



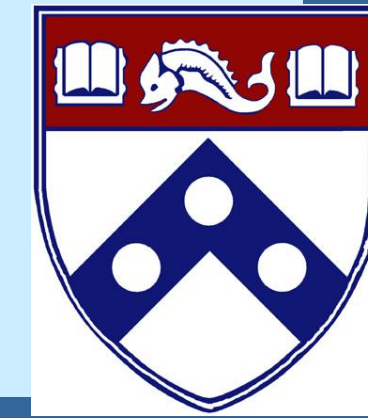
# HHMI Med into Grad Scholars Program University of Pennsylvania School of Medicine



Program Directors: Mitchell Lewis, DPhil & Carolyn Cambor, MD

Acknowledging that the future of translational research depends upon the basic science community being well versed in human disease, the University of Pennsylvania School of Medicine, in conjunction with Penn's biomedical graduate studies program (BGS), has created the HHMI Med into Grad Scholars Program (HGMS). The curriculum integrates focused medical education into the doctoral curriculum and experience, affording Ph.D. Students an appreciation of medicine and human biology not formerly available.

## THE GRADUATE PROGRAMS AT PENN



Biomedical Graduate Studies (BGS) is the academic hub for biomedical graduate education at Penn comprising seven interdepartmental cross-school graduate groups.

- Biochemistry & Molecular Biophysics
- Epidemiology/Biostatistics
- Genomics/Computational Biology
- Immunology
- Neuroscience
- Pharmacological Sciences
- Cell & Molecular Biology
  - Cancer Biology
  - Cell Biology and Physiology
  - Developmental Biology
  - Genetics and Gene Regulation
  - Gene Therapy and Vaccines
  - Microbiology, Virology, Parasitology



## BGS STUDENTS and FACULTY

701 Students  
560 PhD 122 MD-PhD 19 VMD-PhD

615 faculty  
~ 40% M.D.s or M.D./Ph.D.s within clinical departments.

YEAR	HGMS STUDENTS				
	BGS APPS	HGMS APPS	BGS ADMITS	HGMS	HGMS ADMIT
2010	1255	229	219	42	10
2009	1134	200	239	40	6
2008	1084	156	242	36	6
2007	1131	136	227	23	6
2006	1122	n/a	236	n/a	2
2005	1045	n/a	222	n/a	n/a

• There has been tremendous interest in the program. 15-20% of the BGS applicants express an interest in the HGMS program.

• 20% of the admitted students have applied to HGMS

• HHMI sponsors 8 students/year and SOM sponsors 2 additional students

YEAR	HGMS STUDENTS				
	GPA	VERB	QUANT	ANALY	TOT GRE
2010	3.85	591	749	4.5	1340
2009	3.79	620	750	4.6	1370
2008	3.71	588	730	4.8	1318
2007	3.72	605	765	5.2	1370
2006	3.85	585	760	5	1345
2005	3.84	585	760	5	1345

## HGMS REQUIRED COURSES



- Topics in Molecular Medicine:** Explores connections between research and disease, open to all PhD students
- Immunology:** Provides a basic understanding of Immunology, open to all PhD students
- Human Physiology:** New course developed for HGMS Program & open to all PhD students
- Mechanisms of Disease:** New course developed for HGMS Program and open to all PhD students
- Case Studies in Translational Research:** Provides a connection with MDs in the Masters in Translational Research Program
- "Bench to Bedside" Elective of student's choice:** Elective with clinical relevance

## THE HMGS CLINICAL EXPERIENCE



**Recommended time:** summer between 1<sup>st</sup> & 2<sup>nd</sup> year  
**Individualized:** to match student's area of research interest  
**Flexible:** time & duration varies by experience  
**Location:** Penn's extensive clinical resources

