



UNC

CAROLINA INSTITUTE FOR
DEVELOPMENTAL DISABILITIES

101 Renee Lynne Court
Carrboro, NC 27510
Phone: 919-966-5171
Fax: 919-966-2230
www.cidd.unc.edu



Inside the Institute

Issue # 15
October 2014

Spencer Smith Invited to White House BRAIN Initiative

CIDD Investigator Spencer L. Smith, Ph.D. was among the invitees to the White House to discuss the [BRAIN](#) (Brain Research through Advancing Neurotechnologies) Initiative on Tuesday, September 30. Dr. Smith joined about 50 neuroscientists. Together with congressmen, and leaders from several government institutions, including the NIH, NSF, DOE, DARPA, and the FDA, the group discussed BRAIN Initiative successes in the past 18 months, and the prospects going forward.



Drs. Spencer Smith and Chris Xu (Cornell)

The BRAIN Initiative has inspired pledges of support not only from government institutions, but also non-profit institutes including the Simons Foundation and the Allen Institute, as well as for-profit companies including Google, GE, Zeiss, and Coherent. These funds have the ultimate goal of making substantial advances in human neurological health, from autism and neurodevelopmental disorders, to brain injury and post-traumatic stress disorder, and neurodegeneration and Alzheimer's disease.

So far, the BRAIN Initiative has focused on tool and technique development, to support new frontiers of research using both humans and animal model systems. Dr. Smith's work on new neural imaging technology has been awarded two BRAIN Initiative grants. After the White House meeting, the Kavli Foundation hosted a reception at a nearby hotel. There, Smith and other attendees discussed their work on the BRAIN Initiative, and the prospects for the future.

In related news, Smith received a \$300,000 National Science Foundation Early Concept Grant for Exploratory Research (EAGER) to develop a two-photon microscope capable of recording the activity of individual neurons in multiple areas of the brain at the same time. The technology will allow Smith to observe active neural circuitry in the visual cortical areas of living animals. It will allow scientists to see which neurons – and which *kinds* of neurons – fire as a result of visual stimuli or specific behaviors of the animals.

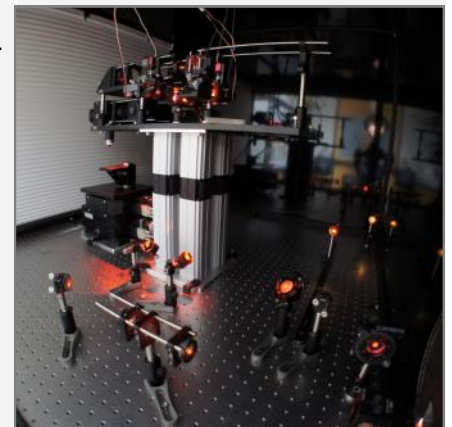
"Right now, we don't really have a good idea how that happens," said Smith, a member of the UNC Neuroscience Center. "If you want to understand how the brain works, we have to be able to look at a more systems-level view of neural activity. We think it's this type of technology that will give us the insights we need to advance our understanding of how brain circuitry actually works, not only in normal circumstances but in disease states."

For instance, scientists have made significant advances in understanding the pathology of certain brain disorders by linking a gene to a molecule and then to the faulty activity of synapses between neurons. But, Smith said, what happens to neural circuitry throughout the brain during these diseases remains poorly understood. "Down the line, we hope to address this with this new technology," Smith said.

Continued on page 9

Newsletter Highlights

Welcome Peter Duquette	2
Early Marker of Autism	2
Plasticity in the Brain	3
Editor's Award AJSLP	3
Governor's Appointment	4
New Educational Groups	4
Protein Hub Discovery	6
NrCAM Gene Link to Autism	7
Community Talk Series	8
Emily Kertcher Joins Faculty	8
Postdoc & Trainee News	10
Your Support	15



Specialized two-photon microscope, the development of which is being supported by the NSF BRAIN EAGER grant. This laser-based imaging system allows for optical recording of neural activity with single cell resolution in multiple brain areas simultaneously.

CIDD Welcomes New Psychologist, Peter Duquette



CIDD would like to welcome Peter Duquette, Ph.D., who joined our faculty this summer. Dr. Duquette is serving as the psychologist on a variety of interdisciplinary teams at CIDD, including the Preschool Assessment, Consultation, and Training (PACT) Clinic, School Age Team, Neurodevelopmental Dyads where he collaborates with our learning specialist on an individualized learning plan based on the student's neurodevelopmental profile of strengths and needs, Postsecondary Transition Clinic where he provides individualized evaluations to generate a personal profile and transition plan for young adults with developmental disabilities who have completed high school, and Prader Willi Syndrome Clinic. Dr. Duquette is also serving as the neuropsychological and developmental disabilities consultant to Central Regional Hospital. His duties there include differential diagnosis related to autism spectrum disorders and intellectual disabilities and assisting psychiatric treatment teams in considering the impact of neurocognitive dysfunction to psychopathology.

Before joining CIDD, Dr. Duquette practiced psychology for the past five years at Cornerstone Healthcare in High Point, NC. He provided outpatient neuropsychological evaluations and was co-director of a multidisciplinary autism diagnostic clinic. Dr. Duquette has also been actively involved with the North Carolina Psychological Association serving on committees related to the long-term impact of healthcare reform on individuals with developmental disabilities and psychiatric conditions. Prior to that time, he completed a post-doctoral fellowship in pediatric neuropsychology at Children's National Medical Center in Washington, DC with two years of experience in their Center for Autism Spectrum Disorders. Dr. Duquette is a former LEND trainee and graduate of the school psychology program at UNC.

Please join us in welcoming Dr. Duquette! He can be reached at 919-966-4845 or pete.duquette@cidd.unc.edu.

