



KSU Fellowship Program in Ophthalmology *(A Four Year Joint Residency Training)*

**Department of Ophthalmology
College of Medicine
King Saud University**

Compiled by

Talal Fadel, MD, FRCS
*Assistant Professor, Department of Ophthalmology, King Saud University
Director, Residency Training Program in Ophthalmology, Riyadh Center*

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Postgraduate Center



TABLE OF CONTENTS

	Page
1.0 Foreword to the First Revision	1
2.0 Preface to the First Revision	2
3.0 Acknowledgement of Contributors, Reviewers, & Secretarial assistance	3 - 5
4.0 Specific Aim of the KSU fellowship Program	6
5.0 Admission Regulations.....	6
6.0 Program Structures and Objectives.....	6 - 10
6.1 Final knowledge and skill that should have been gained after four years training	11 - 12
7.0 Approved Minimum Surgical & Laser Requirements	13
8.0 Approved Residency Office Forms	
A. Application Form	14 -15
B. Medical Report	16 -17
C. Resident Subjective Monthly Evaluation	18
D. Evaluation of Resident to Select Teacher of the Year	19
9.0 Continuous Assessment	20
10.0 End of the Year Exam (EOYE).....	20
11.0 Promotion	20
12.0 Vacation, holidays & On call Duty	20
13.0 Final KSU Fellowship Exam	21
14.0 Certification	21
15.0 Obligatory Training Requirements (R1 level).....	22 – 27
16.0 Obligatory Training Requirements (R2 level).....	28 - 37
17.0 Obligatory Training Requirements (R3 level).....	38 - 44
18.0 Obligatory Training Requirements (R4 level).....	45 – 52
19.0 Self Achieved Training	53 - 60
20.0 Books for Further Reading	61
21.0 References for the Booklet	62



1.0 Foreword to the First Revision

The Department of Ophthalmology of College of Medicine, King Saud University, carries out functions that include under graduate teaching, post graduate training, patient care and research activities in the field of Ophthalmology.

In 1984, the Department of Ophthalmology built a solid structured Residency Training Program, joint with King Khaled Eye Specialist Hospital, which was proudly the first fellowship training ever established in the Medical College of King Saud University. Since then, the Post Graduate Training in Ophthalmology was given a priority and support by the successive deans of the Medical College.

The department goals are to achieve the highest standard of post graduate training and to continue to excel in patient services and research. These noble objectives made it necessary for the Department of Ophthalmology to recruit more faculty members that continue to maintain a distinguished level of competence.

Since the commencement of the Residency Program, the outstanding level of training of our graduates is reflected by the Alumni, who have assumed major responsibilities in ophthalmic care throughout the kingdom.

The recent major boost of research activity in King Saud University will encourage our department staff and residents to widen their scope of research activity in order to achieve personal satisfaction and more academic excellence.

Saleh Al Obeidan, MD
Chair , Department of Ophthalmology
College of Medicine
King Saud University

November 2008

2.0 Preface to the First Revision

In October 1984, the Residency Training Program in Ophthalmology was established jointly between King Saud University and King Khaled Eye Specialist Hospital. The philosophy of the program was based on training the Saudi manpower in the profession of Ophthalmology to cover the exceeding demand in the Kingdom of Saudi Arabia in which 95% of Ophthalmologists were non Saudis. At that time, it was estimated that there was only one Ophthalmologist per 56,250 individuals in Saudi Arabia, while the ideal situation is to have one Ophthalmologist per 20,000 population.

By the end of the academic year 2007/2008, the Residency Training Program have already trained successfully more than 200 Ophthalmologists, with a few graduates from Gulf countries, included, to keep the bonds between the Kingdom and its neighbors.

The credit for initiation of the program should be gifted to its founder, namely Professor Khaled Tabbara, the former Chair of the Department of Ophthalmology of King Saud University, who aimed to have our program matching or even exceeds comparable Residency programs.

Finally, the role of both the Department of Ophthalmology of King Saud University and King Khaled Eye Specialist Hospital continue to be the major training sites for the program. In addition, the introduction of the Saudi Commission for Health Specialties, in 1993, as a joint Supervisory Training body beside the King Saud University will add more assets to the refinement of the program.

Talal Fadel, MD, FRCS
Assistant Professor
Department of Ophthalmology
College of Medicine
King Saud University
Director
Joint Residency Training Program
Riyadh Center
November 2008



3.0 Acknowledgement

I am very grateful to my colleagues all over the kingdom and abroad who assisted me in revision or contributed to the scientific material related to the obligatory and self-achieved training requirements from all levels of training which I compiled for this booklet of **KSU Fellowship Program in Ophthalmology** as I did for the **Curriculum Manual** which was approved by the Saudi Commission for Health Specialties in 2007 to be applied for the Residency Programs of Jeddah and Dammam in addition to our joint Residency Program of Riyadh Center.

3.1 Contributors:

Optics & Refraction

Mark Wilkinson, OD. – Associate Professor of Ophthalmology, University of Iowa Hospitals & Clinic, Iowa City, USA

Ocular Pathology

Abdullah Al Yafi, MD. – Chair of Department of Ophthalmology, King Fahad Military Hospital, Jeddah

Ocular Microbiology

Khalid Tabarra, MD, FRCOphth, ABO. – Medical Director, The Eye Center & The Eye Foundation for Research in Ophthalmology, Riyadh, Saudi Arabia
Adjunct Professor of Ophthalmology, The Wilmer Ophthalmological Institute of The John Hopkins University School of Medicine, Baltimore, Maryland, USA

Ocular Anesthesia

Mark Schreiber, FFA. – Consultant I, Chair, Anesthesia Department, King Khaled Eye Specialist Hospital, Riyadh

Waleed Soliman, MD. – Consultant I, Member, Anesthesia Department, King Khaled Eye Specialist Hospital, Riyadh

Ocular Trauma

Sawsan Nowilaty, MD. – Consultant I, Director of Medical Education, & Member, Vitreoretinal Division, King Khaled Eye Specialist Hospital, Riyadh

Ocular Diagnostic Imaging

Claude Jacquemin, MD. – Former Chair, Department of Diagnostic Imaging, King Khaled Eye Specialist Hospital, Riyadh
Senior Radiologist, Belgium

Ocular Genetics

Arif Khan, MD. – Consultant, Member, Pediatric Division, King Khaled Eye Specialist Hospital, Riyadh

Emergency Room Disciplines

Talal Fadel, MD, FRCS, Former Chief of Emergency Room, King Khaled Eye Specialist Hospital, Riyadh, Assistant Professor, Department of Ophthalmology, KSU
Director, Residency Training Program, Riyadh Center



Community Ophthalmology (Prevention of Blindness)

Abdulaziz Al Rajhi., MD, Co-chair, Eastern Mediterranean Region (EMR), International Agency for the Prevention of Blindness (IAPB)
Senior Consultant, Cornea and Refractive Surgery

Ophthalmic Practice and Medical Ethics

David Dueker, MD. – Associate Medical Director, Research & Member, Glaucoma Division, King Khaled Eye Specialist Hospital, Riyadh

3.2 Revision Panel:

Optics & Refraction

Ali Bukhamseen, OD, FAAO, FIACLA – Former Chief, Optometry Division, King Khaled Eye Specialist Hospital, Riyadh

Pathology

Hind Al Kattan, MD. – Consultant I, Chief, Pathology Division, King Khaled Eye Specialist Hospital, Riyadh

Anterior Segment

Adel Al Rushood, MD. - Assistant Professor, King Faisal University, Former Chair, Local Residency Training Committee, Dammar Center

Ali Al Rajhi, MD, FRCS, FRCOphth. – Senior Academic Consultant, Director of Research, Member, Anterior Segment Division, King Khaled Eye Specialist Hospital, Riyadh

Ghada Al Orkubi, MD. – Chair, Local Residency Training Committee, Jeddah Center
Head of Department of Ophthalmology, National Guard Hospital, Jeddah

Hani Al Mezaine, MD. – Assistant Professor, Member of Anterior Segment Division, Department of Ophthalmology, King Saud University, Riyadh

Michael Wagoner, MD – Former Medical Director, King Khaled Eye Specialist Hospital, Riyadh
Adjunct Professor of Ophthalmology, University of Iowa, USA

Samir Al Mansouri, MD. – Assistant Professor, Former Chair, Department of Ophthalmology, King Saud University, Riyadh

Soliman Al Saleh, MD, Consultant Ophthalmologist, Riyadh Kharj Military Hospital, Riyadh

Tariq Al Debasi, MD, Consultant Ophthalmologist, Anterior Segment Division, National Guard Hospital, Riyadh

Vitreoretinal

Abdulrahman Al Ghedian, MD. – Professor of Ophthalmology, Vitreoretinal Division, King Faisal University, Dammam

Emad Abboud, MD. – Senior Academic Consultant, Associate Medical Director, & Chief, Vitreoretinal Division, King Khaled Eye Specialist Hospital, Riyadh

Saleh Al Amro, MD. – Associate Professor, Chief of Vitreoretinal Division, Department of Ophthalmology, King Saud University, Riyadh

Sawsan Nowilaty, MD. – Consultant I, Director of Medical Education, & Member, Vitreoretinal Division, King Khaled Eye Specialist Hospital, Riyadh

Uveitis

Ahmed Abu El Asrar, MD, PhD. – Professor of Ophthalmology, Member of Vitreoretinal Division, Department of Ophthalmology, King Saud University, Riyadh

Hassan Al Dhibi, MD. – Consultant I, Chief, Uveitis Division, & Member, Vitreoretinal Division, King Khaled Eye Specialist Hospital, Riyadh

Glaucoma

Ibrahim Al Jadaan, MD. – Consultant I, & Chief of Glaucoma Division, King Khaled Eye Specialist Hospital, Riyadh

Saleh Al Obeidan, MD. – Assistant Professor, Chair, Department of Ophthalmology, Chief of Glaucoma Division, King Saud University, Riyadh
Chair, Department of Ophthalmology, King Saud University

Osama Badeeb, MD. – Associate Professor, Chief of Glaucoma Division, King Abdulaziz University, Jeddah

Pediatric Ophthalmology

Abdullah Al Otaibi, MD. – Assistant Professor, Chief of Pediatric Ophthalmology Division, King Saud University, Riyadh

Arif Khan, MD, Senior Consultant, Member, Pediatric Ophthalmology Division, King Khaled Eye Specialist Hospital, Riyadh

Saleh Al Mesfer, MD, - Consultant I, Chief, Pediatric Ophthalmology Division, King Khaled Eye Specialist Hospital, Riyadh

Abdulaziz Awad, MD, Senior Academic Consultant, Member, Pediatric Ophthalmology Division, King Khaled Eye Specialist Hospital, Riyadh

Oculoplastic & Orbit

Hailah Al Hussain, MD. – Senior Consultant, Chief of Oculoplastic & Orbit Division, King Khaled Eye Specialist Hospital, Riyadh

Neuro-ophthalmology

Maha Badr, MD. – Consultant I, Chief of Neuro-ophthalmology, Riyadh Military Hospital, Riyadh

3.3 Internet Search & Secretarial assistance

Marwan Abuammoh, MD, Assistant Professor, Department of Ophthalmology, King Saud University, Riyadh for his assistance in internet Search

Michelle Quesada, for typing the draft of revision of the booklet of Fellowship Program in Ophthalmology

4.0 Specific Aim of the KSU Fellowship Program

The proposal submitted herewith for four-year training in ophthalmology, when completed successfully should allow the candidate to sit for a final written and an oral examination following which he/she will be awarded a certificate of specialization which is equivalent to that of the American Board of Ophthalmology or the FRCS. The Department of Ophthalmology at the King Saud University Medical College and the King Khaled Eye Specialist Hospital have initiated a joint collaboration in providing postgraduate training in ophthalmology. Both institutions have agreed on broad spectrum collaboration of academic commitments and to provide each other with specific supportive services in order to improve the delivery of health care to the patients at either institution, as well as to provide better education for residents.

5.0 Admission Regulations

1. Applicants, currently, should only be Saudi citizens, however only one seat is given for GCC citizens, provided that the candidate obtains a competitive grade within the accepted total number.
2. Applicants must have MBBS from a recognized university
3. Applicants must have completed one year internship before commencing training in the program
4. Applicants must have Documents of success in the Saudi Licensing Exam (SLE)
5. Applicants should not be currently enrolled in another Residency Training Program in Ophthalmology.
6. Applicants must have updated Recommendation letters from at least (3) Consultants. (Preferably Ophthalmologists) worked under their supervision for not less than 3 months, stamped by the Hospital
7. Applicants should be free of hand disability and other disabilities and should have normal current and past medical and ocular history, and should be free of active and chronic medical diseases such as hepatitis B and C, & AIDS, (Medical and ophthalmic status will be checked by Residency Training Committee after completion of the interview. Positive results of the ocular, lab and medical check are major reasons not to accept the candidates for the program, no matter the result of the Selection Exam.)
8. Applicants will be tested for their ophthalmic knowledge, English command, personality and decency, interest in ophthalmology, ability of thinking, level of judgment, General knowledge and research activity
9. All applicants will be admitted to MCQ Exam
10. Only 27 candidates who attain the highest marks from their MBBS, SLE, & MCQ exams will be eligible to sit for the interview session.
11. The number of accepted candidates each year will be decided by the RTC based on the need of the program and the facility available.

6.0 Program Structures and Objectives

Training Requirements;

1. Training is a full time commitment. Residents shall be enrolled in a continuous full time training the whole period of the program.
2. Training is to be conducted in an institution accredited for training by the Residency Training Program of Riyadh Center
3. Training shall be comprehensive including inpatient, ambulatory and emergency room care.
4. Trainee shall be involved in direct patient care with gradual progression of responsibility.
5. Trainee shall abide by the training regulations and obligations set by the Residency Training Program of Riyadh Center

This four years structured training program in Ophthalmology is divided into 4 levels

FIRST YEAR LEVEL

The first eight week of the program are spent in an intensive basic science course and general introduction to ophthalmology. During the Basic Science Course, first year resident is given 5 – 6 sessions in microsurgery, best given on Thursdays, between 8:45 – 13:00 hours. The rest of the year is spent with emphasis on emergency management in ophthalmology and anterior segment skills and plastic surgery, with emphasis on

lid correction of common lid problems, i.e.. trichiasis, entropion and ectropion.

