Environmentally Triggered Neurodevelopmental Disorders

Focus on Endocrine Disruption and Sex Differences in Autism, ADHD, and Schizophrenia

Oct 30 - Nov 2, 2011  Sheraton Imperial Hotel  Research Triangle Park, NC

Sunday Afternoon  30 Oct 2011  2:00 PM – 2:30 PM

2:00 PM Sunday: Opening of NEUROTOX 27

SESSION I: OPENING SESSION

2:00 PM – 2:30 PM
Opening, Welcome and Acknowledgements
Conference Chair: Joan Cranmer, University of Arkansas for Medical Sciences

Overview of Theme of the Conference
Conference Co-Chairs: Isaac Pessah, University of California, Davis
Pamela Lein, University of California, Davis

Sunday Afternoon  30 Oct 2011  2:30 PM – 5:30 PM

State of the Science on the Theme

SESSION II: TUTORIALS ON ENDOCRINE DISRUPTION, IMMUNOLOGICAL INFLUENCE AND SEX DIFFERENCES IN NEURODEVELOPMENTAL DISORDERS

Session Chair: Pamela Lein, University of California, Davis

Theme and Rationale: The focus of this workshop is on endocrine interactions, sex differences and inflammation as common mechanisms by which environmental factors confer susceptibility to complex neurodevelopmental disorders and synaptic plasticity as a common target in neurodevelopmental disorders. The goal of this session is to provide background and context for the remaining sessions. Speakers will present an overview of what is currently known about the role of the endocrine and immune systems in neurodevelopment and mechanisms of endocrine disruption.

Topics and Speakers:

2:30 PM – 2:50 PM
Sexual Dimorphism in Neurological Disorders: From Development to Neurodegeneration
Richard Seegal, Wadsworth Center, New York State Department of Health

2:50 PM – 3:25 PM
Role of the Gonadal Hormones in Neurodevelopment
Janice Juraska, University of Illinois at Urbana-Champaign

3:25 PM – 3:40 PM  Break

3:40 PM – 4:20 PM
Influence of the Immune System on Neurodevelopment
Judy Van de Water, University of California, Davis
Pamela Lein, University of California, Davis

4:20 PM – 4:55 PM
Mechanisms of Endocrine Disruption
Tom Zoeller, University of Massachusetts

4:55 PM – 5:30 PM
Tutorial: Synaptic Plasticity as a Common Target in Neurodevelopmental Disorders.
Serena Dudek, NIH/National Institute of Environmental Health Sciences

5:30 PM – 6:30 PM  Break

Sunday Evening  30 Oct 2011  6:30 PM – 8:45 PM

6:30 PM – 8:45 PM
Welcoming Reception and Hosted Dinner Buffet
**Opening of Plenary Sessions**

**OVERVIEW AND RATIONALE FOR THE THEME**

Clinical disorders of the central nervous system arise from complex interactions among multiple risk factors. Genetic mutations, polymorphisms, and copy number variations confer heritable susceptibility to environmental stressors including exposures to xenobiotic chemicals, shifts in nutritional status, and medical interventions. The prevalence of autism has increased dramatically and there is emerging evidence that suggests increases in the diagnosis of ADHD and schizophrenia. Although some of these trends can be explained by increased awareness, diagnostic drift and changes in diagnostic criteria, environmental factors are likely contributors. An increasing number of persistent organic pollutants (POPs) and metals have been shown to alter endocrine signaling mediated by thyroid, estrogen and androgen hormones. Many of these chemicals are detected in maternal and gestational tissues, breast milk, and neonates at levels of concern. Our knowledge of how endocrine signals shape neurodevelopment has advanced significantly over the last five years, and presentations on the current state of the science will serve as a framework for the conference. The consequences of endocrine disruption during critical periods of neurodevelopment have far-reaching implications and will be the focus of the symposium. The sessions will present the latest evidence and controversies linking endocrine disruption and neurodevelopmental disorders, with a focus on autism, ADHD, and schizophrenia. These disorders share several clinical features including strong gender bias, immune impairments, and an association with seizure disorders. Yet these disorders differ in onset of clinical symptoms that may provide clues to critical windows of susceptibility to specific endocrine disruptors and their underlying mechanisms. The symposium is designed to present attendees with the latest state of the science about the role of the endocrine system in environmentally triggered disorders.

