

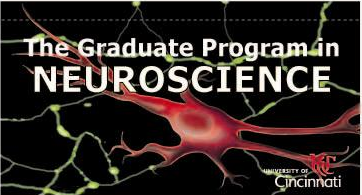
**3rd Annual mGluRs**

**Midwest/Great Lakes Undergraduate**

**Research Symposium in Neuroscience**

**Hosted by The College of Wooster**

***Generously Sponsored by:***





**mGluRs 2011 Schedule**

8:30AM— 9:00AM Registration Wishart Lobby

Breakfast

9:00AM Welcome by Provost Carolyn Newton Lean Lecture Hall

9:15AM— 10:15AM Breakout Session I:

1. Graduate School Panel Wishart 104

Dr. Fred Minnear

West Virginia University

Dr. Jim Eliassen

University of Cincinnati

Dr. A. Courtney DeVries

The Ohio State University

1. Medical School Panel Wishart 101

Erin Wright, College of Wooster ‘07

Medical student North East Ohio Medical University

Dr. Paul Bonvallet

College of Wooster Pre-Health Advisor

Dr. Cara M. Constance

Hiram College Health Science Board Chair

1. Skype Conversation with NSF Wishart 102

Dr. Diane M. Witt, Cluster Leader & Program

Director, Neural Systems Cluster

Integrative Organismal Systems

10:15AM— 10:30AM Coffee Break Wishart Lobby

10:30AM— 11:30PM Student Platform Presentations Lean Lecture Hall

* Melissa Ruddy, Baldwin-Wallace College
* Elizabeth Schock, Wittenberg University
* Lauren Helton, Thomas More College

11:45PM— 12:30PM Buffet Style Lunch

12:30PM— 1:30PM Keynote Speech: Dr. A. Courtney DeVries Lean Lecture Room

*Social Influences on the Brain*

1:30PM— 2:30PM Breakout Session II:

1. Alternative Careers in Science Wishart 102

Maryalice Yakutchik Wensel

MA, Creative Writing

Science writer for John Hopkins Medical

Ray Gaines, College of Wooster, ‘07

Research Assistant Lerner Research Center,

Cleveland Clinic

Laura Grimm, College of Wooster ‘82

MS, Plant Pathology, OSU

8th grade science teacher, Dalton Intermediate

Ann Mowrey, College of Wooster ‘82

MS, Biomechanics, Purdue University

High school Physics teacher, Bay High School

2. Neuroscience Pedagogy Wishart 104

Faculty discussion of undergraduate research

2:30PM— 4:00PM Poster Session and Dessert Freedlander Lobby

* Session One from 2:30— 3:15PM
* Session Two from 3:15— 4:00PM

4:00PM— 4:15PM Wrap-up, Thank you and Goodbye Lean Lecture Hall

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**A Note about our Keynote:**

Dr. A. Courtney DeVries will be discussing:

*Social Influences on the Brain*

Dr. DeVries is a Professor in the Departments of Neuroscience and Psychology and is associated with the Institute of Behavioral Medicine Research at The Ohio State University. Her graduate training occurred at the University of Maryland and her postdoctoral training at the National Institutes of Mental Health

Dr. DeVries studies the effects of social stress on the histological and behavioral consequences of experimental stroke (focal cerebral ischemia) in mice. Among the stroke-induced behavioral alterations assessed are somatosensory function, cognitive function, social interaction, sexual motivation, anxiety, and depression. Additional research interests include studying the role of stress hormones in motivated behaviors such as social bonding and drug-seeking behaviors. Students can expect to learn skills in animal behavior assessment, small animal surgery, neurosurgery, histology, blood sampling techniques, hormonal manipulations, microdialysis, as well as radioimmunoassays and enzyme-linked immunosorbent assays of blood factors.**PLATFORM PRESENTATIONS**

**1. Lauren Helton1, Jaimee Glasgow2, John Cunha2, Ruslan Tiniakov2, Allen Samarel3, Yevgeniya Koshman3, and Karie Scrogin2**

1Department of Psychology, Thomas More College, 2Department of Pharmacology, Loyola University Stritch School of Medicine, 3The Cardiovascular Institute, Loyola University Stritch School of Medicine

**RATS WITH CONGESTIVE HEART FAILURE DEMONSTRATE A DECREASED ABILITY TO ACQUIRE EXTINCTION TRAINING**

Over 1.2 million people in the United States incur myocardial infarction (MI) each year. Of these, 30-40% develop anxiety or depression. Dickens et al. 2008 shows that this can be a deadly combination, as individuals who develop post-MI depression are more likely to die a sudden cardiac death than those who have pre-existing depression. To more effectively treat this subset of patients, the present study aimed to create an animal model of post-MI depression in Sprague-Dawley male albino rats (n=19). These rats underwent an 8-week procedure, beginning with fear conditioning operating on a delayed discriminatory paradigm. Then the rats experienced either coronary artery ligation surgery (to induce MI) or a sham surgery. After the rats had time to heal, a select number were implanted with radio-telemetry probes to measure heart rate and blood pressure. After recovering from surgery, the rats underwent extinction and recall of the initial fear conditioning and freezing behavior, heart rate, blood pressure and fecal boli data were measured. For total freezing behavior during extinction, there was a significant main effect of time and a time by MI interaction for both the CS+ and the CS-, indicating that rats who experienced MI displayed more anxiety-like behavior. Because we were able to create a significant difference in extinction between Sham and MI rats, this model could potentially be used to examine the underlying neurobiology and the effects of treatment of post-MI depression and anxiety so that we can better care for those patients and decrease the mortality rate.

**2. Marissa Ruddy**

Neuroscience and Biology, Baldwin-Wallace College

**THE ROLE OF THE PHOSPHATASE AND TENSIN HOMOLOG IN THE DEVELOPMENT OF AUTISTIC-LIKE FEATURES IN RATS**

Autism is a neurodevelopmental disorder characterized by impairments in social approach, verbal and nonverbal communication, and repetitive and ritualistic behaviors. The amygdala undergoes abnormal development in autistic individuals, and dysfunction in the amygdala has been hypothesized to cause secondary abnormalities through a disruption in cell firing to other interconnected regions of the autistic brain, such as the hippocampus, cerebellum, and inferior olive. Genetics is a major factor leading to autism, with heritability of the disease at over 90%. PTEN, a gene that encodes the PTEN protein and regulates the PI3K/Akt/mTOR signaling pathway plays a critical role in normal growth and development. PTEN disruption causes defects that are also comorbid with autism, such as mental retardation, macrocephaly, seizures, ataxia, and anxiety. In this study, PTEN antisense was intra-cranially administered into the basolateral amygdala of young rats between 25-35 days old and significant impairment was found in social approach, social communication, and repetitive behaviors in adolescence. The impairments in reciprocal social interaction, communication, and repetitive behaviors found in the PTEN antisense rats is comparable to the key characteristics of autistic individuals, indicating that PTEN may play a crucial role in the development of autism spectrum disorders.

