

Curriculum vitae - Konark Mukherjee

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Konark Mukherjee,
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Fralin Biomedical Research Institute at VTC
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Roanoke, VA 24016.
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Education

1989-1994 **MBBS (MD)**, Indira Gandhi Medical College and Hospital, Nagpur, India
1995-2000 **Doctor of Philosophy**, National Institute of Immunology/Jawaharlal Nehru
 University, New Delhi, India
Thesis Title: Reconstitution of Salmonella phagosome-endosome fusion.
Broad Specialization: Cell Biology

Clinical Experience

1994-1995 Internship at Mayo hospital, Nagpur and Rural hospital, Armori, India
1992 Organized and conducted epidemiological studies for “Prevalence of diabetes
 mellitus and hypertension among tribal in rural Maharashtra”

Research Experience

At present Assistant professor at Fralin Biomedical Research Institute and Dept. of
2009-2011 Biological Sciences, Virginia Tech. Postdoctoral fellow at Department of
 Biology, Brandeis University, in the laboratory of Prof. Leslie Griffith
2008-2009 Research Associate at School of Medicine, Stanford University, in the laboratory
 of Prof. Thomas Südhof
2007-2008 Instructor at Department of Neuroscience, UT Southwestern Medical Center at
 Dallas, in the laboratory of Prof. Thomas Südhof
2005-2007 Assistant Instructor at Center for Basic Neuroscience, UT Southwestern Medical
 Center at Dallas, in the laboratory of Prof. Thomas Südhof
2003-2005 Postdoctoral fellow at Department of Neurobiology, Max Planck Institute for
 Biophysical Chemistry, Goettingen, Germany, in the laboratory of Prof. Reinhard
 Jahn
2000-2003 Postdoctoral fellow at Center for Basic Neuroscience, UT Southwestern Medical
 Center at Dallas, in the laboratory of Prof. Thomas Südhof
1995-2000 Graduate student, National Institute of Immunology in the laboratory of
 Amitabha Mukhopadhyay, New Delhi, India

Teaching Experience

2008 1 hour graduate student course on “Synaptic dysfunction and neurological disorder”
 UT Southwestern Medical Center at Dallas.
2013 4 didactic hours on lipid metabolism, protein metabolism, carbohydrate metabolism
 and nucleic acid metabolism to medical students at VTCSOM (VirginiaTech Carilion
 School of Medicine).

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- 2014 6 didactic hours on lipid metabolism, protein metabolism, carbohydrate metabolism and nucleic acid metabolism to medical students at VTCSOM.
- 2015 6 didactic hours on lipid metabolism, protein metabolism, carbohydrate metabolism and nucleic acid metabolism to medical students at VTCSOM.
- 2015 2 didactic hours on presynaptic release and plasticity, microcephaly and brain development, molecular basis of aging, psychosomatic disorders to TBMH (Translational Biology Medicine and Health) graduate students.
- 2015 2 didactic hours on molecular basis of aging for TBMH graduate students.
- 2015 2 didactic hours teaching microcephaly as an exemplar of neurodevelopmental disorders.
- 2015 Directed a week of neuroscience course for TBMH students.
- 2016 6 didactic hours on lipid metabolism, protein metabolism, carbohydrate metabolism and nucleic acid metabolism to medical students at VTCSOM.
- 2016 2 didactic hours on presynaptic release and plasticity, psychosomatic disorders to TBMH graduate students.
- 2016 Directed a week of neuroscience course for TBMH students.
- 2017 2 didactic hours on Human genetics to an Undergraduate class.
- 2018 2 hours didactic lecture on genetics to undergraduate
- 2018 4 hours of didactic lecture to neuroscience students to TBMH graduate students.
- 2019 4 hours of didactic lecture to neuroscience students to TBMH graduate students.
- 2019 2 hours of didactic lecture to cardiac science students to TBMH graduate students.
- 2019 2 hours of didactic lecture to developmental science students to TBMH graduate students.
- 2020 Developed and delivered an online course for TBMH graduate students in lieu of first rotation during Covid-19 pandemic.

