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Day 1. Friday, June 22, 2012

Holiday Inn - Downtown Superdome, 330 Loyola Avenue, New Orleans, Louisiana 70112

KEYNOTE PLENARY LECTURE: INTEGRATED ACTION SEQUENCES AND STRESS RESEARCH. JC Fentress, Dalhousie University, Halifax, Canada; Washington Abbey, Eugene, OR, USA.

The measurement of integrated action sequences and their response to various levels and forms of stress offers many opportunities for linking behavioral and brain research. In this presentation I shall concentrate upon issues of behavioral measurement as these occur under various conditions. A major issue is how we best subdivide individual properties of behavioral expression, and view these within their broader contexts. I shall review basic issues that involve the classification and analysis of integrated patterns of expression as these occur in different contexts. It is important to note that different observational and analytical methods can reveal different behavioral properties. These general principles will be illustrated with specific examples from a comparative (ethological) framework. My presentation will conclude with what I propose as a dynamic focus model in which changing patterns of both excitation and inhibition are involved. Issues of behavioral flexibility versus rigidity follow. The role of striatal circuitry provides a promising target for linking these behavioral properties with brain operations. Both genetic and developmental assays add importantly to measures of well established action patterns, with obvious clinical implications. **METHODS:** My presentation will concentrate upon various methods that investigators have brought to problems of integrated action. Methods of sequential analysis across complementary levels and time frames of organization are highlighted. **RESULTS AND DISCUSSION:** Since this is an overview presentation I shall survey methods not only from my own research, mainly rodent grooming and perseverant stereotypies, but also how methods I have used in the past have been importantly supplemented by research from other active laboratories. While our methods are still imperfect, much progress has been made in highlighting measures that are sensitive to various levels and forms of stress. Dynamic, relational, and multilayered models are most promising, and their pursuit demands not only analytical rigor but also a careful evaluation of the initial observational methods we employ. **RESEARCH SUPPORT:** The National Science Foundation, the Institute of Mental Heath, the Natural Sciences and Engineering Research Council (Canada), and the Medical Research Council (Canada).

GREATER NEW ORLEANS NEUROSCIENCE SOCIETY (GNOSN) SYMPOSIUM

A TALE OF TWO HORMONES: HORMONAL REGULATION OF ANXIETY. N Vasudevan, Dept. of Cell and Molecular Biology and Neuroscience Program, Tulane University, New Orleans, LA, USA.

We are interested in understanding hormonal regulation of social behavior using two different hormones, estrogen and thyroid hormone. Estrogen, a steroid hormone influences reproduction, cognition and cancer progression by binding a specific receptor, the estrogen receptor (ER)α or the ERβ. Traditionally, these receptors reside within cells and signal by slowly regulating the transcription of target genes. Hence, they are ligand-dependent transcription factors. However, estrogen can also rapidly activate kinases and increase calcium within cells via putative receptors on the cell membrane. Our current research elucidates various components of this signaling pathway, starting with the idea that coupling of non-genomic effects to genomic effects occurs via ERα phosphorylation. Estrogen, acting via the putative membrane estrogen receptor (mER), GPR30, has been shown to increase memory. Is this due to an effect of estrogen on state anxiety? Using newly available GPR30 selective agonists and antagonists, we show that activation of this receptor is anxiolytic in female and male mice. A second hormone that plays a role in anxiety is thyroid hormone. A few studies have shown that thyroid hormone affects anxiety and depression, most probably

through thyroid hormone receptor α1 (TRα1). We have shown that both TRs can regulate anxiety using receptor knockout mice. Currently, we use mice models in which thyroid hormone levels are dysregulated or receptors are deleted to understand the contribution of this receptor to anxiety, using a combination of behavioral and histochemical approaches.

SIRT1 ACTIVITY IN DENTATE GYRUS MEDIATES CHRONIC STRESS-INDUCED BEHAVIOR AND MOLECULAR CHANGES. C Ferland, W Hawley, G Dohanich and L Schrader, Dept. of Cell and Molecular Biology and Neuroscience Program, Tulane University, New Orleans, LA, USA.

Prolonged or repeated stress leads to allostatic overload that initiates changes in the function of neurons resulting in various symptom dimensions of depression, including anxiety and deficits in learning and memory. While an extensive comorbidity between depressive and anxiety disorders exists, the common or divergent molecular changes are unknown. The hippocampus is implicated in pathologies associated with depression, and it is strongly impacted by the stress hormones, glucocorticoids. Therefore determination of molecular changes that occur in the hippocampus in response to stress is important to understand progression of the disease. Chromatin modifications are now recognized as a molecular change that can exert dramatic effects on gene transcription and ultimately cell function. One key chromatin modification, deacetylation of histones, is mediated by enzymes known as histone deacetylases (HDACs). The sirtuins are a family of protein deacetylases that can target histones, and 7 different sirtuins (sirt1-sirt7) have been identified. Sirt1 is highly expressed throughout the hippocampus, and it plays a role in learning and memory. Our central hypothesis is that chronic stress causes a persistent increase in sirt1 activity, and this increased sirt1 activity acts as a hub that mediates molecular changes in the granule cells of the dentate gyrus (DG) resulting in hippocampus-dependent memory impairments and anhedonic behavior. In this study, we show that CVS causes memory deficits, increased anxiety and anhedonic effects. In addition, molecular effects of CVS included reduced ERK/MAPK activity, Bcl-2 expression, decreased K12H4 acetylation and increased sirt1 activity in the DG. In order to determine the function of the increased sirt1 activity, we infused the sirt1 inhibitor, sirtinol, into the DG of control and CVS rats. We found that sirtinol reversed the memory deficits and anhedonia, and the molecular effects, but not the increased anxiety effects caused by CVS. These results suggest that excessive sirt1 activity in the hippocampus during CVS mediates molecular changes that result in reduced hippocampus function.

NEURON-SPECIFIC (PRO)RENIN RECEPTOR DELETION ATTENUATES NEUROGENIC HYPERTENSION AND IS ASSOCIATED WITH IMPROVEMENT OF AUTONOMIC FUNCTION. W Li, H Peng, R Eisenberg, A Ichihara and Y Feng, Dept. of Physiology, Tulane University School of Medicine, Tulane Hypertension and Renal Center of Excellence, New Orleans, LA, USA; Dept. of Medicine II, Institute of Endocrinology and Hypertension, Tokyo Women's Medical University, Tokyo, Japan.

Although (pro)renin receptor (PRR) is highly expressed in the brain, the physiological importance of brain PRR remains to be determined. We previously showed that PRR mRNA levels were up-regulated in the brain regions involved in blood pressure (BP) regulation including the subfornical organs (SFO), paraventricular nuclei (PVN), and rostral ventrolateral medulla (RVLM) in the DOCA-salt-induced hypertensive mice. To elucidate whether the increase of PRR expression contributes to the development of hypertension, we developed a neuron-specific PRR knockout mouse (Nefh-PRR) model by crossing PRR-floxed mice with mice that express Cre recombinase with neurofilament-H (Nefh-Cre) promoter. Immunostaining showed that the PRR expression was significantly reduced in cardiac regulatory brain regions including SFO (0.35 ± 0.15), PVN (0.34 ± 0.09), and RVLM (0.41 ± 0.1), where the Cre recombinase was expressed, in Nefh-PRR compared to Nefh-cre mice (1 ± 0.1, 1 ± 0.19, and 1 ± 0.06). Nefh-PRR mice and Nefh-cre mice with wild type PRR gene (WT, n=8/group) were implanted with telemetric probes. BP (mmHg) and heart rate (HR, bpm) were recorded for baseline

and following DOCA-salt treatment (50mg DOCA, 0.9%NaCl drinking solution, 21 days). Nefh-PRR mice exhibited normal baseline BP and HR. Following DOCA-salt treatment, BP was significantly lower in Nefh-PRR (108±3) compared to WT mice (132±6, P<0.05). The cardiac sympathetic tone (HR response to propranolol, ΔHR: -128±46 vs. -180±45) and the vasomotor sympathetic tone (BP response to chlorisondamine, ΔBP: -46±17 vs. -68±12) were lower in Nefh-PRR than WT mice after DOCA-salt treatment. Moreover, cardiac parasympathetic tone (HR response to methylatropine, ΔHR: 98 ± 38 vs. 43±19) was greater in Nefh-PRR. In addition, DOCA-salt treatment increased plasma vasopressin (AVP) levels (33.6±5.3 vs. 3.0±0.3pg/ml) in WT mice. While, PRR deletion significantly attenuated the increase in plasma AVP levels (19.0±2.0pg/ml) induced by DOCA-salt. The data suggests that PRR deletion attenuates the development of DOCA-salt hypertension and is associated with reduction of plasma AVP levels and improvement of autonomic function. We conclude that brain PRR may be a novel therapeutic target for the treatment of hypertension. **RESEARCH SUPPORT:** NIH 1P30HL101285, AHA 11SDG7360050.

HIGH-THROUGHPUT THERAPEUTIC SCREENING FOR GLOBOID CELL LEUKODYSTROPHY USING AUTOMATED NEUROPHENOTYPING OF TWITCHER MICE. B Scruggs, A Bowles, X Zhang, J Semon, E Kyzar, L Myers, A Kalueff and B Bunnell, Tulane University School of Medicine, New Orleans, La, USA.

Globoid cell leukodystrophy (Krabbe's disease) is an autosomal recessive neurodegenerative disorder that results from the deficiency of galactosylceramidase, a lysosomal enzyme involved in active myelination. Due to the progressive, lethal nature of this disease and the limited treatment options available, multiple laboratories are currently exploring novel therapies using the twitcher mouse model of globoid cell leukodystrophy. In order to establish a defined protocol for motor function assessment of the twitcher mouse, this study tested the capability of an automated system to detect phenotypic differences across mouse genotypes and/or treatment groups. **METHODS:** The sensitivity of this system as a screening tool for the assessment of therapeutic interventions was determined by the administration of murine bone marrow-derived stem cells into twitcher mice via intraperitoneal injection. Animal behavior was analyzed using the Noldus EthoVision XT7 software. Novel biomarkers, including abnormal locomotion (e.g., velocity, moving duration, distance traveled, turn angle) and observed behaviors (e.g., rearing activity, number of defecation boli), were established for the twitcher mouse. **RESULTS AND DISCUSSION:** These parameters were monitored across all mouse groups, and the automated system detected improved locomotion in the treated twitcher mice based on the correction of angular velocity, turn angle, moving duration, and exploratory behavior, such as thigmotaxis. Further supporting these findings, the treated mice showed improved lifespan, gait, wire hang ability, twitching severity and frequency, and sciatic nerve histopathology. Taken together, these data demonstrate the utility of computer-based neurophenotyping for motor function assessment of twitcher mice and support its utility for detecting the efficacy of stem cell-based therapy for neurodegenerative disorders. **RESEARCH SUPPORT:** grant R21-NS059665 from the National Institute of Neurological Disorders and Stroke (NIH) and Tulane University.

EMOTIONAL MODULATION OF LEARNING STRATEGY IN PREPUBERTAL AND ADULT MALE RATS. E Grissom, W Hawley, and G Dohanich, Dept. of Psychology and Neuroscience Program, Tulane University, New Orleans, LA, USA.