**3. Elizabeth N. Schock, Windsor C. Ford, Michelle L. McWhorter**

Biochemistry & Molecular Biology Program, Wittenberg University

**THE EFFECTS OF CARBARYL ON NERVOUS SYSTEM DEVELOPMENT IN DANIO RERIO**

In the United States, Sevin brand insecticide is one of the most commonly used insecticides. The active ingredient in Sevin, carbaryl (1-napthyl-N-methylcarbamate) is a known acetylcholinesterase (AChE) inhibitor which prevents the breakdown of acetylcholine to acetate and choline at the synapse. Although carbaryl successfully causes the death of insects by paralysis, it has also been shown to have negative effects on the development of several non-target species. To study the full range of effects of carbaryl on non-target species, zebrafish (Danio rerio) were used to study neuronal development. RNA in situ hybridization against gefilitin 1, a neuronal marker, showed that carbaryl causes a statistically significant decrease in the number of neurons present at 24, 36, and 48 hours post fertilization. In order to determine why this decrease is observed, in situ hybridizations were performed with the RNA probe gata3, a non-neuronal ectoderm marker. The results indicate that while neuronal ectoderm is affected, the non-neuronal ectoderm is largely unaffected by the carbaryl. Additionally, Terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) assays showed that carbaryl is responsible for an increase in apoptosis. This is one possible explanation as to why there are fewer neurons present in carbaryl treated embryos. Future research will look to determine if the cells that are dying are neurons. Also, in situ hybridizations against gefiltin 1 will be performed on AChE mutant embryos. This will help determine the non-acetylcholinesterase effects of carbaryl in the developing nervous system.

**POSTER PRESENTATIONS**

**SESSION ONE -- 2:30-3:15 PM**

**1. Merissa Acerbi, Lindsey Cunningham, Verner Bingman & Cordula MoraJ**

Scott Center for Neuroscience, Mind and Behavior and the Department of Psychology, Bowling Green State University

**THE GOLDEN COMPASS: DETECTION OF MAGNETIC INCLINATION WITH A NOVEL CONDITIONING PARADIGM**

The ability of homing pigeons to return to their loft from places they have never been to before has fascinated scientists and laymen alike for centuries. As true navigators they both need a map and a compass to be able to find their way. It is well established that homing pigeons, like migratory birds, possess an innate magnetic compass to determine direction. But unlike the type of magnetic compass used by humans, it is an inclination compass that measures the angle between the magnetic field vector and the Earth's surface. Recent work with migratory birds has indicated that the avian magnetic compass is light mediated and appears to be based on a chemical radical-pair mechanism with magnetic information mediated to the brain via a visual pathway and processed in a forebrain area called Cluster N. There is, however, also evidence from other migratory species that magnetic direction may be detected with iron-based mechanoreceptors in the olfactory epithelium. The goal of this study was to develop a novel conditioning paradigm that required pigeons to solve a spatial task based on magnetic inclination cues to investigate the nature of the pigeon magnetic compass. Our results so far show that the pigeons are clearly able to discriminate inclination values between 0 and 90 degrees. We next plan to conduct impairment experiments to identify whether pigeons have a light-mediated and/or iron-based magnetoreceptor and whether there is an equivalent area to the Cluster N in this species' forebrain.

**2. Ashley Dawes, Ana Godonoga, Promise Kamanga, Theresa Ford & Amy Jo Stavnezer**

Educational Assessment, Department of Psychology. The College of Wooster

**INTEGRATING THEORY AND PRACTICE: DEVELOPING AN ASSESSMENT FRAMEWORK FOR EXPERIENTIAL LEARNING PROGRAMS AT THE COLLEGE OF WOOSTER.**

The human brain plays a crucial role in the process of experiential learning (EL), as it is responsible for information gathering (sensory cortex), integrating and deciphering this information (temporal integrative cortex), creating novel ideas (frontal integrative cortex) and acting on those ideas (motor cortex). With such an important connection between brain function, education and the process of human learning, one of the current strategic priorities at The College of Wooster is 'Integrating Theory and Practice' through EL. This allows students the opportunity to connect theory and practice to a 'real world' project and learning experience. In the following study we identified where and how much 'Integrating Theory and Practice' occurs at the College; similarities and differences between programs in practices, goals, and outcomes in relation to six subcategories of the College of Wooster Graduate Qualities and the National Society for Experiential Education's (NSEE) Eight Principles of Good Practice; and developed a broad assessment framework for 'Integrating Theory and Practice' experiences at the College. From our results, Wooster students indicate that EL experiences helped achieve many of the identified learning goals such as enhanced critical thinking, academic self-confidence, and oral and written skills. Additionally, statistical analysis demonstrates that participants in EL programs were likely to have a higher overall grade point average. However, one shortfall seen among most of these programs is the lack of reflective assessment on experience. Overall, it is clear that EL programs are an important and effective method for increasing knowledge, developing skills, and clarifying values for students.

**3. Kellie Gross & Anthony Windebank**

Neuroscience Department, Ohio Wesleyan University

**DEVELOPING A LENTIVIRAL VECTOR FOR GLYCODELIN-A EXPRESSION**

Inflammation and immune response after spinal cord injury (SCI) result in secondary damage characterized by an expansion of the initial lesion. In order to promote functional recovery after injury, therapies designed to inhibit these mechanisms are being developed. Glycodelin-A (GdA), a glycoprotein shown to induce apoptosis in T cells, may be useful in preventing some of the immune mediated aspects of secondary damage. However, a viable method of sustained GdA delivery to the CNS does not exist. A lentiviral vector expressing GdA that could be used to transduce mesenchymal stem cells for implantation into the subarachnoid space may offer a solution to this problem. To further the development of this method, the biological activity of GdA expressed from a lentivirus was studied. T cells were transduced with a GdA lentiviral vector and examined for signs of apoptosis using flow cytometry. Analysis showed no evidence of apoptosis being induced in the T cells expressing GdA. This result suggests that the GdA expressed from the lentiviral vector is not biologically active. Lack of biological function may be due to the inability of T cells to properly glycosylate GdA after translation. Future work may seek to compare the glycosyltransferase activity in endometrial cells that endogenously produce GdA to that in T cells.

