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MISSION STATEMENT

The mission of the Neuroscience Research Institute is to foster knowledge and understanding of the nervous system by serving as a center for scientific research breakthroughs. The NRI is a group of investigators whose collective goal is to create an intellectual atmosphere conducive to exploration at the frontiers of human knowledge where disciplinary boundaries disappear. Investigators in the NRI recognize that the interests of neuroscience extend broadly from repair and prevention of human disease to the principles that underlie the earliest nervous systems, from the human mind to the single molecular building blocks of the brain.
DIRECTORS’ STATEMENT

The Neuroscience Research Institute continues to focus its energy on interdisciplinary basic biological research and serving as a clearinghouse for all members of the campus community interested in neuroscience. In addition to serving faculty from seven different academic departments, we recently established a list of thirty additional UCSB “NRI Affiliates” with neuroscience interests in order to highlight their work and to integrate our many intellectual and research efforts. In addition, plans were set in motion to strengthen our working research relationship with physicians at Cottage Hospital as a means to coordinate resources and to better serve the local community.

NRI continues to make great progress toward understanding the development, maintenance, function, degeneration/regeneration and evolution of the nervous system, despite the many fiscal obstacles inherent in the current economic situation. Our work helps define many of the cutting edges throughout the broad discipline of neuroscience, running the gamut from molecular and cellular neuroscience to behavioral and cognitive neuroscience and beyond. Our three Centers (Alzheimer’s Disease Research Center, Center for Stem Cell Biology and Engineering, and Center for the Study of Macular Degeneration) are all active and growing. In addition to our broad-based and superb basic research, NRI investigators are also involved in, or planning, major clinical trials for devastating neurodegenerative conditions such as Alzheimer’s disease and blindness. More details on this work are available on our newly designed NRI webpage and within this Annual Report.

Among the infrastructure highlights for this past year are: (i) the acquisition of a new state-of-the-art Spectral Laser Scanning Microscope funded by the NIH for our communal NRI/MCDB Microscopy Facility and (ii) we are in the process of acquiring for 10 years approximately 11,000 square feet of newly renovated research space dedicated specifically to the Center for Stem Cell Biology and Engineering and (iii) we have just launched our new media-focused NRI website along with Twitter and Facebook accounts to engage colleagues and collaborators online. Additionally, our DNA/RNA library sequencing facility continues to provide the most sophisticated technology available today to all interested UCSB research personnel.

Finally, all that we do in NRI is possible only because of the outstanding people that are the heart of the unit. Our faculty, staff and students are superb and their efforts are facilitated, and indeed made possible, by our exceptional and extremely dedicated administrative and technical staffs. Despite all the trials and tribulations imposed by the ongoing fiscal crisis, NRI personnel continue to excel in our collective efforts to better understand the nervous system.

Stuart C. Feinstein
Co-Director

Kenneth S. Kosik
Co-Director
NRI Staff 2011-2012

- Stuart Feinstein: Co-Director
- Jeanie Cornet: Business Officer (1.0 FTE)
- Sothy Chan: CNT (1.0 FTE)
- Karen Cisneros: Contracts & Grants Admin (1.0 FTE)
- Jen Messecar: Asst. to Ken Kosik (12.5 FTE)

- Laura Susin: Contracts & Grants Manager (1.0 FTE)
- Bee Jay Yokoi: Payroll Manager (1.0 FTE)
- Mary Raven: Microscopy Director (.50 FTE)
- Judy Cushing: Payroll/Purchasing (.875 FTE)
- Undergraduate Student Assistant Var.
- Max McComber: Purchasing Assistant (1.0 FTE)
# OTHER PROJECTS + ACTIVITIES

## ACADEMIC PROJECTS

<table>
<thead>
<tr>
<th>Month</th>
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<tbody>
<tr>
<td>October 2011</td>
<td><em>Losing Control</em> Film Screening</td>
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<td>November 2011</td>
<td>NRI Symposium</td>
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## RESEARCH EXPERIENCES FOR GRADUATE STUDENTS

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<td>Stem Cells, Blindness</td>
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<td>Johnson Lab</td>
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<td>Jordan/Wilson Lab</td>
<td>Microtubule Polymerization</td>
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<td>Kosik Lab</td>
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<td>Ma Lab</td>
<td>Membrane Trafficking, AGS3 and Addiction</td>
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<td>Reese Lab</td>
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<td>Rothman Lab</td>
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<td>Smith Lab</td>
<td>Sea Squirt Development</td>
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<td>Weimbs Lab</td>
<td>Polycystic Kidney Disease</td>
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## RESEARCH EXPERIENCES FOR UNDERGRADUATES

<table>
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<tr>
<th>Lab</th>
<th>Research Areas</th>
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<tr>
<td>Clegg Lab</td>
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<td>Feinstein Lab</td>
<td>Tau in Alzheimer’s</td>
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<td>Fisher Lab</td>
<td>Retinal Detachment</td>
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<td>Grafton Lab</td>
<td>Cognitive Control of Action</td>
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<td>Jordan/Wilson Lab</td>
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<td>Reese Lab</td>
<td>Retinal Neurobiology</td>
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<td>Weimbs Lab</td>
<td>Polycystic Kidney Disease</td>
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ALZHEIMER’S DISEASE RESEARCH CENTER

