

# Subspecialty Curriculum for Fellowship in Cornea and External Diseases

## I. INTRODUCTION

### A. Definition and Scope of Subspecialty

Fellowship training requires more in-depth education about the pathophysiology and management of ophthalmic diseases than can usually be obtained in residency training in ophthalmology. Fellowships include a continuous period of intense and focused training in developing and maintaining knowledge, skills, scholarship, and professionalism.

### The Main Objectives of the Fellowship

*Subspecialty fellowship training for cornea, external disease includes:*

1. Diagnosis and medical management of diseases of the eyelid, conjunctiva, cornea/sclera, and anterior ocular segment.
2. Recognition and treatment of posterior segment disease that may affect the anterior segment.
3. Surgery of the conjunctiva, cornea/sclera, anterior segment, lens, and anterior vitreous, with special emphasis on corneal transplantation and related procedures.
4. Principles of contact-lens fitting and management of complications of contact-lens wear.

### B. Duration and Scope of Education

1. Any fellow entering a program should be able to fully comply with the clinical requirements of the program and **have completed an appropriate residency program** for that subspecialty fellowship.
2. **12 months** of clinical training is highly recommended, including appropriate short periods for vacation or special assignments.
3. Prior to entry in the program, each fellow should be notified of the length of the program, policies for vacation, duties, stipends, other forms of support, and any restrictions associated with the training.

## II. INSTITUTIONAL ORGANIZATION

The number of fellowship positions offered will depend on the adequacy of clinical volume, number of faculty, and other resources.

## III. FACULTY QUALIFICATIONS AND RESPONSIBILITIES

### A. Fellowship Program Director

**Prof. Waleed Ali Abou Samra**

*Responsibilities of the fellowship program director:*

- a. Develop the educational goals of the program with respect to knowledge, skills, and other attributes for each major rotation or other program assignment.
- b. Develop and maintain documentation of the fellows' selection process, patient care statistics, evaluations of faculty and the program, and assessment of the fellows' performance.
- c. Designate and supervise the faculty through explicit descriptions of supervisory lines of responsibility for the care of patients, as well as the skill requirements for the fellows.
- d. Ensure the implementation of fair procedures and due process regarding academic discipline and fellows' complaints or grievances.
- e. Monitor fellow stress, including mental or emotional conditions inhibiting performance or learning.

### B. Faculty

Prof. Ahmed Moustafa.	<i>(Educational Advisor)</i>
Prof. Essam Baddour.	<i>(Surgical Advisor)</i>
Prof. Ashraf Moawad	<b>(Academic Supervisor)</b>
Prof. Hatem El Awady	<b>(Clinical Supervisor)</b>
Prof. Sherif El Khouly	<i>(Log book Evaluator)</i>
Prof. Sameh Saleh.	<i>(Social Advisor)</i>
Ass. Prof. Rania Kamel	<i>(Medical Advisor)</i>
Ass. Prof. Amany Badawy	<i>(Research Advisor)</i>
Ass. Prof. Eman Azmy	<i>(Investigation Advisor)</i>
Dr. Aya Hashish	<i>(Wet Lab Coordinator)</i>

*Responsibilities of the Faculty:*

- a. Possess appropriate clinical and teaching skills, either by subspecialty training or subspecialty oriented clinical practice.
- b. Demonstrate a strong interest in the education of fellows; possess sound clinical, research, and/or teaching abilities; support the goals and objectives of the program; participate in scholarly activities; and be committed to their own continuing medical education.
- c. Have regularly scheduled (minimally every 4 months) documented meetings in order to review the program's goals and objectives, as well as the program's effectiveness in achieving its goals and objectives.

**IV. FACILITIES AND RESOURCES**

**A. Outpatient Examination Facilities**

The outpatient area of each participating program has a minimum of fully equipped examination lane for each fellow. There have access to current diagnostic and investigative equipment.

**B. Inpatient Facilities**

Inpatient facilities are available with sufficient space and beds for good patient care.

**C. Operative Facilities**

Major and Minor operative facilities are available for mastering the operative skills.

**D. Wet lab:**

Wet lab is available for training in surgical skills.

**E. Teaching classes**

Well-equipped teaching halls are available for teaching, seminars and journal club.

**F. Library or Academic Resources**

Fellows have ready access to a major medical library and facilities for electronic retrieval of information from medical databases.

**V. EDUCATIONAL PROGRAM**

Fellowship preceptors must emphasize the principles of ethical and humane treatment of patients in accordance with the International Council of Ophthalmology Code of

Ethics ([www.icoph.org/downloads/icoethicalcode.pdf](http://www.icoph.org/downloads/icoethicalcode.pdf)) and the code of ethics of the supervising bodies of the country in which training takes place. Preceptors and faculty should communicate these principles in both didactic and clinical aspects of the fellowship training.

