

THE INTERNATIONAL STRESS AND BEHAVIOR SOCIETY (ISBS)

PROCEEDINGS

International Neuroscience and Biological Psychiatry
ISBS Regional Conference (S. America)

“NEUROSCIENCE OF STRESS”



Rio de Janeiro, Brazil
December 1-3, 2016

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CONFERENCE PROGRAM

Venue (all sessions): Windsor Excelsior Hotel,
1800 Av. Atlântica, Copacabana, Rio de Janeiro, Brazil

Day 1. Thursday, December 1, 2016

09.00-17.00 REGISTRATION

Morning session

10.00-10.15 ISBS OPENING CEREMONY AND WELCOMING ADDRESSES

10.15-11.00 LECTURE 1: PERSONALITY CHARACTERISTICS OF ELITE EXTREME ATHLETES AND PSYCHOPATHIC OFFENDERS. E Monasterio, University of Otago, Christchurch School of Medicine, Christchurch, New Zealand

11.00-11.35 LECTURE 2: ANTIPSYCHOTICS-INDUCED METABOLIC ALTERATIONS: A STUDY TOWARDS DEVELOPING A NEW PROPHYLACTIC INTERVENTION. LE Rojo, A del Campo, K Cubillos-Robles, PA Gaspar, DK Vélez, E Pastene, Departamento de Biología, Facultad de Química y Biología, Universidad de Santiago de Chile, Santiago, Translational Psychiatry Laboratory, Clínica Psiquiátrica Universitaria, Hospital Clínico Universidad de Chile, Santiago, Facultad de Farmacia, Universidad de Concepción, Centro Estudios Moleculares de la Celula (CEMC), Fac. Cs. Qcas. y Farmaceuticas, Facultad Medicina, Universidad de Chile, Chile

11.35-12.00 COFFEE BREAK

Afternoon session

12.00-17.40 THE JOHN FENTRESS ISBS SYMPOSIUM ON BEHAVIORAL NEUROSCIENCE: FOCUS ON SELF-GROOMING
Chairs: N Garcia-Cairasco, C Estanislau (Brazil), AV Kalueff (China, Russia, USA)

12.00-12.10 INTRODUCTION: PROFESSOR JOHN H. FENTRESS

12.10-12.50 LECTURE 3: NEUROBIOLOGY OF RODENT SELF-GROOMING IN STRESS. AV Kalueff, DA Meshalkina, St. Petersburg State University, St. Petersburg, Ural Federal University, Ekaterinburg, Russia; Research Institute for Marine Drugs and Nutrition, College of Food Science and Technology, Guangdong Ocean University, Zhanjiang, China; ZENEREI Research Center, New Orleans, LA, USA

12.50-13.30 HOW DOES RAT GROOMING BEHAVIOR INTERPLAY WITH ANXIETY AND STRESS IN BEHAVIORAL TESTS? C Estanislau, State University of Londrina, Londrina, Brazil

13.30-14.30 LUNCH BREAK (FREE TIME)

14.30-15.00 NEUROPHARMACOLOGY OF GROOMING. HMT Barros, F Almeida, M Nin, Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, Brazil

15.00-15.25 INFLUENCE OF SEX AND AGE ON ANIMAL MODELS OF ANXIETY WITH A SPECIAL FOCUS ON THE RAT GROOMING BEHAVIOR. GB Filgueiras, R Klein, AV Lima, B Santos, C Estanislau, EG Moreira, State University of Londrina, Londrina, Brazil

- 15.25-15.50 RELATIONSHIP BETWEEN SLEEP AND SELF-GROOMING.** ML Andersen, Department of Psychobiology, Universidade Federal de São Paulo, São Paulo, Brazil
- 15.50-16.15 SELF-GROOMING AS A RELIABLE MEASURE OF SLEEP DEPRIVATION-INDUCED ANXIOGENESIS.** GN Pires, Department of Psychobiology, Universidade Federal de São Paulo, São Paulo, Brazil
- 16.15-16.40 COFFEE BREAK**
- 16.40-17.10 LECTURE 4: COMPULSIVE GROOMING INDUCED BY MICROINJECTION OF OXYTOCIN IN AMYGDALA.** N Garcia-Cairasco, SS Marroni, Ribeirão Preto School of Medicine, University of São Paulo, São Paulo, Brazil
- 17.10-17.30 SOCIAL GROOMING IN HUMANS: A STUDY OF CORTICAL MOTOR REPRESENTATIONS FOR HAND-CARESSING MOVEMENTS.** E Volchan, RR Campagnoli, L Krutman, CD Vargas, I Lobo, JM Oliveira, L Oliveira, MG Pereira, IA David, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Universidade Federal Fluminense, Niteroi, Brazil
- 17.30-17.40 GENERAL DISCUSSION AND CONCLUDING REMARKS**

Day 2. Friday, December 2, 2016

09.30-17.00 REGISTRATION

Morning session

- 10.00-10.30 IRVING I. GOTTESMAN LECTURE: RECOGNIZING THE ENDOPHENOTYPE CONCEPT IN BIOLOGICAL PSYCHIATRY OF STRESS.** AV Kalueff, St. Petersburg State University, St. Petersburg, Ural Federal University, Ekaterinburg, Russia; Research Institute for Marine Drugs and Nutrition, Guangdong Ocean University, Zhanjiang, China; ZENEREI Research Center, New Orleans, LA, USA
- 10.30-11.00 LECTURE 5: GRK2 PROTEIN AND mRNA MEASURES MAY PREDICT RESPONSE TO ANTIDEPRESSANT THERAPY IN PATIENTS WITH MDD.** S Avissar, M Golan, G Schreiber, Ben Gurion University, Beer Sheva, Barzilai Medical Centre, Ashkelon, Israel
- 11.00-13.30 LAPIN-ZUKOWSKA SYMPOSIUM ON BIOLOGICAL PSYCHIATRY**
Chairs: AV Kalueff (Russia, China, USA), C Estanislau (Brazil)
- 11.00-11.10 INTRODUCTION: PROFESSORS IZYASLAV P. LAPIN AND ZOFIA M. ZUKOWSKA**
- 11.10-11.40 PERSONALITY CHARACTERISTICS AND PHYSIOLOGIC STRESS RESPONSES IN EXTREME ATHLETES.** E Monasterio, O Mei-Dan, T Hackney, R Cloninger, A Lane, I Zwir, S Rozsa, University of Otago, Christchurch School of Medicine, New Zealand; University of Colorado, University of North Carolina and Washington School of Medicine, USA
- 11.40-12.00 PECULIARITIES OF NEUROHUMORAL REGULATION AND STRESS IN ELDERLY AGE.** SG Maximova, MB Maximov, OE Noyanzina, DA Omelchenko, AG Morkovkina, Altai State University, Barnaul, Russia
- 12.00-12.30 COFFEE BREAK**

12.30-12.55 INVOLVEMENT OF GABA-A RECEPTOR IN THE ANTI-STRESS EFFECT OF *M. FRUTESCENS* AND *M. GRANDIFLORA* EXTRACTS IN THE WISTAR RAT. JF Rodríguez-Landa, J Cueto-Escobedo, A Flores-Aguilar, GU Rosas-Sánchez, MJ Rovirosa-Hernández, M Carro-Juárez, F García-Orduña, Instituto de Neuroetología and Programa de Maestría en Neuroetología, Universidad Veracruzana Xalapa, Veracruz, Escuela de Medicina Veterinaria y Zootecnia, Universidad Autónoma de Tlaxcala, Tlaxcala, Tlaxcala, México

12.55-13.20 MATERNAL PSYCHOLOGICAL STRESS INDUCED DEVELOPMENTAL DEFECTS AND BEHAVIORAL ALTERATIONS IN OFFSPRING'S OF WISTAR ALBINO RATS. G Sakthivel, R Ravindran, Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani campus, Chennai, India

13.20-13.30 CONCLUDING REMARKS

13.30-14.50 LUNCH BREAK (FREE TIME)

Afternoon session

14.50-16.00 INTERACTIVE POSTER SESSION

EFFECT OF ANXIETY ON THE MAINTENANCE OF POSTURAL STABILITY IN UPRIGHT STANCE OF PATIENTS WITH VESTIBULAR DYSFUNCTION. K Stambolieva and D Petrova, Department of Cognitive psychophysiology, Institute of Neurobiology BAS, Department of Neurology, National Multiprofile Transport Hospital "Tzar Boris III", Sofia, Bulgaria

RELATIONSHIP OF CRAVING SEVERITY WITH SEVERITY OF DISSOCIATIVE EXPERIENCES WHILE CONTROLLING THE STATE AND TRAIT ANXIETY IN A SAMPLE OF INPATIENTS WITH ALCOHOL USE DISORDER. C Evren, G Umut, B Evren, Research, Treatment and Training Center for Alcohol and Substance Dependence (AMATEM), Bakirkoy Training and Research Hospital for Psychiatry Neurology and Neurosurgery, Department of Psychiatry, Baltalimani State Hospital for Muskuloskeletal Disorders, Istanbul, Turkey

RELATIONSHIP OF PTSD WITH IMPULSIVITY WHILE CONTROLLING THE EFFECT OF ANXIETY AND DEPRESSION IN A SAMPLE OF INPATIENTS WITH ALCOHOL USE DISORDER. C Evren, G Umut, B Evren, Research, Treatment and Training Center for Alcohol and Substance Dependence (AMATEM), Bakirkoy Training and Research Hospital for Psychiatry Neurology and Neurosurgery, Department of Psychiatry, Baltalimani State Hospital for Muskuloskeletal Disorders, Istanbul, Turkey

RACIAL DISCRIMINATION TRAJECTORIES, EDUCATION, AND TELOMERE LENGTH: FINDINGS FROM THE CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) STUDY. DH Chae, Y Wang, NB Slopen, T Yip, J Lin, GH Brody, NE Adler, E Puterman, KA Matthews, ES Epel, Center for Health Ecology and Equity Research, Auburn University, College of Human Sciences, Auburn, AL, USA

INTRAVENOUS CHANNEL DRUGS WITH CARCINOSTATIC PROPERTIES. D Nkazi and MV Brunel, Oil and Gas Production and Processing Research Unit, School of Chemical and Metallurgical Engineering, University of the Witwatersrand, Johannesburg, South Africa