(continue ... First year level)

Annual Rotation

4 months, General Ophthalmology, Anterior Segment & Cornea / External Eye Disease & Systemic Disease
2 months, Basic Science Course (including Optics & Refraction & Ocular Pathology)
2 month, ER
1month, Retina
1 month Anterior Segment
1 month Anesthesia/ Pathology
1 month vacation

Educational Activities

1. BSC = 190 hours /yr
2. Subspecialty didactic lectures = 40 hours /yr
3. Grand rounds lectures= 40 hours /yr
4. Obligatory case presentations = once /yr
5. Attendance of case presentation = 15 hours /yr
6. Fluorescein conference = 8 hour /yr
7. Conferences and Seminars = 80 hours /yr
8. Quiz = 30 hours per year
9. Clinical responsibilities = minimum 1740 hours /yr (35 weeks /yr)
10. On Call = 1580 hours /yr

The objectives to be achieved in the first year level are as follows:

A. Emergency Room Skills

1. Work –up of “red eye” patient, differential diagnosis, management
2. Work –up of blunt trauma patient, differential diagnosis, management
3. evaluate and repair lid lacerations
4. Pre-operative work –up and management of patient with ruptured globe
5. Obtain cultures and initiate therapy of conjunctivitis and keratitis
6. Common Emergency Room fundus pathology
7. Examination of infants and children

B. Basic Clinic Skills

1. Refractions and prescribing spectacles including reading and calculation
2. Retinoscopy
3. Pupil Exam and interpretation (including pharmacologic studies)
4. Motility exam and interpretation
5. Visual field selection, performance, and interpretation
6. external and slit lamp exam techniques and interpretation
7. tonometry methods, selection and interpretation
8. ophthalmoscopy
9. gonioscopy
10. hruby lens exam
11. ophthalmodynamometry and interpretation
12. tear secretion test and interpretation
13. lacrimal system dye test and interpretation

C. Basic Science and Anatomy (Fund of Knowledge)

1. Basic embryology
2. Basic retinal biochemistry and physiology
3. Basic aqueous dynamics and pharmacology of glaucoma meds
4. Basic corneal ultrastructure and physiology
5. Basic lens structure and physiology
6. Anatomy of cranial nerves and visual pathways
7. Basic ocular immunology
8. Basic orbital anatomy



- D. Surgical skills (including post operative management)
 - 1. lid laceration repairs
 - 2. chalazia excision
 - 3. enucleations
 - 4. pterygium excision
 - 5. conjunctival biopsy
 - 6. lateral canthotomy
 - 7. retrobulbar block
 - 8. forst suture
 - 9. tarsorrhaphy
 - 10. cyclocryotherapy
 - 11. intracapsular cataract extraction

- E. Glaucoma (BSC)
 - 1. Diagnosis and medical management of chronic open-angle glaucoma
 - 2. diagnosis and management of angle- closure glaucoma

- F. Retina
 - 1. Basic interpretation of fluorescein angiograms
 - 2. recognition of variation in normal fundus exam
 - 3. recognition of common fundus lesions

- G. Anterior Segment
 - 1. Diagnosis and management of conjunctivitis
 - 2. Diagnosis and management of microbial keratitis
 - 3. Diagnosis and management of blepharitis
 - 4. diagnosis and management of episcleritis and scleritis
 - 5. diagnosis and management of uveitis
 - 6. basic knowledge of corneal dystrophies
 - 7. specular microscopy of corneal endothelium
 - 8. considerations, indications, and postop management of PKP
 - 9. considerations, indications, and postop management for cataract extraction
 - 10. considerations, indications, and postop management of keratorefractive surgery

- H. Neuro – Ophthalmology (BSC)
 - 1. Visual field interpretation and clinical correlation
 - 2. pupillary exam and interpretation
 - 3. basic radiologic studies, indications and interpretation
 - 4. Basic knowledge of nystagmus

- I. Pediatric Ophthalmology (BSC)
 - 1. Approach to examination of infants
 - 2. diagnosis and management of common pediatric eye problems

- J. Ocular Oncology (BSC)
 - 1. Differential diagnosis and evaluation of leukocoria
 - 2. differential diagnosis and evaluation of pigmented fundus lesions

Evaluation

Each first year resident is evaluated monthly during the year. Upon successful completion of the first year and passing the MCQ End of the Year exam, the candidate is promoted to the second year.

SECOND YEAR LEVEL

Annual Rotation

2 months, Anterior Segment
2 months, Glaucoma
2 months Pediatrics
1 month Retina
1 month Optics & Refraction
1 month Oculoplastic
1 month Neuro – ophthalmology
1 month ER
1 month vacation

Educational Activities

1. Subspecialty didactic lectures = 40 hours /yr
2. Grand rounds lectures= 40 hours /yr
3. obligatory case presentations = once /yr
4. attendance of case presentation = 15 hours /yr
5. Fluorescein conference = 8 hour /yr
6. conferences and seminars = 80 hours /yr
7. quiz = 30 hours /yr
8. clinical responsibilities = minimum 1760 hours /yr (44 weeks /yr, 40 hours/week)
9. On Call = 1580 hours /yr

By the end of the second year, the resident is able to perform extraocular and intraocular surgery under close supervision by the senior staff. The second year resident is on first call for the service that he/she is rotating in at that time.

Evaluation

The performance of the second year resident is evaluated monthly during the academic year and he/she sits for Oral End of the Year exam. Upon successful completion of the End of the Year exam he/she is promoted to the third year of the residency program provided that he/she passed the first board exam of the Saudi Commission for Health Specialties. If the resident fails any one of these two exams, he / she will repeat training in the second year level.

THIRD YEAR LEVEL

A third year resident is given extensive clinical responsibilities, runs one of the clinical services , and is on second call for ocular emergencies. He assists in teaching of first year residents in the management of ocular disorders and minor ocular injuries in the Emergency Room. He/she assists in developing skills in performing minor and major surgical procedures and is able to achieve the objectives of the program defined in the curriculum.

The third year residents acquire proficiency in various diagnostic procedures including fluorescein angiography, ultrasonography, ERG, EOG and visual fields. The resident will have to attend and give seminars in eye pathology, fluorescein angiography, orbital disorders, ultrasonography , neuro – ophthalmology and cornea.

Annual Rotation

3 months, Anterior Segment
2 months, Retina
2 months, Oculoplastic
2 months, ER
1 month, Neuro-ophthalmology



1 month, Systemic Diseases in general hospital
1 month vacation

(continue ... third year level)

Educational Activities

1. Subspecialty didactic lectures = 40 hours /yr
2. Grand rounds lectures= 40 hours /yr
3. Obligatory case presentations = once /yr
4. attendance of case presentation = 15 hours/yr
5. Fluorescein Conference = 8 hour /yr
6. Conferences and Seminars = 80 hours /yr
7. Quiz = 30 hours /yr
8. Clinical responsibilities = minimum 1760 hours /yr (44 weeks per year, 40 hours per week)
9. On Call = 1580 hours/yr

Evaluation

Residents will be evaluated throughout the academic year on a monthly basis. Upon successful completion of the third year residency and passing the MCQ End of the year exam, the resident is promoted to the fourth year level.

FOURTH YEAR LEVEL

Annual Rotation

During this year, the resident will acquire proficiency in rotating in the following services

- 3 months, Pediatric
- 2 months, Anterior Segment
- 2 months, Retina
- 2 months, Glaucoma
- 2 months, ER
- 1 month, vacation

By the end of this year, the resident shall have the following capabilities and skills:

Can diagnose and manage common ocular disorders, can diagnose and manage all ocular emergencies, be able to do most of the common surgical ophthalmic procedures.

Residents should participate in the preparation and presentation of cases in conferences.

In order to complete four years of training, he she should pass R4 oral end of the year exam.

Educational Activities

1. Subspecialty didactic lectures = 40 hours /yr
2. Grand rounds lectures= 40 hours /yr
3. Obligatory case presentations = once /yr
4. attendance of case presentation = 15 hours /yr
5. Fluorescein Conference = 8 hour /yr
6. Conferences and Seminars = 80 hours/yr
7. Quiz = 30 hours /yr
8. Clinical responsibilities = minimum 1760 hours /yr (44 weeks/yr, 40 hours per week)
9. On Call = 1580 hours /yr



6.1 Final knowledge and skill that should have been gained after four years training should include the following:

A. Anterior Segment/Cornea and External diseases

1. Diagnosis and management of conjunctivitis.
2. Diagnosis and management of microbial keratitis.
3. Diagnosis and management of blepharitis.
4. Diagnosis and management of episcleritis and scleritis.
5. Diagnosis and management of uveitis entities.
6. Basic knowledge of corneal dystrophies.
7. Specular microscopy of corneal endothelium
8. Considerations, indications and post operative management of PKP.
9. Considerations, indications and postoperative management for cataract extraction.
10. Considerations, indications and postoperative management of keratorefractive surgery.
11. Know types and indications of ophthalmic medications and their side effects.
12. Surgical skills – able to do ECCE + IOL implantation with or without anterior vitrectomy and phaco emulsification.
13. Trabeculectomy with or without cataract extraction.
14. To know indications of PKP and asses in PKP/LKP and does part of it and able to recognize and manage common complications.
15. To be able to do ICCE and know its indications.
16. To perform Keratectomy, corneal/scleral laceration repair, and corneal biopsy.
17. Remove superficial conjunctival tumors.
18. Remove pterygium with or without conjunctival or amniotic membrane grafting.
19. Be able to manage all complications of above surgical procedures.
20. Manage all ocular emergencies medically and surgically.

B. Glaucoma

1. Be able to diagnose all types of glaucoma; developmental, open-angle, narrow-angle, secondary glaucomas, etc.
2. Be able to manage acute and chronic types of glaucoma medically and surgically (e.g. trabeculectomy, combined procedures, cyclocryotherapy).
3. Be able to interpret gonioscopy, optic nerve head examination and different visual field changes.
4. Be familiar with possible medical and surgical complication of glaucoma and the sequelae of surgery.
5. Be able to do laser PI, trabeculoplasty and iridoplasty and cyclophotocoagulation.

C. Retina

1. Able to do a complete fundus examination and to recognize normal variation.
2. Identify and detect common posterior segment pathology.
3. Able to diagnose, manage and know indications of surgical intervention in diabetic retinopathy.
4. Interpret fundus fluorescein angiography, OCT & electrophysiology testing.
5. Do cryopexy, panretinal photocoagulation, focal macular laser therapy, laser treatment for holes, vascular retinopathies or other indications.
6. Recognize retinal degeneration and dystrophies and know the necessary investigations and their indications and interpretation.
7. Evaluation and differential diagnosis of pigmented fundus lesion.

D. Pediatric Ophthalmology

1. Be able to do full ophthalmologic examination including refraction and orthoptic work-up and recognize variation in normal examination.
2. Approach to examination of infant.
3. Diagnosis and management of common pediatric ophthalmology problems.
4. Diagnose the cause of leukocoria.



5. Recognize common pediatric tumors.
6. Diagnose strabismus and be able to do simple strabismus surgery.

E. Oculoplastic

1. Know the indications and complications of entropion/ectropion repair, tarsorrhaphy, evisceration, enucleation, lid laceration repair, lacrimal probing.
2. Be able to do tarsorrhaphy, lid laceration and lacrimal probing.

F. Neuro-ophthalmology

1. Visual field interpretation and clinical correlation
2. Pupillary exam and interpretation
3. Optic nerve head (disc), normal variation and the differential diagnosis of disc pathology.
4. Basic radiologic studies, indications and interpretation
5. Basic knowledge of nystagmus

G. Ocular Pathology

1. Be able to do and interpret Gram, Giemsa, GMS staining for ocular specimens.
2. To recognize the histopathological appearance of common ocular disease especially ocular dystrophies and ocular neoplasms.

H. Anesthesia

1. Be able to perform local anesthesia for ophthalmic procedures, in particular, retrobulbar and peribulbar methods.
2. To be certified with the Basic Cardiopulmonary Resuscitation (CPR) during this rotation.
3. To be able to know the indications, contraindications and complications of general anesthesia.



7.0 Approved Minimum Surgical & Laser Requirements

This is approved by the Residency Training Committee of Riyadh Center after recommendation and approval of the Scientific Board of Ophthalmology of the Saudi Commission for Health Specialties

1. Trainee should complete successfully 4 years of training at a capacity of a resident.
2. Trainee should perform clinical refraction and write down prescriptions, for a minimum of 100 patients under direct supervision.
3. Trainee should accomplish within the 4 years of training, the performance of the operative and laser requirement as specified below:

Procedure	Code	Requirement
A. Major Surgery		Main Surgeon/ Assistant
<i>I. Anterior Segment:</i>		
ECCE + IOL	A01	100 cases with minimum 45 cases as main Surgeon
Phaco + IOL	A02	20 cases with minimum 10 cases as main Surgeon
PKP/ Lamellar Keratoplasty	A03	Minimum 3 cases as assistant surgeon
Ocular Trauma/ Rupture Globe	A04	8 cases with minimum 4 cases as main Surgeon
Vitreous Tap	A05	Minimum 2 cases as main Surgeon
<i>II. Glaucoma:</i>		
Trabeculectomy	A06	15 cases with minimum 5 cases as main Surgeon
Filtering +ECCE+IOL	A07	8 cases with minimum 2 cases as main Surgeon
<i>III. Oculoplastic/ Orbit:</i>		
DCR	A08	10 cases with minimum 3 cases as main Surgeon
Enucleation/ Evisceration	A09	8 cases with minimum 2 cases as main Surgeon
Ptosis	A10	10 cases as Assistant Surgeon
IV. Strabismus:	A11	40 cases with minimum 15 cases as main Surgeon
V. Vitreoretinal:	A12	30 cases as Assistant Surgeon
B. Minor Surgery		Main Surgeon/ Assistant
Chalazia, Tarsotomy, Tarsorrhaphy, Conjunctival flap, Hyfrication, Removal of superficial corneal FB ...etc.	B01	Minimum 50 cases as main Surgeon
C. Laser Procedure		Main Surgeon/ Assistant
Anterior Segment/ Glaucoma:		
Yag Laser PI	C01	Minimum 20 cases as main Surgeon
Yag Laser Capsulotomy	C02	Minimum 15 cases as main Surgeon
Cyclophotocoagulation	C03	10 cases with minimum 5 cases as main Surgeon
Posterior Segment:		
Retinal Laser	C04	60 cases with minimum 30 cases as main Surgeon

Continue Application form

Continue application form

C. Health and Ocular Status

A. Current & past systemic diseases or trauma: YES NO

If Yes, Give Details: _____

B. Current & past ocular diseases, surgery or trauma: YES NO

If Yes, Give Details: _____

OE Best corrected visual acuity: OD 20 OS 20

C. Color Vision on Ishihara's: OD 15 OS 15

Stereopsis titmus fly: Present Absent

Name of Ophthalmologist: _____ Signature: _____

Hospital Stamp

D. Applicant Testimony

I hereby acknowledge that the above information is correct.

Applicant's name: _____

Signature: _____

Date: _____



B. Medical Report

**Saudi Council For
Health Specialties**
Saudi Board of Ophthalmology



**King Saud University
College of Medicine**
Department of Ophthalmology

*Residency Training Program in Ophthalmology
Riyadh Center*

Date:
Ref.:

MEDICAL REPORT

(Pre-requisite for admission to Residency
Training Program on Ophthalmology)

Applicant's Name:
Sex:
Age:
Date:

A: GENERAL MEDICAL FITNESS

(Done in KAUH or other Hospitals Approved for Training by SBO)

a) Current major systemic illnesses

.....•.....

b) Past Medical & Surgical History

.....•.....

c) Systemic Check up

I. R/O active & Chronic-systemic illness

II. R/O Hand and Finger disability

III. Hematological, Serological Investigations:

CBC, VDRL/TPHA, HIV, Hbs Ag HCV, Hepatitis B & C

IV. PPD & Chest X Ray

Impression: Cleared not Cleared

If not cleared, mention the medical problem and suggestions:

Name & Level of the examiner: _____ Signature: _____ Date: _____

Hospital Approval/ Level: _____ Signature & Stamp: _____



C. Monthly Evaluation

Saudi Commission For Health Specialties
Saudi Board of Ophthalmology



King Saud University
College of Medicine
Department of Ophthalmology

Residency Training Program in Ophthalmology
Riyadh Center

REVISED
14 June 2008

Resident's Subjective Monthly Evaluation

Resident's Name: _____ Hospital: _____
Resident's Level: _____ Rotation: _____
Date: _____

NB: At the end of the Academic Year, failure of the Resident to attain 50% of the average of the Evaluation per year is a failure of the Promotion Exam & the Resident will repeat the level of training in the next academic year.

(Please Enter Your Score)

CRITERIA	SUBSTANDARD Zero - 59	PASS SCORE 60	ABOVE STANDARD 61 - 100	NOT APPLICABLE
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A. PATIENTS MEDICAL RECORDS

1	Legibility of name, signature & dictation number in patient's records				
2	Professional, free flow dictation				
3	Prompt response to Medical Record requirements				

B. PERFORMANCE & ETHICS

4	Ophthalmic Knowledge				
5	Proficiency in History & Physical Examination				
6	Clinical Judgment & Decision Making				
7	Appropriate use of investigation				
8	Surgical Skills				
9	Punctuality				
10	Discipline & Reliability				
11	Attitude to Staff & Colleagues				
12	Attitude to patient				
13	Academic Activities				
14	Ability to Supervise & Teach				

Office Use	Individual Scores [A+B]			
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Evaluator's Use
Evaluator's Comments:
(Defend Low & High Scores)
Name of Evaluator: **«Evaluator»** Signature: _____

Office Use
Total Score: _____ Approved By: _____
No. of Evaluated Criteria = _____ = _____ %
Director of Residency Training Program, Riyadh Center
Talal S. Fadel, MD, FRCS

Issued: 30 November 2007

NB: To all Attending: The Evaluation is confidential & guaranteed by the RTC



D. Evaluation of Resident to select Teacher of the Year

**Evaluation by Residents
to Select Teacher of the Year**

Instruction

* Give a mark out of 10 for each of the 10 criteria.
* Evaluate Attendings you rotate with for more than 2 weeks from March last year to February current year.

Confidentiality

* This is guaranteed by the Residency Office.
* No liability for the opinion given by the Resident.

