



# Cell and Molecular Biology Program

Handbook  
2009-2010

<http://www.bumc.bu.edu/cmbio>  
<http://people.bu.edu/gmssso>

Organization	PAGE
• Welcome	3
• Organizational Structure	4
• Academic Advisors and Student Mentors	5
• Information for New Students	6
• CMB Monthly Meetings	7
• Rotations	8
Dates	
Presentations	
• Form	
• List of students in program	11
• Graduates and where they are now	13
• Academic Requirements and Policies	14
• Research Training	17
○ Qualifying examinations	
○ Dissertation Advisory Committee	
Pre-thesis committee evaluation forms	
• Mini Courses – Past and Present	22
• Faculty that participate in CMB	24

# Welcome to the Graduate Program

You will be joining a very strong academic graduate program that has attracted excellent students. The program accepted its first group of students 12 years ago and has grown considerably! Thirty-nine students have received their PhDs and have entered industry and academia. Nine students in the program have won the coveted Henry I. Russek Achievement award and an even greater number have been awarded second place and honorable mention awards. This is a real honor! We have had 3 students win the Science Competition at the Charles River Campus. In addition, we have had one student participate in the competitive NSF program (K-12) where students teach in local school systems and take courses on learning how to teach.

As a member of the program you will be required to take a core set of courses in your first year. At the same time you will be doing research in a number of laboratory rotations in departments that belong to the Program. This will allow you to take advantage of the excellent research environment at Boston University before you commit yourself to a laboratory. The departments include Anatomy & Neurobiology, Biochemistry, Genetics and Genomics, Microbiology, Molecular and Cell Biology, Pathology & Laboratory Medicine, Pharmacology and Physiology & Biophysics along with the Program of Molecular Medicine.

There will be monthly “get-togethers” for all students. The meetings will provide you with the opportunity to discuss the work that you do in your laboratory rotations or listen to the work of senior graduate students in the CMB program.

These meetings will provide you with an excellent opportunity to meet graduate students from participating departments and programs. Your fellow students may be your greatest great resource!

We have a student mentoring program. These students come from a number of departments and programs and reflect different levels of seniority. They are available to answer your questions about the program and life in Boston!

Finally if you have any questions about any aspect of the Program, please do not hesitate to ask us.

My door is always open!

Welcome to BUSM!

Dr. Trinkaus-Randall  
Director Cell and Molecular Biology Graduate Program

## Organizational structure of CMB

Position	Name	Department	Phone	email
Program Director	Trinkaus-Randall, Vickery	Biochemistry	8-5099	<a href="mailto:vickery@bu.edu">vickery@bu.edu</a>
Recruitment	Zoeller, Raphael A.	Physiology/Biophysics	8-4010	<a href="mailto:zoeller@med-biophd.bu.edu">zoeller@med-biophd.bu.edu</a>
Student Advisory	Schreiber, Barbara (Co-Chair)	Biochemistry	8-5094	<a href="mailto:schreibe@bu.edu">schreibe@bu.edu</a>
Student Seminars				
Admissions	Murnane, Mary Jo (Chair)	Pathology	8-4926	<a href="mailto:mmurnane@bu.edu">mmurnane@bu.edu</a>

### Steering Committee

Trinkaus-Randall, Vickery	Biochemistry	8-5099	<a href="mailto:vickery@bu.edu">vickery@bu.edu</a>
Zoeller, Raphael	Physiol and Biophysics	8-4010	<a href="mailto:zoeller@med-biophd.bu.edu">zoeller@med-biophd.bu.edu</a>
Dasgupta, Shoumita	Genetics and Genomics	4-1520	<a href="mailto:dasgupta@bu.edu">dasgupta@bu.edu</a>
Hirschberg, Carlos	Molecular and Cell Biol	4-1040	<a href="mailto:chirsch@bu.edu">chirsch@bu.edu</a>
Murnane, Mary Jo	Pathology and Lab. Med	8-4926	<a href="mailto:mmurnane@bu.edu">mmurnane@bu.edu</a>
Schreiber, Barbara	Biochemistry	8-5094	<a href="mailto:schreibe@bu.edu">schreibe@bu.edu</a>
Cohen, Herb	Molecular Medicine	8-7322	<a href="mailto:htcohen@bu.edu">htcohen@bu.edu</a>
Viglianti, Greg	Microbiology and Imm.	8-5165	<a href="mailto:gviglian@bu.edu">gviglian@bu.edu</a>
Zhdanova, Irina	Anatomy and Neuro	8-4187	<a href="mailto:zhdanova@bu.edu">zhdanova@bu.edu</a>

## **Academic Advisors**

All students are assigned to an Academic Advisor. Please arrange a meeting in the first several weeks of the semester with your advisor. You should arrange to meet with your advisor during the middle of each rotation in both the first and second semester. Your advisor is there to assist you in finding rotations and to advise you in your classes.

Dr. Esther Bullitt	Physiology and Biophysics	<a href="mailto:bullitt@bu.edu">bullitt@bu.edu</a>
Dr. Kathrin Kirsch	Biochemistry	<a href="mailto:kirschk@bu.edu">kirschk@bu.edu</a>
Dr. Greg Viglianti	Microbiology	<a href="mailto:gviglian@bu.edu">gviglian@bu.edu</a>

## **Student Mentors**

The goal of the student mentor program is to help incoming students in their transition to graduate school. The students represent different years and different departments/programs that they have entered after the first year. Feel free to contact the students with questions regarding classes and life in general as a graduate student at BUSM. Informal and formal get togethers will be arranged to make your transition easier. Their names and emails are listed below.

Guy Bushkin	Microbiology	<a href="mailto:bushkin@bu.edu">bushkin@bu.edu</a>
Bethany Hannafon	Molecular Medicine	<a href="mailto:hannafon@bu.edu">hannafon@bu.edu</a>
Stephanie Seidl	Biochemistry	<a href="mailto:seidl@bu.edu">seidl@bu.edu</a>
Amanda Watkins	Molecular Medicine	<a href="mailto:awatkins@bu.edu">awatkins@bu.edu</a>
Erika Walsh	Biochemistry	<a href="mailto:emwalsh@bu.edu">emwalsh@bu.edu</a>
Tyler Longmire	Mol Medicine	<a href="mailto:longmire@bu.edu">longmire@bu.edu</a>
Heather Cohen	Pathology	<a href="mailto:hgcohen@bu.edu">hgcohen@bu.edu</a>

## Information for new students

### First get together held by student mentors

Potluck

September 10 2009 at Erika Walsh's appt

7PM

83 Brown St Apt 2

Brookline MA

Walking distance of BU shuttle stop by BU gym

### Classes

-Biochemistry GMS BI755 – M,W 10AM and certain F as posted at 11:30  
Cell Biology GMS CM 753 - L112 9AM T,TH,F(10AM other rms)

-Biochemistry will start Wednesday September 2

-Critical thinking GMS CM 761 - will start on September 9, 2009 at 1:00 in room L317

### Rotations

-Rotations will start on September 8, 2009 and each one will last 7 wks with a short presentation at the end of each one.