Investigations in the ADRC focus upon the normal and pathological action of the microtubule associated protein, tau, as well as mechanisms of neuronal plasticity and its impairment in neurodegeneration. In 2011 co-director Stu Feinstein discovered a new direction in Alzheimer’s research when his lab found that tau completely fragmented, rather than phosphorylated, when neuronal cells were exposed to amyloid beta. In early 2012 it was announced that Ken Kosik and researchers with the Banner Alzheimer’s Institute will begin clinical trials for Genentech’s preventive Alzheimer’s therapy in 2013.

CENTER FOR STEM CELL BIOLOGY & ENGINEERING

The mission of the UCSB Center in Stem Cell Biology and Engineering is to foster an interdisciplinary program of stem cell research and teaching to develop new technologies in the emerging field of regenerative medicine. To accomplish this, the center supports collaboration and exchange of ideas among a wide range of disciplines, with research divided into three general areas: Molecular mechanisms of stem cell pluripotency, proliferation and differentiation; Biotechnology and Bioengineering of stem cell growth, differentiation, sorting and delivery; and Regenerative Medicine to translate discoveries to the clinic.

Training

Funded by a grant of $1.3 million in 2005 from the California Institute for Regenerative Medicine (CIRM), a stem cell training program has been developed to support graduate and postdoctoral fellows engaged in a variety of stem cell projects.

Facilities

The UCSB Laboratory for Stem Cell Biology and Engineering was established free of federal funding to allow research on all stem cell lines. Renovation of this facility, funded by a $2.2 million grant from CIRM, is currently underway.
The Center for the Study of Macular Degeneration (CSMD) is a dedicated biomedical research unit and part of the Neuroscience Research Institute (NRI) at the University of California, Santa Barbara (UCSB). The mission of the CSMD is to advance basic biomedical research into the cellular, molecular, and genetic factors that contribute to the human ocular diseases that are known as macular degeneration. In pursuing its mission, the CSMD seeks to stimulate interactions between basic and clinical scientists, contribute to the training of students and postdoctoral fellows, and lay the groundwork for the development of new diagnostic and therapeutic approaches to treat macular degeneration.

A study led by CSMD scientists identified genes whose expression levels can identify people with AMD, as well as genes that distinguish clinical AMD subtypes. The findings, which appeared in BioMed Central's journal Genome Medicine in February 2012, could offer new candidate targets for the development of AMD diagnostics and therapies. The CSMD also appointed a new director, Pete Coffey, former director of the London Project to Cure Blindness.
AWARDS ADMINISTERED

UNIVERSITY OF SOUTHERN CALIFORNIA

Dennis Clegg 4/1/11-3/31/13 $739,565
Stem Cell Based Treatment Strategy for Age-Related Macular Degeneration (AMD)

We established The California Project to Cure Blindness, a “Disease Team” of investigators from USC, Caltech, City of Hope, University College London, and Regenerative Patch Technologies, LLC, to develop a stem cell therapy for Age-related Macular Degeneration. This work is funded by the California Institute for Regenerative Medicine. The California Project to Cure Blindness is an interdisciplinary research effort involving researchers at UCSB in the Center for the Study of Macular Degeneration and the Center for Stem Cell Biology and Engineering, along with retinal surgeons in the Keck School of Medicine at the University of Southern California, materials chemists at Caltech, and experts in cellular therapy from the City of Hope and University College London. The goal is to differentiate a monolayer of RPE on a synthetic substrate that can be implanted in the macula to replace damaged RPE and therefore preserve photoreceptors.

CALIFORNIA INSTITUTE FOR REGENERATIVE MEDICINE (CIRM)

Dennis Clegg 10/1/09-9/30/15 $844,160
UCSB Laboratory for Stem Cell Biology and Engineering

A shared laboratory was established free of federal funding to allow research on all stem cell lines. Donations from biotechnology companies and private individuals allowed acquisition of material and equipment to establish the laboratory. The renovation of this facility, funded by a $2.2 million grant from CIRM, has recently been completed. The renovated shared laboratory provides access to state-of-the-art stem cell culture facilities that will promote the expansion of stem cell research at UCSB and at neighboring institutions in California’s central coast area. Clientele will include researchers in numerous Departments and Institutes at UCSB, and researchers from The Burnham Institute for Medical Research at UCSB, Sansum Diabetes Research Institute, and Santa Barbara Cottage Hospital.

