THE “QUIET EPIDEMIC”:
UCLA scientists combat addiction

Plus
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Dear Friends and Colleagues,

2015 is a year during which the breadth and reach of our membership has grown. Our new members include faculty from Public Health, Bioengineering and Biostatistics, as well as up-and-coming talents such as Elaine Hsiao who studies microbial cells and Hakwan Lau who elucidates the psychophysics of visual perception.

At the same time, our researchers have made significant breakthroughs in basic and clinical neuroscience. Lara Ray’s recent study confirmed that Naltrexone, a drug helped into clinical practice by Walter Ling, lessens the drug cravings of methamphetamine addicts. This study continues the long history of preeminence of UCLA addiction researchers.

However, with David Jentsch’s departure, Walter’s Ling’s retirement and several other departures from the ISAP, such as Rick Rawson who is planning retirement in the very near future, we are losing key figures in the addiction research community. I hope that this year’s establishment of the Integrative Center for Addictive Disorders will attract new scientific talent to campus, and develop even closer collaborations between neuroscientists and clinicians across campus.

We are also on the cusp of a groundbreaking study that will address the UCLA Depression Grand Challenge. Carrie Bearden’s screening of over 2000 patients in the UCLA Medical System will generate data on the life cycle of depression to an extent that I do not believe has been previously captured. Carrie’s work will be further supported by the BRI’s Joanne and George Miller and Family Chair endowment, which recognizes outstanding researchers in the field of depression.

Since addiction and depression are often co-morbid, the potential impact of Carrie’s research on addiction science and for her study design to be duplicated in the field of addiction are exciting to the neuroscience community here.

I’m also pleased to announce the formation of Project Synapse, an outreach and professional development group for postdoctoral students.

The program is the brainchild of Nanthia Suthana who has risen through the ranks here, first as graduate student and now as a faculty member. It aims to give postdocs skills that are often overlooked, such as how to write an effective CV and grantsmanship. It also aims to train postdocs in outreach education and instill in them a career-spanning commitment, demonstrated over the years by Nanthia herself, to bringing neuroscience to middle and high school students who may not have access to strong science resources.

In the coming months, the BRI website will also provide a series of educational resources for middle and high school teachers and students, in the form of lesson plans, videos, pamphlets and powerpoints. We eventually hope to create a strong reference base for teachers everywhere, even if it’s not always possible for BRI outreach organizations to accomplish school visits.

Though our membership, research and outreach endeavors continue to grow, our rankings in terms of NIH awards from its institutes that fund neuroscience research have slipped in some areas. For instance, our rank for NIDA funding has dropped from 3 in 2012 to 6 in 2015 with an approximately $6 million drop in revenue, and for NINDS NIH funding from 6th to 10th over the same period with a disturbing $13 million drop in revenue. However, on the bright side, for NIMH funding we rank 2nd in the country in 2015, up from 3rd in 2012, and there was a huge jump in ranking for funding from NICHD for developmental research with our ranking increasing from 17th in 2012 to 6th in 2015 and a gain of about $7 million.

Taken as a whole, despite the continued challenging environment UCLA continues to do well in competing for NIH funding.

And that is one of the things I appreciate about our BRI members most -- your sustained energy and commitment to research, outreach and education, and the great science it leads to.

Happy holidays,
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"The Quiet Epidemic":

It's time we recognize as a nation that, for too long, we have had a quiet epidemic on our hands. Plain and simple, drug and alcohol addiction is a disease, not a moral failing and we must treat it as such. ~Hilary Clinton, 2015

There will always be a need for an opiate, and I am afraid it may always come with the smiles and frowns of its two faces. ~Walter Ling, MD

Drug use has been a constant fact of human societies for at least 7000 years since the ancient Sumerians etched tablets with ideograms equating opium with "joy". Regardless of their use – ritual, medicinal, pleasure-driven, or a combination of reasons – alcohol, coca leaves, cannabis, and opium have exerted an indelible influence on human history.

Over the past couple of centuries the growth of licit and illicit pharmacology has resulted in an escalation of drug use such that it seems every generation identifies an addiction "epidemic" of one kind or another. Whether it is the fear of alcoholism that led to Prohibition in 1919 or the heroin and marijuana use that triggered the so-called "War on Drugs" in the 1980s, addiction has always been designated as a scourge on 'civilized' western society. Accompanying this is the presupposition that addicts are somehow morally corrupt, weak, acting in service of their thirst for pleasure and thus not worthy of being part of mainstream culture.

On the 2015 Presidential campaign trail, Hilary Clinton referred to the "quiet epidemic" and accompanied her speech with a $10 billion proposal to combat drug addiction. She was specifically referring to the wave of addiction to opioids stemming from misuse of prescription drugs and leading to heroin use across all levels of society. Policy-makers can no longer pinpoint the blame for the trade and abuse of these drugs to vulnerable sections of society. Simply put, these drugs and their users are everywhere and opioids are being prescribed by physicians and dentists across the country.

The statistics are startling. In a joint report published this year, the U.S. Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) found a radical increase in heroin use over the past decade. The report compares statistics between 2002 and 2013, and calculates a 63% increase in heroin use by U.S. residents over 12, a 90% climb in heroin abuse and dependence, and an almost 400% increase in overdose-related fatalities. Breaking the statistics down further, the study found that the growth rate of heroin use is accelerating. The report stated: "In 2013, an estimated 517,000 persons reported past-year heroin abuse or dependence, a nearly 150% increase since 2007."

These figures are intertwined with the ongoing wave of prescription opioid drug abuse. In fact, the FDA/CDC found that people addicted to prescription opioid painkillers are 40 times more likely to turn to heroin. The reasons for this correlation are manifold, spanning scientific, sociological, political, and geographical determinants. The most obvious cause though is economic. Addicts turn to heroin in order to continue feeding the opioid addicted brain and avoid the mental suffering of withdrawal. Why pay $60-100 for a single dose of oxycontin when heroin costs about $45-$60 for a multi-dose supply, and both of these drugs act on the same neuronal receptors and networks in the brain?

UCLA has been a leader in the science and treatment of addiction since the Brain Research Institute (BRI) was established in the 1950s, when the psychologist James Olds conducted one of the most startling series of experiments in the history of behavioral neuroscience. He implanted electrodes in the hypothalamus and amygdala regions of the rat brain, and taught the rats to press a lever that delivered direct brain stimulation in the form of current into the limbic structure.

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The placement of reward circuitry and the function of dopamine in this circuitry provided the foundation for UCLA scientists to build on. Christopher J. Evans, PhD, a Professor of Psychiatry and Biobehavioral Sciences, and Director of the Hatos Center for Neuropharmacology and UCLA Brain Research Institute, points out the fundamentally reciprocal nature of addiction neuroscience and general neuroscience. “By understanding how drugs work, we begin to unravel links between neurotransmitter systems, circuits, and behaviors. In fact, most of the reward system circuitry has been revealed because of the way that drugs work on these systems. Even in this century, I believe we would have little understanding of the behavioral functions of the endogenous opioid system had we not studied morphine and opioid drug actions.”

In analyzing the pharmacology of drugs, Evans has found that not every opioid drug activates and regulates opioid receptors in an identical way. His research paved the way to many studies on agonist bias at opioid receptors with hope of developing more effective analgesics (pain relief medications) with less addiction. “We know that almost every drug of abuse stimulates the increase in synaptic dopamine in the reward circuitry,” Evans said.

For instance, cocaine increases dopamine in the synapse by blocking the reuptake of dopamine. However, amphetamine works in a slightly different way by inducing the release of dopamine by reverse transport through the dopamine transporters.

Below: Delta opioid receptors are localized both pre- and post-synaptically in the hippocampus Dentate gyrus (left panel), CA1 region (central panel) and CA3 region (right panel). Scale bars 100 mm. (merged image on the right) indicates a presynaptic receptor localization. Courtesy of Brigette Kieffer and Christopher Evans.

Olds found that rats would press this lever up to 7,000 times an hour. Hungry and thirsty rats ignored food and water, males bypassed females in heat, females abandoned newborn nursing pups, and some even self-harmed by crossing an electrified floor grid, all for the pleasure of the lever.

This experiment showed that particular regions of the brain contained a reward circuit that produced pleasure. It also showed that the desire for this pleasure superseded all else, including basic biological survival instincts. Further experiments with electrodes placed at the outer and upper surface of the brain did not induce the same effects. This led to the conclusion that the reward circuitry is distributed deep in a series of interconnected structures in the limbic areas of the brain.

Later, a series of pharmacological and anatomical studies found that the neurotransmitter dopamine is a key factor in this circuitry. Normal levels of brain dopamine are important for normal motivation, but peaks and valleys in dopamine release are associated with reinforcement of rewards.

The close relationship between dopamine and pleasure is such that it is often dubbed “the reward molecule” or “the pleasure chemical”. Alcohol, opiates, cocaine, and other drugs increase dopamine release in the reward pathway of the brain. But, the more the addict uses the drug, the more baseline levels of dopamine drop. This causes the drug to lose its impact and in order to get the same degree of pleasure the user must take larger doses. In some cases, the increased doses become fatal.
The Quiet Epidemic (cont’d)

While opioids work primarily by disinhibition of GABA inhibitory tone on the dopamine cell bodies, dopamine release is not solely involved in opioid reward. He explained, "The way I think of dopamine, which is released not only by reward but also by pain, is it tells the brain to take note that there’s something important going on that requires your utmost attention and needs to be remembered."

Evans’ research, at the forefront of neuropharmacology, is key in both the relationship of dopamine to pain and dopamine as a source of pleasure. "When used to treat pain, opiates may have a very different encoding in the brain compared to the same drugs taken for reward or pleasure. In the lab, animals have a very dysfunctional dopaminergic reward system when they are in pain. They are dysphoric and unconcerned with the rewarding effects of drugs such as cocaine. Their focus is on eliminating the pain. Hence, the salience may be very different if somebody is taking an opiate for pain versus taking drugs for getting high. We think the chronic opiate user is very similar to the pain patient, in that both need the drug to feel normal by either escaping the withdrawal state or relieving the pain. When the pain stops, the need for the opiate is usually gone, but for the addict, an insatiable craving can remain, driving behaviors to obtain the drug at almost any cost," he said.