16.00-16.30 COFFEE BREAK

16.30-17.30 ROUND TABLE: ETHICS IN BIOMEDICINE – CURRENT CHALLENGES

Day 3. Saturday, December 3, 2016

09.30-12.00 REGISTRATION

Morning session

10.00-12.00 ZNRC SYMPOSIUM ON AQUATIC MODELS OF BRAIN DISEASES

Chairs: AV Kalueff (China, Russia, USA), C Maximino (Brazil)

10.00-10.10 INTRODUCTION OF ZNRC - THE INTERNATIONAL ZEBRAFISH NEUROSCIENCE RESEARCH CONSORTIUM

10.10-10.40 A META-ANALYSIS OF BUSPIRONE EFFECTS ON ZEBRAFISH ANXIETY-LIKE BEHAVIOR. C Maximino, MG Lima, Universidade Federal do Sul e Sudeste do Pará, Universidade do Estado do Pará, Marabá, Brazil

10.40-11.00 TIME-DEPENDENT SENSITIZATION IN ADULT ZEBRAFISH AS A MODEL FOR POST-TRAUMATIC STRESS DISORDER: ROLE OF NITRIC OXIDE. MG Lima, C Maximino, AM Herculano, Universidade do Estado do Pará, Marabá/PA, Universidade Federal do Sul e Sudeste do Pará, Marabá/PA, Universidade Federal do Pará, Belém/PA, Universidade do Estado do Pará, Marabá, Brazil

11.00-11.25 BEHAVIORAL TESTS IN ZEBRAFISH (*DANIO RERIO*) FOR PHARMACOLOGICAL SCREENING OF ANXIOLYTIC SUBSTANCES. J Cueto-Escobedo, J Sarabia-Morales, JF Rodríguez-Landa, Instituto de Neuroetología, Universidad Veracruzana, Xalapa, Veracruz, México

11.25-12.00 AQUATIC RAVES, HIGHS AND ACID TRIPS: NOVEL INSIGHTS FROM ZEBRAFISH FOR HALLUCINOGENIC DRUG RESEARCH AND SUBSTANCE ABUSE. AV Kalueff, TO Kolesnikova, SL Khatsko, YuYu Morzherin, Ural Federal University, Ekaterinburg, Institute of Translational Medicine, St. Petersburg State University, St. Petersburg, Russia; Research Institute for Marine Drugs and Nutrition, College of Food Science and Technology, Guangdong Ocean University, Zhanjiang, China; ZENEREI Research Center and the International Zebrafish Neuroscience Research Consortium (ZNRC), New Orleans, LA, USA

12.00-12.20 COFFEE BREAK

12.20-13.00 GENERAL DISCUSSION ON TRANSLATIONAL CHALLENGES USING AQUATIC ANIMAL MODELS OF BRAIN DISORDERS

13.00-13.30 ART MEETS NEUROSCIENCE: AN ARTIST'S PERSPECTIVE. D Raytchev, London, UK

13.30-14.00 CONCLUDING REMARKS AND CLOSING CEREMONY
ANNOUNCING FORTHCOMING ISBS CONFERENCES

ABSTRACTS

Day 1. Thursday, December 1, 2016

LECTURE 1: PERSONALITY CHARACTERISTICS OF ELITE EXTREME ATHLETES AND PSYCHOPATHIC OFFENDERS. E Monasterio, University of Otago, Christchurch School of Medicine, Christchurch, New Zealand

INTRODUCTION: Extreme, risk-taking sportspeople, such as elite mountaineers and BASE jumpers frequently engage in sports associated with considerable risk of serious morbidity and mortality. Psychopathic offenders engage in frequent antisocial criminal behavior associated with considerable risk of harm to others. Elite extreme athletes and psychopathic offenders appear to be psychologically resilient to the effects of trauma and present with low anxiety propensity. **METHODS:** Elite mountaineers and BASE jumpers provided information on sports related accidents and completed the Temperament and Character Inventory (TCI-240), which is based on Cloninger's psychobiological model of personality. The TCI-240 findings of the extreme athletes is compared to TCI-240 findings of psychopathic and non-psychopathic offender populations. **RESULTS AND DISCUSSION:** Two-hundred and fifty-one elite extreme athletes enrolled in the study. TCI-245 findings revealed statistically significant differences between the 'risk-taking' sports population (and an age matched control population). The study populations scored higher on measures of Novelty Seeking and Self-Directedness and lower on measures of Harm-Avoidance, Reward-Dependence and Self-Transcendence. There are considerable temperamental similarities (rate and extent) between extreme athletes and psychopathic offender populations, as they both present with higher scores on Novelty-Seeking and lower scores on Harm-Avoidance and Reward-Dependence. There are considerable character differences as elite athletes score high on Self-Directedness and low on Self-Transcendence whereas psychopathic offenders score low of Self-Directedness, Cooperativeness and Self-Transcendence. The author's presentation will rely on research findings and personal involvement in high performance extreme sports to discuss the implications of the research; in particular the effect of temperamental biases (partially heritable and present at birth) to engagement in pro-social and antisocial risk taking activities, mediated via character development. The presentation will be accompanied by video footage of extreme sport examples. **RESEARCH SUPPORT:** The research was self-funded by the researchers with access to University Departmental resources, but no financial support. There is no conflict of interest to declare.

LECTURE 2: ANTIPSYCHOTICS-INDUCED METABOLIC ALTERATIONS: A STUDY TOWARDS DEVELOPING A NEW PROPHYLACTIC INTERVENTION. LE Rojo, A del Campo, K Cubillos-Robles, PA Gaspar, DK Vélez, E Pastene, Departamento de Biología, Facultad de Química y Biología, Universidad de Santiago de Chile, Santiago, Translational Psychiatry Laboratory, Clínica Psiquiátrica Universitaria, Hospital Clínico Universidad de Chile, Santiago, Facultad de Farmacia, Universidad de Concepción, Centro Estudios Moleculares de la Celula (CEMC), Fac. Cs. Qcas. y Farmaceuticas, Facultad Medicina, Universidad de Chile, Chile

INTRODUCTION: Second-generation antipsychotics (SGAs) have improved quality of life of billions schizophrenia patients worldwide and have become the cornerstone of therapeutic guidelines for psychotic disorders. "Off-label" applications of SGAs include millions of non-schizophrenic adults and children. The SGA users can develop severe cardiometabolic alterations shortly after initiation of the pharmacotherapy. Dysfunctions of hypothalamic satiety centers and increased peripheral lipid accumulation are involved in SGAs toxicity. The up regulation of the sterol regulatory element-binding protein 1c (SREBP1c) induced by SGAs is a key event in SGAs-induced peripheral lipid accumulation and hepatic steatosis. In this work we show advanced pre-clinical evidence towards developing a polyphenols-based formula (PBF) to prevent OLZ-induced weight gain, lipid accumulation and mitochondrial alterations. **METHODS:** Cultured 3T3 cells were differentiated with olanzapine (OLZ) to adipocytes and then used as a model system to assess OLZ-induced intracellular lipid (Oil Red staining), cholesterol and triglycerides synthesis. The PBF was prepared from A. chilensis (Maqui berry) using a solvent-free, food compatible method. Sprague-Dawley rats treated with OLZ (i.p. 4mg/kg) were used as a weight gain model and fed PBF (73 mg/Kg of total anthocyanins) for 21 days. We used OLZ treated cardiomyocytes (primary culture) to assess protection against OLZ-induced cardiotoxicity. **RESULTS AND DISCUSSION:** OLZ-induced intracellular lipid accumulation was significantly inhibited by PBF. The OLZ-induced triglyceride and cholesterol synthesis was inhibited by PBF. OLZ-induced weight gain in Sprague-Dawley rats was also inhibited by PBF. Delphinine-3-glucoside (PBF major component) displayed insulin-like effects and protected cardiomyocytes from OLZ-induced mitochondrial fission. **RESEARCH SUPPORT:** RLE is funded by CONICYT Chile grant FONDECYT 11140915.

THE JOHN FENTRESS ISBS SYMPOSIUM ON BEHAVIORAL NEUROSCIENCE: FOCUS ON SELF-GROOMING. Chairs: N Garcia-Cairasco, C Estanislau (Brazil), AV Kalueff (China, Russia, USA)

INTRODUCTION: PROFESSOR JOHN H. FENTRESS (1939-2015)



PROF. JOHN H. FENTRESS was a noted animal behaviorist and former President of the Animal Behavior Society (ABS). Born in 1939 in East Chicago, IN, he received his BA degree from Amherst College, followed by a PhD in zoology and ethology from Cambridge University in 1965, under Robert Hinde and William Thorpe. Subsequently, he conducted postdoctoral research with Richard Doty. One of his passions always was to synthesize animal experimental psychology, ethology and neuroscience. In 1974, he moved from the University of Oregon to Dalhousie University in Canada to become chair of the Department of Psychology. When the department eventually changed its name to the "Department of Psychology and Neuroscience", John was thrilled and considered it a high point that vindicated his interest in unifying these fields. Following his retirement in 2003, John returned to Oregon but continued to maintain connections and collaborative projects with colleagues at Dalhousie. In his two main areas of research, action patterns in animals (more specifically, grooming sequences) and wolf social behavior, John often contributed to re-defining the status quo by putting forward innovative and thought-provoking ideas. In the 1970s, he re-framed and gave new relevance to the construct of "motor programs" and innate behavior. As such, he was a highly influential thinker and researcher in animal behavior. Early in his career, John edited the well-known book, *Simpler Networks and Behaviour*. He was prolific in his writing, publishing more than 130 scientific papers and abstracts on a range of topics, including aspects of behavioral methodology, behavioral neurobiology, and development and organization of behavior, using both canids and rodents as research subjects. Not surprisingly, throughout his lifetime, John received numerous awards for his outstanding research contributions. In addition to his service as ABS President (1988-1989), he served on numerous committees, including Education, Policy and Planning, Membership, and Nominating committees. In 1993, he was elected a Fellow of the ABS, in recognition of his exceptional research and service contributions to the society. John is fondly remembered as a true gentleman - a devoted and down to-earth person who was always kind, friendly with everyone, and scrupulously honest. He loved animal behavior, and his charismatic personality attracted many outstanding students to the field and to our society. One little known fact about John was his strong interest in health and the mind-body connection. In his younger years he met and conversed on such issues with Carl Jung and Robert Frost. More recently, he led and participated in mind-body workshops that included the Dalai Lama. Excerpt of poem by John: "Have you ever seen a wolf just glide - Across the field or through the wood - It is truly a vision to behold - A dance of nature with grace and trust." [Zuleyma Tang-Martinez, ABS Historian, Simon Gadbois, Dalhousie University]. Importantly, Professor Fentress was also an active supporter of ISBS, and enthusiastically participated – as a plenary speaker, co-author and reviewer - in the Society's scholarly activities and publications. His research and theoretical contribution to neurobiology of grooming behavior remains critical for our improved understanding of this complex behavior in animal models, and continues to influence our attempts at a better translation of this patterned behavior into human brain disorders. This Special ISBS symposium honors Prof. Fentress' long-term contribution to grooming neurobiology, and discusses newest challenges and research directions in this field of biological psychiatry.