*The program requirements for cornea/external disease fellowships are an in-depth continuation of the general ophthalmology residency program but extend beyond the normal requirements of a general program. A wider variety of diseases and more patients in each disease category may be encountered.*

## **A. Clinical Components**

- The goal of the fellowship is to produce an ophthalmologist with subspecialty skills that allow independent medical and surgical management of cornea and external disease. The subspecialist should at a minimum be able to evaluate a patient with acute or chronic redness of the eye; diagnose acute or chronic loss of vision due to structural changes or anomalies of the anterior segment; be able to create a differential diagnosis for typical corneal findings, for specific anterior segment effects of various systemic and ocular medications, and for surgery of the cornea and conjunctiva; and to delineate the risks and benefits for surgical procedures of the anterior segment.
- The subspecialist should be able to probe the patient's history for relevant review of systems and the social history, including the details of the onset and course of the ocular condition. The subspecialist should be able to complete a detailed examination of the eyelid, orbit, conjunctiva, cornea, anterior chamber, iris, anterior chamber angle, lens, optic disc/nerve, vitreous, retina, and choroid, and perform an evaluation under anesthesia when needed.
- The subspecialist should recognize the various tests that are available to aid in the diagnosis of external disease, including evaluation of the tear film, use of the microbiology laboratory, pathology, information available from genetic analysis, special ophthalmic examination techniques (eg, ultrasound, specular microscopy, corneal topography/tomography, and anterior-segment optical coherence tomography [OCT]).
- The subspecialist should be able to use all of these skills in order to diagnose and plan the management of disorders relevant to the subspecialty. The fellow should see and be responsible for approximately 2000 cornea and external disease patients to allow necessary experience.

The fellowship program should focus on the following specific areas:

1. Fundamentals of anterior segment anatomy, chemistry, physiology microbiology and wound healing with focus on the ocular surface, including eyelid function, tear formation and function, corneal

topography/tomography, endothelial cell function, and maintenance of corneal clarity.

2. Basic principles of genetics and immunology, including autoimmunity and pathologic responses of the anterior segment.
3. Principles of anterior segment pharmacology (eg, antimicrobial, anti-inflammatory, ocular hypotensive, anesthetics, viscoprotective, immunosuppressive agents, chemotherapeutic, and growth factors), with emphasis on bioavailability, mechanism of actions, relative efficacy, safety, and potential complications. The fellow should be able to formulate fortified antibiotics and antifungal medications.
4. Mastering examination techniques, including biomicroscopy, vital stains of the ocular surface, and special diagnostic testing (eg, specular microscopy, corneal topography/tomography, high-resolution ultrasonography, anterior-segment OCT, confocal microscopy, and corneal pachymetry). In addition, fellows should be familiar with impression cytology, corneal-scraping interpretation of microbiology results, and corneal-biopsy techniques and interpretation.
5. Developmental anomalies of anterior segment, impact on visual developments, and management (eg, eyelid, conjunctiva, cornea, lens, anterior chamber, and iris).
6. Acute and chronic blepharitis to include both infectious and noninfectious etiologies, with emphasis on microbial blepharitis, meibomian gland dysfunction, and rosacea.
7. Disorders of tear production and the lacrimal system, including dry eye disorders both primary and secondary.
8. Acute and chronic infective conjunctivitis (including bacterial, viral, fungal, and parasitic), neonatal conjunctivitis, and chlamydial disease
9. Allergic and toxic conjunctivitis, including vernal, atopic, and seasonal conjunctivitis, giant papillary conjunctivitis, Stevens-Johnson syndrome, toxic conjunctivitis, and conjunctivitis associated with various cutaneous and systemic diseases.
10. Acute and chronic infectious keratitis, including bacterial, viral, fungal, and parasitic, with emphasis on herpes simplex, herpes zoster, adenovirus, acanthamoeba, and contact lens-associated problems.
11. Tumors of the ocular surface, such as sebaceous carcinoma, pigmented lesions, dermoid and choristomas, lymphomas, conjunctival intraepithelial neoplasia, squamous cell carcinoma, vascular and lymphatic tumors.

