

NEUROSCIENCE

SUMMER 2012

Q U A R T E R L Y

“Knowledge of the brain should be usable as people try to maximize their quality of life.

It’s really about trying to understand ourselves — how people think and feel and interact and process the world around them”

— Huda Akil,
SfN Past President

BrainFacts.org Launches as an Authoritative Source for Public Outreach

The brain — “the universe between our ears” — is a topic of inherent public interest worldwide. But how can neuroscience cut through today’s information-saturated environment to provide key public audiences with authoritative information about brain function and health? To address that challenge, SfN has launched *BrainFacts.org* — a public information initiative of The Kavli Foundation, the Gatsby Charitable Foundation, and SfN.

As part of SfN’s enduring mission to engage the public about the brain and mind, *BrainFacts.org* helps bridge the gap between brain scientists and the general public through a dynamic online platform. The site is filled with authoritative, accessible content, and plans are in place to add additional content and features such as blogging, as well as other tools that meet audience needs and leverage emerging technologies. It is also a great resource for SfN members, science educators, and others who interact with the public and need an easy place to send people for authoritative information.

GUIDED BY SCIENTISTS

On launch, *BrainFacts.org* is guided by a scientist-led editorial board, features nearly 1,000 lay-language articles and vetted educational tools, and leverages social

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2012 Officer and Councilor Election Results Announced

The Society congratulates its newly elected officers and councilors. Chosen by members using an independent online election company, the incoming Council members begin their terms at Neuroscience 2012 in New Orleans.

The membership elected Carol Ann Mason of Columbia University as the incoming president-elect, Stephen G. Lisberger of Duke University as the incoming treasurer-elect, and Tatiana Pasternak of the University of Rochester as the incoming secretary-elect. The elected incoming councilors are M. Catherine Bushnell of McGill University and Edvard I. Moser of the Norwegian University of Science and Technology and the Kavli Institute for Systems Neuroscience.

OFFICERS

Carol Ann Mason is a professor of pathology and cell biology, neuroscience, and ophthalmology at Columbia University. She has been a member of SfN for nearly three decades and her participation has included serving as councilor, reviewing editor of *The Journal of Neuroscience*, and a member of the Committee on Women in Neuroscience and the Public Information Committee. Mason’s research focuses on developmental neurobiology, specifically axon guidance, cell specification, and axon-target interactions.

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Message from the President

Gender Inequality: Biases and Challenges



Moses Chao,
SfN President

My mother often lamented that she was not able to attend graduate school and obtain a PhD. As my father was an economics professor and my brother an engineer with a PhD, she felt left behind. Raised in an era when women's feet were bound in China, she was expected to remain at home and raise a family. In the 1940s and 1950s, women represented a minority in higher education and professional

fields in many countries.

Many decades later, the number of women in PhD programs has risen significantly. In the United States, women now outnumber men at many graduate and medical schools. Representation of women has grown not only in neuroscience, with nearly half of all SfN members being female, but also in many academic fields. However, huge gender disparities still exist.

For example, U.S. surveys show a dramatic dropoff in the number of women in neuroscience after graduate and postdoctoral training — from 54-56 percent of trainees to 29 percent of faculty who achieve tenure-track positions. Women represent only 23 percent of full professors and 19 percent of department chairs. More glaringly, there has been little change in the representation of women in higher academic positions since 2000, despite increased awareness and publicity about the problem. Fewer women at higher career levels is not unique to neuroscience, but can be also observed in other scientific disciplines, such as chemistry and geophysics. Why is there this disturbing disparity?

One reason is invisible factors, such as unconscious bias — although in some cultures within the United States and abroad, the bias can still take conscious forms. Jill Becker and Anne Etgen, former co-chairs of the SfN Professional Development Committee, explored this issue in workshops on “Department Chair Training to Increase Women in Neuroscience (IWiN).” This SfN program, supported by a grant from NSF, is aimed at increasing recruitment and retention of women and minority faculty in neuroscience. The workshops discussed a number of shocking observations. Analysis of recommendation letters for faculty positions in medical schools revealed that the letters for male applicants tended to be longer and contained more references to publications and achievements, whereas letters for female candidates were shorter and contained more references to personal life, negative comments, and faint praise (“It’s amazing how

much she’s accomplished”). Evaluation of identical applications for faculty recruitment in many departments indicated a 2:1 preference to hire a male over a female candidate.

Moreover, a June 2011 study published in *Academic Medicine* found that, while funding rates were not significantly disparate for evaluated NIH programs, “for subsequent grants, both application and funding rates were generally higher for men than for women.” And the report noted that “men had more R01 awards than women at all points in their careers.”

A major argument for increasing the number of women and minorities in academic positions is to promote diversity, which, in turn, leads to better outcomes. Groups with representation from diverse backgrounds are more effective at solving problems and being creative than a homogeneous group. Case in point: an all-white male jury is likely to render a different decision than one with women and minority representation. Likewise, a faculty search or tenure committee has analogous challenges making decisions.

In neuroscience, we are confronted by research problems that are difficult and not immediately tractable. They require multidisciplinary approaches and new viewpoints and ideas, which can only occur with a diverse team of investigators. How do we increase representation and leadership of women in our field? The Society has been conscious of areas where there have been historic gender gaps within the organization, from Council officers to prizes and awards. For instance, there have been only eight women presidents in the more than 40 years of the Society’s existence. Through the Committee on Committees, the Society has made a strong effort to fill Council and committee positions more equitably with regard to gender, race, and nationality. This includes ensuring balance on award committees, which make critical decisions on important prizes, and establishing mentoring awards for women in neuroscience. In the past 10 years, many rules have been implemented by the Program Committee to ensure there are more women lecturers and symposium speakers at the annual meeting. The membership also has voted directly for more gender equity. Five of those eight women presidents have served in the last 10 years — a much more equitable ratio. Still, more needs to be done across the field.

SfN’s Professional Development Committee, with guidance from its Women in Neuroscience Subcommittee, is charged

with advancing the Society’s commitment to gender issues. Programs address identified needs among women neuroscientists, while ensuring they leverage SfN’s strengths and comparative advantages. The IWIn Project is one such effort and has served as a catalyst for critical dialogue among 43 scientific leaders within U.S. academic institutions. In the year ahead, SfN will be working to disseminate the project’s lessons learned, as well as explore how those lessons might reach a wider section of the membership and be discussed within an international context. Additionally, SfN’s annual meeting professional development offerings engage thousands of member attendees and remain an area of top emphasis.

