Graduate Program in Biomedical Science and Translational Medicine

Every effort has been made to ensure the accuracy of the information presented in the Cedars-Sinai Graduate Program General Catalog. However, all courses, course descriptions, instructor designations, curricular degree requirements, and fees described herein are subject to change or to deletion without notice. For additional questions, please contact the Graduate Education Center at 310-423-8294 or gradprogram@csmc.edu.

Graduate Program Accreditation:

Cedars-Sinai Graduate Program in Biomedical Sciences and Translational Medicine is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges (WASC), 985 Atlantic Avenue, #100, Alameda, CA 94501, 510-748-9001.

Western Association of Schools and Colleges
985 Atlantic Avenue, Suite 100
Alameda, CA 94501
510-748-9001

Cedars Sinai
Graduate Program
Biomedical Science and Translational Medicine
8700 Beverly Blvd.
Atrium Building, 2nd Floor
Los Angeles, CA 90048
310-423-8294
http://www.cedars-sinai.edu
It gives me great pleasure to introduce you to the Graduate Program in Biomedical Science and Translational Medicine. Cedars-Sinai has designed and initiated a Graduate Program which differs fundamentally from existing programs. The program is housed within a world class medical center and teaching hospital and is then delivered by a faculty comprised of non-medical scientists and medical doctors. Our students participate in research which has medical relevance. Translational ideas are supported by clinical mentoring and exposure to ideas generated in the clinic. Students experience both basic science and clinical medicine on a sustained basis and it is our hope that they are able to achieve research funding in a translational direction with the program’s one-on-one guidance in grant writing.

Teachers and laboratory mentors are committed to assist our students in networking with local and outside clinical leaders in an effort to allow outstanding students to flourish in academic clinical settings or in appropriate business or community environments relevant to medical research.

I believe that the quality of the education and the research you will experience at Cedars-Sinai is of the finest. The additional support you will receive from the Graduate Program and from Cedars-Sinai and the benefit of being a member of a large, vibrant, intellectually curious and innovative institution will help ensure that your time here is enjoyable, productive and rewarding.

I hope that your application to Cedars-Sinai Graduate Program in Biomedical Science and Translational Medicine is successful and I look forward to welcoming you.

Leon G. Fine, MD
Vice-Dean for Graduate Research Education
About Cedars-Sinai

The Cedars-Sinai Graduate Program in Biomedical Science and Translational Medicine is a unique graduate program focusing on translating laboratory discoveries into therapies, treatment, and cures, and located in one of the country's most distinguished clinical settings, Cedars-Sinai in Los Angeles.

Since its founding in 1902, Cedars-Sinai has focused on providing the finest healthcare available. As a result, many advances in all areas of healthcare have been made and hundreds of thousands of lives have been significantly impacted. Cedars-Sinai ranks as one of the top California hospitals in clinical care. More than 1,800 physicians in virtually all medical specialties are affiliated with Cedars-Sinai. They join more than 8,000 employees, 2,000 volunteers and 15,000 support group members to form a unique partnership in delivering world-class medical care.

Cedars-Sinai physicians and scientists are leaders in basic and clinical research, bringing advancements in medicine directly from the laboratory to the bedside. In addition, they teach over 245 residents and fellows in nearly 60 graduate medical education programs at Cedars-Sinai. Over 500 3rd and 4th year medical student rotations and clerkships take place at Cedars-Sinai. Major components of the Cedars-Sinai Mission include service to the community and the education and training of healthcare professionals and medical research personnel. That emphasis now includes formal research training at the graduate level, leading to the Graduate Program in Biomedical Science and Translational Medicine.

Research education is conducted in the state-of-the-art laboratories under the supervision of faculty mentors, whose interests cover a wide range of basic biomedical science and its application to 21st century medicine.

The Graduate Program adds an important new element to the profile of Cedars-Sinai by expanding the dimension of its education and training mission as embraced in its mission statement as follows:

Cedars-Sinai Health System, a nonprofit, independent healthcare organization, is committed to:

- Leadership and excellence in delivering quality healthcare services
- Expanding the horizons of medical knowledge through biomedical research
- Educating and training physicians and other healthcare professionals
- Striving to improve the health status of our community

Graduate Program Mission

It is the Graduate Program’s mission to:

- Educate biomedical science students in a spirit of self-learning, creativity and independence, so as to optimize their opportunities and success in their chosen career pathways.
- Provide an understanding of the relevance of basic biomedical science to human disease through an exploration of the foundations of translational and clinical research and through interactions with medical practitioners.

The curriculum of the Graduate Program emphasizes research training and closely mentored instruction within a human disease-focused framework. The program is designed to prepare students for successful careers by training them as well-rounded scientists with a strong foundation of knowledge in research design, methodology, presentation and the skills necessary to compete for research funding.

Cedars-Sinai takes the approach to PhD education that emphasizes small-group, mentored learning and critical analysis of primary literature. Beginning with discussions with scientists and clinicians on real medical problems, student will learn how to research the background, analyze existing literature, and develop
productive research plans. Our curriculum has been designed to take specific advantage of the outstanding resources, clinical and research expertise found at Cedars-Sinai.

**Graduate Program Objectives**

- Effective integration of scientific information into an understanding of its relationship to human disease.
- Effective oral communication of scientific information.
- Proficiency in conducting scientific research using modern research, methodologies and design to critically test hypotheses and draw appropriate conclusions.
- Superior skills in grant writing and research presentations.
- Collaborative interactions with peers in a laboratory setting.
- Sound knowledge of modern day biomedical science and the potential to translate the knowledge to medicine.

**Research**

With more than 900 research projects, Cedars-Sinai ranks among the nation’s top non-university hospitals. The scope of research conducted at the Medical Center encompasses the spectrum of disease-related research ranging from molecular genetics, biochemical analysis, and comparative animal studies to clinical investigations, therapeutic trials, and patient care outcomes research.

Cedars-Sinai investigators are currently conducting more than 800 clinical research projects with 230 unique Principal Investigators. These encompass basic, translational, clinical and health services research and cover the entire spectrum of disease investigation, including molecular genetics, biochemical analysis and disease-based areas such as cancer, cardiovascular disorders and neurosciences. With our bench-to-bedside approach to clinical research, some of our work leads to paradigm shifts and dramatic changes in patient care.

**Research Highlights**

- Cedars Sinai ranks among the top 10 non-university hospitals nationwide in NIH funding.
- Research funding reaches over $84 million in fiscal year 2010.
- Cedars Sinai research faculty includes over 360 members.
- More than 350 research papers were published by Cedars Sinai investigators in 2009.

**Recent Achievements by Cedars Sinai Researchers**

- New insights into the role of the immune system in Alzheimer’s disease.
- Initiation of a clinical trial using autologous cardiac stem cells, amplified in vitro to repair damage caused by myocardial infarction.
- Discovery that synthesis of a key virulence factor of methicillin-resistant *Staphylococcus aureus* (MRSA), the carotenoid pigment staphyloxanthin, is inhibited squalene synthase (SQS) inhibitors, a class of cholesterol-lowering drugs.
- Identification of multiple genetic loci affecting diabetes, atherosclerosis, inflammatory bowel disease, rheumatoid arthritis, pulmonary function and skeletal dysplasia.
- Initiation of a clinical trial employing a combined gene therapeutic approach, using one protein (Flt3L) to draw dendritic cells from bone marrow into the brain tumors, and a second protein (herpes simplex type 1 thymidine kinase [TK]), combined with the antiviral gancyclovir to kill tumor cells and elicit long-term survival.