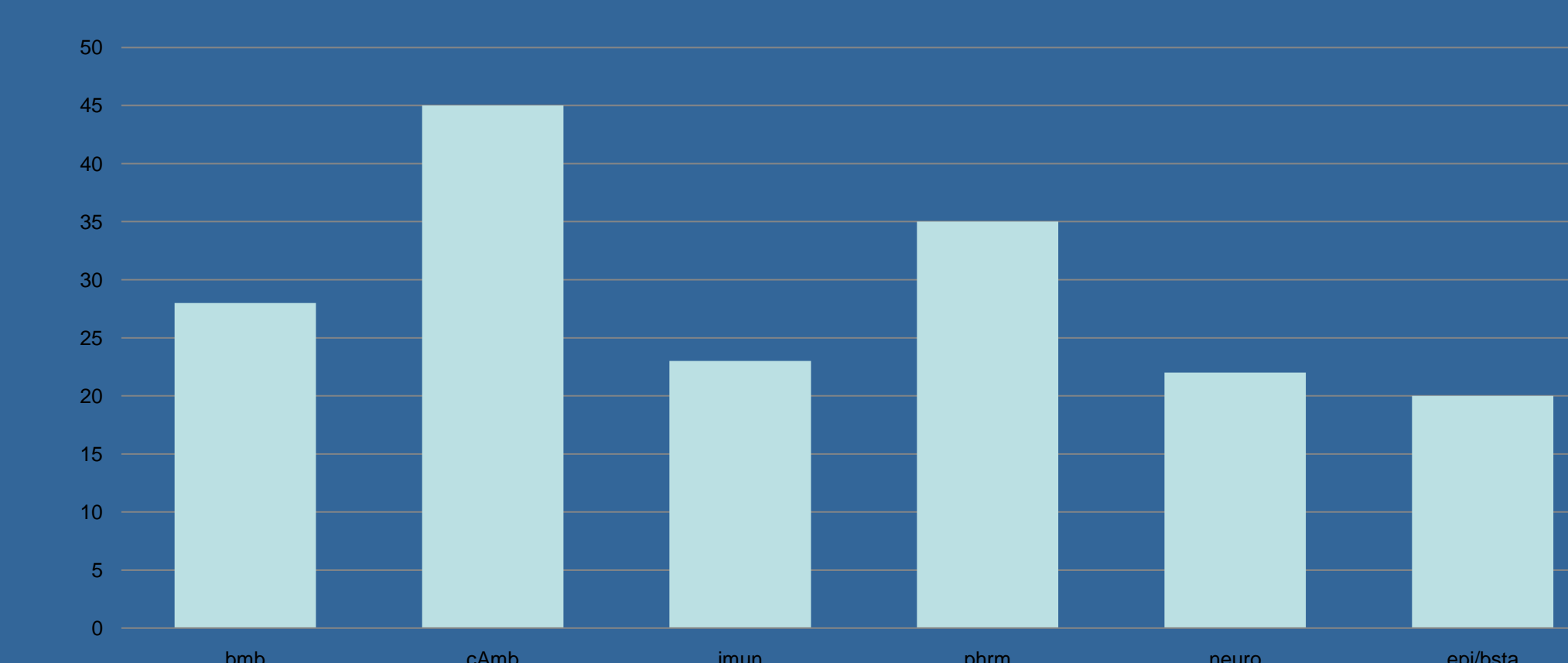
Grad Group	Research Interest Area	Clinical Experience
Neuroscience	Developmental Neurology Neurodegenerative Diseases Neurobiology of Olfaction	Pediatric Neurology; Penn Memory Center; Alzheimer's diagnostic clinic & genetic counseling; Penn Smell & Taste Center - Patients with diseases in which protein misfolding is involved - Alzheimers, Parkinsons, Cystic Fibrosis
BMB	Protein misfolding Origin of thymic dendritic cells; drug development & regulatory issues	Shadow physician caring for patients with bone marrow transplants; pharmaceutical -FDA experience
Immunology	Th1 vs Th2 diseases; Inflammatory Bowel Disease (IBD) and mucosal immunity Drug development for HIV infected patients	Patients with IBD. See pathology of IBD
Pharmacology	Director of Clinical Lab	HIV patients. Clinical testing for viruses. Shadow Clinical Lab Director and all activities Cardiac MRI & Clinical patients in pediatric and adult congenital heart disease program. Autopsy and cardiac specimens at CHOP.
CAMB DBI	Congenital diseases	Infectious Disease & HIV patients;
CAMB MVP	Viral latency; HIV; Herpesvirus	Rheumatology @ VAMC
CAMB CBP	Autoimmune disease	Clinical trials and clinical patient visits at Gyn-Oncology Division
CAMB MVP	Immunotherapy & vaccines, HPV-related cancers	8 week externship w/ pharmaceutical company; 2 months, fulltime;
CAMB GTV	Immunology & Vaccines	

## ITMAT INTEGRATION WITH CTSA



A Clinical and Translational Science Award (CTSA) was granted to the University of Pennsylvania School of Medicine and its partner institutions, the Children's Hospital of Philadelphia (CHOP), the Wistar Institute (WI) and the University of the Sciences in Philadelphia (USP) in 2005

It is part of Institute for Translational Medicine and Therapeutics (ITMAT) and has 582 faculty participating in the CTSA. There are 124 faculty that hold graduate appointments in BGS



**Collaboration of HMGS with Penn's CTSA:** Currently we are developing a plan to implement a required lab rotation for HMGS students with a faculty member that is a participant in the CTSA.