But individual and institutional changes in attitude, as well as sustained efforts, are needed across the field and at all levels to increase opportunities for and representation of women in faculty positions, awards, grants, and leadership positions. Several key areas that require attention are:

- **Mentorship:** Mentoring is important to career success for everyone, but it is especially critical to help women navigate gender-related challenges and advance their careers. SfN continues to focus on enhancing its mentoring programs, but both formal and informal mentoring for women is also needed within academia.
- **Recruitment and Promotion:** Changes in search and recruitment strategies and processes — including start-up

packages and addressing dual-career-couple needs — will help increase women applicants for faculty positions. Tenure and promotion policies should also reflect best practices to create positive environments for women. The inclusion of more women in seminar programs, committees, and recruitment dinners helps to create this environment.

- **Climate:** Campuses can develop policies, resources, and activities that create a supportive climate to help women faculty advance. For example, institutions can develop family-friendly environments and address the “maternal wall bias” that contributes to academia’s gender imbalance. Successful programs and pilot interventions aimed at keeping women from dropping out to raise families should be pursued and shared across campuses.

While data suggest positive changes have occurred over the years with regard to women in neuroscience, much work remains to be done to correct the gender imbalance and achieve equitable representation of women across the field. Many scientists do not even know if there is a gender imbalance at their institutions. A greater awareness of the statistics concerning women across institutional positions will generate increased sensitivity toward this problem. The next forty years of neuroscience innovation and discovery will only meet full potential if the expertise and capacity of the entire global neuroscience community is tapped into — and retained. ■

... SfN Elections, continued from page 1

Stephen G. Lisberger is the George Barth Geller Professor and chair of neurobiology at the Duke University of Medicine. Lisberger has been a member of SfN since 1986. His involvement has included serving as the senior editor of *The Journal of Neuroscience* and a member of the Committee on Animals in Research, as well as the Finance and Publications committees. Lisberger’s research focuses on sensory control of movement and motor learning.

Tatiana Pasternak is a professor in the departments of neurobiology and anatomy, brain and cognitive science at the Center for Visual Science at the University of Rochester. Pasternak has been a member of SfN for more than 25 years. She has served as a member of the Committee on Committees as well the Program Committee and was chair for both the Gruber International Research Award and Donald B. Lindsley Prize Selection Committees. Pasternak’s research is focused on cortical circuitry underlying memory-guided sensory decision making.

COUNCILORS

M. Catherine Bushnell is the Harold Griffith Professor of

Anesthesia and a professor of dentistry at McGill University. She also holds a Canada Research Chair in Clinical Pain Research. Bushnell has been a member of SfN for nearly two and a half decades. In that time, she has served as a member of the Program and Scientific Publications Committees as well as the chair of the Lindsley Prize Selection Committee. Her research focuses on pain mechanisms and pain modulation. Within this area, she studies forebrain mechanisms of pain processing, psychological modulation of pain, and neural alterations in chronic pain patients.

Edvard I. Moser is a professor of neuroscience at the Norwegian University of Science and Technology and the director of the Centre for the Biology of Memory and the Kavli Institute for Systems Neuroscience. He has been a member of SfN for 20 years and during that time has served as the reviewing and associate editor of *The Journal for Neuroscience* and as a member of the *BrainFacts.org* editorial board. Moser’s research is focused on neural network computations in the cortex, with a particular emphasis on the dynamic representation of space and memory in the hippocampal-entorhinal system. ■

Richard Nakamura, Acting Director Center for Scientific Review, National Institutes of Health



Richard Nakamura,
Acting Director,
Center for Scientific
Review, NIH

NQ: Can you explain the role of the Center for Scientific Review (CSR) in the peer review process and how it differs from (or complements) the peer review process at the Institutes?

Nakamura: CSR is the gateway for NIH grants. We receive all NIH grant applications and assign them to the NIH Institutes and Centers (ICs) that could fund them. More importantly,

we organize the peer review groups that evaluate about 70 percent of these applications for scientific and technical merit. As an independent NIH Center, we work to ensure NIH grant applications receive fair, independent, expert, and timely reviews free from inappropriate influences so NIH can fund the most promising research. CSR has 174 chartered study sections, 53 of which cover various areas of neuroscience research or include neuroscience in the research they cover, from basic cellular and molecular to translational/clinical research.

The ICs organize the remaining peer review groups to assess the merit of IC-specific applications, such as those for large center grants and those submitted in response to requests for applications. The ICs also perform a second level of review for all NIH grant applications. Their advisory councils make funding recommendations after considering how well the applications meet IC funding priorities and public health needs. The IC director makes the final funding decision.

NQ: CSR is doing a lot of work to educate researchers about the peer review process. What process changes are you considering that could improve the way study sections function and increase the efficacy of the review and ranking process?

Nakamura: CSR will devote considerable efforts to conduct independent evaluations to improve our operations and study sections. We launched a study section chair training survey with the goal of evaluating prior training so we could enhance future training. We are using bibliometric and text evaluation methods to understand how our study sections cover the spectrum of science presented for review and see how these tools may provide broader evaluations of reviewer quality

and appropriateness for application review. We hope to use these methods to construct quantitative and analytical tools to optimize our reviews and help assess review outcomes. We plan to seek collaborations with extramural researchers who could bring state-of-the-art data analysis methods to CSR.

NQ: It is sometimes said that in a time of limited resources, one can increase the likelihood of success by increasing the number of grant applications. Have there been any studies of this? Is there a correlation between the number of grant submissions by researchers and/or institutions and their success rates?

Nakamura: NIH reviews are not raffles. You don't necessarily increase your chances by simply submitting more applications. I don't believe anyone has collected data on this, but I can tell you that applicants can significantly increase their chances of doing well in peer review by honing their research plans with their NIH program officers and colleagues before they submit and producing well-written applications that clearly and convincingly describe how they could conduct research that will exert a sustained, powerful influence on the research field(s) involved. If applicants believe they have more than one exceptional and distinct research application, they should submit them.

NQ: What is CSR doing to prepare for the possibility of a sustained period of limited resources? What effect does the funding situation have on the peer review process?