**Student Code of Ethics**

Students in the Cedars-Sinai Graduate Program in Biomedical Science and Translational Medicine are expected to behave in a courteous and ethical manner at all times. The attitudes and habits developed as a student form the core of future professional behavior. As such, students are expected to set an example of the highest caliber for those who work with them.

To promote these behaviors within the student body, students use the principles of honesty, integrity, respect and professionalism as personal, academic, and professional guides.

**HONESTY:**

- Understand the Cedars-Sinai Graduate Program policies on academic integrity, and practice them as a part of student life.
- Honor personal obligations to be sincere and forthright by dealing fairly and truthfully with others.

**INTEGRITY:**

- Maintain beliefs and values despite changing circumstances and challenging environments.
- Respect personal reputation and that of Cedars-Sinai Medical Center and the Graduate Program by avoiding unethical behaviors and the circumstances that encourage them.

**RESPECT:**

- Embrace the diverse perspectives and accomplishments of others, knowing that it is the personal and cultural variations among people that enrich us individually and as a society.
- Take pride in Cedars-Sinai and the Graduate Program by protecting our facilities and their surroundings.
PROFESSIONALISM:
- Maintain the highest standards of performance, conduct, and cooperation with fellow students, faculty, staff, and co-workers.
- Perform duties with due diligence and make a continuous effort towards improvement.

General Information

Academic Year Calendar

Trimester Activities
Welcome Week: September
Fall Trimester begins: September
Fall Trimester Ends: January (early)
Winter Trimester Begins: January (mid)
Winter Trimester Ends: May
Summer Trimester Begins: May
Summer Trimester Ends: August/Sept

Holidays and Breaks
Labor Day: September
Thanksgiving Day: November
Winter Break: December
Spring Break: March/April
Memorial Day: May
Independence Day: July

Graduate Program Leadership and Contact Information

The Graduate Program is headed by the Vice Dean of Research and Graduate Research Education and the Program Director.

Vice Dean for Research and Graduate Education Research
Leon Fine, MD
finel@cshs.org
(310) 423-6457
Davis Research Building, Room 5072

Graduate Program Director
David Underhill, PhD
underhilld@cshs.org
(310) 423-7654
Davis Research Building, Room 4089

The Graduate Education Center (GEC) is located in the Atrium Building, 2nd floor.

Academic Program Advisor
Emma Yates Casler
yatesec@cshs.org
Atrium, Room 201

Academic Program Advisor
Linda King
Linda.king@cshs.org
Atrium, Room 202

Graduate Program Associate
Michael Pina
Michael.pina@cshs.org
Atrium, Room 202
Admission Requirements

Undergraduate Preparation
Prospective students are required to have a Bachelor's degree (BA or BS) in a biomedical discipline or an MD degree. Strong undergraduate preparation would include at least one year of general biology, two years of chemistry (general, organic and physical chemistry), and additional advanced coursework in such areas as biochemistry, biophysics, mathematics, computer science, cell biology, genetics, microbiology, molecular biology, immunology and/or neurobiology.

Prerequisites
The following are the prerequisites for admission to the Graduate Program in Biomedical Science and Translational Medicine:
- One year each of general biology and biochemistry
- Two years of chemistry (general and organic), including laboratory
- One year of mathematics
- One year of general physics, including laboratory.
- Significant experience in a research laboratory

Additional recommended courses include the following:
- Microbiology
- Immunology
- Genetics
- Cell physiology
- Developmental biology
- Neurobiology

Curriculum Vitae/Resume
A curriculum vitae or resume indicating your scientific work experience is required. Please indicate your years of study, location, years of scientific work and locations.

Graduate Record Examination GRE
The Graduation Record Exam (GRE) general test is required. In the case of individuals possessing post-graduate degrees such as an MD, the GRE requirement may be waived if there is evidence that the required skills have been acquired prior to or during the course of the post-graduate degree.

Letters of Recommendation
Three (3) letters of recommendation should be submitted from persons who have supervised the applicant's research or academic work and who can evaluate their intellectual ability, creativity, leadership potential, and promise for productive scholarship. If laboratory supervision was provided by a postdoctoral or graduate student, the letter should carry the signature of the faculty member in charge of the research project.

Personal Statement
Each applicant must submit a Statement of Purpose (3 double-spaced pages maximum) detailing his/her reasons for pursuing graduate study in biomedical science and translational medicine, including applicable experiences and preparation, and long-term goals.
English Language Proficiency

The program provides instruction in English only. Proficiency in written and oral English is therefore essential. The institution will admit qualified students from foreign countries. The requirements for admission of such students will be the same as for all other students, except that, to ensure proficiency in the English language, “Test of English as a Foreign Language” (TOEFL) scores are required.

Application Fee/Fee Waivers

An application fee of $35 is required at the time of application. The Graduate Program will waive the application fee for applicants who are participants or who have participated in one of the programs listed below for at least a year. The fee waiver is a one-time offer for eligible applicants.

- Americorps
- Annual Biomedical Research Conference for Minorities Students (ABRCMS)
- Bill and Melinda Gates Millennium Scholarship
- Careers Opportunity Research/NIMH (COR/NIHM)
- Currently serving in the U.S. Military
- Institute for Recruitment of Teachers (IRT)
- Ronald McNair Postbaccalaureate Achievement Program
- Mellon Minority Undergraduate Fellows Program
- Minority Access Research Careers (MARC)
- Minority Biomedical Research Support Program (RISE)
- National Association of African American Honors Program (NAAAHP)
- Peace Corps
- Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)
- Teach for America
- Jackie Robinson Foundation

You will be required to submit a letter from the coordinator of the program. Please email this letter to gradprogram@csmc.edu prior to submitting an online application to the Graduate Program.

Decisions on Applications

Provided that the application is complete and the Graduate Program Office successfully received all of the admissions requirements by the deadline, applicants will receive notification of receipt. Successful applicants will then receive an invitation to interview at Cedars-Sinai with select faculty. The Admissions Committee will make the final selection and applicants will be notified no later than two weeks following the interview process.

The Doctoral Degree

The Graduate Program focuses on the individual student. The curriculum is designed to stimulate creative as well as critical thinking in research. Students are required to attend clinical rotations as well as laboratory rotations and co-curricular activities, allowing each student to gain intimate knowledge of the translational aspects of biomedical science. This greatly enhances a student's knowledge of research and its clinical applications.

During the first two weeks of the first academic year a series of orientation meetings will be held for the students at which they will be able to meet faculty from all disciplines at Cedars-Sinai and hear presentations on the research being done by different research groups. This will be an important opportunity to make laboratories visible to new graduate students who will shortly be selecting those laboratories through which they wish to rotate.

PhD Requirements

The Graduate Program in Biomedical Science and Translational Medicine grants a PhD upon completion of all of the requirements, which include coursework, laboratory rotations, clinical observation rotations, qualifying examination, dissertation research, and dissertation defense. Each requirement is described in more detail under the assigned heading in this catalog. Students in the program are devoted to full-time study and research.

During the first year, students must complete the core curriculum, which is comprised of lecture classes and laboratory rotations. Students will complete six modules taken during the first year; Immunology, Oncology, Gastroenterology, Cardiology, Genetics and Neuroscience. In addition, students are expected to complete courses in Biostatistics, Methods in Cell and Molecular Biology and Introduction to Research. Students are expected to spend half of their time on coursework and half of their time in the rotation laboratories. Students are required to participate in at least three laboratory rotations to increase their exposure to different areas of research study and to ensure that students select a thesis laboratory that matches their research interest.

