

**The following sections describe the Clinician—Scientist Training program in detail. Those who wish to begin the planning and application process after reading this material should contact Harry Quigley, MD, Principal Investigator of the K12 program (410 955 2777, or, [hquigley@jhmi.edu](mailto:hquigley@jhmi.edu)).**

**a. Career Development Program: Overview**

The Wilmer Ophthalmological Institute, founded in 1929, is the Department of Ophthalmology, Johns Hopkins University School of Medicine. It has 100 full-time faculty members engaged in research and is one of the top awardees for federal research support. Total research support from federal, non-profit, and private sources totaled \$13 million in direct costs in fiscal 2007. The Wilmer Institute has been recognized nationally in the U.S. News and World Report survey and by vote of its peers as a premier ophthalmic teaching center in the United States, and its training and research programs are voted at the top of Ophthalmology departments in national surveys of Chairs of Ophthalmology departments. Patient-oriented research training for MD and PhD students has been an important goal for Wilmer. This is particularly important since clinician-scientists are an increasingly smaller proportion of those conducting research and successfully competing for federal research support. To demonstrate our commitment to research training, Wilmer developed its Clinician--Scientist Training Program (CSTP) to produce the next generation of clinician--scientists.

The Wilmer CSTP provides a framework for the substantial commitment of our faculty and department to clinician--scientist training. We have an established record (documented below) for the development of multidisciplinary research training programs for clinician—scientists that provide the most innovative and effective approaches to the understanding of the epidemiology, pathogenesis, and therapy of visual disorders. Each program has an integrated mentor group, exemplifying the diversity of expertise available among our research faculty, with didactic learning experiences in courses given in the Johns Hopkins School of Medicine and Bloomberg School of Public Health. Research subjects have included all of the ocular diseases that represent high priorities for the National Plan of the National Eye Institute. Several past trainees have attained masters and doctoral degrees during their mentored training. Our track record in producing full-time academicians who achieve NIH funding after their K awards is superior (see below).

Each trainee will spend 2-4 years in a multidisciplinary research training experience that includes didactic instruction appropriate to the area being studied, research experience with a mentor team, and an environment that seeks to nurture skills in human research ethics and methodology, along with practical skills in achieving funding and collaboration with appropriate peers.

**b. Recruitment Plan and Selection Process**

**Advantages of Wilmer K12 Program**

- 1. Improves recruitment of candidates**
- 2. Provides information about K awards more effectively**
- 3. Improves recruitment of faculty mentors**
- 4. More effectively matches mentors and mentees**
- 5. Places time of acceptance prospectively**
- 6. Experienced, ongoing committee oversight**
- 7. Central management of training issues by PI**

As detailed below, Wilmer has trained clinician-scientists for the last 20 years under a continuous training program using the NIH K award mechanism. We therefore benefit from a national reputation as a training site to attract mentees. However, in our experience, there is not enough information in the hands of potential young investigators about the availability of this career path, the sites for training, and the particular advantages of the K award system. Indeed, while individual K awardees were always found in small numbers, **one important advantage of having a Departmental commitment to clinician-scientist training under a K12 grant is to provide an organizational system that makes training available much more effectively to the potential candidate.**

**Our K12 program improves recruitment of candidates over the individual K award approach .** An individual faculty member has only a limited ability to advertise the training that he/she offers, whereas the K12 program provides a comprehensive view of all training possible at a Department, cohesively presented to potential trainees on behalf of the group. Many potential candidates have no real information about this career path and come from institutions where there are no mentors who exemplify the clinician-scientist role to which they aspire.

**The second reason our centralized K12 program is advantageous over individual K awards alone is in providing initial information to potential trainees when they make first contact.** This is often a personal approach at a meeting, an email sent to Dr. Quigley, or a telephone call. By having a centralized departmental person for contact, the trainees know the key person to call to begin a daunting process. Furthermore, the half hour telephone call that Dr. Quigley has had with many potential candidates allows the candidates to learn quickly the overview of the program, its breadth, how they can begin the process of identifying a subject for training, research methods that they wish to learn, and how to contact faculty who could serve as potential mentors. In some cases, these initial contacts with faculty by the candidate are not fruitful, and other faculty members are suggested as possible mentors by the PI or advisory committee. In other cases, the candidate is referred to a different institution that has a K12 program with more appropriate faculty mentors for the needs of that candidate. We have found that the initial barrier of learning how to start a K program is a major reason that fewer than the desired number of candidates begins the process. The written material is sent to each inquiring candidate on how to apply for our program. We make it clear in every conversation and advertisement that there is an Institutional Commitment to diversity in our training programs and that underrepresented minorities, women and the disabled are actively encouraged to apply. Since 2006, Johns Hopkins University School of Medicine has required all faculty to participate in a course on diversity.

**The facilitated inclusion of new faculty and a wider mentor group is a third particular strength of our K12 program as opposed to individual awards.** While faculty members who have mentored a past K awardee understand the application process and the mentoring relationship, we found that we could involve a wider range of faculty members in mentor groups, including particularly those from departments outside Ophthalmology, to achieve the fullest training experiences. All of our present K12 mentees have at least one non-Ophthalmology faculty member mentor. By observing which mentor groups have been successful (or not), our committee makes it more likely that a successful training program is constructed with input from faculty members who may not even have worked together before within the institution.

**Fourth, the K12 Advisory Committee serves as a conduit for interactions between candidates and mentors, which has proven to be very important in maximizing the quality of training.** During the application process, the Advisory Committee strongly recommends to candidates that they communicate with potential mentors and construct a draft K application, for submission as an individual K08 or K23. This draft serves as the centerpiece of our recruitment approach. A candidate goes through the steps of finding a potential mentor group, identifies training areas needed, lists courses to be taken in the didactic portion of training, and writes the full application. This allows candidates to determine their level of interest and to ascertain the availability of courses, programs, research projects, and collaborative mentors. Simultaneously, these preliminary interactions allow faculty to assess the likelihood that the candidate will be an appropriate match for training. Furthermore, once the application is written, it can be submitted as an individual K proposal. This application is refined by those accepted into the K12 program so that they can and do continue to submit individual K award applications. Our first K12 mentee during the last grant period moved from the K12 to a K08. However, for the typical candidate, who is applying in the final year of residency or the last year of fellowship, the individual application is not funded (or not) until one month prior to the start date. For many trainees, this uncertainty is too great a risk, as other job possibilities have been foregone, and dual career choices need to be made for partners/spouses well prior to this time. **Thus, the fifth advantage of the K12 approach is that we can accept the candidate for a position in the Fall, 7-8 months prior to the start date, taking this uncertainty out of the decision to apply.** And, the individual K award application may still be submitted for funding.