-Please email the faculty member that you have been assigned to for your first rotation and set up an appt. Please read the section on rotations for more info.

-Questions? Ask your advisor or Dr. Trinkaus-Randall or Dr. Schreiber

### Monthly meetings

These will be either short presentations about your rotation work or research seminars given by senior graduate students.

September 18 12:30 PM L705

-Please see web site for info on CMB seminars and departmental seminars

-If you have questions regarding your health benefits and other general student questions, please go to the web sites listed on the front page. The GMSSO is a wealth of information and Stephanie Seidl (a CMB student) is the president of the student group.

## **CMB Meetings**

Please note that these are required!

Place: L705

Time: Fridays at 12:30-2 PM

Lunch provided

September 18

Senior Graduate Student Talks

Bethany Hannafon and Mike Breen

October 2

Get together. Ask those questions that you didn't think about during orientation from faculty and student mentors

October 30

First Rotation talks by first year students – (10 min talks/person)

November 20 Note 12:45

Senior Graduate Student Talks

Greg Staples and Aditi Gurkar

December 5

career day TBA

January 15

Second Set of Rotation Talks

February 12

Senior Graduate Student Talks

Jeremy Farelli

March 12

Third Set of Rotation Talks

April 9

Senior Graduate Student Talk

Liling Zeng and spring party

## Laboratory Rotations

As a student in the Cell and Molecular Biology Program, you will be expected to rotate through three to four laboratories during the year. The laboratory rotations will allow you to experience a range of laboratory research environments. The Student Affairs Committee (Drs. Schreiber, Bullitt, Kirsch and Viglianti) assigns the first rotation. Since the rotation may be outside your undergraduate experiences this is a great time to learn new technologies and be exposed to new fields. During the time that you are in your first rotation it will be your responsibility to learn about the faculty research interests at BUSM from the various websites.

Please make an appointment to meet with your advisor in the first two weeks of school so that you can receive guidance in these important decisions.

The schedule for the rotations is as follows:

September 8 – October 23  
October 26 – December 11  
January 18 – March 5  
March 8 – April 23

### ***Goal of Rotations***

The goal is to experience a variety of research areas and to identify a research advisor in whose lab you will perform your thesis work.

The choice of the mentor will determine the department that you will join. The rotations are a “two way street”. Your goal is to evaluate the work in the lab to see if it intrigues you. The faculty member will monitor your work to see if you will fit into his/her lab environment. Students will be assigned to the first rotation and your advisor will assist you in choosing subsequent rotations.

It is important to rotate in labs that will be able to take on a doctoral student.

Rotations are to be taken seriously.

You must start each rotation on time!

Students are expected to spend 15-20 hrs per week in the rotation labs.

Please try to attend the weekly laboratory meetings as long as your class schedule permits.

Your experience in the rotation is your opportunity to impress the faculty member and personnel in the laboratory and to find if you like the laboratory! At the end of the rotation if you liked the laboratory and might want to do your thesis work there – tell the rotation mentor. Students should expect to give their data to their lab at the end of the rotation.

## Presentations at the completion of laboratory rotations

At the completion of a rotation students are expected to give a short presentation (10 minutes) to other students and faculty in the Cell and Molecular Biology Program on the work that was performed during the lab rotations. These have proven to be very informative in the past. Students learn how to present their data and also learn about the work that is performed in other laboratories and departments. Please invite your laboratory mentor and/or graduate students/lab workers that you worked with for the presentation.

Keep in mind that the rotations will enable you to decide what lab you want to do your thesis work in. Although it seems like an overwhelming task to choose an advisor, we are here to help you to do that. This is a yearlong process in which you will choose a research advisor, as well as a department in which you will do your thesis work. Feel free to call on any of the members of the Student Advisory Committee or the Executive Committee in any of the departments. There is a representative from each department on the Executive Committee and speaking to these individuals will allow you to get a better sense of the expectations of each department. You can narrow down the list somewhat by checking in the Graduate School Bulletin for the research interests of each of the faculty members on the list, but don't only narrow yourself to areas you've studied in the past. The rotations are a great way to consider new areas of interest or learn a new technology. For example if you have ever wondered what it's like to do NMR, Mass Spec, crystallography, patch clamping, laser tweezing, or confocal microscopy, this is your chance! Finally, call on the investigators whose research interests are to your liking, and talk to them about their work; in this way, you can narrow your list to the 3 labs that you would like to rotate in.

At the end of each rotation, please sit down with your rotation advisor and discuss the rotation. The faculty member should fill out a Rotation Form with you (enclosed). This will help you find your strengths and weaknesses so that you can improve as a student. It needs to be signed by you and the faculty person and handed in to Dr. Barbara Scheiber at the completion of each rotation.

Rotation Evaluation Form

Student \_\_\_\_\_

Faculty Member \_\_\_\_\_ (phone and email)

Rotation Dates \_\_\_\_\_

Describe the student's overall performance in the laboratory rotation

What were the student's strengths that she/he should aim to continue to enhance?

What areas should the student try to improve?

What techniques did the student learn?

Evaluation of lab presentation or formal presentation during rotation talk.