**4. Priscilla Haug & GuQi WangMcColl**

Lockwood Laboratory Cannon Summer Scholar Program, The College of Wooster

**EXPERIMENTAL THERAPY FOR MUSCULAR DYSTROPHY**

Muscular dystrophy (MD) is a muscle disease that that is caused by the lack of the muscle protein dystrophin. This causes the structure of the muscle cell membrane to become unstable, resulting in a decrease in the signaling proteins neuronal nitric oxide synthase (nNOS) and nitric oxide (NO). The levels of nNOS and NO are very low or undetectable in patients with MD. Potential treatments for this disease include pharmacologically increasing NO levels to dystrophic muscles as well as decreasing cellular calcium levels. This research study examined the effects of the new nitric oxide donor, 2-methyl-2-[(nitroxy)methyl]pentyl nitrate (MMPN). Human skeletal muscle cells were dosed with varying concentrations of MMPN to test its effects on reducing cellular calcium, as well as its effects on cell differentiation and proliferation. Additionally, the influence of the compound on exercise endurance using the rotarod performance test in mice was also examined. The new compound was found to reduce cellular calcium levels more than commercially available drugs without causing cytotoxicity. It was also noted that MMPN enhanced both cell proliferation and differentiation in human skeletal muscle cells. Finally, the results of the rotarod test showed that the compound did not cause any muscle weakness in the animals and allowed them to stay on the rotating rod for longer times than the mice treated with commercially available drugs. These results show that this compound is a good candidate drug to be put on the market for treatment of MD and research on the drug should be continued.

**5. Carrie Henderson, Audreyana Jagger, Nicole Rose, & Cathy Pederson**

Biology Department, Wittenberg University

**THE EFFECTS OF CHILDHOOD ABUSE ON AMYGDALA VOLUME**

Childhood abuse can cause serious lifelong effects. Comparisons of amygdala volume were conducted in participants who suffered severe child abuse to those without an abuse history. Participants were right handed women, 20 to 25 years old, with no serious medical problems and no illicit drug use for the past 3 months. They were given the Childhood Trauma Questionnaire (CTQ) and the Wonderlic Personnel Test. In addition, MRI scans were taken of each participant's brain. The hypothesis was that childhood abuse has a negative effect on amygdala volume. In order to test this hypothesis, left amygdala volumes were traced using the MIPAV program in both non-abuse (n=12) and abuse groups (n=14). The PASW program was used to run univariate ANOVAs. In order to ensure childhood abuse was the only significant factor between control and experimental groups, univariate ANOVAs were run to determine group differences on Wonderlic scores (IQ), age, years of education, number of alcoholic drinks per year, packs years smoking and total marijuana joints (p>.05). By design, there was a significant difference between groups for childhood abuse as judged by the average emotional, physical and sexual abuse scores from the CTQ F (1, 25) = 546.09; p < 0.001.When comparing amygdala results between groups, the abuse group had significantly smaller amygdala volumes than the non-abuse group, F (1, 25) = 10.525; p = .003. The results then support the hypotheses that childhood abuse may decrease the volume of amygdala in adults.

**6. Kristen Hodge & Robyn Siegel-Hinson**

Psychology Department, Rochester College

**MULTITASKING: MYTH OR MIRACLE?**

The effectiveness of multitasking has been a common debate amongst psychologists. In the current study, the researcher evaluated the effects texting has on students' ability to recall information within a classroom setting. The researcher measured the distractibility of texting compared to the distraction of a number search. Approximately 70 participants will be tested. A pilot study has already been conducted and the full research is underway. In the control group, the participants watched a pre-recorded video of the researcher giving a lecture. Another group of participants were instructed to attend to the same lecture while texting. The third group watched the same lecture as the previous groups, but was required to complete a number search. It is predicted that texting is a far greater distraction than the number search that was distributed. This research demonstrates the negative influence divided attention has on the classroom experience.

**7. Anne E. Homan, Allison J. Hensler, & E. Lee Coates**

Neuroscience Program and Biology Department, Allegheny College

**EFFECTS OF VITAMIN A DEFICIENCY ON OLFACTORY RECEPTOR RESPONSES TO ODORANTS IN MICE**

Vitamin A plays a critical role in regulating cellular functions such as neurogenesis and neuron replacement in epithelial tissues. All-trans-retinoic acid (ATRA), an oxidized derivative of vitamin A, has been implicated as a signaling molecule that regulates the maturation of olfactory neurons. Studies of vitamin A-deficient (VAD) olfactory epithelia reported an increased population of immature neurons that were arrested in the process of differentiation due to the absence of retinoic acid and the necessary signaling molecule. The objective of this study was to determine how vitamin A deficiency affects the olfactory receptor response to a series of odorants in lecithin:retinol acyltransferase (Lrat -/-) knockout mice. Lrat -/- mice lack the ability to store normal reserves of vitamin A and should become deficient a few months after being placed on a VAD diet. Electro-olfactograms (EOGs) were utilized to measure summated olfactory receptor responses to 1,8 cineole, D-carvone, limonene, and propyl acetate in age-matched wild type and VAD mice. We found that Lrat-/- mice fed the VAD diet for 1 month demonstrated reduced responsiveness to odorants, while it appeared that mice fed the VAD diet for 2 months exhibited a recovery of olfactory ability; however, these trends did not reach statistical significance. These results indicate that either the mice were not VAD after 2 months or that another pathway is utilized to provide vitamin A in Lrat -/- mice. These results were unanticipated based on the evidence that VAD mice contain a smaller population of mature olfactory neurons.

**8. L.R. Jasko, L.M. Neldon, C. Hamilton, E. Mills, & C.M. Constance**

Biology Department, Hiram College

**CHARACTERIZATION OF BEHAVIORAL RHYTHMS AND GENERATION OF TRANSGENIC XENOPUS LAEVIS TO EXAMINE CLOCK FUNCTION**

The biological clock molecular mechanism has been conserved throughout evolution, but there are differences in the expression of particular clock genes. period2 (per2) is a clock gene that is expressed differently in Xenopus laevis and Xenopus tropicalis. In X. tropicalis, per2 is clock regulated, but in X. laevis, per2 is light regulated. We are currently investigating the importance of the per2 gene in X. laevis. We have already established a behavioral assay that is used to monitor the behavior of X. laevis tadpoles. The behavior of the tadpoles is monitored using the Hitachi CCD camera which takes pictures of the tadpoles in the assay chamber every second for 3 to 6 days. A total of 12 out of 36 animals have displayed a circadian rhythm in behavior with a period length of 23.96. We will next establish the meganuclease transgenesis procedure in our lab using the cry-GFP meganuclease vector. We have successfully generated the cry-GFP transgene and cloned it into the meganuclease vector that will be used to inject the X.laevis embryos for transgenesis. Once this procedure has been established, we will generate a transgenic frog that overexpresses per2 in X. laevis, and measure the behavior of these animals. We will then be able to observe what will happen to the behavior when this gene is altered.