Each year, we have from 2-5 final written K applications for committee selection each year. This ensures that at least one new candidate per year is likely to benefit from training, either under the K12 or an individual K08 or K23. The CSTP Advisory Committee selects the new trainee after reviewing all applicants. The committee membership is described in detail below. Candidates are selected once per year in October,

typically to begin in the following July. During the application process, faculty members who will serve as mentors for a candidate communicate with the committee in both written and personal format about the candidate and program. The Advisory Committee serves to assure that the limited percent clinical effort does not expand to interfere with research training. This can be a difficult without committee oversight. Our candidates and their clinical divisions benefit from clear and non-negotiable hours for patient care duties, so that these do not impinge on training. Without the oversight of a K12 Advisory Committee, it can be difficult for a mentee to prevent encroachment on research time by senior clinicians, who control many aspects of their academic life and who may also be part of their mentor group. Members of the Advisory Committee who are to serve as mentors for a particular candidate are recused from voting on that application. While an individual mentor for an individual K award might have had only limited experience to evaluate a candidate, **the K12 approach has the strength that an experienced committee that deals with such training projects regularly can make a more informed decision and provide more experienced advice prior to the initiation and funding of a K experience (thereby representing advantage #6 of the K12 over individual awards).**

Between the acceptance of an applicant in October and the start of the program in July, the Advisory Committee and its administrative staff offer help to the candidates in a variety of important issues. These include the establishment of salary and benefits based on the percent effort allocated to research and clinical activities, assignment of appropriate office space, assistance in housing, information on initial courses that are required in ethics, animal or human research, electronic systems, and privacy regulations. **The fact that there is a knowledgeable, central office to handle these issues is a great advantage to mentors—allowing them to concentrate on research training instead of financial and administrative tasks (advantage #7).**

**c. Research Activities Available to K-mentees in the Wilmer CSTP**

Candidates for the Wilmer CSTP Program have access to Lead Mentors both within the Wilmer Institute and at other areas of the Schools of Medicine and Public Health. To illustrate the breadth of patient-oriented and laboratory research programs within the Wilmer Institute, the following is a list of research groups and their faculty leaders:

<b>Group</b>	<b>Lead Mentor</b>	<b>Team Members</b>
Biomedical Engineering	Ran Zeimer	Q Nguyen
Clinical Trials and Biometry	Neil Bressler	O Schein
Cornea Research	John Gottsch	A Jun, S Chakravarti, O Schein
Epidemiology (Dana Center)	Sheila West	H Quigley, D Friedman, E Gower, J Katz, J Tielsch
Experimental Pathology	Gerard Lutty	H Quigley, M Tso, C Eberhardt
Glaucoma	Harry Quigley	H Jampel, D Friedman, D Zack
Low Vision	Robert Massof	J Goldstein, G Dagnelie
Neuroscience	Jeremy Nathans	N Miller, P Hoffman
Ocular Genetics	Don Zack	J Gottsch, S Chakravarti
Ocular Immunology	Jennifer Thorne	JP Dunn, R Weinberg
Pediatric and Strabismus	David Guyton	M Repka, K Simons
Retinal Molecular Biology	Donald Zack	Peter Campochiaro, Elia Duh, V Canto-Soler, S Merbs
Retinal Disease Models	Peter Campochiaro	D Zack, S Viores
Retinal Clinical Studies	Quan Nguyen	N Bressler, P Campochiaro, J Handa
Vitreoretinal Disease	James Handa	P Campochiaro, G Lutty, Q Nguyen, P Gehlbach, E Duh

Potential candidates for mentored training by our Department use this list as a starting point to match with their areas of interest. Each of these lead mentors and their groups have one or more R01 grants supporting their work, and many have other NIH and private foundation funds to provide a basic framework on which mentored training is supported.

When a potential candidate begins discussion through the K12 Chair, Dr. Quigley, he/she is put in touch with the lead mentor(s) that seem best to fit with the theme of research that is desired. The lead mentor and mentor group then discuss with the candidate their ongoing funded work, as well as the methodologies that are ongoing that could be learned by the candidate. Specific ideas for research that supplements ongoing work are

generated; or, in some cases, entirely new specific aims are generated by synthesis of more than one mentor's laboratory efforts to produce a training experience that is compatible with the candidate's potential.

The time between selection in the Fall of the year prior to beginning and the commencement of training allows a finalization between the candidate and mentor group of the detailed plan for the initial year of training and an overall plan. Formal didactic courses are applied for during the months prior to arrival. All trainees accomplish required coursework, and in addition, take a variety of courses relevant to their individual research training plan. The required coursework for all participants includes: 1) one course in Federal regulations on human subjects research and bioethics; 2) instruction in scientific integrity (conflict of interest, responsible authorship, policies for handling misconduct); 3) training in the responsible conduct of human and animal research; and 4) biostatistics and data management, including study design, analysis, and security of data records. These required areas are selected by participants from the catalog of the School of Medicine and School of Public Health, as approved by the mentor and Advisory Committee. In addition to the required didactic coursework, a variety of courses have been useful to our trainees. These are selected with the advice of the mentor and Advisory Committee. For some candidates, it is appropriate to take specific coursework that is included in the Visual Neuroscience Training Program (described below). Others have matriculated for specific advanced degrees (MPH, MHS, PhD).

**Based on experience with more than 20 K awards (K08, 12, 23, and 24), Dr. Quigley and the Advisory Committee subscribe to the following guidelines in planning and oversight of K training.**

- **Plans should begin 1 year before the K award starts (the type of training, courses, apprenticeship at the "bench" (even when the bench is a computer or a clinical imaging instrument), and off-site learning.**
- **The plan during its first year is often mostly course work or methodology to be learned.**
- **Plans for years 2-4 should include goals for productivity and the writing of an initial R01, R03, or R21 proposal that will follow the K award.**
- **Plans at year 3 should include a plan for transition to faculty status at this or another institution. If the latter, specific plans to assist in finding a job should ensue.**
- **The future research program of the trainee should be specified and an agreement to coordinate or differentiate it from that of the mentor group should be planned.**

Mentors are approved by the Advisory Committee, taking into consideration that they must have a demonstrated commitment to the time and resources needed for training. Specific research projects should depend upon the training objectives, not upon what work the mentor wishes to accomplish in his/her lab. On the other hand, mentees should be willing to defer to the mentor(s) on research subject matter, particularly when their favorite idea is impractical. Individual meetings on a regular basis of the mentor(s) and mentee should occur and reports of these sessions to the Advisory Committee made. A full annual review of each K program is made by the Advisory Committee, with separate meetings with mentee and mentors, written evaluations, and summary suggestions by the Committee for improvement or change (see Appendix).

Mentees are fully informed of their required behavior to continue K12 training, including what they are expected to learn, and how they report progress to the mentor, department and NEI. They are given productivity goals to use protected time effectively. The program gives many incentives for career development, but the requirement for intense productivity is real. A low work ethic requires immediate recognition and remediation. The vast majority of time on a K award is training, not unrelated clinical activity and the limit on clinical activity must be clearly and fairly enforced. In our experience, this presents no hardship to maintaining clinical expertise. Our several K awardees find it useful to meet and to compare notes on successes and problem solving. Both mentees and mentors are given direct access to the Advisory Committee to complain about failures of their program to achieve its goals. Our experience is that no training program functions perfectly without active management.

K awardees have faculty status, but are also trainees, so it is useful to co-sign a letter at the start of the program that the appointment is reviewed annually and that any permanent faculty position is dependent upon satisfactory progress in training as judged by the Department Chair, advised by the Advisory Committee. The salary is discussed prior arrival and should not be disproportionately more or less than other junior faculty members with similar experience.

We mandate ongoing oversight, since conflicts between mentors and mentees are not only likely, but inevitable. Intelligent, obsessive people placed in close proximity where the stakes are high will generate the need for mediation in a constructive manner. Issues that often require attention are: space allocated to trainee, secretarial/technical support, and how budgeting is accomplished. Annual goals include peer-reviewed publication, presentation of research findings at local and national meetings, and grant proposal writing. The Advisory Committee's use of periodic review to perform evaluation and mediation has substantially improved our K training programs (examples of advisory letters are included, Appendix).

