the CAMPAIGN for UAB

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January 13, 2015

The McKnight Brain Research Foundation
c/o Ms. Melanie Cianciotto
Vice President for Foundations and Endowments
SunTrust Bank
200 South Orange Avenue
SOAB 10th Floor
Orlando, Florida 32801

Dear Ms. Cianciotto,

When donors give funds to support the important research efforts at UAB, they reach beyond a single individual or project to leave an indelible imprint on others. This philanthropic investment changes things, creating a future that is better, bolder, and brighter than before. It is my pleasure to share our annual report of how the Evelyn F. McKnight Brain Research Foundation's investment in the Evelyn F. McKnight Brain Institute at UAB continues to have a terrific impact.

The Foundation's leadership in this important area of research is extraordinary. We remain grateful for the generous commitment that has made all of these research efforts possible, and we are excited about the progress we are seeing as a result.

If you have any questions or need additional information, please do not hesitate to call Daphne B. Powell, Senior Director of Stewardship and Donor Relations, at (205) 934-1807. I thank you and all of the trustees of the Evelyn F. McKnight Brain Research Foundation wholeheartedly for your faithful support of UAB.

Best regards,

Shirley Salloway Kahn, Ph.D.
Senior Vice President for Development,
Alumni and External Relations

SSK/dbp

Enclosure

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Knowledge that will change your world

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EVELYN F. MCKNIGHT BRAIN INSTITUTE

DEPARTMENT of NEUROBIOLOGY

# Annual Report

## 2014

J. David Sweatt, Ph.D.
Professor
Evelyn F. McKnight Endowed Chair, Department of Neurobiology
Director, Evelyn F. McKnight Brain Research Institute

University of Alabama at Birmingham
Shelby Interdisciplinary Biomedical Research Building
1825 University Boulevard
Birmingham, Alabama 35294

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Annual Report for the
McKnight Brain Research Foundation
Report Period: 2013/2014
Institution: The Evelyn F. McKnight Brain Institute
at The University of Alabama at Birmingham

# INSTITUTE DIRECTOR'S OVERALL REPORT

# ANNUAL REPORT

## McKnight Brain Research Foundation
## Report for Evelyn F. McKnight Brain Institute
## University of Alabama at Birmingham
## October 2013 – September 2014

This report was prepared by Dr. J. David Sweatt as Director of the Evelyn F. McKnight Brain Institute (MBI) and holder of the Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging at The University of Alabama at Birmingham (UAB).

This report provides an overview and summary of the activities and accomplishments for 2014 of the UAB MBI as a whole. The format is as follows. The first section is an executive summary prepared according to the suggested 17-point format provided by the MBRF. The second section is an overall list of the Investigators of the UAB MBI. In the third section, UAB MBI Investigators with an appointment at the faculty level have prepared his or her own individual annual report for 2014, which is in a shortened and abbreviated format and includes scientific achievements, publications, awards, and collaborations. I also have presented my own individual scientific report as Evelyn F. McKnight Endowed Chair in the final section. The appendices include copies of documents referred to in the summary.

### Overview

We are of course deeply grateful that the Evelyn F. McKnight Brain Research Foundation has partnered with UAB to provide vital funding to the Institute, including the establishment of a permanent endowment to support the Institute.

Highlights for the past year for the Evelyn F. McKnight Brain Institute at UAB include:

- Overall, McKnight Investigators hold appointments across three academic schools (Medicine, Optometry and Arts & Sciences) and seven departments (Neurobiology; Neurology; Vision Science; Psychiatry & Behavioral Neurobiology; Physical Medicine & Rehabilitation; Cellular, Developmental and Integrative Biology; and Psychology). A full listing of the investigators is available in *Appendix 1*.
- McKnight Investigator Dr. Lori McMahon, Jarman F. Lowder Endowed Professor of Neuroscience at UAB, continues to serve as the Associate Director of the UAB McKnight Brain Institute. Dr. McMahon is also the Associate Director of the UAB Center for Aging and Director of the UAB Comprehensive Neuroscience Center. Dr. McMahon helped coordinate an exciting visit to UAB this year of His Holiness The Dalai Lama, who participated in a symposium (along with other invited speakers) covering the area of Restorative Neural Plasticity. This event received national and international attention.
- McKnight Investigators Dr. Farah Lubin and Dr. Lori McMahon received a prestigious NIH R25 Grant, the "UAB Neuroscience Roadmap Scholars Program"—approximately $250,000 per year for five years—to support the development of young scientists at UAB coming from disadvantaged backgrounds.
- Last year Dr. Selwyn Vickers, former Chair of the Surgery Department at the University of Minnesota and IOM member, was recruited as the new Senior Vice President and Dean of the School of Medicine (SOM) at UAB. Dr. Sweatt served as Co-Chair of the Search Committee that recruited Dr. Vickers. Dr. Vickers' continues UAB's strong commitment to the MBI—the Dean's office committed $750,000 for a new McKnight recruitment specifically in the area of cognitive epigenetics, as part of UAB's matching funds

for the MBI. The search for the new McKnight Investigator in this area was finalized this year, with Dr. Hablitz serving as the Chair of the search committee. Dr. Jeremy Day, a tenure-track Assistant Professor in the Department of Neurobiology, has now joined the faculty of the UAB MBI using the recruitment resources provided by Dean Vickers.

- UAB Investigators in collaboration with the other three MBI's helped initiate the new Evelyn F. McKnight Inter-Institutional Bioinformatics Core. We thank the Board for your financial support for establishing the new Core. The McKnight Brian Research Epigenetics Core will pioneer a comprehensive program to test an epigenetic hypothesis of cognitive aging, working collaboratively among all the Evelyn F. McKnight Brain Institutes. The goal is to establish a shared Inter-Institute resource to provide a catalyst for discoveries in the area of epigenetics of cognitive aging. The Core has already begun providing support for bioinformatic analysis of high-throughput DNA/RNA sequencing and epigenomics, bio-informatics, and cross-correlation of human and animal studies. As progress in this area was covered in a separate Progress Report recently, I will not reiterate further details here.
- The Civitan International Research Center (CIRC) based in the Department of Neurobiology continues to receive approximately $500K - $600K per year in spendable support. Much of this is used to support the CIRC fMRI facility, which is used by several McKnight Investigators. An exciting development in this area is the commitment of funds by the UAB SOM to purchase a new fMRI for this facility, to the great benefit of MBI investigators working in this area. The new fMRI is anticipated to go online in mid-2015.
- Neuroimaging is highly relevant to studies of cognitive aging, and UAB and Auburn University have initiated a collaboration to facilitate large scale neuroimaging projects using Auburn's 7T magnet. UAB also has established a new state-of-the-art cyclotron to enable new PET imaging modalities related to CNS dysfunction.
- The British Medical Association Book Awards take place annually to recognize outstanding contributions to medical literature. The 2014 First Prize in Neurology, non-surgical aspects, was awarded to *Epigenetic Regulation in the Nervous System: Basic Mechanisms and Clinical Impact*, edited by J. David Sweatt, Michael J. Meaney, Eric J. Nestler and Schahram Akbarian, and published by Elsevier/Academic Press.
- Evelyn F. McKnight Chair David Sweatt was selected as a *Thomson Reuters Highly Cited Researcher* and was also included in *The World's Most Influential Scientific Minds*. Those recognized as Highly Cited Researchers 2014 earned the distinction by writing the greatest numbers of reports officially designated by Essential Science Indicators as Highly Cited Papers—ranking among the top 1% most cited for their exceptional impact.

**1. Summary of Scientific Achievements since Last Report**

As mentioned above, individual McKnight Investigator's scientific accomplishments are noted in a separate section. The next few paragraphs highlight a few of the principal discoveries from the Institute this year.

McKnight Investigator Dr. Harry Sontheimer published a study in *Nature Communications* describing how disruption of astrocyte-vascular coupling and the blood-brain barrier (BBB) is triggered by invading glioma cells. Astrocytes are a major category of cell in the CNS and their terminal processes (endfeet) cover the entire cerebral vasculature and serve as exchange sites for ions, metabolites and energy substrates from the blood to the brain. They maintain endothelial tight junctions that form the BBB and release vasoactive molecules that regulate vascular tone. Malignant gliomas are highly invasive tumors that use the perivascular space for invasion and co-opt existing vessels as satellite tumors form. Sontheimer's lab used a clinically relevant mouse model of glioma and discovered that glioma cells, as they populate the perivascular space of preexisting vessels, displace astrocytic endfeet from endothelial or

vascular smooth muscle cells. This causes a focal breach in the BBB. Furthermore, astrocyte-mediated gliovascular coupling is lost, and glioma cells seize control over the regulation of vascular tone through Ca(2+)-dependent release of K(+). These findings have important clinical implications regarding blood flow in the tumor-associated brain and the ability to locally deliver chemotherapeutic drugs in disease. Also, as there is evidence for BBB dysfunction in several aging-related disorders including a variety of vascular disorders, these findings indicate an interesting potential target for novel therapeutics in those disorders.

McKnight Investigator Dr. Farah Lubin collaboratively published her discovery of an important new signaling mechanism for regulating synaptic function, a finding which has significant implications for synaptic plasticity and memory formation in the CNS. It is known that exposure to chronic stress produces negative effects on mood and hippocampus-dependent memory formation. Alterations in signaling cascades and histone acetylation present a mechanism of modulation of transcription that may underlie stress-dependent processes in the hippocampus critical to learning and memory and development of depressive behaviors. Using the rat model of chronic variable stress (CVS) Lubin and colleagues investigated the role of changes in protein acetylation and other molecular components of hippocampus-dependent memory formation and anhedonic behavior in response to CVS. Specifically they investigated the molecular and behavioral effects of infusion of the sirtuin inhibitor, sirtinol, into the dentate gyrus (DG). Sirtinol infusion into the DG prevented the CVS-mediated decrease in extracellular signal-regulated protein kinases 1 and 2 activity and Bcl-2 expression, as well as histone acetylation in the DG previously observed following CVS. This corresponded to enhanced performance on the novel object location memory task, as well as reduced anhedonic behavior. These results suggest that changes in sirtuin activity contribute to changes in molecular cascades and histone acetylation within the hippocampus observed following CVS and may represent a novel therapeutic target for stress-induced depression. Moreover, as sirtuins have been directly implicated in regulating aging-related memory decline, these studies identify a new potential mechanism as being in play in cognitive aging.

McKnight Investigator Dr. Erik Roberson published a novel finding this year in the *Neurobiology of Aging* related to the protein Tau that has been implicated in several forms of aging-related cognitive dysfunction. Roberson's lab had already discovered that genetic tau reduction (in Tau(+/-) and Tau(-/-) mice) prevents deficits in AD models and has an excite-protective effect, meaning increased resistance to seizures, without causing apparent neuronal dysfunction. However, most studies of tau reduction have been conducted in less than one-year-old mice, and the effects of tau reduction in aged mice were less clear. Specifically, it was not known whether the excitoprotective effects of tau reduction persist with aging, and whether tau reduction causes neuronal dysfunction, including parkinsonism, with aging was also unclear. In their studies, Roberson's lab performed a comprehensive analysis of two-year-old Tau(+/+), Tau(+/-), and Tau(-/-) mice. They found that in aged mice, tau reduction still conferred resistance to pentylenetetrazole-induced seizures. Moreover, tau reduction did not cause parkinsonian abnormalities in dopamine levels or motor function and did not cause iron accumulation or impaired cognition, although Tau (-/-) mice had mild hyperactivity and decreased brain weight. Importantly, the excitoprotective effect in aged Tau (+/-) mice was not accompanied by detectable abnormalities, indicating that partially reducing tau or blocking its function may be a safe and effective therapeutic approach for AD and other conditions with increased excitability.

## 2. Publications in Peer Reviewed Journals

Investigators at the UAB MBI published a total of 101 research papers, reviews and commentaries in peer-reviewed journals in 2014. The journals in which these papers were published included many of the

leading scientific journals in the discipline of neuroscience: *Nature, Journal of Neurophysiology, Neurobiology of Aging, Journal of Neuroscience, Neuron, Human Molecular Genetics, Neuroimage, Biological Psychiatry, Neuropsychopharmacology,* etc.

**3. Publications (Other)**

- **Books**

  Dr. Harry Sontheimer has a book in preparation on the *Diseases of the Nervous System,* to be published by Elsevier.

  Dr. Farah Lubin is Co-Edited the book *Epigenetics and Neuroplasticity: Evidence and Debate*, published by Elsevier in 2014.

  Dr. Robin Lester Co-Edited the book *Nicotinic Receptors*, published by Springer in 2014.

  Dr. Vlad Parpura Co-Edited three books:

  *Introduction to Neuroglia*, published by Morgan and Claypool, 2014

  *Pathological Potential of Neuroglia*, published by Springer, 2014

  *Glutamate and ATP at the Interface of Metabolism and Signaling in the Brain*, published by Springer in 2014

- **Book Chapters**

  Investigators at the UAB MBI published a total of 16 book chapters in 2014.

**4. Presentations at Scientific Meetings (Also Includes Invited Research Seminars)**

Investigators at the UAB MBI presented a total of 59 scientific presentations in 2014. UAB MBI Investigators presented their work at numerous prestigious institutions and national meetings, including the American Neurological Association, UC Irvine, Northwestern, the Society for Neuroscience, the American College of Neuropsychopharmacology, a Gordon Conference, the American Epilepsy Society and NIMH.

Please note that the UAB MBI sponsored a number of prominent scientists to come visit UAB and the MBI to give research presentations concerning their own work. A list of MBI-sponsored speakers for 2014 is appended to this report.

**5. Presentations at Public (Non-Scientific) Meetings or Events**

Investigators at the UAB MBI presented 27 public-forum presentations in 2014.

**6. Awards and Honors**

Investigators at the UAB MBI received several national-level awards and honors in 2014. Dr. Sweatt was the recipient of an ISI Award for highly cited papers of high impact. Dr. Harald Sontheimer gave a major public lecture at the Society for Neuroscience Annual Meeting. Ten MBI faculty served on NIH Study Sections, and seven faculty members served as journal editors or on editorial boards.

**7. Faculty**

Five new faculty members joined the McKnight Institute in 2014. Dr. Kazu Nakazawa moved to the UAB MBI from the NIMH. Dr. Nakazawa works on epigenetics and cognitive function and is Associate

Professor in the Department of Psychiatry. Two faculty members based in the Neurology Department, Matt Goldberg, Ph.D., and Jeremy Herskowitz, Ph.D., also joined the McKnight Institute last year. Drs. Goldberg and Herskowitz are tenure-track assistant professors also affiliated with the Center for Neurodegeneration and Experimental Therapeutics. All three of these Investigators are based on the 11th floor of the Shelby Building.

As already mentioned, Dr. Jeremy Day was recruited to the McKnight Institute using a recruitment package provided by the new SOM Dean. Dr. Day works on epigenetic mechanisms in memory formation and his laboratory is on the 9th floor of the Shelby Building.

Dr. Sweatt served as a member of the search committee for the new Chair of the Biology Department in the College of Arts and Sciences, helping identify and recruit the newly named Chair, Dr. Steven Austad. Dr. Austad is an internationally renowned aging researcher and came to UAB from the University of Texas Health Science Center at San Antonio, where he served as Professor in the Department of Cellular and Structural Biology and Interim Director of the Barshop Institute for Longevity and Aging Studies. Dr. Austad is a leader in aging studies; beginning January 1, 2014, he began serving as the scientific director for the American Federation for Aging Research. He also serves on the external advisory committee at the Mayo Clinic Kogod Center on Aging and the public policy committee for the Gerontological Society of America.

As a result of philanthropic gifts to the institution, there are two vacant endowed chairs that are currently housed in the Department of Psychiatry & Behavioral Neurobiology, the *Geropsychiatry Research Chair* and the *F. Cleveland Kinney Endowed Chair in Geriatric Psychiatry.* The market share of each endowment exceeds $1.5 million, and both are available for the recruitment of senior level, star-quality faculty engaged in the investigation and treatment of memory disorders in the elderly. Dean Vickers has confirmed the commitment of the SOM to utilize these chairs for UAB MBI-related faculty recruitments.

**8. Trainees, Post Doctoral, Pre-Doctoral, Other**

**A.** The labs of MBI faculty currently involve the training of 35 graduate students and 28 post-doctoral fellows.

**B. Recruiting Initiatives for 2015**

As described above we will continue ongoing searches for senior-level MBI Investigators, several with an endowed chair position, in 2015. In addition, as described above as part of the new SOM Strategic Plan, the Dean has approved an additional new recruitment as part of the MBI endeavor for 2015.

**9. Clinical/Translational Programs**

**A. New Programs**

As has been previously described, Dr. Sweatt's DARPA project is translational, relating to the identification of novel constructs for cognitive enhancement. In this vein several new intellectual property disclosures were filed with UAB this year regarding novel targets and strategies for aging-related cognitive enhancement.

**B. Update on Existing Clinical Studies**

Not applicable

**C. New Treatments**
Not applicable

**D. Drug Trials, Future Research and/or Clinical Initiatives**
Not applicable

## 10. Technology

### A. Patent Applications

Dr. Sweatt's laboratory (through UAB) filed an international patent application for histone H2A.Z as a novel target for memory enhancement.