Oxycontin is a legal drug prescribed for pain. Its chemical base, oxycodone, is closely related to other opiates such as hydrocodone, buprenorphine and codeine. All these drugs resemble morphine, an organic opiate synthesized from dopamine by the opium poppy. In our society at present, oxycontin is acting as a gateway drug leading to heroin, a more dangerous drug because of its short duration of action which creates fast cycles of intoxication and withdrawal and because of the heroin-taking culture that is hazardous in itself.

Peter L. was in his early 20s when he had an episode of excruciating back pain due to heavy lifting. He first experienced an opioid painkiller in the emergency room. His GP followed up with a prescription for Percocet. When that GP stopped prescribing, Peter went to a succession of different doctors until he was flagged. He then turned to buying heroin on the streets. "That first pill... took the pain away, but it messed me up bad. It took me ten years to get clean," he said. But even when Peter L. stopped abusing opioids and heroin, his world had changed.

"One of the problems with drug abuse is not only the fact that you take the drug, but when you take the drug a lot, you have many adaptations in neuronal circuits triggered both by opioid receptor activation and activation of microglia. While you’re on the drug there is allostases – adaptations in the brain at the cellular, circuit and system levels. When you go off the drug, you have to re-establish a new drug free norm for the brain – the physical and psychological anguish of withdrawal – which is in the main opposite to the acute effects of the drug. So in the case of opiates, the acute effects include analgesia and mellowing you out. But when you go off opiates, you feel agitated, and very sensitive to pain," Evans said.

Some addicts never wholly recover, making some researchers believe their brain circuitry has been highly conditioned to the point of engaging habit circuitry to seek opioid drugs at any hint of symptoms resembling withdrawal. When the withdrawal symptoms from opioids include stress, depression, and increased pain, the striking co-morbidity of addiction with anxiety, mood disorders, and chronic pain states is not difficult to envisage.

Walter Ling, MD, recently retired after a highly distinguished career at UCLA where he was a Professor of Psychiatry and Founding Director of the UCLA Integrated Substance Abuse Programs (ISAP), one of the foremost research groups of its kind. He is famous for developing the three FDA-approved medications for treatment of opiate dependence: levo-acetylmethadol, buprenorphine and naltrexone. In fact, Ling has been involved in the development of every major medication to treat opioid addiction that is currently marketed in the United States. The discovery of buprenorphine, a long-lasting opioid drug like methadone, was part of Ling’s search for a ‘non-addicting opiate’. Unlike methadone, buprenorphine only partially activates the opioid receptor, making overdose by respiratory depression impossible at any dose unless combined with other drugs such as benzodiazepines, alcohol, or anesthetics such as propofol.
For over 20 years, Farabee’s research has focused primarily on drug abuse and treatment among correctional populations across the United States. In 2012, 60% of arrestees tested positive for at least one illicit drug. “If you want to study epidemiology, the US prison population is the avant garde of what trends are on the rise,” Farabee said. He described the prison system as “the single largest provider of addiction and mental health services in the country.”

Farabee is one of three principal Investigators of the NIDA-funded “Studies in Medications for Addiction Treatment in Correctional Settings” (SOMATICS) collaborative which involves jails in New Mexico, New York, and Maryland. This is the latest in a series of intervention trials Farabee has conducted in correctional settings.

Research into ways to reduce drug relapse in offenders has led Farabee away from the psychosocial approaches that dominated prisons in the 1980s and 1990s. “Drug ‘counseling’ at that time was comprised of prisoners being told not to use drugs, or a scare-monger style of education on what drugs might do to you. During that period, I thought the so-called therapeutic approach in prisons made sense, but when I started to look at the literature – and the results of my own studies – there were absolutely no positive results among the rigorous trials. I think the psychosocial approach to treating offenders appeals to many of us, but at some point we have to put our intuition aside and follow the data,” he said.

In collaboration with Ling, David Farabee, PhD, a Professor-in-Residence of Psychiatry and Biobehavioral Sciences and Principal Investigator at UCLA’s ISAP, developed and tested the Treatment Effectiveness Assessment tool, a simple questionnaire that patients can answer in order to give clinicians insight into patient progress and recovery. This is part of his overall push for clinicians to use simple, brief measures of treatment needs and relapse/recidivism risk that are free, rather than the longer, proprietary assessments that fare no better than their simpler counterparts.
The Quiet Epidemic (cont’d)

This awareness may be partially attributed to scientists like Farabee who have devoted their careers to assessing ways to prevent relapse and recidivism amongst the drug-using portion of the prison system. The reliance on talk therapies in spite of poor evidence of their effectiveness seemed even less defensible for offenders with opioid use disorder, for which medications exist.

“In my experience with the criminal justice system, I have most hope for depot Naltrexone, which is a drug that competes for morphine at the opioid receptor yet acts as an antagonist, blocking morphine’s agonist signaling. A single injection lasts about a month. If you can dose people before they actually leave prison, you are probably saving lives because fatalities from drug overdose are 13 times higher during the first two weeks of the prisoner’s release. Even if you give a single injection and the parolee leaves and never returns for a second shot, you have at least protected them during the period when their overdose risk is at its peak,” Farabee said.

Farabee’s insights into the prison population provide a microcosm into the larger world of drug abuse and have had an impact on prison officials and government policy makers.

Recently, Edythe London had the chance to directly address these policy makers when she presented at the Congressional Subcommittee on Science, Space, and Technology. Her discussion, “Methamphetamine Addiction: Using Science to Explore Solutions” summarized one of the first major research efforts in the nation to address the growing problem of methamphetamine addiction. Her efforts also have broader implications for understanding the processes of addiction.

London, PhD, is a Professor-in-Residence, Thomas and Katherine Pike Professor of Addiction Studies and Director of the Laboratory of Molecular Neuroimaging. She investigates the neurobiology of self-control in people with various substance abuse disorders.

In close collaboration with J. David Jentsch who was a key part of the UCLA addiction research community over the past 15 years, London has used a variety of neuroimaging techniques to analyze the phenomenon of impulse control, which may be somewhat predictive in terms of susceptibility to drug use and abuse.

Pictured below, a toddler sits in a room. A plate with a single marshmallow is sitting in front of her. Before she can reach out to take it, an adult enters and explains that, if she can resist the marshmallow for a few minutes, she will rewarded with two marshmallows.

In some cases, the toddler cannot resist and quickly stuffs the marshmallow into her mouth. In others, the toddler sits on her hands and waits for the double reward to come. This is a measure of inhibition control and perhaps a measure of later susceptibility to addiction.

What is happening to the toddler’s brain when she is making the decision to delay instant gratification for that extra marshmallow? In the course of her career, London has done seminal work measuring dopamine receptors in the brain and their role in impulse control.

London uses noninvasive brain imaging techniques such as positron emission tomography (PET) and magnetic resonance imaging (MRI) to clarify the effects of methamphetamine use on brain chemistry, structure, and function. She has also led related studies that have elucidated some of the neural mechanisms underlying key behavioral abnormalities thought to promote compulsive drug use and predict poor responses to treatment. Using molecular neuroimaging, London has shown that chronic drug use causes less dopamine to be transmitted in the striatum. This in turn can disrupt cognitive processes in ways that undermine the addict’s ability to be abstinent. Studies using functional magnetic brain resonance have likewise shown that abstinent methamphetamine users have less activity in the prefrontal cortex in processes such as learning, attention, and emotion.

The imaging work at the London lab is central to many clinical and basic science addiction research endeavors on campus.

In a study co-authored with London, Lara Ray, PhD, has identified a potentially effective treatment for methamphetamine addiction. Ray, who is an Associate Professor of Psychology and Director of the UCLA Addictions Laboratory, first studied the drug Naltrexone in the context of alcoholism. The drug works by blocking opioid receptors in the brain, giving people treated for alcoholism less of a “high” from drinking when they take it.
Ray studied 22 men and 8 women who used meth an average of three to four days a week. She treated them with Naltrexone, administered in two sets of hospital stays of four days each, ten days apart. On the last day of each hospital visit, participants were given intravenous doses of methamphetamine. The result was that the subjects’ craving for meth had significantly reduced. The “rewards” of the drug had been blocked, and thus the subjects were less likely to want more of it.

Pharmacological interventions such as Ray’s hold great promise, but they still do not explain all the processes at work in the addicted mind.

Alicia Izquierdo, PhD, is an Associate Professor in the Department of Psychology. Her research focuses on the neural adaptations that arise from drug withdrawal and the environmental factors that may contribute to or undermine the maintenance of sobriety.

“I first started to get interested in addiction in grad school. We would listen to people in their own words talking about addiction. I remember one woman, who had been sober for years, who said, ‘I just want to be happy when I watch my daughter play soccer, but I can’t feel that anymore.’ This kind of lack of ability to normalize the pleasure response in the brain, even when you’re no longer using the drug, is something that impacts the likelihood of relapse,” Izquierdo said.

“I think it’s not so much a lack of control which causes addicts to relapse, but more about a recalibration of neural circuitry and learning pathways that change to modify the ability to make healthy choices.”

“Methamphetamine, for instance, is a very powerful reinforcer. We are particularly interested in the effects of the drugs when they are no longer being used. Our studies have revealed that pre-exposure to meth translates to poor decisions and maladaptive learning. A former meth-user might not be on the drug anymore, but her decisions regarding food or sex or other natural rewards might be unhealthy because of the long-term impact of meth use on her brain,” she said.

Key targets in Izquierdo’s research are the frontal cortex and striatum, areas important in goal-directed, effortful decision making.

