



Symposium for Young Neuroscientists and Professors of the SouthEast

April 2, 2016

Presbyterian College, Clinton, South Carolina



SYNAPSE 2016

Saturday April 2, 2016

Presbyterian College, Clinton, SC

Location:	Registration and Lectures, Edmund Hall Posters and Workshops: Harrington-Peachtree Academic Center
7:30-8:25am	Poster Set-up (Odd numbers only) <i>Location: Harrington-Peachtree Academic Center</i>
7:30-8:25am	Registration, Coffee & Breakfast Breads <i>Location: Edmund Hall</i>
8:30-9:45am	Welcome & Opening Keynote Address <i>Location: Edmund Hall</i>
	Using the neuroscience of will power to treat addiction Peter W. Kalivas, PhD Distinguished University Professor and Chair of Neuroscience Medical University of South Carolina, Charleston, SC Webpage: http://academicdepartments.musc.edu/neuro-research/research/lab/kalivas/
9:45-10:30am	Student Platform Presentations – Session I <i>Location: Edmund Hall</i>
9:45-10:00am	Inhibition of SRC Family Kinases Prevents the Suppressive Effect of BDNF on Cocaine-seeking <i>Awardee Speaker:</i> Kelsey Laine Voisin Department of Biology, Program in Neuroscience, School of Math and Sciences, College of Charleston
10:00-10:15	Autotomization and Recovery in the Snapping Shrimp, <i>Alpheus angulosus</i> . <i>Awardee Speaker:</i> Patricia Cooney Department of Biology, Program in Neuroscience, College of Charleston
10:15-10:30	Looming stimuli evoke a turning escape response mediated by cerci in crickets <i>Awardee Speaker:</i> Aubrey A. Siebels Department of Biology, James Madison University
10:39-10:45am	Coffee Break <i>Location: Harrington-Peachtree Academic Center</i>

10:45-12:00pm	<p>Poster Session I (Odd numbers present) <i>Location: Harrington-Peachtree Academic Center</i></p>
12:00-12:30pm	<p>Lunch pickup <i>Location: Harrington-Peachtree Academic Center</i></p>
12:00-12:30pm	<p>Poster Session II Set-up (Even numbers only) <i>Location: Harrington-Peachtree Academic Center</i></p>
12:30-1:10pm	<p>Lunchtime Workshop Session I <i>Location: Harrington-Peachtree Academic Center</i></p> <p>Preparing for Graduate Study in Neuroscience <i>Keynote speakers: Dr. Peter Kalivas and Dr. Joe Palca</i> <i>Location: Bennett A. Brown Conference Suite - Amphitheater:</i></p> <p>Presbyterian College School of Pharmacy informational session <i>Dr. Nancy Goodbar and Mrs. Rachel Stelling (CPNP president)</i> <i>Location: Conference Room A</i></p> <p>SYNAPSE Steering Committee Meeting <i>Location: Conference Room B</i></p>
1:15-1:55pm	<p>Lunchtime Workshop Session II <i>Location: Harrington-Peachtree Academic Center</i></p> <p>Pharmacy Research Summer Intern program informational session <i>Dr. Alfonso Romero-Sandoval, Abigail Alvarado, M.S. Lab Manager at PCSP, Carolina Moracho-Vilrriales, former iPRSI intern</i> <i>Location: Bennett A. Brown Conference Suite - Amphitheater:</i></p> <p>Engaging High School Students in Neuroscience Research: Mentoring, Science Fairs & Brain Awareness Week <i>Dr. Corey Cleland & Dr. Beth Meyer-Bernstein</i> <i>Location: Conference Room A</i></p> <p>International Opportunities in Neuroscience – study abroad, internships, etc. <i>Students from College of Charleston</i> <i>Location: Conference Room B</i></p>
2:00-2:45pm	<p>Poster Session II (Even numbers present) <i>Location: Atrium, Rm 120, 2nd floor)</i></p>
2:45-3:00	<p>Coffee Break <i>Location: Harrington-Peachtree Academic Center</i></p>

3:15-3:45pm Student Platform Presentations – Session II

*Location: **Edmund Hall***

3:15-3:30am Investigating Functional Roles for Slitrk1 in Zebrafish Spinal Cord Development

Awardee Speaker: Morgan Shannon

Biology Department & Neuroscience Program, Davidson College

3:30-3:45am Cognitive Brain Training may Improve Your Mind, but it's no Magic Bullet

Awardee Speaker: Sarah Luca and Elliot Nauert

Department of Psychology, University of North Carolina, Asheville

3:45-4:45pm Closing Keynote Address

*Location: **Edmund Hall***

Why journalists know how the brain works even though scientists do not

Joe Palca, PhD

Science Correspondent

National Public Radio

Webpage: <http://www.npr.org/people/2101004/joe-palca>

Joe's Big Idea webpage: <http://www.npr.org/series/156490415/joes> big-idea



Using the neuroscience of will power to treat addiction

Peter W. Kalivas, Ph. D.

Distinguished Professor
Chair of Neuroscience
Medical University of South Carolina
Charleston, SC

Dr. Kalivas is a neuroscientist who studies the brain mechanisms of addiction. He has received many national and international awards such as the Daniel H Efron Award (American College of Neuropsychopharmacology, 1996), Washington State Sahlin Faculty Research Excellence Award (1996), and NIDA Merit Award for 2001-2011. Dr. Kalivas has been appointed to the National Advisory Council on Drug Abuse (2002), the NARSAD Scientific Advisory Board (2003), and the Chair of the NIDA Medications Development SAB (2005). He is also recognized by The American Journal on Addictions as a distinguished Basic Science Scholar (Am J Addict, 2005).

Dr. Kalivas' research focuses on neuroplasticity underlying the development of addiction to drugs of abuse in order to design pharmacotherapeutic treatments. His work focuses on the neurobiology of relapse and long-lasting changes in brain function as a consequence of the abuse, which leads to relapse seen in addiction. Current major projects in his lab focus on relapse through drug cues, circuits and synaptic changes produced by addictive drugs in the ventral pallidum, and possible use of N-acetylcysteine for regulation of intrusive thoughts in neuropsychiatric disorders, including cravings of addiction.



Why journalists know how the brain works even though scientists do not

Joe Palca, Ph. D.

Science Correspondent
Host of "Joe's Big Idea"
National Public Radio
Washington, DC

Joe Palca is a science correspondent for NPR. He has covered a range of science topics — everything from biomedical research to astronomy. He has been the recipient of many awards including the National Academies Communications Award, the Science-in-Society Award of the National Association of Science Writers, the American Chemical Society James T. Grady-James H. Stack Award for Interpreting Chemistry for the Public, the American Association for the Advancement of Science Journalism Prize, and the Victor Cohn Prize for Excellence in Medical Writing. He is the co-author of *Annoying: The Science of What Bugs Us* (Wiley, 2011).

Joe Palca received a Ph.D. in psychology from the University of California at Santa Cruz where he researched human sleep physiology. He comes from a journalism background as a health producer for CBS, a news editor for *Nature*, and a senior correspondent for *Science Magazine*. Joe Palca is currently focused on the eponymous NPR series, "Joe's Big Idea." The series explores the minds and motivations of scientists and inventors. Topics vary from physicists trying to find dark matter, to safer anthrax diagnostic tests, to gene editing in living cells.



Poster Session Abstract Titles

(Listed Alphabetically by Author)

1. ALVARADO-VAZQUEZ A, BERNAL L, PAIGE C, ROMERO-SANDOVAL EA
Induction of an M2 phenotype in human macrophages via CD163 gene induction using nanotechnology
Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy
2. ALVARADO-VAZQUEZ A, BORT-BUENO AC, ROMERO-SANDOVAL EA, ASBILL CS
Targeting the cannabinoid system in keratinocytes and fibroblasts to treat peripheral neuropathies. A preliminary in vitro approach.
Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy
3. BLANKENSHIP C, BURNS SC
Attachment in Sibling Pairs: When Close Bonds Lead to Co-Rumination
Presbyterian College
4. BORDELON A, ASKEW A
Persistence of Avoidance Behavior in Defeated Male Syrian Hamsters
Department of Psychology, Presbyterian College
5. BORDELON A, SPATTA B
Type D Attachment in Adolescents
Department of Psychology, Presbyterian College
6. BRUCE AA, GREGORY RA, FARRAND AQ, SCHNELLMANN RG, BOGER HA
5HT receptor-agonist-induced mitochondrial biogenesis as a novel treatment for Parkinson's disease
Department of Neuroscience and Center on Aging; Department of Drug Discovery and Biomedical Sciences, Medical University of South Carolina, Department of Psychology and Program of Neuroscience, College of Charleston
7. BRYSON EB, ASBILL CS
Analgesic Efficacy and Penetration of Compounded Topical Gabapentin Creams: Finding an Optimal Dose and Pre-Treatment Time.
Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy

8. CASEY BK, GOODMAN JI, WILHELM JC
Sensory Neuron Regeneration Occurs in a Sex-Dependent Manner After Complete Nerve Transection
Department of Biology, Program in Neuroscience, Department of Psychology, College of Charleston
9. CHICHESTER K, LUCA S, NAUERT E, KAUR A, & FOO P
Cognitive Brain Training may Improve Your Mind, but it's no Magic Bullet
Department of Psychology; Department of Biology, UNCA
10. CHRISTIE J, BONNAN A, OLIVOVA J
Purkinje Cell Specific ChR2 Expression
Max Planck Florida Institute for Neuroscience
11. COBB SM, DARRACOTT CA
Can Your Cognitive Style Influence Your Faith? Religiosity's Association with Cognitive Flexibility and Action Identification
Department of Psychology, Presbyterian College
12. COONEY PC, HUGHES M, KOREY CA
Autotomization and Recovery in the Snapping Shrimp, *Alpheus angulosus*
Department of Biology, Program in Neuroscience, College of Charleston
13. DARLING MT, BELSKI HM, STAHLMAN WD, WATERS RP
Exploring sociality of mice to model human psychopathology
Department of Biology; Department of Psychological Science, University of Mary Washington
14. DIAMOND ZM, BLACKWELL C
Combatting Joy of Destruction via Prosocial Behavior
Department of Biology and Program in Neuroscience; Department of Economics, College of Charleston
15. DRISCOLL G, CHOPKO R, BIRGBAUER E
The examination of autotaxin in the production of LPA as an axon guidance molecule in chicken retinal ganglion cells
Department of Biology, Winthrop University
16. FERREIRA DW, MORACHO-VILRIALES C, ALVARADO A, MORON CU, ROMERO-SANDOVAL EA
CD163 receptor in macrophages promotes a more efficient wound healing process: Potential therapy to reduce chronic pain.
Department of Pharmacology, University of São Paulo – Ribeirão Preto Medical School, Ribeirão Preto, Brazil, Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy
17. GARIMELLA H, JIN A, SMITH P
Structural and AFM Analyses of Alzheimer's Amyloid Beta Assembly
National Institutes of Health
18. GIBSON, AD; BOROUJERDI, AFB ; SEALEY, LA; BAGASRA, O
Metabolomics and Autism: Utilizing Neuroblastoma cells in exposure to fragrance to uncover biomarkers of autism spectra disorders
Department of Biology, Claflin University

19. GOODMAN, JI, CASEY, BK, WILHELM, JC
Effect of Estrogen Administration on Sensory Axon Regeneration Following Sciatic Nerve Transection
Department of Biology, Program in Neuroscience, Department of Psychology, College of Charleston
20. GROSICK RL, ALVARADO-VAZQUEZ PA, FERRERIA DW, ROMERO-SANDOVAL EA
CD163-overexpressing human macrophages and wound healing in a human full-thickness skin model
Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy
21. GUARD BG, BUFFALARI D
The Role of Acetylcholine During Expression of Amphetamine-Conditioned Place Preference in a Rat Model of Addiction
Department of Psychology, Westminster College
22. HALL C, WHITFIELD K, WRIGHTEN S
Prosocial behavior modulated by light-induced stress
Department of Biology, Francis Marion University
23. HANNA SW, BRENT JJ, MICHAELS JL
Singing as Therapy for Cognitive Communication Impairments
Departments of English and Psychology, Presbyterian College
24. HSU HH, BIRGBAUER E
Investigating the Role of an Lpar2 Variant (ChEST973j21) in Cellular Signaling in B103 Neuroblastoma Cells
Department of Biology, Winthrop University
25. ISAAC JS, BELANGER KH, UPRIGHT NA, RAMIREZ JJ
The Contribution of Septal Cholinergic Neurons to the Heterosynaptic Interaction with the Perforant Path in the Dentate Gyrus
Neuroscience Program, Davidson College
26. JENKINS JW, EL BEJJANI RE
The effect of Alzheimer's disease gene APP/apl-1 on neuron development
Davidson College
27. JORDAN K, WHITFIELD K, HALL C, KELIS D, WRIGHTEN SA
Evidence of Prosocial Behavior in Rats in a Mildly Stressful Situation
Francis Marion University
28. JOSEPH D, PUTZKE T, LÜBBERT M, SATTEFIELD R, KAMASAWA N, YOUNG JR. SM
Overexpression of the Cav2.1 $\alpha 1$ subunit and the effects on Cav2.1 voltage gated calcium channel numbers at Active Zone
Max Planck Florida Institute for Neuroscience
29. KELLIS DM, WRIGHTEN SA
Prior Experience is Insufficient for the Enhancement of Pro-social Behavior in Rats
Department of Biology, Francis Marion University

30. KIM EY, KIM AH
Detection of Chemical irritants by the earthworm, *Lumbricus Terrestris*
Wake Forest University
31. KNEELAND K, PAXTON R, SULLIVAN M, GENDLE M
Alcohol Use and Performance on the Iowa Gambling Task
Department of Psychology, Elon University
32. LEARY M, STEINECKE A, TANIGUCHI H
A comparison of intrinsic and transplanted Chandelier cells during cortical development in Mice
Max Planck Florida Institute for Neuroscience
33. LLOYD JJ, MCGONIGAL JT, NEWSOM RJ, GASS JT
Manipulation of alcohol related memories as a treatment for Alcohol Use Disorder
Department of Biology and Program in Neuroscience, College of Charleston; Department of Neurosciences, Medical University of South Carolina
34. MASON CL, HUGENSCHMIDT CE, SORIANO CT,
Impact of Improvised Dance on Balance for Patients with Dementia and Their Caregivers
Section on Gerontology and Geriatric Medicine, Wake Forest School of Medicine; Department of Theatre and Dance, Wake Forest University
35. MCDOUGLE MJ, BURNETT EJ, CHANDLER LJ
Effect of adolescent intermittent ethanol exposure on choline acetyltransferase expression
Department of Biology, College of Charleston; Department of Neuroscience, Medical University of South Carolina
36. MCKENDRICK GE, KINLEY-COOPER SK, KING BS, RUSCIO MG
Effects of Social Environment and Development on Estrogen Receptor Alpha Expression in a Monogamous Mouse Species: *Peromyscus californicus*
Department of Psychology and Program in Neuroscience, College of Charleston
37. MORACHO-VILRRIALES C, PRESTIA J, PRUITT III J, THREATT T, WAGNER S, ROMERO-SANDOVAL EA
Association of HbA1c and painful diabetic neuropathy in a rural area diabetic population of South Carolina
Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy
38. NASO C, LOM B
Three-Dimensional Visualization of Dopaminergic Neuron Clusters in *Xenopus laevis*
Department of Biology, Davidson College
39. OLIVOVA J, BONNAN A, CHISTIE J
Purkinje Cell Specific ChR2 Expression
Max Planck Florida Institute for Neuroscience
40. OU J, CLELAND CL
Escape response of Madagascar cockroaches (*Gromphadorhina portentosa*) to looming and localized heat stimuli
Department of Biology, James Madison University