Students must have passed all relevant requirements prior to taking the Qualifying Examination. The examination will focus on research distinct from student's thesis research. The goal of this examination are to rigorously test the ability of the student to design a research plan, present the proposal in a formal seminar and discuss the material presented. Students are required to pass the Qualifying Examination for advancement to doctoral candidacy.
Beginning at the advancement to candidacy, students will meet with their chosen Doctoral Committee bi-annually. This will ensure the student's progress is on track and that the student's thesis project is completed in a successful and timely manner. The final requirements for the doctoral degree are the thesis manuscript and the oral defense of the thesis. The oral defense will be held in front of a panel of faculty members and an external expert in the field who is outside of the Cedars-Sinai community.

**Core Curriculum**

All students entering the program will participate in the “core curriculum” during their first year (3 trimesters). The course will be organized as a series of six (6) “Core Modules” (each Core is 8 weeks in length/2 cores per trimester) focused on specific diseases/areas of expertise here at Cedars-Sinai. Core Module instruction will take place three times a week (e.g. MWF) in 1.5 hour blocks of instruction. In addition a series of “Special Topic Units” focused on specific translational research tools and skills will be presented in 1.5 hour sessions twice a week. The first special topics area to be covered will be Biostatistics, followed by condensed, shorter sections on genomics, proteomics, expression, imaging, regulatory and ethical issues. Actual times and organization are subject to change.

**Laboratory Rotations** (2 credits)

Students are required to complete three (3) laboratory rotations during the first year of the program. Laboratory rotations give graduate students an opportunity to experience several laboratory environments, research opportunities and laboratory mentors that they may be considering for their dissertation research. These rotations also allow the faculty to evaluate students in a research setting and get to know the students. Laboratory rotations run congruent with the academic trimesters.

Students are expected to fully partake in the laboratories activities including: group laboratory meetings, discussion groups and laboratory projects. Students are expected to arrange independently each of their three rotations with the Cedars-Sinai mentoring faculty who are actively participating in the program. A list of active faculty can be procured from the Program Coordinator.

Laboratory rotation arrangements between students and laboratory needs cannot be made prior to four weeks before the rotation is scheduled to begin. Students and laboratory heads may not pre-book their laboratory rotations in advance. Students must complete the “Rotation Agreement” form and have the mentor, in whose laboratory they will be rotating, sign it. This form should be turned into the Graduate Program Coordinator no later than two (2) weeks prior to the start of the new rotation.

At the end of each laboratory rotation students are expected to give a 10 minute oral presentation describing the results of their project(s). These presentations are peer reviewed.

**Observational Clinical Rotations** (1 credit)

Students are required to complete 2 clinical rotations during each trimester. Observational Clinical Rotations allow students to observe patient care and clinical research in a variety of clinical settings. Throughout the year students are scheduled to spend half-days observing a variety of in-and outpatient clinics. Inpatient setting includes bone marrow and renal transplantation and surgical procedures; outpatient observations occur in the Rheumatology, Diabetes, and Adult Psychiatry Clinics and the Pituitary Center. Additional clinical observations are provided based on individual research interests of the Graduate Students as they progress through their research years.

**Qualifying Examination**

At the end of year one/beginning of year two, each student will prepare a written and an oral presentation that will be submitted to the Qualifying Exam Committee for evaluation. The written portion of the Examination is submitted to the Qualifying Examination Committee followed by an Oral Examination based upon the proposal. Students must complete the “Qualifying Examination Request” form 30 days prior to the examination date and submit it to the Graduate Office. The Qualifying Examination must be completed by the end of year two.
Qualifying Examination Committee
The mission of the Qualifying Examination Committee is to assess each student's ability to progress towards PhD Candidacy. The committee convenes in the beginning of the student's second year and will review and assess the student's Qualifying Examination, which will consist of a written and an oral component. The exact format of the qualifying examination will be prescribed by the qualifying examination committee each year. It will include an extensive written component (usually conforming to a grant application format) on a topic that is not the topic of the dissertation laboratory, an oral presentation, and a question and answer session.

Each year a Qualifying Examination Committee will be appointed by the Graduate Program. The committee will consist of at least five (5) Cedars-Sinai faculty members representing at least three (3) different departments/institutes. All committee members must be members of the Cedars-Sinai faculty (assistant-, associate-, or full professor).

Advancement to Candidacy
Once the rotations, course work, and the qualifying exam are completed successfully, the student is advanced to PhD candidacy. A minimum of forty-six (46) credits must be completed to advance to candidacy.

Dissertation Research
At the end of the first year, students select one of the laboratories in which they rotated, for their dissertation research. Laboratory selection is based on student choice, with the consent of the laboratory head. In cases where suitable matches cannot be made, additional rotations into the second year may be required. While the majority of the student's time will be spent in the laboratory, ongoing clinical exposure relevant to the student's research will be included. This exposure will assist the student in understanding the potential translational aspects of their research and facilitate communication with clinical investigators.

Doctoral Dissertation
The Graduate Program requires the completion of an approved dissertation that demonstrates the student's ability to perform original, independent research and constitutes a distinct contribution to knowledge in the principal field of study. Students will spend years three and four on completing dissertation research, writing their dissertation, and presenting a defense of the dissertation. Students will meet regularly with their Doctoral Advisory Committees and will participate in ongoing workshops, seminars, and journal clubs. The program is designed such that it is possible, although challenging, to complete the requirements in 4 years. It is the express job of the Doctoral Committees to look out for the best interests of the students with the goal towards graduating students with PhD degrees who will be uniquely qualified to take on their next jobs (postdoctoral fellowships, educational or industrial posts, etc). The Doctoral Committees will base their decisions on a balanced evaluation of academic growth and maturity, problem solving skills, writing and presentation skills, and publication record.

Doctoral Committee
The mission of the Doctoral Committee is to assess each student's dissertation research progress and to award the PhD in Biomedical Science and Translational Medicine to qualified students.

The Doctoral Committee will meet twice a year to evaluate student progress and student plans. The committee will then evaluate the completed dissertation, conduct the oral defense and vote to certify the dissertation.

Membership of the Doctoral Committee will consist of six (6) members, chosen by each student. The membership is defined and approved by the Director of Graduate Research Education and the Program Director.

Standards of Scholarship
Cedars-Sinai requires that students maintain at least a 'B' (3.0) average in all courses taken during their graduate status in the program. Students may be placed on probation if their work in any two consecutive terms falls below a 'B' (3.0) average. The Graduate Program Director and the Director of Graduate Research Education will determine a student's eligibility to continue graduate study. If granted the ability to continue in probationary status, the student is required to make expeditious progress in improving their scholastic status. If the student does not make substantial progress towards improvement, the student may be subject to dismissal from the program. This will be determined by the Graduate Program Director and the Director of Graduate Research Education.

Academic Residence/Transfer Credits
All coursework and research must be completed at Cedars-Sinai Medical Center. The program currently offers no advance placement credit for prior experience or academic accomplishments. Students with prior extensive post-graduate biomedical education may appeal to the Curriculum Committee for exemption from specific courses, which may be granted if the committee concludes that the training would duplicate previous coursework.
Normal Progress to Degree

During the journey towards a PhD degree, the Graduate Program expects to maintain “normal progress toward the degree.” “Normal progress” is moving through the series of steps in the program necessary to obtain a PhD degree at a realistic pace and with the level of performance required of our doctoral students. The steps are as follows:

A. Maintain a 3.0 grade point average in all core coursework; reasonable progress in completing required coursework.
B. Selection of a laboratory dissertation mentor and a Doctoral Committee; initial steps of PhD dissertation work at beginning of second half of the second year.
C. Successful completion of both the written and oral portion of the Qualifying Examination by the end of the second year of graduate study.
D. Successful completion of dissertation research, a written dissertation and an oral presentation defending the dissertation to the Doctoral Committee.
E. Annual meetings with the Director of Graduate Research Education and Graduate Program Director.
F. Bi-annual meetings with the Doctoral Committee.

