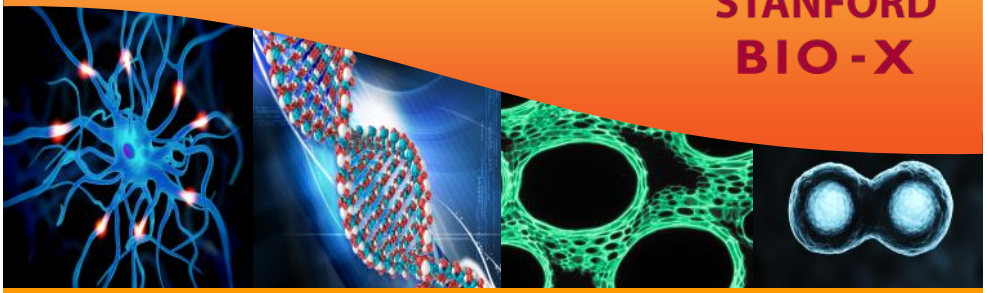
# BIO-X

## 2013 Undergraduate Summer Research Program

STANFORD BIO-X



# Bio-X Undergraduate Summer Research Program

Started in 2005, the Bio-X Undergraduate Summer Research Program funds the research training of Stanford undergraduate students through an award designed to support their interdisciplinary summer research projects. The program is an invaluable opportunity for students to conduct hands-on research, learn how to carry out experiments in the laboratory, and develop the skills to read and analyze scientific literature. At the conclusion of the ten-week period, the students present the results of their summer research experience in the form of a poster presentation open to the public.

A unique component of the Bio-X Undergraduate Summer Research Program is the Undergraduate Research Talk series. These weekly Faculty talks given by the mentors of our student awardees expose students to a variety of scientific fields and enrich their summer research experience. In addition, the talks offer the students a unique opportunity to hear more about the broad range of research within Stanford, to meet faculty in a variety of scientific fields, and to meet each other as potential future collaborators and colleagues. In 2013, students listened to 38 Faculty members discuss new areas of research which they may not otherwise have been exposed to. An invaluable resource, these talks have also been made available online to the entire Stanford community.

Awards are made through an application process available to any Bio-X affiliated faculty across campus (over 600 Faculty are affiliated with the Bio-X program), and all Stanford undergraduates across campus are eligible to apply. Student awardees receive a stipend equivalent to ten weeks of research work while their mentors receive support for their laboratory. To date, 241 students have been awarded the opportunity to participate in the Bio-X Undergraduate Summer Research Program.

Funding for the support of our undergraduate summer research program was provided by generous contributions from the Dean of Research, an anonymous donor, the Vice Provost of Undergraduate Education (VPUE), Pitch and Catherine Johnson, and Bio-X.

**In 2013, we supported 64 participants, the largest group of undergraduate students in the history of the Bio-X Undergraduate Summer Research Program.**

*Undergraduate Summer Research Program Participants 2013*

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## 2013 Bio-X Undergraduate Research Talks given by Stanford Faculty:

**June 26**
Josef Parvizi "Studying the Localization of Functions in the Human Brain with Intracranial Electrodes"
Vinod Menon "Development of Functional and Structural Brain Networks: Implications for Neurodevelopmental Disorders"
Lawrence Steinman "When Bad is Good: Beneficial Amyloid to Protect the Brain"
Dean Felsher "Modeling and Predicting Oncogene Addiction"

**July 3**
Mark Pegram "Therapeutic Strategies Targeting ERBB2"
Firdaus Dhabhar "A Hassle a Day May Keep the Doctor Away - Protective Versus Harmful Effects of Stress"
Renee Reijo Pera "Reprogramming and Programming in Human Embryo Development"
Alexander Urban "Genomic Basis of Mental Disorders"

**July 10**
Beth Pruitt "Microsystems for Mechanobiology"
Kang Shen "Using a Small Nervous System to Answer Big Questions"
Liqun Luo "Of Mice and Flies: How Neural Circuits are Organized and Built"
Carla Shatz "Restoring Plasticity to Old Brains"

**July 17**
Jason Dragoo "The Clinical Use of Stem Cells in Orthopaedic Surgery"
Howard Chang "Genome Regulation by Long Noncoding RNAs"
Yoon-Jae Cho "A Bedside to Bench to Bedside Approach to Childhood Brain Tumors"

**July 24**
Sean Mackey "The Strain in Pain Lies Mainly in the Brain: Lessons Learned from Neuroimaging of Pain"
Nicholas Melosh "Engineering Cell Access"
Yunzhi Yang "Bio Inspired Approaches for Musculoskeletal Tissue Engineering"
Sarah Heilshorn "Biomaterials to Improve Stem Cell Transplantation Therapies"

**July 31**
Elizabeth Sattely "Antibiotic Biosynthesis in Plants: Implications for Plant and Human Health"
Nigam Shah "Making Sense of Unstructured Data in Medicine"
David Stevenson "Targeted Chemoprevention of Neonatal Jaundice"
Judith Frydman "Molecular Origami: Protein Folding and Misfolding in Health and Disease"

**August 7**
Steven Boxer "Not Your Grandmother's GFP"
Matthew Porteus "Genome Editing using Engineered Nucleases"
Sheri Krams "Visualizing the Functional Interactions Between NK Cells and Their Targets"
Robert Malenka "Mechanisms and Functions of Synaptic Plasticity"

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**August 14**
David Paik "Imaging-Based Models of Cancer Treatments"
Susan Holmes "Studying the Resilience of Bacterial Communities in the Human Microbiome"
Gary Steinberg "Genetics and Pathogenesis of Moyamoya Disease"
Anthony Oro "Hedgehog and the Race Against Tumor Evolution"

**August 21**
Andrew Fire "The Difficulties of Genome Engineering and What We Can Learn from Them"
Ravindra Majeti "Therapeutic Targeting of Human Acute Myeloid Leukemia Stem Cells"
James McClelland "Understanding the Cognitive Consequences of Neurodegenerative Disease Through Simulated Damage to Artificial Neural Networks"
Joseph Wu "iPSCs for Cardiovascular Diseases"

**August 28**
Alesha Castillo "Mechanical Stimulation in Bone Adaptation and Healing"
Michael Snyder "Getting Your Genome Sequenced: What Can You Learn?"
Heng Zhao "The Protective Effects of Ischemic Postconditioning Against Stroke"

*Undergraduate Summer Research Program Participants 2013*

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## 2013 Program Participants:

**Amin Aalipour** *Materials Science & Engineering*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Nicholas Melosh, Materials Science & Eng. and Photon Science*

Amin is a rising senior majoring in materials science and pursuing a master's degree in management science. Now in his second year in the Melosh lab, his research focuses on understanding the biophysical interactions of an engineered nanostraw platform with cellular architecture. This nanostraw platform has proven to be a facile method of intracellular delivery for many biomolecules including DNA, protein, small molecules, and ions. Amin is optimistic that his studies can significantly improve the efficiency of biomolecules delivery using this device. He is currently applying to MD/PhD programs and hopes to apply his interests in nano-biotechnology to medicine.

**Fatema AlGharbi** *Mathematical Computational Sciences*
Supported by: Dean of Research
*Mentor: Prof. Susan Holmes, Statistics*

Fatema is interested in statistics and computational mathematics, particularly data mining and data analysis. This summer she is working on a new dataset of human gut microbiome to observe if the data can be clustered to enterotypes and to compare the clusters to the enterotypes of the human gut microbiome found by other earlier studies. She is currently studying methods of normalization, visualization including projections onto lower dimensional space, and clustering of bacterial abundances in the human microbiome.

**Kevin Aliado** *Bioengineering*
Supported by: anonymous donor
*Mentor: Prof. Helen Blau, Microbiology & Immunology*

Kevin Aliado is a rising senior majoring in bioengineering. His research in Dr. Helen Blau's lab focuses on analyzing the effects of candidate growth factors and various hydrogel niche environments on the dedifferentiation of myoblasts into muscle stem cells. He wants to go to medical school somewhere in California after his undergraduate career, and he also plans on getting a PhD in bioengineering eventually. In his free time, Kevin enjoys playing guitar, tennis, and video games.

**David Ayala-Lindeman** *Chemical Engineering*
Supported by: Dean of Research
*Mentor: Prof. Beth Pruitt, Mechanical Engineering*

David Ayala-Lindeman, a rising senior, is working in the Pruitt Lab this summer, fabricating arrays of polystyrene microposts that will be used to study the forces of adherent cells. He is a big soccer fan who is excited to go to Brazil for the 2014 FIFA World Cup. He plans on co-terming in chemical engineering and then using his research experience to get a job in the nanofabrication and semiconductors industry.

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**Brianna Balansay** *Biology*
Supported by: anonymous donor
*Mentor: Prof. Yoon-Jae Cho, Neurology*

Brianna is a rising junior. As a biology major, her interests lie in oncology and neuroscience. This summer in the Cho lab, she is investigating the effectiveness of optogenetic techniques in reducing tumor proliferation in medulloblastoma cells. In her free time, she enjoys watching Saturday morning cartoons, playing card games, and making music on her ukulele.

**Rachel Bent** *Human Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Euan Ashley, Medicine (Cardiovascular) and Genetics*

Rachel Bent is a rising junior majoring in human biology with a concentration in disease and human health. She hopes to pursue a medical career and has particular interest in cardiology. This summer she is conducting research at the Stanford Center for Inherited Cardiovascular Disease in the laboratory of Dr. Euan Ashley. She is working on a project to detect electrocardiographic (ECG) differences between athletes and patients with hypertrophic cardiomyopathy (HCM), a genetic heart condition. The hope is that this analysis will reveal ECG characteristics unique to patients with HCM and will influence policy in the screening of athletes for this disease.