Repetitive Behavior in 12 Month-Olds as an Early Marker of Autism

CIDD researchers are accumulating evidence that repetitive behaviors may be observable as early as 12 months in infants who later develop autism by 24 months of age. Dr. Jason Wolff and colleagues recently published a [ground breaking study](#) documenting that parents report increased levels of repetitive behavior as early as 12 months in high-risk children (those who have an older sibling with autism) who go on to develop autism, as compared to high-risk children who do not develop autism. CIDD investigators now demonstrate that repetitive behaviors can be directly observed in a standardized clinical assessment, supplementing the previous finding from parent reports. [The study](#), "Repetitive Behavior in 12-Month-Olds Later Classified With Autism Spectrum Disorder," is currently in press to be published in the *Journal of the American Academy of Child and Adolescent Psychiatry*.

"In combination, these two papers suggest that repetitive behaviors are present very early in development and that careful observation combined with parent report could potentially augment early identification of autism," says Dr. Jed Elison, lead author of the new study.

As a graduate student at UNC conducting research at the CIDD, Elison traveled to Florida State to train with experts who had used a novel behavioral coding approach to characterizing repetitive behavior in 18-24 month-olds with autism. He and his advisor, Joe Piven, thought that they might be able to apply the same method to infants participating in the Infant Brain Imaging Study (IBIS). Elison learned the coding system and watched digital videos of over 160 12-month-old infants participating in a ~20 minute long, standardized behavioral assessment. He coded how the infants explored and manipulated objects and also whether they showed repetitive motor movements.

Repetitive motor movements, like hand or arm flapping, are quite common during the first year of life. However, "the rate of these behaviors normally decreases between 8 and 12 months of age, as infants acquire muscle strength and more control over reaching and grasping movements," says Elison. The current findings suggest that children who go on to develop autism show an increased rate of repetitive motor movements at 12 months, more than both high-risk infants who do not develop autism and low-risk typically developing infants—these two groups showed similar patterns of motor movements.

"I thought it was a good idea at the time, but also risky considering the amount of work that Jed would have to do," says Piven. "In the end the work has yielded important new evidence that will hopefully improve early identification efforts and ultimately improve the lives of children with autism and their families."



Evidence That Our Sensory Experiences Shape a Novel Form of Plasticity in the Brain

Neuroscientists believe that the connections between brain cells (neurons) must appropriately strengthen and weaken during development in a process termed synaptic plasticity, which enables proper brain development and the ability to learn and remember. The expression of synaptic plasticity in the brain changes during development, and also changes adaptively to a fluctuating environment. The loss of synaptic plasticity can impair brain development in neurodevelopmental disorders and can limit learning later in life. For example, it is commonly thought that developmental reductions in synaptic plasticity explain the increased difficulty to learn a new language with age. Excitingly, researchers from the labs of Dr. Ben Philpot and Dr. Spencer Smith at the University of North Carolina have discovered a new mechanism for adjusting synaptic plasticity during development and with changes in the environment.



Drs. Spencer Smith and Ben Philpot

Neurons in the outer portion of the brain, the neocortex, receive connections from a variety of other neuron types. Neocortex neurons help encode memories and are involved in the processing of sensory information. The authors found that the properties of synaptic plasticity between neocortical neurons depend on the cellular identity of the incoming connection. Interestingly, the authors found that a form of synaptic weakening was lost through development at one type of connection, but was maintained at a separate type of connection. The researchers found that the visual environment dictated whether this form of synaptic weakening was maintained or lost through development at the susceptible connection.

"To study each connection, we utilized a genetic approach known as optogenetics that allowed us to control the activity of specific neurons with blue light," said lead study author Rylan S. Larsen, a former graduate student at UNC School of Medicine's Department of Cell Biology and Physiology. The authors' findings demonstrate that interactions with the environment shape the connections in the brain differently depending on which cell type the connection originates from. The [findings](#) appear online August 20, 2014 in the journal *Neuron*.

What might allow one neuronal connection to be modified by sensory experience but not another? The researchers found that a specific neurotransmitter receptor, the presynaptic NMDA receptor, was regulated by sensory experience. The presence of presynaptic NMDA receptors dictated whether the ability of synaptic weakening was lost at specific connections during development. One single NMDA receptor gene product, GluN3A, in particular was required for responding to changes in the sensory environment. Since NMDA receptors contribute to a large number of neurological disorders – including schizophrenia, neuropathic pain, Alzheimer's disease, certain intellectual disabilities, and stroke – the researchers' findings are of particular importance because they suggest a novel function for these receptors in the human brain and clarify how pharmaceuticals which act on these receptors can alter brain activity. These findings have implications for the treatment of neurological disorders, including those that affect memory and cognition.

Other authors included Ikuko T. Smith, Jayalakshmi Miriyala, Ji Eun Han, and Rebekah J. Corlew of Department of Cell Biology and Physiology at the University of North Carolina. This work was supported grants from the National Institutes of Health, the National Science Foundation, UNC Department of Cell Biology and Physiology's Dr. Susan Fellner fellowship, Helen Lyng White Fellowship, and the Whitehall Foundation.

2013 Editor's Award for the *American Journal of Speech-Language Pathology*

Congratulations to Drs. Linda Watson, Elizabeth Crais, and Grace Baranek in the Department of Allied Health Sciences, along with former Ph.D. students and now colleagues Drs. Jessica Dykstra and Kaitlyn Wilson, whose research "[Communicative Gesture Use in Infants With and Without Autism: A Retrospective Home Video Study](#)" has been selected for the 2013 Editor's Award for the *American Journal of Speech-Language Pathology*. Their study compared gesture use in infants with autism with gesture use in infants with other developmental disabilities or typical development. Findings indicate that differences in gesture use in infancy have implications for early autism screening, assessment, and intervention.

Governor McCrory Appoints CIDD Deputy Director to The Commission for Mental Health, Developmental Disabilities and Substance Abuse Services

North Carolina Governor Pat McCrory appointed Jeffry Low, CIDD Deputy Director, to The Commission for Mental Health, Developmental Disabilities and Substance Abuse Services. Mr. Low will serve a three year term with the option for an additional three year renewal.

The Commission for Mental Health, Developmental Disabilities and Substance Abuse Services (Commission) of the North Carolina Department of Health and Human Services was created in 1973 as part of the Executive Organization Act. Its creation, powers, and duties are set forth, in part, in N.C.G.S. § 143B-147. Its mission is to promote excellence in prevention, treatment, and rehabilitation programs for persons with mental illness, developmental disabilities, and substance abuse disorders in North Carolina.

