

New Staff Members
Recent Publications



Appel
8

Burré Lab



New lab members:

- Saad Ahmad, research technician, Sharma and Burré labs
- Yan Xie, volunteer & soon to be research technician, Sharma and Burré labs
- Shrey Jhalani, volunteer, Sharma and Burré labs
- Katherine Tsang, rotation student, Burré lab
- Virginia Gao has been promoted. Virginia is now a Movement Disorders Fellow at Columbia University and pursuing her research in my lab as an Instructor at WCM.



New PI funding:

- 1RF1NS126342-01, The impact of beta- and gamma-synucleins on alpha-synuclein's synaptic function, MPI Burré and Sharma.
- 1R21NS127939-01, Synaptic vesicle changes in synucleinopathies, PI Burré.
- CTSC Pilot Award, Enteric nervous system alpha-synuclein as a biomarker for Parkinson's Disease, PI Burré

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Mentee awards:

- 3R01NS113960-02S1, Diversity Supplement, Juan Antonio Briano
- 1F31NS125949-01A1, The role of beta-synuclein in synaptic vesicle release, Lauren Komer.
- Postdoctoral fellowship, American Epilepsy Society, Aniv Brukner
2022 AAN Resident Research Scholarship, American Academy of Neurology, Virginia Gao.
- Travel award, Synuclein 2022 meeting, Leuven/Belgium, Virginia Gao.
- Travel award, 4th Pan American Parkinson's Disease and Movement Disorders Congress, Virginia Gao.
- Travel award ("Futures in Neurology Research scholarship"), American Academy of Neurology, AAN meeting, Virginia Gao



Papers:

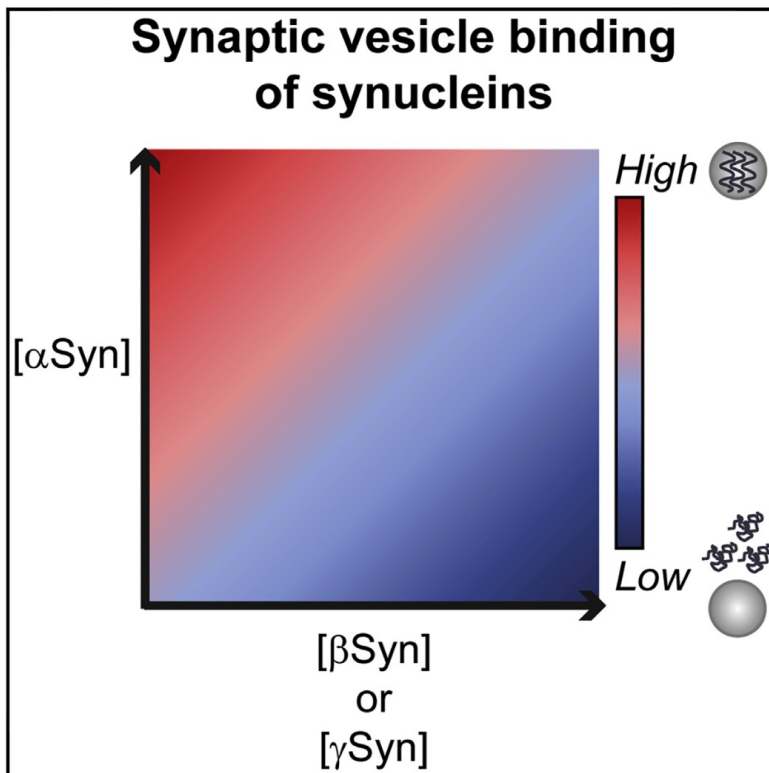
Carnazza KE, Komer LE, Xie YX, Pineda A, Briano AJ, Gao V, Na Y, Ramlall T, Buchman VL, Eliezer D, Sharma M, Burré J. Synaptic vesicle binding of α -synuclein is modulated by β - and γ -synucleins. Cell Reports, 39: 110675 (2022).

Cell Reports

Article

Synaptic vesicle binding of α -synuclein is modulated by β - and γ -synucleins

Graphical abstract



Authors

Kathryn E. Carnazza, Lauren E. Komer, Ying Xue Xie, ..., David Eliezer, Manu Sharma, Jacqueline Burré

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In brief

α -synuclein functions in synaptic neurotransmitter release by binding to synaptic vesicles. The roles of β - and γ -synuclein in this process are unknown. Carnazza et al. demonstrate that on the synaptic vesicle surface, synucleins form heteromultimers whose composition dictates the amount of physiologically active α -synuclein on synaptic vesicles.