Faculty signature \_\_\_\_\_ Date \_\_\_\_\_

Student signature \_\_\_\_\_ Date \_\_\_\_\_

## Year II and + Students in the Program – great reference

Student	Mentor	Department	email
Year VII			
Breen, Mike	Pilch	Biochemistry	<a href="mailto:mbreen@bu.edu">mbreen@bu.edu</a>
Craciun, Florin	Remick	Pathology	<a href="mailto:fcraciun@bu.edu">fcraciun@bu.edu</a>
Liu, Lihan	Corkey	Biochemistry	<a href="mailto:lihanliu@bu.edu">lihanliu@bu.edu</a>
Oswald, Duane	Trinkaus- Randall	Biochemistry	<a href="mailto:doswald@bu.edu">doswald@bu.edu</a>
Year VI			
Agarwal, Aupma	Smith	Biochemistry	<a href="mailto:anupmas@bu.edu">anupmas@bu.edu</a>
Farelli, Jeremiah	Akey	Physiol and Biophys	<a href="mailto:ifarelli@bu.edu">ifarelli@bu.edu</a>
Kurtagic, Elma	Nugent	Biochemistry	<a href="mailto:elmak@bu.edu">elmak@bu.edu</a>
Narasimhan, S	Sherr	Pathology	<a href="mailto:nsupraja@bu.edu">nsupraja@bu.edu</a>
Rankin, Andrew	Faller	Molecular Med	<a href="mailto:arankin@bu.edu">arankin@bu.edu</a>
Staples, Gregory	Zaia	Biochemistry	<a href="mailto:staples@bu.edu">staples@bu.edu</a>
Zeng, Liling	Cohen,H.	Molecular Med	<a href="mailto:llzeng79@bu.edu">llzeng79@bu.edu</a>
Year V			
Chakrabarti, Partha	Kandrор	Biochemistry	<a href="mailto:partha@bu.edu">partha@bu.edu</a>
Daughtry, Kelly	Allen	Phys and Biophysics	<a href="mailto:kddaught@bu.edu">kddaught@bu.edu</a>
Hannafon, Bethany	Rosenberg	Molecular Med	<a href="mailto:hannafon@bu.edu">hannafon@bu.edu</a>
Krawczyk, Sarah	Corkey	Molecular Med	<a href="mailto:krawczyk@bu.edu">krawczyk@bu.edu</a>
Naimy, Hicham	Zaia	Biochemistry	<a href="mailto:hich@bu.edu">hich@bu.edu</a>
Papanicolo, Kyriakos	Walsh	Molecular Med	<a href="mailto:kyriakos@bu.edu">kyriakos@bu.edu</a>
Seidl, Stephanie	Schreiber	Biochemistry	<a href="mailto:seidl@bu.edu">seidl@bu.edu</a>
Walsh, Erica	Xiao	Biochemistry	<a href="mailto:emwalsh@bu.edu">emwalsh@bu.edu</a>
Wu, Ziyang	Sonenshein	Biochemistry	<a href="mailto:zyyu@bu.edu">zyyu@bu.edu</a>
Year IV			
Gurkar,Aditi	Vaziri	Pathology	<a href="mailto:agurk001@bu.edu">agurk001@bu.edu</a>
Guan,Jian	Seldin	Molecular Medicine	<a href="mailto:jianguan@bu.edu">jianguan@bu.edu</a>
Wang,Jing	Bullitt	Physiol and Biophysics	<a href="mailto:jing@bu.edu">jing@bu.edu</a>
Severova,Severina	Bolotina	Molecular Medicine	
	<a href="mailto:severina_severova@yahoo.com">severina_severova@yahoo.com</a>		
Longmire,Tyler	Kotton	Molecular Medicine	<a href="mailto:longmire@bu.edu">longmire@bu.edu</a>
Year III			
Anna Belkina	Dennis	Molecular Medicine	<a href="mailto:belkina@bu.edu">belkina@bu.edu</a>
Gary Bushkin	Sammuelson	Microbiology	<a href="mailto:bushkin@bu.edu">bushkin@bu.edu</a>
Heather Cohen	Stearns-Kurosawa	Pathology	<a href="mailto:hgcohen@bu.edu">hgcohen@bu.edu</a>
Allison Mathes	Lafyatis	Molecular Medicine	<a href="mailto:alk812@bu.edu">alk812@bu.edu</a>
Martin Minns	Trackman	Biochemistry	<a href="mailto:mminns@bu.edu">mminns@bu.edu</a>
Sait Ozturk	Thiagalingam	Molecular Medicine	<a href="mailto:saito@bu.edu">saito@bu.edu</a>
Wei Qiu	Shirai/Corkey	Molecular Medicine	<a href="mailto:qiuwei@bu.edu">qiuwei@bu.edu</a>
Amanda Watkins	Rifkin	Molecular Medicine	<a href="mailto:awatkins@bu.edu">awatkins@bu.edu</a>

Year II

Dana Buckler	Kandrор	Biochem	<a href="mailto:danab@bu.edu">danab@bu.edu</a>
Edward Hartsough	Rahimi	Pathol and Lab Med	<a href="mailto:ehartso@bu.edu">ehartso@bu.edu</a>
Ryan McClure	Genco	Microbiology	<a href="mailto:mcclur30@bu.edu">mcclur30@bu.edu</a>
Nicolae Sandor	Marintchev	Physiol and Biophysics	<a href="mailto:nlsandor@bu.edu">nlsandor@bu.edu</a>
Dolly Thomas	Mostoslavsky	Molecular Medicine	<a href="mailto:dollytc@bu.edu">dollytc@bu.edu</a>
Kathleen Tumelty	Layne	Biochemistry	<a href="mailto:ktumelty@bu.edu">ktumelty@bu.edu</a>

List of first year students in the CMB Program and first lab rotation

Students	Advisor	First Rotation
Linh Ma Aven	Viglianti	Xingbin Ai
Ariana Darcy	Viglianti	Caryn Navarro
Brian Fluharty	<a href="mailto:fluharty@bu.edu">fluharty@bu.edu</a>	Assen Marintchev
Haney Ashton Brooke	Kirsch	Nader Rahimi
Sarah Rozelle	Bullitt	Dan Levin

