CORE FOR VISION SCIENCE

Core Grants, National Eye Institute (NEI): The primary objective of Core Grants for Vision Research is to provide groups of investigators who have achieved independent National Eye Institute (NEI) funding with additional, shared support to enhance their own and their institution's capability for conducting vision research.

Secondary objectives of this program include facilitating collaborative studies and attracting other scientists to research on the visual system.

Core Grants are subdivided generally into discrete units or modules, with each devoted to a specific activity that would be impractical or less-efficient to support on an individual research project grant. The primary purpose of each module is to support a service or resource that enhances or facilitates the research efforts of a group of investigators, each having independent NEI funding. Some sharing of Core Grant resources and services with other NIH-funded collaborators and with investigators new to vision research is encouraged. For more about NEI Core grants, see CORE.

There are several modules currently supported by the CORE Grant: Gene Delivery Module, Microscopic Imaging Module, Software Development Module, and Translational Research Module. These modules can be shared by various groups. The Modules cooperate with one another, and they are also designed to introduce Vision Science researchers to some of the unique resources that are available on the UC Berkeley campus, including facilities in nanotechnology, fMRI, and other optical imaging resources. The contact information for each module is given below, along with links to more information about the purpose of each module.

Gene Delivery Module
Contact: Mei Li, Room 592, Minor Hall, School of Optometry
Email: mei.li@berkeley.edu

Imaging & Instrumentation Module
Contact: Chris Gainer, School of Optometry
Email: cfgainer@berkeley.edu

Software Module
Contact: Akhila Raman, Room 587, Minor Hall, School of Optometry
Email: akhila.raman@berkeley.edu

Translational Research Module
Contact: Zakia Young, School of Optometry
(510) 642-0687
Email: trm_core@berkeley.edu
GENE DELIVERY MODULE OF THE CORE GRANT

The main goal of this Module is to provide DNA constructs and viral vectors for expressing genes in tissues of the visual system, enabling precise molecular manipulation of proteins involved in visual function. The Gene Delivery Module is the only campus facility that provides viral vectors for introducing genes in vivo.

The viral vectors help deliver genes to the area of interest using viruses as carriers — Adeno Associated Virus (AAV) or Lentivirus (LV). These viruses are replication incompetent viruses. They can infect target cells and transmit target genes; however, they cannot replicate within target cells because the viral structure genes are absent. These recombinant viruses have reduced or no immune response in the host and have cloning capacity of up to 4.7 kb for AAV and up to 10 kb for LV. The recombinant viral vectors are packaged by helper virus free approaches, e.g. triple plasmids transfection into HEK293T cells to generate AAV vectors. The triple plasmids are transgene plasmid, RC (rep & cap) plasmid and helper plasmid. Individual researchers submit their own transgene plasmids, in which gene of interest and AAV inverted terminal repeats (ITRs) are included. The GDM provides the RC plasmids and helper plasmids required to generate the serotypes of viral vectors that meet the individual researcher’s needs.

Once the transgene plasmid (100-200 μg) has been submitted to the GDM, the GDM will start culturing a large amount of HEK293T cells; packaging and purifying viral vectors with triple transfection, iodixanol gradient ultracentrifugation and affinity column purification; and at last, measure the viral titers by fluorescent probe labeled quantitative PCR. It takes around three to four weeks to complete generating 1-2 purified viral vectors with the higher titer of 10^{11} to 10^{14} vg/ml (viral genomes per ml) and a total volume of 150-200 μl for in vivo use. These recombinant viral vectors have reduced or no immune response in the host. These viral vectors generated in the GDM are expected to provide good efficiency. The transgene expression depends on the promoter used, the target cells and the serotype used.

For more details or questions please contact:

Mei Li, M.D. Ph.D.
Gene Delivery Research Specialist
Vision Science Core, Gene Delivery Module
University of California, Berkeley
School of Optometry
592 Minor Hall
Berkeley, CA 94720
Mei.li@berkeley.edu
SOFTWARE MODULE OF THE CORE GRANT

The Software Module provides custom programming support for physiological, psychophysical, and brain-imaging applications that are important for understanding visual system function. The Software Development Module is unique in providing new software to solve stimulation, acquisition, and analysis problems that have existed for years, but cannot be solved with commercially available software.

The module supports the development of shared software tools (and some computer hardware) that will be of use to many members of the UC Berkeley Vision Science community. Development focuses in a variety of areas, including Eye Monitoring Tools, Display Tools, Neuroimaging Tools, and Psychophysics/Physiology Software Development.