An example of a successful application from past mentee Michael Boland is in Appendix. It illustrates the team of mentors exhibiting a multidisciplinary set of training goals, includes specific didactic coursework, and involves mentors from both the Department of Ophthalmology and Medicine to illustrate the scope of our mentorship. All of these goals were accomplished during his 4 years

**d. Ongoing Activities: Progress Report**

**d1. Progress in K training: K08, K23, and K12**

For 20 years, the Wilmer Institute has carried out clinician -scientist training under both NIH-funded K awards and through private and foundation-supported programs. The track record of these programs illustrates our faculty commitment to this process. **Our clinician—scientist (K award) program trained 29 persons from 1987 to 2009, 3 persons are presently engaged in individual K awards, and 3 have K awards through our K12 grant continuation.**

**The clinician-scientists who have completed training in our program now hold full-time faculty positions as clinician—scientists here and at other institutions as indicated below. *Of those whose K awards were completed more than 2 years ago, 12 of 13 (92%) have achieved NIH funding as Investigators of R series grants, 9 of these as Principal Investigator.***

**d1a. Track Record of Past Wilmer K08 or K23 Awardees**

<b>Name</b>	<b>K award</b>	<b>K training years</b>	<b>Present Position</b>
Richard Semba Grants:	K11 EY 00286 R01 HD32247 (1995-03); R01AI41956 (1998-03); R01 DA15022 (2001-5); R03 NR09478 (2004-7)	1987-92	Professor, Johns Hopkins
Jonathan Javitt No funded NIH grants	K11 EY 00285	1987-92	Faculty, Johns Hopkins
Charles Weitz Grants:	K11 EY 00289 R01 MH059943 (1999-05); R03 EY013824-02 (2001-3); R01 NS043491-04 (2002-7)	1988-93	Assoc Professor, Harvard
Don Zack Grants:	K11 EY 00297 R01EY009769 (1992-02); R01EY013357 (2001-5); R21EY017155 (2006-8); U10EY010364 (1994-02)	1988-93	Professor, Johns Hopkins
Stuart McKinnon Grants:	K08 EY 00361 R01EY016516 (2005-10)	1996-2001	Assoc Professor, Duke University
David Friedman Grants:	K23 EY 00358 R01EY013460 (2001-4)	1996-2001	Professor, Johns Hopkins
Shannath Merbs Grants:	K08 EY 00378 R01EY09769 (2005-8) (co-investigator)	1996-2001	Assoc Professor, Johns Hopkins
Patrick Tong Grants:	K08 EY 00362 R03EY13744 (co-investigator)	1997-2002	Asst Professor, Johns Hopkins

Elia Duh	K08 EY 00398	1998-2003	Asst Professor, Johns Hopkins
Grants:	R03EY014136 (2003-5), R01EY018138 (2007-2012)		
John Kempen	K23 EY 00386	1998-2003	Asst Professor, U Pennsylvania
Grants:	R01EY014943 (2004-8)		
Mark Walker	K08 EY 00400	1998-2003	Asst Professor, Johns Hopkins
Grants:	RO1 HD040289 (co-investigator) 2006-11		
Kang Zhang	K08 EY 00401	1998-2003	Assoc Professor, U Utah
Grants:	R01EY014428 (2002-6); R01EY014448 (2003-8)		

**d1b. Recently completed K08 or K23 award candidates at Wilmer**

Ronald Farkas	K08 EY 00416	2000-2005	Staff Scientist, F.D.A.
John Kerrison	K08 EY 13946	2002-2005	private practice
Peter Gehlbach	K08 EY 13420	2001-2006	Assoc Professor, Johns Hopkins
Grant:	co-investigator: R01 007969		
Quan Nguyen	K23 EY 13552	2001-2006	Asst Professor, Johns Hopkins
Grant:	R01EY017577-01		
Elizabeth Bradley	K23 013844	2002-2007	Asst Professor, Mayo Clinic
Jennifer Thorne	K23 013707-05	2002-2007	Assoc Professor, Johns Hopkins
Grant:	co-Investigator RO1EY014943(2004-8), Medical officer, co-Investigator in MUST Trial U10EY014655 Deputy Director of SOCA Coordinating Center U10 EY08052		
Roy Chuck	K08 000412	2002-2007	Chairperson, Ophthalmology, Albert Einstein
Nael Al-Abdulla (Neal Adams)	K08 015191	2002-2007	Chairperson, Ophthalmology, Texas Tech
Howard Ying	K12	2004-2008	Assistant Professor, Johns Hopkins
Grant:	R01 NEI EY019347		
Michael Boland	K12	2005-2009	Assistant Professor, Johns Hopkins
Grant:	Microsoft Healthvault grant program		

**d1c. Present Wilmer K08 or K23 awardees**

**d1c1. Albert Jun K08 015523 (2005-2009)**

Role of Collagen 8 A2 in Fuchs Corneal Dystrophy (Mentors: Shukti Chakravarti, John Gottsch) This proposal studies the cellular and extracellular matrix protein abnormalities caused by mutations in collagen VIII that may lead to corneal endothelial cell loss in Fuchs endothelial dystrophy. It will develop and characterize a mouse model of Fuchs dystrophy by introducing the R155Q COL8A2 mutation using gene targeting

techniques. It investigates the effects of COL 8 A2 mutations known to cause Fuchs on homotrimer and heterotrimer formation with Col 8 A1. An R01 application is being submitted for further laboratory research in this area.

**d1c2. Ava Kiser PhD K23 018356 (2008-2012)**

Training in Clinical Trials for Subjects with Low Vision. The primary aim is to train as an independent clinician- scientist, capable of performing high-quality clinical research in low vision through a mentored research project and didactic coursework leading to a PhD in Clinical Investigation, under mentor Robert Massof. Two related areas of research are studied: 1) psychological evaluations and stress reduction interventions for those with chronic disease; and 2) clinical trials, including data analysis statistics, study design and methodology. The candidate's research goals include the conduct of clinical trials in low vision and other interventions in visually impaired patients. Short term research aims are to determine whether fluctuations in visual acuity, contrast sensitivity and visual field among retinitis pigmentosa (RP) patients are associated with perceived stress or negative mood states, accomplished with at home PC-based questionnaires and vision tests, self-administered by the subjects. It will assess the impact of light exposure, sleep, and lab-induced psychosocial stress upon vision tests, including a clinical trial to alleviate these factors in RP patients by stress reduction.

**d1c3. Lori Grover OD K23 017615 (2008-2012)**

A Model Transdisciplinary Health Care Team for Low Vision Rehabilitation. The candidate has developed a program of research and training goals to accomplish the primary objective of becoming an independent investigator in low vision rehabilitation and related health fields. This program combines formal didactic education in the Bloomberg School of Public Health with clinical research under the mentorship of Dr. Robert Massof. Additional guidance will be provided by Dr. Kevin Frick, a health economist, and Dr. Lawrence Wissow, a health behaviorist, both at the Hopkins School of Public Health. The proposed research project will use the panel of experts, the Low Vision Rehabilitation Network, and the computer resources assembled by Dr. Massof for his research. The scientific objective of this proposal is to address a priority unmet need in low vision rehabilitation research. This project is focused on the development, training, and evaluation of a model transdisciplinary health care team that maximizes the functional outcomes of the elderly low vision patient.