The Commission has the authority to adopt, amend and repeal rules to be used in the implementation of state and local mental health, developmental disability, and substance abuse service programs.



Twyla Peoples administers the oath of office for The Commission for Mental Health, Developmental Disabilities and Substance Abuse Services to Jeffry Low as his family looks on.

CIDD Adds New Educational Groups for Parents and Children

Social Smarts Parent Education

Starting this past summer, the CIDD began offering a parent education series entitled "Strengthening Your Child's Social Smarts: Strategies to Help Children with Social Cognitive Challenges."

This four week, two hour educational series is designed to empower parents to help their child learn to navigate the social world by working on and understanding the thinking behind social skills at home, at school and in the community. Based on Michelle Garcia Winner's Social Thinking® framework, which uses a cognitive behavioral approach, this program will provide parents with the tools to assist their child in understanding unwritten social rules, taking perspective of others and becoming more flexible in social situations. Winner's approach teaches kids the social cause and effect of "expected and unexpected" thinking and behavior (Winner, 2000) and how to use social smarts when dealing with life situations. The Social Smarts Education program will give parents an in depth overview of Social Thinking concepts, vocabulary, and strategies such as Social Behavioral Mapping and the Superflex® curriculum (Madrigan & Winner, 2008). The Superflex curriculum allows children to discover their own Superflexible social thinking superhero that then helps them defeat a motley crew of "Unthinkables" (social challenges represented in character form). This creative and innovative approach has proven to be effective both at home and at school and with a wide range of children who struggle with social cognitive challenges. Sherry Mergner, MSW, LCSW is the lead trainer for these groups which will be held in the fall, spring and summer. The group is also open to teachers and other professionals who work with individuals with social cognitive challenges. If you would like more information on the Social Thinking framework, go to: www.socialthinking.com.



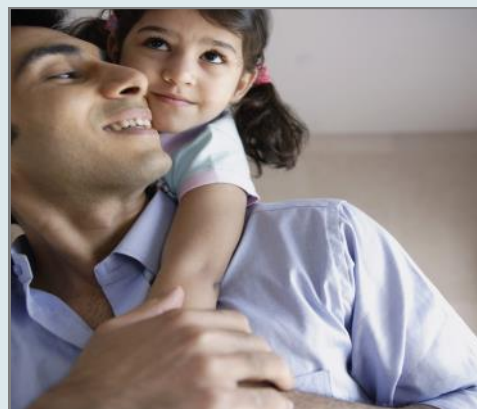
For more information on our **Social Smarts Parent Education** groups, contact Sherry Mergner at sherry.mergner@cidd.unc.edu.

Continued on page 5

CIDD Adds New Educational Groups for Parents and Children *continued*

Raising Special Kids: A Group Program for Parents of Children Recently Diagnosed with a Developmental Disability

Our Raising Special Kids parenting group will begin in February 2015. Raising Special Kids is an eight week program for parents of children who have received a diagnosis of a developmental disability within the last two years. These sessions will offer insight and guidance for any parent facing the unfamiliar challenges of raising a child with autism, intellectual disability, Down syndrome, cerebral palsy or other developmental disability. This program is designed to assist families by connecting them with other families in their community, by providing perspective on their emotional experience that can lead to acceptance and empowerment, and by helping them understand the goals of healthy, conscious parenting. Activities will focus on:



Helping parents experience the gifts that their child offers; Encouraging parents to practice self-care and appreciate all that they do for their child; Strengthening both the parent-child connection and the family as a whole; Improving family communication and developing skills to help children reach optimal potential.

Group facilitators, Sherry Mergner and Ann Palmer, will be using the "Raising Special Kids" program developed by Jared D. Massanari and Alice E. Massanari. Each group member will receive a Parent Guidebook for the group (included in the cost of this program).

For more information on our **Raising Special Kids** groups, contact Sherry Mergner at sherry.mergner@cidd.unc.edu or Ann Palmer at ann.palmer@cidd.unc.edu.

Social Smarts Camp

Another exciting addition to CIDD was the Social Smarts summer camp facilitated by Margaret DeRamus, M.S., CCC-SLP; Angie Waitt, M.S., CF-SLP; Deb Zuver, M.A., LMFT, RDT/BCT; Morgan Parlier, MSW, LCSW; and Sherry Mergner, MSW, LCSW. During the week long camp at the end of July, conference room 101 was transformed into a kid-friendly classroom for camp adventures. At Social Smarts camp, campers learned to use their social thinking tools (based on Michelle Garcia Winner's Social Thinking® model and using the *The Incredible Flexible You* curriculum) while on fun imaginary journeys to places like a farm and outer space. In addition, campers learned about identifying their emotional states, or "zones" (based on the *The Zones of Regulation*), and strategies to move from one zone to another to self-regulate. Campers and counselors had a blast at camp, making it a huge success! We look forward to starting a Social Smarts group in early 2015!



For more information on our **Social Smarts** group, contact Margaret DeRamus at margaret.deramus@cidd.unc.edu.

Let's Talk About Sexuality

The CIDD continues to explore service needs in the community. Sexuality and relationship education emerged as a specific area of need for youth with intellectual and/or developmental disabilities and their families. While major public policies and societal attitudes toward individuals with intellectual and/or developmental disabilities have evolved, perceptions toward sexuality have lagged behind. In response, the CIDD launched a new psycho-educational series in September called: "Let's Talk about Sexuality". This series, developed and co-facilitated by Morgan Parlier, LCSW, clinical social work faculty, and Kylee Miller, PhD, psychology fellow, aims to provide accurate and developmentally appropriate information about sexuality development across the lifespan and to empower youth participants to make good decisions and practice healthy behaviors related to personal relationships and their bodies. *Let's Talk about Sexuality* is comprised of a seven week curriculum offered in two concurrent group settings — one directed toward youth ages 11-16, and the other toward their parents. Included are weekly "family-focused" segments that provide opportunity for interactive family activities designed to explore and clarify family values and to strengthen communication about sexuality. Through this unique family-system approach, we hope to support positive continuous sexuality education in the home through information, strategies, and resources.