## Graduates of the Program

Year of graduation	Department	Mentor	Yrs to Grad	Current Position
2000				
Marevi, D.	Pathology	(transfer)	2	Analyst Decision Res
Trbovich,A.	Pathology	(transfer)	2	Res Fellow Surg MGH/HMS
2002				
Kaluxhny, Yulia	Biochemistry	Ravid	5	Mat Tek Corp-Sr Sci.
Yaar, R.	Biochemistry	Ravid	4	MDPhD fellow. Dermatopathol
BUSM				
Slot, Francis	Biochemistry	Abraham	4	MDPhD Res Family Med
2003				
Mendohlnson, Rick	Biochemistry	Kukuuzinska	5	Sam. Lunenfield Res. U Toronto
Lahiri, S.	Phys/Biophys	Allen	3.5	AstraZeneca
2004				
Perlman, D.	Microbiology	Hu	6.5	Mass Spec Facility
Ratts, R.	Biochemistry	Murphy,J.	4	MDPhD Res MedPedsMGH
Kartik, AG	Phys/Biophys	Zoeller	6	HMS/Brigham + Womens
Yong, Xu	Biochemistry	Smith,B.	4.5	Nanjing Med U (faculty)
2005				
Shi, Jun	Biochemistry	Kandrор	5	Novartis
Chandromohan, V.	Biochemistry	Sonenshein	4.5	Duke (postdoc)
Foy, Rebecca	Molecular Med	Cohen,H	4.5	BUMC/nephrology/Res assoc
2006				
Yang, LingLing	Biochemistry	Trinkaus-Randall	5.5	LSU (postdoc)
Szepessy, E.	Cell /Mol. Bio	Sahin-Toth	4	Belgium
Li, Lin	Biochemistry	Kandrор	4	Chinese Marketing Firm
2007				
Chau, Anne	Biochemistry	Nugent	masters	
Mork, Christina	Microbiology	Faller	6	Consumer Genetics (CA)
Sedita, Jeff	Pathol	Cardoso	7	Defined Health/consultant
O'Callaghan, Cornelia	Biochemistry	Sherman	4.5	Applied Biosystems (Spain)
Qiang, Li	Biochemistry	Farmer	4.5	Columbia University (postdoc)
Icli, Basak	Molecular Med.	Sawyer	5	Brigham + Womens (Cardiology)
Qiu, Wei	Biochemistry	Xiao	5	Shanghai Med Schl (faculty)
Ying, Jia	Molecular Med	Cohen,R	4.5	industry
Lin, Paul	Biochemistry	Kirsch	4	medical school
2008				
Pirani, Alnoor	Physiol /Biophys	Lehman	7	Adelytix/Olympus America
Slater, Damien	Genetics / Genom	Vaziri	6	postdoctoral position
Subramanian, Deepa	Microbiology	Rothstein	5.5	India
Park, Kristen	Mol Medicine	Bolotina	4.5	Harvard U (CBRC)
McCranн,DJ	Biochemistry	Ravid	4.5	Maine Medical Res Ctre Inst,
St Hillaire, Cindy	Biochemistry	Ravid	4.5	NIH/NCI
Zhang, Anne	Genetics /Genom	Christman	5.5	BUSM (Vaziri)
Ottaviano, Phyllis	Mol Medicine	Loscalzo	4.5	HMS (BIDMC)
Gao, Fang Ming	Pathology	Thiagalingam	5	U Kentucky
Papageorgis, Panos	Gen / Genomics	Thiagalingam	5	revising ms –postdoc HMS
Du, Wei	Biochemistry	Xiao	5	<a href="#">finishing up ms</a>
2009				
Tamayo, Alfred	Molecular Med	Murphy	4.5	postdoc/standford/Hutchins
Stanvitch, Jerald	Genetics/Gen	Moore	5.5	New Jersey Med College
Daley, Kulle	Microbiology	Corley	7	business
Pazin, Dorothy	Genetics/Gen	Albrecht	5.5	postdoc HDS (Vicki Rosen)

## **ACADEMIC REQUIREMENTS**

This guide is intended to provide all graduate students and faculty members within the Cell and Molecular Biology Program with a list of requirements. In addition, students must adhere to the guidelines of the Division of Graduate Medical Sciences at Boston University School of Medicine as well as Boston University at large. Students are advised to consult the appropriate personnel if they have further questions regarding policies concerning graduate study at Boston University.

The program is designed so that all entering students take coursework during the first year to fulfill the requirements of the Cell and Molecular Biology Program, as well as the participating departments within the Division of Graduate Medical Sciences. In addition, students will rotate through 4 laboratories during the first year so that they can be exposed to a number of departments and laboratories. The students will then ask to enter a faculty's laboratory and have her/him serve as mentor throughout the remainder of the student's graduate school career. At the end of the first academic year, the student will join the laboratory. Students will become a member of the department of the mentor. At that time, the student will be financially supported by the mentor and respective Department and must fulfill the requirements of that department, as well as the Cell and Molecular Biology Program.

### Academic Advisors

All students will be assigned a faculty member as academic advisor when they enter into the program. The advisors are assigned by the Student Advisory Committee. The academic advisor will function as the student's first formal advisor. The role of the academic advisor is to provide assistance and advice on all academic issues. Students, please keep in touch with your advisor throughout the year. He/she will counsel you on academic issues and guide you in your choice of lab rotations throughout the first year. If you have any questions please make sure to ask your advisor. Upon completion of the first year of study, students will choose a mentor who will serve as permanent research advisor for the remainder of his/her graduate school career. All decisions and discussions should be discussed with Dr. Schreiber, Chair of the Student Advisory Committee.

### Academic Requirements

The Post bachelor's Ph.D. program requires 64 credits. The M.D./Ph.D. and Postmasters Ph.D. programs require 32 credits. The number of lecture credits will vary with requirements for each department. Each student will need to check the requirements for Cell and Molecular Biology Program students in the department of their choice as the number of required courses differs. Students who enter the program are required to take the following courses in the first year.

GMS BI 755/756 Biochemistry (8)

GMS CM 753 Cell Biology (4)  
GMS CM 761/762 Critical Thinking (4)  
GMS BI 782 Molecular Biology (4).

In the second year, the student will take courses required by the specific department he/she joins. In addition, to fulfill the requirements of the Cell and Molecular Biology Program, a minimum of 2 credits of a mini course(s) are required.

GMS CM 765/766 Mini Courses (2).

The subjects of GMS CM 765/766 Mini Courses change each year. Each course is given for half a semester and 2 such courses must be taken to complete the requirement. (1 credit/course). Both of the courses are given in the second semester of the second academic year and after the completion of both courses, the student will be given 2 credits, with a single grade determined by the instructors of both courses.

The course of graduate study is designed so that the Ph.D. student can complete the required coursework during the first two years of graduate work. In addition to taking all courses required by the department in which the student will complete his/her studies, each student must take the qualifying examination of the chosen department/program. The qualifying examinations are specific for each department/program and may differ in format. In addition the timing for taking the examination depends on the department/program. Students who join the laboratory of a faculty member in the Department of Molecular and Cell Biology are requested to meet with their advisor, the Chair of the Department and Dr. Trinkaus-Randall, to develop the course of study. In addition please see the list of requirements below under qualifying exams and thesis committee.

Once students have completed their academic classes the remaining credits will be fulfilled by registering for research credits. Students may often take additional courses for credit. The emphasis after the second year, however, should be on research in the laboratory. Students should register for research credits (research credits in Cell and Molecular Biology are GMS CM 952-), until they have taken the required total number of credits required for his/her degree.