*Conference Co-Chair:  Isaac Pessah, University of California, Davis*

8:30 AM – 8:45 AM

**Theme and Rationale: Environmentally Triggered Neurodevelopmental Disorders. Focus on Endocrine Interactions and Sex Differences as Common Factors in Autism, ADHD and Schizophrenia**

Isaac Pessah, University of California, Davis

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**Plenary Session**

**SESSION III: ENDOCRINE DISRUPTION IN AUTISM SPECTRUM DISORDERS**

*Session Chairs:  R. Thomas Zoeller, University of Massachusetts
Isaac Pessah, University of California, Davis*

**Theme and Rationale:** Endocrine systems play important roles in sculpting the human brain in development. Specific hormones such as estrogen, androgen, progesterone, thyroid hormone and cortisol are known to engage signaling pathways important for stem cell proliferation or differentiation, migration, synaptogenesis and apoptosis. These hormones account for sex differences in specific brain structures and condition cellular responses to contact-dependent or other signaling pathways. Environmental chemicals that interfere with hormone signaling during development can have profound effects on brain architecture by direct impacts on endocrine signaling, and on the ability of hormones to guide cellular response to developmentally important signals. Major classes of chemicals are known to simultaneously interact with more than one endocrine system and in different ways. Some POPs directly interact with receptors for estrogen, androgen and thyroid, as does bisphenol-A. Heavy metals including mercury and lead are known to influence specific endocrine systems. Inflammatory signaling pathways interact with hormone signaling pathways during normal brain development, and overlying inflammatory processes or pharmaceutical therapies may interfere with this. Lifetime consequences of endocrine dysregulation during development may be avoided by recognizing and preventing these disruptive interactions.

**Topics and Speakers:**

8:45 AM – 9:15 AM

**State of the Science on Endocrine Regulated Developmental Milestones and Their Disruption by Environmental Exposures (PoPs, Pesticides, and Personal Care Products)**

R. Thomas Zoeller, University of Massachusetts

will give an overview of the current science of how thyroid, estrogen and androgen signaling systems influence critical prenatal and neonatal neurodevelopmental milestones and outcomes later in life (example - during puberty). He will present the state of the science of how endocrine signals are impaired by exposures to chemicals of concern to environmental health and their impairment of developmental milestones will be discussed.
What is Known Regarding Endocrine Dysfunction in Autism?
Isaac Pessah, University of California, Davis

will give a review of the current literature about what is known about endocrine dysfunction as a contributor to autism susceptibility. Studies of several species will be presented that indicate substantial cross-talk between neuropeptide and endocrine signaling pathways that have significant influence on the development of social cognition that can be highly gender dependent.

The Maternal Infection Risk Factor for Schizophrenia and Autism
Paul H. Patterson, California Institute of Technology

will present his recent research findings showing that activation of the maternal immune system in rodent models sets in motion a cascade of molecular pathways that ultimately result in autism- and schizophrenia-related behaviors in offspring.

Sex Hormones in Autism: Androgens and Estrogens Differentially and Reciprocally Regulate RORA, a Novel Candidate Gene for Autism
Valerie W. Hu, George Washington University Medical Center

will present data from her lab showing that male and female hormones differentially regulate the expression of a novel autism candidate gene, retinoic acid-related orphan receptor-α (RORA) in a neuronal cell line, SH-SY5Y. Her results suggest a mechanism for introducing sex bias in autism.

Sex-Specific Changes in Prairie Vole Social Behavior After Chronic Metals Exposure: An Animal Model of Autism?
J. Thomas Curtis, Oklahoma State University Center for Health Sciences

will present his recently published results testing if metals capable of altering central dopamine systems can produce the social withdrawal characteristic of autism. Results suggest that metals exposure may contribute to loss of social cognition, possibly by interacting with central dopamine function, and support the use of prairie voles as a model organism in which to study autism.

Sexual Dimorphism in the Expression of Endocrine and Neuroendocrine Pathways in Autism: An Animal Model of Autism?
J. Thomas Curtis, Oklahoma State University Center for Health Sciences

will present his recently published results testing if metals capable of altering central dopamine systems can produce the social withdrawal characteristic of autism. Results suggest that metals exposure may contribute to loss of social cognition, possibly by interacting with central dopamine function, and support the use of prairie voles as a model organism in which to study autism.