For more information on our **Let's Talk About Sexuality** groups, contact Morgan Parlier at Morgan.Parlier@cidd.unc.edu or Kylee Miller at Kylee.Miller@cidd.unc.edu.

Researchers Pinpoint Protein Hub Necessary for Proper Brain Development

Researchers at the UNC School of Medicine have found that the protein glycogen synthase kinase-3, or GSK-3, is crucial for proper brain development early in life, a surprising finding considering that drug companies are searching for ways to limit the protein's function to treat conditions such as bipolar disorder, schizophrenia, and Alzheimer's disease.

The discovery, published in the journal *eLife*, also has implications for the study of neurodevelopmental disorders, which can result from abnormal brain formation during embryonic stages and infancy.

"We found that deleting GSK-3 from a specific type of neuron disrupts how those neurons migrate through the cortex," said Meghan Morgan-Smith, PhD, a recent UNC graduate and first author of the *eLife* paper. Neuron migration is key to how the cerebral cortex becomes organized so it can function properly in adulthood. "The finding was shocking. We thought that deleting GSK-3 would enhance the migration of the neurons. Instead, the opposite happened."

Until now, scientists have viewed GSK-3 as an important drug target because it regulates the function of about 200 other proteins in different kinds of brain cells. In certain conditions, such as schizophrenia and Alzheimer's disease, GSK-3 is thought to inhibit these proteins to a greater degree than is normal. By targeting GSK-3, pharmacologists try to suppress GSK-3's activity so that some of the downstream proteins are released and provide therapeutic effects. This is how, for instance, scientists think lithium works on GSK-3 to treat bipolar disorder.

William Snider, MD, director of the UNC Neuroscience Center and senior author of the *eLife* paper, said, "Our study shows that we need to be careful when inhibiting GSK-3 because the brain requires its activity for certain developmental and physiological processes."

Snider and Morgan-Smith said that several other proteins had been previously implicated in brain layer formation, but GSK-3 could wind up being the most important regulator of the entire process because it's a hub of cell signaling for so many other proteins.

"We think this finding is the tip of the iceberg in terms of what GSK-3 does to neurons," Snider said. "It likely affects the regulation of where axons extend and what synapses do to brain plasticity, which are critical for normal brain development."

In the embryonic human brain, neurons are born from progenitor cells and then migrate to the outer reaches of the cortex. As new neurons are born, they migrate past the previously-born neurons to their final position. The last neurons born – cells called layer 2/3 excitatory pyramidal neurons – migrate past all other neurons to form a new layer just under the skull. In this fashion, neurons form cortical layers that are responsible for higher brain functions, such as learning and memory.

During this layering process, the neurons form axons – long, arm-like extensions that connect to other cells in the cortex and elsewhere in the brain. When cortical layering goes awry, these axon connections don't form properly. The result can lead to a range of neurodevelopmental disorders, such as intellectual disabilities.

This same layering process occurs in mice, which also have layer 2/3 excitatory pyramidal neurons with GSK-3.

Using mouse genetics and a technique called in utero electroporation, Morgan-Smith was able to delete the GSK-3 gene from just the layer 2/3 excitatory pyramidal neurons and then study what happens to these cells during brain development.

"Deleting GSK-3 completely shut down the system," said Morgan-Smith, who conducted the research while a graduate student in Snider's lab. "The outer cortical layers aren't formed at all. The neurons are scattered throughout the cortex."

Morgan-Smith's research is the first to study the role of GSK-3 in layer 2/3 excitatory pyramidal neurons in a living system. Other studies of GSK-3 were done in cell cultures. Her work took 3 ½ years, and the published work is her dissertation. She's now finishing work in Snider's lab to figure out if deleting GSK-3 affects the way neurons signal to each other.



Dr. Meghan Morgan-Smith



Dr. William Snider

Researchers Link Gene to Increased Dendritic Spines – a Signpost of Autism

By deleting the NrCAM gene, scientists have found a potential way to cut back on the neural connections implicated in Autism Spectrum Disorder.

Scientists at the UNC School of Medicine have discovered that knocking out the gene NrCAM leads to an increase of dendritic spines on excitatory pyramidal cells in the brains of mammals. Other studies have confirmed that the overabundance of dendritic spines on this type of brain cell allows for too many synaptic connections to form between neurons – a phenomenon strongly linked to autism.

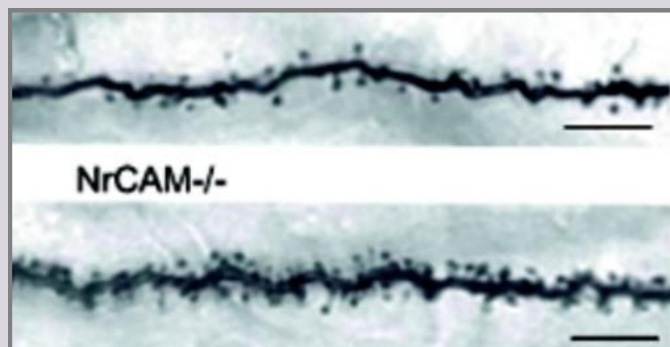
[The finding](#), published in *The Journal of Neuroscience*, adds evidence that NrCAM is a major player in neurological disorders. Previous UNC studies showed that knocking out the NrCAM gene caused mice to exhibit the same sorts of social behaviors associated with autism in humans.

“There are many genes involved in autism, but we’re now finding out exactly which ones and how they’re involved,” said Patricia Maness, PhD, professor of biochemistry and biophysics and senior author of the *Journal of Neuroscience* paper. “Knowing that NrCAM has this effect on dendrites allows us to test potential drugs, not only to observe a change in behaviors linked to autism but to see if we can improve dendritic spine abnormalities, which may underlie autism.”