### Additional Requirements and Guidelines/Academic Policies

#### Academic Policies

Academic policies and procedures dictated by the Division of Graduate Medical Sciences are described in the Division of Graduate Medical Sciences Bulletin. All students are required to maintain a minimum cumulative grade point average of B (3.0) or better in their courses. Any student receiving a grade of C or below must repeat the course and must attain a grade of B (not B-) or above in the course. Please note that if students receive 8 credits of a grade(s) of B- or lower, they will be placed on academic probation. Any students placed on academic probation will receive a letter detailing the expectations for remediation and will be re-evaluated at the end of each semester. Students on academic probation are not allowed to take Departmental Qualifying or Thesis Defense examinations. If the grade point average is not rectified in 1 year, the student will be dismissed from the program.

All students are expected to finish the Ph.D. in a timely manner, having made a significant contribution to their field of research. Financial assistance is dependent upon the student remaining in good standing within the CMB program as well as the department/program the student joins after the first year in the program. The Department will only provide financial aid for courses, which fulfill requirements of the candidate's degree program.

All students are required to be registered every semester at Boston University unless they are on an approved leave of absence. An absence from the lab or from courses for more than 2 weeks per year should be brought to the attention of the Student Affairs Committee and if needed the Executive Committee. Student stipends will be suspended during any extended leave.

M.D. Ph.D. students are required to have successfully completed a minimum of their first year of BUSM curriculum prior to entering the program. Students may not join if they are not in good standing in the medical school.

## Research Training and Dissertation Advisory Committees

### Qualifying Examinations

Your job in the first year is to do well on your coursework and to find a laboratory in which you will do your thesis work. The examination will follow after that and differs with each department. All students must pass a qualifying examination to qualify as a PhD student. The structure of the examination(s) depends on the individual departments.

Students who join the Department of Molecular and Cell Biology will take a qualifying examination after their second year. The committee is assembled by the Chair of the Program and the Chair of the Department. The Qualifying Exam Committee will include 5 faculty members, including 2 members from the Department of Molecular and Cell Biology and 3 members from the Executive Committee in the Cell and Molecular Biology Program. The examination consists of a written proposal on a field outside the research field of the student and an oral component. It is similar in scope to the examination format for the Department of Microbiology, and the Molecular Medicine Program.

### Composition

The role of the Dissertation Advisory Committee is to both advise the student and to assess his/her progress throughout the research component of the Ph.D. program. Ultimately, this Committee will be responsible for determining the acceptability of the Ph.D. candidate's research. Failure to maintain an acceptable research program will result in termination of Ph.D. candidacy.

The Dissertation Advisory Committee is set up by each department and must include 2 members of the Cell and Molecular Biology Program. The committee will consist of 5-6 members, including the research advisor, one other representative of the host department and 3 members of the Cell and Molecular Biology Program faculty. At least 1 member of the committee must be from a department, which is not the host department.

For students in the Department of Molecular and Cell Biology the Committee will be established once the student has passed his/her qualifying examination. The Dissertation Advisory Committee will consist of 5 members. One will be the research advisor. A second member must be a member of the Department. Three additional faculty must be members of the Cell and Molecular Biology Program and be faculty outside the Department of Molecular and Cell Biology.

The first (research advisor) and second readers of the student's dissertation will be members of the Committee. The Committee chair must be appointed prior to the first meeting by the student and research advisor. The chair may be of any rank but must have his/her primary appointment within the Department and must have prior experience serving on thesis committees. The chair, who should not be the research advisor, will keep written records of the meetings. The Committee chair cannot be the first or second reader. The second reader will be selected by the student and research advisor at the last Committee meeting.

It is the committee's responsibility to provide an objective evaluation of the project as well as to contribute to the research direction. A vital function of the committee is to help focus and limit the scope of the research so that the trainee has a clear concept of the overall design of the dissertation proposal. It is expected that this design will change in response to experimental findings; however, it is critical that the trainee be guided to define scope and quality. Research in the advisors lab will commence in the summer after the first year of courses. Full time research is expected to begin the summer of the second year (after successful completion of all required courses and the qualifying examinations). Failure to maintain an acceptable research program will result in termination of Ph.D. candidacy.

#### Frequency of meetings

Within 6 months of passing the qualifying examination, the trainee is expected to present a research proposal to a Dissertation Advisory Committee that will monitor his/her research progress on a regular basis, meeting at least once a year. One week prior to each meeting, the student will present a written summary of research progress to the committee for review. The Thesis Advisory Committee will meet annually with the student (or more frequently if determined by the Committee). All committee members should be present, however in an emergency a quorum of four members are required to be in attendance. It is mandatory that the first meeting be scheduled no later than a year after completion of the qualifying examinations. At the end of each meeting the student will be excused and the Committee chair, in consultation with the Committee, will complete a Thesis Advisory Committee meeting report form (at the time of the meeting).

For the first meeting with the committee a formal written research proposal detailing the Background, Objectives, Specific Aims, and Experimental Approaches of the dissertation research should be presented to the Thesis Advisory Committee one week prior to the first meeting. The format of the proposal will vary from Department to Department. The intention of the committee is to offer insight, expertise and if needed, assistance in selecting appropriate avenues of research. The first committee meeting should not be viewed as an examination, but as a think-tank that will increase the likelihood of generating presentable/cohesive data.

#### Dissertation Committee

The Thesis Advisory Committee will, in most instances, become the Dissertation Committee. Again, the format of the individual departments will be adhered to. If any

member of the Dissertation Committee is not a faculty member of the Division of Graduate Medical Sciences at Boston University then a special faculty appointment in the Division must be obtained.

## Dissertation

All graduate students within the Program are required to maintain a research program that will eventually lead to the dissertation. An acceptable research program will be judged by the research advisor and the Thesis Advisory Committee.

The following is a guideline for the preparation and defense of the Ph.D. thesis. When the student and advisor decide that the laboratory work is nearly completed, a Thesis Advisory Committee meeting should be held for the presentation of a proposal to finish. The Thesis Advisory Committee will then, in conjunction with the student and advisor, implement a specific plan for the student to curtail laboratory work and begin writing the thesis using the timeline advised below. This will be done in accordance with each Department or Program.

The student should investigate the guidelines and deadlines for thesis preparation from the Division of Graduate Medical Sciences Office (Room L317). If you have questions please view completed theses that are present in many laboratories. Each student should discuss the expectations for the thesis with their advisor prior to writing the thesis. In particular the student should establish a general system for how drafts are to be submitted and what time frame will be required for review. It is expected that the first reader should be reasonably satisfied with the complete contents of the thesis within approximately 10 weeks from the beginning of the full time writing period. At this point the first reader will approve the submission of the thesis to the second reader. The second reader is expected to review the thesis within approximately 2 weeks. If necessary, at this time, the student and the two readers can plan a meeting to discuss the status of the thesis (particularly when there might be conflicting opinions). Once the thesis has been approved by the first and second readers, the thesis can be distributed to the full committee. The Thesis Dissertation Committee is given 2 weeks to review the thesis prior to the defense. The presentation of the thesis to the committee is not to be taken lightly and should be considered to be a "finished product" by the first reader.