At the same time, Izquierdo is looking at behaviors that may increase the brain’s ability to recover after addiction. Brain-derived neurotrophic factor (BDNF) is a protein that may help. “BDNF increases in a lot of different places in the brain after exercise. If animals are given access to a running wheel while in withdrawal, they run a lot more than control animals. One of the functions of BDNF is to open a window of plasticity, where the brain can change and perhaps recover. We’re exploring pharmacological interventions that mimic the effect of exercise in a way that may provide a benefit,” Izquierdo said. Edythe London’s imaging studies of exercise while in recovery from methamphetamine use supports this idea.

“The next step is infusing a drug that will normalize reward circuitry after this “recalibration” in addiction. One of our approaches is to use chemogenetic technology to target specific receptors in the striatum to affect reward seeking,” Izquierdo added.

Despite the great progress that has been made at UCLA, understanding the science of addiction remains elusive. In a sense, addiction research is chasing a moving target.

“When you are on drugs the psyche adapts in many different ways. The more we delve into the cellular, circuitry and system modifications in drug dependence and withdrawal, the more complicated it seems,” Evans explained.

“Our hope is that the development of the neuroscience of addiction here at UCLA will one day outpace the growth in the use of drugs as lethal as opiates, and in doing so illuminate new knowledge of the human brain in all its functions.”
The mood disorder commonly known as depression is the largest cause of disability worldwide and it is a growing problem. Acknowledging the devastation to society and the urgency with which the issue needs to be tackled, in October 2015, Chancellor Gene Block announced the UCLA Grand Challenge on Depression.

The challenge has a single goal: to erase the burden of depression by the end of the 21st century through the collaborations of UCLA neuroscientists and scholars drawn from a wide spectrum of the public and private sectors in a shared research endeavor.

Carrie Bearden, PhD, is a Professor in the Department of Psychiatry and Biobehavioral Sciences, and Psychology. She holds the BRI’s Joanne and George Miller and Family Endowed Term Chair which supports researchers in the fight to understand and treat depression, and she is leading one of the first wave of studies addressing this Grand Challenge.

Bearden’s study entitled, “A Framework for Large-Scale Screening of Mood Disorder Risk in the UCLA Community” is a revolutionary screening program that will pave the way to understanding the precipitants of depression, as well as biomarkers that may make it possible to predict onset of subsequent depression, and guard against it. It will also provide addiction researchers with a model for future studies that ask similar questions.

Despite the scope of the problem of depression, scientists have little understanding of the mechanisms at work, which may explain why anti-depressant medications only work in half of the people who take them.

In order to understand the factors that contribute to depressive cycles, Bearden and colleagues are developing an online program that will screen over 2000 members of the UCLA healthcare community, including patients and students. Participants will first answer a specially designed series of questions relating to symptoms of depression.

“When you do this first screening, you’ll be given feedback. It could be that your answers don’t show any risk of depression, or that you are reporting a few symptoms that indicate a certain level of risk for depression.”

Bearden anticipates that the initial screening will identify about 200 people who are either currently depressed or in an at-risk range. This subset, as well as a randomly selected subset of those at lower risk, will be recruited for a longer term study that will involve lab-based measures and ongoing tracking of metrics like sleep and activity levels using wearable devices.

“The ultimate goal is to understand predictive biomarkers, and collect behavioral measures without having to ask the participant personal or direct questions.”

Lab-based measurements will include collection of blood, cortisol, and brain imaging. Such data is essential in investigating the biological processes at work in depression.

“The pathophysiology of depression really needs to be understood. There is evidence that reward circuitry is compromised in patients with mood disorders, but we don’t understand the mechanisms very well at all, particularly the cyclical nature of the illness. So far, it seems that there are multiple neurotransmitters involved, but there is some evidence that nucleus accumbens activity is reduced in depression. Disruption of this nucleus accumbens-ventral tegmental circuit is probably relevant to anhedonia, or lack of pleasure, which is a hallmark symptom of depression.”
The Life and the Death of Depression

The study will also measure activities and social contacts in participants’ day-to-day life. In close collaboration with the UCLA Wireless Health Institute, which will design new applications for devices to track participant activities, Bearden anticipates access to a slew of new information. The chance to take measurements of these biomarkers at various stages in the escalation or abatement of mood disorders will be an invaluable opportunity to gain new insight into the biology of depression.

Data gathered through wireless transmission will inform scientists about symptoms such as social isolation patterns and mood, while retaining personal privacy. “Smart watches and smart phones will capture behavioral measures by tracking activities such as the number of calls you make, the number of texts you send, your GPS location showing how far you are from home, sleep patterns, and how much exercise you get. Obviously privacy is a big issue here, so we won’t be recording exactly where the person is going but we’ll have summary level statistics.”

Bearden is particularly interested in sleep patterns as a potential major biomarker of an impending depression. “My prediction is that you would see increasing sleep variability and sleep disruption predicting a mood episode. I expect that this would coincide with a decline in social contact. Those sorts of changes would correspond to increasing mood symptomatology.” All of which can be measured using wearable devices.

If there are signs of depression based on transmitted information, the study will offer online interventions – a computerized version of face-to-face therapy. “There is great promise for this mode of therapy. It offers patients easy access to treatment. They can do it in their home, on their own time,” Bearden said. In cases of signs of higher risk for serious depressive episodes, the data will trigger a clinician warning offering a stepped up, personal level of care. This component of the project is part of the Depression Grand Challenge Innovative Treatment Center led by close collaborator, Michelle Craske, PhD.

By using remote data collection, and offering online cognitive behavior therapy, the program hopes that participants who suffer from depression will feel less of a stigma when reporting on symptoms.

“A major thing we want to address with the Grand Challenge is stigma. We’ve come a long way, but there’s still a lot of work to be done in terms of reducing stigma surrounding any kind of mental illness or brain disorder, and depression in particular has a lot of misunderstandings. So having a treatment that’s a self-help form of treatment normalizes and reduces the stigma.”

This study will be one of the first of its kind. “We’re starting this with ages 18 and up, but I anticipate we’ll have a wider age range of participants in the years to come.”

Bearden’s career has been characterized by an interest in pediatric and adolescent development. “Eventually, I think that pediatric clinics and adolescent medicine is going to be exactly where we really want to unroll this screening. It’s going to have a lot of value in terms of people who are in the sub-threshold or at-risk range who haven’t yet developed a full blown mood disorder episode. Our hope is that in the future, we’ll be tracking people throughout their lives. The information we will get will transform depression prevention and treatment.”

Imagine – the ability to identify a pre-teen at high risk for severe depression, and having the therapeutic tools to prevent her from ever experiencing a depressive episode. What once seemed to have been a fantasy is becoming a tangible possibility, thanks to studies like Bearden’s, and the UCLA Grand Challenge.
THE BRI WELCOMES NEW MEMBERS

STEPHEN C CANNON, MD, PhD, PROFESSOR AND CHAIR, PHYSIOLOGY

Steve Cannon came to UCLA in 2015, after serving as Professor of Neurology and Associate Dean for Medical Education at University of Texas Southwestern Medical Center in Dallas, Texas.

Cannon’s research career has focused on the study of ion channel disorders of skeletal muscle.

In the past 25 years, mutations of ion channel genes have been defined as the primary cause of over 100 human diseases. Cannon’s lab explores how these channels regulate the electric excitability of cells and how channel defects trigger disease.

In particular, Cannon’s work on a group of inherited channelopathies of skeletal muscle has led to an understanding of the way they alter the electrical excitability of muscle, and thereby produce susceptibility to myotonia from self-sustained bursts of discharges that cause involuntary muscle stiffness from impaired relaxation or to attacks of periodic paralysis from transient episodes of muscle inexcitability.

The Cannon lab has characterized the gating defects of mutant channels, generated computational models of muscle excitability, and produced genetically-engineered mice to gain insights on the pathomechanisms of these disorders and to explore therapeutic interventions.

This work has led to the discovery of gain-of-function defects in the NaV1.4 sodium channel that cause a predisposition to myotonia, to periodic paralysis, or to both and thereby provides a mechanistic basis for the genotype-phenotype associations in these allelic disorder. It also established the gating pore “leak” resulting from S4 mutations in NaV1.4 or CaV1.1 as a major determinant in causing susceptibility to hypokalemic periodic paralysis due to paradoxical depolarization in low K+. The knock-in mutant mouse models prove these missense mutations are sufficient to cause myotonia or periodic paralysis, have yielded new insights on the mechanisms for triggering attacks, and provided proof-of-principle that inhibitors of the Na-K-2Cl transporter can reverse or prevent acute attacks of weakness in HypoPP.

ARIA FALLAH, MD, MSc, ASSISTANT PROFESSOR, NEUROSURGERY

Aria Fallah’s expertise and research interests are in Evidence Based Surgery, Clinical Trials, Observational Studies and Meta-Analyses as it relates to clinical and operative Pediatric Epilepsy Surgery.

Fallah’s current research projects include a multi-center, international study to generate and validate a prognostic tool in pediatric hemispherectomy (HOPS Study), comparative effectiveness and cost-effectiveness studies in Tuberous Sclerosis Complex in children with medically intractable epilepsy, as well as the development of advanced decision making tools that evaluate individual values and preferences to be incorporated in the pre-operative discussion for children that are being considered for pediatric epilepsy surgery.

Fallah’s most recent publication, “Moving beyond evidence-based medicine: incorporating patient values and preferences” in the journal Epilepsy & Behavior, reviews the work of groups such as the Cochrane Collaboration, GRADE working group, and various specialty committees have worked diligently to improve the quality of decision-making and health-care delivery across the world.