Highlights

- β - and γ -synuclein have a reduced membrane affinity compared with α -synuclein
- β - and γ -synuclein form heteromultimers with α -synuclein



Papers:

Gao V, Briano JA, Komer L, Burré J. Functional and pathological effects of α -synuclein on synaptic SNARE complexes. *Journal of Molecular Biology*, in press (invited review article).



Functional and Pathological Effects of α -Synuclein on Synaptic SNARE Complexes

Virginia Gao^{1,2*}, Juan A. Briano^{1†}, Lauren E. Komer^{1†} and Jacqueline Burré^{1*}

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<https://doi.org/10.1016/j.jmb.2022.167714>

Edited by Jiajie Diao

Abstract

α -Synuclein is an abundant protein at the neuronal synapse that has been implicated in Parkinson's disease for over 25 years and characterizes the hallmark pathology of a group of neurodegenerative diseases now known as the synucleinopathies. Physiologically, α -synuclein exists in an equilibrium between a synaptic vesicle membrane-bound α -helical multimer and a cytosolic largely unstructured monomer. Through its membrane-bound state, α -synuclein functions in neurotransmitter release by modulating several steps in the synaptic vesicle cycle, including synaptic vesicle clustering and docking, SNARE complex assembly, and homeostasis of synaptic vesicle pools. These functions have been ascribed to α -synuclein's interactions with the synaptic vesicle SNARE protein VAMP2/synaptobrevin-2, the synaptic vesicle-attached synapsins, and the synaptic vesicle membrane itself. How α -synuclein affects these processes, and whether disease is due to loss-of-function or gain-of-toxic-function of α -synuclein remains unclear. In this review, we provide an in-depth summary of the existing literature, discuss possible reasons for the discrepancies in the field, and propose a working model that reconciles the findings in the literature.

Burré Lab



Welcome Katherine!

Hi Appel! My name is Katherine Tsang (any pronouns, most use she/her). I graduated from Columbia University in 2019 with a major in Biochemistry and a minor in English. While there, I conducted research into the neural basis of nutrient preference with the Zuker Lab. This summer, under the purview of the Tri-I MD-PhD program, I will be rotating in the Burré Lab to broaden my understanding of synapse mechanisms and learn skills to probe such mechanisms and their pathologies. I am broadly interested in neurobiology, and especially curious about the mechanisms underlying psychiatric disorders. Outside of science I like playing racquet sports, attending anime conventions, video editing, and just generally spending too much time on the internet. If you want someone to play tennis/video games with just let me know! I look forward to meeting you all.



Katherine Tsang
Rotation Student
Burré Lab

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Burré Lab



Welcome Saad!

Hi Appel!

My name is Saad Ahmad. I was born in Pakistan and grew up in the NYC area. I recently graduated from SUNY Albany with a Bachelor of Science in Biology. During my time at Albany, I studied circadian modulation of astrocyte morphology and synaptic transmission under Annalisa Scimemi. My research interest lies in the progression of neurodegenerative diseases such as Alzheimer's and Parkinson's disease (PD). Currently, I am working in the Burré/Sharma Lab studying the role of a-synuclein in synucleopathies such as PD. My goals in the Burré/Sharma Lab are to continue to learn and refine my research skills in neuroscience, I am also currently applying to medical school. Outside of the lab, I enjoy video games and listening to music. I am looking forward to working with you all!



Saad Ahmad

Research Technician

Burré/Sharma Lab

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Burré Lab



Welcome Shrey!

Hi Appel! I'm Shrey Jhalani, a rising senior at the Collegiate School, and I'm a volunteer at the Burré/Sharma Laboratory. After I lost my grandmother to Progressive Supranuclear Palsy a few years ago, I began looking to get involved in the research world, particularly in Parkinsonian disorders. Because of COVID, my search for an open laboratory lasted for almost two years before, fortunately, finding Dr. Burré and the Burré Lab. The Burré Lab's focus on synaptic transmission and early pathological events that trigger neurological disorders especially fascinated me, and I'm incredibly excited to learn more about the role that synapses play in causing neurodegeneration during my time here! When I'm not at school or in the lab, I greatly enjoy playing basketball, unhealthily binge-watching a show that I've already seen far too many times, and sleeping.