### B. Revenue Generated from Technology

Not applicable

## 11. Budget Update

A full financial report for 2013/2014 is included as Section 2.

## 12. Educational Programs Focusing on Age Related Memory Loss

### A. Scientific

The MBI was instrumental in establishing the new undergraduate honors Neuroscience major at UAB. It is a unique program—a joint offering between the undergraduate College of Arts and Sciences and the School of Medicine. This is a recruiting platform for future medical and graduate students interested in memory research. For example, several of our 2014/2015 graduates from this program are currently in (or applying to) medical school or MD/PhD programs at UAB.

### B. Public

Not applicable

## 13. Collaborative Programs with other McKnight Institutes, Institutions and Research Programs

UAB MBI Investigators have identified a total of 17 inter- and intra-MBI collaborations, representing all three other MBIs. More details on these collaborations are noted in the section with the individual investigators' data.

## 14. Collaborative Programs with Non McKnight Institutes, Institutions and Research Programs

UAB MBI Investigators have identified a total of 44 inter- and intra-institutional collaborations locally, nationally, and internationally.

**15. Were any funds used for a Prohibited Purpose during the report period?**

No

**16. Do you recommend any modification to the Purpose or mandates in the Gift Agreement?**

None

**17. Did all activities during the report period further the Purpose?**

Yes

**18. Briefly describe your progress compared to the original goals.**

The UAB MBI is progressing in accordance with the original strategic plan for the Institute, which was outlined to the Board when the UAB MBI was approved for renewed funding in 2009. We have focused on recruiting new faculty members as was originally proposed. The quality of the new investigators has been uniformly excellent. The current membership of the UAB MBI comprises 34 Investigators, with a nicely diverse distribution of Assistant, Associate, and Full Professors including six current or former Department Chairs. Approximately two-thirds (25/34) of the Investigators are new appointees to the Institute since 2006, an exceptional expansion given the state of the economy over that time-frame.

We also are progressing nicely in developing our research infrastructure as planned. The 11$^{th}$ floor of the Shelby building, i.e., the final third of the MBI physical plant, was completed, and we have essentially full occupancy with Drs. Roberson, Lubin, Gamlin, Nakazawa, Ubogu, Goldberg, and Herskowitz occupying new labs there. Both the Neurology and Psychiatry Departments are undertaking collaborative recruitments with the MBI to recruit additional new MBI-relevant professors into the MBI. Two important Core laboratories, the *MBI Mouse Behavioral Assessment Core* and the *McKnight Rodent Physiological Assessment Core*, are in operation and provide an excellent platform for inter-Institute collaborations. These two Cores provide excellent opportunities for expanded expertise among UAB MBI Investigators in utilizing cutting-edge genetically engineered mouse models relevant to cognitive aging. In addition, these two Cores capitalize on scientific strengths of the UAB MBI and allow for collaborative opportunities with the other MBI's, which in general are not historically strong in the area of mouse genetic engineering. Finally, as already mentioned the new McKnight Inter-Institute Epigenetics and Bioinformatics Initiative provides a powerful platform for collaboration and cross-fertilization in the area of the epigenetics of cognitive aging.

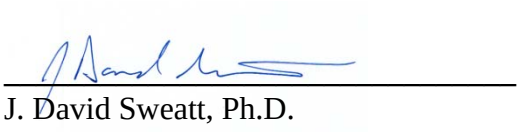
**19. Please describe any negative events (loss of personnel, space, budget, etc.) that occurred during the report period and the possible impact on carrying out the Gift Agreement.**

None

**20. Please provide any general comments or thoughts not covered elsewhere – a response is not required. Please respond only if you would like to add something not otherwise covered elsewhere.**

No additional comments.

**21. Signature, date, and title of person submitting report**



January 13, 2015
Date

J. David Sweatt, Ph.D.
Professor
Evelyn F. McKnight Endowed Chair
Director, Evelyn F. McKnight Brain Institute
Chairman, Department of Neurobiology
UAB School of Medicine

# FINANCE

**McKnight Brain Research Foundation**

Financial Summary Format:

__(Institute) and/or (Endowed Chair)

Summary for 12 months ended _____09/30/14_____

Account Name: __Evelyn F. McKnight Brain Institute Endowed Support Fund

| | | |
|---|---|---|
| | Beginning Balance on ____10/01/2013__ | $ _4,287,887 |
| B. | Investment Growth | $ ___(49,734) |
| C. | Distributions | $ ___243,000 |
| D. | Additional Contribution | $ __1,000,000 |
| E. | Ending Balance on _____09/30/2014__ | $___5,481,153 |

**DEFINITIONS**

*DISTRIBUTION* is the money transferred from the account to the spendable/operating account for the designated use.

*BALANCE* is the market value of the account as of the first or last day of the reporting year.

*ADDITIONAL CONTRIBUTION* is additional contribution by MBRF, the reporting institution, match etc.

*INVESTMENT GROWTH* (Loss) is the total undistributed interest, dividends, and realized and unrealized gains and losses.

*BALANCE* is the value of the account's corpus including all contributions, and applicable state match monies as of the date indicated.

**McKnight Brain Research Foundation**

Financial Summary Format:

(Institute) and/or (Endowed Chair)

Summary for 12 months ended 09/30/14

Account Name: Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging

| | | |
|---|---|---|
| | Beginning Balance on 10/01/2013 | $ 1,502,362 |
| B. | Investment Growth | $ (16,987) |
| C. | Distributions | $ 71,896 |
| D. | Additional Contribution | $ 0 |
| E. | Ending Balance on 09/30/2014 | $ 1,557,271 |

**DEFINITIONS**

*DISTRIBUTION* is the money transferred from the account to the spendable/operating account for the designated use.

*BALANCE* is the market value of the account as of the first or last day of the reporting year.

*ADDITIONAL CONTRIBUTION* is additional contribution by MBRF, the reporting institution, match etc.

*INVESTMENT GROWTH* (Loss) is the total undistributed interest, dividends, and realized and unrealized gains and losses.

*BALANCE* is the value of the account's corpus including all contributions, and applicable state match monies as of the date indicated.

MCKNIGHT BRAIN INSTITUTE AT UAB
2014 ANNUAL REPORT
FINANCIAL SUPPLEMENT

In compliance with Section 6.3 of the gift agreement between the Evelyn F. McKnight Brain Research Foundation (MBRF) and UAB, this income and distributions report is provided as a supplement to the annual report on the McKnight Brain Institute (MBI) at UAB.

In compliance with Sections 9.2.1.2 and 10.3 of said gift agreement, UAB ensures that the contributions from the MBRF and the distributions from the endowed chair have been used solely for the purpose of promoting research and investigation of the brain in the fundamental mechanisms that underlie the neurobiology of memory with a clinical relevance to the problems of age-related memory loss.

In compliance with Sections 7, and 9.1.5.3, of said gift agreement, UAB ensures that no portion of the contributions received from the MBRF or distributions from the endowed chair were used directly or indirectly to construct, purchase, improve, or maintain real property; to pay overhead or indirect costs; or for anything other than direct expenditures in furtherance of the purpose of the fund.

| Fiscal Year | Item | MBRF Deposits | MBRF Chair, Gift and Endowment Distributions ** | MBRF Funds Expended or Encumbered | Matching Fund Expended or Encumbered Endowment Distributions | Matching Funds Expended or Encumbered |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Grand Totals** | **MBRF Prior Agreement** | **$ 6,000,000** | **$ 598,150** | **$ 5,911,757** | **$ -** | **$ 12,357,436** |
| | | | | | | |
| **2010** | **MBRF New Agreement** | **$ 1,000,000** | | $ 1,000,000 | | |
| | | **$ 500,000** | | | | |
| | Sweatt Salary | | | $ 81,617 | | |
| | Rumbaugh Salary | | | $ 26,966 | | |
| | L.Wadiche Salary | | | $ 72,485 | | |
| | J. Wadiche Salary | | | $ 78,526 | | |
| | V. Parpura Salary | | | $ 156,829 | | |
| | K. Visscher Salary | | | $ 117,192 | | |
| | R. Lester Salary | | | $ 12,594 | | |
| | F. Lubin Salary | | | $ 11,677 | | |
| | J. Hablitz Salary | | | $ 30,723 | | |
| | K. Speed Salary | | | $ 24,455 | | |
| | V. Hixon Salary | | | $ 6,734 | | |
| | I. Rivera Salary | | | $ 4,851 | | |
| | M. Kilgore Salary | | | $ 26,245 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | One Pilot Project | | | $ 25,000 | | |
| | Evelyn F. McKnight Interdisciplinary Retreat | | | $ 10,808 | | $ 4,000 |
| | V. Hixon and M. Kilgore Travel | | | $ 2,833 | | |
| | M. Olsen Start Up Package | | | | | $ 756,000 |
| | G. King Start Up Package | | | $ 35,000 | | $ 665,000 |
| | F. Cleveland Kinney Endowed Chair in Geriatric Psychiatry * | | | | $ 74,014 | $ 1,500,050 |
| | Geropsychiatry Research Chair * | | | | $ 102,544 | $ 1,222,896 |
| | Patsy W. and Charles A. Collat Scholar in Neuroscience - D. Geldmacher | | | | | $ 500,000 |
| | Dixon Scholar in Neurology - M. Gray | | | | | $ 245,000 |
| | Parpura Start Up Package | | | $ 40,000 | | |
| | F. Lubin Start Up Package | | | $ 8,750 | | |
| | J. Wadiche Start Up Package | | | $ 55,000 | | |
| | L. Wadiche Start Up Package | | | $ 10,000 | | |
| | MBRF Chair Spendable Earnngs | | $ 83,499 | | | |
| | MBRF Gift Earnings ** | | $ 61,169 | | | |
| | MBRF Institute Spendable Earnings | | $ 55,984 | | | |
| | Previous MBRF Agreement Residual | | $ 409,277 | | | |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **FY 10 Totals** | | **$ 1,500,000** | **$ 609,929** | **$ 1,838,285** | **$ 176,558** | **$ 4,892,946** |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| **2011** | **MBRF New Agreement** | **$ 1,000,000** | | $ 1,000,000 | | |
| | | **$ 500,000** | | | | |
| | Sweatt Salary | | | $ 74,605 | | |
| | L.Wadiche Salary | | | $ 74,297 | | |
| | J. Wadiche Salary | | | $ 80,489 | | |
| | V. Parpura Salary | | | $ 156,829 | | |
| | K. Visscher Salary | | | $ 103,503 | | |
| | F. Lubin Salary | | | $ 55,208 | | |
| | J. Hablitz Salary | | | $ 30,723 | | |
| | K. Speed Salary | | | $ 12,505 | | |
| | V. Hixon Salary | | | $ 6,532 | | |
| | S. Hyman Salary | | | $ 4,924 | | |
| | G. Kass Salary | | | $ 12,469 | | |
| | S. Ewell Salary | | | $ 6,417 | | |
| | Evelyn F. McKnight Interdisciplinary Retreat | | | $ 10,483 | | $ 5,000 |
| | F. Cleveland Kinney Endowed Chair in Geriatric Psychiatry * | | | | $ 67,724 | |
| | Geropsychiatry Research Chair * | | | | $ 93,795 | |
| | Warren Family Scholar | | | | | $ 600,000 |
| | Patsy W. and Charles A. Collat Scholar in Neuroscience - D. Geldmacher | | | | | $ 300,000 |
| | S. Phillips Development Grant | | | | | $ 10,000 |
| | SOM Additional Support | | | | | $ 50,000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Parpura Start Up Package | | | $ 25,000 | | |
| | J. Wadiche Start Up Package | | | $ 11,760 | | |
| | L. Wadiche Start Up Package | | | $ 13,290 | | |
| | A. Theibert - Support | | | $ 15,000 | | |
| | R. Lester - Support | | | $ 20,000 | | |
| | MBRF Chair Spendable Earnings | | $ 79,969 | | | |
| | MBRF Gift Earnings ** | | $ 59,606 | | | |
| | MBRF Institute Spendable Earnings | | $ 100,316 | | | |
| | Previous MBRF Agreement Residual | | $ 317,881 | | | |
| | | | | | | |
| **FY 11 Totals** | | **$ 1,500,000** | **$ 557,772** | **$ 1,714,034** | **$ 161,519** | **$ 965,000** |
| | | | | | | |
| **2012** | **MBRF New Agreement** | **$ 1,000,000** | | $ 1,000,000 | | |
| | | | | | | |
| | Sweatt Salary | | | $ 74,432 | | |
| | L.Wadiche Salary | | | $ 77,984 | | |
| | J. Wadiche Salary | | | $ 81,004 | | |
| | V. Parpura Salary | | | $ 153,611 | | |
| | K. Visscher Salary | | | $ 89,463 | | |
| | F. Lubin Salary | | | $ 93,245 | | |
| | J. Hablitz Salary | | | $ 30,092 | | |
| | K. Speed Salary | | | $ 13,601 | | |
| | V. Hixon Salary | | | $ 6,528 | | |
| | G. King Salary | | | $ 33,836 | | |
| | S. Ewell Salary | | | $ 14,917 | | |
| | Evelyn F. McKnight Interdisciplinary Retreat | | | $ 11,938 | | $ 3,062 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | F. Cleveland Kinney Endowed Chair in Geriatric Psychiatry * | | | | $ 65,269 | |
| | Geropsychiatry Research Chair * | | | | $ 90,396 | |
| | Warren Family Scholar * | | | | $ 39,775 | $ 1,000,000 |
| | Jarman F. Lowder Endowed Professorship in Neuroscience - L. McMahon * | | | | $ 25,723 | $ 505,519 |
| | Virginia B. Spencer Endowed Professorship in Neuroscience - E. Roberson * | | | | $ 24,041 | $ 500,000 |
| | Patsy W. and Charles A. Collat Scholar in Neuroscience - D. Geldmacher * | | | | $ 14,125 | |
| | L. Dobrunz - CCTS Pilot Project | | | | | $ 15,000 |
| | SOM Additional Support | | | | | $ 50,000 |
| | Evelyn F. McKnight Advertisement | | | $ 4,463 | | |
| | L. Dobrunz - Pilot Project | | | $ 52,000 | | |
| | A. Theibert - Support | | | $ 10,000 | | |
| | R. Lester - Support | | | $ 5,000 | | |
| | D. Sweatt - Travel | | | $ 771 | | |
| | V. Hixon - Travel | | | $ 1,214 | | |
| | MBRF Chair Spendable Earnngs | | $ 73,369 | | | |
| | MBRF Gift Earnings ** | | $ 6,546 | | | |
| | MBRF Institute Spendable Earnings | | $ 145,708 | | | |
| | Previous MBRF Agreement Residual | | $ 174,079 | | | |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **FY 12 Totals** | | **$ 1,000,000** | **$ 399,702** | **$ 1,754,099** | **$ 259,329** | **$ 2,073,581** |
| | | | | | | |
| | | | | | | |
| **2013** | **MBRF New Agreement** | **$ 1,000,000** | | $ 1,000,000 | | |
| | | | | | | |
| | Sweatt Salary | | | $ 75,262 | | |
| | L.Wadiche Salary | | | $ 56,980 | | |
| | J. Wadiche Salary | | | $ 81,979 | | |
| | V. Parpura Salary | | | $ 88,679 | | |
| | K. Visscher Salary | | | $ 79,244 | | |
| | J. Hablitz Salary | | | $ 30,233 | | |
| | K. Speed Salary | | | $ 11,311 | | |
| | V. Hixon Salary | | | $ 6,531 | | |
| | Evelyn F. McKnight Interdisciplinary Retreat | | | $ 11,043 | | $ 4,500 |
| | F. Cleveland Kinney Endowed Chair in Geriatric Psychiatry * | | | | $ 66,963 | |
| | Geropsychiatry Research Chair * | | | | $ 92,742 | |
| | Warren Family Scholar * | | | | $ 75,495 | |
| | Jarman F. Lowder Endowed Professorship in Neuroscience - L. McMahon * | | | | $ 26,395 | |
| | Virginia B. Spencer Endowed Professorship in Neuroscience - E. Roberson * | | | | $ 24,664 | |
| | Patsy W. and Charles A. Collat Scholar in Neuroscience - D. Geldmacher * | | | | $ 19,400 | |
| | SOM Additional Support | | | | | $ 275,000 |

