International Behavioral
Neuroscience Society

Annual Meeting
Program and Abstracts

Nassau, The Bahamas
June 9-14, 2009

Abstracts of the International Behavioral Neuroscience Society, Volume 18, June 2009

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IBNS CENTRAL OFFICE

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Dear Conference Participants, Colleagues, and Friends,

It is my pleasure to welcome you to the 2009 International Behavioral Neuroscience Society Annual Conference! This meeting had a very rocky start, as all of you know due to circumstances outside of our control, but thanks to our amazing Executive Coordinator, Marianne Van Wagner and our dedicated Program Committee (Don Stein-Chair, Wim Crusio-Co-Chair, Betty Zimmerberg, Ray Kesner, Helene David, Leonie de Visser, Bianca Topic, and John Bruno) and Council (Joseph Huston, Melanie Paquette, Stefan Brudzynski, Stephen Kent, Elena Choleris, Helene David, David Eilam, Shuji Aou, Sara Cruz-Morales, Jared Young, John P. Bruno, Adrian Dunn, and Larry Reid), and also to the flexibility and good will of the Local Organizing Committee (Sara Cruz-Morales-Chair, Rosalinda Guevara-Guzman, and Raul Paredes), the Wyndham Hotel management team and the Manzanillo Isla Navidad Resort, we were able to move our meeting to an alternate location. And what a location it is!!! Beautiful Nassau is a tropical paradise, which you all will love, I am sure. Even more importantly, due to the diligence and careful planning by our Program Committee, this year again, we have an excellent scientific program with exciting symposia, world-renowned key note speakers (Professors Trevor W. Robbins and Ann M. Graybiel), a special Darwin Lecture by Professor Robert Blanchard, and wonderful oral and poster presentations. I thank all of you, presenters and participants, for making this exciting program possible.

I would also like to extend my greatest appreciation for the dedicated and hard work of many others who contributed to the success of this meeting. The Education and Training Committee (Susan Powell-Chair, Katerina Savelieva-Co-Chair, Pascual Gargiulo, Jodi Gresack, Sarah Johnson, Peter Shiromani, and Anders Agmo) worked hard to select the best students for our travel awards and to organize other student activities. Professor John Bruno continues to play a pivotal role in obtaining and renewing the NIH grant support for our conferences. And last but not least, we have to acknowledge our sponsors who have provided crucial financial support for the meeting: National Institutes of Health, Elsevier Science, Stoelting Co., and IITC. We also thank NNOXe Pharmaceuticals for funding the Wayner-NNOXe Award.

Now it is time to immerse ourselves in great science and reap the benefits of all this hard work: Enjoy the meeting and welcome to Nassau!

Robert Gerlai
President of IBNS

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We are pleased to announce the recipients of the IBNS Travel Awards for the 2009 meeting in Nassau, The Bahamas. These awards will be presented at the Awards Banquet on Saturday evening. Award winners will receive a cash award, certificate, and waiver of registration and banquet fees. Congratulations to all.

TRAVEL AWARDS

(listed alphabetically)

Presentations given by the Travel Awardees are indicated in the program by the symbol †.

Postdoctoral Student Travel Awards

Dr. Jonathan Lael Brigman, National Institute on Alcohol Abuse and Alcoholism, Rockville, MD, USA
Dr. Susanne Brummelte, University of British Columbia, Vancouver, British Columbia, Canada
Dr. Nicholas Gilpin, The Scripps Research Institute, La Jolla, CA, USA
Dr. Adam Lee Halberstadt, University of California San Diego, La Jolla, California, USA
Dr. Daniela Schulz, Brookhaven National Laboratory, Upton, NY, USA
Dr. Alicia A. Walf, University at Albany, Albany, NY, USA

Graduate Student Travel Awards

Mr. Ethan Hayes Beckley, Oregon Health & Science University, Portland, OR, USA
Ms. Jennifer Michelle Brielmaier, George Mason University, Fairfax, VA, USA
Ms. Amy Elizabeth Clipperton, University of Guelph, Guelph, Canada
Mr. Mickael Degoulet, Université de Aix-Marseille II, Marseille, France
Mr. Daniel Eskenazi, University of Washington, Seattle, WA, USA
Mrs. Darby F. Hawley, University of Houston, Houston, TX, USA
Ms. Leigh Ann Miles, Emory University, Atlanta, GA, USA
Dr. Eimeira Padilla, University of Texas at Austin, Austin, Texas, USA
Ms. Mariana Schroeder, Bar Ilan University, Ramat Gan, Israel
Mr. Calvin Kai Young, University of Calgary, Calgary, Alberta, Canada

Undergraduate Travel Award

Mr. Paul Brito-Vargas, Universidad del Este, Carolina, Puerto Rico

Student Travel awardees are presenting orally in the Travel Award Blitz and will also have their research presented in a poster session.

SPONSORS

The IBNS would like to express our gratitude to the following organizations that have given financial support to the 18th International Behavioral Neuroscience Society Conference. This financial support enabled many students to attend the conference and also allowed recruitment of excellent speakers.

National Institute of Mental Health

Grant Number: 2R13MH065244-06

CORPORATE SPONSORS

The IBNS would like to express our gratitude to the following corporate sponsors that are attending the meeting as booth exhibitors and/or have given special financial support to the International Behavioral Neuroscience Society.

Elsevier Science, Inc.
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EXHIBITORS

We would also like to thank the following companies that are supporting the IBNS by attending the meeting as booth exhibitors.

Clever Sys., Inc.
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Viewpoint Life Sciences

The Society would like to extend our deep appreciation to the following committees that are responsible for the success of this meeting:

Program Committee

Don Stein, Chair
Wim Crusio, Co-Chair
Leonie de Visser
Betty Zimmerberg
Ray Kesner
Helene David
Bianca Topic
John Bruno

Education and Training Committee

Susan Powell, Chair
Katerina Savelieva, Co-Chair
Pascual Gargiulo
Jodi Gresack
Sarah Johnson, Student
Peter Shiromani
Anders Agmo

Local Organizing Committee

Sara Cruz-Morales, Chair
Rosalinda Guevara-Guzman
Raul Paredes

KEYNOTE SPEAKERS

Ann M. Graybiel, Ph.D., MIT, Cambridge, MA, USA
Our habitual lives: How the brain makes and breaks habits.

T. W. Robbins, F.R.S., University of Cambridge, U.K.
From impulsivity to compulsivity: Neural substrates and psychiatric implications.

MATTHEW J. WAYNER-NNOXe PHARMACEUTICALS AWARD

C. Sue Carter, University of Illinois, Chicago, IL, USA
Sex differences in oxytocin and vasopressin: Implications for autism spectrum disorders?

IBNS SPECIAL LECTURE

Robert Blanchard, University of Hawaii, Honolulu, HI, USA
Darwin: His life and legacy for behavioral neuroscience.

SPECIAL SYMPOSIA

NEUROBIOLOGY OF HUMAN IMPULSIVITY: MICE AND RATS BEHAVIORAL MODELS.
Chairperson: Sylvie Granon, Université d'Orsay Paris Sud (NAMC) Institut Pasteur, Paris, France

BEHAVIORAL NEUROSCIENCE OF THE PARENTAL BRAIN IN RATS AND HUMANS: FROM BASIC MECHANISMS TO CLINICAL IMPLICATIONS.
Chairperson: James E. Swain, Yale University, New Haven, CT, USA

WHAT IS THE FUNCTIONAL AND CLINICAL SIGNIFICANCE OF THE HIPPOCAMPAL-PREFRONTAL CORTICAL INTERACTION?
Chairperson: Yukiori Goto, McGill University, Montreal, Canada

VERTEBRATE MODELS OF SOCIAL BEHAVIOR: NEUROBIOLOGICAL AND COMPARATIVE PERSPECTIVES.
Chairperson: Elena Choleris, University of Guelph, Canada

STUDENT WORKSHOP

Organizers: Susan Powell (Chair, Education and Training Committee)
Jared Young (Student Representative to Council)

This workshop will focus on grant writing skills to procure funding for the training stages of your career. Several examples of previously submitted grants have been provided for review and instruction purposes. A panel of investigators with reviewer experience will take attendees through the review process, describing what reviewers focus on and what to look out for when writing grant proposals. This 'mock study section' will provide insight regarding what to aim for and/or avoid in future grant writing.

IBNS 2010 - CALL FOR SYMPOSIA and SATELLITE PROPOSALS

The Program Committee is now soliciting proposals for symposia and satellites for the 2010 Annual Meeting of the International Behavioral Neuroscience Society.

A typical symposium includes four (4) speakers and is scheduled for two (2) hours. The time and date of symposia are set by the Program Committee. Satellites are structured and financed by the organizers. Satellite meetings and may be held either prior to or after the IBNS meeting dates.

All proposals should include a title, the name of the chairperson(s), a substantive description of the topic and proposed talks, the list of speakers, their affiliations, and tentative talk titles of their talks. Satellite proposals should also include the anticipated location and plans for financing.

All proposals are reviewed by the Program Committee and then submitted to the IBNS Council for consideration.

The deadline for priority consideration of symposium proposals is September 1, 2009. Please send your proposal to the Program Committee Chair, Dr. Wim Crusio at wim_crusio@yahoo.com and COPY the IBNS Central Office at ibns@ibnshomepage.org. Please use subject line: Symposia/Satellite Proposal 2010.

PROGRAM NOTES:

- All main events including Lectures, Symposia, Oral Sessions, Business Meeting, Poster Sessions, Slide Blitz and Student Workshop will be held in the Crystal Ballroom and Foyer. The Welcome Reception will be held Poolside. The Council meeting will be in the Flamingo Boardroom. The Student Social will be held at the Flamingo Pool Bar & Grill. The final Banquet/Dance will be Poolside.
- Presenting authors are indicated in the program by **bold** type.
- † Indicates Travel Award recipient.

Tuesday, June 9, 2009

2:00-4:30 **Registration**. *Foyer of Crystal Ballroom*. For late arrivals only, the registration desk will be open on Wednesday morning at 8:00 a.m.

5:00-7:00 **Cocktail Reception.** *Poolside.*

Wednesday, June 10, 2009

8:30-9:00 **Welcome**: IBNS President, Robert Gerlai. *Crystal Ballroom*.

9:00-10:00 **Presidential Lecture:** A SMALL FISH WITH A BIG FUTURE: ZEBRAFISH IN BEHAVIORAL NEUROSCIENCE. **Robert Gerlai.**

10:00-10:30 **Break & Exhibit Viewing**

10:30-11:45 **Matthew J. Wayner-NNOXe Pharmaceuticals Award Lecture:**
C. Sue Carter, University of Illinois at Chicago, USA. SEX DIFFERENCES IN OXYTOCIN AND VASOPRESSIN: IMPLICATIONS FOR AUTISM SPECTRUM DISORDERS? **Introduction: Wim Crusio**

12:00-4:00 **Council Meeting.** *Flamingo Boardroom*.

4:00-6:00 **Symposium 1:** NEUROBIOLOGY OF HUMAN IMPULSIVITY: MICE AND RATS BEHAVIORAL MODELS. **Chairperson: Sylvie Granon**

4:00 INTER-INDIVIDUAL DIFFERENCES IN IMPULSIVITY IN THE RAT: RELATIONSHIPS WITH COGNITION, DECISION-MAKING AND THE DOPAMINERGIC SYSTEM. Rivalan, M.; Le Moine, C.; Grégoire, S. ; **Dellu-Hagedorn, F.**

4 :30 DIFFERENTIAL CONTRIBUTION OF MU AND DELTA OPIOID RECEPTORS TO MOTOR IMPULSIVITY. **Olmstead, M.C.**

5:00 SEPARATION OF BEHAVIORAL DISINHIBITION TO NON-TARGET STIMULI FROM IMPULSIVE EARLY RESPONDING: DOPAMINERGIC AND SEROTONERGIC RECEPTOR EFFECTS. **Young, J.W.**; Geyer, M.A.

5:30 RELATIONSHIP BETWEEN IMPULSIVITY AND FLEXIBLE BEHAVIORS IN MICE. **Granon, S.**; Serreau, P.

6:30- 8:00 **Student Social.** *Flamingo Pool Bar & Grill*.
(Note: This function is for students only.)

Thursday, June 11, 2009

8:30-9:30 **Keynote Lecture: T. W. Robbins, University of Cambridge, U.K.** FROM IMPULSIVITY TO COMPULSIVITY: NEURAL SUBSTRATES AND PSYCHIATRIC IMPLICATIONS. **Introduction: Robert Gerlai**

9:30-10:00 **Break & Exhibit Viewing**

10:00-11:30 **Symposium 2:** BEHAVIORAL NEUROSCIENCE OF THE PARENTAL BRAIN IN RATS AND HUMANS: FROM BASIC MECHANISMS TO CLINICAL IMPLICATIONS. **Chairperson: James E. Swain**

10:00 NEURAL CIRCUITRY OF MATERNAL REWARD AND LACTATION: INSIGHTS FROM FUNCTIONAL MRI IN POSTPARTUM RATS. **Febo, M.**; Ferris, C.F.; Kulkarni, P.; Stolberg, T.S.; Nephew, B.N.; Felix-Ortiz, A.C.; Caffrey, M.K.

10:30 INTERPLAY OF BIOLOGICAL AND ENVIRONMENTAL INFLUENCES ON NEW MOTHER'S BRAIN: PERCEIVED QUALITY OF MATERNAL CARE IN CHILDHOOD AND BREASTFEEDING. **Pilyoung, K.**; Leckman, L.; Mayes, L.C., Feldman, R.; Swain, J.E.

11:00 FUNCTIONAL BRAIN ACTIVATIONS OF PARENTS LISTENING TO THEIR OWN BABY-CRY THAT CHANGE OVER THE EARLY POSTPARTUM AND VARY ACCORDING TO DELIVERY. **Swain, J.E.**; Leckman, J.F.; Mayes, L.C.; Feldman, R.; Tasgin, E.; Kim, P.; Schultz, R.T.

12:00-4:00 **Meet the Professionals Lunches**

4:00-5:45 **Oral Presentations**. **Chairperson: Leonie de Visser**

4:00 TRANSLATIONAL STUDY ON THE INTERACTION BETWEEN ANXIETY AND DECISION-MAKING IN RATS AND HUMANS. **De Visser, L.**; Baars, J.M.; Van der Loo, A.J.A.E.; Van der Knaap, L.J.; Ohl, F.; Van den Bos, R.

4:15 ~~RESPONSE DISINHIBITION EVOKED BY CHOLINERGIC ACTIVATION: RESULTS FROM A TANDEM VI-DRL SCHEDULE AND STOP-SIGNAL TASK. **Kirshenbaum, A.**~~ **NOT PRESENTED.**

4:30 COGNITIVE IMPAIRMENT UNDER EMOTIONAL AROUSAL CONDITIONS IN MICE LACKING TIP39. **Coutellier, L.**; Usdin, T.

4:45 COGNITIVE ASPECTS OF CONGENITAL LEARNED HELPLESSNESS AND ITS REVERSAL BY THE MAO-B INHIBITOR DEPRENYL. †**Schulz, D.**; Mirrione, M.; Henn, F.

5:00 THE EFFECTS OF GESTATIONAL AND POSTPARTUM ENVIRONMENTAL STIMULATION IN DAM RATS. **Sparling, J.**; Mahoney, M.; Baker, S.; Bielajew, C.

5:15 SHOPPING FOR PARTS VS. FINAL CONSTRUCTION: FINE GRAINED NEST BUILDING BEHAVIOR IN MICE. **Gaskill, B.N.**; Rodda, C.; Garner, J.P.

5:30 CHRONIC METHAMPHETAMINE ALTERS SPONTANEOUS NEURAL DISCHARGE AND SYNAPTIC PLASTICITY IN GUINEA PIG HIPPOCAMPUS IN VIVO. **Chirwa, S.**; Aduonum A.

6:00-8:00 **Poster Session I**

Anxiety, Stress and Fear

1. INDUCTION OF CREB EXPRESSION IN THE PAG PRODUCES PREDATOR STRESS-LIKE PATTERN OF PCREB EXPRESSION, NEUROPLASTICITY AND ANXIETY IN RATS. Adamec, R.; Berton, O.; Abdul Razek, W.

2. THE EFFECT OF THE BENZODIAZEPINE MIDAZOLAM IN THE CINGULATE CORTEX 1 MAY UNDERLIE THE ONE-TRIAL TOLERANCE IN RATS. **Albrechet-Souza, L.**; Borelli, K. G.; Carvalho, M.C.; Brandao, M. L.

3. CHRONIC AMPHETAMINE INCREASES ANXIETY-LIKE BEHAVIOR AND REDUCES MONOAMINES AND NEUROGENESIS IN THE ADULT RAT DENTATE GYRUS. **Barr, J.L.**; Forster, G.L.

4. CORTICOTROPIN-RELEASING FACTOR INTO THE DORSAL COLUMNS OF PERIAQUEDUCTAL GRAY EXERT DIFERENCIAL EFFECTS ON DEFENSIVE STARTLE BEHAVIOR. **Borelli, K.G.**; Albrechet-Souza, L.; Brandao, M.L.

5. SENSORIMOTOR GATING MEASURED BY PREPULSE INHIBITION IS ALTERED IN WISTAR AUDIOGENIC RATS (WAR). Salum, C.; Oliveira, J.A.C.; DelBel, E.A.; Brandão, M.L.; Garcia-Cairasco, N.

6. DO HUMANS INDUCE SIMILAR FEAR/ANXIETY REACTIONS, AND RESPONSE PATTER TO DIAZEPAM, IN MARMOSET MONKEYS AS NATURAL PREDADORS? **Cagni, P.**; Gonalves Jr., I.; Ziller, F.; Emile, N.; Barros, M.

7. THE EFFECTS OF CORTAGINE ON STARTLE AND PPI IN CRF1 AND CRF2 KO MICE. **Gresack, J.E.**; Geyer, M.A.; Risbrough, V.B.

8. DOES COPING STRATEGY MODULATE THE EFFECTS OF CHRONIC UNPREDICTABLE STRESS ON HIPPOCAMPAL INTEGRITY? †**Hawley, D.F.**; Leasure, J.L.

9. CORTICOTROPIN-RELEASING FACTOR (CRF) TYPE 1 RECEPTORS IN THE BED NUCLEUS OF THE STRIA TERMINALIS MEDIATE LONG- (MINUTES) BUT NOT SHORT-(SECONDS) DURATION STARTLE INCREASES TO SHOCK-PREDICTING CUES. †**Miles, L.**; Walker, D.; Davis, M.

10. STRAIN, SEX, AND BEHAVIORAL RESPONSE TO NOVELTY: FACTORS UNDERLYING THE GENETIC SUSCEPTIBILITY FOR HELPLESSNESS. †**Padilla, E.**; Barret, D; Shumake, J; Gonzalez-Lima, F.

11. INCREASED SEROTONERGIC ACTIVITY IN THE DORSAL PERIAQUEDUCTAL GRAY DURING CONDITIONED FREEZING RESPONSE. **Zanoveli, J.M.**; de Carvalho, M.C., Cunha, J.M.; Brandao, M.L.

12. DIAZEPAM EFFECTS ON ANXIETY-LIKE BEHAVIORAL RESPONSES TO RETRAINED STRESS IN NULLIAPROUS AND PRIMIPAROUS RATS. **Zimberknopf, E.**; Garcia, C.; Felicio, L.

13. CANNABIDIOL IN RAT DORSAL PERIAQUEDUCTAL GRAY CAUSES BOTH ANXIOLYTIC- AND PANICOLYTIC-LIKE EFFECTS. **De Paula Soares, V**.; Campos, A.C.; De Bortoli, V.; Guimaraes, F.S.; Zangrossi, H.; Zuardi, A.W.

14. NOVEL ELECTROPHYSIOLOGICAL AND NEUROCHEMICAL PROPERTIES OF STRESS-RELATED NON-SEROTONERGIC CELLS IN THE CAUDAL DORSAL RAPHE NUCLEUS. **Vasudeva, R.**; Waterhouse, B.

15. EFFECT OF HIGH MATERNAL CORTICOSTERONE LEVELS AND ENRICHED ENVIRONMENT ON THE BEHAVIOURAL OUTCOME OF THE MALE AND FEMALE OFFSPRING. †**Brummelte, S.**; Galea L.A.M.

16. THE RELATIVE CONTRIBUTIONS OF NOREPINEPHRINE AND SEROTONIN TO NOCICEPTIVE RESPONSES. **Hall, F.S.**; Schwarzbaum, J.M.; Perona, M.T.G.; Lesch, K.P.; Murphy, D.L.; Caron, M.; Uhl, G.R.

17. REGULATION OF 5-HT TRANSPORTER EXPRESSION BY MICRORNAS. **Moya P.R.**; Wendland J.R.; Laporte J.; Murphy D.L.

18. GROUP I METABOTROPIC GLUTAMATE RECEPTORS ARE INVOLVED IN FEMALE GENERALIZED ANXIETY WITHOUT AFFECTING THE ACQUISITION OF EMOTIONAL MEMORY. **De Jesús-Burgos, M.I.;** Pérez-Acevedo, N.L.

19. ANXIOGENIC-LIKE EFFECT AFTER ACUTE EXPOSURE OF THE SYNTHETIC ANDROGEN 17-αMETHYLTESTOSTERONE IN JUVENILE MALE RATS. **Pérez-Acevedo, N.L.**; Rodríguez-Aguiar, G.; Oyola-Ortiz, M.

20. AFFECTIVE STRESS IN DIFFERENT PERIODS OF BRAIN DEVELOPMENT INDUCES DISTINCT PATTERNS OF EXPLORATION OF A NEW OBJECT. **Limonte, F.H**.; Pereira, M.T.R.; Sinhorini, E.R.A.; Tonso, V.M.; Iyomasa, M.M.; Rosa, M.L.N.M.

21. EFFECTS OF PRENATAL INFECTION ON LEARNING AND BEHAVIORAL FLEXIBILITY IN THE JUVENILE RAT. **Burt, M.A.**; Luheshi, G.N.; Boksa, P.

Maturation and Adolescence

22. FUNCTIONAL ALTERATIONS IN THE 5HT1A RECEPTOR FOLLOWING NEONATAL +/- 3,4-METHYLENEDIOXYMETHAMPHETAMINE (MDMA) EXPOSURE IN RATS. **Braun, A.A.**; Schaefer, T.L.; Vorhees, C.V.; Williams, M.T.

23. PRE-OBESE BEHAVIORAL AND NEUROBIOLOGICAL PHENOTYPE IN THE OLETF RATS DURING THE SUCKLING PERIOD. †**Schroeder, M.**; Blumberg, S.; Bi, S.; Moran, T.H.; Smith, G.P.; Weller, A.

24. DIFFERENTIAL MODULATION OF INHIBITORY AVOIDANCE LEARNING AND ENERGY METABOLISM IN GONADALLY-INTACT AND OVX PUBERTAL FEMALE RATS AFTER EXPOSURE TO ANABOLIC STEROIDS. **Ramos-Pratts, K.M.**; Villafañe, B.; Barreto-Estrada, J.L.

25. DIFFERENTIAL MODULATION OF EMOTIONAL MEMORY AND ENERGY METABOLISM IN GONADALLY-INTACT AND OVARIECTOMIZED PUBERTAL FEMALE RATS AFTER CHRONIC EXPOSURE TO ANABOLIC STEROIDS. **Ramos-Pratts, K.M.**; Villafañe, B.; Pérez-Acevedo, N.L.; Barreto-Estrada, J.L.

26. EXAMINING CRITICAL PERIODS OF NEONATAL 3,4-()-METHYLENEDIOXYMETH-AMPHETAMINE (MDMA) ADMINISTRATION ON BEHAVIOR. **Skelton, M.**; Vorhees, C.; Graham, D.; Schaefer, T.; Grace, C.; Braun, A.; Williams, M.

27. STRESS MODULATION OF NICOTINE REWARD IN ADOLESCENT RATS. †**Brielmaier, J.M.**; McDonald, C.G.; Smith, R.F.

28. EFFECTS OF EARLY OR LATE ADOLESCENT EXPOSURE TO NICOTINE ON BEHAVIOR IN AN APPETITIVE CONDITIONED PLACE PREFERENCE PARADIGM. **McMillen, B.A.**; Andersen, H.K.; Williams, H.L.

29. BEHAVIOURAL AND NEUROCHEMICAL EFFECTS OF AMPHETAMINE AND STRESS IN PERIADOLESCENT HIGH- AND LOW-LG OFFSPRING. **Pomarenski, A.J.**; Moquin, L.; Sharma, S.; Meaney, M.J.; Gratton, A.

30. NEUROPROTECTANT PROPERTIES OF NEUROSTEROIDS FOLLOWING NEONATAL ETHANOL EXPOSURE. **Yates, C. L.**; Kelly, S. J.

31. THE ANABOLIC STEROID 17α-METHYLTESTOSTERONE INCREASES NPY LEVELS IN THE VMN BUT DECREASES NPYY2 AND NPYY5 RECEPTORS OF PUBERTAL MALE RATS. **Santiago-Gascot, M.E.**; Roig- López, J.L.; Barreto-Estrada, J.L.

32. THE EFFECTS OF PRENATAL ESTRADIOL ON THE MALE AND FEMALE NEONAT AND ITS POSSIBLE CONNECTION TO AUTISM. **Aiello, P.T.**; Borella, A.; Whitaker-Azmitia, P.;

Animal Models of Human Conditions

33. GABA-A RECEPTORS CONTRIBUTE TO PROGESTERONE WITHDRAWAL. †**Beckley, E.**; Finn, D.

34. THE AFFECTS OF THE VIRAL MIMIC POLY I:C ON BTBR T+ tf/J MICE: A MODEL FOR AUTISM. **Benno, R.**; Smirnova, Y.; Nguyen, N.; Schanz, N.

35. FOLATE DEFICIENCY IN GCPII MICE, A MOUSE MODEL OF SCHIZOPHRENIA. **Chu, H.C.**; Schaevitz, L.R.; Berger-Sweeney, J.E.

36. LISURIDE- AND LSD-INDUCED DISRUPTION OF PREPULSE INHIBITION ARE MEDIATED BY DISTINCT RECEPTOR MECHANISMS. †**Halberstadt, A.L.**; Geyer, M.A.

37. RITALIN-TREATMENT IMPROVES THE BEHAVIORAL DEFICITS OF NEUROGRANIN KNOCKOUT MICE. **Huang, K.-P.**; Huang, F.L.

38. 5-HT1A AGONISM FOR L-DOPA-INDUCED-DYSKINESIA. **Paquette, M.A.**; Lewis, J.R.; Berger, S.P.

~~**39.** SUBCHRONIC TREATMENT WITH GALACTOSYLATED DOPAMINE INHIBITS ITS ACUTE EFFECT ON BEHAVIORAL RESPONSE TO NOVELTY IN THE NAPLES HIGH-EXCITABILITY RATS. Ruocco, L.A.; Gironi Carnevale, U.A.; De Angelis, G.; Conte, R.; Treno, C.; Murolo, M.; Melisi, D.; Curcio, A.; Rimoli, M.G.; **Sadile A.G.**~~ **NOT PRESENTED.**

40. EFFECTS OF A NEUROTOXIC LESION IN THE BASAL -LATERAL AMYGDALA, NUCLEUS ACCUMBENS CORE, OR THE ORBITAL FRONTAL CORTEX, ON THE EXPRESSION OF LOCOMOTION AND COMPULSIVE CHECKING IN THE QUINPIROLE SENSITIZATION MODEL OF OBSESSIVE COMPULSIVE DISORDER (OCD). **Szechtman, H**.; Silva, C.; Bisnaire, L.; Thomas Mcmurran, T.; Dvorkin, A.; Foster, J.

41. DAILY LIFE ACTIVITY IS NOT ALTERED IN MOUSE MODELS OF NEUROPATHIC AND INFLAMMATORY PAIN. **Urban, R.**; Scherrer, G.; Goulding, E.; Tecott, L. and Basbaum A.

42. PRENATAL CHOLINE SUPPLEMENTATION IN A MOUSE MODEL OF RETT SYNDROME. **Schaevitz, L.R.**; Saulsberry, L.N.; Berger-Sweeney, J.

43. COGNITIVE AND SOCIAL DEFICITS OF MECP2(1LOX) MICE, A MODEL OF RETT SYNDROME. **Moriuchi, J.M.**; Schaevitz, L.; Berger-Sweeney, J.E.

44. CALORIE RESTRICTION ATTENUATES SICKNESS BEHAVIOUR. **Kent, S.**; MacDonald, L.; Radler, M.; Paolini A.G.

45. LIGATION OF SPINAL NERVES L4 AND L5 PRODUCES ROBUST ALLODYNIA WITHOUT MAJOR MOTOR DEFICITS IN MICE. Ye, G-I.; **Savelieva, K.V.**; Baker, K.B.; Syrewicz, J.; Mason, S.S.; Lanthorn, T.H.; Rajan, I.

46. ~~EFFECTS OF APICULTURE PRODUCTS ON MEMORY AND BEHAVIORAL TEST BATTERY IN A RAT MODEL OF EPILEPSY INDUCED BY PENTYLENETETRAZOLE. **Zarraga-Galindo, N.**~~ **NOT PRESENTED.**

47. ~~ENRICHED ENVIRONMENT IMPROVES MOTOR FUNCTION OF HEMIPARKINSONIAN RATS IMPLANTED WITH DOPAMINE COMPLEX. **Dominguez-Marrufo, L.E.**~~ **NOT PRESENTED.**

48. ~~STUDIES OF BIOCOMPATIBILITY BY THE HOST REACTION TO THE IMPLANT OF TIO2 COMPLEX TO IMPROVE MOTOR FUNCTION IN THE HEMIPARKINSONISM RAT MODEL. **Hernandez-Ramirez, H.**~~ **NOT PRESENTED.**

49. ~~DOPAMINE COMPLEX COULD LEAD TO IMPROVED MOTOR DEFICITS OF HEMIPARKINSONISM INDUCED IN THE RAT. **Ibarra-Guerrero, P.**~~ **NOT PRESENTED.**

Friday, June 12, 2009

8:30-10:30 **Symposium 3:** WHAT IS THE FUNCTIONAL AND CLINICAL SIGNIFICANCE OF THE HIPPOCAMPAL-PREFRONTAL CORTICAL INTERACTION? **Chairperson: Yukiori Goto**

8:30 INTERACTIONS BETWEEN MEDIAL PREFRONTAL CORTEX AND HIPPOCAMPUS FOR SPATIAL LOCATION INFORMATION. **Kesner, R.P.**

9:00 DOPAMINE MODULATION OF HIPPOCAMPAL-PREFRONTAL CORTICAL INTERACTION ON MEMORY-GUIDED BEHAVIOR. **Goto, Y.**

9:30 DIFFERENTIAL CONTRIBUTIONS OF PREFRONTAL AND HIPPOCAMPAL DOPAMINE D1 AND D2 RECEPTORS IN HUMAN COGNITIVE FUNCTIONS. **Takahashi, H.**

10:00 THE VENTRAL HIPPOCAMPUS AND MEDIAL PREFRONTAL CORTEX SYNCHRONIZE IN THETA RANGE DURING ANXIETY. **Gordon, J**.; Adhikari, A.; Topiwala, M.

10:30-11:00 **Break & Exhibit Viewing**

11:00-12:00 **Special Lecture:** DARWIN: HIS LIFE AND LEGACY FOR BEHAVIORAL NEUROSCIENCE. **Robert Blanchard. Introduction: Kelly Lambert.**

12:00-2:00 **Break**

2:00-4:00 **Student Workshop**

4:00-6:00 **Student Travel Award Slide Blitz.** Chairs: **Jodi Gresack, Katerina Savelieva, Melanie Paquette**

GABA-A RECEPTORS CONTRIBUTE TO PROGESTERONE WITHDRAWAL. †**Beckley, E.**; Finn, D.

STRESS MODULATION OF NICOTINE REWARD IN ADOLESCENT RATS. †**Brielmaier, J.M**.; McDonald, C.G.; Smith, R.F.

EFFECTS OF GENETIC AND PHARMACOLOGICAL INACTIVATION OF THE 5-HT TRANSPORTER (5-HTT) ON COGNITIVE FLEXIBILITY IN MICE. †**Brigman, J.**; Mathur, P.; Harvey-White, J.; Saksida, L.; Bussey, T.; Murphy, D.; Holmes, A.

HEDONIC & REWARDING PROFILES OF ANABOLIC ANDROGENIC STEROIDS CLASS I-III. †**Brito-Vargas, P**.; Cruz, B.; Parrilla-Carrero, J.; Figueroa, O.; Lugo, A.; Rivera, M.; Garcia-Sosa, R.; Barreto-Estrada, J.L.

EFFECT OF HIGH MATERNAL CORTICOSTERONE LEVELS AND ENRICHED ENVIRONMENT ON THE BEHAVIOURAL OUTCOME OF THE MALE AND FEMALE OFFSPRING. †**Brummelte, S.**; Galea, L.A.M.

ESTROGEN RECEPTOR ALPHA AGONIST IMPAIRS MEMORY BUT NOT ACQUISITION OF A SOCIALLY LEARNED FOOD PREFERENCE IN CD1 MICE. †**Clipperton, A.E.**; Brown, A.; Hussey, B; Tam, C.; Choleris, E.