**9. Jemika Shrestha Kastee, Alison Casserly, Elizabeth Mills, Samuel McCarthy & Cara Constance**

Biology Department, Hiram College

**EXPRESSION OF CLOCK GENES IN THE BRAIN OF XENOPUS TROPICALIS**

The biological clock determines the timing of rhythms in behavior, physiology and biochemistry of organisms ranging from microorganisms to plants and animals. These rhythms are endogenous and occur once every 24 hours. Gene expression that defines the central clock mechanism is additionally influenced by external factors like light and temperature. Clock gene expression can be varied by changes in light that occur when crossing time zones or in shift work. Some of the central clock genes like period1, period2, bmal and neuropeptides like vasoactive intestinal polypeptide (VIP) and arginine vasopressin (AVP) can be used to monitor changes in the circadian clock. In this research, the above-mentioned circadian genes and neuropeptides were tracked in the Xenopus tropicalis brain using in situ hybridization in order to define where clock function is found in this species. Brain sections were collected every 4 hours for 24 hours. After being probed with radioactively labeled antisense RNA, these sections were exposed to film and analyzed. AVP was used as a marker for the suprachiasmatic nucleus (SCN) of the hypothalamus, which is the central clock in mammals. This neuropeptide showed strong labeling in the SCN region. The results of clock gene analysis show that expression of bmal, per1 and per2 overlapped in the hypothalamus as well as other regions of the forebrain and midbrain. Further analyses of these data to evaluate the timing of the expression of these clock genes are in progress.

**10. Gregory Norris & Robert Woodward**

Chemistry Department, The College of Wooster

**TARGETING BACTERIAL LIPOPOLYSACCHARIDE BIOSYNTHESIS: USING NATURE'S SCAFFOLD AS A PLATFORM FOR ANTIBIOTIC DESIGN.**

Pathogenic gram-negative bacteria, the cause of bacterial meningitis, are medicinally problematic due to the presence of a protective layer known as lipopolysaccharide (LPS). Embedded within the outer membrane, LPS provides a means in which bacteria can defend themselves against human defense responses. Bacteria devoid of these structures show little to no viability in vivo. We designed a carbohydrate-based chemical agent that disrupts the formation of LPS through the inhibition of an enzyme known as LpxC. While many small molecule inhibitors have been designed to target this enzyme, the production of analogs that mimic the natural substrate of LpxC has been very limited. We are currently exploring methods to install a hydroxamic acid functional group, which will coordinate to the Zn2+ ion in the active site of LpxC. Should this urea-based analog prove stable in the presence of LpxC, we can then move forward towards further mimicking the natural substrate.

**11. Nate A. Parker, Ranjan Dutta, & Jacqueline Morris**

Department of Biology, Baldwin-Wallace College

**MICRORNA-MEDIATED CONTROL OF OLIGODENDROCYTE DIFFERENTIATION IN ZEBRAFISH**

MicroRNAs (miRNAs) are short ribonucleic molecules that act as post trascriptional regulators of target messenger RNA (mRNA) transcripts. miRNAs regulate various biological processes, however little is known about their role in the disease multiple sclerosis (MS). A common neural cell type that has been observed to be affected by miRNA is oligodendrocytes. Like most glial cells, the purpose of oligodendroctyes is the generation of a myelin layer to insulate and protect the axons, while increasing the speed at which nerve impulses propagate and flow along the cell's myelinated fibers. Since the myelin is targeted for degradation by immune cells within the brain during an episode of MS and etiology of the MS is not fully understood, investigating the differential expression of microRNAs in MS brains might provide the clues to understand how this disease progresses. In order to determine the role of the miRNAs associated with the MS brain, we microinjected morpholinos generated against miRNAs of interest in zebrafish embryos at the one cell stage. The findings in this study illustrate the fundamental role of miRNAs in oligodendrocyte differentiation, providing insight into early CNS development, differentiation, and repair.

**12. Marissa Ruddy**

Neuroscience Department, Baldwin-Wallace College

**THE ROLE OF THE PHOSPHATASE AND TENSIN HOMOLOG IN THE DEVELOPMENT OF AUTISTIC-LIKE FEATURES IN RATS**

Autism is a neurodevelopmental disorder characterized by impairments in social approach, verbal and nonverbal communication, and repetitive and ritualistic behaviors. The amygdala undergoes abnormal development in autistic individuals, and dysfunction in the amygdala has been hypothesized to cause secondary abnormalities through a disruption in cell firing to other interconnected regions of the autistic brain, such as the hippocampus, cerebellum, and inferior olive. Genetics is a major factor leading to autism, with heritability of the disease at over 90%. PTEN, a gene that encodes the PTEN protein and regulates the PI3K/Akt/mTOR signaling pathway plays a critical role in normal growth and development. PTEN disruption causes defects that are also comorbid with autism, such as mental retardation, macrocephaly, seizures, ataxia, and anxiety. In this study, PTEN antisense was intra-cranially administered into the basolateral amygdala of young rats between 25-35 days old and significant impairment was found in social approach, social communication, and repetitive behaviors in adolescence. The impairments in reciprocal social interaction, communication, and repetitive behaviors found in the PTEN antisense rats is comparable to the key characteristics of autistic individuals, indicating that PTEN may play a crucial role in the development of autism spectrum disorders.