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|---|---|---|---|---|---|---|
| | SOM McKnight Recruitment | | | | | $ 750,000 |
| | L. Dobrunz - Pilot Project | | | $ 7,000 | | |
| | A. Theibert - Support | | | $ 35,000 | | |
| | V. Hixon - Travel | | | $ 1,084 | | |
| | MBRF Chair Spendable Earnngs | | $ 69,969 | | | |
| | MBRF Gift Earnings ** | | $ 3,741 | | | |
| | MBRF Institute Spendable Earnings | | $ 188,781 | | | |
| | Previous MBRF Agreement Residual | | $ 10,000 | | | |
| | | | | | | |
| **FY 13 Totals** | | **$ 1,000,000** | **$ 272,491** | **$ 1,484,346** | **$ 305,659** | **$ 1,029,500** |
| | | | | | | |
| **2014** | **MBRF New Agreement** | **$ 1,000,000** | | $ 1,000,000 | | |
| | | | | | | |
| | Sweatt Salary | | | $ 65,918 | | |
| | L.Wadiche Salary | | | $ 53,000 | | |
| | J. Wadiche Salary | | | $ 53,684 | | |
| | V. Parpura Salary | | | $ 57,203 | | |
| | K. Visscher Salary | | | $ 78,060 | | |
| | J. Hablitz Salary | | | $ 7,506 | | |
| | V. Hixon Salary | | | $ 6,970 | | |
| | Evelyn F. McKnight Interdisciplinary Retreat | | | $ - | | $ 1,000 |
| | F. Cleveland Kinney Endowed Chair in Geriatric Psychiatry * | | | | $ 68,424 | |
| | Geropsychiatry Research Chair * | | | | $ 94,764 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Warren Family Scholar * | | | | $ 77,142 | |
| | Jarman F. Lowder Endowed Professorship in Neuroscience - L. McMahon * | | | | $ 26,972 | |
| | Virginia B. Spencer Endowed Professorship in Neuroscience - E. Roberson * | | | | $ 25,202 | |
| | Patsy W. and Charles A. Collat Scholar in Neuroscience - D. Geldmacher * | | | | $ 25,519 | |
| | SOM Additional Support | | | | | $ 375,000 |
| | Jeremy Herskowitz Start Up Package | | | | | $ 1,000,000 |
| | Matthew Goldberg Start Up Package | | | | | $ 1,000,000 |
| | Kazu Nakasawa Start Up Package | | | | | $ 925,000 |
| | V. Hixon - Travel | | | $ 1,416 | | |
| | MBRF Chair Spendable Earnings | | $ 71,896 | | | |
| | MBRF Gift Earnings ** | | $ 1,674 | | | |
| | MBRF Institute Spendable Earnings | | $ 243,000 | | | |
| | Previous MBRF Agreement Residual | | $ 5,000 | | | |
| | | | | | | |
| **FY 14 Totals** | | **$ 1,000,000** | **$ 321,570** | **$ 1,323,757** | **$ 318,023** | **$ 3,301,000** |
| | | | | | | |
| **Grand Totals** | | **$ 6,000,000** | **$ 2,161,464** | **$ 8,114,521** | **$ 1,221,088** | **$ 12,262,027** |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | * denotes encumbered endowment match | | | | | |
| | ** Original MBRF gift was set up as an interest bearing account. These items account for the interest over time ($279,608 in the prior agreement and $127,321 in the current agreement). | | | | | |

## Financial Schedule for the Evelyn F. McKnight Brain Institute at UAB

| | *MBRF CONTRIBUTION* | | *UAB MATCH* | | |
|---|---|---|---|---|---|
| **Date** | **Endowment** | **Operations** | **Endowment** | **Operations** | **Endowment Distribution** |
| 10/1/2009 | $ 1,000,000 | $ 500,000 | $ 2,722,946 | $ 2,170,000 | $ 316,041 |
| 10/1/2010 | $ 1,000,000 | $ 500,000 | $ - | $ 365,000 | $ 341,804 |
| 10/1/2011 | $ 1,000,000 | | $ 500,000 | $ 100,000 | $ 480,918 |
| 10/1/2012 | $ 1,000,000 | | $ 2,005,519 | $ 68,062 | $ 581,128 |
| 10/1/2013 | $ 1,000,000 | | | $ 1,029,500 | $ 646,699 |
| 10/1/2014 | | | | $ 3,301,000 | |
| **Total** | **$ 5,000,000** | **$ 1,000,000** | **$ 5,228,465** | **$ 7,033,562** | **$ 2,366,590** |

**Projected FY 14-15 Evelyn F. McKnight Brain Institute Budget**

| Category | McKnight Operations Amount | McKnight Endowment Spendable Earnings Amount | McKnight Endowed Chair Spendable Earnings Amount | UAB Encumbered Endowment Spendable Earnings Amount | Totals |
|---|---|---|---|---|---|
| | | | | | |
| **Salary and Benefits** | $0 | $255,956 | $72,720 | | **$328,676** |
| **Other McKnight Brain Institute Support** | | | | | **$0** |
| **F. Cleveland Kinney Endowed Chair in Geriatric Psychiatry** | | | | $68,424 | **$68,424** |
| **Geropsychiatry Research Chair** | | | | $94,764 | **$94,764** |
| **Warren Chair** | | | | $77,142 | **$77,142** |
| **Lowder Chair** | | | | $26,972 | **$26,972** |
| **Collat Chair** | | | | $25,519 | **$25,519** |
| **Spencer Chair** | | | | $25,202 | **$25,202** |
| **Total** | **$0** | **$255,956** | **$72,720** | **$318,023** | **$646,699** |
| | | | | | |

# Department of Neurobiology/Evelyn F. McKnight Brain Institute
# Extramural Funding Report

The Department of Neurobiology/Evelyn F. McKnight Brain Institute currently has active extramural funding of $6,366,818 in direct costs and $8,907,217 in total costs broken down as follows:

| | | |
|---|---|---|
| NIH | $4,714,704 | Direct Costs |
| DARPA | $1,344,336 | Direct Costs |
| Other Foundations | $ 307,778 | Direct Costs |
| Total | $6,366,818 | Direct Costs |

A detailed report of grant awards is attached.

# Department of Neurobiology
# Active Extramural Funding
# Fiscal Year 2014-2015

| | | | Type of Grant and Grant Number | | | | Current Annual | | | All Years | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Faculty | Role | Percent Effort | | Agency | Grant Period | Title | Direct Costs | F & A | Total | Direct Costs | F & A | Total |
| Day | PI | 25% | R00 DA034681 | NIH | 07/01/14-06/30/17 | Epigenetic Regulation of cocaine-Induced Neuroadaptations | 169,388 | 79,612 | 249,000 | 508,164 | 238,836 | 749,000 |
| Dobrunz | PI | 25% | R01 MH098534-01 | NIH | 07/01/12 - 06/30/17 | Interneuron Dysfunction Alters the Dynamics of the Inhibition Excitation Balance | 250,000 | 116,250 | 366,250 | 1,250,000 | 581,250 | 1,831,250 |
| Hablitz | PI | 5% | P30 NS047466 | NIH NINDS | 02/1/10-11/31/15 | UAB Neuroscience Core Center | 442,853 | 205,927 | 648,780 | 2,420,745 | 1,125,795 | 3,546,540 |
| Hablitz | PI | 40% | R01 NS090041 | NIH | 09/15/14-07/31/18 | Acquired HCN Channelpathies in Cortical Dysplasia | 218,750 | 102,813 | 321,563 | 875,000 | 411,252 | 1,286,252 |
| King | PI | 75% | R00 AG034989 | NIH | 07/01/11-06/30/15 - NCE | Klotho Regulation and Aging | 30,000 | 13,950 | 43,950 | 496,320 | 230,788 | 727,108 |
| Lubin | PI | 20% | 1R25NS089463-01 | NIH | 09/30/14-07/31/19 | UAB Neuroscience Roadmap Scholars Program | 241,809 | 19,345 | 261,154 | 1,159,045 | 92,724 | 1,251,769 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lubin | PI | 50% | R01 MH097909-01 | NIH | 07/01/12-06/30/17 | Chromatin Remodeling Mechanisms of Gene Transcription in Memory | 262,224 | 121,934 | 384,158 | 1,402,908 | 676,762 | 2,079,670 |
| Parpura, Vladimir | PI | 20% | R21 HD078678-01 | NIH | 12/01/13-11/30/15 | The Role of Astroglia in the Enteric Nervous System and Gut Function | 125,000 | 58,750 | 183,750 | 275,000 | 129,250 | 404,250 |
| Pozzo-Miller | PI | 20% | R01 NS065027 | NIH | 02/01/10-01/31/15 | MECP2 Mutations and BDNF Signaling: Shared Mechanisms of Rett and Autism | 218,750 | 101,719 | 320,469 | 1,093,750 | 508,595 | 1,602,345 |
| Pozzo-Miller, Lucas | PI | 0% | R01 NS065027 Adminstrative Supplement | NIH | 06/01/13-01/31/15 | MECP2 Mutations and BDNF Signaling: Shared Mechanisms of Rett and Autism | 68,105 | 31,895 | 100,000 | 68,105 | 31,895 | 100,000 |
| Pozzo-Miller, Lucas | PI | 20% | 1R21HD074418-01A1 | NIH | 06/10/13-05/31/15 | Reversing BDNF Impairments in Rett Mice with TRPC Channel Activators | 97,200 | 45,198 | 142,398 | 272,200 | 126,573 | 398,773 |
| Pozzo-Miller | PI | | Rat Model Working Group Collaborative Agreement | RettSyndrome.org | 12/01/14-11/30/15 | Investigating astrocytes and neurons in a Rat model of Rett syndrome | 4,545 | 455 | 5,000 | 4,545 | 455 | 5,000 |
| Sontheimer | PI | | R01 NS036692 CR | NIH NINDS | 04/01/14-03/31/19 | The Role of Ion Transport in Glioma Cell Migration, Proliferation, and Apoptosis | 275,537 | 129,502 | 405,039 | 1,377,685 | 647,510 | 2,025,195 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sontheimer | PI | | R01 NS082851 | NIH-NINDS | 09/30/13-08/31/17 | Glioma-Astrocyte Vascular Interactions | 218,750 | 102,813 | 321,563 | 875,000 | 411,252 | 1,286,252 |
| Sontheimer | PI | | R01 NS052634 | NIH-NINDS | 09/30/11-07/31/16 | Amino-acid Transport and the Biology of Human Gliomas | 218,750 | 101,719 | 320,469 | 1,093,750 | 508,595 | 1,602,345 |
| Sontheimer/ Robel | PI/Mentor | | ABTA Grant | ABTA | 07/01/13-06/30/15 | Glutamate Release Promotes Tumor Growtha nd Tumor-Associated Epilepsy | 50,000 | - | 50,000 | 100,000 | - | 100,000 |
| Sweatt | PI | 15% | R01 MH057014 CR | NIH-NIMH | 08/01/10-07/31/15 | Biochemical Mechanisms of Long-Term Potentiation | 303,071 | 140,928 | 443,999 | 1,649,600 | 767,065 | 2,416,665 |
| Sweatt | PI | 15% | R01 MH091122 | NIH-NIMH | 06/03/11-03/31/16 | DNA Methylation in Memory Formation | 250,000 | 116,250 | 366,250 | 1,250,000 | 561,250 | 1,831,250 |
| Sweatt | PI | 15% | R01 MH104150 | NIH-NIMH | 07/01/14-06/30/19 | Molecular and Behavioral Neurobiology of Transcription Factor TCF4 | 250,000 | 117,500 | 367,500 | 1,250,000 | 587,500 | 1,837,500 |
| Sweatt | PI | 8% | 1R01 NR012686-01 | NIH-University of Maryland-Baltimore | 9/28/10 - 07/31/15 | Epigenetic Modifications of BDNF and trkB Genes Underlie Pain Plasticity | 110,000 | 51,150 | 161,150 | 593,695 | 276,070 | 869,765 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sweatt | PI | 10% | HR0011-14-1-0001 | DARPA | 10/01/13-04/14/15 - NCE | In Vivo Nanoplatforms for Epigenetic Enhancement of Memory - Phase II | 564,975 | 179,688 | 744,633 | 564,975 | 179,688 | 744,633 |
| Sweatt | PI | 25% | FA8650-13-C-7339 | DARPA | 06/17/13-12/16/14 - NCE | A Whole Epigenome Approach to Identify Novel Targets for Nano-Pharmacologic Memory Enhancement | 30,000 | 13,950 | 43,950 | 984,399 | 426,752 | 1,411,151 |
| Sweatt | PI | 5% | HR001-13-C-0103 | DARPA | 08/10/13-08/09/16 | Hathor- Sphinx II: Epigenetic Based Neurotherapeutics | 749,361 | 254,512 | 1,003,873 | 1,136,526 | 429,182 | 1,565,707 |
| Sweatt | PI | 8% | Ellison Foundation | Ellison Foundation | 11/01/10-10/31/14 | An Epigenetic Hypothesis of Cognitive Aging | 150,000 | 69,750 | 219,750 | 600,000 | 279,000 | 879,000 |
| Sweatt | PI | | T32NS061788 CR | NIH | 07/01/13-06/30/18 | Training Program in the Neurobiology of Cognition and Cognitive Disorders | 213,792 | 13,071 | 226,863 | 1,095,450 | 65,355 | 1,160,805 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Visscher | PI | | Patient-Oriented Research Award | HSF-GEF | 11-01-14-10/31/16 | Visual Brain Core - Research Resources on Visual Dysfunction and Plasticity | 103,233 | - | 103,233 | 164,300 | - | 164,300 |
| Wadiche, Jaqcues | PI | 35% | R01 NS065920 | NIH-NINDS | 06/01/14-05/31/19 | Timing of Neurotransmitter Release | 218,750 | 102,813 | 321,563 | 1,093,750 | 506,770 | 1,600,520 |
| Wadiche, Linda | PI | 40% | R56 NS064025 | NIH | 04/01/14-03/31/15 | Newborn Neurons in the Adult Hippocampal Network | 313,225 | 147,216 | 460,441 | 313,225 | 147,216 | 460,441 |
| Wilson | PI | 50% | R01 NS047533 | NIH | 02/1/10-12/31/15 - NCE | The Role of Usp 14 in Regulating Neuronal Function | 218,750 | 101,719 | 320,469 | 1,093,750 | 508,595 | 1,602,345 |
| | | | | | | | | | | | | |
| | | | | | **Total Active Grants** | | 6,366,818 | 2,540,429 | 8,907,217 | 25,061,887 | 10,455,975 | 35,539,831 |

# LISTING OF INVESTIGATORS
# AND
# INDIVIDUAL FACULTY REPORTS

**Investigators of the UAB McKnight Brain Institute**

***Professors***

J. David Sweatt, Ph.D.
Evelyn F. McKnight Chair, Department of Neurobiology
Director, UAB-MBI
Area of Interest: Signal transduction and transcriptional control in memory and aging

Lori McMahon, Ph.D.
Professor, Department of Physiology/Biophysics
Director, UAB Comprehensive Neuroscience Center
Associate Director, UAB MBI
Area of Interest: Hormonal control of synaptic plasticity in aging

Karlene Ball, Ph.D.
Professor and Chair, Department of Psychology
Area of Interest: Aging-related cognitive function

James H. Meador-Woodruff, M.D.
Professor and Chair, Department of Psychiatry and Behavioral Neurobiology
Area of Interest: Cellular and subcellular alterations of neural circuitry and molecular expression in psychiatric illnesses

David Standaert, M.D., Ph.D.
Professor and Chair, Department of Neurology
Director, UAB Movement Disorders Center
Area of Interest: Striatal molecular and cellular biology, Parkinson's Disease

Steve Austad, Ph.D.
Professor and Chair, Department of Biology
Area of Interest: Molecular and organismal biology of aging

Michael Brenner, Ph.D.
Professor, Department of Neurobiology
Area of Interest: Glial cell biology, Alexander Disease

David Geldmacher, M.D.
Professor, Collat Scholar, Department of Neurology
Area of Interest: Aging-related memory disorders and visual cognition in AD

John Hablitz, Ph.D.
Professor, Department of Neurobiology
Area of Interest: Modulation of excitability in neocortial circuits

Robin Lester, Ph.D.
Professor, Department of Neurobiology
Area of Interest: Nicotinic receptors in CNS function

Lucas Pozzo-Miller, Ph.D.
Professor, Department of Neurobiology
Area of Interest: Mechanisms controlling dendritic spine morphology

Harry Sontheimer, Ph.D.
Professor, Department of Neurobiology
Director, UAB Center for Glial Biology in Medicine
Area of Interest: Cell biology of glial function

Paul Gamlin, Ph.D.
Professor, Department of Ophthalmology
Area of Interest: Cell biology and systems neuroscience of vision and visual disorders

Erobo Ubogu, Ph.D.
Professor, Department of Neurology
Director of the Neuromuscular Division of Neurology
Area of Interest: Inflammatory neuropathies

***Associate Professors***

Lynn Dobrunz, Ph.D.
Associate Professor, Department of Neurobiology
Area of Interest: Regulation of short-term synaptic plasticity in the hippocampus

Alecia Gross, Ph.D.
Associate Professor, Department of Vision Sciences
Area of Interest: Signal transduction mechanisms in the CNS

Linda Overstreet-Wadiche, Ph.D.
Associate Professor, Department of Neurobiology
Area of Interest: Adult neurogenesis in the dentate gyrus

Vlad Parpura, M.D., Ph.D.
Associate Professor, Department of Neurobiology
Area of Interest: Imaging approaches to investigating synaptic and glial cell function

Erik Roberson, M.D., Ph.D.
Associate Professor, Department of Neurology
Co-Director, UAB Center for Neurodegeneration and Experimental Therapeutics
Area of Interest: Aging-related memory disorders

Anne Theibert, Ph.D.
Associate Professor, Department of Neurobiology
Director, UAB Undergraduate Neuroscience B.S. Program
Area of Interest: PI-3-Kinase signal transduction in neuronal cell biology

Scott Wilson, Ph.D.
Associate Professor, Department of Neurobiology
Area of Interest: The ubiquitin/proteasome system in neuronal function

Kazu Nakazawa, Ph.D.
Associate Professor, Department of Psychiatry
Area of Interest: Epigenetics and cognition