Fallah completed a residency in neurological surgery at the University of Toronto, and a pediatric neurosurgery fellowship at Miami Children’s Hospital. He has an advanced degree in clinical epidemiology through McMaster University.
STEFAN (Steve) HORVATH, PhD, ScD, PROFESSOR, HUMAN GENETICS AND BIOSTATISTICS

Steve Horvath is a bioinformatician who works on all aspects of biomarker development, with a particular focus on the genomic biomarkers of aging. His research area intersects aging research with computational biology, genetics, epidemiology, machine learning, and systems biology, applying data mining methods to study a broad range of diseases including Huntington’s disease, Parkinson’s disease, Alzheimer’s disease, NeuroAIDS, cancer, and cardiovascular disease.

Horvath is well-known for uncovering a biological clock embedded in human genomes that may give insights into how and why aging occurs, and provide directions as to how the process can be slowed. Known as the epigenetic clock, the tool has demonstrated why some parts of the body age at different rates than others.

“To fight aging, we first need an objective way of measuring it. Pinpointing a set of biomarkers that keeps time throughout the body has given us the means to do so,” Horvath said.

Horvath revealed the epigenetic clock in the October 21, 2013 edition of Genome Biology, with findings from a study of 8,000 samples of 51 types of tissues and cells taken from throughout the human body. He analyzed the tool’s predictive capability by comparing each sample’s chronological to its biological age.

The tool proved accurate in most cases, but when it found differences the clock led to insights into a range of diseases. In this case, Horvath found that, “[a woman’s] breast tissue is about two to three years older. If a woman has breast cancer, the healthy tissue next to the tumor is an average of 12 years older than the rest of her body,” he said. These results may help to explain the prevalence of breast cancer in women and its relationship to chronological age.

The applications of Horvath’s clock are manifold. In one study Horvath and colleagues used the clock to evaluate the effect of body weight on the biological ages of a variety of human tissues. This proved the theory that obesity ages the body faster and could explain the early onset of many age-related diseases in people who are obese, such as liver cancer.

Other recent investigations have shown that brains of Down syndrome age faster, that HIV-1 infection accelerates age, and that DNA methylation age of blood may predict future onset of lung cancer in women.

The cerebellum ages slowly according to the epigenetic clock. (Horvath et al) addressed the need for development of measures of biological age, as opposed to physiological age, in context of gerontology.

In 2015, Horvath was one of four UCLA researchers to share an award of $2.5 million from the Paul G. Allen Family Foundation.

Artist’s interpretation of the “Horvath Clock”. Courtesy of Steve Horvath.
ELAINE HSIAO, PhD, ASSISTANT PROFESSOR, INTEGRATIVE BIOLOGY AND PHYSIOLOGY

Elaine Hsiao investigates the neurobiology of disease, with a special focus in the interactions between the brain and microbial cells in the gut. Her work is situated at the interface of neurobiology, immunology and microbiology and uses an integrative systems approaches to study fundamental questions in biology: What are the effects of the microbiota on the nervous system? How do resident microbes communicate with the nervous system? Which individual species or communities confer particular functional effects? How do microbe-nervous system interactions impact health and disease? What, if any, are the potential evolutionary benefits for microbes to interact with the nervous system? Can rational modification of the microbiota be used to treat symptoms of neurological diseases?

“Our bodies are comprised of around ten times more microbial cells than human eukaryotic cells, and more and more, we are learning that these microbes that make up ‘us’ play a fundamental role in regulating brain development and function, and behavior,” Hsiao explains.

These microbes are primarily bacteria, but are also viruses and protozoa and comprise what’s called the Commensal Microbiome. In the intestines, there are 100 trillion of these bugs, reflecting over 10K unique specials and contributing 150 times more genes than the human genome.

Hsiao’s studies have given new insights into the way commensal microbes regulate complex behaviors such as anxiety, learning and memory and appetite. For instance, mouse studies have shown that the vagus nerve, which connects the gut to the brain, has a role in depression. If the nerve is severed, mice exhibit signs of depression. Microbes also activate the immune system. Studies have shown that the bug bacteroides fragilis is beneficial in conferring immunity to multiple sclerosis. It also has an impact on core abnormalities such as a communication deficit that is a hallmark symptom of autism.

Hsiao believes that microbes have a key role to play in future therapeutics. “What if we could, without a single invasive procedure, treat disorders like autism, depression and MS with microbe-based therapeutics,” she says. Since microbes are relatively easy to manipulate and eliminate, they can be readily modified for better functioning, regulatory control and even delivery. Some of these microbes can be truly mind-altering, effecting our brain development, function and even our behavior.

LIN JIANG, PhD, ASSISTANT PROFESSOR, NEUROLOGY

Lin Jiang joined the UCLA faculty in 2015. His research focuses on computational structural biology and drug design for Alzheimer’s, Parkinson’s, Lou Gehrig’s disease and other degenerative disorders.

Jiang’s current research is driven by two key questions: How do unfolded or misfolded proteins self-associate into abnormal aggregates? How do these aggregates propagate and lead to disease? In these contexts, Jiang develops new therapeutic approaches to neurodegenerative and other brain diseases. These include: 1) an allosteric BACE inhibitor that specifically blocks the APP cleavage and Abeta production; 2) a protein inhibitor that blocks the prion-like transmission of protein aggregates in neurodegenerative diseases; and 3) a new protein that crosses the blood-brain barrier via carrier-mediated transport.

Jiang’s research aims to identify new drug targets, develop new therapeutics and design new therapeutic compounds or peptides for the treatment of neurodegenerative disorders. His ultimate goal is to strengthen our ability to design biological systems with desired properties, provide an alternative perspective to understand our living world, and provide solutions to some of the most pressing problems in human health.
VARGHESE JOHN, PhD, ASSOCIATE PROFESSOR, NEUROLOGY

Varghese John, PhD, joins UCLA and the BRI from the Buck Institute for Research on Aging. A member of the Mary S. Easton Center for Alzheimer’s Disease Research and Co-Director of UCLA’s Alzheimer’s Drug Discovery Lab, John primarily focuses on the development of new therapeutics for disorders such as Alzheimer’s disease, Parkinson’s disease, and amyotrophic lateral sclerosis. His research, though, has larger implications for a variety of other treatment approaches to a range of neurological diseases.

In particular, John’s investigations into the protein fragment sAPPα have resulted in novel insights into the function of brain regulation of amyloid beta production, and hints at a new direction for the creation of a new class of CNS therapeutics for Alzheimer’s and beyond. John has also shown that sAPPα inhibits the proteolytic enzyme BACE1, and thus “it be possible that this protein fragment can be used to help prevent potentially dangerous increases in BACE1 activity, and thus prevent the onset of Alzheimer’s disease,” John said.

“Our study suggests that developing sAPPα itself as a biologic, finding a smaller protein or peptide fragment that has similar effects, or identifying a chemical compound that increases levels of this beneficial protein fragment may help normalize brain function and either restore memory and cognitive function, or prevent decline.”

The John lab continues to mine the potential of sAPPα thanks partially to an R21 grant for identification of compounds that enhance the protein fragment. In 2015, the NIH also awarded John a substantial R01 grant for the screening of enhancers of the major longevity determinant SirT1, found to be lower in serum from In Alzheimer’s patients.

“We hope that future collaborations with BRI membership will enhance our explorations into the wide spectrum of impacts that sAPPα may have in neurological disorders including Mild Cognitive Impairment, Traumatic Brain Injury, ALS, and a range of other dementias.”

HAKWAN LAU, DPhil, ASSOCIATE PROFESSOR, PSYCHOLOGY

In 2014, Hakwan Lau came to UCLA from Columbia University to join the department of Psychology with an emphasis in Cognitive and Behavioral Neuroscience. Lau uses fMRI and psychophysics to test computational models of how individuals determine their subjective confidence in visual perceptual tasks. He also studies how attention modulates the subjective experience of seeing, addressing the puzzling impression that in the unattended periphery of sight, people believe they see details that are, in fact, beyond their ability to process.

“We like to think of consciousness as evolved in the case of higher cognitively intelligent animals. It seems true, intuitively, but in terms of psychology or neuroscience—is it possible to empirically demonstrate what is really the function of consciousness. I want to explore how to approach that problem,” Lau said.

Central to Lau’s work is the question of what it takes to consider a neurobiological or behavioral effect to be “unconscious”, and how this question can be interrogated in methodologically sound bias-free experimental procedures.

Lau is the recent recipient of an Air Force Office of Scientific Research award for, “Stochastic Resonance and Biases in Perceptual Decision Making”, an empirical investigation of stochastic resonance (i.e. when increases in the levels of random interference such as noise paradoxically cause an increase in the quality of the signal), in the context of naturalistic stimuli as opposed to laboratory settings.

IN 2014, the NIH awarded Lau an R01 for his project, “The Neural Basis of Metacognition.”
**BEATE RITZ, MD, PhD, PROFESSOR, EPIDEMIOLOGY**

Beate Ritz is an epidemiologist and expert on the connection between contaminants and the risk of disease. Her paradigmatic work analyzes the health effects of occupational and environmental toxins such as pesticides, ionizing radiation, and air pollution on chronic diseases. It has led to new understandings of factors that may predicate the onset of neurodegenerative disorders such as Parkinson’s disease and Alzheimer’s disease, cancers, autism, asthma, and adverse birth outcomes.

In April, 2009, Ritz published the results of an epidemiological study of California’s Central Valley residents diagnosed with Parkinson’s disease. The study found that years of exposure to the combination of the pesticides maneb and paraquat increased the risk of Parkinson’s by 75%. The study also found exposure increased the risk of the disease in people ages 60 or younger by four- to six-fold.

Until the time of the study’s publication, data on human exposure had been unavailable because of the inability to measure environmental exposure to a specific pesticide. To address this, Ritz and colleagues developed a geographic information system-based tool that combined land-use maps and details of pesticide use supplied by the state of California. In 1998, the study recruited over 360 longtime residents diagnosed with Parkinson’s, and spent almost a decade correlating residential histories and estimated ambient pesticide exposure.