Professional Services

- 2012-2013 Served on five faculty search committee
- 2014 Served as a member of Executive committee
- 2013- Full time member of Virginia Tech research integrity committee
- 2018- Full time member of Virginia Tech IACUC.
- 2011- Ad hoc reviewing in scientific journals including PNAS, J Neuroscience, Exp Neurol. and PLOS one.
- 2020- Editorial board of Frontiers in Molecular Neuroscience.
- 2020- Board of undergraduate research activity at VirginiaTech

Postdoctoral mentoring

- 2011-2016 Dr. Leslie LaConte (Co-authored 4 manuscripts and 4 posters)
- 2011-2016 Dr. Vrushali Chavan (Co-authored 5 manuscripts and 3 posters)
- 2012-2013 Dr. Benson Morrill
- 2014-2015 Dr. Yunfu Wang

Graduate student mentoring

- 2015-2019 Chen Liang (Postdoctoral fellow at Baylor College of Medicine)
- 2018-current Paras Patel

Medical Students mentoring

- 2013 Robert Brown (Co-authored 1 poster)
- 2014 Mohsan Chowdhury, Yisrael Katz and Shervin Mirshahi

Undergraduate student training

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2011-2012	Bryce Allen (presented two posters, at present pursuing Doctorate in Marine Biology at University of Miami)
2012-2013	Sidney Walker (Co-authored 1 manuscript and 1 poster)
2013-2014	Sidney Walker (Currently pursuing DO degree), Sabrina Patwary, Nicolas Baudoin, Jeffery Willis (Co-authored 3 manuscripts and 2 posters)
2014-2015	Helen Clark, (Co-authored 3 manuscripts and 1 poster, at present pursuing Doctorate at Johns Hopkins Medical School) Ike Osuorah, Obaid Rahman, Durga Dahal, Shaban Rana
2017	Haley Bain Caitlyn Donahue
2018-2019	Ashwin Arora, Andrea Sanders and Matthew Everett

High school student training

2014	Barika Mirza (Co-authored a poster and won third prize in poster presentation at Roanoke Valley Governor school scientific forum)
2105	Chris Wu
2016	Chris Wu Rohan Chakravarty

Scholarships and Honors

1995-1996	Junior research fellowship, National Institute of Immunology, India
1997-2000	Senior research fellowship, National Institute of Immunology, India
1996	Qualified Diplomate national board (I) for Medical Doctors
2001	Nominated for Indian National Science Academy, young scientist award
2012	Nominated for Basil O Connor, March of Dimes Award
2015	Scholar of the Week at Virginia Tech

Professional Societies

Member, ARVO
Member, Society for Neuroscience
Member, American Association of Advancement of Science (AAAS)
Registered, Medical Council of India

Invited Lectures

2001	Salmonella-phagosome maturation, Indian National Science Academy, New Delhi.
2007	Uncovering Neurexin-CASK signaling. <i>2nd Westerburg Symposium on Molecular Dynamics of the Chemical Synapse</i> . Westerburg, Germany.
2009	CASK: a neurexin specific specialized kinase. Jackson Laboratories, Bar Harbor, Maine.
2010	CASK: a neurexin specific specialized kinase. Cambridge Institute of Medical Research, England.

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- 2010 Role of CASK in brain development. Sanford Research, Sioux Falls, South Dakota.
- 2011 Role of CASK in brain development. Emory University, Atlanta Georgia.
- 2013 Identification and glycerol-induced correction of misfolding mutations in the X-linked mental retardation gene CASK, International conference on psychology, autism and Alzheimer's disease. San Antonio, Texas
- 2014 Mechanism of CASK-associated pontocerebellar hypoplasia. National Institute of Immunology, New Delhi, India. 2014.
- 2015 Mechanism of CASK-associated pontocerebellar hypoplasia. Greenwood Genetic Center, South Carolina.
- 2017 What does an animal model of optic nerve hypoplasia tells us? Department of Ophthalmology, School of Medicine, University of Missouri.
- 2018 Role of CASK in post-natal microcephaly, Department of Neurology, School of Medicine, University of Virginia.
- 2019 Role of lipid metabolism in optic nerve hypoplasia. Hamilton Eye Institute, Memphis, Tennessee.