David Knight, Ph.D.
Associate Professor, Department of Psychology
Area of Interest: Human imaging approached to investigating memory

Matt Goldberg, Ph.D. (Recruited from UT Southwestern)
Associate Professor, Neurology
Area of Interest: Mechanisms of neurodegeneration

***Assistant Professors***

Tara DeSilva, Ph.D.
Assistant Professor, PM&R
Area of Interest: Neural-glial signaling mechanisms in the CNS

Michelle Gray, Ph.D.
Assistant Professor, Dixon Scholar, Department of Neurology
Area of Interest: Neurogenetics, glial function, and Huntington's Disease

Gwen King, Ph.D.
Assistant Professor, Department of Neurobiology
Area of Interest: Memory and aging, Klotho proteins in aging and cognition

Farah Lubin, Ph.D.
Assistant Professor, Department of Neurobiology
Area of Interest: Signal transduction mechanisms in memory and memory disorders

Michelle Olsen, Ph.D.
Assistant Professor, Department of Physiology and Biophysics
Area of Interest: Signal transduction mechanisms in the CNS, epigenetics

Scott Phillips, Ph.D.
Assistant Professor, Department of Neurobiology
Area of Interest: Neurogenetics, neurobiochemistry

Kristina Visscher, Ph.D.
Assistant Professor, Neurobiology
Area of Interest: Human imaging approaches to investigating memory

Jacques Wadiche, Ph.D.
Assistant Professor, Department of Neurobiology
Area of Interest: Synaptic plasticity and function in the cerebellum

Jeremy Day, Ph.D.
Assistant Professor, Department of Neurobiology
Area of Interest: Epigenetic mechanisms in memory formation

Jeremy Herskowitz, Ph.D. (Recruited from Emory SOM)
Assistant Professor, Neurology
Area of Interest: Amyloid beta effects on neurons

**Recent UAB McKnight Institute New Faculty Recruits:**

**2006 Recruits:**
Linda Overstreet Wadiche, Ph.D. (Recruited from the Vollum Institute)
Assistant Professor, Neurobiology
*Area of Interest:* Adult neurogenesis in the dentate gyrus.
Jacques Wadiche, Ph.D. (Recruited from the Vollum Institute)
Assistant Professor, Neurobiology
*Area of Interest:* Synaptic plasticity and function in the cerebellum

**2007 Recruits:**
David Knight, Ph.D. (Recruited from the NIH)
Assistant Professor, Psychology
*Area of Interest:* Human imaging approaches to investigating memory.
Vlad Parpura, M.D., Ph.D. (Recruited from the University of California, Riverside)
Associate Professor, Neurobiology
*Area of Interest:* Imaging approaches to investigating synaptic and glial cell function
Tong Ye, Ph.D. (Recruited from Duke University)
Assistant Professor, Neurobiology
*Area of Interest:* In vivo imaging, 2-photon imaging
David Standaert, M.D., Ph.D. (Recruited from Harvard in 2006)
Professor, Neurology
Director, UAB Movement Disorders Center
Area of Interest: Striatal molecular and cellular biology, Parkinson's Disease

**2008 Recruits:**
Christina Visscher, Ph.D. (Recruited from Harvard)
Assistant Professor, Neurobiology
*Area of Interest:* Human imaging approaches to investigating memory.
Erik Roberson, M.D., Ph.D. (Recruited from the University of California, San Francisco)
Assistant Professor, Neurology and Neurobiology

*Area of Interest:* Using genetically engineered mice to investigate aging-related memory dysfunction. Dr. Roberson also sees patients at the aging-related memory disorders clinic here at UAB

Farah Lubin, Ph.D. (Recruited from Baylor College of Medicine and UAB)
Assistant Professor, Neurobiology
*Area of Interest:* Epigenetic mechanisms in memory formation and memory dysfunction

**2009 Recruits:**

Alecia Gross, Ph.D. (Recruited from Baylor College of Medicine in 2006)
Assistant Professor, Vision Sciences
Area of Interest: Signal transduction mechanisms in the CNS

James H. Meador-Woodruff, M.D. (Recruited from Michigan in 2005)
Professor and Chair, Department of Psychiatry and Behavioral Neurobiology
Area of Interest: Cellular and subcellular alterations of neural circuitry and molecular expression in psychiatric illnesses

**2010 Recruits:**

Karlene Ball, Ph.D.
Professor and Chair, Department of Psychology
Area of Interest: Aging-related cognitive function

Tara DeSilva, Ph.D. (Recruited to UAB from Harvard in 2009)
Assistant Professor, PM&R
Area of Interest: Neural-glial signaling mechanisms in the CNS

Michelle Gray, Ph.D. (Recruited to UAB from UCLA in 2008, newly appointed Asst Prof)
Assistant Professor, Dixon Scholar, Dept of Neurology
Area of Interest: Neurogenetics, glial function, and Huntington's Disease

Michelle Olsen, Ph.D.
Assistant Professor, Physiology and Biophysics
Area of Interest: Signal transduction mechanisms in the CNS, epigenetics

**2011 Recruits:**

David Geldmacher, M.D. (Recruited to UAB from UVA, arriving March 2011)
Professor, Collat Scholar, Department of Neurology
Area of Interest: Aging-related memory disorders and visual cognition in AD

Gwen King, Ph.D. (Recruited to UAB from Boston University, arriving March 2011)
Assistant Professor, Neurobiology
Area of Interest: Memory and aging, Klotho proteins in aging and cognition

Scott Phillips, Ph.D. (Dr. Phillips was already a member of the UAB MBI in a Core Director capacity, and was promoted to an Assistant Professor position in 2011.)
Assistant Professor, Neurobiology
Scientist, UAB IDDRC Recombinant Technologies Core
Area of Interest: Neurogenetics, neurobiochemistry

**2013 Recruits:**

Paul Gamlin, Ph.D.
Professor, Department of Ophthalmology
Area of Interest: Cell biology and systems neuroscience of vision and visual disorders

Erobo Ubogu, Ph.D.
Professor, Department of Neurology

Director of the Neuromuscular Division of Neurology
Area of Interest: Inflammatory neuropathies

**2014 Recruits:**

Kazu Nakazawa, Ph.D. (Recruited from the NIMH)
Associate Professor, Department of Psychiatry
Area of Interest: Epigenetics and cognition

Matt Goldberg, Ph.D. (Recruited from UT Southwestern)
Associate Professor, Neurology
Area of Interest: Mechanisms of neurodegeneration

Jeremy Herskowitz, Ph.D. (Recruited from Emory SOM)
Assistant Professor, Neurology
Area of Interest: Amyloid beta effects on neurons

Steve Austad, Ph.D.
Professor and Chair, Department of Biology
Area of Interest: Molecular and organismal biology of aging

Jeremy Day, Ph.D.
Assistant Professor, Department of Neurobiology
Area of Interest: Epigenetic mechanisms in memory formation

**UAB McKnight Research Scientists**:

Cristin Gavin, Ph.D
Scientific Director, UAB McKnight Synaptic Plasticity Core
*Area of Interest:* Epigenetic control of neuronal biophysical properties

Jing Wang, Ph.D.
Scientist, UAB McKnight Synaptic Plasticity Core
*Area of Interest:* Place cells in the hippocampus

Andrew Kennedy, Ph.D.
Director of the MBI Rodent Behavior Core
*Area of Interest:* Epigenetic mechanisms in memory formation

# SWEATT INDIVIDUAL REPORT

**McKnight Brain Research Foundation**
**Annual Report 2014**
**J. David Sweatt, Evelyn F. McKnight Chair**
**University of Alabama at Birmingham**

This is an individual report for Dr. Sweatt as Evelyn F. McKnight Endowed Chair for Learning and Memory in Aging at UAB.

## 1. Summary of Scientific Achievements for 2014

Aging-related memory decline is manifest prominently in declarative/episodic memory and working memory, memory modalities anatomically based largely in the hippocampus and prefrontal cortex, respectively. The neurobiological underpinnings of age-related memory deficits include aberrant changes in gene transcription that ultimately affect the ability of the aged brain to be "plastic." This has led us to hypothesize that dysregulation of epigenetic control mechanisms and accumulation of aberrant epigenetic marks are a driver for aging-related cognitive dysfunction. Specifically, given that the transcription of key memory-promoting genes are known to decline during aging, we propose that these changes are regulated by aberrant epigenetic marks and control mechanisms within brain regions particularly vulnerable to the aging process (i.e. hippocampus and prefrontal cortex), which together result in age-related cognitive deficits. In studies over the last year we have made important discoveries concerning the role of epigenetic mechanisms in memory-associated areas of the CNS, which I will describe below.

In a major series of experiments published this last year, we considered the fact that signaling-dependent histone subunit exchange is a potent epigenetic regulator of transcription in most cells, but that its role in cognition has not been explored. In a series of studies we found that H2A.Z, a variant of histone H2A, is a memory suppressor that is exchanged during memory formation. In these studies we observed that ear learning transiently reduces H2A.Z expression and H2A.Z binding at plasticity-associated genes in the hippocampus, and H2A.Z knockdown in this region enhances recent memory consolidation. In the longer term, altered H2A.Z binding was observed in the cortex as the memory became increasingly dependent on this region, and H2A.Z knockdown in the cortex enhanced stabilization of remote memory. Through these studies we identified H2A.Z subunit exchange as a novel regulator of memory, and thereby implicated nucleosome composition in stabilizing outcomes from transient experiences. These results were published in *Nature* a few weeks ago.

Significance: Over the course of the last decade, we have generated evidence for an "epigenetic code" in the central nervous system that mediates synaptic plasticity, learning, and memory. Our findings indicate that specific epigenetic changes are regulated and may interact with each other during memory formation, and we are beginning to understand how these changes manifest functionally at the cellular and circuit levels. Aberrant epigenetic modifications may lead to cognitive disorders that affect learning and memory, and our results highlight the therapeutic potential of epigenetic treatments for the amelioration of these conditions. Thus, our findings demonstrate that epigenetic mechanisms play a role in synaptic plasticity and memory. As such, these findings greatly expand the known scope of the types of cellular mechanisms falling under the control of DNA methylation and histone modifications.

Plans: The project will continue to focus on the role of epigenetic mechanisms in hippocampus-dependent plasticity and memory, and their identity as targets of synaptic activity in neurons. I believe that the novel

targets of transcriptional regulation that we are investigating are the product of innovative thinking and that their pursuit will allow us to continue a leadership role in this area.

**2. Publications in Peer Reviewed Journals**

1. Lithner CU, Lacor PN, Zhao WQ, Mustafiz T, Klein WL, Sweatt JD, Hernandez CM. (2013) Disruption of neocortical histone H3 homeostasis by soluble Aβ: implications for Alzheimer's disease. Neurobiol Aging. 34:2081-90.

2. Yokoi F, Cheetham CC, Campbell SL, Sweatt JD, Li Y. (2013) Pre-Synaptic Release Deficits in a DYT1 Dystonia Mouse Model. PLoS One. 2013;8(8):e72491.

3. Zovkic IB, Paulukaitis BS, Day JJ, Etikala DM, Sweatt JD. (2014) Histone H2A.Z subunit exchange controls consolidation of recent and remote memory. Nature. 515:582-6.

4. Allison DB, Antoine LH, Ballinger SW, et al. (2014) 'Aging and energetics' 'Top 40' future research opportunities. F1000Research 2014, 3:219 (doi: 10.12688/f1000research.5212.1).

5. Guzman-Karlsson MC, Meadows JP, Gavin CF, Hablitz JJ, Sweatt JD. (2014) Transcriptional and epigenetic regulation of Hebbian and non-Hebbian plasticity. Neuropharmacology. 80:3-17.

6. Day JJ, Kennedy AJ, Sweatt JD. DNA Methylation and Its Implications and Accessibility for Neuropsychiatric Therapeutics. Annu Rev Pharmacol Toxicol. 2014 Oct 17. [Epub ahead of print].

**3. Publications (other)**

**Books**

This year I was invited by Elsevier to write and publish the 3rd Edition of my textbook, *Mechanisms of Memory*. Preparations are underway for finalizing the book proposal and contract.

**Book Chapters**

None for 2014

**4. Recent (2014) Presentations at Scientific Meetings (also includes invited research seminars)**

AAAS Annual Meeting Symposium speaker
UCSF, Gladstone Institute
NIH, Neuroscience Seminar Series
UK Genetics Society, Psychopharmacology meeting Keynote speaker
Teratology Society Annual Meeting - Elsevier Distinguished Lecturer
Experimental Biology Society, Annual Meeting Symposium Speaker
Pitt-Hopkins Research Foundation Inaugural Research Symposium Speaker
Neuroepigenetics Journal SfN Satellite Meeting Speaker

**5. Presentations at Public (non-scientific) Meetings or Events**

Presented at three public events:

Civitan Club Public Lecture Series presentation
Hoover Public Library Invited Speaker
Alzheimer's of Central Alabama Invited Speaker

**6. Awards and Honors**

2014 BMA Medical Book Award First Prize – Neurology Section, from the British Medical Association (for *Epigenetic Mechanisms in the Nervous System*, Edited with Eric Nestler, Michael Meaney, and Schahram Akbarian)

2014 Neurobehavioral Teratology Society Annual Meeting Elsevier Distinguished Lecturer Award

Thomson Reuters Highly Cited Researchers 2014

Thomson Reuters World's Most Influential Scientific Minds, 2014

2013 PROSE Award for the best reference book published in 2013
(for *Epigenetic Mechanisms in the Nervous System*, Edited with Eric Nestler, Michael Meaney, and Schahram Akbarian)

Associate Editor, NeuroEpigenetics, 2014

New or recently renewed Grant Awards:

NIH Grant MH104158 – Molecular and Behavioral Neurobiology of Transcription Factor TCF4
D. Sweatt PI
07/01/14 - 6/30/19 $1,250,000 total direct costs

Pitt-Hopkins Syndrome Foundation - Mouse Models for Pitt-Hopkins Syndrome
D. Sweatt PI
$160,000 total direct costs

**Please note that Sections 7 through 9, and 11 through 16, are covered in the overall UAB MBI annual report, so I will not repeat them here.**

**Concerning Section 5b, trainee recruitment for my own laboratory** –

I had a total of approximately 15 post-doc and grad student applications for my laboratory this year.

I currently have three graduate students, seven post-doctoral fellows, and four undergraduate students working in my lab.

**10. External Collaborations**

**A. Collaborative Programs with other McKnight Institutes, Institutions and Research Programs**

University of Arizona and UF: We are continuing a very fruitful collaboration with Carol Barnes and Tom Foster concerning the possible role of DNA methylation in controlling aging-related transcriptional alterations in the CNS.

UAB: We are collaborating with a number of McKnight investigators here at UAB, including Farah Lubin, David Standaert, Scott Wilson, Gwen King, Erik Roberson, and John Hablitz.

**B. Collaborative Programs with non McKnight Institutes, Institutions and Research Programs**

Temple University: We are collaborating with Dan Liebermann's laboratory to investigate the involvement of GADD45 in memory formation and LTP induction.

Johns Hopkins: We are collaborating with Honjun Song's laboratory to investigate the role of TET oxidases in active DNA demethylation in memory formation.

University of Maryland: We are collaborating with Susan Dorsey to investigate BDNF gene methylation in spinal cord plasticity.

University of Delaware: We are collaborating with Tania and Eric Roth to investigate the role of epigenetic mechanisms in stabilizing hippocampal place cell function.

Aurasense Pharmaceuticals/Northwestern University: this collaborative project is developing nanotechnology-based next-generation histone de-acetylase inhibitors as memory-enhancing agents. This project is funded by the Defense Advanced Research Projects Agency (DARPA).

Ibis Pharmaceuticals: This year we obtained funding for an innovative collaborative project developing antisense oligonucleotide-based next-generation histone de-acetylase inhibitors as memory-enhancing agents. This project is funded by DARPA.

Signature, date, and title of person submitting report

January 13, 2015
Date

J. David Sweatt, Ph.D.
Professor
Evelyn F. McKnight Endowed Chair
Director, Evelyn F. McKnight Brain Institute
Chairman, Department of Neurobiology
UAB School of Medicine

## INDIVIDUAL FACULTY REPORTS

### 1. Summary of Scientific Achievements for 2014

**Brenner, Michael**

- Proteins may be irreversibly modified by conversion of peptidyl-arginine to peptidyl-citrulline, and reaction catalyzed by several different isoforms of peptidyl-arginine deiminase (PAD). In the course of following up observations of Tony Nicholas of deimination of GFAP in Alexander disease, we discovered that longevity of a lethal Alexander disease mouse model was increased when it was bred onto a PAD2 KO background. Since small molecule drugs that inhibit PAD activity are already used for other illnesses, this raises the possibility that these drugs can be used to treat Alexander disease. A grant proposal for such an investigation will be submitted.

-In a collaboration with Michelle Olsen we have obtained preliminary evidence that mutation of a canonical AP-1 transcription factor binding site in the GFAP promoter of GFAP driven lacZ transgenes prevents their up-regulation in response to injury. If substantiated, this could provide an important therapeutic target for controlling reactive gliosis.

**Day, Jeremy**

-Discovered that reward-related memories alter gene expression and epigenetic patterns in dopamine neurons, a critical part of the brain's reward system. These changes are required for animals to form memories about positive events.