“The results confirmed observations from previous animal studies. One, that exposure to multiple chemicals may increase the effect of each chemical. Two, that the age of the resident at time of exposure is important,” Ritz said. The data also suggested that the critical window of exposure to toxicants may have occurred years before the onset of motor symptoms when a diagnosis of Parkinson’s is made. To date, Ritz’ Central Valley study remains the only such longitudinal study of its kind in the United States. Ritz also collaborates on a complementary study in Denmark, the only other such study in the world.

Ritz’ most recent publication explores the environmental factors on the etiology of childhood brain tumors, and examines risks for brain tumors in children after prenatal and infant exposure to monitored ambient air toxins. Building on these findings, in September 2015, Ritz was part of a group of scientists awarded $4.2 million by the NIH to study how environmental pollution negatively affects how the placenta develops in pregnant women, and ultimately contributes to poor pregnancy outcomes.

**CINDY YEE-BRADBURY, PhD, PROFESSOR, PSYCHOLOGY and PSYCHIATRY & BIOBEHAVIORAL SCIENCES**

Cindy Yee-Bradbury is a world renowned expert on schizophrenia, conducting research on the psychophysiological correlates of emotional processing in context of the disorder.

Schizophrenia is one of the most debilitating mental illnesses, and Yee-Bradbury’s research is concerned with understanding neurocognitive, emotional and interpersonal processes during the clinical high risk or prodromal phase, initial course, and chronic phase of schizophrenia.

Currently, Yee-Bradbury and her colleagues at the UCLA Laboratory for Clinical and Affective Psychophysiology, are examining how interactions between attention, memory, emotion, and stress contribute to risk for psychosis and dysfunction in schizophrenia, and how they may suggest pathways for intervention. Methods include dense array recordings to examine event-related brain potential and EEG activity, psychophysiological measures of heart rate activity, electrodermal activity and the startle eye blink reflex, cortisol, and interview and behavioral measures of clinical symptoms and life stress.

NEW MEMBERS (CONT’D)
**STEPHANIE SEIDLITS, PhD, ASSISTANT PROFESSOR, BIOENGINEERING**

Stephanie Seidlits is a bioengineer focusing on the extracellular matrix in central nervous system injury and regeneration. Her research is situated at the intersection of engineering, neuroscience and medicine, and seeks to develop clinical therapies for disorders including spinal cord injury, traumatic brain injury and glioma formation.

Using biomaterial microenvironments and advanced imaging tools, Seidlits describes her work as “engineering the neural microenvironment”. Its aim is to identify differences between the extracellular environment of diseased and healthy or developing and adult CNS tissues, and exploit these mechanistic discoveries to develop novel therapies that target the local environment.

The long-term goal of this research is to translate biomaterial microenvironments to in vivo regenerative therapies using hydrogels, gene and protein delivery and cell replacement as building blocks. The results will be particularly applicable in treatment of spinal cord injury and glioblastoma multiforme.

Seidlits’ recent article in *Biomark Insights* leverages her expertise in a review of the current state of development of effective gene therapies in the spinal cord, and discusses the potential of biomaterials to mediate gene delivery while simultaneously providing inductive scaffolding to facilitate tissue regeneration.

A major focus of the Seidlits lab is the repair of spinal cord injury, for which there are no treatments available that can achieve regeneration. Development of clinically effective strategies to restore function after spinal cord injury requires consideration of multiple aspects of this inhibitory environment. Ultimately, Seidlits aims to develop a combinatorial therapy that addresses multiple barriers to spinal cord repair by incorporating substrate-immobilized biochemical cues, genetically encoded regulatory factors, and cell replacement.

Transverse section of mouse spinal cord with a biomaterial substrate implanted at a dorsal injury site (4 weeks post-injury, neurofilament-200 immunofluorescence shown in red). Courtesy of Stephanie Seidlits.
JOHN MAZZIOTTA APPOINTED VICE CHANCELLOR OF UCLA HEALTH SCIENCES

John Mazziotta, MD, PhD, the world-renowned brain imaging expert who established the UCLA Brain Mapping Center, has been appointed Vice Chancellor of UCLA Health Sciences.

Mazziotta joined the UCLA faculty in 1983, and has served as Associate Vice Chancellor for Health Sciences and Executive Vice Dean of the Geffen School of Medicine since 2012. He has been Chair of the Department of Neurology since 2002, and he has directed the Ahmanson-Lovelace Brain Mapping Center since 1993.

In announcing the appointment, Chancellor Gene Block wrote, “We are excited that Dr. Mazziotta has agreed to take on this critically important role for UCLA. There is no better person than John Mazziotta to lead UCLA’s health science enterprise.”

“It is a great honor and privilege to lead one of the world’s finest schools of medicine and innovative, patient-focused health systems,” Mazziotta said. “This will be a very productive and exciting time for the David Geffen School of Medicine and the UCLA Health System. I look forward to joining my colleagues of many years as we continue to ensure that UCLA is the future of medicine.”

Previously, Mazziotta was Chair of the UCLA Neurology Department and Director of UCLA’s Ahmanson-Lovelace Brain Mapping Center. He was also principal investigator of the International Consortium for Brain Mapping, which led the creation of the first comprehensive atlas of the structure and function of the normal adult human brain.

Mazziotta, who Block called “a widely respected faculty administrator with a deep commitment to excellence in education, research, clinical care and public service,” has published more than 255 research papers and eight texts.

Mazziotta is a member of the Institute of Medicine of the National Academy of Sciences and the Royal College of Physicians.

KELSEY MARTIN APPOINTED INTERIM DEAN AND ASSOCIATE VICE CHANCELLOR OF THE DAVID GEFFEN SCHOOL OF MEDICINE AT UCLA

Kelsey Martin, MD, PhD, a Professor of Biological Chemistry, Psychiatry and Biobehavioral Sciences, will provide strategic vision and operational leadership for the David Geffen School of Medicine. Her responsibilities include developing and managing policy, programs and resource allocation to achieve the medical school’s mission.

Martin is the principal investigator of a molecular neurobiology research laboratory that integrates cell biological, molecular and electrophysiological approaches to understand how experience changes brain connectivity to store memories.

Previously, Martin has served as Chair of the Biological Chemistry Department and Co-Director the UCLA-Caltech Medical Scientist Training Program.

Martin has received many honors. Among them: a W.M. Keck Foundation Distinguished Young Scholar in Medical Research Program Award, the Jordi Folch-Pi Award from the American Society for Neurochemistry and the Daniel X. Freedman Award from the National Alliance for Research on Schizophrenia and Depression.
PAUL MICEVYCH NAMED CHAIR OF THE DEPARTMENT OF NEUROBIOLOGY

Paul Micevych, PhD, who is also Distinguished Professor in the Department of Surgery, joined the UCLA faculty in 1983 and became a full professor in the Department of Neurobiology in 1992. He has consistently demonstrated a strong commitment to development of graduate and post-doctoral talent.

Micevych is an internationally recognized leader in the field of steroid hormone action in the brain, with research emphasizing the cellular actions of estrogen mediating reproductive and nonreproductive behavior and physiology.

Throughout his career, Micevych has provided consistent mentorship to graduate and postdoctoral students who went on to have outstanding careers in research. At UCLA, he has participated in institutional governance and was Vice Chair and Chair of the Council on Academic Personnel in 2008 and 2009 respectively.

In his role as Acting Chair of Neurobiology, Micevych was instrumental in the department's transition from its previous incarnation as department of Cell Biology and Anatomy.

STEPHEN CANNON, MD, PhD, NAMED CHAIR OF THE DEPARTMENT OF PHYSIOLOGY

Cannon, esteemed for his scientific research and commitment to education, was recruited to the position after an intensive national search. Previous to beginning his appointment this year, Cannon was Professor of Neurology and Associate Dean for Medical Education at the University of Texas Southwestern Medical Center, Dallas, Texas.

Research in Cannon’s laboratory is supported with an NIH MERIT Award, and focuses on the mechanistic basis for a group of inherited conditions that alter the electrical excitability of skeletal muscle, including periodic paralysis and myotonia.

As a complement to his great success as a research scientist, Cannon has been a highly dedicated and decorated educator. While at the University of Texas, his lab was actively engaged in predoctoral training for graduate students in the Program in Neuroscience and Biomedical Engineering Program. In addition to many scientific awards and honors, Cannon received the UT Regents’ Outstanding Teaching Award in 2014.

MARIE-FRANCOISE CHESSELET, NAMED INTERIM CHAIR OF THE DEPARTMENT OF NEUROLOGY

Marie-Francoise Chesselet, MD, PhD, is the Charles H. Markham Professor of Neurology and Distinguished Professor in the Departments of Neurology and Neurobiology at UCLA.

Chesselet directed the NINDS-funded UCLA Udall Center for Parkinson’s Disease research from 1998 to 2013, the NIEHS-funded UCLA center for Gene Environment in Parkinson’s Disease from 2002 to 2014 and the UCLA Advanced Center for Parkinson’s Disease Research of the American Parkinson Disease Association since 1998. She has also directed graduate programs at the University of Pennsylvania and at UCLA, and directed the NINDS-funded Training Program in Neural Repair from 1998 to 2014.

Chesselet’s laboratory conducts research on the molecular mechanisms of disorders of the basal ganglia and treatments for Parkinson’s disease and Huntington’s disease. She has published over 150 peer-reviewed scientific papers, has edited several books, and serves on the scientific advisory boards of the Hereditary Disease Foundation, the Michael J. Fox Foundation and the American Parkinson’s Disease Association. Her work has been supported by the NIH, the Michael J. Fox Foundation, the Cure HD Initiative, and several biopharmaceutical companies. She currently holds grants from the Department of Defense, the California Institute for Regenerative Medicine and Tsumura, Inc.
NEW APPOINTMENTS (CONT’D)

CARRIE BEARDEN NAMED THE BRAIN RESEARCH INSTITUTE’S JOANNE AND GEORGE MILLER AND FAMILY ENDOWED TERM CHAIR

The BRI has named Carrie Bearden, PhD, the Joanne and George Miller and Family Endowed Term Chair. The endowment, which supports leading researchers in the fight to understand and treat depression, was previously held by David E. Krantz, MD, PhD, and Ian Cook, MD.