Shrey Jhalani

Volunteer

Burré/Sharma Lab

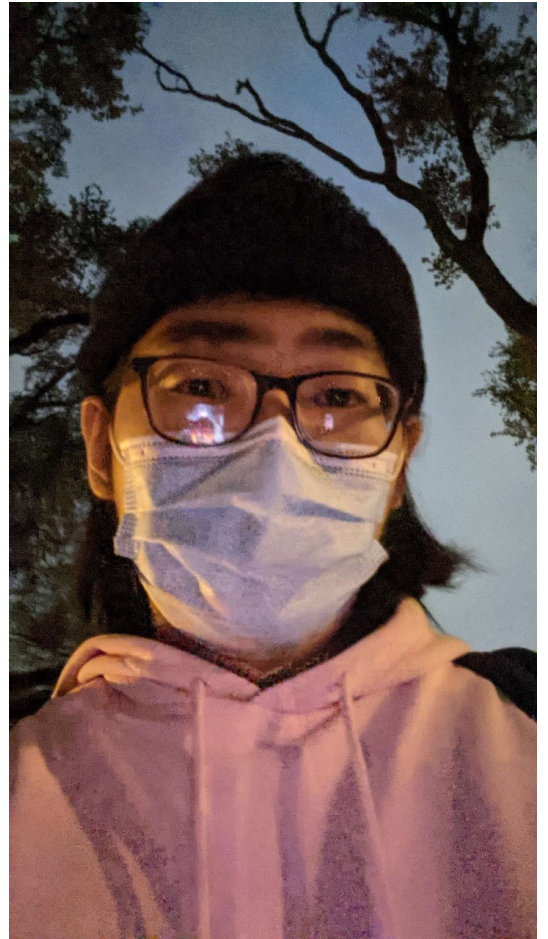
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Burré Lab



Welcome Yan Xie!

Hi Appel! I'm Yan, a volunteer in the Burré/Sharma labs. I graduated in June 2022 from Brooklyn College with a Bachelor of Science in biology. I am interested in gaining more insight into the cellular-molecular mechanisms of neurodegenerative diseases, including Alzheimer's and Parkinson's. I look forward to learning more about and contributing to the fantastic research projects here. Outside of the lab, I like exploring the city and taking naps.



Yan
Volunteer
Burré/Sharma Lab
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Gan Lab



New lab members:

- Dr. Hao Chen joined as a Postdoc in our lab.
- Maitrayee Bhawat is our new Research Technician.
- Raina is our Summer Research Intern.
- Miguel Chavez Pachas is our new Rotating Student.
- Daiyan Ahmed joined as a Diversity Summer Scholar.

Papers:



ARTICLE



<https://doi.org/10.1038/s41467-022-29552-6>

OPEN

Microglial NF- κ B drives tau spreading and toxicity in a mouse model of tauopathy

Chao Wang¹, Li Fan², Rabia R. Khawaja³, Bangyan Liu², Lihong Zhan¹, Lay Kodama², Marcus Chin¹, Yaqiao Li¹, David Le¹, Yungui Zhou¹, Carlo Condello^{4,5}, Lea T. Grinberg^{5,6}, William W. Seeley^{5,6}, Bruce L. Miller^{5,6}, Sue-Ann Mok⁷, Jason E. Gestwicki^{4,8}, Ana Maria Cuervo³, Wenjie Luo² & Li Gan^{1,2}

Activation of microglia is a prominent pathological feature in tauopathies, including Alzheimer's disease. How microglia activation contributes to tau toxicity remains largely unknown. Here we show that nuclear factor kappa-light-chain-enhancer of activated B cells (NF- κ B) signaling, activated by tau, drives microglial-mediated tau propagation and toxicity. Constitutive activation of microglial NF- κ B exacerbated, while inactivation diminished, tau seeding and spreading in young PS19 mice. Inhibition of NF- κ B activation enhanced the retention while reduced the release of internalized pathogenic tau fibrils from primary microglia and rescued microglial autophagy deficits. Inhibition of microglial NF- κ B in aged PS19 mice rescued tau-mediated learning and memory deficits, restored overall transcriptomic changes while increasing neuronal tau inclusions. Single cell RNA-seq revealed that tau-associated disease states in microglia were diminished by NF- κ B inactivation and further transformed by constitutive NF- κ B activation. Our study establishes a role for microglial NF- κ B signaling in mediating tau spreading and toxicity in tauopathy.

