

**RUTGERS**  
School of Arts and Sciences

**Fall 2019**

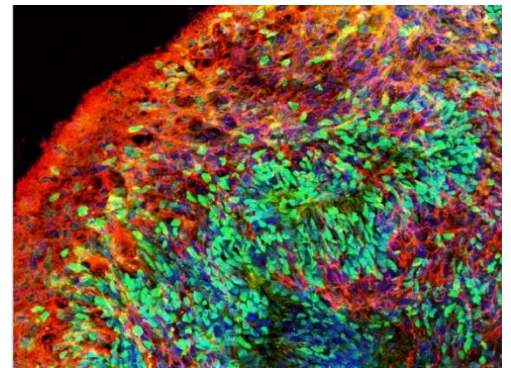
**IN THIS ISSUE**

## A Message from the Chair

Welcome to the Fall issue of Department of Cell Biology and Neuroscience (CBN) newsletter. In this newsletter, we highlight the research of Assistant Professor Peng Jiang, as well as Assistant Professor Victoria Abaira receiving the Pew Scholar Award – only the fourth Rutgers Pew Scholar and the first female faculty receive this honor! We also recently recruited Dr. Rafiq Huda, who is completing his postdoctoral studies at MIT, to Rutgers and he will be joining us in January 2020! On the last page, you will find CBN news bites, a collection of events and happenings within the department.

Best wishes for a happy and healthy holiday!

With warm regards,



### Targeting Key Gene Could Help Lead to Down Syndrome Treatment

Jiang Lab's research is featured in Rutgers Today

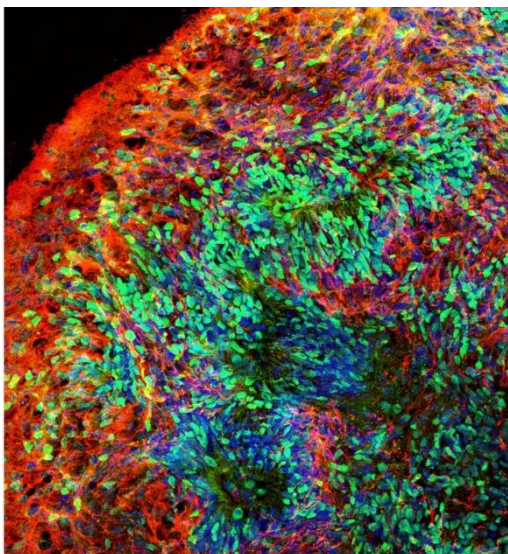


### CBN Welcomes Dr. Rafiq Huda

CBN will welcome new Assistant Professor Dr. Rafiq Huda to the department in January 2020.

# Targeting Key Gene Could Help Lead to Down Syndrome Treatment

By Todd Bates; This article was previously featured in Rutgers Today



A living 3D "organoid" model of the brain generated from Down syndrome human stem cells. Photo: Ranjie Xu

Targeting a key gene before birth could someday help lead to a treatment for Down syndrome by reversing abnormal embryonic brain development and improving cognitive function after birth, according to a Rutgers-led study. Using stem cells that can turn into other cells in the brain, researchers developed two experimental models – a living 3D "organoid" model of the brain and a mouse brain model with implanted human cells – to investigate early brain development linked to Down syndrome, according to the [study in the journal Cell Stem Cell](#). The study focused on human chromosome 21 gene OLIG2.

"Our results suggest the OLIG2 gene is potentially an excellent prenatal therapeutic target to reverse abnormal embryonic brain development, rebalance the two types of neurons in the brain – excitatory and inhibitory, and a healthy balance is critical – as well as improve postnatal cognitive function," said [Peng Jiang](#), assistant professor in the [Department of Cell Biology and Neuroscience](#) at [Rutgers University–New Brunswick](#).

Usually, a baby is born with 46 chromosomes, but babies with Down syndrome have an extra copy of chromosome 21. That changes how a baby's body and brain develops, which can lead to mental and physical challenges, according to the [U.S.](#)

[Centers for Disease Control and Prevention](#). Down syndrome is the most common chromosomal condition diagnosed in the United States, affecting about one in 700 babies, and about 6,000 infants are born each year with the condition.