Bearden is Professor at the Department of Psychiatry & Biobehavioral Sciences at the David Geffen School of Medicine, and Department of Psychology, Semel Institute for Neuroscience and Human Behavior. Her research aims to understand genetic, cognitive and neurobiological risk factors for the development of adolescent onset neuropsychiatric disorders. She examines these questions through the investigation of intermediate cognitive, neuroanatomic and temperament traits associated with the development of psychosis and/or mood disorder; and the study of neurobehavioral manifestations of syndromes with an identified genetic origin.

Much of this work has focused on unique genetic populations, such as large families from a genetically isolated population in Latin America with high rates of severe bipolar disorder. Bearden also has a demonstration project in the newly launched Depression Grand Challenge, in which she will implement novel screening methods in the UCLA student body and health system to identify those at high risk for mood disorder. “I am thrilled that my appointment to the Miller Chair is beginning just as UCLA embarks upon the Depression Grand Challenge, which aims to make major breakthroughs in understanding, preventing and treating depression, a disorder that has become our greatest public health problem. It is truly inspiring to be part of this transformative effort,” she said.

S. THOMAS CARMICHAEL APPOINTED CAROL AND JAMES COLLINS CHAIR IN THE DEPARTMENT OF NEUROLOGY AND DIRECTOR OF THE BRI’S INTEGRATIVE CENTER FOR NEURAL REPAIR

S. Thomas Carmichael, MD, PhD, is a Professor and Vice Chair for Research and Programs in the Department of Neurology. The Collins Chair appointment, which supports researchers who have had large impacts on the field of neurology, acknowledges the important contribution Carmichael has made to understanding various aspects of neural repair after stroke and other elements of neural wiring and neural stem cell biology.

The support provided by the Carol and James Collins Chair will allow him to expand his tremendous impact on the field of neurology. With almost 70 papers in leading medical journals, Carmichael’s research utilizes the tools of molecular biology to address practical issues pertinent to how the brain heals (or fails to heal) after stroke. His most recent paper “GDF10 is a signal for axonal sprouting and functional recovery after stroke,” was recently published in Nature, Neuroscience and has received national and international media attention.

Carmichael has also replaced Marie-Francoise Chesselet as Director of the Brain Research Institute’s Integrative Center for Neural Repair, a focused research and educational endeavor that unites cutting edge research from a broad range of disciplines in order to accelerate the pace of scientific discovery, paving the way for more effective and innovative treatments for diseases and injuries of the nervous system. Major areas of research include Neurodegeneration, Stroke, Traumatic Brain Injury, and Spinal Cord Injury.
TWO BRAIN RESEARCH INSTITUTE MEMBERS RECEIVE THE CAL-BRAIN INAUGURAL AWARD

Anne Andrews, PhD, and Carlos Portera-Cailliau, MD, PhD are the only UCLA researchers to receive inaugural California Blueprint for Research to Advance Innovations in Neuroscience (Cal-BRAIN) Awards.

Cal-BRAIN was established as a statewide program to fund, support, and integrate the search and convergence on new technologies capable of monitoring wide-scale activity in the brain. The program’s goal is to develop new technologies to revolutionize the understanding of the brain in health and disease by improving our ability to monitor and analyze brain activity. Each of the 16 awards were given to California-based innovative projects that will be applicable to the full spectrum of brain disorders.

At UCLA, Anne Andrews, Professor of Psychiatry and Richard Metzner Endowed Chair in Clinical Neuropharmacology, leads efforts in basic and translational research on anxiety and depression.

The Cal-BRAIN grant for Andrews’ project, “Nanoscale Neurotransmitter Sensors”, will employ recently developed, broadly applicable approaches to identify sensing elements that selectively recognize neurotransmitters. These chemically specific sensors will approach the size of synapses and have sub-second response times. The sensors will be employed to investigate intra-neuronal signaling at the length and time scales pertinent to intrinsically encoded information, and ultimately relate this information to complex behavior. In the long term, these sensing elements will provide the foundation for development of the next generation of in vivo neurotransmitter sensors that will be on the nanoscale, extremely fast, and multiplexed for simultaneous neurotransmitter measurements. Short and long term impact may be a greater of the neurochemical basis of complex behavior, psychiatric and neurodegenerative disorders, and the treatment of these disorders.

Carlos Portera-Cailliau, MD, PhD, is an Associate Professor, Neurology and Neurobiology. The Portera-Cailliau laboratory investigates how developmental defects in network connectivity at the level of the cerebral cortex directly lead to symptoms of autism, learning disability and intellectual dysfunction.

Portera-Cailliau’s Cal-BRAIN award is for the project, “High-speed interrogation of network activity with frequency domain multiplexing.” The goal of the proposal is to develop a highly innovative fluorescence microscopy instrumentation technology for high-speed neural imaging applications, capable of kilohertz frame rates with sufficient sensitivity and resolution to resolve the millisecond-timescale dynamics of neuronal ensemble activity in the awake brain of mice. Portera-Cailliau will work with Bahram Jalili, PhD, and his team of bioengineers to develop cutting edge techniques in radiofrequency communications and in vivo two-photon calcium imaging of network activity in mice. The ability to resolve the fast fluorescent transients associated with neuronal action potential firing over a large volume of brain tissue will enable new directions in modern neuroscience research, leading to a better understanding of neural circuit connectivity and activity.

Images of the assembly of plasticity of cortical circuits. Courtesy of the Portera-Cailliau Lab.
BRI SCIENTISTS RECEIVE PRESTIGIOUS BRAIN INITIATIVE GRANT FROM THE NIH: TEAM PLANS TO BUILD MINI-MICROSCOPES TO STUDY NEURONS IN REAL TIME

Article courtesy of Mark Wheeler and the UCLA Newsroom

Five UCLA scientists, including BRI members Peyman Golshani, Baljit Khakh, and Alcino Silva, have received a grant from the National Institutes of Health for a study that could provide a better understanding of how neural circuits in the brain process, encode, store and retrieve information.

The three-year, $2.3 million grant will support the team’s work to develop methods for recording the activity of intact neural networks in living animals. The funding is through the NIH’s BRAIN Initiative, which was first announced by President Barack Obama in 2013.

The investigators, led by Peyman Golshani, MD, a UCLA Associate Professor of Neurology and Psychiatry, aim to build a new generation of miniature fluorescent microscopes to image and manipulate the activity of large numbers of brain cells in mice. The mice will be studied while moving freely in their natural environments. The tiny head-mounted microscopes, which are expected to weigh less than three grams, will monitor brain cell activity in real time, in ways that were not possible before.

The microscopes will visualize individual neurons expressing calcium triggered fluorophores, which light up when specific wavelengths of light from the microscope are shined on them. The method will illuminate cells that are flooded with calcium, which happens when neurons fire.

“When we image calcium levels, what we are really finding out is how large numbers of cells fire during specific behaviors,” Golshani said. “That could allow us to understand the relationship between cellular activity patterns and actual behavior.”

Eventually, the researchers hope to adapt the mini-microscopes to allow scientists to control the activity of neurons remotely, and allow both monitoring and control with wireless technology.

“These new-generation microscopes will allow us to greatly increase our understanding of how the brain’s circuits compute information in real-world environments,” Golshani said. “We will also better understand how neurological and neuropsychiatric disease alters activity patterns of specific cell types, bringing us closer to modulating these specific cells to treat these disorders.”

The microscopes are being built from relatively inexpensive, off-the-shelf parts. Existing microscope systems can cost more than $150,000, but the researchers’ goal is to build the new microscopes for a few thousand dollars each. The researchers also plan to make their design and plans available to other investigators at a wiki page, miniscope.org.

“This is a wonderful award for our team,” said co-investigator Baljit Khakh, UCLA Professor of Neurobiology and Physiology. “We are now poised to address fundamental open questions in neuroscience that have stood for decades.”

The project’s other investigators are Alcino Silva, PhD, a UCLA Professor of Neurobiology, Psychiatry and Psychology; Dejan Markovic, a UCLA Professor of Electrical Engineering; and Daniel Aharoni, a postdoctoral fellow.

The microscopes will visualize individual neurons expressing calcium-triggered fluorophores, which light up when specific wavelengths of light are shined on them. Courtesy of Daniel Aharoni/UCLA Health.
TWO BRI MEMBERS RECEIVE $1.2 MILLION FROM THE PAUL G. ALLEN FAMILY FOUNDATION

Two BRI researchers have been selected for one of six awards recently announced by the Paul G. Allen Family Foundation to support work at the frontier of one of the most challenging roadblocks in neuroscience: growing mature human brain cells in the laboratory. The BRI’s new Allen Distinguished Investigators, Daniel Geschwind, MD, PhD, and Steve Horvath, PhD, ScD, will receive an award of $1.2 million, out of a total of $7.5 million the foundation is funding over three years.

“This new cohort of Allen Distinguished Investigators and their research is especially significant because the field of neuronal maturation is at the leading edge of bioscience,” said Tom Skalak, executive director for Science and Technology for the Allen Foundation. “The awardees’ broad talents and areas of expertise are what we need to explore this beckoning undiscovered territory.”

The Allen Foundation provides awards to leading investigators who are seeking innovations and world-changing breakthroughs. UCLA’s investigators will explore ways to more efficiently and effectively create neurons, the core cellular components of the nervous system, which includes the brain, spinal cord and the nerves that reach throughout the body. Diseases of this system include autism, Alzheimer’s, Parkinson’s, epilepsy and many other conditions.

Geschwind, Professor of Neurology and Psychiatry, and Human Genetics, and Horvath, Professor of Human Genetics and Biostatistics, received the award to create a better environment in which to grow mature neurons. One of the major obstacles to using human stem cells in the laboratory is that even the best systems yield immature or inconsistent cells.