LECTURE 3: NEUROBIOLOGY OF RODENT SELF-GROOMING IN STRESS. AV Kalueff, DA Meshalkina, St. Petersburg State University, St. Petersburg, Ural Federal University, Ekaterinburg, Russia; Guangdong Ocean University, Zhanjiang, China; ZENEREI Research Center, New Orleans, LA, USA

Self-grooming is a complex innate behavior with an evolutionarily conserved sequencing pattern and is one of the most frequently performed behavioral activities in rodents. This introductory lecture will discuss the neurobiology of rodent self-grooming, and highlights studies of rodent models of neuropsychiatric disorders - including models of autism spectrum disorder and obsessive compulsive disorder - that have assessed self-grooming phenotypes (Kalueff et al., 2016a,b). Overall, mounting evidence suggests that rodent self-grooming may be a useful measure of repetitive behavior in various CNS models, and therefore of value to translational psychiatry. In line with seminal early works by J Fentress, assessment of rodent self-grooming may also be useful for understanding the neural circuits that are involved in complex sequential patterns of action.

HOW DOES RAT GROOMING BEHAVIOR INTERPLAY WITH ANXIETY AND STRESS IN BEHAVIORAL TESTS? C Estanislau, State University of Londrina, Londrina, Brazil

In regular behavioral procedures, rodent grooming behavior can easily account for 10-20 % of the available time. Although long known to have relationships with stress, grooming has also long been seen as a behavioral measure that leads to contradictory findings. Nevertheless, this picture is beginning to change and some more recent studies from different laboratories have exemplified clear connections between grooming and stress or anxiety. Studies like these suggest a heuristic role for grooming in neurobehavioral research. The knowledge about human conditions like obsessive-compulsive disorders, trichotillomania, Tourette's syndrome, and some anxiety disorders could benefit from this. **RESEARCH SUPPORT:** CNPq (proc. 483937/2011-8 and 471214/2014-0) and Fundação Araucária (prot. 38.134).

NEUROPHARMACOLOGY OF GROOMING. HMT Barros, F Almeida, M Nin, Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, Brazil

INTRODUCTION: Grooming behavior is considered a displaced behavior that may represent a conflict of decision to be made during stressful events. It is also considered to represent an adaptation to a stressful environment. Grooming duration and structure of behavioral events may vary in accordance with stress intensity and it is a valuable tool to detect the effects of pharmacological agents in acts, postures and motion transitions. The objective of this review is to describe the effects of pharmacological agents that may modify grooming behaviors in rodents. Special attention will be paid in respect to agents that interact with the brain GABA-ergic system. **METHODS:** This presentation will review the effects of toxic and pharmacologic agents on grooming behavior associated with the open-field, elevated plus maze, forced-swimming and through the novel-environment grooming microstructure analysis in male and female rats. **RESULTS AND DISCUSSION:** Hormonal variation during the different phases of the estrous cycle of female rats changes the grooming behavior. Direct or indirect agonists and positive modulators of the GABA-A receptors, including neurosteroids, decrease the duration, frequency, incorrect transitions and uninterrupted bouts of grooming of male and female rats in the open-field. GABA-A receptor antagonists reverse the effects of GABA agonists in grooming. Intermittent acute ethanol withdrawal is associated with decreased grooming. The grooming microstructure test is a useful tool for detecting anxiogenic and anxiolytic-like behaviors in rats. Because grooming behavior was moderately associated with anxiolytic-like effects of drugs in the elevated plus maze test the grooming microstructure might reflect collateral drug effects in anxiety. Toxic cholinergic agents such as propoxur and nicotine increase grooming in the open-field. In our hands, pollution, agents with antidepressant or agents with antioxidant effects did not change grooming behaviors. Hormonal variation during the different phases of the estrous cycle of female rats also changes the grooming behavior. **RESEARCH SUPPORT:** CAPES and CNPQ.

INFLUENCE OF SEX AND AGE ON ANIMAL MODELS OF ANXIETY WITH A SPECIAL FOCUS ON THE RAT GROOMING BEHAVIOR. GB Filgueiras, R Klein, AV Lima, B Santos, C Estanislau, EG Moreira, State University of Londrina, Londrina, Brazil

INTRODUCTION: Animal models of psychiatric disorders are widely used in experimental investigations and their constant development and improvement are essential to support the advances in the understanding of the pathophysiology and treatment of human mental health problems. In this sense, the grooming behavior has been suggested as a marker of emotionality in behavioral models of anxiety. Despite of the reported sexual and age differences in behavioral animal models, adult male rodents are the most used animals in these models. Based on the above considerations, the present study aimed to investigate: 1) the influence of sex and age on the rats behaviors evaluated in three animal models of anxiety: open field, elevated plus maze and exposure to a conditioned fear context; 2) the influence of session duration on the behavioral categories displayed by these animals and 3) if the division of grooming behavior into two target regions (rostral and body) would improve its capability to detect differences in emotional states. **METHODS:** Pubescent (35 days-old) and adult (75-90 days-old) female and male rats were evaluated for 5 and 20 minutes in the open field, elevated plus maze and exposure to a conditioned fear context. **RESULTS AND DISCUSSION:** results showed that: 1) females behaved less anxiously than males; 2) pubescent animals behaved more anxiously than adults; 3) while extending the session duration turned open-field more sensitive, shorter sessions were enough to reveal effects in the elevated plus-maze and in the conditioned fear context; 4) rostral grooming was increased in animals that behaved more anxiously, paralleling alterations observed in conventional emotional parameters of all three tests. This work highlighted the importance of considering sex and age, as well as the test type and different parameters when designing a behavioral study. The results suggests that adult females would be more suitable to studies investigating environmental factors expected to induce anxiogenic or sedative effects while male adults to studies investigating environmental factors expected to induce anxiolytic or motor stimulant effects. Pubescence showed to be a window of vulnerability when considering anxious-like behavior. Finally, rostral grooming seemed to be a potential measure for studying rodent anxiety.

RELATIONSHIP BETWEEN SLEEP AND SELF-GROOMING. ML Andersen, Department of Psychobiology, Universidade Federal de São Paulo, São Paulo, Brazil

Sleep and self-grooming are both important activities in laboratory animals, corresponding to a considerable portion of total rodents' behavioral phenotype. While the first occupies more than a half of rodents' life, the latter takes 20 to 40% of their total awake time. Considering the ubiquity of these activities, one may realize how important the relationships between them are. Self-grooming and sleep in rodents are associated in two different contexts: Firstly, self-grooming is observed as a normal behavior related to somnolence and the transition between sleep and wakefulness. In this case, the association between these behaviors is a normal ethological observation with no pathological or abnormal correlations. In the second case, self-grooming is altered as a consequence of sleep deprivation. As lack of sleep is an important stressor, increased self-grooming have been observed in several different experimental contexts, being often taken as a measure of stress response and anxiogenesis. Few articles have disclosed reduced self-grooming in a very specific experimental condition, when associated with maternal aggression in sleep-deprived dams, but also in this case it seems to be a stress-related response. Most of these articles draws upon the analysis of classical behavioral parameters related to grooming - latency to initiate grooming behavior, total duration and frequency of grooming bouts,

which may lead to dubious interpretation. By means of these analyses associated to sleep deprivation, increased self-grooming may be interpreted either as a marker of stress response acute and increased acute anxiety, or simply as a consequence of increased sleep pressure, indicative of higher somnolence. The differentiation between normal and stress-related self-grooming can be achieved by analyses of the grooming microstructure and sequencing patterns. A single study has analyzed grooming microstructure following sleep deprivation showing fragmented and non-sequential grooming patterns, indicating sleep deprivation as a strong stressful and disruptive condition. The current lecture will address both sides of the relationship between sleep and self-grooming, giving special attention to the effects of sleep deprivation on grooming behavior.

SELF-GROOMING AS A RELIABLE MEASURE OF SLEEP DEPRIVATION-INDUCED ANXIOGENESIS. GN Pires, Department of Psychobiology, Universidade Federal de São Paulo, São Paulo, Brazil

Anxiety has been reported as one of the most common behavioral consequences of sleep deprivation in humans. However, rodent studies conducted so far have raised inconsistent results, failing to reproduce the same sleep deprivation induced-anxiety observed in clinical settings. Most of these animal experiments were conducted in the elevated plus-maze, the gold-standard method for anxiety assessment in rodents. While some of them presented anxiogenesis as a result of sleep deprivation, other reported anxiolysis due to the lack of sleep. A recent meta-analysis by our group (not yet published) has confirmed that none of the classical and most used rodent anxiety measurement tools are able to reproduce a sleep deprivation-induced anxiogenesis. The most probable explanation for such a translation discrepancy lies in the nature of the methods that have been used to assess anxiety-like behavior in rodents and on the overall behavioral effects of sleep deprivation. Together with anxiety, sleep deprivation in rodents elicits a mania-like behavior or an increased impulsivity state. Considering the elevated plus maze, it is expected that an anxious animal will remain in the enclosed arms for most of the time, presenting low exploratory and locomotor behaviors, while an animal with increased impulsivity would present a higher rate of time in the open arms, displaying increased locomotor and exploratory activity. Thus, lack of sleep leads to a behavioral state concomitantly composed by increased anxiety and impulsivity, which are opposite and mutually exclusive when tested in the elevated plus maze and related measurement tools. We believe the reasons for this translational inconsistency does not rely on the actual effects of sleep deprivation in rodents, but rather on a possible lack of sensitivity and applicability of the currently used methods to evaluate the sleep deprivation-induced anxiogenesis in laboratory animals. It is necessary to find a method that allows anxiety to be measured without interference from other behaviors; the best current option seeming to be self-grooming analysis. Both anxiety and impulsivity leads to a similar fragmentation of cephalo-caudal patterns of grooming behavior, overcoming the aforementioned problem of opposition of these behavioral variables on the elevated plus maze. A previous study have used the grooming analysis algorithm to evaluate the effects sleep deprivation on anxiety, resulting in a marked anxiogenesis and corroborating the observation in clinical experiments. This lecture will present the results of the mentioned meta-analysis, discussing the reasons why animal experiments do not replicate the sleep deprivation-induced anxiogenesis observed in humans and finally addressing the reasons why we believe that self-grooming microstructure analysis might be the best option to solve this translational problem.