Degree Completion Time Limit

It is the expectation of the program that students will complete their doctoral degree within four to five years of registration. A student has a maximum of seven calendar years from the date of first registration in the Graduate Program to complete the doctoral degree.

Credits

The Graduate Program is a full-time commitment. Nevertheless progress through this commitment is typically measured in course credits completed. Students need to complete forty-six (46) credits to advance to candidacy and need to complete a minimum of sixty-four (64) credits to graduate. The curriculum credits for the first year are shown below.
Module Course Descriptions

Core Module 1: Course 502 Genetics (4.5 credits)

This course will cover the human genome and its impact on phenotype. Topics covered include the study of genetic mechanisms in rare disorders and the role of genetics in multi-factorial, complex disorders. Students who complete this course will understand how genes influence human development and phenotypes as well as how genetics and environment interact to dictate phenotype. This course will allow the student to utilize research tools used in gene discovery and define the errors that occur in genes and gene expression that impact human disease. Students will produce an oral presentation on a specific genetic disorder as well as complete a written final exam.

Core Module 2: Course 501 Infectious Disease/Immunology (4.5 credits)

This course is designed for students to learn about the roles and importance of immunology in various human diseases and animal models, including cancer immunology, autoimmune diseases, infectious diseases, and immunodeficiency diseases. The goals of this course are to introduce students to these active research topics, to bridge the basic immunology and clinical immunology, and motivate them to the select their own research topics related to important human diseases. This course will require the presentation of a scientific paper as well as a written final examination.

Core Module 3: Course 503 Gastroenterology (4.5 credits)

Diseases used to illustrate biological principles in this module include pancreatitis, irritable bowel syndrome, liver disease and inflammatory bowel disease with a specific emphasis on IBD including genetic and environmental factors as well as the gut flora in the GI system. Course readings are drawn from a wide variety of medical journals and other scholarly texts. Students will develop an understanding of many fundamental concepts and their clinical relevance to gastroenterology.

Core Module 4: Course 505 Oncology (4.5 credits)

This module will cover genetic factors impacting cancer as well as recent advances in cancer prevention, detection and treatment. Students will integrate information from basic and clinical cancer research to describe the major impediments to eliminating cancer as a disease. Students are expected to complete an oral presentation which will cover prevalence of cancer types, associated risk factors, cellular and molecular mechanisms of cancer type, the physiology and pathology of the disease as well as detection, treatment and possible strategies for prevention.

Core Module 5: Course 504 Cardiology (4.5 credits)

This module will cover cardiovascular disease, its effects on human health and the evaluation and treatment strategies of the disease. Students completing the course will understand the role of metabolism on cardiovascular disease as well as the recent advances in stem cell biology. Hypertension and artherosclerosis will be studied along with multiple physiologic systems influencing blood pressure control with emphasis on the kidney. Select papers will be outlined and discussed and students will be expected to complete two quizzes as well as a written final examination.

Core Module 6: Course 506 Neuroscience (4.5 credits)

The goal of this module is to provide an introduction to basic and fundamental concepts in the field of neuroscience and to prepare students for possible research in this field. This module will provide an introduction and overview of cellular and molecular neuroscience, a neuro-anatomy overview, sensory and motor systems, brain regulation of behavior and body physiology, and neural development.
### Core Curriculum

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Special Topics in Biomedical Science and Translational Medicine Course Descriptions

Course 512-Introduction to Research I (3 credits)
Stem Cells: Biology & Imaging: 14 class series investigating the use of stem cells (including embryonic and adult stem cells, and induced pluripotent stem cells) for regeneration of skeletal, cardiac and neural tissues. This course also introduces the importance of the stem cell microenvironment for the tissue engineering. An introduction to small animal optical (bioluminescent, fluorescent) imaging, micro CT, micro PET and micro MRI imaging including guidance on experimental design and data analysis.

Topics in Clinical Research: 7-class series covering design of translational and patient-oriented studies, Good Clinical Practice (GCP), bioinformatics/information systems, conduct of ethical biomedical research and research management are discussed.

Grant Writing: 4 classes introducing students to identify traditional and new funding sources, grantsmanship, peer review and budgeting. The objective of these lectures is to provide a broad overview on the grant writing process. The specific topics covered include: fundamentals of good grant writing, general preparation of the grant application (i.e., specific aims, research design, career development plans, budgets, analysis of reviews and revision strategies), roles and responsibilities of the Cedars-Sinai Research Development Team and an overview about the various available funding mechanisms. At the end of their first year all graduate students, under the guidance of a Research Development Team member, will prepare and submit at least one competitive peer-reviewed grant (research fellowship) application.

Course 513-Introduction to Research II (3 credits)
Microscopy and image analysis: Basic microscopy techniques, optimizing research design (including live cell imaging) and sample preparation are discussed. Techniques for analysis of confocal and two-photon microscopic images are introduced.

Advanced Techniques: This course introduces new advances in microarray technology, flow cytometry, sequencing, gene delivery and other technology-intensive applications. The influence of instrument platforms, experimental variables, and the analysis of complex data will be discussed.

Course 511-Methods in Molecular & Cellular Biology (2 credits)
This course focuses on a particular laboratory technique or method including some fundamental principles of molecular and cellular biology. Classes are led by post-doctoral fellows in order to provide the post-doc fellows with teaching experience and to begin building relationships between the post-doc fellows and the graduate students. Every class is also attended by a faculty member.

Course 510-Biostatistics (3 credits)
This course introduces methods and concepts of statistical analysis. Sampling situations are utilized with special attention to those occurring in biological sciences. Topics include distributions, tests of hypotheses, estimation, types of error, significance and confidence levels, power and sample size.

Course 514-Structured Journal Club (9 credits)
This course is a continuation of the journal clubs within the core curriculum and is required during the student's 2nd through 4th year. This class refines the student's knowledge of scientific literature as well as presentation skills.

Course 802-Dissertation Laboratory (18 credits)
This "course" includes the completion of an approved dissertation that demonstrates the student's ability to perform original, independent research and constitutes a distinct contribution to knowledge in the principal field of study. Students will spend years 2 through 4 on completing thesis research, writing a dissertation, and presenting a defense of the dissertation. Students will meet regularly with their thesis advisory committees during this course.

Candidates with MD or Equivalent Degrees

1. Prospective students who hold an MD or equivalent degree from an accredited institution can be admitted to the program. The principles for such admission are (i) that they receive the same core curriculum as the regular track with the exception that advance credits for medical school courses in biomedical sciences may be given after an evaluation of prior coursework by the Curriculum Committee and (ii) that they complete their dissertation research in the same time period.

2. During the first year three (3) laboratory rotations are required. Because there could be less required coursework in biomedical sciences, the laboratory rotation time may be shortened. This process will be handled on an individual basis.
Academic Integrity

Integrity and honesty are fundamental to the pursuit of truth and knowledge at any academic institution. These core values are essential to the function of the academic community at a research institution such as Cedars-Sinai. Only by maintaining the highest standards of integrity are the conduct of research, the evaluation of a student’s academic performance and the ultimate award of a degree meaningful.

The following information is intended to assist graduate students at Cedars-Sinai in understanding and abiding by the Institution’s standards for academic honesty. The definitions and clarifications are informational and meant to provide examples of these behaviors. They are not intended to be all-inclusive. Questions regarding this policy or requests for additional clarification can be directed to the Director of Graduate Program or to the Director of Graduate Research Education or his designee.

Plagiarism

Books, published papers, written documents, and electronic information (including words, data, drawings, and photographs) are the intellectual property of the persons who created them and are the legal property of the parties named in the copyright notice. Students who, in their written academic work, incorporate the ideas of others, whether as direct quotation or as paraphrase, are obligated to credit the source through appropriate citation. Likewise, information used in academic projects or in oral presentations must be credited to the source.