Dennis Clegg 9/1/09-8/31/15 $844,160
Training Program in Stem Cell Biology & Engineering

This award from the California Institute for Regenerative Medicine (CIRM) supports a graduate and postdoctoral training program in stem cell research. This grant was first awarded in 2005 and was renewed in 2009 and 2012. CIRM graduate students and postdoctoral trainees conduct research on a wide range of innovative, interdisciplinary projects in the laboratories of 20 faculty mentors in the department of Molecular, Cellular, and Developmental Biology, the College of Engineering,
and the Neuroscience Research Institute. Projects range from studies of stem cells in model systems, pluripotent human stem cells, adult stem cells, and novel biotechnologies with applications in stem cell research. The CIRM grant has allowed the establishment of two new Stem Cell Graduate Courses: Stem Cell Biology, MCDB 246 and Bioethical Issues of Stem Cell Research, MCDB 247. In addition, Scholars present their research at a Stem Cell Round Table each month, and numerous speakers are invited for seminars.

Peter Coffey 11/1/11-10/31/17 $4,880,116
Development of Cellular Therapies for Retinal disease LA1-02086

Dr. Coffey was awarded a CIRM Leadership Award to establish a new laboratory within NRI and as part of The Centre for Stem Cells and Engineering. The grant has allowed him to establish a small group of researchers who understand the potential of human embryonic stem cells and their capacity to replace the diseased eye cells of a number of retinal disease, specifically in the short term age-related macular degeneration and future work in diabetic retinopathy.

INTERNATIONAL RETINAL RESEARCH FOUNDATION, INC.

Steven Fisher 10/7/11-11/7/12 $57,100
Creating Brainbow Astrocytes, A New Tool for Studying Retinal and Optic Nerve Astrocytes

The goal of this project was to create a transgenic mouse randomly expressing a set of 4 fluorescent protein genes in retinal astrocytes. Cottage Hospital’s research program has on several occasions provided funds that lead to preliminary data used to submit a larger grant to a federal agency. To date, our lab has completed the design and construction of the brainbow plasmid, a critical part of the project. Using the funds provided by the Santa Barbara Cottage Hospital Research Program, we were able to clone 4 fluorescent proteins into a vector containing the human full-length glial fibrillary acidic protein promoter (GFAP). Subsequently this promoter was sequenced to verify that our design and engineered plasmid was correctly synthesized. Additionally, we were able to test this plasmid on cultured U-87 human glioblastoma cells, immortal mouse retinal astrocytes, and 293T kidney cells for cell-type specificity as well as transfection efficacy. We shipped our completed vector to UC Irvine’s transgenic mouse facility in June for final purification and DNA microinjection on July 3rd, 2012. This mouse will allow us to view retinal astrocytes stained with a nearly 90 different fluorescent hues allowing us to study the attributes of individual cells and their reaction to injury.
AWARDS ADMINISTERED

ALCON LABORATORIES

Steven Fisher 1/3/12-1/2/14 $399,784
Development of an *in vivo* model of proliferative vitreoretinopathy (PVR)

The goal of this project funded by the surgical instrument division of Alcon (Irvine) is to establishing a reliable model for generating vitreal cellular membranes (or glial scars) in the rabbit retina. So-called proliferative retinal diseases lead to scar formation in the retina which can cause major threats to sight, including the recovery of sight after intraocular surgery. These include such diseases as proliferative vitreoretinopathy after retinal reattachment, idiopathic epiretinal membranes, diabetic retinopathy, subretinal fibrosis, age-related macular degeneration, retinitis pigmentosa among others. Although several experimental reagents have been tested in animals to determine their ability to inhibit such scar formation, none have been successful in humans to date, and the treatment remains solely in the domain of retinal surgery. Developing new surgical techniques and instruments has presented a challenge for this delicate surgery and is a major goal of Alcon’s instrument division. A major issue is that no good animal models for this category of diseases exist, models on which new surgical techniques can be tested. It is the goal of this project, with funding from Alcon Surgical Division to develop such an animal model. With the recent installation of critical instrumentation (Ocular Computerized Tomography) for high resolution, non-invasive observation in the eye of living animals this project is now just getting underway with first results expected in September, 2012.

NIH NEUROLOGICAL DISORDERS & STROKE

Scott Grafton 9/1/11-8/31/12 $1,185,955
Spatial and Temporal Scales of Motor Sequence Learning

This project is a collaborative effort by a team of five motor systems laboratories seeking to probe the mechanisms that underlie the brain’s capacity for learning a new motor skill. The common thread for all groups is to focus on changes that occur within motor circuits of the brain as a new sequential skill is acquired. The work is central to the problem of understanding the mechanisms where practice leads to reorganization of the human motor system in the face of aging, neurodegeneration, stroke or brain injury. Understanding these mechanisms has an impact on the design of therapies directed at preserving function, developing compensatory movements and ultimately, developing novel motor capacity.
AWARDS ADMINISTERED

EISAI COMPANIES (JAPAN)

Mary Ann Jordan 7/1/11-10/31/12 $9,211
Comparison of Pathogenic Actions of Eribulin, Paclitaxel, Ixabepilone and Vincristine on Events Associated with Peripheral Neuropathy

Eribulin is a novel anticancer drug that was recently approved for metastatic breast cancer. We have previously elucidated its mechanism of action in collaboration with Eisai Pharmaceuticals, the company that developed the drug. Eribulin works its magic by targeting microtubules in cells and inhibits their dynamics. Interestingly, it appears to cause less peripheral neuropathy (a serious side effect) than some other microtubule-targeted anticancer drugs. We are trying to discover the cellular basis of this side effect with 4 microtubule-targeted drugs, namely, Eribulin, Paclitaxel, Ixabepilone and Vincristine, comparing their effects on cultured neurons, in animals, and in the test tube with purified microtubules. Our collaboration with Eisai has been very productive over a number of years, and has allowed several undergraduate students in our laboratory to experience meaningful, challenging scientific efforts as well as providing exciting projects for graduate students and postdoctoral students.