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Discussion

Break for Lunch on Your Own

Monday Afternoon  31 Oct 2011  1:30 PM – 4:30 PM

SESSION IV: CLINICAL CLUES OF ENDOCRINE DISRUPTION IN AUTISM SPECTRUM DISORDERS

Session Chairs:  Martha Herbert, Harvard Medical School  Isaac Pessah, University of California, Davis  Randi Hagerman, UC Davis MIND Institute

Theme and Rationale:  Today, one in 110 children (and one in 70 boys) born in the U.S. is diagnosed with autism, and the numbers have been rising 10% to 17% a year.  Autism has a range of features that suggest the possibility of endocrine-related alterations, including a much higher prevalence in males.  Additional clues of endocrine dysfunction may contribute to autism severity including atypical growth patterns, abnormal patterns of autonomic arousal (both hypo- and hyper-arousal), marked changes at puberty (e.g. sometimes seen are increase in aggression, severe premenstrual syndrome), sleep disturbances, hypothyroid, and seizures.  These clinical manifestations invite investigation of potential toxicological and endocrine disruptive contributors and will be the focus of the session presentation and discussion.

Topics and Speakers:

Patterns of Susceptibility in FMR1 Related Disorders: Clues from Gender Specific Differences
Randi Hagerman, UC Davis MIND Institute

will report on the clinical manifestations of psychiatric illness in FMR1 related disorders including premutation carriers, FXTAS and FXS. Cognitive, mood, anxiety, and autistic disorders appear to have gender biases. Fragile X premutation-associated conditions are part of the clinical differential diagnosis of several psychiatric syndromes, particularly in pedigrees with known fragile X syndrome cases. She will discuss how FMR1-associated psychiatric manifestations serve as a useful model for a molecular genesis of neuropsychiatric illness.
1:55 PM – 2:20 PM

**Why Are Autism Spectrum Conditions More Common in Males?**

Rebecca Knickmeyer, *University of North Carolina Chapel Hill*

will present an overview of the state of the science addressing biological contributions to the gender bias observed with autism. She will discuss how relating typical sex differences in brain structure may be relevant to autism, highlighting possible biological mechanisms mediated by endocrine hormones to account for the male bias. Alternative biological theories will be considered, the X and Y chromosome theories, and the reduced autosomal penetrance theory. She will present her latest research findings and will discuss critical research needs.

2:20 PM – 2:35 PM

**Break**

2:35 PM – 3:00 PM

**Prenatal Exposure to Endocrine Disrupting Chemicals and Childhood Behavioral Development**

Stephanie A. Engel, *University of North Carolina at Chapel Hill*

will present how prenatal exposure to endocrine disruptors has the potential to impact early brain development in children. This study investigated prenatal exposure to the phthalate esters and bisphenol A (BPA), and social behavior in a sample of adolescent inner-city children. Prenatal phthalate exposure was associated with childhood social impairment in a multiethnic urban population.

3:00 PM – 3:25 PM

**Endocrine System in Autism and Related Disorders: What are the Clinical Clues?**

Martha Herbert, *Harvard Medical School*

will present case reports that focus on clinical clues of endocrine dysfunction in autism. Outcomes discussed will include atypical growth patterns, abnormal patterns of autonomic arousal (both hypo- and hyper-arousal), marked changes at puberty (e.g. sometimes seen are increase in aggression, severe premenstrual syndrome), sleep disturbances, hypothyroid, and seizures.

3:25 PM – 4:30 PM

**FACILITATED ROUNDTABLE PANEL DISCUSSION**

*Questions:* Selected questions that address key issues are published in the program to facilitate discussion.

Additional questions from participants are welcome!

**Discussion Leaders:** Martha Herbert, *Harvard Medical School*

R. Thomas Zoeller, *University of Massachusetts*

**Panelists:**

*Speakers in Sessions III and IV:*

- Isaac Pessah, *University of California, Davis*
- Paul H. Patterson, *California Institute of Technology*
- Valerie W. Hu, *George Washington University Medical Center*
- J. Thomas Curtis, *Oklahoma State University Center for Health Sciences*
- Randi Hagerman, *University of California, Davis*
- Rebecca Knickmeyer, *University of North Carolina at Chapel Hill*
- Stephanie A. Engel, *University of North Carolina at Chapel Hill*

**Representatives from governmental agencies with missions related to the theme of NEUROTOX 27:**

- NIEHS – Cindy Lawler
- NIMH/OARC – Susan Daniels
- NIH CounterACT Program – David Jett
- EPA/ORD/NCEA – Susan Makris
- ATSDR – Casandra Smith

**Autism Advocacy Groups:**

- Autism Research Institute – Jill James
- Autism Society – Donna Ferullo
- Autism Speaks – Alycia Halladay
- Safe Minds – Sallie Bernard
**TWENTY-SEVENTH INTERNATIONAL NEUROTOXICOLOGY CONFERENCE**

Questions:

1. Because autism is defined by behavioral measures, how can rodent (or other) model systems be employed to study the etiology of autism spectrum of disorders?