Examinations

Any use of external unauthorized assistance during an examination is considered academically dishonest. This includes, but is not limited to, any use of written or electronic information such as books, notes, or calculators unless expressly authorized by the teacher responsible for administering the examination. Likewise, communication with another student or any other person during an examination will be considered a violation of the integrity of that examination.

Fabrication

The invention or alteration of data, information or citation in any academic exercise constitutes a violation of academic integrity. This includes fabrication of material submitted for lab assignments, class projects or other assignments, whether wholly or partially falsified. Fabricated information constitutes work representing neither the student’s own effort nor the truth concerning a particular line of investigation or study.

Fair Treatment of Human and Animal Subjects in Research

Graduate students will participate in laboratory research in which human and/or animal research subjects are utilized. Cedars-Sinai Medical Center has created mission statements to address the fair treatment of research subjects and all graduate students are expected to uphold these standards. Any student found not in compliance with the following mission statements may be subject to disciplinary action.

CSMC IRB Mission Statement:

The CSMC IRB (Institutional Review Board) operates under a Federal-Wide Assurance (FWA) approved by the Department of Health and Human Services, Office of Human Research Protection, which requires CSMC to conduct human subjects’ research in accordance with the Belmont principles of respect for persons, beneficence and justice. The mission of the CSMC IRBs is to protect the rights and welfare of human subjects involved in research at CSMC. In order to accomplish this mission, the IRBs conduct thorough reviews of each research study prior to its initiation, and at regular intervals thereafter to ensure that the research conforms to and abides by all applicable ethical principles and federal, state, and institutional regulations. In addition, the IRBs monitor the conduct of research after approval.

CSMC IACUC Mission Statement:

The mission of the IACUC (Institutional Animal Care and Use Committee) is to promote the humane
care and use of animal subjects involved in research and training activities at CSMC. In order to accomplish this mission, the IACUC operates under an Animal Welfare Assurance approved by the Office of Laboratory Animal Welfare at the National Institutes of Health, which commits the CSMC IACUC to perform thorough review of all proposed research prior to its initiation and at regular intervals thereafter to ensure that the research conforms to, and abides by all applicable regulations, policies, and standards. In addition, at least once every six months, the IACUC reviews the institutional animal care and use program and inspects all animal facilities and animal study areas at CSMC to certify institutional compliance with all applicable regulations, policies, and standards.

Student Grievances

The student is encouraged to seek resolution of complaints and other concerns relating to his/her appointment or responsibilities. The student is urged to first discuss complaints and similar concerns with his/her mentors, teachers or members of the Doctoral Committee wherever possible and appropriate. Issues can best be resolved at an early stage and every effort should be made to achieve a mutually agreeable solution. After thorough discussion, if the complaint or concern is not adequately addressed to the reasonable satisfaction of the student, the student may present the complaint or concern to the Graduate Program Director for the purposes of achieving a mutually agreeable solution. Notwithstanding the foregoing, in situations in which the complaint or concern is related to Faculty Members or the student’s Doctoral Committee and the student believes that a fair resolution cannot be attained by presenting the complaint or concern to these individuals, the student may present the complaint or concern directly to the Graduate Program Director.

If the complaint or concern is still not resolved to the reasonable satisfaction of the student after discussions pursuant to the foregoing provisions, the student may present the complaint or concern, in writing, to the Director of Graduate Research Education for the purposes of achieving a mutually agreeable solution. In addition to the foregoing, in situations where the complaint or concern relates to both the student’s mentors or teachers or the Graduate Program Director and the student believes that a fair resolution cannot be attained by presenting the complaint or concern to those individuals, the student may present the complaint or concern in writing directly to the Director of Graduate Research Education.

I (Incomplete) Grades

A student will receive a grade of ‘I’ (incomplete) when his/her work is of passing quality but is incomplete for a good cause. A student may remove the Incomplete and receive credit(s) and a grade if he/she satisfactorily completes the work of the course by the end of the next trimester in which the student is enrolled. If the student fails to complete the appropriate course work by the end of the next trimester, the ‘I’ grade will automatically be replaced with the grade ‘F’ or ‘U’ (unsatisfactory) as appropriate.

In cases where the work for a course was not completed and the student’s ‘I’ was replaced with an ‘F’ or ‘U’, with permission from the instructor, the student may complete the course in a subsequent trimester and the appropriate earned grade will be assigned to the record. Notwithstanding the foregoing, in situations where the complaint or concern relates to both the student’s mentors or teachers or the Graduate Program Director and the student believes that a fair resolution cannot be attained by presenting the complaint or concern to those individuals, the student may present the complaint or concern in writing directly to the Director of Graduate Research Education.

Leaves of Absence

A leave of absence may be granted by the Graduate Program to continuing graduate students in good standing (3.0 GPA), who have completed at least one trimester in graduate status at Cedars-Sinai. Request for Leave of Absence forms are available from the Graduate Program Coordinator. All leaves must be requested before the end of the second week of class of the trimester in which the leave of absence is to begin.

A leave is normally granted for periods of one to six months. Leaves may be extended for a total of one year at the request of the student, on the recommendation of the department and/or laboratory involved, and with the approval of the Graduate Program. If the student fails to return to the program after being on official leave of absence, or leaves the program without an official leave of absence, the student must apply for readmission to the graduate program. Time spent on an officially approved leave of absence is not counted in the seven year time limit on degree completion.
Withdrawal

If a student is considering withdrawing from the Graduate Program we strongly urge that they first discuss this with his/her mentor and with the Director of Graduate Research Education and the Graduate Program Director. If the student decides to withdraw, he/she should communicate that decision in writing by completing an End of Enrollment form, and returning it to the Graduate Program Coordinator once it has been completed and has required department signatures. All books must be returned to the library and laptops must be returned to the Graduate Program Coordinator. All other Cedars-Sinai property must be returned to the appropriate departments within thirty (30) days of withdrawal. Upon withdrawing from the program the student’s stipend will cease from the date of the withdrawal.

STUDENT LIFE

Unique Setting

Cedars-Sinai Medical Center has evolved to become the largest non-profit hospital in the western United States, one that is internationally renowned for the best patient care that modern medicine has to offer. Today, Cedars-Sinai Medical Center is committed to providing superior outpatient, acute and sub-acute patient care, breakthrough biomedical research, graduate and undergraduate medical education and community service. Cedars-Sinai Medical Center’s physicians and scientists are leaders in basic and clinical research, bringing advances in medicine directly from the laboratory to the bedside. It is in this unique environment in which the Graduate Program educates future biomedical researchers and scientists.

As a major community medical center and tertiary referral center, Cedars-Sinai offers unparalleled opportunity for translational studies. The research buildings which house the graduate program are surrounded by cutting-edge centers of excellence in a wide range of medical disciplines. The program’s faculty includes clinicians who interact daily with patients in hospital and clinic settings. Similarly, basic scientists who work in Cedars-Sinai’s research community are focused on uncovering new knowledge that will directly advance patient care.

Students are taught by and interact among the medical and research faculty of Cedars-Sinai. The medical center’s campus houses several research institutes including, the Burns and Allen Research Institute, the Board of Governor’s Gene Therapeutics Research Institute, the Heart Institute, the Inflammatory Bowel and Immunobiology Research Institute (IBIRI), the Maxine Dunitz Neurosurgical Institute (NSI), the Medical Genetics Institute (MGI), the Regenerative Medicine Institute, the Samuel Oschin Comprehensive Cancer Institute, the Women’s Cancer Research Institute, and the Women’s Guild Lung Institute. Students may choose to rotate among these research institutes during their education.