41. POTHARAJU PP, UPRIGHT NA, RAMIREZ JJ
Effect Of Bilateral Entorhinal Cortex Lesions On Spatial Working Memory In Rats
Neuroscience Program, Davidson College
42. RICHARDSON KE, MICHAELS JL
Coaching Cues on Motivation and Athletic Performance
Department of Psychology, Presbyterian College
43. SASSER TK, SLEDGE RA, MOORE EJ, JOHNSON HL, KAPLAN ZS, QUICK CR, PAVELKA MN
Using IMPULSE in International Medical Undergraduate Education
The Honors College, Appalachian State University
44. SAWYER, LE, GALUSKA, CM
Regulation of Rats' Fluid Intake by Transitions in Food Reward
Department of Psychology and Program in Neuroscience, College of Charleston
45. SCHWARTZ DJ, SPENCER SM, ALLEN NP, SCOFIELD MD, KALIVAS PW
Development of a rodent model of $\Delta 9$ -Tetrahydrocannabinol Self-Administration
Department of Biology and Neuroscience Program, College of Charleston; Department of Neurosciences, Medical University of South Carolina
46. SHANNAHAN MS, KOHMAN RA
Therapeutic approaches to attenuate cognitive decline in an Alzheimer's disease model
Department of Psychology, Department of Biology, University of North Carolina at Wilmington
47. SHANNON M, STRICKLAND J, ROUND J, LOM B
Investigating Functional Roles for Slitrk1 in Zebrafish Spinal Cord Development
Biology Department & Neuroscience Program, Davidson College; Biology Department & Neuroscience Program, Ursinus College
48. SIEBELS AA, CHILDS AM, SCHMIDT JX, REIMAN KL, CLELAND CL
Looming stimuli evoke a turning escape response mediated by cerci in crickets
Department of Biology, James Madison University
49. SNAPP KS, SHULBACK AT, GENDLE MH
Relationship Between Total Cholesterol Levels and Performance on the Conners Continuous Performance Test II
Department of Psychology, Elon University
50. SPEAGLE M, BRUMMER D
Acute ethanol exposure decreases excitatory transmission in *Procambarus clarkii* (crayfish) neuromuscular junction
Department of Biology, Wake Forest University
51. STELLING R, PARTELOW J, ABEE A, SHARPE B, NASH K, GOODBAR N
Evaluating the frequency of appropriate metabolic monitoring in Hospital Inpatients on Second Generation Antipsychotics
Presbyterian College School of Pharmacy

52. THOMPSON B, HOLLIDAY E, CLEMENTS J
Perception of sleep habits on glycemic control among patients with type 2 diabetes mellitus at a rural-health family medicine clinic
Presbyterian College School of Pharmacy
53. TRAN N, YU J
Characterization of Rab10 Conditional Knock Out
Max Planck Florida Institute for Neuroscience
54. TROMP M, JACOB A, WILSON D, FITZPATRICK D
Maturation in Laminar Distribution of Inhibitory Neurons during Development
Department of Functional Architecture and Development of Cerebral Cortex, Max Planck Florida Institute for Neuroscience
55. UNROE KA, FRUCHTERMAN TC, FRANSSSEN CL, FRANSSSEN RA
Decision to Care for Offspring by Maternal Rats Determined by Processing in the Frontal Cortex, Amygdala, and whether a she is a “Good” or “Bad” Mom
Department of Biological and Environmental Sciences, Longwood University
56. VERDI G, SEAMON KM, CHRZAN CA, CARTER LC, SAMMONS KM, LEE J, SORIAGALVARRO JC, KABORE MN, CLELAND CL
Rat hindlimb nociceptive withdrawal response to heat and mechanical stimuli depends on the initial position of the paw but not stimulus location
Department of Biology, James Madison University
57. VOISIN KL, BARRY SM, MCGINTY JF
Inhibition of SRC Family Kinases Prevents the Suppressive Effect of BDNF on Cocaine-seeking
Department of Biology and Program in Neuroscience, College of Charleston; Department of Neurosciences, Medical University of South Carolina
58. VOLLMER K, PATEL N, RUSCIO M, KOREY C
Central Nervous System Neuroanatomy of the Snapping Shrimp, *Alpheus angulosus*: Towards a Model of Adult Neurogenesis
Department of Biology, Department of Psychology, Program in Neuroscience, College of Charleston
59. WILLIS D, ASKEW A
Retention of Conflict-Induced Avoidance Behavior in Male Syrian Hamsters
Department of Psychology, Presbyterian College
60. YOUNG L, STICKLE, M, WILLIAMS DC
The Role of Calcium in ROS-Mediated Neurodegeneration in *C. elegans*
Department of Biology, Coastal Carolina University



Poster Session Abstracts

(Listed Alphabetically by Author)

1. ALVARADO-VAZQUEZ A, BERNAL L, PAIGE C, ROMERO-SANDOVAL EA

Induction of an M2 phenotype in human macrophages via CD163 gene induction using nanotechnology

Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy

ABSTRACT:

Major and invasive surgeries are associated with a higher risk of developing chronic postoperative pain. We hypothesize that a more efficient wound healing process will reduce the risk of developing chronic postoperative pain following major surgeries. Previous studies have shown that alternatively activated macrophages (M2) are essential in the promotion of wound healing and the resolution of inflammation via CD163. We propose to use a nanotechnology-based approach for the induction of CD163 gene expression in human macrophages. We used THP-1 human macrophages stimulated with lipopolysaccharide (LPS, 1 µg/ml) or interleukin (IL)-6 (50 ng/ml). Macrophage transfections were performed with polyethylenimine (PEI) nanoparticles grafted with a mannose receptor ligand (mPEI). This nanoparticle has been successfully used in humans for other gene induction. Macrophages were incubated with mPEI complexed with CD163 plasmid or the empty vector for 24, 48 and 96 h. The levels of CD163 mRNA were assessed by q-PCR and the protein expression by immunocytochemistry and fluorescence microscopy. Since the mannose receptor is also a marker of alternatively activated macrophage, we also evaluated the protein expression of the mannose receptor (CD206). The mRNA levels of CD163 were increased from 48 to 96 h after plasmid transfection via mPEI nanoparticle in LPS and IL-6 stimulated macrophages. CD163 protein expression increased 48 h after transfection in both LPS and IL-6 challenged macrophages (70% and 66% respectively). The mannose receptor CD206 increased 72 h and 96 h after transfection in both LPS (90% and 79% respectively) and IL-6 (85% and 78% respectively) challenged macrophages. Our results indicate that mPEI nanoparticles are capable of inducing CD163 and CD206 expression in human macrophages. These data suggest that this technology could help to develop a translational approach to promote a more efficient wound healing and reduce the development of chronic postoperative pain following invasive surgeries with large tissue damage.

2. ALVARADO-VAZQUEZ A, BORT-BUENO AC, ROMERO-SANDOVAL EA, ASBILL CS

Targeting the cannabinoid system in keratinocytes and fibroblasts to treat peripheral neuropathies. A preliminary in vitro approach.

Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy

ABSTRACT:

Inflammatory chronic conditions such as psoriatic arthritis or peripheral neuropathies are frequently accompanied by chronic inflammatory and/or neuropathic pain. Persistent chronic inflammation and a subsequent peripheral neuronal hyperexcitability are factors that influence the promotion and maintenance of chronic pain. Endogenous and exogenous cannabinoids, through cannabinoid receptor type 2 (CB2) mostly expressed in the periphery, modulate the production of inflammatory

cytokines and chemokines. However, CB2 mediated effects have been mostly studied in immune cells. Little attention has been paid to skin cells such as keratinocytes and fibroblasts under inflammatory conditions. We hypothesize that CB2 activation will promote an anti-inflammatory phenotype in keratinocytes and fibroblasts. We determined the cytokine levels of primary human keratinocytes and fibroblast in culture following lipopolysaccharide (LPS) stimulation. Keratinocytes or fibroblasts were stimulated with 10 µg/mL or 5 µg/mL of LPS respectively. Supernatants were collected at 0, 4, 24, 48, 72 and 96 hours after LPS stimulation to measure interleukin (IL)-6, tumor necrosis factor-alpha (TNF-α), monocyte chemoattractant protein-1 (MCP-1), tumor growth factor-beta (TGF-β) and IL-10 by ELISA assays. We confirmed the mRNA expression of CB2 in both types of cells using qRT-PCR. We determined the effect of JHW015 (0.05, 0.1, 0.5 and 1 µM) on cytokine concentration in LPS-stimulated keratinocytes or fibroblasts at 24 hours. Following LPS stimulation keratinocytes and fibroblast displayed an increase in IL-6, MCP-1 and TGF-β. Levels of IL-10 and TNF-α were below the sensitivity of our ELISA kits. We observed an increase in CB2 mRNA levels following LPS stimulation. The addition of JHW015 in both keratinocytes and fibroblasts resulted in a decrease of IL-6 and MCP-1 and an increase in TGF-β levels in a dose-dependent manner. Our findings suggest that targeting CB2 receptors on keratinocytes and fibroblast could represent a therapeutic strategy to promote an anti-inflammatory milieu that results in a reduction of chronic inflammation, neuropathies and/or chronic pain.

3. BLANKENSHIP C, BURNS SC

Attachment in Sibling Pairs: When Close Bonds Lead to Co-Rumination

Presbyterian College

ABSTRACT:

Communication is an important part of life. Sharing feelings and opinions provides the basis for relationships with others. For twins and sibling pairs, talking in person or proximity seeking provides a way to serve each other as confidante and friend, especially in times of distress. However, having close attachment with someone, especially one's twin or one's sibling, could lead to problem talk, which is linked to co-rumination. Co-rumination is a tendency to repeatedly focus on negative or distressing issues in conversation and has been linked to depression. Because of their communal nature, girls are more likely to discuss problems with each other, resulting in a higher chance of co-rumination. To investigate this relationship, we will measure rates of different forms of communication, both in person and digitally, and compare these rates to a scale of co-rumination. We hypothesize that girl twins will have higher rates of proximity seeking, and that these individuals will co-ruminate more than any other sibling pairs, but also that twins communicate and co-ruminate more than regular sibling pairs.

4. BORDELON A, ASKEW A

Persistence of Avoidance Behavior in Defeated Male Syrian Hamsters

Department of Psychology, Presbyterian College

ABSTRACT:

Social conflict is the struggle for power between two or more opposing individuals in an agonistic interaction. Defeat in a social context tends to lead to negative psychological and physiological effects. Syrian hamsters are solitary animals and tend to attack and rapidly defeat intruders, and therefore, serve as appropriate animal models for social conflict. Our lab employs a modified passive avoidance apparatus—Conflict Alleyway; this apparatus uses low-power lasers and photodetectors to determine the average distance a hamster maintains from its dominant opponent. The purpose of Experiment 1 was to investigate the permanence of learned avoidance. We found that subjects failed to demonstrate avoidance of the dominant opponent 75 days after defeat. The purpose of Experiment 2 was to investigate whether avoidance would persist 7 days after defeat. Results indicated that 42% of the animals continued to exhibit avoidance behavior 7 days after defeat. Our findings suggest that post-defeat avoidance in male Syrian hamsters is not a long-lasting phenomenon.

5. BORDELON A, SPATTA B

Type D Attachment in Adolescents

Department of Psychology, Presbyterian College

ABSTRACT:

This research study used self-report questionnaire data, obtained from 78 students (51 females and 27 males) in the CHAMPS program, to investigate the effect of Fear Induction (a parenting style) on Indecision (an indicator of Type D attachment). The hypothesis that adolescents (age range: 11-16 years old) who report Fear-Inducing parenting will also report high levels Indecision (an indicator of Type D attachment) was examined. The mean reported level of Indecision for males (1.55) is higher than for females (1.50). In addition, the mean reported level of Fear Induction is higher for females (1.63) than for males (1.56), and the standard deviation for this measure is higher for females (.78) than for the males (.60). Correlational analyses indicated a significant, positive relationship between Fear Induction and Indecision. These findings provide support for the hypothesis that the child's perception of the caregiver as frightening or "Fear-Inducing" leads to increased levels of Indecision. This significant, positive correlation also lends further support to the idea that these measures serve as a valid assessment of Type D attachment in adolescents.

6. BRUCE AA, GREGORY RA, FARRAND AQ, SCHNELLMANN RG, BOGER HA

5HT receptor-agonist-induced mitochondrial biogenesis as a novel treatment for Parkinson's disease

Department of Neuroscience and Center on Aging; Department of Drug Discovery and Biomedical Sciences, Medical University of South Carolina, Department of Psychology and Program of Neuroscience, College of Charleston

ABSTRACT:

Parkinson's disease (PD) is a progressive neurodegenerative illness that causes debilitating motor and cognitive impairments due to degeneration of dopaminergic (DA) neurons in the substantia nigra (SN). Current approved treatments for PD do little to inhibit its progression and often include detrimental side effects. A recent avenue in PD research has focused on mitochondrial function, which is critical for effective neuronal development, survival, and communication. It has been shown that mitochondrial dysfunction contributes to SN-DA degeneration in PD. Previous studies have demonstrated therapeutic potential for two serotonin (5HT) receptor agonists, Lasmitidan and LY344864, that induce mitochondrial biogenesis. We hypothesized that treatment with these 5HT agonists in mice would slow or even halt the progression of PD-related locomotor deficits and DA neuron degeneration. Mice were administered bilateral intrastriatal injections of 6-OHDA lesions to simulate PD, or saline. Two weeks after lesion inducement, motor activity was assessed and the mice began a treatment regimen of either saline, Lasmitidan, or LY344864. Following two weeks of drug treatment, locomotor activity was reassessed. The brains were dissected for immunohistochemical assessment of nigrostriatal DA using tyrosine hydroxylase (TH). As previously cited in the literature, 6-OHDA resulted in a significant reduction in locomotor activity. The subsequent administration of LY344864 resulted in an increase in locomotion in 6-OHDA mice, compared to saline-injected 6-OHDA mice. TH-immunoreactivity is currently being analyzed by densitometry measurements in the dorsal striatum and unbiased stereological cell counting in the SN to determine any other effects from the drug treatments. Data from this study could provide insight into the beneficial effects of 5HT receptor agonists as a potential therapeutic for PD.