NIH NATIONAL INSTITUTE ON AGING

Kenneth Kosik 7/1/11-6/30/13 $126,758
Development of RNAi as Treatment for Neurodegeneration

Alzheimer’s disease, already a serious global disease afflicting large segments of the population, is about to burgeon into an even larger problem as the baby-boomer bubble approaches retirement age. The disease remains incurable; however validated therapeutic targets are known. RNA interference (RNAi) technology poses a potential therapeutic option which requires further investigation. Targeting the mRNA rather than the protein offers major advantages in the ease of designing a highly specific inhibitory agent and rapidly advancing approaches to RNAi delivery suggest that the method can be developed into a therapy. Our hypothesis is that RNAi will prove to be an effective and selective strategy to slow, and perhaps even reverse, the pathogenic processes in inherited and sporadic AD.

Kenneth Kosik 2/1/11-10/31/12 $647,272
Development of Cdk5 Inhibitors

This collaborative effort with RNAi development poses several questions concerning the cause and possible treatment of neurofibrillary pathology in Alzheimer’s disease. The key question for this project is whether suppression of Cdk5, an increasingly accepted disease target, can modify neurofibrillary pathology in an animal model. Cdk5 is an enzyme that phosphorylates tau protein and in so doing is thought to
AWARDS ADMINISTERED

contribute to the conversion of the protein into an insoluble aggregate known as the neurofibrillary tangle. Cdk5 is targeted by RNAi delivered in a viral vector.

THE LARRY L. HILLBLOM FOUNDATION

Kenneth Kosik                      1/1/08-12/31/12                             $183,787
The Pathobiology of Tau Inclusions

Diseases, like Alzheimer’s and frontotemporal dementia, with intracellular inclusions such as neurofibrillary tangles, represent a broad category in pathology, and yet the mechanism of their formation is poorly understood. While most research directed toward the biochemical mechanism of tangle formation focuses on a class of enzymes called kinases, the aims of this project are built on the hypothesis that the accumulation of tau protein is due to a failure of the protein degradation machinery.

UC IRVINE

Kenneth Kosik                      12/1/09-11/30/12                            $50,000
Neuro Stem Cells as a Developmental Candidate to Treat Alzheimer’s Disease

This project focuses on generating quantitative data on microRNAs using RNA extractions, real-time multiplex PCR and data analysis. The work also includes small RNA analyses by deep sequencing using our Applied Biosystems SOLiD platform.

Geoffrey Lewis                     7/1/11-6/30/14                               $361,670
Human Retinal Progenitor as Candidate Therapy for Retinitis Pigmentosa

Retinitis pigmentosa is an inherited, degenerative eye disease that causes severe vision impairment and blindness. The goal of our CIRM funded proposal “Human retinal progenitor cells as candidate therapy for retinitis pigmentosa” was to use retinal progenitor cells, injected into the eyes of rats with a similar genetic eye disease, to “deliver” survival factors and prevent the retina from degenerating. To date we have identified the injected cells using histological markers (antibodies) to stem cells and have documented that they survive for months after injection into the eyes. In addition, we have shown that the stem cells greatly slow the degeneration of the retina without causing any adverse affects. The work is the result of an ongoing collaboration with colleagues at UC Irvine. In addition, UCSB undergraduates contributed greatly to the project by doing much of the routine histology on the rat eyes.
AWARDS ADMINISTERED

NATIONAL ALLIANCE FOR RESEARCH ON SCHIZOPHRENIA & DEPRESSION (NARSAD)

Dzwokai (Zach) Ma 1/1/09-1/1/12 $15,000
Characterization of the Role of AGS3 in the Trafficking of Receptors and Channels

Although up-regulation of AGS3 (Activator of G protein Signaling 3) is shown to be necessary for recurring cocaine- and alcohol-seeking behavior in animal models of addiction, the cellular pathways modulated by AGS3 remain little understood. Further, how the AGS3 level is regulated is unknown. Our studies have discovered a novel role of AGS3 in modulating the structure and/or function of the late Golgi compartments and suggested an inhibitory function of AGS3 in macroautophagy. Moreover, we have identified USP9x as a regulator of AGS3. Future studies will aim to understand whether and how AGS3 affects addiction via the above cellular pathways.