**d1d5. Jennifer Sung MD K 12, appointed, 7/1/06—6/30/2010**

The awardee has devoted time to bench laboratory method acquisition, including probes for *in situ* hybridization, breeding transgenic mice, and developing models for oxidative damage. She added Seth Blackshaw, PhD., as a collaborative mentor for this work to Drs Campochiaro and Snyder. Coursework carried out included: Biostatistics and Epidemiology (Hopkins School of Public Health) and the Core Ethics Course (Johns Hopkins University). She attends regular laboratory meetings with co-mentor Drs. Campochiaro and Snyder, reviewing research plan, grantsmanship, and career development. She has participated in research conferences at Wilmer including Journal Club, Friday Afternoon Research Meetings, Tuesday research seminars, and the Visual Scientist Training Program. She was inducted into The Retina Society in October 2006. Dr Sung spends 80% effort in research training and 20% in patient care. Further training will be obtained during 2008-09 in electroporation and retinal cell culture. **The awardee has written and been funded as a Center Grant module investigator to Foundation Fighting Blindness.**

**d1d6. Pradeep Ramulu, MD PhD, K12 appointed 7/1/07—6/30/2011**

Dr Ramulu completed the coursework for the MHS degree in Clinical Investigation through the Johns Hopkins School of Public Health, including a 3 quarter Epidemiology series, a 4 quarter Biostatistics series, 2 courses on Research Ethics, formal coursework on paper and grant writing, and others in clinical research methods. Dr. Ramulu is utilizing the Salisbury Eye Evaluation (SEE) database to study functional loss related to glaucoma and multiple papers are in press from this work. In the second year, Dr. Ramulu has begun 2 clinical trials related to the impact of visual field deficit on functional capacity and to define conditions associated with changes in reading performance in subjects with glaucoma. **He was awarded research funding from the Glaucoma Research Foundation for study of reading impairment in glaucoma**

**subjects and an American Glaucoma Society Physician Scientist research Award. He was awarded a \$100,000 grant from Alcon, Inc. to study functional loss in glaucoma patients.**

**d2. Research Environment and Institutional Commitment of Specific Research Areas at Wilmer related to K12 CSTP program**

**d2a. Internal Wilmer Research Groups (representative examples selected)**

**d2a1. The Division of Ocular Immunology** specializes in research and clinical patient care of patients with uveitis. The group is headed by Senior Scientists JP Dunn, Richard Semba, and Jennifer Thorne, the latter two being past K awardees in the Wilmer program, as was John Kempen (now faculty at University of Pennsylvania). The group holds several NIH -funded grants, including leadership roles in epidemiologic studies and multicenter clinical trials. Approximately 90% of patients with HIV- related ocular disease and other immune-mediated ocular disorders in the Baltimore metropolitan area are managed here, providing outstanding opportunities for clinical research. A database of all AIDS patients has been maintained for 15 years. The Division of Ocular Immunology has weekly administrative and educational meetings in which K awardees are both presenters and participants.

**d2a2. The Dana Center for Preventive Ophthalmology** is a joint undertaking of the Wilmer Institute and the School of Public Health to bring a public health approach to the prevention and control of blindness in the U.S. and around the world. Activities include research, training, and development/implementation of blindness control programs. The center conducts research on the epidemiology and control of eye diseases both domestically and internationally. Faculty epidemiologists and biostatisticians include Drs. Sheila West, Oliver Schein, Beatriz Munoz, David Friedman, Emily Gower, and Harry Quigley, as well as Drs. Joanne Katz and James Tielsch (at the School of Public Health). The Center houses Wilmer's Biostatistical Core Facility. Numerous observational and interventional epidemiologic studies are ongoing on a variety of domestic and international topics. Notable studies include elucidation of the role of Vitamin A in the prevention of blindness and early childhood mortality, cataract surgery outcomes studies, numerous eye disease surveys in several countries, development of reproducible systems for grading cataract, xerophthalmia, trachoma and glaucoma for epidemiologic research; development of a community-based intervention strategy to prevent trachoma; and population- based assessment of the functional impact of vision loss in elderly persons in a U.S. community (Salisbury, Maryland). The Gates Foundation has made a \$10 million grant to the Dana Center for eradication of trachoma. The Dana Center is a World Health Organization Collaborating Centre for the prevention of blindness. Trainees who choose mentored research in this area have received both MPH and PhD degrees in health sciences, epidemiology and international health, including David Friedman, Lydia Giardano and Michael Boland (under the present K12).

**d2a3. The Ocular Genetics Group**, led by John Gottsch, Shukti Chakravarti and Don Zack, provides opportunities for clinician—scientists to develop skills in methods of genetic analysis of ocular diseases, matched by training in epidemiological methods. In combination with our Retinal Development and Retinal Molecular Biology groups, training experiences have been developed in the manifestations of retinal disease, corneal degenerations, and glaucoma. Studies by this group have defined the genetic disorder of color vision in a Pacific Island group (Pingalap Island), identified markers associated with Fuchs corneal dystrophy, and identified relationships between abnormalities of ocular development and specific gene defects. A present K08 trainee, Dr Albert Jun is studying the genetics of corneal dystrophy with this group.

**d2a4. The Retinal Disease Group**, led by Dr. Peter Campochiaro, has included training programs for several past K awardees, including present K08 and K12 mentees, Neal Adams and Jennifer Sung. Research by this group has pioneered the production of models of retinal neovascularization similar to that in age-related macular degeneration (AMD) in mice. Boasting one of the largest colonies of transgenic mice at Johns Hopkins, they have developed several potential therapies for AMD. Mentor groups based in this area have accessed other department faculty at Johns Hopkins Medical School, including Lasker Award winner Dr. Solomon Snyder, Chair of Neuroscience, and Champalimeau award winner Jeremy Nathans, Professor of Neuroscience and Ophthalmology.

**d2a5. The Glaucoma Research Group**, led by Dr. Harry Quigley, has a broad range of research activities, including laboratory studies in animal models of glaucoma, gene therapy experiments, progenitor cell

experiments with ciliary-derived cells, experimental surgical therapy, epidemiological modeling of disease progression, large database studies of adherence with therapy, participation in multicenter clinical trials (OHTS, CIGTS), development of algorithms for progression measurement in structure and function, and risk assessment and calculation in decision theory. The K programs of Drs Michael Boland and Pradeep Ramulu (K12) include members of the Glaucoma Group, as well as faculty from the Departments of Medicine, and the School of Public Health.

**d2a6. The Retinal Molecular Biology Group**, led by Don Zack, Peter Gehlbach, Valeria Canto-Soler, and Elia Duh studies mechanisms of molecular events related to normal development, as well as outer and inner retinal disease. The methods of gene array, bioinformatics, isolated cell culture, laser capture microdissection, and molecular biological techniques are housed in the Wilmer Molecular Biology Core facility. Dr. Zack has been a significant participant in K training mentor groups for Drs. Stuart McKinnon, Ron Farkas, Peter Gehlbach, and Elia Duh during their training at Wilmer.

**d2a7.** There are several other Wilmer groups listed above that are not described here in detail.

### **d2b. Joint CSTP Training Programs between Wilmer and other Johns Hopkins Faculty**

Trainees in the Wilmer Institute routinely access collaborative, multidisciplinary programs for training throughout the School of Medicine and School of Public Health. Ongoing training experiences are now occurring with the following groups of researchers outside the Wilmer Institute. While it is expected that all trainees will be studying visual disorders as the overlying theme of our CSTP, the associated disciplines of study vary widely and take advantage of the diversity of both the Wilmer faculty and the resources of the Johns Hopkins University to diversify and to enrich our research in vision science.