7. BRYSON EB, ASBILL CS

Analgesic Efficacy and Penetration of Compounded Topical Gabapentin Creams: Finding an Optimal Dose and Pre-Treatment Time.

Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy

ABSTRACT:

Chronic pain affects greater than 116 million Americans. Even with the best pain management approaches, many chronic pain patients still suffer from moderate to severe pain. An alternative therapy to treat chronic pain includes compounded topical formulations of common analgesics. Compounded dosage forms of gabapentin are commonly used for pain management. Although widely utilized, the penetration and efficacy of gabapentin in these compounded topical formulations have not been fully studied. The transdermal penetration of gabapentin was studied in Franz diffusion cells using porcine skin. Gabapentin was compounded in two commercially available bases; Lipobase, Lipoderm, and a standard poloxamer lecithin organogel (PLO). For the in vivo studies, adult male Syrian hamsters were acclimated to Plexiglas boxes for three sessions prior to test day. 1%, 5%, or 10% gabapentin formulated in Lipoderm was used for the animal studies. Following application of 0.5 mL of compounded gabapentin at the appropriate pre-treatment time, animals were briefly and lightly anesthetized with isoflurane and 1% formalin in 40 mL was administered subcutaneously in the treated hindpaw. The amount of time spent flinching, licking and elevating the hindpaw was counted in 1-minute bins for 40 minutes. In addition, behavior during each minute was qualitatively assessed. The most rapid and greatest penetration and retention of gabapentin in the skin for the in vitro study occurred with a PLO base (Skin penetration for gabapentin formulated with PLO base at Q24 was $(211.93 \text{ mcg/cm}^2/\text{hr} \pm 288.25)$). Skin retention with PLO base was $(179.34 \text{ mcg/gram skin} \pm 149.72)$. Gabapentin's ability to attenuate pain in the in vivo model was dependent upon concentration and pre-treatment time. The compounded formulation that most significantly attenuated pain was the gabapentin 5% Lipoderm cream applied 30 minutes prior to formalin administration. Gabapentin is routinely compounded to treat chronic neuropathic pain, yet few studies exist that examine its topical efficacy and safety. Our studies demonstrated that the permeability of gabapentin through porcine skin is relatively low, but there is a high retention of gabapentin in the porcine skin tissues. Our studies demonstrate that topically applied pain medications may be an efficacious alternative for those suffering from chronic pain.

8. CASEY BK, GOODMAN JI, WILHELM JC

Sensory Neuron Regeneration Occurs in a Sex-Dependent Manner After Complete Nerve Transection

Department of Biology, Program in Neuroscience, Department of Psychology, College of Charleston

ABSTRACT:

Each year, peripheral nerve injury impacts thousands of people. Presently, treatment options are limited and functional recovery is rarely achieved. The regeneration of motoneurons has been studied extensively, while the regenerative efforts of sensory neurons remains largely unknown. To determine the extent of sensory axon regeneration, male and female mice underwent a complete nerve transection, in which the right common fibular branch of the sciatic nerve was severed and repaired using a fibrin glue. Two weeks following the initial sciatic nerve injury, sensory neurons whose axons had regenerated a minimum of 1500 μm distal to the original cut sites were labeled with a fluorescent retrograde tracer. The degree of regeneration was quantified by counting and measuring each of the fluorescent labeled sensory neurons in the lumbar region of the spinal cord using CellSens and ImageJ software after tissue harvest. Experimental findings have revealed that although there is no difference in the number of sensory neurons that participate in regeneration between sexes, females demonstrate regeneration of larger cells than males. These findings suggest a sex-dependent variation in the types of sensory neurons regenerating and implicate sex steroid involvement in afferent axon regeneration.

9. CHICHESTER K, LUCA S, NAUERT E, KAUR A, & FOO P
Cognitive Brain Training may Improve Your Mind, but it's no Magic Bullet
Department of Psychology; Department of Biology, UNCA

ABSTRACT:

In January of 2016, the creators and marketers of the Lumosity “brain training” program agreed to settle Federal Trade Commission charges alleging that they deceived consumers with unfounded claims regarding the effectiveness of their program. Specifically, Lumosity claimed that their proprietary cognitive training would 1) improve performance on everyday tasks, in school, at work, and in athletics; 2) delay age-related cognitive decline and protect against mild cognitive impairment, dementia, and Alzheimer’s disease; and 3) reduce cognitive impairment associated with health conditions, including stroke, traumatic brain injury, PTSD, ADHD, the side effects of chemotherapy, and that scientific studies proved these benefits. In this poster we report the latest results in our ongoing study designed to evaluate the effectiveness of Lumosity. We compare it to other cognitively challenging tasks in building transferable cognitive skills such as inductive and deductive reasoning which are key components to fluid intelligence and thus success in the classroom. Our study recruited approximately 100 student participants aged 18-24, sorted into 1 of 5 groups: No Contact Control, Alternate Task Control (Sudoku puzzles), Crystallized Intelligence Control (Trivia), Flexibility-Focused Lumosity Experimental, and Memory-Focused Lumosity Experimental. Participants completed “workouts” for cognitive improvement 3-5 times per week for 20 minutes, as recommended by Lumosity experts. One-way ANOVA analysis of Pre and post-test measures of flexibility, memory and fluid intelligence suggest that cognitive training may improve performance on these measures, but not to the level of statistical significance. Our findings are consistent with scientific evidence cited by the FTC in their multi-million dollar settlement, and may provide a model of civic-engagement in neuroscience education at the undergraduate level.

10. CHRISTIE J, BONNAN A, OLIVOVA J
Purkinje Cell Specific ChR2 Expression
Max Planck Florida Institute for Neuroscience

ABSTRACT:

The cerebellum is a key brain structure involved in motor learning: the process by which we acquire precise, coordinated movements. The Purkinje cells (PC), which are the only output neurons from the cerebellum, are thought to be central to this process. The main theory of cerebellar-dependent motor learning, developed by Marr, Albus and Ito in the 70s speculates that climbing fiber (CF) inputs carry an instructive signal to PC that induces long-term plasticity at the parallel fiber (PF) to PC synapse. But since this early theory, many forms of plasticity have been shown in vitro in the cerebellum as well as downstream of it, in the brainstem and how and where are motor memories formed in this circuit is still unclear. To gain insights into the role of PC during this process, we want to bypass the climbing fiber input by directly stimulating the PC during behavior, and see the effects on motor learning. This requires to be able to target specifically PC. For this, we took advantage of the cre-lox recombination system. Because the Purkinje cell protein-2 (Pcp2) is highly expressed in PC, we used different version of the pcp2/L7 promoter to express the cre gene (either in transgenic mice or in wild-type mice through viral delivery) and combined it with virus injection of adeno-associated virus (AAV) containing a flexed ChR2 in the vermis and the flocculus. Subsequently, we checked for specificity of expression as well as for subcellular localization of expression using immuno-histochemistry and confocal fluorescence microscopy.

11. COBB SM, DARRACOTT CA

Can Your Cognitive Style Influence Your Faith? Religiosity's Association with Cognitive Flexibility and Action Identification

Department of Psychology, Presbyterian College

ABSTRACT:

Religious belief is associated with health benefits and increased lifespan. However, it remains largely unknown why this association exists. We propose that these effects are related to unique cognitive processing styles linked to religiosity. In our study, we examined how cognitive flexibility and action identification level differ based on a person's spirituality and faith strength. Using a quasi-experimental design, we grouped participants based on whether they had a low or high cognitive flexibility and a low or high action identification. We found that cognitive flexibility and action identification are related processes. Cognitive flexibility seems to have a stronger relationship with religiosity than action identification. Higher cognitive flexibility is related to stronger spirituality and stronger faith. In addition, we found that both higher cognitive flexibility and higher action identification are linked to greater intrinsic motivation to pursue faith. These results demonstrate that religiosity is associated with specific cognitive processing styles.

12. COONEY PC, HUGHES M, KOREY CA

Autotomization and Recovery in the Snapping Shrimp, *Alpheus angulosus*

Department of Biology, Program in Neuroscience, College of Charleston

ABSTRACT:

The snapping shrimp (*Alpheus* spp.) exhibit extreme claw lateralization, presenting a large snapper and a small pincer, which are used for different behaviors. Like most crustaceans, the snapping shrimp is able to autotomize, or drop, limbs when threatened, and through subsequent molts, regenerate the lost limb. Though autotomy is costly in terms of loss of function and limb re-growth, failing to autotomize a limb could be deadly. Through previous work regarding post-autotomy claw transformation in *Alpheus angulosus*, we found that regeneration of external claw morphology occurs rapidly, restoring snap behavior after the first molt despite reduced claw size. Our previous analysis of post-autotomy sensory plasticity exhibits appearance and proliferation of a new setae type by molt two of transformation, suggesting that sensory setae follow behind snapping functionality and may be less important for shrimp fitness. In this study, we examine variation in "drop latency", or the latency to autotomize the snapper claw in response to a standardized physical threat. We measured drop latency of mature snapper claws in a large cohort of shrimp (n=72). We found autotomy to be based on threat type rather than threat duration among all shrimp. Specifically, autotomy occurrences were distributed in clusters around threat intensity changes, rather than normally distributed throughout threat time. We also found significantly longer drop latency in males, suggesting a greater cost of mature snapper autotomy to males than females, (p=0.002). After initial snapper autotomy, we also measured latency to autotomize the regenerating claw based on molt stage. Surprisingly, despite return of sensory setae and external morphology regeneration during the molt stages observed, all molt stages exhibited shorter drop latency than mature snapper autotomy (p=0.008). Through these perspectives, we will present the evolutionary costs of autotomy and plasticity in the snapping shrimp.

13. DARLING MT, BELSKI HM, STAHLMAN WD, WATERS RP

Exploring sociality of mice to model human psychopathology

Department of Biology; Department of Psychological Science, University of Mary Washington

ABSTRACT:

Mice form social hierarchies, in which higher-ranking (dominant) animals display aggressive behavior toward lower-ranking (subordinate) animals. These social interactions are intensely stressful, and have profound effects on the physiological and behavioral state of both the dominant

and subordinate individuals. These often resemble the symptoms of human stress related pathology (e.g. depression, PTSD, addiction), and so multiple laboratory paradigms utilize social stress in mice to model these disorders. However, many of these paradigms fall short with respect to ethological and ecological validity. They typically use short-term interactions between animals and/or heavily weighted interactions, which do not correspond to mouse social interactions in nature, nor to the social situations that often contribute to human pathology. To address this deficit, we have developed a social model of mouse behavior, in which we assess the physiological and behavioral traits associated with the formation of dominance hierarchies, the fluidity of these hierarchical systems, and the relations between hierarchical rank and physiology/behavior. Our current paradigm utilizes classical methods to assess behavior (e.g., home cage videotaping and the tube test), and we will incorporate novel tools (i.e., radio-frequency identification tags and automated animal sorting) that increase the integrity and resolution of our behavioral analysis. We also collect feces and tissue samples to assess physiological systems that are associated with social behavior. We present our findings from an initial study using classical methods to characterize and integrate dominance rank (a serial tube test and urine deposition), home cage behavior (video scoring), and physiological measures associated with social dominance (fecal testosterone and corticosterone).

14. DIAMOND ZM, BLACKWELL C

Combating Joy of Destruction via Prosocial Behavior

Department of Biology and Program in Neuroscience; Department of Economics, College of Charleston

ABSTRACT:

Oxytocin, that has long been associated with morality, is a mammalian hormone associated with bonding and parental care. Recently, the effects of oxytocin have been implicated in neuroeconomic game theory. For example, oxytocin administration has been shown to increase the amount of money participants give to one another in the economics paradigm, Dictator Game. In addition, interpersonal touch, such as hugging, may result in the neural release of oxytocin. While oxytocin's ability to increase moral inclinations has been studied, its ability to negate malicious impulses has yet to be examined. This study seeks to combat innate antisocial behavior via hugging and its prosocial implications. In previous studies, economics mini-game, Joy of Destruction (JoD), showed that participants will eliminate a portion of another subject's monetary reward despite there being no obvious motivation to do so. This behavior is cited as evidence for innate spiteful tendencies. In this study, undergraduates participated in JoD twice: once having hugged prior, and once without hugging. In addition, Big Five Inventory (BFI) and Machiavelli (Mach-IV) personality tests were given to determine which personality types may be more inclined to act spitefully. Preliminary data showed that participants took more money away in JoD when they did not hug before; however, these data were not significant. Additionally, there was a weak positive correlation between Mach-IV score and amount of money taken in JoD. These results suggest that an individual's potential to make spiteful financial decisions may be quantifiable. However, engaging in prosocial activity may not reduce this potential. This research helps expand the small, but growing literature in neuroeconomics by looking at how oxytocin may moderate non-incentivized, malevolent behavior. The notion of regulating antisociality with prosociality may have broad implications for economics, sociology and even the study of crime.

15. DRISCOLL G, CHOPKO R, BIRGBAUER E

The examination of autotaxin in the production of LPA as an axon guidance molecule in chicken retinal ganglion cells

Department of Biology, Winthrop University

ABSTRACT:

Growth cones direct axon pathfinding during neurological development. The finger-like projections do this by detecting environmental stimuli, which are referred to as axon guidance molecules. Lysophosphatidic acid (LPA) is produced by the enzyme autotaxin (ATX) and has been demonstrated

to cause growth cone collapse in vitro. ATX has been found in the mid-forebrain boundary of the embryonic chick brain, a target region for retinal axons. To understand LPA's role in axon guidance, we injected a virus expressing an siRNA agent for ATX into chick brains prior to retinal axon innervation at day three of development (E3), and then examined retinal axon guidance to the target, the optic tectum, at E12. Through viral expression of the siRNA, the mRNA transcript of ATX is silenced, thereby depleting the production of enzyme and its subsequent product, LPA. Using a control virus that does not silence ATX, and thus not inhibit LPA production, preliminary data demonstrate normal retinal axon development and pathfinding to the optic tectum. Examination of optic tecti with the ATX/siRNA virus under fluorescence and confocal microscopy will allow us to investigate whether LPA acts as an axon guidance molecule for retinal axons at the tectum.

16. FERREIRA DW, MORACHO-VILRIALES C, ALVARADO A, MORON CU, ROMERO-SANDOVAL EA
CD163 receptor in macrophages promotes a more efficient wound healing process: Potential therapy to reduce chronic pain.