LECTURE 4: COMPULSIVE GROOMING INDUCED BY MICROINJECTION OF OXYTOCIN IN AMYGDALA. N Garcia-Cairasco, SS Marroni, Ribeirão Preto School of Medicine, University of São Paulo, São Paulo, Brazil

Although oxytocin (OT) is widely known as a neurohormone associated to diverse peripheral actions such as milk ejection and parturition, this nonapeptide, synthesized in hypothalamic cells and that project to the neurohypophysis, is also detected in several regions of the central nervous system, where is linked to a variety of cognitive, sexual, reproductive, grooming and affiliative behaviors. Obsessive-compulsive disorder (OCD) includes also cognitive and behavioral symptoms with strong association with central OT actions. In the current study we characterized behavioral, neuroanatomical and cellular substrates of compulsive grooming (hypergrooming) induced by administration of OT in the central nucleus of amygdala (CeA) of Wistar rats and in animals from the Wistar Audiogenic Rat (WAR) strain, an experimental model of epilepsy. In Wistar animals we characterized an experimental model of compulsion, by means of a grooming score and neuroethology (flowcharts). In the case of the WARs, we used the grooming score, flowcharts and graph analysis of syntactic grooming chains. The comparative study between the strains allowed us to investigate the association between epilepsy and compulsion circuits, after administration of OT or saline (SAL) into the CeA. Hypergrooming is considered as a model of compulsive behavior and our data suggest a link between the CeA and the hypothalamic grooming area (HGA), which includes the paraventricular nucleus and the dorsal hypothalamic area. Our data on co-localization of OT immunohistochemistry, OT receptor (binding assay) and its retrogradely labeled cells after Fluoro-Gold injection in the CeA suggest that CeA and connections are important substrates of the circuit underlying this OT-dependent compulsive behavioral pattern (Marroni et al, 2007). In the other hand, functionally activated Fos+ circuits in both Wistar and WAR were detected in regions such as orbitofrontal cortex, striatum, paraventricular nucleus of the hypothalamus, dentate gyrus, substantia nigra compacta and substantia nigra reticulata. The hypergrooming observed in WARs after microinjection of SAL into CeA was similar to the hypergrooming induced in Wistar rats after microinjection of OT. In conclusion our data indicate first: that hypergrooming induced after OT microinjection into CeA is a model of compulsion and that besides cortico-basal ganglia-thalamic-cortical circuits, amygdala complex can be added as an import, possibly modulatory emotion-related component of the compulsion circuits. Second: Because in the WARs strain, an experimental model of epilepsy, we detected increased grooming in a novel environment and

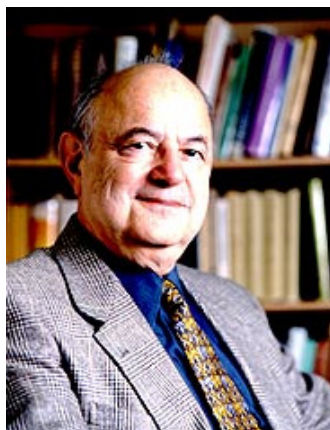
hypergrooming after SAL into CeA, similar to OT-induced hypergrooming in Wistars, this compulsive grooming can be considered a neuropsychiatric comorbidity in WARs. In fact we demonstrated clear-cut expression of c-Fos+ neuronal activity after OT microinjections, detected in nuclei that are part of the cortical-striatal-thalamic-cortical circuit and the parallel cortical-striatal-nigral-thalamic-cortical circuit. **ACKNOWLEDGEMENTS:** Members of the Neurophysiology and Experimental Neuroethology Laboratory FMRP-USP. **RESEARCH SUPPORT:** FAPESP, CAPES-PROEX, CNPq and FAEPA.

SOCIAL GROOMING IN HUMANS: A STUDY OF CORTICAL MOTOR REPRESENTATIONS FOR HAND-CARESSING MOVEMENTS. E Volchan, RR Campagnoli, L Krutman, CD Vargas, I Lobo, JM Oliveira, L Oliveira, MG Pereira, IA David, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Universidade Federal Fluminense, Niteroi, Brazil

INTRODUCTION: Interpersonal touch-based contact (*allo-grooming*) is an essential and prominent component of human social bonding. It relies on two agents and grooming another one is supposed to be underpinned by a strong motivational drive. Previous neurophysiological studies of human social touch have emphasized the perspective of the touch's recipient. In the present work we focus on the grooming-giver and searched for pre-programmed motor circuits associated with hand-caressing movements. **METHODS:** We employed exposure to bonding cues and electrophysiological (brain and muscles) recordings related to a task consisting of a grooming-like movement. We studied the readiness potential, an electroencephalographic marker of motor preparation that precedes movement execution. The bonding cues were pictures depicting dyads (one child & one adult, or two children) directly interacting with each other. The control pictures also depicted those dyads, but they were not interacting. The task consisted of a paced single flexion of fingers over a soft cloth, few seconds after each picture's presentation. Fingers flexor electromyography measured action output. **RESULTS AND DISCUSSION:** Exposure to the bonding pictures increased subjective feelings of sociability and decreased feelings of isolation. Participants who more frequently engage in mutual caress/groom a "significant other" in daily life initiated the motor preparation earlier, emphasizing the distinctiveness of neural signatures of social bonding through grooming-like movements. As hypothesized, readiness potentials preceding the caressing of the soft cloth were significantly reduced under exposure to bonding as compared to control pictures. Furthermore, an increased fingers flexor electromyographic activity was identified under exposure to the former as compared to the latter pictures. The facilitatory effects are likely due to the recruitment of pre-set cortical motor repertoires related to grooming-like movements as well as motor facilitation downstream. We conclude that predispositions to act towards social grooming are imprinted in the human brain. **RESEARCH SUPPORT:** National Council for Scientific and Technological Development (CNPq), the Carlos Chagas Filho Foundation for Research Support in Rio de Janeiro (FAPERJ), and the Coordination for the Improvement of Higher Education Personnel (CAPES).

Day 2. Friday, December 2, 2016

IRVING I. GOTTESMAN LECTURE: RECOGNIZING THE ENDOPHENOTYPE CONCEPT IN BIOLOGICAL PSYCHIATRY OF STRESS. AV Kalueff, St. Petersburg State University, St. Petersburg, Ural Federal University, Ekaterinburg, Russia; Research Institute for Marine Drugs and Nutrition, Guangdong Ocean University, Zhanjiang, China; ZENEREI Research Center, New Orleans, LA, USA



PROFESSOR IRVING (IRV) I. GOTTESMAN (1930-2016) was born in Cleveland, OH to Hungarian-Romanian Jewish parents. Irv was a science enthusiast from an early age and began a physics degree while serving as an officer in the US Navy, later switching to psychology. He completed his PhD at the University of Minnesota on the genetics of personality, but initially had great difficulty in getting his findings published because of the prevailing orthodoxy in US academia in the late 1950s that behavior was entirely due to nurture, and nothing to do with nature. After his postdoctoral fellowship in London, Irv returned in 1966 to the biology-friendly department of Psychology in Minneapolis, and set up one of the first behavior genetics training programs in the US. He thereafter held chairs in Washington University in St Louis (1980-85), and at the University of Virginia (1986-2001), where he set up a clinical psychology doctorate, before returning to Minnesota, where he remained for the rest of his career. Irv won many plaudits and prizes worldwide but retained particular affection for and gratitude to the UK, where his recent awards included honorary fellowship of the Royal College of Psychiatrists and King's College London. His far-reaching conceptual innovation was their idea of "endophenotypes", proposed (with J. Shields)

in their 1972 book, *Schizophrenia and Genetics*. Specifically, they posited that the genetic basis of psychiatric disorders could be better understood, and specific genes more readily identified, by the discovery of biological characteristics that lie a step closer to DNA/genes than the clinically observable symptoms and signs ('exophenotypes'), by which disorders are defined. Irv continued to elaborate the endophenotype concept over ensuing years and it provoked thousands of

papers by others (P. McGuffin, 2016). Today, Gottesman's endophenotype concept remains one of the most influential thoughts in biological psychiatry. Irving was also a good friend of ISBS, advising our members and enthusiastically contributing to many ISBS publications. Recognizing his critical impact on the field, this Special ISBS Lecture will discuss the developing utility of endophenotypes in stress neurobiology, the potential role of the interplay of endophenotypes in brain pathogenesis, and the emerging promising new areas of research in this direction.