Diversity

Cedars-Sinai Medical Center is dedicated to having a diverse medical staff and training programs to meet the ethnic and cultural needs of the diverse community that the Medical Center serves. The Cultural Diversity Committee of the medical staff is chartered to: provide culturally diverse lectures and assist the medical staff in attaining cultural competence, encourage more culturally diverse students to select Cedars-Sinai as their site for clerkships, residency training and graduate education and to provide special mentoring of the culturally diverse physician-in-training.

One of the Graduate Program’s highest priorities is to advance the diversity of its student body and encourages underrepresented minorities to apply to the program.

Housing

Students are responsible for arranging their own accommodations. The Graduate Program does not offer on-campus housing. For additional information regarding housing in the areas surrounding the medical center, please contact the Graduate Education Center.
Financial Responsibility

Students are not responsible for any course fees. Students will receive an annual stipend of $36,000 plus the benefits specified below.

Benefits

Students enrolled in the PhD program at Cedars-Sinai are eligible to participate in the following group benefits for graduate students. Note: carriers for the medical, dental, and vision plans are subject to change at the institutions sole discretion.

• Medical Plan – Anthem Blue Cross, there are two choices: HMO or PPO
  • HMO – Students and spouses, dependents, domestic partners are fully covered (free)
  • PPO – Students and spouses, dependents, domestic partners pay a monthly premium.
• Dental Plan – Delta Dental (PPO) or DeltaCare USA Plan (similar to an HMO plan)
• Vision Plan – Vision Service Plan (VSP)

Leave Benefits

Students are entitled to leave benefits as follows:

• 20 paid days off:
  • Labor Day (1)
  • Thanksgiving (2)
  • Winter Break (10)
  • Spring Break (5)
  • Memorial Day (1)
  • Independence Day (1)
• Family Leave, available upon request
• Medical Leave, available upon request
• Personal Leave, available upon request

Work ‘n’ Life Matters

Managing busy academic and personal lives can be more challenging than ever in our complex world. The good news is - you don't have to do it alone. As a Cedars-Sinai graduate student, you may use the confidential services of Work ‘n Life Matters specialists for assistance with:

• Family and personal problems
• Emotional concerns (depression, anxiety, stress, grief, etc.)
• Alcohol, drugs (prescription or other), and/or gambling concerns
• Work relationship issues
• Problems arising from financial, legal or health difficulties
• Customized child care referrals
• Parenting issues and concerns
• Creative ways to balance busy work and personal lives

Work ‘n Life Matters Parent Services, EAP (Employee Assistance Program) and Career Services are staffed by licensed mental health professionals, child development and childcare referral specialists and career counselors. All contacts with the Work ‘n Life staff are confidential and there is no charge to Cedars-Sinai Graduate Program participants for services provided.

To make an appointment, please call Work ‘n Life Matters at extension 38044.

Student Travel Support

Cedars-Sinai Graduate Program encourages students to get involved in the scientific community through attending scientific conferences and seminars. There will be assistance with funding for student travel during the course of the Graduate Program.

Medical Library

The Medical Library is a resource center available to Cedars-Sinai medical staff, employees and students in the Medical Center’s training programs. Registered users may access library information and electronic resources on the Cedars-Sinai Intranet or through the proxy server. Copyright and licensing restrictions do not permit the Medical Library to offer access to electronic resources to the public at this site.

Services

As the hub for medical information, the Library provides many resources and services including:

• Electronic and print journals and books
• Document delivery
• Education and consulting
• Links to other libraries and resources
• Computers for searching databases and the Internet

The Medical Library is located in the South Tower on the Plaza level, room 2815.

Hours of Operation

Monday thru Friday: 8am – 8pm
Saturday and Sunday: Closed

Helpful Phone Numbers

Library Front desk (310) 423-3751
Library Fax (310) 423-0138
Interlibrary Loan & Document Delivery (310) 423-3647

Databases, online books, online journals and other Library resources are available anytime from computers connected to the Medical Center's intranet.
Student Educational Center

The student educational center is located in the Atrium building on the second floor, room 209A. The center is for exclusive use by Cedars-Sinai graduate students. The center contains individual study stations with laptop hook-ups, a printer, and a copier. There is a lunchroom attached to the Student Center that has a refrigerator, microwave and sink that students may use.

Student Educational Center Policy

The Student Center is for the students use only. It provides a quiet place for students to study, read, and use their laptops. It also provides a place for students to store their belongings while on campus.

Terms & Conditions

1. The Student Center is for the use of current & enrolled students only.
2. Students must respect the furniture and equipment in the student center at all times.
3. Students must be respectful to other students while in the center and keep noise to a minimum.
4. Students should not use their cell phones in the student center: they should step outside if they need to make a phone call.
5. Students should report any problems with equipment and/or center to the Graduate Program Coordinator immediately.
6. Graduate Program reference books and journals should not be removed from the Student center at any time; they are to be available to all students at all times.
7. The center should not be used as a place for social interactions with individuals who are not in the program.

Student Laptop Computer Policy

The Cedars-Sinai Graduate Program in Biomedical Science and Translational Medicine will provide enrolled Graduate students with a laptop computer for the duration of their graduate studies. The laptop remains the property of Cedars-Sinai Graduate Program for the duration of and after the program. No ownership rights are transferred to the students at any time. Laptops will be limited with respect to the programs and software installed at Cedars-Sinai’s sole discretion.

Laptops should be returned in working condition; normal wear and tear will be anticipated. At the completion of the Graduate Program, students must return the laptop, in working condition, within 30 days to the Graduate Program Coordinator. In the event of a termination of the student/graduate school relationship, the student will have 15 days to return the laptop, in working condition, to the Graduate Program Coordinator. Students may use their own PC/laptop so long as its configuration and usage conforms to Cedars-Sinai policies. There will be a fee to configure personal PC/laptops to Cedars-Sinai.

Student Pal Program

In order to help ease the transition into working as full-time students at Cedars-Sinai, the incoming graduate students will be paired with an existing graduate student upon acceptance into the program. The Student Pal Program is designed to help new students get to know the graduate program, the medical center and the city. The senior students should provide the newcomers with personal contact and support throughout their first year as a graduate student.
Parking

Parking is available to all new students on a first come first serve basis, depending on availability and your personal schedule.

If you choose to park in a Cedars-Sinai lot, the monthly fee will be automatically deducted from your paycheck. The monthly parking fees range from $18.00 to $32.00 per month. The fee varies depending upon the proximity of the selected parking lot to the main Medical Center.

Parking at Cedars-Sinai is voluntary and you may choose to park elsewhere. If you choose, the parking fee may be waived or reduced through the Rideshare program.

For additional parking information, please contact 310.423.5535 between the hours of 7:30am-4:00pm, Monday through Friday.

Cedars-Sinai Shuttle Service

Cedars-Sinai has buildings located off site from the main campus. You can access these sites by taking the Cedars-Sinai shuttle service, free of charge, with employee ID. For shuttle schedules and real time access please go to:  http://www.cshssshuttle.com/.

Rideshare

Rideshare is an alternative transportation option that can save you money as well as contribute to clean air. The following are alternative modes of transportation to CSMC:

Carpooling

Definition: Two (2) to Six (6) people traveling together between their residence and their worksites, for the majority of the total trip. Commuting with a child between both residence and day care facility/school is included within this definition as long as they are in the same vehicle for the majority of the total trip distance.

All carpoolers who participate in the Rideshare Program are eligible for a monthly parking fee refund when minimum rideshare requirements are met. Parking reimbursements are refunded according to the schedule provided annually by the Payroll Department. Schedules may be obtained from the rideshare office.