WASHINGTON UNIVERSITY, (ST. LOUIS, MO)

Stanley Parsons 6/15/11-5/31/13 $59,591
PET Probes for Imaging the Vesicular Acetylcholine Transporter

Amazingly, there is today no laboratory test in living people for Alzheimer’s disease. Because there are many causes of dementia (about 40% is non-Alzheimer’s), specific treatment of Alzheimer’s disease will require an accurate laboratory test, preferably at an early stage. We are seeking to develop compounds that can image the density of “cholinergic” nerve terminals (those that release the neurotransmitter acetylcholine) in brain by use of a technique called Positron Emission Tomography (PET). Loss of cholinergic terminals is characteristic of Alzheimer’s disease. Such imaging would create a laboratory diagnostic of Alzheimer’s disease and, once treatment has been developed by other researchers, allow assessment of treatment efficacy.

AMERICAN HEALTH ASSISTANCE FOUNDATION

Monte Radeke 7/1/11-6/30/13 $100,000
The Epigenetics of RPE Aging

Current evidence suggests that inherent age-dependent losses in retinal pigmented epithelium (RPE) function contribute to the onset and progression of AMD. Our genome contains all of the information required to generate the various cell types in our body. During the course of development each unique cell type is determined, in large part, through a process known as epigenetic modification. The most fundamental modification results from site-specific methylation of DNA and generally results in
restricted gene expression. The resulting pattern of methylation is referred to as the methylome. Although once considered permanent, recent studies have shown that changes in the methylome are associated with aging and cancer. Aging is the one universal risk factor for age-related macular degeneration (AMD). Our research efforts are directed at determining if age-associated changes in the RPE methylome could contribute to the onset and/or progression of AMD.

NIH NATIONAL CENTER RESEARCH RESOURCES

Mary Raven 5/15/12-5/14/13 $429,480
Spectral Laser Scanning Biological Microscope

The extensive research need documented by an interdisciplinary group of thirteen National Institutes of Health (NIH) funded researchers led a successful application for a new Spectral Laser Scanning Microscope from the NIH. The Spectral Confocal replaces an aging confocal microscope used for imaging fluorescent samples with a system that enhances the confocal imaging capabilities available at UC, Santa Barbara. Since the award date, an Olympus Fluoview 1000S was installed in the NRI-MCDB Microscopy Facility and researchers from the Major Users Group: Anthony De Tomaso, Kenneth Kosik, Jamey Marth, William Smith, Benjamin Reese, Joel Rothman, Erkki Ruoslahti and Minor Users Group: Patrick Daugherty, Stuart Feinstein, Tod Kippin, Jacob Israelachvili, Cyrus Safinya and Thomas Weimbs have been given access to the instrument following training for their research applications. Seventeen of the eighty active confocal users have completed initial training and additional training sessions are scheduled to meet the training demand. The instrument is directly overseen by PI/Facility Director Mary Raven.

NIH NATIONAL EYE INSTITUTE

Benjamin Reese 1/1/11-12/31/12 $378,792
Development of Retinal Bipolar Cells

This research program is identifying the molecular and genetic determinants controlling the natural variation in nerve cell number, examining the populations of synaptically connected photoreceptors, bipolar cells and amacrine cells in the retina. We are also determining how such variation in afferent and target cell number modulates the dendritic morphology of the post-receptoral cells. This program will, consequently, clarify the developmental events and their underlying mechanisms that produce the functional architecture and connectivity of the retina. These studies will contribute to our understanding of retinal development and degeneration, and will enlighten our approach in developing treatments for retinal disease, particularly where the latter seek to re-establish connectivity following cell replacement therapy.
We are continuing our studies on how cell division and growth are controlled by investigating the cellular components that switch dividing cells into non-dividing cells with specialized functions. These processes are critically important in the genesis of cancer and are uncontrolled in growing tumor cells. The project is providing training for graduate students and undergraduate researchers who are learning molecular genetic and cell biological experimental methods that effectively address these problems.

NIH GENERAL MEDICAL SCIENCES

William Smith 7/1/11-7/31/12 $266,608
Exploring Planar Cell Polarity in a Novel Invertebrate Chordate System

The formation of organs and tissues in the developing embryo requires coordinated action of multiple cells. Cells are not uniform structures, but rather have distinct sides, a property we call polarity. For example, cells in an organ may adhere tightly to a substrate with one face, while actively secreting on another face. We use a simple model organism in which the organs are composed of only tens to hundreds of cells to investigate the cellular mechanisms by which cells sense directionality and coordinate polarity while they assemble into organs.

SANTA BARBARA COTTAGE HOSPITAL

Carol Vandenberg 9/26/11-9/25/12 $15,000
Trafficking of Potassium Channels in Periodic Paralysis

This project is aimed at understanding the cellular mechanisms that underlie electrical activity of muscle. In particular, we are studying skeletal muscle potassium channels, which are pores that regulate the flux of potassium ions across the muscle plasma membrane. Inward rectifier potassium channels play an important role in skeletal muscle in controlling electrical excitability and providing a stable resting potential. Genetic mutations of the channels are associated with muscle disease. We are investigating the trafficking of potassium channels to the muscle surface membrane and how disease-associated channel mutations may alter function of skeletal muscle.
NIH CENTER FOR SCIENTIFIC REVIEW

Thomas Weimbs 7/1/11-6/30/13 $329,601
Regulation of the mTOR Pathway in Polycystic Kidney Disease

Polycystic Kidney Disease (PKD) is a common, life-threatening genetic disease that affects over 600,000 people in the US alone. PKD leads to kidney failure and there is currently no available treatment to slow down the progression of this disease. Previous research in our laboratory has led to the finding that a cellular signaling pathway centered around a protein called mTOR is driving the progression of PKD and is a highly promising drug target for treatment of PKD. Our present research is aimed at better understanding the regulation of this pathway in PKD with the goal to devise effective strategies for treating this disease.