**Sara Broski** *Biology*
Supported by: anonymous donor
*Mentor: Prof. Matthew Scott, Developmental Biology, Genetics, and Bioengineering*

A soon-to-be junior, Sara Broski is continuing her research in Dr. Matthew Scott's laboratory. Her work focuses on understanding regulation of gene transcription and how inappropriate gene expression can result in tumorigenesis. When not working in the lab, Sara spends her time swimming, reading, and discovering new music. She is a Bay Area native who is majoring in biology and plans to practice as a paramedic for several years before ultimately going to graduate school for a degree in the neurosciences.

**Tally Buckstaff** *Human Biology*
Supported by: anonymous donor and Pitch and Catherine Johnson
*Mentor: Prof. Matthew Scott, Developmental Biology, Genetics, and Bioengineering*

Tally is a rising senior majoring in human biology with a concentration in genomics and cancer biology. She is currently conducting research on genetic regulation in development and disease in Dr. Matthew Scott's lab. She is looking for upstream effector molecules of the sonic hedgehog pathway that may play a key role in the progression of many cancers, including medulloblastoma. By identifying target molecules, drugs can be made to inhibit these molecules and stop the mechanism the cancer uses to grow.

**Robert Carrera** *Bioengineering*
Supported by: anonymous donor
*Mentor: Profs. James Chang and Alesha Castillo, Surgery*

Robert Carrera is a junior majoring in bioengineering. This summer he is working in the Castillo lab at the Palo Alto VA, studying bone regeneration in response to mechanical loading and the role of certain genes in osteoblast recruitment, proliferation, and differentiation. The aim of this research is to develop novel treatments for bone breaks and fractures, particularly for elderly patients. Robert plans on pursuing either an MD, a PhD in bioengineering, or an MD/PhD. In his free time, Robert likes to play rugby.

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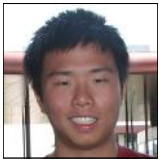

**George Chen** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Calvin Kuo, Medicine (Hematology)*

George is a rising junior majoring in biology with a concentration in neuroscience. This summer in Calvin Kuo's lab, he is studying the effect of miR-126 deletion on tumor angiogenesis by using a Lewis lung carcinoma syngeneic mouse tumor model. In this approach, wild-type control and miR-126 knockout mice on a C57/BL6 background will be inoculated subcutaneously with LLC cells. Some of his other interests include writing for The Stanford Daily and swimming. He plans to pursue medical school after graduation.

**William Chen** *Biomedical Computation*
Supported by: Dean of Research
*Mentor: Prof. Nigam Shah, Medicine (Biomedical Informatics Research)*

Will is a rising junior studying biomedical computation. He is currently working in the Shah Lab, exploring the possibility of using free-text clinical notes to generate predictive models. During his free time, Will enjoys playing tennis; he is also an avid pianist and cellist. In the future, Will hopes to continue using medical technology to further understanding of the patient and hospital space.

**Robin Cheng** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Irv Weissman, Pathology and Developmental Biology*

Robin Cheng is a rising junior majoring in biology with a concentration in molecular & cell biology. This summer, he is working in the lab of professor Irv Weissman in the Institute for Stem Cell Research & Regenerative Medicine. He is investigating the expression of the cell surface protein CD90 on cancer stem cells and characterizing its potential as a therapeutic antibody target in murine and human forms of breast cancer. After college, he would like to pursue an MD/PhD degree to advance his studies of cancer and stem cell biology.

**Jeffrey Choi** *Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Fan Yang, Orthopaedic Surgery and Bioengineering*

Jeffrey is currently doing his coterm in biology. His research in Dr. Fan Yang's lab focuses on genetically engineering stem cells non-virally for therapeutic angiogenesis. Specifically, he is transiently modifying adipose-derived stem cells to overexpress angiogenic growth factors and homing signals via poly (β-amino ester) nanoparticulate vectors in order to stimulate blood vessel growth in both *in vitro* and *in vivo* models. Jeffrey plans to attend medical school upon graduation.

**Kieran Chung** *Biomechanical Engineering*
Supported by: anonymous donor
*Mentor: Prof. Jason Dragoo, Orthopaedic Surgery*

Kieran is a rising junior majoring in biomechanical engineering. His research in the Human Performance Lab is focused on testing the efficacy of a six week biomechanical intervention program designed for varsity athletes who are at high risk of ACL injury. The research involves the utilization of 3D motion analysis software to capture and analyze data. Upon graduation, he plans to pursue medical school. Kieran also competes on the varsity sailing team at Stanford during the academic year.

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**Beza Dagne** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Bruce MacIver, Anesthesia*

Beza is a senior majoring in biology with a concentration in neurobiology. She is working in Dr. Bruce MacIver's neuropharmacology lab in the anesthesiology department. This summer she is exploring the effect of different energy supplements (i.e. glucose, pyruvate, and lactate) in Artificial Cerebrospinal Fluid (ACSF) on the energetics and synaptic activity of neurons in the hippocampus. Data will be gathered using *in vitro* electrophysiological recordings of rat hippocampi slices. Beza's future plans include applying to medical school and traveling.

**Nicole Dalal** *undeclared*
Supported by: Dean of Research
*Mentor: Prof. Mary Teruel, Chemical Systems & Biology*

Nicole Dalal is a rising sophomore who intends to major in human biology. As a member of the Teruel lab this summer, she is researching various factors involved in the mechanisms of adipogenesis and insulin resistance, which is critical to a better understanding and treatment of obesity. Nicole is fascinated by the application of science and research in clinical settings to improve health outcomes. Apart from research, she enjoys playing and watching sports and spending time with family and friends. In the future, Nicole plans to attend medical school.

**Camil Diaz** *Chemical Engineering*
Supported by: Dean of Research and Pitch and Catherine Johnson
*Mentor: Prof. Elizabeth Sattely, Chemical Engineering*

Camil graduated in June 2013. She decided to stay in the Sattely Lab another summer to continue her project investigating how certain members of the human gut microbiota activate ingested glucosinolates—anticancer compounds found in commonly consumed vegetables like kale, broccoli, and other brassicas. This summer, she will implement the high-throughput screen developed during her undergraduate honors project to identify the bacterial genes responsible for this enzymatic activation. In November, Camil will begin her Fulbright research in the Philippines to engineer iron-fortified rice, prior to starting her PhD in chemical engineering at the University of Delaware the following fall.

**Ubah Dimbil** *Biology*
Supported by: Dean of Research and Pitch and Catherine Johnson
*Mentor: Prof. Jill Helms, Surgery*

Ubah Jimale Dimbil is a rising senior majoring in biology and minoring in Arabic. Ubah is currently conducting research at the Hagey Pediatric Regenerative Medicine facility where she is focusing on finding the rate limiting step of Wnt3a protein production in CHO-S cells. In general, Ubah is extremely excited about stem cell research and its future impacts in biology. She has also recently decided to take a year off to teach before applying to medical school.

# Bio-X Undergraduate Summer Research Program

**Osama El-Gabalawy** *Biomedical Computation*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Vijay Pande, Chemistry*

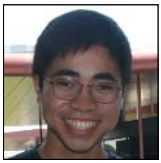
Osama is a rising junior at Stanford with an intended major of biomedical computation. His research in the Pande lab aims to improve parameter estimation of the Karplus equation utilizing machine learning with large data sets from molecular dynamics simulations of small proteins. When he is not conducting research, Osama can be found playing basketball.

**Gia Garrett** *Human Biology*
Supported by: anonymous donor
*Mentor: Prof. Joseph Wu, Medicine (Cardiovascular) and Radiology*

Gia is a rising senior majoring in human biology with a concentration in infectious disease and literary medicine. As a member of the Wu Lab, she is currently studying the fates of induced pluripotent stem cells and exploring novel forms of cardiovascular disease modeling and cell therapy. In addition to regenerative medicine, her academic interests include the medical humanities and the subjective experience of disease through narrative forms. Post-graduation, Gia plans to work in a community health setting prior to attending medical school.

**Angad Gogia** *undeclared*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Lawrence Steinman, Neurology and Pediatrics*

Angad is a rising junior planning to major in computer science. This summer in Dr. Steinman's lab, he is working with mice to investigate myeloid cell heterogeneity in autoimmune diseases. More specifically, he is working to investigate the subset of macrophages that exist *in vivo*. Up to this point, most work in this area has been done *in vitro*. He is very excited about the opportunity to work with Bio-X this summer and plans to pursue medical school upon graduation.



**Oliver Hamto** *Chemistry*
Supported by: anonymous donor
*Mentor: Prof. Steven Boxer, Chemistry*

Oliver Hamto is a rising senior. His research in the Boxer lab focuses on a fluorescent protein that emits in the red zone of the visible spectrum: mCherry. The study aims to apply mCherry constructs to split protein methods previously developed in the same lab for green fluorescent proteins. In his spare time, he likes to get involved with the Pilipino-American community on- and off-campus.

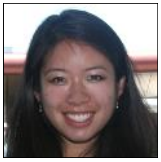
**Jimmy He** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Gary Steinberg, Neurosurgery*

Jimmy He, a biology major, is working in Dr. Steinberg's lab. This summer, he will learn tissue culture techniques as well as how to design and run effective experiments. His goal is to elucidate the role of ZNF521, one of several genes uniquely overexpressed in the vasculature of Moyamoya disease patients, in possible smooth muscle cell proliferation. Apart from Bio-X, Jimmy is learning golf and playing trombone in the summer Stanford Symphony Orchestra.