12. Noninfectious inflammatory diseases of the cornea, including marginal keratitis, interstitial keratitis, keratitis associated with various collagen vascular diseases, Mooren ulcer, epitheliopathies (ie, superficial punctate, filamentary, recurrent erosions, neurotropic), and endotheliopathies.
13. Anterior segment anomalies, including various anomalies associated with specific genetic abnormalities, corneal dystrophies, and corneal degenerations.
14. Autoimmune and immunologic diseases of the anterior segment, including allergy, corneal graft rejection, and cicatrizing conjunctivitis; and familiarity with oral and topical immunosuppression and anti-allergy medications.
15. Pathophysiology and management of allograft rejection, including limbal stem cell rejection, corneal graft rejection, and graft-versus-host disease.
16. Diseases of the sclera, including episcleritis, various forms of immune-mediated scleritis, and infective scleritis.
17. Assessment and emergency management of anterior segment trauma, including chemical, thermal, and mechanical injuries.
18. Fundamentals of preventative, nutritional, and community acquired eye care (eg, vitamin A prophylaxis, trachoma prevention, onchocerciasis).
19. Skill in anterior-segment surgery, including eyelid, conjunctival, scleral, and corneal procedures, with emphasis on corneal protective procedures (eg, tarsorrhaphy), conjunctival or amniotic membrane grafts, reconstruction of the ocular surface, surgical management of corneal erosions, and phototherapeutic keratectomy.
20. Skill in penetrating and lamellar keratoplasty, including full thickness transplant and selective transplantation, including endothelial keratoplasty and anterior lamellar keratoplasty, with emphasis on patient selection, surgical technique, and postoperative care. This should include recognition and management of graft rejection and endophthalmitis. The fellow should have knowledge of different techniques of keratoprosthesis surgery.
21. Fundamental knowledge of contact lens physiology, design, and materials; and complications for both cosmetic and therapeutic use.
22. Medical and surgical management of corneal thinning and perforation, including techniques of pharmacological manipulation; and office procedures such as application of tissue glue and therapeutic contact lenses.
23. Medical and surgical management of complications of intraocular lenses (IOLs), including but not exclusive to, dislocated IOLs, suturing IOLs, iris

suturing, and visual aberrations; and complications related to single vision and multifocal IOLs.

24. Skill in use of reference material, including electronic searching and retrieval of relevant articles, monographs, and abstracts.

## **B. Didactic Components**

The fellow should exhibit scholarly activity by participating in research and clinical conferences, or their equivalent, for at least the minimum number of hours needed per year to demonstrate competence in the subject. Scholarly activity should consist of:

1. Didactic instruction, seminars, lectures, basic science courses, and hands-on skill courses.
2. Active engagement in at least 1 research project during the fellowship year or be lead author of 1 peer-reviewed publication or presentation at a nationally recognized meeting in corneal and external disease within 1 year of fellowship completion.

When applicable, corneal fellows will participate in the teaching programs of the cornea service and of the institution, if the fellowship is affiliated with a teaching institution or that may be obtained in an exchange program.

1. Attendance at weekly grand rounds or similar venue. The fellow is to actively participate in case presentations and discussions of patients with corneal and external disease.
2. Attendance at monthly morbidity, pathology, and complications conferences.
3. Attendance at lectures on corneal topics given by the faculty during the resident teaching program. These should include at least 6 lecture hours per year. The fellow must prepare and present at least 1 of these lectures.
4. Attendance and participation in courses on anterior segment surgery, corneal transplantation, external disease, and refractive surgery.
5. The fellow should actively participate, along with the cornea faculty, in a journal club at least quarterly. The fellow and faculty should present and critically discuss selections from the current literature.
6. The fellow should attend local and regional conferences relevant to corneal and external disease surgery.

### **C. Supervision**

1. Faculty should be available to supervise fellows as they examine and treat outpatients and inpatients. They should be available for consultation, assistance, and review of the patients. The supervision should be direct for the majority of encounters. Direct faculty supervision occurs when the faculty reviews the findings with the fellow prior to the patient leaving the clinic or being discharged from the hospital.
2. The faculty should participate as primary surgeon or assistant surgeon to the fellow in a sufficient number of surgical procedures to confirm the fellow's surgical judgment and skill.
3. It is recommended that fellows perform a sufficient number of procedures to achieve competence.
  - a. To gain further competency, the fellow should be the assistant surgeon for at least the minimum number of surgeries needed to demonstrate competence.
  - b. The fellow should be the primary surgeon for at least the minimum number of surgeries needed to demonstrate competence.
  - c. Receive instruction and develop surgical proficiency in both full thickness penetrating keratoplasty and selective endothelial keratoplasty;
  - d. Actively participate in the postoperative management in the majority of grafts where he/she is part of the surgical team;
  - e. Have sufficient experience with other surgical procedures, including pterygium excision with graft, corneal and conjunctival biopsies.
  - f. Participate in the surgery of more complex conditions, including extensive conjunctival reconstruction, amniotic membrane transplantation, lamellar keratoplasties, and limbal stem cell transplantation

### **D. Duty Hours and Conditions of Work**

Duty hours and night and weekend call for fellows should reflect the concept of responsibility for patients and provide for adequate patient care.