**13. Matthew Smith and Sam Crish**

Neuroscience Program, The College of Wooster and Department of Pharmacology, Northeast Ohio Medical University

**A CHARACTERIZATION OF GLIOSIS, CELL DEATH, AND IMMUNE RESPONSE IN SECONDARY NEURODEGENRATION IN RAT CORTEX AND THE ASSESSMENT OF THE NEUROPROTECTIVE EFFICACY OF NGP1-01 FOLLOWING CONTROLLED CORTICAL IMPACT INDUCED TRAUMATIC BRAIN INJURY**

AbstractTraumatic brain injury (TBI) is a common result of head injury in both combat and peacetime accounting for a third (30.5%) of all injury-related deaths in the United States (CDC, 2011). A large percentage of the eventual clinical deficits resulting from this injury are caused by secondary degeneration, neuronal damage that occurs hours to months after the original injury (Brady S and Morfini G, 2010). Using immunolabeling and Western Blot techniques we sought to characterize changes in several neural and glial markers after we induced TBI using the controlled cortical impact (CCI) method in rats. Next, as calcium dysregulation (Lipton et al.,1999) and glutiminergic neurotoxicity (Arundine et al., 2004) has been implicated in the spread of secondary degeneration, we examined the effect of a single dose of the neuroprotective calcium channel/NMDA receptor antagonist NGP1-01 (Kiewert C, Van der Schyf et al., 2006) given one hour after cortical impact. After survival time of one week, we found that CCI elicited a loss of NeuN-positive cells in the tissue surrounding the impact site as well as increases in the astrocyte marker glial fibrillary acidic protein (GFAP) and Toll-like Receptor 2 (TLR2) â€“ indicating neuronal loss, gliosis, and an increased immune response. There was a trend for NGP1-01 treatment to slightly ameliorate neuron loss but this was not statistically significant. Results including NGP1-01 affect on gliosis and immune responses are pending.

**14. Nestor Matthews, Michael Vawter & Jenna G. Kelly**

Psychology Department, Denison University

**RIGHT HEMIFIELD DEFICITS IN JUDGING SIMULTANEITY: A PERCEPTUAL LEARNING STUDY**

Prior reports demonstrate that simultaneity is judged less precisely in the right visual field (RVF) than in the left visual field (LVF). The present psychophysical study was conducted to provide new information about why and when (i.e., the visual information stage at which) RVF deficits arise in simultaneity judgments. In experiment 1, participants judged either the simultaneity or the relative spatial frequency of Gabor targets in the right or left hemifield while distractors were randomly absent or present. When attention was not needed to exclude distractors, signal detection theory analyses revealed a RVF simultaneity deficit with an error pattern that implicates low RVF temporal acuity, not excessive RVF neural noise. Adding attentionally demanding distractors introduced a separate, significant RVF simultaneity deficit with error patterns that implicate the inappropriate integration of temporal asynchronies from distractor locations. Neither the distractor-independent RVF acuity deficit nor the distractor-induced RVF excessive spatial integration occurred for spatial frequency discrimination at the same retinal locations. In experiment 2, a perceptual learning procedure significantly improved RVF simultaneity judgments. The learning was task-specific but generalized to the untrained (left) visual field and to novel retinal locations. This observation implicates the simultaneity decision as the visual information stage that sets the limit on performance.

**SESSION TWO –- 3:15–4:00 PM**

**1. Ryan C. Brindle, Ly Q. Hong-Brown, Charles H. Lang & Sean D. Stocker**

Neuroscience and Psychology Department, Allegheny College

**ROLE OF MOTOR PATHWAY IN CENTRAL ANGIOTENSIN II SIGNALING**

The central renin-angiotensin system has been implicated in cardiovascular regulation and body fluid homeostasis. Although peripheral angiotensin II (Ang II) has been shown to activate the intracellular PI3K-Akt, Phospholipase C, and mammalian target of Rapamycin (mTOR) signaling pathway, central intracellular signal transduction mechanisms remain unclear. The present study examined the role of the mTOR pathway in central angiotensin signaling in CATH.a cells expressing Ang II receptors and in an in vivo rat model of Ang II induced thirst. Western blot analysis was utilized to detect levels of phosphorylated mTOR and its downstream protein targets S6K1 and 4E-BP1 in CATH.a cells after various time exposures to Ang II (100nM). Sprague-Dawley rats were implanted with intracerebroventricular (ICV) cannulas and administered Ang II (10ng/2Î¼L) to establish a baseline water intake. Rats were then pre-treated with Rapamycin (25Î¼g/2Î¼L), an mTOR inhibitor, and water intake was recorded after a second ICV Ang II injection. Phosphorylated mTOR did not change over the Ang II time course while level of phosphorylated S6K1 and 4E-BP1 increased at each time point when compared to time matched controls. Water intake was significantly reduced (p<.05) in rats pre-treated with Rapamycin. Taken together these results suggest a role for the mTOR pathway in central angiotensin signaling.

**2. Lindsey Cunningham, Merissa Acerbi, Verner Bingman & Cordula MoraJ.P.**

Scott Center for Neuroscience, Mind and Behavior and the Department of Psychology, Bowling Green State University

**TURNING UP THE INTENSITY: DETECTION OF MAGNETIC INTENSITY CONTOUR LINES IN A VIRTUAL MAGNETIC MAP**

Ever wonder how homing pigeons are able to return to their loft from distant and unfamiliar locations? Animal navigation is among the many scientific mysteries yet to be solved and the homing pigeon is one of the main model species for studying how animals find their way around. During homing, pigeons use a map to know where they are in relation to their loft and a compass to translate that position into a direction for flight. We still know very little about the map step of navigation in homing pigeons and other species capable of long distance navigation. One hypothesis is that pigeons possess a magnetic map, which is based on spatial information provided by the Earth's magnetic field. The Walker model proposes that positional latitude is easily determined by comparing magnetic field intensity at the release site to that at the loft. Longitude could theoretically be obtained by assessing how the direction of the steepest magnetic intensity slope has changed at the release site from that normally experienced at the loft location. Preliminary work by Mora and Bingman has demonstrated for the first time with a virtual magnetic map technique that homing pigeons are able to detect the direction of a simple magnetic intensity slope, thus fulfilling the main requirement of the Walker model for magnetic map navigation. The goal of this study is to determine whether pigeons can also be conditioned to discriminate the direction of the magnetic intensity contour lines in the same virtual magnetic map.