Nakamura: Like all parts of government, CSR has been asked to tighten its belt. As we look for efficiencies, we are conscious of the need to ensure the quality of NIH peer reviews so taxpayer funds support research with the most promise for advancing science and health.

CSR has worked to be more efficient in delivering the same, if not better, levels of service. Holding more meetings on the west coast is a good example. Overall costs are comparable to DC meeting costs, and we are better able to recruit west coast reviewers. Since electronic reviews have lower costs, we will hold more of them this year to review applications that are well-suited for electronic reviews: fellowship, small business, and shared instrument (S10) applications. We will be doing comparisons of electronic platforms versus face-to-face to maintain the quality of review.

NQ: What has been the feedback on the new scoring system (1–9) and the new format (bullet points) for evaluating grants?

Nakamura: NIH made a commitment to assess the effectiveness of the recent peer review enhancements and continually assess our grants and peer review system. NIH stakeholders were surveyed by the Office of Extramural Research soon after the implementation of the 1–9 scoring system and bulleted review format. Reviewers were able to communicate meaningful difference in the quality of applications with the new scoring range. For the bullets, applicants agreed they helped them focus on problem areas that could be corrected, and reviewers said they offered efficiencies. However, all stakeholders were concerned with how well the bullets explained the factors that affected the review outcome. NIH responded by asking reviewers to add a narrative statement about what influenced the Overall Impact score. The results from follow-up surveys are expected before the end of the year on the Office of Extramural Research website.

NQ: What would you say to someone who has never participated in a study section about the benefits?

Nakamura: Ask new reviewers and they will likely tell you how serving on study sections gave their careers a boost because they were able to better understand what makes an application successful. Additionally, they got to know and perhaps collaborate with exceptional scientists in their field or related fields. Because the experience is so formative, CSR launched an Early Career Reviewer program, which we are using to train future reviewers and increase the diversity of our reviewer pool. More information is available at www.csr.nih.gov/ecr.

More senior reviewers will tell you how serving on a study section is a good way to stay up-to-date on their field and gain insight that adds a new dimension to their research. Additionally, all reviewers with NIH grants know they have benefited from the labor of others who volunteered to review their grants, and many feel they should do their part in return. ■

Summer Is Crucial Time for U.S. Advocacy Activity

U.S. lawmakers are returning home for summer recess, and key decisions on research funding have yet to be made. There is enormous pressure for elected officials to make drastic cuts in federal programs. Now is the time for the Society’s U.S. members to take the case for neuroscience funding directly to their congressional representatives. Set up a meeting with your local member of Congress, attend a town hall meeting, or host a congressional lab tour. These activities help build the case for strong and reliable funding for biomedical research. SfN has resources to help guide you.

You don’t need to come to Washington, DC, to meet your elected representatives. Members of Congress are looking for opportunities to meet their constituents, whether in their home offices or in their labs. Hosting a lab tour is one of the best ways to show lawmakers how federal investment in neuroscience research benefits their constituents.

August is also a time when many officials host town hall meetings in person or by phone. This is a chance to share your concerns about science funding with lawmakers in an open forum. Look for upcoming congressional town hall

meetings in your area. SfN has tools and resources to help you prepare to make an argument for science funding.

Because many issues compete for their attention, lawmakers often do not have an expert understanding of complex scientific issues. There is no better way to educate them about the importance of research funding than hearing about it directly from you.

NEUROSCIENTISTS WORLDWIDE CAN ENGAGE AS CITIZEN-SCIENTISTS

SfN is committed to taking advantage of opportunities to expand its collaborations with strategic partners around the world. SfN has been working with the Federation of European Neuroscience Societies (FENS) and the International Brain Research Organization (IBRO) to assist national societies in advancing their advocacy goals. SfN, FENS, and IBRO serve as catalysts and sources of support for the global pursuit of professional development, public advocacy, and outreach. More information about advocacy opportunities is available at sfn.org/advocacy or by contacting advocacy@sfn.org. ■

The Roots of Mental Illness

A century ago, Sigmund Freud postulated that the mental illnesses we now call depression, anxiety, and schizophrenia were rooted in negative emotional experiences during childhood. While our knowledge of the brain has greatly advanced since the time of Freud, our understanding of the specific mechanistic origins of mental illness remains somewhat vague. Carol Tamminga, professor and chair of psychiatry at the University of Texas Southwestern, moderated a press conference at Neuroscience 2011 where “five brilliant young scientists,” as she described them, presented their findings on the mechanistic roots of mental illness.

ALTERED CIRCUITRY IN CHILDHOOD

The amygdala is at the center of a functional brain network that influences emotion, fear, stress, and related cognitive abilities. That circuitry is altered in adults with anxiety and depression disorders. Shaozheng Qin examined whether these circuitry changes were also present in affected children.

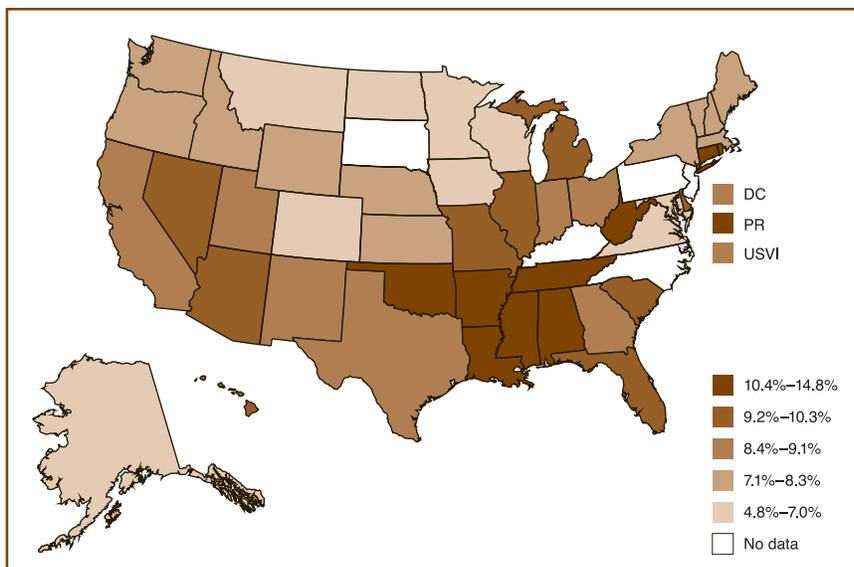
Qin, a postdoctoral fellow at Stanford University working with Vinod Menon, analyzed the brain scans of 60 children, aged seven to nine, with parent-reported anxiety and depression. Using a technique called task-free resting-state functional magnetic resonance imaging (rs-fMRI), Qin imaged the whole brain every two seconds for five minutes. In the resting brain, the amygdala emerged as the hub of a functional network involving the insula, the prefrontal cortex, the basal ganglia, and temporal regions.