## HMGS COMMUNITY BUILDING



### HMGS community

#### Each class of HMGS students

Course work connections: All HMGS students in the same year take the same required courses together

#### All HMGS students

An event every month:

- Translational research seminars: 2009-2010 was the first year. Seminars highlight HHMI & translational research investigators at Penn (4 per year)
- Social events with HMGS students only (4 per year) - "Body Worlds" trip, *Phillies* outing, and happy hours.
- Group meetings with Program Directors (4 per year)
- Peer mentoring for first year HMGS students about courses and clinical experiences
- Involvement in recruiting: HMGS students are invited to meet with students applying for the program
- Students from other HHMI MIG programs: Yearly symposium with peer cluster students

### HMGS and the SOM community

#### Other PhD students:

- Several courses in the HMGS curriculum are open to all PhD students
- Interactions with PhD students in their Graduate Group - HMGS students represent diverse interests in study: Cell & Molecular Biology; Neuroscience; Biochemistry & Molecular Biophysics, Immunology

#### MD-PhD students:

- HMGS students are encouraged to attend monthly MD-PhD grand rounds

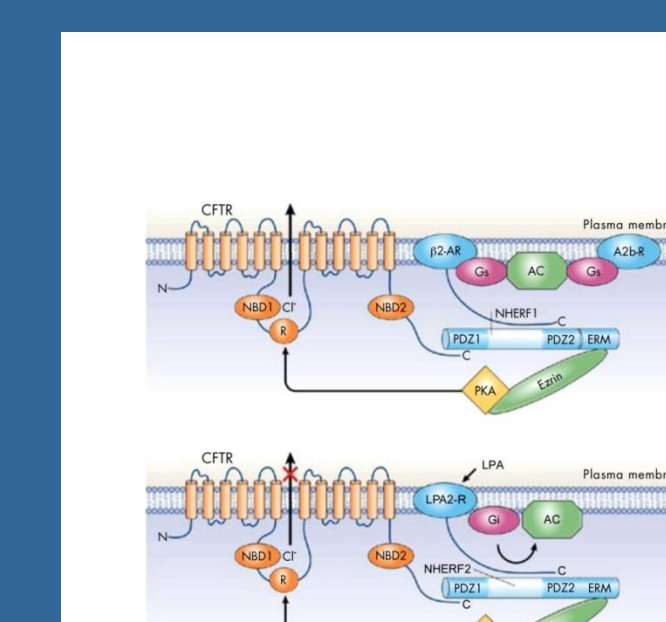
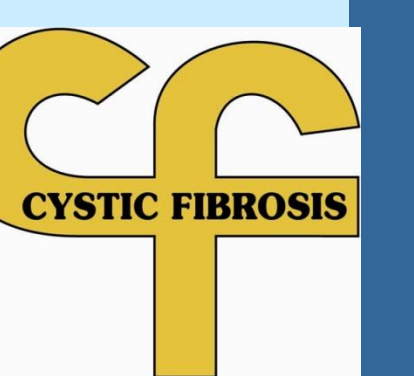
#### MDs:

- Case Studies in Translational Research: taken by MDs
- Many courses that HMGS students take are taught by MDs / MD-PhDs
- Clinical experiences with MDs and MD-PhDs
- Some students will have MDs on their Prelim and Thesis committees

#### SOM conferences

- Extensive number of clinical, translational and research talks throughout the SOM by MDs and MD-PhDs

## CYSTIC FIBROSIS SYMPOSIUM



CYSTIC FIBROSIS: A MODEL FOR TRANSLATIONAL RESEARCH

HHMI MED INTO GRAD SYMPOSIUM  
May 7 - 8, 2010  
BIOMEDICAL RESEARCH BUILDING 3/8B  
UNIVERSITY OF PENNSYLVANIA SCHOOL OF MEDICINE

### Topics included:

- "The experience of being a young woman with CF"
- "Molecular mechanisms of fluid secretion by lung submucosal glands"
- "Epithelial ion transport responses to inflammatory cytokines"
- "Gut Feelings and Technical Precision: Thinking about Cystic Fibrosis"
- "Designer adeno-associated viral vectors for lung gene delivery and immune implications"
- "Translating Basic Science into Mechanism-Based Novel Therapies for Cystic Fibrosis"

• 60 student participants from Harvard, Yale & Penn