LECTURE 5: GRK2 PROTEIN AND mRNA MEASURES MAY PREDICT RESPONSE TO ANTIDEPRESSANT THERAPY IN PATIENTS WITH MDD. S Avissar, M Golan, G Schreiber, Ben Gurion University, Beer Sheva, Barzilai Medical Centre, Ashkelon, Israel

INTRODUCTION: G-protein-coupled receptor kinases (GRKs) interfere in receptor-G-protein coupling leading to desensitization of G-protein-mediated receptor signalling. G-protein-coupled receptor signalling and its desensitization were previously implicated in the pathophysiology, diagnosis and treatment of mood disorders. **OBJECTIVES:** The present study aimed to evaluate alterations in GRK2 protein and mRNA levels in mononuclear leukocytes (MNL) of untreated patients with major depression and the effects and time-course of antidepressant treatments on these alterations **METHODS:** Repeated GRK2 protein and mRNA measurements were carried in MNL of 24 patients with major depression. Each patient was examined while untreated and after 1, 2, 3 and 4 wk of antidepressant treatment; 24 healthy subjects were also studied. GRK2 protein and mRNA levels were evaluated through immunoblot analyses using monoclonal antibodies against GRK2 and reverse transcriptase-polymerase chain reaction, respectively. **RESULTS:** GRK2 protein and mRNA levels in MNL of untreated patients with major depression were significantly lower than the measures characterizing healthy subjects. The decreased GRK2 protein and mRNA levels were alleviated by antidepressant treatment. Normalization of GRK2 measures preceded, and, thus, could predict clinical improvement by 1-2 wk. **DISCUSSION:** These findings support the implication of GRK2 in the pathophysiology of major depression and in the mechanism underlying antidepressant-induced receptor down-regulation and therapeutic effects. GRK2 measurements in patients with depression may potentially serve for biochemical diagnostic purposes and for monitoring and predicting response to antidepressants. **RESEARCH SUPPORT:** S.A. is incumbent of Eugene Hecht Chair in Clinical Pharmacology.

LAPIN-ZUKOWSKA SYMPOSIUM ON BIOLOGICAL PSYCHIATRY. Chairs: AV Kalueff (Russia, China, USA), C Estanislau (Brazil)

INTRODUCTION: PROFESSORS IZYASLAV P. LAPIN AND ZOFIA M. ZUKOWSKA. This regular ISBS symposium is dedicated to Professors Izyaslav 'Slava' P. Lapin (1930-2012) and Zofia M. Zukowska (1949-2012).



PROF. IZYASLAV P. LAPIN was a true pioneer of experimental neuropsychopharmacology and biological psychiatry. Slava Lapin graduated from Pavlov Medical School in St. Petersburg, and shortly after receiving PhD, was invited in 1960 to establish the first psychopharmacology laboratory at the Bekhterev Psychoneurological Institute. The most important scientific contribution of Prof. Lapin was establishing the link between serotonin levels and mood-elevating (thymoleptic) action of antidepressants. He suggested that enhanced central serotonergic tone is essential for the mood-elevating effects of antidepressants. Lapin's serotonin hypothesis of antidepressant action, published in *Lancet* in 1969, became one of the most cited papers published in this journal in the last 50 years. Lapin's studies have contributed greatly to the development of newest serotonergic antidepressants, such as SSRIs, currently representing the most prescribed group of psychotropic drugs in the world. Prof. Lapin was also the first to report the neuroactive effects of kynurenine and its derivatives – a discovery that opened another rapidly expanding area of glutamatergic psychopharmacology. A talented professional musician, prolific writer, painter, and an enthusiastic athlete, Prof. Lapin was a strong supporter of ISBS, and generously shared his knowledge with colleagues and students at our "Stress and Behavior" conferences and ISBS summer schools. His enthusiasm, friendship, generous support of junior colleagues, and the deep knowledge as both a clinical and experimental neuropharmacologist ('humanists' and 'animalists', as he called them), made a long-lasting impact on his colleagues and students.



PROF. ZOFIA M. ZUKOWSKA received her M.D. and Ph.D., trained in cardiovascular medicine at the Warsaw Medical Academy (Poland). She pursued post-doctoral training at the NIH, working with such renowned scientists as Irwin I. Kopin, Scientific Director of NINDS, and Julie Axelrod, Nobel Laureate. It was during this research period when her interest in stress and neuropeptides became galvanized. For the 25 years, she was a professor (and, later Chair) of the Department of Physiology and Biophysics at Georgetown University, before moving to the University of Minnesota as the Director of Stress Physiology Center. Her research examined how stress affects cardiovascular and metabolic health and diseases, and the role of peptides, in particular neuropeptide Y (NPY), a sympathetic neurotransmitter and a

stress mediator. She was the first to determine that NPY mediates stress-induced prolonged vasoconstriction and vascular mitogenic and pro-atherosclerotic effects (via Y1 receptors) and potent angiogenic actions (via Y2 receptors), establishing the role of NPY in ischemia, retinopathy, tumors and obesity. Professor Zukowska was a strong supporter of the ISBS and a regular plenary speaker at our conferences. Her scientific vision, extraordinary creativity, kindness to colleagues, and the talent to be daring, continue to inspire all her ISBS colleagues and their research.

PERSONALITY CHARACTERISTICS AND PHYSIOLOGIC STRESS RESPONSES IN EXTREME ATHLETES. E Monasterio, O Mei-Dan, T Hackney, R Cloninger, A Lane, I Zwir, S Rozsa, University of Otago, Christchurch School of Medicine, New Zealand; University of Colorado, University of North Carolina and Washington School of Medicine, USA

INTRODUCTION: Risk-taking (extreme) sports such as mountaineering and BASE jumping are growing in popularity and are associated with significant risk of injury. Participants in these sports appear to have a unique capacity to cope with stressful situations, as these sports are associated with considerable risk, and require high performance in situations of uncertainty and high physical risk. This presentation examines the personality characteristics of participants in these sports, by examining the findings of the author's research into the personality profile associated with risk-taking in sport. In addition research data on physiologic stress responses in BASE jumpers will be presented and discussed. **METHODS:** Participants provided information on sports related accidents and completed the Temperament and Character Inventory (TCI-240), which is based on Cloninger's psychobiological model of personality. In addition a cohort of BASE jumpers provided a baseline (basal) saliva sample twenty-four hours before they jumped, and on the day of a BASE jump event, saliva was collected 3-10 minutes prior to jumping (pre-jump) and another within 1-5 minutes following the jump (post-jump). Samples were later evaluated in duplicate for cortisol and alpha-amylase via ELISA procedures. **RESULTS AND DISCUSSION:** Forty-nine mountaineers and 202 BASE jumpers enrolled in the study. TCI-240 findings revealed statistically significant differences between the 'risk-taking' sports population (and an age matched control population). The study populations scored higher on measures of Novelty Seeking and Self-Directedness and lower on measures of Harm-Avoidance and Self-Transcendence. A substantial number of BASE jumpers (40%) scored within the extremely low range for HA. Baseline findings revealed that 47% of mountaineers and 60% of BASE jumpers had suffered at least one significant accident and at 4-year follow-up, there was an 8% death rate from climbing misadventure. A cohort of 79 BASE jumpers provided saliva samples. Three classes of jumpers were identified using Latent Class Analysis based on their personality profiles, prior jumping experience, and levels of cortisol and alpha-amylase at all three time points. Jumpers in class 1 had a strong sense of self-directedness and mastery, extensive prior experience, and had little alpha-amylase reactivity and average cortisol reactivity. Jumpers in class 2 were highly cooperative and trustful individuals who had little cortisol reactivity coincident with the social support they experienced prior to jumping. Jumpers in class 3 were courageous (determined) despite anxiety and inexperience, and they had high sympathetic reactivity but average cortisol activation. High anxiety (TCI Harm Avoidance) and social detachment (low Reward Dependence) predicted high cortisol reactivity, whereas high Persistence (determination, tenacity) predicted high alpha-amylase reactivity. The emotional drives measured by the TCI temperaments of Harm Avoidance, Novelty Seeking, and Reward Dependence are predictive of individual differences in the emotional regulation of cortisol release by the HPA axis, but not sympathetic arousal. In contrast, personality measures of tenacity in self-governance (persistence and character) are predictive of differences in sympathetic reactivity, but not cortisol reactivity. In other words, the reactivity of the HPA and SAM stress systems can be dissociated in people with particular personality profiles. A personality profile of psychological resilience (i.e., low Harm Avoidance combined with high Persistence and/or high Self-directedness) mediates decision making to pursue likely rewards despite substantial risk of injury. **RESEARCH SUPPORT:** The research has been self-funded by the researchers with access to University Departmental resources, but no financial support. There is no conflict of interest to declare.

PECULIARITIES OF NEUROHUMORAL REGULATION AND STRESS IN ELDERLY AGE. SG Maximova, MB Maximov, OE Noyanzina, DA Omelchenko, AG Morkovkina, Altai State University, Barnaul, Russia

INTRODUCTION: Endocrine-biochemistry mechanisms of stress reaction play an important role in development of condition of psycho disadaptation. In fact, all stress reactions accompanied with change of psychical health, reveal in violation of unite barrier of psychical adaptation, which was formed by not only biological, but by social-psychological factors too. In clinical practice, it reveals in neurotic disorders. Changes in the system of neuro humoral regulation play a great role in mechanisms of the ageing. With taking into consideration all possible class, population variability, they create a general complex of changes, indicated as "stress – age - symptom". It bases on common direction of hypothalamus-hypophysis pituitary -endocrine changes during ageing and stress, common character of many cell and molecular changes during these processes. Consideration of this age symptom emphasize system character of the change with possible variants in separate elements in the process of ageing. Thus, there are two sides of the "stress – age – adaptation" problem: emerge of "stress-age-symptom" together with ageing, first of all; peculiarities of development of stress in this process, caused by different endogenous and exogenous factors, secondly. **METHODS:** We determined hormonal status of the group of persons (70 persons total, among them are 46 women and 24 men) to study the peculiarities of development of the "stress – age - symptom". We realized blood collection in the morning hours, fasting and from the cubital vein. Content of hormones in the blood was determined with the use of radioimmunology method with correlated set of reagents. We determined the following hormones: adrenocorticotrophic (ACTH), somatotropin (STH ST?), thyroid (TSH), follicle-stimulating hormone (FSH), luteinizing hormone (LH),

triiodothyronine, thyroxine, cortisol, estriol, estradiol, testosterone, progesterone, insulin. Simultaneously, we studied for psychological characteristics basing on following methods: MMPI-questionnaire (in Berezins's adaptation); Eysenck Personality Questionnaire (variant A: Eysenck Personality Inventory); Leonhard-Schmieschek Questionnaire; and Questionnaire of neuropsychological tension (NPN) by Nemchin, which represents a set of attributes of neuropsychological tension, based on data of clinical psychological observation, consists of 30 general characteristics of this condition, divided on tree levels of expression. **RESULTS AND DISCUSSION:** We tried to consider several aspects of possible role of endocrine status in behavioral reactions of persons of elderly age by revealing of hormonal component of stress and with the accent on hormones as possible modulators of system reactions of adaptation. During analysis of realized researches we marked, that as men as women have considerable changes in hormonal status in the process of ageing. In particular, we fixed change in group of content of ACTH, FSH and LH and lowering of concentration of TSH, T3, T4; growth of content of androgens and estrogens decrease among women; growth of content of estrogens and decrease of androgens among men of elderly and senile age. In other words, activation of hypothalamic-hypophysis pituitary-glucocorticoid system occurs, decrease of the activity of thyroid and some other systems of organism happen. We can not notice the similarity of many leading manifestations of stress and ageing. Thus, we can speak about the "stress – age - symptom", which emerge in the process of the ageing. During the aging, not only separate systems of hormonal regulation transform, but the interendocrine networks in a unite system of neuro hormonal control too. Basing on results of correlation and factor analysis we can speak about some peculiarities of influence of hormonal status on psychological peculiarities of persons of elderly and senile age (in particular, sex hormones, ACTH and thyroxine influence on revelation of such character features as schizoid, paranoid and hysteria). Integral estimation of psychological profile of men in elderly and senile age reveals their increasing anxiety, rigidity of emotions, the constant concern about physical health, pessimism, increased nervousness and vulnerability. Integral estimation of psychological profile of women in elderly and senile age testifies about their planlessness and chaotic behavior, orientation of experiences on external observer. Women tend to be suspicious and vindictive, have less emotional perceptions, but if any event provokes emotional reaction, they discover unexpected vulnerability. Mutual influence of endocrine status and social stress factors in the process of the ageing can lead to deep psychological disorders and deviations in social and psychological adaptation.