-Used next-generation sequencing approaches to construct a comprehensive list of transcriptional and epigenetic changes following memory formation. These experiments have led directly to novel targets for the potential enhancement of memory.

-Developed next-generation sequencing bioinformatics platforms that have enabled investigation of how neuronal activity alters gene transcription within neurons.

**Dobrunz, Lynn**

-My lab has continued to investigate the effects of transcriptional dysregulation in inhibitory interneurons on synaptic and circuit function in hippocampus using the PGC-1a knockout mice, which models aspects brain changes that are seen schizophrenia. We have discovered that there is altered regulation of inhibitory synaptic transmission by dopamine D4 receptors in these mice, which may contribute to the enhanced inhibition in hippocampus that we previously discovered.

-My lab has continued to investigate changes in the endogenous anti-anxiety molecule Neuropeptide Y (NPY) a mouse model of Post-traumatic Stress Disorder. We have discovered that the predator scent stress model causes a reduction in the release of NPY in hippocampus which alters synaptic transmission in the temporammonic pathway. Because the temporoammonic pathway is important for memory consolidation, this may contribute to altered memory consolidation in PTSD.

**Hablitz, John**

-Demonstrated that HCN channels modulate synaptic integration in GABAergic interneurons.
It was found that epileptiform discharges in disinhibited rat neocortex are modulated by HCN channels

**King, Gwendalyn**

-We have generated data to support an RO1 application anticipated to be submitted in October and under revision for resubmission in July on the role of klotho in adult neurogenesis. Largely spear headed by my graduate student, Ann Laszczyk, we have made novel discoveries of a role for klotho in adult neurogenesis making klotho one of the very rare postnatal only, modifiers of neurogenesis.

-We have localized klotho to the synapse of neurons and found that electrophysiological effects in the klotho knockout brain are specific to klotho protein expression. This is part of an ongoing study to define the role of klotho expression in neurons.

-We have characterized and are in the process of publishing the world's best klotho antibody. We have developed a new model of the absence of klotho necessary for work in the brain where the current model shows leaky and variable expression. And we have developed the first NIH funded conditional knockout of klotho. With much invested in tools development we are poised to make significant contributions to a field suffering from a paucity of resources.

**Lester, Robin**

-Finished editing 22 chapters for a book "Nicotinic Receptors"

-Re-evaluated past data on slow synaptic cholinergic nicotinic synaptic transmission in the context of sleep-wake cycles and addiction.

**Lubin, Farah**

- This year I have had a blast! My scientific achievements since the last report include publishing manuscripts (5 + 2 "In Revision") and co-editing an Elsevier book entitled "*Epigenetics and Neuroplasticity: Evidence and Debate*" that currently is "in review". I continue to present numerous seminars and lectures at Universities throughout the US or at national and international conferences.

- I have served as Ad-hoc Reviewer for several peer-reviewed journals (16) and granting agencies (6). For my efforts, I received an award of excellence in Reviewing and Editing from the Editors at the Neurobiology of Learning and Memory Journal.

- In addition to my current funding, I continue to pursue additional research funding through submission of grant applications (resubmission of my NIH/NINDS R21 [29$^{th}$ percentile], VA merit award [33$^{rd}$ percentile], and CURE Innovator award). I currently have an NIH/NINDS R25 under the status "pending council review for funding". As such, I continue to make excellent progress, as detailed in my attached curriculum vitae, which will earn me tenure!

**Overstreet-Wadiche, Linda**

-We defined how the role of excitatory drive, synaptic inhibition and intrinsic excitability shifts during the maturation of adult born neurons in a manner that maintains the sparse population coding that is a hallmark of the dentate gyrus.

-We are continuing to study how a specific extracellular matrix molecule controls the sequence and timing of GABA synaptic innervation of adult generated neurons, using cre/loxp systems to express channelrhodopsin in specific subtypes of hippocampal interneurons.

-We have identified evidence that adult-born neurons compete with existing mature neurons for synaptic partners and that non-apoptotic functions of the Bax protein is required for competition-induced loss of synapses on mature neurons.

**Parpura, Vladimir**

-We used inducible genetic ablation of connexin 43 in enteric glia of mice to study the role of enteric glia in intestinal transit of animals in vivo (**JA 107**). Of note, these cells are glial fibrillary acidic protein positive (GFAP) and represent an astrocyte equivalent in the enteric nervous system.

-We are making efforts related to brain pathologies/injuries by developing scaffolds and dispersible materials, most notably modified colloidal solutes and films of carbon nanotubes (CNTs) (**JAs 101, 114**). Selected astrocytic morpho-functional changes induced by CNTs are mediated by GFAP, i.e. perimeter, shape and cell death for solutes and proliferation for films.

-We used a myoblast cell lines to produce myotubes using principles of synthetic biology (**JA 105**) and engineered combination of transcription factor; these myotubes would be used in Cyberplasm, a biomimetic robot modeled after C. elegans (**JA 104**). We have been developing subcellularly targeted optogentics probes to drive $Ca^{2+}$ dynamics and muscle contractility as well as to visualize vesicular recycling; such probes were also employed to astrocyte research in collaboration with Zorec to visualize single vesicles using structured illumination microscopy, a superresolution microscopy technique with improved transverse resolution to ~100 nm (**JA 109**).

**Pozzo-Miller, Lucas**

-The first description that impaired BDNF trafficking in *Mecp2* knockout neurons is rescued by a selective HDAC6 inhibitor. Published in *Frontiers in Cellular Neuroscience*.

-The first description that hyperforin, the active ingredient in St John's wort, increases dendritic spine density in hippocampal pyramidal neurons via the activation of $Ca^{2+}$-permeable TRPC6 channels. Published in *Hippocampus*.

-The first demonstration that chronic IGF-1 treatment worsens the metabolic syndrome suffered by *Mecp2* knockout mice, raising concerns about its use in human Rett individuals. Published in *Human Molecular Genetics*.

**Sontheimer, Harry**

-Showed that gliomas invade along blood vessels and in doing so they breach the blood brain barrier

-Showed that tumor associated epilepsy is due to a loss of GABAergic inhibition as peritumoral neurons loose expression of KCC2

-Show that the system XC transporter responsible for glutamate release can be pharmacologically inhibited in patients as determined by MRI spectroscopy

**Visscher, Kristina**

- Participants with Macular Degeneration show stronger preparatory activity in visual cortex than do controls. In patients with healthy vision, neural activity in early visual cortical areas is enhanced during preparation to perform a visual task. This preparatory activity is larger in patients with Macular Degeneration than in matched controls, implying that participants who have lost vision due to Macular Degeneration compensate for their lack of visual input by augmenting attention-related neural activity.

-Improvements in speed of processing following training do not rely on larger or more frequent microsaccades. Speed of processing training is a well-documented training paradigm that has been shown to result in robust, reproducible improvements in performance on a range of visual tasks. The mechanism is unknown, but one proposed mechanism was that training resulted in shifts in the patterns of small eye movements called microsaccades. This change in microsaccades could result in improved detectability of peripheral visual stimuli by exciting peripheral photoreceptors. Our data show this mechanism does not occur. This suggests that speed of processing relies on a different mechanism, likely one involving higher-order brain areas.

-Improvement in performance following speed of processing training results in more 'efficient' neural networks. We recorded brain activity during quiet rest in a group of participants before and after speed of processing training. We used functional connectivity methods and a graph theory analytic approach to define 'efficiency' of the network before and after training. Those participants who improved more after training also showed increased efficiency. Our data support the conclusion that (1) our metric of efficiency is a valid and important one, and (2) more efficient neural networks correlate to better performance in an older adult population.

**Wadiche, Jacques**

-We have defined the role glutamate spillover to extrasynaptic receptors and how it shapes the information flow within microcircuits.

-We have exploring a previously unexplored property of AMPARs and their ion flux. We are currently testing the hypothesis that AMPAR calcium permeability is dependent on ligand concentration.

-We are studying how non-synaptic glutamatergic signaling at the input layer of the cerebellar cortex signaling to Golgi cells through mGluR activation.

**Wilson, Scott**

-Identified the mix linage kinase 3 (MLK3) as a substrate for USP14

-Determined that HRS is required for myelination of peripheral nerves

-Determined that HRS is required for the recycling of TrkB receptors in Schwann cells

**2. Publications in Peer Reviewed Journals**

**Brenner, Michael**

-Brenner, M. (2014). Role of GFAP in CNS injuries. Neuroscience Let. 565 (2014) 7–13.

-Gottipati, M.K., Bekyarova, E., Brenner, M., Haddon, R.C., Parpura, V. (2014). Changes in the morphology and proliferation of astrocytes induced by two modalities of chemically runctionalized single-walled carbon nanotubes are differentially mediated by glial fibrillary acidic protein. Nanolett 10.1021/nl4048114.

**Day, Jeremy**

-Day, J.J., Childs, D., Guzman-Karlsson, M.C., Kibe, M., Moulden, J., Song, E., Tahir, A., & Sweatt, J.D. (2013). DNA methylation regulates associative reward learning. Nature Neuroscience 16(10):1445-52.

**Dobrunz, Lynn**

-Dougherty, S. E., A. F. Bartley, E. K. Lucas, J. J. Hablitz, *L. E. Dobrunz and *R. M. Cowell (2014). "Mice lacking the transcriptional coactivator PGC-1alpha exhibit alterations in inhibitory synaptic transmission in the motor cortex." Neuroscience 271: 137-48.

-Marshall, A. G., J. A. Watson, J. J. Hallengren, B. J. Walters, L. E. Dobrunz, L. Francillon, J. A. Wilson, S. E. Phillips and S. M. Wilson (2013). "Genetic background alters the severity and onset of neuromuscular disease caused by the loss of ubiquitin-specific protease 14 (usp14)." PLoS One 8(12): e84042.

-Walters, B. J., J. J. Hallengren, C. S. Theile, H. L. Ploegh, *S. M. Wilson and *L. E. Dobrunz (2014). "A catalytic independent function of the deubiquitinating enzyme USP14 regulates hippocampal synaptic short-term plasticity and vesicle number." J Physiol 592(Pt 4): 571-86.

* = co-senior authors.

2 other papers have been submitted

**Hablitz, John**

-Albertson, A., Williams. S.B. and Hablitz, J.J. Regulation of epileptiform discharges in rat neocortex by HCN channels. J. Neurophysiol. 2013, 110:1733-1743. PubMed PMID: 23864381

Dougherty, S.E., Hollimon, J.J., McMeekin LJ, Bohannon AS, West AB, Lesort M, Hablitz JJ, Cowell RM. Hyperactivity and cortical disinhibition in mice with restricted expression of mutant huntingtin to parvalbumin-positive cells. Neurobiol Dis. 2014;62:160-171. PubMed PMID: 24121117.

-Dougherty, S.E., Bartley, A.F., Lucas, E.K., Hablitz, J.J., Dobrunz, L.E Cowell, R. M. Mice lacking the transcriptional coactivator PGC-1α exhibit alterations in inhibitory synaptic transmission in the motor cortex. Neuroscience 2014,271C:137-148 PMID:2476943.

-Guzman-Karlsson, M.C., Meadows, J.P., Gavin, C.F., Hablitz, J.J. and Sweatt, J.D. Transcriptional and Epigenetic Regulation of Hebbian and non-Hebbian Plasticity. Neuropharmacology 2014,80:3-17 PMID: 24418102.

Manuscripts and chapters accepted, in press or published (give full reference and official status)

-Lucas et al. Reduction of novel PGC-1α-dependent transcripts in the anterior cingulate cortex of patients with schizophrenia. J. Neurosci. (under revision).

**King, Gwendalyn**

-Tucker Zhou TB, King GD, Chen C, Abraham CR. Biochemical and functional characterization of the klotho VS polymorphism implicated in aging and disease risk. Journal of Biological Chemistry (2013) 288 (51):36302-11. PMCID:PMC3868745

-Reish NJ*, Maltare A*, McKeown AS, Laszczyk AM, Kraft TW, Gross AK, King GD. The age-regulating protein Klotho is vital to sustained retinal function. Investigative Ophthalmology and Visual Science (2013) 54 (10): 6675-6685. PMCID: PMC3796940

-Clinton SM, Glover ME, Maltare A, Mehi SJ, Simmons RK, King GD. Expression of Klotho mRNA and protein in rat brain parenchyma from early postnatal development into adulthood. Brain Research (2013) 1527:1-14. PMCID: PMC3756829

-Mehi, SJ, Maltare A, Abraham CR, King GD. MicroRNA-339 and microRNA-556 regulate Klotho expression in vitro. Age. (2013) 36 (1):141-9. PMCID: PMC3889880

**Lester, Robin**

Martindale R, Lester, RAJ (2014) On the Nature of the Nicotinic Acetylcholine Receptor Channel. In “Nicotinic Receptors” (Ed. RAJ Lester) Springer. (In press)

**Lubin, Farah**

Current h-index =16, i10-index=20, 1885, based on Scopus and Google scholar database (07/11/2014).

- R.R. Parrish, A. Albertson, S. Buckingham, J. Hablitz, W. Haselden, and F.D. Lubin. Status epilepticus triggers early and late alterations in brain-derived neurotrophic factor and NMDA glutamate receptor GRIN2B DNA methylation levels in the hippocampus. 2013, Sep 17th *Neuroscience* 248:602–619. (Impact factor 3.389)
- C.L. Ferland, W.R. Hawley, R.E. Puckett, K. Wineberg, F.D. Lubin, G.P. Dohanich, L.A. Schrader. Sirtuin activity in dentate gyrus contributes to chronic stress-induced behavior and ERK1/2 cascade changes in the hippocampus. 2013, *Biological Psychiatry* Dec 15;74(12):927-35. (Impact factor 9.247)
- S. Gupta-Agarwal, T.J. Jarome, J. Fernandez, and F.D. Lubin. NMDA receptor- and ERK-dependent changes in histone methylation in the lateral amygdala bidirectionally regulate fear memory formation. 2014, *Learning and Memory*. 21: 351-362. (Impact factor 4.057)
- T.J. Jarome and F.D. Lubin. Histone lysine methylation: critical regulator of memory and behavior. 2013. *Reviews in the Neurosciences* May 27: 1-13. (Impact factor 3.260)
- R.R. Parrish, S. Buckingham, K.L. Mascia, J.J. Johnson, M.M. Matyjasik, R.M. Lockhart, and F.D. Lubin. Methionine increases BDNF DNA methylation and improves memory in epilepsy. 2014. *Annals of Neurology*. In Press. (Impact factor 11.193)
- S. Morse, A. Butler, R.L. Davis, W.D. Haselden, I. Soller, and F.D Lubin. Environmental enrichment reverses age-related hippocampal histone methylation changes. 2014. *Neurobiology of Aging*. In Revision. (Impact factor 6.166)
- T.J. Jarome, J. S. Thomas, and F.D. Lubin. Epigenetics of memory consolidation, retrieval, and reconsolidation. 2014. *Neurobiology of Learning and Memory MCCS special Edition* November. In Revision. (Impact factor 3.860)

**Overstreet-Wadiche, Linda**

-Chancey JH, Poulson DJ, Wadiche JI, Overstreet-Wadiche L (2014) Hilar mossy cells provide the first glutamatergic synapses to adult born dentate granule cells. *Journal of Neuroscience*, 34:2349-54. PMC3913876.

**F1000 recommended*

-Dieni CV, Nietz AK, Panichi R, Wadiche JI, Overstreet-Wadiche L (2013) Distinct determinants of sparse activation during granule cell maturation. *Journal of Neuroscience*, 33:19131-42. PMC3850038.

-Overstreet-Wadiche L and Wadiche JI (2014) Good Housekeeping. *Neuron* 81:715-717.

**Parpura, Vladimir**

-Gottipati, M.K., Samuelson, J.J., Kalinina, I., Bekyarova, E., Haddon, R.C., Parpura, V. (2013) Chemically Functionalized Single-Walled Carbon Nanotube Films Modulate the Morpho-Functional and Proliferative Characteristics of Astrocytes. Nano Lett 13: 4387−4392.

-Tewari, S., Parpura, V. (2013) A possible role of astrocytes in contextual memory retrieval: An analysis obtained using a quantitative framework. Front Comput Neurosci 7:145. doi:10.3389/fncom.2013.00145

-Rose, C.F., Verkhratsky, A., Parpura, V. (2013) Astrocyte glutamine synthetase: pivotal in health and disease. Biochem Soc Trans 41: 1518-1524

-Stout, R.F.Jr, Grubišić, V., Parpura, V. (2013) A Caenorhabditis elegans locomotion phenotype caused by transgenic repeats of the hlh-17 promoter sequence. PLoS ONE 8: e81771. doi:10.1371/journal.pone.0081771

-Grubišić, V., Gottipati, M.K., Stout, R.F.Jr., Grammer, J.R, Parpura, V. (2013) Heterogeneity of myotubes generated by the MyoD and E12 basic helix-loop-helix transcription factors in otherwise non-differentiation growth conditions. Biomaterials 2013 Dec 19. pii: S0142-9612(13)01425-7. doi: 10.1016/j.biomaterials.2013.11.059. [Epub ahead of print] 35 (2014) 2188-2198

-McClain, J., Grubišić, V., Fried, D., Gomez-Suarez, R.A., Leinninger, G.M., Sévigny, J., Galligan, J.J., Parpura, V., Gulbransen, B.D. (2014) Calcium responses between enteric glia are mediated by connexin-43 hemichannels and function to modulate colonic transit in the mouse. Gastroenterology 146(2):497-507.e1. doi: 10.1053/j.gastro.2013.10.061. Epub 2013 Nov 6.