# Bio-X Undergraduate Summer Research Program

**Michael Iorga** *Biomechanical Engineering*
Supported by: VPUE and Bio-X
*Mentor: Prof. Josef Parvizi, Neurology & Neurological Sciences*

Michael is a rising junior. His research interests revolve around the development of new technologies for medical applications. This summer Michael is working on an EEG sonification device that can process brain signals into music and "sing" the melody of the brain using computer-synthesized voices in real time, thus providing an intuitive and auditory method for distinguishing between brain states. Enabling patients to listen to their own brain signals in real time allows for research into a new, sonification-enhanced biofeedback therapy for epilepsy. After graduation, Michael is planning on attending medical school.



**Olivia Jew** *Human Biology*
Supported by: VPUE and Bio-X
*Mentor: Prof. Jill Helms, Surgery*

Olivia is a rising senior majoring in human biology. This summer she is working in Dr. Jill Helms' lab to investigate the role of Wnt, a stem cell growth factor, in skin graft healing and angiogenesis. She is fascinated by tissue regeneration and applications for improving surgical outcomes. Olivia's hobbies include dance, hiking, ceramics, taekwondo, and traveling. She is involved on campus as a student advisor in the human biology department, a patient navigator at Arbor Free Clinic, and a member of Bent Spoon Dance Company. She plans to pursue a career in medicine after graduation.

**Rosy Karna** *Biology*
Supported by: anonymous donor
*Mentor: Prof. Vinod Menon, Psychiatry & Behavioral Sciences*

Rosy is an international transfer student majoring in biology. After her undergraduate studies, she wants to pursue an MD/PhD and hopes to get involved in neurosciences research. She is currently working in the Stanford Cognitive and Systems Neuroscience Laboratory under the guidance of Dr. Vinod Menon, Dr. Lucina Uddin, and Dr. Kaustubh Supekar. They are investigating the neural correlates of reading abilities in school-age male and female children for the first time. Rosy thanks the Bio-X program for giving her the wonderful opportunity to work in the lab this summer.

**Habib Khoury** *undeclared*
Supported by: Dean of Research
*Mentor: Prof. Yanmin Yang, Neurology & Neurological Sciences*

Habib is a rising sophomore hoping to pursue a major in biology with a concentration in neurobiology and a minor in history. This summer in Yanmin Yang's lab, Habib is culturing and cloning neurons to understand how STK25, a kinase included in neuronal mechanisms, regulates neuron polarity. Through a better understanding of how this kinase works, he will then focus on discovering the relationship between Nemitin, a protein newly identified by the Yang Lab, and STK25. Habib plans to pursue medical school after graduation.

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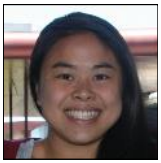
**Geurim Kim** *Biology*
Supported by: VPUE and Bio-X
*Mentor: Prof. Anthony Oro, Dermatology*

Geurim Junie Kim is a rising senior majoring in biology and studying violin performance at Stanford. She has been working in the Oro lab in the dermatology department with Dr. Scott Atwood since freshman year. She is currently studying the regulation and function of oncogenic polarity kinase: atypical Protein Kinase C (aPKC) in hedgehog pathway, which has been identified as a novel target gene for cancer therapy. The objective of her research is to investigate aPKC activation in tumors and develop peptide inhibitors. In general, Geurim is interested in cancer biology and plans to pursue an MD/PhD after graduating from Stanford.

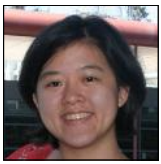
**Mariam Kyarunts** *Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Irv Weissman, Pathology and Developmental Biology*

Mariam is a rising sophomore. She intends to attend medical school after she pursues a major in biology as an undergraduate. She has a passion for the sciences and a desire to ameliorate global health. Her hobbies include recreational swimming, reading, and spending time with friends. She is currently conducting research in the Weissman Lab. Her research is focused on the ability to harness the human immune system as a therapeutic for cancer. She is especially excited to learn more about the novel method of directing the power of the immune system toward the solution of key problems.



**Thien-Linh Le** *Human Biology*
Supported by: anonymous donor
*Mentor: Prof. Michael Hsieh, Urology*

Linh is a rising senior majoring in human biology with a concentration in global health and infectious diseases. Currently in the Michael Hsieh urology lab, Linh is exploring the natural course of infection with the parasitic blood fluke *Schistosoma haematobium* in Syrian golden hamsters and testing the effects of dimethoxycurcumin (a curcumin analog) on reducing the ability of *Escherichia coli* to form a biofilm matrix on urinary catheters surgically implanted in mouse bladders. When she is not studying, Linh loves to rock climb and sing.



**Rachel Lee** *Symbolic Systems*
Supported by: Dean of Research and Department of Symbolic Systems
*Mentor: Prof. James McClelland, Psychology*

Rachel is a rising junior pursuing a neurosciences major. As part of Professor Jay McClelland's PDP labs, Rachel's research focuses on building computational models that can capture both human behavior and neural data. This summer, Rachel has been studying perceptual learning by designing deep networks that mimic the human visual system. Working closely with Andrew Saxe of the PDP and Dr. Andrew Ng's Stanford AI lab, Rachel is building a model with a deep learning algorithm that can resolve the competing theories on the loci of change in the brain for perceptual learning. Rachel plans to pursue a PhD in computational neuroscience.

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**Richard Li** *Chemical Engineering*
Supported by: VPUE and Bio-X
*Mentor: Prof. Andrew Fire, Genetics and Pathology*

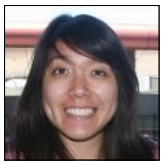
Richard Li is a senior majoring in chemical engineering. He enjoys backpacking and producing music. His research in the Fire laboratory focuses on characterizing the primary Argonaute in the *C. elegans* RNA interference pathway and engineering a Cas9/CRISPR system for targeted genomic editing. After graduation, Richard is interested in bridging his engineering and experimental biology backgrounds to pursue dual MD/PhD program in computational and systems biology.

**Alex Lindqwister** *Biomedical Computation*
Supported by: Dean of Research
*Mentor: Prof. Mark Pegram, Medicine*

Alex Lindqwister is a rising junior majoring in biomedical computation (informatics track). Presently, Alex works on truncated ERBB2 amplified genes and lipid raft association in the Pegram lab. His academic interests involve using computer science to address problems in molecular biology. Alex plans on co-terming in biomedical computation and on eventually going to medical school.

**Debra Linfield** *Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. David Stevenson, Pediatrics*

Debra is a rising junior and feels privileged to work in the Stevenson laboratory. She is conducting research on the effect of different light wavelengths on phototherapy for treating neonatal jaundice. Debra aspires to be a neonatologist who treats patients, conducts research, and teaches. Debra is majoring in biology and minoring in math; in the fall, she will be a resident assistant in Roble Hall. She enjoys spending time with her friends and six siblings, exercising, and watching Grey's Anatomy.



**Lisa Ly** *Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Sheri Krams, Surgery*

A rising junior, Lisa Ly has declared a major in biology. This summer in the Transplant Immunology Lab with Dr. Sheri Krams, she is investigating NKp30's role in the immunological synapse between natural killer (NK) cells and tumor cells using confocal microscopy. Always appreciating the human body's wonders and health-related community service, she hopes to attend medical school in the future.

**Shamik Mascharak** *undeclared*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Sarah Heilshorn, Materials Science & Engineering*

Shamik Mascharak, a rising junior, is currently conducting research in Professor Sarah Heilshorn's lab, investigating electrospun elastin-like protein matrices as clinically relevant substrates for endothelial cell motility and migration. He hopes to identify key design principles of this substrate so that it may be used to induce rapid monolayer formation and healing in engineered vascular grafts. In his free time, he enjoys practicing martial arts (Tae Kwon Do, Muy Thai), writing music, and, recently, teaching himself guitar. In the future, he hopes to be involved in the application of biomaterials to patients as a physician-scientist.

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**Trevor Mooney** *Human Biology*
Supported by: VPUE and Bio-X
*Mentor: Prof. Yanmin Yang, Neurology & Neurological Sciences*

Trevor is a rising senior majoring in human biology. His research in the Yang laboratory focuses on the biochemistry of microtubule-associated proteins as related to neurodegeneration. Outside the lab, Trevor enjoys pickup basketball, Oakland A's games, and tug-of-war with Luka, his family's German Shepherd.

**David Mundy** *Biology*
Supported by: anonymous donor
*Mentor: Prof. Heng Zhao, Neurosurgery*

David Mundy is a senior majoring in biology. He is currently conducting stroke research, specifically the role of distinct T cell subsets involved in tissue inflammation following reperfusion in focal ischemia. He plans on taking a few years to teach or conduct research after graduation before attending medical school. He enjoys diving, playing saxophone, scuba diving, and traveling in his free time.

**Katherine Nabel** *Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Howard Chang, Dermatology*

Katherine is a rising senior majoring in biology with a specialization in molecular and cell biology. In the Chang lab, Katherine researches post-translational modifications of p53 and interactions with the lncRNA DINO. Specifically, she is investigating the role of p53's C-terminal domain in RNA binding by identifying the biochemical determinants of the p53-DINO interaction. After graduation, Katherine plans to apply to medical school and pursue her passion for global health equity by working in rural African healthcare clinics. In her spare time, Katherine loves hiking with her dogs, Charlie and Cooper.

**Lila Neahring** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Philip Beachy, Biochemistry and Developmental Biology*

Lila Neahring is a rising junior planning to major in biology. In the Beachy laboratory, part of the Institute for Stem Cell Biology and Regenerative Medicine, she is researching the structural sites involved in the activation of the Smoothened oncoprotein, a part of the Hedgehog signaling pathway. Lila is a co-founder of Stanford's rock climbing team in the club sports program.