Department of Pharmacology, University of São Paulo – Ribeirão Preto Medical School, Ribeirão Preto, Brazil, Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy

ABSTRACT:

Up to 50% of the patients that undergo major surgeries develop chronic postoperative pain, while 10% of patients with minor surgeries develop this type of chronic pain. Peripheral neuroimmune interactions play an important role in the development of pain and wound healing process after surgery. We hypothesize that the over-expression of the scavenger receptor gene CD163 in human macrophages will promote an M2 cellular phenotype that will result in the resolution of inflammation and a more efficient wound healing process. We will test this hypothesis following these aims: 1) Induce CD163 in macrophages using a nanoparticle that target these cells specifically; 2) Promote a more efficient wound healing process with CD163 overexpressing macrophages using an in vitro assay; and 3) Determine that the observed effects are achieved specifically by the overexpression of CD163. The purpose of this study is to develop a cell-directed gene therapy using nanotechnology. The nanoparticle mPEI was used for gene transfections. CD163 mRNA induction was confirmed using qRT-PCR. We used an in vitro wound healing scratch assay with primary human keratinocytes and fibroblasts co-cultured with macrophages overexpressing CD163 (or control groups) in the presence or absence of antibodies, anti-CD163 antibody [RM3/1] or its isotype control IgG1. Microscopy and imaging analysis were performed. The specificity of the antibody and the increased expression of CD163 at the protein level in macrophages were determined by immunohistochemistry and immunofluorescence microscopy. We have previously shown that the induction of CD163 in macrophages successfully promotes an anti-inflammatory phenotype. We confirmed the over-expression of CD163 in macrophages (mRNA and protein). Using an in vitro scratch assay we also observed that CD163 overexpressing macrophages promoted a more rapid and efficient wound healing process through a unique interaction with fibroblasts. The addition of CD163-blocking antibody, but not isotype control, blocked the efficient wound healing process induced by CD163-overexpressing macrophages. CD163 seems to play a critical role in the resolution of inflammation, as well as in the induction of wound healing by promoting an anti-inflammatory phenotype in macrophages. We further postulate that this approach could promote a more efficient wound healing process following major surgeries, which would reduce the incidence of chronic postoperative pain.

17. GARIMELLA H, JIN A, SMITH P

Structural and AFM Analyses of Alzheimer's Amyloid Beta Assembly

National Institutes of Health

ABSTRACT:

Alzheimer's disease affects more than 5 million people, in the U.S. alone, and it is the sixth -leading cause of death. It cannot yet be cured, prevented, or slowed.]. Amyloid β protein is known to be associated with Alzheimer's, as large deposits of it were found in the brain of patients with Alzheimer's. Thousands of monomers of the amyloid β build up exponentially in the brain, forming fibers. The problem lies in the fact that the pathogenicity of the amyloid β , or how it exactly causes Alzheimer's, is unknown. The current hypothesis established by scientists is that the tangle in the fibers, called plaques, causes Alzheimer's. However, there is another belief, though not as well known, that the true culprit is the small soluble oligomers, that makeup the polymers, with protein conformational changes from random coil to alpha-helix, and to beta-sheets. The atomic force microscopy (AFM), which provides high resolution 3D visualization at the nanoscale, is used in the study. The machine is used to identify and record protein oligomers' conformational changes and shape in vitro, at all stages of the polymerization of the amyloid β , that correlate to the loss of axon function in Alzheimer's. It offers both qualitative and quantitative information on many physical properties including size, morphology, surface texture and roughness, stiffness, surface area, volume distributions, etc. Software-based image processing of AFM data through Nanoscope and ImagemJ can generate size distribution of the fibers, diameter, length, etc. We aim to combine our studies with dynamic light scattering, mathematical modeling, optical Imaging, raman and fluorescence spectroscopy, and theoretical analysis to identify the mechanics of the protein oligomers in vitro. The structural biology and mechanics of protein assembly of the amyloid β protein can be outlined through the AFM, which will give us insight into its pathogenicity. The study of the amyloidosis of amyloid β is central to the pathology of Alzheimer's. It is necessary to understand on a macromolecular level what triggers the complex folding mechanisms and shifts the equilibrium from functional to pathological isoforms of proteins. By doing so we will be able to be able to map out the pathway of amyloid β and inhibit the protein assembly.

18. GIBSON, AD; BOROUJERDI, AFB ; SEALEY, LA; BAGASRA, O

Metabolomics and Autism: Utilizing Neuroblastoma cells in exposure to fragrance to uncover biomarkers of autism spectra disorders

Department of Biology, Claflin University

ABSTRACT:

Autism and Autism Spectral Disorder (ASD) are terms for a group of complex brain development disorders that affect about 1% of the worldwide population; however, in the United States, 1 in 68 births are affected (1.5%), a difference that could point to the advanced detection methods used in the U.S. Furthermore, the prevalence of autism and ASD in U.S. children has increased dramatically over the past decade, making it the fastest growing developmental disability. Both disorders can be caused by genetic and environmental factors; however, due to the increasing rate of occurrence, the focus of many studies has been on possible environmental causes of the disorders. Recent research has indicated that fragrances can affect brain development during the gestational period. The goals of this study were to identify and quantify the metabolites in neuroblastoma cells, observe how these metabolites change in response to stress, and observe how these changes can contribute to autism in children. We used neuroblastoma cells to observe changes in metabolism due to the stress of an applied fragrance. Four cell lines, two male and two female, of neuroblastoma cells were cultured, extracted at 90% confluent, solvent removed, rehydrated, centrifuged, and analyzed. All cell lines were stressed with the same fragrance at femtomolar concentration and then their metabolic profiles compared to their control counterparts. Polar metabolites were extracted from the cells and analyzed using NMR spectroscopy. Of the different amino acids that were identified, four of them (alanine, aspartate, glutamate and phenylalanine) were significantly higher in concentration in both

the stressed male and stressed female cell lines. Based on previously reported research done on autism disorders, similar increases in concentrations of these four amino acids have been observed in autistic children.

19. GOODMAN, JI, CASEY, BK, WILHELM, JC

Effect of Estrogen Administration on Sensory Axon Regeneration Following Sciatic Nerve Transection

Department of Biology, Program in Neuroscience, Department of Psychology, College of Charleston

ABSTRACT:

Peripheral nerve injuries affect thousands of people annually and dysregulate the normal function of sensory and motoneurons. Available treatment options are insufficient, and functional recovery is often inadequate. Past studies demonstrate treadmill training increases motoneuron participation during axon regeneration in a sex-dependent manner. Administration of estrogen receptor antagonist ICI-182,780 blocks the effect of treadmill training, indicating that estrogen signaling plays a crucial role in mediating this observed enhancement of regeneration. In the present study, we expanded our investigation into the effect of estrogen administration on regenerating sensory afferents of the peripheral nervous system (PNS). In male and female wild type mice we transected the right common fibular branch of the sciatic nerve and repaired it with fibrin glue. Immediately following nerve transection, mice were treated with subcutaneously implanted sustained-release systemic estrogen-filled or blank control silastic capsules. Fourteen days post-transection, sensory neurons in the dorsal root ganglia whose axons had regenerated a minimum of 1500 μm distal to the original cut site were labeled with a retrograde tracer. Regeneration was quantified by counting and measuring the number of fluorescent labeled sensory neurons in the dorsal root ganglia of the spinal cord. We did not find a significant difference in sensory axon regeneration between mice treated with exogenous estrogen and control subjects. Although our data did not demonstrate that estrogen administration enhances regeneration of sensory axons of the PNS after nerve cut injury, high variability in our data warrants a repeat experiment with a larger sample size to find any real differences if they do exist.

20. GROSICK RL, ALVARADO-VAZQUEZ PA, FERRERIA DW, ROMERO-SANDOVAL EA

CD163-overexpressing human macrophages and wound healing in a human full-thickness skin model

Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy

ABSTRACT:

Patients with chronic inflammatory disorders, such as chronic postoperative pain, rheumatoid arthritis or diabetes, may display deficiencies in tissue repair that lead to neuropathies and/or chronic pain. Wound healing is a multifaceted process in which cells repair layers of tissues after being damaged. Macrophages are instrumental in tissue repair, as well as the onset and resolution of inflammation. Disruptions in the transition of macrophages from pro- (M1) to anti-inflammatory (M2) can cause a significant delay in the resolution of inflammation and wound healing. Macrophages overexpressing CD163 adopt an M2 phenotype by increasing the concentration of anti-inflammatory cytokines. However, this CD163-induced anti-inflammatory phenotype in macrophages may alter the interaction with skin cells and the wound healing process. We hypothesize that macrophages overexpressing CD163 will not delay the wound healing process. In the present study, we used human THP-1 macrophages and a 3D organotypic full-thickness human tissue. Organotypic tissues (MatTek) provided a 3D model that contains functional keratinocytes in the epidermis and fibroblasts in the dermis, and come with a standardized wound. THP-1 macrophages were added to wounded organotypic tissues after their transfection with mannosylated polyethylenimine (mPEI) complexed with a plasmid that encodes CD163 (pCD163) or an empty vector as negative control (pEmpty). Histological studies using hematoxylin and eosin stain were performed at basal time points (day 0, tissue with no macrophages) and 1 and 3 days after the addition of macrophages (n=3-

4 tissues/group). The length of re-epithelialization, the percent wound closure, and cellularity of the newly formed epithelium were measured in microscopic images taken from 3 slices per tissue. Our results show that macrophages overexpressing CD163 neither affected the percent of wound closure nor the length of the re-epithelialized tissue. However, CD163 overexpression induced an increase in the cellularity of the re-epithelialized tissues. Our findings establish a groundwork to test the effects of macrophages overexpressing CD163 in an in vivo wound healing model. Due to the high translational value of our approach, we anticipate that this cell-directed gene therapy could result in a therapeutic option for chronic pain and/or neuropathies associated with chronic inflammatory processes.

21. GUARD BG, BUFFALARI D

The Role of Acetylcholine During Expression of Amphetamine-Conditioned Place Preference in a Rat Model of Addiction

Department of Psychology, Westminster College

ABSTRACT:

The purpose of this study was to investigate the relationship between acetylcholine and the expression of addictive behavior using rats as an animal model. It has been shown previously that acetylcholine and muscarinic receptors may be responsible for the learned behaviors associated with addiction. The rats were conditioned using amphetamine (AMPH, 1.5mg/kg/mL) in a conditioned place preference paradigm, then tested for successful positive drug-pairing. The subjects were retested after being given an injection of atropine either systemically (10 mg/kg/mL) or intracranially (10 µg/kg/µL). It was hypothesized that the subjects would form a drug-paired association using AMPH, but the expression of that association would be subsequently blocked through atropine administration. The first hypothesis was supported ($p < 0.01$), but the atropine was found to have no effect on the expression of the conditioning ($p = 0.520$). There was found not to be a role of acetylcholine in addictive behavior, but there is a possibility it has a role on a receptor level. This will be explored using a behavioral sensitization paradigm followed by subject sacrifice immediately following a final injection of AMPH and immunohistological studies of the cholinergic neurons in subject tissue. Results are to follow.

22. HALL C, WHITFIELD K, WRIGHTEN S

Prosocial behavior modulated by light-induced stress

Department of Biology, Francis Marion University

ABSTRACT:

Prosocial behavior is thought to stem from the expression of empathy and in rats specifically, their ability to exhibit emotional contagion. Previous experiments aimed at testing the prosocial abilities of rats have indeed produced significant results supporting this idea. In our present study, the goal was to determine if the presence of an additional stressor, specifically light, would significantly impact the prosocial behavior of the rats tested. In order to do so, pairs of adult female rats were tested utilizing a paradigm in which one rat was placed inside a restrainer with a lever operated door and one rat was allowed to be free within an arena that contained the restrainer. This same experiment, with the addition of a light, was carried out on different pairs of adult female rats. The experiments were conducted for twenty minutes a day for twenty days. At the end of the twenty days the data for specific behaviors of interest were compared between the two conditions. The behaviors of interest included the number of times grooming behavior was exhibited by the free rat, the number of contacts between the two rats once the restrained rat was released from the restrainer and the number of times the free rat contacted the occupied restrainer. The presence of light showed significant differences in the reported. More specifically, free rats in the light condition showed significantly more grooming behaviors than free rats in the no-light condition. There was also a significant difference in the number of contacts between the rats in the light and no-light condition, with the greater number of contacts occurring in the no-light condition. Additionally, there was a

significant difference in the number of contacts with the occupied restrainer. The free rats in the light condition contacted the occupied restrainer significantly more than the free rats of the no-light condition. The comparison of the experimental paradigm under these two conditions confirmed the hypotheses and showed that stress did indeed modulate prosocial behaviors in the rats.

23. HANNA SW, BRENT JJ, MICHAELS JL

Singing as Therapy for Cognitive Communication Impairments

Departments of English and Psychology, Presbyterian College

ABSTRACT:

The purpose of this study was to test the efficacy of singing as a form of speech therapy treatment in helping patients with Cognitive Communication Impairments (CCI) overcome and cope with communication handicaps as a result of common geriatric issues, such as dementia and stroke-induced aphasia. This study examines the extent to which singing in therapy improves a patient's mood, his or her communication and comprehension abilities, and his or her level of interest in therapy. The hypothesis for this study states that geriatric patients with various types of Cognitive Communication Impairments will have more positive responses to treatment, will exhibit more effective improvements in communication, and will display more positive dispositions if exposed to singing in therapy than those not exposed to singing. In testing this hypothesis, I visited the Presbyterian Nursing Home facility four days a week, working with two CCI patients on singing activities in speech therapy and two on regular spoken therapy activities, with the spoken activity patients serving as the control variables in this study. A Diagnostic Assessment Test was administered at the beginning and at the end of the project to document any cognitive improvements that may have occurred over time. Furthermore, daily measurements were taken to record the individual patients' performances for that day. Ultimately, our hypothesis was supported, as CCI patients exposed to singing in speech treatment experienced greater improvements in cognition and disposition. With the growing need for speech treatment and the rarity of singing as an instrument of therapy, this study may be helpful in providing the field of Speech-Language Pathology with more options for communication improvement.

24. HSU HH, BIRGBAUER E

Investigating the Role of an Lpar2 Variant (ChEST973j21) in Cellular Signaling in B103 Neuroblastoma Cells

Department of Biology, Winthrop University

ABSTRACT:

Lysophosphatidic acid (LPA) is a bioactive lysophospholipid mediator that is involved in diverse biological activities and is well known as an extracellular signaling molecule. Fincher et al (2014) found that LPA induces growth cone collapse and neurite retraction in the embryonic retinal axons of the chicken embryo. LPA can be found abundantly in a wide range of cells and tissues at varying concentrations. Many studies link LPA to human cancer and have shown that Lpar2 is highly expressed in several human organs and tumorigenesis. We discovered a chicken cDNA clone (ChEST973j21) that is partially identical to chicken Lpar2 at the nucleotide level and we considered this chicken cDNA clone (ChEST973j21) as a Lpar2 variant. This cDNA clone consists of a fragment (from 125bp to 490bp) that matches to bases 1 to 367 in chicken Lpar2, and while the rest of the sequence diverges. This study focus is on identifying the biological functions of ChEST973j21 in cellular signaling and response in B103 neuroblastoma cells by comparing with Lpar2 from chicken brain, specifically as ChEST973j21 relates to Lpar2. B103 cells normally do not express LPA receptors and do not respond to LPA. We cloned ChEST973j21 and chicken Lpar2 into a mammalian expression vector to express them in B103 cells. We are testing them in B103 cells exposed to LPA in order to investigate the role of this Lpar2 variant (ChEST973j21) in B103 cells compared to chicken Lpar2 in LPA signaling. This study aims to discover whether ChEST973j21 could be a new LPA receptor that responds to and/or may be regulated by LPA.