-Stout, R.F.Jr, Verkhratsky, A., Parpura V. (2014) Caenorhabditis elegans glia modulate neuronal activity and behavior. Front Cell Neurosci 8: 64. doi: 10.3389/fncel.2014.00067

-Singh, P., Jorgačevski, J., Kreft, M., Grubišić, V., Stout, R.F. Jr., Potokar, M., Parpura, V., Zorec R. (2014) Single-vesicle architecture of synaptobrevin2 in astrocytes. Nat Commun 5: 3780; doi:10.1038/ncomms4780

-Martineau, M., Parpura, V., Mothet, J.-P. (2014) Cell-type specific mechanisms of d-serine uptake and release in the brain. Front. Synaptic Neurosci. 6:12. doi: 10.3389/fnsyn.2014.00012

-Verkhratsky, A., Parpura V. (2014) Calcium signalling and calcium channels: Evolution and general principles. Eur J Pharmacol, pii: S0014-2999(13)00884-4. doi: 10.1016/j.ejphar.2013.11.013. [Epub ahead of print]

-Verkhratsky A., Rodríguez, J.J., Parpura, V. (2014) Morpho-functional changes of neuroglia in senescence and disease. Cell Tissue Res. [Epub ahead of print]

-Verkhratsky A., Parpura, V. (2014) Neurological and psychiatric disorders as a neuroglial failure. Period Biol In press

-Gottipati, M.K., Verkhratsky A., Parpura, V. (2014) Probing astroglia with carbon nanotubes: Modulation of form and function. Philos Trans R Soc Lond B Biol Sci. In press

-Montana, V., Verkhratsky A., Parpura, V. (2014) Pathological role for exocytotic glutamate release from astrocytes in hepatic encephalopathy. Curr Neuropharmacol. In press

-Liang, P., Parpura, V., Verkhratsky, A. (2014) Neuroglia as a central element of neurological diseases: An underappreciated target for therapeutic intervention. Curr Neuropharmacol. In press

-Gottipati, M.K., Bekyarova, E., Brenner, M., Haddon, R.C., Parpura, V. (2014) Changes in the morphology and proliferation of astrocytes induced by two modalities of chemically functionalized single-walled carbon nanotubes are differentially mediated by glial fibrillary acidic protein. Nano Lett. [Epub ahead of print]

-Verkhratsky A., Parpura, V. Pekna, M., Pekny, M., Sofroniew, M. (2014) Glia in the pathogenesis of neurodegenerative diseases. Biochem Soc Trans. In press

**Pozzo-Miller, Lucas**

*a) Accepted* (10 total)

Full research papers

-Xu X, Kozikowski A & L Pozzo-Miller (2014). A selective histone deacetylase-6 inhibitor improves BDNF trafficking in hippocampal neurons from *Mecp2* knockout mice: implications for Rett syndrome. *Frontiers in Cellular Neuroscience* 8:68 (doi: 10.3389/fncel.2014.00068).

-Larimore J, PV Ryder, K-Y Kim, L.A. Ambrose, C Chapleau, G Calfa, C Gross, G Bassell, L Pozzo-Miller, Y Smith, K Talbot, I-H Park & V Faundez (2013). MeCP2 regulates the synaptic expression of a Dysbindin-LOC-1 network component in mouse brain and human induced pluripotent stem cell-derived neurons. *LoS ONE* 8(6): e65069 (doi:10.1371/journal.pone.0065069).

-Pitcher MR, CS Ward, EM Arvide, CA Chapleau, L Pozzo-Miller, A Hoeflich, S Saenger, F Metzger & JL Neul (2013). Insulinotropic treatments exacerbate metabolic syndrome in mice lacking MeCP2 function. H*uman Molecular Genetics* 22: 2626-2633.

-Leuner K, W Li, MD Amaral, S Rudolph, G Calfa, AM Schuwald, C Harteneck, T Inoue & L Pozzo-Miller (2013). Hyperforin modulates dendritic spine morphology in hippocampal pyramidal neurons by activating $Ca^{2+}$-permeable TRPC6 channels. *Hippocampus* 23: 40-52.

-Arnold JJ, MS Hansen, Gorman GS, Rao V, Spellen S, Hunsinger R, Chapleau CA, L Pozzo-Miller & P Challa (2013). The effect of Rho-associated kinase (ROCK) inhibition on the ocular penetration of timololaleate. *Investigative Ophthalmology & Visual Science* 54: 1118-1126.

Peer-reviewed Reviews

-Xu X & L Pozzo-Miller (2013). A novel DNA-binding feature of MeCP2 contributes to Rett syndrome. *Frontiers in Cellular Neuroscience* 7:64 (doi: 10.3389/fncel.2013.00064).

-Li W & L Pozzo-Miller (2014). BDNF deregulation in Rett syndrome. *Neuropharmacology* 76: 737-746.

-Chapleau CA, J Lane, L Pozzo-Miller & AK Percy (2013). Evaluation of current pharmacological treatment options in the management of Rett Syndrome: from the present to future therapeutic alternatives. *Current Clinical Pharmacology* 8(4): 358-369.

Peer-reviewed Book Chapters

-Percy AK, C Chapleau, JB Lane & L Pozzo-Miller (2014). *Defining and Diagnosing Rett Syndrome: Correlating Symptoms and Pathogenesis with Autism*. In: "The Comprehensive Guide to Autism", V Patel, V Preedy, C Martin (Eds.), pp. 2581-2601. Berlin: Springer Reference, Springer-Verlag.

-Chapleau CA, J Lane, L Pozzo-Miller & AK Percy (2013). *Rett Syndrome: A Model of Genetic Neurodevelopmental Disorders*. In: "Genetic Disorders", M Puiu (Ed.), ISBN: 978-953-51-0886-3, InTech, DOI: 10.5772/53075. Available from: http://www.intechopen.com/books/genetic-disorders/rett-syndrome-a-model-of-genetic-neurodevelopmental-disorders (Open Access).

*b) Submitted*

-Calfa G, W Li, JM Rutherford & L Pozzo-Miller. Excitation/inhibition imbalance and impaired synaptic inhibition in hippocampal area CA3 of *Mecp2* knockout mice. *Hippocampus*.

*c) Published Abstracts*

-Li W & L Pozzo-Miller (2014). Excitatory CA3->CA1 synapses are stronger in *Mecp2* knockout mice and saturate long-term potentiation. *Society for Neuroscience Abstracts*

-Xu X, J Garcia, R Ewalt & L Pozzo-Miller (2014). The *BDNF* val-66-met polymorphism impairs dendritic complexity and dendritic spine density and form in hippocampal neurons of *Mecp2* knockout mice. *SfN*

-Li W & L Pozzo-Miller (2013). Enhanced synaptic transmission impairs hippocampal LTP in *Mecp2* knockout mice. *Society for Neuroscience Abstracts* 335.03.

-Xu X & L Pozzo-Miller (2013). Bi-directional dendritic BDNF transport is impaired in *Mecp2* knockout neurons. *Society for Neuroscience Abstracts* 335.05.

**Sontheimer, Harry**

Publications in peer reviewed journals

-Cuddapah VA, Turner KL, Sontheimer H. Calcium entry via TRPC1 channels activates chloride currents in human glioma cells. Cell Calcium. 2013 53(3):187-94. PMCID: PMC3594368.

-Cuddapah VA, Turner KL, Seifert S, Sontheimer H. Bradykinin-Induced Chemotaxis of Human Gliomas Requires the Activation of KCa3.1 and ClC-3. J. Neurosci. 23;33(4):1427-40 (2013) PubMed PMID: 23345219.

-Honasoge, A. and H. Sontheimer "Involvement of tumor acidification in brain cancer pathophysiology." Front Physiol **4**: 316, (2013) PMID: 24198789.

-Turner KL, Sontheimer H. KCa3.1 Modulates Neuroblast Migration Along the Rostral Migratory Stream (RMS) In Vivo. Cereb Cortex. 2013 May 15. PMID: 23585521.

-Turner KL, Sontheimer H. Cl- and K+ channels and their role in primary brain tumour biology. Philos Trans R Soc Lond B Biol Sci. 2014 Feb 3;369(1638):20130095. (2014). PubMed PMID: 24493743; PMCID: PMC3917349.

-Robert SM, Ogunrinu-Babarinde T, Holt KT, Sontheimer H. Role of glutamate transporters in redox homeostasis of the brain. Neurochem Int. (2014) Jan 10. PMID: 24418113.

-Honasoge A, Shelton KA, Sontheimer H. Autocrine regulation of glioma cell proliferation via pHe-sensitive K+ channels. Am J Physiol Cell Physiol. (2014) Mar;306(5):C493-505. PMID: 24380845.

-Robert SM, Sontheimer H. Glutamate transporters in the biology of malignant gliomas. Cell Mol Life Sci. 2013 Nov 27. PMID: 24281762.

-Turner KL, Honasoge A, Robert SM, McFerrin MM, Sontheimer H. A proinvasive role for the Ca(2+) -activated K(+) channel KCa3.1 in malignant glioma. Glia. 2014 Mar 2. doi: 10.1002/glia.22655. PMID: 24585442.

-Watkins, S., Robel, S., Kimbrough I.K., Robert, S.M., Ellis-Davies, G. and Sontheimer, H. Disruption of astrocyte-vascular coupling and the blood-brain barrier by invading glioma cells. Nature Communications, in press (2014).

-Cuddapah, V A, Robel, S., Watkins, S. and Sontheimer, H. A neurocentric perspective on glioma invasion, Nature Reviews in Neuroscience, in press. (2014)

-Campbell S.L., , Robel, S., Cuddapah, V.A., Robert, S., Buckingham, S.C., Kahle, K.T., and Sontheimer, H. GABAergic disinhibition and impaired KCC2 cotransporter activity underlie tumor-associated epilepsy. GLIA, in press (2014)

-Seifert, S., and Sontheimer, H. Bradykinin enhanced the invasion of malignant glioma into the brain parenchyma by inducing cells to undergo amoeboid migration. J. Physiology, in press (2014).

**Visscher, Kristina**

-Burge, W.K., Ross, L.A., Amthor, F.R., Mitchell, W.G., Zotov, A., Visscher, K.M. (2013). Processing speed training increases the efficiency of attentional resource allocation in young adults. Frontiers in Human Neuroscience 7:684. PMID: 24151461

-Hadley, J., Nenert, R., Kraguljac, N., Bolding, M., White, D., Skidmore, F., Visscher, K.M., Lahti, A.C. (2013). Ventral Tegmental Area/Midbrain Functional Connectivity and Response to Antipsychotic Medication in Schizophrenia. Neuropsychopharmacology 39(4): 1020-30.

**Wadiche, Jacques**

-Coddington LT, Rudolph S, Vande Lune P, Overstreet-Wadiche L, Wadiche JI (2013). Spillover-mediated feedforward inhibition functionally segregates interneuron activity. *Neuron* 78:1050-62.

-Chancey JH, Poulson DJ, Wadiche JI, Overstreet-Wadiche L (2014)
Hilar mossy cells provide the first glutamatergic synapses to adult born dentate granule cells. *Journal of Neuroscience*, 34:2349-54.

-Dieni CV, Nietz AK, Panichi R, Wadiche JI, Overstreet-Wadiche L (2013)
Distinct determinants of sparse activation during granule cell maturation. *Journal of Neuroscience*, 33:19131-42.

-Overstreet-Wadiche L and Wadiche JI (2014)
Good Housekeeping. *Neuron* 81:715-717.

-Coddington LT, Nietz AK, and Wadiche JI (2014)
The contribution of extrasynaptic signaling to cerebellar information processing.*Cerebellum* 13:513-20

Publications in peer reviewed journals

-Marshall AG, Watson JA, Hallengren JJ, Walters BJ, Dobrunz LE, Francillon L, Wilson JA, Phillips SE, Wilson SM. 2013. Genetic background alters the severity and onset of neuromuscular disease caused by the loss of ubiquitin-specific protease 14 (usp14). PLoS One. 2013 Dec 16;8(12):e84042. PMID: 24358326

-Walters BJ, Hallengren JJ, Theile CS, Ploegh HL, Wilson SM*, Dobrunz LE*. 2013. A catalytic independent function of the deubiquitinating enzyme USP14 regulates hippocampal short-term synaptic plasticity and vesicle number. J Physiol. 2013 Nov 11. *Co-senior authors.

-Jarome TJ, Kwapis JL, Hallengren JJ, Wilson SM, Helmstetter FJ. The ubiquitin-specific protease 14 (USP14) is a critical regulator of long-term memory formation. Learn Mem.2013 Dec 16;21(1)

**3. Publications – Other**

**Brenner, Michael**

Publications (other)

-Brenner, M. Alexander's Disease, In: Aminoff, MJ. and Daroff, RB., Encyclopedia of the Neurological Sciences, 2nd Edition, Elsevier, New York (in press).

-Messing, A. and Brenner, M. Alexander Disease and Astrotherapeutics, In Parpura, V. and Verkhratsky, A., Pathological potential of neuroglia: Possible new targets for medical intervention, Springer, New York (in press).

-Brenner, M. Alexander disease. In NORD Guide to Rare Disorders, Lippincott, Williams & Wilkins. Philadelphia, PA (in press).

-Brenner, M. and Messing, A. A New Mutation in GFAP Widens the Spectrum of Alexander Disease. [commentary] Europ. J. Hum. Genet (in press).

**King, Gwendalyn**

Maltare A, Nietz A, Laszczyk AM, Dunn T, Ballestas M, Acciviti-Loper A, King GD. Development and characterization of monoclonal antibodies to detect klotho. Under review April 2014

**Lubin, Farah**

2014. Epigenetics and Neuroplasticity: Evidence and Debate. Farah D. Lubin and Schahram Akbarian (Co-editors) (Publishing editor, Elsevier).

**Parpura, Vladimir**

Books: (**3**)

-Verkhratsky, A., Parpura, V. Introduction to Neuroglia. In: Colloquium Series on Neuroglia for biology and medicine: From physiology to disease (Verkhratsky, A., Parpura, V., Eds). Morgan & Claypool Publishers, Colloquium Digital Library of Life Sciences; DOI: 10.4199/C00102ED1V01Y201401NGL001(2014)

-Parpura, V., Verkhratsky, A. (Eds.) Pathological potential of neuroglia: Possible new targets for medical intervention. Springer, New York, NY (2014) In Press

-Parpura, V., Schousboe, A., Verkhratsky, A. (Eds.) Glutamate and ATP at interface of metabolism and signaling in the brain. Springer, New York, NY (2014) In Press

Edited volumes/series: (**1**)

-Verkhratsky, A., Parpura, V. (Eds.) Colloquium Series on Neuroglia for biology and medicine: From physiology to disease. Morgan & Claypool Publishers, Colloquium Digital Library of Life Sciences (2014); Last updated Feb 25, 2014 (http://www.morganclaypool.com/toc/ngl/1/1)

Invited chapters/chapters in edited books : (**7**)

-Verkhratsky, A., Parpura V. (2013) History of electrophysiology and the patch-clamp. Methods Mol Biol. In Press

-Verkhratsky, A., Parpura V. (2014) General pathophysiology of neuroglia: Neurological and psychiatric disorders as gliopathies. In: Parpura, V., Verkhratsky, A. (Eds.) Pathological potential of neuroglia: Possible new targets for medical intervention. Springer, New York, NY. In Press

-Verkhratsky, A., Parpura V. (2014) Ionic signalling in physiology and pathophysiology of astroglia. In: Parpura, V., Verkhratsky, A. (Eds.) Pathological potential of neuroglia: Possible new targets for medical intervention. Springer, New York, NY; In Press

-Verkhratsky, A., Parpura V., Rodríguez, J.J. (2014) Neurodegeneration and neuroglia: Emphasis on astroglia in Alzheimer's disease. In: Parpura, V., Verkhratsky, A. (Eds.) Pathological potential of neuroglia: Possible new targets for medical intervention. Springer, New York, NY; In Press

-Verkhratsky, A., Butt, A.M., Rodríguez, J.J., Parpura V. (2014) Astrocytes, Oligodendrocytes and NG2 cells: Structure and Function. In: Toga, A.W., Zilles, K, Amunts, K. (Eds.) Brain Mapping: An Encyclopedic Reference. Elsevier; In Press

-Verkhratsky, A., Noda. M., Parpura, V. (2014) Microglia: Structure and Function. In: Toga, A.W., Zilles, K, Amunts, K. (Eds.) Brain Mapping: An Encyclopedic Reference. Elsevier; In Press

-Verkhratsky, A., Schousboe, A., Parpura, V. (2014) Glutamate and ATP: The crossroads of signaling and metabolism in the brain. In: Parpura, V., Schousboe, A., Verkhratsky, A. (Eds.) Glutamate and ATP at interface of metabolism and signaling in the brain. Springer, New York, NY; In Press

Undergraduate journal articles: (**1**)

-Cavender, C.E., Gottipati, M.K., Malarkey, E.B., Parpura, V. (2013) Method for the determination of trajectory angles of directional secretory vesicles in cultured astrocytes. *Inquiro* 7:48-52.