**d2b1 . The Dana Center Fellowship program** is a multidisciplinary program of the Wilmer Institute that provides training in patient—oriented research centered in the Dana Center for Preventive Ophthalmology at Wilmer. This one -year academic program assists the clinician candidate in acquiring skills in epidemiology, biostatistics, and the specific problems relevant to visual disorders in the world. The Dana Center of the Wilmer Institute and the Hopkins School of Public Health provide an unparalleled setting for realizing the merger of public health and ophthalmology. The Dana Center faculty of ophthalmologists, epidemiologists, and biostatisticians contributes a broad expertise in ophthalmic research, while the School of Public Health offers the perspective of epidemiologic research and community-based action. Trainees enroll in the Master of Public Health degree program required courses and electives, including a specially-designed 2 semester course in ophthalmic epidemiology given by Dana Center faculty, by faculty at the School of Public Health, and by U.S. and international experts in blinding conditions. Each student writes a thesis (“capstone project”) that consists of a protocol for an epidemiologic study of an ocular problem to provide practical application of the principles demonstrated in introductory epidemiology classes. Many projects have served as blueprints for studies that have been carried out. Over 100 students have participated in this fellowship since 1983. Former students have gone on to the following (as examples): became Brazilian representative to the Pan American Health Organization, organized a national blindness survey in Fiji, medical director for Helen Keller International, chief medical officer of Zambia, head of preventive ophthalmic services for South Australia, medical director for Project Orbis, and served as regional director of blindness prevention in a province in India. **Four present Wilmer faculty members were Dana Center fellows**, demonstrating the relevance of this program to the generation of new clinician-scientists.

**d2b2 . The Visual Neuroscience Training Program (VNTP)** is an NIH-funded training grant (EY 07143) based in Wilmer. This multidisciplinary program trains candidates in research in the visual neurosciences as a collaboration of the Departments of Neuroscience and Ophthalmology. It combines research opportunities and a specially designed didactic program headed by Drs. Campochiaro, Connor, Dagnelie, Hendry, Hoffman, Hsiao, Johnson, Kirkwood, Massof, Montell, Nathans, Niebur, Quigley, Sundin, Valle, Von der Heydt, Worley, Yau, Zack and Zee. Disciplines represented among the faculty include molecular biology, cellular and developmental biology, immunology, cellular electrophysiology, experimental pathology, and visual psychophysics. In addition to participation in VNTP didactic courses, students carry out research under the mentorship of one of the faculty members mentioned above and select at least three visual neuroscience courses as part of the six electives required by the Neuroscience Program. VNTP elective courses that illustrate subject matter that is relevant to patient-oriented research are: Cellular and Molecular Biology of Photoreceptors in Health and Disease, Development of the Visual System, Introduction to Visual Psychophysics, Advanced Visual Psychophysics, and Molecular Mechanisms of Sensory Transduction. A

series of seminars by invited speakers is offered as part of the VNTP. Our CSTP Program trainees attend VNTP lectures, and have selected mentors who are participants in the VNTP program.

**d2b3. The Center for Clinical Trials** is a cooperative venture of the Departments of Epidemiology, Biostatistics, and International Health at the School of Public Health, and of the Departments of Ophthalmology, Medicine, and Oncology in the School of Medicine. The goal of the Center is “to promote the use of clinical trials as an evaluation method and to facilitate research and teaching efforts in relation to clinical trials and other studies”. One Center effort toward this goal has been the establishment of the Training Program in Vision Research, one of two such programs in the nation, which has included the training of vision researchers for nearly ten years. This program offers a monthly seminar series, and annual presentations by participants of research in progress. The senior personnel of the Center, Drs. Kay Dickersin and Barbara Hawkins have extensive background in collaborative design, conduct, and analysis of multicenter clinical trials and prospective observational studies (many in vision—related research), including the Diabetic Retinopathy Study, the Glaucoma Laser Trial Followup Study, the Coronary Drug Project, the University Group Diabetes Program, the Childhood Asthma Management Program, and other major trials. Dr Hawkins is a Wilmer Institute faculty member, and is Associate Director of the Center.

**d2b4. The Departments of Epidemiology and International Health**, School of Public Health has long-standing relationships with the Wilmer Institute for CSTP training and research. The former Dean of the Bloomberg School of Public Health, Alfred Sommer, MD, was a Wilmer faculty member and founded the Dana Center for Preventive Ophthalmology described above. He directly participates in training in our PHO program, whose graduates receive the MPH degree. The Department of Epidemiology is the oldest autonomous Department of Epidemiology in the world, with 100 faculty members and post-doctoral students. Wilmer trainees have participated in departmental seminars, and the Division of Chronic Diseases journal club, which meets biweekly. In addition, the School sponsors a large number of special seminars on topics of general public health interest, to which trainees will have access. The Department of Epidemiology (through cross-appointed members of the Wilmer faculty, including Advisory Committee member Dr. Sheila West) offers full access to the academic resources of the School of Hygiene and Public Health and its library. Faculty in International Health has served as mentors in clinician—scientist (K23 and K12) programs based in the Wilmer Institute (Drs. James Tielsch, Joanne Katz, and Sheila West). The interactions possible with these investigators broaden the scope of research to include a large number of patient—oriented health issues of worldwide interest.

**d2b5. The Johns Hopkins Program for Medical Technology and Practice Assessment** is a center with the mission to define clinical, management and policy strategies that will contain health care costs while preserving or enhancing quality of care. To achieve this mission, Program faculty conduct research in technology assessment, analysis of alternative clinical management strategies and practice variations, analysis of health care financing, development and application of methods for measuring quality of care, and use of practice guidelines and medical education to develop strategies for improving health care. The Program places a major emphasis on economic costs and quality of life in addition to clinical outcomes. The Program brings together physicians from a variety of clinical disciplines as well as economists, health services researchers, clinical epidemiologists, and statisticians. These include experts in health policy, decision analysis, and measurement of health status, medical informatics, medical ethics and clinical education. The resulting broad expertise enhances the ability to conduct multidisciplinary research. For many years, the Program and its faculty have collaborated with the faculty and trainees in the Wilmer Institute on a variety of projects. The Program is committed to continuing this highly successful relationship and will serve as a valuable resource for the proposed Mentored Clinical Research Scholar Program. One of the recent past trainees, Dr. David Friedman, conducted an extensive evaluation of the costs and outcomes of cataract surgery in collaboration with this Program.

### **d3. Plans for the next 5 year grant period**

Based on the experience we have gained in the 2 decades of clinician—scientist training under K awards at Wilmer, we have an established record of developing future faculty members in Departments of Ophthalmology. We believe that our approach of selecting new K12 trainees, while encouraging all applicants to apply for individual K08 and K23 funding, can maximize the opportunities at Wilmer for training in the broad spectrum of research areas that we can offer. The changes that we envision will be to rotate faculty members

of the advisory committee, with two members changing each two years, in a manner that brings new ideas to the group, but maintains experience within the Advisory Committee.