MEMANTINE BLOCKS BEHAVIORAL SENSITIZATION TO AMPHETAMINE VIA INTRA-ACCUMBENS GLUTAMATERGIC- AND NICOTINIC-DEPENDENT MECHANISMS. †**Degoulet, M.F.**; Rostain, J.C.; Abraini, J.H.; David, H.N.

THE ROLE OF THE SEROTONIN 6 RECEPTOR IN DORSAL STRIATUM MEDIATED LEARNING IN THE RAT. †**Eskenazi, D.**; Neumaier, J.F.

CHRONIC "PROPHYLACTIC" TREATMENT WITH A CRF1-R ANTAGONIST SUPPRESSES ALCOHOL DRINKING BY DEPENDENT AND NON-DEPENDENT RATS. †**Gilpin, N.W.**; Koob, G.F.

LISURIDE- AND LSD-INDUCED DISRUPTION OF PREPULSE INHIBITION ARE MEDIATED BY DISTINCT RECEPTOR MECHANISMS. †**Halberstadt, A.L.**; Geyer, M.A.

DOES COPING STRATEGY MODULATE THE EFFECTS OF CHRONIC UNPREDICTABLE STRESS ON HIPPOCAMPAL INTEGRITY? †**Hawley, D.F.**; Leasure, J.L.

CORTICOTROPIN-RELEASING FACTOR (CRF) TYPE 1 RECEPTORS IN THE BED NUCLEUS OF THE STRIA TERMINALIS MEDIATE LONG- (MINUTES) BUT NOT SHORT- (SECONDS) DURATION STARTLE INCREASES TO SHOCK-PREDICTING CUES. †**Miles, L.**; Walker, D.; Davis, M.

STRAIN, SEX, AND BEHAVIORAL RESPONSE TO NOVELTY: FACTORS UNDERLYING THE GENETIC SUSCEPTIBILITY FOR HELPLESSNESS. †**Padilla, E.**; Barret, D.; Shumake, J.; Gonzalez-Lima, F.

PRE-OBESE BEHAVIORAL AND NEUROBIOLOGICAL PHENOTYPE IN THE OLETF RATS DURING THE SUCKLING PERIOD. †**Schroeder, M.**; Blumberg, S.; Bi, S.; Moran, T.H.; Smith, G.P.; Weller, A.

THE RATCAP PORTABLE SCANNER: TOWARDS PET IMAGING IN BEHAVING ANIMALS. †**Schulz, D.**; Southekal, S.; Schiffer, W.; Henn, F.A.; Schlyer, D.; Vaska, P.

THE EFFECTS OF ESTRADIOL AND SELECTIVE ESTROGEN RECEPTOR MODULATORS FOR BEHAVIORAL PROCESSES, TUMORIGENESIS, AND UTERINE PROLIFERATION IN OVARIECTOMIZED RATS. †**Walf, A.**; Rusconi, J.; Frye, C.

DYNAMIC INTERACTIONS BETWEEN HIPPOCAMPAL AND SUPRAMAMMILLARY NUCLEUS THETA OSCILLATIONS DURING SPATIAL LEARNING. †**Young, C.K.**; Ruan, M.; McNaughton, N.

6:00-8:00 **Poster Session II**

Cognition

50. DIFFERENTIAL EFFECTS ON OBJECT AND SPATIAL MEMORY FOLLOWING CHRONIC DOSES OF METHYLPHENIDATE AND ATOMOXOTINE. **Bigney, E.**; Taukulis, H.; Wilson, J.

51. EFFECTS OF GENETIC AND PHARMACOLOGICAL INACTIVATION OF THE 5-HT TRANSPORTER (5-HTT) ON COGNITIVE FLEXIBILITY IN MICE. †**Brigman, J.;** Mathur, P.; Harvey-White, J.; Saksida, L.; Bussey, T.; Murphy, D.; Holmes, A.

52. LITTLE AND OFTEN? MAINTAINING CONTINUED PERFORMANCE IN AN AUTOMATED T-MAZE FOR MICE. **Gaskill, B.N.**; Lucas, J.R.; Pajor, E.A.; Garner, J.P.

53. THE ROLE OF GLUTAMATE IN METHYLPHENIDATE-INDUCED MEMORY IMPAIRMENTS. **Fry, M.D.**; LeBlanc-Duchin, D.

54. ASSESSMENT OF OLFACTORY IMPAIRMENT BY BETA AMYLOID INJECTION IN HIPPOCAMPUS OR OLFACTORY BULB IN AN ANIMAL MODEL. **Bernal-Mondragon, C.;** Guevara-Guzman, R.

55. ACTIVITY-REGULATED AMPA RECEPTOR ENDOCYTOSIS PLAYS DIFFERENT ROLES IN INSTRUMENTAL HABIT LEARNING. **Ma, L.**; Ahn, S.; Wang, Y.; Phillips, A.

56. AGED RATS DEMONSTRATE INCREASED SUSCEPTIBILITY TO DISTRACTION IN A SELECTIVE ATTENTION VERSION OF THE PEAK-INTERVAL PROCEDURE. **Stewart, A.L.**; McAuley, J.D.; Mercier, A.M.; Pang, K.C.H.

57. DYNAMIC INTERACTIONS BETWEEN HIPPOCAMPAL AND SUPRAMAMMILLARY NUCLEUS THETA OSCILLATIONS DURING SPATIAL LEARNING. †**Young, C.K.**; Ruan, M.; McNaughton, N.

58. DISTINCT EFFECTS OF ANTERIOR CINGULATE, ORBITOFRONTAL AND PRELIMBIC CORTEX LESIONS ON DECISION-MAKING IN A RAT GAMBLING TASK. Rivalan, M.; Coutureau, E.; **Dellu-Hagedorn, F.**

59. THE ROLE OF THE SEROTONIN 6 RECEPTOR IN DORSAL STRIATUM MEDIATED LEARNING IN THE RAT. †**Eskenazi, D.**; Neumaier, J.F.

60. EFFORT-DRIVEN REWARD TRAINING ENHANCES NEUROBIOLOGICAL RESILIENCE IN MALE LONG-EVANS RATS. **Hyer, M.M.**; Karsner, S.; Tu, E.; Franssen, C.L.; Lambert, K.G.

61. MATERNAL EXPERIENCE MAY PROTECT HIPPOCAMPAL LEARNING AND MEMORY FROM NEUROTOXIC INSULT. **Rzucidlo, A.**; Franssen, C.L.; Baranova, A.; Kinsley, C.H.; Lambert, K.G.

62. ROUGH-AND-TUMBLE PLAY ENHANCES FOCUSED ATTENTION IN JUVELINE MALE LONG-EVANS RATS. **Karsner, S.**; Hall, K.; M'Coy, G.;Franssen, C.L.; Lambert, K.G.

63. MEDIAL SEPTUM NEUROKININ-2 RECEPTORS INFLUENCE ACh RELEASE IN CHOLINERGIC PROJECTION AREAS. Schäble, S.; **Huston, J.P.**; de Souza Silva, M.A.

64. THE ROLE OF SEROTONIN IN THE MEDIAL PREFRONTAL AND ENTORHINAL CORTEX IN THE MEDIATION OF THE EFFECTS OF COCAINE. Pum, M.E.; Carey, R.J.; **Huston, J.P.**; Müller, C.P.

65. COLOBOMA MICE EXHIBIT GENDER-SPECIFIC ALTERATIONS IN EXTINCTION AND REVERSAL LEARNING. **Heyser, C.J**.; Wilson, M.C.

66. METHYLENE BLUE PREVENTS MEMORY IMPAIRMENT IN A SPATIAL TASK CAUSED BY POSTERIOR CINGULATE CORTICAL HYPOMETABOLISM. **Riha, P.D.**; Rojas, J.C.; Gonzalez-Lima, F.

67. THE RATCAP PORTABLE SCANNER: TOWARDS PET IMAGING IN BEHAVING ANIMALS. †**Schulz, D.**; Southekal, S.; Schiffer, W.; Henn, F.A.; Schlyer, D.; Vaska, P.

68. SHORT TERM EFFECTS OF ESTROGEN RECEPTOR ALPHA AND BETA AGONISTS ON LEARNING AND DENDRITIC SPINES. **Phan, A.**; Lancaster, K.E.; Armstrong, J.N.; MacLusky, N.J.; Choleris, E.

Social Behaviour

69. THE INVOLVEMENT OF ESTROGEN RECEPTOR ALPHA AND OXYTOCIN IN MALE MONGOLIAN GERBIL PARENTAL AND SOCIAL BEHAVIORS. **Phan, A.**; Roberts, V.; Mong, J.; Abadilla, R.; Choleris, E.; Clark, M.M.

70. MAIN OLFACTORY SYSTEM MEDIATES SOCIAL BUFFERING OF CONDITIONED FEAR RESPONSES IN MALE RATS. **Kiyokawa, Y.**; Takeuchi, Y.; Nishihara, M.; Mori, Y.

71. SOCIAL ANXIETY-LIKE BEHAVIOR FOLLOWING EARLY-LIFE SOCIAL ISOLATION IS REDUCED BY CORTICOTROPIN-RELEASING FACTOR RECEPTOR ANTAGONISM WITHIN THE DRN. **Lukkes, J.L.**; Vuong, S.; Scholl, J.L.; Oliver, H.; Forster, G.L.

72. SELECTIVE BREEDING FOR DIFFERENTIAL RATES OF 50 KHZ ULTRASONIC VOCALIZATION: AN EXAMINATION OF SOCIAL RECOGNITION AND FEAR CONDITIONING. **Webber, E.S**.; Beckwith, T.J.; Peña, S.; Cromwell, H.C.

73. MORPHOLOGICAL ASPECTS OF PINEAL GLAND IN A WILD BRAZILIAN CARNIVORE WITH SAZONAL REPRODUCTIVE BEHAVIOR AND NOCTURNAL HABIT PROCYON CANCRIVORUS - CURVIER 1789. **Carvalho, A.F.**; Marques, L.O.; Zimberknopf, E.; Mananares, C.A.F.

74. ESTROGEN RECEPTOR ALPHA AGONIST IMPAIRS MEMORY BUT NOT ACQUISITION OF A SOCIALLY LEARNED FOOD PREFERENCE IN CD1 MICE. †**Clipperton, A.E.**; Brown, A.; Hussey, B; Tam, C.; Choleris, E.

75. FATHERHOOD INHIBITS ADULT NEUROGENESIS WITHOUT ALTERING BEHAVIORS ASSOCIATED WITH THE HIPPOCAMPUS. **Glasper, E.R.**; Pavlic, A.; Kozorovitskiy, Y.; Gould, E.

76. THE EFFECTS OF ESTRADIOL AND SELECTIVE ESTROGEN RECEPTOR MODULATORS FOR BEHAVIORAL PROCESSES, TUMORIGENESIS, AND UTERINE PROLIFERATION IN OVARIECTOMIZED RATS. †**Walf, A.**; Rusconi, J.; Frye, C.

77. CHRONIC PROGESTERONE TO INTACT RATS RESULTS IN SEX DIFFERENCES IN COGNITIVE, AFFECTIVE AND/OR SOCIAL BEHAVIORS. Llaneza, D.C.; Frye, C.A.

78. SEX DIFFERENCES, AND ENDOGENOUS HORMONAL MILIEU, INFLUENCE DOSE-DEPENDENT RESPONSE TO COCAINE FOR EFFECTS ON ANXIETY AND SEXUAL BEHAVIOR. Kohtz, A.S.; Paris, J.J.; Frye, C.A.

Human Studies

79. OBSESSIVE-COMPULSIVE DISORDER AS A DYSFUNCTION OF SECURITY MOTIVATION. **Hinds, A.**; Szechtman, H.; Van Ameringen, M.; Mancini, C.

80. DISSOCIATION OF THE BRAIN ACTIVATION NETWORK ASSOCIATED WITH HYPOTHESIS-GENERATING AND HYPOTHESIS-UNDERSTANDING IN BIOLOGY LEARNING: FMRI STUDY. **Lee, J-K.**; Kwon, Y-J.; Jeong, J-s.; Kwon, S-W.

81. EUROPEAN MEDICINES AGENCYS DRAFT GUIDELINE ON THE DEVELOPMENT OF MEDICINAL PRODUCTS FOR THE TREATMENT OF ALCOHOL DEPENDENCE: DO YOU AGREE? **Ostrowski, N.L.**; Rizvi, L.

82. BRAIN ACTIVITY DURING COGNITIVE PERFORMANCE IN MIDDLE AGED WOMEN CARRIES OF CATECHOL-O-METHYLTRANSFERASE VAL158MET GENOTYPE. **Solis-Ortiz, S.**; Gutierrez-Munoz, E.; Perez-Luque, E.; Morado-Crespo, L.

83. ~~SEX STEROID HORMONES AND NEUROPSYCHOLOGICAL FUNCTIONS: ROLE OF ESTROGEN IN WORKING MEMORY FOR EMOTIONAL FACIAL EXPRESSIONS, IN YOUNG WOMEN. **Gasbarri, A.**; Pompili, A.; dOnofrio, A.; Tavares, M.C.; Tomaz, C.~~ **NOT PRESENTED.**

84. ~~SEX-RELATED TALKATIVENESS AND EMOTIONAL MEMORY. **Gasbarri, A.**; Pompili, A.; Arnone, B.; Tavares, M.C.; Tomaz, C.~~ **NOT PRESENTED.**

Reward and Addiction

85. CONDITIONED HYPERACTIVITY TO ETHANOL-PAIRED STIMULI IN ZEBRAFISH (DANIO RERIO). **Blaser, R.**; Koid, A.

86. HEDONIC & REWARDING PROFILES OF ANABOLIC ANDROGENIC STEROIDS CLASS I-III. †**Brito-Vargas, P**.; Cruz, B.; Parrilla-Carrero, J.; Figueroa, O.; Lugo, A.; Rivera, M.; Garcia-Sosa, R.; Barreto-Estrada, J.L.

87. EFFECTS OF LOW DOSES OF QUINPIROLE ON PRODUCTION OF 50 kHz CALLS IN RATS. Komadoski, M.D.; **Brudzynski, S.M.**

88. CHRONIC "PROPHYLACTIC" TREATMENT WITH A CRF1-R ANTAGONIST SUPPRESSES ALCOHOL DRINKING BY DEPENDENT AND NON-DEPENDENT RATS. †**Gilpin N.W.**; Koob G.F.

89. IN VIVO CHARACTERIZATION OF THE NEUROPEPTIDE S ANTAGONIST SHA68. **Shoblock, J.R.**; Welty, N.; & Lovenberg, T.

90. INDIVIDUAL VARIATION IN ANXIETY AND ETHANOL SELF-ADMINISTRATION: A PHENOTYPIC ANALYSIS OF LIMBIC SYSTEM NEURON ACTIVATION. White, L.C; Ford, K.A.; Fadel, J.R.; **Wilson, M.A.**

91. MEMANTINE BLOCKS BEHAVIORAL SENSITIZATION TO AMPHETAMINE VIA INTRA-ACCUMBENS GLUTAMATERGIC- AND NICOTINIC-DEPENDENT MECHANISMS. †**Degoulet, M.F.**; Rostain, J.C.; Abraini, J.H.; David, H.N.

Saturday, June 13, 2009

8:30-10:30 **Symposium 4:** VERTEBRATE MODELS OF SOCIAL BEHAVIOR: NEUROBIOLOGICAL AND COMPARATIVE PERSPECTIVES. **Chairperson: Elena Choleris**

8:30 SHOALING IN ZEBRAFISH: A NOVEL TOOL FOR THE ANALYSIS OF VERTEBRATE SOCIAL BEHAVIOR. **Gerlai, R.**

9:00 A MAMMALIAN SOCIAL ENGAGEMENT SYSTEM: INSIGHTS FROM THE POLYVAGAL THEORY. **Porges, S.W.**

9:30 SOCIAL BEHAVIOR AND COMMUNICATION IN THE MOUSE. **Blanchard, R.J.**; Blanchard, D.C.; Arakawa, H. ; Borelli, K.G.

10:00 NEUROBIOLOGY OF SOCIAL RECOGNITION AND PARASITE AVOIDANCE. **Kavaliers, M.**; Choleris, E.

10:30-11:00 **Break & Exhibit Viewing**

11:00-12:00 **Keynote Lecture: Ann M. Graybiel, MIT, Cambridge, MA, USA.** OUR HABITUAL LIVES: HOW THE BRAIN MAKES AND BREAKS HABITS. **Introduction**: **Kelly Lambert**

12:00-4:00 **Meet the Professionals Lunches**

5:00-6:00 **Business Meeting.** Open to all IBNS members.

7:00-11:00 **Banquet**. Awards, buffet, dancing. *Poolside*. DJ – David Sawyer.

Wednesday, June 10, 2009

9:00-10:00 **Presidential Lecture:** A SMALL FISH WITH A BIG FUTURE: ZEBRAFISH IN BEHAVIORAL NEUROSCIENCE. **Robert Gerlai.**

A SMALL FISH WITH A BIG FUTURE: ZEBRAFISH IN BEHAVIORAL NEUROSCIENCE. Gerlai R., Department of Psychology, University of Toronto Mississauga, ON L6M 4C6 Canada. Zebrafish is gaining popularity in behavioral neuroscience and behavioral genetics: The number of papers published in these research areas using zebrafish is exponentially increasing. The reason is simple: as a result of over three decades of zebrafish studies in developmental biology by now we have a sophisticated genetics tool set for this species. The genetics tools can be utilized in any biology disciplines and thus behavioral neuroscientists have also started to take advantage of this little fish. The bottleneck of our research, however, is the paucity of information on the brain function and behavior of this species. Most agree by now that the sophisticated genetic tools must be matched with equally sophisticated behavioral paradigms. This is particularly important for screening applications (e.g. forward genetics-based mutation screening and drug screens) where the identification of mutants or drugs is dependent upon proper phenotypical tests. Briefly, behavioral paradigms are the foundation of forward genetics as far as the analysis of brain function is concerned. In the current talk, I present numerous pioneering studies whose results suggest that zebrafish will indeed have a bright future in behavioral neuroscience. Focusing on a crucial disease problem, alcohol abuse, I argue that 1, zebrafish has a sophisticated behavioral repertoire, 2 that behavioral responses of zebrafish to alcohol can be precisely measured using automated and high throughput methods, 3 that alcohol induces changes in zebrafish that show good face validity, and 4 that these behavioral changes are accompanied by neurotransmitter and gene expression changes allowing one to start the mechanistic characterization of alcohols effects. In this paper I present evidence for acute and chronic alcohol induced behavioral changes demonstrating the development of tolerance after long term alcohol exposure and also show significant effects of withdrawal from alcohol in zebrafish. In addition, I also present how low levels of alcohol exposure during early development alters social behavior later in life in zebrafish. Although the findings presented in this talk do not form a coherent story and do not yet allow one to answer detailed mechanistic questions about the effects of alcohol on the vertebrate brain, they suggest that zebrafish will be an excellent tool with which such questions can be addressed. Briefly, I propose that zebrafish will be in the mainstream of behavioral neuroscience and in particular it will be an important translational research tool for the analysis of human alcoholism and alcohol abuse.

10:30-11:45 **Matthew J. Wayner-NNOXe Pharmaceuticals Award Lecture: C. Sue Carter,** University of Illinois at Chicago, USA. SEX DIFFERENCES IN OXYTOCIN AND VASOPRESSIN: IMPLICATIONS FOR AUTISM SPECTRUM DISORDERS? **Introduction: Wim Crusio**

SEX DIFFERENCES IN OXYTOCIN AND VASOPRESSIN: IMPLICATIONS FOR AUTISM SPECTRUM DISORDERS? Carter, C.S. Brain Body Center, Department of Psychiatry, University of Illinois at Chicago, Chicago, IL 60612. Autism spectrum disorders (ASD) are male-biased and characterized by deficits in social behavior and social communication, excessive anxiety or hyperreactivity to stressful experiences, and a tendency toward repetitiveness. The purpose of this talk is to consider evidence for a role for two sexually dimorphic neuropeptides, oxytocin (OT) and arginine vasopressin (AVP), in these features of ASD. Both AVP and OT play a role in normal development. AVP is androgen-dependent and of particular importance to male behavior. Excess AVP or disruptions in the AVP system could contribute to the male vulnerability to ASD. Alternatively, protective processes mediated via OT or the OT receptor might help to explain the relatively rare occurrence of ASD in females. Disruptions in either OT or AVP or their receptors could result from genetic variation or epigenetic modifications of gene expression, especially during early development. (Supported by HD 38490, MH072935 and MH073022).

4:00-6:00 **Symposium 1:** NEUROBIOLOGY OF HUMAN IMPULSIVITY: MICE AND RATS BEHAVIORAL MODELS. **Chairperson: Sylvie Granon**

INTER-INDIVIDUAL DIFFERENCES IN IMPULSIVITY IN THE RAT: RELATIONSHIPS WITH COGNITION, DECISION-MAKING AND THE DOPAMINERGIC SYSTEM. Rivalan M.; Le Moine C.; Grégoire S. and Dellu-Hagedorn F. Lab. MAC, UMR CNRS 5227, Bordeaux, France. Impulsivity is a hallmark of several mental disorders such as mania, addictive disorders and ADHD. These disorders are also characterized by working memory deficits, risk-taking and poor decision-making, suggesting that common brain mechanisms may underlie their etiologies. If mental disorders can truly be seen as extreme manifestations of behavioral dimensions, relationships between these behavioral characteristics should be revealed in a normal sample of rats. Inter-individual differences in inhibition capacities were assessed in rats in a fixed consecutive number schedule (FCN16) and animals presenting higher impulsive responses were compared with intermediate and non impulsive rats for working memory capacities (8-arm radial maze), risk-taking (light-dark emergence task) and decision-making (rat gambling task). A relationship between working memory and inhibition capacities was revealed. Dose-effect of amphetamine (s.c.) modulated similarly these two functions according to both initial individual performances (inverted-U shaped relationship) and prefrontal cortex D1 receptor expression levels. Poor decision-making was associated with risk-taking proneness and these traits were unrelated to inhibitory capacities. These results suggest that poor working memory and disinhibition are intimately related and share common neural substrates, distinct from those sustaining risk-taking and poor decision making. This dimensional approach in the rat is promising to elucidate the neurobiological interactions between these executive functions. It is in line with dimensional views of mental health assuming the absence of natural boundaries between mental disorders and normality.

DIFFERENTIAL CONTRIBUTION OF MU AND DELTA OPIOID RECEPTORS TO MOTOR IMPULSIVITY. [1]Olmstead, M.C.; [2]Ouagazzal, A-M.; [2]Kieffer, B.L. [1]Dept. of Psychology, Queen's University, Kingston Ontario, K7L 3N6. [2]Institut de Génétique et de Biologie Moléculaire et Cellulaire, Département Neurobiologie, Illkirch, France. Impulsivity is a primary feature of many psychiatric disorders, most notably attention deficit hyperactivity and drug addiction. Impulsivity includes a number of processes such as the inability to delay gratification, the inability to withhold a motor response or acting before all of the relevant information is available. These processes are mediated by neural systems that include dopamine, serotonin, norepinephrine, glutamate and cannabinoids. In this study, we examined the role of opioid systems in impulsivity by testing whether inactivation of the mu- (*Oprm1*) or delta- (*Oprd1*) opioid receptor gene alters motor impulsivity in mice. Wild-type and knockout mice were examined on either a pure C57BL6/J (BL6) or a hybrid 50% C57Bl/6J50% 129Sv/pas (HYB) background. Mice were trained to respond for sucrose in a signaled nose poke task that provides independent measures of associative learning (responses to the reward-paired cue) and motor impulsivity (premature responses). *Oprm1* knockout mice displayed a remarkable decrease in motor impulsivity. This was observed on the two genetic backgrounds and did not result from impaired associative learning, as responses to the cue signaling reward did not differ across genotypes. Furthermore, mutant mice were insensitive to the effects of ethanol, which increased disinhibition and decreased conditioned responding in wild-type mice. In sharp contrast, mice lacking the *Oprd1* gene were more impulsive than controls. Again, mutant animals showed no deficit in associative learning. Ethanol completely disrupted performance in these animals. Together, our results suggest that mu-opioid receptors enhance, whereas delta-opioid receptors inhibit, motor impulsivity. This reveal an unanticipated contribution of endogenous opioid receptor activity to disinhibition. In a broader context, these data suggest that alterations in mu- or delta-opioid receptor function may contribute to impulse control disorders.

SEPARATION OF BEHAVIORAL DISINHIBITION TO NON-TARGET STIMULI FROM IMPULSIVE EARLY RESPONDING: DOPAMINERGIC AND SEROTONERGIC RECEPTOR EFFECTS. Young, J.W.; Geyer, M.A. Dept of Psychiatry, University of California San Diego, 9500 Gilman Drive, La Jolla, CA 92093-0804 USA Impaired attention/vigilance is commonly observed in neuropsychiatric patients including schizophrenia, Bipolar Disorder, and ADHD, as is behavioral disinhibition and impulsive responding. Developing cognitive therapies for these symptoms remains a priority given the relationship between the cognitive dysfunction and functional outcome. The 5-choice continuous performance test (5C-CPT) of vigilance in mice offers the opportunity to assess two forms of impulsivity as well as attention, while also measuring behavioral disinhibition. Dopamine D4 receptor wildtype (WT, n=7), heterozygous (HT, n=7), and knockout mice (KO, n=7) were trained to perform the 5C-CPT. Performance was challenged with: 1) a variable stimulus duration (SD; 0.8, 1, and 2 s), then 2) an extended inter-trial interval (ITI) session, with vehicle or the 5-HT2C antagonist SB242084 (0.1 or 0.3 mg/kg) in a within subjects design. 1) HT mice exhibited a trend toward higher levels of false alarm responding ($F(4,32)=2.2$, $p=0.096$) compared to WT mice, leading to significantly impaired attention ($F(4,32)=2.7$, $p<0.05$). No difference in premature responding was observed however, nor was there a difference in behavioral bias, suggesting the deficit was not attributable to behavioral disinhibition. 2) a significant drug-induced increase in premature responding was observed ($F(2,34)=4.4$, $p<0.05$), with no interaction or effect of genotype. No drug effect was observed on false alarm responding nor on attention or behavioral bias. Thus the increase in premature responding was also not due to behavioral disinhibition. The use of target and non-target stimuli in the 5C-CPT enables the differentiation of impulsivity in response to non-target stimuli (false alarms-alterable via dopamine D4 manipulation) and motor impulsivity (premature responding-

alterable via 5-HT2C manipulation) in an attentional task which can also be differentiated from general behavioral disinhibition. The data support the use of the 5C-CPT when assessing putative therapeutics in animal models of neuropsychiatric disorders. Supported by the National Institute of Mental Health (R01-MH071916), NARSAD, and a Stein Institute for Research in Aging Fellowship (JWY).

RELATIONSHIP BETWEEN IMPULSIVITY AND FLEXIBLE BEHAVIORS IN MICE Sylvie Granon & Pierre Serreau Universit d'Orsay Paris Sud (NAMC) & Institut pasteur, Paris Bat. 446, 91405, Orsay Cedex, FRANCE tel: 00 (1) 69 15 74 79 granon@pasteur.fr or sylvie.granon@u-psud.fr Impulsive behaviour is frequently observed in psychiatric disorders (Schizophrenia, ADHD, OCD, Addictions) and can be assessed in rats by different tasks. In primates or rats, impulsive behaviours have been shown to be a predictive marker of other behavioural dysfunctions such as addiction. We designed a behavioural task specific to mice to evaluate and measure motor impulsivity. In this task, mice have to wait for the presentation of a given stimulus to make a motor response (a single nosepoke in a single hole) that conditioned the distribution of a food reward. After eating, the mouse has to inhibit its response for a fixed or a variable delay (inter trial intervaliti) before the onset of the next stimulus allowing a rewarded response. An anticipatory response (during iti) reflects impulsivity. When the iti got variable and longer, the number of anticipatory responses increased as a function of the iti duration. We show here that this motor impulsivity task allows the subdivision of a group of normal C57bl/6 mice into two subgroups, one with highly impulsive performance and one with less impulsive performance. This subdivision is independent of anxiety level or locomotor behaviour. However, when behavioural flexibility is measured in a social interaction task involving a conflict between three motivations -food reward, novelty exploration and social interaction- the two subgroups show significant differences for the time devoted to each motivation, suggesting that impulsivity may be a behavioural marker for other cognitive dysfunctions.

Thursday, June 11, 2009

8:30-9:30 **Keynote Lecture: T. W. Robbins, University of Cambridge, U.K.** FROM IMPULSIVITY TO COMPULSIVITY: NEURAL SUBSTRATES AND PSYCHIATRIC IMPLICATIONS. **Introduction: Robert Gerlai**

FROM IMPULSIVITY TO COMPULSIVITY: NEURAL SUBSTRATES AND PSYCHIATRIC IMPLICATIONS. Robbins, T.W., Dept. of Expt. Psychology and Behavioural and Clinical Neuroscience Institute, University of Cambridge, U.K. Impulsivity can be defined as the tendency to respond prematurely, without foresight. Investigations of the neuropsychological and neurochemical mechanisms underlying impulsivity, using a range of methods in rodents and humans, have revealed several distinct neural substrates for this construct, suggesting that it can, to some degree, be fractionated into constituent elements. Previous evidence indicates that human cocaine abusers have a propensity for impulsivity, as measured by standard clinical instruments. We found that one index of impulsivity in the rat, the tendency to respond prematurely in a test of sustained visual attentional performance, is predictive of a susceptibility of rats to escalate responding reinforced by the intra-venous self-administration of cocaine, and also of compulsive drug use, as defined operationally by DSM-IV. Furthermore, these high impulsive rats exhibit a down-regulation of dopamine D2/3 receptors in the ventral striatum, even prior to receiving cocaine, and their impulsive responding is normalised by the selective norepinephrine re-uptake blocker atomoxetine. Other forms of impulsivity, such as the capacity for motor inhibition, as measured on Logans stop-signal reaction time task, which is commonly used in patients with attention deficit hyperactivity disorder, appear to depend upon a different cortico-striatal substrate, both in rodents and humans, but are also remediated by atomoxetine, probably via its cortical action. Stop-signal inhibition is also impaired in patients with patients with obsessive-compulsive disorder, suggesting some further connection of impulsivity with compulsivity (the tendency to perseverate, despite adverse consequences). Further experiments described are aimed at identifying the neural and neurochemical substrates of compulsive behavior. Finally, both the inter-relationships and the utility of the impulsivity and compulsivity constructs are considered more broadly, in the context of neuropsychiatric disorders. Notes: TW Robbins Ph.D. F.R.S. F.Med.Sci. Professor of Cognitive Neuroscience and Experimental Psychology, Head of Dept. of Expt. Psychology and Director of the Behavioural and Clinical Neuroscience Institute, University of Cambridge, U.K.

10:00-11:30 **Symposium 2:** BEHAVIORAL NEUROSCIENCE OF THE PARENTAL BRAIN IN RATS AND HUMANS: FROM BASIC MECHANISMS TO CLINICAL IMPLICATIONS. **Chairperson: James E. Swain**

NEURAL CIRCUITRY OF MATERNAL REWARD AND LACTATION: INSIGHTS FROM FUNCTIONAL MRI IN POSTPARTUM RATS. Febo, M; Ferris, C.F.; Kulkarni, P.; Stolberg, T.S.; Nephew, B.N.; Felix-Ortiz, A.C.; Caffrey, M.K. Lactation provides a rewarding experience beneficial to mother-infant bonding. Data will be presented on experiments examining the lactating postpartum brain using functional magnetic resonance imaging. Over the past 4 years, fMRI in awake rats has provided insight on the neural circuits of lactation following three parallel lines of investigation, namely, (i) the analysis of suckling stimulated reward activation, (ii) understanding the role of oxytocin in suckling stimulated neural activity and (iii) the neural processing of suckling associated sensory information in the maternal cortex. We have observed that, in addition to hypothalamic areas, brain reward centers and specific cortical areas are strongly responsive to suckling stimulation. The nucleus accumbens, medial prefrontal cortex and ventral tegmental area are activated by suckling, but much less so by central administration of cocaine. Interestingly, suckling stimulated activation of the prefrontal cortex is curtailed following repeated administration of the psychostimulant. In another series of parallel experiments we have been able to show that blockade of oxytocin modulates the neural response in several areas of the lactating brain. Finally, the processing of suckling stimulation may involve large areas of the cortical mantle and not a restricted somatotopic representation. Currently we are studying the neural responses of mothers in the face of a nest intruder. Ongoing studies have been designed to image postpartum lactating rats facing a male intruder threat in the presence of pups and bedding odors in order to recreate certain nest environmental features. Our present results show specific activation of limbic circuitry classically known for their roles in emotional responding. In agreement with human imaging studies, our results portray the prefrontal cortex and limbic circuits as active participants in maternal reward, lactation and care.