2. Hormones control many different aspects of development, and sex differences in the brain are clearly related to hormone action during development. How do you imagine that hormones may interact that, when disrupted, may produce an element of autism spectrum?

3. Thyroid hormone controls oligodendrocyte differentiation. Is it possible that thyroid disruption could be responsible for altering myelination in a sex-specific manner such that elements of autistic spectrum could be triggered?

4. If endocrine disruption is important in the measured increase in the incidence of autistic spectrum disorders, how can it be identified in the human population?

5. Most animal work in the field of environmental impacts on brain development employs a model whereby a single chemical is tested for its ability to interfere with development by an endocrine or other mechanism. These studies can be enhanced by molecular and biochemical studies that clarify specific pathways of interaction. However, when this insight is applied to the human population, to what degree is it possible to "prove" a causal relationship between chemical exposure (in a mixture) and adverse outcome? Do you believe that regulatory agencies are cognizant of the limits to which science can prove these relationships?

4:30 PM – 6:30 PM  
**Break for Dinner on Your Own**

6:30 PM: Return for Keynotes, Poster Session, Student Competition and Dessert! (No-Host Bar)

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**Monday Evening 31 Oct 2011  6:30 PM – 9:00 PM**

**Keynotes and Poster Session**

**SESSION V: KEYNOTES ON STEM CELLS, GENERAL POSTER SESSION & STUDENT AWARD COMPETITION**

**Keynotes**

6:30 PM – 7:15 PM

**“STEM CELLS... SUPER HEROES OR SUPER VILLAINS OF NEUROTOXICOLOGY?”**

**Patient-Derived Stem cells as a Translational Model of Neurological Risk**

Aaron Bowman, Vanderbilt University Medical Center

**Progress and Pitfalls in the Use of Stem Cell Derived Neurons as Testing Models for Neurotoxicology**

Tim Shafer, US Environmental Protection Agency

7:15 PM – 9:00 PM

**POSTER SESSION**

Poster Session Co-Chairs and Networking Mentors:

Nikolay Filipov  
Mary Gilbert  
Jean Harry  
Prasada Kodavanti  

Susan Schantz  
Rich Seegal  
Edwin van Wijngaarden  
Dongren Yang

Poster abstracts are numbered from P-64 to P-108 and are listed on pages 15 – 21 of this Program

The Poster Session is a highlight of this conference series. It has proven to be an effective venue for informal, in-depth discussion and collaboration building -- as well as an important networking opportunity for all participants. Papers on any aspect of neuroscience, toxicology, children’s environmental health, public health & policy are welcome! Posters may be put up as early as 9:00 AM on Sunday and should remain up for the conference duration for maximum exposure.
TWENTY-SEVENTH INTERNATIONAL NEUROTOXICOLOGY CONFERENCE

7:15 PM – 8:30 PM

STUDENT AWARD COMPETITION

Competition Co-Chairs: Will Boyes
Anumantha Kanthasamy

The Student Award Competition is divided into two groups: one for post-doctoral and one for pre-doctoral competition. Awards will consist of a cash prize, plaque or certificate, plus a one year subscription to the international journal NeuroToxicology. A winner(s) will be chosen from each group. Competing students are asked to give an overview of their work in 2-3 minutes to the judges followed by a brief set of questions and answers. Originality, significance, hypothesis, presentation material and style, as well as knowledge of the subject, will be considered in selecting the winners. All papers in competition for the Student Awards must be presented from poster. Judging will be done during this time.

Judging will be done between 7:15 PM and 8:30 PM. Students please stand by your poster during this time.