25. ISAAC JS, BELANGER KH, UPRIGHT NA, RAMIREZ JJ

The Contribution of Septal Cholinergic Neurons to the Heterosynaptic Interaction with the Perforant Path in the Dentate Gyrus

Neuroscience Program, Davidson College

ABSTRACT:

Long-term potentiation (LTP) is a physiological correlate of learning and memory, which results in strengthened connections between neurons and increased efficiency of synaptic transmission. The hippocampus has a well-established role in memory and is a proposed site where LTP occurs. It receives innervation from the medial septum/nucleus of the diagonal band of Broca (MS/DB) through the septodentate pathway (SD) whose terminations are especially dense in the dentate gyrus (DG). The DG also receives input from the entorhinal cortex (EC) by means of the perforant path (PP). The SD, specifically its cholinergic neurons, is considered essential for memory function. This role has been complicated by the identification of a third glutamatergic neurotransmitter system in the SD, which was thought to consist of only GABAergic and cholinergic neurons. A thorough dissection of the SD is required to fully understand how each of its constituents contributes to the overall neuronal circuitry involved in memory. We examined the putative role of SD cholinergic neurons in memory by performing extracellular electrophysiological recordings in rats that received injections of the selective neurotoxin IgG saporin to induce their degeneration. In Male Sprague Dawley rats, IgG saporin was delivered intracerebroventricularly (ICV) into the left ventricle. Three weeks after the IgG injection, recordings were made from the DG following stimulation of the EC and septum. Population spikes in the DG were measured at stimulation intensities of 25%, 50%, 75% and 100%, as previously determined by an input-output curve. A heterosynaptic paired-pulse paradigm was used to assess septal facilitation of the PP response beginning at 40 minutes before and up to 130 minutes after LTP was induced using a high-frequency stimulation tetanization protocol. Four different interpulse intervals of 30, 60, 100, and 500 ms were used to characterize the effect of septal stimulation on the PP response. The cholinergic neuronal markers, choline acetyltransferase (ChAT) and acetylcholinesterase (AChE), were labeled in the MS and DG respectively to determine the extent of degeneration caused by IgG saporin. The number of ChAT-positive cells in the MS/DB was assessed and the degree of AChE labeling in the DG was quantified using densitometry. Statistical analyses of the electrophysiological recordings and tissue samples show failure of the neurotoxin to successfully degenerate SD cholinergic neurons.

26. JENKINS JW, EL BEJJANI RE

The effect of Alzheimer's disease gene APP/apl-1 on neuron development

Davidson College

ABSTRACT:

The amyloid precursor protein (APP) is best studied for its role in Alzheimer's disease (Alexander, Marfil, & Li, 2014). However, APP is highly expressed in normal brains and its role in neural function remains unclear (Nicolas & Hassan, 2014). *Caenorhabditis elegans* are useful model organisms because they are easy to study and APP has a conserved gene in *C. elegans* (apl-1). We have inserted a transgene that overexpresses the intracellular domain of apl-1 (AICD) into the genome of *C. elegans*, and I have found that this transgene causes 26.6% of axons to be misguided when compared to the wild type. To determine a mechanism for this defect, I am testing for the involvement of the retromer pathway on the axon guidance defect caused by apl-1. I have preliminary data suggesting that deleting retromer gene rab-6.2 with the apl-1 overexpression worsens the defect in axon guidance. If true, this would suggest that rab-6.2 worsens the defect caused by apl-1. I am also testing for the involvement of lin-10, as lin-10 is a known effector of rab-6.2. In the future, I plan to investigate more retromer pathway genes thought to interact with apl-1.

27. JORDAN K, WHITFIELD K, HALL C, KELIS D, WRIGHTEN SA

Evidence of Prosocial Behavior in Rats in a Mildly Stressful Situation

Francis Marion University

ABSTRACT:

Prosocial behaviors, behaviors that benefit the recipient only, have long been widely studied in human and non-human primates. Recently, there has been increased interest in the ability of rodents to express prosocial behavior. Our lab conducted studies to investigate prosocial behavior using a mildly distressing paradigm. To conduct these studies we used adult female Sprague Dawley rats. The first set of experiments was carried out using pairs of cage mates. For the experiment, one rat was placed into a restrainer that could only be opened from the outside (trapped rat). The restrainer was then placed into a larger enclosed area (arena) and her cagemate was placed inside the arena but outside the restrainer (free rat). The free rat could open the restrainer by pressing a lever holding the door closed. A light source was placed behind the restrainer to illuminate it and hopefully increase the distressing nature of the restrainer. The rats were placed in this paradigm for twenty trials, with one trial occurring each day for twenty minutes. After twenty trials the roles of the rats were reversed (newly trapped rat=rat previously free rat), and the experiment was repeated for another twenty trials. Control rats underwent the same paradigm, except that control rats were tested without a cage mate. Several behaviors of the free rat including door opening, latency to approach the restrainer, number of contacts with the restrainer, and grooming behavior were recorded. It was found that rats in the experimental group were more likely to open the restrainer door than control rats. Additionally, experimental rats had a shorter latency to approach the restrainer, and an increased number of grooms. There were no differences found between the number of times the experimental rats contacted the restrainer compared to the control rats. Collectively, these data suggest that rats will engage in prosocial behavior to aid a cage mate trapped in a mildly distressing situation.

28. JOSEPH D, PUTZKE T, LÜBBERT M, SATTEFIELD R, KAMASAWA N, YOUNG JR. SM

Overexpression of the Cav2.1 α 1 subunit and the effects on Cav2.1 voltage gated calcium channel numbers at Active Zone

Max Planck Florida Institute for Neuroscience

ABSTRACT:

Ca^{2+} entry levels during action potentials (APs) correlate to the Cav2 number at the AZ, and affects synaptic transmission and plasticity characteristics by impacting: 1) readily releasable pool (RRP) size, the pool of fusion competent SVs located at the AZ, 2) the release probability, the likelihood of an SV being released from the RRP in response to APs, and 3) SV release kinetics in response to APs. How do presynaptic terminals regulate Cav2 subtype levels? It has been proposed that slots, which interact with Cav2, set the total amount of Cav2 per AZ, exist in a saturated state, and have different Cav2 subtype affinities, which set individual Cav2 subtype levels. However it is known that AZs vary in VGCC numbers. Therefore to test if Cav2.1 channels exist in a saturated state at the active zone, we overexpressed the Cav2.1 α subunit at the calyx of Held using HdAD technology in combination with our high level expression cassette pUNISHER. Subsequently, we carried out pre-embedding Immunogold electron microscopy (EM) experiments to measure SV distribution and AZ size in P7 calyces to determine effects on Cav2.1 O/E at the active zone. Finally to quantitate Cav2.1 numbers we performed Freeze-Fracture replica labeling experiments, Results of our work will be discussed.

29. KELLIS DM, WRIGHTEN SA

Prior Experience is Insufficient for the Enhancement of Pro-social Behavior in Rats

Department of Biology, Francis Marion University

ABSTRACT:

Previous research has suggested that rats with prior experience in a stressful situation perform greater pro-social behavior towards another rat in that situation compared to rats without prior experience. Experience in a stressful situation and prior experience of being helped in such a situation, however, have often been confounded. To build on these findings, the current study investigated whether experience-dependent enhancement of pro-social behavior is based on experience being helped in a stressful situation or solely the experience of the stressful situation. In our studies, one rat (restrained rat) was placed in a restrainer, which was inside a larger arena, for 1 hour on 5 consecutive days. The restrainer had a door with a lever, which allowed opening only from the outside. After 5 days, the restrained rat's cage mate was placed in the restrainer and the previously restrained rat was now placed "free" in the larger arena for twenty minutes over twenty consecutive days. The free rat (previously restrained) now had the opportunity to help its cage mate by pressing the lever to open the door of the restrainer. Latency to open the door was recorded during this time. Positive controls consisted of free rats that were not restrained for 5 days prior to the start of the experiment. When given the opportunity to free a cage mate, rats that had previously experienced restraint did not differ in their total door openings or average door opening latencies compared to rats that had not previously experienced restraint. Therefore, prior experience was insufficient for enhancement of pro-social behavior. This suggests that social learning, reciprocity, or "knowledge that one can be helped" may facilitate experience-dependent pro-social behavior in rats subjected to mild restraint stress.

30. KIM EY, KIM AH

Detection of Chemical irritants by the earthworm, *Lumbricus Terrestris*

Wake Forest University

ABSTRACT:

Charles Darwin said of the earthworm: "Without the work of this humble creature, who knows nothing of the benefits he confers upon mankind, agriculture, as we know it, would be very difficult, if not wholly impossible" (1881). Earthworms have significant impacts on the soil in which they burrow by allowing proper aeration and assisting in decomposition; ultimately resulting in improved plant growth. Like most organisms, earthworms are able to detect and avoid certain chemicals within its environment. How earthworms detect irritants, however, is poorly understood. Allyl isothiocyanate (AITC), a chemical expellant used for earthworm sampling to help quantify the role of earthworms in ecosystems, is a known transient receptor potential cation channel, subfamily A, member 1 (TRPA1) agonist. This suggests that earthworms may be detecting noxious chemicals using TRPA1 channels. In a first step to explore this possibility we have developed a T-maze assay to determine what chemicals might repel earthworms. One *L. terrestris* is placed into the center of a soil-filled tube. One half of the tube contains dirt saturated with the test chemical, the other half contains soil saturated with the vehicle. Worms are repelled by AITC and cinnamaldehyde (TRPA1 agonists) but not menthol (TRPM8 agonist) or capsaicin (TRPV1 agonist). These behavioral experiments are directing our immunohistochemical, electrophysiological and molecular biological investigations of the detection of irritants by earthworms

31. KNEELAND K, PAXTON R, SULLIVAN M, GENDLE M
Alcohol Use and Performance on the Iowa Gambling Task
Department of Psychology, Elon University

ABSTRACT:

Alcohol use has been shown to negatively affect prefrontocortical networks that are correlated with decision-making abilities. Alcohol users may value the immediate rewards of alcohol over potential negative long-term health effects. The objective of this study was to explore the relationship between alcohol use and decision making, as measured by the Iowa Gambling Task (IGT). One-hundred twenty-seven female university undergraduates completed a health behavior survey and completed the IGT, following standardized instructions. Participants who self-reported not consuming alcohol (n=21) won more money in dollars on the IGT (+\$81) than those that self-reported consuming alcohol (-\$430), but this difference was not statistically significant ($p = 0.12$). Although the difference between groups was not significant, the magnitude of this difference is notable and warrants further investigation. The unexplained variance in IGT performance in both groups was very large, and future studies should collect covariate data that could account for some of this variability, via a statistical method utilizing covariate control.

32. LEARY M, STEINECKE A, TANIGUCHI H
A comparison of intrinsic and transplanted Chandelier cells during cortical development in Mice
Max Planck Florida Institute for Neuroscience

ABSTRACT:

Cortical Interneurons are a specific type of neurons that cause an Inhibitory Post Synaptic Potential in excitatory neurons by releasing the neurotransmitter Gamma amino butyric acid (GABA). There are different types of interneurons based on morphology, physiology, gene expression profiles, and location in the cerebral cortex. A specific interneuron, the Chandelier Cell (ChC), is a fast-spiking cell, found in layer 2/3 and 5 of the cerebral cortex. It specifically innervates the axon initial segment (AIS) of excitatory neurons: the site of the pyramidal neurons generating their output in form of action potentials. Recent findings showed, that it is possible to genetically target ChCs by using transgenic animals, expressing the CRE recombinase under the control of the transient transcription factor Nkx2.1. (Taniguchi et al. 2013) By crossing these mice to ROSA26GFP reporter lines GFP can be expressed continuously in ChCs to study cellular processes of intrinsic ChCs. The expression of GFP in these mice is very weak and is limited by the transient expression of Nkx2.1-CRE to achieve cell type specific expression of genes. To overcome these problems we developed a technique to transplant transfected ChC-progenitors into the cortex of developing mice using single cell electroporation. This gives rise to high expression of any gene of interest during the whole developmental period specifically in cortical ChCs. Here we show that transplanted ChCs follow the developmental time course of intrinsic ChCs. The comparison of the methods has been accomplished by analyzing the axon arborization and innervation of the excitatory neuron for ChCs on post-natal day 16 and 21. The mice were sacrificed, their brains sliced, and their AIS and ChC stained using immunohistochemistry, followed by the acquisition of confocal Z stack images. Imaris imaging software was used for both the transplanted and transgenic mice to reconstruct the axonal boutons, located on and off the AIS of pyramidal cells, as well as the arborization of the ChC axons. This data allowed for a comparison between the transplanted and intrinsic ChC development. The results prove the transplantation of transfected ChC-progenitors into the cortex of developing mice is a viable process because its ChC development follows the time course of intrinsic ChCs. Therefore this method is feasible to overcome the weaknesses in intrinsic cells of transgenic animals.

33. LLOYD JJ, MCGONIGAL JT, NEWSOM RJ, GASS JT

Manipulation of alcohol related memories as a treatment for Alcohol Use Disorder

Department of Biology and Program in Neuroscience, College of Charleston; Department of Neurosciences, Medical University of South Carolina

ABSTRACT:

Alcohol Use Disorder (AUD) has been classified in the literature as a disorder of learning and memory. The association of environmental cues with the rewarding and anxiolytic effects of alcohol leads to the formation of strong cue associated memories. The neurocircuitry involved in these cue associated memories perpetuate AUD. To decrease the effect of these cues on alcohol-seeking behavior, we manipulated memories associated with alcohol-related cues and relapse-like behaviors through behavioral pharmacology. Rats were initially trained to self-administer alcohol by associating it with a lever press. Prior to extinction training, rats were treated with the cognitive enhancer CDPPB (an agonist of the mGluR5 receptor), or a placebo. They were then exposed to an extinction paradigm during which lever presses were no longer reinforced with access to alcohol. Treatment with CDPPB significantly facilitated the extinction of alcohol-seeking behavior and decreased relapse-like behaviors compared to control rats. This set of studies revealed that pharmacological enhancement of glutamatergic transmission facilitates the extinction of alcohol-related memories. These experiments suggest that manipulation of alcohol-related memories can be used to prevent alcohol-seeking behaviors and strengthen extinction memories. Additionally, these findings could be used to improve clinical treatments for AUD and to gain a better understanding of the neurocircuitry involved in the disorder. Studies are currently being conducted to disrupt the "reconsolidation" of an alcohol memory using optogenetics.