When learning to navigate toward a goal in space, rodents employ distinct cognitive strategies that are mediated by specific regions of the brain. A place learning strategy is mediated by the hippocampus and relies upon the relationships between extramaze cues and a goal. Alternatively, the striatum guides the expression of both response and stimulus-response strategies, which rely upon proprioceptive cues that guide specific movements toward a goal, or upon a single salient intra-maze

cue that marks the location of a goal. These two brain systems work in an interactive fashion, such that when the integrity of the hippocampus is comprised, the striatum emerges to assume control over learning. A variety of factors affect the type of learning strategy used by rodents to learn a given spatial task. Recent evidence implicates emotionality as one such moderator of learning strategy. Consequently, heightened emotionality, linked to elevated levels of anxiety or induced by exposures to various forms of stressors, dysregulate the functioning of the hippocampus influencing how information is learned. In a series of experiments, we examined the effects of anxiety levels and stressful experiences on learning strategy in male rats prior to puberty or in young adulthood. We predicted that anxiety and stress would bias male rats toward the use of striatum-dependent stimulus-response strategy and away from hippocampus-dependent place strategy when solving a dual-solution spatial task. **METHODS:** The impact of trait anxiety and stress on learning strategy in male Long-Evans rats was explored in a series of three experiments. (1) Effects of Trait Anxiety: Prepubertal and adult males were tested for their natural levels of trait anxiety on an open field test and then tested for their learning strategy preference on a dual-solution water maze task. (2) Effects of Early Stress: Pre-weaning males were separated from their dams for 15 or 180 min daily for the first two weeks of life and later tested for their levels of anxiety and learning strategy preference prior to reaching puberty. (3) Effects of Adult Stress and Reactivation of Aversive Memory: Adult males were exposed to a single footshock, and their learning strategy preference was later tested following reactivation of the aversive memory. **RESULTS AND DISCUSSION:** (1) Both prepubertal and adult male rats high in trait anxiety preferred a stimulus-response strategy over a place strategy. (2) Long periods of daily maternal separation in early life shifted prepubertal males toward a stimulus-response strategy, which was correlated with higher levels of trait anxiety. (3) Adult males that received a footshock, with or without later re-exposure to its context, displayed a preference for stimulus-response strategy over place strategy one month after the shock was administered. However, two months after the receiving shock, only those rats reminded of the stressor maintained a preference for striatum-based stimulus-response strategy. These results indicate that learning strategy preference in male rats is shifted toward stimulus-response strategy by high emotionality as a result of either elevated levels of inherent trait anxiety or following exposure to stressors. Similar effects of anxiety and stress on spatial cognition have been reported in humans, including adolescents diagnosed with anxiety disorders. **RESEARCH SUPPORT:** Floweree Summer Fellowship Fund, Weiss Presidential Fellowship, Department of Psychology, Program in Neuroscience.

UPDATE ON DEVELOPMENT AND ANALYSIS OF ZEBRAFISH ENDOPHENOTYPES WITH 3D TRAJECTORY RECONSTRUCTIONS. J Cachat, E Kyzar, A Stewart, J Green, S Gaikwad, J Chawla, M Brimmer, C Craddock, M Gebhardt, S Landsman, A Roth, C Collins and A Kalueff, Neuroscience Program, Dept. of Pharmacology, Tulane University Medical School, New Orleans; ZENEREI Institute, Slidell, LA, USA.

Despite the advancements made in mammalian models toward understanding psychiatric disease, the need for alternative and complementary animal models has been justified in light of limitations in using mammalian species. Overall these are reflected by 1) the experimental restrictions in unraveling the cellular and molecular mechanisms from a developmental perspective relevant to the etiology of brain disorders, and 2) inability to develop high-throughput technology or techniques for drug discovery in the field of psychiatry. In order to probe these aspects in vivo an ideal animal model would be low cost, have well-established genetic to cellular investigation techniques, possess considerable homology to human neurophysiology, and display more complex behavioral responses in which domains of psychiatric diseases can be modeled. These attributes are precisely what have established zebrafish (Danio rerio) as a very promising, rapidly expanding animal model in neurobehavioral research and drug discovery. **METHODS:** There are several assays and quantification methods currently employed to investigate adult zebrafish behavior, including maze-based, open-field, novel tank, light-dark box, social preference and shoaling tests. While these assays are designed to investigate specific domains of cognitive, affective and/or social phenotypes,

each requires accurate, reliable and repeatable detection of the subject's spatiotemporal location. **RESULTS AND DISCUSSION:** Our lab has developed and utilized 3D reconstructions of zebrafish swim paths as a technique to examine and identify unique movement profiles following psychotropic drug treatments. We have examined several aspects of data pre-processing, concluding that LOWNESS smoothing over 10 samples, using 0.3 cm as the minimal distanced moved are the optimal conditions to reduce outlier and noise effects. Currently, we are investigating calculation of rapid movement and slow movement parameters based on individual, fish specific thresholds. We are also investigating zone-based analysis to distinguish between anxiogenic, anxiolytic and hallucinogenic treatments. We have found that anxiogenic and anxiolytic treatments are primarily distinguished by profiles of upper tank exploration or the lack thereof, paired with immobility or rapid movements in seemingly undirected short-lived bouts. However, hallucinogenic treatments present more complex endophenotypes reflecting the complex pharmacology of these compounds. Using 3D reconstructions, we are able to hypothesize potential quantification techniques that could detect unique profiles and patterns observed and presented for each treatment class. **RESEARCH SUPPORT:** Tulane Intramural Research Funds, LA BoR and SOAR R03 (NIH, NIDA) grants to AVK.

CONFERENCE PRESENTATION: OBSESSIVE COMPULSIVE DISORDERS: COMPARATIVE STUDY OF HOMEOPATHIC TREATMENT VS. PROZAC. C De Rosa, EOLAS, Irish Homeopathic Research Centre, Ireland.

Obsessive-Compulsive Disorder (OCD) is an anxiety disorder and is characterized by recurrent, unwanted thoughts (obsessions) and/or repetitive behaviors (compulsions). Repetitive behaviors such as handwashing, counting, checking, or cleaning are often performed with the hope of preventing obsessive thoughts or making them go away. Performing these so-called "rituals", however, provides only temporary relief, and not performing them markedly increases anxiety. Treatments may involve psychotherapy techniques and some times antidepressant drugs serotonin re-uptake inhibitors (SSRIs) such as Prozac. **METHODS:** The study was conducted in Ireland between September 2010 and March 2011 (6 months). A controlled single-blinded methodology was used. 128 patients (aged 35 to 55, 68 females and 60 males) were considered; they all completed the protocol. Intrusive and irrational mental images, repeated attempts to resist irrational or unwanted thoughts, repetitive behaviors, anxiety attacks, genetic influence, tendency to perfectionism and inflexibility, difficulty and/or anxiety episodes dealing with stressful events have been considered as inclusion criteria. Therapeutic success within 30 days, 2 months, 4 months and 6 months of treatment was considered as evaluation criteria. The comparative study has been supported by BIH Ireland – British Institute of Homeopathy, Cork city (Ireland) and Vis Vitalis Education Intl, Institute for Advanced Training and Research in Homeopathy based in Italy. **RESULTS AND DISCUSSION:** After 6 months of treatment (phase IV) 89% of the Homeopathic Group showed favourable response against 65% of the Allopathic Group. Furthermore, after treatment only 2% of the Homeopathic group relapsed against 31% of the Allopathic Group. The homeopathic medicine was not therapeutically inferior to the allopathic reference drug. Furthermore, the homeopathic treatment has proved superior in terms or relapses and side effects. **RESEARCH SUPPORT:** The study was conducted on volunteers. Patients attended homeopathic consultations and treatment once a month at our Research Centre at Eolas. Our team of Homeopathic Consultants and Psychologists have volunteered to support the project.

CONFERENCE PRESENTATION: RIDING THE PHYSIOLOGICAL ROLLER-COASTER: HOW LIFE STRESS ALTERS STRESS RESPONSIVE PHYSIOLOGICAL SYSTEMS. E Shirtcliff, Dept. of Psychology, University of New Orleans, New Orleans, LA, USA.

Since Selye coined the term stress, theories for how stress exposure "gets under the skin" to influence physiology have emphasized the dynamic, complex nature of stress physiology. Yet, empirical research is often simplistic, suggesting linear associations of cortisol with behaviors and

health problems. The popular notion is that stress is bad, overwhelming and damaging and, likewise, the stress hormone cortisol is a destructive silent killer. **METHODS:** The present discussion will review empirical studies which support a dynamic view about cortisol, illustrating how there are benefits of high cortisol and costs of low cortisol in acute and chronic settings. For example, cortisol rises during acute stress, and this includes putatively enjoyable activities such as mirthful laughter, competition, roller coasters, skydiving, and social drinking. Conversely, cortisol declines in some acute settings which are clearly distressing, such as during an ice storm, in soldiers before combat, upon the death of a child, and during marital or family conflict. Individual differences support a "paradox" of stress hormones, such that individuals with high cortisol can have positive traits – such as social connection with other individuals, closer family ties, and more friends. Conversely, individuals with low cortisol can display some negative traits, such as callous-unemotional traits, aggression and externalizing behavior problems. Results and discussion: These seemingly paradoxical empirical findings will be interpreted via an emerging conceptual perspective in which stress responsive physiology is neither good nor bad, but allows the individual to adapt to the context in which they are in. The Adaptive Calibration Model (ACM) puts forward specific non-linear predictions about cortisol and behavior. Yet this level of complexity is necessary to resolve the seeming paradoxes that high (and low) cortisol can be good (and bad). When cortisol is high, it allows the individual to enhance and encode environmental signals, amplifying life-history relevant traits. This amplification can have clear advantages when the environment is warm, secure and safe; this amplification also has advantages (unfortunately) for early detection of threat and danger in adverse, unpredictable and unstable environments. When cortisol is low, many environmental will be filtered, allowing the individual to be buffered from the day-to-day hassles and stressors, but also potentially making the individual less open to receive social information and connect emotionally with others. The ACM looks like a physiological roller-coaster, but it promises to be a fun ride. **RESEARCH SUPPORT:** K01 career development award, MH093675.

PLENARY LECTURE: *DROSOPHILA* AS A MODEL SYSTEM TO STUDY COMPLEX BEHAVIORS INVOLVING SEROTONIN: LEARNING AND MEMORY, AGGRESSION, AND STRESS. C Nichols, LSU Health Sciences Center, New Orleans, LA, USA.

Serotonin is a neurotransmitter involved in many behaviors in mammals including regulation of mood, appetite, sleep, memory, aggression, and sexual behavior. In the fruit fly, *Drosophila melanogaster*, serotonin has been demonstrated to also be involved in many of these same behaviors. Advantages that the fly offers over traditional mammalian models include powerful genetics, rapid generation time, and significantly reduced costs, that together contribute towards an enhanced rate of discovery. The effects of serotonin are primarily mediated through interactions with G-protein coupled receptors to initiate multiple signal transduction pathways. Drosophila express orthologs of three mammalian 5-HT receptor subtypes: 5-HT1A (5-HT1ADro and 5-HT1BDro), 5-HT2 (5-HT2Dro), and 5-HT7 (5-HT7Dro). In mammals, these three receptor families modulate many significant behaviors, especially with regards to neuropsychiatric disorders. We have generated the genetic tools necessary to examine serotonin receptor function and have used them in combination with pharmacological methods to examine the specific role of each serotonin receptor in the fly with respect to many complex behaviors including aggression, learning and memory, courtship and mating, circadian rhythms, sensory processing, and locomotor activity. Here, our findings with respect to aggression, learning and memory, and stress response will be presented. **METHODS:** Conditioned stimulus olfactory learning and memory experiments were used to define the roles of serotonin receptor families in learning and memory. For the aggression assays, isolated male flies were paired in an area, videoed, and scored for aggressive behaviors. For stress response, flies were subject to heat and cold stressors. For each of these behavioral experiments, combinations of genetic and pharmacological tools were used to manipulate 5-HT receptor function. **RESULTS AND DISCUSSION:** Each serotonin receptor family is involved in mediating olfactory learning and memory, with differential involvement in long term learning and memory. 5-HT2 receptor activation decreases a subset of aggressive behaviors,

whereas 5-HT1A receptor activation increases a different subset of aggressive behaviors. 5-HT1A receptor activity regulates insulin and responses to heat and cold stress. **RESEARCH SUPPORT:** the National Institute of Mental Health (1R01MH083689).