Hospital

Academic Year

No.	Name of Attendings	Criteria										Office use
		Punctuality		Teaching Ability		Attitude		Resident involvement		Patient care		Total %
		Patient Services	Academic commitment	Knowledge	Discussion	to Patient	to Resident	in case Presentation	in Research	Clinical	Surgical	
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
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22												
23												
24												
25												
26												

Resident's Name & Signature

Director of Residency Training
Program in Ophthalmology



9.0 Continuous Assessment

1. This is divided into 2 parameters:
 - a. Monthly Evaluation = 20%
 - b. OSPE = 30%
2. Monthly Evaluations are collected between **March** of last academic year to **February** of the current academic year & the average is taken for each.
3. OSPE (Objective Structured Practical Evaluation) is to evaluate the knowledge gained by the Resident from the weekly educational activities. This is done during the month of **May**, with one session designated for Junior level (R1 & R2) & another one for Senior level (R3 & R4).
4. Failure of the Resident to obtain 50% out of the combined components of the Continuous Assessment is a failure of the Final Promotion Score, regardless of the result of the EOYE.

10.0 End of the Year Exam (EOYE)

- A. MCQ form for R1 and R3 levels
- B. Oral form for R2 and R4 levels

This is a committee based and not average based exam, i.e. the result to pass or fail the EOYE is decided by all members of the examination committees.

11.0 Promotion

This is controlled by the Residency Training Committee regulation named (*Final Promotion Score Regulation*) revised on 23 June 2008, which is summarized as follows:

1. Residents of all levels has to pass both continuous assessment and End of the Year Exam in order to be promoted to the next level.
2. Resident of R2 level should pass both End of the Year exam of R2 level and the First Board Exam of the Saudi Commission for Health Specialties in order to be promoted to R3 level.
(Failure of any of these 2 exams is failure of the promotion and the resident will be requested to repeat training in R2 level)

12.0 Vacations, holidays and On-call Duty

1. Residents are entitled for four weeks vacation annually and a maximum of 10 days for one of the Eid holidays.
2. Emergency leave: Death or incapacitating illness in a close member of the family entitles the Resident for 2 to 5 working days of uncompensated leave per year of training, based on the judgment of the Director of the Residency Training Program.
3. Sick and maternity leave shall be compensated for during or at the end of training.
4. On call duty shall be an average of one every three to four nights (minimum of 7 calls per month, 24 hours per call). Residents are expected to perform regular duty the day after call and ensure continuity of care for their patients. In case of a heavy on call duty in the night before, the resident should contact his/her attending in the next day to take permission for a half day off.



13.0 Final KSU Fellowship Exam

1. This examination is given to candidates after successful completion of training, as evidenced by a **NOTICE** approved by the Director of the Residency Training Program.
2. It is held once a year in King Saud University.
3. The final examination consists of two parts;
 - a.) **Written part;** designated to evaluate knowledge and clinical judgment. The pass mark is 70%. Only successful candidates in this part are allowed to sit the clinical/oral part.
 - b.) **Clinical/oral part;** This is a committee based exam, designated to test clinical skills/abilities judgment in the field of ophthalmology. Candidates are tested by 8 committees (Anterior Segment, Retina/ Uveitis, Glaucoma, Pediatric Ophthalmology, Oculoplastic, Neuro-Ophthalmology/ Systemic Diseases, Ocular Pathology, and Optics & Refraction). Candidates should pass the minimum of 6 out of 8 committees and allowed a maximum of five attempts to pass the examination within a period of five years after completion of the Residency training.

14.0 Certification:

Candidate passing the Final KSU Fellowship exam is awarded the KSU certificate for Specialty of Ophthalmology, which is accepted by the Ministry of Civil Services as PhD in the Specialty of Ophthalmology.



15.0 Obligatory Training Requirements (R1 level)

R1 Level

BASIC SCIENCES & GENERAL OPHTHALMOLOGY ROTATION:

OPTICS & REFRACTION

A. *Cognitive Skills*

1. Physical and Geometrical Optics

- a. Light
- b. Vergence
- c. Diopters
- d. Lens Systems
- e. Simple Lens Formula
- f. Multiple Lens Systems
- g. Lens Effectivity
- h. Focal Points
- i. Ray Tracings – Lenses
- j. Physical Optics
- k. Snell's Law of Refraction
- l. Apparent Thickness Formula
- m. Law of Reflection and Critical Angle
- n. Mirrors
- o. Ray Tracing – Mirrors
- p. Prisms
- q. Prentice's Rule
- r. Magnification
- s. Telescopes
- t. Aniseikonia
- u. Knapp's Rule

2. Assessing Refractive Error

- a. Basic ophthalmic optics
- b. Schematic eye
- c. Refractive/Axial myopia and hyperopia
- d. Retinoscope
- e. Phoropter



3. **Visual Acuity Testing**
& Contrast Sensitivity Testing
4. **Instruments**
 - a. Lens clock
 - b. Lensometer
 - c. Indirect Ophthalmoscope
 - d. Direct Ophthalmoscope
5. **Subjective Refraction Techniques**
 - a. Keratometry
 - b. Phoropter
 - c. Trial lens set and trial frame
 - d. Objective and subjective refraction techniques
 - e. Cross cylinder technique
 - f. Refining sphere and cylinder
 - g. Douchrome technique
 - h. Comfort and clarity
 - i. Binocular balancing
 - j. Presbyopia, measuring of near adds
 - k. Pinhole technique
 - l. Amplitude of accommodation
 - m. Tests of accommodation
 - n. Far point
 - o. Near point
6. **Prescribing Glasses**
 - a. Lens Aberrations
 - b. Lens materials
 - c. Multifocal design
 - d. Image jump
 - e. Image displacement
7. **Contact lenses**
 - a. Lens types
 - b. Basic parameters
 - c. Field of vision
 - d. Image size
 - e. Accommodation demands
 - f. Convergence demands
 - g. Tear lens
 - h. Correcting astigmatism
 - i. Correcting Presbyopia
 - j. Correcting Keratoconus
 - k. Correcting Aphakia

8. **Low Vision rehabilitation**
 - a. Types of visual impairment
 - b. Pathology effect on visual function
 - c. Low vision devices
 - d. Function tests
 - e. Refracting individuals with visual impairments

B. Technical Skills (Practical)

1. Hands on retinoscopy and subjective refraction
2. Contact Lenses
3. Low vision aids

BASIC SCIENCES & GENERAL OPHTHALMOLOGY ROTATION:	GLAUCOMA
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A. Cognitive skills

1. To describe the epidemiology and genetics of primary open angle glaucoma (POAG).
2. To describe the aqueous humor dynamics and the anatomy of the anterior chamber and its angle, and of the ciliary body.
3. To describe basic tonometry.
4. To describe optic nerve and nerve fiber layer anatomy and pathological changes in glaucoma.
5. To describe fundamentals of perimetry, including kinetic and automated static perimetry.
6. To describe principles, indications and basic techniques of gonioscopy, including normal and abnormal findings.

B. Technical skills

1. To perform basic tonometry (e.g. applanation, Pneumotonometry, Schiottz {if applicable}, tonopen, airpuff) and recognize the pitfalls and artifacts of each.
2. To interpret manual (e.g. Goldmann) and automated (e.g. Humphrey, Octopus) visual fields in routine glaucoma.
3. To perform gonioscopy, by Goldmann Goniolens to start with, and to interpret the findings
4. To perform stereo examination of optic nerve head by gonio lens.

BASIC SCIENCES & GENERAL OPHTHALMOLOGY ROTATION:	PEDIATRIC OPHTHALMOLOGY & STRABISMUS
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A. Cognitive skills

1. To describe basic visual development and visual assessment of the pediatric ophthalmology patient (e.g. central, steady, maintained fixation, illiterate E, Allen cards, Landolt C rings).
2. To describe basic anatomy and physiology of strabismus (e.g. innervation of extra ocular muscles, primary actions, comitant and incomitant deviations, overaction and underaction, restrictive and paretic and saccades and pursuit movements).
3. To describe basic sensory adaptations of binocular vision (e.g. normal and anomalous retinal correspondence, suppression, fusion, stereopsis).
4. To describe and recognize pseudostrabismus.

B. Technical skills

1. To apply Hering's and Sherrington's laws.
2. Tests of binocularity and retinal correspondence
3. Anterior and posterior segment examination



A. Cognitive skills

1. To describe basic eyelid, lacrimal, and orbital anatomy and physiology (e.g. eyelid, orbicularis, orbital structures, meibomian glands, lacrimal glands, glands of Zeiss, Whitnall's ligament, Muller's muscle, Lockwood's ligament, canaliculi, puncta, orbital bones, orbital foramina, paranasal sinuses, annulus of Zinn, arterial and venous vascular supply, lymphatics, nerves, extraocular muscles).
2. To recognize and treat localized trichiasis.
3. To describe techniques and complications of minor operating room procedures (e.g. incision and drainage of chalazia, excision of small eyelid lesions).
4. To describe typical features of orbital cellulitis.

B. Technical/surgical skills

1. To perform minor lid and conjunctival procedures (e.g. removal of benign eyelid skin lesions, chalazion curettage or excision).
2. To perform epilation.
3. To perform a lateral tarsorrhaphy.
4. To perform a simple incisional or excisional biopsy of a lid lesion.

BASIC SCIENCES & OCULAR PATHOLOGY ROTATION

1. To interpret and describe the macroscopical appearance of an ocular tissue or a glass slide.
2. To be familiar with different standard stains used in ocular pathology e.g. (H & E, PAS, stains for different corneal dystrophies and deposits).
3. To recognize and describe by light microscopy, the normal histological structure of the globe and adnexa, including the lids and lacrimal system.
4. Recognize and report ocular tissue abnormalities by light microscopy.
5. To be able to describe and diagnose major lid lesions including benign and malignant tumors e.g. (sq. cell carcinoma, basal cell carcinoma, sebaceous gland tumors, dermoid, epidermoid, and inclusion cysts.)
6. To be able to describe and diagnose conjunctival degenerative lesion, cysts in addition to benign and malignant lesions.
7. To be able to describe and diagnose different corneal pathological changes including e.g. (ulcers, wound healing, corneal dystrophies and degenerative changes, epithelial and fibrous down growth and endothelial ingrowth.)
8. Able to recognize angle closure or recession, Iris cyst and neovascularization, lenticular changes or inflammatory processes affecting the lens.
9. Recognize vitreoretinal changes e.g. vitreous hemorrhage, true retinal detachment glaucomatous retinal changes, vascular retinal changes and peripheral retinal degeneration.
10. Optic nerve pathology e.g. (glaucomatous changes, neoropathies and optic nerve tumors).
11. Intraocular tumours e.g. (Retinoblastoma and Melanoma).
12. Intra and peri ocular inflammation and sequelae of surgical and non surgical ocular trauma.
13. Able to recognize some congenital and chronic ocular anomalies e.g. (phacomatosis).

A. Cognitive skills

1. To describe the neuro-anatomy of the visual pathways.
2. To describe the neuro-anatomy of the cranial nerves.
3. To describe the pupillary and accommodative neuro-anatomy.
4. To describe the ocular motility and related neuronal pathways.

ANTERIOR SEGMENT ROTATION

I. CRYSTALLINE LENS & CATARACT*A. Cognitive skills*

1. To identify the most common causes and types of cataract (e.g. anterior polar, cortical nuclear, sclerotic, posterior and subcapsular)
2. To list the basic history of examination steps for pre-operative cataract evaluation.
3. To describe the steps in cataract surgical procedures.

B. Technical/surgical skills

1. To perform basic slit lamp biomicroscopy.
2. To evaluate and classify common types of lens opacities.
3. To assist at cataract surgery and perform patient preparation, sterile draping, and anesthesia.

II - CORNEA & EXTERNAL DISEASE*A. Cognitive skills*

1. To describe the basic anatomy, embryology, physiology, pathology, microbiology, immunology, genetics, epidemiology and pharmacology of the cornea, conjunctiva, sclera, eyelids, lacrimal apparatus, and ocular adnexa.
2. To describe characteristic corneal and conjunctival degeneration (e.g. pterygium, pinguecula, senile plaques of the sclera, keratoconus).
3. To recognize the common corneal inflammation and infection (e.g. herpes simplex, zoster, syphilis, interstitial keratitis).
4. To describe the fundamentals of ocular microbiology and recognize corneal and conjunctival inflammations and infections (e.g. Staphylococcal hypersensitivity, simple microbial keratitis, trachoma, ophthalmia neonatorum, herpes zoster ophthalmicus, herpes simplex keratitis and conjunctivitis).
5. To recognize the basic presentations of ocular allergy (e.g. phlyctenules, seasonal hay fever, vernal conjunctivitis, allergic and atopic conjunctivitis and giant papillary conjunctivitis).
6. To recognize and treat lid margin disease (e.g. Staphylococcal blepharitis, meibomian gland dysfunction).
7. To describe the basic differential diagnosis of acute and chronic conjunctivitis or "red eye" (e.g. scleritis, episcleritis, conjunctivitis, orbital cellulitis, gonococcal and chlamydial conjunctivitis).
8. To recognize corneal lacerations (perforating and non-perforating), pterygia that may require surgery, corneal and conjunctival foreign bodies.
9. To diagnose and treat corneal exposure (e.g. lubrication, temporary tarsorrhaphy).
10. To recognize and describe the treatment for a chemical burn (e.g. types of agents, medical therapy).
11. To describe the etiologies and treatment of superficial punctate keratitis (e.g. dry eye, Thygeson's superficial punctate keratopathy), blepharitis, toxicity, ultraviolet photokeratopathy, contact lens related).

12. To describe the symptoms and signs, testing and evaluation for, and treatment of exposure keratopathy and dry eye, (e.g. Schirmer testing).
13. To recognize the anterior segment manifestations of systemic disease (e.g. Wilson's disease) and pharmacologic side effects (e.g. amiodarone vortex keratopathy).

B. Technical/surgical skills

1. To administer topical anesthesia, as well as special topical stains of the cornea (e.g. fluorescein dye and Rose Bengal).
2. To perform simple tests for dry eye (e.g. Schirmer test).
3. To perform simple corneal sensation testing (e.g. cotton tip swab).
4. To perform techniques of sampling for viral, bacterial, fungal and protozoal ocular infections (e.g. corneal scraping and appropriate culture techniques).
5. To manage corneal epithelial defects (e.g. pressure patching and bandage contact lenses).
6. To perform removal of a conjunctival or corneal foreign body (e.g. rust ring).
7. To perform irrigation of chemical burn to the eye.
8. To perform IOL calculation.
9. To perform Topography & Pachymetry.

VITREORETINA ROTATION

A. Cognitive skills

1. To describe basic principles and retinal anatomy, embryology and physiology (layers of the retina, retinal and RPE physiology, the vascular supply of the eye).
2. To describe and recognize different stages of diabetic retinopathy and retinopathy of prematurity.
3. To describe fundamentals and demonstrate basic understanding of fluorescein angiography as applied to retinal vascular disease (e.g. indications, phases of the angiogram, patterns of hyper and hypofluorescences).
4. To describe etiologies and mechanisms of retinal detachment.
5. To describe basic principles of laser photocoagulation.
6. To recognize the signs and patterns of retinal vascular disease.
7. To describe the types, stages and complications of diabetic retinopathy.
8. To describe fundamentals of OCT.

B. Technical skills

1. To perform direct ophthalmoscopy.
2. To perform indirect ophthalmoscopy.
3. To perform binocular indirect ophthalmoscopy.
4. To perform biomicroscopic examination of the macula.
5. To perform fundus examination with +90, +78 lenses.
6. To start performing PRP.

