Seena S. Mathew

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EDUCATION

University of Alabama at Birmingham, Birmingham, AL, USA / 2007
- Doctorate of Philosophy
- Department of Neurobiology (UAB School of Medicine)
  Laboratory of John Hablitz, PhD
- Thesis: "Kainate receptor modulation of synaptic transmission in the neocortex"

Kenyon College, Gambier, OH, USA / 2002
- Bachelor of Arts Degree – Cum Laude
- Major: Neuroscience
- Thesis: "Coordinate modulation of Na-K-2Cl cotransport and K-Cl cotransport by cell volume and chloride in *Manduca Sexta*"

SELECTED PUBLICATIONS

1. Campbell SL, Mathew SS, Hablitz, JJ (2007). Pre- and postsynaptic effects of kainate receptor activation in rat prefrontal cortex. Neuropharmacology 53:37-47.

2. Mathew SS, Pozzo-Miller L, Hablitz JJ. Kainate modulates presynaptic GABA release from two vesicle pools. Submitted

3 Mathew SS, Hablitz JJ. Calcium release via activation of presynaptic IP_3 receptors contributes to kainate-induced IPSC facilitation in rat neocortex. Submitted.

4. Mathew SS, Hablitz JJ. Kainate differentially modulates presynaptic GABA release evoked by natural stimulation patterns. In preparation

5. Mathew SS, Hablitz JJ. GluR6 subunit containing KARs are not involved in the KAR mediated facilitation seen in layer II/III pyramidal cells of the prefrontal cortex. In preparation.

SELECTED ABSTRACTS

1. S. S. Mathew, S. J. Markwardt, J. J. Hablitz Altered developmental regulation of presynaptic NMDA receptors in cortical dysplasia. Society for Neuroscience Annual Meeting. Program No. 165.4. 2007

2. M.A. Amaral, S.S. Mathew, G. Rumbaugh, L. Pozzo-Miller. BDNF causes action potential-independent vesicular release from presynaptic terminals labeled with FM1-43: multiphoton excitation microscopy in area CA1 of hippocampal slices. Society for Neuroscience Annual Meeting. Program No. 443.8. 2007.

2. S.S. Mathew, L.D. Pozzo-Miller, J.J. Hablitz. Modulation of vesicle release by presynaptic kainate receptors imaged by FM1-43 multiphoton microscopy in acute brain slices. Society for Neuroscience Annual Meeting. Program No. 336.18. 2006.

3. S.S. Mathew, J.J. Hablitz. Modulation of inhibitory synaptic transmission in the neocortex of GluR6 knock-out mice. Society for Neuroscience Annual Meeting. Program No. 40.8. 2005.

4. S.S. Mathew, J.J. Hablitz. Kainate receptors modulate inhibitory synaptic transmission in rat neocortex. Society for Neuroscience Annual Meeting. Program No. 803.10. 2003.

5. E. Cormet-Boyaka, Mathew S.S., and K.L. Kirk. Rescue of DF508-CFTR and D2-79-CFTR processing by an ER localized fragment of CFTR. Pediatric Pulmonology Suppl. 25, 2003.

RESEARCH EXPERIENCE

Molecular Biology

Pipetting, sterile technique, agarose electrophoresis, reagent and buffer preparation, tissue culture, cell culture, western blot analysis and immunohistochemistry, genotyping animals by PCR.

Electrophysiology

Biocytin labeling, whole cell patch clamp recording (voltage-clamp and current clamp recordings), FM dye labeling, Fluo-4 labeling, and field recordings.

Microscopy

Light, fluorescent, confocal, and two-photon microscopy.

Animal Handling

Colony Management, perfusion of mice and rats.

June 2003- present: Researcher, Neurobiology Department, University of Alabama at Birmingham

Under direction of Dr. John Hablitz- Observed the effects of kainic acid on inhibitory post-synaptic currents in the prefrontal cortex. It has been seen that kainic acid shows a facilitatory effect on IPSCs when doing whole cell recordings from layer II/III pyramidal cells of the neocortex. Kainate receptors (KARs) appear to be located presynaptically. Direct analysis of presynaptic vesicular release was examined with 2 photon microscopy. The mechanism of facilitation was investigated. Also, experimentation with KAR subunit knock-out mice was performed to observe the involvement of specific kainate receptor subunits on KAR mediated facilitation in prefrontal cortex.