Day 2. Saturday, June 23, 2012
Holiday Inn - Downtown Superdome, 330 Loyola Avenue, New Orleans, Louisiana 70112

PLENARY LECTURE: NEW ZEBRAFISH MODELS OF BRAIN DISORDERS. A Kalueff, E Kyzar, J Cachat, S Gaikwad, J Green, A Roth, C Collins and S Landsman, Dept. of Pharmacology and Neuroscience Program, Tulane Medical School, New Orleans; ZENEREI Institute, Slidell, LA, USA.

Adult zebrafish models are increasingly utilized in the fields of neuroscience and biological psychiatry. Zebrafish possess a fully characterized genome and a complex behavioral repertoire, and they represent an important bridge between model organisms. Although early publications were critical of the potential usefulness of this model, research by our group has shown that zebrafish behavioral and physiological domains are sensitive to a variety of pharmacological manipulations. Adult zebrafish display robust geotaxis (bottom preference) in response to novelty – an anxiety-related behavior which is enhanced by anxiogenic drugs and reversed by anxiolytic compounds. Apart from anxiety, chronic doses of reserpine induced marked hypolocomotion and increases in whole-body cortisol in absence of top-bottom preference, resembling depressive-like states observed in rodents and humans. We have recently tested hallucinogenic compounds of various classes (e.g., LSD, MDMA, mescaline, ketamine, phencyclidine, salvinorin A and ibogaine) on adult zebrafish, revealing significant alterations in locomotion, geotaxis, melanophore aggregation, and endocrine function. Importantly, testing these drugs using standardized methods permits comparison of their various efficacies in aquatic models, thereby facilitating an evolutionary prospective in psychopharmacology. Our lab has explored the spatiotemporal dynamics of zebrafish novelty exploration, revealing conserved and patterned exploration that is distinct from anxiety-related states. Physiological biomarkers, such as whole-body cortisol and brain *c-fos* expression, are easily quantified in zebrafish and provide additional correlates of experimentally-induced states. This presentation will summarize why zebrafish models prove invaluable for the field of biological psychiatry. Moreover, it is worth reviewing the attributes of the zebrafish model in relation to other animal models of psychiatric disorders in relation to animal use, welfare and care (Steenberg, 2011). Rodent models of stress, particularly neonatal exposure and developmental paradigms, require continuous, invasive intervention on the dams during all stages of embryonic development. This not only introduces extraneous variability, but effects the well-being of both the mother and the pup at each point in stressful intervention. Following fertilization, zebrafish embryos can be exposed to neonatal stressors without having to consider the effects and influence of these procedures on the mother (Burne, 2010). Moreover, studying developmental programming of the stress response system in rodents requires invasive post-natal procedures (i.e. drug injection paradigms, maternal separation). While the analogous paradigms in zebrafish, via drug immersion, eliminate the potential confounds handling and injection, also eliminating the abuse to another animal (the mother). Lastly, the effects of stressors on brain development, neuronal circuit activity and gene expression can now all be examined in live zebrafish throughout their lifespan. This enables continuous and dynamic investigation of developmental trajectories without having to forcibly interrupt brain development by killing the animal (as necessary in rodent models) for post-mortem analysis (Morris, 2009). While this highlights a specific paradigm, the adaption of zebrafish models for preclinical screenings (i.e. drug discovery, drug target and toxicity) explicitly embodies the animal care's core objective to "…enhance animal well-being, the quality of research and the advancement of scientific knowledge…" (Guide for the Care and Use of Laboratory Animals: Eighth Edition, 2010). We strongly support the view that

early phenotypic characterization of novel compounds and drug discovery efforts, which currently are the largest bottleneck in psychiatric research (Agid, 2007), could benefit tremendously from emerging zebrafish models. The techniques developed and refined in so far, as well as the data collected on adult behavioral phenotypes, provide a significant contribution to the zebrafish research community towards advancing psychiatric research. **RESEARCH SUPPORT:** NIDA SOAR R03, CELT, Tulane Synergy and LA BoR OPT-IN grants to AVK.

CONFERENCE PRESENTATION - ASK THE PROGRAM DIRECTOR: NIDA INTEREST IN RAT GENETICS AND GENOMICS FOR ADDICTION RESEARCH. D-Y Wu, Program Director, Division of Basic Neuroscience and Behavior Research, National Institute on Drug Abuse, NIH, Bethesda, MD, USA.

For many decades complex human behavior models have been generated in rat; however, genomic screening, phenotype mapping and genetic manipulations in rat have been hindered by insufficient high-throughput sequencing capability, complexity of rat genetics and the lack of rat embryonic stem cell lines. Rat modeling is pivotal in psychiatric research because many important behavior traits are difficult to detect or measure in mice. The recent advances in gene sequencing and molecular technologies, and the successful creation of pluripotent rat embryonic stem cell lines have provided unprecedented opportunities for breakthroughs in rat genetics and genomics for modeling and studying mental health and psychiatric disorders, including substance use and dependence. These new technologies include the next generation gene sequencing and screening, RNA-Seq for gene expression analysis, zinc finger technology, TAL Effector Nuclease (TALEN), transposon mutagenesis, and rat stem cell line homologous gene manipulation. These new technologies have ushered in a new era that will enable genomic mapping for gene variations and for screening of predisposition and risk factors for psychiatric disorders in rat, and foster rapid adaptation of gene manipulation approaches to targeting and manipulating specific genes with roles in psychiatric disorders. They will provide unprecedented opportunities for new understandings of the cell and molecular mechanisms of biological psychiatry and substance abuse and addiction. NIDA is interested in the developing tools and methodologies that can accelerate rat genetics and genomics research for substance abuse and dependence, generating critically needed resources for the addiction research community and initiating cutting edge innovative research projects that take advantage of rat genetics and genomics for addiction research.

Symposium: FRONTIERS IN CLINICAL PSYCHIATRY AND PSYCHOLOGY

ARE PATIENTS WHO RECEIVE SHOCKS FROM AN IMPLANTABLE CARDIAC DEFIBRILLATOR MORE LIKELY TO DEVELOP CLINICAL DEPRESSION? J Muzer, M Klamerus, K Bouck, T Price and P Zack, McLaren Cardiovascular Group, MI, USA.

It has been suggested that cardiac patients who undergo insertion of an implantable cardioverter defibrillator (ICD) and subsequently receive "shocks" from the ICD may be at particularly high risk for development of depression. It has been proposed that ICD discharge is a model for the "learned helplessness" theory of development of depression, which holds that exposure to an unavoidable and inescapable aversive stimulus will potentiate the onset of depression. **METHODS:** We retrospectively reviewed the electronic medical records of all 14 patients in our cardiology practice who received shocks from an ICD over a 12 month period (Group I) and 14 age and gender matched patients who had undergone implantation of an ICD, but had never received shocks (Group II). Clinical depression was considered to be present if the patient had been prescribed an anti-depressant/anti-anxiety agent by the primary care or mental health provider. **RESULTS AND DISCUSSION:** Groups I and II were similar with regard to history of coronary disease, cardiac surgery, congestive heart failure and use of

conventional cardiac medications. Depression was present in 6 patients (43%) in group I, but only 1 patient (7%) in group II (p < .05). These findings are consistent with ICD discharge as a model for the learned helplessness theory of depression development. Based on these findings, we have established a multi-disciplinary support group of ICD patients, and established a protocol for early referral of ICD patients for mental health treatment following discharge of the device. **RESEARCH SUPPORT:** McLaren Health Care, Lansing, MI, USA.

MIXED MANIA FOLLOWED BY A SHORT DURATION OF CORTICOSTEROID ADMINISTRATION IN A PATIENT WITH PERIPHERAL FASCIAL PALSY: A CASE REPORT. H Balibey and S Verim, Mevki Military Hospital, Dept. of Psychiatry and Radiology, Ankara, Turkey.

Corticosteroids are routinely used in the treatment of peripheral facial palsy. Affective symptoms have been reported as a possible side effect due to long term use of corticosteroids. However, mixed mania caused by short term use of corticosteroids has been reported very rare in the literature. Lithium and olanzapine are used effectively in the management of psychosis related with the use of corticosteroids. **METHODS:** Thirty-eight year-old, single, high-school graduate, male patient who works as government official, was admitted peripheral facial palsy diagnosis in neurology polyclinic and methylprednisolone treatment had been given six weeks before from his application to psychiatry polyclinic. Shortly after quitting the treatment, he applied with the complaints of more talking, exaggerated speech, irritable mood, hyperactivity, psychomotor agitation, anxiety, insomnia and excitement. In neurological examination, we have seen that the peripheral facial palsy was partially recovered. No physical disease that can explain the mental symptoms was found in laboratory tests including computed tomography. The case was evaluated as mixed mania attack according to DSM-IV-R criteria which arises after corticosteroid treatment that was given for peripheral facial palsy. During the treatment, 10 mg oral olanzapine and 900 mg oral lithium were given. **RESULTS AND DISCUSSION:** Clinical aspects and response to olanzapine and lithium treatment has been discussed in a patient with peripheral facial palsy, who developed mixed mania due to the short-term use of corticosteroids.

NEUROIMAGING IN ANXIETY DISORDERS. A CASE REPORT. S Verim and H Balibey, Mevki Military Hospital, Dept. of Psychiatry and Radiology, Ankara, Turkey.

Over the last few years, neuroimaging techniques have contributed greatly to the identification of the structural and functional neuroanatomy of anxiety disorders. The amygdala seems to be a crucial structure for fear and anxiety, and has consistently been found to be activated in anxiety-provoking situations. Apart from the amygdala, the insula and anterior cingulate cortex seem to be critical. In recent years, neuroimaging techniques have been used in an attempt to better understand the neurobiology of anxiety disorders. **METHODS:** Twenty-five year-old single, high-school gradute, male patient who has fear, anxiety, crying, uneasiness, suicide thoughts, at the right side mild rigidity, from time to time increasing dysarthria and tremor complaints, was hospitalized in psychiatry clinic. He was diagnosed anxiety disorder according to DSM-IV-R criteria. After neurology consultation, cranial computed tomography (CT) and magnetic resonance imaging (MRI) were performed. In these examinations; 1.1*1.5 cm. sized, nonspecific area located adjacent to left external capsule and insular cortex, was detected. The lesion was isointense on T1 weighted images, and hyperintense on T2 weighted and FLAIR sequences. After paramagnetic contrast agent use, no enhancement was seen in the lesion. With these imaging features, the lesion was primarily evaluated as gliotic focus or a low-grade glial tumor. **RESULTS AND DISCUSSION:** In this report, psychiatric signs and cranial CT/MRI findings of a case in a patient who was diagnosed as anxiety disorder according to DSM-IV-R criteria, will be discussed in light of literature data.

A PRELIMINARY PROFILE OF THE PSYCHOLOGICAL DIFFERENCES BETWEEN MARTIAL ART PRACTICES. S Tosch, D Hughes, A Linker, A Johnson, B Mader, J Osben, W Martin and J Warnick, Arkansas Tech University, Russellville, AR, USA.