Gan Lab



Welcome Raina!

Hi! My name is Raina Wang, and I am a new summer intern in the Wenjie/Gan lab. I will be entering my junior year of high school in September at Millburn High School. My interest in biology has led me to explore both the medical and research aspects of the field. During my internship here in the lab, I look forward to learning more about the research process. From PCR Genotyping to analyzing mice behavior, I hope to learn not only about the process and the steps but also to gain a deeper understanding of the pathology of Alzheimer's disease and how these laboratory experiments connect to the overarching research topics and questions. On Fridays, when I'm not at the lab, I'm enjoying a 12-hour shift as an EMT at the Millburn-Short Hills Volunteer First Aid Squad.



Raina Wang
Summer Research
Intern

Gan Lab

Gan Lab



Welcome Maitreyee!

Hello everyone! I am Maitreyee Bhagwat. I graduated from Rutgers University with a Bachelor of Arts in Genetics. My reason for pursuing research is that I have always believed in health care being affordable and accessible to all. So, I am determined to be a part of the process of creating various medical options for people to better their lives.

I have assisted with various research studies and found working in the neuroscience lab the most enjoyable. My goals in the Gan lab are to widen my research knowledge and skills, to understand mental health issues from neuroscience and genetics perspective, and help raise mental health awareness in my home country, India.

I managed to take Korean language courses up to the intermediate level while at the university. I love exploring restaurants, reading manga and translated Chinese novels, watching anime, and listening to K-pop.



Maitreyee Bhagwat
Research Technician
Gan Lab

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Welcome Hao!

Hi Appel! My name is Hao Chen. I came from a beautiful city called Changzhou in China. I got my Ph.D. with major in Molecular and Cell Biology from the University of Texas at Dallas. In 2020, I finished my first project related to the mitochondrial deficits and neurodegeneration. Later, I joined a new lab, whose study is involved in liver autophagy, cell death as well as brain aging. I led the brain aging project under the supervision of Dr. Wen-Xing Ding, I think I might be the first person who set up the behavior test in a liver lab. Today, I am working as a postdoctoral in Wenjie Luo's Group in Gan's lab. It's super exciting to come back to the neuroscience area and continue my study in Alzheimer's disease. Outside of the lab, I enjoy basketball, exploring different foods as well as meeting new people in NYC!



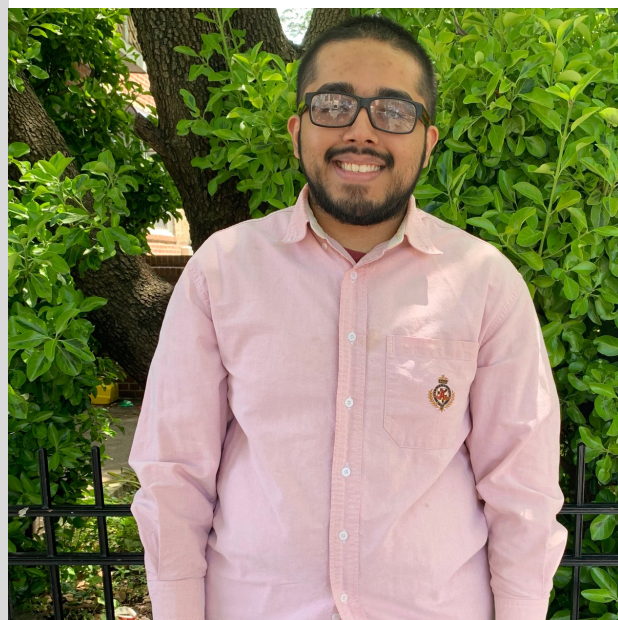
Hao Chen, PhD
Postdoc
Gan Lab

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Welcome Daiyan!