Geschwind and Horvath will use mathematical predictions to identify factors that drive neuronal maturation in the human brain but that are absent in neurons grown from stem cells in a petri dish cell culture. They will use these factors to create more stable cells that are similar to functioning neurons in the brain. These models can be used to identify therapies that could have potential benefits for patients by modifying the genetics of the cells or testing drugs on the cells while they’re in the petri dish, called “disease in a dish.” Horvath has also identified an aging clock based on genetic measurements from thousands of cells and tissues; he and Geschwind will use similar methods to mimic the effects of aging in the laboratory.

_Cultured differentiated human neural progenitors, which aid in the study of neuropsychiatric diseases._
_Courtesy of Daniel Geschwind_
S. Lawrence Zipursky, PhD, has been awarded the 2015 Louisa Gross Horwitz Prize for his discovery of a molecular identification system that helps neurons to navigate and wire the brain. The Horwitz Prize, first awarded in 1967, is Columbia University’s top honor for achievement in biological and biochemical research. Forty-three Horwitz Prize awardees have won Nobel Prizes.

Zipursky, a Distinguished Professor of Biological Chemistry at the David Geffen School of Medicine at UCLA and a Howard Hughes Medical Institute investigator, received the award for changing the way neuroscientists think about the processes involved in the brain’s wiring.

How an organism behaves and makes decisions is largely determined by how the cells in its nervous system are wired together. Since starting his lab at UCLA in 1985, Zipursky’s research has focused on identifying genes that guide the formation of connections between neurons into circuits. From this search, Zipursky’s team discovered a fruit fly gene related to the human Down Syndrome Cell Adhesion Molecule (DSCAM), which helps neurons choose the right paths to take as they extend through the developing nervous system.

“Dr. Zipursky’s research has helped illuminate one of science’s biggest mysteries: how do our brains work, and how did they develop such incredible complexity?” said Lee Goldman, MD, Columbia University’s Dean of the Faculties of Health Sciences and Medicine.

Zipursky’s lab found that DSCAM harnesses a special genetic process called “alternative splicing,” which combines different stretches of code from the same gene. This mechanism allows DSCAM to produce over 38,000 different versions of the same protein. This finding led Zipursky’s group to propose that the protein diversity encoded inside the DSCAM gene could underlie complex wiring decisions in the nervous system.

Precisely how DSCAM accomplished this feat was unknown. Zipursky’s team showed that rather than directly instructing nerve cells how to wire together, DSCAM helps a neuron distinguish between its own branches and the branches of other neurons. Each neuron chooses to display a specific set of DSCAM variants on its surface, with the result that each nerve cell has a unique identity. In effect, DSCAM is the nervous system’s molecular ID tag.

“Forming a deep understanding of how our brains are wired is a vital step in revealing how complex neurological disorders develop. For this reason, Dr. Zipursky’s work is invaluable,” added Gerard Karsenty, MD, PhD, Chair of the Horwitz Prize Committee.

Zipursky and colleagues showed that DSCAM molecular barcoding is the basis for a process called “self-avoidance” in which neurons guide themselves through the wiring process by pushing away their own branches. The diverse ID tags provided by DSCAM ensure that this repulsion happens only between branches from the same cell. This process of self-recognition followed by repulsion sculpts the complex branching pattern of neurons, and prevents neurons from making connections to themselves.

These discoveries, along with research from others, reveal how different processes work together to wire the brain. Cells leave trails of molecules for neurons to follow in the developing brain, deploy guide cells to chaperone wandering branches, or — as Zipursky discovered — use genetic name badges that allow neurons to distinguish between one another. These molecular mechanisms all weave together elegantly to organize a complex neural architecture.

“The Horwitz Prize is awarded annually for research that has transformed our fundamental thinking about how biology works,” says Michael Purdy, PhD, Executive Vice President for Research at Columbia University. “Dr. Zipursky’s work is an excellent example of this as it is an important step toward revealing the mysteries of the most complex object in the known universe: the brain.”
SPECIAL EVENTS

The 2015 Horace Winchell “Tid” Magoun Lecture
Istvan Mody, PhD: “Watching the Wheels Go Round and Round”

Mody, Tony Coelho Professor of Neurology and Physiology, is a renowned expert in the regulation of synaptic transmission and neuronal excitability. He uses electrophysiological techniques to record the excitatory and inhibitory ionic currents resulting from brief activation of various ligand-gated receptor/channels. These channels are opened by the bindings or excitatory (eg., L-glutamate) or inhibitory (eg. Gamma-aminobutyric acid or GABA) amino acid neurotransmitters. The ultimate goal of Mody’s research is to understand how long-term alterations in the excitability of nerve cells and circuits are responsible for offsetting the fragile balance between excitation and inhibition. If this balance isn’t struck, the nervous system behaves abnormally, which in turn leads to brain disorders.

The lecture’s title refers to the cycle of inhibition driven by GABA. “Early on in this research,” Mody explained, “every synapse revolved around excitation. It is only now that the interneurons that provide diversity in the brain are found to have a lot of function and are involved in a lot of diseases of the nervous system.”

The lecture summarized Mody’s findings in the GABA field, and included unpublished data suggesting that, in case of old age, changes in inhibition reduce specificity of synaptic plasticity. “This is another example of the unexpected workings of the interneurons and ‘inhibition’ in the brain,” Mody said. Since plasticity is very much dependent on GABA receptors, this work could have significant impact on neuroprotective strategies after stroke.

When BRI Director Chris Evans introduced Mody, he noted “a career characterized by great work and wide ranges of collaborations with UCLA researchers from a variety of disciplines. Istvan has really contributed to this community,” Evans said.

Video here.

The 2015 H. “Tom” Sawyer Lecture:
Catherine Woolley, PhD: “Neurosteroid Estrogens in the Hippocampus: Implications for Epilepsy”

Every year, the BRI celebrates the memory of Tom Sawyer who, with his study of the effect of hormones on the brain and ovulation, became the founder of the neuroendocrine community at UCLA. Sawyer, Chair of the Department of Anatomy (now Neurobiology), remained a defining force in this field for over 30 years, teaching and inspiring generations of neuroendocrinologists.

Woolley is the William Deering Professor in the Department of Neurobiology at Northwestern University. She is one of the youngest recipients in the history of this lectureship.

In his introduction of Woolley, Art Arnold said, “Her science is empirical and really cutting edge. She has a lot of balance in her approach to science and an understanding of what is good, and what is going to last.”

Woolley’s lecture explored an idea that has been around for some time: neurosteroids produced in the brain can modulate the time scale. The lecture described how estrogen effects cause changes in dendritic tree synaptic physiology and rapidly modulate both excitatory glutaminergic inputs from dendrites as well as inhibitory gaba.

The 2015 Samuel Eiduson Student Lecture Award,
Neelroop Parikshak: “Insights from the Molecular Underpinnings of Autism from the Analysis of Gene Expression in Human Brain”

This year’s Samuel Eiduson Student Lecture Award recognizes the outstanding work done by graduate student, Neelroop Parkshak from the laboratory of Daniel Geschwind.

In this lecture, Parikshak discussed his application of high-throughput genomic technologies and bioinformatics to questions at the interface of human genetics and neurobiology. Parkshak’s work, in context of Autism Spectrum Disorder, analyzed gene expression and how it is effected by mutations at a whole tissue level, leading to the conclusion that ASD genetic risk converges during cortical development. This is specifically related to early transcriptional and chromatin regulators disrupted by ASD-specific mutations in normal cortical development. Parkshak also identified new biological pathways that are implicated in autism.

Video here.

Parikshak was introduced by Felix Schweizer, PhD.
Special Events (Cont’d)

Arnold Scheibel Distinguished Postdoctoral Fellow Lecture
Denise Cai, PhD: “Linking Memories Across Time”

The Scheibel Distinguished Postdoctoral Fellow in Neuroscience Lecture honors one postdoctoral fellow annually for outstanding research in neuroscience, comprises part of the Joint Seminars in Neuroscience series, and confers a prize to attend a scientific meeting.

Cai is from the laboratory of Alcino Silva, PhD, in the UCLA Departments of Neurobiology, Psychiatry & Biobehavioral Sciences and Psychology. In his introductory remarks, Silva described Cai as “a force of nature, whose incredible mentoring and organizational skills have done an outstanding job of bringing a large team of undergraduate students to our lab and taught us ways to effectively integrate them. I’m sure other PIs like me understand that talented people like Denise make us seem so much smarter than we are.”

Silva described the focus of Cai’s work exploring how memory consolidation has a role in linking memories across time, as “a deeply original, creative project.”

Cai’s presentation “Linking Memories Across Time” summarized recent studies in support of the hypothesis that a shared neural ensemble can link distinct memories encoded close in time.

Arnold Scheibel was Professor and Chair, Departments of Anatomy and Psychiatry, and Director of the Brain Research Institute from 1990 – 1995. In addition to his seminal work on the neural underpinnings of behavior in context of the structural-functional basis of cognition and action, Scheibel is known as a passionate educator who inspired generations of neuroscience scholars to achieve excellence.

The Integrative Center for Learning and Memory Distinguished Lecture
Susumu Tonegawa, PhD: “Memory Engram Cells Have Come of Age”

Nobel prize-winner, Susumu Tonegawa, PhD, is Picower Professor of Biology and Neuroscience at the Picower Institute for Learning and Memory, Massachusetts Institute of Technology; Director, RIKEN Brain Science Institute; Investigator, Howard Hughes Medical Institute.

Tonegawa was the scientist to label and reactivate engrams, which are clusters of brain cells that store specific memories. His “Memory Engram Cells Have Come of Age,” explored the two guiding theories on engram cells: the “engram” theory of Richard Semon, and the “synaptic plasticity theory” espoused by Donald Hebb. Tonegawa reviewed the large number of studies that have been conducted since, each supporting some aspect of each of these theories, and showed that until recently integrative evidence for the existence of engram cells and circuits as defined by the theories was lacking.