INTERPLAY OF BIOLOGICAL AND ENVIRONMENTAL INFLUENCES ON NEW MOTHER'S BRAIN: PERCEIVED QUALITY OF MATERNAL CARE IN CHILDHOOD AND BREASTFEEDING Pilyoung K.; Leckman L.; Mayes L.C., Feldman R.; Swain J.E. Yale Child Stuy Center, New Haven, CT 06511 USA We asked whether maternal brain activations depend on different experiential factors. The first study investigated whether the perceived quality of maternal care in childhood may be associated with maternal brain anatomy and functions. We examined whether the level of perceived maternal care (PMC) in childhood is associated with brain structure and functional responses to salient infant stimuli among human mothers in the first postpartum month. Higher PMC in childhood was linked to larger gray matter volumes and

increased activations in brain regions related to social and emotional information processing (middle temporal gyrus, superior temporal gyrus, and fusiform gyrus). Lower PMC in childhood was associated with increased activations in hippocampus, a brain region sensitive to stress regulation. The second study examined whether breastfeeding may be linked to brain activations and maternal behaviors among new mothers in response to their own infant cry (vs control infant cry) stimuli. The longitudinal study obtained fMRI data at 2-4 weeks and 12-16 weeks postpartum. At 2-4 weeks postpartum, breastfeeding mothers showed greater activation in areas of maternal motivation and reward (hypothalamus, substantia nigra, amygdala, putamen, obitofrontal cortex) than the formula-feeding mothers. although the breastfeeding mothers showed greater activation in areas for maternal behavior, formula-feeding mothers exhibited increased activations in superior frontal cortex, superior temporal gyrus. The correlation analysis revealed that greater activations in the reward-associated regions were correlated with greater maternal sensitivity.

FUNCTIONAL BRAIN ACTIVATIONS OF PARENTS LISTENING TO THEIR OWN BABY-CRY THAT CHANGE OVER THE EARLY POSTPARTUM AND VARY ACCORDING TO DELIVERY Swain J.E.; Leckman J.F.; Mayes L.C.; Feldman R.; Tasgin E.; Kim P.; Schultz R.T. Yale Child Study Center, New Haven, CT 06511 USA With childbirth, genetic and epigenetic processes reorganize parental brain circuits to encourage adaptive parental thoughts and behaviours. We sought to: 1. Determine specific brain circuits that respond to auditory and visual baby-stimuli in parental brains, and how they vary in the early postpartum 2. Determine how parental brain responses vary with mode of delivery, parental preoccupations and parental thoughts and behaviours. We are studying parental attachment in several ways in 50+ sets of parents and two time-points: administering interview, self-report and video assessments parenting and performing functional magnetic resonance brain imaging while they attended to own and other baby-cries. Grouping mothers and fathers together, listening to their own baby-cry activates a range of cortical and subcortical brain circuits. Some are consistently more sensitive to own baby-cry over time. Other brain responses shift as the parent-infant relationship develops. Many brain responses correlate with measures of mood and parenting. Subsets of vaginal vs. cesarean section delivery mothers were more sensitive to own baby-cry in certain cortical and subcortical brain regions. In sum, new parental brains in the early postpartum respond to own baby-cry in specific emotion regulation circuits, some of which show plasticity over the first few months postpartum from early habit formation and social cognition regions to certain emotion regulation and reward regions. Mode of delivery appears to alter the sensitivity to baby-cry. Parental worries and mood are related to specific brain regions that are sensitive to own baby-cry, suggesting human parental brain circuits for further study across dimensions of mental health risk and resilience.

4:00-5:45 **Oral Presentations**. **Chairperson: Leonie de Visser**

TRANSLATIONAL STUDY ON THE INTERACTION BETWEEN ANXIETY AND DECISION-MAKING IN RATS AND HUMANS. De Visser, L. de; Baars, J.M., Van der Loo, A.J.A.E.; Van der Knaap, L.J.; Ohl, F.; Van den Bos, R. Dept. of Animals, Science and Society, Utrecht University, Utrecht, The Netherlands. Anxiety is an adaptive emotion, aimed at adequately directing an individuals response towards a possible threatening stimulus or situation. In its exaggerated form however, anxiety may develop into a psychological disorder disrupting both cognitive and behavioural functioning. An essential part of daily functioning is decision-making, which involves both the emotional and cognitive processing of different and varying costs and benefits, ultimately converging into a successful choice strategy. Disruption of decision-making processes leads to problems in many different areas, such as in social and financial affairs. Common neural substrates can be identified in anxiety and decision-making, such as the ventromedial prefrontal cortex, anterior cingulate cortex and the amygdala. More specifically, the top-down inhibitory control mechanism of the PFC-amygdala connection may be causally involved in the relation between high anxiety and impaired decision-making. In this study, we aimed therefore at investigating the interaction between anxiety and decision-making in a translational set-up. In male humans subjects, anxiety was measured with Spielbergers State-Trait Anxiety Inventory (STAI) and compared to performance on the Iowa Gambling Task for decision-making. In male rats, anxiety was measured using the elevated plus maze and compared to performance in a rodent version of the Iowa Gambling Task. In both humans and rats, high levels of anxiety were predictive of an impaired performance on the decision-making tasks, reflected by an increase in the number of disadvantageous choices in highly anxious individuals. To assess whether high levels of anxiety and impaired decision making indeed share a common substrate cFos immunohistochemistry analysis is currently performed on rat brain slices.

~~RESPONSE DISINHIBITION EVOKED BY CHOLINERGIC ACTIVATION: RESULTS FROM A TANDEM VI DRL SCHEDULE AND STOP SIGNAL TASK. Kirshenbaum, A.P., Krikstone Laboratory for the Behavioral Sciences, Dept. of Psychology. Saint Michaels College, Colchester, VT 05443, USA~~. **NOT PRESENTED.**

COGNITIVE IMPAIRMENT UNDER EMOTIONAL AROUSAL CONDITIONS IN MICE LACKING TIP39. Coutellier, Laurence; Usdin, Ted. Section on Fundamental Neuroscience, NIMH, National Institute of Health, Bethesda, MD, USA. Stress affects cognitive performance. Two systems have been implicated in this phenomenon: the hypothalamic-pituitary-adrenocortical (HPA-) axis and the noradrenergic system. Recently, increased anxiety-related behaviors following environmental provocation were observed in mice lacking the neuropeptide tuberoinfundibular peptide of 39 residues (TIP39), which is synthesized by neurons at the caudal end of the thalamus that project to areas involved in emotional responses. Thus, TIP39 could mediate effects of stress on cognitive function. To investigate this hypothesis, we tested object and social recognition memory of TIP39-KO and WT mice under conditions that differed in their training-associated emotional arousal. When the object recognition test was performed under low emotional-arousal (high habituation to the experimental paradigm), both WT and KO-mice recognized the familiar object (preference score, PS, was above chance level: PS_WT=0.670 0.030, p=0.001; PS_KO=0.663 0.017, p<0.001). In contrast, under high emotional arousal (no habituation to the paradigm), KO-mice failed to recognize the familiar object (PS=0.484 0.021, p=0.466) while WT-mice succeeded (PS=0.620 0.029, p=0.005). In a social recognition test, the PS of WT-mice was not affected by the level of emotional arousal associated with the training condition (p=0.694) while the PS of KO-mice was reduced when tested under high emotional arousal compared to the low emotional arousal condition (p=0.01). Thus, under high emotional arousal, KO-mice did not recognize a familiar conspecific (PS=0.476 0.043, p=0.593) while WT-mice did (PS=0.602 0.042, p=0.045). The present findings suggest that training-induced emotional arousal interferes with learning in TIP39-KO mice. The neuropeptide TIP39 appears to be involved in stress-induced effects on cognitive function. Future experiments will address whether it is related to the HPA-axis and/or the noradrenergic system.

COGNITIVE ASPECTS OF CONGENITAL LEARNED HELPLESSNESS AND ITS REVERSAL BY THE MAO-B INHIBITOR DEPRENYL. (1)Schulz, D.; (1)Mirrione, M.M.; (1,2)Henn, F.A. (1)Medical Department, Brookhaven National Laboratory, Upton, NY; (2)Psychiatry Department, Mount Sinai School of Medicine, New York, NY. Much attention has been paid to emotional factors in depression. Here we focused on the role of cognitive functions. Selectively bred helpless (cLH, n = 10) and non-helpless (cNLH, n = 12) Sprague Dawley rats as well as wild type (WT, n = 8) controls were exposed to an empty open field for 10 min on each of two successive test days. On the third day, an object exploration paradigm was carried out. A few days later, the animals were tested for helplessness using a foot-shock paradigm. On the first day, both cLH and cNLH rats were more active than WTs, as measured by the distance moved in the periphery of the open field. Over trials, cNLH and WT rats lowered their activity less than cLH rats. This resistance-to-habituate co-varied with a resistance to develop helplessness. In cLH rats, higher anxiety or less time spent in the central open field co-varied with severe helplessness, consistent with the known relationship between depression and anxiety. In WTs, a greater reactivity to novel objects and to a spatially relocated object predicted lower levels of helplessness. In cLH rats (n = 5/group), chronic treatment with a high dose of deprenyl (10mg/kg; i.p.) attenuated the escape deficit in the helplessness test. Remarkably, helplessness reversal required the experience of repeated test trials, reminiscent of a learning process. In conclusion, the cLH strain shows consistency with a depressive phenotype which may be related to altered mechanisms of reinforcement learning and to abnormalities in MAO-A and/or MAO-B functioning.

THE EFFECTS OF GESTATIONAL AND POSTPARTUM ENVIRONMENTAL STIMULATION IN DAM RATS. Sparling, J.; Mahoney, M.; Baker, S.; Bielajew, C. University of Ottawa, School of Psychology, Ottawa, Ontario, Canada. Environmental enrichment is known to influence an animals well-being, provide opportunities for activity, and encourage behaviors appropriate to the species. Female Long-Evans rats were bred and co-housed throughout gestation and until weaning in a colony housing environment comprised of numerous cages, with interconnecting tunnels, and surrounding a multileveled enclosure with many physical objects throughout. Compared to a control group of rats, housed in pairs in standard conditions, the effects of the physical and social enrichment made possible by the colony housing were determined by evaluating group differences in body weight, litter characteristics, elevated-plus maze performance (gestational and postpartum), and Morris water maze behaviour (postpartum only). Results showed that control females displayed greater weight gain during pregnancy and postpartum. Group differences in litter characteristics were observed, with enriched females having heavier pups, but a smaller number of offspring. Although no behavioural effects of enrichment were found in the gestational elevated-plus maze, evaluation of postpartum elevated-plus maze performance showed that experimental females explored the open arms earlier and displayed increased grooming, decreased rearing and attenuated frequency of closed arm entry compared to their control counterparts. In the probe trial of the Morris water maze test, the enriched rats showed more activity as they frequented the platform quadrant and swam through the center of the maze more often, while control females spent significantly more time around the maze perimeter. The present enrichment experience improved maze

exploratory confidence, as well as produced leaner body types, likely due to increased physical activity, and heartier offspring, a predictor of developmental success.

SHOPPING FOR PARTS VS. FINAL CONSTRUCTION: FINE GRAINED NEST BUILDING BEHAVIOR IN MICE. Gaskill, B.N.; Rodda, C.; Garner, J.P. Purdue University, USA. Nest building in mice involves a very complex series of behaviors, and is readily disrupted by unsuitable materials. We hypothesized that overall strain differences in nest quality sublimate into different behavioral components of nest building, each differentially dependent on nesting material. We predicted that strains would differ in their ability to gather and process suitable material, versus their ability to build nests with freely available material. We housed nave CD-1, Balb/c, and C57BL/6 mice (18 male and 18 female/strain in groups of 3) in standard cages with one of 3 nesting treatments (13g Eco-bedding; 8g Eco-bedding in a 5g cardboard box; and 6g Eco-bedding+ 2g tissue in a 5g cardboard box). Nests were scored daily. During weekly cage cleaning fresh nesting treatment was provided. Analysis used GLMs with post-hoc contrasts. Nest quality depended on strain ($p<0.001$) sex ($p<0.018$) and treatment ($p<0.001$). Strains differed in their response to treatment ($p<0.001$): Balb/c had no difficulty retrieving nesting material from the box, while CD-1s had the greatest difficulty. Strains differed in nest quality with the days since cage cleaning ($p=0.002$): CD-1s showed little improvement in nest quality, while C57s showed the most improvement. In conclusion, these strains differ in their abilities to recognize, retrieve or process nesting material, versus their abilities to construct a nest from these processed materials.

CHRONIC METHAMPHETAMINE ALTERS SPONTANEOUS NEURAL DISCHARGE AND SYNAPTIC PLASTICITY IN GUINEA PIG HIPPOCAMPUS IN VIVO. [1]Chirwa, S.; [2]Aduonum A. [1]Meharry Medical College, Nashville, USA, [2]Philadelphia College of Osteopathic Medicine, Georgia Campus, Suwanee, USA. Neural output from the hippocampus controls memory formation and its disruption results in memory dysfunctions. Consequently we wondered if the impairment in memory and behavioral sensitization associated with chronic methamphetamine (METH) intake is partly due to changes in neural functions in the hippocampus. Thus 20 male guinea pigs (150–200 g) were inserted with osmotic mini-pumps to deliver either a) saline infusions or b) 1 mg/kg METH for 7 days. We found that guinea pigs treated with METH (n=12) showed significant increases in locomotor activity relative to saline (n=8; $p<0.05$, ANOVA). Subsequently guinea pigs were anesthetized and small access holes were made in the skull to lower electrodes for stimulating in the left CA3 area and recording spontaneous field potentials and evoked population spikes (PS) in left CA1 subfield. High frequency stimulation (HFS; 100 Hz, 1 s, 3 trains) was used to induce long-term potentiation (LTP; an enduring increase in synaptic efficacy thought to underlie learning and memory). We found that animals treated with saline developed robust LTP that lasted beyond 3 hours (PS amplitude as percent of pre-tetanus: 60 min post-HFS, 195±12, and 180 min post-HFS, 165±14; $p<0.05$ for both time intervals). By contrast, animals treated with chronic METH could produce LTP but this decayed within 90–120 min (PS amplitude: 60 min post HFS, 155±15, and 180 min post-HFS, 125±11; $p<0.05$ at 60 min interval). We also observed multiple spikes in the evoked PS as well as increased spontaneous bursting activity in drug–treated guinea pigs and these responses were prominent after HFS. Our results raise the prospect for a causal link between drug–induced aberrant CA1 network output and reported METH-induced memory dysfunctions. Supported by NIH Grant DA021471.

6:00-8:00 **Poster Session I**

Anxiety, Stress and Fear

1. INDUCTION OF CREB EXPRESSION IN THE PAG PRODUCES PREDATOR STRESS-LIKE PATTERN OF PCREB EXPRESSION, NEUROPLASTICITY AND ANXIETY IN RATS. Adamec, R.[1]; Berton, O.[2]; Abdul Razek, W.[1] 1. Memorial University; 2. University of Pennsylvania. Unprotected exposure to a cat (predator stress) produces long-lasting anxiogenic effects on behavior which are NMDA receptor-dependent. Phosphorylation of CREB to pCREB (phosphorylated cyclic AMP response element binding protein) is also regulated by NMDA receptors. Moreover pCREB-like-immunoreactivity (lir) is increased after predator stress in fear circuitry, including in the right lateral column of the PAG (periaqueductal gray). Elevation of PAG pCREB by predator stress is accompanied by potentiation of CeA-PAG (central amygdala-PAG) transmission in the right but not left hemisphere up to 12 days later. The present study explored the functional significance of these pCREB changes by genetically inducing increased CREB expression in non-predator stressed rats through viral vectoring, and assessing the behavioral, electrophysiological and pCREB expression changes in comparison with handled and predator stressed controls. Increasing CREB expression in right PAG increased open arm avoidance in the elevated plus maze without affecting risk assessment or level of activity. Median peak startle amplitude was also elevated, while rate of habituation was decreased. Potentiation of the CeA-PAG pathway in the right but not left hemisphere was also observed 5 days after injection. pCREB expression was slightly elevated in the right lateral column of the PAG while the dorsal and ventral columns were not affected. These findings suggest that by increasing CREB in the right lateral PAG, it is possible to produce rats that exhibit behavioral, brain, and molecular changes that closely resemble those seen in predator stressed rats. These findings also suggest that pCREB in the right lateral PAG is a mediating factor in some, but not all, of the changes in brain and behavior associated with predator stress.

2. THE EFFECT OF THE BENZODIAZEPINE MIDAZOLAM IN THE CINGULATE CORTEX 1 MAY UNDERLIE THE ONE-TRIAL TOLERANCE IN RATS Albrechet-Souza, L.; Borelli, K. G.; Carvalho, M. C.; Brandao, M. L. Laboratorio de Neuropsicofarmacologia and Instituto de Neurociencias & Comportamento - INeC, FFCLRP, University of Sao Paulo - Ribeirao Preto, SP, Brazil. Prior experience to the elevated plus-maze (EPM) increases the avoidance of rodents to the open arms and impairs the anxiolytic effects of benzodiazepines evaluated during a subsequent exposure to the maze, a phenomenon known as one-trial tolerance. The present study investigated whether the benzodiazepine midazolam alters the pattern of Fos distribution underlying the test (T1) and retest (T2) sessions in the EPM. Wistar rats received either saline or midazolam (0.5 mg/kg, i.p.) and were submitted to T1 or T2 sessions. After two hours, Fos protein expression was measured in twenty-three brain areas. Midazolam produced the usual pattern of exploratory behavior, increasing the activity of naive rats in the open arms and producing no effects in rats re-exposed to the EPM. Moreover, this treatment before T1 decreased the number of Fos-positive neurons in cingulate cortex 1, anterior hypothalamus central and dorsal premammillary nuclei. The Fos protein expression in these structures, however, was not altered when the drug was injected before T2. Bilateral infusions of midazolam (5g/side) into the cingulate cortex 1 produced anxiolytic effects in rats submitted to T1 session, without affecting the exploratory behavior in T2. These results suggest that this cortical area could be a key structure involved in the anxiolytic effects of midazolam in the EPM and this particular pattern of the drug action could underlie the lack of the benzodiazepine effects in the retest session. Financial support: CNPq

3. CHRONIC AMPHETAMINE INCREASES ANXIETY-LIKE BEHAVIOR AND REDUCES MONOAMINES AND NEUROGENESIS IN THE ADULT RAT DENTATE GYRUS. Jeffrey L. Barr, & Gina L. Forster Basic Biomedical Sciences and Neuroscience Group, Sanford School of Medicine, The University of South Dakota, Vermillion, SD, USA. Newly generated neurons in the dentate gyrus contribute to the function of the hippocampus. Recent evidence suggests a role for these neurons in both anxiety behavior and aspects of drug addiction. However, the effects of chronic amphetamine on adult hippocampal neurogenesis are unknown. We measured the effect of a two week treatment with amphetamine (2.5 mg/kg, ip.) on cytogenesis and neurogenesis in the adult rat dentate gyrus. Our results show that amphetamine reduced the number of newly generated neurons without affecting cytogenesis. This suggests an effect on the maturation or integration of new neurons. Acute amphetamine administration activates monoaminergic pathways and systemic corticosterone, both of which influence multiple stages of neurogenesis. Therefore, we treated adult male rats with either amphetamine or saline for two weeks and measured plasma corticosterone and tissue levels of monoamines in the hippocampus twenty hours or four weeks following treatment. While plasma corticosterone was unaltered by amphetamine treatment or withdrawal, there was a subregion-specific affect of amphetamine on monoamines. Norepinephrine and serotonin concentrations were selectively reduced in the dentate gyrus twenty hours post treatment. Anxiety-like behavior, as measured on the elevated plus maze, increased markedly in amphetamine treated rats both twenty hours and four weeks following treatment. These results suggest that amphetamine may reduce neurogenesis through alterations in monoaminergic

transmission and that reduced neurogenesis may sustain negative affect during withdrawal. Support: NIH P20 RR15567 & R01 DA019921.

4. CORTICOTROPIN-RELEASING FACTOR INTO THE DORSAL COLUMNS OF PERIAQUEDUCTAL GRAY EXERT DIFERENCIAL EFFECTS ON DEFENSIVE STARTLE BEHAVIOR Borelli, K. G.; Albrechet-Souza, L.; Brandao, M. L. Laboratorio de Neuropsicofarmacologia & Instituto de Neurociencias e Comportamento INeC, FFCLRP, University of Sao Paulo, Ribeirao Preto, SP, Brazil. Corticotropin-releasing factor (CRF) and its receptor subtypes have been implicated in the regulation of endocrine, behavioral and autonomic responses to stress. Ovine CRF (oCRF) is a nonspecific CRF receptor agonist that produces anxiogenic-like effects when injected locally into the dorsal aspects of the periaqueductal gray (PAG) in models of unconditioned fear. The involvement of the CRF mechanisms in the PAG columns in the conditioned fear, however, is still unclear. The purpose of the present study was to characterize the effects of oCRF (1 □g/0.2 □L) injections into the dorsomedial (dmPAG), dorsolateral (dlPAG) and lateral (lPAG) columns of the PAG using the fear-potentiated startle. Microinjections of oCRF intra-dmPAG and dlPAG of rats before test sessions of fear conditioning paradigm caused significant increase in fear-potentiated startle. In contrast, oCRF intra-lPAG did not affect this response. These data indicate that CRF mechanisms participate in the conditioned fear response elaborated in the dmPAG and dlPAG but did not produce effects intra-lPAG on startle reactivity. Thus, dmPAG and dlPAG could be involved in the anxiety-like response by means of the CRF system activation. Financial support: FAPESP.

5. SENSORIMOTOR GATING MEASURED BY PREPULSE INHIBITION IS ALTERED IN WISTAR AUDIOGENIC RATS (WAR). Salum, C.[1], Oliveira, J.A.C.[2,5], DelBel, E.A.[3,5], Brandão, M.L.[4,5], Garcia-Cairasco, N.[2,5] [1]Cognition and Complex Systems Unit, CMCC, Federal University of ABC, Santo André-SP, Brazil. [2]Neurophysiology and Experimental Neurothology Laboratory, FMRP. [3]MEF-Physiology Department, FORP. [4]Laboratory of Psychobiology, FFCLRP. [5]University of São Paulo, Ribeirão Preto-SP, Brazil. Prepulse inhibition (PPI), a reduction of amplitude startle reflex (ASR) when a startling pulse is preceded by a nonstartling prepulse, is defective in many mental disorders. Acute audiogenic seizure is a model of generalized tonic-clonic seizures induced by high intensity acoustic stimulation (AS) in genetically susceptible rodents, such as the Wistar audiogenic rats (WAR strain). In the present study we investigated the performance of WARs on the PPI. 14 Wistar male rats from the FMRP and 14 male rats from the WAR colony were used. PPI test: 60 presentations randomly divided in pulse, prepulse and prepulse-pulse. %PPI was the percentage decrease of ASR to prepulse-pulse related to ASR to pulse-alone. Rats were submitted to 3 PPI tests: naïve; acute (after 1 day of AS) and chronic (after 10 days of AS). WAR group was subdivided in recruited group (WRG, presented limbic seizures) and non-recruited group (WNRG). The control group was also subdivided in sensitive group (Wistar susceptible rats-WSR) and control (resistant group). Results revealed that %PPI of WRG was marginally smaller than WSR at naïve situation. After the acute stimulation, %PPI of WRG was significantly greater than WNRG. After chronic stimulation, %PPI of WRG was again marginally inferior to WSR. Data showed that WARs present deficits in sensorimotor gating which may be reduced by an acute stimulation. This suggests that WAR strain may be an important tool to for the study of sensorimotor gating deficits in epilepsy. Financial Support: FAPESP, FAPESP-Cinapce, CNPq, CAPES.

6. DO HUMANS INDUCE SIMILAR FEAR/ANXIETY REACTIONS, AND RESPONSE PATTER TO DIAZEPAM, IN MARMOSET MONKEYS AS NATURAL PREDADORS? Cagni, P.; Gonalves Jr., I.; Ziller, F.; Emile, N.; Barros, M. Primate Center and Dept. of Pharmaceutical Sciences, University of Braslia, DF 70910-900 Brazil. Predation has had a significant influence on primate behavioral ecology. Marmoset monkeys, particularly, demonstrate highly diverse and complex anti-predation strategies that persist even in captive and captive-born individuals. Thus, the behavioral response of marmoset monkeys in the Human Threat (HT) test of anxiety, and the effects of diazepam (DZP), were compared to those in the Predator Confrontation (PC) procedure. Subjects (n=10) were submitted to two habituation trials, followed by four random confrontation sessions for each stimulus tested (0, 0.10, 0.25 and 0.50 mg/kg). Each 15-min trial was divided into three consecutive 5-min intervals: pre-exposure, exposure (human observer and taxidermized oncilla cat) and post-exposure. Exposure to both stimuli-types increased direct gazes and alarm calls significantly, being dose-dependently reduced by DZP only in the PC test. In the HT protocol, the significant decrease in aerial scans was not detected with 0.10 mg/kg DZP. Locomotion, proximity, displacement activities and vigilance were not consistently influenced by the stimuli and/or DZP treatment. The differences observed are likely due to methodological variations with previous studies and/or distinct inherent nature of each stimulus. Whether this indicates a lack of concurrent validity between these two anxiety tests is still uncertain.

7. THE EFFECTS OF CORTAGINE ON STARTLE AND PPI IN CRF_1 AND CRF_2 KO MICE. Gresack, J.E.; Geyer, M.A.; Risbrough, V.B. Dept. Psychiatry, UCSD, La Jolla, CA 92093. Corticotropin-releasing factor, a neuropeptide released during stress, binds to CRF_1 and CRF_2 receptors in brain regions modulating anxiety-

like behaviors (e.g. startle, prepulse inhibition (PPI)). Although the relative contribution of CRF_1 and CRF_2 to central CRF activity is critical in responding to stress, the role of each receptor is unclear. One theory posits that CRF_2 activation plays a negative feedback role, reducing initial stress responses initiated by CRF_1 activation. Our preliminary observations support this theory - h/r CRF, a preferential CRF_1 agonist, has prolonged effects in CRF_2 null mutation (KO) mice; urocortin 2, a selective CRF_2 agonist, increases PPI in C57BL/6J and CRF_2 WT, but not CRF_2 KO. To further test the hypothesis that CRF_1 is involved in the initial response to stress and CRF_2 is involved in recovery of the CRF_1 response, we characterized the effects of cortagine, a selective CRF_1 peptide, in C57BL/6J, CRF_1 KO, and CRF_2 KO mice (n = 8-14/group). Consistent with previous reports using preferential CRF_1 agonists, we first found that cortagine dose-dependently increased startle and disrupted PPI in C57BL/6. Next, cortagine (0.2 nmol) increased startle and disrupted PPI in CRF_1 WT, but not KO, thus confirming the selectivity of cortagine for CRF_1 and the hypothesis that CRF_1 directly modulates anxiety-like responses and is involved in the initial response to stress. However, we also found that CRF_2 KO mice did not take longer to recover normal PPI and startle after cortagine infusion (0.2, 0.06 nmol). A role for CRF_2 in recovery from the effects of CRF_1 activation was thus not supported using this paradigm, although alternative explanations will be offered. Support: NIH MH074697

8. DOES COPING STRATEGY MODULATE THE EFFECTS OF CHRONIC UNPREDICTABLE STRESS ON HIPPOCAMPAL INTEGRITY? Hawley, D.F.; Leasure, J.L. Dept. of Psychology and Development Cognitive Neuroscience. The University of Houston, Houston, TX 77004 USA. Chronic stress is unavoidable and has negative effects on the brain, particularly in the hippocampus where stress decreases plasticity, contributing to learning and memory deficits and depression. Effective coping strategies are important for diminishing allostatic load during chronic stress and imperative for good health. Extending on prior research showing flexible coping rats resiliency to stress, the current study investigates which coping strategies can modulate the effects of chronic stress on hippocampal health. Thirty-two adult male rats coping strategies were classified as active, passive, or flexible in a Back Test before half were exposed to a two-week chronic unpredictable stress paradigm of ecologically relevant stressors. Bromodeoxyuridine (BrdU), an exogenous marker of cell proliferation, was quantified in the granule cell layer of the dentate gyrus (DG) in the hippocampus. Stressed animals had significantly fewer BrdU-positive cells ($p< 0.001$) than did control animals. Additionally, animals with flexible coping strategies tended to have increased amounts of BrdU-positive cells compared to the other coping strategies. We will also be examining the phenotypes of the BrdU+ cells in the DG. We are continuing our investigation on the effect of coping strategy by examining the role that neuropeptide Y (NPY), a peptide known for its anti-anxiety effects, has in resiliency to chronic stress in the hilar region of the hippocampus and in the basolateral nucleus (BLA) of the amygdala. We hypothesize that the flexible coping strategy will lead to enhanced neural resiliency against the effects of chronic stress.

9. CORTICOTROPIN-RELEASING FACTOR (CRF) TYPE 1 RECEPTORS IN THE BED NUCLEUS OF THE STRIA TERMINALIS MEDIATE LONG- (MINUTES) BUT NOT SHORT- (SECONDS) DURATION STARTLE INCREASES TO SHOCK-PREDICTING CUES. MILES, L. [1]; WALKER, D. [2]; DAVIS, M. [2] [1]Dept Pharmacol, [2]Psychiatry & Behavioral Sci., Emory Univ., Atlanta, GA. Oral administration of the CRF-R1 antagonist GSK008 disrupts sustained startle increases produced by intra-ventricular CRF infusions and those that occur when rats are tested in an illuminated environment (innate anxiety response), but not startle increases produced by short-duration (i.e., 3.7-sec) lights that predict shock. These and other results suggest a preferential role of CRF in sustained (vs. short) or innate (vs. conditioned) fear reactions or in fear reactions to vague (vs. imminent, well-defined) threats. To evaluate these three alternatives, the effects of orally administered GSK008 were evaluated using several different fear conditioning and fear potentiated startle (FPS) test procedures. Experiment 1, rats received variable-duration (3-sec to 8-min) 60-Hz clicker stimuli with co-terminating footshock and were later tested for FPS to 8-min clicker presentations (i.e. long, conditioned, unpredictable). Experiment 2, rats received 3.7-sec clicker stimuli and co-terminating footshock, and were later tested for FPS to 3.7-sec clicker presentations (i.e., short, conditioned, predictable). Experiment 3, rats were trained with variable duration clicker stimuli, but were tested with 3.7-sec clicker presentations (short, conditioned, unpredictable). FPS to 8-min (Exp. 1) but not 3.7-sec (Exp.s 2 and 3) CS presentations was blocked by GSK008. Together, these results indicate that CRF mediates long-duration fear responses irrespective of conditioning or predictability. Previous findings indicate a similar role for the bed nucleus of the stria terminalis (BNST) in mediating long-duration fear responses. To determine if the effects of oral GSK008 administration might have involved the BNST, we next compared the effect of intra-BNST GSK008 infusions on FPS to 3.7-sec vs. 8-min CS presentations. As with oral infusions, intra-BNST GSK008 blocked FPS to the 8-min but not 3.7-sec shock-associated CS.

10. STRAIN, SEX, AND BEHAVIORAL RESPONSE TO NOVELTY: FACTORS UNDERLYING THE GENETIC SUSCEPTIBILITY FOR HELPLESSNESS Eimeira Padilla, Douglas Barrett, Jason Shumake, F. Gonzalez-Lima University of Texas at Austin, Institute for Neuroscience and Department of Psychology, 1 University Station A8000, Austin, TX 78712-0187, USA Learned helplessness represents a failure to escape after exposure to

inescapable stress and may model human psychiatric disorders related to stress. Previous work has demonstrated individual differences in susceptibility to learned helplessness. In this study, we assessed different factors associated with this susceptibility, including strain, sex, and behavioral response to novelty. Testing of three rat strains (Holtzman, Long-Evans, and Sprague-Dawley) revealed that Holtzman rats were the most susceptible to helplessness. Holtzman rats not only had the highest escape latencies following inescapable shock, but also showed spontaneous escape deficits in the absence of prior shock when tested with a fixed-ratio 2 (FR2) running response. Moreover, when tested with fixed-ratio 1 (FR1) running an easy response normally unaffected by helplessness training in rats inescapable shock significantly increased the escape latencies of Holtzman rats. Within the Holtzman strain, we confirmed recent findings that females showed superior escape performance and therefore appeared more resistant to helplessness than males. Regression and covariance analyses suggest that this sex difference may be explained by more baseline ambulatory activity among females. In addition, some indices of novelty reactivity (greater exploration of novel vs. familiar open-field) predicted subsequent helpless behavior. In conclusion, Holtzman rats, and especially male Holtzman rats, have a strong predisposition to become immobile when stressed which interferes with their ability to learn active escape responses. The Holtzman strain therefore appears to be a commercially available model for studying susceptibility to helplessness in males, and novelty-seeking may be a marker of this susceptibility.