**e. Environment and Institutional Commitment/Resources**

**e1. Resources used to encourage the developing research careers of candidates**

Our faculty, both those on the Advisory Committee and mentors, provide extensive time to assist in training and planning for each candidate, well beyond the salary provided to a few mentors to cover percent effort expended. This begins with the first contact with a young scientist inquiring about the possible application for a K award, through introducing mentors to the candidate and scheduling planning meetings, assisting in the writing of a full K award application prior to being considered for our program. Daily work at the bench or in the clinical research area as well as weekly "lab" meetings are a regular commitment of the faculty. Assessments of the K award programs in detail are part of our regular system and require considerable time in interviewing mentors, mentees, meeting with both together, then providing written feedback to them with suggested improvements.

The cost of research performed by each K awardee is provided by the faculty, since it is not covered by the supply money. In many cases, these costs are covered by private donations, foundation support, and the writing of grants to fund the work with the mentee. Laboratory technical help is provided in most labs and further assistance comes from the Department Core Facility grant that has modules useful in nearly all of our K award programs. These include:

**e2. The Biostatistics Core Center of Wilmer**, headed by Sheila West, is a major contributor to research training and productivity at the Institute. With senior biostatisticians serving on its staff, this group participates in training in a variety of ways. It provides didactic lectures during the year to Institute staff. It consults before, during and after the design and implementation of research projects. All K awardees have accessed assistance from the Biostat Core, most recently Dr. Boland during his second year of work.

**e3. The Bioinformatics Core Center of Wilmer**, headed by Don Zack has 3 employees performing data analysis on genomics data (largely gene array outcomes). These experts are available for consultation and data analysis of work in this area. Dr. Adams (K12 then K08) used this Core for work related to his training.

**e4. The Imaging and Microscopy Core Center of Wilmer**, headed by Harry Quigley, has confocal, transmission electron microscopic, inverted microscopic, fluorescence microscopic, and automated image analysis technologies, all of which are available to K trainees where appropriate to their work.

**e5. Office/Equipment/Other Facilities Provided:** Each trainee has been provided with office space, access to computer network access and basic secretarial support through the office of the primary mentor. Salary and benefits assistance and budget management are provided either in the mentor office or in the CSTP PI office. A desktop personal computer is provided for candidate use. The Johns Hopkins Medical Institutions campus offers outstanding electronic and text-based library collections, including the Welch Medical Library, the Lillienfeld Public Health Library, and the Friedenwald Library of the Wilmer Ophthalmological Institute. These libraries contain in their collections virtually every modern journal or text (both on-line and in print) and those not available on site can be obtained through inter-library loan.

**e6. Lecture Presentations:** We feel every developing scientist benefits from the opportunity to present their work at a variety of venues, and to that end, all present orally to their individual laboratory or clinical research groupings several times per year. In addition, all are required to present work by the second year of training at both Wilmer meetings and at national meetings. These include a weekly Wilmer research meeting the Friday Afternoon Research Meeting (FARM) and the annual Wilmer Research Meeting. All of our K awardees will present material at ARVO this year and will also give presentations before national sub-specialty meetings (Dr Sung to the Retina group and Dr. Boland to the American Glaucoma Society). Mentors and Advisory Committee members review these talks prior to their being given and give post-presentation feedback to improve communication skills.

**f. Program Management:**

**f1. CSTP Director**, Harry A. Quigley, MD, is the A. Edward Maumenee Professor of Ophthalmology, Director of Glaucoma Services and Director of the Dana Center for Preventive Ophthalmology, serving at Wilmer for 30 years. He has been the principal investigator of several R01 grants (continuously funded for 28 years), the principal investigator of the former T32 Wilmer Fellowship Training Grant (for 10 years), a member of the Vision Research Review Committee for 4 years (the study section reviewing training programs for the

National Eye Institute), recently served 4 years on AED Study Section, elected head of the Association for Research in Vision and Ophthalmology for 5 years, and elected Editor-in-Chief of Investigative Ophthalmology and Visual Science. He chairs Wilmer's Research Committee. Dr. Quigley's research interests include the pathogenesis, epidemiology, diagnosis and therapy of glaucoma, clinical trials, disease prevalence surveys, longitudinal observational studies, and laboratory research.

Dr. Quigley has served as mentor for more than 50 clinician—scientists, in F32 and T32 fellowships, K08, K23 and K12 programs. Among these, a representative list of those now in full-time academic positions, each of whom has successfully competed for R01 funding after training is given below (with present position):

Claude Burgoyne, MD	Professor, Devers Eye Institute, Portland Oregon ( <b>F32 fellow</b> )
Anne L. Coleman, MD PhD	Frances & Ray Stark Professor, Jules Stein Eye Institute, UCLA ( <b>F32 fellow</b> )
David S. Friedman, MPH MD	Associate Professor, Wilmer Eye Institute ( <b>K23 mentee</b> )
Lucian del Priore, MD	Professor, Columbia University ( <b>F32 fellow</b> )
Henry D. Jampel, MD	Odd Fellows Professor, Wilmer Eye Institute ( <b>F32 fellow</b> )
Mark Juzych, MD	Associate Professor, Kresge Eye Institute, Detroit
Stuart McKinnon, MD PhD	Associate Professor, Duke University ( <b>K08 mentee</b> )
John Morrison, MD	Kenneth Swan Professor, Oregon Health Sciences University ( <b>F32 fellow</b> )
Louis Pasquale, M.D.	Associate Professor, Director Glaucoma Services, Harvard ( <b>F32 fellow</b> )
Rohit Varma, MD	Professor, University of Southern California ( <b>K08 mentee</b> )
Donald Zack, MD PhD	Professor Johns Hopkins University ( <b>K08 mentee</b> )

**f2. CSTP Advisory Committee** consists of Oliver Schein, MD, MPH, Don Zack, MD, PhD, Peter Campochiaro MD, Sheila West, PhD, and Harry Quigley, MD, James Handa, MD PhD, Shannath Merbs MD PhD, Jennifer Thorne MD PhD, and Gerard Luty, PhD.

The Advisory Committee meets quarterly to review activities and progress of the trainees. This monitoring begins with a form sent to mentor(s) and mentee, on which every aspect of the past results, present activities, and future plans are accounted, and compared to the updated plan of the previous year. This includes determination that required didactic course material has been completed, as well as review of additional courses taken toward the fulfillment of training goals. The committee requests notification of failed courses by any participant in the Program from the Dean's offices, so that remedial mentorship can be applied and redirection of effort made, where appropriate. After committee review of these reports, the mentee and mentor(s) are asked to appear before the committee separately to respond to questions and to receive constructive advice. The Committee and its staff person summarize the status and progress of each candidate and each mentor in a formal letter with specific recommendations sent to mentee, mentors and Department Chair. The committee pays specific attention to the percent of time spent by trainees in various activities in relation to their individual training program. Review of financial and budgetary interactions of the K12 program and the related financial needs of trainees are within the committee's mandate.

The PI and Committee prepare the annual progress report that summarizes the success or shortcomings of trainees, including degrees earned, publications, talks given, courses taken, faculty positions acquired satisfaction survey results, problems and their solutions, financial report, and interaction with other training programs.