CANCER CENTER OF SANTA BARBARA

Leslie Wilson 7/1/10-8/30/12 $50,000
Sulforaphane: Its Potential for the Treatment of Breast Cancer in Combination Therapy

Sulforaphane (SFN), the major isothiocyanate found in cabbages, exerts a number of chemoprotective and anticancer activities, and most importantly for this project, the ability to inhibit breast cancer cell proliferation at mitosis leading to cancer cell death in a manner similar to, but weaker than that induced by chemotherapeutic anti-mitotic drugs. Dr. Wilson’s postdoctoral researcher Dr. Olga Azarenko discovered that SFN effectively suppresses microtubule dynamics and stabilizes microtubules both in MCF7 breast adenocarcinoma cells and with purified microtubules at low concentrations. She is investigating SFN’s efficacy as a natural adjuvant to taxol and/or vinblastine.
PUBLICATIONS


PUBLICATIONS

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horticulturalists. Hypertension 60:25–33.

18) Gurven M, Stieglitz J, Hooper PL, Gomes C, Kaplan H (2012b) From the 
womb to the tomb: The role of transfers in shaping the evolved human life history. 
Experimental gerontology 47:807–813.
PUBLICATIONS


PUBLICATIONS


STATISTICAL SUMMARY

Academic personnel engaged in research:

a. Faculty 23
b. Professional Researchers (including Visiting) 2
c. Project Scientists 9
d. Specialists 20
e. Postdoctoral Scholars 18
f. Postgraduate Researchers -
g. Academic Coordinator -
TOTAL 72

2. Graduate Students:

a. Employed on contracts and grants 27
b. Employed on other sources of funds -
c. Participating through assistantships -
d. Participating through traineeships 5
e. Other (specify) -
TOTAL 32

3. Undergraduate Students:

a. Employed on contracts and grants 18
b. Employed on other funds -
c. Number of volunteers, & unpaid interns -
TOTAL 1

4. Participation from outside UCSB: (optional)

a. Academics (without Salary Academic Visitors) 34
b. Other (specify) -

5. Staff (Univ. & Non-Univ. Funds):

a. Technical 26
b. Administrative/Clerical 10

6. Seminars, symposia, workshops sponsored

Proposals submitted 75

7. Number of different awarding agencies dealt with* 30

8. Number of extramural awards administered 61

10. Dollar value of extramural awards administered during year** $53,023,565

11. Number of Principal Investigators*** 29

12. Dollar value of other project awards **** $2,727,689

13. Number of other projects administered 38

14. Total base budget for the year (as of June 30, 2012) $310,313

15. Dollar value of intramural support $1,116,859

16. Total assigned square footage in ORU 14,661

17. Dollar value of awards for year (2012 Total) $12,716,748
## BUDGET SUMMARY

### PERMANENT NR02 447636-19900

<table>
<thead>
<tr>
<th>Item</th>
<th>Appropriation</th>
<th>Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Salaries</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Director</td>
<td>$12,000</td>
<td>$12,000</td>
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<tr>
<td>Staff Salaries</td>
<td>$268,439</td>
<td>$261,448</td>
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<tr>
<td>General Assistance</td>
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<tr>
<td>Employee Benefits</td>
<td>$134,362</td>
<td>$134,362</td>
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<tr>
<td>Supplies &amp; Expense</td>
<td>$0</td>
<td>$737</td>
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<tr>
<td>Travel &amp; Equipment</td>
<td>$0</td>
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<tr>
<td>Other: Copier Recharge</td>
<td></td>
<td>($7)</td>
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<tr>
<td><strong>Total 2011-2012</strong></td>
<td>$435,873</td>
<td>$408,540</td>
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<tr>
<td><strong>Adjusted total 2011-2012</strong></td>
<td>$435,873</td>
<td>$408,540</td>
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<tr>
<td><strong>Carry forward/(overdraft)</strong></td>
<td>$27,333</td>
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### PERMANENT NR01 447636-07427

<table>
<thead>
<tr>
<th>Item</th>
<th>Appropriation</th>
<th>Expense</th>
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<tr>
<td>Associate Director</td>
<td>$3,287</td>
<td>$237</td>
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<tr>
<td>Supplies &amp; Expense</td>
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<tr>
<td><strong>Total 2011-2012</strong></td>
<td>$8,802</td>
<td>$237</td>
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<tr>
<td><strong>Adjusted total 2011-2012</strong></td>
<td>$8,802</td>
<td>$237</td>
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<tr>
<td><strong>Carry forward (overdraft)</strong></td>
<td>$8,565</td>
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### TEMPORARY