11. INCREASED SEROTONERGIC ACTIVITY IN THE DORSAL PERIAQUEDUCTAL GRAY DURING CONDITIONED FREEZING RESPONSE. Zanoveli, JM.; de Carvalho, MC., Cunha, JM.; Brandao, ML. FFCLRP/USP (University of Sao Paulo) - Laboratory of Psychobiology; Institute of Neuroscience & Behavior (INeC) - *Campus* USP/Ribeirao Preto. Previous studies indicate that an increase in the serotonin (5-HT) neurotransmission at the dorsal periaqueductal gray (dPAG) inhibits unconditioned fear responses organized in this same structure. However, little has been done to investigate the participation of 5-HT system of the dPAG in the mediation of conditioned fear responses. Thus, the present study measured the extracellular level of 5-HT and its metabolite 5-hydroxyindolacetic acid (5-HIAA) in the dPAG during unconditioned and conditioned fear states using *in vivo* microdialysis procedure. For the unconditioned fear test, animals were chemically stimulated in the dPAG with semicarbazide (SEM, 5 μg/0.2 μl), an inhibitor of the gamma aminobutyric acid-synthesizing enzyme glutamic acid decarboxylase. For the conditioned fear test, animals were subjected to a contextual conditioned fear paradigm using electrical footshock as the unconditioned stimulus. Our results show that 5-HT and 5-HIAA levels in the dPAG did not change during unconditioned fear, whereas 5-HT concentration, but not 5-HIAA concentration, increased in this same area during conditioned fear. The present study showed that the 5-HT activity of the dPAG was activated during conditioned fear, whereas it remained unchanged during unconditioned fear. These findings bring support to the suggestion that the increase of 5-HT in the dPAG during conditioned fear states may play a significant role on the inhibition of the unconditioned fear response organized in this structure. Supported by: FAPESP

12. DIAZEPAM EFFECTS ON ANXIETY-LIKE BEHAVIORAL RESPONSES TO RETRAINED STRESS IN NULLIAPROUS AND PRIMIPAROUS RATS Zimberknopf, E. 1; Garcia, C. 1; Felicio, L2. UNIFEOB1; University of Sao Paulo2, Brazil. Reproductive experience, i.e., pregnancy and lactation, can modify anxiety-like responses as well as diazepam effects. In addition, stress induces an anxiogenic effect in the plus-maze. Thus, this study aimed to evaluate possible influences of diazepam injection on anxiety-like responses in the plus-maze in nulliparous and primiparous rats during proestrous morning. Wistar female rats, monitored by daily vaginal lavage, (4 groups with n=7 each; nulliparous and primiparous injected with saline, and nulliparous and primiparous injected with diazepam) were submitted to restrained stress during 1 h and then treated with diazepam (2,0 mg/kg s.c.) or saline. Twenty minutes after injections, females were placed in the plus-maze (5 min). All females were retested 24 h after without any further stress or injections. No significant differences were found between groups after diazepam or saline injection. Nevertheless, it was observed that primiparous treated with diazepam tended (p=0,07) to explore more, suggesting an increased drug sensitivity on this induced stress condition. Also, after diazepam injection the day before, there was a significant reduced percentage of time spent in closed arms (F=3.21; p=0.04) and a tendency of increased percentage of time spent in open arms (p=0.053) during retest in primiparous compared to nulliparous, suggesting a more intense residual drug effect in primiparous. These preliminary results suggested that reproductive experience can induce an enhanced anxiolytic effect of diazepam on anxiety-like behavioral responses. Complementary studies should continue to explore dose effects and estrous cycle influence.

13. CANNABIDIOL IN RAT DORSAL PERIAQUEDUCTAL GRAY CAUSES BOTH ANXIOLYTIC- AND PANICOLYTIC-LIKE EFFECTS. 1De Paula Soares, V.; 2Campos, A.C.; 2De Bortoli, V.C.; 2Guimares, F.S.; 2Zangrossi Jr, H.; 1Zuardi, A.W. 1Department of Neuropsychiatry and Medical Psychology, Ribeiro Preto Medical School, University of So Paulo, Brazil; 2Department of Pharmacology, Ribeiro Preto Medical School, University of So Paulo, Brazil. The dorsal periaqueductal gray (DPAG) is a midbrain area extensively associated with anxiety and

panic-related responses. Electrical stimulation of DPAG generates escape response in rats and panic-like response in humans. Thus, escape response has been related to panic attacks. Intra-DPAG microinjection of Cannabidiol (CBD), a nonpsychotomimetic constituent of Cannabis, induces anxiolytic-like effects in Vogel conflict test and elevated plus maze, both animal models employed to screening generalized anxiety disorder-related drugs. However, the effects of CBD on panic-associated responses are unknown. In the present study we investigated the effects of intra-DPAG injection of CBD on escape response of rats submitted to the electrical stimulation of DPAG and the Elevated T maze (ETM). Besides escape, the ETM also measures inhibitory avoidance, a behavior associated with generalized anxiety disorder. The results show that CBD microinjected into the DPAG promotes a panicolytic-like effect, by both increasing the electrical current applied to DPAG necessary to produce escape behavior and inhibiting escape response in the ETM. Also, CBD impaired the inhibitory avoidance acquisition, an anxiolytic-like effect. In conclusion, our results show that CBD affects, besides generalized anxiety disorder-related behaviors, escape response, which has been associated with panic disorder.

14. NOVEL ELECTROPHYSIOLOGICAL AND NEUROCHEMICAL PROPERTIES OF STRESS-RELATED NON-SEROTONERGIC CELLS IN THE CAUDAL DORSAL RAPHE NUCLEUS. Vasudeva, R.K.; Waterhouse, B.D. Dept. of Neurobiology & Anatomy, Drexel University College of Medicine, Philadelphia PA 19129 USA. Serotonin (5HT) plays a major role in CNS stress circuitry, and therapeutics that act on this system have been effective in treating anxiety. The dorsal raphe nucleus (DRN) is one of the main 5HT projections to the forebrain and is linked to the stress circuit. It can be divided into subregions and has a distinct neurochemical topography. About 50% of the cells in the DRN contain 5HT; other transmitters present include gamma aminobutyric acid (GABA), dopamine, and nitric oxide. Prior research has linked neurons in the DRN expressing nitric oxide synthase (NOS) in the stress response, particularly those in the caudal lateral wing (cLW) subregion, where 5HT is absent. This study investigates the physiology of NOS cells in the anesthetized animal, their response to 5HT1A agonist, and potential co-localization with GABA decarboxylase (GAD) or vesicular acetylcholine transporter (VAChT). Due to the absence of 5HT, we predict that cells in the cLW have different electrophysiological properties compared to the 5HT-rich, NOS-deficient, rostral LW (rLW). Additionally, it is unlikely cLW neurons co-localize GABA based on established characteristics of GABAergic neurons. The possibility exists that cLW cells co-localize VAChT due to the proximity of ACh neurons in the adjacent laterodorsal tegmental area. We found baseline electrophysiological data collected from the rLW to be consistent with established values for 5HT neurons, while baseline cLW data indicates cells in this subregion are different from 5HT cells. Comparison of firing regularity shows that cLW cells are significantly more bursty than the regular firing rLW cells. Systemic administration of 5HT1A agonist suggests that NOS neurons in the cLW, which express the 5HT1A receptor, are less sensitive to the drug than 5HT neurons in the rLW. Lastly, NOS neurons in the LW, but not the midline, colocalize VAChT. These data suggest that these cells are modulated by seroton5HT but are electrophysiologically and neurochemically different than 5HT neurons in the rLW. Further investigation regarding the projections of the cLW and the behavior of these cells in the waking animal will further delineate their role in the stress response and their relationship with 5HT neurons in the DRN.

15. EFFECT OF HIGH MATERNAL CORTICOSTERONE LEVELS AND ENRICHED ENVIRONMENT ON THE BEHAVIOURAL OUTCOME OF THE MALE AND FEMALE OFFSPRING. Brummelte, S. and Galea, L.A.M. Department of Psychology and Brain Research Center, University of British Columbia, Vancouver, BC, Canada. Early developmental influences such as maternal stress during the postpartum period or environmental challenges have been shown to influence the development of the offspring. Stress and prolonged elevated levels of corticosterone (CORT) in rats and hypercortisolism in humans are associated with depression. We have previously created an animal model of post partum stress/depression based on high levels of CORT during the postpartum period (40mg/kg). Male offspring of CORT treated dams showed a suppression in cell proliferation in the dentate gyrus and various behavioural changes in adulthood while females seemed to be less affected. The present study was conducted to investigate the potential of an enriched environment to positively influence the impact of the early adverse conditions in our postpartum model (i.e. increased maternal CORT levels (daily 40mg/kg s.c.) and reduced maternal care). We observed maternal care, mood and weight and then studied the behavioural outcome of the offspring in young adulthood. Consistent with previous results, prolonged exposure to high CORT levels decreased body weight, reduced maternal care and increased depressive-like behaviour in the forced swim test in the dams. After weaning, rats were either individually housed (impoverished) or pair-housed with enrichment objects (enriched). Young adult male and female rats were then tested in several behavioural test (e.g. open field test). Preliminary results show higher resistance and longer times to capture for CORT offspring in a resistance to capture test. Further, CORT offspring travelled less distance overall in the open field, while enriched offspring spend more time in center of open field and showed less depressive-like behaviour in the forced swim test compared to impoverished controls. However, contrary to our hypothesis enrichment did not influence the behaviour of CORT-

treated offspring. Thus, our data suggest that early influences such as the maternal hormonal state can influence the behavior of male and female offspring, which can not be easily compensated by an enriched environment.

16. THE RELATIVE CONTRIBUTIONS OF NOREPINEPHRINE AND SEROTONIN TO NOCICEPTIVE RESPONSES. Hall, F.S.[1]; Schwarzbaum, J.M. [1]; Perona, M.T.G. [1]; Lesch, K.P. [2]; Murphy, D.L. [3]; Caron, M. [4]; Uhl, G.R. [1] [1]Molec. Neurobiol. Branch, NIDA-IRP/NIH/DHHS, Baltimore, MD; [2]Dept. Psychiatry, Univ. Wurzburg, Germany; [3]Lab. Clin. Sci., NIMH-IRP/NIH/DHHS, Bethesda, MD; [4]Depts. Cell Biol. and Med., Duke Univ., Durham NC. Tricylclic antidepressant drugs display varying potencies for blockade of norepinephrine (NET/SLC6A1) and serotonin (SERT/SLC6A4) transporters. A previous study of amitriptyline analgesia in NET and SERT knockout (KO) mice found that NET KO mice were hypoalgesic, but this study was able to assess the full measure magnitude of these effects. Therefore an another series of experiments specifically examined baseline pain sensitivity in these mice: NET and SERT KO mice were assessed for nociception in the hot plate (HP) and tail flick (TF) tests, and for visceral nociception in the acetic acid writhing test (AAW). The HP and TF tests assessed increasing temperatures: HP 47 to 54, and TF 45 to 52. In the AAW, mice were injected with 10 □L/g 0.7% acetic acid and the number of writhes was counted for 20 minutes. NET -/- mice exhibited profound hypoalgesia in both tests of thermal nociception, and also profoundly attenuated AAW. By contrast SERT -/- mice exhibited a slight hypoalgesia in the HP test and no differences in pain sensitivity in the TF test or the AAW. Because neurodevelopmental consequences of the knockouts may have contributed to these effects, the analgesic effects of fluoxetine and nisoxetine were also examined in WT mice. Nisoxetine produced analgesic responses in both the TF and HP tests, while fluoxetine was without effect. Contrary to much previous thinking about the relative roles of serotonin and norepinephrine in nociception, these data document far greater effects of both pharmacologic and genetic manipulations of NET compared to SERT. (Support: NIDA-IRP/NIH/DHHS)

17. REGULATION OF SEROTONIN TRANSPORTER EXPRESSION BY MICRORN As. Moya P.R.; Wendland J.R.; Laporte J.; Murphy D.L. Alterations in serotonin transporter (SERT) expression have been shown to have a role in psychiatric diseases including anxiety and depressive disorders as well as autism and other developmental spectrum disorders. Most prior research has focused on polymorphisms in the promoter and coding regions of this gene, while investigations of the 3-untranslated regulatory region including its messenger RNA is scant. This information gap is critical since the recent discovery of the role of microRNA (miRNAs), a family of Pol II-transcribed small non-coding RNAs in the regulation of gene expression is being increasingly recognized. Using bioinformatics tools, we found a cluster of predicted miRNA binding sites in the 3untranslated region (UTR) of the human SERT mRNA. Cloning of the 696 bp SERT 3UTR into a reporter vector markedly reduced its expression compared in serotonergic RN46A and JAR cell lines. miRNA precursors miR-15a and miR16 further decreased gene expression. No effect was found when pre-miRNAs negative controls were transfected. Transfection of the corresponding anti-miRNA rescued the expression of reporter vector to levels comparable to control. Similar results were obtained when cloning a small, 75 bp region spanning the predicted miRNA binding site; the same region cloned in opposite direction abolished the repression, thus validating the role of this region as a miRNA binding site. Endogenous SERT expression was also found to be modulated by lentiviral-mediated miRNA over expression, as found in RN46A cells. We are currently performing stereotaxical injections of lentivirus to overexpress miRNAs in vivo, and evaluate the putative effects in the tail suspension test and forced swim test. These results are evidence of a novel regulatory layer of SERT gene expression and its effect in behavior.

18. GROUP I METABOTROPIC GLUTAMATE RECEPTORS ARE INVOLVED IN FEMALE GENERALIZED ANXIETY WITHOUT AFFECTING THE ACQUISITION OF EMOTIONAL MEMORY. De Jesús-Burgos MI and Pérez-Acevedo NL. School of Medicine, Medical Sciences Campus Department of Anatomy and Neurobiology, San Juan, Puerto Rico 00936. Anxiety disorders are more prevalent in females than males. Interestingly, experiments have been focused in males, disregarding the implications that estrogens might produce in neural circuitries of anxiety. Metabotropic glutamate receptors (mGluRs) have been suggested as new targets to treat anxiety. We studied the role of group I mGluRs (mGluR1α & mGluR5) within the basolateral amygdala (BLA) in generalized anxiety and in the acquisition of emotional memory in female rats. We used ovariectomized female rats without (OVX) and with estrogen (OVX-EB) implants. Control animals (0.9% saline), S-3,5-Dihydroxyphenylglycine (DHPG, a group I mGluRs agonist, 1μM) and 7-(Hydroxyimino)cyclopropa[b]chromen-1a-carboxylate ethyl ester (CPCCOEt, mGluR1 antagonist, 10nM) were infused into the BLA. We analyzed generalized anxiety using the elevated plus maze (EPM) and the acquisition of emotional memory with the inhibitory avoidance task (IAT). DHPG increased the percent open time in OVX-EB but not OVX female rats ($p=0.003$). This effect was blocked by co-administration of DHPG with CPCCOEt in OVX-EB female rats. Infusion of CPCCOEt increased the percent open time and entries ($p=0.001$ & $p=0.007$, respectively). DHPG and/or CPCCOEt did not modulate exploratory-like behaviors such as rearing ($p>0.05$) and sniffing ($p>0.05$) during the EPM. In the IAT, DHPG and/or CPCCOEt did not affect the acquisition of an emotional memory. Taken together,

DHPG exerts an anxiolytic-like effect only in estrogen-treated rats. We suggest that in the BLA mGlu1α and estrogen receptors interact to reduce anxiety in female rats. Acknowledgement: This project was partially supported by RCMI (G12RR03051) and MBRS-RISE Program (R25-GM061838).

19. ANXIOGENIC-LIKE EFFECT AFTER ACUTE EXPOSURE OF THE SYNTHETIC ANDROGEN 17-αMETHYLTESTOSTERONE IN JUVENILE MALE RATS. 1Pérez-Acevedo NL, 2Rodríguez GL, and 2Oyola-Ortiz M. 1 Dept of Anatomy & Neurobiology, Medical Sciences Campus, and Dept of General Sciences, UPR-Ro Piedras Campus, San Juan, PR. The emotional effects of anabolic androgenic steroids (AAS) are still unknown. In humans, chronic exposure of AAS has been linked to increased aggressiveness, depressive episodes and anxiety. We aimed to evaluate the influence of acute exposure of 17α-methyltestosterone (17α-met) on anxiety levels during puberty. We examined the behavioral response after 30 minutes of systemic injection (i.p.) of either the vehicle or 17α-meT (1.0 and 10mg/kg). We analyzed generalized and conflict-based anxiety using the Elevated Plus Maze (EPM) and the Vogel Conflict Test (VCT), respectively. Emotional memory was assessed by performing the Inhibitory Avoidance Task (IAT). We also analyzed behavioral postures such as exploratory, non-emotional and Risk Assessment Behaviors (RABs) during the EPM. In the EPM, acute exposure of 17α-meT (1mg/kg) reduced the percent open arm entries ($p=0.014$) and time ($p=0.078$). In the VCT, 17α-meT reduced the licking behavior at 1.0 ($p=0.032$) but not 10mg//kg ($p=0.902$). 17α-meT (1 mg/kg) increased the number of stretched attended posture (SAP) when analyzed the RABs ($p=0.003$). At a high dose, 17α-meT did not produce any changes during the EPM ($p>0.05$) but reduced the SAP ($p=0.003$). In the IAT, 17α-meT did not alter the acquisition, consolidation or retention phase ($p>0.05$). Thus, in juvenile male rats, acute exposure of 17α-meT (1mg/kg) produces an anxiogenic-like effect, while higher doses (10mg/kg) alter RABs and exploratory behavior. Emotional memory is not affected by 17α-meT. We suggest that acute exposure to AAS during puberty may alter the developmental processes that regulate anxiety during adulthood. Supported by MBRS-RISE (RISE GM61838), RCMI Program (G12RR03051), and NIH-MRISP (MH048190).

20. AFFECTIVE STRESS IN DIFFERENT PERIODS OF BRAIN DEVELOPMENT INDUCES DISTINCT PATTERNS OF EXPLORATION OF A NEW OBJECT. Limonte, F.H.; Pereira, M.T.R.; Sinhorini, E.R.A.; Tonso, V.M.; Iyomasa, M.M.; Rosa, M.L.N.M. Faculty of Medicine-FIPA. Catanduva-SP, Brazil. Aim: To evaluate if chronic isolation in different periods of brain development affects the recognition memory and the exploration of a new object. Isolation rearing: Pups (n=12) remained with their mothers (6/mother) until weaning (PND21) when were allocated to: 1) grouped, housed 4/cage; 2) isolated, housed individually. Social isolation: Rats (140g; n=12) were allocated in the same conditions. Behavioral tests began after ten weeks. Maternal separation: Pups were either separated from their mothers for 180min (MS180) or left undisturbed (n=11) from PND1-21 when were housed 4/cage for 5 weeks before testing. On the first day rats were submitted to a habituation session (5min). After 24h rats were given 5-min training trial exposed to two identical objects (A1/A2). On the short-term memory (STM), 90 min after training, rats were allowed to explore a familiar object (A) and a different one (B). On the long-term memory (LTM), 24h after training, the object A and a third different one (C) were used. Exploration: Time exploring both objects. Recognition index: TB/(TA+TB) or TC/(TA+TC). Student t-tests ($p<0.05$). No change in the index of recognition was induced by any condition of isolation in the sessions. However, isolation from weaning induced a significant decrease (64%, $p=0.001$) in the total exploration of the objects on LTM while maternal separation induced a significant increase (33%, $p=0.01$). Isolation of adult rats induced no alterations in this behavior. Isolation reared rats do not remain motivated in the exploration of objects, according to emotional features of schizophrenia. In contrast, the neuronal plasticity seems to reverse the possible effects of the maternal separation in this behavior. FAPESP and FPA.

21. EFFECTS OF PRENATAL INFECTION ON LEARNING AND BEHAVIORAL FLEXIBILITY IN THE JUVENILE RAT. Burt, M.A.[1]; Luheshi, G.N [2]; Boksa, P. [2] 1.Department of Neurology and Neurosurgery 2.Department of Psychiatry, McGill University, Douglas Mental Health University Institute, Montreal, Quebec, Canada. Prenatal infection has been identified as a risk factor for neurodevelopmental disorders such as schizophrenia and autism. Identifying the effects of prenatal infection on neurodevelopment is essential for understanding the influence it may have in the etiology of such disorders. To investigate this risk factor, an animal model has been developed using the bacterial endotoxin, lipopolysaccaride (LPS), during prenatal development. Schizophrenia-relevant alterations in behavior and brain function have been described in this and similar models. Within the schizophrenia population, alterations in behavioral flexibility are commonly reported and are often present prior to onset of the disorder. The neural processes mediating behavioral flexibility are undergoing maturation during early adolescence. Therefore, juvenile development is of particular interest for investigation. We hypothesized that maternal infection would alter reversal learning, a correlate of behavioral flexibility, in juvenile offspring. Using Sprague-Dawley rats we examined the effects of administration of 100 g/kg of LPS or saline control on both gestational days 15 and 16 on reversal learning in both the Morris Water Maze (MWM) and wet T-

maze in juvenile offspring, starting on postnatal days 25 and 32 respectively. Our results indicate that the prenatal LPS offspring had significantly enhanced reversal learning in the MWM, as juveniles, represented by a decreased latency to find the hidden platform during the reversal trials. This improvement was restricted to reversal learning, as no differences were found during acquisition. These results are similar to previous findings in another model of prenatal infection, looking at adult offspring. In the wet T-maze we found no differences in discrimination or reversal learning. However, there was a trend towards significance with the prenatal LPS offspring requiring fewer trials to reach criterion during acquisition. The results of this study indicate prenatal infection leads to augmented behavioral switching in a spatial task in juvenile offspring, demonstrating an alteration in the normal development of behavioral flexibility. Supported by the Canadian Institutes of Health Research.

Maturation and Adolescence

22. FUNCTIONAL ALTERATIONS IN THE $5HT_{1A}$ RECEPTOR FOLLOWING NEONATAL +/-3,4-METHYLENEDIOXYMETHAMPHETAMINE (MDMA) EXPOSURE IN RATS. Amanda A. Braun, Tori L. Schaefer, Charles V. Vorhees, and Michael T. Williams. Cincinnati Childrens Res. Fnd., Div. of Neurology, University Cincinnati College of Medicine, Cincinnati OH 45229 Exposure to MDMA from postnatal day (P)11-20 results in increased agonist stimulated [^{35}S]GTPγS binding using either 5HT or the $5HT_{1A/7}$ agonist 8-hydroxy-2-(di-n-propylamino)tertraline (8-OH-DPAT) when the animals were adults (Crawford et al. 2006). In order to test the functional significance of this effect, male rats were treated with MDMA (4 x 10 mg/kg/day at 2 h intervals on P11-20) or saline (SAL) and assessed for changes in temperature and acoustic startle following 8-OH-DPAT challenge (0.5 mg/kg), a known effector of body temperature and startle (Sheets et al. 1989), at 4 different ages (P23, 30, 45, or 60). Body temperatures were recorded by remote telemetry for 30 min after 8-OH-DPAT challenge and acoustic startle was assessed 15 min post-challenge. At P45, 8-OH-DPAT reduced body temperature and increased acoustic startle responses; however MDMA exposure did not differentially affect startle or body temperature. At P60, 8-OH-DPAT reduced body temperature as before, but at this age MDMA-treated rats showed a trend (treatment x challenge interaction, $p<0.10$) toward acoustic startle hyperreactivity compared to SAL controls. In addition 8-OH-DPAT augmented startle (main effect of challenge) compared to SAL challenged groups (which showed no differential startle response as a function of early MDMA vs. SAL treatment). The P23 and P30 groups are currently being tested and additional animals are being added to the P45 and P60. The data suggest that early MDMA may induce long-term changes in $5HT_{1A}$ functionality.

23. PRE-OBESE BEHAVIORAL AND NEUROBIOLOGICAL PHENOTYPE IN THE OLETF RATS DURING THE SUCKLING PERIOD. Schroeder, M.1,3; Blumberg, S.2; Bi, S.4; Moran, T.H.4; Smith,G.P.5 and Weller, A.2,3. 1Faculty of Life Sci, 2Psychology Dep and 3Gonda Brain Res Center, Bar Ilan Univ, Israel. 4 Johns Hopkins Univ Medical School, USA. 5 Weill Medical College, Cornell Univ.The OLETF rat model of obesity has a spontaneous genetic mutation leading to lack of CCK1 receptors. Adult OLETF rats are obese, hyperleptinergic, hyperphagic and males also develop diabetes. We invested much effort into understanding the early stages of obesity development in this strain, in order to identify abnormal characteristics that can predict future obesity and its complications. Young OLETF rats present exaggerated eating patterns (compared to LETO controls) in independent ingestion and nursing tests, more white fat, larger adipocytes and a leptin surge on postnatal day (PND) 7 and this profile persists until weaning. Examination of the orexigenic neuropeptide NPY revealed an early up-regulation in the dorsomedial hypothalamus of young OLETF pups, and this was accompanied by up-regulation of the anorexigenic neuropeptide POMC in the arcuate nucleus. In order to investigate the pups' capacity to respond to dietary fat, they received preloads of corn oil or mineral oil on postnatal day 18. In half of the animals, c-fos immunoreactivity was examined in several areas of the brainstem and hypothalamus in response to the preloads. The other half underwent an independent ingestion test after the preloads and voluntary intake was examined. OLETF pups presented a significantly decreased response to dietary fat in the medial, caudal and intermediate nucleus of the solitary tract, and in the hypothalamic arcuate nucleus. They also failed to eat less after corn vs. mineral oil preloads, a nutritive effect found in the LETO controls. Altogether, the results expose an explicit pre-obese phenotype in the OLETF pups during the suckling period that precedes the actual outburst of overweight and obesity. Early identification of pre-obese signs may allow for early interventions that could successfully improve long term obesity and moderate its health-threatening complications.

24. DIFFERENTIAL MODULATION OF INHIBITORY AVOIDANCE LEARNING AND ENERGY METABOLISM IN GONADALLY-INTACT AND OVX PUBERTAL FEMALE RATS AFTER EXPOSURE TO ANABOLIC STEROIDS. [1]Ramos-Pratts, K.M.; [2]Villafañe, B.; [1]Barreto-Estrada, J.L. [1]Department of Anatomy and Neurobiology, Medical Sciences Campus, [2]Department of Biology, Ro Piedras Campus, University of Puerto Rico, San Juan, P.R. 00936. The amygdala (AMY) is a set of subnuclei, with unique inputs and outputs among each other and with other brain regions. During development of anxiety, signals to the AMY caused it to consolidate memories

of an anxious or emotional event. In addition, the AMY expresses steroid receptors, making it very susceptible to changes in hormonal levels. It is known that high testosterone doses cause negative changes in mood and cognitive impairments. Exposure to anabolic androgenic steroids (AAS) causes modulation of behavior possibly acting through androgen receptors in the amygdala. Puberty is an important period of susceptible hormonal changes, and abuse of anabolic steroids may disrupt behavioral patterns. According to NIDA, there is an increase of adolescent girls abusing AAS. Unfortunately, there is little information on the behavioral consequences of AAS abuse during puberty. We aimed to assess modulation of anxiety-like behavior and emotional memory after exposure to 17α-methyltestosterone in female pubertal rats. Food intake and body weight were also measured during AAS exposure. AAS-treated females showed a significant increase in body weight and food intake. For generalized anxiety and emotional memory, we used the Elevated Plus Maze and the Inhibitory Avoidance Task, respectively. Anxiety was not altered, but there was a significant impairment of inhibitory avoidance learning in AAS-treated females. In ovariectomized rats, no differences were found in the same parameters. Our results show that chronic exposure to AAS modulates passive avoidance learning and energy metabolism during puberty in the females. NCRR-NIH (P20RR016470), RCMI (G12RR030551).

25. DIFFERENTIAL MODULATION OF EMOTIONAL MEMORY AND ENERGY METABOLISM IN GONADALLY-INTACT AND OVARIECTOMIZED PUBERTAL FEMALE RATS AFTER CHRONIC EXPOSURE TO ANABOLIC STEROIDS. [1]Ramos-Pratts, K.M.; [2]Villafañe, B.; [1]Pérez-Acevedo,N.L.; N.L.; [1]Barreto-Estrada, J.L. [1]Department of Anatomy and Neurobiology, Medical Sciences Campus, [2]Department of Biology, Ro Piedras Campus, University of Puerto Rico, San Juan, P.R. 00936. Puberty is an important period of susceptible hormonal changes, and abuse of anabolic androgenic steroids (AAS) may disrupt behavioral patterns. According to NIDA, there is an increase of adolescent girls abusing AAS. Unfortunately, there is little information on the behavioral consequences of AAS abuse during puberty. High doses of synthetic androgens produce negative changes in mood, and cognitive impairments. We aimed to assess modulation of anxiety-like behavior and emotional memory after chronic exposure to 17α-methyltestosterone (17α-meT) in female pubertal rats. We compared the effect of 17α-meT in gonadally-intact and ovariectomized (OVX) female rats during puberty. For generalized anxiety and emotional memory, we used the Elevated Plus Maze and the Inhibitory Avoidance Task, respectively. Food intake and body weight were also measured after two weeks of AAS exposure. In gonadally-intact female rats, 17α-meT did not alter generalized anxiety, but impaired emotional memory. It also increased the body weight and the food intake. However, no differences were found by chronic exposure of 17α-meT in OVX female rats in the same parameters. Our results show that chronic exposure to AAS modulates emotional memory and energy metabolism during puberty in gonadally-intact female rats. Our findings suggest that AAS might alter emotional memory through androgen receptors in the amygdala. Supported by NCRR-NIH (P20RR016470), RCMI (G12RR030551).

26. EXAMINING CRITICAL PERIODS OF NEONATAL 3,4-()-METHYLENEDIOXYMETHAMPHETAMINE (MDMA) ADMINISTRATION ON BEHAVIOR. Skelton, M.; Vorhees, C.; Graham, D.; Schaefer, T.; Grace, C.; Braun, A.; Williams, M. Cincinnati Childrens Research Foundation, Div. of Neurology, Dept. of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH 45229 Previous results with neonatal MDMA treatment suggested that effects were age-dependent, with spatial and path integration learning deficits after treatment from P11-20 but not from P1-10. However, when shorter treatment intervals were used (P1-5, 6-10, 11-15, 16-20), all regimens resulted in hypoactivity and deficits in spatial, but not path integration, learning. It is not clear whether this discrepancy is attributable to treatment duration and/or treatment initiation age. Accordingly, separate litters were treated on P1-10, 6-15, or 11-20. Two male/female pairs/litter received 4 daily injections of 0, 10, or 15 mg/kg MDMA. In each litter one pair underwent startle, straight swim, Cincinnati water maze (CWM), and latent inhibition, while the other underwent locomotor activity, straight swim, and Morris water maze testing. MDMA impaired CWM and MWM (acquisition), but the effects after P1-10 exposure were smaller compared to those of other exposure ages. Treatment effects were also demonstrated on locomotor activity and startle. The most substantial activity reductions were evident after P6-15 while the largest startle increases were evident after P1-10 treatment. Swim speed was unaffected. Analyses of the remaining MWM trials and latent inhibition are ongoing. The results suggest no single critical period for MDMA effects but rather a series of overlapping vulnerable periods related to regional differences in CNS developmental processes. (Supported by DA021394.)

27. STRESS MODULATION OF NICOTINE REWARD IN ADOLESCENT RATS. Brielmaier, J.M., McDonald, C.G., Smith, R.F. Psychology Dept. George Mason University, Fairfax, VA 22030 USA. Nicotine potently activates brain systems also responsive to stressors. However, it is not known how stress affects nicotines rewarding properties. Given that adolescents are uniquely vulnerable to nicotine and stress, we investigated the effects of stress given immediately (Experiment 1) or 24 hours (Experiment 2) before single-trial nicotine place conditioning in adolescent (P28-31) male rats. After a pretest to determine initial side preference, animals were assigned to one of

four groups: 1) nicotine-stress, 2) nicotine-no stress, 3) saline-stress, 4) saline-no stress. Stressed animals were subjected to 10 minutes of intermittent footshock stress (IFS) (0.8 mA, 1 s, mean intershock interval 36.5 s, range 10-70 s off). Nicotine (0.4 mg/kg, s.c.) and saline injections were paired with distinct sides over alternating days. For Experiment 1, conditioning order (i.e. saline or nicotine first) was counterbalanced within groups 1) and 2). For Experiment 2, groups 1) and 2) received nicotine first. For Experiment 1 (stress just before conditioning) IFS had opposite effects depending on conditioning order. In animals receiving saline first, IFS enhanced nicotine CPP relative to non-stressed animals. Conversely, in animals receiving nicotine first, IFS attenuated CPP relative to non-stressed animals. For Experiment 2 (stress 24 hours before conditioning), IFS produced a near-significant (< .06) enhancement of CPP relative to non-stressed animals. This is the first demonstration that stress can enhance nicotine reward in adolescence, and that the stressors effect may be lasting. The results also suggest a complex relationship between stress and nicotine reward, with conditioning order being an important determinant of the stressors effects in Experiment 1. The importance of conditioning order is currently being investigated for Experiment 2. Additional nicotine doses are also being tested.