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16.0 Obligatory Training Requirements (R2 level)

R2 Level

OPTICS & REFRACTION ROTATION

A. Cognitive skill

1. To describe the major types of refractive errors.
2. To describe basic ophthalmic optics and optical principles of refraction and retinoscopy.
3. To describe the indications for and to use trial lenses or a phoropter for simple refractive error.
4. To perform objective and subjective refraction techniques for simple refractive error.
5. To describe fundamentals of ophthalmic optics in contact lens management and list indications in non complex cases.
6. Laws of refraction (Snell's Law)
 - a. Passage of light from one medium to another
 - b. Absolute index of refraction
 - c. Total internal reflection
7. Image jump and displacement
8. Astigmatic lenses
 - a. Cylindrical lenses
 - i.) Sphero-cylinder lenses and surfaces
 - ii.) Cross cylinders, e.g. Jackson cross cylinder
 - b. Maddox rod
 - c. Toric lenses
 - d. Conoid of Sturm
9. Notation of lenses
 - a. Spectacle prescribing
 - b. Simple transposition
 - c. Toric transposition
10. To use astigmatic lenses
 - a. Neutralization
 - b. Focimeter
11. To master notation of lenses
 - a. Correction of aberration relevant to the eye (spherical, astigmatism)
 - b. Duchrome test
 - c. Spherical equivalent
12. to master contact lens practice
 - a. To know all types of contact lens
 - b. To know the importance of K-reading in contact lens practice
 - c. To understand types of refractive errors and how to choose the appropriate contact lens



B. Technical Skill

1. To perform retinoscopy for detecting simple refractive errors.
2. To perform elementary refraction techniques (e.g. for myopia, hyperopia, near-vision add)
3. To describe the basic principles of a keratometer.
4. To master clinical optics
 - a. Optics of the eye
 - b. Visual acuity
 - i.) distance and near acuity measurement
 - c. Contrast sensitivity
 - d. Emmetropia
 - e. Accommodation
 - f. Pinhole
 - g. Ametropia
 - i.) Myopia
 - ii.) Hypermetropia
 - iii.) Astigmatism
 - iv.) Anisometropia
 - v.) Aniseikonia (Knapp's rule)
 - vi.) Aphakia
 - h. Correction of Ametropia
 - i.) Spectacle lenses
 - ii.) Contact lenses
 - iii.) Intraocular lenses
 - i. Problems of spectacles in aphakia
 - j. Effective power of lenses
 - k. Back vertex distance
 - l. Spectacle magnification
 - m. Presbyopia (measuring for near adds)
 - n. Clinical refraction
 - i.) Retinoscopy
 - ii.) Subjective refraction
 - iii.) Measurement of BVD
 - iv.) Muscle balance tests
 - v.) Accommodative power
 - vi.) Measurement of IPD
 - vii.) Decentration of lenses and prismatic effect
 - viii.) Best form lens
 - ix.) Prescribing multifocal lenses
 - x.) Prescribing for children
 - xi.) Cycloplegic refraction
 - o. To perform techniques to verify and inspect contact lenses
 - p. To utilize appropriate teaching skills to instruct patients in the safe insertion, removal and care of contact lenses
 - q. Instruments and tests
 - i. Retinoscope
 - ii. Focimeter
 - iii. Simple magnifying glass (loupe)
 - iv. Lensmeter
 - v. Automated refraction
5. Clinical contact lens practice
 - a. Soft contact lenses
 - b. RGP contact lenses
 - c. Cosmetic contact lenses
 - d. Contact lens verification
 - e. Fitting evaluation
 - f. Over refraction
 - g. Final prescription
 - h. Contact lens trouble shot

OCULAR PATHOLOGY ROTATION

1. To interpret and describe the macroscopical appearance of an ocular tissue or a glass slide.
2. To be familiar with different standard stains used in ocular pathology e.g. (H & E, PAS, stains for different corneal dystrophies and deposits).
3. To recognize and describe by light microscopy, the normal histological structure of the globe and adnexa including the lids and lacrimal system.
4. Recognize and report ocular tissue abnormalities by light microscopy.
5. To be able to describe and diagnose major lid lesions including benign and malignant tumors e.g. (sq. cell carcinoma, basal cell carcinoma, sebaceous gland tumors, dermoid, epidermoid, and inclusion cysts.)
6. To be able to describe and diagnose conjunctival degenerative lesion, cysts in addition to benign and malignant lesions.
7. To be able to describe and diagnose different corneal pathological changes including e.g. (ulcers, wound healing, corneal dystrophies and degenerative changes, epithelial and fibrous down growth and endothelial ingrowth.)
8. Able to recognize angle closure or recession, Iris cyst and neovascularization, lenticular changes or inflammatory processes affecting the lens.
9. Recognize vitreoretinal changes e.g. vitreous hemorrhage, true retinal detachment glaucomatous retinal changes, vascular retinal changes and peripheral retinal degeneration.
10. Optic nerve pathology e.g. (glaucomatous changes, neuropathies and optic nerve tumors).
11. Intraocular tumours e.g. (Retinoblastoma and Melanoma).
12. Intra and peri ocular inflammation and sequelae of surgical and non surgical ocular trauma.
13. Able to recognize some congenital and chronic ocular anomalies e.g. (phacomatosis).

ANTERIOR SEGMENT ROTATION:

CATARACT

A. Cognitive Skills

1. To confirm the basic knowledge obtained in R1 level regarding causes & types of cataract, preoperative cataract evaluation, steps of cataract surgical procedures & techniques to obtain best corrected vision.
2. To describe the major etiologies of dislocated or subluxated lens (e.g. trauma, Marfan's syndrome, homocystinuria, Weill-Marchesani syndrome, syphilis).
3. To be familiar with the techniques of extracapsular cataract extraction and phacoemulsification, & acquaint self with the technique of ICCE in awkward situation..
4. To describe the following:
 - i.) Basic ophthalmic optics as related to cataracts
 - ii.) Types of refractive error in cataract
 - iii.) Retinoscopy techniques for cataract patients
 - iv.) Types of IOLs; IOL power calculation



B .Technical/surgical skills

1. To perform subjective refraction techniques and retinoscopy in patients with cataracts.
2. To perform direct and indirect ophthalmoscopy pre and post-cataract surgery.
3. To perform local injections of corticosteroids, antibiotics, and anesthetics.
4. To implement the basic preparatory procedure for cataract surgery (e.g. obtaining informed consent, identification of instruments, sterile technique, gloving and gowning, prep and drape, other pre-operative preparation).
5. To use the operating microscope for basic cataract surgery
6. To assist at cataract surgery, including ECCE & Phacoemulsification, and perform patient preparation, sterile draping, and anesthesia.
7. To perform the following steps of cataract surgery under direct supervision, including any or all of the following:
 - a. Wound construction
 - b. Anterior capsulotomy/capsulorrhexis
 - c. Instillation and removal of viscoelastics
 - d. Extracapsular
 - e. Irrigation and aspiration
 - f. Cortical clean-up
 - g. IOL implantation (e.g. anterior and posterior)

ANTERIOR SEGMENT ROTATION:	CORNEA & EXTERNAL DISEASE
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A. Cognitive skills

1. To confirm the knowledge obtained in R1 level that includes basic ocular sciences and the basics of the corneal inflammations & infection, corneal laceration, dry eye and the differential diagnosis of Red eye.
2. To describe congenital abnormalities of the cornea, clear, and globe (e.g. Peter's anomaly, microphthalmos, birth trauma, bupthalmos).
3. To describe characteristic corneal and conjunctival degenerations (e.g. pterygium, pinguecula, senile plaques of the sclera, keratocunos).
4. To recognize the common corneal dystrophies and degenerations (e.g. map-dot-fingerprint dystrophy, Meesman's dystrophy, Reiss-Bucler dystrophy, Francois dystrophy, Schnnyder dystrophy, congenital hereditary stromal dystrophy, lattice dystrophy, granular dystrophy, macular dystrophy, congenital hereditary endothelial dystrophy, Fuch's dystrophy, posterior polymorphous dystrophy, Salzmann's degeneration).
5. To understand the fundamentals of corneal optics and refraction (e.g. keratoconus).
6. To describe the fundamentals of ocular microbiology and recognize corneal and conjunctival inflammations and infections (e.g. Staphylococcal hypersensitivity, simple microbial keratitis, trachoma, ophthalmia neonatorum, herpes zoster ophthalmicus, herpes simplex keratitis and conjunctivitis).
7. To recognize the basic presentations of ocular allergy (e.g. phlyctenules, seasonal hay fever, vernal conjunctivitis, allergic and atopic conjunctivitis, giant papillary conjunctivitis).
8. To recognize and treat lid margin disease (e.g. Staphylococcal blepharitis, meibomian gland dysfunction).
9. To know the features of, diagnose, and treat (or refer) vitamin A deficiency (e.g. Bitot spots, dry eye, slowed dark adaptation) and neutrophic corneal disease).
10. To know the basic mechanisms of traumatic and toxic injury to the anterior segment (e.g. alkali burn, lid laceration, orbital fracture, etc.).



11. To understand the mechanisms of ocular immunology and recognize the external manifestations of anterior segment inflammation (e.g. red eye associated with acute and chronic iritis).
12. To describe the basic principles of ocular pharmacology of anti-infective, anti-inflammatory and immune modulating agents (e.g. indications and contraindications for topical corticosteroids, non-steroidal anti-inflammatory agents, and antibiotics).
13. To recognize and describe the treatment for a chemical burn (e.g. types of agents, medical therapy).
14. To recognize and describe the etiologies of hyphema and microhyphema.
15. To describe the etiologies and treatment of superficial punctate keratitis (e.g. dry eye, Thygeson's superficial punctate keratopathy,) blepharitis, toxicity, ultraviolet photokeratopathy, contact lens related).
16. To recognize the anterior segment manifestations of systemic disease (e.g. Wilson's disease) and pharmacologic side effects (e.g. amiodarone vortex keratopathy).
17. To recognize, list the differential diagnosis, and evaluate aniridia and other developmental anterior segment abnormalities (e.g. Axenfeld's, Rieger's, Peters' anomalies and related syndromes).
18. To recognize and treat pyogenic granuloma.

B. Technical/surgical skills

1. To make certain of the procedures done in R1 level.
2. To perform external examination (illuminated and magnified) and slit lamp biomicroscopy, including drawing of anterior segment findings.
3. To perform and interpret simple stains of the cornea and conjunctiva (e.g. culture techniques, culture media, Gram stain, Giemsa stain, calcofluor white, acid fast).
4. To perform primary pterygium excision.
5. To perform an isolated lid laceration repair.
6. To perform an isolated corneal laceration repair (e.g. linear laceration not extending to limbus).
7. To treat hyphema and microhyphema (e.g., and the complication of increased intraocular pressure and rebleeding).

VITREORETINA ROTATION

A. Cognitive skills

1. To recall the basic knowledge and fundamentals obtained in R1 level.
2. To describe, recognize, and know how to manage different stages of diabetic retinopathy and retinopathy of prematurity.
3. To describe macular anatomy and function and to describe typical features of common macular disease (e.g. age-related macular degeneration, macular hole, macular dystrophies, macular pucker, macular edema, central serous chorioretinopathy).
4. To describe and recognize features of closed blunt traumatic injuries and know their management (commotio retinae, traumatic choroidal ruptures peripheral retinal dialysis, Purtscher's retinopathy etc.).
5. To describe common forms of retinal vascular disease (e.g. branch, hemi- or central retinal vein and artery occlusion).
6. To describe typical features of retinitis pigmentosa.
7. To describe features of, recognize, and evaluate posterior vitreous detachments and retinal detachments.
8. To enumerate the causes of peripheral retinal neovascularization and their management.
9. To describe the features of infectious endophthalmitis and their management.

10. To recognize patterns of retinal diseases and appropriately categorize encountered pathologies into one category: vascular, inflammatory, degenerative, dystrophic, tumoral and acquired.
11. To understand the basic fundamental concepts of retinal electrophysiology (ERG, EOG and VER).
12. To have basic information about vitreous substitutes e.g., gases, heavy liquids, silicone.
13. To describe fundamentals of and changes in OCT in different diseases.

B. Technical/Surgical skills

1. To make sure of grasping the technique of indirect ophthalmoscopy & to examine the fundus with Hruby, + 78, + 90 lenses, 3-mirror contact lens and trans-equator (pan-funduscopy) contact lens.
2. To interpret basic fluorescein angiography in common retinal disorders (e.g. diabetic retinopathy, cystoid macular edema).
3. To perform Panretinal Photocoagulation.
4. To perform digital massage of the globe (CRAO management).
5. To perform anterior chamber paracentesis in phakic and aphakic eyes (CRAO management).
6. To acquire the skills of pattern recognition of common retinal diseases.
7. To master the techniques of panretinal photocoagulation.

UVEITIS ROTATION

A. Cognitive skills

1. To describe basic principles of history taking, examination and work-up of a patient with uveitis.
2. To list signs and symptoms of anterior and posterior uveitis (e.g. keratic precipitates, anterior chamber cells and flare, iris atrophy, transillumination, heterochromia and nodules, posterior vitreous haze and opacities, macular edema, snowbanking, retinal vasculitis, exudative retinal detachment, optic nerve head swelling, hyperemia and infiltration, retinitis, choroiditis).
3. To describe the classification of uveitis (e.g. acute and chronic uveitis, granulomatous and non-granulomatous, anterior, intermediate, and posterior).
4. To describe differential diagnosis of anterior uveitis, e.g. juvenile idiopathic arthritis, HLA-B27 associated uveitis, Fuch's heterochronic uveitis, herpetic, sarcoidosis, etc.
5. To describe typical features and differential diagnosis of posterior segment uveitis:
 - a. Behcet's disease
 - b. Vogt-Koyanagi-Harada disease and sympathetic ophthalmia.
 - c. Sarcoidosis
 - d. Toxoplasmosis
 - e. Differential diagnosis of retinal vasculitis
 - f. Infectious disorders e.g. Tuberculosis, acute retinal necrosis, human immunodeficiency virus and AIDS, syphilis, cytomegalovirus retinitis, herpes simplex, herpes zoster
 - g. Endophthalmitis
 - h. Masquerade syndromes
6. To describe the immunosuppressive agents used to treat uveitis.

B. Technical skills

1. To perform slit-lamp biomicroscopy of the anterior and posterior segment
2. To perform indirect ophthalmoscopy and scleral depression to evaluate patients with posterior uveitis.
3. To interpret imaging techniques e.g. Fluorescein angiography, indocyanine green angiography, optical coherence tomography, ultrasound.

GLAUCOMA ROTATION

A. Cognitive skills

1. To confirm the knowledge obtained in previous level.
2. To perform evaluation of POAG & PACG.
3. To describe principles of medical management, including indications for and side effects of treatment options (e.g. topical and systemic medications) for simple glaucoma (e.g. POAG, primary angle closure glaucoma).
4. To describe and recognize normal tension glaucoma ("low tension glaucoma").
5. To describe the features of and recognize primary and secondary angle closure glaucoma and aqueous misdirection.
6. To describe the clinical features of and to recognize hypotony (e.g. Seidel test for transconjunctival leakage).
7. To describe principles, techniques and indications of Yag laser Iridotomy.
8. To describe principles, techniques and indications of suture lysis.

B. Technical skills

1. To perform basic tonometry (e.g. applanation, pneumotometry, Schiøtz{if applicable}, tonopen, airpuff) and recognize the pitfalls and the artifact of the testing.
2. To perform basic gonioscopy (e.g. recognize angle structures, identify angle closure), by the use of Goldmann and Zeis gonioscopes.
3. To interpret manual (e.g. Goldmann) and automated (e.g. Humphrey, Octopus) visual fields in routine glaucoma.
4. Stereo assessment of the optic nerve head.
5. To assist then to start performing initial steps of Yag laser Iridotomy.
6. To start performing the following procedures under close supervision:
 - a) Simple primary Trabeculectomy
 - b) Suture lysis following Trabeculectomy

PEDIATRIC OPHTHALMOLOGY AND STRABISMUS ROTATION

A. Cognitive skills

1. To describe basic examination techniques for strabismus (e.g. ductions and versions, cover and uncover testing, alternate cover testing, prism cover testing).
2. To describe basic visual development and visual assessment of the pediatric ophthalmology patient (e.g. central, steady, maintained fixation, illiterate E, Allen cards, Landolt C rings).
3. To describe basic anatomy and physiology of strabismus (e.g. innervation of extraocular muscles, primary actions, comitant and incomitant deviations, overaction and underaction, restrictive and paretic saccades and pursuit movements).
4. To describe basic sensory adaptations for binocular vision (e.g. normal and anomalous retinal correspondence, suppression, horopters, Panum's area, fusion, stereopsis).
5. To describe different etiologies of amblyopia (e.g. deprivation, ametropic, strabismic, anisometropic, organic).
6. To describe etiologies of esotropia (e.g. congenital, comitant and incomitant, accommodative and non-accommodative, decompensated, sensory, neurogenic, myogenic, neuromuscular junction, restrictive, nystagmus blockage syndrome, spasm of the near, monofixation syndrome, consecutive).



