

674.7  
F90

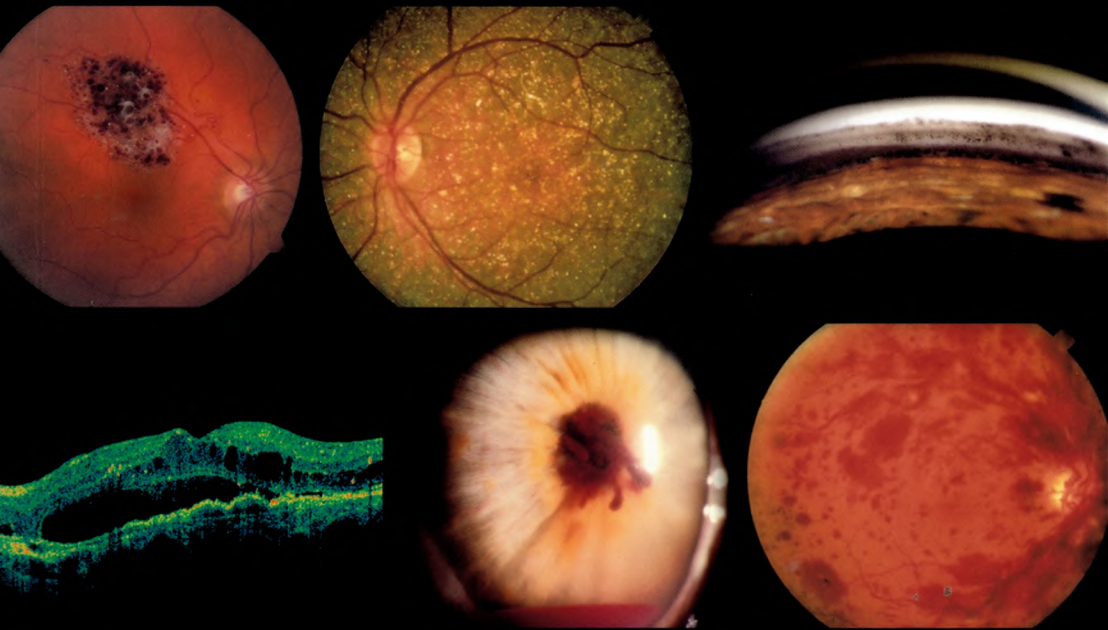


Enhanced  
**DIGITAL  
VERSION**  
Included

**THE MASSACHUSETTS  
EYE AND EAR INFIRMARY**  
ILLUSTRATED MANUAL OF

# OPHTHALMOLOGY

**NEIL J. FRIEDMAN | PETER K. KAISER**  
ROBERTO PINEDA II



**FIFTH EDITION**



ELSEVIER

697.7  
F90

THE MASSACHUSETTS  
EYE AND EAR INFIRMARY  
ILLUSTRATED MANUAL OF

# OPHTHALMOLOGY

FIFTH EDITION

**NEIL J. FRIEDMAN, MD**

Adjunct Clinical Professor  
Department of Ophthalmology  
Stanford University School of Medicine  
Stanford, CA, USA  
Partner  
Mid-Peninsula Ophthalmology Medical  
Group  
Menlo Park, CA, USA

**PETER K. KAISER, MD**

Chaney Family Endowed Chair in  
Ophthalmology Research  
Professor of Ophthalmology  
Cleveland Clinic Lerner College of  
Medicine  
Cole Eye Institute  
Cleveland, OH, USA

*Associate author*

**ROBERTO PINEDA II, MD**

Thomas Y. and Clara W. Butler Chair in Ophthalmology  
Associate Professor of Ophthalmology  
Harvard Medical School  
Cornea and Refractive Surgery Service  
Massachusetts Eye and Ear Infirmary  
Boston, MA, USA

For additional online content visit [ExpertConsult.com](http://ExpertConsult.com)