28. EFFECTS OF EARLY OR LATE ADOLESCENT EXPOSURE TO NICOTINE ON BEHAVIOR IN AN APPETITIVE CONDITIONED PLACE PREFERENCE PARADIGM. McMillen, B. A.; Andersen, H. K.; Williams, H. L. Dept. of Pharmacology & Toxicology, Brody Sch. of Medicine at East Carolina University, Greenville, NC 27858 USA. Periadolescence, the period that brackets the onset of puberty, is considered a developmentally vulnerable period. Injections of 0.4 mg/kg nicotine (NIC) from postnatal day (P) 35-44, but not P 60-69, results in increased responsiveness at P 80 to nicotine, cocaine or diazepam. A behavioral model used to test for drug reward was the drug-conditioned place preference (CPP). In order to determine if NIC had improved learning rather than increased drug reward, a sucrose solution was used as the conditioning stimulus. Male Sprague-Dawley rats received 10 once daily injections of 0.4 mg/kg i.p. NIC (as the base) or vehicle either early or late in adolescence. At P 80 the 13-day CPP experiment began: 1 night with access to a drinking tube of 2.5% sucrose in water, 3-days of free exploration, 4 days with confinement to the least preferred side with sucrose alternated with 4 days in the preferred side with water, and finally another 15 min free exploration. The increased time spent in the least preferred side for P 35-44 treatment was 183 62 sec for vehicle exposed and 115 49 sec for NIC exposed rats. For the P 60-69 treatment, the increases were 113 41 sec and 86 28 sec, ($F_{3,36} = 0.801$, $p > 0.50$, NS). All of the rats exhibited increased movement in the apparatus after conditioning. Age at time of treatment did not affect the response. This result indicates that NIC exposure did not alter responses in a classical conditioning paradigm when an appetitive reward was the conditioning stimulus and suggests that learning was not altered. In harmony with this observation, we have found that adolescent exposure to nicotine did not alter behaviors in a spatial water-maze task. Thus, the altered responses to drugs of abuse must reflect a heterologous sensitization induced by NIC in pathways modified by these drugs.

29. BEHAVIOURAL AND NEUROCHEMICAL EFFECTS OF AMPHETAMINE AND STRESS IN PERIADOLESCENT HIGH- AND LOW-LG OFFSPRING. Pomarenski, A. J.; Moquin, L.; Sharma, S.; Meaney, M. J.; Gratton, A. Douglas Mental Health University Institute, McGill University, Montreal, QC, Canada. Adolescence is a period when individuals are likely to experiment with drugs of abuse. However, not all individuals who experiment with drugs become addicted. The main neural network that mediates drug-associated reward is the mesocorticolimbic dopamine (DA) system. Maternal care during early life can impact the developmental trajectory of the DA system. In addition to altered DA activity, adult offspring of High- and Low-licking/ grooming (LG) dams exhibit increased neuroendocrine stress reactivity. We found previously that Low-LG periadolescents exhibit increased locomotion following an acute AMPH injection, but only when pre-exposed to a stressor. We are now attempting to elucidate mechanisms responsible for this difference. As cross-sensitization occurs between stress and drugs, drug-reactivity during adolescence may be affected by altered development of these two systems. Therefore, we investigated whether pre-existing differences in mesocorticolimbic DA and neuroendocrine stress systems exist between High- and Low-LG offspring. In the first experiment, 35-day old High- and Low-LG rats were sacrificed at designated time-points following 20 min restraint stress. Plasma CORT and ACTH were analyzed by radioimmunoassay and stress-induced DA release was analyzed using HPLC. In the second experiment, autoradiography was conducted to quantify DA receptor and transporter levels in DAergic terminal regions of nave adult and periadolescent High- and Low-LG offspring. Results show that Low-LG animals had higher basal CORT levels than High-LG offspring, but maternal care did not affect stress-induced DA release. Autoradiographic analyses revealed increased D1 binding in periadolescent Low-LG compared to High-LG offspring. Taken together, these results suggest that underlying differences in DA and stress systems may interact to modulate the behavioural differences to AMPH seen between High- and Low-LG periadolescent rats.

30. NEUROPROTECTANT PROPERTIES OF NEUROSTEROIDS FOLLOWING NEONATAL ETHANOL EXPOSURE. Yates, C. L.; Kelly, S. J. Dept. of Psychology, University of South Carolina, Columbia, SC, 29208

USA. The Surgeon General has warned against the dangers of drinking while pregnant for over 25 years, yet Fetal Alcohol Spectrum Disorders remain the leading known cause of mental retardation in the U.S. Despite numerous studies examining alcohols effect on the brain, the mechanism of ethanol-induced damage to the CNS is poorly understood. Recent studies have suggested a dysregulation of cholesterol homeostasis may mediate developmental ethanol-induced damage to the CNS through the action of neurosteroids, specifically a rise in pregnenolone-sulfate (preg-S). This study attempted to counteract the increase in preg-S by administering allopregnanolone (allo) or progesterone (prog), two neurosteroids with opposite effects of preg-s and important to the migration and myelination of developing neurons. Six experimental groups were used in this study: ethanol (ET)-prog, ET-allo, ET-placebo, intubated control (IC)-prog, IC-allo, IC-placebo. Neurosteroids were administered in a subcutaneous pellet implanted in the scruff of the neck on postnatal day (PD) 6. ET administration occurred on PD 7-9. On PD 10, brains were removed and Golgi stained. One pyramidal neuron, from the medial prefrontal cortex was studied per animal, using Neurolucida (MicroBrightField, Inc.). Ethanol exposure decreased spine density in male animals. The data suggest that neurosteroid treatment has opposite effects on male ET and IC animals apical and basilar spine density, such that neurosteroids increased spine density in ET animals, and decreased spine density in IC animals. Supported by NIAAA 11566 to S.J.K.

31. THE ANABOLIC STEROID 17α-METHYLTESTOSTERONE INCREASES NPY LEVELS IN THE VMN BUT DECREASES NPYY2 and NPYY5 RECEPTORS OF PUBERTAL MALE RATS. [1]Santiago-Gascot, M.E., [2]Roig-López, J.L., [1]Barreto-Estrada, J.L. [1]Department of Anatomy and Neurobiology, Medical Sciences Campus, University of Puerto Rico, San Juan, P.R. 00936, [2]Department of Science and Technology, Universidad del Este, Carolina, P.R. 00984. Alarming reports estimate that adolescents abuse of supraphysiological doses of anabolic androgenic steroids (AAS), leading to a diverse spectrum of behavioral effects. Sexual behavior is affected through hypothalamic nuclei in the brain. In males, the mPOA and the VMN modulate copulatory and motivational domains of the sexual behavior, respectively. We aim to better understand the neurochemical basis underlying AAS exposure, in particular, the neuropeptide circuits. We choose to study Neuropeptide Y (NPY), since it is related to sexual behavior, and its expression in the hypothalamus is well known. We hypothesized that AAS will affect the NPYergic circuit in the hypothalamus, leading to alteration of the sexual response. Male pubertal rats were under chronic exposure of 17α-methyltestosterone. Brain punches at the VMN and the mPOA were done to measure NPY levels by RIA, and NPY mRNA including its receptors by semi-quantitative real-time PCR. AAS treatment produced an increase in NPY levels in the VMN, while the mPOA was not affected. However, an increase of NPY mRNA in the mPOA, but not in the VMN was observed. A decrease of the mRNAs for $NPYY_2$, $NPYY_5$ and of the androgen receptor was also found in the VMN. In addition, sexual incentive motivation was increased after AAS-treatment, while the copulatory behavior was not altered. This study shows that androgen exposure has long-term effects when administered during puberty, and suggests that NPY might be an important substrate underlying androgen misuse. EARDA-NIH (G11HD046326), NCRR-NIH (P20RR016470), MBRS-RISE(R25-GM066255)-SCORE(5SOGM0082224), RCMI (G12RR030551).

32. THE EFFECTS OF PRENATAL ESTRADIOL ON THE MALE AND FEMALE NEONATE AND ITS POSSIBLE CONNECTION TO AUTISM. Aiello, P. T.; Borella, A.; Whitaker-Azmitia, P. Dept. of Psychology. Stony Brook University, Stony Brook, NY 11794-2500 USA. Autism is a neurodevelopmental disorder characterized principally by social deficits and shows a 4:1 ratio in male to female diagnosis. The sex ratio difference has led investigators to propose that one factor that may be involved is altered levels of prenatal sex hormones such as testosterone. Indeed, a recent study has shown that amniotic fluid levels of testosterone is positively associated with social deficits in the child. The current study was undertaken to test this hypothesis by using 17β-estradiol, a metabolite of testosterone. This metabolite may also explain the sex differences in diagnosis as the developing female brain may have a greater capacity to resist increased levels due to the presence of α-fetoprotein. Estradiol's effects on brain development include influences on apoptosis, synaptogenesis and cellular maturation such as axonal elongation and dendritic elaboration. Thus, it is highly plausible that variations in the concentration of estradiol in blood circulation of the developing fetus would disrupt the normal process of development and could lead to social deficits of autism. To test this hypothesis, developing rat pups were treated at the age when the hypothalamus undergoes sex hormone mediated differentiation (postnatal day 1-2) with peanut oil or 17β-estradiol (5 or 50μg). We report that varying dosages of estradiol caused autism like traits in male rats on such behavior tests as huddling behavior, proximity to dam and response to novel stimuli. In comparison, female rats did not show similar traits on the proximity to dam and response to novel stimuli tests. Preliminary analysis of oxytocin-immunoreactive cells of the hypothalamus shows the social deficits may be related to alterations in this hormonal system.

Animal Models of Human Conditions

33. GABA-A RECEPTORS CONTRIBUTE TO PROGESTERONE WITHDRAWAL. Beckley, E.H.; Finn, D.A. Dept. Behav. Neurosci., Oregon Health & Sci. Univ.; VA Medical Research; Portland OR, 97239 USA. Progesterone (PRO) withdrawal (WD) at the end of pregnancy may contribute to postpartum depression. In a mouse model of PRO WD we found that inhibiting 5alpha-reduction of PRO following PRO injections mimicked the effect of PRO WD on forced swim test (FST) immobility. This suggested that WD from a neuroactive PRO metabolite (e.g., the GABAergic steroid allopregnanolone, ALLO) contributed to FST immobility during PRO WD. To identify brain receptor systems involved in increased FST immobility during PRO WD, the current studies used the GABA-A receptor antagonist picrotoxin (PTX) and the PRO receptor antagonist mifepristone (MIF) to selectively inhibit receptor systems that respond to PRO and ALLO. Increasing doses of PTX did not alter FST immobility when co-administered with PRO. However, when administered 1 hr after PRO, 2 mg/kg PTX significantly increased FST immobility, consistent with the rate of metabolism of PRO to ALLO. PTX without PRO did not increase FST immobility, supporting the idea that PRO WD is mediated by decreased activation of GABA-A receptors. Increasing doses of MIF co-administered with PRO did not increase FST immobility. These results offer increased evidence that PRO WD may have depressogenic effects that are the result of correlative WD of PRO metabolites acting on GABA-A receptors. Support: F31-MH081560 (EHB), and AA012439 and the Department of Veterans Affairs (DAF).

34. THE EFFECTS OF THE VIRAL MIMIC POLY I:C ON BTBR T+ tf/J MICE: A MODEL FOR AUTISM. Benno, R.; Smirnova, Y.; Nguyen, N.; Schanz, N. Biology Department, William Paterson University, Wayne, NJ 07470 USA. Autism spectrum disorders (ASD) are a complex group of diseases believed to be due to a multitude of factors. Several studies using the BTBR T+ tf/J (BTBR) inbred mouse have shown that this strain may serve as a model genetic system for ASD. Studies in other inbred mice have demonstrated that injections of the viral mimic Poly I:C given to pregnant dams will result in offspring who demonstrate several autistic phenotype behaviors. In this study we sought to determine if the effects of injection of Poly I:C in the BTBR strain will act in an additive manner to produce a population of BTBR offspring demonstrating a more robust autistic phenotype than in saline injected controls. BTBR dams were injected (IV) with either 0, 5, or 10 mg/kg of the viral mimic POLY I:C on either day 9.5 or 12.5 of gestation. Neonatal analysis included measures of sensory/motor system development and ultrasonic vocalization. Social interaction was analyzed in both juvenile and adult mice. In addition, anxiety and response to amphetamine were also measured in adult mice. Preliminary findings show that the effects of Poly I:C are small, and our model accounts for only a small percentage of the variance in the measures. A surprising finding was that a low dose of amphetamine (2.5 mg/kg) produced a hypolocomotor response in both control and Poly I:C mice, although the response to a medium dose (5.0 mg/kg) in all groups was the expected hyperlocomotion. It is possible that this unexpected reaction to amphetamine and lack of response to Poly I:C may underlie the mechanisms responsible for the occurrence of ASD in BTBR mice.

35. FOLATE DEFICIENCY IN GCPII MICE, A MOUSE MODEL OF SCHIZOPHRENIA. Chu, H.C.; Schaevitz, L.R.; Berger-Sweeney, J.E. Wellesley College, Wellesley, MA 02481 USA. Hypofunction of the glutamatergic synapse contributes to the negative symptoms and cognitive deficits of schizophrenia (Scz). Activity of glutamate carboxypeptidase II (GCPII), an essential enzyme at the glutamatergic synapse, is reduced in frontal cortex, hippocampus, and temporal cortex of Scz patients, ultimately resulting in decreased glutamate release. Previously, we have shown that mutant mice that express reduced levels of GCPII exhibit some negative symptoms and cognitive deficits. However, the deficits in these mutants are relatively mild and only partially reminiscent of Scz. Growing evidence suggests that Scz results after a combination (multiple hits) of genetic and environmental insults. We are modeling multiple hits by placing GCPII mutant mice on a folate deficient diet. In human schizophrenics, serum folate concentrations are correlated negatively with the intensity of negative symptoms. Additionally, GCPII is identical to folate hydrolase I (FOLH1), which hydrolyzes folate. We hypothesized that GCPII-deficient mice deprived of folate would exhibit more severe negative symptoms and cognitive deficits than those in mice with GCPII deficiencies or folate deficiencies alone. We tested four groups of mice (wildtype, GCPII-deficient heterozygous, folate-deprived wildtype, and mice with both GCPII and folate deficiencies) on a behavioral battery to analyze specific behavioral phenotypes associated with Scz:. baseline locomotion, motor coordination, a forced swim test, a social awareness task, a Morris water maze, and pre-pulse inhibition. Our results show that folate-deprived wildtypes were severely impaired on several of the tasks, whereas contrary to our expectations, the GCPII-deficient/ folate-deficient mice performed similarly to wildtypes. In other words, GCPII-deficiency appears to protect against the severe impact of folate deficiency. We are examining currently biochemical mechanisms that may support this alternative hypothesis.

36. LISURIDE- AND LSD-INDUCED DISRUPTION OF PREPULSE INHIBITION ARE MEDIATED BY DISTINCT RECEPTOR MECHANISMS. Halberstadt, A.L.; Geyer, M.A. Dept. of Psychiatry, UCSD, La Jolla, CA 92093-0804 USA. Lisuride is an ergot derivative that is used as a treatment for Parkinsons disease. Lisuride is structurally similar to the hallucinogen lysergic acid diethylamide (LSD); like LSD, lisuride acts as an agonist at a variety of monoamine receptors including serotonergic 5-HT2A and dopaminergic D2 receptors. Classical hallucinogens such as LSD are believed to exert their behavioral effects via activation of the 5-HT2A receptor. Nonetheless, lisuride does not produce hallucinogenic effects in man, a finding that is paradoxical given its activity at 5-HT2A receptors. LSD and other hallucinogens have been shown to disrupt prepulse inhibition (PPI), an operational measure of sensorimotor gating, by activating 5-HT2A receptors. The objective of the present investigation was to examine whether lisuride disrupts PPI in male Sprague-Dawley rats. Experiments were also conducted to identify the mechanism(s) responsible for the effect of lisuride on PPI, and to compare the effects of lisuride to those of LSD. As shown previously (Ouagazzal et al. (2001) Neuropsychopharmacology 25:565), LSD (0.05, 0.1, and 0.2 mg/kg, s.c.) reduced PPI, and the effect of LSD (0.1 mg/kg) was blocked by pretreatment with the selective 5-HT2A antagonist MDL 11,939 (0.3 mg/kg, s.c.). Administration of lisuride (0.035, 0.07, and 0.14 mg/kg, s.c.) also reduced PPI. However, the PPI disruption induced by lisuride (0.07 mg/kg) was not blocked by pretreatment with MDL 11,939, but was prevented by pretreatment with the D2/D3 antagonist raclopride (0.1 mg/kg, s.c). It is concluded that D2/D3 receptors are responsible for lisuride-induced disruption of PPI in rats. Conversely, activation of 5-HT2A receptors does not appear to contribute to the behavioral effects of lisuride. These experiments demonstrate that lisuride and LSD disrupt PPI via distinct receptor mechanisms. These findings provide additional support for the classification of lisuride as a non-hallucinogenic 5-HT2A agonist. Acknowledgements: Supported by NIDA (DA02925).

37. RITALIN-TREATMENT IMPROVES THE BEHAVIORAL DEFICITS OF NEUROGRANIN KNOCKOUT MICE. Huang, K.-P. ; Huang, F.L. Program of Developmental Neurobiology, NICHD, NIH, Bethesda, MD 20892 USA. Neurogranin (Ng) is a neuronal protein expressed at a high level in the mammalian forebrain. Deletion of Ng gene in mouse causes deficits in cognitive function and hippocampal long-term potentiation (LTP). In human, terminal end deletion of a copy of chromosome 11q that includes Ng gene also causes cognitive deficits and behavioral abnormalities. Further characterization of the Ng knockout mice (KO) revealed that these animals also exhibited hyperactivity, inattentiveness, and impulsivity. Attempt was made to treat these animals with Ritalin (methylphenidate, 10 mg/kg/day, i.p), a commonly used drug for the treatment of attention-deficit hyperactivity disorder (ADHD) patients. After 3 weeks of daily treatment, four groups of animals, including control wild type (WT) and NgKO (both injected with saline) and Ritalin-treated WT and NgKO, were subjected to behavioral tests, while drug treatment continued throughout the testing period. Ritalin appeared to reduce the hyperactivity of the NgKO as indicated by a reduction of the movement time, total and marginal distances travelled in the open field and an increase in the immobility time in the forced-swim chamber. The cognitive functions of the drug-treated NgKO were also improved as evidenced by a reduction of the latency time to locate the hidden platform in the water maze and an increase in the freezing time after fear-conditioning. Although drug treatment only has a marginal effect on the performances of the WT, these animals always performed better than the NgKO. Measurements of the high-frequency stimulation (1x100 Hz)-induced hippocampal LTP also showed a positive effect of the drug on the NgKO. These results suggest that NgKO may serve as an animal model for ADHD and that Ritalin exerts a beneficial effect on NgKO as it does for the human patients. Supported by the Intramural Research Program of NICHD, NIH.

38. 5-HT1A AGONISM FOR L-DOPA-INDUCED-DYSKINESIA. Paquette, M.A.; Lewis, J.R.; Berger, S.P. Laboratory of Translational Behavioral Neuroscience, Oregon Health & Science University and the VAMC, Portland, OR 97239. The unilateral 6-hydroxydopamine (6-OHDA) rat model of Parkinsons disease has been used to test pharmacotherapies for L-DOPA-induced dyskinesia (LID). Using this model, we and others have shown that partial agonists (e.g., buspirone) or full agonists (e.g., flesinoxan) at the 5-HT1A receptor suppress LID. Our novel data show that the anti-dyskinesia effects of medications previously thought to act via other mechanisms are also mediated by the 5-HT1A receptor. Specifically, anti-dyskinesia effects of the sigma-1 antagonist BMY-14802 and the NMDA antagonist dextromethorphan are prevented by the 5-HT1A antagonist WAY-100635. Thus, we predict that 5-HT1A agonists should be effective anti-dyskinesia treatments in patients with Parkinsons disease. The 5-HT1A agonist sarizotan failed clinical trials due to worsening parkinsonism, likely due to its dopamine receptor antagonist properties. Using a sensorimotor behavioral battery adapted for the dyskinetic rat, we demonstrate that neither BMY-14802 nor dextromethorphan worsen parkinsonism or prevent L-DOPA-mediated therapeutic effects. Therefore, we suggest that 5-HT1A agonists that lack dopamine receptor antagonist properties should be pursued as anti-dyskinesia treatments in patients with Parkinsons disease. Supported by VA Merit #07-1003.

39. ~~SUBCHRONIC TREATMENT WITH GALACTOSYLATED DOPAMINE INHIBITS ITS ACUTE EFFECT ON BEHAVIORAL RESPONSE TO NOVELTY IN THE NAPLES HIGH EXCITABILITY RATS. Ruocco, L. A.; Gironi Carnevale, U. A.; De Angelis, G.; Conte, R.; Treno, C.; Murolo, M.; Melisi, D.; Curcio, A.;Rimoli, M.G.; Sadile A. G. Dept Exptl Med., Second Univ. of Naples; Pharmaceut. and Toxicol. Chem., Univ. of Naples Federico II, Na.~~ **NOT PRESENTED.**

40. EFFECTS OF A NEUROTOXIC LESION IN THE BASAL -LATERAL AMYGDALA, NUCLEUS ACCUMBENS CORE, OR THE ORBITAL FRONTAL CORTEX, ON THE EXPRESSION OF LOCOMOTION AND COMPULSIVE CHECKING IN THE QUINPIROLE SENSITIZATION MODEL OF OBSESSIVE COMPULSIVE DISORDER (OCD). Szechtman, H; Silva, C; Bisnaire, L; Thomas Mcmurran, T; Dvorkin, A; Foster, J. Dept Psychiatry & Behav Neurosc. McMaster University, Hamilton, Canada. Current neuroanatomical models propose that OCD represents some dysfunction in a network involving cascading cortico-striato-pallido-thalamo-cortical loops, with limbic system inputs. To examine what specific role different components of this network may play in the expression of compulsive behavior, we employed an animal model of OCD in which chronic treatment with the D2/D3 dopamine agonist quinpirole induces in rats locomotor sensitization and compulsive checking behaviour. The experimental approach involved selective lesions of various brain targets with the expectation that such manipulations would yield target-related fractionation in the expression of compulsive checking. In the present study we focused on the basal-lateral amygdala (BLA), nucleus accumbens core (NAc), and the orbital frontal cortex (OFC). A 2x4 fully crossed factorial design was employed, with one factor being Dose of Chronic Quinpirole Treatment (0 vs 0.5 mg/kg) and the other being a Region of Interest Lesion factor (Sham lesion vs BLA lesion vs NAc lesion vs OFC lesion). After the induction of compulsive checking using our standard protocol (quinpirole twice weekly x 8, with a 55 min test after each injection in a large, 160 cm x 160 cm, open field without walls), bilateral NMDA lesions were made, and following a 2-wk recovery period checking behavior and locomotion were re-assessed 4 times during the next 17 days; the response to an acute injection of saline/quinpirole was also evaluated. Results showed that the expression of quinpirole-induced compulsive checking was apparently not affected by lesions of the BLA or OFC, and that a NAc lesion slightly reduced the frequency and recurrence time of checking. Strikingly, NAc lesions produced marked hyperactivity in saline-treated rats but without yielding full-blown compulsive checking, as measured by the set of criteria defining performance of compulsive checking. Findings from the animal model suggest that once established, performance of compulsive checking behavior can proceed relatively unimpeded in the absence of the lesioned structures. Supported by CIHR (MOP-64424).

41. DAILY LIFE ACTIVITY IS NOT ALTERED IN MOUSE MODELS OF NEUROPATHIC AND INFLAMMATORY PAIN. Urban, R.; Scherrer, G.; Goulding, E.; Tecott, L. and Basbaum A. Univ. California San Francisco. Despite the impact of persistent pain on daily life activity in the clinic, animal models of chronic pain rarely address this important consequence. To better understand the behavioral impact of persistent pain in mice, here we measured daily life behavior in an inflammatory pain model (intraplantar injection of Complete Freunds Adjuvant, CFA), and in a neuropathic pain model (spared nerve injury, SNI), both of which are associated with profound mechanical hypersensitivity. We used an activity monitoring system (AFL) to document daily life of mice after CFA or SNI, for a consecutive 16-day period after injury. The AFL system not only measures overall locomotion, feeding and drinking, but also allows for more precise analysis of active states patterns and bouts of feeding/eating. Although we hypothesized that activity patterns would be severely impacted, we found no significant differences between nave controls, sham-operated and SNI mice or between saline and CFA injected mice in measures of locomotion (in meters), time budgeting (time spent in each activity), circadian rhythm or in other measures of the daily routine, including bout and active state duration. These results suggest that these two mouse conditions of persistent pain, though associated with profound and long lasting mechanical allodynia, do not significantly alter daily life behavior. To the extent that these measures are indicative of ongoing, spontaneous pain, our results suggest that these models of neuropathic and inflammatory pain do not fully reflect the human

conditions, in which there are both severe ongoing pain and dramatic lifestyle changes. Supported by NS14627 and T32 MH020006.

42. PRENATAL CHOLINE SUPPLEMENTATION IN A MOUSE MODEL OF RETT SYNDROME. Schaevitz, L.R.; Saulsberry, L.N.; Berger-Sweeney, J. Department of Biological Sciences, Wellesley College, Wellesley, MA. Rett Syndrome (RTT) is a neurodevelopmental disorder on the autistic spectrum caused by mutations in the X-linked gene encoding methyl-CpG-binding protein 2 (MeCP2). Girls with RTT suffer from deficits in motor, social, respiratory, and cognitive function. Several mouse models have been created that exhibit behavioral deficits similar to those seen in human RTT. While numerous treatments options have been explored postnatally in Mecp2 mutant mice, including environmental enrichment and choline supplementation in our laboratory, improvements have been reported to motor and respiratory functions but not yet to social or cognitive functions. We hypothesize that postnatal treatments miss a critical time window for cognitive development. Here, we examine whether choline supplementation to the pregnant dam given prenatally from embryonic day (E) 12 E17 (a time window that enhances learning and memory in normal mice) can improve cognitive deficits in the Mecp21lox adult mice. Our results suggest that some measures of cognitive function are improved in the adult Mecp2 mutant animals after prenatal supplementation. Examining the differing effects of treatment during precise time windows throughout development will provide clinicians with a better understanding of when interventions may be most effective in ameliorating particular symptoms associated with RTT.

43. COGNITIVE AND SOCIAL DEFICITS OF Mecp2^{1lox} MICE, A MODEL OF RETT SYNDROME. Moriuchi, J.M.; Schaevitz, L.; Berger-Sweeney, J.E. Dept. Biological Sciences. Wellesley College, Wellesley, MA 02481 USA. Rett Syndrome (RTT) is a regressive neurodevelopmental disorder on the autism spectrum associated with mutations in the X-linked gene encoding MeCP2, which leads to severe deficits in cognitive, social, motor, and respiratory functioning. *Mecp2^{1lox}*-null mice, which lack functional Mecp2 protein, effectively recapitulate many physical and cognitive symptoms associated with the human disorder. However, the social behavior of these mutant mice has not yet been explored, and the cognitive impairments in the mutants have not been explored as extensively as motor and respiratory deficits. Here, we examine the cognitive and social performance of *Mecp2* mutant mice using object recognition (cognitive) and social awareness (social) tasks. The object recognition task (on postnatal day 28) tested memory for a novel object after 1-hr and 24-hr delays. The social awareness test (on postnatal day 33) measured autistic-like behaviors of social preference and social recognition. We adapted both tasks to reduce confounding effects of the severe motor impairment of *Mecp2*-nulls. *Mecp2*-null mice exhibited impaired object memory after a 1-hr delay, but not after a 24-hr delay, and an autistic-like deficit in social preference. These results provide the first evidence of social impairment and further define the cognitive impairment in *Mecp2^{1lox}* mice. We will continue to use these measures to investigate the beneficial effects of preclinical therapies for RTT.

44. CALORIE RESTRICTION ATTENUATES SICKNESS BEHAVIOUR. Kent, S.; MacDonald, L.; Radler, M.; Paolini A.G. School of Psychological Science. La Trobe University, Bundoora, VIC, Australia. Calorie restriction (CR) has been shown to have health promoting benefits, such as extending the life span of numerous species, and inhibiting the development of certain cancers. CR alters the release of some cytokines and reduces mortality after exposure to a bacterial infection. To date, however, CRs effect on sickness behaviour (fever, anorexia, cachexia) has not been investigated. **Procedure**- Adult male C57BL/6J mice were fed ad lib or exposed to either a 25% (CR25%) or 50% calorie restriction (CR50%) for 28 days. On the 29th day the mice were injected IP with 50μg/kg of lipopolysaccharide. Changes in core body temperature, locomotor activity, body weight, and food and water intake were determined. **Results**- CR50% mice demonstrated a full attenuation of all sickness behaviour measures in comparison to controls; however, CR25% mice only showed a partial attenuation. The CR25% mice displayed a shorter-lived fever with the same peak in comparison to the controls, whereas the CR50% mice did not develop fevers ($p<.05$ to .001 for the duration of the fever in controls). Neither CR25% nor CR50% mice exhibited anorexia ($p < .001$) and both had reduced cachexia ($p < .001$). The CR groups demonstrated a significant decline in core body temperature during the 4 week CR period (both $p<.001$); CR50% animals demonstrated the largest decline. **Conclusions**- CR results in a suppression of sickness behaviour in a dose dependent manner. This may be due to CR causing a reduction in metabolism and/or influencing several central nervous, endocrine, and immune mechanisms. Possible mechanisms that could be involved in this phenomenon include leptin, glucocorticoids, neuropeptide Y, and ghrelin due to their known involvement in the inflammatory response and altered levels after weight change.

45. LIGATION OF SPINAL NERVES L4 AND L5 PRODUCES ROBUST ALLODYNIA WITHOUT MAJOR MOTOR DEFICITS IN MICE. Ye, G-l.; Savelieva, K.V.*; Baker, K.B.; Syrewicz, J.; Mason, S.S.; Lanthorn, T.H.; Rajan, I. Lexicon Pharmaceuticals, Inc., The Woodlands, TX, 77381-1160, USA Introduced in 1992 by Kim and Chung, spinal nerve L5/L6 ligation (SNL) in rats has become well recognized and accepted as an animal model for mechanistic studies of peripheral neuropathy and for screening of novel analgesics. However, the spinal nerve L5/6

ligation model has not been widely utilized in mice, in part because surgery, particularly ligation of mouse L6, and behavioral testing in such small and active animals are challenging. Based on a recent report that mouse L3 and L4 neural segments are anatomically and functionally homologous with rat L4 and L5 segments (1), we investigated individually ligating L4 or L5, and L4/L5 ligation in albino C57 mice using the von Frey test to evaluate the resultant allodynia and histological dissection to confirm the ligations. Aside from a single exception, none of the L4 or L4/L5-ligated animals (n=79) lost the use of their ipsilateral leg which indicates that, in contrast to rats, L4 does not significantly innervate major proximal leg muscles in mice. The data from von Frey testing on postoperative weeks 1 - 6 revealed statistically significant reductions of the 50% withdrawal threshold in all three ligation groups, with the order of significance being L4/L5 > L4 > L5. The model was pharmacologically validated with benchmark compound, gabapentin (GBP). In all 3 doses tested GBP significantly reduced 50% withdrawal threshold in von Frey testing. With its ease in surgery and robust allodynia, the ligation of spinal nerves L4/L5 optimizes the SNL model in mice irrespective of strain differences in number of lumbar vertebrae.(1) Rigaud M, Gemes G, Barabas ME, et al., 2008, Pain 136: 188-201.