**3. Zac D. Daniels, Zackary C. Szabo, & Cathy L. Pederson**

Biology Department, Wittenberg University

**MARIJUANA'S EFFECT ON THE VOLUME OF THE HIPPOCAMPUS IN WOMEN**

Marijuana use is linked to deficits in short-term and episodic memory, abilities provided by the hippocampus. The study was designed to determine the extent, if any, of neuromorphological differences of the hippocampus depending on the use of marijuana. Twenty-four right-handed females between the ages of 20 and 41 were systematically selected from a group of 80 women in a database of women with MRI brain scans to eliminate confounding results. Participants were screened for age, packyears smoking, total drug use, number of drinks per year, and Wonderlic Personnel Test (IQ) using univariate ANOVAs (p>.05). The left hippocampus was traced on the MRIs using the MIPAV program. Next, univariate ANOVAs were run using PASW. By design, univariate ANOVAs revealed a significant difference between the total number of joints of marijuana smoked between the marijuana users and control group (F (2,21) = 3.681, p>.01). However, the women who used marijuana did not demonstrate any significant differences in hippocampal volume when compared to the control group (F (2, 21) = 0.641, p>.05). In conclusion, although the varying amounts of marijuana use did not significantly affect the volume of the hippocampus in the twenty-four women, this does not imply that marijuana has a neutral effect on the short-term and episodic memory.

**4. Stephen Ferguson, Reichard DG, Rosvall KA, Whittaker DJ, & Ketterson ED**

Department of Biology, College of Wooster

**DIFFERENTIAL EFFECTS OF SHORT- AND LONG-RANGE SONG ON BEHAVIOR AND TESTOSTERONE IN A MALE SONGBIRD**

Social interactions between conspecifics, such as auditory communication, can have profound impacts on animal behavior and neuroendocrine secretions. In songbirds, communication is heavily reliant on song, which can be broadly classified based on differences in amplitude: (1) low amplitude short-range song (SRS), used in close-proximity aggression and courtship displays, and (2) high amplitude long-range song (LRS), important in territory maintenance and mate attraction. SRS and LRS can also differ substantially in structure and complexity and can elicit very different behavioral responses from territorial males. However, whether these song classes differentially affect the activation of the hypothalamo-pituitary-gonad axis and behavior of male receivers is unknown. We presented free-living male dark-eyed juncos (Junco hyemalis) with simulated territorial intrusions consisting of 10 min of LRS or SRS playback and recorded their behavioral responses. Then, 15 min after playback ended, we captured each male and collected blood samples to measure post-intrusion testosterone (T) levels. Song type significantly impacted behavioral responses: males spent significantly more time near the speaker and flew significantly less during SRS playback than during LRS playback, indicating a more aggressive response to the SRS intrusion. Differences in both the behavioral and T responses to these two song classes will be discussed in relation to the function of each song class as well as how T responses to playback might differentially influence neural pathways for aggressive behavior.

**5. Melissa Haug & Jeffery Kline**

Department of Emergency Medicine at CMC, The College of Wooster

**USE OF FACIAL EXPRESSION TO PREDICT ILLNESS SEVERITY**

Chest pain and shortness of breath account for about 20 million ED visits per year in the US and may indicate a variety of life-threatening diseases. Life threatening illnesses activate the autonomic nervous system, which affects facial expressions. Studies show that facial expressions can be used to distinguish illness in patients and that angry facial expressions are associated with myocardial ischemia. The present study investigated the use of facial expression to distinguish between patients with life-threatening illness and those who are not as ill. The faces of forty-three adult patients (Mean age = 52) with a chief complaint of chest pain and/or shortness of breath were videotaped in response to three images, two funny and the other sad. The Facial Action Coding System (FACS) was used to score the patients facial reactions and diagnoses were recorded. The non-diseased patients had higher median Action Unit (AU) scores than the diseased patients indicating that the patients with less serious illness showed greater variability in facial expressions in this sample. The non-diseased group had a higher percentage of patients with AU scores above 0 for expressions representing Surprise, Frown, and smiles for funny images. For the sad image, there was considerable overlap for all facial expressions. A receiver operating characteristic curve determined how well the variability of the patients' facial expression diagnosed the patients with serious illness. The images of the cartoon and face were fair predictors of illness severity (area under curve = .67 and .65) while the sad image was not.

**6. Rebecca Haug, Mark A. Hirsch, Danielle Englert, Sanjay Lyer, Margaret Quinlan, Sarah Cashdollar, & Mohammed Sanjak**

Neuroscience Program, College of Wooster and Carolinas Rehabilitation, Carolinas Medical Center, Department of Neurology, University of North Carolina

**RELATIONSHIP OF EXERCISE TO BURDEN AMONG INDIVIDUALS WITH EARLY STAGE PARKINSON'S DISEASE AND THEIR SPOUSES**

Parkinson's disease (PD) is a chronic, progressive, neurodegenerative condition affecting over 1 million people in the United States and over 6 million people worldwide. This disease affects the nigrostriatal dopaminergic neurons, leading to symptoms such as tremor, rigidity, bradykinesia, and postural reflex impairment in patients. Exercise is a relatively inexpensive and safe intervention that leads to a decrease in symptoms and higher quality of life for the patient, which may also decrease the burden felt by the caregiver. Historically, PD clinical care has primarily focused on interventions for the patient, however recent studies suggest that, in the long-term, spousal caregivers of persons with PD can experience high levels of morbidity and mortality. The relationship between patient exercise and level of caregiver burden has not been examined, therefore we conducted this study to determine if patient exercise will benefit both the PD patient and the caregiver. Patients with early stage PD and their caregivers were enrolled in the study. Standardized tests of caregiver burden, depressive symptomatology, quality of life and PD motor function were administered to patients and caregivers, as well as open ended interviews to assess the experience of exercise and any associated caregiver burden. Individuals with PD at early stages of the disease displayed heterogeneous levels of physical function and stigma. The standardized instruments of caregiver burden did not capture caregiver burden in the caregivers of these patients with early stage PD, however exercise was viewed as being supportive for the patient and the caregiver.

**7. Hilary Szabo, Jaclynn Garry, & Cathy Pederson**

Biology Department, Wittenberg University

**EFFECTS OF NICOTINE ON THE NUCLEUS ACCUMBENS WHEN COMPARING FEMALE SMOKERS AND NON-SMOKERS**

No studies have examined the effects of nicotine exposure on the volume of the nucleus accumbens. The hypothesis of this study was that smokers would have an increased volume of the nucleus accumbens compared with non-smokers. Participants were right-handed women between 22 and 40 years old and did not have any major illnesses. In order to qualify, participants could not have significant medical issues, been unconscious for more than 5 minutes, or had illicit drug use in the past 6 months. Members of the control group (n=12) were all non-smokers, while those in the experimental group (n=12) smoked between 6- 26 pack years (p<0.001). There was no significant difference in marijuana exposure, number of alcoholic drinks in the past year, body mass index, intelligence, or working memory between groups (p<.05). In order to determine the significance of each variable, univariate ANOVAs and paired sample t-tests were run using the PASW program. The MIPAV computer program was utilized to determine the volume of the nucleus accumbens of all participants on MRI scans. There was no significant difference in nucleus accumbens volume between groups (p>.05). A paired sample t-test revealed no relationship between the volume of the nucleus accumbens and nicotine exposure t(23)=.004, p=.948. Based on these data, smoking did not appear to have a significant impact on the volume of the nucleus accumbens.