34. MASON CL, HUGENSCHMIDT CE, SORIANO CT,

Impact of Improvised Dance on Balance for Patients with Dementia and Their Caregivers

Section on Gerontology and Geriatric Medicine, Wake Forest School of Medicine; Department of Theatre and Dance, Wake Forest University

ABSTRACT:

Dementia patients are at an increased risk of falling. Dance interventions have been shown to improve balance and may serve as an important therapy for people with dementia (PWD). Improvised dance imposes an additional cognitive challenge that may further benefit PWD. This pilot study examines the effect of an improvised dance intervention on balance for PWD and their caregivers (CG) (N=10). Older adults with either Mild Cognitive Impairment (MCI) or early-onset dementia and their caregivers participated in this study in dyads. Participants (N=20) completed an extensive battery of tests at baseline and follow-up, including the Fullerton Advanced Balance Scale (FAB), Timed Up and Go (TUG) with cognitive and manual subtests, and the Falls Efficacy Scale International (FES-I), all highly correlated with fall risk. The intervention group (N=10) completed an eight-week improvised movement intervention, meeting twice weekly at a local dance studio. The control group received no contact between baseline and follow-up measures. FAB scores improved significantly for PWD in the intervention group ($p=0.0229$), but did not differ significantly for caregivers. Improvised dance may improve balance in older adults, although this intervention may only be beneficial for those with MCI or early-onset dementia. Further study is warranted to explore the relationship between improvised dance and improvement of motor symptoms in PWD.

35. MCDOUGLE MJ, BURNETT EJ, CHANDLER LJ

Effect of adolescent intermittent ethanol exposure on choline acetyltransferase expression

Department of Biology, College of Charleston; Department of Neuroscience, Medical University of South Carolina

ABSTRACT:

Adolescence is characterized by increased risk-taking and the pursuit of novel stimuli including drugs and alcohol. Binge-drinking and heavy alcohol use during adolescence has been linked to long-term cognitive deficits and increased risk of developing alcohol use disorders in adulthood. The cholinergic system serves to regulate cognitive function, sleep, wakefulness, reward and aversion, all of which are altered by prolonged alcohol exposure. The present study was designed to investigate the effects of adolescent alcohol exposure on the adult cholinergic system. Beginning on P28, pair-housed male Long-Evans rats received adolescent intermittent ethanol (AIE) exposure in a binge-like, two-day-on, two-day-off pattern for a total of four cycles ending on P42 (n=7). Control rats were exposed to air in a similar fashion (n=7). Rats were subsequently sacrificed in adulthood on P110 and brains were processed for ChAT visualization using standard avidin-biotin immunohistochemistry methods. ChAT expression was measured in regions expressing dense ChAT-positive cell body or fiber staining including the medial septum (Ch1), nucleus basalis (Ch4), pedunculopontine tegmental nucleus (Ch5; PPTg), laterodorsal tegmental nucleus (Ch6; LDTg), medial habenula (Ch7), interpeduncular nucleus, striatum, and prefrontal cortex. Reduced ChAT expression was observed in the medial habenula ($p<0.01$) and interpeduncular nucleus ($p<0.01$) of AIE rats compared to controls. A similar trend was observed in the PPTg and LDTg ($p<0.09$). Thus, AIE exposure results in region-specific reductions in ChAT expression that last into adulthood. These results suggest that alterations in the cholinergic system may underlie some of the long-term behavioral deficits observed following AIE exposure. In addition, our data are in agreement with previous work demonstrating reduced ChAT expression using other methods of adolescent ethanol exposure indicating that, regardless of route of exposure, ethanol exposure during this critical period of development results in a significant decrease in ChAT expression.

36. MCKENDRICK GE, KINLEY-COOPER SK, KING BS, RUSCIO MG

Effects of Social Environment and Development on Estrogen Receptor Alpha Expression in a Monogamous Mouse Species: *Peromyscus californicus*

Department of Psychology and Program in Neuroscience, College of Charleston

ABSTRACT:

Adverse social environments, such as isolation, have a variety of detrimental effects across vertebrate species. In an attempt to reveal the specific neuroendocrine mechanisms underlying behavioral changes resulting from social isolation, we aimed to quantify activity of estrogen receptor throughout the limbic system of the mouse species *Peromyscus californicus*. Estrogen receptor alpha ($ER\alpha$) concentration in the limbic system has a prominent role in an assortment of social behaviors, including mate selection, sexual selection, social learning, and prosociality. Previous research has suggested that $ER\alpha$ could serve as an index of sociality across species. California mice are both monogamous and biparental, therefore we predicted that adjustments of their social environment by the introduction of a housing stressor should result in particularly acute effects on neural mechanisms associated with social behaviors. Male and female California mice were divided into either paired or isolated housing groups for 4 or 24 days. Following this stressor, brain samples were collected. Using fluorescent immunocytochemistry we quantified $ER\alpha$ concentration within the dentate gyrus (DG) of the hippocampus, the medial amygdala (MeA), and other limbic areas. $ER\alpha$ expression ($ER\alpha$ -immunoreactivity) in the DG was significantly greater in the 24-day housing groups compared to the 4-day housing group. There was also an interaction with sex and duration with females in the 24-day housing condition, demonstrating higher $ER\alpha$ in the DG. We anticipate other limbic areas may show similar patterns. These data could potentially illuminate a more direct relationship between the neuroendocrine effects of social isolation.

37. MORACHO-VILRRIALES C, PRESTIA J, PRUITT III J, THREATT T, WAGNER S, ROMERO-SANDOVAL EA
Association of HbA1c and painful diabetic neuropathy in a rural area diabetic population of South Carolina

Department of Pharmaceutical and Administrative Sciences, Presbyterian College School of Pharmacy

ABSTRACT:

Diabetes Mellitus is one of the major public health conditions worldwide. Diabetes can lead to several comorbidities, such as painful diabetic neuropathy. We hypothesize that the severity of painful diabetic neuropathy in patients of a SC rural area is associated with higher glycosylated hemoglobin (HbA1c) levels, a marker of average plasma glucose concentrations over three months. We tested our hypothesis following these specific aims: 1) Associate mild, moderate or severe peripheral diabetic neuropathy (PDN), determined by the amount of insensate points obtained by a foot exam, with HbA1c levels recorded 6 months before and 3 months after a foot exam; and 2) Correlate the levels of HbA1c with the severity of painful and non-painful diabetic neuropathy. Our aims were accomplished by collecting information from clinical records of patients registered in the Presbyterian College School of Pharmacy, Wellness Center under the IRB protocol PC-201517. The severity of PDN was not correlated with the levels of HbA1c ($8.6 \pm 1.86\%$, $9.03 \pm 1.1\%$ and $9.51 \pm 1.94\%$ for mild, moderate and severe respectively). However, when we compared the blood level of HbA1c between painful and non-painful diabetic neuropathy, HbA1c blood levels were significantly higher in painful diabetic neuropathy than in non-painful diabetic neuropathy $9.35 \pm 1.97\%$ vs. $8.44 \pm 1.59\%$, $P=0.0315$). Interestingly, this association was observed specifically in moderate ($10.15 \pm 1.49\%$ vs. $8.67 \pm 0.78\%$, $P=0.0497$) and severe ($11.02 \pm 0.52\%$ vs. $8.00 \pm 1.5\%$, $P=0.0155$) PDN sub-groups. Our study shows that higher levels of HbA1c are correlated with painful diabetic neuropathy.

38. NASO C, LOM B

Three-Dimensional Visualization of Dopaminergic Neuron Clusters in *Xenopus laevis*

Department of Biology, Davidson College

ABSTRACT:

Bisphenol A (BPA) is an industrial chemical and endocrine disrupter found in polycarbonate plastics and epoxy resins, some of which are used in containers that store food and beverages. The FDA regards current BPA concentrations in food to be safe. Low BPA concentrations, however, can cause developmental and genital abnormalities. BPA has been consistently detected in human urine samples of adults and children, indicating that its extensive use has resulted in widespread human exposure. Unintentional BPA contact, especially in utero, may result in adverse health effects with BPA exposure linked to neurobehavioral disorders such as ADHD, schizophrenia, and autism. BPA is thought to exert its negative effects by acting as an estrogen mimic, binding to estrogen receptors and catalyzing downstream effects. Dopamine is a neurotransmitter implicated in mood, reward, addiction, and stress. Populations of dopaminergic neurons are known to be sexually dimorphic, indicating them as likely targets of BPA in the brain. Additionally, abnormal dopamine levels have been linked to hyperactivity, a disorder associated with BPA exposure. Dopaminergic activity can be quantified through tyrosine hydroxylase (TH) expression, the rate-limiting enzyme in dopamine synthesis. Previous work in our lab demonstrated that low level BPA exposure during the first 96 hours of development caused decreased TH expression in the developing tadpole (*Xenopus laevis*) brain within two bilateral clusters of TH, the posterior tuberculum. Currently, our lab visualizes these TH+ neurons by immunostaining $20 \mu\text{M}$ cryostat sections of brain and imaging with confocal microscopy. A two-dimensional area of TH expression is measured from these sections. However, this method of quantification ignores the three-dimensional structure of the TH+ neuron cluster in the posterior tuberculum. This study seeks to develop a novel way to quantify the posterior tuberculum TH+ neuron clusters in developing *Xenopus laevis*. Recent endeavors have focused on dissecting and staining whole brains for analysis with confocal microscopy, rather than sections, to improve three-dimensional visualization. Concurrent staining protocols explored include BABB

clearing, glycerol clearing, and proteinase-K aided permeabilization. We anticipate the eventual ability to conduct three-dimensional cluster analysis to quantify BPA's effects on TH expression more accurately.

39. OLIVOVA J, BONNAN A, CHISTIE J
Purkinje Cell Specific ChR2 Expression
Max Planck Florida Institute for Neuroscience

ABSTRACT:

The cerebellum is a key brain structure involved in motor learning: the process by which we acquire precise, coordinated movements. The Purkinje cells (PC), which are the only output neurons from the cerebellum, are thought to be central to this process. The main theory of cerebellar-dependent motor learning, developed by Marr, Albus and Ito in the 70s speculates that climbing fiber (CF) inputs carry an instructive signal to PC that induces long-term plasticity at the parallel fiber (PF) to PC synapse. But since this early theory, many forms of plasticity have been shown in vitro in the cerebellum as well as downstream of it, in the brainstem and how and where are motor memories formed in this circuit is still unclear. To gain insights into the role of PC during this process, we want to bypass the climbing fiber input by directly stimulating the PC during behavior, and see the effects on motor learning. This requires to be able to target specifically PC. For this, we took advantage of the cre-lox recombination system. Because the Purkinje cell protein-2 (Pcp2) is highly expressed in PC, we used different version of the pcp2/L7 promoter to express the cre gene (either in transgenic mice or in wild-type mice through viral delivery) and combined it with virus injection of adeno-associated virus (AAV) containing a flexed ChR2 in the vermis and the flocculus. Subsequently, we checked for specificity of expression as well as for subcellular localization of expression using immuno-histochemistry and confocal fluorescence microscopy.

40. OU J, CLELAND CL
Escape response of Madagascar cockroaches (*Gromphadorhina portentosa*) to looming and localized heat stimuli
Department of Biology, James Madison University

ABSTRACT:

Optheroid insects (crickets, cockroaches) exhibit robust escape responses to aversive stimuli such as wind, looming objects and localized heat. Escape strategies are diverse, however, and there are conflicting results whether escape responses can be evoked in the Madagascar cockroach. The specific aim of this research is first to determine if Madagascar cockroaches execute escape responses to aversive stimuli, and if so, to elucidate their movement strategy. Looming stimuli were created by attaching a 3" black polyurethane ball to the end of a 12" air cylinder (45 degrees to vertical) driven by compressed air. The direction of "attack" was varied in 45 degree increments around the cricket (n=8). In separate animals, heat stimuli were delivered to each of the six tarsi with an infrared laser (n=10). The cockroach's response was recorded by a high-speed video camera (650 fps) from overhead. The location and orientation of the cockroach were tracked over time. Movement of the cricket was quantified in terms of turning and translation. Primary results show that Madagascar cockroaches execute appropriate escape responses. Heat reliably caused the cockroach to both turn and walk away from the stimulus. Looming was less effective, evoking less frequent and smaller responses. Interestingly, responses to looming were largely translational (without turn) while responses to heat included both turning and translational components. Together, our results show that Madagascar cockroaches possess organized and appropriate escape response responses to diverse aversive stimuli.

41. POTHARAJU PP, UPRIGHT NA, RAMIREZ JJ

Effect Of Bilateral Entorhinal Cortex Lesions On Spatial Working Memory In Rats

Neuroscience Program, Davidson College

ABSTRACT:

Spatial working memory is the ability to retain spatial information in working memory and apply it to a task within a short period of time. The hippocampal formation, particularly the dentate gyrus (DG), has been employed as a model structure for the study of learning and memory. The DG possesses a variety of afferents, notably the perforant path (PP) which arises from the entorhinal cortex (EC) and terminates on the ipsilateral DG. Although most projections from the EC to hippocampus appear to run through the PP, there is evidence of parallel pathways between the parahippocampal region and the cerebral cortex. The extent of these hippocampal-entorhinal circuits, which facilitate the formation and association of working memory, remain unclear. Utilizing an eight-arm radial maze (RAM) and behavioral acquisition task approach, we assessed spatial working memory for 6 weeks following bilateral entorhinal lesions. Male, Sprague-Dawley rats were first baited in each arm of the maze in order to become accustomed with the environment and food reward presented at the end of each arm. Each subject was given either bilateral entorhinal lesions or sham operations, which consisted of a bilateral craniotomy over each entorhinal area. Following between seven and ten days of postoperative rest, the subjects were tested on a working memory task in the RAM five days per week for a six-week period. Each rat was placed in a central hub at the start of the trial and allowed to choose one of the eight arms. Upon selection of an arm, the rat was confined for 30 seconds and left to collect the food reward. Each trial concluded when all eight arms had been visited at least once, or eight minutes had passed since the start of the session. The rats' choice sequences and time to completion were recorded, with acquisition of the task defined as seven out of eight arms correctly chosen over five out of six consecutive trial days. Preliminary findings suggest that rats with bilateral lesions showed impairments in spatial working memory across the 6 weeks of postoperative testing. This may have been due to a loss of entorhinal grid cells, which facilitate the formation of a cognitive map. The lack of a cognitive map may contribute to poor performance in the maze; however, lesion cases did show improvement to control levels over time, indicating possible compensation by the medial prefrontal cortex or other extra-hippocampal areas such as the parahippocampal region.