Despite the deep historical roots of combative sports and the modern mass appeal of these athletic contests, little research has been conducted on the psychological attributes of athletes in the combative sports or comparison of variables between the various combative sport disciplines. The current pilot study sought to begin addressing this gap in research literature by investigating multiple psychological variables (optimism, pessimism, impulsive behavior, aggressive behavior, personality traits, and self-esteem) associated with practitioners of a budo-focused martial art (i.e., aikido) and practitioners of other traditional, but more recently sport-oriented, martial arts (i.e., judo and muay thai boxing). This comprehensive coverage of psychological variables allows this laboratory to begin comparing the combative sports to other athletic endeavors and establish starting points for future research. **METHODS:** Participants (N = 18) were recruited from judo, aikido and muay thai boxing classes at The Enso Dojo in Russellville, Arkansas. Participants were recruited in person to participate in the study via an online questionnaire. Informed consent was provided in person prior to the participant accessing the questionnaire. The survey consisted of a series of demographic variables (age, gender, race, education level, and martial art experience) and the following surveys: Optimism/Pessimism Instrument, UPPS-P Impulsive Behavior Scale, Aggression Questionnaire, Ten-Item Personality Inventory, and the Rosenberg Self-Esteem Scale. **RESULTSAND DISCUSSION:** There were minimal effect sizes found between the martial art practices on the following psychological variables: Optimism (d = 0.02), Lack of Perseverance (d = 0.13), Sensation Seeking (d = 0.02), Negative Urgency (d = 0.34), Positive Urgency (d = 0.23), Physical Aggression (d = 0.29), Anger (d = 0.32), Hostility (d = 0.16), Indirect Aggression (d = 0.22), Extraversion (d = 0.03), Agreeableness (d = 0.3), Conscientiousness (d = 0.34), Self-Esteem (d = 0.14). Practitioners of judo and muay thai boxing were found to be more pessimistic (d = 0.44), show less premeditation (d = 0.79), show more verbal aggression (d = 0.89), be more emotionally stable (d = 0.61), and be less open to new experiences (d = 0.42) than aikido practitioners. These results demonstrate that there are potential psychological differences between practitioners of the various martial arts. The current study suggests that the more sport-oriented martial arts are practiced by individuals that are more pessimistic, more aggressive and more emotionally stable than practitioners of budo-focused martial arts. This study provides a useful starting point for future research on the psychological variables that influence the combative sports.

MENTAL HEALTH AND WORKING PRESSURE ANALYSIS OF CHINA'S PETRO-CHEMICAL ENTERPRISES EMPLOYEES. X Ren, SINOPEC, China's Petrochemical Corporation, China.

China Petrochemical Corporation or Sinopec Corp. is Asia's largest oil refining and petrochemical enterprise, administered by the State Council of the People's Republic of China. In 2009, it was ranked 9th by Fortune Global 500, becoming the first Chinese corporation to make the top ten and in 2010 it was ranked 7th. It has over 640,500 employees worldwide. With its rapid growth, the ability to understand the working pressure and metal health conditions of its employees is of significant importance for China Petrochemical Corporation to maintain and improve the sustainable growth of the company. **METHODS:** The Symptom Checklist (SCL-90) were used to assess 5.544 employees participated in this study, and all participators' mental health and working pressure were evaluated, and compared to the Chinese national standard. **RESULTS AND DISCUSSION:** According to the SCL results, the total score was 128.95 ± 18.46; the number of positive factors was 26.88 ± 18.46. Each factor had an average between 1.21 -1.62, and no obvious peak was found. Of all the 5,544 employees from China Petrochemical Corporation participated, 58.23% (3,228 people) is under the normal working pressure; 27.63% (1,532 people) is estimated as mild; and 14.14% (784 people) as high. As for the metal health conditions, only 0.09% of the people under the normal working pressure has unusual mental health, which is much lower compared to the people who have a high working

pressure, 13.14% of them is suffering from unusual mental health. On the other hand, employees under a good mental health tend to feel less working pressure. Of 51.57% of the participators with unusual mental health weigh against 9.73% of the ones with healthy mental conditions are under high pressure. The results indicated that employees from China Petrochemical Corporation generally have a good mental health condition: over 94% of the testers estimated as healthy or normal mental condition; only 5.4% of the employees suffer from unusual mental health. With respect to working pressure, over 85% of the participators are under normal or mild pressure. Compared the results with the Chinese national standard, the following factors, such as somatization, anxiety, mental illness, have considerable higher scores than the national standard. Based on the results, employers and employees should have a comprehensive and objective understanding of working pressure and metal health, for special cases correct adjustment and further consultancy should be made, in order to improve the work efficiency of the company and satisfaction of the employees. **RESEARCH SUPPORT:** SINOPEC (China's Petrochemical Corporation), carried out by SINOPEC Corp. Safety Engineering Institute, Health Supervision Department.

Conference Presentation: THE RELATIONSHIP OF ANXIETY, COPING, THINKING STYLE, LIFE SATISFACTION, SOCIAL SUPPORT, AND SELECTED DEMOGRAPHICS AMONG YOUNG ADULT COLLEGE STUDENTS. J Mahmoud, R Staten and T Lennie, USA.

Recent research and clinical experience indicate that more young adults are experiencing increased levels of anxiety. It is less clear what activities might help this population in managing this mental health concern. Understanding young adults' anxiety requires applying a multidimensional approach that assesses the psychosocial, behavioral, and cognitive aspects of this phenomenon. The purpose of this study was to develop an integrated theoretical model of anxiety and test its validity in a sample of young adult college students. **METHODS:** This was a cross-sectional on-line survey study. Using the path analysis method, a hypothetical model of the relationship among coping style (adaptive and maladaptive), thinking style (positive and negative), life satisfaction, and selected demographics and anxiety was tested. A total of 257 undergraduate students aged 18-24 completed an online survey that included the study measures and a short demographic information questionnaire. The independent variables in the model were measured using the Multidimensional Scale of Perceived Social Support, an adapted version of the Brief Students' Multidimensional Life Satisfaction Scale, the Brief COPE Inventory, the Positive Automatic Thoughts Questionnaire, and the Cognition Checklist-Anxiety. Anxiety was measured using the Anxiety sub-scale in the 21-item shortened version of the Depression Anxiety and Stress Scale (DASS-21). **RESULTSAND DISCUSSION:** The model indicated that only negative thinking and maladaptive coping had a direct relationship with anxiety (β = .50 and .24, respectively). Negative thinking was the main predictor of both maladaptive coping and anxiety. These findings suggest that helping young adult college students manage their anxiety can be achieved through designing interventions that may decrease negative thinking. Future research is recommended for testing the causal relationship between negative thinking and anxiety proposed in this model. **RESEARCHSUPPORT:** College of Nursing at the University of Kentucky and the Delta Psi Chapter of Sigma Theta Tau.

Conference Presentation: EARLY LIFE STRESS AND METHYLATION OF THE SEROTONIN TRANSPORTER IN HEALTHY CAUCASIAN MEN. E Duman and T Canli, Stony Brook University, Stony Brook, USA.

Early Life Stress (ELS) has long been associated with various impairments in stress response systems, leading to adverse health outcomes. One of the proposed molecular mechanisms for this association is methylation of candidate genes involved in stress, resulting in changes in gene expression. Among those genes is the serotonin transporter gene (5-HTT), which is widely studied for its interaction with ELS on stress sensitivity and vulnerability to psychopathology. In this study, we

investigated the methylation of a CpG island upstream of the 5-HTT for differential methylation as a function of ELS. **METHODS:** Healthy Caucasian men (n = 87) completed the Childhood Trauma Questionnaire (CTQ) as a measure of ELS and provided blood samples for DNA methylation analysis. DNA methylation of the CpG island upstream of 5-HTT was quantified by the Sequenom Epityper system. **RESULTS AND DISCUSSION:** ELS was associated with differential methylation of the 5-HTT CpG island, both over extended regions and at specific sites. These findings suggest that ELS may lead to changes in methylation of the 5-HTT gene and can potentially influence gene expression and upstream behavioral processes, altering the risk for psychopathology. **RESEARCH SUPPORT:** NSF BCS-0843346.

POSTER SESSION

RNA-SEQ AND DIGE REVEAL CHRONIC LSD RESULTS IN PERSISTENT GENETIC AND PROTEOMIC CHANGES IN RAT PREFRONTAL CORTEX RELEVANT TO SCHIZOPHRENIA. D Martin and C Nichols, Dept. of Pharmacology and Experimental Therapeutics, LSU Health Sciences Center, New Orleans, LA, USA.

Schizophrenia is a debilitating mental illness that results from a complex interaction of poorly understood genetic and environmental factors. Useful animal models of schizophrenia are highly desirable for both understanding the disease and developing new therapies. Treatment of rats with low doses of LSD every other day results in many aberrant behaviors (hyperactivity, no sucrose preference, anti-social behaviors) relevant to both positive and negative symptoms of schizophrenia. These behaviors build over 3 months and then persist indefinitely in the absence of additional drug treatments. Here, we molecularly characterize proteome and transcriptome changes in the mPFC present 6 weeks after the last LSD treatment which correlate with the behavioral changes. **METHODS:** Male Sprague-Dawley rats (n=10) were treated with 0.16 mg/kg LSD every other day for 90 days. Behavioral analysis was performed 30 days after the last LSD treatment to verify persistent behavioral changes in the LSD group compared with controls. Total RNA and protein were isolated from the medial prefrontal cortex of each rat. RNA was subjected to RNA-seq analysis on an Illumina GAIIx, and proteomics were performed using 2-D DIGE. The resulting sequence data was analyzed using a variety of available bioinformatic tools, including Galaxy, Tophat, Cufflinks, and DESeq. Functional cluster analysis utilized NIH's Database for Annotation, Visualization and Integrated Discovery (DAVID). Validation and expression refinement was performed by QPCR. **RESULTS AND DISCUSSION:** Bioninformatic analysis of RNA-Seq data revealed a large collection of genes which are differentially transcriptionally regulated after LSD treatment. Many of these genes are neurotransmitter-related and have been previously linked to schizophrenia, including dopamine, glutamate, and GABA receptor genes. Functional clustering suggests changes in synaptic plasticity and metabolic homeostasis. DIGE analysis revealed a collection of 9 proteins previously found to be altered in post-mortem schizophrenic cortex. **RESEARCH SUPPORT:** NIH-R01MH083698.

THE CONTEMPORARY FACE OF ANIMAL RIGHTS SUPPORTERS: CHANGING DEMOGRAPHICS AND VIEWS OF NATURE. S Tosch, A Linker, W Martin and J Warnick, Arkansas Tech University, Russellville, AR, USA.

The contemporary animal rights movement began in the 1970's with the publication of Peter Singer's Animal Liberation (1975) and the founding of animal rights groups like PETA and the Animal Liberation Front. In the relatively short time this movement has been around, there have only been three in-depth investigations on the demographics of animal rights supporters and the psychological variables that influence their beliefs (Blocker and Eckberg, 1997; Jerolmack, 2003; Kruse, 1999). These studies showed that animal rights supporters were more likely to be young, female, less

educated, non-black minorities, less religious, supportive of the environmental movement, supportive of science and not holding a Darwinian view of nature. Each of these studies used the 1993 and 1994 General Social Survey to obtain there data. The current study used the 2008 General Social Survey to determine the potential changes in the previous demographic variables and views of nature by animal rights supporters. **METHODS:** The data were obtained from the 2008 General Social Survey (http://www3.norc.org/GSS+Website/) and included 1,433 respondents. Demographic variables (gender, age, education, religion, political ideology, income, scientific support, scientific understanding, and environmentalism support) and variables related to one's view of nature were correlated with one's support of research that may cause pain and distress in animal subjects. **RESULTS AND DISCUSSION:** Similar to previous studies using the 1993 & 1994 General Social Survey (Blocker and Eckberg, 1997; Jerolmack, 2003; Kruse, 1999), the current study found that the variables of gender ($r = -.255$, $p<.0001$), race ($X2 = 20.46$, $p<.005$), interest in improving and protecting the environment ($r =-.120$, $p<.005$), interest in environmental issues ($r =-.094$, $p<.05$), and non-Darwinian views of nature (whether someone in their house hunted: $r =0.78$, $p<.05$; how important it is to help others: $r = -.14$, $p<.0001$) showed statistically significant relationships with supporting animal rights. All other demographic and social variables shown to be related to animal rights supporters in previous studies were not found to be significant in the 2008 sample. These variables include: age, education, religion, political ideology, income, scientific understanding and support. These data demonstrate that the support of animal rights has moved from a segmented portion of the population as many of the key demographic features of supporters found in previous studies are no longer statistically significant. Future research needs to further elucidate how one's view of nature is related to supporting animal rights.