**Raman Nelakanti** *Bioengineering*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Joseph Wu, Medicine (Cardiovascular) and Radiology*

Raman is a rising senior in the bioengineering honors program. This summer in Joe Wu's lab, he is conducting research on how the immune system responds to induced pluripotent stem cell transplants. Additionally, his secondary objectives for the summer include curing cancer. In the coming years, he hopes to attend an MD/PhD program and pursue a career in academia. Some of his other interests include basketball, arranging music, singing, and hiking.

# Bio-X Undergraduate Summer Research Program

STANFORD BIO-X

**Mira Nencheva** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Firdaus Dhabhar, Psychiatry & Behavioral Sciences*

Mira Nencheva is a rising sophomore. She intends to major in biology with a concentration in microbes and immunity and minor in psychology. She is currently doing research in Firdaus Dhabhar's lab. Her research interests gravitate towards the immunology of the mind-body stress response. This summer Mira is exploring the effects of acute stress on skin cancer in mice as well as the influence of various environmental and biological factors on the immune system of Asian elephants.

**Nam Phuong Nguyen** *Materials Science & Engineering*
Supported by: anonymous donor
*Mentor: Prof. Judith Frydman, Biology*

A rising sophomore, Phuong plans to major in materials science with a concentration in bioengineering. This summer in Judith Frydman's lab, she is conducting protein conformational studies using techniques developed by the Frydman lab. They hope to elucidate the interacting nature of chaperonin TRIC and its cochaperone, Prefoldin, which are involved the cytoskeletal support and function in all cellular kingdoms.

**James Nie** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Robert Malenka, Psychiatry & Behavioral Sciences*

James Nie is a rising junior majoring in biology with a concentration in neuroscience. He is currently conducting research on deep brain stimulation for treatment of Parkinson's disease through an optogenetic model. The objective of this research is to demonstrate that a recently developed brain-slice model that recapitulates key features of *in vivo* recordings accurately models the neuronal firing observed during *in vivo* opto-deep brain stimulation. He plans to pursue medical school after graduation.

**Rebekah Oragwu** *Human Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Alexander Urban, Psychiatry & Behavioral Sciences*

Rebekah is a rising junior majoring in human biology and pursuing a minor in creative writing. She enjoys playing Catchphrase and picking up words from other languages. This summer she is studying the effects of genetic variation on brain development in the context of the complex neurogenetic disorder schizophrenia.

**Sunil Pai** *Physics*
Supported by: Pitch and Catherine Johnson
*Mentor: Prof. Renee Reijo Pera, Obstetrics & Gynecology*

Sunil Pai is a rising junior planning to major in physics and minor in computer science. His research this summer under Dr. Reijo Pera will focus primarily on understanding the influence of electric fields on neural stem cell movement and modeling cell migration patterns with and without electric fields using advanced imaging and software tools. He hopes that this research could lead to treatment aids during stem cell treatment for neurological disorders in which temporary implanted electrodes help to guide cell migration. In his free time, Sunil enjoys playing basketball, squash, and tennis.

# Bio-X Undergraduate Summer Research Program

**Dave Praharaj** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Dean Felsher, Medicine (Oncology) and Pathology*

Dave Praharaj, a rising senior, is a biology major with an interest in cancer and molecular biology. This summer he is working in the Felsher lab under Dr. Alice Fan. He will be using a nanoimmunoassay to analyze fine needle aspirate (FNA) samples of renal cell carcinoma (RCC) patients to help identify proteomic cancer signatures for kidney cancer. In his free time he enjoys bollywood dance and pickup soccer. After graduation, Dave wants to attend medical school and pursue a career with a focus on clinical research and personalized medicine.

**Niraj Punjya** *Biology*
Supported by: Pitch and Catherine Johnson
*Mentor: Prof. Matthew Porteus, Pediatrics*

Niraj Punjya is a rising junior on the molecular and cellular biology track at Stanford. This summer, he is conducting genetic engineering research in the Porteus lab, using engineered nucleases such as TALENs and CRISPRs to study triplet repeat disorders such as Huntington's disease and myotonic dystrophy. Because varying repeat lengths in the same gene lead to different pathologies, Niraj hopes to create cell lines with varying lengths of the repeat segment to accurately model these diseases, thus providing a means to screen therapeutics. In the future, Niraj intends to apply to MD/PhD programs.

**Danielle Rasooly** *Mathematics - Biomedical Informatics*
Supported by: Dean of Research
*Mentor: Prof. David Paik, Radiology*

Danielle is a senior studying mathematics and co-terming in biomedical informatics. Under the guidance of professor David Paik, she is characterizing psycho-perceptual factors involved with tumor detection from medical imaging in an effort to further better image interpretation and quantitation both by human observer and computer software. She is incredibly passionate about combining her quantitative skills with her love for medicine to one day help save thousands, if not millions, of lives.

**Richard Sapp** *Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Carla Shatz, Biology and Neurobiology*

Richard Sapp is a co-term student in the biology department. He is planning on pursuing a career in medicine with a specialty in developmental-behavioral pediatrics. He received the Firestone Medal of Excellence for Undergraduate Research for work conducted in Dr. Shatz's lab. His thesis was titled "Acutely disrupting the function of PirB enhances ocular dominance plasticity." This summer, he is continuing his research to determine whether pharmacologically blocking PirB can rescue plasticity in disease models. In his spare time, he enjoys playing violin and piano and playing basketball.

# Bio-X Undergraduate Summer Research Program

**Helena Scutt** *Biomechanical Engineering*
Supported by: Dean of Research
*Mentor: Prof. Scott Delp, Bioengineering and Mechanical Engineering*

Helena Scutt is a rising senior. Her research at the Neuromuscular Biomechanics Lab involves developing a spinal cord implant for optogenetic inhibition of motor neurons. Research in this field may someday improve therapies for people with paralysis and movement disorders. Helena is on the Stanford Varsity Sailing Team and the US Sailing Team. She intends to pursue a master's degree in mechanical engineering through the co-term program at Stanford.

**Amy Sentis** *Computer Science*
Supported by: Division of Pain Medicine VPUE grant and Bio-X
*Mentor: Prof. Sean Mackey, Anesthesia*

Amy Sentis is a rising senior majoring in computer science, focusing on biocomputation. In her research in the Systems Neuroscience and Pain Lab, Amy is examining alternative approaches to train patients who suffer from chronic pain to better self-manage their pain. Using machine learning algorithms for multivariate classification, she is analyzing fMRI data from areas of the brain involved in pain perception and regulation to detect differences in brain activation from subjects who are attempting to increase or decrease the perceived pain resulting from a thermal stimulation. After graduation, Amy plans to pursue an MD/PhD program.

**Rashmi Sharma** *Bioengineering*
Supported by: VPUE and Bio-X
*Mentor: Prof. Yunzhi Peter Yang, Orthopaedic Surgery*

Rashmi is a rising senior majoring in bioengineering and minoring in computer science. Interested in tissue engineering, she is pursuing an honors thesis in Peter Yang's Orthopaedic Surgery lab, studying the genes responsible for rapid deer antler growth and how they could be useful in the regenerating bone. In her spare time, Rashmi enjoys trying new baking recipes, figuring out innovative ways to prevent squirrels from destroying her garden, and attempting to make music using her voice.

**Sharon Bade Shrestha** *Human Biology*
Supported by: anonymous donor
*Mentor: Prof. Allan Reiss, Psychiatry & Behavioral Sciences and Radiology*

Sharon Bade Shrestha is a rising senior pursuing a major in human biology and a minor in psychology. She is fascinated by the human mind and its correlations with brain morphology, activity, and function. This summer she continues her work in Dr. Allan Reiss's lab, CIBSR, where she investigates morphological and activity based differences in developing brains with Fragile X and Turner syndromes along with social and behavioral measures of development. Sharon is a self-proclaimed lover of the outdoors and loves hiking, camping, and a general appreciation of our beautiful planet.

STANFORD BIO-X

BIO-X AT STANFORD

TO EDUCATE...

TO DISCOVER....

TO INVENT....

# Bio-X Undergraduate Summer Research Program

**Greeshma Somashekar** *undeclared*
Supported by: Dean of Research
*Mentor: Prof. Alejandro Sweet-Cordero, Pediatrics*

Greeshma is a rising sophomore. She intends to major in human biology with a minor in creative writing. This summer, she hopes to learn more about the mechanism of EWS/FLI-1 mediated oncogenesis in Ewing's Sarcoma. Specifically, Greeshma is working to determine the functional role of the metabolic gene Upp1 in this mechanism and how it might contribute to improved treatment for children with this rare pediatric cancer. Academically, she is interested in cancer biology, clinical research, and narratives in medicine.

**Lauren Sweet** *Biology*
Supported by: VPUE and Bio-X
*Mentor: Prof. Yunzhi Peter Yang, Orthopaedic Surgery*

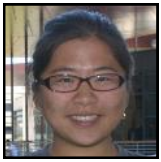
Lauren Sweet is a rising junior studying in the biology department. She works in Dr. Peter Yang's biomaterials lab in the orthopaedics department at the Stanford School of Medicine. Her research interest is in bone innervation with a focus on calcium phosphate scaffolds. This summer she is testing the viability of nervous system tissues on ß-tricalcium phosphate substrates. Her hope is to eventually help construct an integrated bone implant utilizing the innervating and angiogenic signaling properties of schwann cells. Lauren is considering an MD/PhD program.

**Zahra Harati Taji** *Chemistry*
Supported by: Dean of Research
*Mentor: Prof. Justin du Bois, Chemistry*

Zahra is a rising senior working with professor Justin Du Bois in the chemistry department. Her research involves using derivatives of guanidinium toxins, a class of potent neurotoxins found throughout nature, as molecular probes for studying the structure and function of voltage-gated sodium channels. This summer, her work is focused on the design, synthesis and biological testing of toxin-fluorophore conjugates for use in dynamic and kinetic studies of these channels.