INVOLVEMENT OF GABA-A RECEPTOR IN THE ANTI-STRESS EFFECT OF *M. FRUTESCENS* AND *M. GRANDIFLORA* EXTRACTS IN THE WISTAR RAT. JF Rodríguez-Landa, J Cueto-Escobedo, A Flores-Aguilar, GU Rosas-Sánchez, MJ Rovirosa- Hernández, M Carro-Juárez, F García-Orduña, Instituto de Neuroetología and Programa de Maestría en Neuroetología, Universidad Veracruzana Xalapa, Veracruz, Escuela de Medicina Veterinaria y Zootecnia, Universidad Autónoma de Tlaxcala, Tlaxcala, Tlaxcala, México

INTRODUCTION: Depression is a stress-related psychiatric disorder frequently treated with alternative therapies based on phytomedicines. Plants from the genus *Montanoa*, including *M. tomentosa*, *M. frutescens* (Mf), and *M. grandiflora* (Mg), have been used for centuries in traditional Mexican medicine as a remedy for anxiety and mood disorders. Although anxiolytic properties of Mf and Mg have been recently reported, anti-despair affects are unknown. **METHODS:** Male Wistar rats were included in a vehicle group (purified water), two groups with Mf and two with Mg (25, 50 mg/kg, respectively, p.o), and another two groups received fluoxetine (1.0 mg/kg, p.o) or Remotiv® (7.14 mg/kg, p.o) as reference of antidepressant activity. The effects of substances were evaluated on days 0, 1, 7, 14, 21, and 28 of treatment; and 24 and 48 hours after the last administration using open field and forced swim tests. A second experiment explored the participation of GABAA receptors in previous effects. Rats received vehicle, Mf and Mg extracts (50 mg/kg, p.o), fluoxetine (1.0 mg/kg, p.o) and Remotiv® (7.14 mg/kg, p.o) during 28 consecutive days; additionally other four groups with similar treatment were antagonized (30 min before last administration) with picrotoxin (1 mg/kg, i.p.). The effects were evaluated in open field and swim tests one hour after the last administration. **RESULTS AND DISCUSSION:** Mf and Mg extracts (50 mg/kg) reduce immobility time since 24 hours of treatment. Fluoxetine and Remotiv® required at least 14 days, but these effects prevailed 48h after interruption of treatment; while the effects of extracts disappeared 24 h after treatment. Interestingly, picrotoxin only blocked the effect produced by Mf and Mg extracts, but not of fluoxetine or Remotiv®. This data suggest that effects produced by *Montanoa* extracts are established through immediate actions on GABAA receptors, while fluoxetine and Remotiv® involve plastic mechanisms related with their antidepressant effect. **CONCLUSION:** *Montanoa* extracts produced anti-stress-like effects, rather than antidepressant-like effects, through GABAA receptors in the forced swim test.

MATERNAL PSYCHOLOGICAL STRESS INDUCED DEVELOPMENTAL DEFECTS AND BEHAVIORAL ALTERATIONS IN OFFSPRING'S OF WISTAR ALBINO RATS. G Sakthivel, R Ravindran, Department of Physiology, Dr. ALM Post Graduate Institute of Basic Medical Sciences, University of Madras, Taramani campus, Chennai, India

BACKGROUND: Stress becomes inevitable part of human life; stress exposure during pregnancy has detrimental effect on neonatal and postnatal development of offspring. Major stress responses are mainly mediated by hypothalamic pituitary adrenal (HPA) axis on brain. Prolonged stress exposure during pregnancy causes increased secretion of maternal glucocorticoids levels, which affects fetus brain development and also it leads to over-activation of neonatal HPA axis. It mainly affects prefrontal cortex, hippocampus and amygdala of brain due to high expression of glucocorticoid receptor (GR), which may lead to cognitive impairment and behavioral alterations in the offspring. Birth defects, infant mortality and stillbirth are the major socioeconomic problem. Etiology of birth defects by genetic could be

30-40%, multifactorial 7-10% and remaining 50% is still remains unknown. The present study is to explore the effect of maternal immobilization stress and its associated risk for birth defects, infant mortality, stillbirth and alterations in the cognitive functions. **STUDY DESIGN:** Gestational animals were exposed to immobilization stress for 45 minutes / 3 times / per day in different days of gestational period. The stress exposed animals were divided into Group I: Control; Group II: Early gestational stress (EGS); Group III: Late gestational stress (LGS); Group IV: Full term stress exposure (FGS). **RESULTS AND DISCUSSION:** Rats those were exposed to prenatal maternal immobilization stress, which showed physical impairment, neonatal deaths; still births, low birth weight, pre-term births and delayed eye lid opening when compare to the control rats. The data showed significant alterations in the cognitive behavior of offspring which is exposed to immobilization stress during gestation. Gestational immobilization stress exposed groups showed severe impairment on their learning ability, memory retention ability, and novelty preference. **CONCLUSION:** From the present study, it is clearly hypothesized that gestational stress exposure has negative impact on neonatal and postnatal development of offspring and altered cognitive function; this might be due to stress induced impairment in neuronal development, thereby it leads to learning and memory deficit. The underlying mechanism behind the birth defects would be elevated levels of glucocorticoids, catecholamines and low feed intake which alter the normal physiology.

INTERACTIVE POSTER SESSION

EFFECT OF ANXIETY ON THE MAINTENANCE OF POSTURAL STABILITY IN UPRIGHT STANCE OF PATIENTS WITH VESTIBULAR DYSFUNCTION. K Stambolieva and D Petrova, Department of Cognitive psychophysiology, Institute of Neurobiology BAS, Department of Neurology, National Multiprofile Transport Hospital "Tzar Boris III", Sofia, Bulgaria

INTRODUCTION: Dizziness, vertigo and postural instability are common symptoms of the vestibular disorders. Usually the attack of vertigo and imbalance are accompanied by vegetative symptoms as nausea and vomiting. That caused a significant decreasing on the ability of patients to perform one or more activities of daily living and provoke an anxiety in some of the patients. The aim of this study was to evaluate the effect of anxiety on the postural stability in patients with vestibular disorders. **PATIENTS AND METHODS:** Forty patients with diagnosed vestibular disorders (aged between 25 and 55 years) took part in the investigation. The diagnosis was based on the detailed anamnesis and neuro-otological clinical examination, including audiometry, vestibular tests and static posturography. The postural stability was evaluated by static posturography during upright stance with eyes-open and eyes-closed on firm and foam supports. The total length of displacement of center of foot pressure (Sway path) and sway velocity were measurement. The Dizziness Handicap Inventory (DHI) questionnaire was applied to evaluate severity of the dizziness and/or vertigo and its effects on the quality of life of patients. The degree of anxiety in patients was evaluated by hospital anxiety and depression scale (HADS). The patients were divided on the basis of their HADS_A score of groups without anxiety and with different degree of anxiety. **RESULTS:** We found a significant positive correlation between anxiety and postural instability parameters, as well as between anxiety and DHI – scores. It was found more visually dependence for maintenance of postural stability in upright stance in patients with anxiety compared to vestibular patients without anxiety. The recovery period of patients with anxiety is longer and the quality of life is strongly disturbed. **CONCLUSION:** Anxiety has a negative effect on patients with vestibular disorders. Fear of dizziness and/or vertigo, and fear of falling restricts the activity of the patients on the one hand and psychologically inhibits them from the other hand. This leads to a delay of the central vestibular compensation. The timely intervention of a psychiatrist in the course of treating these patients is mandatory.

RELATIONSHIP OF CRAVING SEVERITY WITH SEVERITY OF DISSOCIATIVE EXPERIENCES WHILE CONTROLLING THE STATE AND TRAIT ANXIETY IN A SAMPLE OF INPATIENTS WITH ALCOHOL USE DISORDER. C Evren, G Umut, B Evren, Research, Treatment and Training Center for Alcohol and Substance Dependence (AMATEM), Bakirkoy Training and Research Hospital for Psychiatry Neurology and Neurosurgery, Department of Psychiatry, Baltalimani State Hospital for Musculoskeletal Disorders, Istanbul, Turkey

OBJECTIVE: The aim of the present study was to evaluate the relationship of craving severity with the severity of dissociative experiences while controlling the state and trait anxiety in a sample of inpatients with alcohol use disorder (AUD). **METHOD:** Seventy eight consecutively admitted male inpatients with AUD were considered for participation in the study. Participants were evaluated with the Obsessive–Compulsive Drinking Scale (OCDS), the State-Trait Anxiety Inventory (STAI) and the Dissociative Experiences Scale (DES). **RESULTS:** Scale scores were moderately correlated with each other. Correlation coefficient between OCDS and DES was 0.411, whereas it was 0.375 between OCDS and STAI-State and 0.459 between OCDS and STAI-Trait. In a linear regression model when DES score was taken as a dependent variable and state and trait anxiety scores were taken as independent variables, trait anxiety predicted DES score. In second step OCDS score was included in the analysis as a independent variable and it singly predicted DES score. Finally obsession and compulsion dimensions of OCDS were included in the analysis instead of OCDS total score as an independent variables. In this analysis severity of compulsive craving dimension predicted the severity of dissociative experiences together with trait anxiety in a linear regression model. **CONCLUSION:** These findings suggest that the alcohol dependent patients with higher trait anxiety may be managing their craving, particularly compulsive craving with dissociation, which originally is a defense mechanism.