BEHAVIORAL EFFECTS OF GALANIN IN STRESSED RATS AND PARTICIPATION OF ITS RECEPTOR SUBTYPES. P Skopek, S Hynie and V Klenerova, Charles University in Prague, First Faculty of Medicine, Laboratory of Neuropharmacology ULBLD, Prague, Czech Republic.

Several neuropeptides play important regulatory roles both in periphery and CNS. Galanin (Gal) is one from recently intensively studied neuropeptides, which is implicated in variety of physiological and pathological processes, including stress. Gal acts through three receptor subtypes, which have substantial differences in their signaling activities. The aim of our study was to investigate whether Gal given systemically produces any changes in the behavior under basal conditions and after acute stress. Since there are many controversies about the occurrence of individual Gal receptor subtypes in adenohypophysis (AH), we determined the expression of its subtypes in AH, which plays an important role in the stress. We used male Wistar rats for acute restraint stress (IMO). Behavior of rats in the open field device was video-monitored by an automated activity monitoring system (AnyMaze, Stoelting, USA) in a circular arena (150/110 cm). Several exploratory parameters were recorded, including the total movement distance (TMD) and movement in the central part of the arena (CMD). In the AH, the expression of Gal receptor subtypes (GalR1, GalR2, and GalR3) was determined by immune-fluorescence. We used primary antibodies against Gal receptor subtypes (Alomone labs, Israel) and secondary antibodies Alexa Fluor 488 (Invitrogen, USA). Specificity of the antibodies was confirmed with the use of Western blot. In our behavioral experiments Gal revealed anxiolytic and anti-stress effects. Remarkable result was the anti-stress effects of Gal that were observable even when drug was given systemically and after stress termination. Another important observation was long-lasting effect of acute stress alone and also the survived anti-stress effect of Gal. In our study using the immunofluorescent procedure, we clearly demonstrated that AH expresses all Gal receptor subtypes, i.e. GalR1, GalR2 and GalR3. The specificity of the reaction was confirmed by the Western blot. Restraint stress revealed statistical increase in studies with GalR2 receptor subtype. Further studies are necessary to disclose the function of Gal receptor subtypes in the stress. **RESEARCH SUPPORT:** Grants GAUK 85210, PRVOUK25/LF1/2, SVV 264514 and MSM 002162086. The authors are grateful to Dr. M. Flegel for the synthesis and supply of peptides used in this study.

EXPERIENCE OF DEPRESSIVE SYMPTOMS IN RELATION TO WEEKLY WORKING HOURS OF KOREAN WORKERS IN THEIR THIRTIES AND FOURTIES. S Kim, S-W Kim and K Lee, Bundang Seoul National University, Korea.

Among the OECD countries, Korea has the longest working hours per week. Previous studies have reported associations between long working hours with cardiovascular disease, drinking problems and unhealthy lifestyles, in addition to an increase of depressive symptoms in females. Although references reporting depression in relation to work related stress exist in Korea, none has focused on the relationship of depression to the actual amount of working hours. **METHODS:** We used data from the fourth round of Korea National Health and Nutrition Examination Survey(KNHANES) conducted in 2008 to acquire information on participants aged 30 through 49. Multiple logistic regression analysis was performed to identify the factors associated with depressive symptoms and amount of working hours. All statistical analyses were executed using STATA 10.1 software. **RESULTS AND DISCUSSION:** Men and women who worked longer hours per week were significantly experiencing more depressive symptoms than those that were working fewer hours. After adjusting for factors that were known to be risk factors of depression such as gender, economic status, education level, marital status, and chronic diseases (using subjective health surveys), participants in their thirties and forties who were working over 56 hours per week were at a significant increased risk of experiencing depressive symptoms compared to those working between 40 to 56 hours or less (odd ratio: 1.66, p 0.010. We thus concluded that longer weekly working hours can affect the mental health of men and women in their thirties and forties. **RESEARCH SUPPORT:** Seoul National University Dept. of Family Medicine.

BEHAVIORAL ASSESSMENT OF ACUTE AND SUBACUTE ZINC TREATMENT WITH PAROXETINE IN THE FORCED SWIM TEST IN MICE. H Al Amri and H El Refaey, College of Medicine, Psychiatry Department, Saudi Arabia.

Major depression disorder (MDD) is a common, severe, chronic and often life-threatening illness. Although research into the pharmacologic treatments of MDD has expanded significantly in the past several years, Less than half of older adults achieve remission with antidepressant medications, and rates of remission are even poorer for those with comorbid conditions. Addition of another medication to the antidepressant regimen of patients with MDD not responding adequately to their treatment has become a common intervention. Zinc is a BDNF inducer, modulator of synaptic plasticity and potent inhibitor of the NMDA receptors. We hypothesized that addition of zinc with its multiple pharmacological effects to the antidepressants may modulate and enhance their efficacy. The present study investigated the behavioral changes of acute and sub-acute interaction of zinc with Paroxtine in the forced swimming test (FST) in mice. **METHODS:** Mice were injected with either Paroxtine (20 mg/kg); zinc sulfate (40 mg/kg) or Paroxtine in combination with zinc for one day and one week (once daily). **RESULTS AND DISCUSSION:** Results showed a significant antidepressant activity of Paroxtine or zinc alone as has been shown in a decrease of immobility and increase of swimming behavior. Also, results showed a significant decrease in the immobility time and increase in the swimming behavior time of the animals treated with zinc in combination with Paroxtine as compared with animals treated with either Paroxtine or zinc alone. There was no significant difference in the animals' behavior between acute and sub-acute treatment with Zinc or even upon its addition to paroxetine. Moreover, none of the treatment regimens have shown any significant changes in the animals' motor activity. The present data support the notion that administration of zinc may offer additional antidepressant activity. This combination may have a significant clinical application in psychiatric patients particularly in geriatric patients or other population where zinc level has shown dramatic decrease. **RESEARCH SUPPORT:** College of Medicine-Abha, King Khalid University, Saudi Arabia.

THE ZEBRAFISH NEUROPHENOME PROJECT (ZNP) – THE ZNP DATABASE FOR ANALYSES OF COMPLEX NEUROPHENOTYPES IN ZEBRAFISH MODELS. S Gaikwad, E Kyzar, J Green, A Stewart, C Collins, J Cachat, A Kalueff and the Zebrafish Neurophenome Project. Dept. of Pharmacology and Neuroscience Program, Zebrafish Neuroscience Research Consortium (ZNRC), Tulane University Medical School, New Orleans; ZENEREI Institute, Slidell, LA, USA.

Electronic databases have become particularly effective in organizing and sharing scientific knowledge. Due to a well-characterized genome, robust behavioral responses and physiological similarity to humans, the zebrafish (*Danio rerio*) has emerged as a useful species for neurobehavioral research. The growing utility of this model organism requires the development of specialized databases of zebrafish neurophenotypes, such as the Zebrafish Neurophenome Project (ZNP) (www.tulane.edu/~znpindex/search) that we have recently created, in collaboration with the growing zebrafish research community and Zebrafish Neuroscience Research Consortium (ZNRC). Representing a new bioinformatics-based tool, the ZNP interactive searchable database consolidates neurobehavioral and related physiological phenotypes obtained in various zebrafish models and tests. ZNP contributes to increased accessibility of current zebrafish neurobiological knowledge, and may be used for various research projects. As of June 2012, the ZNP has over 460 original contributions, organized in over 700 experiments and >5550 phenotypic data entries (each reflecting a specific positive or negative finding). Currently, approximately 99% of this data is publication-based research, with the remaining 1% consisting of personal communications, PI's clarifications [of information provided in the original publication], corrections and other types of unpublished data. The published data available in ZNP contains approximately 65% of articles published in the last 50 years and indexed in PubMed, as well approximately 30% of published articles and book chapters/sections not indexed in PubMed (including multiple journals in the field of ethology, ecology, laboratory animal science, fish science and other fields of knowledge not presented in major biomedical search engines). Approximately 5% currently (with a tendency to grow in the future) contains other types of scientific publications including, but not limited to, scientific abstracts/conference proceedings, as well as doctoral dissertations, master's theses and brochures published by biomedical companies and other research organizations that contain zebrafish phenotypic data. Currently, over 80% of that information is being input by the members of the ZNP team, and the remaining 20% of information was directly submitted by PIs, either in the form of electronic submission to the ZNP, filling in the ZNP template forms or sending their articles and other communications to the ZNP. In approximately 1% of cases, the ZNP team contacted the PIs to request clarification of the phenotypes presented in original publications, as well as additional methodological details not explicitly stated in the research articles. This updated information was included in the ZNP, database, thereby providing a more comprehensive summary of zebrafish phenotypic data. Approximately 20-25% of ZNP information currently contains unaffected endpoints/negative findings, and this percentage (based on our evaluation) remains relatively stable, representing a realistic cross-section of the available literature in the field. Although this information represents only a snapshot of the ZNP, as the database continues to grow, we expect to see some new trends as they emerge in the dynamic and vibrant field of zebrafish neuroscience research. **REFERENCES:** 1) E Kyzar, I Zapolsky, J Green, S Gaikwad, M Pham, A Roth, AM Stewart, C Collins, P St-Pierre, B Hirons, A Kalueff. The Zebrafish Neurophenome Database (ZND): a dynamic open-access resource for zebrafish neurophenotypic data. *Zebrafish*, 2012; 9:8-14. 2) I Zapolsky, E Kyzar, J Green, S Gaikwad, M Pham, S Chanin, C Fryar, J Hester, S Bagawandoss, J Raymond, J Enriquez, AM Stewart, A Kalueff. Utilizing the Zebrafish Neurophenome Project (ZNP) Database for analyses of complex neurophenotypes in zebrafish models. In: *Zebrafish Protocols for Neurobehavioral Research*, Humana Press, NY, 2012, vol. 66, Part 2, pp. 343-353. **RESEARCH SUPPORT:** NIDA/NIH SOAR R03 grant, ZNRC and ZENEREI Institute.

CONSTRUCTING HABITUOME FOR NEUROBEHAVIORAL RESEARCH. AM Stewart, A Roth, S Gaikwad, J Green, E Kyzar, C Collins, J Cachat and A Kalueff, Dept. of Pharmacology and Neuroscience Program, Zebrafish Neuroscience Research Consortium, Tulane University Medical School, ZENEREI, New Orleans, LA, USA.

As an evolutionarily conserved behavior, habituation to novelty reflects spatial working memory and is observed in various species, including zebrafish (*Danio rerio*). However, despite the increasing use of zebrafish in biomedical research as neurobehavioral models, the extent to which they habituate, remains unclear. **METHODS:** Here we perform a large-scale characterization of zebrafish novel tank and open field behaviors, to construct the zerbafish *habituome* – a clustering of complex behaviors based on intra-trial habituation and sensitivity to anxiolytic or anxiogenic manipulations. The habituation profiles of high- and low-anxiety sub-cohorts of a large heterogenous zebrafish population were also examined as further verification of population validity. **RESULTS AND DISCUSSION:** Overall, our analyses demonstrate that anxiety responsivity and the ability to habituate show no correlation for multiple zebrafish behaviors. Rather, as a new conceptual approach to globally assess multiple behavioral endpoints based on their habituation and anxiety, the *habituome* revealed that some behaviors may be highly sensitive to anxiety, yet show relatively low habituation. Additionally, despite robust behavioral differences in anxiety-related behaviors observed between high- and low-anxiety sub-cohorts, no significant differences in the ability of most zebrafish behaviors to habituate were observed. Given the marked similarity in animal novelty exploration, this approach may also be used to construct *habituomes* in other model organisms, including rodents and humans. **RESEARCH SUPPORT:** NIH/NIDA SOAR R03 DA030900-01, Tulane University 'Synergy' grant, Newcomb Fellows' and CELT grants to AVK.