The researchers obtained skin cells collected from Down syndrome patients and genetically reprogrammed those cells to human-induced pluripotent stem cells (hiPSCs). Resembling embryonic stem cells, the special cells can develop into many different types of cells, including brain cells, during early life and growth and are useful tools for drug development and disease modeling, according to the [National Institutes of Health](#).

Using brain cells derived from stem cells with an extra copy of chromosome 21, the scientists developed the 3D brain organoid model, which resembles the early developing human brain. They also developed the mouse brain model, with stem cell-derived human brain cells implanted into the mouse brain within a day after the mice were born. They found that inhibitory neurons – which make your brain function smoothly – were overproduced in both models, and adult mice had impaired memory. They also found that the OLIG2 gene plays a critical role in those effects and that inhibiting it led to improvements.

To read the full article click [\[here\]](#).

## Assistant Professor Victoria Abaira Named 2019 Pew Scholar

Dr. Victoria Abaira was named one of 22 Pew Scholars of 2019. Dr. Abaira will explore the neural circuits involved in processing and responding to touch.

"Although touch is an important part of our everyday lives and shapes how we move through the world and interact with others, it is the least studied of all the senses," Abaira said in her bio posted on Pew. "As a postdoctoral fellow, I discovered that most of the neurons in the skin that detect touch relay information to cells in the spinal cord, rather than communicating directly with the brain."

Using methods in molecular genetics coupled with advanced techniques for manipulating and monitoring the activity of individual neurons in awake mice, her team will stimulate or silence specific spinal circuits to determine how they encode tactile sensations and use this information to guide the animal's behavior and its ability to coordinate movement. The team will also explore, for the first time, how social touch is modulated by spinal circuits that differ from those that process the touch that allows us to grasp and distinguish objects.

"Our findings could lead to new treatments for disorders that impair social interactions, such as autism, or to improved therapies for spinal cord injury," she says.

The Pew Charitable Trusts awarded 22 early-career researchers who have been selected to join the Pew Scholars Program in the Biomedical Sciences. These promising scientists will receive four years of funding to invest in exploratory research to advance human health and tackle some of biomedicine's most challenging questions.

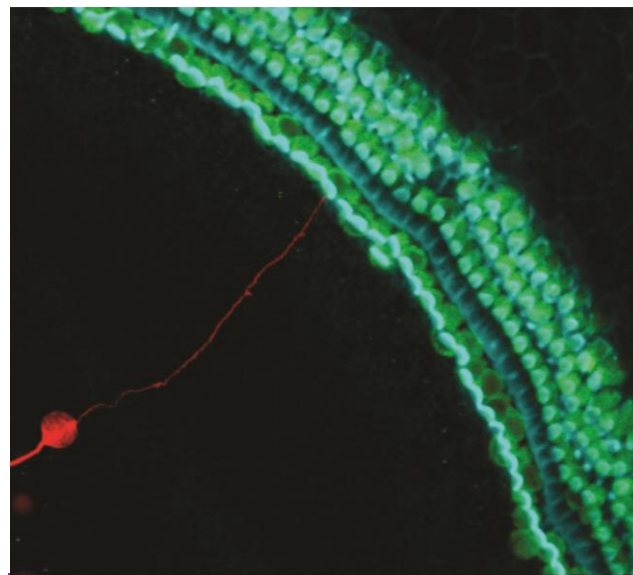


**Dr. Victoria Abaira is only the fourth Pew Scholar from Rutgers and the first female faculty to ever receive this honor.**