RELATIONSHIP OF PTSD WITH IMPULSIVITY WHILE CONTROLLING THE EFFECT OF ANXIETY AND DEPRESSION IN A SAMPLE OF INPATIENTS WITH ALCOHOL USE DISORDER. C Evren, G Umut, B Evren, Research, Treatment and Training Center for Alcohol and Substance Dependence (AMATEM), Bakirkoy Training and Research Hospital for Psychiatry Neurology and Neurosurgery, Department of Psychiatry, Baltalimani State Hospital for Muskuloskeletal Disorders, Istanbul, Turkey

OBJECTIVE: The aim of the present study was to evaluate relationship of PTSD with impulsivity while controlling the effect of anxiety and depression in a sample of inpatients with alcohol use disorder. **METHOD:** Participants included 190 inpatients with alcohol use disorder. Participants were evaluated with the State-Trait Anxiety Inventory (STAI), Beck Depression Inventory (BDI), the Short Form Barratt Impulsiveness Scale (BIS-11-SF) and PTSD Checklist Civilian version (PCL-C). **RESULTS:** Age was lower in the group with PTSD than the group without PTSD. Duration of education, marital and employment status did not differ between the groups. STAI, BDI, and BIS-11-SF scores were higher in the group with PTSD. Trait anxiety, depression and impulsivity predicted PTSD diagnosis according to PCL-C cut-off score of 50 in a logistic regression model. Same variables predicted the severity of PTSD symptoms in a linear regression, whereas among dimensions of impulsivity nonplanning was the predictor. **CONCLUSION:** These findings suggest that the PTSD may be related with impulsivity, particularly nonplanning impulsivity, even after controlling anxiety and depression among inpatients with alcohol use disorder.

RACIAL DISCRIMINATION TRAJECTORIES, EDUCATION, AND TELOMERE LENGTH: FINDINGS FROM THE CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) STUDY. DH Chae, Y Wang, NB Slopen, T Yip, J Lin, GH Brody, NE Adler, E Puterman, KA Matthews, ES Epel, Center for Health Ecology and Equity Research, Auburn University, College of Human Sciences, Auburn, AL, USA

INTRODUCTION: There is increasing evidence that racial discrimination may be detrimental for health, as indicated by a number of biological indicators. However, reports of racial discrimination and whether it is appraised as a source of stress may be associated with levels of education, which may also moderate these associations. This study examined trajectories in reports of racial discrimination in relation to leukocyte telomere length, and whether this association varied by levels of education. **METHODS:** Data were from 408 African Americans in the Coronary Artery Risk Development in Young Adults (CARDIA) Telomere Ancillary Study. Participants were 18-30 years of age at baseline in 1985. Experiences of racial discrimination were self-reported in Years 7, 15, and 25 (1992, 2000, and 2010). Latent growth mixture modeling (LGMM) was used to identify racial discrimination trajectories and multiple regression including the interaction between racial discrimination and education was used to predict LTL measured at Year 25. **RESULTS AND DISCUSSION:** LGMM identified two racial discrimination classes: (1) high and increasing; and (2) low and decreasing. Compared to those with a high school education or less, those with greater than a high school education were more likely to be in the high and increasing racial discrimination class. Further, there was a significant interaction between racial discrimination class and educational attainment predicting LTL ($b=0.19$, $SE=0.09$, $p<0.05$). Among those with lower levels of education, being in the high and increasing racial discrimination class was associated with shorter telomere length compared to those in the low and decreasing racial discrimination class. In contrast, among those with higher levels of education, being in the high and increasing racial discrimination class was associated with longer LTL compared to those in the low and decreasing racial discrimination class. Findings suggest that experiences of racial discrimination through the lifecourse may be associated with telomere length in midlife among African Americans, but in different ways by education level. Racial discrimination may represent a particular threat to African Americans with lower levels of education, who may possess fewer resources to effectively manage such experiences. In contrast, being able to recognize negative experiences as being motivated by racial discrimination may help to preserve LTL among those with higher levels of education. **RESEARCH SUPPORT:** The National Institute on Aging (NIA) NIH Award K01AG041787. The Coronary Artery Risk Development in Young Adults Study (CARDIA) is supported by contracts HHSN268201300025C, HHSN268201300026C, HHSN268201300027C, HSN268201300028C, HHSN268201300029C, and HHSN268200900041C from the National Heart, Lung, and Blood Institute (NHLBI), the Intramural Research Program of NIA and an intra-agency agreement between NIA and NHLBI (AG00005). The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

INTRAVENOUS CHANNEL DRUGS WITH CARCINOSTATIC PROPERTIES. D Nkazi and MV Brunel, Oil and Gas Production and Processing Research Unit, School of Chemical and Metallurgical Engineering, University of the Witwatersrand, Johannesburg, South Africa

Cancerous cells multiply faster compare to normal cells and are sensitive to the anticancer drugs. Chemotherapy drugs are mostly administered intravenously, and can also be used in conjunction with radiotherapy and surgery to increase the treatment efficiency. The improvement of drug efficiency and side effect of current drugs stimulated researchers to investigate the use of macromolecular drug delivery systems as anti-tumor agents. This research contributes to the development of macromolecules which reduce drug toxicity and other drug deficiencies in cancer chemotherapy. The synthesis of water-soluble macromolecular anticancer drugs composed of a polymeric carrier to which the antineoplastic agents are tied via biodegradable hydrazone links were investigated in this project. Carriers were synthesized essentially by polyaddition, and polycondensation process, from polysuccinimide as parent carrier's structure. Drug systems were modified to contain carbonyl functionality, the crucial reaction site in this hydrazone

linking process, and bioactive aldehydes. Cell carrier and conjugate polymers were purified, fractionated by aqueous phase dialysis in membrane tubing of 12 000 – 14 000 molecular mass cut - off, and isolated by freeze-drying in ultimate yields of 45 – 80 % as water-soluble materials; and were structurally characterized by spectroscopic techniques. In vitro experiments done under buffered solution showed the released of drugs in cancer cell's pH (pH<7). The results of these tests suggest that in acidic environment PSI-hydrazine carriers drugs systems can release active drug, and on the other hand the polymers drugs systems showed higher stabilities under neutral conditions.

ROUND TABLE: ETHICS IN BIOMEDICINE – CURRENT CHALLENGES. This traditional and informal ISBS Round Table session will address the emerging questions of ethical experimentation, research integrity, selected related aspects (including authorship, lab demographics, lab psychological climate, inter-group dynamics) and the career development needs of junior scientists.

Day 3. Saturday, December 3, 2016

ZNRC SYMPOSIUM ON AQUATIC MODELS OF BRAIN DISEASES. Chairs: AV Kalueff (China, Russia, USA), C Maximino (Brazil)

INTRODUCTION OF ZNRC – THE INTERNATIONAL ZEBRAFISH NEUROSCIENCE RESEARCH CONSORTIUM.

The main goal of ZNRC is to promote zebrafish neuroscience research worldwide. Created in February 2010, ZNRC is a rapidly growing research community which offers excellent networking opportunities and peer support for active zebrafish labs. This symposium continues a series of regular ZNRC-sponsored zebrafish neurobehavioral meetings and workshops, to emphasize the value of aquatic, fish-based animal models of brain functions and dysfunctions.

A META-ANALYSIS OF BUSPIRONE EFFECTS ON ZEBRAFISH ANXIETY-LIKE BEHAVIOR. C Maximino, MG Lima, Universidade Federal do Sul e Sudeste do Pará, Universidade do Estado do Pará, Marabá, Brazil

INTRODUCTION: Buspirone is a partial 5-HT_{1A}R agonist with clinical efficacy in the treatment of generalized anxiety disorder. It is sometimes used as a positive control in screening tests for anxiolytic compounds in animal models, and has previously been demonstrated to alter zebrafish behavior in some, but not all, anxiety tests. **METHODS:** A systematic review was conducted to identify published articles addressing the effects of buspirone on zebrafish behavior in the novel tank test (NTT), group behavior task (GBT) and light/dark test (LDT). Bibliographic data (including DOI, date of publication, title, and abstract) of studies identified in the systematic review were exported to a spreadsheet. Each article on the list was then reviewed at four levels of detail (title, abstract, full text, and a detailed review of experimental design) to determine their eligibility for the review. Studies were required to be written in English and to have reported anxiety-related behavior in zebrafish. Included studies were required to contain (1) primary behavior data from LDT, NTT, or GBT experiments for the drug of interest; (2) suitable controls were reported; and (3) at least sample sizes and test statistics for the drug effect were reported. Possible confounding effects of the role of developmental stage were reduced by excluding studies not performed in adult fish. Graphically presented data were extracted from images using PlotDigitizer (<http://plotdigitizer.sourceforge.net/>). When multiple endpoints were reported, only the primary variable was used (Table 1). All estimates were then standardized to Hedge's g with 95% confidence intervals, I² and τ^2 heterogeneity values, and p-values using a mixed-effects model, with assay and dose as moderators, using a permutation test of the model coefficients with 100,000 iterations. Maximum predictive values (MPVs) were also calculated from the data. Meta-analyses were performed with the metafor package in R. Results were presented in forest plots with 95% confidence intervals. **RESULTS AND DISCUSSION:** 7 studies, comprising four LDT experiments, three NTT experiments, and one GBT experiment were identified studying the effects of buspirone on zebrafish. Significant heterogeneity was found in zebrafish studies using buspirone ($\tau^2 = 2.72 \pm 0.99$; I² = 92.44%), with statistically significant residual heterogeneity (QE[df = 14] = 161.56, p < 0.0001). Funnel plots of the zebrafish data suggested significant publication bias (t[df = 17] = -2.64, p = 0.017). However, the small number of studies can be an important limitation of this interpretation. Buspirone had a medium effect on anxiety-like behavior (average g = -0.87, 95% CI [-1.786, 0.03621]; average MPV = 0.396, 95% CI [-0.316, 1.103]), reducing it when compared with untreated controls. The permutation test indicated a significant participation of the moderators (QM[df = 4] = 13.5883, p = 0.05), with no effect of dose (estimate = -0.0521±0.0245, 95% CI [-0.1002, -0.004]; z = -2.1224, p = 0.055) and an effect on the NTT (estimate = 1.4263±0.8322, 95% CI [-0.2048, 3.0575]; z = 1.7139, p = 0.0051) but not LDT (estimate = -0.05±0.0771, 95% CI [-1.578, 1.4681]; z = -0.0708, p = 1) or GBT (estimate = -1.3597±0.7152, 95% CI [-2.716, 0.0421]; z = -1.901, p = 0.322). These effects are much smaller than those reported in a meta-analysis of clinical efficacy in GAD, in which azapirone (ipsapirone and buspirone) were found to be superior than placebo with reported WMD of -4.48(95% CI[-6.86, -2.10]). Nonetheless, the evidence for publication bias suggests the need for more studies on the effects of buspirone in the GBT and LDT.