ATTENUATION OF FEAR IN OPEN FIELD TESTING OF RATS WITH HISTORIES OF MATERNAL SEPARATION. N Salinas and F Ernst, University of Texas - Pan American, Edinburg, TX, USA.

Animal models have been useful in studying the effects of early maternal separation (MS) on emotional and neurobiological development (Cirulli, et al., 2003). Numerous studies have found adverse effects of early MS on behavior later in life and most have focused on the neurobiological dysregulation of the hypothalamic-pituitary-adrenal axis as the critical mechanism through which adverse developmental outcome is instrumented (Faturi, et al., 2010). Ostensibly, this work represents the best efforts of neuroscientists to model maternal neglect in human mother-child relationships despite the fact that numerous studies employ and discuss the MS protocol as an acute stressor or even trauma (Matthews and Robbins, 2003). We would argue that the MS model is, at best, an analogue of neglect rather than trauma or stress. If viewed as a model of neglect, the critical questions about MS in rats (and in humans) are "what is lost?" in mother's absence and can "what is lost" be prevented, replaced or "surrogated?" Presumably, in mother's absence, there is a potential poverty of stimulation (neglect) which mediates compromised brain function resulting in pathophysiology of critical neurotransmitter systems or deficient and/or mis-wired critical brain structures. We investigated the effects of MS on emotional development, specifically fear, comparing rats experiencing MS during critical early development to unseparated controls and to rats that received tactile stimulation as a method to test for a surrogate maternal attentional effect in her absence. On the basis of previous related work, we hypothesized that MS would result in fearful and inhibited exploratory behavior in an open field apparatus. Moreover, we expected that tactile stimulation during MS would attenuate the fear-potentiating effect of the MS. **METHODS:** A total of 31 pups bred from three Sprague-Dawley females (Charles Rivers Laboratory) were utilized in this experiment (15 females and 16 males). Two dams were separated from their pups for 180 minutes from post-natal day (PND) 2 through PND 15 (MS condition). The third dam served as a control (C) with no separation from her pups. One of the two MS litters received tactile stimulation (TS) with a soft brush for five-minutes at the beginning of each one-hour segment of MS. The pups were weaned at 21 days and housed 2 or 3 per cage until behavioral assessments in an Open Field apparatus

(Med-Associates, Burlington, VT) were performed on PND 25. **RESULTS:** Exploratory activity in the MS group was significantly inhibited when compared to the Control group ($P < 0.05$). As expected, the TS revealed significant attenuation of this inhibitory effect ($P < 0.05$). **CONCLUSIONS:** This model of studying parental neglect on emotional development in the rat appears sensitive and robust based on our findings and those of numerous studies with similar outcomes. We plan to extend our research to include additional measures of emotional and neurobiological development from these findings with juveniles to studies with adolescent and adult rats as well.

USING 3D-BASED NEUROPHENOTYPIC ANALYSES TO UNDERSTAND HALLUCINOGENIC DRUG ACTION IN AQUATIC MODELS. C Collins, AM Stewart, A Roth, S Gaikwad, J Green, E Kyzar, S Landsman, J Cachat and A Kalueff, Dept. of Pharmacology and Neuroscience Program, Zebrafish Neuroscience Research Consortium, Tulane University Medical School, ZENEREI, New Orleans, LA, USA.

Hallucinogenic drug research is rapidly re-gaining its momentum in the field of translational neuroscience and biopsychiatry research. Zebrafish (*Danio rerio*) represent a promising translational animal model with significant physiological homology to humans. They are excellent models for high-throughput screening - due to low cost, ease of maintenance and genetic manipulations, and robust behavioral responses to various drugs of abuse. Here, we summarize several high-throughput strategies recently developed for the thorough dissection of zebrafish phenotypes in our laboratory. First, we developed tools for 3D spatial and temporal mapping of fish exploratory behavior (Cachat et al., 2011) for the analysis of swimming patterns and various behavioral endpoints (including velocity, angular velocity and turning angle) following LSD, MDMA, mescaline, psilocybin, ketamine, PCP and morphine. We next applied the Noldus EthoVision XT8.5 tools for analysis and visualization of videos in 3D using Track3D 2.0 software. To reconstruct the 3D position of the fish from 2D images, we used X,Y,Z coordinates and entered them in the calibration software included in Track3D suite. This approach provided a wide range of movement parameters, including speed and heading in each plane and in the 3D space, for all major hallucinogenic psychotropic substances. Here we also explain how this method also offered options for data filtering, interpolation, lens correction and analysis in 3D, as well as for generating the animated 3D tracks of fish following the exposure to various drugs of abuse. The ongoing study presented here is successfully modeling the effects of numerous drugs in zebrafish behavioral paradigms, revealing their high sensitivity to various psychotropic compounds, which may have multiple practical implications.

STRESS DETECTION OF IT PROFESSIONALS USING ONE MINUTE ECG RECORD. S Jayaraman, Abhilash Software Development Centre, Karnataka, India.

Heart Rate Variability (HRV) analysis is a noninvasive technique and is often used to assess the effect of autonomous nervous system on the cardiac system. Currently, a major challenge in signal processing is to measure maximum information with limited input signal. Usually, five minute ECG records are known to produce reliable HRV features. Our study claims that one minute ECG record is sufficient to get reliable metrics for stress detection. The aim of the present study is to 1) evaluate one minute ECG record for determining the HRV parameters which significantly affect stress. 2) Determine the stress level experienced by IT professionals and identify the period of acute stress experienced by them during their work hours. **METHODS:** 11 volunteers from the IT Company participated in this study. ECG data was collected for 1 min at 5 different intervals of the day when the subjects follow their regular work routine. ECG signals acquired were preprocessed and HRV parameters in time, geometrical and frequency domain were extracted. ECG signal was acquired at sampling rate of 250 Hz using a handheld ECG monitor -MD100B capable of acquiring single channel ECG. The signals were recorded for 1 minute duration each for five phases: Morning, before lunch, after lunch, Tea break and Evening. a) Baseline Recording – ECG was recorded in the morning i.e.

before they start their daily work at office; b) The second phase of ECG signal was collected before the subject left for lunch; c) The third phase of ECG signal was collected after lunch break; d) The fourth phase of ECG signal was collected after tea break; e) The last phase of ECG recording was collected before subject left the office in the evening. It was made sure that readings were taken when the subject was in relaxed position. In addition, movement of subject was avoided during data collection. **RESULTS AND DISCUSSION:** Kolmogorov/Skewness test performed on the HRV parameters extracted from RR Intervals showed that they were not normally distributed. Thus, a nonparametric statistical Friedman test (p<0.05) was performed to determine the HRV parameters that were significantly different among the different intervals of the day. The results indicated that mean RR, mean HR, SDNN, LF, HF and Total power were significantly different among the different intervals of the day. Wilcoxon sign rank test was performed to determine the interval of acute stress experienced by the subjects. Results indicated that IT professionals experience high level of stress during the second half of the day than first half.

COMPARATIVE ANALYSIS OF THE INFLUENCE OF EMOTIONALLY NEGATIVE TV-NEWS' PLOTS AND UNCENSORED VIDEOS CONTAINING REAL VIOLENCE, TAKEN FROM YOUTUBE, ON THE PSYCHO-PHYSIOLOGICAL CONDITION OF THEIR VIEWERS. Y Havrylets, S Tukaiev, O Radchuk, V Rizun and M Makarchuk, National T. Shevchenko University of Kyiv, Ukraine; Institute of Health and Communication, Università della Svizzera italiana, Switzerland.

Nowadays, there have been blurred conventional boundaries between television and the Internet. In particular, very often in the news we can see shots, taken on a mobile phone and posted on www. From the other side, television news can be viewed anytime when it is comfortable for viewers through the Internet, not only on TV. It is possible due to online resources of certain television channels and at special video resources – video portals, the most popular of which is YouTube. So it is really relevant to analyze different effects, caused by the viewing of negative TV news' plots and cruel video that contains uncensored video of violence (towards human beings, as well as towards animals). **METHODS:** 42 healthy volunteers, aged from 17 to 20 years participated in this experiment. Current study used two types of videos to demonstrate before the volunteers, divided by emotional stress - negative TV news' plots and videos, containing real violence. To assess the impact on the mental state of volunteers, data of experimental tests were collected before and after the experiment. The following tests were used: WAM (Wellbeing, Activity, Mood), State Anxiety Inventory by Spielberger, Hanin and diagnosis of internal aggression by Daihoff. At the end of the experiment we used Aggression Test by Assinger (assessment of aggressiveness in the relationships), and assessed each TV-news plots on the scales of "relaxing-activating" and "unpleasant-pleasant". Facial reactions observed while viewing the videos, were recorded with digital video camera. Emotional activation is usually accompanied by shifts in the autonomic area of the body, the nature of which depends on the type of emotion. Registration of the electrocardiogram allowed to estimate the degree of emotional activation, caused by the viewed videos. **RESULTS AND DISCUSSION:** TV-plots were evaluated with scale "unpleasant-pleasant" as follows: negative news' videos were regarded as more pleasant, violent – as more unpleasant; on a scale "relaxing-activating" violent videos made a more activating effect, negative - more relaxing one. We indicated that violent videos worsen mood more significantly than negative pieces of news. More than twice as much situational anxiety is felt towards the set of violent videos, than negative ones. Overt aggression was not caused by any of the viewed videos' set. Instead, the violent videos cause anger more infrequently than negative pieces of news. Feeling worse was most impressive in case of viewing violent scenes, as well as a mood of our volunteers worsened more significantly due to the violent videos (more than twice as much as in opposite collections videos). Instead, activity when viewing violent videos (compared with negative) was almost similar. During the experiment, we observed 277 volunteers' facial reactions (mimic signs, confirming the experience of certain emotions). Of these reactions, for violent videos we counted 207 reactions (74.7%), and for negative – 70 reactions (25.3%). Overall among emotional states when viewing negative stories there often occurred fear, anger, abomination (eyes wide open (or vice versa

squinted with stress), or intense eyebrows raised up or strained, or dropped down). Among the emotional states, caused by viewing of violent videos were actually the same moves of mimic, but with more intensity and frequency. During viewing of violent videos there were observed also more frequently squinting eyes, in addition to intense eyebrows and straining of the whole face. Patterns of activation of the autonomic nervous system that adequately impact on the character of changes of heart rate, while watching both sets of demonstrated video did not differ. Overall, the results of psychological tests and analysis of mimic reactions, we can conclude that by all the parameters violent videos exert much more significant influence on the psycho-physiological condition of the viewers, that negative news' plots.

Day 3. Sun, June 24, 2012

Holiday Inn - Downtown Superdome, 330 Loyola Avenue, New Orleans, Louisiana 70112

Conference Lecture: USING DROSOPHILA AS A MODEL TO IDENTIFY NEUROGENETIC FACTORS MEDIATING HOMEOSTATIC RESPONSES TO STRESS. W Neckameyer and K Argue, Saint Louis University School of Medicine, St. Louis, MO, USA.