46. ~~EFFECTS OF APICULTURE PRODUCTS ON MEMORY AND BEHAVIORAL TEST BATTERY IN A RAT MODEL OF EPILEPSY INDUCED BY PENTYLENETETRAZOLE. ZARRAGA GALINDO N[1]; IBARRA-GUERRERO P[1]; LOPEZ-GARIBAY LA[1]; MARTÍNEZ-VEGA R[2]; CISNEROS MARTÍNEZ M[1]; MELÉNEZ-ROSALES S; VERGARA-ARAGON P[1]—[1]Dept Physiol Fac Med.,UNAM., Mexico, Mexico City, Mexico; [2] Mathematics Acad., UACM, San Lorenzo Tezonco, México City, Mexico.~~ **NOT PRESENTED.**

47. ~~ENRICHED ENVIRONMENT IMPROVES MOTOR FUNCTION OF HEMIPARKINSONIAN RATS IMPLANTED WITH DOPAMINE-COMPLEX. Domínguez,-Marrufo L.E.[1].; Ibarra-Guerrero P[1]; Hernández, H[1].; López, L.A[1].; Perea, R.L[1].; Magaña, C.R[2].; Martínez, R[4].; Cisneros, M[4].; Acosta, D.R.[2].; García,J.A[3].; Valverde, M. G[3].;Vergara, P[1]-[1]Dept Physiol Fac Med.,UNAM., Mexico, Mexico City, Mexico; [2]Condensed Matter Dept, Physics Institute, UNAM, México City, Mexico. [3]Solid State Dept., Physics Institue, UNAM, México City, Mexico; [4]Mathematics Acad., UACM, San Lorenzo Tezonco, México City, Mexico.~~ **NOT PRESENTED.**

48. STUDIES OF BIOCOMPATIBILITY BY THE HOST REACTION TO THE *IMPLANT* OF TiO_2 COMPLEX TO IMPROVE MOTOR FUNCTION IN THE HEMIPARKINSONISM RAT MODEL. HERNANDEZ RAMIREZ, H[1].; IBARRA, P[1].; DOMINGUEZ, L.E[1].; LOPEZ, L.A[1].; PEREA, R.L[1].; MAGAÑA, C.R[2].; MARTÍNEZ R[4].; CISNEROS, M[4].; ACOSTA, D.R[2].; GARCÍA, J.A[3].; VALVERDE, M.G AND VERGARA, P. [1]Dept Physiol Fac Med.,UNAM., Mexico, Mexico City, Mexico; [2]Condensed Matter Dept, Physics Institute, UNAM, México City, Mexico. [3]Solid State Dept., Physics Institue, UNAM, México City, Mexico; [4]Mathematics Acad., UACM, San Lorenzo Tezonco, México City, Mexico **NOT PRESENTED.**

49. DOPAMINE COMPLEX COULD LEAD TO IMPROVED MOTOR DEFICITS OF HEMIPARKINSONISM INDUCED IN THE RAT. IBARRA GUERRERO P[1], DOMINGUEZ, LE[1].; HERNANDEZ, H[1].; LÓPEZ, L.A[1].; PEREA, R.L[1].; MAGAÑA, C.R[2].; MARTÍNEZ, R[4].; CISNEROS, M[4].; ACOSTA, D.R[2].; GARCÍA, J.A[3].; VALVERDE, M. G[3].; VERGARA, P[1] [1]Dept Physiol Fac Med.,UNAM., Mexico, Mexico City, Mexico; [2]Condensed Matter Dept, Physics Institute, UNAM, México City, Mexico. [3]Solid State Dept., Physics Institue, UNAM, México City, Mexico; [4]Mathematics Acad., UACM, San Lorenzo Tezonco, México City, Mexico.**NOT PRESENTED.**

Friday, June 12, 2009

8:30-10:30 **Symposium 3:** WHAT IS THE FUNCTIONAL AND CLINICAL SIGNIFICANCE OF THE HIPPOCAMPAL-PREFRONTAL CORTICAL INTERACTION? **Chairperson: Yukiori Goto**

INTERACTIONS BETWEEN MEDIAL PREFRONTAL CORTEX AND HIPPOCAMPUS FOR SPATIAL LOCATION INFORMATION. Kesner, R.P. Dept of Psychology, University of Utah, Salt Lake City,UT 84112. Using a variety of spatial paradigms, the potential interactions between the medial prefrontal cortex and hippocampus was investigated. With the use of temporary inactivations of the prelimbic and infralimbic(PL/IL) cortex and either dorsal hippocampus or the intermediate CA1 subregion of the hippocampus, it was found that in a delayed non-matching to sample paradigm the dorsal hippocampus and PL/IL cortex process short-term memory (based on 10 sec delays) in parallel. With intermediate memory (based on 5 min delays) there are deficits only for the dorsal hippocampus not PL/IL in one study, but there are deficits for both the intermediate CA1 and PL/IL in another study. With extensive training the deficit for the 10 sec delays disappears. However, when both the PL/IL and dorsal hippocampus or intermediate CA1 are compromised there is a total deficit for both the 10 sec and 5 min delays, suggesting that the two regions interact with each other to ensure the processing of spatial information across a dynamic temporal range including both short-term and intermediate-term memory. In addition, based on a disconnection paradigm, it can be shown that the PL/IL and intermediate CA1 interact with each other. In yet another study using the Hebb- Williams maze, it can be shown that bilateral inactivation of either the PL/IL or the intermediate CA1 produces a deficit in encoding and retrieval associated with maze learning and retention and furthermore based on a disconnection paradigm there is an interaction between the IL/PL and the intermediate CA1. The nature of the interaction still needs to be determined but could include differential processing of retrospective and prospective information in the context of the dynamics of temporal processing.

DOPAMINE MODULATION OF HIPPOCAMPAL-PREFRONTAL CORTICAL INTERACTIONS ON MEMORY-GUIDED BEHAVIOR. Goto, Yukiori. Department of Psychiatry, McGill University, Montreal, Quebec, Canada. Goal-directed behavior is critically dependent on information from past events and anticipation of future events. These retrospective and prospective memory processing are proposed to be the functions of hippocampus (HPC) and prefrontal cortex (PFC), respectively. The roles of mesocortical dopamine (DA) on HPC-PFC interaction for these processes was examined using the eight arm maze task in which 1, 3, 5, or 7 arms were presented to rats first, and after a delay, two arms were presented; one that animals had entered, and the other that animals did not. We found that rats could utilize retrospective and prospective memory and flexible switching between these 2 memory processes to guide their behaviors in this task, for which retrospective memory is mainly processed in the HPC but that this retrospective information must be incorporated within the PFC to be used to switch to an anticipatory response strategy involving prospective memory. Furthermore, switching between memory processes is regulated by DA system in the PFC. Thus, D1, but not D2, receptor activation is crucial for incorporation of HPC-based retrospective information into the PFC. However, once this takes place, D2 receptor activation is required for further processing of information to effect preparation of future actions. In contrast, DA D1 and D2 receptor activation in the PFC differentially affects retrospective memory processing within the HPC by facilitating and attenuating HPC activity via an indirect feedback pathway. These results suggest that dynamics of DA release in the PFC regulates the interactions between the HPC and PFC, which provide a unique perspective on the mechanism of memory-based goal-directed behavior.

DIFFERENTIAL CONTRIBUTIONS OF PREFRONTAL AND HIPPOCAMPAL DOPAMINE D1 AND D2 RECEPTORS IN HUMAN COGNITIVE FUNCTIONS. Hidehiko Takahashi, MD, PhD Department of Molecular Neuroimaging, National Institute of Radiological Sciences 4-9-1 Anagawa Inage Chiba 263-8555, Japan Dopamine D1 receptors in the prefrontal cortex (PFC) are known to be crucial in prefrontal functions including working memory, and animal studies indicated that stimulation of D1 receptors in PFC induce an inverted U-shaped response, such that too little or too much D1 receptor stimulation impairs prefrontal functions. In contrast to D1 receptors, relatively less attention has been paid to the role of prefrontal D2 receptors in cognitive functions. Previous positron emission tomography (PET) study showed that D2 receptors in the hippocampus (HPC) were associated not only with memory function but also frontal lobe functions, suggesting dopaminergic modulation on HPC-PFC interactions during the cognitive process. We measured both D1 and D2 receptors in PFC and HPC using [11C]SCH 23390 and [11C]FLB 457 PET in normal subjects, aiming to elucidate how regional D1 and D2 receptors are differentially involved in neurocognitive performance. We found a significant inverted U-shaped relation between prefrontal D1 receptor binding and performance of the Wisconsin Card Sorting Test. Although prefrontal D2 binding has no relation with any neuropsychological measures, hippocampal D2 receptors showed positive linear correlations not only with memory function but also with frontal lobe functions. Our findings suggest that human prefrontal functions are optimized within a narrow range of D1 receptor stimulation, and orchestration of prefrontal D1 receptors and hippocampal D2 receptors through HPC-PFC interactions might be necessary for normal prefrontal functions.

THE VENTRAL HIPPOCAMPUS AND MEDIAL PREFRONTAL CORTEX SYNCHRONIZE DURING ANXIETY. Gordon, J.A., Adhikari, A., and Topiwala, M. Department of Psychiatry, Columbia University, New York, NY 10032 USA. The dorsal hippocampus (dHpc) has been implicated in spatial learning, while lesion and anatomical studies support a role for the ventral hippocampus (vHpc) in innate, conflict-based tests of anxiety. We hypothesize that the vHpc influences anxiety by acting on downstream structures such as the medial prefrontal cortex (mPFC), an area known to modulate fear and anxiety-related behaviors. In agreement with this hypothesis we previously reported that during exposure to an anxiogenic open field, theta power (4-12 Hz) in the vHpc and mPFC (Adhikari et al., 2007, SfN abstract 269.5) was increased relative to a control environment. We now report that this effect on mpfc and vHpc theta can be observed in an additional anxiety paradigm, and that the increases in mPFC theta power correlate with behavioral measures of anxiety in both tasks. We recorded local field potentials (LFPs) from the vHpc, dHpc and mPFC, an area required for normal behavior in conflict-based anxiety paradigms that receives direct vHpc but not dHpc projections. Multisite recordings were made from 129/SvEvTac mice in a familiar environment and two anxiogenic tasks: a brightly lit open field and the elevated plus maze. In all environments the mPFC LFP is highly coherent with vHpc but not dHpc at both gamma (30-80 Hz) and theta ranges, presumably reflecting the direct connectivity between vHpc and mPFC. In the open field and in the plus maze increases in both mPFC and vHpc theta power were found. The increase in mPFC theta power correlated significantly with behavioral measures of anxiety such as time spent in the center of the open field and time in the open arms of the plus maze. Interestingly, power correlations at the theta range between the mPFC and vHpc but not dHpc increased in both anxiety paradigms. We also found a trend towards increased phase-locking of mPFC single unit firing to local theta in the open field, demonstrating that increases in mPFC theta power in anxiogenic environments affect single unit firing. These findings support the hypothesis that the hippocampus drives the mPFC specifically during states of increased anxiety. Further studies recording single units in the mPFC are underway, to confirm and extend the field potential findings reported here.

6:00-8:00 **Poster Session II**

Cognition

50. DIFFERENTIAL EFFECTS ON OBJECT AND SPATIAL MEMORY FOLLOWING CHRONIC DOSES OF METHYLPHENIDATE AND ATOMOXOTINE. Bigney, E.; Taukulis, H.; Wilson, J. University of New Brunswick Saint John, Canada. Methylphenidate (MPH; Ritalin) is a psychostimulant that increases extracellular dopamine (DA) and norepinephrine (NE). It is most often prescribed for the treatment of attention-deficit/hyperactivity disorder (ADHD). Recent studies have shown that chronic oral MPH treatment results in impairment of certain types of memory formation, and that this effect may result from the over-activation of dopamine D1 receptors. Atomoxotine (ATX; Strattera), a relatively selective norepinephrine reuptake inhibitor, is a non-stimulant drug also used to treat ADHD. ATX appears to have limited effects on some dopaminergic systems, but it has a low affinity for dopamine D1 receptors (Bymaster, F. et al., 2002). The aim of the present study was to compare the impact of chronic oral ATX treatment against MPH on tests of object and spatial memory, as well as general locomotor activity. Periadolescent male Long-Evans rats were treated with oral ATX at doses of 0.5, 1.5, or 3.0 mg/kg, MPH at a dose of 5.0 mg/kg, or vehicle twice a day for 21 days. After an 11-day washout period, all animals were tested in Open Field (OF), Object Recognition (OR), and Morris Water Maze (MWM) tests. In agreement with earlier studies, the MPH group exhibited memory impairment in the OR test; however, all ATX groups exhibited object memory equivalent to that seen in the no-drug control rats. In a probe trial of the MWM test, wherein the animals searched for a familiar platform that had been removed from the pool, the MPH group took significantly longer to reach the quadrant in which the platform had previously been found. It was concluded that, at least at the doses tested, chronic ATX does not result in the recognition and spatial memory deficits seen subsequent to chronic oral MPH.

51. EFFECTS OF GENETIC AND PHARMACOLOGICAL INACTIVATION OF THE 5-HT TRANSPORTER (5-HTT) ON COGNITIVE FLEXIBILITY IN MICE Brigman1, J.L., Mathur1, P., Harvey-White, J.2, Saksida3,4 L.M., Bussey3,4, T.J., Murphy5, D., and Holmes1, A. 1 Section on Behavioral Science and Genetics, Laboratory for Integrative Neuroscience, National Institute on Alcoholism and Alcohol Abuse, NIH, USA, 2 Laboratory of Physiologic Studies, National Institute on Alcoholism and Alcohol Abuse , Rockville MD, 3Department of Experimental Psychology, University of Cambridge, Cambridge, United Kingdom, 4The Medical Research Council and Wellcome Trust Behavioral and Clinical Neuroscience Institute, 5Laboratory of Clinical Science, National Institute of Mental Health, NIH, USA Studies in rats and non-human primates have demonstrated that depletion of 5-HT, particularly in the prefrontal cortex, produce impairments in executive function. The 5-HT transporter (5-HTT) is an important modulator of 5-HT neurotransmission. The 5-HTT is a therapeutic target for various neuropsychiatric disorders, including depression and obsessive-compulsive disorder, which are characterized by executive dysfunction. Genetic variation in the 5-HTT has been also associated with risk for these disorders. However, the role of the 5-HTT in modulating executive functions diseases is still not well understood. In the current study, we examined the effect of genetic (via gene knockout) and pharmacological (via chronic fluoxetine treatment) inactivation of the 5-HTT on a common measure of cognitive flexibility, reversal learning, in mice using a touchscreen based discrimination and reversal task. Results showed that 5-HTT knockout mice exhibited significantly facilitated reversal, and a trend for improved discrimination. C57BL/6J mice chronically treated with fluoxetine also showed facilitated reversal, restricted to the early phase of reversal. Taken together, these data show that either genetic or pharmacological inactivation of the 5-HTT, both of which increase synaptic 5-HT availability, improves cognitive flexibility, although the former also has some effects on discrimination learning. This finding is consistent with previous studies showing that 5-HT depletion impairs reversal learning in non-human primates and rats. This study further supports a major role for 5-HT in the pathophysiology and treatment of executive function in neuropsychiatric disease. Research supported by the National Institute on Alcohol Abuse and Alcoholism Intramural Research Program.

52. LITTLE AND OFTEN? MAINTAINING CONTINUED PERFORMANCE IN AN AUTOMATED T-MAZE FOR MICE. Gaskill, B.N.; Lucas, J.R.; Pajor, E.A.; Garner, J.P. Purdue University, USA. Operant and maze tasks in mice are limited by the small number of trials (~15) possible in a session before they lose motivation. We hypothesized that by manipulating reward size and session length, motivation, and hence performance, would be maintained in an automated T-maze. We predicted that larger rewards and shorter sessions would improve acquisition; and that smaller rewards and shorter sessions would maintain higher and less variable performance. 18 C57BL/6 mice (9 males and 9 females) acquired (criterion 8/10 correct) and performed a spatial discrimination, with one of 3 reward sizes (.02, .04, or .08g) and one of 3 session schedules (15, 30, or 45 minute sessions with the same inter-session intervals). Each mouse had a total of 360 minutes of access to the maze per night, for two nights, and completed 190 trials on average. Analysis used split-plot GLM with contrasts testing for linear effects. Acquisition

of the discrimination was unaffected by reward size or session length/interval. As predicted, after-criterion average performance improved as reward size decreased ($p<0.001$). As predicted, after-criterion variability in performance increased as reward size increased ($p=0.001$). Session length/interval did not affect any outcome. We conclude that an automated maze, with suitable reward sizes, can provide sustained performance with low variability, at 5-10 times the throughput of traditional methods.

53. THE ROLE OF GLUTAMATE IN METHYLPHENIDATE INDUCED MEMORY IMPAIRMENTS. Fry, M.D.; LeBlanc-Duchin, D. Dept. of Psychology. University of New Brunswick, Saint John NB, Canada. Recent studies have found that chronic exposure to methylphenidate (MPH) can produce impairment of object recognition and object placement memory in rats, and that this deficit may be attributed to the over-activation of D1 dopamine receptors. This receptor hyperactivity is also linked to a marked reduction in extracellular glutamate levels in the brain, and this effect may mediate the MPH-induced memory deficits. The present study tested the hypothesis that this impairment might be reversible through treatment with d-cycloserine (DCS), a glutamate receptor agonist, shortly before memory assessment. To this end, male Long-Evans rats were administered either MPH (8.0 mg/kg) orally for twenty days or no drug over this period. Testing began 14 days after the final dose of MPH. Thirty minutes prior to the acquisition trial of both an object recognition and an object placement test, the rats were injected with either DCS (12.0 mg/kg) or saline. While methylphenidate impaired memory in the object recognition test to a limited extent, no evidence for a reversal of this effect by DCS was detected.

54. ASSESSMENT OF OLFACTORY IMPAIRMENT BY BETA AMYLOID INJECTION IN HIPPOCAMPUS OR OLFACTORY BULB IN AN ANIMAL MODEL. Bernal C.; Guevara-Guzman R. Departamento de Fisiologa, Facultad de Medicina, Universidad Nacional Autnoma de Mexico, Mexico, DF 04510 Alzheimer's Disease (AD) is the most common cause of dementia in old age. It is a public health problem in several countries. β-amyloid is a neurotoxic peptide that forms neuritic plaques in the brain of AD patients. Nevertheless, this impairment in memory is not the first symptom, as it is preceded by an olfactory deficit which also appears in some other neurodegenerative diseases that are into dementia. Olfactory impairment caused by in situ β -amyloid injection has not been assessed in an animal model, neither the correlation of neuronal impairment in different sites of injection: olfactory bulb (OB), hippocampus (HIPP) and entorrinal cortex. Therefore, the aim of this research work is to assess if the β -amyloid peptide injected in the olfactory bulb (Group 1) or hippocampus (Group 2) of the rat produces alteration in the social, olfactory and spatial memory. To assess olfactory behavior, we carried out different olfactory tests, in addition to other behavioral and biochemical tests. We detected olfactory behavior impairment in the group injected in the hippocampus in regards to the control group. The olfactory tests showed: a) inability to find a chocolate chunk hidden during the search test; b) inability to discriminate between the two scents in a discriminating test. However, not significant difference in the investigation time during the two encounters of the social recognition test was found. A similar increase of lipoperoxidation was showed, not only in the HIPP, but also in the entorrinal cortex and OB in group 2; whereas group 1 showed higher levels of lipoperoxidation in OB than in the HIPP. We may infer that the β -amyloid injection in HIPP produces olfactory impairment in the rat throughout oxidative stress process in this structure, which extends to the OB and the entorrinal cortex. The doses injected in OB did not cause an extensive impairment in the olfactory behavior as the one in HIPP. GRANTS: IN-216907, 24784-M and SDEI-PTID05.5

55. ACTIVITY-REGULATED AMPA RECEPTOR ENDOCYTOSIS PLAYS DIFFERENT ROLES IN INSTRUMENTAL HABIT LEARNING. Liya Ma1, Soyon Ahn2, Yu-Tian Wang3, Anthony G. Phillips2. 1Graduate Program in Neuroscience, 2Dept. of Psychiatry, 3Dept. of Medicine and the Brain Research Centre, University of British Columbia. Habit formation is characterized by a transition from goal-directed action to an outcome-independent response. The role(s) of activity-regulated glutamate AMPA receptor endocytosis were explored at different stages of instrumental learning, using a membrane-permeable interference peptide Tat-GluR2 $_{3Y}$. Food-restricted Long Evans rats were trained daily in operant boxes to receive 30 sucrose reward pellets. Following the magazine and the lever-press training, they were given a random-interval (RI) 30s training session every day except on the 3 test days, scheduled after 2d, 12d and 20d of RI30s training. On each test day, the animals had 1hr free access to either the sucrose reward pellets (the devalued group) or a palatable food pellets (the valued group). Then their lever press and head entrance were assessed on an extinction test and a rewarded test. Prior to each extinction test, the interference peptide was systemically injected to half of the animals, while the vehicle controls received saline. On the first extinction test, immediately after the acquisition of the action-outcome contingency, the devalued group responded at a significantly lower rate than the valued group. Additionally, the interference peptide accelerated the rate of extinction in the valued group in comparison to their vehicle controls. On the second extinction test, their responses remained sensitive to outcome devaluation. On the third extinction test after extended training, the animals became resistant to the outcome devaluation effect, demonstrating a robust instrumental habit. Additionally, the interference peptide appeared to decrease the extinction rate, which was the

opposite effect of the first extinction test. This finding suggests that AMPAR-endocytosis mediated synaptic depression is critically and differentially involved in the early and late phases of instrumental training.

56. AGED RATS DEMONSTRATE INCREASED SUSCEPTIBILITY TO DISTRACTION IN A SELECTIVE ATTENTION VERSION OF THE PEAK-INTERVAL PROCEDURE. Stewart, A.L.[1], McAuley, J.D., [1,2] Mercier, A.M,[1] Pang, K.C.H. [2,3] [1]J P Scott Center for Neuroscience, Mind & Behavior and Psychology Department, Bowling Green State University, Bowling Green, OH 43403, [2]Stress & Motivated Behavior Institute (SMBI), NJMS-UMDNJ, Newark, NJ 07103; [3]Neurobehavioral Research Laboratory (129), DVA Medical Center, NJHCS, East Orange, NJ 07018. Elderly adults show impairments in attention and timing. Increased distractibility is a type of attentional impairment that has been attributed to an age-related decrease in inhibitory control. The present study assessed age-related changes in distractibility using a selective attention version of the peak-interval procedure. Young (4 months) and aged (19 months) male Fisher 344 rats were trained to time a light stimulus using a peak interval (PI) procedure with a 24 s criterion. Following PI training, selective attention was tested in distractor sessions, in which random tone bursts and house light flashes were presented as potential distractors throughout some trials, but not presented on other trials. Distractor test sessions were interleaved with non-distractor test sessions that were identical to initial PI training. For initial PI training and non-distractor test sessions, aged rats made fewer lever presses and were slighter more variable in their timing than young rats, but average peak times (a measure of temporal accuracy) were not significantly different. In distractor test sessions, both timing accuracy and variability were poorer for aged rats than for young rats. With respect to accuracy, peak times for aged rats were shorter and more variable with distractors than without distractors, especially early in testing with distractors; young rats, in contrast, showed relatively little effect of distractors on timing performance. These results demonstrate that aged rats are more distractible than young rats even though accuracy of timing is unimpaired, and are generally consistent with the hypothesis of an age-related decrease in inhibitory control. Supported by SMBI, DVA Medical Research and NIH.

57. DYNAMIC INTERACTIONS BETWEEN HIPPOCAMPAL AND SUPRAMAMMILLARY NUCLEUS THETA OSCILLATIONS DURING SPATIAL LEARNING. [1]Young, C.K.; [2]Ruan, M.; [2]McNaughton N. [1]Dept. of Psychology, University of Calgary, Canada [2]Dept. of Psychology, University of Otago, New Zealand. Hippocampal (HPC) theta oscillations are thought to contribute to functions from cognition to emotion. Recent studies suggest theta coherence between HPC and extra-HPC structures (such as the medial prefrontal cortex) is crucial for the expression of learned behaviours. In this study, we examine the relationship of theta oscillations between the HPC, and the supramammillary nucleus (SuM), which has been considered only as an ascending control structure of HPC theta frequency. Here, 4 rats were trained in the Morris water maze. Sixteen consecutive trials were administered in a single day while concurrent HPC and SuM recordings were obtained. The data were segmented into 3 epochs for each trial: 1) 2s prior to pool entry; 2) 2s prior to reaching the platform and; 3) 2s on the platform. Multi-taper spectral analysis, Hilbert transform and directed transfer function (DTF) were used to calculate theta (4-10 Hz) coherence, phase differences and Granger causality, respectively. We report experience-dependent modification of HPC and SuM phase differences and DTF as animals improved their latency in water maze performance. Phase differences and DTF were also differentially modulated between the 3 behavioural epochs. All these changes were associated with relatively constant theta peak and mean coherence during learning. These dynamic changes in phase and DTF between the HPC and the SuM indicate that SuM may contribute to the consolidation of water maze learning. These data are consistent with recent reports of reciprocal, rather than unilateral nature of HPC-SuM interactions.

58. DISTINCT EFFECTS OF ANTERIOR CINGULATE, ORBITOFRONTAL AND PRELIMBIC CORTEX LESIONS ON DECISION-MAKING IN A RAT GAMBLING TASK. Rivalan M.[1], Coutureau E.[2] and Dellu-Hagedorn F.[1] Lab. MAC, CNRS UMR 5227[1]; and lab. CNIC, CNRS UMR 5228[2], Bordeaux, France. Complex decision-making is profoundly impaired in psychiatric and neurological disorders (attention-deficit/hyperactivity disorder, addictions or frontal cortex lesions), but also in some healthy individuals for whom immediate gratification prevails over long-term gain. These deficits can be revealed experimentally using the Iowa Gambling Task (IGT). In order to explore the neurobiological bases of decision-making, we designed a Rat Gambling Task analogue of the IGT. This test provides rapid and specific measurement of adapted and maladapted decision-making in healthy rats. As in humans, good and poor decision-makers (preferring immediate larger reward despite suffering large loses or without any preference) can be identified within a single session, in an operant cage. The effects of Orbitofrontal (OF), Anterior Cingulate (AC) or Prelimbic (PL) cortex lesions were compared to Sham lesions in this task. A majority of OF and PL rats exhibited an inflexibility in behaviour, which was based on spatial preferences developed during training. This behaviour was not observed in sham and only in a few AC rats. Among rats with flexible behaviour, good and poor decision-makers remained in similar proportions except for the PL lesion. This lesion removed rats preferring bad options and increased proportion of undecided rats. Whereas behaviour of poor

decision-makers with lesions was unchanged, AC lesions markedly delayed decision-making in good performers. No relationship between behaviour and size of the lesions was observed. Our results reveal that rats solve a complex decision-making task by recruiting prefrontal cortex areas that are differentially involved in action/consequence associations, behavioural flexibility and sensitivity to reward. This model demonstrates good face and construct validities and provides a unique opportunity to easily explore the neurobiological bases of complex decision making.

59. THE ROLE OF THE SEROTONIN 6 RECEPTOR IN DORSAL STRIATUM MEDIATED LEARNING IN THE RAT. Eskenazi, D.; Neumaier, J.F. Medical Scientist Training Program. Graduate Program in Neurobiology and Behavior. Dept. of Psychiatry and Behavioral Sciences. University of Washington, School of Medicine, Seattle, Washington. Serotonergic innervation of the rat striatum plays a role in reward-mediated behaviors and reinforcement learning but it is not known which serotonin receptors are involved. Given their abundance in striatum, the Serotonin 6 (5-HT6) receptors are a prime suspect to mediate some of these effects. Previous work published from our lab has shown that viral mediated gene transfer (VMGT) leading to overexpression of 5-HT6 receptors in the ventral striatum interferes in establishing a conditioned place preference to cocaine and that VMGT of 5-HT6 receptors in the dorsomedial striatum (DMS) interferes with the acquisition of an operant task using forty trial daily sessions over three days. Here we demonstrate more evidence that 5-HT6 receptor overexpression in the DMS interferes with learning acquisition, rather than memory consolidation, used a fixed interval schedule on a lever pressing for sugar pellet paradigm in a single session of 100 trials. In line with other evidence demonstrating regional variability in the dorsal striatum, we show here for the first time that VMGT of 5-HT6 receptors in the sensorimotor dorsal lateral striatum (DLS) interferes with habitual responding by enhancing sensitivity to a change in reward contingency using the omission procedure. In all, we provide evidence that the 5-HT6 receptor subtype mediates many of serotonins regulatory roles in striatal-mediated reinforcement-learning behaviors. Future work is directed at characterizing the role of the 5-HT6 receptors in distinct striatal cell types.

60. EFFORT-DRIVEN REWARD TRAINING ENHANCES NEUROBIOLOGICAL RESILIENCE IN MALE LONG-EVANS RATS. Hyer, M.M., Karsner, S., Tu, E.; Franssen, C. L.; Lambert, K.G. Dept of Psychology, Randolph-Macon College, Ashland, VA 23005. The purported effort-driven reward (EDR) circuit includes the nucleus accumbens, striatum, prefrontal cortex and associated interconnections. Activation of this circuit has been suggested to build resilience against the emergence of depressive symptoms such as anhedonia, compromised cognitive abilities, and motor fatigue (Lambert, 2005). Prior research in our lab indicated that five weeks of EDR training, requiring animals to dig for froot loop rewards in mounds of bedding, increased persistence in a subsequent novel problem solving task. In the current study, one group of animals received EDR training for five weeks (n=8) and one group of animals, the non-contingent group, received froot-loop rewards regardless of directed physical effort to obtain the reward (n=8). Following training, the EDR-trained animals persisted in a novel problem solving task significantly longer than the non-trained group; specifically EDR animals spent more time directed toward the task and exhibited longer bout durations. Additionally, Neuropeptide Y, a neuropeptide associated with diminished anxiety and enhanced resilience (Gutman et al., 2008), was examined in the basolateral amygdala. The EDR-trained animals exhibited significantly higher percentages of Neuropeptide-Y immunoreactivity in the amygdala than the non-contingent animals. In sum, using an alternative version of learned helplessness (i.e., learned persistence), the results of the current study suggest that EDR training presents an opportunity to explore resilience-building strategies in rodents.

61. MATERNAL EXPERIENCE MAY PROTECT HIPPOCAMPAL LEARNING AND MEMORY FROM NEUROTOXIC INSULT. Rzucidlo, A.$_1$; Franssen, C.L.$_1$; Baranova, A.$_2$; Kinsley, C.H.$_2$; Lambert, K.G.$_1$ $_1$Dept. of Psychology. Randolph-Macon College, Ashland, VA 23005 USA; $_2$Dept of Psychology, University of Richmond, VA 23173 USA. Numerous studies have demonstrated that hormonal changes typically occuring during pregnancy, birth and lactation (e.g., altered levels of estrogen, progesterone, prolactin, and oxytocin), are cognitively and behaviorally beneficial. Such changes may actually remodel the female brain, increasing neuronal size and producing significant structural changes (Kinsley & Lambert, 2006; Kinsley & Lambert, 2008; Kinsley, et al., 2006). Recently, it has been suggested that ovarian hormones, including progesterone and estrogen, may act as neuroprotectants, promoting and enhancing neurological repair after traumatic brain injury (TBI; Rogers & Wagner, 2006; Stein, 2008). In this study we examined the effect of previous maternal experience on recovery from exposure to a seizurogenic neurotoxic chemical, kainic acid (KA). Prior work has demonstrated that KA administration causes damage to brain areas including the dentate gyrus (DG) and the CA2 and CA3 region of the hippocampus (Hilton, Bambrick, Thompson, & McCarthy, 2006). Age-matched virgin (n=16) and maternal rats (n=16) were trained on a dry-land version of the Morris Water Maze and tested before and after intraperitoneal injections of saline or KA (n=8, each group). Behavioral assessments following injections indicated that KA administration negatively affects performance on this task and that maternal animals have improved maintenance of this task. Rats were also tested on an object recognition task both before and after KA injections; maternal animals were significantly quicker than

their virgin counterparts to recognize an object they had previously encountered during both trials. The two reproductive groups were not significantly different in their seizure response to the drug, indicating that KA affected virgin and maternal animals in a similar physiological manner. We assessed neurotoxicity in the hippocampus using the FluoroJade-B stain for neurodegeneration. While we did not find differences in CA1 or DG, preliminary analyses indicate a neuroprotective effect in CA2 and CA3 areas of maternal animals.

62. ROUGH-AND-TUMBLE PLAY ENHANCES FOCUSED ATTENTION IN JUVENILE MALE LONG-EVANS RATS. Karsner, S.; Hall, K.; M'Coy, G.;Franssen, C.L.; Lambert, K.G. Dept of Psychology, Randolph-Macon College, Ashland, VA 23005. In recent years, the prevalence of the neurobehavioral disorder, Attention Deficit Hyperactivity Disorder (ADHD), has increased dramatically (Mandell et al., 2005). This disorder, characterized by hyperactivity, impulsivity, and pervasive inattention, affects males more than females and is often accompanied by substantial functional impairment. Because the prescription of psychotropic drugs remains controversial for children, it is important to investigate alternative therapeutic strategies (LaCasse & Leo, 2009). Interestingly, because rough-and-tumble play facilitates the development of executive functions in rodent models, diminishing physical play opportunities in contemporary childrens lifestyles have been linked to increased rates of ADHD (Panksepp, 2007). Play has been found to influence relevant neurochemicals in cognitive functions (e.g., dopamine and noradrenaline; Vanderschuren et al., 1997; Siviy, 1999). Accordingly, the purpose of the current study was to expose juvenile male Long-Evans rats to either two 30 minute play sessions with a conspecific for seven days (n=8) or comparable time with a stuffed toy (n=8). All rats were subsequently assessed in the attention set-shifting paradigm to determine the animals ability to discern salient cues among various distracting stimuli (adapted from Birrell & Brown, 2000). Specifically, the animals were assessed in a sequence of simple, complex, and intra-dimensional shift discriminatory tasks. In all tasks, rats retrieved froot loop rewards from small flower pots filled with various types of filler materials and marked with different odors. Results indicated that, whereas there were no differences between the player and non-player groups in latency to begin digging (indicating comparable motivation across groups), in the more difficult complex and intra-dimensional discrimination tasks, the players made significantly fewer errors than the non-players ($p<.05$). Thus, these results suggest that rough-and-tumble play facilitates performance on attention tasks in the juvenile rat.