**Tara Trujillo** *Human Biology*
Supported by: VPUE and Bio-X
*Mentor: Prof. Karen Parker, Psychiatry & Behavioral Sciences*

Tara is a rising senior majoring in human biology. She is currently conducting research in Dr. Karen Parker's lab in the psychiatry and behavioral sciences department, and her primary research in the lab is focused on a Phase II clinical trial testing the effects of intranasal oxytocin as a treatment to improve social functioning in children with Autism Spectrum Disorder. Tara plans on pursuing either a PhD or MD in the future, with a focus in psychiatry or neuroscience. In her free time, Tara enjoys long-distance running.



**Christina Wang** *Public Policy*
Supported by: Dean of Research
*Mentor: Prof. Mindie Nguyen, Medicine (Gestroenterology & Hepatology)*

Christina Wang is a rising junior. She is majoring in public policy and is interested in health policy and health disparities, especially with the high incidence and prevalence of hepatitis B in Asians and Asian Pacific Islanders. She is grateful for the research support she received in finding out Bay Area physicians' adherence to proper hepatocellular carcinoma screening with routine alpha fetoprotein and imaging. In her spare time, she loves playing guitar, baking, and cooking.

# Bio-X Undergraduate Summer Research Program

STANFORD BIO-X

**Stephanie Wang** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Kang Shen, Biology and Pathology*

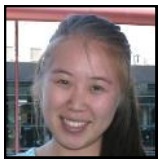
Stephanie Wang is a rising junior majoring in biology. In professor Kang Shen's lab, she is working with *Caenorhabditis elegans* and is using genetic and molecular techniques to characterize the molecular mechanism of microtubule polarity in the dendrites of ciliated neurons. After graduation, she plans on attending medical school to become a pediatrician. In her free time, she enjoys playing the piano and singing to the radio.

**Dana Wyman** *Biology*
Supported by: Dean of Research and VPUE
*Mentor: Prof. Michael Snyder, Genetics*

Dana Wyman is a rising senior majoring in biology with a specialization in molecular and cell biology. She is currently working in Dr. Mike Snyder's lab, and her project entails using RegulomeDB to annotate potentially damaging single nucleotide polymorphisms (SNPs) within regulatory regions of personal genomes. In addition to biology, Dana enjoys programming and hopes to study both genetics and computer science in the future.

**Issa Yousif** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Marius Wernig, Pathology*

Issa Yousif is a rising junior. He is currently working in Dr. Wernig's lab at the Institute of Stem Cell Biology and Regenerative Medicine. Issa is conducting research on age related neurodegenerative diseases via iN cells. Specifically, he is working on FoxO transcription factors, which, among other things, regulate neuronal stem cell maintenance and function. He hopes to elucidate the role of FoxO transcription factors in iN conversion from aging fibroblasts in hopes of providing a powerful tool for the modeling and study of neurodegenerative diseases.



**Linda Yu** *Biology*
Supported by: Dean of Research
*Mentor: Prof. Ravindra Majeti, Medicine (Hematology)*

Linda Yu, a rising junior at Stanford, is currently working in Ravi Majeti's lab in the Institute for Stem Cell Biology and Regenerative Medicine. Her work focuses on identifying and isolating targets in NPM1c+ pre-leukemic stem cells to prevent relapse in patients with NPM1c-mutated AML. Outside of the lab, Linda consumes more fruits and veggies than the typical *Homo sapiens*, loves discovering musical artists with breathtaking vocals, and is always on the lookout for lyrical prose.

**Samantha Zarate** *undeclared*
Supported by: anonymous donor
*Mentor: Prof. Liqun Luo, Biology*

Samantha is a rising sophomore hoping to major in biomedical computation. She is excited to be working this summer in Dr. Liqun Luo's lab researching the role of the gene Rai1 in the mouse brain, focusing specifically on the dendritic spines of medium spiny neurons in the striatum. Outside of biology, Samantha is also interested in forensic science, psychology, and English history.

# Bio-X Undergraduate Summer Research Program

## 2013 Poster Titles

"Truncated ERBB2 Amplified Genes: The p110 IRES"
Alex Lindqwister[1], Toby Ward[1], Mark Pegram[1]
Department of Cancer Biology[1], Stanford University

"Probing Physical Barriers to Nanostraw Cell Access"
Amin Aalipour[1], Alexander M. Xu[1], Nicholas A. Melosh[1]
Department of Materials Science & Engineering[1], Stanford University

"Support Vector Machine Classification of Chronic Pain States Using Real-Time fMRI"
Amy Sentis[1], Epifanio Bagarinao[2], Sean Mackey[2]
Departments of Computer Science[1] and Anesthesia[2], Stanford University

"Exploring Myeloid Cell Heterogeneity in Autoimmune Disease"
Angad Gogia[1], Bahareh Ajami[1], Matt Spitzer[2], Garry Nolan[2], Lawrence Steinman[1]
Departments of Neurology[1] and Microbiology & Immunology[2], Stanford University

"Food for Thought: A Better Way to Feed Your Brain Slices"
Beza A. Dagne[1], Melis K. Sunay[1], James Nie[1], Bruce MacIver[1]
Neuropharmacology Lab[1], Stanford University

"Tumor Suppressive Effects of Optogenetic and Pharmacological Stimulation in Medulloblastoma Cells"
Brianna Balansay[1], Yujie Tang[1], Brian Nguyen[1], Simone Schubert[1], James M. Cook[3], Sundari Rallapalli[3], Frances Jensen[2], Yoon-Jae Cho[1]
Department of Neurology[1], Stanford University; Children's Hospital Boston[2]; University of Wisconsin-Milwaukee[3]

"A Gut Microbe-Plant Interaction Generates Anticancer Compounds: Metabolism of Dietary Glucosinolates by *Bacteroides thetaiotaomicron* and Implications for Human Health"
Camil A. C. Diaz[1], Andrew P. Klein[1], Elizabeth S. Sattely[1]
Department of Chemical Engineering[1], Stanford University

"Higher Rates of Hepatitis B Surface Antigen (HBsAg) Seroclearance in Males and Hepatitis B E-Antigen Negative Chronic Hepatitis B (CHB) Patients"
Christina K. Wang[1], Long H. Nguyen[1], Irene S. Sonu[2], Kevin Kin[7], Huy N. Trinh[4], Jiayi Li[5], Jian Q. Zhang[6], Aijaz Ahmed[3], Mindie H. Nguyen[3]
Liver Transplant Clinic[1], Department of Medicine[2], and Division of Gastroenterology and Hepatology[3], Stanford University; San Jose Gastroenterology[4]; Department of Gastroenterology[5], Palo Alto Medical Foundation; Chinese Hospital[6], San Francisco; Pacific Health Foundation[7]

"Annotating Regulatory Regions of Personal Genomes"
Dana Wyman[1], Alan Boyle[2], Michael Snyder[2]
Departments of Biology[1] and Genetics[2], Stanford University

"Characterizing Psycho-Perceptual Factors Involved with Tumor Detection from Medical Imaging"
Danielle Rasooly[1], David Paik[1]
Department of Radiology[1], Stanford University

# Bio-X Undergraduate Summer Research Program

## 2013 Poster Titles continued

"Defining Nanoproteomic Profiles of Kidney Cancer"
Dave R. Praharaj[1], Jennifer J. O'Rourke[1], Thomas J. Metzner[1], Rachael Curtis[1], Sandy Srinivas[1], Joanna E. Liliental[1], John Leppert[1], Alice C. Fan[1], Dean W. Felsher[1]
Stanford Cancer Institute[1], Stanford University

"Development of Polystyrene Microposts for Traction Force Microscopy"
David Ayala-Lindeman[1], Alexandre Ribeiro[1], Beth Pruitt[1]
Department of Mechanical Engineering[1], Stanford University

"The Role of CX3CR1 in Focal Ischemic Brain Injury & Inflammation in Mice"
David Mundy[1], Xiaoxing Xiong[2], Heng Zhao[2]
Departments of Biology[1] and Neurosurgery[2], Stanford University

"The Effect of Light Wavelength on the Efficacy and Safety of Phototherapy for Neonatal Jaundice"
Debra T. Linfield[1], David N. Lin[1], Stephanie Schulz[1], Hendrik J. Vreman[1], Ronald J. Wong[1], David K. Stevenson[1]
Department of Pediatrics[1], Stanford University

"Dynamics of Bacterial Communities through a Time Course Experiment"
Fatema AlGharbi[1], Shariyar Pruisken[1], Brandon Ewonus[1], Paul J McMurdie II[2], Yana Hoy[3], David Relman[3], Susan Holmes[2]
Mathematical Computational Sciences[1], Department of Statistics[2], and School of Medicine[3], Stanford University

"The Role of miR-126 in Lung Tumor Angiogenesis"
George Chen[1], Cynthia Kosinski[1], Calvin Kuo[1]
Department of Medicine[1], Stanford University

"Smoothened is a Frequent Driver of Drug-Resistant Basal Cell Carcinoma"
Geurim Kim[1], Scott X. Atwood[1], Kavita Sarin[2], Jiang Li[1], Sandra Melo[1], Frederic J. de Sauvage[3], Anne Lynn S. Chang[1,2], Jean Y. Tang[1,2], Anthony E. Oro[1,2]
Program in Epithelia Biology[1] and Department of Dermatology[2], Stanford University; Department of Molecular Biology[3], Genentech, Inc.