766351



ELSEVIER

UNIVERSITATEA DE STAT DE MEDICINĂ ȘI FARMACIE  
„NICOLAE TESTEMIȚANU”  
BIBLIOTECA  
ȘTIINȚIFICĂ MEDICALĂ

SL3

Edinburgh London New York Oxford Philadelphia St. Louis Sydney 2021

# Contents

Video Table of Contents ix  
Preface xi  
Contributors xii  
Acknowledgements xiii  
Figure Courtesy Lines xiv  
Introduction xvii

## CHAPTER 1

### Orbit 1

---

Trauma 1  
Globe Subluxation 7  
Carotid–Cavernous and Dural  
Sinus Fistulas 8  
Infections 10  
Inflammation 13  
Congenital Anomalies 17  
Pediatric Orbital Tumors 19  
Adult Orbital Tumors 24  
Acquired Anophthalmia 29  
Atrophia Bulbi and Phthisis  
Bulbi 30

## CHAPTER 2

### Ocular Motility and Cranial Nerves 33

---

Strabismus 33  
Horizontal Strabismus 35  
Vertical Strabismus 40  
Miscellaneous Strabismus 43  
Nystagmus 45  
Third Cranial Nerve Palsy 48  
Fourth Cranial Nerve Palsy 51  
Sixth Cranial Nerve Palsy 54  
Multiple Cranial Nerve Palsies 56  
Chronic Progressive External  
Ophthalmoplegia 59  
Horizontal Motility Disorders 61

Vertical Motility Disorders 63  
Myasthenia Gravis 65

## CHAPTER 3

### Lids, Lashes, and Lacrimal System 69

---

Eyelid Trauma 69  
Eyelid Infections 73  
Eyelid Inflammations 80  
Eyelid Malpositions 86  
Blepharospasm 94  
Bell's Palsy 95  
Floppy Eyelid Syndrome 97  
Trichiasis 98  
Congenital Eyelid Anomalies 99  
Benign Eyelid Tumors 103  
Malignant Eyelid Tumors 110  
Systemic Diseases 116  
Canaliculitis 120  
Nasolacrimal Duct Obstruction 123  
Dacryoadenitis 125  
Lacrimal Gland Tumors 128

## CHAPTER 4

### Conjunctiva and Sclera 131

---

Trauma 131  
Telangiectasia 135  
Microaneurysm 136  
Dry Eye Disease (Dry Eye  
Syndrome, Keratoconjunctivitis  
Sicca) 136  
Inflammation 142  
Conjunctivitis 145  
Degenerations 154  
Ocular Cicatricial Pemphigoid 156  
Stevens–Johnson Syndrome (Erythema  
Multiforme Major) 158



- Graft-versus-Host Disease 160  
 Tumors 161  
 Episcleritis 170  
 Scleritis 171  
 Scleral Discoloration 173

## CHAPTER 5

### Cornea 177

- Trauma 177  
 Limbal Stem Cell Deficiency 182  
 Peripheral Ulcerative Keratitis 184  
 Contact Lens–Related Problems 187  
 Miscellaneous 193  
 Corneal Edema 198  
 Graft Rejection and Failure 199  
 Infectious Keratitis (Corneal Ulcer) 201  
 Interstitial Keratitis 210  
 Pannus 212  
 Degenerations 213  
 Ectasias 217  
 Congenital Anomalies 220  
 Dystrophies 224  
 Metabolic Diseases 233  
 Deposits 235  
 Enlarged Corneal Nerves 240  
 Tumors 240

## CHAPTER 6

### Anterior Chamber 243

- Primary Angle–Closure Glaucoma 243  
 Secondary Angle–Closure Glaucoma 245  
 Hypotony 248  
 Hyphema 250  
 Cells and Flare 251  
 Hypopyon 253  
 Endophthalmitis 254  
 Anterior Uveitis (Iritis, Iridocyclitis) 258  
 Uveitis–Glaucoma–Hyphema  
 Syndrome 265