All eligible participants in the Rideshare Program must obtain a Rideshare Validation Card (RVC) from the Rideshare Office.

Ridematching

The CSMC Rideshare Program offers Ridematching. Ridematching will assist students who are interested in carpooling but do not have a carpool partner.

The Ridematch Database will match CSMC you with other CSMC employees who reside in the same area and work the same schedule. Receive a personalized list of possible carpool partners. Your information is confidential and your home address, if provided will never be disclosed.
**Rides to Riches**  
Bicycle, Carpool, Shuttle, or Walk! Eligible participants begin earning points from their date of enrollment. Enrollment is not retroactive.

Students that meet rideshare requirements are eligible to participate in this program. Earn 100 daily Award Points for each day you commute by an alternative mode of transportation to work. Points become inactive if there is no activity within ninety (90) days.

**Vanpooling**  
Vanpool Fares are deducted monthly through a student stipend. Fares are calculated according to the vanpool route and full time vanpool passengers are not eligible for parking privileges however, all vanpool passengers are entitled to One Day Parking Passes that will be issued as needed.

One Day Parking Passes are accepted on Lot 4, Lot 7 and the Mark Goodson Parking Structures. Parking Lot 4 and Lot 7 is located on Sherbourne between Gracie Allen & 3rd Street.

The Vanpool Program welcomes part-time riders when seat/s are available on any of the vans. Part-time riders are encouraged to keep in frequent contact with the Rideshare Coordinator to maintain their interest or seat availability.

Part-time riders must purchase a vanpool script prior to commuting on the van. Part-time riders who unexpectedly arrive at the park and ride without notice or script/s may not be able to commute on the vanpool.

**Metro Corporate Transit Pass**  
All Cedars Sinai Medical Center Employees who commute to work by Public Transit are eligible to purchase a monthly Metro Corporate Transit Pass.

*MTA EZ Pass*: Cedars-Sinai also offers students the EZ Pass. The EZ Pass makes it easy to ride from Bus to Bus, Bus to Rail, Rail to Dash and City to City. Metro Bus & Rail Schedules can be obtained at the Rideshare Office.

The MTA Monthly Pass is sold on the twenty-fifth (25th) of each month through the fifth (5th) of the following month. The MTA Monthly Voucher/Pass is sold Monday through Friday however the pass is not issued or sold after 3:00 p.m.

For additional information regarding parking options, please contact:

Rideshare at x35789 or visit Room 1603 in the South Tower, Street Level, Monday - Friday 7:00am - 3:30pm

Parking Office Location: Employee Parking Lot 8, room 100 Phone: x35535 Hours: Monday - Friday 7:00am - 4:00pm. For additional information on parking options, please contact:

2. Rideshare at x35789 or visit Room 1603 in the South Tower, Street Level, Monday - Friday 7:00am - 3:30pm
3. Parking Office Location: Employee Parking Lot 8, Room 100. Phone: x35535. Hours: Monday - Friday 7:00am - 4:00pm.
Key Faculty

David Underhill, PhD
Director, Immunobiology Research Institute,
Associate Professor of Medicine

Research Focus
Although inflammation is essential for the body to protect itself against infection, when the process becomes overly aggressive it contributes to a host of inflammatory conditions including inflammatory bowel diseases, heart disease, autoimmune disorders, and sepsis. The laboratory studies the molecular mechanisms by which blood phagocytes such as macrophages and dendritic cells recognize microbial pathogens and initiate inflammatory responses. Further, a central question in immunology is to understand how inflammatory responses become tailored to specific microbial infections, and we hypothesize that phagocytosis, the process by which these cells eat foreign microbes, is a key part of this. The laboratory has used coordinated recognition of fungal pathogens by the C-type lectin receptor Dectin-1, and the Toll-like receptor TLR2 as a model for defining how different innate immune receptors can work together to orchestrate very specific inflammatory responses. Hopefully, understanding in exquisite detail how macrophages and dendritic cells translate recognition of microbes into inflammatory responses will lead to the design of targeted interventions to clinically manipulate these processes.

Research Contributions
Key contributions to our understanding of how innate immunity initiates host defense. Have specifically championed the role of phagocytes in immunity and the role of phagocytosis in signal transduction.

Current investigations include:
Defining signal transduction mechanisms activated by innate immune receptors in macrophages and dendritic cells. Learning about how these signals can be modified to shape inflammatory responses - both for improved host defense and for tempering the inflammatory tissue damage that is often associated with active immunity.

George Liu, MD, PhD
Immunobiology Research Institute,
Assistant Professor, Pediatrics

Research Focus
Community-associated methicillin-resistant Staphylococcus aureus (CA-MRSA) is arguably the most important pathogen of our time, but how it causes more frequent and severe infections is not known. A primary objective of the research program is to understand how S. aureus, particularly CA-MRSA, interacts with the host immune system. Combining the use of bacterial genetics, cell cultures, and small animal infection models, the lab studies the molecular mechanisms of S. aureus infections.

Research Contributions
Identification of microbial carotenoids as a novel class of virulence factors.
Current investigations include:
Host-Pathogen interaction, S. aureus and MRSA pathogenesis and colonization, role of the Staph golden pigment, catalase, Panton-Valentine Leukocidin, and hyaluronidase in infections.
Sandra Orsulic, PhD
**Director, Women's Cancer Biology**
**Women's Cancer Research Institute**

Dr. Orsulic is Director of Women's Cancer Biology at the Women's Cancer Research Institute at Cedars-Sinai Medical Center. Prior to joining Cedars-Sinai, Dr. Orsulic was Principal Investigator of a research laboratory at Massachusetts General Hospital in Boston, where she also served as Assistant Professor of Pathology at Harvard Medical School.

Dr. Orsulic's primary research interests include mouse models of gynecological cancers, the molecular characterization of ovarian cancer, and pathway-targeted therapy. Dr. Orsulic is a member of the Cancer Genome Atlas Project Ovarian Carcinoma Working Group, which investigates the underlying genetic changes that occur in human ovarian cancer.

Dr. Orsulic received her bachelor's degree from the University of Zagreb, Croatia, and her doctorate from the University of North Carolina at Chapel Hill. She was a postdoctoral fellow in the laboratory of Nobel Prize Laureate Dr. Harold Varmus at the National Institutes of Health and Memorial Sloan-Kettering Cancer Center.

Dermot P. B. McGovern MD
**Director, Translational Medicine, Inflammatory Bowel Disease Center and Immunobiology Research Institute**

Dermot McGovern, MD, PhD is Director of Translational Medicine for the Inflammatory Bowel Disease Center and Immunobiology Research Institute at Cedars-Sinai Medical Center. Dr. McGovern is also Associate Professor of Medicine at University of California, Los Angeles David Geffen School of Medicine.

Dr. McGovern's main clinical and research interests are in understanding the effect of genetic variants on susceptibility, natural history and response to therapy of the inflammatory bowel diseases, ulcerative colitis and Crohn’s disease.

Dr. McGovern has authored or co-authored numerous articles for peer-reviewed publications, including articles in Nature Genetics, The American Journal of Human Genetics, Human Molecular Genetics, The Lancet, GUT and Gastroenterology. He is a member of the editorial board of The IBD Journal.

Dr. McGovern earned his medical degree from St. Mary's Hospital Medical School at the University of London and is a Member of the Royal College of Physicians of London. He completed his fellowship at the University of Oxford, UK where he also earned a doctorate in IBD Genetics.