Qin found that children with greater anxiety had more extensive functional connections between the amygdala and the rest of the brain, suggesting that the amygdala is hyperfunctional in anxiety. The amygdala in very anxious children — like in adults — was also larger and more densely packed than those with low-level anxiety. Qin believes the work improves understanding of how childhood anxiety and depression affect healthy emotional development in the brain within this “anxiety” circuit.

HOPE CIRCUITRY

Melissa Warden, also a postdoctoral researcher at Stanford University working with Karl Deisseroth, investigated the brain circuitry of depression in adults. Activity in a serotonergic circuit between the prefrontal cortex (PFC) and the dorsal raphe nucleus (DRN) is altered in depressed people, and both areas are targeted by antidepressant therapies. Within this circuit, Warden identified a population of neurons with activity that seems directly linked to hopeful behaviors.

Warden recorded from individual neurons while rats performed the forced swim test, a commonly used measure of depression-like behavior in rodents. The rats struggle to escape the water, but at some point give up and float motionless, as if helpless. Warden found certain cells with activity that corresponded to swimming behavior: The neurons “shut off” when the rats were immobile, suggesting their activity corresponded with hopeful behaviors.



Depression is the leading cause of disability in North America and carries huge costs for individuals and nations. The above chart displays the prevalence of depression in different U.S. states, where it affects up to 14.8 percent of the population. Source: Centers for Disease Control and Prevention.

Warden next asked whether she might influence the rats’ behavior by controlling these neurons. Using optogenetics, Warden and her colleagues engineered the neurons to express a light-sensitive protein called channelrhodopsin and subsequently light-activated them by exposure to blue light. Exciting the neurons by illuminating their axons in the DRN induced rapid antidepressant-like behavior. When the PFC neurons were activated, rats resumed struggling to escape; when these neurons were at rest, so were the rats.

The work reveals the DRN-PFC circuit’s direct control over behaviors associated with depression. Press conference moderator Tamminga pointed out that this research has implications for current therapies like deep-brain stimulation and other not-too-distant strategies like gene therapy.

TARGETING GLIA

While most antidepressant therapies center on neurons, glial cells are emerging as a workable target. People with depression show deficits in certain glial populations, and scientists suspect that replenishing them might improve matters. Some studies suggest that oligodendrocyte proliferation might explain the benefits of antidepressant drugs. Unlike neurons, these glia can be continuously regenerated from a precursor population in a process spurred on by growth factors like fibroblast growth factor-2 (FGF2).

Maha Elsayed and her colleagues at Yale University administered FGF2 into rat cerebral ventricles. Like humans with anhedonia who stop seeking pleasurable activities, chronic stress in rats dampens their pursuit of a sugary drink. Stressed rats that received FGF2 continued to track down the treat, suggesting that FGF2 protected them from this depression-like symptom.

Next, Elsayed honed in on the prefrontal cortex (PFC), where oligodendrocytes are reduced in depressed patients. In the PFC of stressed rats, FGF2 restored numbers of dividing oligodendrocyte precursor cells to non-stressed levels, suggesting the FGF2 prompted a glial repopulation. In the forced swim test, FGF2 rescued despair-like immobility behavior, indicating an antidepressant effect. In another behavioral test, FGF2 treatment showed anti-anxiety effects.

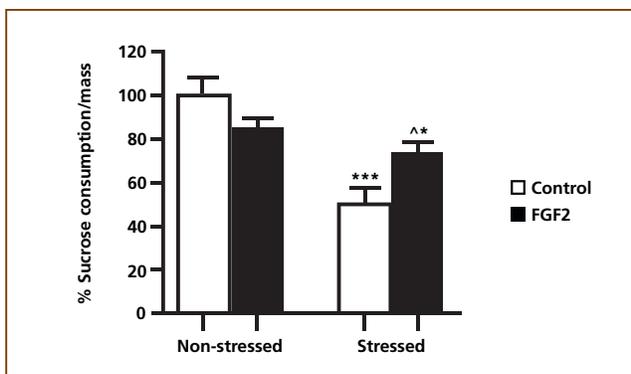
Current antidepressant drugs can take weeks to provide benefits, reflecting the involvement of downstream signaling molecules, including FGF2. Targeting FGF2 and oligodendrocytes more directly, said Elsayed, might result in better therapeutics.

SCHIZOPHRENIA DRUGS...EXPLAINED?

Despite the benefit of antipsychotic medications such as haloperidol and clozapine for people with schizophrenia, it is still unclear how the drugs work to alleviate symptoms. Nikisha Carty, a postdoctoral fellow at Yale University working with Paul Lombroso, examined the role of a signaling molecule called striatal-enriched tyrosine phosphatase (STEP) that is elevated in brains of people with schizophrenia.

A current hypothesis in schizophrenia research suggests that signaling by the neurotransmitter glutamate might be underactive, particularly at the NMDA-type glutamate receptors. According to a current model, STEP reduces surface levels of NMDA receptors on neurons at synapses, thereby reducing synaptic strength in affected brain areas. This type of synaptic dysfunction could potentially underlie cognitive deficits associated with schizophrenia.

Carty found mice given PCP, which produces schizophrenia-like behaviors in humans and animals, failed to form a memory of an exploratory experience, but



Researchers at Yale University found mice stopped their pursuit of a sugary drink when under stressful conditions, but those that received the growth factor FGF2 continued to pursue the treat even while under stress. The result suggests growth factors may prove to be promising treatments for anxiety and depression. Source: Elsayed M. et al. (2012): Antidepressant Effects of Fibroblast Growth Factor-2 in Behavioral and Cellular Models of Depression. *Biol Psychiatry*.

mice lacking STEP showed no such deficit. Furthermore, antipsychotic drugs reduced STEP activity and increased levels of surface NMDA receptors, potentially explaining some of their benefits. These findings suggest targeting STEP directly might be a viable treatment target for schizophrenia.