Dr. Patricia Maness

Maness’s finding comes on the heels of [a report from Columbia University](#) researchers who found an overabundance of the protein MTOR in mice bred to develop a rare form of autism. By using a drug to limit MTOR in mice, the Columbia researchers were able to decrease the number of dendritic spines and thus prune the overabundance of synaptic connections during adolescence. As a result, the social behaviors associated with autism were decreased. However, the drug used to limit MTOR can cause serious side effects, and it is located inside cells, making it a potentially difficult protein to target.



A comparison of a dendrite with the protein NrCAM (top) and a dendrite without the protein (bottom), which has a greater density of spines that neurons use to form synaptic connections.

It is too early to tell if NrCAM and MTOR are linked, but Maness is now studying if the decreased amount of the NrCAM protein could trigger activation of MTOR. If so, then NrCAM, which is an accessible membrane-bound protein, might be a preferred therapeutic target for certain autism-related conditions.

In their study, Maness and her colleagues found that the NrCAM protein forms a complex with two other molecules to create a receptor on the membrane of excitatory pyramidal neurons. Maness’s team found that this receptor allows dendritic spines to retract, allowing for proper neuron pruning during maturation of the cortex. As a result, excitatory and inhibitory synapses between neurons develop in a balanced ratio necessary for brain circuits to function properly.

Maness, a member of the UNC Neuroscience Center and the Carolina Institute for Developmental Disabilities, also said that there are likely many other proteins downstream of NrCAM that depend on the protein to maintain the proper amount of dendritic spines. Decreasing NrCAM could allow for an increase in the levels of some of these proteins, thus kick starting the creation of dendritic spines.

“Basic science in autism is converging in really exciting ways,” Maness said. “Too many spines and too many excitatory connections that are not pruned between early childhood and adolescence *could be* one of the chief problems underlying autism. Our goal is to understand the molecular mechanisms involved in pruning and find promising targets for therapeutic agents.”

This research was funded by the National Institutes of Health and a Charles and Johanna Busch Biomedical Award.

CIDD Community Talk Series

Join us to learn about recent advances in developmental disabilities.

The CIDD has been hosting a series of talks to share information about recent advances in developmental disabilities. These sessions are a great opportunity for parents, teachers, professionals, and others to learn more about specific developmental disabilities topics. All talks are free, and everyone is welcome.

Wednesday, November 12th

Marian Kaslovsky, MS, LRT/CTRS

Coordinator of Adapted Recreation and Inclusion Support for Chapel Hill Parks & Recreation

Creating, Analyzing and Finding Appropriate Recreational Activities for Individuals with Developmental Disabilities

This presentation will address analyzing and finding appropriate recreational activities through conducting activity analyses and looking at the goals and benefits of recreation for individuals with developmental disabilities.



Wednesday, December 10th

Sheryl Moy, PhD

Research Professor, UNC-CH

Julie Daniels, MPH, PhD

Associate Professor, UNC-CH

Current Research in Autism: Human Population and Mouse Model Approaches for Understanding, Treatment, and Prevention

This presentation will describe the types of human and animal studies that are used to investigate the role of environment and genetics in the development of autism spectrum disorders.



Sessions are held from 7PM to 8:30PM at the CIDD

To RSVP or for more information, please contact Debbie B. Reinhartsen at (919) 966-4138 or Debbie.Reinhartsen@cidd.unc.edu

Emily Kertcher Appointed to Clinical Assistant Professor



We'd like to congratulate Dr. Emily Kertcher as she transitions to Clinical Assistant Professor in the Division of Occupational Science and Occupational Therapy within the Department of Allied Health Sciences, School of Medicine at UNC Chapel Hill. Dr. Kertcher is a former CIDD LEND trainee and will continue her clinical and educational roles at the CIDD, serving on interdisciplinary clinical teams and mentoring OT students. She co-facilitates the LEND Problem-Based Learning Course at CIDD and teaches additional courses at DAHS. In addition, Dr. Kertcher is the project coordinator for the ASD State Implementation Grant.

Spencer Smith Receives NSF Grant to Build a Better Way to Explore the Brain *continued*

Smith, whose [most recent research](#) was featured in the journal *Nature*, is not new to designing microscopes. His first two-photon microscope allowed him to view individual neurons firing in the brain of a mouse over an area of 1.4 millimeters. His team then designed a system to view individual neurons firing over a span of 3.5 mm.

"But we really need to optimize the optics on that microscope before we can use it," Smith said. "This is what the NSF grant is supporting." Typically, when scientists want to build a microscope, they buy the lenses off the shelf. Smith, though, couldn't find what he needed. "And the custom design process was extremely slow and expensive," he said. "I figured we'd see if we could do this ourselves."

He enlisted the help of Jeffrey Stirman, PhD, a postdoctoral fellow and bioengineer in his lab, and Mike Kudenov, PhD, an optics expert at NC State. The team designed precisely what Smith knew he'd need to increase his field of view in the visual cortex while also improving the resolution of the images of the neurons. Smith's lab is currently building the new microscope, including developing custom optical systems.

"It's as if you're developing a high performance car; typically you'd find a nice engine to put in it," Smith said. "You wouldn't think about buying a hunk of aluminum and start drilling to make the entire thing from scratch. But that's sort of what we did to make the objectives for the microscope – the actual glass lenses that we needed in order to get the performance out of the microscope that we want."

Smith plans on finishing the construction of the microscope in the next two years with the new grant support.

The NSF issued 36 EAGER grants to researchers working to create technologies that will allow scientists to better understand how complex human behaviors result from neural activity inside the brain. The grants, totaling \$10.8 million, were made in support of President Barack Obama's [BRAIN Initiative](#), a multi-agency endeavor with the goal of creating new neurotechnologies to help scientists open new areas of investigation into how the brain works.



The CIDD participated in the ALS Ice Bucket Challenge. Thanks to our good friend Steve Reznick who was recently diagnosed with ALS and joined us as an inspiration.