Examples of software development in this module include (a) Design and implementation of software in Matlab and C language; (b) Signal processing algorithms for vision science and neuroscience projects; (c) Eye Tracker data analysis, (d) Pupil tracking in wavefront sensor; (e) Retinal motion tracking; (f) Cardiac, respiratory and ultrasound data analysis; (g) neural spike sorting software; (h) Monitor gamma estimation by visual contrast method; and (i) orientation sensor software.

For more details or questions, please contact:

Akhila Raman
Room 587, Minor Hall
School of Optometry
University of California
Berkeley, CA 94720-2020
Email: akhila.raman@berkeley.edu
The School of Optometry’s newest CORE Unit is the Translational Research Core Facility (TRCF). The TRCF has been established to provide research design and implementation, in conjunction with organizational and statistical resources, to support investigators in their patient-oriented translational research. The TRCF has on staff a Clinical Research Coordinator who can facilitate IRB submissions and assist with subject recruitment. The Newest member of the TRCF staff is Dr. Shaokui Ge, a biostatistician. Shaokui has a background in quantitative biology, specializing in data analysis for biomedicine and environmental health related issues. He earned his PhD in quantitative biology from Chinese Academy of Sciences in Beijing, China. From 2011 to 2013, Shaokui was an NIH-sponsored Senior Training Fellow for both the Departments of Biostatistics and Epidemiology at the University of Washington. He served as a Statistical Research Associate for Fred Hutchinson Cancer Research Center in Seattle. Through his education and training, Shaokui has been able to develop and hone his skills in following data analysis areas: sample size calculation and power analysis, generalized linear models, longitudinal data analysis, categorical data analysis, survival analysis, classification and prediction, and infectious disease modeling. Shaokui is excited to join the TRCF and is looking forward to getting to work on his first TRCF project. If the TRCF’s staff can be of assistance to you, please call (510) 642-0687 or email trm_core@berkeley.edu with any questions.

Zakia Young
Clinical Research Coordinator
Translational Research Core Facility
School of Optometry
Telephone: (510) 642-0687
Email: trm_core@berkeley.edu

Shaokui Ge
Biostatistician
Translational Research Core Facility
School of Optometry
Telephone: (510) 642-0687
Email: trm_core@berkeley.edu

Directors
Dennis M. Levi, OD, MS, PhD, FAAO
Professor of Vision Science and Optometry
Email: dlevi@berkeley.edu

Meng C. Lin, OD, PhD, FAAO
Associate Professor, Clinical Optometry and Vision Science
Email: mlin@berkeley.edu
MICROSCOPE IMAGING MODULE OF THE CORE GRANT

The Microscopic Imaging Module provides expert technical support for the assembly, modification, and use of advanced microscopic systems for vision research. In addition, this module provides Vision Science researchers with a wide-field fluorescence microscope and a cryostat (located on the 5th floor of Minor Hall), and also subsidizes the training for, and use of, instruments in the Molecular Imaging Center. The main goals of the module are to:

- introduce Vision Science researchers to shared instrumentation available on campus
- customize existing microscopes to satisfy individual research needs
- assemble new imaging instruments from component parts to bring advanced imaging technologies to Vision Science researchers
- maintain imaging existing instrumentation and make repairs when necessary

MOLECULAR IMAGING CENTER (MIC)

http://imaging.berkeley.edu

2 Locations: 251 Life Sciences Addition, 361 Li Ka Shing Center

For a full list of instruments currently available through the MIC, please visit http://crl.berkeley.edu/molecular-imaging-center/instrumentation-fees-mic/

TRAINING – Before using MIC instruments, users are required to attend a 1.5-hour training lecture on microscopy. The lecture occurs on the second Tuesday of each month from 2:30 to 4:00 pm in LSA 547. Anyone is welcome to attend, and there is a sign-in sheet for new MIC users at the lecture.

RESERVING EQUIPMENT AND BILLING – Use of MIC instruments requires an iLabs account. For assistance getting an iLabs account set up with fees covered by the Vision Science Core Grant, please contact Chris Gainer.

For more details or questions, please contact:

Chris Gainer
Associate Imaging Specialist
MTW – LSA 195 – (510) 642-9712
WRF – Minor Hall 591 – (510) 643-5357
email: cfgainer@berkeley.edu