SCHIZOPHRENIA: MODELING RISK

A complex mix of genetic and environmental risk factors confers risk for schizophrenia. Melissa Burt of McGill University investigated a demonstrated risk factor for prenatal maternal infection.

Burt injected pregnant rats with LPS, a bacterial toxin that produced a systemic infection with about a day of fever. When they reached adolescence, rats exposed to maternal infection had defects in the hippocampus, an area critical to learning and memory.

Electrophysiological experiments showed that NMDA receptor activity was diminished in single neurons and throughout the region. A cellular mechanism of learning called long-term depression was abolished in neurons of the LPS-exposed rats. The rats also showed deficits in learning in the Morris water maze.

The findings suggest prenatal infection can alter NMDA receptor function. Burt believes the immune challenge may alter the developmental trajectory of the hippocampus, which could play a role in the onset of schizophrenia.

Because the mechanistic origins of mental illness are unknown and the targets so obscured, it has been difficult to design treatments that combat disease progression or cure the symptoms. By shining a light on how these serious mental disorders begin, these young scientists are laying the groundwork that may one day lead to their end. ■

... *BrainFacts.org*, continued from page 1

technologies and strategic partnerships with others in the field. It dispels common “neuro-myths,” expanding on a concept initially developed in 2009 with then-SfN President Tom Carew, and its content is written at a secondary school reading level. The responsible use of animals in research is also threaded throughout site content. The varying levels of complexity of neuroscience information on *BrainFacts.org* make it useful to students, the media, neuroscientists, patient advocates, and other members of the general public.

“The public is almost as interested in the nervous system as neuroscientists,” said Nicholas Spitzer, the editor-in-chief of *BrainFacts.org*. “But there is a remarkable lack of knowledge about how the brain and nervous system work — and how they fail to work.”

Spitzer, a distinguished professor of biology at the University of California, San Diego, and co-director of the UCSD Kavli Institute for Brain and Mind, has a long history with public outreach, including his term as chair of SfN’s Public Education and Communication Committee from 2006 to 2009. Spitzer guides *BrainFacts.org*’s international editorial board of leading neuroscientists from four countries, which oversees overall content development and ensures scientific accuracy.

ROOTED IN SFN’S MISSION AND VISION

BrainFacts.org’s origins go back many years, starting with the Society’s inclusion of public outreach in its original mission. Over the next thirty years, SfN built a strong reputation for excellent public information content provided in print format.

In 2003, Huda Akil, then-SfN president, was one of the first leaders to identify the opportunity for a major authoritative online presence for neuroscience. Recognizing the paucity of information for lay audiences about brain research and therapeutic implications, Akil envisioned an authoritative and engaging neuroscience resource that would educate the entire public, from those suffering from brain disorders to public officials making important decisions about science funding. The technology revolution — and the generous support of founding partners — turned Akil’s 2003 vision into a 2012 reality.

“I see neuroscience as more than just highly intellectualized knowledge, but something that we as scientists can share with others,” said Akil, a professor of neuroscience



and psychiatry at the University of Michigan, Ann Arbor. “I feel that understanding the brain is one of humanity’s hardest endeavors. Knowledge of the brain should be usable as people try to maximize their quality of life. It’s really about trying to understand ourselves — how people think and feel and interact and process the world around them.”

Though written for the general public, Akil said neuroscientists can use *BrainFacts.org* to cultivate their own understanding of neuroscience disciplines outside their individual research interests.

STRONG FOUNDATION PARTNERS

Support for Akil’s concept of an authoritative public resource about neuroscience was provided through generous contributions from the Gatsby Charitable Foundation and The Kavli Foundation. Their donations total \$1.53 million over six years to help build and sustain *BrainFacts.org*.

“*BrainFacts.org* fits one of the key missions of The Kavli Foundation, which is to promote public understanding of scientific research,” said Fred Kavli, founder and chairman of the Kavli Foundation, based in the United States. “With SfN’s vision, leadership, and resources, we see *BrainFacts.org* becoming the most trusted public source for this kind of information.”

The international reach of the founding partners set the tone for the *BrainFacts.org* mission. “I believe *BrainFacts.org* will serve a unique and important function that is presently unfilled,” said Lord Sainsbury of Turville, the settlor of the Gatsby Charitable Foundation, based in England. “With *BrainFacts.org*, the Gatsby Charitable Foundation seeks

to ensure that accurate information about the brain and nervous system is available to the public, educators, and policymakers worldwide, without boundaries or borders.”

To augment *BrainFacts.org*, SfN will continue to look to private and governmental sources of funding, with a particular emphasis on developing strategies to communicate with key constituencies, including science educators, policymakers, patient advocacy groups, and others. Additionally, the section of *BrainFacts.org* dedicated to the responsible use of animals in scientific research is funded through a generous grant from The Esther A. & Joseph Klingenstein Fund, Inc.

CONTENT PARTNERS AND INTERACTIVITY

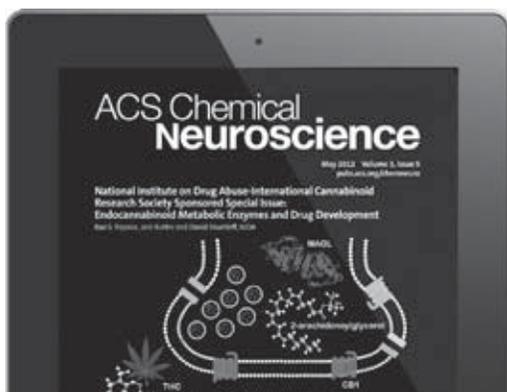
At launch, about half of the content assets are provided by inaugural content partners including the Canadian Institutes of Health Research — the Institute of Neurosciences Mental Health, and Addiction; The Dana Foundation; Foundation for Biomedical Research; International Brain Research Organization; National Institute of Mental Health; National Institute of Neurological Disorders and Stroke; and The Wellcome Trust. *BrainFacts.org* credits each piece of partner content with the organization’s logo and website link, so readers can learn more about the content partner and additional education resources.

Over time, *BrainFacts.org* expects to forge new content partnerships with organizations worldwide. While *BrainFacts.org* publishes only English-language resources, the editorial board will consider partners from any country with scientifically vetted content translated into English.