Prior to scheduling a defense date, a dissertation outline must be completed (using the Division cover sheet), approved by the Thesis Advisory Committee, and submitted to the Department and Division office. The dissertation abstract and approval form must be signed by the research advisor, the Graduate Director, and the Chair of the Department, and these materials must be filed by the student in the Department and Division of Graduate Medical Sciences offices at least three weeks before the defense. Students must obtain written approval of the dissertation by the first and second readers and distribute the final dissertation to the Thesis Advisory Committee at least two weeks prior to the defense. The defense will consist of an oral presentation of the research results open to all, and a separate dissertation defense meeting with the Dissertation Committee, which should

immediately follow. Four out of five Dissertation Committee members must agree to pass the student. Once the Dissertation Committee has agreed to pass the student, he/she must submit a final copy of the thesis to the Department and the Division offices.

Below is a brief list of the sequence of events leading to the granting of the Ph.D. Almost all forms are available in the Division of Graduate Medical Sciences Office.

- Submit an outline, approved by the Thesis Advisory Committee, using the Division cover sheet to the Department and the Division.
- Submit an abstract, approved by the advisor, Director of Graduate Studies for your department and the Chair to the Department and the Division at least 3 weeks prior to the defense.
- Submit a first and second reader approval form at least 2 weeks prior to the defense. (The first and second readers must approve the complete version of the thesis prior to scheduling the defense).
- Having completed the above, the defense may be scheduled. Please make sure you are advised of all specific departmental requirements.
- The Schedule of Exam form must be approved and submitted to the Department and the Division at least 2 weeks prior to the defense.
- A complete copy of the thesis must be given to each member of the Dissertation Committee at least 2 weeks prior to the defense.
- 4 out of 5 committee members must agree to pass the student.
- A final copy of the thesis must be submitted to the Department (1 copy) and the Division (2 copies on specific grade paper as described by Division staff).

On the page below is a form that can be used to document committee meetings. Each department may have their own form.

THESIS ADVISORY COMMITTEE MEETING REPORT FORM

Name of Student: \_\_\_\_\_

Meeting number: \_\_\_\_\_ Date: \_\_\_\_\_

Ph.D. Start Date: \_\_\_\_\_ Research Start Date: \_\_\_\_\_

Committee members present (identify chair):

Essential points presented by student:

Committee recommendations:

Committee concerns:

Student concerns:

Committee's overall impression of progress:

Date recommended for next meeting:

This form was filled in by \_\_\_\_\_ (committee chair signature) \_\_\_\_\_ (date)

This completed form was discussed with \_\_\_\_\_ (student signature) \_\_\_\_\_ (date)

## A list of previous minicourses

These are 1 credit courses that generally last 6 weeks and meet once per week for 2 hrs. They may be theory or practice based. All second year students are required to take the mini-courses in their second year. This is merely a list of past courses to give you a feeling of the diversity of the courses. They are given in the spring semester.

1997

V. Trinkaus-Randall Cell Biology of Wound Healing

Barbara Seaton Proteins: Form and Function

James Head

Karen Allen

1998 (Spring)

Peter Brecher Mechanism of Angiotensin II Action

Mary Walsh Biophysical Techniques in Cell and Molecular Biology

1998 (Fall)

Michael Holick Translational Medicine: The Skin Connection

1999 (Spring)

David Larson Gap Junctions: Connexins in Health and Disease

Jim Xiao Cell Cycle and Cancer

1999(Fall)

Robert Moreland Signalling and crosstalk in G-protein coupled receptors

2000 (Spring)

Andrew Zoeller Somatic Cell Genetics

2000(Fall)

Nader Rahimi Cellular Signal Transduction and Angiogenesis

2001 (Spring)

Carlos Hirschberg The Fungal Cell Wall: Signaling, Differentiaion and Pathogenicity

2001 (Fall)

Esther Bullitt Electron Microscopy and Image Processing as tools for understanding Cellular Assemblies

2002 (Spring)

Sam Thiagalingam Cancer Genomics

2002 (Fall)

Vickery Trinkaus-Randall Imaging of Cells- Theory and Practice Thursday s 2-4 PM  
starting October 24

2003 (Spring)

Joseph Ozer Transcriptional Regulation

2004 (Spring)

Vickery Trinkaus-Randall Imaging of Cells- Theory and Practice

Ron Corley Transcription Regulation

2005 (Spring)

Vickery Trinkaus-Randall Imaging of Cells: Theory and Practice

Kenneth Albrecht A Mouse Embryonic Cell Model

2006 (Spring)

Vickery Trinkaus-Randall Imaging of Cells: Theory and Practice

Jefferey Moore Molecular Motors

2007 (Spring)

Vickery Trinkaus-Randall Imaging of Cells: Theory and Practice

Trinkaus-Randall and Schreiber Proposal Writing

2008 (Spring)

Vickery Trinkaus-Randall Imaging of Cells: Theory and Practice and Proposal Writing

2009 (Spring)

Vickery Trinkaus-Randall Imaging of Cells: Theory and Practice and Proposal Writing

## **CMB Faculty Participants**

Faculty belong to many different departments and have many different interests. If you are interested in a person please go first to pubmed and read some of their articles and then contact the faculty person and set up a meeting to speak with them.

### **Carmela Abraham, PhD**

Amyloid and inflammation in the brain during normal aging and Alzheimers disease

### **Xingbin Ai, PhD**

Matrix dependent mechanisms that regulate extracellular signalling during embryogenesis and regeneration, functions of heparan sulfate editing enzymes (Sulfs) in the skeletal and nervous system

### **Christopher Akey, PhD**

Structural biology of channels and chaperones

### **Kenneth Albrecht, PhD**

Mechanism of human sex reversal and adrenal dysmorphogenesis, gonad development

### **\*Karen Allen, PhD**

Protein structure and function using x-ray crystallography and kinetics

### **Salomon Amar, DMD., PhD**

Molecular and cellular events associated with inflammatory processes; emphasis is placed on the cytokine control of gene expression with potential applications into various animal models.