In the past few years, the combination of transgenics, optogenetics, and other technologies have allowed Tonegawa and his colleagues to begin identifying memory engram cells by detecting specific populations of cells activated during specific learning epochs and by engineering them not only to evoke recall of the original memory, but also to alter the content of the memory.

Image of a transgenic mouse hippocampus.
Carol Mason, PhD, is a Professor of Pathology and Cell Biology, Neuroscience and Ophthalmic Science, Columbia University, College of Physicians and Surgeons, New York, NY.

Her lecture discussed recent findings in cell-cell interactions as a way to understand the mechanisms underlying the development of the visual system.

To implement binocular vision in higher vertebrates, retinal ganglion cells (RGC) axons project ipsi- and contralaterally at the optic chiasm and terminate in eye-specific zones in the thalamus. Mason’s work has identified guidance receptors directing RGC axon navigation at the optic chiasm and transcription factors associated with the identity of these two subpopulations.

Studies have revealed additional developmental aspects of this divergent circuit including the time and place of generation as related to cell fate and projection and the eye-specific organization of axons as RGC axons extend away from the optic chiasm to targets and its mechanisms.

Mason (pictured left) also discussed the albino visual pathway, where defects in melanogenesis in the retinal pigment epithelium (RPE) lead to fewer ipsilateral RGCs. Neurogenesis and RGC specification are aberrant in albino mice, providing a good tool for studying cell fate, connectivity and the role of the RPE in its modulation.

The Neuroscience Poster Day gives undergraduate and graduate students the forum to present research to colleagues, faculty and visitors from across and outside campus. This year’s session features 150 posters representing the increasingly diverse spectrum of neuroscience research occurring on campus (below).
The Brain Research Institute is one of the most active science outreach organizations at UCLA with programs that educate elementary, middle school and high school students about neuroscience, and give UCLA undergraduates, graduates and postdoctoral fellows the skills to teach them.

“One of the BRI’s primary missions is to promote neuroscience education at all levels,” said BRI Director, Christopher Evans, PhD.

2015 was a strong year for continuing and new outreach efforts and promises to lead to an even larger impact on the community at large in 2016.

In February, UC Irvine hosted the Los Angeles/Irvine Brain Bee, the preeminent global neuroscience competition for high school students.

The Brain Bee aims to motivate young students to learn about the brain, capture their imaginations, and inspire them to pursue neuroscience careers in order to help treat and find cures for neurological and psychological disorders. Brain Bees are designed to test one’s knowledge of the human brain including such topics as intelligence, emotions, memory, sleep, vision, hearing, sensations, Alzheimer’s disease, Parkinson’s disease, stroke, schizophrenia, epilepsy, depression, addictions and brain research.

This year, the Los Angeles/Irvine Brain Bee was attended by over 200 high school students from the Southern California area. The LA/I competition was in three parts: a written exam in question-and-answer format; a neuroanatomy laboratory practicum with real human brains; and an oral Jeopardy-style quiz for the finalists.

2015 Brain Bee participants pictured below.

For over 15 years, the BRI has also sponsored Brain Awareness Week activities on campus, as part of an international initiative to increase public awareness of the progress and benefits of brain research for people of all ages.

The BRI promotes this event by inviting children from all over Los Angeles County to visit campus and get hands-on demonstrations and presentations in basic neuroscience, as well as tours of lab facilities and the campus at large.

This year over 300 students attended, along with teachers and parents. Staffed by UCLA neuroscience graduate and undergraduate students, the K-12 guests got up-close and personal with preserved adult brains, experienced the vertigo-inducing effects of goggles that distorted vision 20 degrees to the left, and learned how to extract their own DNA.

Brain Awareness Week is just one of several ways UCLA neuroscientists and their students are trying to introduce science to children in Los Angeles county.

Each year the undergraduate student group Project Brainstorm takes a quarter-long class in neuroscience teaching and presentation skills, and lesson plan development. The group then hits the road with preserved human brains, models and learning tools to visit classrooms and science academies, reaching hundreds of K-12 students annually.

“Project Brainstorm aims to generate interest in science at the K-12 level, as well as give college students some exposure to teaching in the real world,” said Rafael Romero-Calderón, PhD, who created the program. “All students benefit. School children find science more interesting and real than in their textbooks, and UCLA undergrads get to apply the knowledge they acquire in their classes in a professional setting.”
Romero-Calderón, along with Christopher Evans, co-directs the neuroscience outreach class “Drug Abuse and Society”, which is modeled similarly to Project Brainstorm. After a quarter learning about the neuroscience of drug use and addiction, undergraduate and graduate students learn how to put together short, informative presentations on a variety of drug classes, which are then delivered to a middle or high school that doesn’t have a strong science program. “UCLA students learn how to present the neuroscience of drug addiction in a non-judgmental, non-didactic way,” Romero-Calderón said. “The hope is these lectures will inspire interest in neuroscience. We also aim, by presenting the impact of drugs on the brain in neutral scientific terms, to provoke hesitation when the children are faced with the choice to use drugs in real world situations.”

BRI-supported outreach efforts are not restricted to neuroscience. The institute also co-sponsors “aWISE STEM Day”, highlighting opportunities in science, technology, engineering and mathematics for girls from underserved schools in the Los Angeles Unified School District.

This year, over 100 middle school students came to campus to get hands-on exposure to the applications of science, technology, engineering and mathematics. The girls, who came from underserved schools in the LAUSD, experienced a day filled with fun, interactive education in scientific concepts underscoring a range of STEM fields from neuroscience to physics.

Other programs such as NeuroCamp, a free BRI summer outreach program that hosts high school students in a two-week instructional course on campus; the BRI Summer Undergraduate Research Experience, bringing students participating in the Minority Access to Research Careers from all over the country to UCLA, for an 8-week research-training program; and BRI sponsorship of Junior and Senior prizes at the County and State Science Fairs, have led to new generations of neuroscience scholars that have made significant impacts in the field. For a list of research winners in the County and State Fairs, please refer here.

One such scholar, Nanthia Suthana, PhD, is now an Assistant Professor in the Department of Neurosurgery at UCLA. After receiving both her BS and PhD in Neuroscience at UCLA, Suthana was inspired to create a new outreach endeavor, based on her own experience participating in Project Brainstorm as an undergraduate and graduate student.

Recently appointed as the BRI’s Assistant Director for Postdoctoral Outreach and Educational Programs, Suthana initiated Project Synapse – a new postdoctoral group sponsored by the BRI. Project Synapse will build a strong network of colleagues, offer career development workshops, and opportunities to participate in new K-12 outreach and teaching activities.

“When I was a postdoctoral student here, I often felt the need for a more formalized postdoctoral network offering skill sets that are needed for a career in academia and research,” Suthana said. Upcoming Project Synapse workshops will include presentation and communication skills, grant writing, and more.

Project Synapse members will also participate in ongoing visits to local Los Angeles schools to teach and inspire interest in neuroscience, higher education and STEM careers. “My experience as a UCLA student in Project Brainstorm,” Suthana said, “greatly enhanced my teaching skill set at all levels of education.” She hopes the program will inspire postdocs to mentor graduate students in outreach, who in turn will mentor undergraduate students, to create generations of scholars who will participate in outreach efforts throughout their careers.

Below: Suthana, standing, leads a postdoctoral workshop on CV design as part of Project Synapse’s educational efforts.
Right: Brain Bee participants learn about Evolution in one of several educational stations between competition rounds.

Below: Middle school students attending aWise STEM Day experience real human brains.

Above: Brain Bee finalists participate in a Jeopardy style neuro-quiz.

Below: aWise STEM Day undergraduate and graduate volunteers prepare to teach attendees how to extract their own DNA.
THE BRAIN RESEARCH INSTITUTE’S 2015 STUDENT AND POSTDOCTORAL AWARD WINNERS (AND FACULTY MENTORS)

Each year, the BRI, Semel Institute and Fine Science Tools present awards to UCLA students and postdoctoral scholars. This year’s winners are listed below.

Society for Neuroscience Postdoctoral Fellow Student Travel Award Recipients
Abha Rajbhandari (Michael Fanselow), Vivek Swarup (Daniel Geschwind)

Society for Neuroscience Graduate Student Travel Award Recipient
Sarah Hersman (Michael Fanselow)

Fine Science Tools Postdoctoral Scholar Travel Award Recipients
Nancy Day (Stephanie White), Melissa Malvaez (Kate Wassum)

Postdoctoral Fellow Travel Award Recipients
Daniel Aharoni (Peyman Golshani, Alcino Silva, Baljit Khakh), Julia Sophia Crane (Martin Monti), Ana Maria Estrada-Sanchez (Michael Levine), Ann Hoffman (Michael Fanselow), Evan Lutkenhoff (Martin Monti), Helen Monanis (Dean Buonomano), Alessandra Perugini (Michelle Basso), Aroa Relano Gines (Marie-Francoise Chesselet)

Graduate Student Travel Award Recipients
Lavanya Acharya (Mayank Mehta), Zahra Aghajan (Mayank Mehta), Erica Arroyo (Carlos Porter-Cailliau), Andrew Brumm (S. Thomas Carmichael), Zachary Burkett (Stephanie White), Anne Collins (Kate Wassum), Marina DeSalvo (Kelsey Martin), Allison Elizabeth Furtner (Giovanni Coppola), Michael Hardy (Dean Buonomano), Andrew Howe (H. Tad Blair), Alisa Kosheloff (Nigel Maidment), Griselda Metta Yvone (Patricia Phelps), Jason Moore (Mayank Mehta), Lisa Moore (Daniel Lu), Katherine Myers (Felix Schweizer), Zachary Pennington (Michael Fanselow), Alexandra Stolyarova (Alicia Izquierdo), Natalia Tchemodanov (Nanthia Suthana), Courtney Yaeger (Josh Trachtenberg)