Manuscript under consideration

Paras Patel, Julia Hegert, Ingrid Cristian, Alicia Kerr, Leslie LaConte, Michael Fox, Sarika Srivastava and **Konark Mukherjee**. Complete loss of intellectual disability gene CASK causes cerebellar degeneration

Publications

- [1] Rajan D, Patel P, **Mukherjee K**, and Srivastava S. Survival of a male patient harboring CASK Arg27Ter mutation to adolescence. *Mol Genet Genomic Med*. 2020 Oct;8(10):e1426. doi: 10.1002/mgg3.1426.
- [2] Patel P, Liang C, Arora A; Vijayan S, Ahuja S, Wagley P, Settlege, Laconte L, Goodkin H, Lazar I, Srivastava S and **Mukherjee K**. Haploinsufficiency of X-Linked intellectual disability gene CASK induces post-transcriptional changes in synaptic and cellular metabolic pathways. *Exp Neurol*. 2020 Jul;329:113319. doi: 10.1016/j.expneurol.2020.113319.
- [3] Studtmann C, LaConte L and **Mukherjee K**. Comments on: A de novo in-frame deletion of CASK gene causes early onset infantile spasms and supratentorial cerebral malformation in a female patient. *Am J Med Genet A*. 019 Dec;179(12):2514-2516. doi: 10.1002/ajmg.a.61358.
- [4] Kerr A, Patel P, LaConte L, Liang C, Chen C-K, Shah V, Fox M, **Mukherjee K**. Non-cell autonomous role of CASK in optic nerve hypoplasia. *Invest. Ophthalmol. Vis. Sci*. 2019 Aug 1;60(10):3584-3594. doi: 10.1167/iovs.19-27197
- [5] McMillan RP, Stewart S, Budnick JA, Caswell CC, Hulver MW, **Mukherjee K**, Srivastava S. Quantitative Variation in m.3243A > G Mutation Produce Discrete Changes in Energy Metabolism. *Sci Rep*. 2019 Apr 8;9(1):5752.
- [6] LaConte LEW, Chavan V, DeLuca S, Rubin K, Malc J, Berry S, Gail Summers C, **Mukherjee K**. An N-terminal heterozygous missense CASK mutation is associated with

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- microcephaly and bilateral retinal dystrophy plus optic nerve atrophy. *Am J Med Genet A*. 2019 Jan;179(1):94-103.
- [7] LaConte LEW, Chavan V1, Elias AF, Hudson C, Schwanke C, Styren K, Shoof J, Kok F, Srivastava S, **Mukherjee K**. Two microcephaly-associated novel missense mutations in CASK specifically disrupt the CASK-neurexin interaction. *Hum Genet*. 2018 Mar;137(3):231-246. doi: 10.1007/s00439-018-1874-3. Epub 2018 Feb 9.
- [8] DeLuca S, Wallace D, Trucks M and **Mukherjee K**. A clinical series using intensive neurorehabilitation to promote functional motor and cognitive skills in three girls with CASK mutation. *BMC Res Notes*. 2017 Dec 19;10(1):743.
- [9] Liang C, Kerr A, Cristofoli F, Van Esch H, Fox MA, **Mukherjee K**. Optic nerve hypoplasia is a pervasive pathology of subcortical visual system in neonates. *Invest. Ophthalmol. Vis. Sci*. 2017 Oct 1;58(12):5485-5496
- [10] LaConte L, Srivastava S, and **Mukherjee K**. Probing Protein Kinase-ATP Interactions Using a Fluorescent ATP Analog. *Methods. Mol. Biol*. 2017;1647:171-183
- [11] Liang C, Chavan V and **Mukherjee K**. Internalization of scavenger receptor ligands by cortical neurons. *Matters* 2017 May 22.
- [12] **Mukherjee K**, Clark H, Chavan V, Benson E, Kidd G and Srivastava S. Analysis of brain mitochondria using serial block-face scanning electron microscopy. *J. Vis. Exp.* (113), e54214, doi:10.3791/54214 (2016).
- [13] Srivastava S, McMillan R, Willis J, Clark H, Chavan V, Liang C, Zhang H, Hulver M, **Mukherjee K**. X-linked intellectual disability gene CASK regulates postnatal brain growth in a non-cell autonomous manner. *Acta Neuropathol Commun*. 2016 Mar 31;4(1):30.
- [14] LaConte L, Chavan V, Willis J, Schönhense EM, Schoch S and **Mukherjee K**. CASK stabilizes neurexin and link it to liprin- α in a neuronal activity dependent manner. *Cell. Mol. Life Sci*. 2016 Sep;73(18):3599-621.
- [15] Chavan V, Willis J, Walker S, Clark H, Liu X, Fox M, Srivastava S and **Mukherjee K**. Central presynaptic terminals are enriched in ATP but the majority lack mitochondria. *PLOS One* 2015 Apr 30;10(4):e0125185. doi.
- [16] Slawson JB, Kuklin EA, **Mukherjee K**, Pérez N, Donelson NC, Griffith LC. Regulation of dopamine release by CASK- β modulates locomotor initiation in *Drosophila melanogaster*. *Front Behav Neurosci*. 2014 Nov 18;8:394
- [17] **Mukherjee K**, Slawson JB, Christmann BL, Griffith LC. Neuron-specific protein interactions of *Drosophila* CASK- β are revealed by mass spectrometry. *Front Mol Neurosci*. 2014 Jun 30;7:58.
- [18] LaConte L, Chavan C and **Mukherjee K**. Identification and glycerol-induced correction of misfolding mutations in XLMR gene CASK. *PLOS One* 2014 Feb 5;9(2):e88276. Doi.703.