TIME-DEPENDENT SENSITIZATION IN ADULT ZEBRAFISH AS A MODEL FOR POST-TRAUMATIC STRESS DISORDER: ROLE OF NITRIC OXIDE. MG Lima, C Maximino, AM Herculano, Universidade do Estado do Pará, Marabá/PA, Brazil, Universidade Federal do Sul e Sudeste do Pará, Marabá/PA, Brazil, Universidade Federal do Pará, Belém/PA, Brazil, Universidade do Estado do Pará, Marabá, Brazil

INTRODUCTION: Post-traumatic stress disorder (PTSD) is classified as a trauma- and stressor-related disorder, a set of severely debilitating neuropsychiatric disorders characterized by the dysregulation of stress responses after a traumatic event. Zebrafish (*Danio rerio* Hamilton 1822) emerged as an important model organism for the study of genetic, neuropharmacological and behavioral functions, such as the study of anxiety and stress. Nitric oxide (NO) is a gaseous transmitter that appears to have an important role in the regulation of neurobehavioral responses to stress, including in zebrafish. In this scenario, we propose a behavioral model for PTSD in the evaluation of the time-dependent sensitization of behavior in zebrafish as a consequence of the exposure to conspecific alarm substance (AS) – a potent stressor. Using this model, we verified the role of the nitric system in this process of sensitization.

METHODS: Animals were exposed to AS and kept stress-free for 24 h; after this interval, animals' behavior was analyzed. 5 experiments were made to investigate: i) the delayed effect of alarm substance on different behavioral tasks in zebrafish, ii) a comparison of time-dependent sensitization on shortfin and longfin phenotypes, iii) the application of Behavioral Cutoff Criteria on time-dependent sensitization, iv) the quantification of extracellular glutamate and tissue nitrite in the telencephalon after exposure to alarm substance, and v) the participation of NO on the initiation and consolidation of time-dependent sensitization. **RESULTS AND DISCUSSION:** Our results revealed that: i) alarm substance produces a delayed sensitization of anxiety (increased geotaxis, decreased habituation, increased erratic swimming and thrashing in the novel tank test; decreased time on white, increased erratic swimming, risk assessment and thigmotaxis on the light/dark test) and arousal (increased swim distance on the first trial and increased habituation slope in the startle reactivity test). ii) In relation to shortfin animals, exposure of longfin zebrafish to AS sensitized time on white, risk assessment and thigmotaxis more, while shortfin animals had more erratic swimming. iii) 25.74% of AS-exposed animals reached criteria for Extreme Behavioral Response (EBR), and 20% reached criteria for Minimal Behavioral Response (MBR); in non-exposed animals, only 4% reached criteria for EBR and 96% reached criteria for MBR. Animals classified as EBR spent less time in the white compartment, with shorter entries, more thigmotaxis and more erratic swimming than animals classified as MBR and non-exposed controls. iv) treatment with L-NAME 30 minutes before AS exposure did not block the behavioral sensitization in the light/dark test; v) treatment with L-NAME or aminoguanidine 30 minutes after AS exposure blocked the sensitization of scototaxis and risk assessment; vi) treatment with L-NAME 90 minutes after AS exposure blocked the sensitization of risk assessment, erratic swimming and thigmotaxis. These results suggest that time dependent sensitization is a good model to study PTSD and point to NO as an important mediator in this process. **RESEARCH SUPPORT:** CAPES and CNPq.

BEHAVIORAL TESTS IN ZEBRAFISH (*DANIO RERIO*) FOR PHARMACOLOGICAL SCREENING OF ANXIOLYTIC SUBSTANCES. J Cueto-Escobedo, J Sarabia-Morales, JF Rodríguez-Landa, Instituto de Neuroetología, Universidad Veracruzana, Xalapa, Veracruz, México

INTRODUCTION: anxiety is an emotional incapacitating disorder studied at preclinical level with behavioral models such as elevated plus maze, dark/light box, open field and defensive burying. Most of these models measure defensive and exploratory behaviors of rodents exposed to novel or aversive environments. Recently, rodent anxiety models have been adapted to aquatic environments to exploit the defensive behaviors of zebrafish (*Danio rerio*) due to rapid and easy development and breeding, and lower costs of production. Anxiety models with zebrafish measure specific behaviors that suggest anxiety-like states which are induced through sensorial stimuli such as chemical substances, variations in luminosity, novel environments and exposure to predators. Anxiety-like behaviors induced in these models can be reverted by anxiolytic drugs validated in rodent models and human beings. Zebrafish possess the advantages of small species as *D. melanogaster* and *C. elegans* which allow discovery of new pharmacological targets with high throughput screenings, but is also a vertebrate as rodents. Under the light of these features, the present work collects, analyzes and describes the development of behavioral pharmacology research on anxiety in zebrafish, as a species of growing popularity in universities and research laboratories. **METHODS:** A literature review on anxiety models with zebrafish was done in the NIH, Scielo and Redalyc databases using zebrafish, anxiety models and *Danio rerio* as key words. **RESULTS AND DISCUSSION:** The developments of anxiety models with zebrafish have increased exponentially over the past years. Most employed stressful stimuli are novel environments, predator images or dummies, alarm pheromones and changes in light intensity, among others. These stimuli release anxiety-like behaviors as freezing, bottom dwelling and swimming, dark environments preferences and erratic evasive movements. Anxiety-like behaviors decrease with administration of anxiolytic drugs such as diazepam and fluoxetine, a criterion of predictive validity. **CONCLUSION:** zebrafish is a useful species to model features of anxiety disorder and discover of potentially anxiolytic drugs.

AQUATIC RAVES, HIGHS AND ACID TRIPS: NOVEL INSIGHTS FROM ZEBRAFISH FOR HALLUCINOGENIC DRUG RESEARCH AND SUBSTANCE ABUSE. AV Kalueff, TO Kolesnikova, SL Khatsko, YuYu Morzherin, Ural Federal University, Ekaterinburg, Institute of Translational Medicine, St. Petersburg State University, St. Petersburg, Russia; Research Institute for Marine Drugs and Nutrition, College of Food Science and Technology, Guangdong

Zebrafish (*Danio rerio*) are an excellent model species for translational neuroscience and biological psychiatry research. With a high (75%) genetic homology to humans, the physiological and behavioral complexity of zebrafish offers a unique (and, potentially, high-throughput) opportunity to model complex human brain disorders and drug-evoked pathogenesis. As numerous zebrafish models become available with a wide spectrum of behavioral, genetic, and environmental methods to test novel drugs, this 'overview' lecture will discuss recent zebrafish data on modeling the effects of acute and chronic hallucinogenic drug treatment. Indeed, after decades of sociopolitical obstacles, the field of psychiatry is experiencing a revived interest in the use of hallucinogenic agents to treat brain disorders (Kyzar and Kalueff, 2016). Along with the use of ketamine for depression, recent pilot studies have highlighted the efficacy of classic serotonergic hallucinogens, such as lysergic acid diethylamide (LSD) and psilocybin, in treating addiction, post-traumatic stress disorder, and anxiety. However, many basic pharmacological and toxicological questions remain unanswered with regard to these compounds. Thus lecture discuss psychedelic medicine, as well as the behavioral and toxicological effects of hallucinogenic drugs in zebrafish. Specifically, we emphasize this aquatic organism as a model ideally suited to assess both the potential toxic and therapeutic effects of major known classes of hallucinogenic compounds (Kyzar and Kalueff, 2016). Additionally, endocrine biomarkers become increasingly well-characterized in zebrafish, making them an inexpensive, robust and effective model for toxicology research and pharmacological screening. Thus, well-designed preclinical studies utilizing zebrafish can contribute to the reemerging treatment paradigm of psychedelic medicine, leading to new avenues of clinical exploration for psychiatric disorders. Finally, the lecture will critically discuss the limitations of utilizing this model organism, and will outline future strategies of research in the field of zebrafish psychopharmacology and substance abuse.

ART MEETS NEUROSCIENCE: AN ARTIST'S PERSPECTIVE. D Raytchev, London, UK

'Progress not Perfection' and upcoming 'Capital' projects are centered around people who currently suffer or have dealt with their addictions, whole spectrum of them. Abstract portraits of the participants who come from all walks of life show their past experience, present state of mind and future ambitions. Graphic nature in some cases suggests altered state of reality as well as playful, honest and open-minded approach to discussing many times stigmatized issue. Expressive character of the artwork relates to the fluctuating emotions, often accompanied by anxiety and depression, that is juxtaposed against clean 'peaceful' linework. There is certain beauty in capturing the chaos and vulnerabilities. Paintings include personal narratives of the subjects who Raytchev interviews and studies over the period of several sittings before creating the final large scale pieces.



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Established in 2007

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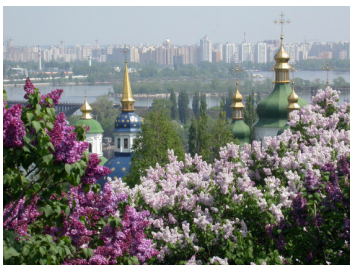
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