CIDD Postdoc & Trainee Accomplishments and News

LEND Audiology Fellows Awarded Summer Research Traineeships



Jenna Browning (left); Sadie Schwarz (right)

Sadie Schwarz and Jenna Browning, third-year graduate students in UNC's Doctor of Audiology (AuD) program, were each awarded T35 Research Traineeships for the summer of 2014. Ms. Schwarz completed her research experience at Vanderbilt University under the mentorship of Dr. Ben Hornsby, with a focus on behavioral and subjective listening fatigue. Ms. Browning's research experience at Boystown National Research Hospital in Omaha was mentored by Dr. Ryan McCreery with a focus on hearing aid features designed to improve the understanding of speech in children with hearing loss. Their work will be presented at the annual convention of the American Auditory Society in the spring, 2015. Both students described the summer experience as a valuable learning opportunity and an ideal complement to their LEND training at UNC. Ms. Schwarz and Ms. Browning are funded by a supplemental grant to our LEND program aimed at increasing the number of audiologists with knowledge and skill in specialized areas of pediatric audiology. Ms. Schwarz, who completed her undergraduate degree at Ohio State University, and Ms. Browning, a graduate of the University of Washington - Seattle, are planning audiology careers that combine clinical service with participation in clinical research.

Future Directions for Research in Autism Spectrum Disorders

The past few years have witnessed unprecedented transformations in the understanding of autism spectrum disorder (ASD) neurobiology, genetics, early identification, and early intervention. However, recent increases in ASD prevalence estimates highlight the urgent need for continued efforts to translate novel ASD discoveries into effective interventions for all individuals with ASD. CIDD psychology trainee, Cara Damiano, is first author on a review paper that was recently published in the *Journal of Clinical Child and Adolescent Psychology*. CIDD investigator Dr. Gabriel Dichter, Damiano's advisor, is senior author. Their paper titled "[Future Directions for Research in Autism Spectrum Disorders](#)" highlights promising areas for ongoing and new research expected to quicken the pace of scientific discovery and ultimately the translation of research findings into accessible and empirically supported interventions for those with ASD.

As part of the CIDD Autism Journal Club on March 18th, 2015 at 4pm in CIDD room 101 Ms. Damiano and Dr. Dichter will be discussing this paper, as well as other potential directions for future autism research. If you would like to be added to the listserve for this journal club, please send Dr. Dichter (dichter@med.unc.edu) your onyen.

Khalilah Johnson Named as 2014-2015 Trainee Liaison



Khalilah Johnson, MS, OTR/L has been named as the 2014-2015 Trainee Liaison representing the CIDD for the Leadership Education in Neurodevelopmental and Related Disabilities (LEND) program. The goal of LEND is to prepare trainees from diverse professional disciplines to assume leadership roles in their respective fields and to improve quality of life for individuals with developmental disabilities and their families. Trainee liaisons identify strategies to improve trainee networking and linkage within the Association of University Centers on Disabilities (AUCD; www.aucd.org) network, and improve the exchange of information among trainees across the network and within their own Centers. Mrs. Johnson is a doctoral candidate and teaching fellow in the *Division of Occupational Science and Occupational Therapy*. She has eight years clinical experience in practice areas including acute care, inpatient rehabilitation, and home health care. Khalilah's research interests include the institutionalization of adults with intellectual disability and the sociopolitical structures which organize how they choose and participate in daily life activities and their transition from institutions to local communities. She is supervised by Dr. Emily Kertcher.

Drs. Swanson and Kinard Receive Joanne Erwick Roberts Early Career Award

Congratulations to Meghan Swanson, Ph.D., and Jessica Kinard, Ph.D., recipients of the 2014 Joanne Erwick Roberts Early Career Award.



Dr. Swanson is a CIDD NICHD T32 postdoctoral scholar working with Joseph Piven, M.D., on the Infant Brain Imaging Study (IBIS), a multi-site longitudinal study of infants at risk for autism. Dr. Swanson's research focuses on the early social risk and protective factors that could influence brain development and cognitive outcomes for infants at risk for autism. She uses cutting-edge technology developed by the LENA Research Foundation which employs pocket sized speech recorders to generate information on the amount of child and adult speech during a full day recording of the home life. Information on the early language environment is then compared to brain development using longitudinal magnetic resonance imaging brain scans. Understanding these dynamic brain-behavior relationships could potentially provide insight into targets for early intervention.



Dr. Kinard is a postdoctoral scholar working with Gabriel Dichter, Ph.D., on the Restricted Interests and Repetitive Behaviors project, examining neural mechanism of reward learning in adolescents with autism. For this study, adolescents with and without autism participate in clinical assessments and fMRI scans, which examine anticipatory responses to social and non-social stimuli. Prior to her postdoctoral position, Dr. Kinard worked under the mentorship of Linda Watson, Ed.D., on the Early Development Project, studying the efficacy of a parent-mediated intervention for improving the social-communication and sensory-regulatory skills of toddlers at-risk for autism. For her dissertation, Dr. Kinard examined the success of this parent-mediated intervention for Spanish-speaking families of toddlers and preschoolers with autism.

The Joanne Erwick Roberts Early Career Award was established in 2009 to support the early career development of researchers. Dr. Roberts had a long and distinguished career as a researcher at UNC from 1981 until her death in 2008. Dr. Roberts' primary appointment was at the FPG Child Development Institute. She was also a Professor in the Division of Speech and Hearing Sciences, Research Professor of Pediatrics, and actively involved in the CIDD.

Sarah Hannigen Laughlin Receives Wallach Award

Congratulations to CIDD psychology intern, Sarah Hannigen Laughlin, Ph.D., recipient of the 2013-2014 Wallach Award. Each year, UNC's Department of Psychiatry Clinical Psychology Internship program recognizes graduate student excellence and superior accomplishment with the Wallach Award.

Dr. Hannigen joined the CIDD in September 2013, hailing from Pittsburgh, PA. She completed graduate training at the University of Pittsburgh, and prior clinical research training at the Yale University Child Study Center. Since graduating from Bates College in 2003, Dr. Hannigen's clinical work and academic experience has centered on children with developmental disabilities and their families.