Commentaries: (**2**)

-Parpura, V. (2013) American Society for Neurochemistry (ASN) Report. Neurochemistry News 42: 11-12. [Report]

-Tewari, S., Parpura, V. (2014) Data and model tango to aid the understanding of astrocyte-neuron signaling. *Front Comput Neurosci* 8:3. doi:10.3389/fncom.2014.00003 [opinion] - peer-reviewed

**Sontheimer, Harry**

Elsevier Book - “Diseases of the Nervous System”

**Visscher, Kristina**
-Nenert, R., DeCarlo, D.K., Chen, R.C., Ross, L.R. **Visscher**, K.M. (2014). Macular degeneration affects functional connectivity of primary visual cortex.
-Bays, B.C., **Visscher**, K.M., Le Dantec, C.C., Seitz, A.R. (2014). Alpha-band EEG activity as a signature of automaticity in perceptual learning.
-Turkstra, L.S., Vandenheuvel, S., **Visscher**, K.M. (2014). Emotion recognition in context in adults with traumatic brain injury. Tenth World Congress on Brain Injury.
-Elkhetali, A.S., Vaden, R.J., Nenert, R., **Visscher**, K.M. (2013). Task based modulation of background connectivity in sensory cortex. Society for Neuroscience Abstracts.
-Griffis, J., Elkhetali, A.S., Vaden, R.J., **Visscher**, K.M. (2013). Task set modulates the response of human V1 during auditory and visual tasks. Society for Neuroscience Abstracts.
-Hadley, J.A., Nenert, R., Bolding, M.S., White, D.M., **Visscher**, K.M., Lahti, A.C. (2013). Ventral tegmental area functional connectivity predicts antipsychotic drug response in schizophrenia. Organization for Human Brain Mapping Annual Meeting Abstracts.

**Wilson, Scott**
Publications (other)- Under review
-Jada J. Hallengren, Bula J. Bhattacharyya, Ping-Chung-Chen, Jennifer A. Watson, Andrea G. Marshall, Scott E. Phillips, Christopher S. Theile, Julie A. Wilson, Hidde L. Ploegh, Gwendalyn E. King, Richard J. Miller and **Scott M. Wilson**. Deubiquitination of mixed lineage kinase 3 by USP14 regulates JNK signaling at the neuromuscular junction. Resubmitted to the Journal of Neuroscience.
-Jennifer A. Watson, Jada J. Hallengren, Julie A. Wilson, Mert Icyuz, Alan D. Howard, Gene P. Siegal, Andrew J. Bean, Scott E. Phillips, and **Scott M. Wilson**.
Under review at the Journal of Neuroscience.

**4. Presentations at Scientific Meetings**

**Day, Jeremy**
-Dartmouth College, Department of Psychological and Brain Sciences Seminar
-Neuroscience 2013, Nanosymposium on Epigenetics in Learning and Memory
-University of Maryland Medical School, Department of Anatomy and Neurobiology Seminar
-University of North Carolina at Chapel Hill, Department of Psychiatry Seminar

**Dobrunz, Lynn**
-University of Otago, Dunedin, New Zealand. March 28, 2014. Departmental seminar.
-Florey Neurosciences Institute, Melbourne, Australia. April 4, 2014. Departmental seminar.
-UAB Mood Disorders Symposium. April 11, 2014. Invited talk.

**King, Gwendalyn**
-Weekly Seminar for the Comprehensive Center for Healthy Aging, Birmingham AL April 2013
-Society for Neuroscience – two poster presentations, San Diego CA, November 2013
-Weekly Seminar for the Cell Developmental and Integrative Biology Department Birmingham AL October 2013

**Lester, Robin**
-Department of Pharmacology, University of Florida (Papke lab meeting)
-Department of Neurobiology/Behavior, SUNY Stony Brook (Seminar)
-Department of Psychiatry, Yale University (Picciotto lab meeting)

**Lubin, Farah**

-F.D. Lubin. Epigenetics, Memory, and Memory Deficits. The Robert S. Dow Neurobiology Laboratories seminar series. Portland, Oregon. Invited by Dr. Detlev Boison.
-F.D. Lubin. Methyl supplementation rescues memory deficits associated with TLE. UCI (University of California, Irvine) EpiCenter (Epilepsy Research Center) seminar series. Invited by Drs. Tallie Baram, Chris Gall, Al Goldin, Ivan Soltesz & John Weiss.
-F.D. Lubin. Improving memory. Behavioral Neuroscience seminar series at UAB. Birmingham, AL. Invited by Dr. Frank Amthor.
-F.D. Lubin. Understanding Mechanisms of Memory Formation. The Campus Civitan Club seminar series at UAB. Birmingham, AL. Invited by John Lanier and Tyler Furgerson.
-F.D. Lubin. Aging and Memory. Annual meeting for the "Winter Conference on Neural Plasticity". Vieques, Puerto Rico. Invited by Dr. Paul Coleman.
-F.D. Lubin. Targeting chromatin to improve memory in Epilepsy. Department of Cell, Developmental and Integrative Biology (CDIB) Seminar Series. University of Alabama at Birmingham AL. Invited by Dr. Qin Wang.
-F.D. Lubin. Novel Molecules and Mechanisms in Vulnerability and Resilience Throughout Life. 52nd American College of Neuropsychopharmacology (ACNP) Annual Meeting. Hollywood, Florida. Panel Participants: Drs. Tallie Baram, Marcelo Wood, Farah Lubin, Timothy Bredy and Tracy Bale.
-F.D. Lubin. Basic Mechanisms of Epilepsy: Mechanisms underlying cognitive and behavioral deficits associated with epilepsy. The American Epilepsy Society Annual Meeting, Washington D.C. Invited by Drs. Dane Chetkovich and Amy Brewster.
-F.D. Lubin. Session Chair Molecular and Cellular Cognition Society. Neuroscience Satellite Symposium San Diego, CA.
-F.D. Lubin. Epigenetics in Epilepsy: Epiphany or epiphenomenon?. Invited by Dr. Tallie Baram, Minisymposium. The Society for Neuroscience Annual Meeting, San Diego, CA.
-F.D. Lubin. Board Meeting for the University of Alabama Health Services Foundation. University of Alabama at Birmingham (UAB). Invited by Dr. Will Ferniany and Ms. Patricia J. Pritchett.

**Overstreet-Wadiche, Linda**

-Invited speaker at the Adult Neurogenesis meeting in Mumbai, India. February 5-8 2014
-Invited speaker at the 25th Aniversary of the Spain Rehab Center, UAB. April 25 2014
-Sept 20 2013 Northwestern University Neuroscience Institute Annual Retreat Speaker
-Dec 5 2013 Department of Neurobiology, Stoneybrook University
-Mar 19 2014 Department of Physiology, Northwestern University
-April 30 2014 Department of Neuroscience, Tufts University

**Parpura, Vladimir**

Parpura-Invited talks (14)

-"Spatio-temporal characteristics of vesicular fusions in astrocytes: single vesicle/molecule measurements" In symposium VIII: Signaling in neuronal-glial networks (Chair: Vladimir Parpura, UAB, USA), FENS Featured Regional Meeting, Prague, Czech Republic

-"Nanotechnology at the interface of cell biology: Probing neural cells with carbon nanotubes" in Cell physiology II (Chairs: Carlo Reggiani, University of Padova, Italy and Ines Mrakovcić-Sutić, University of Rijeka, Croatia) 3rd Congress of Croatian Physiological Society and 1st Regional Congress of the Physiological Societies, Rijeka, Croatia

-"$Ca^{2+}$ sources for the exocytotic glutamate release from astrocytes" in AE-Letters: Life and related sciences session, 25th Anniversary Meeting of the Academia Europaea, Wrocław, Poland

-"Tripartite synapse-astrocytic regulation of glutamate", Department of Physiology, University of Oslo, Norway.

-"Tripartite synapse-astrocytic regulation of glutamate", Research Training School InterNeuro, University of Leipzig, Germany

-"Exocytotic glutamate release from astroglia " in Panel "Non-conventional modes of neurotransmission in the CNS: Do we need a new vocabulary?" (organizer and chair: Louis-Eric Trudeau, University of Montreal, Canada), 47th Winter Conference on Brain Research (WCBR), Steamboat Springs, CO

-"Exocytotic glutamate release from astrocytes in health and disease" in Symposium "Exocytic Gliotransmitter Release Astrocyte Metabolism and Behavior" (organizer and chair: Robert Zorec, University of Ljubljana, Slovenia). 45th Annual Meeting of the American Society for Neurochemistry, Long Beach, CA.

-"Probing neural cells with carbon nanotubes: Implications for translational medicine" Neuromodulation Brainstorming Retreat, Carmel, CA

-"Vesicle trafficking in astrocytes and cell-cell communication: relevance for disease pathogenesis", Training School and International Research Conference "Astrocyte Intermediate Filaments (Nanofilaments) and Astrocyte Function in Health and Disease", Gothenburg-Lerum, Sweden

-"$Ca^{2+}$ sources for the exocytotic glutamate release from astrocytes in heath and disease", A joint Biochemical Society and British Neuroscience Association Focused Meeting "Astrocytes in Health and Neurodegenerative Disease", London, UK

-"Exocytotic release of glutamate from astrocytes in health and disease" in Symposium "The Growing Significance of Astrocytes in Psychiatric Disease" (organizer and chair: Mikhail Pletnikov, John Hopkins School of Medicine, Baltimore MA; co-chair; Philip G. Haydon, Tufts University School of Medicine, Boston, MA). The Society of Biological Psychiatry 69th Annual Scientific Convention and Meeting, New York, NY

-"Astroglial cells release glutamate by regulated exocytosis in heath and disease", International Scientific School "Frontiers in Modern Neuroscience", Nizhny Novgorod – Il'ino, Russian Federation.

-"Probing neural cells with carbon nanotubes: Implications for translational medicine", International Congress of Neuroscience, Krasnoyarsk, Russian Federation.

-"Exocytotic release of glutamate from astroglia in health and disease", International Congress of Neuroscience, Krasnoyarsk, Russian Federation.

Laboratory: (4)

-Gottipati, M.K. [2], Kalinina, I., Bekyarova, E., Haddon, R., Parpura, V. (2013) Chemically Functionalized Single-Walled Carbon Nanotube Conductive Films Modulate the Morpho-Functional and Proliferative Characteristics of Astrocytes. Biomedical engineering Society 2013 Annual Meeting, Platform session "Nanobioniterfaces II), Talk

-Grubišić, V. [2], Gottipati, M.K. [2], Stout, R.F. Jr. [2], Grammer, .J.R. [4], Parpura, V. (2013). Generation of muscle using synthetic biology. Arnold and Madaleine Penner 2nd Annual Musculoskeletal Repair and Regeneration Symposium, Bronx, NY. Poster presentation

-Gottipati, M.K. [2], Parpura, V. (2014) Probing astrocytes with carbon nanotubes: Implications for translational medicine. International Association of Neurorestoratology (IANR) VII & 1st Stem Cell Society of India (SCSI) with 11th Global College of Neuroprotection & Neuroregeneration(GCNN) & 2nd Indian Federation of Neurorehabilitation (IFNR) Conference, Mumbai, India. Invited talk

-Cavender, C.E.[1], Gottipati, M.K.[2], Malarkey, E.B.[3], Parpura, V. (2014) Method for the determination of trajectory angles of directional secretory vesicles in cultured astrocytes. Southern Regional Honors Council Conference, Savannah, GA. Poster presentation

[1] Undergraduate and [2] graduate students, [3] Post-doctoral fellow, [4] Senior research associate (SRA) in Parpura laboratory.

**Pozzo-Miller, Lucas**
Presentations at scientific meetings
Name and location of department/institution, date, and forum – e.g. departmental seminar, workshop, award lecture, etc.
-Speaker at the 13th Annual Meeting of the International Rett Syndrome Foundation, Chantilly, VA (June).
-Behavioral Neuroscience Program, Department of Psychology, College of Arts & Sciences, UAB (March).
-Speaker at "*Cortical dysfunction in Rett Syndrome: Opportunities for new treatment development*" panel, Winter Conference on Brain Research, Steamboat Springs, CO (January).
-Department of Neuroscience & Physiology, and Skirball Institute of Biomedical Medicine, NYU Medical Center, New York NY (December).
-Departments of Pharmacology, and of Cell Biology, School of Chemical Sciences, Universidad Nacional de Córdoba, Argentina (November).
-Department of Drug Discovery and Development, Auburn University, Auburn, AL (October).
-Neurobiology Retreat, UAB, Columbiana, AL (September).

**Sontheimer, Harry**
-American Neurological Association, "Novel targets to treat Glioma"
-American Epilepsy Society, "Role of astrocytes in epilepsy"
-Keynote speaker, Society for Neuroscience Annual meeting, "Glioma: A Neurocentric Look at Cancer"
-Keynote Speaker, Neuroscience Day 2014, Wright State University, Dayton, OH
-World Experts in Health and Medical Science, Copenhage, Denmark, "Primary Brain Tumors:
Can Neurosceince provide much needed Therapies."

**Visscher, Kristina**
Presentations at scientific meetings
-UAB Comprehensive Center for Healthy Aging and Birmingham/VA Geriatric Research, Education and Clinical Center seminar, "Ready, set, go! The Aging brain's preparation for information processing." January 3, 2014
-UAB Collat School of Business departmental seminar "Studying Attention with fMRI" April 4, 2014
-McKnight Annual meeting "Functional Neuroimaging of Older Adults: Individual Differences in Brain Activity and Relationship to Performance" April 24, 2014
-University of Wisconsin, Madison Cognition and Communication Laboratory, workshop, July 2, 2014

**Wadiche, Jacques**
-Invited speaker at the Cerebellum Gordon Research Conference.
-Invited speaker at the University of Minnesota Department of Neuroscience
-Janelia Farm Research Campus Conference, How to Read a Map: Understanding Structure-Function Relationships in the Brain

**Wilson, Scott**
-Invited Speaker at the 5th Annual Ubiquitin Drug Discovery & Diagnostics Conference July 2014.
-Speaker at UAB CNC/Neurobiology Retreat 2013

**5. Presentations at public (non-scientific) meetings or events**

**Lubin, Farah**
-CHDI Foundation workshop on HDAC4 and Huntington's Disease (HD). Los Angeles, California.
-The research being conducted at the Civitan international research center. University of Alabama at Birmingham, Birmingham, Alabama. Invited by CIRC to talk to guests at the annual Paisley's Bicycle Relay Across America event.
-Career options in research. University of Alabama at Birmingham, Birmingham, Alabama. Spoke to students in SPIN (Summer program in Neuroscience).
-Grant writing workshop sponsored by the Postdoctoral Association. University of Alabama at Birmingham, Birmingham, Alabama. Spoke to postdocs and faculty about the NIH-K99 funding mechanism.

**Parpura, Vladimir**
- Appeared in in Novi List (Croatia) newspaper, http://novine.novilist.hr/Default.asp?WCI=Rubrike&WCU=285928582863285E2863285A28582859285C2863287A287128632863285F28582860285C285F285A2863286328632858286 3U

**Pozzo-Miller, Lucas**
-People-Behind-the-Science Web Radio Interview (May 2014).
-Scientific Communication and Innovation Talks, Research Civitan Club, Civitan International Foundation, Birmingham AL (May 2014).
-Suki Foundation Fund Raising Banquet and Silent Auction, United Cerebral Palsy, Birmingham AL

**Visscher, Kristina**
-Brain Bee and UAB Neuroscience Day Keynote speaker

**6. Awards**

**Day, Jeremy**
K99/R00 Pathway to Independence Award
Project title: Epigenetic regulation of cocaine-induced neuroadaptations
This grant provides research and salary support during my transition to an independent laboratory, as well as three years of research funding as a new lab.

**Lubin, Farah**
-Excellence in Editing/Reviewing- Neurobiology of Learning and Memory Journal
-American Epilepsy Society Basic Sciences Committee

**Parpura, Vladimir**
Member (3-year term), Physiology and Medicine Section Committee, Academia Europaea.

**7. External collaborations with other McKnight Institutes, institutions and research programs**

**Brenner, Michael**
-Dr. Michelle Olsen, Assistant Professor of Cell, Developmental & Integrative Biology: Injury response of GFAP-driven transgenes
-Dr. Vlad Parpura, Associate Professor of Neurobiology: Role of GFAP in the response of astrocytes to nanoparticles

**Day, Jeremy**
-K99/R00 Pathway to Independence Award, Project title: Epigenetic regulation of cocaine-induced neuroadaptations. This grant provides research and salary support during my transition to an independent laboratory, as well as three years of research funding as a new lab.