Kenneth E. Bernstein, MD
**Director of the Experimental Pathology Division in the Department of Pathology and Laboratory Medicine, Professor of Pathology**

Dr. Bernstein is a world-renowned experimental and renal pathologist who has authored in excess of 125 peer review articles. His research focus is on angiotensin converting enzyme and its receptors, and he has made seminal discoveries in this field of study. Dr. Bernstein has been recognized for his significant contributions, as evidenced by his receipt of the American Heart Association (AHA) Basic Research Prize, the AHA Novartis Award in Hypertension Research, and a National Institutes of Health (NIH) MERIT Award, among other honors. He currently holds two active NIH grants and participates in a third. He is on the editorial board of three high impact journals, and is a reviewer for more than 30 additional journals. Dr. Bernstein also is a frequent grant reviewer, having sat on NIH study sections many times.

Board certified in anatomic pathology, Dr. Bernstein is committed to medical education as evidenced by his participation in renal pathology medical student courses. He is a sought-after mentor for undergraduate and graduate students, and postdoctoral fellows, having advised more than 30 trainees.

Dr. Bernstein received his medical degree from New York University School of Medicine followed by a residency in Pathology at Columbia-Presbyterian Hospital in New York and the National Cancer Institute and National Institutes of Health, Bethesda, MD. This was followed by two additional years at the NIH as Special Assistant to the Director in the Institute of Diabetes, Digestive and Kidney Diseases.
Rhona Schreck PhD  

Scientific Director, Clinical Cytogenetics Laboratory

Rhona Schreck is the Scientific Director of the Clinical Cytogenetics Laboratory at Cedars-Sinai. Dr. Schreck is also a professor of pediatrics at the David Geffen School of Medicine at University of California, Los Angeles (UCLA). She previously worked in the clinical cytogenetics laboratories at UCLA and Children’s Hospital Boston.

A diplomate of the American Board of Medical Genetics, Dr. Schreck is certified in cytogenetics and is a founding fellow of the American College of Medical Genetics. She has also served on the exam writing committee of the American Board of Medical Genetics, and she received a Cedars-Sinai Medical Center President’s Award in 2000.

Dr. Schreck has conducted research on the structural organization of chromosomes and the pharmacogenetics of carcinogen activation. She has written numerous papers on research and clinical cytogenetics for such peer-reviewed publications as the American Journal of Human Genetics, American Journal of Medical Genetics, Nature and Proceedings of the National Academy of Science.

Dr. Schreck received her bachelor’s degree in biology from The City College of New York. She earned her doctorate degree from the department of Human Genetics and Development at Columbia University in New York, where she held a faculty fellowship and was a National Institutes of Health (NIH) trainee. She completed her postdoctoral training in the division of clinical genetics at Children's Hospital Boston and was an instructor in pediatrics at the Harvard University Medical School.

Leslie Raffel MD

Associate Director, Common Diseases Genetics Program

Leslie J. Raffel, MD is Associate Director of the Common Diseases Genetics Program at Cedars-Sinai. Dr. Raffel is also Program Director for the General Clinical Research Center. In addition, she is a professor of pediatrics at the David Geffen School of Medicine at University of California, Los Angeles (UCLA). Dr. Raffel serves as Co-Chair of the PhD Curriculum Committee for the Cedars-Sinai Medical Center Graduate Program in Biomedical Sciences and Translational Medicine and Curriculum Coordinator for the Cedars-Sinai Medical Center Clinical Scholars Program.

Dr. Raffel’s research focuses on delineation of the genetic basis of susceptibility to common adult-onset diseases, including Type 2 (non-insulin dependent) diabetes mellitus and its complications, hypertension and coronary artery disease. Other research interests include the ethical aspects of genetics research and informed consent. She has written numerous scientific articles related to her research, as well as book chapters on the genetics of diabetes and common disease genetics.

A founding fellow of the American Board of Medical Genetics, Dr. Raffel is a member of the American Society of Human Genetics, the International Genetic Epidemiology Society, the American Diabetes Association, the American Academy for the Advancement of Science, the American Federation for Clinical Research and the American Medical Association.

Dr. Raffel received a master’s degree in genetics from the Pennsylvania State University and her medical degree from the Medical College of Pennsylvania. Her pediatric residency was completed at St. Christopher’s Hospital for Children in Philadelphia, followed by a clinical and research fellowship in medical genetics at Harbor-UCLA Medical Center. She is board certified in both pediatrics and clinical genetics.
Jeff Gornbein, PhD

Biostatistics

BA, Mathematics, UCLA, 1978
MS, Biostatistics, UCLA, 1983
Dr.PH, Biostatistics, UCLA, 1987

Research Interests: Repeated measure analysis, clinical trial design, receptor binding model, survival analysis

Miklos Peterfy, PhD

Associate Professor, Medical Genetics Institute
Director, Laboratory of Mouse Models of Metabolic Disease

Obesity, type 2 diabetes and hyperlipidemia are among the most common diseases in the developed world. Although the genetic basis of these metabolic abnormalities is well established, our understanding of the actual genes and underlying molecular mechanisms remains incomplete. The focus of the Mouse Models of Metabolic Disease laboratory is the discovery of novel genes and disease mechanisms involved in carbohydrate and lipid metabolism. A wide range of experimental approaches are employed in the laboratory including genetics, molecular and cell biology, and physiology using genetically manipulated mouse models. Current studies include the characterization of LMF1, a gene involved in plasma lipid metabolism in mice as well as humans. Transgenic and tissue-specific knock-out mouse models are being used to investigate the role of LMF1 in tissues of metabolic importance, such as adipose (fat) tissue and the insulin-producing beta cells of pancreas. Our hope is that the discovery of genes and mechanisms involved in metabolic diseases will facilitate the development of novel therapeutic approaches.

Dr Peterfy has authored and co-authored numerous peer-reviewed publications in journals such as Nature Genetics, Diabetes, Journal of Biological Chemistry, Journal of Lipid Research, and Arteriosclerosis, Thrombosis and Vascular Biology. He is a member of the editorial board of the Adipocyte journal.

Dr Peterfy earned his PhD degree at the Budapest University of Technology in Hungary. He was a postdoctoral fellow at the National Cancer Institute at the National Institutes of Health in Bethesda, MD. Subsequently, Dr Peterfy was Research Scientist at Amgen, Inc. and Assistant Professor at the University of California, Los Angeles.

Kathrin S. Michelsen, PhD

Assistant Professor, F. Widjaja Foundation Inflammatory Bowel & Immunobiology Research Institute

Kathrin Michelsen, PhD is Assistant Professor in the F. Widjaja Foundation Inflammatory Bowel & Immunobiology Research Institute at Cedars-Sinai Medical Center. Dr. Michelsen is also Assistant Professor of Medicine at University of California, Los Angeles David Geffen School of Medicine.

Dr. Michelsen’s main research interests are in understanding the role of the innate and adaptive immune system in the development of inflammatory bowel diseases, infectious colitis, and colon cancer.

Dr. Michelsen has authored or co-authored numerous articles for peer-reviewed publications, including articles in Proceedings of the National Academy of Sciences of the United States of America, The Journal of Immunology, The Journal of Clinical Investigation, Gastroenterology, Circulation, and The Journal of Biological Chemistry. She currently serves as Scientific Councilor for the International Endotoxin and Innate Immunity Society.

Dr. Michelsen earned her master’s degree in Biopharmacology from the Ernst-Moritz-Arndt-University Greifswald, Germany and her doctorate in Molecular Biology from the Humboldt-Universität zu Berlin, Berlin, Germany. She completed her postdoctoral fellowship at Cedars-Sinai Medical Center, Los Angeles.
Graduate Education Center

Graduate Program
Biomedical Science and Translational Medicine

The graduate program is housed in the Graduate Education Center located in the Atrium Building, 2nd floor, on the corner of Beverly Blvd and George Burns Rd.
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