42. RICHARDSON KE, MICHAELS JL

Coaching Cues on Motivation and Athletic Performance

Department of Psychology, Presbyterian College

ABSTRACT:

This study examined how a coach's level of instructiveness (i.e., their manner of verbally cuing players) impacted their athletes' intrinsic motivation and performance during a cardiovascular conditioning session. Inspired by the ideas put forth in Cognitive Evaluation Theory (Deci, 1975) and applying them to a cardiovascular conditioning session with Division I athletes, a single factor, two-level matched groups experiment was performed where participants were cued in either an instructional manner or a controlling manner. Those in the "informationally cued" group were told that they were running five sprints and were asked to work their hardest on each one; the "controlling cued" group was told that they were running five sprints, but if they did not run the fifth sprint in under a certain time, they would have to run two additional sprints. It was hypothesized that the average times for the informational group would be faster and the effort exerted would be higher while times for the controlling cued group would be slower for every sprint but the fifth, with lower reported levels of effort on the first four sprints. The data from the athletes' sprint time appears to reveal that instructional cuing resulted in generally stronger performance. These findings were congruent with the hypothesis and propositions laid out by Deci (1975). Informational cuing had a positive effect on intrinsic motivation and resulted in faster sprints while controlling aspects had a negative influence on intrinsic motivation and resulted in slower sprints.

43. SASSER TK, SLEDGE RA, MOORE EJ, JOHNSON HL, KAPLAN ZS, QUICK CR, PAVELKA MN
Using IMPULSE in International Medical Undergraduate Education
The Honors College, Appalachian State University

ABSTRACT:

The European model for medical education typically routes students directly to medical school following secondary education, often precluding research opportunities. Their student colleagues in the U.S. who are interested in neuroscience pursue many different majors and co-curricular opportunities prior to medical school that help extend their understanding of the scientific foundations of clinical practice. Serving as a reviewer for IMPULSE, a journal designed for undergraduates to publish and review neuroscience work, is an example of such an educational enhancement. Medical students from the University of the Free State (South Africa) have shown that it is possible for students in medical bachelor's degree programs to join IMPULSE and benefit from that experience. Faculty there have been mentoring a team of neuropsychiatry-focused clinical students for the past six years, and they and individual medical students from around the world report that the opportunity to review original research papers and learn how to evaluate neuroscience manuscripts is a valuable addition to their neuro-related career plans. Data from an earlier survey (reported at SfN/FENS in 2013/2014) indicated that 85% of 46 respondents felt the experience improved their own writing skills. Over 75% felt it improved their literature research skills, while 99% felt it improved their article reading skills. Nearly 20% of these students were in M.D. or M.B. programs, while a further 25% were in Ph.D. programs after their IMPULSE time.

44. SAWYER, LE, GALUSKA, CM
Regulation of Rats' Fluid Intake by Transitions in Food Reward
Department of Psychology and Program in Neuroscience, College of Charleston

ABSTRACT:

One animal model of alcoholism used to dysregulate fluid intake is schedule-induced polydipsia (SIP). The neural mechanisms of SIP are unknown but are thought to result from mesolimbic dysfunction including hypoactive dopaminergic signaling coupled with hyperactive serotonergic and noradrenergic activity. One disadvantage of using SIP is that the effect can be short-lasting and inconsistent. To improve existing models, we incorporated a procedure shown to produce enduring behavioral disruption in the forms of aggression and escape to determine if it would also cause excessive drinking in rats. Retractable levers were used to signal four transitions defined by food reward: small-small, small-large, large-large, and large-small. The large-to-small transition is analogous to environmental conditions changing from favorable to less favorable. This procedure better approximates real world conditions than current models. We tested both the effect of food reward magnitude and differential response requirements. The effect of reward magnitude was done by holding the response requirement constant at 150 lever presses. Completion of the lever presses produced either a 1 or 6 pellet reward. The effect of altering the response requirement was done by holding the reward magnitude constant at 1 pellet. The response requirement was either 50 or 200 lever presses to earn the reward. During the experimental conditions, we inserted a water bottle with lickometer to record drinking. In both manipulations, the favorable to less favorable transition provoked water drinking while the other transitions typically did not. With the addition of a 10% sucrose solution, there was a tenfold increase in fluid consumption. We are currently identifying optimal parameters to increase drinking. Then we will incrementally add ethanol volume to the sucrose solution to test as a model of self-administration.

45. SCHWARTZ DJ, SPENCER SM, ALLEN NP, SCOFIELD MD, KALIVAS PW

Development of a rodent model of Δ^9 -Tetrahydrocannabinol Self-Administration

Department of Biology and Neuroscience Program, College of Charleston; Department of Neurosciences, Medical University of South Carolina

ABSTRACT:

Cannabis is the most frequently used illicit drug worldwide; however, there is little understanding of the fundamental mechanisms underlying the effects of cannabis use and the impairments which develop as a result. Preclinical models of addiction are well established in rats for various drugs using an operant self-administration procedure. A model for cannabis addiction is yet to be established, as rats have not successfully sustained self-administration of Δ^9 -tetrahydrocannabinol (THC). THC is the main psychopharmaceutical component of cannabis and is a partial agonist to cannabinoid receptors CB1 and CB2. The lack of a cannabis addiction model has led to a delay in preclinical findings on the short- and long-term effects of this drug. Through the alteration of specific self-administration parameters, we extended a reproducible 'addiction-like' self-admin/reinstatement model to cannabis use in rats. Following the successful establishment of this model, we then applied the procedure to further explore the physiological and behavioral sex differences in response to cannabis addiction. THC delivery (vapor and infusion) resulted in physiological changes for both male and female subjects including lowered body temperature and preliminary data showing increased blood plasma THC concentrations. Female rats showed increased drug sensitivity compared to male subjects during a dose response, and males show greater active vs inactive lever discrimination than females. Both males and females exhibited drug primed and cue-induced reinstatement, and drug intake in females was not determined to be cycle dependent. The establishment of a rodent model for cannabis addiction will allow for the investigation of the THC-dependent molecular mechanisms and underlying brain changes, and it will aid further determination of sex differences in response to cannabis use. It will also allow researchers to evaluate the variation between brain changes observed in THC addiction compared to those of more well-studied models for drugs of abuse and identify novel therapeutic targets for the future treatment of addiction.

46. SHANNAHAN MS, KOHMAN RA

Therapeutic approaches to attenuate cognitive decline in an Alzheimer's disease model

Department of Psychology, Department of Biology, University of North Carolina at Wilmington

ABSTRACT:

Alzheimer's disease (AD) is characterized by progressive cognitive decline and accumulation of A β plaques. These pathological changes stimulate inflammation by activating microglia, the immune cells of the brain. Microglia can express an anti-inflammatory phenotype which administers a neuroprotective response by clearing plaques. Studies show that exercise can reduce inflammation and may protect against cognitive impairments. Minocycline, an anti-inflammatory compound, inhibits microglial cell activation and shows reduction in A β levels. This study investigated possible combined effects of minocycline and exercise using a mouse model of AD. Subjects were housed with or without a running wheel and were administered minocycline or water. During treatment behavioral tests were completed to evaluate motor behavior, anxiety and to evaluate spatial learning and memory retention. Preliminary results indicate that there were minimal differences between mice on the behavioral tests. Additional work is in progress to determine whether combinations of treatments altered inflammation and levels of plaques.

47. SHANNON M, STRICKLAND J, ROUND J, LOM B

Investigating Functional Roles for Slitrk1 in Zebrafish Spinal Cord Development

Biology Department & Neuroscience Program, Davidson College; Biology Department & Neuroscience Program, Ursinus College

ABSTRACT:

The Slitrks are a novel family of transmembrane proteins thought to play roles in central nervous system (CNS) development and wiring due to their structural similarities to the well-characterized Slit and Trk protein families. Slitrk genes have been associated with various neuropsychiatric conditions including Tourette's syndrome, schizophrenia, and OCD spectrum disorders. Within the Slitrk family, Slitrk1 is unique in that it lacks the tyrosine residues characteristic of other Slitrks. Additionally, overexpression of Slitrk1 induces neurite outgrowth while overexpression of other Slitrks inhibit neurite outgrowth. Therefore, Slitrk1 may play unique roles in CNS development and wiring. Because Slitrk1 is highly expressed in the early spinal cord during the time when initial synaptic connections are formed, this study investigated potential roles played by Slitrk1 in spinal cord development. To do so, we conducted loss-of-function studies in which we suppressed Slitrk1 translation by injecting antisense morpholino oligonucleotides (AMOs) into 1 to 2-cell stage embryos. Knocking down Slitrk1 did not affect gross morphological features (eye diameter or tail length) at 48 hours post fertilization (hpf). Secondary motorneurons, visible in the Islet1-GFP transgenic zebrafish line, were also unaffected by knocking down Slitrk1. Slitrk1 did, however, significantly reduce the number of Rohon-Beard (RB) neuron in a region of the anterior spinal cord in 48 hpf zebrafish. RB neurons are a group of transient, mechanosensory neurons located in the dorsal spinal cord during early stages of development that express Slitrk1. Behaviorally, touch-response assays at both 48 and 72 hpf indicate no difference between embryos with and without functional Slitrk1 protein in their ability to respond to environmental stimuli. These results are the first studies of Slitrk1 function in developing zebrafish nervous system and suggest new avenues for revealing Slitrks' function in neuronal development.

48. SIEBELS AA, CHILDS AM, SCHMIDT JX, REIMAN KL, CLELAND CL

Looming stimuli evoke a turning escape response mediated by cerci in crickets

Department of Biology, James Madison University

ABSTRACT:

Animals respond to aversive stimuli with withdrawal or escape responses. Wind, which might normally be produced by an approaching predator, evokes an escape response in crickets that is mediated by cercal sensory receptors. Similarly, limited studies have shown that crickets also escape from looming stimuli. However, it is unclear whether crickets utilize the same or a different strategy and sensory mechanisms for looming stimuli. The goal of our research was to determine the strategy and sensory modalities used by crickets (*Acheta domesticus*) to escape from looming stimuli. Looming stimuli were created by projecting a 3" black polyurethane ball (1 m/s; 45 degrees to vertical), against a white background, toward the cricket. The direction of "attack" was varied in 45-degree increments around the cricket. The resulting response was captured with high speed video (650 fps, 2336x1728) and the location and orientation of the cricket over time was tracked in software. Looming stimuli consistently evoked a turn followed by walking or occasionally jumping. Our results (n=24) showed that turning response angle depended significantly ($p < 10^{-6}$, Pearson) on stimulus direction, such that crickets turned directly (slope= 1.14 deg/deg linear regression) away from the stimuli. There are four sensory organs – eyes, cerci, antennae, and filiform hairs over the body – that the cricket could use to sense looming stimuli. To identify the contribution of each modality to the escape response, we designed a series of lesion experiments to determine if each modality was necessary or sufficient for an escape response. Ablating eyes, cerci, or antennae tested necessity; ablating all modalities but eyes, cerci, or antennae tested sufficiency. Preliminary findings (n=32) suggested that cerci are sufficient and necessary to evoke an escape response. In contrast, both antennae and vision were neither sufficient nor necessary. However, vision may contribute

when looming stimuli approached anteriorly. Looming stimuli, similar to wind stimuli, evoked an escape response that used a turning-walk strategy mediated largely by cercal sensory receptors.

49. SNAPP KS, SHULBACK AT, GENDLE MH

Relationship Between Total Cholesterol Levels and Performance on the Conners Continuous Performance Test II

Department of Psychology, Elon University

ABSTRACT:

Considerable research has demonstrated the negative effects of elevated total cholesterol (TC) on cardiovascular health, however the relationship between plasma TC and central nervous system (CNS) functioning is not yet fully understood. This study examined the relationship between plasma TC levels and performance on the Conner's Continuous Performance Test II (CPT), a task that directly measures attentional control and impulsivity. Based on past research, it was hypothesized that in regards to cognitive function, TC follows an inverse-U dose-response function, wherein both extremely high and low levels of TC would be associated with greater rates of commission errors, a measure on the CPT that indicates an impairment in behavioral control. For each participant (41 undergraduate students), fasting plasma TC levels were obtained. Demographic information was collected through self-report and all participants completed the CPT. After controlling for hormone therapy, self-identified sex, and self-reported caffeine intake, no significant differences in the rate of commission errors were observed between groups of $TC \geq 155\text{mg/dL}$ and $TC < 155\text{ mg/dL}$ ($p = 0.59$). However, significant differences were observed between these groups for number of omission errors ($p = 0.01$) and perseverations ($p = 0.003$) committed on the CPT, after controlling for the same covariates listed above. Both omission errors and perseverations occurred in low frequencies overall; however, both types of responses occurred more frequently in the group of participants with higher cholesterol. This data suggests a specific and subtle impairment on the CPT that is related to TC; however, due to the small sample size, these conclusions merit confirmation with additional studies.

50. SPEAGLE M, BRUMMER D

Acute ethanol exposure decreases excitatory transmission in *Procambarus clarkii* (crayfish) neuromuscular junction

Department of Biology, Wake Forest University

ABSTRACT:

Alcohol is a common drug used by many people with a wide range of acute, intoxicating effects. Its effect on the glutamatergic system in the amygdala, in particular, causes alcohol withdrawal-induced anxiety. Acute ethanol (EtOH) has been shown to inhibit N-methyl-D-aspartate (NMDA) glutamate receptors, and EtOH's effects on these receptors seem to be subunit-specific. This study examined acute EtOH's postsynaptic effect on the less well-studied non-NMDA receptors on crayfish superficial flexor muscles. Excitatory Post Synaptic Potentials (EPSPs) were recorded before and after a 10 minute exposure to EtOH. EtOH significantly inhibited EPSPs, indicating that acute EtOH is likely acting on non-NMDA receptors. Non-NMDA receptor subunits found in crayfish muscles can, therefore, be compared to subunits found in vertebrate non-NMDA receptors to determine the subunit specificity of acute EtOH to non-NMDA receptors. This study is important in helping better understand the mechanisms of acute EtOH intoxication.