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| **Lubin, Farah**<br>-Carol Barnes-University of Arizona<br>-Hendrik Luesch-University of Florida<br>-Matt Huentelman- Tgen |
| **Overstreet-Wadiche, Linda**<br>-Jacques Wadiche, UAB<br>-Gwen King, UAB<br>-Erik Roberson, UAB |
| **Visscher, Kristina**<br>-Member of the McKnight MRI Standardization Workgroup. Worked with representatives at each of the centers to develop strategies for comparing data across sites.<br>-Collaborating with Adam Woods from University of Florida, Gainesville on a project looking at augmenting useful field of view training by using transcranial direct current stimulation. |
| **Wadiche, Jacques**<br>-Linda Wadiche, UAB<br>-Gwen King, UAB |

**8. Collaborative programs with non-McKnight institutes, institutions and research programs**

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| **Brenner, Michael**<br>A.Within the UAB system<br>-Dr. Anthony Nicholas, Associate Professor of Neurology: The role of GFAP deimidation in Alexander disease<br>-Dr. Stephen Barnes, Professor of Pharmacology: Proteomic analysis of Rosenthal fibers in Alexander disease<br>-Dr. Michelle Olsen, Assistant Professor of Cell, Developmental & Integrative Biology: Injury response of GFAP-driven transgenes<br>-Dr. Vlad Parpura, Associate Professor of Neurobiology: Role of GFAP in the response of astrocytes to nanoparticles<br><br>B. Outside the UAB system<br>-Dr. Albee Messing, University of Wisconsin, Madison: Studies of GFAP transcription; analyses of Alexander disease cases<br>-Dr. David C. Muddiman, North Carolina State University: Proteomic analysis of Rosenthal fibers in Alexander disease |
| **Dobrunz, Lynn**<br>Within the UAB system<br>-Scott Wilson<br>-Rita Cowell<br>-Mark Bevensee |
| **Hablitz, John**<br>Inside UAB<br>-Rita Cowell<br>-Karen Gamble<br>-Kazu Nakazawa |

**King, Gwendalyn**
A. Within the UAB System
-Collaboration with Dr. Brian Simms to develop a neurosphere model for the study of klotho in neurogenesis
-Collaboration with Dr. Sarah Clinton to study the role of GRIK5 in depression.
B. Outside the UAB system
Collaboration with Dr. Darryl Quarles, University of Tennessee to characterize the brain in FGF23 knockout mice and share resources relevant to our research programs. Dr. Quarles is interested in klotho in kidney and we are interested in klotho in brain.

**Lubin, Farah**
A. Within the UAB system
-Standaert Lab
-Chatham Lab
-Ver Hoef La
-Riley Lab
-Riddle Lab
-Roberts Lab
B. Outside the UAB system
-Nguyen- University of Toronto
-Huentelman- Tgen
-Nigel Jones-University of Melbourne, Australia
-Robert Lipsky, INOVA
-Molly Meffert, John Hopkins
-Laura Schrader, Tulane University

**Overstreet-Wadiche, Linda**
A. Within the UAB system
-Candace Floyd, UAB
B.Outside the UAB system
-Dave Poulson, University of Montana Missoula
-Karoly Mirnics, Vanderbilt
-Brad Aimone, Sandia Labs
-Roberto Panichi, University of Perugia, Italy

**Parpura, Vladimir**

Collaborative programs with non-McKnight Institutes, institutions and research programs

A.Within the UAB system

-CFTR/ENaC plasma membrane interactions (B. Berdiev)
-The role of astrocytes in Huntington's disease (M. Gray)
-Exocytotic glutamate release from gliomas (H. Sontheimer)
-The role of GFAP in CNT-mediated effects on astrocytes (M. Brenner)
-Changes in gut motility in a model of Pits-Hopkins syndrome (J.D. Sweatt)
-Trafficking of rhodopsin (A. Gross)
-The role of sodium-bicarbonate exchangers in astrocytes (M. Bevensee)

B.Outside the UAB system

-Cyberplasm (C. Voigt, Univ of California San Francisco, CA; J. Ayers, Northeastern University, MA; Daniel Frankel, Newcastle University, UK)

-Pools of glutamate for exocytotic glutamate release (H.S. Waagepetersen and A. Schousboe; Univ of Copenhagen, Danmark)
-The role of connexin 43 in astrocytic exocytosis (E. Scemes and D.C Spray, Albert Einstein College of Medicine, NY)
-Optogenetic approaches for stimulation of astrocyte in vivo (S. Kasparov, Univeristy of Bristol, UK and P.G. Haydon, Tufts Univ, Boston, MA)
-CNTs in modulation of neuronal growth, astrocytic maturation/stellation (R.C. Haddon, Univ of California Riverside, CA)
-CNTs in endocytosis (P. Lučin, University of Rijeka, Croatia)
-CNTs in traumatic brain injury (G. Župan, University of Rijeka, Croatia)
-CNTs and dental pulp stem cells (J. Milašin, University of Belgrade, Serbia)
-CNTs and brain stem cells (S. Gajović, University of Zagreb, Croatia)
-SNARE complex proteins (R. Zorec, Univ of Ljubljana, Slovenia)
-VGLUTs trafficking in astrocytes (R. Zorec, Univ of Ljubljana, Slovenia)
-The role of presenilins in vesicular trafficking in astrocytes (R. Zorec, Univ of Ljubljana, Slovenia)
Nanosieve-based detection of botulinum toxins (A. Gu, Univ Missouri, Columbia, MO)
-Enteric glial cells and calcium dynamics (B. Gulbransen, Michigan State University, East Lansing, MI)
-EGCG effects on calcium dynamics and cell growth (K. Pavelić, University of Rijeka, Croatia)
-Purinergic status in astrocytes (S. Stojilkovic, NIH)
-The role of Homer in calcium dynamics and exocytosis from astrocytes (P. Bezzi, University of Lausanne, Switzerland)
-Graphene in biological applications (V. Jokanović, Vinča Institute, Belgrade, Serbia)
-Mechanisms underlying GFAP modulation of hyposmotic regulation of hypothalamic vasopressin neuron activity (Y-F. Wang, Harbin Medical University, P.R. China)

**Pozzo-Miller, Lucas**
A. Within the UAB system
-Michelle Olsen
-Alan Percy
-Scott Wilson
B. Outside the UAB system
-Frank Longo, Stanford University, San Francisco, CA
-Jeff Neul, Baylor College of Medicine
-Graham Ellis-Davies, Mt Sinai School of Medicine
-Tien-Le Xu, Jiao-Tong University, Shanghai, China
-Arturo Romano, University of Buenos Aires, Argentina
-James Eubanks, Toronto Western Hospital, Canada
-Alan Kozikowski, University of Illinois
-Steve Gray, University of North Carolina at Chapel Hill
-Gabriela Paglini, Instituto Ferreyra, Córdoba, Argentina
-Maurizio Giustetto, University of Torino, Italy
-Suzanne Oberholster, Samford University, Birmingham, AL
-Takafumi Inoue, Waseda University, Tokyo

**Visscher, Kristina**
A. Within the UAB system
-Lesley Ross and Karlene Ball, Psychology Department. We wish to examine how ongoing brain activity as measured with fMRI may be altered after training on a visual processing speed task. This task has been shown to have great behavioral gains for older adults, thought to arise from changes in speed of processing of visual attention, which is likely to be mediated by attention. We have submitted four grant proposals (two funded) about this general topic. (One was a section of a PO1 proposal, the other was a funded CCTS pilot program proposal. A version of this project, in younger adult participants, is part of my recent RO1 proposal. Another version of the project, using older adult data, but exploring connectivity, was funded by a pilot grant in October of 2013 by the UAB Interdisciplinary Institute for Imaging).
-Cynthia Owsley and Dawn DeCarlo, Ophthalmology Department. Both Dr. Owsley and Dr. DeCarlo are involved in the macular degeneration and training project described above and in the 'grants' section. Dr. Owsley's expertise in training and vision loss, and Dr. DeCarlo's clinical expertise with low vision populations have been a great team for examining this question. My lab's project on cortical effects of macular degeneration, funded by the Dana Foundation, requires this collaboration.
-Daniel Marson, Neurology Department. Dr. Marson's NIH funded grant studies the relationship between financial abilities and brain structure and function in participants with Mild Cognitive Impairment. My role in the project is to assist with methods, interpretations and analyses of MRI and fMRI data. We are examining how the integrity of connections among brain networks may predict participants' behavioral scores indicating their financial capacity. I work closely with Dr. Marson's lab members to analyze and interpret their data.
-Adrienne Lahti, Psychiatry Department. Dr. Lahti studies patients with Schizophrenia. We are collaborating to implement and describe more robust methods for examining functional connectivity in these patients, removing some artifacts due to head movement.
-Jerzy Szaflarski, Neurology Department. Dr. Szaflarski's focus is on epilepsy. He has used simultaneous EEG/fMRI methods to localize the origin of seizure activity. With Dr. Szaflarski, we are collecting simultaneous EEG/fMRI data in a group of healthy participants as well as a group of patients with epilepsy. We will compare oscillatory EEG signals that change depending on a participant's task set with modulations in functional MRI activity.
B. Outside the UAB system
-Professor Aaron Seitz, UC Riverside. Dr. Seitz's lab focuses on implicit learning. Our collaborative project examines how ongoing fluctuations in EEG alpha power are influenced by learning. Data were presented at the Vision Sciences Society meeting in 2014.
-Professor Lyn Turkstra, University of Wisconsin, Madison. Dr. Turkstra studies how traumatic brain injury impacts social cognition. I am a collaborator on her NIH RO1 funded grant examining how eye movements interact with these effects. Data examining eye movements in traumatic brain injury were presented at the International Brain Injury Association World Congress in March 2014.

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| **Wadiche, Jacques**<br>A. Within the UAB system<br>-Gwen King, UAB<br>-Tara DeSilva, UAB<br>-William Britt, UAB<br>B. Outside the UAB system<br>-Anastassios Tzingounis, University of Connecticut Storrs<br>-Loren Looger, JFRC |
| **Wilson, Scott**<br>A. Within the UAB system<br>-Lucas Pozzo-Miller<br>-Erik Roberson<br>B. Outside the UAB system<br>-Richard Miller (NW University) |

# APPENDICES

List of Seminar Speakers sponsored by the Evelyn F. McKnight Brain Institute at UAB.

| Evelyn F. McKnight Brain Institute<br>Seminars<br>2014 | | |
|---|---|---|
| 01/09/2014 | Roger Nicoll, M.D.<br>University of California, San Francisco | *Long term potentiation: the bare bones* |
| 01/16/2014 | Pamela J. McLean, Ph.D.<br>Mayo Clinic | *Alpha-synuclein as a target for Parkinson's disease therapeutics* |
| 01/23/2014 | Srdjan Djurovic, PhD<br>Professor<br>UiO: Institute of Clinical Medicine | *Using stem cells to understand the underlying mechanisms of polygenic risk of severe mental disorders* |
| 02/03/2014 | Jeremy Day, Ph.D.<br>Postdoctoral Fellow<br>University of Alabama, Birmingham | *Epigenetic Regulation of Brain Reward Circuitry* |
| 02/06/2014 | Kerry Ressler, MD, PhD<br>Professor<br>Emory University | *Risk and Resilience for Fear Related Disorder: From Pavlov to PTSD* |
| 02/18/2014 | Quan Lin, Ph.D.<br>Postdoctoral Fellow<br>University of California, Los Angeles | *microRNA regulation of dendritogenesis during early development influences fear behavior in adulthood* |
| 02/20/2014 | Laura Volpicelli-Daley, Ph.D.<br>Assistant Professor<br>UAB | *How can novel models of alpha-synuclein aggregation advance our understanding of Parkinson Disease?* |
| 03/06/2014 | Scott Nawy, Ph.D.<br>Professor<br>Albert Einstein College of Medicine | *Plasticity in the retina: A tale of two synapses* |
| 03/13/2014 | Baljit S. Khakh, Ph.D.<br>Professor<br>David Geffen School of Medicine<br>UCLA | *Conditions and constraints for astrocyte calcium signaling in the hippocampal mossy fiber pathway* |
| 03/20/2014 | Karen O'Malley, Ph.D.<br>Professor<br>Washington University SOM | *Role of axon transport in experimental models of Parkinson's disease* |
| 04/03/2014 | Marc Diamond, M.D.<br>Professor<br>Washington Univeristy in St. Louis | *Tau as a prion: Implications for diagnosis and therapy of neurodegenerative diseases* |
| 04/10/2014 | Matthew Goldberg, Ph.D.<br>Assistant Professor<br>UT Southwestern | *Molecular Mechanisms of Mutations Linked to Familial Parkinson's Disease* |
| 04/24/2014 | Alice Chen-Plotkin, M.D.<br>Assistant Professor<br>Perelman SOM<br>University of Pennsylvania | *Big screens to find genes/proteins and where you go from there: Two examples in neurodegeneration* |

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| 07/14/2014 | Paul D. Smolen, Ph.D.<br>Assistant Professor, Research<br>University of Texas-Houston Medical School | *Computational Design of Enhanced Learning Protocols* |
| 09/25/2014 | Javier E. Stern, MD, PhD<br>Professor<br>Georgia Regents University | *Dendritic Peptide Release Mediates Interpopulation Crosstalk in the Hypothalamus* |
| 10/09/2014 | Joe Martinez, Ph.D.<br>Professor/Chair<br>University of Illinois, Chicago | *How the Brain Stores Information* |
| 10/16/2014 | Timothy Bredy, PhD<br>Assistant Professor<br>University of California, Irvine | *Neocortical 5-hydroxymethylcytosine and adaptive behavior* |
| 10/23/2014 | Craig Jahr, PhD<br>Senior Scientist<br>Oregon Health & Science University/Vollum Institute | *Are presynaptic NMDA receptors postsynaptic?* |
| 11/06/2014 | C. Savio Chan, PhD<br>Assistant Professor<br>Northwestern University Feinberg SOM | *Astrocytic dysfunction in mouse models of Parkinson's disease* |

# ARTICLES AND OTHER NEWS ITEMS

UAB News
Knowledge that will change your world

Innovation & Development

# Novel mechanism involved in memory discovered by UAB researchers

by Bob Shepard

**A protein that regulates memory may prove to be a therapeutic target for dementia and memory loss.**

Researchers at the **University of Alabama at Birmingham** report the discovery of a novel mechanism in the brain involved in the formation of memory and learning. In findings reported online this week in **Nature**, the research team describes the role of a histone subunit known as H2A.Z.

The discovery could have therapeutic ramifications for conditions including dementia, age-related memory loss or even post-traumatic stress disorder.

Histones are proteins that help regulate 24-hour memory formation in the hippocampus as well as longer memory formation in the cortex. The UAB

This acrylic on canvas artwork is an artistic interpretation of dynamic chromatin regulation in memory formation. Histones are the chief protein components of chromatin, which is a complex of molecules consisting of DNA and protein found in cells. The artist is the study's senior author, J. David Sweatt, Ph.D.

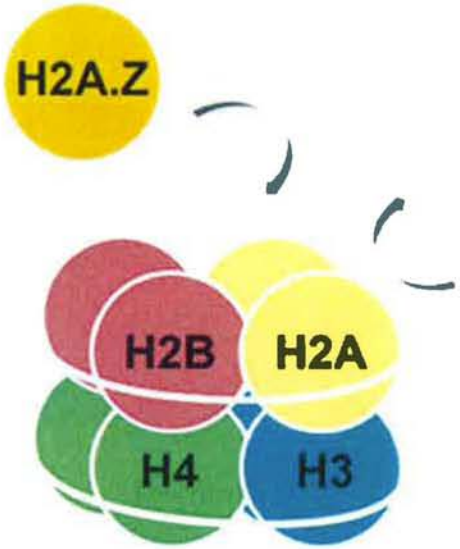
study of the subunit H2A.Z in mice was the first done in a complex mammalian model. Previous studies had been done only in simple cells such as yeast.

Histones band together in groups of eight to form a core protein required for memory formation. In a healthy individual, the histone subunit H2A.Z is not part of the core protein, but is exchanged for — or replaces — one of the other eight core histones at the time a memory is laid down in the hippocampus.

The UAB research team, led by J. David Sweatt, Ph.D., chair of the **Department of Neurobiology** and director of the **Evelyn F. McKnight Brain Institute**, removed H2A.Z in mouse models by means of a genetically engineered virus so that the subunit exchange could not take place. The mice then underwent threat recognition training, which allowed researchers to measure their memory response to a perceived threat over a 24-hour period.

To their surprise, memory improved in the animal models in which the H2A.Z exchange had not taken place.

"Memory improved with the absence of H2A.Z, which was unexpected, since we hypothesized that H2A.Z would be a necessary part of memory formation in normal situations," Sweatt said. "This gives us an intriguing new target for therapies for conditions involving memory loss or poor memory formation."




Sweatt says one possible next step would be the development of H2A.Z inhibitors that might be beneficial in cases of declining memory associated with aging or dementia. Other applications might include memory impairment related to intellectual disability.

The discovery that memory improved in the absence of H2A.Z, thought to be an integral part of memory formation, does beg the question of H2A.Z's responsibilities for normal memory formation. Sweatt speculates that H2A.Z plays a role in modulating

memory, serving as a sort of memory suppressor in cases of unpleasant or painful memories.

"It may be that its role is a type of buffer, to dampen negative memories so that they don't overwhelm us or lead to additional health problems such as post-traumatic stress disorder," Sweatt suggested. "In that eventuality, the ability to either inhibit or promote H2A.Z may play a valuable role in blocking or treating PTSD in the aftermath of traumatic experiences."

Funding for the study was provided by the **McKnight Brain Research Foundation**, the **National Institute for Mental Health** and the **Defense Advanced Research Projects Agency**.