7. To describe etiologies of exotropia (e.g. congenital, comitant and incomitant, decompensated, sensory, neurogenic, myogenic, neuromuscular junction, restrictive, basic, divergence excess, exophoria, convergence insufficiency).
8. To describe various strabismus patterns (e.g. A or V pattern).
9. To describe etiologies, evaluation, and management of vertical strabismus (e.g. neurogenic, myogenic, neuromuscular junction, oblique overaction or underaction, dissociated vertical deviation, restrictive).
10. To describe non-surgical treatment of strabismus.
11. To describe different forms of childhood nystagmus.
12. To describe features, classification, and treatment indications of retinopathy and prematurity.
13. To describe etiologies and types of pediatric cataracts.
14. To describe and recognize ocular findings in child abuse (e.g. retinal hemorrhages) and appropriately refer to child protective services or other authorities.
15. To describe common hereditary or congenital ocular motility or lid syndromes (e.g. Duane syndrome, Marcus Gunn jaw winking, Brown syndrome),
16. To describe typical features of retinoblastoma.
17. To describe basic evaluation of decreased vision in infants and children (e.g. retinopathy of prematurity, hereditary retinal disorders, congenital glaucoma, measles, vitamin A deficiency).
18. To describe identifiable congenital ocular anomalies (e.g. microphthalmia, persistent fetal vasculature).

B. Technical/Surgical skills

1. To apply the basic knowledge obtained in the previous level.
2. To perform an extraocular muscle examination based on knowledge of the anatomy and physiology of ocular motility.
3. To assess ocular motility using testing of ductions and versions.
4. To perform basic measurement of strabismus (e.g. Hirschberg, Krimsky, cover testing, prism cover testing, simultaneous prism cover testing, alternate cover testing, Parks-Bielschowsky three-step test, Lancaster red-green test, Maddox rod testing, double Maddox rod testing).
5. To perform assessment of vision in the neonate, infant, and child.
6. To recognize and apply in a clinical setting the following skills in the ocular motility examination:
 - a. Stereoacuity testing
 - b. Accommodative convergence/accommodation ratio (e.g. heterophoria method, gradient method).
 - c. Tests of binocularity and retinal correspondence
 - d. Cycloplegic refraction (retinoscopy)
 - e. Anterior and posterior segment examination
 - f. Basic and advanced measurement of strabismus
 - g. Cover test measurement
 - h. Assessment of vision
 - i.) teller acuity cards
 - ii.) Fixation preference test
 - iii.) Standard subjective visual acuity tests
 - iv.) Induced tropia test
 - i. Assessment of paralytic & restrictive squint by Hiss or Lee screen
7. To assist a primary surgeon in performing extraocular muscle surgery including:
 - a. Recession
 - b. Resection
 - c. Muscle weakening (e.g. tenotomy) and strengthening (e.g. tuck) procedures
 - d. Transposition
 - e. Use of adjustable sutures

OCULOPLASTIC ROTATION

A. Cognitive skills

1. To confirm the basic sciences knowledge and clinical applications done in the previous level.
2. To describe basic mechanisms and indications for treatment of eyelid, orbital, and lacrimal trauma.
3. To perform pre-operative and post-operative assessment of patients with common oculoplastic disorders (thyroid eye disease).
4. To recognize different causes of entropion and ectropion of the eyelids.
5. To perform correction of entropion and ectropion.
6. To recognize and treat floppy eyelid syndrome.
7. To recognize blepharospasm and hemifacial spasm.
8. To describe the differential diagnosis of common orbital tumors in children and adults.
9. To describe the differential diagnosis of lacrimal gland mass (e.g. inflammatory, neoplastic, congenital, infectious).
10. To identify normal orbital anatomy on imaging studies (e.g. magnetic resonance imaging, computed tomography, ultrasound).
11. To describe the differential diagnosis of proptosis in children and adults.

B. Technical/surgical skills

1. To ascertain the knowledge of performing the procedures done in the previous level.
2. To describe indications for and to perform the basic office examination techniques for the most common oculoplastic and orbital abnormalities.
3. To perform the basic assessment of the eyelids, eyebrows, and eyelashes (e.g. eversion, double eversion, margin to reflex distance, lid crease, levator function, eyelid/brow malpositions).
4. To identify indications for and to perform the basic lacrimal assessment (e.g. dye testing, punctal dilation, canalicular probing, lacrimal irrigation).
5. To identify indications for and to perform the basic assessment of the orbit (e.g. Hertel exophthalmometry, inspection, palpation, auscultation).
6. To identify indications for and to perform the basic socket assessment (e.g. types of implants, socket health).
7. To treat complications of minor operating room procedures (e.g. incision and drainage of chalazia, excision of small eyelid lesions).
8. To perform punctal plug insertion or removal.
9. To perform a simple enucleation or evisceration under supervision.

NEURO-OPHTHALMOLOGY ROTATION

A. Cognitive skills

1. To confirm the basic sciences knowledge and clinical applications done in the previous level.
2. To describe the typical features, evaluation, and management of the most common optic neuropathies (e.g. demyelinating optic neuritis, ischemic optic neuropathy {arteritic and non-arteritic}, toxic or nutritional optic neuropathy, Leber's hereditary optic neuropathy, ethambutol toxicity, neuroretinitis, and compressive, inflammatory, infiltrative, and traumatic optic neuropathies).
3. To describe the typical features, evaluation, and management of the most common ocular motor neuropathies (e.g. third, fourth, sixth nerve palsy).
4. To describe the typical features of cavernous sinus and superior orbital fissure syndromes (e.g. infectious, vascular, neoplastic, inflammatory etiologies).



5. To describe the typical features, evaluation, and management of the most common causes of nystagmus (e.g. congenital motor and sensory, downbeat, upbeat, gaze-evoked, drug-induced).
6. To describe the typical features, evaluation, and management of the most common papillary abnormalities (e.g. relative afferent papillary defect, anisocoria, Horner syndrome, third nerve palsy, Adie's tonic pupil).
7. To describe the typical features, evaluation, and management of the most common visual field defects (e.g. optic nerve, optic chiasm, optic radiation, occipital cortex).
8. To describe the clinical features, evaluation, and management of ocular myasthenia gravis.
9. To describe the clinical features, evaluation, and management of carotid-cavernous fistula.
10. To describe the differential diagnosis, evaluation, and management of congenital optic nerve abnormalities (e.g. optic pit, disc coloboma, papillo-renal syndrome, morning glory syndrome, tilted disc, optic nerve hypoplasia, myelinated nerve fiber layer, melanocytoma, disc drusen, Bergmeister's papilla).

A. *Technical skills*

1. To perform a basic papillary examination:
 - a. To describe indications for and perform basic pharmacologic pupillary testing for Horner syndrome, pharmacologic dilation, and Adie's tonic pupil.
 - b. To list the differential diagnosis of anisocoria (e.g. sympathetic or parasympathetic lesion, "physiologic" or normal).
 - c. To describe, detect, and quantitate a relative afferent pupillary defect.
 - d. To list the causes for light-near dissociation (e.g. Argyll-Robertson pupils, diabetic neuropathy, tonic pupil).
2. To perform a basic ocular motility examination.
 - a. To describe the indications for and to perform forced duction testing.
 - b. To perform an assessment of saccade accuracy and pursuit and optokinetic testing.
 - c. To describe the indications for visual field testing and to perform and interpret perimetry studies:
 - d. To perform confrontational field testing (static and kinetic, central and peripheral, red and white targets).
 - e. To perform and interpret a tangent screen test.
 - f. To describe the indications for and perform basic Goldmann perimetry, and interpret results.
 - g. To describe the indications for and perform basic automated perimetry, and interpret results.
3. To perform basic direct, indirect, and magnified ophthalmoscopic examination of the optic disc (e.g. recognize optic disc swelling, optic atrophy, neuroretinitis).
4. To describe the anatomy and indications for, order appropriately, and interpret basic radiology studies of the brain and orbits, demonstrating the ability to communicate with radiologists in order to maximize both choice of proper diagnostic test and accuracy of interpretation.

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17.0 Obligatory Training Requirements (R3 level)

R3 Level

ANTERIOR SEGMENT ROTATION

I – CATARACT

A. Cognitive skills

1. To describe the less common causes of lens abnormalities (e.g. lenticonus, ectopia lentis, etc.).
2. To describe the pre-operative evaluation of the cataract patient, including:
 - a. The systemic diseases of interest or relevance to cataract surgery.
 - b. The relationship of external and corneal diseases of relevance to cataracts and cataract surgery (e.g., lid abnormalities, dry eye).
 - c. The relationships of glaucoma, uveitis, and capsular opacities related to cataract surgery.
3. To describe glare analysis testing in pre and post cataract surgery.
4. To describe the use of A and B scan ultrasonography in cataract surgery.
5. To describe the instruments and techniques of cataract extraction, including extracapsular surgery and phacoemulsification (e.g., trouble-shooting the phacoemulsification machine, altering the machine parameters).
6. To describe the types, indications and techniques of anesthesia for cataract surgery (e.g., topical, local, general).
7. To describe indications, techniques and complications of surgical procedures, including:
 - a. Extracapsular surgery
 - b. Intracapsular surgery
 - c. Phacoemulsification
 - d. Paracentesis
 - e. IOL implantation
8. To correlate the level of visual acuity with the lens or capsular opacities.
9. To confirm the knowledge obtained in previous levels of the common complications of cataract and anterior segment surgery (e.g., intraocular pressure elevation, hyphema, endophthalmitis, cystoid macular edema, retinal detachment, intraocular lens dislocation, lens-induced glaucoma and uveitis).
10. To make certain of the knowledge of the indications, principles, and techniques of YAG laser capsulotomy, and to understand the proper timing of YAG laser capsulotomy.

B. Technical/surgical skills

1. To perform extracapsular surgery in a practice setting (e.g., animal or practice lab) and then in the operating room under supervision, including mastery of the following skills:
 - a. Wound construction
 - b. Anterior capsulotomy
 - c. Instillation and removal of viscoelastics
 - d. Extracapsular technique
 - e. Beginning phacoemulsification techniques (e.g. sculpting, divide and conquer, phaco-chop).
 - f. Irrigation and aspiration
 - g. Cortical clean-up
 - h. IOL implantation (e.g. anterior and posterior chamber & special IOLs)



2. To start performing, under direct supervision, some initial steps of Phacoemulsification.
3. In addition to performing the appropriate steps in cataract surgery, to assist in cataract surgery and perform more advanced steps in patient preparation and anesthesia.
4. To describe the more advanced applications of viscoelastics in surgery (e.g., control of iris prolapse, elevation of dropped nucleus, viscodissection, aspiration of residual/retained viscoelastic).
5. To perform basic post-operative evaluation of the cataract patient.
6. To recognize and refer or treat common post-operative complications of cataract surgery (e.g., endophthalmitis, elevated intraocular pressure, cystoid macular edema, wound leak, uveitis).

II – CORNEA & EXTERNAL DISEASE

A. Cognitive skills

1. To know the more complex anatomy, embryology, physiology, pathology, microbiology, immunology, genetics, epidemiology, and pharmacology of the cornea, conjunctiva, sclera, eyelids, lacrimal apparatus, and ocular adnexa.
2. To identify the more complex congenital abnormalities of the cornea, sclera, and globe (e.g., hamartomas and choristomas).
3. To recognize, evaluate, and treat peripheral corneal thinning (e.g., inflammatory, degenerative, dellen-related, infectious, immunologic).
4. To recognize common conjunctival neoplasia (e.g., benign, malignant tumors).
5. To recognize and treat less common corneal or conjunctival presentations of degenerations (e.g., inflamed, atypical, or recurrent pterygium, band keratopathy).
6. To describe the epidemiology, differential diagnosis, evaluation, and management of Bitot's spots.
7. To describe the differential diagnosis, evaluation, and management of Thygeson's superficial punctate keratopathy.
8. To understand more complex corneal optics and refraction (e.g. irregular astigmatism).
9. To correlate the concordance of the visual acuity with the density of media opacity (e.g., cataract) and to evaluate the etiology of discordance between acuity and findings from examination of the media.
10. To describe more complex ocular microbiology and describe the differential diagnosis of more complicated corneal and conjunctival infections (e.g., complex, mixed, or atypical bacterial, fungal, Acanthamoeba, viral, or parasitic keratitis).
11. To describe differential diagnosis, evaluation, and treatment of interstitial keratitis (e.g., syphilis, viral diseases, non-infectious, immunologic, inflammation).
12. To describe less common, but more serious differential diagnosis of the "Red eye" (e.g., autoimmune and inflammatory disorders causing scleritis, episcleritis, conjunctivitis, orbital cellulitis).
13. To describe key features of trachoma, including epidemiology, clinical features and staging, and its complications (e.g., cicatrization), prevention (e.g., facial hygiene), and topical and systemic antibiotic treatment (especially in hyperendemic regions), and surgery (e.g., tarsal rotation).
14. To describe mechanisms of traumatic and toxic injury to the anterior segment (e.g., long-term sequelae of acid and alkali burn, complex lid laceration involving the lacrimal system, full-thickness laceration).
15. To describe the differential diagnosis and the external manifestations of more complex anterior segment inflammation (e.g., acute and chronic iritis with and without systemic disease).
16. To describe the principles of ocular pharmacology of anti-infective, anti-inflammatory and immune modulating agents (e.g., use of topical non-steroidal and steroidal agents, topical cyclosporine).
17. To recognize and treat corneal lacerations (perforating and non-perforating).
18. To recognize and treat large, recurrent, or atypical pterygia that may require surgery.
19. To describe surgical indications of hyphemas.
20. To recognize, evaluate, and treat chronic conjunctivitis (e.g., Chlamydia, trachoma, molluscum contagiosum, Parinaud's oculoglandular syndrome, ocular rosacea).
21. To describe the clinical features, pathology, evaluation, and treatment of ocular cicatricial pemphigoid.

22. To recognize, evaluate, and treat the ocular complications of severe diseases, such as chronic exposure keratopathy, contact dermatitis, and Stevens-Johnson syndrome.
23. To recognize and treat complex corneal lacerations (e.g., lacerations extending beyond the limbus).
24. To describe the epidemiology, clinical features, pathology, evaluation, and treatment of peripheral corneal thinning or ulceration (e.g., Terrien's marginal degeneration, Mooren's ulcer, rheumatoid arthritis-related corneal melt).

B. Technical/surgical skills

1. To perform techniques that include keratometry, keratoscopy, endothelial cell count and evaluation, specular microscopy, and pachymetry.
2. To perform stromal micropuncture.
3. To perform application of corneal glue.
4. To assist in more complex corneal surgery (e.g., penetrating keratoplasty and phototherapeutic keratectomy).
5. To perform more complex pterygium excision, including conjunctival grafting.
6. To perform manual superficial or lamellar keratectomy.
7. To perform more complex corneal laceration repair (e.g., stellate perforating laceration).

VITREORETINA ROTATION

A. Cognitive skills

1. To describe detailed retinal anatomy and physiology.
2. To describe more advanced concepts of fluorescein/indocyanine green (ICG) angiography as applied to retinal vascular and other diseases (e.g., indications, phases of the angiogram).
3. To describe principles of retinal detachment recognition, various types of retinal detachment (e.g., exudative, rhegmatogenous, tractional), and their evaluation, management and repair (e.g., identify retinal break).
4. To describe and recognize typical features of less common macular disease (e.g., parafoveal telangiectasias, cone dystrophies, inherited macular dystrophies, fundus flavimaculatus, toxic maculopathies, vitreomacular traction).
5. To describe indications for and complications of laser photocoagulation.
6. To describe the findings of major studies in retinal diseases, including the following:
 - a. Diabetic Retinopathy Study (DRS)
 - b. Diabetic Vitrectomy Study (DVS)
 - c. Early Treatment of Diabetic Retinopathy Study (ETDRS)
 - d. Macular Photocoagulation Study (MPS)
 - e. Diabetes Control and Complications Trial (DCCT)
 - f. Branch Vein Occlusion Study (BVOS)
 - g. Central Vein Occlusion Study (CVOS)
 - h. United Kingdom Prospective Diabetes Study (UKPDS)
 - i. Age-Related Eye Disease Study (AREDS)
 - j. Verteporfin in Photodynamic Therapy Study (VIP)
 - k. Treatment of Age-Related macular Degeneration with Photodynamic Therapy Study (TAP)
 - l. Endophthalmitis Vitrectomy Study (EVS)
7. To describe the fundamentals, evaluations & management of peripheral retinal disease and vitreous pathology (e.g., vitreous hemorrhage, retinal breaks) & the criteria to refer.
8. To describe, evaluate, and treat choroidal detachments, uveal effusion syndrome.
9. To identify and evaluate retinoschisis (e.g., juvenile, senile).