The editorial board continues to make interactivity a prominent *BrainFacts.org* goal. The site already contains compelling video content, as well as social media feeds from @Brain_Facts_org on Twitter and facebook.com/BrainFactsOrg. Blogging by neuroscientists will begin on *BrainFacts.org* in fall 2012, and multimedia teaching tools for primary and secondary-level educators will be added over time. ■

HOW MEMBERS CAN USE *BRAINFACTS.ORG*

- Link to *BrainFacts.org* on your website.
- Suggest it as a follow-up resource for family, friends, colleagues, and others unfamiliar with neuroscience.
- Search for materials to use for Brain Awareness Week and other public engagement.
- Cite in lectures and engagements with the public.
- Use to demonstrate neuroscience’s impact on society.
- Use resources to demonstrate the diversity and interdisciplinary nature of the broad field.



GUEST EDITORS: Rao Rapaka, Joni Rutter, and David Shurtleff

Endocannabinoid Metabolic Enzymes and Drug Development

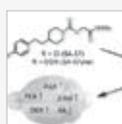
National Institute on Drug Abuse-International Cannabinoid Research Society Sponsored Special Issue

The endocannabinoid system is associated with a number of physiological functions such as mood, appetite, inflammation, pain sensation, reproduction and neurodegenerative disorders. This special issue of *ACS Chemical Neuroscience* relates to the 2011 NIDA-ICRS co-sponsored workshop of the same name and brings forth the latest research towards the characterization of metabolic endocannabinoid enzymes and the pharmacologic targeting of the endocannabinoid system.

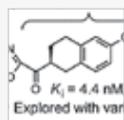
HIGHLIGHTS FROM THE SPECIAL ISSUE:



Endocannabinoid Signaling in Female Reproduction
Xiaofei Sun and Sudhansu K. Dey
DOI: 10.1021/cn300014e (Review)



O-Hydroxyacetamide Carbamates as a Highly Potent and Selective Class of Endocannabinoid Hydrolase Inhibitors
Micah J. Niphakis, Douglas S. Johnson, T. Eric Ballard, Cory Stiff, and Benjamin F. Cravatt
DOI: 10.1021/cn200089j (Research Article)



α-Ketoheterocycle-Based Inhibitors of Fatty Acid Amide Hydrolase (FAAH)
Katerina Otrubova and Dale L. Boger
DOI: 10.1021/cn2001206 (Review)

View the complete issue at pubs.acs.org/chemneuro



Preparing Graduate Students for the Job Market

The Annual Spring Conference of Neuroscience Departments and Programs brought together 70 neuroscience program directors and faculty representing 58 programs from the United States, Canada, and the Caribbean to discuss models and innovative approaches for preparing undergraduate and graduate students and postdoctoral trainees for careers both within and outside academia. The one-day conference covered current trends and issues in neuroscience training, including ways to enrich students' research experiences, providing professional skills training to better prepare students for non-traditional career paths, and approaches to using students as teachers to give them experience that will help them succeed in academia.

INSPIRED TO RETHINK NEUROSCIENCE TRAINING

Hermes Yeh, incoming chair of the SfN Committee on Neuroscience Departments and Programs (CNDP), which organizes the conference program, posed a question that served as one of the central themes of the day's discussions: "Of the PhD graduates in neuroscience, only about 20 percent actually enter academia. The other 80 percent opt for non-traditional career paths. Should we be embracing or including in our graduate training programs some aspects that will prepare students for non-academic career paths?"

In striving to address this question, speakers on the "Providing Opportunities for Non-Traditional Career Choices" panel discussed how well prepared they were when transitioning to careers beyond the bench. Christopher Tobias, Executive Vice President at Dudnyk, a healthcare marketing agency in Philadelphia, described how after working as a bench scientist for the first ten years of his professional career, he found himself suddenly unprepared for many of the common skills needed in a business environment — including financial management and business presentation skills.

Program directors and faculty members came away from the conference invigorated to apply many of the training concepts they learned about during the conference.

"It is very inspiring for me to make connections with others thinking about the same issues and to see the range of creative solutions to student training and its funding," said Bruce Johnson of Cornell University's Department of Neurobiology and Behavior. Johnson was also part of the panel discussion, "Letting Challenges Drive Creativity and Invention."

With what he learned at the conference, Johnson added, "I will make more effort to bring graduate students and



Steven Hyman, director of Stanley Center for Psychiatric Research at the Broad Institute and former provost of Harvard University, delivered the keynote address concerning training program challenges.

postdocs into the loop on what's going on behind the scenes of their research projects and help make the writing and reviewing processes more transparent."

Janet Finlay, who teaches in the behavioral neuroscience department at Western Washington University, attended the conference for the first time. "I was really impressed with the emphasis at many top-tier research institutions on opportunities for postdoctoral trainees to obtain meaningful undergraduate neuroscience teaching experience," Finlay said. "There were some nice ideas floated about how to better connect undergraduates at primarily undergraduate institutions with graduate students — I'll definitely be exploring those options further."

The conference offered a range of panels followed by interactive group discussions about nontraditional career choices, international exchange programs, and neuroscience boot camps for graduate recruits. Karen Gale, the director of admissions and professor of pharmacology at Georgetown University, found the neuroscience boot camp discussion particularly interesting.

"I enjoyed hearing about a spectrum of boot camps, some of which were a bit less ambitious and more in line with what we could envision introducing for our own program," said Gale, who also was a panelist in the

“Letting Challenges Drive Creativity and Invention” discussion. Georgetown will test out its own one-week boot camp program this summer with its incoming class.

NEUROSCIENCE TRAINING IN CHALLENGING TIMES

Keynote speaker Steven Hyman outlined the need for institutional programs to think more broadly about their trainees’ graduate experiences. Hyman is a former Harvard provost and now a visiting scholar at the Stanley Center for Psychiatric Research within the Broad Institute’s Psychiatric Disease Program.

Graduate students should embrace the interdisciplinary nature of neuroscience by specializing in a subdiscipline, Hyman said. Students need to be prepared to participate in “big science” projects that involve many types of scientists and scientific goals, such as the human genome project.

“It is important to develop students’ depth and skills in some home area of neuroscience,” Hyman said. “Important problems increasingly demand cross-disciplinary collaboration.”