63. MEDIAL SEPTUM NEUROKININ-2 RECEPTORS INFLUENCE ACh RELEASE IN CHOLINERGIC PROJECTION AREAS. Schäble, S.; Huston, J.P.; de Souza Silva, M.A. Institute of Physiological Psychology, Heinrich-Heine-University of Düsseldorf, Universitätsstr. 1, 40225 Düsseldorf, Germany. Neurokinins are neuropeptides, belonging to the tachykinin family, which are proposed to work as neurotransmitters or neuromodulators. Three neurokinin (NK) receptors, namely NK1, NK2 and NK3, were identified on cholinergic neurons in the medial septum. The neuropeptides, substance P (SP), neurokinin A (NKA) and neurokinin B (NKB), bind preferentially to the NK1, NK2 and NK3 receptors, respectively, but also with different degrees of affinity to the three neurokinin receptors. NK1, NK2 and NK3 receptors have been identified in the medial septum. There, systemic NK2 receptor antagonism blocked the acetylcholine (ACh) release in the hippocampus, induced by intra-septal administration of the NKA. The aim of this study was to assess the role of the NK2 receptors in the increase in extracellular ACh levels in frontal cortex, amygdala and hippocampus induced by medial septal injection of SP, NKA or NKB. Anesthetised animals were submitted to microdialysis procedure. Samples were analysed by HPLC-EC. Local injection of vehicle followed by SP, NKA or NKB into the medial septum increased ACh levels in the frontal cortex, amygdala and hippocampus. Application of the non-peptidic NK2 receptor antagonist, SR48968, followed by NKA or NKB injection into the medial septum blocked the increase in ACh in the amygdala and hippocampus in a dose dependent manner. Medial septal SR48968 administration was less effective in blocking the increase in ACh in the frontal cortex, amygdala and hippocampus induced by SP. Our results indicate that the medial septum NK2 receptors have an important role in mediating ACh release in the projection areas. It seems that the different degrees of affinity of the SP, NKA and NKB at the NK2 receptors do not primarily result in different effects on ACh release. These results support the finding that ligand cross-interaction occurs between neurokinins and their receptors.

64. THE ROLE OF SEROTONIN IN THE MEDIAL PREFRONTAL AND ENTORHINAL CORTEX IN THE MEDIATION OF THE EFFECTS OF COCAINE. Pum, M.E.[1]; Carey, R.J.[2]; Huston, J.P.[1]; Müller, C.P.[3] [1]Institute for Physiological Psychology, University of Düsseldorf, Germany; [2] Research Service (151), VA Medical Center, Syracuse, NY, USA; [3]Social, Genetic and Developmental Psychiatry Center, Institute of Psychiatry, King's College London, De Crespigny Park, London. Neuroimaging studies show that the application of cocaine as well as the presentation of cocaine-related stimuli lead to wide-spread neuronal activation outside the mesolimbic dopamine (DA) system. Thus, the present series of studies investigated the role of serotonin (5-HT) in cortical areas in the mediation of the effects of cocaine. To this end, a microdialysis study assessed the effects of cocaine on the levels of 5-HT and DA in the medial prefrontal cortex (mPFC), the perirhinal cortex (PRC) and the entorhinal cortex (EC).

Subsequently, the functional relevance of the effects of cocaine on 5-HT in the cortex was investigated in conditioned place preference (CPP) studies. The serotonergic innervation of the mPFC, the EC, or the occipital cortex (OccC), in which a previous study had found significant effects of cocaine on 5-HT levels, was lesioned by local infusion 5,7-dihydroxytryptamine (5,7-DHT), and the effect of these lesions on cocaine-induced CPP was tested. The acute injection of cocaine led to a dose-dependent increase of 5-HT and DA in the mPFC, the EC, and the PRC. In the CPP studies it was found that following a 90% depletion of 5-HT from the mPFC or a 61% depletion of 5-HT from the EC animals did not show cocaine-induced CPP. In contrast, the 78 % 5-HT depletion of the OccC had no effect on CPP. Thus, the present studies show that (a) cocaine dose-dependently increased DA and 5-HT in cortical areas associated with learning and memory, and (b) that the elevation of 5-HT in the mPFC and the EC contributes to cocaine-induced CPP. In general this finding supports a role of 5-HT in the mediation of cocaines effects and clarifies the association between an acute neurochemical effect and its long-term behavioral consequences.

65. COLOBOMA MICE EXHIBIT GENDER-SPECIFIC ALTERATIONS IN EXTINCTION AND REVERSAL LEARNING. Heyser, C.J; Wilson, M.C. Dept of Psychology, Franklin & Marshall College, Lancaster, PA 17603, USA. The coloboma mutation (Cm) is a neutron-irradiation induced gene deletion including a region encoding the synaptic vesicle docking fusion protein, synaptosomal-associated protein of 25 kD (*Snap25*). The resulting mutation is semi-dominant with heterozygote mice exhibiting a triad of phenotypic abnormalities that comprise profound spontaneous hyperactivity, head bobbing and a prominent eye dysmorphology. Although the coloboma mouse has been proposed as an animal model of attention deficit hyperactivity disorder given the profound hyperactivity, very little is known about the effects of this mutation on learning and memory. Therefore, the present study was conducted to examine learning in adult male and female coloboma mice using a discriminated operant task. More specifically, experiments were conducted to examine acquisition, extinction and reversal learning in this task. During the acquisition phase, all mice were trained (15 min daily sessions) to respond (nosepoke) on a FR-1 schedule of reinforcement for food (20 mg pellets) and then this requirement was increased to FR-3. The results showed that all mice acquired the discriminated operant response. During extinction, male coloboma mice responded significantly more than controls and female coloboma mice, which did not differ from each other. Female coloboma mice required significantly more trials to learn the reversal. Taken together, these data demonstrate gender-selective disruptions in learning in coloboma mutants and provide evidence supporting the hypotheses that alterations in *Snap* gene expression are associated with functional behavioral consequences.

66. METHYLENE BLUE PREVENTS MEMORY IMPAIRMENT IN A SPATIAL TASK CAUSED BY POSTERIOR CINGULATE CORTICAL HYPOMETABOLISM. P.D. Riha1, J.C. Rojas2, F. Gonzalez-Lima1,2 1. Department of Psychology, 2. Institute for Neuroscience, University of Texas, Austin, TX, USA. Hypometabolism in the posterior cingulate cortex (PCC) in patients with mild cognitive impairment is a major risk factor for developing Alzheimers disease. In rats, PCC metabolic inhibition produces spatial memory deficits, oxidative damage, and neurodegeneration. Methylene blue is a chemical compound that enhances memory, increases cytochrome oxidase activity and oxygen consumption, and has antioxidant properties. This study tested the neuroprotective and memory-enhancing properties of methylene blue in rats that received an injection of sodium azide, an inhibitor of cytochrome oxidase, directly in the PCC. Sodium azide administration resulted in impaired spatial memory in a hole board food-search task. In addition, sodium azide-treated rats had significantly fewer correlations in cytochrome oxidase activity between the PCC and other brain region as compared to the control rats. Co-administration of 4 mg/kg methylene blue prevented the memory impairment and maintained several of the significant brain interregional correlations that were found in the control group. Specifically, correlations in cytochrome oxidase activity between the PCC and hippocampal areas, and between the PCC and secondary motor cortex, were preserved. In addition, reference memory scores were significantly correlated with PCC metabolic activity in both the control and AZ+MB groups. Our results suggest that memory impairment associated with PCC hypometabolism can be prevented by interventions that strengthen the functional connectivity of the PCC or that optimize the metabolic function of regions that mediate spatial memory. Supported by NIH grant TM32 MN65728 to F.G.L.

67. THE RATCAP PORTABLE SCANNER: TOWARDS PET IMAGING IN BEHAVING ANIMALS. D. Schulz[1], S. Southekal[2], W. Schiffer[1], F.A. Henn[1,3], D. Schlyer[1], P. Vaska[1] [1]Medical Department, Brookhaven National Laboratory, Upton, NY; [2]Biomedical Engineering Department, SUNY Stony Brook, Stony Brook, NY; [3]Psychiatry Department, Mount Sinai School of Medicine, New York, NY. The Rat Conscious Animal PET (RatCAP) is a fully functional PET scanner developed at Brookhaven Lab to allow for imaging of receptor occupancy using specific radiotracers in the unanesthetized, unrestrained rat. This is made possible by its miniature size which permits direct attachment to the rat's head. Here we show first data which demonstrate the unique capabilities of the RatCAP. In a series of experiments, female adult Sprague-Dawley rats were scanned while awake once or twice in succession and also under ketamine anesthesia. Each scan lasted approximately an hour. ^{11}C-raclopride, a dopamine D2/3 receptor

ligand, was used as a radiotracer. Infused doses were 1.5 mCi with a total mass of 5 nmol/kg (i.v.) or less. Stress hormone levels were measured to assess the animal's state while in the RatCAP. The rat was free to move about in an open field during the scans. We show that a) open field activity was correlated with degree of ^{11}C-raclopride binding in the striatum, b) ^{11}C-raclopride utilization during continuous low rate infusions differed in the awake and anesthetized rat, c) ^{11}C-raclopride uptake decreased after treatment with cold raclopride (2 mg/kg; i.v.) and d) corticosterone levels decreased to baseline while the RatCAP was attached. In the future, we hope to initiate studies which will allow us to establish correspondence between changes in neurochemical and behavioral activity as the animal performs a specific behavioral task. The RatCAP promises to be a groundbreaking tool in the neurosciences, paving the way towards PET imaging in behaving animals.

68. SHORT TERM EFFECTS OF ESTROGEN RECEPTOR ALPHA AND BETA AGONISTS ON LEARNING AND DENDRITIC SPINES. Phan, A.1,2; Lancaster, K.E.1; Armstrong, JN1; MacLusky, N.J.1; Choleris, E.2 1Dept. of Biomedical Sciences, 2Dept. of Psychology. University of Guelph, Guelph, ON. N1G 2W1 Canada. Estrogens are involved in learning and memory, but results from studies range from improvement to impairment. This may be due to the differential activation of estrogen receptors (ER), ERα, ERβ or membrane-associated ERs. Most behavioral research has examined the long-term effects of nuclear estrogens receptor activation (> few to several hrs). However, rapid effects of estrogens on neuronal plasticity have also been reported (<1hr). It is not known whether these rapid changes also have effects on learning or memory. Therefore, we investigated the actions of ERα agonist (PPT) and ERβ agonist (DPN) on 3 estrogen-sensitive learning paradigms (at doses of 30μg, 50μg, 75μg, 150μg per mouse). Adult female, ovariectomized, CD1 mice were subcutaneously treated with PPT or DPN and tested in social recognition (ability to recognize conspecifics), object recognition or object placement paradigms. The paradigms were adjusted such that they were completed within 40min of drug administration. PPT (at 75μg) rapidly improved social and object recognition, and object placement. DPN did not improve either type of recognition learning and may impair social recognition. DPN (at 75μg) however did improve object placement. Secondly, we investigated the effects of PPT and DPN (both at 75μg) on CA1 apical dendritic spine length and number within the same 40min time period. PPT increased spine length and number, but DPN did not. These data indicate that rapid activation of ERα and ERβ affect learning and neuronal spine morphology, with ERα being more involved in these actions than ERβ. Funded by NSERC.

Social Behavior

69. THE INVOLVEMENT OF ESTROGEN RECEPTOR ALPHA AND OXYTOCIN IN MALE MONGOLIAN GERBIL PARENTAL AND SOCIAL BEHAVIORS. Phan, A.1,2; Roberts, V.1; Mong, J.3; Abadilla, R.4; Choleris, E.2; Clark, M.M.4 1Dept. of Biomedical Sciences, 2Dept. of Psychology, University of Guelph, Guelph, ON. N1G 2W1 Canada. 3Dept. of Pharmacology & Experimental Therapeutics, University of Maryland, School of Medicine, Baltimore, MD. 21201 USA. 4Dept. of Psychology, McMaster University, Hamilton, ON. L8S 4L8 Canada. Mongolian gerbils (*Meriones unguiculatus*) are a social species, in which both the male and female contribute to raising their pups. We investigated the potential involvement of estrogen receptor alpha (ERα) and oxytocin (OT) in various social behaviors (i.e. parental behavior, social investigation, scent marking) and physiological measures (i.e. body weight, testes weight). After behavioral testing, the brains of 57 males were extracted, and immunocytochemistry for ERα and OT were performed. The density of cells stained for ERα or OT in various brain nuclei were measured and correlated with behavioral measures. ERα expression in the hypothalamic ventral medial nucleus negatively correlated with the amount of time fathers spent away from their pups, while preliminary results suggest that OT staining in the paraventricular nucleus is positively correlated to the amount of time fathers spend with their pups. ERα and OT expression in several nuclei also negatively correlate with social investigation times. Overall, these results suggest that both OT and ERα may be involved in the regulation of male parental behavior and other social behaviors in Mongolian gerbils. Funded by NSERC.

70. MAIN OLFACTORY SYSTEM MEDIATES SOCIAL BUFFERING OF CONDITIONED FEAR RESPONSES IN MALE RATS. Kiyokawa, Y.; Takeuchi, Y.; Nishihara, M.; Mori, Y. Graduate School of Agricultural and Life Sciences. The University of Tokyo, Tokyo 113-8657 JAPAN. In a phenomenon known as social buffering in various species, stress responses are less distinct when animals are exposed to a stressor with one or more conspecific animals. We previously reported in adult Wistar male rats that the presence of an associate rat mitigated conditioned fear responses to an auditory and contextual conditioned stimulus (CS). In a subsequent study, we found that physical contact between the dyad was not necessary for this phenomenon. If social buffering mitigates conditioned fear responses, the subject should receive some sort of signals from the accompanying animal. In this study, we investigated the role of the main olfactory system in this social buffering. The main olfactory epithelium of the subject was lesioned by intranasal injection of $ZnSO_4$ two days before the conditioning day. Then, they were fear-conditioned to an auditory CS and, twenty-four hours later, were re-exposed to the CS either alone or with an

associate separated by double wire mesh. When fear-conditioned rats were exposed to the CS alone, both $ZnSO_4$- and saline-treated subjects showed freezing. Although the presence of an associate mitigated freezing of the saline-treated subject, $ZnSO_4$-treated subject showed robust freezing in spite of the presence of an associate. These results suggest that the main olfactory system mediates social buffering of conditioned fear responses in male rats.

71. SOCIAL ANXIETY-LIKE BEHAVIOR FOLLOWING EARLY-LIFE SOCIAL ISOLATION IS REDUCED BY CORTICOTROPIN-RELEASING FACTOR RECEPTOR ANTAGONISM WITHIN THE DRN. Lukkes, JL[1,2]; Vuong, S[1]; Scholl, JL[1]; Oliver, H[1]; Forster, GL[1]; [1]Basic Biomedical Sciences, University of South Dakota, Vermillion, SD. [2]Integrative Physiology, University of Colorado, Boulder, CO. Social isolation (SI) of rats during the early part of development increases social anxiety-like behavior in adulthood. Furthermore, early-life SI increases the levels of corticotropin-releasing factor (CRF) receptors in the serotonergic dorsal raphe nucleus (dRN) of adult rats. Interactions between serotonin and CRF systems are thought to mediate anxiety behavior. Therefore, we investigated the effects of CRF receptor antagonism within the dRN on social anxiety-like behavior following early-life SI. Rats were reared in isolation or in groups from weaning until mid-adolescence, and re-housed in groups and allowed to develop into adulthood. Adult rats underwent surgery to implant a drug cannula into the dRN. Following recovery and acclimation to the testing arena, rats were infused with vehicle or the CRF receptor antagonist d-Phe CRF (50 or 500 ng) into the dRN prior to a social interaction test. Isolation-reared rats pretreated with vehicle exhibited increased social anxiety-like behavior as compared to rats reared in groups. Pretreatment of the dRN with d-Phe CRF significantly reduced social anxiety-like behaviors exhibited by isolation-reared rats. However, infusion of the CRF antagonist within the dRN did not affect locomotion in the absence of social interaction. Overall, this study shows that CRF antagonism within the dRN reduces social anxiety-like behavior following early-life SI. These data suggest that CRF receptor antagonists could provide a potential treatment of social anxiety.

72. SELECTIVE BREEDING FOR DIFFERENTIAL RATES OF 50 KHZ ULTRASONIC VOCALIZATIONS: AN EXAMINATION OF SOCIAL RECOGNITION AND FEAR CONDITIONING. Webber, E.S; Beckwith, T.J.; Peña, Samantha; Cromwell, H.C. John Paul Scott Center for Neuroscience Mind and Behavior. Psychology Department, Bowling Green State University, Bowling Green, OH 43402. The current study explored basic emotional and social processes using animals that were selectively bred based upon differential 50 kHz ultrasonic vocalization (USV) emission during a "tickle" paradigm. 50 kHz USVS are vocalizations that rats emit during positive social experiences such as play. Two main lines have been created: a high-line and low-line based on rate of USV production. These lines have been compared with a random-line control group. This animal model was designed to examine how differences in levels of affective communication in rats may be related to alterations in social abilities and general affective processes. Previous research has found that the low-line animals may demonstrate an anxious phenotype, and the high-line animals may demonstrate a phenotype resilient to anxiety. For example, juvenile low-line animals display reduced play behavior relative to control animals. The specific aims of the current study were to compare 1) social recognition abilities and 2) play suppression in response to predatory (cat collar) odor between selectively bred animal lines. To determine the extent of cat odor-induced play suppression, behavior was monitored in eight extinction sessions. Results demonstrated that low line animals have reduced social recognition abilities measured by a social memory test and reduced play suppression following cat odor exposure. In contrast, suppression of play behavior in high-line animals was enhanced and extended throughout the extinction period. This divergence between animal lines suggests a fundamental difference in emotional learning. Low line animals express little ability to associate cues with emotional and social stimuli while high line animals appear extra-sensitive to emotional experiences and their related contexts. This dissociation in emotional learning sheds light on previous findings with these animal lines and provides a novel model of emotional alterations produced from selective breeding.

73. MORPHOLOGICAL ASPECTS OF PINEAL GLAND IN A WILD BRAZILIAN CARNIVORE WITH SAZONAL REPRODUCTIVE BEHAVIOR AND NOCTURNAL HABIT PROCYON CANCRIVORUS - CURVIER 1789. Carvalho, A.F.; Marques, L.O.; Zimberknopf, E.; Mananares, C.A.F. Morphologycal Departament. Veterinary Medicin Octvio Bastos, So Joo da Boa Vista, Brazil. The pineal gland of the mammals release different neuropeptides such as those from autonomic sympathetic and parassimpathetic neurons, as well as autocrine/paracrine peptides and peptidergic hormones to the systemic circulation. Melatonin, a pineal gland peptidergic hormone influenced by circadian, ultra and infracircadian rhythms, is of special interest in sazonal species. Thus, the aim of the present study was to morphologically characterize the pineal gland of Procyon cancrivorus and its relationship with seasonal reproductive and nocturnal behavior of the Procyon. Six authorized animals were used. The glands were collected all year long, dissected, photographed, radiographic, dehydrated and embedded in paraffin. Cuts were stained by picrossirius with deep of hematoxilin HE and Toluidin blue. Macroscopically the gland was located between the rostral colicules, rostral to the cerebelar vermis, ventral to the

esplen of the corpus callosum and caudal to the habenular comissure. It was classified as type A and the subcallosum. The gland was covered with a connective tissue capsule that infiltrates into the entire parenchyma and divided it into visible and distinct lobes. The pineal recess was in contact with the third ventricle, what it can directly provide melatonin secretion to the liquor. A large quantity of blood vessels and cells were also observed. Calcium concretions were not found, suggesting intense glandular activity without any function loss. Morphological evidences, such as the large quantity of blood vessels and cells (pinealocytes) demonstrated that the gland of these animals was highly active all over the year, and its secretion mechanism must be similar to the ovine one which in turn is cycling during short photoperiods influencing its behavior.

74. ESTROGEN RECEPTOR ALPHA AGONIST IMPAIRS MEMORY BUT NOT ACQUISITION OF A SOCIALLY LEARNED FOOD PREFERENCE IN CD1 MICE. Clipperton, A.E.[1], Brown, A. [2], Hussey, B. [3], Tam, C.[4], Choleris, E.[1] Dept Psychology[1], Dept Biomedical Sciences[2], Dept Molecular Biology & Genetics[3], Dept Human Kinetics[4] Estrogens are known to modulate many behaviors, including learning. They bind to two estrogen receptors, alpha (ERα) and beta (ERβ). Activation of ERβ often improves learning, while ERα tends to impairs it. We have previously shown that the ERα agonist 1,3,5-tris(4-Hydroxyphenyl)-4-propyl-1H-pyrazole (PPT) impairs the learning of a socially transmitted food preference when administered 48 hours prior to learning and testing. To tease apart the effects of PPT on the acquisition, consolidation or retrieval of this socially learned memory, a time interval was introduced between the learning and the testing parts of the social learning paradigm. Pilot work had previously shown that ovariectomized female mice were capable of retaining the memory of the socially acquired food preference for up to 1 week. Thus, in a subsequent study, different groups of ovariectomized observer mice were administered PPT either immediately (post-acquisition) or 24h (post-consolidation) following a social interaction with an ovariectomized, familiar, conspecific demonstrator that had just been fed a flavoured food . During the interaction, observers normally acquire a preference for the demonstrators food. The observers were tested for their memory of the food preference 48 hr after drug administration. Preliminary results suggest that the social transmission of food preferences was impaired by post-acquisition and post-consolidation administration of PPT. Feeding behaviour per se was not affected by drug treatment. This, combined with our previous results, suggests that ERα activation impairs social learning by acting on the retrieval of the memory. Supported by NSERC.

75. FATHERHOOD INHIBITS ADULT NEUROGENESIS WITHOUT ALTERING BEHAVIORS ASSOCIATED WITH THE HIPPOCAMPUS. Glasper, E.R.; Pavlic, A.; Kozorovitskiy, Y.; Gould, E. Department of Psychology and Neuroscience Institute. Princeton University, Princeton, NJ 08544 USA. Much attention has been devoted to maternal experience and subsequent effects on hippocampal structure and function. However, fatherhood has been little studied, in large part due to the lack of caregiving provided by most male mammals. Paternal care is a relatively rare occurrence among mammalian species (~6%). California mice (*Peromyscus californicus*) are unusual in this respect, participating extensively in raising their young. California mouse fathers engage in all maternal behaviors, including licking/grooming, nest building, retrieval, and huddling, with the exception of nursing. The effects of fatherhood on adult neurogenesis and subsequent changes in hippocampal-mediated behavior are currently unknown. To determine whether fatherhood alters adult neurogenesis, we examined the number of BrdU-labeled cells in the dentate gyrus of fathers caring for their young compared to age-matched pair housed males without pups. Four weeks after birth, around the time of weaning, the number of BrdU-labeled cells was significantly reduced in fathers compared to controls. No differences in the percentage of BrdU-labeled cells expressing NeuN was observed between controls and fathers, suggesting that the decreased number of BrdU-labeled cells associated with fatherhood represents decreased neurogenesis. Additionally, anxiety-like behavior (novelty suppressed feeding) and learning/memory (object recognition) were also investigated. While fatherhood reduced adult neurogenesis, no significant changes in either of these behaviors were observed. The ability to discriminate between novel and familiar objects was similar between control males and fathers. Likewise, fatherhood did not significantly alter the latency to consume food in a novel arena, compared to controls. Together, these findings indicate that fatherhood is associated with significant changes in hippocampal structure; however, some functions of the hippocampus remain preserved.

76. THE EFFECTS OF ESTRADIOL AND SELECTIVE ESTROGEN RECEPTOR MODULATORS FOR BEHAVIORAL PROCESSES, TUMORIGENESIS, AND UTERINE PROLIFERATION IN OVARIECTOMIZED RATS Walf, A.; Rusconi, J.; Frye, C. Dept. of Psych, Biol, and the Centers for Neuroscience and Life Science Research, University at Albany, Albany, NY USA 12222. A major concern of estradiol (E2)-mimetic hormone therapies is the potential for deleterious effects with respect to tumorigenic processes, which may outweigh possible beneficial effects on psychological processes. E2 has actions at estrogen receptors (ERs), of which two subtypes have been characterized (ERα, ERβ) with different expression in the brain and body. Potential mechanisms for E2s beneficial effects in the brain on behavioral processes, and negative proliferative effects in the body, was investigated using an animal model. We compared the effects of E2, an ERα-selective estrogen receptor modulator

(SERM; PPT), and an ERβ-SERM (DPN) to vehicle, for anxiety-like behavior in ovariectomized rats. Some rats were administered the chemical carcinogen (DMBA) or inert vehicle. Tumor burden and uterine weight were analyzed. Markers of cell division/proliferation in the brain and these peripheral tissues were assessed. We found that E2 and DPN, but not PPT, decreased anxiety-like behavior. E2 and PPT increased tumor burden and uterine weight. Changes in cell division were noted in the uterus, tumors, and hippocampus. Thus, there may be ER subtype-specificity for estrogens trophic effects. Supported by: Dept. of Defense, NSF, and NIMH.

77. CHRONIC PROGESTERONE TO INTACT RATS RESULTS IN SEX DIFFERENCES IN COGNITIVE, AFFECTIVE AND/OR SOCIAL BEHAVIORS Llaneza, D.C1, Frye, C.A.1-4 Dept. of Psychology1, Biological Sciences2, and The Centers for Neuroscience3 and Life Sciences4 Research; The University at Albany-SUNY Neurodevelopmental and neuropsychiatric disorders are characterized by disruptions in cognitive, affective and/or social behaviors and many demonstrate gender differences. Sex differences in behaviors indicate females show more pro-social behavior, and males tend to perform better in some cognitive tasks. Male rodents show less anxiety-like behavior, and females are typically more stress-responsive. Rodents also show sex differences in progestogen levels in adulthood. Males have lower progestogen levels than do females, and progestogen levels are cycle-phase dependent in females. Sex differences in progestogens may be related to sex differences in behaviors. Female rodents show improved cognitive performance, less anxiety-like behavior, are more social, and less stress-responsive when progestogen levels are high, compared to ovariectomized (ovx) rodents. Gonadectomy increases anxiety-like behavior of male rodents. Administration of progesterone (P4) to ovx rodents can improve anxiety-like behavior, enhance cognitive performance, and increase sociability; however, activational effects of progestogens on males are not established. Sex differences in behaviors may be attributed, in part, to sex differences in P4. We hypothesized P4 administration to females and males will mediate social, cognitive and/or affective behaviors differentially, resulting in sex differences. Adult female and male gonadally-intact Long-Evans rats were implanted with silastic capsules containing crystalline P4 or were empty. Administration of P4 to females enhanced affective behavior and cognitive performance, while males showed opposite effects. Thus, there are sex differences in response to P4 such that P4 improves behaviors of females, and decreases performance of males. Progestogen and androgen levels are being examined to determine how mechanistic actions in several brain regions may influence these sex differences in behaviors.

78. SEX DIFFERENCES, AND ENDOGENOUS HORMONAL MILIEU, INFLUENCE DOSE-DEPENDENT RESPONSE TO COCAINE FOR EFFECTS ON ANXIETY AND SEXUAL BEHAVIOR. Kohtz, A.S.[1]; Paris, J.J.[1]; & Frye, C.A.[1-4] Departments of Psychology[1] and Biology[2] and Centers for Neuroscience[3] and Life Sciences[4] Research The University at Albany-S.U.N.Y., Albany, NY Sex-dependent factors, such as hormones, may influence the experience of illicit drug use, such as cocaine. Gender differences are observed in interoceptive effects of cocaine. Women, compared to men, tend to report less euphoria, more anxiety, stronger cue-induced cravings, and are more likely to relapse. Female rats are more sensitive to the psychoactive effects of cocaine, than are their male counterparts. Notably, the progesterone (P) metabolite, 5a-pregnan-3a-ol-20-one (3a, 5a-THP), an integral hormone for normative sexual and anxiety behaviors in rodents, may account for some of these differences. Administration of cocaine or 3a, 5a-THP, or sex, produce conditioned place-preference response, and thus are rewarding. As such, sex is an ideal medium for studying interactive effects of rewarding stimuli. Additionally, 3a, 5a-THP is necessary for sexual behaviors to occur. Hormones also influence cocaine response, as studies have shown cyclic changes in endogenous P alters proclivity to self-administer cocaine, and exogenous P can attenuate effects of cocaine. Cocaine, or 3a,5a-THP, administration have dose-dependent effects to attenuate anxiety, and modify sexual behaviors. Thus, we hypothesized that natural variations in progestogen milieu may regulate dose-dependent effects of cocaine to influence affective and/or reproductive behavior of rats. Utilizing naturally cycling female and male rats, we acutely administered cocaine in saline (0, 5, 10, or 20mg/kg, IP) and observed open-field and paced-mating behaviors. Our data reveal differences in anxiolytic response, and variations in sexual behaviors, in a dose-dependent manner across the estrous cycle. These cyclic variations could be contributed to interactions of cocaine with 3a, 5a-THP.

Human Studies

79. OBSESSIVE-COMPULSIVE DISORDER AS A DYSFUNCTION OF SECURITY MOTIVATION. Hinds, A.; Szechtman, H.; Van Ameringen, M.; Mancini, C. Dept. Psychiatry & Behav Neurosc, McMaster Univ, Hamilton, ON; Schmidt, L. Dept Psychology, Behavior & Neuroscience, McMaster Univ; Woody, E. Dept. Psychol., Univ Waterloo, Waterloo, ON, Canada. A recent theory (Szechtman & Woody, Psychol Review, 111:111-127, 2004) posits a Security Motivation System (SMS) activated by potential, rather than by imminent, threat to the individual. The SMS coordinates motor activity that probes the environment for danger and includes precaution behaviors such as checking (eg, for the presence of predators) and cleaning (for infestation by germs, etc), and induces also an

affective phenomenological cue of potential danger that is experienced as anxiety. The production of these species-typical behaviours is thought to be essential for the effective termination of an activated SMS and subsequent decrease in anxiety. Investigation of a physiological measure of the SMS heart rate variability (HRV) demonstrated elevation of anxiety after exposure to a high contamination threat stimulus which persisted until performance of appropriate threat-removal behaviours (in this case, hand washing). We further theorized that disturbance in the normal function of the SMS produces the characteristic symptoms of Obsessive-Compulsive disorder (OCD). Under this model, participation in SMS-terminating behaviours is insufficient to return the system to baseline; thus, individuals afflicted with OCD were predicted to display prolonged anxiety after exposure to contamination stimuli, despite participating in hand washing. We report here on a paradigm to test the expected results. In preliminary trials, participants diagnosed with OCD contacting a stimulus which appeared contaminated (diapers appearing wet and soiled) demonstrated an increase in anxiety that was comparable to controls. After hand washing, anxiety, as measured by HRV, returned to baseline in controls, indicative of SMS termination. This decrease in anxiety was incomplete in OCD patients. These trends obtained in the preliminary study provide support for the Security-Motivation theory of OCD, and suggest that dysfunctional termination of the SMS after participation in motivated security behaviours is associated with the compulsions and elevated anxiety characteristic of OCD. Supported by CIHR MOP134450.

80. DISSOCIATION OF THE BRAIN ACTIVATION NETWORK ASSOCIATED WITH HYPOTHESIS-GENERATING AND HYPOTHESIS-UNDERSTANDING IN BIOLOGY LEARNING: FMRI STUDY. Lee, Jun-Ki1; Kwon, Yong-Ju1,2; Jeong, Jin-su3; Kwon, Suk-Won1. 1Department of Biology Education, Korea National University of Education, Cheongwon, Chungbuk 363-791, Korea. 2A. A. Martino Center for Biomedical Imaging, Department of Radiology, Massachusetts General Hospital, Charlestown, MA 02129. USA. 3 Division of Science Education, Biology Education Major, Daegu University, Gyeongbuk 712-714, Republic of Korea Functional magnetic resonance imaging (fMRI) was used to examine the hypothesized dissociation between the neural network of hypothesis-generating and hypothesis-understanding. We have designed two sets of task paradigm on the biological phenomena: hypothesis-generating and hypothesis-understanding and sixty healthy participants performed the tasks. Our results show that participants used different neural network between hypothesis-generating and hypothesis-understanding and they were appearing dissociating patterns. In other words, in their brain, two types of thinking strategy related to hypothesis dont share the same brain regions or networks. Therefore likewise the general physical causality experiment the neural network associated with hypothesis-generating and hypothesis-understanding in biology learning is operating independently. Taken together, it concludes that hypothesis-generating and hypothesis-understanding in biology learning is dissociated in neural network level. That is the reason why what we could not students ability of scientific hypothesis-generating by the traditional teachers expository style teaching-learning method (hypothesis-understanding type learning).

81. EUROPEAN MEDICINES AGENCY DRAFT GUIDELINE ON THE DEVELOPMENT OF MEDICINAL PRODUCTS FOR THE TREATMENT OF ALCOHOL DEPENDENCE: DO YOU AGREE? Ostrowski, N.L.; Rizvi, L. Global Patient Safety, Eli Lilly and Company, Indianapolis, IN 46285 USA. Until recently, there has been no pharmaceutical regulatory agency that has developed consensus and issued guidance to pharmaceutical companies regarding how to develop therapeutic treatments for alcohol dependent patients. While global entities such as the World Health Organization recognize that up to 24% (EMEA draft Guidance) of some populations suffer from alcohol abuse disorders, there has not been a focused effort to develop pharmacotherapies. There are 3 compounds that are currently approved in the US for alcohol-dependence that work through distinct mechanisms and yet there is substantial unmet need in the treatment of alcoholism. (insert period) The EMEA issued a draft guideline in January, 2009, providing the first set of recommendations regarding clinical development of therapies for alcohol dependence and asked for feedback. This interactive poster highlights some of the theoretical and practical issues raised and asks for your opinions and insights.