Intramural Funding*—Funds allocated directly to Organized Research Unit

<table>
<thead>
<tr>
<th>Person/Project-Source of funds</th>
<th>Appropriation</th>
<th>Expense</th>
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<tbody>
<tr>
<td>447636-07427 Carry Forward from FY2010-2011</td>
<td>$124,239</td>
<td>$22,404</td>
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<tr>
<td>447636-07427 Indirect Cost Return 2011-2012</td>
<td>$163,614</td>
<td>$33,133</td>
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<tr>
<td>447633-07427 Coffey CIRM Match-swap</td>
<td>$70,000</td>
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<tr>
<td>447636-07427 Kydland Match</td>
<td>$12,500</td>
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<tr>
<td>447636-07427-Raven NIH Instr. Match</td>
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<td>447636-07427 IACUC Buchholz</td>
<td>$1,301</td>
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<tr>
<td>447636-19900-Kydland Salary EVC</td>
<td>$73,175</td>
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<td>447636-19900-Feinstein IACUC</td>
<td>$16,800</td>
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<tr>
<td>447636-19900 Coffey CIRM Match</td>
<td>$280,000</td>
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<td>447636-19900 Gurven Buy out funds</td>
<td>$9,263</td>
<td>$1,118</td>
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<td>447636-69750 CF 2010-2011</td>
<td>$104,730</td>
<td>$1,634</td>
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<td>447636-19933 CF 2010-2011</td>
<td>$22,189</td>
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## BUDGET SUMMARY

<table>
<thead>
<tr>
<th>Description</th>
<th>Income</th>
<th>Expense</th>
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<tbody>
<tr>
<td>447636-19933 ARRA Overhead Return 2011-2012</td>
<td>$24,538</td>
<td>$16,473</td>
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<tr>
<td>447636-19941- 19900 CF 2010-2011</td>
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<td>$111,737</td>
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<td>447636-19941 Benefits</td>
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<td>447636-19941 Gurven Demography Lab</td>
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<td>447636-19941-Weimbs ARC</td>
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<td>Less Budgetary Savings Assessment (BSA) 447636-07427</td>
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<tr>
<td>Total Appropriations/Expenses</td>
<td>$1,116,859</td>
<td>$599,608</td>
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<td>Carry forward/(overdraft)</td>
<td>$517,251</td>
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<table>
<thead>
<tr>
<th>Recharge/Income Account 447636-62190</th>
<th>Income</th>
<th>Expense</th>
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<tbody>
<tr>
<td>Academic Salaries</td>
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<td>Staff Salaries</td>
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<td>S&amp;E</td>
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<td>Benefits</td>
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<td>Other: Equipment &amp; Facilities Unallocated</td>
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<td>Total Recharge Income/Expenses</td>
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<td>Carry forward/(overdraft)</td>
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<td>$23,460</td>
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<table>
<thead>
<tr>
<th>Other Income (specify source and use)</th>
<th>Income</th>
<th>Expense</th>
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<tbody>
<tr>
<td>Donations/Gifts/Endowments</td>
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<tr>
<td>Various Donors</td>
<td>$276,817</td>
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<tr>
<td>Gifts</td>
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<td>Endowments</td>
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<tr>
<td>Total Other Income/Expenses</td>
<td>$2,727,689</td>
<td>$600,336</td>
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<tr>
<td>Carry forward/(overdraft)</td>
<td>$2,127,353</td>
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</tbody>
</table>

| Total Funding/Expenses for FY 2011-2012          | $4,328,379| $1,632,181|
| Total carry forward/(overdraft)                  | $2,696,198|         |
ADVISORY COMMITTEE
ADMINISTRATIVE + TECHNICAL STAFF

ADVISORY COMMITTEE

Mark Brzezinski, EEMB
Peter Coffey, NRI/MCDB
Scott Grafton, Psychological + Brain Sciences
Thomas Harriman, Community
Janice Hartoch-Taylor, Development
Richard Lehman, Santa Barbara Cottage Hospital
JoAnn Kuchera-Morin, Media Arts + Technology
B.S. Manjunath, Electrical + Computer Engineering

Fyl Pincus, Biomolecular Science + Engineering
Art Rosenblatt, Olympus
Thomas Weimbs, Chair, NRI/MCDB

EX-OFFICIO

Jeanie Cornet, NRI
Stuart Feinstein, NRI
Kenneth Kosik, NRI

ADMINISTRATIVE STAFF

Judy Cushing, Payroll/Purchasing Assistant
Karen Cisneros, Administrative/Purchasing Manager
Jeanie Cornet, Business Officer
Stuart Feinstein, Co-Director
Kenneth S. Kosik, Co-Director
Max McCumber, Purchasing Assistant
Jen Messecar, Assistant to Kenneth Kosik
Laura Susin, Contract + Grants Manager
Bee Jay Yokoi, Payroll Manager