51. STELLING R, PARTELOW J, ABEE A, SHARPE B, NASH K, GOODBAR N

Evaluating the frequency of appropriate metabolic monitoring in Hospital Inpatients on Second Generation Antipsychotics

Presbyterian College School of Pharmacy

ABSTRACT:

Psychotic disorders including schizophrenia, bipolar, major depressive disorder, and other general psychosis can be debilitating for patients as they interfere with normal reasoning and cause delusions and hallucinations. Appropriate pharmacotherapy is vital in this patient population in order to allow patients to function normally within society. The use of first generation antipsychotics (FGA) has fallen out of favor due to their ability to cause extrapyramidal side effects (EPS) making second generation antipsychotics (SGA) first line therapy for many patients. Although EPS is less likely to occur with SGA, these drugs are associated with metabolic syndrome including hypertension, dyslipidemia, diabetes, and weight gain. A consensus statement released in 2010 urged practitioners to do appropriate metabolic monitoring in patients on SGA since these side effects significantly increase their risk for developing cardiovascular disease. Monitoring includes patient history, BMI, waist circumference, blood pressure, blood glucose, and lipids at baseline and at specified time frames during therapy. The inpatient setting provides an excellent place for such monitoring to take place especially for patients who do not regularly see a physician. Lack of evidence in this setting has encouraged this study in order to ensure patient safety and risk reduction in this unique population.

Following IRB submission and approval, a patient list from an institutional setting was generated for all medical inpatients currently on or initiating SGA therapy. Patients were randomly selected via a random number generator to compile a sample size of 500 patients. Exclusion criteria included surgical admissions. Inclusion criteria included patients over 18 admitted to the hospital over the last five years on SGA therapy including clozapine, olanzapine, risperidone, quetiapine, aripiprazole, and ziprasidone. Retrospective analysis was conducted to gather demographics and evaluate whether appropriate monitoring was completed per guidelines during hospital stay.

Results: research in progress

52. THOMPSON B, HOLLIDAY E, CLEMENTS J

Perception of sleep habits on glycemic control among patients with type 2 diabetes mellitus at a rural-health family medicine clinic

Presbyterian College School of Pharmacy

ABSTRACT:

Studies have shown that sleep disturbances or complaints are associated with increased incidence of type 2 diabetes. However, there is a lack of literature reporting how patients perceive sleeping habits based on glycemic control. The purpose of this study was to evaluate patient perception correlating sleep habits to glycemic control and determine the prevalence of sleep problems among patients with type 2. This study was approved by the Institutional Review Board and was conducted June 1, 2015- June 30, 2015. Men and women aged 18 to 85 who provided informed consent were enrolled if they had type 2 diabetes for longer than 1 year, receiving primary care services towards diabetes management at the family medicine office, and spoke English as a primary language.

Patients meeting inclusion criteria were asked to complete a questionnaire. The primary objective of this study was to evaluate perception of sleep habits on glycemic control among patients at a rural family medicine health clinic. Study endpoints to be evaluated include: patient perceptions of sleep, such as quality and quantity. The secondary objective of this study was to determine the prevalence of sleep problems among patients with type 2 diabetes in a rural health clinic. A total of one hundred and ten patients completed questionnaires which were assessed based on patient responses. Of the patients included in the study, 51.8% of patients had an A1C greater than 7% and 49.1% of patients had type 2 diabetes for longer than 1 year. Nearly 16% of the patients reported being diagnosed with a sleeping disorder. Approximately 38% of patients received enough sleep per month, but 54% of

patients admitted to experiencing a shorter duration of sleep frequently or every day. There was no significant difference with most recent A1C level control on adequate amount of sleep per month ($p=0.473$), sleeping disorders present at baseline screening ($p=0.053$), and difficulty maintaining sleep each night ($p=0.914$). The results provided insight among patients with type 2 diabetes and their evaluation of sleep habits. There is a high prevalence of sleep problems among patients with type 2 diabetes. Sleeping disorders, adequate amount of sleep received, and difficulty maintaining sleep did not affect the most recent A1C reported. Further studies are needed to assess the long-term effect of sleep habits on glycemic control and quality of life in patients with diabetes.

53. TRAN N, YU J

Characterization of Rab10 Conditional Knock Out

Max Planck Florida Institute for Neuroscience

ABSTRACT:

Gene inactivation is the best way to determine the biological role of a protein; however, many genes, such as Rab10, are critical to the survival of a mouse. Thus, knocking out a gene completely may result in a developmental lethality. To bypass this, a Cre/loxP system has been used to create conditional knock out mice, but it differs from conventional knock out strategies because the targeting vector is engineered so that no exons are lost from homologous recombination. The objective of this experiment is to validate that the endogenous protein Rab10 was conditionally knocked out correctly. Utilizing Western Blot techniques and RT-qPCR we will confirm that Rab10 was conditionally knocked out. Western blotting will confirm the presences of Rab10 proteins. RT-qPCR will confirm that Rab10 and actin (housekeeping gene) are correctly expressed from the extracted RNA in the wildtype, “after FLP” and “after Cre” animals. Rab10 is a Reticular Activating System (RAS) related GTPase. Researching this protein will give many insights to how the extrathalamic control modulatory system functions. Future research of this system could have profound effects of our current understanding of human attention—and more specifically—ADHD and ADD.

54. TROMP M, JACOB A, WILSON D, FITZPATRICK D

Maturation in Laminar Distribution of Inhibitory Neurons during Development

Department of Functional Architecture and Development of Cerebral Cortex, Max Planck Florida Institute for Neuroscience

ABSTRACT:

The emergence of functional properties in the visual cortex requires maturation of different circuit elements, including inhibitory neurons. GABAergic neurons of different molecular classes can play different inhibitory roles in cortical circuits; it remains unclear how visual experience affects the laminar organization of these inhibitory neurons. Here, we study changes in density of GABAergic neurons in the ferret visual cortex from eye opening to adulthood, finding that inhibitory neuron density decreases with the onset of visual experience. We focused on the changes in distribution of GABAergic neurons of known subtypes, finding that the relative fraction of somatostatin-positive neurons remains constant through development while that of parvalbumin-positive neurons increases with age. Together, these findings suggest that variation in inhibitory neuron composition may contribute to experience-dependent functional changes in visual cortex.

55. UNROE KA, FRUCHTERMAN TC, FRANSSSEN CL, FRANSSSEN RA

Decision to Care for Offspring by Maternal Rats Determined by Processing in the Frontal Cortex, Amygdala, and whether a she is a “Good” or “Bad” Mom

Department of Biological and Environmental Sciences, Longwood University

ABSTRACT:

What determines if someone is a good mother? Many would argue that good mothers care for and nurture their offspring without hesitation, whereas a bad mother might not. Our lab is investigating the decision making processes of mother Sprague-Dawley rats (*Rattus norvegicus*) presented with a litter of pups that contains either her own pups, a combination of her own and alien pups, or exclusively alien pups. Behavioral data suggests that mother rats will more rapidly retrieve and care equally for pups from a litter that contains more than 25% of her own pups than pups from a litter that contains 25% or fewer of her own pups. Intriguingly, not all mothers responded in the same way to our conditions. Though the largest number of mother rats retrieved their own pups faster than alien pups as expected, a second group of mothers would retrieve pups from any litter – regardless of own/alien ratio – without hesitation. Perhaps even more surprisingly, a third group of mothers would completely ignore pups from any litter, even if all of the pups were hers. Taken together, these data suggest that there are underlying neurological differences among mother rats. Using c-fos immunoreactivity as a marker, we have identified the frontal cortex and amygdala as regions responsible for the differences in retrieval times between litters containing more or less than 25% of the mothers' own pups. The connections between the neurological underpinnings of the decision to care for rats will be discussed in the context of what it might mean to be a good or bad mother.

56. VERDI G, SEAMON KM, CHRZAN CA, CARTER LC, SAMMONS KM, LEE J, SORIAGALVARRO JC, KABORE MN, CLELAND CL

Rat hindlimb nociceptive withdrawal response to heat and mechanical stimuli depends on the initial position of the paw but not stimulus location

Department of Biology, James Madison University

ABSTRACT:

Rats rapidly withdraw their hind limb in response to noxious stimulation, an example of the Nociceptive Withdrawal Response (NWR). Previous studies in spinalized or lightly anesthetized non-human mammals have shown that the direction of response depends on stimulus location; however studies had not yet been conducted in intact mammals. Our initial goal was to determine whether the location of heat and mechanical stimuli influences the direction of the NWR in intact rats. Based on previous studies we hypothesized that the response would be directly away from the location of the stimulus. Sprague-Dawley rats (n=57), placed on a glass or mesh plate, were stimulated with either localized noxious heat (infrared laser) or mechanical (Von Frey monofilament, 30 g needle) stimuli. Stimulation was directed to one of five small (1mm) spots (three aligned rostral-caudal, three aligned lateral-medial) on the left paw's plantar surface. The initial and final positions of the stimulated paw were recorded with a camcorder (60 fps @ 1080p) underneath the rat, with the difference representing the NWR movement response vector. In response to stimuli, rats rapidly withdrew and replaced (~50ms) their paw on the surface in all possible directions. Unexpectedly, stimulus location did not significantly influence the direction of the response ($p > 0.005$, ANOVA), falsifying our hypothesis. We noticed, however, that the initial paw position was variable, suggesting its location may influence the direction of response. Correlation between the initial location and the change in location rostral/caudally or medial/laterally revealed significant negative slopes ($p < 10^{-6}$, t-test) regardless of stimulus modality. Thus, if the paw was initially rostral, it would move caudal after stimulation; if the paw was initially caudal, it would move rostral. There are two possible sources of the information that the CNS could have used to determine the initial location of the paw – proprioceptive feedback or efference copy (a copy of the internal command the rat used to place the foot in its current location). To distinguish between these hypotheses, we placed the stimulated paw

on an independently movable glass plate and then dissociated proprioceptive from efference information by repositioning the rat's stimulated paw just prior to stimulation. Preliminary results (n=4) suggest that proprioceptive feedback informs the CNS about initial paw location. That is, if the paw was initially rostral and we repositioned it more caudal, then the direction of NWR became more rostrally directed, consistent with proprioceptors but inconsistent with efference copy (in which case the direction of movement of the paw should be unaffected by the re-positioning of the paw). Taken together our results suggest the CNS in intact rats uses proprioceptive information about limb posture, but not stimulus location, to program the direction of the NWR movement.

57. VOISIN KL, BARRY SM, MCGINTY JF

Inhibition of SRC Family Kinases Prevents the Suppressive Effect of BDNF on Cocaine-seeking

Department of Biology and Program in Neuroscience, College of Charleston; Department of Neurosciences, Medical University of South Carolina

ABSTRACT:

Relapse is a persistent problem in the treatment of human addiction. Animal models of relapse indicate that neuroadaptive changes in reward circuitry during cocaine self-administration underlie relapse to drug-seeking behaviors. Implicated in relapse is dysregulation of the neuronal pathway from the prefrontal cortex (PFC) to the nucleus accumbens (NAc). Our lab has shown that an infusion of brain-derived neurotrophic factor (BDNF) in the dorsomedial PFC, specifically prelimbic cortex, of rats directly following cocaine self-administration attenuates reinstatement of drug seeking. This effect is reversed by the inhibition of the BDNF receptor, glutamate receptors, or the members of the associated signaling cascades. This implies that the interaction between glutamate-mediated activity and tyrosine receptor kinase B (TrkB) signaling is central to BDNF's effect on drug-seeking. Src family kinases (SFK) activate TrkB and phosphorylate glutamate receptors, linking the two signaling pathways. Thus, we investigated whether infusing a selective SFK inhibitor, PP2, into the dorsomedial PFC prior to BDNF infusion would prevent BDNF's ability to attenuate relapse. PP2 blocked the suppressive effect of BDNF in both context-induced relapse after one week and cue-induced reinstatement following extinction. Following this, the rats were sacrificed and the brains extracted and cannulation placements were analyzed. Further investigation is being conducted to determine whether cocaine induces deficits in the expression of phospho-SFK in the dmPFC and if such deficits are reversed by BDNF. These data definitively support the role of Src family kinases in BDNF's ability to suppress drug-seeking behaviors in rats with a cocaine self-administration history through modulation of associated signaling cascades.

58. VOLLMER K, PATEL N, RUSCIO M, KOREY C

Central Nervous System Neuroanatomy of the Snapping Shrimp, *Alpheus angulosus*: Towards a Model of Adult Neurogenesis

Department of Biology, Department of Psychology, Program in Neuroscience, College of Charleston

ABSTRACT:

Unlike the adult vertebrate central nervous system (CNS), the plasticity of the adult invertebrate CNS allows for the natural systemic reorganization of the system post injury. Invertebrate systems possessing regenerative abilities provide a simple and tractable experimental system for exploring neural plasticity. The snapping shrimp, *Alpheus angulosus*, is a small crustacean with bilaterally asymmetric claws that serve distinct behavioral and sensory functions. If the large claw is lost, the organism switches handedness, transforming their small pincer claw into a large snapping claw while simultaneously developing a small claw on the contralateral side. To better understand how the CNS adapts to this radical change in body composition, it is necessary to distinguish areas of the poorly characterized CNS of *A. angulosus*. Through obtaining coronal and horizontal sections and staining them with Anti-Synapsin, we were able to identify distinctive areas within the CNS. We used previous literature on spiny lobsters and crayfish to help us identify the optic lobes, olfactory lobes, antennal neuropil, and thoracic ganglia. We will use this information to create a three dimensional

model and identify areas of adult neurogenesis of the snapping shrimp brain. Due to previous findings in spiny lobsters, we will investigate whether neurogenesis occurs via neural stem cells within the olfactory lobes. We will also explore whether sensory system reorganization is present within the thoracic ganglia during claw transformation.

59. WILLIS D, ASKEW A

Retention of Conflict-Induced Avoidance Behavior in Male Syrian Hamsters

Department of Psychology, Presbyterian College

ABSTRACT:

This experiment will use the Conflict Alleyway to investigate the long-term retention of post-conflict avoidance in defeated male Syrian hamsters. The aim of the experiment is to determine whether equating the number of defeat experiences will yield long-term retention of avoidance when tested 7 and 14 days after post-defeat trials. It is possible that the apparatus used in this study, the Conflict Alleyway, might be utilized to establish a model of recurrent stress.

60. YOUNG L, STICKLE, M, WILLIAMS DC

The Role of Calcium in ROS-Mediated Neurodegeneration in *C. elegans*

Department of Biology, Coastal Carolina University

ABSTRACT:

Neurodegeneration has significant impacts on human health, but the molecular mechanisms of degeneration are not well understood. Our lab uses the model organism *C. elegans* to study the genes and molecules involved in the degeneration process. Specifically, we trigger reactive oxygen species (ROS)-mediated neurodegeneration using the optogenetic photosensitizer KillerRed. We previously found that ROS-mediated cell death is independent of the worm ryanodine receptor, which is encoded by the gene *unc-68*. As this gene has been shown to be necessary for other paradigms of neurodegeneration, our results suggest there are multiple pathways of neurodegeneration. We are expanding our genetic analysis by testing the requirement of other genes involved in intracellular Ca^{2+} signaling as well as using pharmacological perturbation. Through this genetic and pharmaceutical dissection, we hope to further define the role of Ca^{2+} in ROS-mediated neurodegeneration.