### **E. Scholarly Activity**

The fellowship should take place in a scholarly atmosphere where resources are available that allow the fellow to participate in scholarly activities. Fellows should participate in the development of new knowledge and evaluate research findings. The responsibility for establishing and maintaining an environment of

inquiry and scholarship rests with the faculty. While not all members of the faculty must be involved in research, the staff as a whole should demonstrate broad involvement in scholarly activity. This activity should include:

1. Active participation of the faculty in clinical discussions, rounds, and conferences in a manner that promotes a spirit of inquiry and scholarship. Scholarship implies an in-depth understanding of basic mechanisms of normal and abnormal states and the application of current knowledge to practice.
2. Active participation in regional or national professional and scientific societies, particularly through presentations at their meetings and publications in peer-reviewed journals.
3. Participation in research leading to peer-review publications or presentations at regional and national scientific meetings.
4. Adherence by faculty and fellows who participate in research to the Declaration of Helsinki on Rights of Research Human Subjects and to the Association for Research in Vision and Ophthalmology's Guidelines for Use of Research Animals.

#### **F. Fellow Research Activities**

The fellow should be exposed to opportunities to develop research skills. A specific block of time may be set aside for clinical or laboratory research.

## **VI. EVALUATION**

There should be regular evaluation of the fellow's knowledge, skills, and overall performance, including the development of professional attitudes consistent with being a physician.

The program director, with the participation of members of the faculty, shall:

1. At least quarterly review the surgical log and evaluate the knowledge, skills, and professional growth of the fellow.
2. Communicate each evaluation to the fellow in a timely manner.
3. Advance each fellow to positions of higher responsibility on the basis of evidence of their progressive development of knowledge, skills, and professionalism.
4. Maintain a permanent record of evaluation for each fellow.

The program director should maintain a written, final evaluation for each fellow who completes the program. The evaluation should include a review of the fellow's performance during the period of training and should verify that the fellow has demonstrated sufficient professional ability to practice competently and independently. This final evaluation should be part of the fellow's permanent record maintained by the fellowship director.

#### Reference:

#### ICO Subspecialty Curricula Development Project

#### **Recommended Readings**

1. Basic and Clinical Science Course. Section 8: External Disease and Cornea. San Francisco: American Academy of Ophthalmology, 2010.
2. Krachmer JH, Mannis MJ, Holland EJ. Cornea: Fundamentals, Diagnosis, and Management 3 ed. Mosby Elsevier, 2011.
3. Yanoff N, Duker JS. Ophthalmology 3 ed. Mosby Elsevier, 2009 (Chapter 4).
4. Friedman NJ, Kaiser PK, Trattler WB. Review of Ophthalmology. Elsevier Saunders 2005, Philadelphia. Pp 197-234.
5. Vajpayee RB. Corneal Transplantation 2nd edition. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
6. Coster D. Cornea (Fundamentals of Clinical Ophthalmology Series). Blackwell Publishing Limited.

#### **Recommended Websites**

1. American Academy of Ophthalmology EyeWiki Cornea/External Disease  
[http://eyewiki.aao.org/Category:Cornea/External\\_Disease](http://eyewiki.aao.org/Category:Cornea/External_Disease)
2. University of Arizona Hereditary Ocular Disease  
<http://disorders.eyes.arizona.edu/>
3. University of Iowa Hospital and Clinics Eye Rounds  
<http://webeye.ophth.uiowa.edu/eyeforum/atlas/indexes/Cornea.html>
4. University of Iowa Hospital and Clinics Eye Rounds – Case Presentations  
<http://webeye.ophth.uiowa.edu/eyeforum/cases.htm> (Cornea and Anterior Segment tab)
5. Columbia Digital Reference of Ophthalmology Cornea and External Disease  
<http://dro.hs.columbia.edu/ced1.htm>
6. Online Journal of Ophthalmology Atlas of Ophthalmology - Cornea  
<http://www.atlasonline.com/atlas/folder.jsf?node=922&locale=en>

#### **Periodicals:**

- Cornea Journal
- Journal of Cataract and Refractive Surgery
- The Journal of Cornea and External Disease
- American Journal Of Ophthalmology
- British Journal Of ophthalmology
- Ophthalmology