## CHAPTER 7

### Iris and Pupils 267

- Trauma 267  
 Corectopia 271  
 Seclusio Pupillae 272

- Peripheral Anterior Synechiae 273  
 Rubeosis Iridis 275  
 Neovascular Glaucoma 276  
 Pigment Dispersion Syndrome 277  
 Pigmentary Glaucoma 278  
 Iris Heterochromia 279  
 Anisocoria 281  
 Adie's Tonic Pupil 283  
 Argyll Robertson Pupil 284  
 Horner's Syndrome 285  
 Relative Afferent Pupillary Defect  
 (Marcus Gunn Pupil) 287  
 Leukocoria 289  
 Congenital Anomalies 290  
 Mesodermal Dysgenesis Syndromes 292  
 Iridocorneal Endothelial Syndromes 295  
 Tumors 297

## CHAPTER 8

### Lens 303

- Congenital Anomalies 303  
 Congenital Cataract 306  
 Acquired Cataract 310  
 Posterior Capsular Opacification 316  
 Aphakia 318  
 Pseudophakia 319  
 Exfoliation 320  
 Pseudoexfoliation Syndrome 321  
 Pseudoexfoliation Glaucoma 322  
 Lens-Induced Glaucoma 324  
 Dislocated Lens (Ectopia Lentis) 325

## CHAPTER 9

### Vitreous 329

- Amyloidosis 329  
 Asteroid Hyalosis 330  
 Persistent Hyperplastic Primary Vitreous  
 (Persistent Fetal Vasculature  
 Syndrome) 331  
 Posterior Vitreous Detachment 332  
 Synchysis Scintillans 334  
 Vitreous Hemorrhage 334  
 Vitritis 335

**CHAPTER 10****Retina and Choroid 337**

- Trauma 338  
 Hemorrhages 342  
 Cotton-Wool Spot 344  
 Terson Syndrome 345  
 Branch Retinal Artery Occlusion 345  
 Central Retinal Artery Occlusion 347  
 Ophthalmic Artery Occlusion 350  
 Branch Retinal Vein Occlusion 351  
 Central or Hemiretinal Vein Occlusion 354  
 Venous Stasis Retinopathy 358  
 Ocular Ischemic Syndrome 358  
 Retinopathy of Prematurity 360  
 Coats Disease and Leber's Miliary Aneurysms 362  
 Familial Exudative Vitreoretinopathy and Norrie Disease 364  
 Incontinentia Pigmenti 364  
 Eales Disease 364  
 Macular Telangiectasia (MacTel, Idiopathic Juxtafoveal, and Perifoveal Telangiectasia) 365  
 Retinopathies Associated with Blood Abnormalities 367  
 Diabetic Retinopathy 370  
 Hypertensive Retinopathy 377  
 Toxemia of Pregnancy 378  
 Acquired Retinal Arterial Macroaneurysm 379  
 Radiation Retinopathy 380  
 Age-Related Macular Degeneration 381  
 Retinal Angiomatous Proliferation 388  
 Polypoidal Choroidal Vasculopathy 390  
 Age-Related Choroidal Atrophy 392  
 Myopic Degeneration and Pathologic Myopia 393  
 Angioid Streaks 395  
 Central Serous Chorioretinopathy 396  
 Cystoid Macular Edema 399  
 Macular Hole 401  
 Vitreomacular Adhesion and Traction 404  
 Epiretinal Membrane and Macular Pucker 404  
 Myelinated Nerve Fibers 407  
 Solar and Photic Retinopathy 407  
 Toxic (Drug) Maculopathies 408  
 Lipid Storage Diseases 417  
 Peripheral Retinal Degenerations 418  
 Retinoschisis 420  
 Retinal Detachment 423  
 Choroidal Detachment 427  
 Chorioretinal Folds 428  
 Chorioretinal Coloboma 429  
 Proliferative Vitreoretinopathy 430  
 Intermediate Uveitis and Pars Planitis 430  
 Neuroretinitis (Leber's Idiopathic Stellate Neuroretinitis) 432  
 Posterior Uveitis: Infections 433  
 Posterior Uveitis: White Dot Syndromes 447  
 Posterior Uveitis: Other Inflammatory Disorders 455  
 Posterior Uveitis: Evaluation and Management 464  
 Hereditary Chorioretinal Dystrophies 466  
 Hereditary Macular Dystrophies 476  
 Hereditary Vitreoretinal Degenerations 484  
 Leber Congenital Amaurosis 490  
 Retinitis Pigmentosa 493  
 Albinism 501  
 Phakomatoses 503  
 Tumors 509  
 Paraneoplastic Syndromes 523