February 2003 – May 2003: Researcher, Dept of Physiology and Biophysics, University of Alabama at Birmingham

Under direction of Dr. Kevin Kirk- Defects in the gene encoding CFTR reduce either its Cl^- transport capacity or its level of cell surface expression causing cystic fibrosis. Deletion of amino acids 2-79 of CFTR (Δ2-79-CFTR) seemed to rescue the protein. In addition the processing defect of ΔF508 was analyzed in order to rescue its trafficking to the plasma membrane. The rescue of the ΔF508-CFTR and Δ2-79-CFTR was done by an ER localized fragment of CFTR. These findings were presented as an abstract (Cormet-Boyaka et al., 2003).

August 2002- November 2002: Researcher, Neurobiology Department, University of Alabama at Birmingham

Under direction of Dr. Scott Wilson- Observed genes involved in neurodegeneration to understand the mechanisms of neuronal cell loss. Identifying which genes may be responsible for this was done by creating a transgenic mouse that increased expression of Usp14. In addition, through immunohistochemistry it was observed that *ataxia* mice seem to have both central and peripheral nervous system defects.

January 2001- May 2002: Researcher, Biology Department, Kenyon College, Gambier, OH

Under direction of Dr. Christopher Gillen- Helped characterize a cell line transfected with a *Manduca Sexta* ion transport protein. Worked with PIB and NKCC and tried to decipher how average rubidium uptake is affected in these lines when they were treated with either NEM and/or Bumetanide. The inhibitor, Bumetanide, was seen to inhibit both the PIB and NKCC cells. The activator NEM was not seen to activate the NKCC cell line. Thus several theories remain. The NEM may not have activated the cells because the transfected gene may not have been transfected as expected. The gene, if present, may not be turned on or active. If the gene is present and not turned on, the final conclusion seems the most reasonable. NEM, although an activator of vertebrate cells, may not be an activator of invertebrate cells.

September 1999- December 2000: Researcher, Biology Dept., Kenyon College, Gambier, OH

Under direction of Dr. Joan Slonczewski- Worked with *Escherichia coli* and various lac-fusion genes, experimentally observing the expression of the genes at various pH levels. The expression of the GadA and GadB genes at various pH levels was observed. It was seen that both the GadA and GadB genes had higher expression at both acidic and basic pH levels. Yet there was lower expression at the neutral pH. In addition work was done with the Alx gene. Alx expression at acidic pH was inhibited but there was a high level of expression at basic pH. DNA sequencing of Alx was done to try to determine what sequence makes the Alx and Gad genes both expressed at the higher pH levels and what difference causes the inhibition at the lower pH.

September 1998- April 1999: Researcher, Biology Dept., Kenyon College, Gambier, OH

Under direction of Dr. Diane Sklensky- Spent the year researching spinach plant circadian rhythm patterns, trying to decipher the reasons for varying types of growth in different seasons. When the plants had grown to approximately 5 cm they were taken from the greenhouse, and placed in a temperature-controlled chamber where the day and night cycle was able to be controlled. It was observed that plants kept in a day and night cycle mimicking the summer season had the most growth. Various temperatures were also studied and cooler temperatures were seen to be most conducive to growth.

SOFTWARE APPLICATIONS

ImageJ, Clampex, Origin, Fluoview, TIWB, Clampfit, MiniAnalysis, Adobe Photoshop, Macromedia Flash, Bitplane Imaris, and Microsoft PowerPoint.

PRESENTATIONS

- *Invited Speaker,* 6th Annual Southeast Multiphoton Confocal Users Group Meeting and Workshop, Atlanta, GA, August 2006
- *Speaker,* University of Alabama at Birmingham, Department of Neurobiology Retreat, Columbiana, AL, 2005, 2006
- *Speaker,* Graduate Student Research Day, Birmingham, AL, 2006

TEACHING/TRAINING

- Provide training and technical assistance for the 2 photon laser scanning microscopy setup in the Department of Neurobiology, UAB, Birmingham, AL.
- Provide training and technical assistance for set-up and maintenance of whole-cell patch clamp recording set-ups.

Seena S. Mathew

AWARDS

- Franklin Miller Award, 2001
- HHMI Summer Science Scholar, 1999

MISCELLANEOUS

- Peer Mentor, *Ronald E. McNair* Scholars Program, 2006
- Student host to invited speakers – August to December, 2005

PROFESSIONAL REFERENCES

Will be available on request.