### **Brygida Berse, PhD**

Signal transduction pathways regulating gene expression in neuronal cells

### **J. Krzysztof Blusztajn, PhD**

Acetylcholine synthesis and release; signal transduction by lipid messengers

### **Victoria Bolotina, PhD**

Cardiovascular diseases, ion channels and mechanisms of calcium signaling

### **Steven Bogen, MD, PhD**

Monoclonal gammopathies, solid tumor detection

### **Esther Bullitt, PhD**

Protein structure and function by electron microscopy

### **Wellington Cardoso, MD., PhD**

Mechanisms that regulate lung development

### **Herbert Cohen, MD**

Molecular basis of renal cancer, renal cystic disease and renal development

### **Richard A. Cohen, MD**

Nitric oxide regulation of vascular cells, oxidative stress and atherosclerosis

### **Wilson Colucci, MD**

Mechanisms that mediate myocardial remodeling and failure

### **John H. Connor, PhD**

Determining how viruses interact with infected cell hosts, mechanisms controlling switch to viral translation, use of VSV in targeting destruction of tumor cells

**Lawreen H. Connors, PhD**

Role of protein structure in mechanisms of systemic forms of amyloidosis

**Barbara Corkey, PhD**

Metabolic regulation of signal transduction, calcium handling and fatty acyl CoA in pancreatic beta cells and fat cells

**R.B. Corley, PhD**

Chair of Microbiology

**M. Carter Cornwall, PhD**

Visual transduction and light adaptation in rods and cones of the vertebrate retina

**Catherine E. Costello, PhD**

Biopolymer studies based on development and application of mass spectral studies; glycobiology

**Douglas Cotanche, PhD**

Hearing, actin, regeneration of hair cells

**Shoumita Dasgupta, PhD**

Admissions Committee

**Gerald Denis, PhD**

Non-Hodgkin's lymphoma, Function of the BRD2 gene in normal and diseased B cells

**Isabelle Dominguez, PhD**

To characterize the mechanism of Wnt signaling in development and cancer. We are studying the function, regulation and mechanism of action of two components of the Wnt pathway: the serine-threonine kinases CK2 and GSK3beta.

**Douglas Faller, MD., PhD**

Molecular and cellular biology of virus and oncogene-transformed cells and tumors

**Stephen Farmer, PhD**

Tissue specific gene expression; role of matrix interactions and cell morphology

**Rachel Fearn, PhD**

Molecular biology of human respiratory syncytial virus, control of virus gene expression and genome replication

**Caroline Genco, PhD**

Characterization of bacterial virulence factors produced by mucosal pathogens

**Terrell Gibbs, PhD**

Modulators of amino acid receptor function in the brain

**David A. Goukassian, MD., PhD**

Cellular responses to UV-induced DNA damage, development of novel treatment for UV induced human tumors

**Rahm Gummuluru, PhD**

Virus-host interactions in HIV-1 pathogenesis

**Hwai-Chen Guo, PhD**

Protein structure/function using x-ray crystallography and molecular biology

**Olga Gursky, PhD**

Folding structure and stability of apolipoproteins

**James A. Hamilton, PhD**

Lipid/protein interactions and lipid/membrane dynamics

**James Head, PhD**

Regulatory role of high affinity intracellular calcium binding proteins

**Andrew Henderson, PhD**

Interested in investigating how cellular signals regulate HIV transcription and replication

**Alan Herbert, MChB, PhD**

Gene discovery, genome wide screen to type high density of single nucleotide polymorphisms in families, identifying novel classes of coRNAs and their impact on alternative splicing of RNA

**Carlos Hirschberg, PhD**

Novel regulation of posttranslational modifications in mammals and yeast  
Chair Molecular Cell Biology BUSM Dental School

**Michael Hollick, MD., PhD**

Physiology and molecular biology of skin and bone, vitamin D and peptide hormones

**Kevin Jarrell, PhD**

Molecular mechanisms of RNA splicing and catalysis

**Konstantin Kandrор, PhD**

Regulated vesicle traffic in different eukaryotic cells

**Kathrin Kirsch, PhD**

Molecular mechanisms important for tumor initiation and progression with interest on adapter proteins

**Darrell Kotton, MD**

Stem cell biology and gene therapy, embryonic lung development and repair

**Neil Kowall, MD**

Mechanisms of cell death in the central nervous system

**Maria Kukurizinska, PhD**

Protein N-glycosylation in growth and development

**Shinichiro Kurosawa, MD.PhD**

New therapeutics and novel diagnostics for patients using in vitro approaches, and exploring model systems, Sepsis, Inflammation, Thrombosis and Hemostasis.

**Robert Lafyatis, M.D.**

Regulation of sclerosis, member of Scleroderma Program

**Matthew Layne, PhD**

Transcriptional control of genes upregulated in vascular smooth muscle cells and fibroblasts in cardiovascular and pulmonary disease

**William J. Lehman, PhD**

Structural studies on actin filament function

**Adam Lerner, MD**

Apoptosis in lymphoid malignancies and role of adhesion-associated proteins in breast cancer anti-estrogen resistance

**David E. Levin, PhD.**

The Levin lab uses yeast as a model system for the molecular genetic dissection of stress signaling pathways. We are interested in the mechanisms by which fungal cells maintain the structural integrity of their cell walls in response to osmotic stress and other challenges. Our work is directed at the identification of potential anti-fungal drug targets in pathogenic species.

**Jennifer I. Luebke, PhD**

Normal aging and Alzheimer's disease

**Zhijun Luo, Ph.D.**

Regulation and function of Raf kinase and AMP-activated protein kinase, both of which have been implicated in cancer and other diseases

**Assen Marintchev, PhD**

Our work is focused on studying the architecture of the translation initiation complexes, the molecular mechanisms of key steps in the process, and their regulation. The long-term goal is to build a detailed mechanistic and quantitative model of translation initiation as a whole, and learn how to rationally manipulate the system for the purposes of cancer therapy and treatment of metabolic disorders. Two areas of particular interest are the coordination between start codon selection and ribosomal subunit joining and the regeneration of the eIF2-GTP:Met-tRNA<sub>i</sub> complex.