As the clinical psychology intern at UNC, Dr. Hannigen worked with and learned from most of CIDD's clinical faculty. She was mentored by Dr. Jean Mankowski, psychologist and Clinical Assistant Professor at the CIDD. "At the CIDD I was able to develop expertise in my professional areas of interest: individuals with autism spectrum disorders, psychodiagnostic assessment, and neuropsychology," said Dr. Hannigen who is currently a Post-Doctoral Fellow in Clinical Neuropsychology within the Department of Psychiatry at Allegheny General Hospital in Pittsburgh. "Outside of the CIDD, I was able to gain breadth of experience that complemented my interest in developmental disabilities through work at the Center for Child and Family Health (CCFH), TEACCH, WakeMed Hospital's NICU, and UNC's Children's Hospital's inpatient child unit."



The Wallach Award intern displays significant progress toward excellence as a scientist-practitioner. This includes an appreciation of the empirical basis of psychological work in the intern's chosen area of clinical practice, demonstrated strengths in written and oral expression, and high ethical standards. Additionally, the awardee demonstrates the thoughtful style, conscientiousness, genuine care and respect for clients and colleagues, and advocacy of the needs of underserved populations which characterized Dr. Martin Wallach.

Welcome New T32 Postdocs

The CIDD T32 Postgraduate Research Training Program is to develop researchers with expertise in both the biological basis and clinical manifestations of neurodevelopmental disorders. This broad-based and integrated perspective enables researchers to better relate across disciplines and maximizes the potential for major research advances in understanding the pathogenesis and treatment of these disorders.



Shanna Resendez, Ph.D. received her doctorate from the University of Michigan, Ann Arbor. Working in the lab of Dr. Brandon Aragona, Shanna's research examined the role of the endogenous opioid system in the formation and maintenance of selective social attachments. To conduct this research, Shanna combined behavioral pharmacology, anatomical techniques, and neurochemistry with an animal model of social attachment, the socially monogamous prairie vole, to identify a dramatic reorganization of brain reward circuitry that occurs following the establishment of a social bond. Through the CIDD T32, Shanna is conducting research under the mentorship of Dr. Garret Stuber that utilizes *in vivo* imaging techniques to identify the activity of oxytocin neurons during a socially engaging task. Shanna plans to apply this approach to a mouse model exhibiting autistic-like phenotypes in order to examine how the activity of oxytocin neurons during social behavior varies among mice with varying degrees of sociality.



Mark Shen, Ph.D. received his doctorate in Cognitive Neuroscience from the UC Davis MIND Institute under the mentorship of David Amaral. Mark used longitudinal MRI methods to study the brain development of infants at-risk for developing ASD, in collaboration with Sally Ozonoff. His research identified a structural brain anomaly in infants at 6 months of age that was associated with a later ASD diagnosis at 3 years of age and was predictive of autism symptom severity. Mark joined the CIDD T32 program to work with Heather Hazlett and Martin Styner to study the brain development of children with related neurodevelopmental disorders including ASD, Fragile X, and Angelman Syndrome. In addition, Mark will apply molecular genetics approaches to determine the relationships between aberrant brain development and genetic risk factors in infants who develop ASD. His research aims to increase our understanding of the pathogenic mechanisms that underlie gene-brain-behavior relationships in children with neurodevelopmental disorders.



Michael Sidorov, Ph. D. received his doctorate from the Massachusetts Institute of Technology in neuroscience. Working with Dr. Mark Bear, he characterized how metabotropic glutamate receptor 5 (mGluR5) regulates *in vitro* and *in vivo* forms of synaptic plasticity in mouse visual cortex. Michael also used novel therapeutic approaches targeting mGluR5-mediated signaling and to ameliorate physiological and behavioral phenotypes in a mouse model of Fragile X syndrome. At CIDD, Michael will be working with Dr. Ben Philpot studying a mouse model of Angelman syndrome. His work will investigate neural mechanisms underlying cortical processing in Angelman syndrome model mice and their consequences on disease-relevant behaviors.

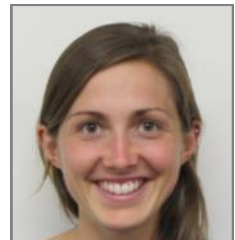
Welcome to Our 2014-2015 Long-Term Fellows & Trainees



Samantha Anscher is a LEND Family Trainee mentored by Ann Palmer. Samantha recently completed her undergraduate degree and is currently applying to Occupational Therapy schools to pursue her interests in Maternal and Child Health.



Lisa Englander is a UNC MPH/RD nutrition student, mentored by Janice Sommers. Lisa is especially interested in pediatric clinical nutrition and assisting children and their families in achieving optimal development in challenging situations.



Emily Bellfi is a 2nd year student in the MPH/RD program at UNC, mentored by Janice Sommers. Emily is interested in working in Pediatric Nutrition, in both the clinical and public health settings.



Conner Haring is a 2nd year Audiology student, mentored by CIDD faculty Jack Roush. Conner is interested in newborn hearing screenings and reasons for delay of diagnosis.



Jenna Browning is a 3rd year student in the Audiology program at UNC, mentored by Jack Roush. She is interested in working with children who have hearing loss and has a specific interest in translational research for children with DD.



Andrea Hartzell is a physical therapist and MCH LEND fellow, mentored by Katie Ollendick. Andrea is interested in further developing her leadership skills and gaining knowledge on establishing a multidisciplinary approach to treat children she serves.



Julia Campbell is a 2nd year graduate student at North Carolina Central University's program for Communication Disorders. Her interests include working with neurodevelopmental disorders across the lifespan. Julia is mentored by Debbie Reinhartsen.



Sara Harwood is a second year student in the School of Social Work and Gillings School of Public Health dual degree program. She is interested in international work around the reproductive health and nutrition of mothers and children. Sara is mentored by Anita Farel.



Ashley Costner is a School Psychology student completing her Advanced Doctoral Externship under the supervision of Peter Duquette. Her current research and clinical interests include I/DD and traumatic brain injury.



Brendan Hendrick is a 3rd year PhD student in UNC School Psychology. Research interests include school based mental health service provision and universal social emotional learning intervention. Brendan will be working in CIDD's Autism Diagnosis Clinic and Behavior Medicine Clinic, mentored by Pete Duquette.



Cara Damiano is the CIDD intern from the UNC clinical psychology program where she worked with Gabriel Dichter. Cara's clinical interests are related to the assessment of DD (particularly autism spectrum disorders) and her research interests are related to neuroimaging of children with ASD.