**8. Zane Kalik, Joshua Mike, Cassandra Doinoff, Jozsi Jalics, Mark Womble, &Carl Sims**

Departments of Biological Sciences and Mathematics and Statistics, Youngstown State University

**SEX AND REGIONAL DIFFERENCES IN RABBIT L-TYPE CALCIUM CURRENT LEVELS AND MATHEMATICALLY PREDICTING ACTION POTENTIAL DURATION AND ARRHYTHMIA VULNERABILITY.**

Sex and apex-base differences in cardiac L-type calcium current (ICa-L) levels have been shown to modulate vulnerability to arrhythmogenic early afterdepolarizations (EADs) in a drug-induced model of Long QT Syndrome Type 2 (LQTS2) in adult rabbit heart left ventricular epicardial myocytes. It is unknown whether similar gender and regional differences in ICa-L exist in the right ventricle. To investigate the role of ICa-L in of EAD genesis, the apex-base distribution and biophysical properties of the calcium current in adult male and female right ventricles were assessed by the patch clamp technique. We found that ICa-L density measured at 0mV was 84.6% higher in female (7.2Â±0.83 pA/pF, n=8) compared to male base myocytes (3.9Â±0.38, n=12, p<0.001). Analysis of regional differences in female right ventricle revealed 60.1% higher current density at the base (7.3Â±0.83 pA/pF, n=8) compared to female apex myocytes (4.56Â±0.45 pA/pF, n=9, p<0.02). There were no significant differences in ICa-L density in apex myocytes and no significant gender or regional differences in the voltage dependence of ICa-L activation and inactivation. These data were incorporated into a modified version of the Luo Rudy mathematical model of cardiac action potentials. A direct correlation was found between ICa-L density and action potential duration (APD) under 50% suppression of the rapidly inactivating delayed rectifier potassium current, to mimic LQTS2. Additionally, a direct correlation between APD and EAD genesis was found. Taken together, the biophysical data and the mathematical predictions support the hypothesis that higher levels of ICa-L contribute to EAD genesis.

**9. Matthew Kirchner, Brett English, Pratik Pandharipande, Tim Girard, Wesley Ely, & Carrie Jones**

Department of Neuroscience, The College of Wooster and Vanderbilt University Medical Center Department of Medicine, Division of Allergy, Pulmonary, Critical Care Medicine Department of Anesthesiology, Surgical Critical Care Department of Pharmacology, Center for Neuroscience Drug Discovery.

**EFFECTS OF THE M1-SELECTIVE POSITIVE ALLOSTERIC MODULATOR (PAM), BQCA, ON A CHOLINERGICALLY-MEDIATED, HIPPOCAMPAL DEPENDENT MEMORY TASK OF MEMORY LOSS**

Cholinergic pathways are networks of neurons that fire using acetylcholine. These pathways are involved in a wide variety of functions including muscle contraction, salivation, vasorelaxation, learning, and memory. Specifically, the M1 cholinergic receptors in the striatum, cortex, and hippocampus have been found to be important in the formation of long term memories as well as attention. It has been shown that decreased activity in cholinergic systems facilitates delirium and cognitive impairment. Our study has examined the positive impact of BQCA, an M1 positive allosteric modulator, on the cholinergic system in the brain. We examined this by looking at mice and their freezing behavior in a contextual fear conditioning experiment after being administered the drug at various doses. If an animal freezes for a high percentage of the testing time, then it has successfully learned the conditioning well. BQCA mice ultimately showed more freezing behavior than vehicle mice. The dose response curve for the freezing behavior of mice demonstrated less freezing behavior in mid-range levels of BQCA doses. BQCA at low and high end doses show the most freezing behavior. It can be inferred that mice administered BQCA showed better acquisition of memory and better attention than vehicle mice due to their demonstration of higher percentage of freezing behavior.

**10. Megan Mcconnell & Richard Edwards**

Department of Music, Ohio Wesleyan University

**PROFESSIONAL BACKGROUND SURVEY IN NEUROMUSICAL RESEARCH**

The neuroscience of music has been a growing area of interest for researchers across many fields of study (Edwards and Hodges, 2008). The purpose of this study is to examine the types of musical and educational backgrounds that may lead to a career in neuromusical research. MethodsA survey was conducted among the participants of a triennial, international conference, The Neuroscience of Music IV: Learning and Memory, at The University of Edinburgh, Scotland (June 9-12, 2011). The survey was also distributed to the recipients of the Neuromusic News, a bi-monthly email newsletter that highlights recent international neuromusical research. Both the conference and the newsletter are supported and produced by the Mariani Foundation. Results & DiscussionThe degree areas leading to participation or interest in neuromusical research is widespread. The most common characteristic among the respondents was that 89% described themselves as musically trained. A total of 27 different undergraduate degrees and 27 different graduate degrees were represented in the professional backgrounds of the survey respondents. The most commonly reported undergraduate degree programs were Psychology (39%), Music (20%), and Biology (9%). The most commonly reported graduate degree programs were Psychology (44%), Music (19%) and Neuroscience (15%).Limitations of the study include the small sample size of the survey respondents (n = 107), the lack of clarification between respondents conducting research and those who are interested in neuromusical research, and the similar wording between items 4 and 9 which may have caused inconsistent categorical themes.