82. BRAIN ACTIVITY DURING COGNITIVE PERFORMANCE IN MIDDLE AGED WOMEN CARRIES OF CATECHOL-O-METHYLTRANSFERASE VAL158MET GENOTYPE. Solis-Ortiz, S.; Gutierrez-Munoz, E.; Perez-Luque, E.; Morado-Crespo, L. Dept. of Medical Research, University of Guanajuato. Leon 37320, Mexico. In the prefrontal cortex, the enzyme catechol-methyltransferase (COMT) is critical in the metabolic degradation dopamine, a neurotransmitter involved in human cognitive function. The gene contains a functional polymorphism val158met, which has been associated with cognitive impairment in healthy volunteers and schizophrenia. The effect of this polymorphism on cerebral function in healthy women is not well known. The aim of this study was examined the relationship between COMT genotype, brain activity and executive functions in middle aged healthy women at menopausal period, which is characterized by impairment in some aspects of cognitive function. EEG activity was recorded in 14 posmenopausal women (median=53 years) carries of val/val genotype, 11 with the met/met genotype and 11 with the val/met genotype during the performance of Wisconsin Card Sorting Test, a test

that measure prefrontal functions. The absolute power (AP) of delta, theta, alpha1, alpha2, beta1 and beta2 activity, and the number of the errors of the test were obtained. The val/val group committed significantly fewer errors in the test than either the met/met or val/met groups ($p<0.02$). During performance test, AP of delta ($p<0.001$) and beta2 ($p<0.001$) in the frontal and central brain regions, delta ($p<0.001$), theta ($p<0.05$), beta1 ($p<0.01$) and beta2 ($p<0.01$) in the parietal region was lower in the women carries val/val genotype compared with met/met group. AP of beta1 ($p<0.01$) and beta 2 ($p<0.001$) bands was increased in the met/met group in the temporal region. These findings suggesting that a functional genetic polymorphism involve in human cognitive function may influence on brain activity at menopausal period. Work supported by CONACYT Grant 060645, CONCYTEG Grant 06-16-K117-142 and University of Guanajuato.

83. ~~SEX STEROID HORMONES AND NEUROPSYCHOLOGICAL FUNCTIONS: ROLE OF ESTROGEN IN WORKING MEMORY FOR EMOTIONAL FACIAL EXPRESSIONS, IN YOUNG WOMEN. Gasbarri, A.* (1); Pompili, A(1); dOnofrio, A(1); Tavares, M.C. (2) ; Tomaz, C. (2). (1) Dept. Biomed. Sci & Technol, Univ. LAquila, Italy (2) Dept. Physiol. Sci, Lab. Neurosci. & Behav, Univ. Braslia, Brazil.~~ **NOT PRESENTED.**

84. ~~SEX-RELATED TALKATIVENESS AND EMOTIONAL MEMORY. Gasbarri, A.*(1); Pompili, A. (1); Arnone, B. (1); Tavares, M.C. (2) ; Tomaz, C. (2) . (1) Dept. Biomed. Sci & Technol, Univ. LAquila, Italy. (2) Dept. Physiol. Sci, Lab. Neurosci. & Behav, Univ. Braslia, Brazil~~. **NOT PRESENTED.**

Reward and Addiction

85. CONDITIONED HYPERACTIVITY TO ETHANOL-PAIRED STIMULI IN ZEBRAFISH (DANIO RERIO). *Blaser, R.E., & **Koid, A. *Department of Psychology, University of San Diego, San Diego, CA, 92110; **Franklin and Marshall College, Lancaster, PA 17602. One of the most robust and readily measurable effects of ethanol on zebrafish behavior is locomotor hyperactivity, a behavior that has also been used as a simple and objective measure of conditioning in fish. The purpose of the current experiment was to test whether ethanol-induced hyperactivity could be conditioned. Adult, wild-type zebrafish received eight conditioning trials, four with ethanol and four without. For half of the subjects, a black tank was paired with ethanol (CS+), and a white tank with

fresh water (CS-); the colors were reversed for the remaining half. There were five groups: Group C0.0 received no ethanol in any trial, Groups C0.5 and E0.5 received 0.5% ethanol in the CS+, and Groups C1.0 and E1.0 received 1.0% ethanol in the CS+. After the conditioning trials, subjects were tested with the CS+ and CS-. Experimental subjects (E0.5 and E1.0) were tested in the CS+ without ethanol and in the CS- with ethanol to measure conditioned behavior. Control subjects (C0.0, C0.5 and C1.0) were tested in the CS+ with ethanol and the CS- without ethanol (as in training) for comparison. Across the four ethanol trials, experimental subjects showed sensitization rather than tolerance to ethanol-induced hyperactivity. In the test, experimental subjects receiving 1.0% ethanol (but not 0.5%) demonstrated significant hyperactivity to the CS+ (in the absence of ethanol), and significant hypoactivity to the CS- (in the presence of ethanol). These results suggest a learning component in the sensitization effect, and demonstrate that ethanol is an effective US for classical conditioning in zebrafish.

86. HEDONIC & REWARDING PROFILES OF ANABOLIC ANDROGENIC STEROIDS CLASS I-III 1Brito-Vargas, P., 2Cruz, B., 1Parrilla-Carrero, J., 3Figueroa, O., 4Lugo, A., 5Rivera, M., 6Garcia-Sosa, R., 7Barreto-Estrada, JL. 1Department of Sciences and Technology, Universidad del Este, Carolina, PR, 2Department of Biology, (UPR), Mayagez Campus, 3Department of Biology (UPR), Humacao Campus, 4Natural Sciences Department, Interamerican University, Metropolitan Campus, 5Department of Social Sciences, (UPR), Cayey Campus, 6Department of Biology, (UPR), Rio Piedras Campus, 7School of Medicine, Department of Anatomy and Neurobiology, (UPR), Medical Sciences Campus, San Juan, PR. Anabolic androgenic steroids (AAS) are synthetic derivates of testosterone. There are approximately 60 differents AAS compounds that can be classified in three classes based upon their chemical structure and metabolites, as well as route of administration. Even short exposure to AAS can produce significant mood and behavioral symptoms. A growing body of work in rodents shows that androgen compounds have hedonic and reinforcing effects. AAS are thought to be very similar in action and side effects, making generalizations very common. However, we hypothesized that different classes of AAS will produce different behavioral changes due to their disparities in chemical composition and metabolism. In this experiment the AAS, testosterone propionate (TP) a class I AAS, nandrolone, a class II (AAS) and 17α-methyltestosterone (17α-meT), a class III AAS were injected in adult mice to study their effects in hedonia and reward using the conditioned place preference (CPP). In addition, we measured anxiety behaviors using the dark-light transitions and elevated plus maze (EPM). In this study, we injected (TP) a class I AAS, nandrolone, a class II AAS, and 17 α-meT, a class III AAS in C57Bl/6J mice at three doses (0.075, 0.75 and 7.5 mg/kg). We have found a shift in place preference in TP in all doses tested, and also in nandrolone at the higher doses tested (0.75 and 7.5 mg/kg). On the contrary, 17 α-meT did not produce a shift in place preference at any dose. In exploratory-based anxiety using light-dark transitions we found a decrease in transitions only in nandrolone-treated animals at the lower dose tested (0.075 mg/kg). Gonadal weight was not affected in any of the AAS treatments. These results suggest that effect of AAS in hedonia and anxiety behaviors might be based in differences in metabolism more than to chemical structure. MBRS-RISE-MSC (GM61838) and UNE (1R25-GM066250-01A4), RCMI (G12RR03051), NIH-NCRR (P20RR016470), MRISP (MH048190) and AMP-UPR (HRD-0601843).

87. EFFECTS OF LOW DOSES OF QUINPIROLE ON PRODUCTION OF 50 kHz CALLS IN RATS. Komadoski, M.D.; Brudzynski, S.M. Dept. Psychology, Brock University, St. Catharines, ON, L2S 3A1 Canada. Rats communicate with two main types of ultrasonic vocalizations labelled as 22 kHz alarm calls and 50 kHz social calls. While the 22 kHz vocalizations are initiated by the activity of the ascending cholinergic system, the 50 kHz social calls are initiated by activity of the mesolimbic dopamine system. Intracerebral application of dopamine agonists (e.g. amphetamine) have been reported to produce increased numbers of 50 kHz calls. The 50 kHz calls are subdivided into subcategories depending on the their sonographic structure, into frequency-modulated (FM) and non-modulated calls. It is not exactly known what type(s) of calls are emitted under the conditions of pharmacological stimulation. The goal of the present experiment was to induce 50 kHz calls by a direct intraaccumbens application of low doses of dopamine agonist, quinpirole, and a subsequent analysis of induced call types. Intracerebral injection of quinpirole in a dose range of 0.25 - 1.00 g increased production of 50 kHz calls as compared to results after injection of isotonic saline (ANOVA, P 0.05). The total number of 50 kHz calls increased three-fold after application of 0.25 g but to a lesser degree after higher doses. The fraction of different types of calls after quinpirole was changed. An eight-fold increase in trill calls (Fisher exact test, $p < 0.03$) and two-fold increase in flat calls ($p < 0.05$) were observed, while step calls and other types of modulated calls were not significantly changed. We may conclude that the low dose of quinpirole predominantly increased FM calls with trills and, to a smaller degree, flat calls but not other types of 50 kHz calls. Supported by NSERC of Canada.

88. CHRONIC "PROPHYLACTIC" TREATMENT WITH A CRF1-R ANTAGONIST SUPPRESSES ALCOHOL DRINKING BY DEPENDENT AND NON-DEPENDENT RATS. Gilpin N.W.; Koob G.F. Committee on the Neurobiology of Addictive Disorders. The Scripps Research Institute, La Jolla, CA 92037 U.S.A. Corticotropin-releasing factor (CRF) antagonists selectively suppress alcohol drinking and anxiety-like behavior in rats chronically

exposed to high doses of alcohol. R121919, a CRF1-receptor antagonist, selectively suppresses operant alcohol responding by alcohol-dependent rats. The purpose of this investigation was to determine if dependence-induced elevations in operant alcohol responding are blocked by chronic prophylactic treatment with R121919 during the transition to dependence. Wistar rats (n=29) were trained to respond for 10% (w/v) alcohol in an operant situation and then divided into four groups based on g/kg alcohol intake: dependent and non-dependent rats repeatedly injected with either R121919 (10 mg/kg) or vehicle. Dependent rats were exposed to alcohol vapor for 23 days, while non-dependent rats were exposed to ambient air for 23 days. Rats were injected with either drug or vehicle on even-numbered days of vapor exposure, and tested for operant alcohol responding on vapor days 3, 7, 11, 15, 19, and 23. Dependent rats exhibited higher alcohol intake across 23 days of vapor exposure relative to controls. Also, chronic R121919 treatment suppressed alcohol drinking in all rats. These results parallel past findings that chronic prophylactic NPY treatment produces long-term suppression of alcohol drinking.

89. IN VIVO CHARACTERIZATION OF THE NEUROPEPTIDE S ANTAGONIST SHA68. Shoblock, J.R.; Welty, N.; & Lovenberg, T. Dept. Neuroscience, Johnson & Johnson, PRD, LLC, San Diego CA 92121 USA. Neuropeptide S (NPS) is a recently discovered neuropeptide that activates the GPRA\NPSR receptor. NPS has been shown to increase locomotor activity and arousal, decrease anxiety, and modulate feeding. Here we describe the in vivo characterization of SHA68, a brain-penetrant NPSR antagonist that was recently reported in the literature. SHA68 (50 mg/kg, i.p.) given during the light-cycle significantly stimulated food intake in both mice that were fully food-deprived (0 g of food for the 18 hours before testing) or partially food-restricted (1 g of food for the 18 hours before testing). Interestingly, SHA68 was less effective in the fully food-deprived mice. When injected at the start of the dark-cycle, SHA68 stimulated basal levels of food intake. However, SHA68 did not affect basal food intake in mice when injected during the light cycle. These experiments suggest that SHA68 only increases food intake when animals are already motivated to consume (either by food restriction or the start of the dark cycle) and that SHA68 is less effective in fully deprived animals. In a separate study, SHA68 (50 mg/kg, i.p.) was found to be anxiogenic and decrease locomotor activity in a mouse light-dark box. These results agree with the anxiolytic and locomotor activating effects reported for NPS. In another study, SHA68 (50 mg/kg, i.p.) was tested in the conditioned place paradigm. SHA68 by itself produced a robust place aversion, however, SHA68 was able to attenuate the expression of amphetamine conditioned place preference. The results of these experiments demonstrate that the NPS system is tonically active, and confirms its effects on anxiety and locomotor activity. In addition, these results suggest that NPS normally suppresses food intake, perhaps through complex interactions with other systems. Finally, the ability of an NPS antagonist to attenuate amphetamine-seeking suggests that NPSR antagonists may have a therapeutic potential in treating addiction.

90. INDIVIDUAL VARIATION IN ANXIETY AND ETHANOL SELF-ADMINISTRATION: A PHENOTYPIC ANALYSIS OF LIMBIC SYSTEM NEURON ACTIVATION White, L.C; Ford, K.A.; Fadel, J.R.; Wilson, M.A. Department of Pharmacology, Physiology & Neuroscience, Univ South Carolina School of Medicine, Columbia SC 29208. The current study utilizes a limited access ethanol self-administration paradigm in order to examine individual differences in anxiety and ethanol intake, and the neuronal activation of amygdala neuron populations associated with ethanol self-administration. We hypothesized that animals would show individual variation in both anxiety and ethanol self-administration, and that neuropeptide Y (NPY) and enkephalin (ENK) containing neuronal populations in the amygdala would be activated in response to heightened ethanol intake. Male, Long Evans rats were exposed to the elevated plus maze in order to assign them to high and low anxiety groups using a median split of percent open arm time (percent open arm times 17.8 2.2 versus 3.41.4). For ethanol self-administration rats received 2 hours daily access to a 6% ethanol solution in place of their water bottle beginning 2 hours into the dark period. Using this limited access paradigm, significant individual differences in ethanol intake were observed with low anxiety animals drinking more ethanol (1.1 g/kg/day) than high anxiety animals (0.6 g/kg/day). After a two weeks of daily ethanol access, animals were analyzed for neuronal activation using immunohistochemical detection of Fos either immediately after a 2 hr ethanol access period or after a 24 hr withdrawal period. A history of ethanol intake was associated with robust Fos expression in the basolateral (BLA) and central (CeA) amygdala, and dorsal BNST in drinkers compared to non-drinkers. Phenotypic analysis revealed increased numbers of NPY-immunoreactive neurons in the BLA, medial amygdala, and cingulate cortex, as well as increases in double-labeled neurons containing Fos and ENK in the CeA, of drinkers compared to non-drinkers. These studies demonstrate that individual differences in ethanol self-administration are associated with differences in baseline anxiety, differential activation of amygdala and BNST neuronal populations, and increased NPY expression in numerous limbic brain areas. SUPPORTED BY: R21 AA017361 to MAW & JF.

91. MEMANTINE BLOCKS BEHAVIORAL SENSITIZATION TO AMPHETAMINE VIA INTRA-ACCUMBENS GLUTAMATERGIC- AND NICOTINIC-DEPENDENT MECHANISMS. Degoulet M.F., Rostain JC., Abraini J.H., David H.N. UMR CI-NAPS 6232, University of Caen, CNRS, CEA. Centre CYCERON, 14074 Caen,

FRANCE In addition to the primary role that dopamine neurotransmission plays in behavioral sensitization to amphetamine, subsequent studies have shown that the development, maintenance and expression of sensitization involve alterations in glutamatergic neurotransmission. The expression of locomotor-activating properties of amphetamine involves an increase in extracellular dopamine concentration in the nucleus accumbens (NAcc) that is part of the mesoaccumbens dopaminergic pathway, which originate in the ventral tegmental area (VTA). Studies using prototypical N-methyl-D-aspartate (NMDA) receptor antagonists have led to the conclusion that blocking the development of behavioral sensitization by the use of NMDA receptor antagonists may involve intra-VTA, but not intra-NAcc, mechanisms. We found that the low affinity NMDA receptor antagonist memantine, witch also possess mild effects at the nicotinic receptor level, blocks the development of behavioral sensitization as does MK-801. Moreover it appears that this blockage is dependent upon interactions between memantine and both glutamatergic and nicotinic receptors in the NAcc, but not in the VTA. Furthermore we found that memantine, but not MK-801, reduces the amphetamine-induced increase in carrier-mediated dopamine release in the NAcc ex vivo, thereby providing one possible mechanism to support the behavioral effects of memantine on the development of sensitization to amphetamine. Taken together, our data strongly suggest that memantine blocks the development of behavioral sensitization to amphetamine, by acting at the NMDA and nicotinic receptor levels in the NAcc, but not in the VTA. Given that memantine is clinically well tolerated, possesses reduced side-adverse effects and neurotoxicity and is devoid of abuse potential, our results may be of therapeutic interests for treating addiction to psychostimulant drugs.

Saturday, June 13, 2009

8:30-10:30 **Symposium 4:** VERTEBRATE MODELS OF SOCIAL BEHAVIOR: NEUROBIOLOGICAL AND COMPARATIVE PERSPECTIVES. **Chairperson: Elena Choleris**

SHOALING IN ZEBRAFISH: A NOVEL TOOL FOR THE ANALYSIS OF VERTEBRATE SOCIAL BEHAVIOR. Gerlai R., Department of Psychology, University of Toronto Mississauga, ON L6M 4C6 Canada. Zebrafish has been in the forefront of developmental biology for the past three decades but as a result of the genetic tools developed for this species, it is also gaining popularity in behavioral neuroscience. Zebrafish has been particularly useful in high throughput mutagenesis and drug screens where the small size and prolific nature of this species represent major advantages. From a behavioral perspective, zebrafish appears to be also an appropriate study species. It has a complex, albeit not well characterized, behavioral repertoire. Specifically, it is one of the very few laboratory species that is highly social. In nature, zebrafish forms small shoals, loose aggregates of fish staying in close proximity to each other, a behavior that is also apparent under laboratory conditions. However, this behavior has not been well described or characterized. We know very little about what makes a good zebrafish, i.e. what features of a moving objects zebrafish regard as characteristic of a preferred shoal mate. Would zebrafish shoal with any species of fish or are they selective? What are the dynamics of shoaling? Is the distance among shoalmates species-specific and rigid, or can it change according to environmental conditions and or developmental stage? In our laboratory, we have been trying to answer such questions. We have developed numerous behavioral test paradigms and quantification methods to characterize the social behavior of zebrafish. Our ultimate goal is to unravel the biological mechanisms of vertebrate social behavior and make zebrafish a good tool for translational research facilitating the understanding of human brain disorders associated with abnormal social behavior. The first step in this endeavor is behavioral characterization and test development, and this is what we present on here.

A MAMMALIAN SOCIAL ENGAGEMENT SYSTEM: INSIGHTS FROM THE POLYVAGAL THEORY. Porges, S.W., University of Illinois at Chicago. As mammals evolved from reptiles, there were parallel shifts in the neural regulation of both the autonomic nervous system and the striated muscles of the face and head. This evolutionary transition resulted a new vagal circuit that linked, via brainstem mechanisms, the function of the muscles of the face to the calming functions of the vagus. A product of this evolutary transition was an emergence of an integrated social engagement system that optimizes social communication via face-to-face interactions and conspecific vocalizations. The talk will discuss the importance of the polyvagal theory in conceptualizing the mammalian social engagement system as a mechanism that moderates proximity and social bonding, while dampening defensive reactions.

SOCIAL BEHAVIOR AND COMMUNICATION IN THE MOUSE. Blanchard,R..J.; Blanchard,D.C.; Arakawa,H.; Borelli K.G., University of Hawai, Honolulu, Hi96822 USA. Wild mice (Mus species) have spread geographically as human commensals and are tolerant of a wide variety of ecological and social environments. A particularly common type of social organization involves single or multiple females and their young occupying an area included in the larger territory of an adult male that will attack adult male intruders. Young males are tolerated but spaced at puberty. Adult males patrol and scent mark their territories, countermarking scent deposited by other males. They also increase marking in the presence of other males. Initial marking in the absence of conspecific male stimuli serves as a social signal, whereas countermarking reflects a response to a social signal. We have examined scent marking in C57BL/6J (C57) mice, in novel situations without conspecific stimuli, and to both scent marks and the presence of novel adult male mice. As C57 are inbred, and cannot discriminate the scent of other C57 males (unless these are fed different diets) from their own, CD-1 males are used as stimuli. The magnitude of scent marking is responsive to factors such as the grouping status of the subject, familiarity of the test situation and of the conspecific stimulus, and stimulus age and sex. Regional brain activity (c-FOS) correlates of discrimination of a conspecific scent appear to involve a small number of amygdala and hypothalamic structures, whereas those associated with discrimination of a novel compared to a familiar conspecific scent engage a much wider system, including medial prefrontal cortex, septum, a wider range of hypothalamic sites, and the periaqueductal gray. Because scent marking paradigms can be varied to include different aspects of social behavior and communication, they are potentially useful in analysis of social behaviors and their brain and neurochemical correlates.

NEUROBIOLOGY OF SOCIAL RECOGNITION AND PARASITE AVOIDANCE. Martin Kavaliers[1] and Elena Choleris[2], [1]Dept. Psychology Univ. Western Ontario, [2]Dept. Psychology Univ. Guelph. Social behavior entails the processing of social information and recognition of individuals. Social recognition allows the establishment of group hierarchies and mediates the development of appropriate social preferences in relation to adaptive mate choices and the avoidance of potentially infectious parasitized conspecifics. The neural-hormonal systems implicated in the processing of social recognition include, the neuropetide oxytocin (OT) as well as estrogenic (ER) mechanisms. Male and female mice with deletion for the gene OT [OT knockout (OTKO)] or estrogen receptors α and β (ERαKO and ERβKO) are impaired in social recognition and memory, with ERα and ERβ being differentially involved. One of the major costs of social behavior is the increased risk of exposure

to parasites and infection. Animals utilize social information, including chemical signals, to recognize and avoid infected conspecifics. Female and Male mice distinguish between infected and uninfected conspecifics of the same or opposite sex by urinary odors, displaying aversive response to, and avoidance of the odors of infected mice. This recognition and avoidance involves OT and ERs. OTKO, ERαKO and ERβKO mice are specifically impaired in their recognition of, aversion to, and memory of the odors of infected individuals. The olfactory and mate choice responses of females can be further modulated by social factors such as previous experience and the mate choices of other females. Female mice use indirect social information from cues produced by individuals with similar interests and requirement. This "mate copying", which can modulate and attenuate the aversive responses to infected individuals, also involves OT. Thus, estrogenic regulation of the OT system controls social recognition and adaptive social behaviors such as the avoidance of parasitized conspecifics, mate choices and mate copying. Supported by NSERC.

11:00-12:00 **Keynote Lecture: Ann M. Graybiel, MIT, Cambridge, MA, USA.** OUR HABITUAL LIVES: HOW THE BRAIN MAKES AND BREAKS HABITS. **Introduction**: **Kelly Lambert**

OUR HABITUAL LIVES: HOW THE BRAIN MAKES AND BREAKS HABITS. Graybiel, A.M., MIT, Cambridge, MA. The same brain that can construct language, music and mathematics also lets us develop habits of thought and action. These semi-automatic routines free us to think and attend to the world. But the habit system can also be hijacked by disease and drug exposure. This lecture will focus on the habit system of the brain and our remarkable ability to switch from conscious activity to nearly non-conscious behavior. The lecture will highlight research directed towards understanding how we make and break habits and how the neurobiology of the habit system is helping to advance understanding of human problems ranging from Parkinsons disease to obsessive-compulsive spectrum disorders and addiction. This research supports the view that basal ganglia-based circuits can build representations of habits, and that the laying down of such representations involves genes expressed in basal ganglia-related networks. Disorders of such basal ganglia plasticity could contribute to behavioral fixity and difficulty of initiation of behavior, as in Parkinsons disease, or to the excessive release of behaviors, as in Huntingtons disease, or to the repetitive behaviors and thoughts characteristic of many neuropsychiatric disorders. The basal ganglia thus may influence not only motor pattern generators, but also cognitive pattern generators.

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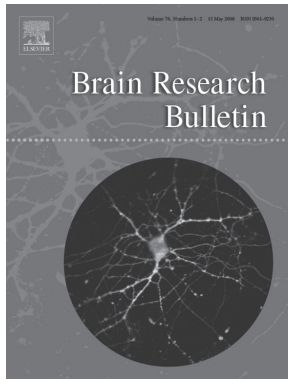

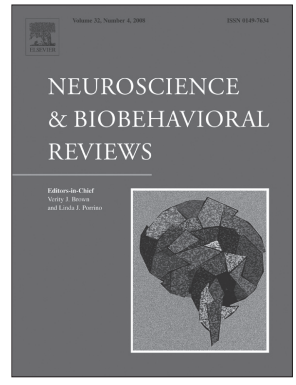

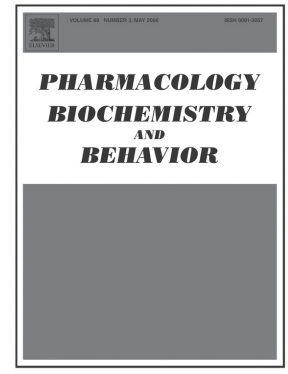

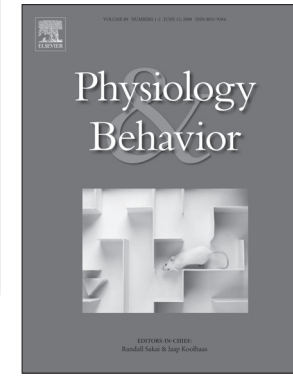

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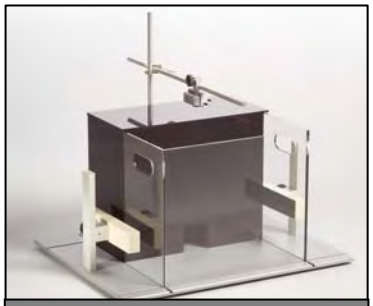

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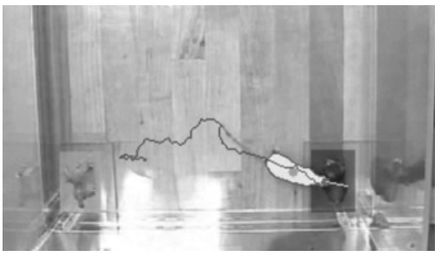

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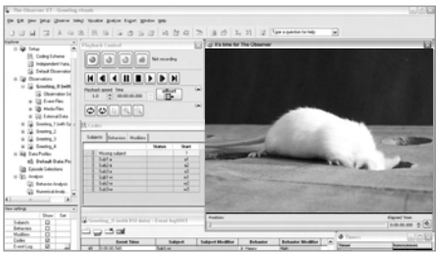

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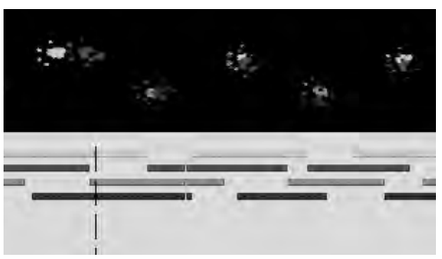

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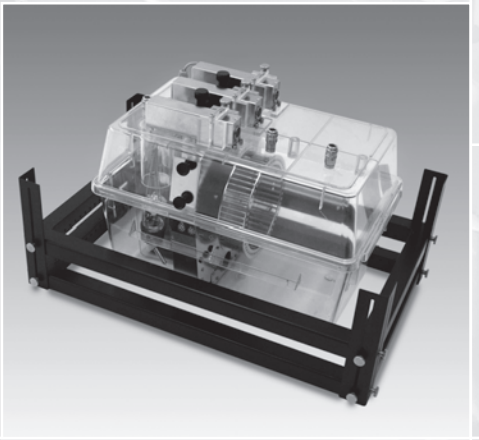

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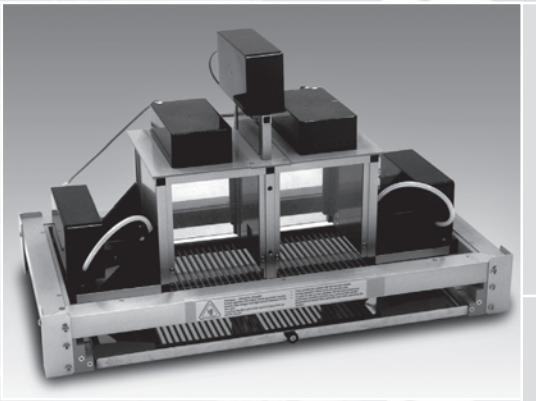

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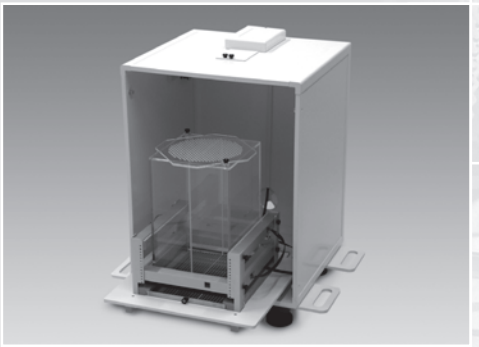

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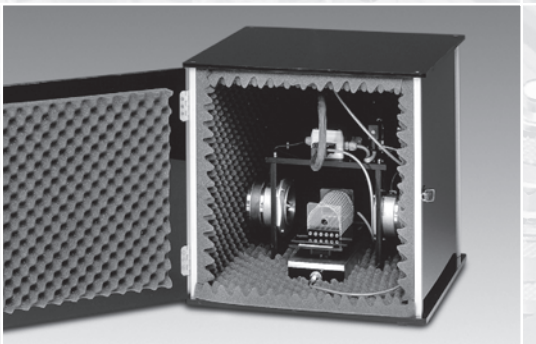

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All events will be held in the Crystal Ballroom unless otherwise noted.

Tuesday, June 9, 2009

2:00-4:30	Registration. *Foyer of Crystal Ballroom*.
5:00-7:00	Cocktail Reception. *Poolside.*

Wednesday, June 10, 2009

8:30-9:00	Welcome: IBNS President, Robert Gerlai. *Crystal Ballroom*.
9:00-10:00	Presidential Lecture: Robert Gerlai.
10:00-10:30	Break & Exhibit Viewing
10:30-11:45	Wayner-NNOXe Award Lecture: C. Sue Carter
12:00-4:00	Council Meeting. *Flamingo Boardroom.*
4:00-6:00	Symposium 1: NEUROBIOLOGY OF HUMAN IMPULSIVITY: MICE AND RATS BEHAVIORAL MODELS. Chairperson: Sylvie Granon
6:30- 8:00	Student Social. *Flamingo Pool Bar & Grill.*

Thursday, June 11, 2009

8:30-9:30	Keynote Lecture: T. W. Robbins, University of Cambridge, U.K. FROM IMPULSIVITY TO COMPULSIVITY: NEURAL SUBSTRATES AND PSYCHIATRIC IMPLICATIONS.
9:30-10:00	Break & Exhibit Viewing
10:00-11:30	Symposium 2: BEHAVIORAL NEUROSCIENCE OF THE PARENTAL BRAIN IN RATS AND HUMANS: FROM BASIC MECHANISMS TO CLINICAL IMPLICATIONS. Chairperson: James E. Swain
12:00-4:00	Meet the Professionals Lunches
4:00-5:45	Oral Presentations. Chairperson: Leonie de Visser
6:00-8:00	Poster Session I

Friday, June 12, 2009

8:30-10:30	Symposium 3: WHAT IS THE FUNCTIONAL AND CLINICAL SIGNIFICANCE OF THE HIPPOCAMPAL-PREFRONTAL CORTICAL INTERACTION? Chairperson: Yukiori Goto
10:30-11:00	Break & Exhibit Viewing
11:00-12:00	Special Lecture: DARWIN: HIS LIFE AND LEGACY FOR BEHAVIORAL NEUROSCIENCE. Robert Blanchard.
12:00-2:00	Break
2:00-4:00	Student Workshop
4:00-6:00	Student Travel Award Slide Blitz
6:00-8:00	Poster Session II

Saturday, June 13, 2009

8:30-10:30	Symposium 4: VERTEBRATE MODELS OF SOCIAL BEHAVIOR: NEUROBIOLOGICAL AND COMPARATIVE PERSPECTIVES. Chairperson: Elena Choleris
10:30-11:00	Break & Exhibit Viewing
11:00-12:00	Keynote Lecture: Ann M. Graybiel, MIT, Cambridge, MA, USA. OUR HABITUAL LIVES: HOW THE BRAIN MAKES AND BREAKS HABITS. Introduction: Kelly Lambert
12:00-4:00	Meet the Professionals Lunches
5:00-6:00	Business Meeting. Open to all IBNS members.
7:00-11:00	Banquet. Awards, buffet, dancing. *Poolside*. DJ – David Sawyer.

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