10. To diagnose, treat, and recognize the complications of retinopathy of prematurity (e.g., retinal detachment).
11. To diagnose, evaluate, and treat the following retinal vascular diseases:
 - a. Arterial and venous obstructions
 - b. Diabetic retinopathy
 - c. Hypertensive retinopathy
 - d. Peripheral retinal vascular occlusive disease
 - e. Acquired retinal vascular diseases
 - f. Ocular ischemic syndrome
 - g. Sickle cell retinopathy
12. To describe and recognize common and uncommon macular disorders :
 - a. Age-related macular degeneration (ARMD)
 - b. Choroidal neovascularization
 - c. High myopia
 - d. Macular dystrophies
 - e. Macular pucker (e.g., epiretinal membrane)
 - f. Macular holes
 - g. Cystoid macular edema
 - h. Central serous choroidopathy (retinopathy)
 - i. Optic pit and secondary serous detachment
 - j. Retinal pigment epithelial detachment
13. To describe the fundamentals of retinal electrophysiology.
14. To describe, recognize, and evaluate hereditary retinal and choroidal diseases (e.g., gyrate atrophy, choroideremia, retinitis pigmentosa, cone dystrophies, Stargardt's disease, Best's disease, congenital stationary night blindness).
15. To describe the techniques for retinal detachment repair (e.g., pneumatic retinopexy, scleral buckling, vitrectomy).
16. To describe the basics of surgical vitrectomy (e.g., indications, mechanics instruments, and technique).
17. To perform peripheral scatter photocoagulation (sector or panretinal).
18. To describe the fundamentals of special vitreoretinal techniques:
 - a. Macular hole repair
 - b. Epiretinal membrane peeling
 - c. Complex vitrectomy for proliferative vitreoretinopathy
 - d. Use of heavy liquids and intraocular gases (e.g., perflourocarbons)
19. To describe, evaluate, and treat posterior uveitis syndromes and endophthalmitis.
20. To describe the fundamentals of the various vitreous substitutes namely gases, silicone oil, heavy liquid perfluorocarbons.
21. To assist in performing scleral buckling.
22. To recognize and treat infectious endophthalmitis.
23. To perform vitreous tap/biopsy and intravitreal injection for endophthalmitis.
24. To describe the mechanisms of retinal breaks and Rhegmatogenous retinal detachment in blunt closed globe injuries and their management.
25. To describe the sequelae of open globe injuries, the mechanism of retinal detachment in this setting and the rule and principles of vitrectomy for their management.
26. To master indications of prophylactic laser therapy for peripheroretinal lesions.

B. Technical/Surgical skills

1. To ascertain performing the examination techniques done in previous levels and to interpret the result of investigations.
2. To perform indirect ophthalmoscopy with scleral indentation.
3. To perform laser retinopexy (demarcation) for isolated retinal breaks.
4. To perform laser therapy for ROP.
5. To describe indications and interpret basic electrophysiological tests (e.g., electroretinogram {ERG}, electro-oculogram {EOG}, visual evoked potential (VEP), dark adaptation).
6. To interpret basic ocular imaging techniques (e.g., B-scan echography, nerve fiber layer analysis).
7. To perform fundus drawings of the retina, showing complex vitreoretinal relationships and findings.
8. To perform cryotherapy of retinal holes and other pathology.
9. To describe indications, techniques, and complications of pars plana vitrectomy and to assist in a retinal surgery or perform part of the procedure under supervision.
10. To take vitreous samples for endophthalmitis cases.
11. To perform intravitreal injections of antibiotics/steroids.

UVEITIS ROTATION

A. Cognitive skills

1. To grasp the knowledge gained in R2 level.
2. To describe basic immune mechanisms in uveitis.
3. To describe immunosuppressive agents used to treat uveitis that include indication, route of administration, dosage, side effects and patient monitoring.
4. To describe antimicrobial agents used to treat infectious uveitis e.g. tuberculosis, toxoplasmosis, syphilis, viral infections.
5. To describe complications of uveitis and their management.
6. To describe different types of endophthalmitis (acute postoperative, chronic postoperative, post-traumatic and endogenous).

B. Technical skills

1. To make certain of the skills acquired in R2 level.
2. To participate actively in the management of uveitis patients.
3. To be able to get a vitreous biopsy and to give intravitreal injections.
4. To be able to give periocular injections.

OCULOPLASTIC ROTATION

A. *Cognitive skills*

1. To describe more advanced eyelid, lacrimal, and orbital anatomy and physiology (e.g. lacrimal apparatus, orbital vascular anatomy).
2. To recognize and treat common and uncommon benign and malignant lid lesions.
3. To recognize and treat common malpositions of the eyelids (e.g., entropion, ectropion, and ptosis).
4. To describe the genetics (where known), clinical features, evaluation, and treatment of congenital eyelid deformities (e.g., coloboma, distichiasis, epicanthus, telecanthus, blepharophimosis, ankyloblepharon, epiblepharon, euryblepharon, and Goldenhar, treacher-Collins, Waardenburg syndromes).
5. To describe the clinical features, evaluation and management of congenital orbital deformities (e.g., anophthalmia, microphthalmia, cryptophthalmia, hypertelorism).
6. To treat (or refer for treatment) congenital eyelid abnormalities (see Basic Level, above).
7. To perform pre-operative and post-operative assessment of patients with simple and more serious oculoplastic disorders (e.g., multi-disciplinary procedures).
8. To describe the mechanisms and indications for treatment of more advanced eyelid, orbital, and lacrimal trauma (e.g., full thickness lid laceration, chemical burns to the face).
9. To describe features of, evaluate, and treat more complicated cases of nasolacrimal duct obstruction, canaliculitis, dacryocystosis, acute and chronic dacryoadenitis, preseptal cellulitis, and orbital cellulitis.
10. To recognize, evaluate, and treat thyroid ophthalmopathy (e.g., epidemiology, symptoms and sign; associated systemic diseases; orbital imaging; differential diagnosis; surgical, medical, and radiation indications; side effects of treatment).
11. To recognize, evaluate and treat orbital inflammatory pseudotumor (e.g., symptoms and signs, orbital imaging, differential diagnosis, biopsy indications, choice of treatments).
12. To recognize, treat, or refer blepharospasm or hemifacial spasm.
13. To recognize less common orbital tumors (e.g., metastatic lesions).

B. *Technical/surgical skills*

1. To confirm the knowledge of the surgical techniques done in the previous levels.
2. To identify indications for and to perform more advanced assessment of eyelids and eyebrows (e.g. facial symmetry, brow ptosis).
3. To identify indications for and to perform more advanced lacrimal assessment (e.g., interpretation of dye testing, canalicular probing in trauma).
4. To perform more complicated minor lid procedures (e.g., large benign skin lesions) or surgery (e.g., recurrent or multiple chalazion & lid laceration repair).
5. To recognize the indications and complications and to perform more complex minor operating room or limited operating room procedures (e.g., incision and drainage of recurrent or larger chalazia, excision of moderate sized benign eyelid lesions).
6. To recognize and treat orbital trauma (e.g., intraorbital foreign body, retrobulbar hemorrhage, fracture).
7. To identify common orbital pathology (e.g., orbital fractures, orbital tumors) on imaging studies (e.g., magnetic resonance imaging, computed tomography, ultrasound).
8. To treat common presentations of preseptal or orbital cellulitis.
9. To describe, recognize the indications for and complications of, and perform the basic lacrimal procedures below:
 - a. Lacrimal drainage testing (irrigation, dye disappearance test).
 - b. Lacrimal intubation
 - c. Dacryocystorhinostomy (external)
 - d. Repair simple lacerations of the lacrimal apparatus



A. *Cognitive skills*

1. To describe typical and atypical features, evaluation, and management of the most common optic neuropathies (e.g., papilledema, optic neuritis, ischemic, inflammatory, infectious, infiltrative, compressive, and hereditary optic neuropathies).
2. To describe typical and atypical features, evaluation, and management of the more complex supranuclear and internuclear palsies and less common ocular motor neuropathies (e.g. progressive supranuclear palsy and internuclear ophthalmoplegia).
3. To describe typical and atypical features, evaluation, and management of the more complex and less common forms of nystagmus (e.g., rebound, convergence, retraction).
4. To describe typical and atypical features, evaluation, and management of the more complex and less common papillary abnormalities (e.g., light-near dissociation, pharmacologic miosis).
5. To describe typical and atypical features, evaluation, and management of the more complex and less common visual field defects (e.g., lateral geniculate, monocular temporal crescent).
6. To describe more advanced aspects of visual field indications, selection, and interpretation (e.g., artifacts of automated perimetry, testing and thresholding strategies).
7. To describe neuro-ophthalmic aspects of common systemic diseases (e.g., hypertension, diabetes, thyroid disease, myasthenia gravis, temporal arteritis, systemic infections and inflammation).
8. To describe neuro-ophthalmologic findings in trauma (e.g., traumatic optic neuropathy, traumatic brain injury).
9. To describe typical features of inherited neuro-ophthalmologic diseases (e.g., Leber’s hereditary optic neuropathy, autosomal dominant optic atrophy, spinocerebellar degenerations).
10. To recognize, evaluate, and treat ocular myasthenia gravis.

B. *Technical skills*

1. To describe the indications for, administer, and interpret the results of intravenous edrophonium (Tensilon) and prostigmine tests for myasthenia gravis.
2. To perform a detailed cranial nerve evaluation (e.g., testing of oculomotor, trochlear, trigeminal, and facial nerve function).
3. To describe the more advanced interpretation of neuro-radiologic images (e.g., indications and interpretation of orbital tumors, thyroid eye disease, pituitary adenoma, optic nerve glioma, optic nerve sheath meningioma).
4. To describe the evaluation, management, and specific testing (e.g., stereopsis, mirror test, red-green testing) of patients with “functional” (non-organic) visual loss (e.g., recognize non-organic spiral or tunnel visual fields).
5. To describe the indications for, to perform, and to list the complications of temporal artery biopsy.

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18.0 Obligatory Training Requirements (R4 level)

R4 Level

ANTERIOR SEGMENT ROTATION

I – CATARACT

A. Cognitive skills

1. To define the more complex indications for cataract surgery (e.g. better view of posterior segment), describe the performance of and describe the complications of more advanced anterior segment surgery (e.g., pseudoexfoliation, small pupils, mature cataract, hard nucleus, black cataract, post-traumatic, zonular dehiscence), including more advanced procedures (e.g., secondary IOL's and indications for specialized IOL's, capsular tension rings, iris hooks, use of indocyanine green staining of the anterior capsule).
2. To describe the indications for, techniques of, and complications of cataract extraction in the context of the subspecialty disciplines of glaucoma (e.g., combined cataract and glaucoma procedures, glaucoma in cataractous eyes, cataract surgery in patients with prior glaucoma surgery), retina (e.g., cataract surgery in patients with scleral buckles or prior vitrectomy), cornea (e.g., cataract extraction in patients with corneal opacities), ophthalmic plastic surgery (e.g., ptosis following cataract surgery), and refractive surgery (e.g., cataract surgery in eyes that have undergone refractive surgery).
3. To independently evaluate complications of cataract and IOL implant surgery (e.g., posterior capsular tears, capsular dialysis, vitreous prolapse, intra-vitreous dislocation of cataractous fragments, choroidal effusions).
4. To understand indications for and technique of intracapsular surgery (e.g., rare cases may require this procedure, or patients may have had the procedure performed previously).
5. To know the indications for and instrumentation and techniques used to implant foldable and non-foldable IOL's.
6. To know the evaluation and management of common and uncommon causes of post-operative endophthalmitis.
7. To perform repositioning, removal or exchange of IOL's.
8. To assist in the teaching and supervision of basic and standard level learners (i.e., first and second year residents).
9. To identify the government and hospital regulations that apply to cataract surgery.

B. Technical/surgical skills

1. To know the principles, indications for, mechanics of, and performance of A-scan ultrasonography and the calculation of IOL power.
2. To perform phacoemulsification in the practice setting (e.g. animal or practice lab) and then in the operating room, including mastery of the following skills:
 - a. Wound construction
 - b. Anterior capsulotomy/capsulorhexis
 - c. Viscoelastics
 - d. Intracapsular, extracapsular and phacoemulsification-techniques (e.g., sculpting, divide & conquer phaco-chop, stop and chop).
 - e. Instrumentation and techniques of irrigation and aspiration
 - f. IOL implantation (e.g., anterior and posterior, special IOL's)
 - g. IOL repositioning, removal or exchange



3. To perform implantation of foldable and non-foldable IOL's.
4. To perform intraoperative and postoperative management of any event that may occur during or as a result of standard cataract surgery & Phacoemulsification, including:
 - a. Vitreous loss
 - b. Capsular rupture
 - c. Anterior or posterior bleeding
 - d. Positive posterior pressure
 - e. Choroidal detachments
 - f. Expulsive hemorrhage
 - g. Loss of anesthesia
 - h. Elevated intraocular pressure
 - i. Use of topical and systemic medications
 - j. Astigmatism
 - k. Post operative refraction (simple and complex)
 - l. Corneal edema
 - m. Wound dehiscence
 - n. Hyphema
 - o. Residual cortex
 - p. Dropped nucleus
 - q. Uveitis
 - r. Cystoid macular edema (CME)
 - s. Elevated intraocular pressure and glaucoma
 - t. Postoperative early and late intraocular infection

II – CORNEA & EXTERNAL DISEASE

A. Cognitive skills

1. To describe the detailed anatomy, embryology, physiology, histopathology, microbiology, immunology, genetics, epidemiology, and pharmacology of the cornea, conjunctiva, sclera, eyelids, lacrimal apparatus, and ocular adnexa.
2. To describe the less common congenital abnormalities of the cornea, sclera, and globe (e.g., cornea plana, keratoglobus).
3. To understand the most complex corneal optics and refraction (e.g., post-keratoplasty).
5. To describe less common and rare ocular infections and describe the differential diagnosis of the most complicated corneal and conjunctival infections (e.g., amoebas, Leishmaniasis, nematodes).
6. To describe the most complex differential diagnosis of the “red eye” (e.g. pemphigoid, pemphigus, Stevens-Johnson syndrome).
7. To diagnose and treat the most severe corneal exposure cases (e.g., total lid avulsion, severe alkali burn).
8. To describe the differential diagnosis and the external manifestations of the most complex or uncommon anterior segment inflammations (e.g., syphilitic keratouveitis).
9. To describe the most complex principles of ocular pharmacology of anti-infective, anti-inflammatory and immune modulating agents (e.g., combination therapies of antiviral and anti-inflammatory agents).
10. To diagnose and treat the most severe corneal exposure cases (e.g., conjunctival flap).
11. To understand ocular surface transplantation, limbal stem cell transplantation.
12. To understand the surgical indications (e.g., Fuchs' dystrophy, aphakic/psuedophakic bullous keratopathy), surgical techniques, and recognition and management of postoperative complications (especially immunologically-mediated rejection) or corneal transplantation (e.g., penetrating lamellar).
13. To understand the preoperative assessment, patient selection, surgical management, and post operative care of refractive surgical techniques, photoablation (photorefractive, phototherapeutic, LASEK & LASIK), corneal and wedge resection, thermokeratoplasty, intracorneal rings, phakic intraocular lens, and clear lens extraction.

B. Technical/surgical skills

1. To perform and interpret the most advanced corneal techniques (e.g., pachymetry, keratometry, endothelial microscopy, computerized corneal topography).
2. To understand and perform specialized and complicated contact lens fitting (e.g., post-keratoplasty).
3. To perform more complex corneal surgery (e.g., penetrating or lamellar keratoplasty, keratorefractive procedures and phototherapeutic keratectomy).
4. To repair complex entropion and ectropion.
5. To perform a thin conjunctival flap (e.g., Gunderson flap).
6. To perform other complex ocular surface surgery (e.g., amniotic membrane and limbal stem cell transplant).
7. To perform basic non-laser refractive surgery techniques (e.g., relaxing keratotomy & astigmatic keratotomy).
8. To manage and treat more complex neoplasms of the conjunctiva (e.g., carcinoma, melanoma).