"Safety Parameters of Bone Marrow Derived Stem Cell Transplantation for Treatment of Ischemic Cardiomyopathy"
Gia Garrett[1,2], Elly Seo[1,2], Andrew Lee[1,2], Charles Chan[1,2], Joe Wu[1,2]
Departments of Radiology[1] and Medicine[2], Stanford University

"Investigation of Potential Metabolic Gene in Ewing's Sarcoma"
Greeshma Somashekar[1], Dana Gwinn[1], Alejandro Sweet-Cordero[1]
Department of Pediatrics[1], Stanford University

"Investigating the Role of Nemitin on STK25's Function in Regulating Neuronal Polarity"
Habib Khoury[1], Ivan Millan[1], Yanmin Yang[1]
Department of Neurology[1], Stanford University

# Bio-X Undergraduate Summer Research Program

## 2013 Poster Titles continued

"Optogenetic Inhibition of Motor Neurons"
Helena Scutt[1], Kate Montgomery[2], Shrivats Iyer[2], Scott Delp[1,2,3]
Departments of Mechanical Engineering[1], Bioengineering[2], and Orthopaedic Surgery[3], Stanford University

"The Role of FoxO Transcription Factors in Neuronal Conversion from Aging Fibroblasts"
Issa Yousif[1], Henrik Ahlenius[1], Marius Wernig[1]
Institute for Stem Cell Biology & Regenerative Medicine[1], Stanford University

"Hippocampal Field Inhibiting Potentials: A Novel Screening for General Anesthetics"
James Nie[1], Boris D. Heifets[1], Beza A. Dagne[1], Melis Sunay[1], Bruce MacIver[1], Robert Malenka[1]
Department of Psychiatry & Behavioral Sciences[1], Stanford University

"Engineering Adipose-Derived Stem Cells using Biodegradable Polymeric Nanoparticles to Overexpress HGF and CXCR4 for Therapeutic Angiogenesis"
Jeffrey Choi[1], Lorenzo Deveza[2,4], Sungwon Lim[2], Fan Yang[2,3]
Departments of Biology[1], Bioengineering[2], and Orthopaedic Surgery[3] and School of Medicine[4], Stanford University

"Elucidating the Role of ZNF521 on Vascular Smooth Muscle Cell Proliferation in Moyamoya Disease"
Jimmy He[1], Lorelei Shoemaker[1], Gary Steinberg[1]
Department of Neurosurgery[1], Stanford University

"Interactions between p53 and the lncRNA DINO: Effects of Post-Translational Modifications on RNA Binding"
Katherine G. Nabel[1,2], Adam M. Schmitt[1,2,3], Tiffany Hung[1,2], Howard Y. Chang[1,2]
Howard Hughes Medical Institute[1], Program in Epithelial Biology[2], and Department of Radiation Oncology[3], Stanford University

"Promotion of Muscle Stem Cell Fate in Bioengineered Culture Environments"
Kevin Aliado[1], Andrew Ho[1], Helen M. Blau[1]
Baxter Laboratory for Stem Cell Biology Institute for Stem Cell Biology & Regenerative Medicine
Department of Microbiology & Immunology[1], Stanford University

"Anterior Cruciate Ligament Modifiable Biomechanical Risk Factors"
Kieran Chung[1], Rebecca Shultz[2], Jason Dragoo[2]
Departments of Biomechanical Engineering[1] and Orthopedic Surgery[2], Stanford University

"Characterization of Schwann Cell Growth and Behavior on Variable Geometry ß-TCP Scaffolds"
Lauren Sweet[1], Yunqing Kevin Kang[2], Chris Czisch[3], Lukasz Witek[4], Yang Shi[4], Jim Smay[4], Giles Plant[3], Yunzhi Peter Yang[2]
Departments of Biology[1], Orthopedic Surgery[2], and Neurosurgery[3], Stanford University;
Department of Chemical Engineering[4], Oklahoma State University

"Regulation of the Hedgehog Pathway by Endogenous and Synthetic Small Molecules Targeting Smoothened"
Lila Neahring*, Benjamin Myers[1,2,3,4], Philip Beachy[1,2,3,4]

# Bio-X Undergraduate Summer Research Program

## 2013 Poster Titles continued

"Boolean Analysis of CpG Methylation and Recurrent Mutations in Acute Myeloid Leukemia with Implications for Therapy and Prognosis"
Linda Yu[1,2], Subarna Sinha[3], Daniel Thomas[1,2], David Dill[3], Ravindra Majeti[3]
Institute for Stem Cell Biology & Regenerative Medicine[1] and Departments of Medicine (Division of Hematology)[2] and Computer Science[3], Stanford University

"NKp30 Recruitment to the Natural Killer Cell's Immune Synapse"
Lisa Ly[1], Uzi Hadad[1], Olivia Martinez[1], Sheri Krams[1]
Department of Surgery[1], Stanford University

"Generation of a Fully Mouse Monoclonal Antibody Blocking the CD47-SIRPalpha Interaction"
Mariam Kyarunts[1], Adriel Cha[1], Jens Volkmer[1], Teja Nayik[1], Irv Weissman[1]
Department of Biology[1], Stanford University

"The Brain in Performance: Understanding Brain Waves through Sound and Space"
Michael Iorga[1], Juan-Pablo Caceres[3], Chris Chafe[3], Josef Parvizi[2]
Departments of Biology[1] and Neurology[2] and CCRMA[3], Stanford University

"Earthquakes and Elephants: Effects of Seismic Activity on Immune Cell Distribution in Asian Elephants"
Mira Nencheva[1], Harry Peachey[5], Mariya Kalashnikova[2], Allison Litzinger[2], Firdaus S. Dhabhar[1,3,4]
Department of Psychiatry & Behavioral Sciences (Laboratory of Stress Immunology)[1], Former student of Department of Psychiatry & Behavioral Sciences (Laboratory of Stress Immunology)[2], Institute for Immunity, Transplantation, & Infection Laboratory of Stress Immunology[3], and Cancer Institute, Stanford University[4]; Columbus Zoo[5]

"Bag of TRICs: The Complexities of Prefoldin-TRIC Interaction Unveiled"
Phuong Nguyen[1], Dan Gestaut[1], Judith Frydman[1]
Department of Biology[1], Stanford University

"Understanding the Functional Role of C/EBPβ in Insulin Resistant Adipocytes"
Nicole Dalal[1], Asuka Ota[2], Mary N. Teruel[2]
Departments of Human Biology[1] and Chemical & Systems Biology[2], Stanford University

"Creating Myotonic Dystrophy Triplet Repeat Corrected Cell Lines using Engineered Nucleases"
Niraj Punjya[1], Ayal Hendel[1], Matthew Porteus[1]
Department of Pediatrics[1], Stanford University

"Cherry Picking: Proteolytic and Chaotropic Disassembly of Monomeric Red Fluorescent Proteins"
Oliver Hamto[1], Luke Oltrogge[1], Steven Boxer[1]
Department of Chemistry[1], Stanford University

"Canonical Wnt Signaling Promotes Skin Graft Survival and Angiogenesis"
Olivia S. Jew[1], Khosrow S. Houschyar[1], Andrew A. Smith[1], Jill A. Helms[1]
Department of Surgery (Division of Plastic & Reconstructive Surgery)[1], Stanford University

# Bio-X Undergraduate Summer Research Program

## 2013 Poster Titles continued

"Karplusplus: Improving the Karplus Relation"
Osama El-Gabalawy[1], TJ Lane[2], Kyle Beauchamp[3], Vijay Pande[2]
Departments of Biology[1], Chemistry[2], and Biophysics[3], Stanford University

"Modeling Perceptual Learning with Deep Networks"
Rachel Lee[1], Andrew Saxe[2], Jay McClelland[3]
Departments of Symbolic Systems[1], Electrical Engineering[2], and Psychology[3], Stanford University

"Detection of Electrocardiographic Differences Between Athletes and Patients with Hypertrophic Cardiomyopathy"
Rachel Bent[1], Marco Perez[1,2], Victor Froelicher[2], Euan Ashley[1,2]
Stanford Center for Inherited Cardiovascular Disease[1] and Department of Cardiovascular Medicine[2], Stanford University

"The Humanized BLT Mouse Model has Superior Human Lymphocyte Engraftment but Lacks an Adequate Allograft Immune Response"
Raman Nelakanti[1], Nigel Kooreman[1], Patricia de Almeida[1], Joseph Wu[1]
Department of Medicine (Division of Cardiology)[1], Stanford University

"Identification of Deer Antler Proliferation Genes for Accelerating Growth of hMSCs"
Rashmi Sharma[1], Elmer Ker[2], Stephen Quake[1], Joseph C. Wu[3], Howard Chang[4], William J. Maloney[2], Yunzhi Peter Yang[2]
Departments of Bioengineering[1], Orthopaedic Surgery[2], Radiology[3], and Dermatology[4], Stanford University

"Copy Number Variation in Lymphoblastoid Cell Line Samples: A Blood vs. LCL Comparison"
Rebekah Oragwu[2], Xiaowei Zhu[1], Alexander Urban[1]
Departments of Psychiatry & Behavioral Sciences[1] and Human Biology[2], Stanford University

"Characterization of RDE-1 Function in the *C. elegans* Exogenous RNAi Pathway"
Richard Li[1,2,3], Andrew Z. Fire[1,2]
Departments of Genetics[1], Pathology[2], and Chemical Engineering[3], Stanford University

"Increasing Cortical Plasticity and Connectivity by Targeting PirB"
Richard W. Sapp[1], David N. Bochner[2], George Sebastià Vidal Pérez-Treviño[2], Maja Djurisic[2], Carla J. Shatz[1,2]
Departments of Biology[1] and Neurobiology[2], Stanford University