Hyman also acknowledged that students are dealing with a different professional landscape and feeling the pressure to publish. He said training programs need to teach students about the benefits and challenges to various approaches to publishing. “It is important not to let students discover the complexities of the [publishing] landscape randomly or by accident,” Hyman said. “They should understand the difference between a monopoly publisher versus society publishers versus open-access journals.”

“Big science” also has complicated the already difficult process of appropriately crediting students for their research contributions in large-scale projects. “We must do a better job of ensuring credit for work done when there are many authors,” Hyman said.

Hyman is optimistic about the future of the neuroscience field, but thinks graduate programs could improve the effect of their training if they put it in the context of an eventual job search. “We should be bullish about the future, while advocating for it in the right way so our students have all of the career options that we want for them,” Hyman said.

Neuroscience programs also should explain the realities of the academic job market to their students. “Academic jobs remain limited,” Hyman said. “We don’t want to

discourage people, but we need to have realistic conversations [with students].”

COLLABORATING FOR THE FUTURE

The NDP conference also marked the launch of SfN’s new Educational Resources in Neuroscience (ERIN) web portal, a database of books, software, lab exercises, digital images, tutorials, videos, and other resources funded by NSF/Transforming Undergraduate Education in Science. The portal, introduced by Richard Olivo of Smith College, provides a forum for collaboration across the international neuroscience training community by allowing faculty to share and evaluate syllabi, lab exercises, and ideas about innovative approaches to teaching and learning.

Eric Wiertelak, director of neuroscience studies at Macalester College, was particularly impressed by the portal. “I know that I will use the ERIN resources in my work at Macalester College and encourage my faculty to do the same,” Wiertelak said. “Expanding our ability to deliver the curriculum is always labor-intensive. But with the portal in place, some of that intensive labor has already been done for us.”

A panel on international exchange programs also highlighted how collaboration can enhance students’ training experiences. Panelists offered case studies of successful international exchange programs that help students learn new techniques, broaden their intellectual perspective, build international collaborations, cultivate new teaching methods, and increase awareness of international graduate training opportunities. ■



Christopher Tobias of Dudnyk and Teresa Esch of *The Journal of Neuroscience* answer attendees’ questions after their panel discussion about providing opportunities for non-traditional career choices.

Save the date for the 2013 Annual Conference on Neuroscience Training, to be held March 8, 2013, in Washington, DC. Check sfn.org/ndp later this year for more workshop and registration information.

Spring Council Round-Up

The SfN Council met from May 21 to 22 in Washington, DC, for its spring meeting. The following highlights some key discussion items.

SfN FY2013 OPERATING BUDGET

Council passed the fiscal year 2013 Operating Budget and approved several new and expanded initiatives, including the development of online professional development content and other technology-driven projects aimed at enhancing the effectiveness of SfN's programs and operations.

The new budget reflects increases in revenues consistent with the multi-year financial plan adopted by Council. The FY2013 budget projects a 1.5 percent increase in the Society's revenue and a 3.4 percent increase in expenditures over the FY2012. Council and the Finance Committee continue to closely monitor the Society's finances and are cautiously optimistic that the Society is well-positioned to undertake these initiatives.

STRATEGIC OPPORTUNITIES AND MEMBERSHIP ENHANCEMENT

Since the fall, Council's various working and advisory groups have made progress toward achieving their strategic goals. Implementation continued on a multi-year professional development plan to better support younger members as their careers progress, while the Annual Meeting Advisory Group is conducting a survey of annual meeting attendees to identify opportunities to enhance the meeting experience.

Additionally, the Membership Enhancement Plan Working Group is exploring ways to enrich members' experience with a focus on the shifting demographics of SfN membership. Proposed activities include personalization of communications to members, leveraging technology and SfN chapters to better serve members locally, and providing programs and materials that support members throughout their professional life cycles.

ADVOCACY

Council discussed the outlook for both global advocacy and neuroscience funding in the U.S. including the proposed FY2014 flat funding for NIH and modest increases for NSF. Council also discussed the potentially severe cuts that could result from the August 2011 Congressional budget agreement that would force deep cuts in "discretionary" spending. They also discussed advocacy activities in this challenging funding climate — including engagement of Congressional representatives through Hill Day, lab tours, and other outreach activity — and approved a new GPA initiative to engage young neuroscientists in advocacy activities.

Council was also updated about the Neuroscience Policy Working Group (NPWG), which has been engaged with the White House Office of Science and Technology Policy (OSTP). Legislation passed last November to fund OSTP included language authored by Congressman Chaka Fattah (D-PA) asking the White House to establish an interagency working group to coordinate Federal investments in neuroscience research. The NPWG has met several times with leaders of this White House initiative, including OSTP Assistant Principal Director for Science Philip Rubin and Assistant Director for Biotechnology Michael Stebbins to discuss its goals and direction. The working group is actively involved in responding to White House requests and consistently communicating the continuing vital importance of investigator-initiated basic science.

TECHNOLOGY AND WEB UPDATES

Staff reported on the successful launch in May of *Brainfacts.org*, SfN's new informational Web site about the brain and nervous system funded by The Kavli Foundation and The Gatsby Charitable Foundation. Council reviewed plans to further position the Society to serve its members and the field with cutting-edge, innovative, integrated technologies, including the re-architecture and redesign of SfN's website. New features will include embedded social networking capabilities and connectivity with *NeurOnLine* and *Brainfacts.org* to enhance the website's utility and create a cohesive Web experience for SfN's members and the public. The site is expected to launch in early 2013.

Additionally, Council approved the demonstration of a new digital poster presentation format that will be showcased at Neuroscience 2012. Presenters utilizing the Dynamic Poster technology will have greater versatility in exhibiting and highlighting their scientific content. Look for the demonstration on the poster floor in New Orleans!

Council also expressed its enthusiasm for the adaptation of SfN online content for mobile technology. Mobile applications for *The Journal of Neuroscience*, *NeurOnLine*, and the annual meeting are currently in development. Finally, SfN is pursuing the creation of a business intelligence system of integrated data and analytics that will serve as a pivotal toolset in enhancing the Society's programming.

ETHICS COMMITTEE

Council approved the formation of an Ethics Committee that will investigate all ethics and misconduct allegations related to *The Journal of Neuroscience*, the annual meeting, and *NeurOnLine*, and will recommend sanctions when appropriate. The committee will be constituted this fall. ■

Mobile Accessibility Makes *The Journal* Available Everywhere



Now you can get the most cited neuroscience content wherever you go. *The Journal of Neuroscience*, the official journal of SfN, is now available for iPhone and iPad through the free JNeurosci app available for download at the iTunes App Store.

