</i>	
1.4	Risk Factors	9	4.1	Age-Related Changes and Deposits in Bruch's Membrane	48
1.4.1	Genetic Factors	9	4.1.1	Structure of Bruch's Membrane	48
1.4.2	Racial Variation	11	4.1.2	Age-Related Changes of Bruch's Membrane	49
1.4.3	Gender and Sex Hormones	11	4.1.3	Deposits in Bruch's Membrane, Drusen	50
1.4.4	Ocular Risk Factors	11	4.2	Choroidal Neovascularization	54
1.4.5	Vascular Risk Factors	13	4.3	Retinal Pigment Epithelial Detachment	60
1.4.6	Environmental Factors	14	4.4	Retinal Pigment Epithelial Atrophy	63
1.4.7	Antioxidants and Diet	15		References	64
1.4.8	Comorbidity	17	5	Clinical Manifestations	69
1.4.9	Medication	17		<i>F.G. Holz, D. Pauleikhoff</i>	
	Conclusions	17	5.1	Manifestations	70
	References	17	5.1.1	Drusen	70
2	Genetics of AMD	23	5.1.2	Focal Hypo- and Hyperpigmentation of the Retinal Pigment Epithelium	74
	<i>H. Stöhr, B.H.F. Weber</i>		5.1.3	Geographic Atrophy of the RPE	74
2.1	Evidence for a Genetic Basis of AMD ..	24	5.1.4	Detachment of the RPE	76
2.2	Identifying AMD-Relevant Genes	24	5.1.5	Choroidal Neovascularization	78
2.2.1	Genes Underlying Monogenic Retinal Diseases as Candidates for AMD Susceptibility	24	5.1.6	Rips of the RPE	80
2.2.2	Controversy About the Role of ABCA4 in AMD	26	5.1.7	End-Stage Age-Related Macular Degeneration: Disciform Scar	81
2.2.3	Selection of Candidate Genes for AMD Based on Functional Considerations	26	5.1.8	Abnormal Choroidal Perfusion	81
	Conclusions	27	5.2	Prognosis	82
	References	27	5.2.1	Bilateral Drusen	82
3	Pathophysiology	31	5.2.2	Unilateral Late-Stage AMD	83
	<i>F.G. Holz, F. Schütt, D. Pauleikhoff, A.C. Bird</i>			Conclusions	84
3.1	Age-Related Changes and Pathogenetic Factors	32		References	84

6	Fundus Angiography	87			
	<i>R.F. Spaide, N. Eter</i>				
6.1	Characteristics of Fluorescein Dye	88	7.2.2	Visual Field, Central Increment	
6.2	Characteristics of Indocyanine			Threshold Sensitivity	111
	Green Dye	88	7.2.3	Color Vision Testing	112
6.3	Cameras Used in Fluorescence		7.2.4	Contrast Vision and Glare Sensitivity	
	Angiography	89		Tests	113
6.4	Patient Consent and Instruction	89	7.3	Objective Functional Testing	113
6.5	Photographs Taken Before Injection		7.3.1	Photopigment Scanning	
	of Dye	90		Densitometry	113
6.6	Fluorescein Injection	90	7.3.2	Ganzfeld Electroretinography	114
6.7	Fluorescein Technique	91	7.3.3	Pattern Electroretinography	115
6.8	ICG Technique	91	7.3.4	Multifocal Electroretinography	115
6.9	Interpretation of Fluorescein			Conclusions	117
	Angiographies	91		References	118
6.9.1	Filling Sequence	91	8	Reading with AMD	
6.9.2	The Macula	93		<i>S. Trauzettel-Klosinski</i>	
6.9.3	Deviations from Normal		8.1	Physiological Principles	120
	Angiographic Appearance	93	8.2	Reading with a Central Scotoma	121
6.10	Interpretation of ICG Angiographies ..	94	8.2.1	The Reading Visual Field Related	
6.11	Non-neovascular Age-Related			to Other Parameters	121
	Macular Degeneration	94	8.2.2	The Significance of Fixation	
6.11.1	Drusen	94		Behaviour	123
6.11.2	Pigmentary Abnormalities	95	8.3	Methods of Examining Reading	
6.12	Neovascular AMD	96		Ability	125
6.13	Additional Angiographic Features		8.3.1	Magnification Needed	125
	of Neovascular AMD	100	8.3.2	Reading Speed	125
6.13.1	RPE Detachments	100		Conclusions	125
6.13.2	RPE Tears	100		References	125
6.13.3	Contribution of Retinal Vessels		9	Laser Coagulation in AMD	127
	to the Exudative Process	100		<i>D. Pauleikhoff, G. Spital, A. Wessing</i>	
6.13.4	Blood and Elevated Blocked		9.1	Basic Principles and Techniques	
	Fluorescence	102		of Laser Coagulation	128
6.14	Disciform Scar	102	9.2	Choroidal Neovascularization:	
6.15	Evaluation for Treatment	103		Survey of Laser Photocoagulation	
6.15.1	Location of the Vessels	104		Procedures	129
6.15.2	Type of Neovascularization	105	9.3	Methods of Laser Photocoagulation	
6.15.3	Angiography of Treated Lesions	105		for Different Manifestations of CNV .	130
6.16	Follow-up	105	9.3.1	Classic CNV	130
6.16.1	Thermal Laser	105	9.3.2	Occult CNV Without Serous	
6.16.2	Photodynamic Therapy	106		Pigment Epithelial Detachment	134
7	Tests of Macular Function	109	9.4	Serous Detachment of the RPE	
	<i>E. Zrenner, M.W. Seeliger, J. Reinhard</i>			with or Without Occult CNV	
7.1	The Correlation Between Morphology			or Associated with Polypoidal	
	and Function in the Macula	110		Choroidal Vasculopathy	135
7.2	Subjective Function Testing	110	9.5	Drusen and Prophylactic Laser	
7.2.1	Visual Acuity and Reading			Treatment	137
	Performance	110		Conclusions	139
				References	140