"Mechanical Stimulation and Bone Healing"
Robert Carrera[1], Alesha Castillo[2]
Departments of Bioengineering[1] and Surgery - Plastic and Reconstructive Surgery[2], Stanford University

"Evaluation of CD90 as a Therapeutic Antibody Target on Cancer Stem Cells"
Robin Z. Cheng[1], Stephen Willingham[1], Irving L. Weissman[1]
Institute for Stem Cell Biology & Regenerative Medicine[1], Stanford University

# Bio-X Undergraduate Summer Research Program

## 2013 Poster Titles continued

"Influence of Gender in Early-Stage Math Learning"
Rosy Karna[1], Kaustubh Supekar[2], Vinod Menon[2,3]
Departments of Biology[1], Psychiatry & Behavioral Sciences[2], and Neurology & Neurological Sciences[3], Stanford University
Departments of Bioengineering[1] and Materials Science & Engineering[2], Stanford University

"Understanding the Function of RAI1 through Genetic Mosaic Analysis in Mice"
Samantha Zarate[1,2], Casey Guenthner[1,2], Liqun Luo[1,2]
Howard Hughes Medical Institute[1] and Department of Biology[2], Stanford University

"Interaction of Gli1 with Basic Helix-Loop-Helix Transcription Factors During Cerebellar Development"
Sara M. Broski[1,2,3], James G. Purzner[1,2,3], Eunice Y. Lee[1,2,3], Alexander S. Brown[1,2,3], Matthew P. Scott[1,2,3]
Departments of Developmental Biology[1], Genetics[2], and Bioengineering[3], Stanford University

"Modifying Collective Physiology of Endothelial Cells on Electrospun Elastin via Nanoscale Control of Cell-Matrix Interactions"
Shamik Mascharak[1], Patrick Benitez[1], Sarah C. Heilshorn[2]
Departments of Bioengineering[1] and Materials Science & Engineering[2], Stanford University

"Cognitive and Neuroanatomical Manifestations of Glucocorticoid Receptor Polymorphism in Fragile X Syndrome"
Sharon Bade Shrestha[1], David Hong[1,2], Allan Reiss[1,2]
Center for Interdisciplinary Brain Sciences Research[1] and Department of Psychiatry & Behavioral Sciences[2], Stanford University

"Understanding the Molecular Mechanisms of Microtubule Polarity in the Ciliated Neurons: A Study in *Caenorhabditis elegans*"
Stephanie Wang[1], Jing Yan[1], Kang Shen[1]
Department of Biology[1], Stanford University

"Using the Force": Modeling the Effect of Electric Fields on Neural Stem Cell Migration"
Sunil Pai[1], Smruti M. Phadnis[1], Pengbo Zhang[1], Thomas M. Baer[2], Renee Reijo Pera[1]
Institute for Stem Cell Biology & Regenerative Medicine[1] and Department of Applied Physics[2], Stanford University

"Identifying Early Events of Hedgehog Signaling"
Tally Buckstaff[1], Teresa Purzner[2], Matthew Scott[2]
Departments of Human Biology[1] and Developmental Biology[2], Stanford University

"Double-Blind, Randomized, Placebo-Controlled Trial of Oxytocin Treatment for Social Deficits in Children with Autism"
Tara Trujillo[1], Dean S. Carson[1], Antonio Y. Hardan[1], Karen J. Parker[1]
Department of Psychiatry & Behavioral Sciences[1], Stanford University

# Bio-X Undergraduate Summer Research Program

## 2013 Poster Titles continued

"Combating Catheter-Associated Biofilms with Curcumin Analogs"
Thien-Linh Le[2], Ji-Yuon Lim[1], Yi-Ju Hsieh[2], Michael Hsieh[2], Lynette Cegelski[1]
Departments of Chemistry[1] and Urology[2], Stanford University

"A Novel Motor Protein? Testing the Activity of the Putative ATPase Domain of BPAG1n4"
Trevor Mooney[1], Yanmin Yang[1]
Department of Neurology & Neurological Sciences[1], Stanford University

"Rate Limiting Step of Wnt3a Secretion from CHO-S Cells"
Ubah Jimale Dimbil[1], Girija Dhamdhere[1], Jill Helms[1]
Department of Surgery[1], Stanford University

"Data Mining on Electronic Medical Records"
William Chen[1], Kenneth Jung[1], Paea LePendu[1], Nigam Shah[1]
Department of Biomedical Informatics[1], Stanford University

"Fluorescent Saxitoxin Conjugates for Voltage-Gated Sodium Channel Study"
Zahra Harati Taji[1], Arun Thottumkara[1], Darren Finkelstein[1], Justin Du Bois[1]
Department of Chemistry[1], Stanford University

**To view the poster titles of previous Bio-X USRP participants, visit:**

**http://biox.stanford.edu/grant/urawards.html**

*Undergraduate Summer Research Program Participants 2010*

# Bio-X Undergraduate Summer Research Program

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## 2012 Bio-X Undergraduate Research Talks given by Stanford Faculty:

**June 27**
Alejandro Sweet-Cordero "Functional analysis of the EWS/FLI-1 translocation"
Ian Gotlib "Understanding and reducing risk for depression"
Anthony Oro "Definitive genetic therapies for skin diseases"

**July 6**
Philip Beachy "Hedgehog signaling in development, disease, and regeneration"
Virginia Walbot "Origin of meiotic cells in plants"
May Han "Multiple sclerosis and brain autoimmunity"
Alex Dunn "The cell as machine: Understanding how cells detect and respond to mechanical information"

**July 11**
Gerald Crabtree "Engineering mice to study chromatin *in vivo"*
Stefan Heller "How our senses of hearing and balance work and what happens when they don't work"
James Gross "Emotion regulation"
Paul Khavari "Genomic reprogramming in stem cell differentiation and cancer"

**July 18**
Anne Brunet "Regulation of aging and longevity"
Sharon Pitteri "New strategies for the imaging of cancer"
Michael Hsieh "Studying an ancient enemy with 21st century tools: Vanquishing the world's deadliest worm"
Marius Wernig "Direct conversion of skin cells to neurons"

**July 25**
Calvin Kuo "Engineering cancer cells in 3D environments"
Stephen Montgomery "The genetics of gene expression"
C. Andrew Bonham "Transplantation of intestinal stem cells"
M. Bruce MacIver "The time-course of synaptic inhibition in human vs rat brain circuits"

**August 1**
Robert Chang "Peristat online visual field screening for glaucoma"
Michelle Monje-Deisseroth "Remodeling the brain's infrastructure: Mechanisms of postnatal neurodevelopment in health and disease"
Miriam Goodman "How do we feel? The mystery and importance of touch and what *C. elegans* can teach us about how it works:
Karen Parker "The role of oxytocin biology in the social impairments of autism"

**August 8**
Karl Deisseroth "Optogenetics: Development and application"
Mary Teruel "Using single-cell imaging and targeted mass spectrometry to uncover the feedback loops controlling differentiation"
Laura Attardi "Deconstructing p53 pathways *in vivo* using mouse models"
Allan Reiss "Integrating genes, brain and behavior in Fragile X (FXS) and Williams Syndromes (WS): The 'yin and yang' of social behavior"

**August 15**
Anthony Norcia "Using EEG to image the dynamics of human vision"
Steven Block "Optical tweezers: Biophysics, one molecule at a time"
Josh Elias "Measuring dynamic proteomes with quantitative mass spectrometry"
Drew Nelson "Fatigue and residual stresses in bones and arteries"

# Bio-X Undergraduate Summer Research Program

**August 22**
Scott Delp "Dynamics of walking and running"
Olivia Martinez "Challenges and opportunities for the future in transplant Immunology"
Russ Altman "Understanding the interaction of genes and drugs"
Julie Theriot "Life on the inside: Secrets of bacterial pathogens"

**August 29**
Dean Felsher "Modeling and predicting therapeutic efficacy of cancer treatments"
Justin du Bois "Turning toxins into tools for ion channel studies"
Yanmin Yang "Calcium tips the balance"
Tom Quertermous "Dissecting the genetic risk for coronary heart disease"

## 2011 Bio-X Undergraduate Research Talks given by Stanford Faculty:

**June 15**
Fan Yang "Engineering biomaterials for directing stem cell differentiation and tissue regeneration"
Matthew Scott "Developmental biology and cancer"
Theo Palmer "New neurons in learning, memory and forgetting"

**June 22**
Gavin Sherlock "Watching yeast change: Using genomics to understand the adaptive landscape"
Hanlee Ji "Next generation human disease genetics through digital genome analysis"
Carlos Bustamante "Genomic insights into the great human diasporas"

**June 29**
Alan Cheng "Development and function of the mammalian cochlea"
James Chen "Zebrafish models of regeneration"
Serafim Batzoglou "When will everyone be sequenced?"
Aaron Straight "Organizing and segregating the genome"

**July 6**
Russell Fernald "How does behavior change the brain?"
Daniel Rubin "Imaging informatics: from pixels to biomedical meaning"
Richard Zare "Fun with nanoparticles"
Vijay Pande "Folding@home: Pushing the limits of molecular simulation"

**July 13**
Calvin Kuo "Gastrointestinal tissue engineering"
Chaitan Khosla "Biological Chemistry or Chemical Biology?"
Ron Levy "Using the immune system to treat cancer"
Jill Helms "Modeling the salamander: using developmental signals to enhance tissue regeneration"

**July 20**
Raphael Guzman "Intravascular stem cell therapy for experimental neonatal hypoxia"
Hongjie Dai "Nanomaterials for detection, imaging and therapy"
Paul Khavari "How cancers arise"
Antonio Hardan "Pivotal response group treatment studies for parents of young children with autism"