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- [19] LaConte L and **Mukherjee K**. Structural constraints and functional divergences in CASK evolution. *Biochem. Soc. Trans.* 2013 Aug 1;41(4):1017-22.
- [20] Pertsinidis A, **Mukherjee K**, Sharma M, Pang ZP, Park SR, Zhang Y, Brunger AT, Südhof TC, Chu S. Ultrahigh-resolution imaging reveals formation of neuronal SNARE/Munc18 complexes in situ. *Proc Natl Acad Sci U S A*. 2013 Jul 23;110(30):E2812-20
- [21] Juranek JK, **Mukherjee K**, Siddiqui TJ, Kaplan BJ, Li JY, Ahnert-Hilger G, Jahn R, Calka J, Active zone protein expression changes at the key stages of cerebellar cortex neurogenesis in the rat. *Acta Histochem.* 2013 Feb 20. pii: S0065-1281(13)00017-2.
- [22] **Mukherjee, K** (2012) CASK: A specialized neurokinase (Chapter 5) p 73-85. *Neuromethods* 68: Protein kinase technologies. Humana press (2012)
- [23] Slawson JB, Kuklin EA, Ejima A, **Mukherjee K**, Ostrovsky L, and Griffith LC. Isoform specific function of CASK in central neuronal circuitry regulating locomotor behavior in drosophila. *Genetics* 2011 Jan;187(1):171-84.
- [24] **Mukherjee K***, Sharma M, Jahn R, Wahl MC and Südhof TC. Structural Mechanism and evolution of Mg²⁺-independence of CASK kinase activity. *Science Signaling* 2010 Apr 27(3); (119): ra33. (Cover page) * **Corresponding author**
- [25] **Mukherjee K**, Yang X, Gerber SH, Kwon HB, Ho A, Castillo P, Liu X, Südhof TC. Piccolo and Bassoon maintain synaptic vesicle clustering without directly participating in vesicle exocytosis. *Proc Natl Acad Sci USA*. 2010 Apr 6;107(14):6504-09.
- [26] **Mukherjee K***, Sharma M, Urlaub H, Bourenkov GP, Jahn R, Südhof TC and Wahl MC. CASK functions as a Mg²⁺-independent neurexin kinase. *Cell* 2008 Apr 18; 133(2):328-39. (Cover page) * **Corresponding author**
- [27] Juranek J and **Mukherjee K**. Piccolo and Bassoon. *New encyclopedia of neuroscience: Elsevier press. (revised 2013)*
- [28] Atasoy D, Schoch S, Ho A, Nadasy KA, Liu X, Zhang W, **Mukherjee K**, Nosyreva ED, Fernandez-Chacon R, Missler M, Kavalali ET, Südhof TC. Deletion of CASK in mice is lethal and impairs synaptic function. *Proc Natl Acad Sci U S A*. 2007 Feb 13; 104(7):2525-30.
- [29] Juranek J, **Mukherjee K***, Rickmann M, Martens H, Calka J, Südhof TC, Jahn R. Differential expression of active zone proteins in neuromuscular junctions suggests functional diversification *Eur J Neurosci.* 2006 Dec 24(11):3043-52. ***equal contribution**
- [30] Matos MF, **Mukherjee K**, Chen X, Rizo J, Südhof TC. Evidence for SNARE zippering during Ca²⁺-triggered exocytosis in PC12 cells. *Neuropharmacology.* 2003 Nov; 45(6):777-86.
- [31] **Mukherjee K**, Mazumdar J, Yadav A, Kumar R, Kunte S, Basu SK, and Mukhopadhyay A. Diverting the intracellular trafficking of Salmonella to lysosome for selective killing:

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activation of the late endocytic rab7 through scavenger receptor-mediated targeting of muramyl dipeptide. *J. Cell Sci.* 2002 Sep 15;115(18):3693-701

- [32] Schoch S, Castillo PE, Jo T, **Mukherjee K**, Geppert M, Wang Y, Schmitz F, Malenka RC, Sudhof TC. RIM1alpha forms a protein scaffold for regulating neurotransmitter release at the active zone. *Nature.* 2002 Jan 17; 415(6869):321-6.
- [33] **Mukherjee K**, Parashuraman S, Raje M, Mukhopadhyay A. SopE acts as an Rab5-specific nucleotide exchange factor and recruits non-prenylated Rab5 on Salmonella-containing phagosomes to promote fusion with early endosomes. *J Biol Chem.* 2001 Jun 29; 276(26):23607-15.
- [34] Hashim S, **Mukherjee K**, Raje M, Basu SK. and Mukhopadhyay A. Live *Salmonella* modulate expression of rab proteins to persist in a specialized compartment and escape transport to lysosomes. *J Biol Chem.* 2000 May 26; 275(21):16281-8.
- [35] **Mukherjee K**, Siddiqi SA., Hashim S, Raje M, Basu SK. and Mukhopadhyay A. Live *Salmonella* recruits N-Ethylmaleimide-sensitive Fusion Protein on phagosomal membrane and promotes fusion with early endosome. *J Cell Biol.* 2000 Feb 21; 148(4):741-53.

Conference proceedings:

- [1] **Mukherjee K**, Sudhof TC, Wahl MC. CASK: A Neurexin Kinase. ASCB Annual Meeting, Dec.2007, Washington, USA.
- [2] Juranek J, Całka J, **Mukherjee K**, Ahnert-Hilger G and Li J. Expression of active zone proteins in developing rat cerebellum. XXVIII Zjazd Polskiego Towarzystwa Anatomicznego i XLII Sympozjum Polskiego Towarzystwa Histochemików i CytochemikówPoznań 5-7 września Sep. 2007, Poznan, Poland.
- [3] Juranek J, **Mukherjee K**, Rickman M and Jahn R. Molecular determinants of presynaptic specialization in ultrstructurally and functionally divergent neuromuscular junction. 7th International Symposia of Polish Neuroscience Society. Sep 2005, Cracow, Poland.
- [4] Allen B, Chavan V, LaConte L, **Mukherjee K**. Investigation into the Structural Basis of CASK Linked Mental Retardation. The 2013 National Collegiate Research Conference at Harvard.
- [5] Allen B, Chavan V, LaConte L., **Mukherjee K**. The Role of CASK in Neurodevelopment. Biomedical Engineering Society 2012 Annual Meeting.
- [6] LaConte L and **Mukherjee K**. Examining the impact of mutation in X-linked mental retardation protein CASK. Virginia Academy of Science, 92nd Annual meeting (Structural Biology, Biochemistry and Biophysics Section) 2014.
- [7] Srivastava S, McMillan RP, Hulver M, **Mukherjee K**. Low heteroplasmic level of m.3243a>g diabetogenic mutation promotes mitochondrial bioenergetics and nutrient metabolism. Cell Symposia: Systems Approach to Metabolic Diseases, Chicago, IL, 2014. (SS won a travel grant).
- [8] LaConte L, Chavan V, Willis J, Schoch S and **Mukherjee K**. CASK stabilizes neurexin and link it to liprin- α in a neuronal activity dependent manner. Neuroscience Symposium, 2015, Santa Cruz, California.
- [9] Srivastava S, McMillan R, Willis J, Clark H, Chavan V, Liang C, Zhang H, Hulver M, Mukherjee K. (2016). X-linked intellectual disability gene CASK regulates postnatal brain growth in a non-cell autonomous manner. Cell Symposia, San Diego, October 21-23, 2016.