**11. Andrew Mickley, Kyle Ketchesin, Gina N. Wilson, Jennifer Remus, Orion Biesan, Anthony DiSorbo, Zana Hoxha, Joseph Luchsinger & Suzanna Prodan**

Neuroscience Program, Baldwin-Wallace College

**LATENT INHIBITION OF A CONDITIONED TASTE AVERSION (CTA) IN FETAL RATS IS AGE-DEPENDENT.**

CTAs may be acquired when an animal consumes a novel taste (Conditioned Stimulus = CS) and then experiences the symptoms of poisoning (Unconditioned Stimulus = US). When later re-exposed to the CS, the animal will avoid the taste or reduce consummatory oral-facial movements. In the current studies we sought to determine if a CTA could be diminished by non-reinforced pre-exposure to a CS (i.e., latent inhibition; LI) in fetal rats. We injected E17 or E18 pregnant Sprague-Dawley rats with 100% allicin (pure garlic extract; i.p.) or an equal volume of physiological saline. One day later the pregnant dams received a second injection of the CS, allicin (i.p.) followed by either LiCl (81 mg/kg, i.p.; the US) or a control injection of saline. Forty-eight hours later (either E20 or E21) pups received oral lavage with 0.1% allicin and observations of ingestive orofacial motor responses (mouthing and licking) were recorded. If allicin had been paired with LiCl in utero, E21 fetuses exhibited a conditioned suppression of orofacial movements, indicative of an aversion to this taste. However, pre-exposure to the garlic taste on E18 produced a latent inhibition of this CTA. Rats one day younger during conditioning (E18) did not exhibit signs of a CTA when they were tested ex utero on E20. Our data provide the first demonstration that fetal rats can acquire a LI. Our data also suggest that this ability emerges when pre-exposure to the CS occurs on E18 but not E17.

**12. Stephanie L. Simon-Dack, Grant Sinning, & Derek Gosman**

Department of Psychological Science, Ball State University

**AUDITORY DISCRIMINATION IN PERI-PERSONAL SPACE FACILITATED BY TOUCH**

Previous studies of auditory-somatosensory (i.e., touch) integration demonstrated attenuated event-related potentials (ERPs) in frontal brain regions when participants held a pair of speakers in their hands versus placing their hands in their laps while performing a free-field auditory oddball discrimination task (Simon-Dack et al., 2008, 2009). Specifically, the N2 waveform that is indicative of effortful processing and categorization was smaller when participants held the speakers. These findings support literature that neural coding of events on or near the body (i.e., peri-personal space) involve specific sensory integration processes that differ from integrating multisensory inputs outside of peri-personal space (Hari & Jousmaki, 1996; Short & Ward, 2009; Johnson-Frey, 2004). For the current auditory oddball experiment, participants were placed in one of two conditions (lap-lap or lap-hold). Participants in the lap-lap condition completed two sessions of 8 blocks each: for both sessions they kept their hands in their laps while performing the task. Participants in the lap-hold condition completed one session of 8 blocks with their hands in their laps and a second session of 8 blocks while holding the speakers. Average reaction time (RT) and accuracy (Acc) were recorded and compared for the sessions and conditions using mixed subject 2x2 ANOVAs (session x condition). Preliminary data indicate a multisensory facilitation effect: participants in the lap-hold condition are on average 30 ms faster in session two when holding the speakers than they are in session one. While participants in the lap-lap condition show a trend towards slower RTs in session two.

**13. Amy Jo Stavnezer, Rebecca Lang, Elysse Wadman, & Catherine Fenster**

Neuroscience Program, The College of Wooster and Biology Department, Ashland University.

**EFFECTS OF PERINATAL PCB AND BPA EXPOSURE ON NEUROENDOCRINE AND BEHAVIORAL RESPONSES.**

Our long-term research goal is to understand how exposure to environmental chemical contaminants affects neuroendocrine function in mammals. This research focuses specifically on effects of bisphenol-A (BPA) and polychlorinated biphenyls (PCB), chemicals known to alter estrogen receptor-mediated signaling, thyroid function, and behavior. BPA and PCB have been detected in biosolid waste, our nation's water sources and, consequently, human tissues. This is a cause for concern because BPA and PCB alter hormone signaling even at low environmentally relevant levels. In this study we exposed female C57BL/6J females to 0.5mg/kg BPA, 18mg/kg PCB (Aroclor), a combination of these contaminants, or vehicle control from one week pre-pregnancy through postnatal day 21 using daily corn oil oral dosage. At either 35 days of age or 3 months of age, the offspring were tested for anxiety in an open field and elevated plus maze and hippocampal function with object recognition, Y-maze and Morris water maze. Adolescent BPA-treated animals exhibited more anxious behavior than control groups on the elevated plus maze and in the open field. Adult PCB-treated animals exhibited more anxious behavior than all three groups on the elevated plus maze. Adult animals treated with a combined dose of BPA and PCB exhibited greater activity level in the open field than control and BPA treated animals. There were no significant treatment effects for the object recognition task, Y-maze, or Morris water maze. We concluded that these chemicals may lead to subtle behavioral effects, and current research is evaluating the cellular mechanisms leading to those effects.

**14. Lenore Waites**

Psychology Department, Rochester College

**EFFICACY OF A WORK BASED TREATMENT ON THE REDUCTION OF STRESS BEHAVIORS IN A MOUSE MODEL**

Certain experiences have been shown to buffer humans and animals against experiencing learned helplessness when exposed to chronic or inescapable stress. One method of buffering demonstrated in a rat model is to require the rat to complete work tasks in order to receive food and treats (work based treatment). The present study sought to explore the efficacy of utilizing similar experiences post-stress to relieve stress behaviors in mice. Exposure to the work based treatment was shown to reduce stress symptoms in mice at a significantly faster rate than seen in non-work based treated mice. It was also demonstrated that the mice that were subjected to stress and then received the work based treatment demonstrated higher levels of perseverance when given an unsolvable puzzle than unstressed mice.

**15. Jacob Dodd, Kellie Gross, Anna Hoffman, Sharif Kronemer, Katelyn Marchal,**

**and Jennifer Yates**

David O. Robbins Neuroscience Program, Ohio Wesleyan University

**ASSESSMENT OF SPINAL CORD INJURY IN A GUINEA PIG MODEL**

Researchers using the guinea pig model of spinal cord injury (SCI) have previously used basic functional measures such as the placing and toe-spread responses and the \*cutaneus trunci \*muscle reflex (Blight et al., 1990; Blight, 1994; Blight et al., 1995; Yates et al., 2007). The limitations of these measures include a ceiling effect and insufficient sensitivity that may hide functional improvements and treatment differences. Several measures that have previously been used in rat spinal cord injury studies were tested in the guinea pig model including air righting behavior (Pellis et al., 1996; Wayner et al., 2000) contact righting behavior (Bouet et al.,

2004), open field activity and the incline plane apparatus (Fehlings & Tator, 1995). Preliminary results show injury severity-dependent changes in function for air righting with mixed results for contact righting and no differentiation for open field activity. Inter-rater reliability is also

high in the air and contact righting measures. Preliminary data acquired from the incline plane apparatus indicates that the measure is able to differentiate amongst injury severities when classified by sensory and motor function.