**July 27**
Carla Shatz "Releasing the brake on neural plasticity"
Julie Theriot "Mechanics and dynamics of cell motility"
Christina Smolke "Programming cellular behavior with RNA controllers"
Peter Maxim "Motion management in radiotherapy"

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**August 3**
Marius Wernig "Direct induction of neuronal cells from fibroblasts"
Julien Sage "The RB gene family in stem cells and cancer initiation"
Bruce MacIver "Using EEG to measure loss of consciousness in fighter jet pilots"
Kalanit Grill-Spector "Neural basis of face, body, and object recognition in the human brain"

**August 10**
Yanmin Yang "BPAG1n4: a sensory neuron's sustainer"
Ben Barres "What do astrocytes do?"
Mary Teruel "Understanding PI3K signaling and variation in the control of fat cell function"
Sam Gambhir "Imaging cancer using molecular spies"

**August 17**
Steven Block "Single molecule biophysics"
Joe Wu "Clinical hurdles of pluripotent stem cell therapy"
Scott Delp "Dynamics of running"
Judith Frydman "Molecular origami: protein folding and misfolding in the cell"


*Undergraduate Summer Research Program Participants 2011*

# Bio-X Undergraduate Summer Research Program

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## 2010 Bio-X Undergraduate Research Talks given by Stanford Faculty:

**June 16**
Jennifer Cochran "Engineered Protein Therapeutics and Diagnostic Agents Inspired by Nature"
Jill Helms "Saving the Cheerleader, Saving the World: What Can Regenerative Medicine Really Achieve?"
Paul Brown "3-D Digital Anatomy"

**June 23**
KC Huang "How Bacteria Get Into Shape"
Joseph Lipsick "Epigenetic Regulation by Proteins Encoded by Cancer Genes"
Liqun Luo "Studying Imprinting Chromosome by Chromosome in Mice"

**June 30**
Daphne Koller "Machine Learning for Systems Biology and Medicine"
Manpreet Singh "Prevention of Early Onset Bipolar Disorder: Clues from Genetics and Neurobiology"
Bruce MacIver "Using EEG to Measure Loss of Consciousness in Fighter Jet Pilots"

**July 7**
Vijay Pande "Folding@home: Pushing the Limits of Molecular Simulation"
Gerald Fuller "Creating a Cellular Pied Piper"
Tobias Meyer "Systems Biology of Cell Migration"

**July 14**
Shaul Hestrin "Definition of Cortical Circuits"
Marius Wernig "Direct Conversion of Fibroblasts to Neurons"
Michael Longaker "Stem and Progenitor Cell Recruitment Following Injury"

**July 21**
Theo Palmer "Stem Cell Therapies for Neurological Disease"
Fan Yang "Stem Cell and Biomaterials Engineering for Tissue Regeneration"
Matt Scott "Controlling Growth of the Cerebellum"

**July 28**
Suzanne Pfeffer "How the Golgi Works"
Joachim Hallmayer "The Genetics of Autism and Pervasive Developmental Disorders"
Richard Zare "Making Nanoparticles for Drug Delivery"
Annelise Barron "Toxic Granulocyte Peptides of Innate Immunity: Disease Culprits, Hiding in Plain Sight?"

**August 4**
Joseph Wu "Clinical Hurdles of Pluripotent Stem Cell Therapy"
Anne Brunet "Mechanisms of Aging and Longevity"
Karen Parker "Oxytocin Biology and the Social Deficits of Autism Spectrum Disorders"

**August 11**
Merritt Maduke "Inhibiting Chloride Transport: Why and How"
Jianghong Rao "Building Molecules to Spy on Cells"
Michael Clarke "Regulation of Self Renewal in Stem Cells"

**August 18**
Marc Levenston "Biophysical and Biochemical Cues in Controlling Cell Behavior"
Alan Pao "Development of a New Class of Aquaretics for the Treatment of Hyponatremia"
Karl Deisseroth "Optogenetics: Development and Application"

# Bio-X Undergraduate Summer Research Program

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## 2009 Bio-X Undergraduate Research Talks given by Stanford Faculty:

**June 24**
Zev Bryant "Engineering Molecular Motors"
Sarah Heilshorn "Designing New Medical Materials for Stem Cell Transplantation"
Dmitri Petrov "Studies of Molecular Adaptation"

**July 1**
Miriam Goodman "Using *C. elegans* to Understand Pleasant and Painful Touch Sensation"
Geoff Gurtner "Understanding the Role of Progenitor Cell Mediated Repair Following Injury"
Cliff Wang "Evaluation of Combinatorial Gene Expression in Lymphocytes"

**July 8**
Carla Shatz "Brain Tuning"
Matthew Bogyo "Applications for Small Molecules in the Study of Protease Function"

**July 15**
Judith Frydman "Protein Folding and Misfolding in the Eukaryotic Cytosol"
Michael Longaker "Adipose-derived Cells for Skeletal Tissue Engineering"
Charles Taylor "Biomechanical Factors in Vascular Disease"

**July 22**
Kevan Yamahara "California Beach Sands - Reservoirs for Fecal Indicator Bacteria"
Margaret Fuller "Regulation of Self-renewal and Differentiation in Adult Stem Cell Lineages"
Suchi Saria "Towards Holistic Diagnostic Models"

**July 29**
Helen Blau "Bioengineering Stem Cell Fate"
Jill Helms "Wnt-mediated Tissue Regeneration"
Steve Quake "Turning the Spotlight to Dark Matter in Biology"

**August 5**
Matthew Scott "Genetic Control in Development and Disease"
John Huguenard "Dissecting Neural Circuitry One Cell at a Time"

**August 12**
Richard Zare "Cell, Cell, Cell!"
Michael Clarke "Molecular Regulation of Self Renewal"

**August 19**
Patrick Ng "Vaccines for the Treatment of Lymphomas"
Theo Palmer "Functional Roles for New Neurons in Old Neural Networks"
Raphael Guzman "Multimodality Imaging in Stroke Stem Cell Therapy"

**August 26**
Joachim Hallmayer "Genetics of Autism"
Kang Shen "Small Connections in Tiny Worms: Molecular Mechanisms of Synapse Formation"

# Bio-X Undergraduate Summer Research Program

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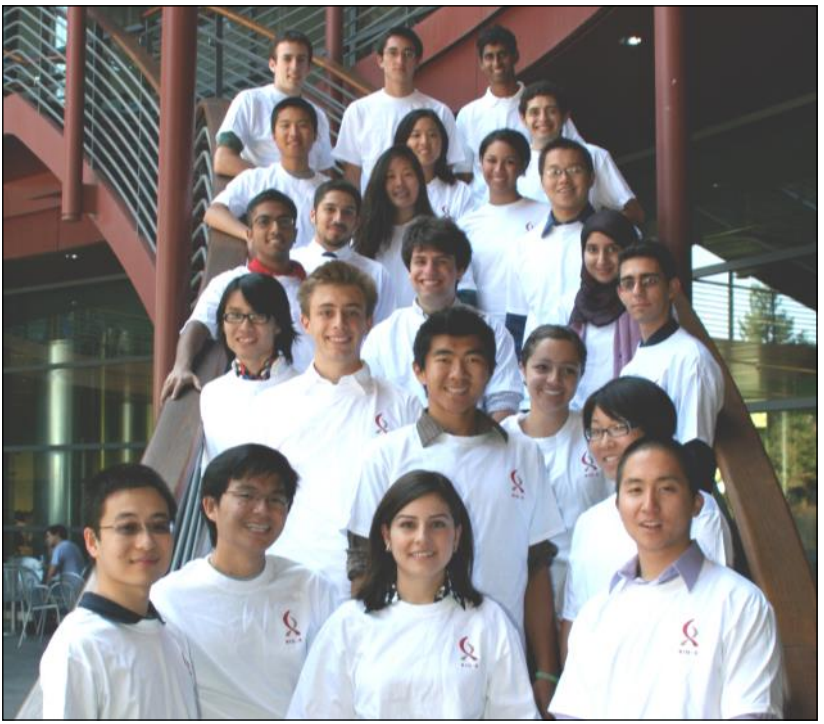
## Some student comments about the program:

*"[Because of the program] I feel encouraged that I would be able to participate in academia if that is the path I choose, but I also have a much more full picture on the intense work that goes into even the smallest of projects. The techniques I learned in lab were also very helpful, and I will continue to use them in my research in the future, but I think the most valuable part of the program was being exposed to the broad spectrum of research that is going on and deepening my understanding through the Wednesday talks."*
- Christine Yost, 2012 cohort

*"The program gave me a great appreciation for the sheer amount of research occurring just at Stanford. It was wonderful to be surrounded by peers who were all working on such interesting projects. I had definitely not been surrounded by such a motivated group of students in any previous grant program. The weekly lectures were very useful in providing me with directions and techniques to apply to my own project."*
- Sam Lawrence, 2011 cohort.

*"[The program] provided me the unique experience of formulating research questions and thinking critically about my project. I think that the Bio-X research program really affords students the opportunity to get a hands-on experience to apply concepts learned in classes [to] real-life situations and thereby buttress the material in textbooks."*
- Debbie Lee, 2009 cohort

*"I found my experience at the poster session to be especially gratifying. It was so wonderful to have other scientists at all different levels ask great questions that really made me reexamine my own project… In addition, I really enjoyed speaking with scientists who were genuinely interested in my project as it related to their own project. It was great to be able to compare experimental techniques and talk about the aims, progress, and current results of each other's projects."*
- Annie Tran, 2011 cohort



*Undergraduate Summer Research Program Participants 2009*

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**To learn more about the Bio-X program at Stanford, please visit the Bio-X website at:**

**http://biox.stanford.edu**


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*Brochure designed by F. Sincock*