TECHNICAL STAFF

Mary Arcila, Sequencing Facility Assistant Director
Sothy Chan, Computer Support
Geoffrey Lewis, Microscopy Support
Mary Raven, Microscopy Director
## Principal Investigators

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don Anderson</td>
<td>Research Scientist</td>
<td>NRI</td>
</tr>
<tr>
<td>Osnat M. Ben Shahar</td>
<td>Researcher</td>
<td>Psychological + Brain Sciences</td>
</tr>
<tr>
<td>Dennis O. Clegg</td>
<td>Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>Stuart C. Feinstein</td>
<td>Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td></td>
<td>Co-Director</td>
<td>NRI</td>
</tr>
<tr>
<td>Steven K. Fisher</td>
<td>Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>Michael Gazzaniga</td>
<td>Professor</td>
<td>Psychological + Brain Sciences</td>
</tr>
<tr>
<td>Claudia Gottstein</td>
<td>Adjunct Assistant Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td></td>
<td>Director</td>
<td>CNS Biological Nanostructures Lab</td>
</tr>
<tr>
<td>Scott Grafton</td>
<td>Professor</td>
<td>Psychological + Brain Sciences</td>
</tr>
<tr>
<td>Michael Gurven</td>
<td>Professor</td>
<td>Anthropology</td>
</tr>
<tr>
<td>Roger Ingham</td>
<td>Professor</td>
<td>Speech + Hearing Sciences</td>
</tr>
<tr>
<td>Gerald H. Jacobs</td>
<td>Professor</td>
<td>Psychological + Brain Sciences</td>
</tr>
<tr>
<td>Lincoln V. Johnson</td>
<td>Research Scientist</td>
<td>NRI</td>
</tr>
<tr>
<td>Mary Ann Jordan</td>
<td>Research Scientist</td>
<td>NRI</td>
</tr>
<tr>
<td>Tod Kippin</td>
<td>Associate Professor</td>
<td>Psychological + Brain Sciences</td>
</tr>
<tr>
<td>Kenneth S. Kosik</td>
<td>Harriman Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td></td>
<td>Co-Director</td>
<td>NRI</td>
</tr>
<tr>
<td>Tonya Kydland</td>
<td>Project Scientist</td>
<td>NRI</td>
</tr>
<tr>
<td>John Lew</td>
<td>Associate Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>Geoff Lewis</td>
<td>Research Scientist</td>
<td>NRI</td>
</tr>
<tr>
<td>Dzwokai &quot;Zach&quot; Ma</td>
<td>Assistant Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>Stanley M. Parsons</td>
<td>Professor</td>
<td>Chemistry + Biochemistry</td>
</tr>
<tr>
<td>Monte Radeke</td>
<td>Assistant Research Scientist</td>
<td>NRI</td>
</tr>
<tr>
<td>Benjamin E. Reese</td>
<td>Professor</td>
<td>Psychological + Brain Sciences</td>
</tr>
<tr>
<td>Joel Rothman</td>
<td>Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>Charles E. Samuel</td>
<td>C.A. Storke II Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>William Smith</td>
<td>Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>Karen Szumlinski</td>
<td>Associate Professor</td>
<td>Psychological + Brain Sciences</td>
</tr>
<tr>
<td>Megan T. Valentine</td>
<td>Assistant Professor</td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Carol Vandenberg</td>
<td>Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>Thomas Weimbs</td>
<td>Associate Professor</td>
<td>MCDB</td>
</tr>
<tr>
<td>Leslie Wilson</td>
<td>Professor</td>
<td>MCDB</td>
</tr>
</tbody>
</table>
STUDENTS

GRADUATES

Mary Arcila
Sarah Benbow
Tracy Clevenger
Roxanne Croze
Julia Palter
Nicolas Doerr
Julianna Erickson
Erin Folchi
David Forest
Israel Hernandez
Matthew Lalli
Tyronne Martin
Huyen Nguyen
Britney Pennington
Jack Reifert
Krista Reuland
Misty Riddle
Erica Sommerman
Jeff Talbot
Lauren Vucovich
Irene Whitney
Xu Zhoujin

UNDERGRADUATES

Shant Donoyan
Joshua Dorst
Hanna Hart
Lyndsey Leach
Megan Lim
Katherine McLean
Ethan McSpadden
Joshua Meinert
Robert Musgrave
Sagen Elizabeth Peterson
Stephen Rifflle
Alex Rifkind
Kimberly Skyles
Dhrov Verma
Amy Walker
Kelsey Walorinta
Kirby Welsh
Nicole Wypychowski
SPECIAL THANKS

Special thanks to Jen Messecar for her tireless efforts in compiling the NRI 2011-2012 Annual Report, and for her dedication and creativity in designing the new NRI website, along with Brian Wolf of the Life Sciences Computing Group.

The cover image depicting a tomographic map of a neuronal synapse and the neuron seen at bottom right are courtesy of Dr. Steven Fisher. Thanks also go out to Geoff Lewis, Gabe Luna, Monte Radeke, and David Buchholz for use of their images.

Please follow us on Twitter and Facebook for current updates on NRI research news.