VITREORETINA ROTATION

A. Cognitive skills

1. To apply in clinical practice the most advanced knowledge of retinal anatomy and physiology (e.g., surgical anatomy).
2. To apply in clinical practice the most advanced concepts of fluorescein/ICG angiography in complex retinal vascular and other diseases (e.g., occult choroidal neovascular membranes, recurrent neovascularization, vascular tumors, diseases of choroids and retinal pigment epithelium).
3. To evaluate, know how to treat and refer complex retinal detachments (e.g., recurrent retinal detachment, proliferative vitreoretinopathy).
4. To evaluate, know how to treat and refer the most complex macular disease (e.g., subfoveal or recurrent neovascular membranes).
5. To describe the indications for laser photocoagulation, including photodynamic therapy for the most complex retinal pathology (e.g., subfoveal and neovascular membranes).
6. To make sure to interpret the findings of the major studies in retinal diseases and describe the indications and exceptions for application to individual patients, as done in the previous level.
7. To apply in clinical practice understanding of the most complex peripheral retinal disease and vitreous pathology (e.g., Goldmann-Favre disease, incontinentia pigmenti, familial exudative vitreoretinopathy).
8. To evaluate, know how to treat and refer complications of retinal photocoagulation (e.g., vitreous hemorrhage, choioretinal anastomoses).
9. To evaluate, know how to treat and refer complex retinal detachments (e.g., giant tear).
10. To evaluate, know how to treat and refer the more complex cases of retinopathy of prematurity (e.g., tractional retinal detachment).
11. To evaluate, treat or refer the most complex forms of retinal vascular disease:
 - a. Combined arterial and venous obstructions
 - b. Advanced diabetic retinopathy
 - c. Advanced hypertensive retinopathy
 - d. Peripheral retinal vascular occlusive disease
 - e. Acquired retinal vascular diseases e.g. arterial macroaneurysms, Telangiectasia, etc.

12. To evaluate and treat or refer the uncommon manifestations or presentations of the following macular diseases:
 - a. Age-related macular degeneration (ARMD)/choroidal neovascularization, (e.g., recurrent subfoveal neovascularization)
 - b. Uncommon macular dystrophies
 - c. Refractory cystoid macular edema
 - d. Recurrent central serous choroidopathy (retinopathy)
 - e. Acute posterior multifocal placoid pigment epitheliopathy (choroidopathy)
 - f. Multiple evanescent white dot syndromes
 - g. Serpiginous choroiditis
 - h. Acute zonal outer retinopathy
 - i. Triangular syndrome
 - j. Polypoidal choroidopathy
13. To describe the more complex techniques for retinal detachment repair:
 - a. Repeat scleral buckling
 - b. Pars plana vitrectomy (e.g., diagnostic tap; core vitrectomy, extensive vitrectomy)
 - c. Repair of uveal effusion
14. To apply in clinical practice the more complex principles of surgical management of diabetic retinopathy (e.g., vitrectomy, membrane release).
15. To describe complex vitreoretinal techniques:
 - a. Macular hole repair
 - b. Epiretinal membrane peeling
 - c. Complex vitrectomy for proliferative vitreoretinopathy
 - d. Use of heavy liquids
16. To evaluate, and treat or refer the etiologically more complex or uncommon cases of posterior uveitis (e.g., sympathetic ophthalmia) and endophthalmitis (e.g., endogenous).
17. To describe and recognize retinopathy of prematurity (e.g., stages and treatment indications).
18. To understand the role and describe the indications of intravitreal injections (e.g. Avastin, Lucentis & Triamcinolon) as adjuvant therapy for macular edema complicating retinal vascular disease, retinal venous occlusive disease and choroidal neovascularization.

B. Technical/surgical skills

1. To master the examination techniques & interpretation of the result of investigation done in the previous levels.
2. To perform posterior segment photocoagulation in more complicated retinal cases:
 - a. Diabetic focal/grid macular treatment (e.g., monocular patient, repeat treatment).
 - b. Repeat peripheral scatter photocoagulation (panretinal).
 - c. Laser retinopexy (demarcation) of large or multiple breaks; cryotherapy.
 - d. LIO for ROP
3. To perform detailed fundus drawings of the retina with vitreoretinal relationships in the most complex retinal cases (e.g., recurrent retinal detachment, retinoschiasis with and without retinal detachment).
4. To assist in performing scleral buckle/vitrectomy in retinal detachment.
5. To assist in performing parts of pars plana vitrectomy surgery.
6. To independently perform vitreous tap/biopsy and intravitreal injection for endophthalmitis.

GLAUCOMA ROTATION

A. *Cognitive skills*

1. To describe the epidemiology and perform screening for routine and more advanced primary and secondary open angle glaucoma.
2. To describe the treatment of disturbances of aqueous humor dynamics.
3. To describe the more complex etiologies for, evaluation of, and treatment of glaucoma (e.g., angle recession, inflammatory, steroid-induced, pigmentary, pseudoexfoliative, phacolytic, neovascular, post-operative, malignant, lens particle glaucomas, plateau iris, glaucomatocyclitic crisis; iridocorneal endothelial syndromes; aqueous misdirection).
4. To describe more advanced tonometric and tonographic (if applicable) methods (e.g., diurnal curve).
5. To describe more advanced optic nerve and nerve fiber layer anatomy in primary and secondary glaucoma and to recognize typical and atypical feature associated with glaucomatous cupping (e.g., rim pallor, rapid progression, central acuity loss, hemianopic or other non-glaucomatous types of visual field loss).
6. To describe more advanced forms of perimetry (e.g., kinetic and automated static visual fields) and perimetry strategies (e.g., threshold testing, supra-threshold testing, special algorithms).
7. To describe the principles, indications, and more advanced anatomic findings and gonioscopic features of primary and secondary glaucomas (e.g., plateau iris, appositional closure).
8. To describe the principles of medical management of more advanced glaucomas (e.g., advanced POAG, secondary open and closed angle glaucomas, normal tension glaucoma).
9. To describe the features of, recognize, and treat primary angle closure glaucoma and aqueous misdirection.
10. To describe the clinical features of, recognize, and treat less common etiologies of ocular hypotony.
11. To describe the results and apply the conclusions to clinical practice of the major clinical trials in glaucoma (e.g., Glaucoma Laser Trial, Normal Tension Glaucoma Study, and Advanced Glaucoma Intervention Study).
12. To recognize and treat the various adult secondary glaucomas.
13. To describe the features of primary infantile and juvenile glaucomas.
14. To describe and apply specific medical treatments of more advanced glaucoma.
15. To describe the principles of laser treatments of glaucoma (e.g., indications, techniques, and complications, and use of various types of laser energy, spot size, laser wavelengths).
16. To describe the surgical treatment of glaucoma: (e.g., trabeculectomy, combined cataract and trabeculectomy, setons, and cyclodestructive procedures, including indications, techniques and complications).
17. To describe the features of the most complex and most advanced forms of primary and secondary open angle glaucoma.
18. To describe the mechanics of aqueous humor dynamics in the most advanced and complex etiologies of glaucoma (e.g., angle recession, combined or multifactorial glaucoma, traumatic or inflammatory glaucoma, pigmentary dispersion glaucoma).
19. To apply in clinical practice tonometric and tonographic methods (e.g., diurnal curve) in complicated or atypical cases of glaucoma.
20. To apply the most advanced knowledge of optic nerve and nerve fiber layer anatomy and describe techniques, methods and tools for analyzing the nerve fiber layer.
21. To recognize and evaluate atypical or multifactorial glaucomatous cupping (e.g., rim pallor).
22. To describe, interpret, and apply the results of the most complex and advanced forms of perimetry, including special kinetic and automated static perimetry strategies in atypical or multifactorial glaucoma.
23. To describe the principles and indications, and apply to clinical practice the findings of gonioscopy in the most complex primary and secondary glaucomas.



B. Technical/surgical skills

1. To perform YAG or argon laser procedures in glaucoma patients (e.g., monocular patient, repeat laser, vitreous lysis, suture lysis).
2. To perform laser peripheral iridotomy for more advanced glaucoma (e.g., monocular patient, acute angle closure, hazy cornea).
3. To perform laser treatments (e.g., argon laser trabeculoplasty, iridoplasty) for more advanced glaucoma cases (repeat treatments, monocular patient).
4. To perform cyclophotocoagulation for more advanced cases (e.g., prior surgery, monocular).
5. To perform routine and repeat trabeculectomy with or without antimetabolites.
6. To describe, manage, and treat surgically, if necessary, a flat anterior chamber.
7. To perform more advanced techniques for the revision of filtering blebs (e.g., failing bleb, leaking bleb).
8. To recognize and treat complications of glaucoma surgery.
9. To perform combined procedures (e.g. Trab + Phaco & Trab + ECCE).
10. To assist in advanced procedures (e.g. Viscocanalostomies).

PEDIATRIC OPHTHALMOLOGY & STRABISMUS ROTATION

A. Cognitive skills

1. To make sure of the basic knowledge and examination techniques done in the previous levels.
2. To describe more advanced anatomy and physiology of strabismus (e.g., torsion, tertiary actions, consecutive deviations).
3. To describe more advanced sensory adaptations (e.g., anomalous head position).
4. To describe basics of binocular sensory testing (e.g., Titmus stereo testing, Randot stereo testing, Worth 4-dot, Bagolini lenses, afterimage testing).
5. To describe and to recognize different etiologies of amblyopia.
6. To describe and recognize etiologies of esotropia.
7. To describe and recognize etiologies of exotropia.
8. To describe and recognize various strabismus patterns (e.g., A or V pattern).
9. To describe and recognize the etiologies of vertical strabismus.
10. To describe and utilize the non-surgical treatment of strabismus and amblyopia (e.g., patching, atropine penalization, Fresnel and grind-in prism therapy).
11. To describe and recognize the different forms of childhood nystagmus (e.g., sensory, motor, congenital, acquired).
12. To describe and recognize less common hereditary or malformative ocular anomalies and syndromes (e.g., Mobius, Goldenhar syndrome).
13. To describe the main features of dyslexia and its relationship to vision.
14. To describe basic evaluation and differential diagnosis of decreased vision in infants and children (e.g., retinal and optic nerve etiologies, amblyopia).
15. To describe recognizable causes blindness in infants (e.g., albinism, optic nerve hypoplasia, achromatopsia, Leber's congenital amaurosis, retinal dystrophy, congenital optic atrophy).
16. To describe etiology, evaluation, and management of congenital infections (e.g., toxoplasmosis, rubella, cytomegalovirus, syphilis, herpes).
17. To describe and recognize the common causes of pediatric uveitis.
18. To describe and perform the most advanced strabismus examination techniques (e.g., complicated prism cover testing in multiple cranial neuropathies, patients with nystagmus, dissociated vertical deviation, double Maddox rod testing).

19. To perform the most advanced techniques of assessment of visual development in complicated or non-cooperative pediatric ophthalmology patients (e.g., less common objective measures of visual acuity, electrophysiologic testing).
20. To apply the most advanced knowledge of strabismus anatomy and physiology (e.g., spiral of Tillaux, secondary and tertiary actions, spread of comitance) in evaluation of patients.
21. To describe clinical application of the most advanced sensory adaptations (e.g., anomalous head position, anomalous retinal correspondence).
22. To recognize and treat the most complicated etiologies of amblyopia (e.g., refraction non-compliance, patching failures, pharmacologic penalization).
23. To recognize and treat the most complex etiologies of esotropia (e.g., optical, prism-induced, post-surgical/consecutive).
24. To recognize and treat the most complex etiologies of exotropia (e.g., supranuclear, paralytic pontine exotropia, consecutive).
25. To recognize and treat the most complex strabismus patterns (e.g., aberrant, regeneration, post-surgical, thyroid ophthalmopathy and myasthenia gravis).
26. To recognize and treat the most complex etiologies of vertical strabismus (e.g., skew deviation, post-surgical, restrictive).
27. To apply non-surgical treatment (e.g., patching, atropine penalization) of more complicated forms of amblyopia (e.g., non-compliant, patching failures).
28. To recognize and evaluate the less common congenital ocular anomalies (e.g., unusual genetic syndromes).
29. To apply the most advanced principles of binocular vision and amblyopia (e.g., physiology of binocular vision, diplopia, confusion and suppression, normal and abnormal retinal correspondence, classification and characteristics of amblyopia).
30. To recognize and treat complex pediatric glaucoma.
31. To recognize and treat complex pediatric eyelid disorders (e.g., congenital deformities, lid lacerations, lid tumors).
32. To recognize and treat (or refer) pediatric orbital diseases (e.g., orbital tumors, orbital fractures, rhabdomyosarcoma, severe congenital orbital malformations).

B. Technical/Surgical skills

1. To assess more advanced ocular motility problems (e.g., bilateral or multiple cranial neuropathy, myasthenia gravis, thyroid eye disease).
2. To apply Hering's and Sherrington's laws in more advanced cases (e.g., pseudoparesis of the contralateral antagonist, enhancement of ptosis in myasthenia gravis).
3. To perform more advanced measurements of strabismus (e.g., double Maddox rod testing, Lancaster red green testing, use of synaptophore or amblyoscope).
4. To perform assessment of vision in more difficult strabismus patients (e.g., uncooperative child, mentally impaired, nonverbal or preverbal).
5. To perform basic extraocular muscle surgery:
6. To exercise surgical judgment for the indications and contraindications for strabismus surgery
7. To perform pre-operative assessment, intraoperative techniques and to describe intraoperative and post-operative complications of strabismus surgery.
9. To perform the following strabismus surgeries
 - a. Recession
 - b. Resection
 - c. Muscle weakening (e.g., tenotomy) and strengthening (e.g., tuck) procedures
 - d. Transposition
 - e. Use of adjustable sutures

- 10 To manage the complication of strabismus surgery (e.g., slipped muscle, anterior segment ischemia).
- 11 To describe and perform the pre-operative assessment, intraoperative techniques and to describe postoperative complications for more complicated strabismus surgery (e.g., re-operation, slipped muscle).
- 12 To describe indications for and to perform adjustable sutures in more complicated cases (e.g., thyroid ophthalmopathy).
- 13 To describe and manage more complex complications of strabismus surgery (e.g., globe perforation, endophthalmitis, overcorrection).

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19.0 Self Achieved Training

19.1 Basics of Ophthalmology

It is mandatory for Residents in the training programs to increase their fund of knowledge in the following fields:

A. Basic Sciences

1. Ocular Embryology
2. Ocular Anatomy & Histology
3. Ocular Physiology
4. Ocular Biochemistry
5. Ocular Pathology
6. Physiological Optics

B. Ophthalmic Examination & Equipment

C. Ophthalmic Ancillaries

1. Diagnostic Ultrasonography
2. IOL Calculation
3. Corneal Topography
4. Visual Field
5. Flourescein Angiography
6. Electrophysiology
7. Confocal Microscopy
8. Specular Microscopy
9. OCT
10. Laser Interferometry

D. Laser in Ophthalmology

1. Yag
2. Argon
3. Krypton
4. Diod
5. Excimer

19.2 Ocular Microbiology

All Residents should concentrate on the following fundamentals:

I. Basic Concepts

1. Epidemiology of Ocular Infections
2. Prevention of Ocular Infections
3. Immunology of Infections
4. Ocular Surface Defense Mechanisms
5. Pathogenesis of Corneal Infections
6. Pathogenesis and Correlations in Conjunctival Infections

II. Diagnostic Ocular Microbiology

1. Principles of diagnostic Ocular Microbiology
2. Quantitative ocular Bacteriology
3. Ocular Virology
4. Microbiology of Ocular Chlamydial Infections
5. Ocular Bacteriology
6. Ocular Mycology
7. Eye-related Parasitic Diseases



III. Clinical Management

A. Bacterial, Fungal and Viral Ocular Infections

1. Bacterial Keratitis
2. Fungal Keratitis
3. Herpes Simplex Keratitis
4. Varicella and Herpes Zoster Ophthalmicus
5. Nonherpetic Viral Keratitis
6. Bacterial Conjunctivitis
7. Chlamydia: Trachoma and Inclusion Conjunctivitis
8. Viral Conjunctivitis
9. Conjunctivitis of the Newborn
10. Parinaud's Oculoglandular Conjunctivitis (Ocular Cat-Scratch Disease)
11. Infections of the Sclera
12. Viral Retinitis
13. Endogenous Bacterial and Fungal Infections of the Retina and Choroid
14. Endogenous Ocular Candidosis
15. Infections of the Orbit
16. Infections of the Lacrimal Apparatus
17. Infections of the Eyelid
18. Endophthalmitis
19. Ocular Leprosy
20. Human Immunodeficiency Virus Infections and AIDS
21. Lyme Disease
22. Endemic Syphilis (Bejel)
23. Ocular Brucellosis

B. Parasitic Ocular Infections

1. Ocular Toxoplasmosis
2. Ocular Onchocerciasis
3. Acanthamoeba Keratitis

C. Chemotherapeutics in Ocular Infections

1. Antibacterial Agents
2. Antifungal Agents
3. Antiviral Agents
4. Antiparasitic Agents
5. Antiinflammatory Agents

19.3 Ocular Pharmacology

Resident should be thoroughly knowledgeable with the hospital formulary system they work in, it provides for procuring and prescribing of drugs under their generic (non propriety names). Resident should comply with the policy and procedure of prescribing narcotic and controlled substances. In case of drug-induced side effect observed, the resident should fill adverse drug reaction formula and send it to the Pharmacy for action.