The brain is the primary mediator of plastic responses to environmental changes, and dysregulation of the neural substrates mediating adaptation can lead to psychopathologies. A key gap in our current knowledge is the identification of these specific neural substrates and pathways responsible for the gene by environment interactions that result in the onset of mental illness. Since juveniles and adults respond differently to different stressors, as do males and females, the neural substrates mediating the response to stress must differ in these populations. Drosophila provides an exceptionally tractable model to identify and characterize such factors, since Drosophila and mammalian neuronal development arise from common evolutionary origins, and neurobiological signaling pathways are also conserved. **METHODS:** We initiated a loss-of-function screen by subjecting sexually immature and mature male and female Drosophila carrying mutations in single genes to simple, high-throughput, and easily reproducible environmental stressors to facilitate the analysis of a large number of animals for direct comparisons. The animals were assessed for locomotor changes via a high-resolution tracking paradigm as well as for changes in heart rate. Our screen has been designed to identify factors critical for juvenile versus adult neuronal remodeling, as well as for sexually dimorphic responses. Since resilience to ELS suggests that genetic factors can modify the negative effects of ELS on the maturing brain circuitry, we are also establishing Drosophila as a model for early life stress (ELS). This is being accomplished by assessing volumetric changes in the mushroom bodies (the hippocampal equivalent) and cognitive changes in mature animals after exposure of Drosophila to diverse stressors during the first 24 hours of adult life (equivalent to adolescence). **RESULTS AND DISCUSSION:** Our genetic screen has thus far yielded a candidate, cryptocephal (crc), which is the Drosophila homolog of ATF4, a basic leucine zipper transcription factor which is induced in response to oxidative stress and starvation. ATF4 expression levels impact embryonic neurogenesis; in Drosophila, crc plays a critical role in metamorphosis via interactions with steroid-hormone signaling pathways. We propose that crc/ATF4 mediates neurogenesis in response to stress by modulating steroid hormone signaling pathways. We also show that exposure to diverse early life stressors results in sexually dimorphic changes in mushroom body size that are distinct from changes observed in similarly-aged flies exposed to these stressors as mature adults. Cognitive function in females exposed to ELS appears relatively intact compared to males, demonstrating sexually dimorphic differences in early life brain plasticity in response to stress. **RESEARCH SUPPORT:** NIH grant NIMH1RO1MN083771 to WSN.

Symposium: TRANSLATIONAL NEUROSCIENCE AND BIOLOGICAL PSYCHIATRY: LESSONS FROM VARIOUS MODEL SPECIES

A NOVEL SIGNALING MECHANISM FOR PURINERGIC RECEPTOR: P2X3 RECEPTOR SIGNALS VIA RETROGRADE SIGNALING ENDOSOMES IN PRIMARY SENSORY NEURONS. X-Q Chen, B Wang and L Bao, State Key Laboratory of Cell Biology, Institute of Biochemistry and Cell Biology, Shanghai Institutes for Biological Sciences, Chinese Academy of Sciences, Shanghai, China.

Purinergic (P) X3 receptor is abundantly expressed in dorsal root ganglion (DRG) neurons and play important roles in sensory and pain processing. Traditionally, activation of P2X3 receptors in peripheral terminals of DRG neurons produces action potential via calcium influx. The mechanism for the long-distance and long-term purinergic signaling mediated by P2X receptor is unclear and requires further investigation. **METHODS:** We used in vivo sciatic nerve ligation and in vitro DRG neuron culture system by means of Western blot, immunofluorescence and live cell imaging to confirm the retrograde transport of P2X3 receptor and dissect its molecular mechanism and function. **RESULTS AND DISCUSSION:** We found that the calcium influx through the P2X3 receptors after receptor activation could activate a signaling pathway comprised of protein kinase C, rat sarcoma viral oncogene and extracellular signal-regulated protein kinase (ERK), which could associate with endocytic P2X3 receptors to form "signaling endosome". These endosomes were retrogradely transported from terminals to cell bodies of DRG neurons to increase the activation level of ERK and cAMP response element-binding protein in the cell bodies and enhance neuronal excitability. Further results also showed that the α, β-MeATP treatment of peripheral axons increased the number of anterogradely transported P2X3 receptors, suggesting that this regulated transport of P2X3 receptors may compensate for the loss of receptors induced by ligand stimulation at peripheral terminals. These results provide a novel signaling transduction mechanism for purinergic receptor. **RESEARCH SUPPORT:** the National Natural Science Foundation of China (30930044).

GENETICALLY DETERMINED DIFFERENCES OF THE THREE STRUCTURES OF LIMPIC BRAIN SYSTEM DETERMINE THREE DISTINCTIVE AND UNIQUE PERSONALITY TYPES: A SPECIAL KEY FOR UNDERSTANDING CONNECTION BETWEEN BRAIN FUNCTION AND ITS PLASTICITY WITH HEALTH PREVENTION. A Stathopoulou and G Paschalidis, University of Patras Medical School, Patras, Greece.

There is accumulating evidence that there are biological factors that influence our personality and behaviour and new research shows that personality traits are mirrored by changes in our brains. These changes define who we are. Paschalidis demonstrates that people are divided into only three human types with common personality traits and point out that individual differences in activation, volume and functional connectivity of temporal cortex, amygdala and hippocampus, the three brain structures of limpic system, are related to these personalities and determine the function of the whole body. He presents that each human type shares common characteristics in neuroanatomical and neurochemical basis that are determined by the genetic make-up of one of the individual parent. Each human type has its respective area in the brain that is specific and sensitive for each one of the three human type. The purpose of the presented study was to examine and to verify whether the knowledge of the three human types meets fully the research data as well as to understand its psychotherapeutic action in keeping and preventing health via brain plasticity. **METHODS:** We review recent research addressing the relationship between personality traits and the neural response to stress. Thorough research was performed using main literature databases, and web search engines such as Pubmed, Google, for relevant studies, by using appropriate keywords. **RESULTS AND DISCUSION:** A synthesis of the literature contribute to this Three Human Personality Type Model. Persons with Human Type A behaviour pattern are characterized by action at the moment, rage, openness, extraversion, high novelty seeking, risk taking which are associated with genetic structural

and functional differences of temporal cortex. People with Human Personality Type B show anxiety about future, fear, anxiety, depression and appear to have hyperactive amygdala. Persons with Type C are characterized by over-conscientious, hard working and self-disciplined, mania with persistence and reliving the past with intrusive thoughts, traits that are linked to abnormal functioning of the hippocampus, a key structure for episodic memory. Paschalidis has noted that chronic overreaction to stress overloads the brain with powerful hormones and alterations of trace metals and neurotransmitters concentrations in a regional-specific manner, especially manganese in temporal cortex (for A human type), magnesium in amygdala (for B human type), and copper in hippocampus (for C human type). Structural plasticity of the brain explains the stress-induced changes in these regions. This work offers new insights about the genetic and environmental influences that shape the essence of who we are and the forces that alter our patterns of thought and action. The question what produces the patterns of behaviour, emotion and thought and why and how people differ from each other has been largely resolved by the emergence of the Three Human Personality Type Model. The Three Human Personality Type Model help us to realize that we can reconfigure our brain and our personality. With the proof that there is corresponding plasticity of the brain, we now can begin to make leaps with this new cognitive model for psychological change and we can uncover the biological mechanisms by which personality and health are interrelated.

NEUROPEPTIDE MODULATION OF AROUSAL STATE IN LARVAL ZEBRAFISH. I Woods, D Schoppik, J Greenwood, E Soucy and A Schier, Ithaca College, Ithaca, NY; Harvard University, Cambridge, MA, USA.

The arousal state of an animal must be properly tuned in order for it to behave in a manner appropriate to its environment. Effective cognitive and locomotor functions both depend on optimal levels of arousal. Previous studies have demonstrated that behavioral and neuroanatomical aspects of hypocretin (hcrt) neuropeptide activity are conserved from fish to human. In larval zebrafish, overexpression of hcrt induces an insomnia-like phenotype and enhances responsiveness to optical stimuli. Taken together, these data suggest that enhanced hcrt activity may elevate the arousal state of larval fish. **METHODS**: To identify additional modulators of arousal state in larval zebrafish, we have generated six new stable lines of transgenic fish that inducibly overexpress neuropeptides. Like hypocretin, each of these additional peptides is expressed in discrete clusters of neurons in the developing brain. Using high-throughput video tracking of locomotor behavior, we subjected these transgenic fish to rest-wake analysis at millisecond-scale temporal resolution and generated behavioral profiles for each, based upon fundamental characteristics of their motion. In addition, we quantified response parameters in transgenic fish to stimuli of various modalities, including optical, acoustic/mechanical, and thermal stimuli. **RESULTS AND DISCUSSION:** Strikingly, elevated expression of cgrp (calcitonin-gene related peptide) resulted in a profile of rest/wake behavior almost identical to that of hcrt, characterized by decreased inter-movement rest and increased movement amplitude. Overexpression of adcyap1b elicited a similar phenotype, but to a lesser extent. Elevated levels of galanin and pnoca (nociceptin a) resulted in phenotypes opposite to those induced by elevated hcrt and cgrp, and exhibited increased rest intervals between movements. Overexpression of cck (cholecystokin) resulted in a unique phenotype: movements were initiated at a much higher rate than their wildtype siblings, and once a movement bout was initiated, the fish remained in motion for a much longer period of time. After rigorous correction for the statistics of background motion, behavioral profiles generated from the stimulus-response data closely mirror the profiles generated in the high resolution rest/wake analysis, with some notable exceptions (explored below). For example, overexpression of cgrp, which increases general locomotor activity, also increases responsivity to stimuli of multiple modalities. Similarly, overexpression of galanin, which decreases locomotor activity, also decreases responsivity to stimuli of multiple modalities. A central question regarding arousal is whether it is a general phenomenon or if it can be subdivided into separate components. For example, can 'endogenous' arousal – the inherent activity level of an animal – be separated from 'exogenous' arousal, or the animal's propensity to respond to external stimuli? Our results indicate a

clear separation of these components. Overexpression of cck results in profound elevation of basal locomotor behaviors but no change in responsivity to stimuli of multiple modalities. In contrast, overexpression of cart results in robust increases in responsitivity but no changes in rest/wake behaviors. In addition, responsivity can vary depending on stimulus modality. For example, overexpression of hcrt and pnoca both induce changes in responsivity to optical stimuli (higher and lower, respectively), but no apparent changes in responsivity to acoustic/mechanical or thermal stimuli. **RESEARCH SUPPORT:** IW was supported by a Postdoctoral Fellowship from the American Cancer Society.

MULTIPLE 3D ZEBRAFISH TRACKING. W Weng, XyZfish, Ronkonkoma, NY, USA.

We present here a real time 3D zebrafish tracking system. This system is comprised of a novel catadioptric stereo-vision setup and methods for robust tracking of 3D motion-related behavior. The system has many advantages over 2D monitoring methods, such as being able to completely monitor the animals\' behavior in 3D space with high spatial and temporal resolution, track multiple animals simultaneously without any physical marker, and accurately reconstruct 3D motion trajectories despite the potential problems of water refraction and reflection. **METHODS:** We established a 3D real time monitoring system using virtual camera and water refraction calibration. This setup effectively eliminated most of the error been introduced by inadequate tracking methods. We also developed software which is capable to track zebrafish swimming pattern among many other mathematical parameters. **RESULTS AND DISCUSSION:** By applying this new technology, we are able to track single to multiple zebrafish and their social distance among multiple zebrafish. For the first time, we are able to observe detailed interaction among zebrafish and obtain many behavior endpoints like freezing, jumping, and velocity automatically. This system can therefore be used for studying zebrafish behavior related to stress, anxiety and pharmacological treatment. This technology will open many fields like predator exposure, social interactions, alarm pheromone exposure and shoaling behavior. Since many new zebrafish models had been created in recent years, it is worthy to use this system to study zebrafish models for anxiety, epilepsy, drug abuse, cognitive deficits, ADHA, Autism, Schizophrenia or Fragile X Syndrome. **RESEARCH SUPPORT:** xyZfish.

THE 5-HT7-DRO RECEPTOR, IS ESSENTIAL FOR NORMAL COURTSHIP AND MATING BEHAVIOR IN *DROSOPHILA MELANOGASTER*. J Becnel, K Sherman, O Johnson and C Nichols, Louisiana State University Health Science Center, LA, USA.