# Meet Dr. Rafiq Huda, CBN's New Faculty Member

The Department of Cell Biology and Neuroscience is excited to welcome Dr. Rafiq Huda to the department in January 2020! Dr. Huda completed his undergraduate studies at Carleton College, where he studied Biology and Neuroscience and continued his training through graduate studies at Northwestern University. Using cellular electrophysiology techniques, he uncovered novel mechanisms for respiratory motor control by brainstem neural circuits. Seeking to bridge the mechanisms operating at cellular and systems levels, he did his postdoctoral work in the Dept. of Brain and Cognitive Sciences at MIT, where he extended his training to systems neuroscience and advanced optical methods for analysis of neural circuits in behaving mice. He uncovered the function of distinct prefrontal cortex circuits in attention and motor planning and also dissected the role of striatal circuits in reward-based learning. Dr. Huda's long-term research goal is to understand the cellular and neural circuit mechanisms underlying key cognitive functions like attention and behavioral flexibility. Current work in his lab emphasizes the role of molecularly- and anatomically-defined cortical, striatal, and midbrain circuits in attention and flexibility using next-generation optical tools. In addition to resolving the contribution of these circuits to various cognitive functions, his work will identify general principles for information flow and computation in long-range brain circuits.



COVER PAGE: PHOTO CREDIT TO KWAN LAB; IMMORTALIZED MULTIPOTENT OTIC PROGENITORS DERIVED NEURON LABELED IN RED ENGRAFTED ONTO A COCHLEA. HAIR CELLS ARE LABELED IN GREEN AND CYAN.

## CBN News Bites

### Assistant Professor Brian Daniels Receives American Parkinson's Disease Association Grant

Dr. Brian Daniels has received a \$75,000 grant from the American Parkinson's Disease Association to study roles for programmed cell death signaling in astrocytes during Parkinson's Disease (PD). These studies aim to identify molecular mechanisms that promote harmful astrocyte activation in PD, with the ultimate goal of informing future development of therapies targeting this process.

### Associate Professor Qian Cai Receives NIH Grant Renewal for Alzheimer's Research

Dr. Qian Cai has received a renewal for a \$2,625,000 R01 grant to study regulation of mitochondrial quality through mitophagy in Alzheimer's Disease (AD). The goal of this study is to establish a causative link between mitophagy deficits and early synaptic pathology in a physiological Alzheimer's Disease model and define mechanistic details of a strategy that can rescue mitophagy deficiency and bioenergetics dysfunction in AD mice.

### CBN Gathering, October 10, 2019

CBN recently held our third annual CBN Gathering in conjunction with the CBN Student Society on October 10, 2019 at the Nelson Labs. The fair was geared towards students who are currently in the CBN major and those who are interested in becoming CBN majors. It featured two presentations. Dr. Greg Sobol of the

Health Professions Office, spoke about getting into Medical School, and Dr. Janet Alder, Associate Professor at Robert Wood Johnson Medical School, discussed alternate career options and various graduate studies in the biomedical sciences. After the presentations, students had the opportunity to visit booths and meet and mingle with CBN faculty in an informal setting.

### SAS Major Fair, October 23, 2019

Dr. Shu Chan Hsu, Director of Advising, at the School of Arts and Sciences Major Fair on Wednesday, October 23<sup>rd</sup> answering questions about the CBN Major.

### Distinguished Professor Wise Young Featured in SAS News, November 8, 2019

Distinguished Professor Wise Young's research and mission on spinal cord injury was featured in Rutgers Today. He and the W. M. Keck Center for Collaborative Neuroscience hold open houses nearly every month to provide updates on spinal cord injury research and clinical trials. To read the article, click [[here](#)].

### 2020 CBN Retreat

Keep an eye out for details regarding the 2020 Annual CBN Retreat! CBN will be hosting a retreat open to undergraduate students, graduate students postdoctoral associates, and faculty. The first half of the retreat will consist of presentations from CBN faculty and the latter half will be a poster presentation by graduate students and postdoctoral associates.

Left: CBN Student Society and Dr. Greg Sobol talking at the CBN Gathering




Right: Dr. Wise Young at the W.M. Keck Center Open House

## Supporting our CBN Students & Faculty



This holiday season, we hope you will consider a gift to our CBN Awards Fund and help us reward the hard work and commitment of our students. As you reflect on your own experience as an undergraduate with a passion for the sciences, we hope you will remember how important it was for you to be recognized for your work. We hope, with your help, to do that for our students today so that they may be inspired to pay it forward in the future.

In addition, a gift to the fund will also support students in their research and educational endeavors and assist in funding leading biomedical research by our CBN faculty.



**Every gift goes a long way!**  
**We wish you and yours**  
**a peaceful and joyous holiday.**



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