Hi! My name is Daiyan Ahmed and I am an intern for Weill Cornell Medicine's BMRI Summer Scholar's Program. I'm a senior in St John's University majoring in Biology. At Weill Cornell Medicine, I will be working with Dr. Luo regarding ongoing research on the dap12/Trem2 complex and how the presence -- as well as absence -- of dap12 contributes to the emergence of disease associated microglia (DAM) in Alzheimer's Disease. My goals in the Gan Laboratory are learning the striking complexities within Alzheimer's Disease while assisting in pioneering research, obtain the skills needed to be a scientist, and to be in touch with researchers in the field, Some of my interests include sightseeing, visiting bookstores, and exploring new places in and out of NYC!



Daiyan Ahmed
Diversity Summer
Scholar
Gan Lab

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Welcome Miguel!

Hello! My name is Miguel Chavez. I was born in Lima, Peru and immigrated to the United States in 2002. I graduated from City College of New York with a Bachelor of Science in Biochemistry in 2020. Before coming to the Tri-I to begin my MD/PhD journey, I spent two years at the Laboratory for Stem Cells and Tissue Engineering at Columbia University with Dr. Gordana Vunjak-Novakovic. Currently, my research interests are in developing stem cell derived neuronal organoids and to study microglial polarization and the biological mechanisms involved in these processes. As an incoming rotation student, my goals in the Gan lab are to explore all the amazing research that is conducted here and to begin thinking about what kinds of translational research questions could be answered using the lab's techniques and tools. Outside of lab, I love to produce music and record some original tracks, love cycling and going upstate for hikes.



Miguel Chavez Pachas
Rotating Student

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Accomplishments and Milestones

- **Stephanie Jackvony** received the F31 NRSA predoctoral fellowship from the NIH (1F31AG079616-01): [Effects of TDP-43 pathology on innate antiviral mechanisms in neurodegenerative disease](#)
- **Daniel Barnett** successfully completed his ACE for the Neuroscience Graduate Program and received an Honorable Mention from the NSF Graduate Research Fellowship Program
- **Daniel Barnett** and **Till Zimmer** contributed to a collaborative paper led by Denali Therapeutics: [Novel App knock-in mouse model shows key features of amyloid pathology and reveals profound metabolic dysregulation of microglia](#)
- **Adam Orr** and **Anna Orr** have filed a patent application on: [Methods of treating neurodegenerative disorders and STAT3-linked cancers using suppressors of electron leak](#)





New members

- **Anthony Villegas** has joined the lab as a rotating graduate student
- **Amber Cao** has joined the lab as an undergraduate research intern
- **Martin Rhie Kim** has joined the lab as an undergraduate research intern



Orr Lab



Welcome Anthony!

Anthony Villegas is currently a PhD student and IMSD fellow in the Neuroscience program. Anthony received his Bachelor's degrees in Psychology and Biological Sciences from Hunter College. During his undergraduate training, Anthony worked in the laboratory of Dr. Nesha S. Burghardt studying the effects of curcumin on prenatal development and adult hippocampal neurogenesis using behavioral analysis and microscopy imaging. In the Orr Lab, Anthony is interested in glial pathobiology and astrocytic-neuronal interactions that contribute to neurodegeneration. As a former MARC scholar and BP-ENDURE fellow, Anthony is also passionate about diversity in science and outreach.



Anthony Villegas
Rotating Student

Orr Lab

Orr Lab



Welcome Amber!

Amber graduated from The Hill School in 2021 and is currently an undergraduate sophomore at Cornell University. She is a Biology/Society and Psychology double major in the College of Arts and Sciences, where she was on the Dean's List for the past two semesters. She is interested in potential careers in research or medicine focusing on neuroscience. Amber is spending the summer in the Orr Lab learning from Daniel Barnett. She is acquiring basic lab skills and learning about Daniel's work on mitochondrial ROS production and its impact on neurodegenerative diseases. On weekends, Amber is excited to explore restaurants and coffee shops in the city.



Amber Cao
Undergraduate Research
Intern

Orr Lab

Orr Lab



Welcome Martin!

Martin comes from Seoul, South Korea and is currently a second-year undergraduate student attending Cornell University. He is intending to double major in Psychology and Biology with a concentration in neuroscience. This summer, he is working in the Orr lab and assisting Connie Zhou with their research project on the effects of TDP-43 mislocalization and regulation of nucleocytoplasmic transport. During his free time, Martin loves playing and watching any type of sport. Go Sixers!



Martin Rhie Kim
Undergraduate Research
Intern

Orr Lab

Participate!

Get inspired and send us your work!

Contact Billy for details guc9014@med.cornell.edu