**CHAPTER 11****Optic Nerve and Glaucoma 525**

- Papilledema 525  
 Idiopathic Intracranial Hypertension and Pseudotumor Cerebri 527  
 Optic Neuritis 529  
 Anterior Ischemic Optic Neuropathy 530  
 Traumatic Optic Neuropathy 533  
 Other Optic Neuropathies 535  
 Congenital Anomalies 539  
 Tumors 544  
 Chiasmal Syndromes 548  
 Congenital Glaucoma 551  
 Primary Open-Angle Glaucoma 552

Secondary Open-Angle Glaucoma	561
Normal (Low)-Tension Glaucoma	564

## CHAPTER 12

### Visual Acuity, Refractive Procedures, and Sudden Vision Loss 567

Refractive Error	567
Refractive Surgery Complications	570
Refractive Surgery Complications: Evaluation and Management	579
Vertebrobasilar Insufficiency (Vertebrobasilar Atherothrombotic Disease)	581
Migraine	582
Convergence Insufficiency	586
Accommodative Excess (Accommodative Spasm)	586
Functional Visual Loss	586
Transient Visual Loss (Amaurosis Fugax)	587
Amblyopia	588
Cortical Blindness (Cortical Visual Impairment)	590
Visual Pathway Lesions	591

## APPENDIX 595

Ophthalmic History and Examination	595
American Academy of Ophthalmology Suggested Routine Eye Examination Guidelines	622
Differential Diagnosis of Common Ocular Symptoms	622
Common Ophthalmic Medications	625
Color Codes for Topical Ocular Medication Caps	632
Ocular Toxicology	633
List of Important Ocular Measurements	634
List of Eponyms	635
Common Ophthalmic Abbreviations (How to Read an Ophthalmology Chart)	638
Common Spanish Phrases	640

## Index 645

# Video Contents

- Video 2.1 Torsional nystagmus.
- Video 2.2 Acquired pendular nystagmus.
- Video 2.3 Down-beating nystagmus.
- Video 2.4 Up-beating nystagmus.
- Video 2.5 Fixation instability.
- Video 2.6 Fixation instability, episodic.
- Video 2.7 Ataxia of saccades.
- Video 2.8 Saccadic pursuit.
- Video 2.9 Cranial nerve 3 paresis, left.
- Video 2.10 Cranial nerve 4 paresis, right.
- Video 2.11 Cranial nerve 6 paresis, left.
- Video 2.12 Internuclear ophthalmoparesis, right.
- Video 2.13 Bilateral ophthalmoparesis (one-and-a-half syndrome, left, and vertical gaze paresis in both eyes).
- Video 2.14 Spasm of near reflex.
- Video 2.15 Ocular myasthenia.
- Video 3.1 Blepharospasm.
- Video A.1 Ocular motility testing (cranial nerve 4 paresis, right).

Videos are courtesy of Y. Joyce Liao, MD, PhD, with special thanks to Dr. Thomas Hwang, Angela Oh, and Ali Shariati for their assistance.

Available on [www.expertconsult.com](http://www.expertconsult.com)