Laura Hiruma is a clinical psychology postdoctoral fellow in the LEND Program, mentored by Jean Mankowski. Laura's clinical and research areas of interest include interdisciplinary diagnostic assessment, behavioral interventions, and social skills interventions for individuals with DD.



Pam Dickens is a professional advocate in the LEND Program, mentored by CIDD faculty Deb Zuver. Pam's interests include public health and health promotion for individuals with DD.



Kim Holden is a 2nd year student in the Doctor of Audiology program at UNC, mentored by Jack Roush. Kim is focused in pediatrics, and has a particular interest in the clinical management of children with auditory neuropathy spectrum disorder (ANSD).

Welcome to Our 2014-2015 Long-Term Fellows & Trainees *continued*



Katie Houser is a LEND Self-Advocacy Trainee who is very committed to the field of developmental disabilities and shows great potential as a leader in the field. Katie's CIDD faculty mentors are Deb Zuver and Donna Yerby.



Matthew Mier is a 2nd year student in the School Psychology program. Areas of interest include ASD, behavioral interventions, and the impact of different teaching styles on student outcomes. Matt is working with Lynn Makor as the CIDD/NCDPI School Psychology research assistant.



Laura Jacobsen is a 3rd year UNC pediatric resident with special interest in hearing loss. She is working to develop a teaching module for physicians/residents about the diagnosis and management of hearing loss and speech delay in NC. Mentored by Jack Roush.



Andrea Millea is a Physical Therapist in the LEND program at the CIDD in conjunction with Duke University's Pediatric Physical Therapy Residency program. Andrea's CIDD faculty mentor is Katie Ollendick.



Khalilah Johnson is a PhD candidate/teaching fellow UNC Division of Occupational Science/Occupational Therapy. Research interests include the institutionalization of adults with ID, sociopolitical structures which organize how they choose and participate in daily life activities, and their transition from institutions to local communities. Mentor is Emily Kertcher.



Kylee Miller is a Psychology LEND Post-Doctoral Fellow. Mentor is Heather Hazlett. Clinical interests in diagnostic evaluation and treatment of DD and pediatric populations. Research interests lie at the nexus of cognition, health, and academic performance in school aged children, as well as patient education and advocacy for at-risk, underserved populations.



Susan Kermon is a LEND Self-Advocacy Trainee Coach, mentored by Deb Zuver. She has a BFA in Sculpture from UNC-Greensboro. Susan was diagnosed with ASD in February 2012, and is particularly interested in adults who have learned later on in life that they are on the spectrum.



Chelsea Privette is a graduate student in the Communication Disorders Program at North Carolina Central University. Her areas of interest include bilingualism, culturally/linguistically diverse populations, and autism. CIDD faculty mentor is Debbie Reinhartsen.



Elizabeth Kunreuther is a LEND Family Trainee, mentored by Ann Palmer. Elizabeth recently earned her MSW from UNC and is currently employed by Carolina Outreach as a member of a Community Support Team offering services in Wake and Durham counties.



Krysta Gougler Reeves is a 1st year Social Work student in the MSW/MPH dual degree program with Maternal and Child Public Health. She is interested in the connections between social work and public health, specifically health among women with I/DD. CIDD faculty mentor is Sherry Mergner.



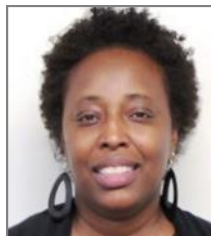
Heather Mazzola is a 2nd year audiology student at UNC. She has worked with Special Olympics Healthy Hearing for many years and hopes to continue working with this population in her career as an audiologist. Heather's CIDD faculty mentor is Jack Roush.



Sadie Schwarz is a 3rd year Audiology Student at UNC. She is interested in Pediatric Audiology and within that area, she is specifically interested in working with children with multiple disabilities as well as the Spanish-speaking population. CIDD faculty mentor is Jack Roush.



Megan McVea is a former teacher and current 2nd year student in the school psychology doctoral program. Her research interests are social emotional learning in tiered school-based mental health services, and neuropsychology as it relates to school functioning. Mentored by Donna Yerby.



Pamela Smith is a Post-Masters student in the Psychiatric Mental Health Nurse Practitioner Program at UNC School of Nursing. She has worked as a Family Nurse Practitioner, serving the medically underserved populations for fifteen years. CIDD faculty mentor is Rob Christian.

Welcome to Our 2014-2015 Long-Term Fellows & Trainees *continued*



Rachel Taylor is a LEND trainee, and student at both UNC School of Social Work and Duke Divinity School. She is interested in exploring how faith-based organizations and multi-faith communities can assist families with developmental disabilities. Mentor is Sherry Mergner.



Julie Williams-Swiggett is a parent of a child with bilateral sensorineural hearing impairment. She is interested in becoming a stronger advocate for her child and leading other parents in their roles as advocates for children with special healthcare needs. CIDD faculty mentor is Ann Palmer.



Angie Waitt is a speech language pathology clinical fellow and LEND fellow. Mentors are Margaret DeRamus and Debbie Reinhartsen. Areas of interest include interdisciplinary diagnostic assessment and intervention for children with I/DD, ASD, childhood apraxia of speech, and complex communication disorders. Also interested in literacy and use of AAC with children who have special needs.



Stephanie Wolfe is an MD/MPH, fourth year Pediatric Neurology resident, and first year LEND fellow. Clinically, she strives to provide developmentally and functionally relevant neurologic care. She is also interested in translational and diagnostic research for neurodevelopmental disabilities. Mentor is Rob Christian.



Dani Warmund is a 2nd year audiology student, mentored by Jack Roush. Dani's interests include the field of pediatric audiology with a specific emphasis in the care and intervention of children with multiple developmental disabilities.



Latasha Woods is a doctoral student in UNC's School Psychology Program. While working at the CIDD as a Psychology Extern, she will be involved with PACT, SAT, and the Neurodevelopmental Dyad clinics. Latasha's CIDD faculty mentor is Jean Mankowski.

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