Serotonin (5-HT) is a monoamine neurotransmitter that regulates a variety of behaviors and physiological processes including circadian rhythms, sleep, appetite, aggression, locomo- tion, perception and sexual behavior in mammals. In mammals, there are fourteen different receptors than can be organized into seven families. The fruit fly expresses orthologs of three of the seven mammalian receptor families: 5-HT1A/BDro, 5-HT2Dro and 5-HT7Dro. The fly receptors couple to the same effector pathways as their mammalian counterpart and have been demonstrated to mediate similar behaviors. We are interested in elucidating the roles serotonin and the serotonin receptors play in the courtship and mating behaviors in the fly. **METHODS:** The 5-HT7-Dro receptor remains one of the less well characterized serotonin receptors. We examined the courtship and mating behaviors of flies that were fed the 5-HT7 receptor specific antagonist SB258719. We verified the results of the pharmacological studies using a 5-HT7-Dro-RNAi knockdown line. Recently, we developed a powerful new genetic tool to control fly behavior based upon the Designer Receptors Exclusively Activated by Designer Drugs (DREADDs). When using this new technology in the courtship and mating paradigm, we were able to further validate our previous 5-HT7-Dro courtship data, as well as demonstrate the ability to dose-dependently control fly behavior. **RESULTS AND DISCUSSION:** Using the combined pharmacological and genetic approaches, we determined that the 5-HT7-Dro receptor is essential for both courting rituals and mating in the fly, modulating receptivity

and/or interest levels in both males and females. The importance of 5-HT7-Dro becomes more pronounced as courtship and mating behavior progresses from early behavior such as wing song to the later behaviors of attempted and successful copulations. We are currently exploring the roles of the remaining Drosophila 5-HT receptors in these behaviors. **RESEARCH SUPPORT:** NIH R01MH083698.

DOPAMINE NEURONS ARE DIFFERENTIALLY RECRUITED INTO THE STRESS RESPONSE CIRCUITRY FOR SEXUALLY IMMATURE AND MATURE MALE AND FEMALE DROSOPHILA. K Argue and W Neckameyer, Saint Louis University School of Medicine, St. Louis, MO, USA.

Previous studies in Drosophila have demonstrated that, as in mammals, stress elicits both neurochemical and behavioral changes, and that dopamine (DA) is integral to the stress response pathway. Based on these findings, we hypothesized that, although the population of DA neurons is not sexually dimorphic, the DA neurons recruited into the stress response circuit differs in sexually immature and mature males and females. **METHODS:** Six transgenic lines carrying promoter sequences directing expression within different populations of DA neurons were used to decrease DA levels in those neurons via targeted knockdown of Drosophila tyrosine hydroxylase (TH) using double stranded RNA. Post-synaptic neurons were targeted using transgenic lines carrying RNAi constructs corresponding to the 2 DA type 1-like and 1 DA type 2-like receptors. Sexually immature and mature male and female animals were exposed to a 24 hour stress prior to assaying for locomotor and heart rate response. Both locomotion and heart rate are modulated, at least in part, by DA. **RESULTS AND DISCUSSION:** Comparison of the effects that each genotype had on the stress response for each population validates our hypothesis that DA neurons are differentially recruited into the stress response circuitry for different populations. **RESEARCH SUPPORT:** NIMH 1RO1MN083771 and NSF 0616062.

OMICS-DRIVEN RESESARCH OF MOUSE GROOMING TO UNDERSTANDING HUMAN PSYCHIATRIC DISORDERS. A Roth, E Kyzar, S Gaikwad, J Green, C Collins, J Cachat, A Stewart, M El-Ounsi, A Davis, M Pham and AV Kalueff, Dept. of Pharmacology and Neuroscience Program, Tulane University Medical School, New Orleans; ZENEREI, Slidell, LA, USA.

INTRODUCTION: With the rapid development of high-throughput neurophenotyping techniques and genetically modified animals, the utility of using mice in phenotype-genotype analyses is increasing. Mouse grooming behavior is a frequently occurring and information-rich phenotype whose duration and patterning is subject to modulation by behavioral, genetic and pharmacological means. Due to the similarity between certain human neurological disorders and the grooming phenotypes of many genetically modified mice, the interest in using this model to study diseases including obsessive compulsive disorder, autism and schizophrenia is growing. **METHODS:** Bioinformatics databases allowed two cohorts of genes to be generated. Using grooming duration measurements of several mouse strains in four testing paradigms, behavioral data was correlated with gene expression. The genes generated from this analysis were input into the STRING database to uncover interactions between these 'grooming' genes. Allen Brain Atlas provided in-situ hybridization data showing the expression pattern of genes throughout the brain. When compared to a list of control genes, this information allowed us to determine which brain regions are of particular importance in grooming behavior. In order to generate the second cohort of genes, several online databases were utilized to build a comprehensive list of genetic models currently available to researchers with aberrant grooming behavior. Once generated, these genes were input into the DAVID database to uncover common functional roles and relationships. These genes were input into Allen Brain Atlas in order to investigate whether their role involved regions associated with related human diseases. **RESULTS AND DISCUSSION:** The first group of grooming genes represents the normal genetic program which is initiated in response to a behavioral paradigm. When compared with a cohort of control genes, the

expression of these grooming genes was significantly different in several regions of the brain, most strongly in the cerebellum and medulla. Interestingly, this analysis generated the hematopoietic gene Hoxb4 which is located in the same gene cluster as Hoxb8, a well established modifier of grooming behavior. Different from this cohort, the second group of genes represents those whose proper sequence and function are essential to normal grooming. The mutation of many of these genes in humans leads to several neurological disorders. Interestingly, sexually dimorphic effects on behavior were found in the second cohort of genes, a prominent feature of the human diseases modeled by this phenotype. Collectively, these systems-level analyses revealed several pathways and brain regions that may lead to improved understanding of grooming and its translational value in treating human brain disorders. **RESEARCH SUPPORT:** Tulane Intramural Funds and ZENEREI Institute. The authors thank Dr. Richard Brown (Dalhousie University, Halifax, Canada) and his lab for collaborating with us in the field of mouse neurophenotyping.

ABSTRACT COMMUNICATIONS:

THE ANTIDEPRESSANT-LIKE EFFECT OF FISH OIL IN MICE. B Ali, T Araimi, Y Al Bulushi and S Al Adawi, Dept. of Pharmacology and Behavioral Medicine, Sultan Qaboos University, Al-Khod, Oman.

Omega-3 polyunsatuarted fatty acids has been suggested to be of some benefit in depression. As fish oil (FO) is a rich source of these fatty acids, and because of the lack of experimental evidence on the effect of FO on models of depression in rodents, we studied here the antidepressant-like effects of FO in mice using two commonly used models, the forced swimming test (FST), and the tail suspension test (TST). The effect of gender on the effect of FO, and its interaction with the known antidepressant drug, fluoxetine, in these models has also been tested. **METHODS:** Male or female mice were divided into several groups and orally treated for 28 days orally by gavage with normal saline (control), FO (0.05, 0.1 or 0.2 ml/mouse/day), fluoxetine alone (10 mg/kg), and fluoxetine (10 or 1 mg/kg) given concomitantly with FO (0.05 or 0.1 ml /mouse/day). FST was conducted by the method of Porsolt et al. 1977, and the TST by an automated equipment (Bioseb, France), using video-recording. **RESULTS AND DISCUSSION:** The results indicated that, FO alone significantly reduced the immobility time in both models of depression, compared to control, strongly suggesting an antidepressant-like action. Fluoxetine alone produced a highly significant reduction in immobility time in both models, an effect which was significantly potentiated by FO in the TST, but not the FST. There was no consistent or significant gender differences between the two sexes in the above results, and therefore, the results presented are combined from those obtained from the two sexes. **RESEARCH SUPPORT:** grant from Sultan Qaboos University.

ASSESSMENT METHODS OF WORKING PRESSURE AND BEHAVIOR OF EMPLOYEES IN CHINA. X Dong and X Ren, Jinnan Military Region in China, Qingdao Second Nursing Home, Psychology Department, Qingdao, China.

With the rapid urbanization and economic growth in China, which results in speedy changes in social system, employees from all walks of life in China are facing significant working pressure to meet the requirements and competition at work, which leads to poor mental health conditions and even damages of human behavior and health. Research about working pressure has become a hot topic by psychologist and scholars from other disciplines, however, in China, related research and literature are rare. Here, we prepared working pressure assessment scale to valuate company employees' working pressure in China. **METHODS:** Use both the working pressure assessment scale, which includes 20 assessment questions, with three different optional answers and scores for each question (A=1 credit, B=2 credits, C=3 credits) and the Symptom Checklist (SCL-90) which uses computer to conduct man-machine dialogue as a combination to evaluate the working pressure of employees in

China. For the evaluation, the higher the total score is, the bigger the working pressure individual employee has. In general, the scores between 20-30 credits reflect the normal pressure level, scores between 30-45 credits represents mild pressure, and scores between 45-60 indicate a significant pressure level. **RESULTS AND DISCUSSION:** Of 6280 employees in China that we evaluated, 3528 employees are in the normal working pressure level, accounting for 56.18%; the number of people with a mild working pressure is 1832, accounting for 29.17%; and the 920 people left are in the high working pressure level, which accounts for 14.65%. On the same time, we evaluated the individual's mental health level, to serve as a comparison with their working pressure level. Of the same 6280 people, 4120 people (65.61%) are in the good mental condition; 1496 people (23.82%) are in the fair level; and 644 people (10.57%) have a relative bad metal condition. **DISCUSSION:** The employees in China who have a mild working pressure level turns to have a good metal health condition, and generally the ones with high working pressure have a relative poor metal condition. On the other hand, the employees in China who have a good metal health condition turns to have a normal or mild working pressure, and the one with a relative bad mental health condition turns to feel a high working pressure. By verifying the assessments results with participates and their colleges and families, it shows that the results' match rate is over 90%, the evaluation is of good reliability and validity. People should have a comprehensive and objective understanding of working pressure which could be assessed and evaluated; and the correct adjustment of working pressure could have a positive effect of improving mental health condition, and therefore, improving the work efficiency and satisfaction in life. **RESEARCH SUPPORT:** Jinan Military Region Joint Logistics Department, and Qingdao Second Nursing Home.

FEMALE ANXIETY AND ALTERED FEEDING BEHAVIOR IN AN EARLY STRESS MODEL ARE NOT RELATED TO CHANGES IN THE HPA AXIS RESPONSE TO ACUTE STRESS IN RATS. T Machado, R Dalle Molle, D Laureano, A Portella, C da Silva Benetti, I Werlang and P Silveira, Faculdade de Medicina Hospital de Clínicas de Porto Alegre, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil.

Chronic stress increases anxiety and makes individuals to use palatable foods as "comfort foods", which seems to be mediated by an altered functioning of the hypothalamus-pituitary-adrenal axis. We aimed at verifying if an early life stress also affects anxiety, feeding behavior, stress responses in adult female rats. **METHODS:** By the second day of life litters of Wistar rats were subjected to reduced nesting material (Early–Life Stress) or standard care (Controls). Anxiety was evaluated using the novelty suppressed feeding test (NSFT), and stress reaction was measured by corticosterone at baseline and immediately after a 20-, 40-, 60- and 90-min restrain stress. Feeding preference for palatable food (rich in fat [34%] and sugar [20%], CF-diet) was measured in a continuous monitoring computerized system of food consumption (BioDaq, Research Diets) in rats receiving only standard chow (std-diet) or exposed to both (std and CF- diet) continuously for 30 days. **RESULTS AND DISCUSSION:** Early life stress increases anxiety in the NSFT (p=0.005). No differences were seen in the corticosterone measurements in baseline or in response to acute restraint (p=0.305). On the preference test, while the control group chronically receiving the CF-diet showed a diminished preference for the palatable food compared to the control group exposed only to std-diet, the rats exposed to early life stress did not demonstrate this reduction in preference after the chronic exposure (p<0.001). Therefore, the anxiety and altered feeding behavior seen in early life stressed animals in this model do not seem to be related to changes in the HPA axis response to acute stress. Different sensitivity to glucocorticoids or alterations in others mediators such as serotonin may be involved. **RESEARCH SUPPORT:** Fipe/HCPA, CNPq, CAPES and Pronex/FAPERGS.

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