**Jay Mizgerd, ScD**

Innate immunity, lung infections, transcriptional and post-transcriptional regulation of cytokines

**Neil Ruderman, MDPHd**

Diabetes

**C. James McKnight, PhD**

Protein structure/function and folding using NMR

**Jeffrey R. Moore, PhD**

Cytoskeletal dynamics and motor proteins

**Gustavo Mostoslavsky, MD.,PhD**

Stem cell biology and gene therapy; embryonic stem cell modeling of intestinal differentiation

**Mary Jo Murnane, PhD**

Tumor markers within a proteolytic cascade in tumorigenesis

Director of Admissions

**George J. Murphy, PhD**

Stem cells

**John R. Murphy, PhD**

Diphtheria toxin repressor; diphtheria toxin catalytic domain and entry into eukaryotic cell cytosol, protein structure function

**Caryn Navarro, PhD**

When members of the dynein complex (molecular motors) are mutated, loss of function of the dynein associated protein Lissencephaly 1 (Lis-1), leads to neurodegenerative disease due to a lack of neuronal migration. Lis-1 is important for RNA localization, cell division and nuclear migration in the Drosophila ovary, and neuronal migration in the mammalian nervous system. My goal is to understand the mechanisms of dynein directed molecular transport and how intracellular transport is affected by mutations in piRNA (piwi-interacting) pathway components.

**Barbara Nikolajczyk, PhD**

Activation of immunologically critical genes in context of chromatin, regulation of IL-1 beta gene transcription, inflammation in type 2 diabetes,

**Matthew Nugent, PhD**

Cell proliferation, growth factor-receptor interactions, proteoglycans, extracellular matrix

**Gwynneth Offner, PhD**

Epithelial protection and repair; structure, function and regulation of both membrane bound and secreted mucins. Mucins protect normal cells from a variety of environmental insults

and are critical signaling mediators as they transduce extracellular stimuli into cellular responses.

**Paul Pilch, PhD**

Membrane trafficking and cell biology of insulin action

**Nader Rahimi, PhD**

Receptor tyrosine kinase regulation of angiogenesis and signal transduction

**Maria Ramiriz, PhD**

To identify the molecular mechanisms that drive the formation of different lineages of lung epithelial cells during development

**Katya Ravid, PhD**

Genetic and signaling mechanisms regulating blood cell development; vascular biology

**Daniel G. Remick, MD**

Inflammatory response; soluble mediators of inflammation, role of inflammatory response on tissue/organ injury and death

**Ian Rifkin, MD**

Association of autoantibodies to nucleic acids as potential activators of innate immunity, systemic lupus erythematosus

**Phillip W. Robbins, PhD**

Glycoprotein processing and secretion

**Carol Rosenberg, MD**

Breast Cancer, molecular biological mechanisms

**Douglas Rosene, PhD**

Neurobiological basis of normal learning and memory in normal brain and in neurodegenerative diseases

**Sayon Roy, PhD**

Diabetic retinopathy, regulation of extracellular matrix

**Neil Ruderman, PhD, D.Phil**

Insulin action, gene expression and diacylglycerol protein kinase C in skeletal muscle

**Shelley Russek, PhD**

Gene expression in neurons, tissue specific promoters as targets for therapeutic targets

**Miklos Sahin-Toth, MD., PhD**

Proteases and their inhibitors in the pathogenesis of pancreatitis/crystallography of mutated trypsinogens

**David Salant, MD**

Glomerular epithelial biology, proteomic analysis of components that constitute the glomerular filtration barrier

**John C. Samuelson, MD., PhD**

Pathogenesis and evolution of parasites that cause disease

**Ivelisse Sanchez, PhD**

Neurodegenerative diseases

**Barbara Schreiber, PhD**

Atherosclerosis and aortic smooth muscle cells, effect of atherotogenic lipoproteins on proliferation and biosynthesis of collagens and apolipoproteins

**John H. Schwartz, MD**

Targeting of proteins in epithelial transport, renal tubular acidosis affect proton pump assembly and trafficking in inner medullary collecting duct cells

**Barbara Seaton, PhD**

Structure/function using x-ray crystallography and other biophysical/biochemical technologies

**David Seldin, MD.,PhD**

Oncogenes and tumorigenesis as modeled in transgenic mice, Dir. of Amyloid Program

**Jacqueline Sharon, PhD**

Generation and use of polyclonal antibody libraries for therapeutics and diagnostics

**Michael Sherman, PhD**

Molecular mechanisms underlying role of heat shock protein Hsp72 in prevention of cell death

**David Sherr, PhD**

Mechanisms through which environmental chemicals suppress immune apoptosis, molecular signaling leading to carcinogenic and spontaneous breast cancers

**Barbara Smith, PhD**

Changes in gene expression of connective tissue components associated with transformation and differentiation

**Jean-Jacques Soghomonian, PhD**

Neuroanatomy of the basal ganglia, neurobiological basis of motor control, sensorimotor and learning

**Gail Sonenshein, PhD**

Role of oncogenes in control of cell proliferation, apoptosis and neoplastic transformation

**Deborah Stearns-Kurosawa, PhD**

Sepsis and pathophysiology of anthrax

**Karen Symes, PhD**

Role of cell-cell interaction in embryonic development

**Sam Thiagalingam, PhD**

Smad signaling and cancer metastasis; role of p53 in genome stability; genetic susceptibility and molecular markers of lung cancer

**Phillip Trackman, PhD**

Gene regulation of extracellular matrix diseases

**Vickery Trinkaus-Randall, PhD**

Signal transduction mechanisms of wound repair, Amyloid and fibril formation, regulation of P2X7 in development and wound repair

**Gregory Tullis, PhD**

Molecular understanding of retinal degenerative diseases using gene therapy

**Gregory A. Viglianti, PhD**

Molecular biology of HIV-1; role of virus-host cell interactions in pathogenesis

**Kenneth Walsh, PhD**

Signalling and transcriptional-regulatory mechanisms that control normal and pathological tissue growth in the cardiovascular system

**Benjamin Wolozin, MD., PhD**

Pathophysiology of neurodegenerative diseases;Alzheimers and Parkinsons, genetic models in cell culture

**Zhi-Xiong Jim Xiao, PhD**

Tumor suppressor genes in cell cycle, proliferation and differentiation

**Qian Yu, PhD**

Tyrosine phosphorylation, cell signaling, apoptosis and metastasis

**Joseph Zaia, PhD**

Structure and function of proteoglycans and glycosaminoglycans using mass spectrometry as a primary tool

**Irina V. Zhdanova, MD., PhD**

Role of endogenous factors secreted into the cerebrospinal fluid and/or blood circulation in sleep regulation; interested in the effects of these factors on sleep, cognitive performance and drug abuse

**Vassilis I. Zannis, PhD**

Mechanisms of transcriptional regulation of apolipoprotein genes in vivo and in vitro, transgenic mice, adenovirus-mediated gene transfer

**R. Andrew Zoeller, PhD**

Somatic cell genetics to define roles of lipids in stroke, myocardial infarction and neurodegenerative diseases

\*Dr. Allen has moved to the Charles River Campus in the Department of Chemistry.