MOBILE APP FOR IPHONE AND IPAD

JNeurosci provides the current issue of *The Journal*, as well as the five most recent issues. *The Journal* app experience is interactive, with searchable

abstracts and full-text articles complete with side navigation and internal hyperlinks (such as linked article

references) that load external websites inside the app. You can browse images, article sections, and references in text and downloadable PDF formats. Devices registered with an institutional subscriber can access articles whether the user is on or off-campus.

The Journal app also tracks reading history and allows users to electronically share *Journal* content with colleagues. JNeurosci enables mobile *Journal* reading by allowing font size manipulation and simple article browsing.

JOURNAL OPTIMIZED FOR THE MOBILE WEB

The Journal is also mobile-accessible for a variety of platforms through its website which is newly optimized for small screens. Every section of *The Journal* is now easier to navigate on mobile Web browsers on devices such as Droids and Kindle Fires. Through the mobile website, subscribers can access all archived content of the most highly-cited journal in the field — anytime, anywhere. ■

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Connect With the Global Neuroscience Community



NEUROSCIENCE 2012

Neuroscience 2012, taking place in New Orleans, October 13–17, will mark the 42nd annual meeting of the Society for Neuroscience. Five days of cutting-edge research and science, presentations from leading experts, networking, and career opportunities make SfN's annual meeting the premier event for the neuroscience community. The meeting's scientific program will include nine featured lectures, 11 special lectures, 24 symposia, and 22 minisymposia covering neuroscience topics from Parkinson's disease and the neuroethics of smart drugs to neurotrophin signaling and the neurobiology of brain tumors.

The 2012 Presidential Special Lecture themes will be language, structural neuroscience, and the multidisciplinary nature of neuroscience. Janet Werker of the University of British Columbia will speak about infant language attunement, Simon Fisher of the Max Planck Institute for Psycholinguistics in the Netherlands will discuss speech and language genes, James Rothman of Yale University will explore synchronous neurotransmitter release, and Carla Shatz of Stanford University will speak about neuronal circuit tuning.

The Dialogues Between Neuroscience and Society lecture brings National Medal of Arts recipient Chuck Close to Neuroscience 2012 to speak about his art, as well as how his brain impairments have influenced his work. Close's iconic works, such as his large-scale portraits of the human face, have had a major impact on American art and culture. His talk is titled, "My Life as a Rolling Neurological Clinic."

ADVANCE YOUR CAREER AT ANY STAGE

Neuroscientists at every stage of their career have opportunities to learn about professional training and development. Looking for a graduate program? At the first annual Graduate School Fair on October 14 and 15, undergraduate students, undergraduate advisers, and graduate program staff will be able to meet face-to-face to discuss advanced neuroscience training programs.

Undergraduates and graduate program staff should visit SfN.org/neurojobs for more information about attending and exhibiting at the Graduate School Fair.

Exploring careers? The second annual NeuroJobs Career Fair is a

free opportunity for attendees to speak with employers from industry, nonprofit organizations, and academia. More information about the Career Fair and the exhibitors will be available at SfN.org/neurojobs as the annual meeting approaches.

The Career Fair will be held with concurrent academic and career development workshops, covering topics ranging from interviewing skills to ethics in science and publishing. Attendees can learn about research careers in the private sector, careers beyond the bench, and mid-career opportunities. Qualified panelists will also speak to attendees about industrial collaboration in neuroscience and connecting the humanities and social sciences to neuroscience. Early career trainees will benefit from the panel discussions about making the most out of international training opportunities and how to publish a paper.

ORGANIZE YOUR OWN EVENTS

Is there a topic-based event you would like to see at Neuroscience 2012? Make it happen by organizing a satellite event — a symposium, meeting or social event not planned or sponsored by SfN. Events can include scientific presentations, business meetings, or a purely social reception for alumni and specialty groups. Event organizers can hold social events in conjunction with or independent of a symposium. Satellite event submissions will be accepted until October 1 at SfN.org/satellites.

USE SOCIAL MEDIA TO CONNECT WITH PEERS

Neuroscience 2012 is an ideal venue for connecting with thousands of neuroscientists. Many social media tools are in place to help you

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| 43 | trees |
| 19,489 | gallons of water |
| 1,235 | pounds of solid waste |
| 4,322 | pounds of hazardous effluent |

maximize your virtual and in-person networking opportunities.

Follow @Neurosci2012 and the meeting's official hashtag, #SfN12, to read what attendees are saying and receive regular updates.

Expand your conversations with members planning to attend the meeting by using *NeurOnLine*, SfN's online member community. Find a roommate for Neuroscience 2012 using *NeurOnLine*'s "Roommate Matching Forum." Create a network with other members through group discussions you start on *NeurOnLine*. Connecting with attendees before the meeting begins will help you once you're in New Orleans.

Annual meeting blogging is another great way to contribute to the Neuroscience 2012 buzz. This year, blogs will provide various perspectives

on each of the Neuroscience 2012 themes. Applications to be a 2012 official meeting blogger will be available August 9.

"Without the meeting bloggers, it's very likely that conversation about a particular talk or presentation stops after a day or so," said Grigori Guitchounts, a 2011 official meeting blogger with guitchounts.com. Guitchounts blogged about theme G, focusing on novel methods and technology development.

Rim Khazall and Harry Mackay blogged about theme C, disorders of the nervous system, on their blog, neurobites. Khazall said, "Interacting with the general members of SfN and the neurobloggers themselves pushed me to explore other topics within neuroscience, further broadening my scope within the discipline." ■

MULTIMEDIA AT THE MEETING: DYNAMIC POSTERS

Look for dynamic poster demonstrations during each of the meeting's nine poster sessions at Neuroscience 2012. The posters will appear on a flat screen allowing the presenters to use multimedia such as video and animation in their presentations. For example, David McCormick will give a dynamic poster presentation on the interaction of excitatory and inhibitory networks in cortical functions. McCormick's poster will show his findings using videos of physiological recordings.

Dynamic posters are being introduced to the 2012 poster floor to pilot ways to help scientific presentations keep up with rapidly developing multimedia technology. Moving forward, the program could evolve to include more dynamic posters in 2013.

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