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- [10] Liang, C., chavan, V., LaConte, L., Srivastava, S., & Mukherjee, K. (2016). Deletion of XLID gene CASK does not disrupt Reelin signaling. Virginia-Nordic Precision Neuroscience, Roanoke, October 6, 2016.
- [11] Kerr, A., Liang, C., Mukherjee, K., & Fox, M., (2016). Novel roles for CASK in visual system development and in Optic Nerve Hypoplasia. Virginia-Nordic Precision Neuroscience, Roanoke, October 6, 2016.
- [12]Liang, C., chavan, V., LaConte, L., Srivastava, S., & Mukherjee, K. (2016). Deletion of XLID gene CASK does not disrupt Reelin signaling. International conference on Glial Biology in Medicine, Roanoke, October 16-18, 2016
- [13]Kerr, A., Liang, C., Qui Y, Cristofoli F, Fox, MA, Mukherjee, K. Optic Nerve Hypoplasia is a Pervasive Subcortical Pathology of Visual System in Neonates. Annual Meeting for the Society for Neuroscience, Washington D.C., 2017.
- [14] Kerr, A., Liang, C., Mukherjee, K., Fox, MA. Novel Roles for CASK in visual system development and in Optic Nerve Hypoplasia. Annual Meeting for the Central Virginia Chapter of the Society for Neuroscience, Roanoke, VA, 2017.
- [15] Kerr, A., Liang, C., Mukherjee, K., Fox, MA. Novel Roles for CASK in visual system development and in Optic Nerve Hypoplasia. American Society for Neurochemistry, Little Rock, AR, 2017.
- [16] Srivastava, S. Liang, C., Mukherjee K. CASK aids postnatal brain development in a non-cell autonomous manner. American Society for Neurochemistry, Little Rock, AR, 2017.
- [17] CASK-linked microcephaly. American Society for Neuroscience, Riverside, CA May 2018: Oral lecture by K Mukherjee
- [18] Liang C, Mukherjee K. CASK is critical only during early postnatal life. Riverside, CA May 2018
- [19] McMillan RP, Hulver M, Mukherjee K, and Srivastava S. Poster at UMDF, 2018, Nashville, TN.Loss of CASK Function Causes Mitochondrial Metabolic and Neurodevelopmental Defects in Mice.
- [20] Mukherjee K: Mechanism of CASK-linked optic nerve hypoplasia. ARVO 2019, Vancouver, BC, Canada.

Previous Fellowships

- 1995-1996 Junior research fellowship, National Institute of Immunology, India
- 1997-2000 Senior research fellowship, National Institute of Immunology, India

Completed grant

UVA-VTC seed grant

- 1/1/2017-12/31/2017 Mukherjee/Goodkin (Co-PI)
- “Role of early epileptiform activity in development of microcephaly”

NIH 1DP7OD018428 Friedlander/Van Wart (MPI)

- 09/20/2013-08/31/2018
- “Mentorship and development program for biomedical trainees.”

VTCCD seed grant

- 1/31/2019-6/31/2019
- Regulation of CASK gene expression

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Current Grant Support

NIH R01EY024712-01A1

Mukherjee (PI)

04/01/15-03/31/20; \$2,000,000

Investigating the Mechanism of Optic Nerve Hypoplasia Associated with CASK Mutation

Role: PI

NIH R01

9/1/2017-8/31/2022 Lazar (PI) Mukherjee (Co-I)

“MICROFLUIDIC CHIP FOR THE ANALYSIS OF CELL-SURFACE PROTEINS”

Polish Science Academy

The role of Diaph1 signaling in diabetic neuropathy pathogenesis. PI: Juranek

Role: Collaborator

Pending proposals

Mitochondrial role in epileptic epilepsy. R01; PI: Srivastava

Role: Co-I. Scored at 18 percentile. Has been resubmitted.

Mechanism of eye-specific retinocollicular synapse formation. R01; PI: Fox

Role: Co-I. Scored at 20 percentile. Has been resubmitted.

Role of Piccolo in monoamine release. R01

Role: PI, first submission.