10	Photodynamic Therapy	143	12.4.1	Transplantation of Retinal Pigment Epithelial Cells	174
	<i>U. Schmidt-Erfurth</i>		12.4.2	Transplantation of Autologous Iris Pigment Epithelial Cells	175
10.1	Photodynamic Therapy: Historical Background	145	12.4.3	Perspective	176
10.2	The Principle of Photodynamic Vascular Occlusion	145	12.5	Macular Translocation	177
10.3	Photosensitizer	147	12.5.1	Macular Translocation Techniques ...	178
10.4	Current Status of Photodynamic Therapy	148	12.5.2	Macular Translocation Outcomes	180
10.5	Indications for Different Forms of Laser Therapy	148		Conclusions	183
10.5.1	Clinical and Angiographic Characteristics	149		References	184
10.6	Study Results	152	13	Radiation Therapy	189
10.6.1	The TAP Study	152		<i>F. Schütt, C. Bellmann, A. Bindewald, R. Engenhardt-Cabillic, J. Debus, F.G. Holz</i>	
10.6.2	The VIP Study	152	13.1	Scientific Rationale	190
10.7	Safety Issues	154	13.2	Methods of Radiation	190
10.8	Guidelines for Photodynamic Therapy	154	13.3	Results	191
10.8.1	Angiographic Criteria	154	13.3.1	Non-randomized Clinical Trials	191
10.8.2	Whom Not to Treat	155	13.3.2	Randomized Clinical Trials	193
10.9	Future Indications	155	13.4	Radiation-Associated Side Effects	194
10.10	Perspectives	155	13.4.1	Cataract	194
	References	155	13.4.2	Radiation Retinopathy	194
11	Transpupillary Thermotherapy	159	13.4.3	Radiation Optic Neuropathy	195
	<i>S. Dithmar</i>		13.4.4	Dry Eye Syndrome	195
11.1	Development and Basic Information on TTT	160		Conclusions	196
11.2	TTT for AMD	161		References	196
11.3	Experiences with TTT in Patients with AMD	161	14	Pharmacological Therapy and Prophylaxis	199
11.4	Risks and Complications	163		<i>D. Miller, M. Stur, F.G. Holz</i>	
11.5	Patient Selection and Practical Aspects	163	14.1	Vitamins and Minerals	200
	Conclusions	166	14.1.1	Age-Related Eye Disease Study	201
	References	166	14.1.2	Lutein and Zeaxanthin	202
12	Surgical Therapy	169	14.2	Antiangiogenic Therapy	203
	<i>C. Toth, G. Thumann, B. Kirchhof</i>		14.2.1	Anti-VEGF Therapies	203
12.1	General Aspects of Subretinal Surgery	170	14.2.2	Pigment Epithelium-Derived Factor	205
12.2	Extraction of Subretinal Neovascular Membranes	171	14.2.3	Matrix Metalloproteinase Inhibitors	205
12.3	Management of Subretinal Hemorrhages	172	14.2.4	Steroids	205
12.4	Pigment Epithelial Cell Transplantation	173	14.2.5	Interferon- α -2A	206
			14.2.6	Thalidomide	207
			14.2.7	Low-Dose Chemotherapy	207
			14.2.8	Is Antiangiogenic Therapy Dependent on the Type of CNV?	207
			14.3	Other Pharmacological Approaches ..	207
			14.3.1	Neuroprotective Factors	207
			14.3.2	Etaretin	207

14.3.3	Gingko biloba Extracts	208	15.7	Electronic Magnifiers for Near Tasks	224
14.3.4	Iodine	208	15.7.1	Closed-circuit Television Systems	224
14.3.5	Perfusion-Enhancing Medications ...	208	15.8	Optoelectronic Systems	226
14.4	Drug Delivery	208	15.9	Electronic Reading Instruments	227
	Conclusions	209	15.10	Additional Aids	228
	References	209	15.10.1	Reading Table	228
15	Magnifying Reading Aids in AMD	213	15.10.2	Illumination	228
	<i>K. Rohrschneider, A. Blankenagel</i>		15.11	Details in Prescription of Magnifiers	228
15.1	Definition of Visual Impairment	214	15.11.1	Reading Technique	228
15.2	Effects of Visual Impairment in AMD	214	15.11.2	Prescription as Early as Possible in AMD	228
15.3	Evaluation of the Magnification Needed	216	15.12	Principles of Prescription	229
15.4	Methods of Magnification	216		Conclusions	229
15.5	Optical Magnifying Visual Aids for Distance Vision	217		References	230
15.5.1	Aids for Watching Television	217		Subject Index	231
15.6	Optical Magnifiers for Short Distances	218			