**f2a. Oliver D. Schein** is the Burton E. Grossman Professor of Ophthalmology at Wilmer with a joint appointment in Epidemiology at the Johns Hopkins University Bloomberg School of Public Health. He has been at Wilmer for 16 years and has been principal investigator on numerous federally funded clinical research grants. Dr. Schein's principal research interests have applied epidemiologic methods to ocular disease and technology, using case-control designs, survey sampling, observational cohorts, population-based studies, randomized clinical trials, decision analysis, and techniques to assess patient preferences. In 1999, Dr. Schein was awarded a Mid-Career Investigator Award in Patient Research (K24) in recognition of past productivity and mentorship. His research has elucidated outcomes of cataract surgery, health services research related to cataract management, epidemiology of dry eye, and technology assessment. Dr. Schein serves on the American Academy of Ophthalmology Quality of Care Committee and has been a co-author of its Preferred Practice Pattern on Cataract Surgery. He has acted as research mentor to a variety of young physicians and Public Health School degree candidates over the past decade, and held a K24 mentor grant from NEI. A selection of his past mentees (and their present academic achievement) is:

David Friedman, MD PhD	Professor, Wilmer Eye Institute ( <b>K23 mentee</b> )
Ellen Freeman, PhD	Assistant Professor, University of Montreal
Michael Boland MD PhD	Assistant Professor, Wilmer Eye Institute ( <b>K12 mentee</b> )
Cheryl Enger, PhD	Research Biostatistician, Boston
Cesar Vicencio, MD MPH	Ministry of Health, Chile
Seang-Mei Saw, PhD	Research faculty, Singapore National Eye Centre
Susan Vitale, PhD	Faculty, National Institutes of Health

#### **f2b. James Handa**

James T. Handa is the Robert Bond Welch Professor of Ophthalmology, specializing in medical and surgical management of vitreoretinal diseases, especially age-related macular degeneration and diabetic retinopathy. He is an expert in intraocular oncology and retinoblastoma, devoting significant effort to research related to the early causes of age-related macular degeneration, using molecular pathological approaches to understand how the eye transforms from normal aging to early macular degeneration. His most recent research examines the role of advanced glycation end product mediated cholesterol deposition in Bruch's membrane and local state administration for the treatment of age-related macular degeneration. He was a K11 awardee and has present R01 funding from NIH. His mentees have included:

David DiLoreto, MD PhD	Assistant Professor, U Rochester ( <b>K08 mentee</b> )
Rajendra Apte, MD PhD	Assistant Professor, Washington University ( <b>K08 mentee</b> )
Neal Adams, MD	Chair, Ophthalmology, Texas Tech, ( <b>K08 mentee</b> )
Itay Chowers, MD	Assistant Professor, Hadassah University, Jerusalem, Israel
Howard Ying, MD, PhD	Assistant Professor, Wilmer Eye Institute; ( <b>K12 mentee</b> )
Wen Hsiang Lee, MD PhD	Assistant Professor, Bascom Palmer Eye Institute, U Miami
Diana Do, MD	Assistant Professor, Wilmer Eye Institute
Eric Tourville, MD	Assistant Professor, Centre Hospital, Universite Laval, Canada
Yuko Yamada, MD	Assistant Professor, Kobe University, Department of Ophthalmology, Japan

**f2c. Sheila K. West** is the El Maghraby Professor of Ophthalmology, and has participated in mentored training for several clinician-scientists. She is jointly appointed in the School of Medicine and the School of Public Health (Epidemiology). She directed a community-based study of prevalence of trachoma in Tanzania that developed a successful intervention in hyper endemic areas, producing the present World Health Organization guidelines for this disease. Her publications documented for the first time the association between cataract and both cigarette smoking and sunlight exposure in field studies of Chesapeake Bay Watermen. She recently led the Hispanic Eye Study (Proyecto VER) in Arizona, determining that glaucoma is highly prevalent as a cause of blindness in this growing population. She served as President of ARVO and is Editor in Chief of Ophthalmic Epidemiology. Her mentees (and present positions) have included :

Jennifer Thorne MD PhD	Associate Professor, Wilmer Eye Institute ( <b>K23 award</b> )
Elizabeth Bradley MD PhD	Associate Professor, Department of Ophthalmology, Mayo clinic ( <b>K23 Award</b> )
Emily West Gower PhD	Assistant Professor, Wilmer Eye Institute (Ph.D. thesis)
Stephen McLeod MD	Chairperson, Department of Ophthalmology, U Calif San Francisco
David Friedman MD PhD.	Professor, Wilmer Eye Institute ( <b>K23 mentee</b> )
Matt Oliva MD	Himalayan Expeditions (Cataract NGO), Ophthalmic Consultants in Seattle
Thomas Bochow MD	Staff Ophthalmologist with ORBIS International and Eye Care Assoc. Texas
Ellen Friedman PhD	Assistant Professor, University of Montreal (Ph.D. thesis)
Alison Gump PhD	Assistant Professor, Johns Hopkins Bloomberg School of Public Health
Anthony Solomon PhD	London School of Tropical Medicine and Hygiene (Ph.D. thesis)

**f2d. Peter Campochiaro** is the George S. and Dolores Dore' Eccles Professor of Ophthalmology and has received multiple funding awards for the study of the clinical manifestations and pathogenesis of retinal diseases. He has been a principal in clinical trials of surgical therapy and nutrition related to eye disease and

his laboratory studies gene therapy and transplantation treatments for degenerations of the retina. He is the principal investigator on two NIH grants and a co-investigator on two others. He is the principal investigator on the Wilmer Center Grant from the Foundation Fighting Blindness and has grants from the Juvenile Diabetes Foundation and the American Health Assistance Foundation. He is currently the sponsor for a KO8 training grant for Dr. Peter Gehlbach and a K23 training grant for Dr. Quan Nguyen. He is also the sponsor for a Knights Templar Foundation training grant for Dr. Anna-Maria Demetriades, and a NIH Minority Supplement training grant for Dr. Godwin Okoye. His past trainees (and present positions) included:

Neal Adams, MD,	Chair, Ophthalmology, Texas Tech, <b>(K08 mentee)</b>
Peter Gehlbach, MD PhD	Assoc Prof, Wilmer Eye Institute, <b>(K08 mentee)</b>
Zvi Friedman MD	Chairman of Ophthalmology at Haifa University in Israel
Andrew Lee, MD	Assistant Professor of Ophthalmology at Baylor University
Takao Tobe, MD PhD	Associate Professor, Kansai University, Kobe, Japan
Haruhiko Yamada MD	Assistant Professor, Kansai University,
Jose Luna, MD	Assistant Professor, University of Cordova, Argentina
Carlos Schoenfeld MD PhD	Asst Professor of Ophthalmology, University of Munich
Naoyuki Okamoto MD	Associate Professor of Ophthalmology, Miyazaki University, Japan
Hiroaki Ozaki, MD PhD	Assistant Professor, Fukuoka University, Fukuoka, Japan,
Man-Seong Seo, MD	Associate Professor, Chonnam National Univ, South Korea
No-Hoon Kwak, MD	Associate Professor, Catholic University of Korea, South Korea.
Jennifer Lim MD	Assistant Professor, Doheny Eye Institute, Univ Southern California
Sharon Fekrat MD	Assistant Professor of Ophthalmology, Duke University Eye Center

**f2e. Donald J. Zack, M.D., Ph.D.**, Guerrieri Professor of Genetic Engineering and Molecular Ophthalmology, joined the Wilmer Institute in 1988 as a K awardee following ophthalmology residency at the Massachusetts Eye and Ear Infirmary. He was in the Medical Scientist Training Program (MSTP) at the Albert Einstein College of Medicine. His clinical activities are with the Wilmer Glaucoma Service and his lab studies the molecular biology of retinal diseases, including glaucoma, AMD and other retinal degenerations, and diabetic retinopathy. He is actively participating in research merging molecular genetics and epidemiology. He has trained over 20 MD and/or Ph.D. students/fellows:

Elia Duh, MD	Assistant Professor, Johns Hopkins <b>(K08 award)</b>
Stuart McKinnon, MD PhD	Associate Professor, Duke University, <b>(K08 award)</b>
Kang Zhang, MD PhD	Associate Professor, University of Utah, <b>(K23 award)</b>
Shiming Chen, PhD	Asst Professor, Washington Univ, (NRSA fellowship; now R01)
Rajan Kumar, MD PhD	Project Leader, David Sarnoff Labs (NRSA fellowship)
Robert Nickells, PhD	Associate Professor, University of Wisconsin
Neil Della, MD PhD	(deceased) Assoc Professor, University of Adelaide, Australia
Zuqin Nie PhD	Research Scientist, Gerontology Center, NIH
Michelle Chang, PhD	Research Associate, UCLA
Ronald Farkas, MD PhD	Staff Scientist F.D.A <b>(K08 award)</b>

**f2f. Jennifer E. Thorne, MD, PhD** is Associate Professor of Ophthalmology at the Wilmer Eye Institute and of Epidemiology at The Johns Hopkins Bloomberg School of Public Health (JHSPH). A board -certified ophthalmologist and PhD-level epidemiologist, her ophthalmic expertise is in ocular infectious and inflammatory disorders. She received her PhD in Epidemiology at JHSPH **as part of her K -23 grant** (completed April 2007) investigating visual acuity outcomes among patients with AIDS and cytomegalovirus retinitis. Dr. Thorne has extensive experience in design and conduct of multicenter clinical trials and large epidemiologic studies, longitudinal data analysis, management and analysis of large datasets, and the standardization of classification criteria, results reporting, and treatment guidelines for ocular inflammatory diseases. She serves as Deputy Director for the Coordinating Center of the Studies of Ocular Complications of AIDS (SOCA) and is medical officer for the Multicenter Uveitis Steroid Treatment (MUST) Trial. At Wilmer she serves on the Research Committee (chaired by Dr. Quigley) and the K-grant Committee. She is fellowship director for the Division of Ocular Immunology and a member of the Board of Managers for the AUPO's

Fellowship Compliance Committee. She is a faculty advisor in the Masters of Public Health program at JHSPH. Her past mentees include:

Sanjay R. Kedhar, MD	Assistant Professor, New York Eye and Ear Infirmary
Marie-Lyne Belair MD	Assistant Professor, University of Montreal
Steven J. Kim, MD	Assistant Professor, Vanderbilt University
Anat Galor, MD	Assistant Professor, Bascom Palmer Eye Institute
Henry A. Leder, MD	Assistant Chief of Service, Wilmer Eye Institute
Michelle Tarver-Carr, MD, PhD	Assistant Professor, Wilmer Eye Institute
Irina Bykhovskaya, MD	2004 (training as resident, ophthalmology)
Fasika A. Woreta, MD, MPH	2005-2006 (training as resident, ophthalmology)
Mary Ann Karolchyk, DO	2007-2008 (still in training)

**f2h. Shannath Merbs, MD PhD** is Assistant Professor of Ophthalmology since 1997, **receiving a K08 award**, and is a fellowship-trained surgeon in the Division of Oculoplastic surgery. She holds joint appointment as an assistant professor of Oncology. Dr. Merbs treats diseases such as congenital defects, benign and cancerous growths, tear duct problems, and the ocular effects of thyroid disease, as well as traumatic injuries to the eyelids, tear drainage system and bones of the eye socket. Her laboratory research program is in the field of ocular oncology, studying the molecular genetic changes that lead to uveal melanoma, the most common ocular malignant tumor. Her present funded research aims to determine the genetic changes that lead to cancer formation and metastasis. She has experience in mentoring the following past students:

Paola Parrella, MD	Senior Researcher, Unit di Patologia Molecolare e Terapia Genica, Italy
Benjamin Shalev, MD	Chief Attending Oculoplastic Surgeon, Tel Aviv
Tonya Stefko, MD	Assistant Professor of Ophthalmology, University of Pittsburgh.

**f2h. Gerard Lutty, PhD.**, studies the development of blood vessels in the eye and how they change in age-related macular degeneration (AMD), retinopathy of prematurity, sickle cell and diabetic retinopathies. Dr. Lutty studies normal development and function of blood vessels and the ischemic retinopathies, Dr. Lutty's lab studies angiogenic factors and naturally occurring inhibitors of angiogenesis. He has served as past program chair for his section at ARVO. His past mentees include:

Tari Prow, PhD	Assistant Professor, University of Queensland, Australia
Takuya Hasegawa, MD	Chief Attending Ophthalmology, Meiwa Hospital, Nishinomiya, Japan
Carmen Mocanu, MD	Director of Ophthalmology, University of Craiova Med. Craiova, Romania
Imran A. Bhutto, MD	Research Associate, Wilmer Ophthalmological Institute, Baltimore, Maryland
Ichiro Fukushima, MD, PhD	Chief of Ophthalmology, Kansai Medical University Hospital, Osaka, Japan
Michaela Kunz-Matthews, MD	Staff Ophthalmologist at University of Maryland Hosp, Baltimore, Maryland
Jingtai Cao, MD	Researcher-Regeneron Pharmaceuticals, Inc. Tarrytown, NY

### **f3. Commitment of Staff Time**

The PI, Dr. Quigley and staff administrator, Pat Tracey, expend considerable time in the organization and administration of the CSTP program. These activities include the advertisement of the program, the fielding of inquiries from prospective candidates, the matching of mentors and mentor group organization, the committee organization to select and to evaluate mentorships on a regular basis, the budget management of the program and its individual components, the associations with the University research administration, Human Subjects Committees, Animal Care Committees, Departmental evaluations, as well as individual assistance to the candidates in offices, technical support, financial and budget reconciliation, meeting presentations, travel and parking. They will provide liaison between the School of Medicine, the School of Hygiene, and trainees, in terms of credentialing, benefits, tuition, and communications.

### **f4. Other Teaching and Clinical Responsibilities of Candidates**

We limit the non-research training responsibilities of candidates to 20% or less of their total effort. This includes patient care, surgery, and non-research duties such as teaching or departmental contributions. Some

clinical activities are actually related to research, e.g. where recruitment of subjects for research programs occurs in the context of outpatient care.

**f5. Instruction in the Responsible Conduct of Research.**

Every mentee in our CSTP will take and pass web-based courses in the responsible conduct of human research, as well as courses in the conduct of animal experimentation. These are undertaken in the first year of the program. The committee will establish the areas in which required courses are to be taken by every trainee, including, but not limited to: Instruction in the Responsible Conduct of Research, Federal regulations on Human Subjects and Animal Research, Bioethics, Instruction in Scientific Integrity (conflict of interest, responsible authorship, policies for handling misconduct), Biostatistics and Data Management, including study design, analysis, and security of data records.

**f6. Additional Functions of the Advisory Committee**

The Advisory Committee's functions in Recruitment and Selection and Research Activities have been summarized already above under b. and c. We feel that there is abundant reason to favor the K12 mechanism with its Program component as a complement to the individual K08 and K23 mechanisms:

- to make training available much more effectively to the potential candidate**
- to provide a comprehensive view of all training possible at a Department**
- to facilitate inclusion of new faculty into a wider mentor groups**
- to provide an experienced committee to advise the implementation of a K project**
- to accept the candidate in the year prior to entry, removing uncertainty**
- to offer an administrative office to handle bureaucratic detail**