In order to fulfill the professional requirements, residents from early level of training should start building up their knowledge of ocular pharmacokinetics, pharmacodynamics, pharmacotherapeutics and the related toxicology for the most commonly used ophthalmic medication as follows:

- Antibacterial agents
- Antifungal agents
- Antiparasitic agents
- Anti viral agents

- Anti glaucoma agents
- Anti inflammatory and anti allergic agents
- Mydriatics, cycloplegics
- Lubricants and viscoelastics
- Anesthetic agents
- Botulinum toxin

19.4 Ocular Anesthesia

Resident at early level of training should master the following skills:

1. Understand the orbital and ocular anatomy and nerve conduction.
2. Grasp a fair knowledge of the pharmacology of the commonly used local anesthetics.
3. Acquire the ability to diagnose and manage the toxicity that may associate local anesthetic block.
4. Learn the art of performing the standard ophthalmic block.
5. Avoid giving the block and seek the assistance of an expert in the following conditions;
 - ✓ One eyed patients
 - ✓ Axial length greater than 25mm
 - ✓ Presence of staphyloma
 - ✓ Glaucoma patients with axial length not recorded
 - ✓ Previous ocular surgeries
 - ✓ Supplements of local anesthetics

19.5 Ocular Immunology

Residents who completed four years of training should have acquired a solid knowledge of immunology as follows:

1. Principles of General Immunology that include the lymphoreticular system, types of immunity, types of T-lymphocytes, types of antigens, types of antibodies and the compliment system.
2. Mechanisms of immune reactions that include:
 - Type I, (atopic or anaphylactic)
 - Type II, (cytotoxic)
 - Type III, (immune complex)
 - Type IV, (delayed hypersensitivity)
3. Clinical application of the general principles on the ocular immune response

19.6 Ocular Trauma

Starting from the 2nd year of training and onwards, Residents should be familiar with the fundamentals of ocular trauma as follows:

1. To know the basic principles for classifying ocular injuries according to the International Classification of Ocular Trauma.
2. To describe the basic mechanisms of ocular injuries and their implications on the type of eye injury and management.
3. To correctly classify a mechanical ocular injury into closed and open globe injuries, using specific terminology such as contusion, superficial laceration, penetrating injury, perforating injury, IOFB injury etc.
4. To enumerate the various intraocular findings associated with blunt ocular trauma (in closed and open globe injuries) and their immediate and secondary management.
5. To describe the principles of evaluation and management of open globe injuries (with and without IOFB).
6. To recognize and fully evaluate the sequelae of a closed globe injury.
7. To know the indications, contraindications and when to use ancillary techniques in the management of ocular injuries (Ultrasound, CT scan, MRI, VER etc.).
8. To describe the principles of management of open globe injuries with endophthalmitis.

19.7 Emergency Room Disciplines

Residents rotating in ER should comply with the following standards:

1. Patient's privacy.
2. Confidentiality of patients' medical records.
3. To give respect to patient's complaints and do not undermine patients credibility in telling the truth.
4. To give all patients the benefit of doubt, especially single-eyed patients; patient's with recent history of surgery and patients with history of similar complaints in the other eye e.g., high myopia associated with Regmatogenous Retinal Detachment.
5. To document legibly the decision given & plan of care of cases presenting to ER.
6. If in doubt about the urgency of a case based on the patient's symptoms, the ER Resident should accept the patient for examination.
7. If the patient is not convinced about the Resident's decision to label the case as non-ER, ER Resident should accept the case for examination to confirm the state of non-ER and to avoid clashes with the patient.
8. If in doubt about the diagnosis, plan of care etc., ER Resident should not hesitate to consult with the ER attending, Division on call or ophthalmologist on call.
9. ER Residents must be confident and systematic in examining patients presenting to ER, however, they should get rid of overconfidence that under estimate the patient's complaints or the clinical findings. Such an attitude can easily lead to missing cases of serious diagnostic entities e.g. Retinoblastoma or mismanage condition that need special care e.g. enrolled corneal flap following lasik procedure.

19.8. Imaging in Ophthalmology

Message from Dr. Claude Jacquemin to all Residents:

1. With the advance in the new technology, Imaging in Ophthalmology gains the momentum to become a broad topic in the medical practice that requires a multi disciplinary approach.
2. Remember that conventional X-rays of the orbit are now becoming obsolete.
3. CT scanner is the first choice exam to be done in case of trauma which will give a good assessment of the soft tissues, bony structures and possibly intraocular and intraorbital foreign bodies.
4. MRI will be required to give detailed study of the ocular, lacrimal or mascular structures.
5. Ultrasound and Doppler Ultrasound will be helpful if detailed intraocular lesion or study of the orbital vascularization are required.
6. OCT will give excellent study of the Retina and is also used for Glaucoma patients.
7. The Neuroradiologist consult and support should be obtained by the Pediatric Ophthalmologist when dealing with complex central nervous systems disorders and malformations.
8. Residents are strongly encouraged to acquire the habit of visiting frequently the Diagnostic Imaging Department in their hospitals to gain the knowledge and build up the confidence in diagnosis and to form a better understanding of the strengths and pitfalls of each of the Imaging techniques.



19.9 The Eye In Systemic Diseases

Residents should be aware of the following facts:

1. The eye is considered to be an appendage of the brain that requires the ophthalmologists to be well versed in the neurological area.
2. The relationship of the eye to myriad systemic diseases causes ophthalmologist to be familiar with wide-ranging aspects of General medicine that cover the following disorders:
 - a. Endocrinologic
 - b. Rheumatologic
 - c. Nervous
 - d. Gastrointestinal
 - e. Hematologic
 - f. Dermatologic
 - g. Cardiovascular
 - h. Metabolic & Genetic
 - i. Infectious
 - j. Lymphomas & Malignancies

19.10 Medical Genetics – Core Competencies

- A. Cognitive skill/Knowledge
 - I. Basic principles of human and medical genetics
 1. Genes and chromosomes
 2. Genogram/pedigree
 - a. Components
 - b. Preparation
 - c. Interpretation
 3. Basic Mendelian inheritance patterns (hair/eye color, blood type)
 - a. Autosomal dominant
 - b. Autosomal recessive
 - c. X-linked dominant
 - d. X-linked recessive
 4. Non-Mendelian inheritance patterns
 - a. Multifactorial
 - b. Mitochondrial (MELAS)
 - c. Trinucleotide repeats (fragile X syndrome, Huntington's disease)
 - d. Imprinting (Prader –Willi syndrome, Angelman's syndrome)
 - e. Uniparental disomy (Willi syndrome, Angelman's syndrome)
 - II. Ethical and legal considerations/controversies
 1. Screening for genetic abnormalities
 2. Prenatal-preconception testing
 3. Presymptomatic genetic testing (breast cancer genes, Huntington's disease)
 4. Carrier testing for genetic disorders
 5. Confidentiality
 6. Risk assessment
 7. Responsibility to inform
 8. Discrimination issues (insurance coverage, employment)
 9. Informed consent
 10. Paternity determinations



- III. Terminology used in medical genetics (mosaicism, incomplete penetrance, variable expressivity, pleomorphic, malformation, deformation, disruption, dysmorphic, minor/major anomaly, homozygote, heterozygote, allele, polymorphism)
- IV. Laboratory studies and research
 1. Karyotype
 2. Fluorescent in situ hybridization
 3. Polymerase chain reaction, sequencing, mutation detection
 4. Gene mapping
- V. Limitations of genetic testing (polymorphism versus mutation)
- VI. The genetic implications of common disorders and conditions – e.g. Down syndrome, retinoblastoma, Marfan syndrome, sickle cell trait/anemia
- VII. Approach to the dysmorphic child/adult with multiple congenital abnormalities
- VIII. Recognition of the importance of collaborators in the evaluation, diagnosis and management of patients referred for genetic consultation

B. Technical Skills:

1. Preparation of a genogram/pedigree
2. Identification of local community resources for genetic counseling and consultation
3. Identification of pertinent community groups addressing the needs of patients and families with genetically based disorders
4. Basic genetic counseling for Mendelian disorders

19.11 Community Ophthalmology (Prevention of Blindness)

A. Residents should acquaint themselves with the following knowledge:

1. To be aware that “Prevention of Blindness (PB)” is not a subspecialty, but a target for ophthalmologists to prevent or treat avoidable blindness.
2. To be aware also that community ophthalmology is the ophthalmic subspecialty that covers most aspects of Prevention of Blindness and deals with the following:
 - i.) study of ophthalmic disorders and their impact on the community
 - ii.) identifies programs and modalities of treatment to control diseases
 - iii.) search for human resources and plan for community development
3. To be familiar with the international initiative: (Vision 2020: The Right to Sight)
4. To be familiar with the WHO resolutions in relation to Prevention of Blindness
5. To have a broad understanding of the activities in the field of (PB) that carried out by the International Non Governmental Organization (NGO) in collaboration with WHO
6. To be aware of the following local activities:
 - i.) The national NGO working in the field of PB and Low Vision (LV) rehabilitation
 - ii.) The national centers that are involved in community ophthalmology
 - iii.) The National Prevention of Blindness Committee (NPBC)

B. For the purpose of the national commitment, Residents are advised to:

1. Engage in some of the national PB activities such as:
 - i.) giving lectures to public
 - ii.) participate in community ophthalmic care, etc.
2. Devote some time to philanthropic activities in the community
3. Know statistical data on blindness, particularly national figures (WHO website, through MOH publication & NPBC)

4. Know more about PB activity by referring to the following websites:
 - WHO: www.who.it
 - Vision 2020: www.v2020.org
 - The NPBC: www.saudipb.org

19.12 Ophthalmic Practice and Medical Ethics

Residents should develop understanding of the following principles:

A. Ethical Issues in Patient Care:

1. **Informed consent.** The patient has the right to be informed regarding the nature of their disease(s), the causes, the possible treatments, and the prognosis. This information should be provided calmly and carefully in clear language appropriate for the patient. Opportunity should be given for the patient to ask questions, and the patient should not be made to feel that their questions are inappropriate or bothersome. Ultimately, the patient (or their legal guardian) will make decisions about treatment based on the information provided. Even when a patient clearly indicates their intention to follow whatever course the physician recommends, the physician should still explain why they recommend a treatment, including discussion of its risks and benefits in comparison to alternatives.
2. **Decision-making.** Recommendations regarding treatment should be based on a careful, thorough examination, supplemented, as needed, by appropriate ancillary tests, and based, finally, on the best available medical evidence regarding treatment efficacy and safety. The patient's other health issues, as well as social issues, should be considered, and may well modify the recommended treatment.
3. **Confidentiality and Privacy.** The doctor-patient relationship is founded on trust and respect. The patient must feel free to share personal information, and the doctor must insure that this information is protected and used only for the care and benefit of the patient.
4. **Risk Management.** There is no medical treatment without risk, and the doctor must inform the patient about this unavoidable fact honestly and accurately. It is wrong to promise outcomes that are unrealistically optimistic or to falsely minimize estimates of risk.

B. Professional Standards:

1. **Licensing and Credentials.** All physicians must meet the local standards required by governmental licensing agencies and professional review boards. In addition, every physician has a personal responsibility to maintain competency through continuing education.
2. **Professional Relations.** Good inter-collegial relations contribute to patients' well-being by promoting prompt and effective consultation and coordination of patient care. Ethical professional relations are based first and foremost on the needs and interests of the patient. It is wrong to base treatment recommendations or referral of patients on anticipated or promised financial rewards or other inducements.
5. **Staff Relations.** Physician relations with non-physician staff must be based on respect, courtesy, and a sense of shared responsibility for the environment of care.



C. Personal Health and Responsibility: (“Physician, heal thyself”)

1. **Physician Health.** The best medical care will be delivered by physicians who are themselves healthy. It is therefore an obligation of every physician to avoid harmful substances and to follow a healthy life style.
2. **A Balanced Life.** The obligations and demands of medical practice should be kept in balance with the equally important responsibilities of the physician to his or her family and community.



20.0 Books for Further Reading

N.B. No particular book is specially recommended to Residents in the Training Programs, however, the following books and references are enumerated for further reading:

1. The American Academy of Ophthalmology Series
2. Ophthalmology
by: Myron Yanoff & Jay S. Duker
Published by Mosby
3. The Cornea
(Scientific Foundations and Clinical Practice)
Gilbert Smolin and Richard A. Thoft (Editors)
Little, Brown and Company Publishers, Boston, USA
4. The Eye and Systemic Diseases
Frederick A. Jakobies and Kathryn Colby (Editors)
International Ophthalmology Clinics
Lippincott-Raven Publishers 1998, Philadelphia, Pennsylvania, USA
5. Diagnostic Microbiology and Cytology of the Eye
Kathleen Byrne, Khalid F. Tabbara, Eileen M. Burd, Robert A. Hyndiuk
Butterworth-Heinemann, USA 1995
6. Infections of the Eye, 2nd Edition
Khalid F Tabbara and Robert A, Hyndiuk (Editors)
Little, Brown and Company Publishers, Boston, USA 1996
7. Magnetic Imaging of the Brain and Spine, William Scott
8. Ocular Infection and Immunity
Jay S. Pepose, Gary N. Holland, Kirk R. Wilhelmus (Editors)
Mosby Publications, USA 1996
9. Ophthalmic Pathology
An Atlas and Textbook Fourth Edition by William H. Spencer
Published by W. B. Saunders Company
10. Basic Histology
Text and Atlas
10th Edition Louiz Carlos Junqueira and Jose' Carneiro
Published by Lange Medical Books McGraw-Hill
11. Posterior Uveitis: Diagnosis and Management
Khalid F. Tabbara and Robert B. Nussenblatt (Editors)
Butterworth-Heinemann, Newton, USA 1994
12. Radiologic Clinics of the North America: imaging in Ophthalmology
Volume I & II (Mahmood F. Mafee)
13. MRI of the Eye and Orbit (Patrick de Potter, Jerry Shields) Lippincot Company



21.0 References for the Booklet for KSU Fellowship Program in Ophthalmology

1. Booklet of Information, Fellowship Program in Ophthalmology, King Saud University 1984(1404H) by Professor Khaled Tabbara, Chair Department of Ophthalmology, KSU
2. Curriculum Manual, Residency Training Programs in Ophthalmology, first revision 2007. Compiled by Talal Fadel, MD, FRCO, Assistant Professor, Department of Ophthalmology, King Saud University, Chair, Local Residency Training Committee, Riyadh Center
3. Guidelines and Standards for Education of an Ophthalmologist: A curriculum Outline, Year 2004, International Council of Ophthalmology (ICO), 945 Green Street San Francisco CA 94133, Phone: +14154098410; Email: info@icoph.org
4. Resident's Manual Program Structure and Educational Standard, Year 2005, Mc Gill University Health Center, Quebec, Canada
Email: www.medicine.mcgill.co/ophthalmology/academic/resmare.htm.
5. Residency Training Manual, Year 2004-2005, Department of Ophthalmology, The University of British Columbia and Affiliated Hospitals, Vancouver, Canada
6. The American Academy of Ophthalmology Series, Section 1, Fundamentals and Principles of Ophthalmology, Section 10, Update of General Medicine.
7. Publication of IAPB, www.iapb.org
8. Publication of WHO in the P and B
www.v2020.org