GROUP I: POST-DOCTORAL COMPETITION

Chair: Anumantha Kanthasamy

Post-Doctoral Award Committees

Sub-Group A

Anumantha Kanthasamy, Chair
Jamie DeWitt
Christine Curran

Sub-Group B

Judy Van de Water, Chair
Ed Levin
Janice Juraska

Post-Doctoral Trainees

1. Bagrat Abazyan Mentors: Mikhail Pletnikov & Tomás Guilarte
2. Asad A. Aboud Mentor: Aaron B. Bowman
3. Mamta Behl Mentors: Jean Harry & Michelle Hooth
4. Celia Dodd Mentor: Nikolay M. Filipov
5. Adam Dziorny Mentor: Philip Davidson
6. Paul Eubig Mentor: Susan Schantz
7. Kate Hoffman Mentor: Julie Daniels
8. Fang Liu Mentor: Cheng Wang
9. Allison McAfee Mentor: Sean Strain
10. Amir Miodovnik Mentor: Shanna H. Swan
11. Maria Mulhern Mentor: Sean Strain
12. Christina Powers Mentor: J. Michael Davis
13. Sarah Short Mentor: John H. Gilmore
14. David Szabo Mentors: Bob Sonawane & Kate Guyton
15. Steven Szabo Mentor: Jean Harry
16. Sukrat Sinha Mentor: TBA

GROUP II: PRE-DOCTORAL COMPETITION

Chair: Will Boyes

Pre-Doctoral Student Award Committees

Sub-Group A

Will Boyes, Chair
Sarah Blossom
Brenda Eskenazi

Sub-Group B

Stephanie Engel, Chair
Aaron Bowman
David Jett

Pre-Doctoral Students

1. Jordan Bailey Mentor: M. Christopher Newland
2. Ian Bryan Mentor: Jamie DeWitt
3. Nioka Chisolm Mentor: Janice Juraska
4. Megan Culbreth Mentor: Timothy Shafer
5. Marjannie Eloi Mentor: Judy Van de Water
6. Jocelyn Fowler Mentor: Christine Curran
7. Jason N. Franklin Mentor: Jamie DeWitt
8. Elizabeth Hawkey Mentor: Joel T. Nigg
9. Saritha Krishna Mentor: Nikolay M. Filipov
10. Wang Luan Mentor: Douglas Ruden
11. Christopher McPherson Mentor: Jean Harry
12. Abby Meyer Mentor: Helen Sable
13. Renee Sadowski Mentor: Janice Juraska
SESSION VI-A: ADHD – THE ROLES OF GENETICS, ENVIRONMENTAL CONTAMINANTS AND SEX

Session Co-Chairs: Susan Schantz, University of Illinois – Champaign-Urbana
                   Richard Seegal, Wadsworth Center, New York State Department of Health

Theme and Rationale: Attention deficit disorder with hyperactivity (ADHD) is the most common neurodevelopmental disorder and encompasses several core symptoms including inattention, hyperactivity and impulsivity. ADHD is more common in boys than girls although the sexual dimorphism is not as profound as that seen in autism. This session will focus on environmental contaminants as putative etiologic agents in ADHD, as well as presenting findings related to the pathobiology, genomics and neuroendocrine factors that play a role in this disorder and which may aid in explaining the aforementioned sexual dimorphism.

Topics and Speakers:

8:30 AM – 9:00 AM
ADHD: Gene x Environment Interactions, Etiology, Pathobiology, Neuropsychology, and Sex Differences
Joel Nigg, Oregon Health & Science University
 will discuss the neuropsychological, endocrine and gene x environment interactions that influence the prevalence of ADHD; the greater incidence in boys and the effects of lead exposure in the etiology of ADHD.

9:00 AM – 9:30 AM
Pesticides and Other Environmental Risk Factors for ADHD
Brenda Eskenazi, UC Berkeley
 will discuss her ongoing epidemiological research showing an association between exposure to organophosphate pesticides and ADHD.

9:30 AM – 10:00 AM
Developmental Exposure to Diverse Environmental Compounds: Common Pathways Leading to Neurobehavioral Dysfunction Associated with ADHD
Jason Richardson, Rutgers University
 will discuss his laboratory studies describing the role of developmental exposure to pesticides in altering neurochemical and behavioral processes impaired in ADHD.

10:00 AM – 10:20 AM                  Break

10:20 AM – 10:50 AM
Developmental Exposures to PCBs and Lead: Parallels with ADHD
Paul Eubig, University of Illinois, Urbana-Champaign
 will discuss the behavioral consequences of developmental exposure to polychlorinated biphenyls (PCBs) and lead and the parallels with the behavioral deficits observed in ADHD children.

10:50 AM – 11:20 AM
Sex-Specific Developmental White-Matter Effects of PCBs
Veronica Miller, Wadsworth Center, New York State Dept. of Health
 will discuss the consequences of developmental exposure to PCBs on cerebellar morphology, inflammatory cytokines and innate sexually dimorphic differences in neuronal and glial markers of development related to ADHD.

11:20 AM – 11:45 AM
Panel Discussion
Discussion Leaders: Susan Schantz and Rich Seegal

11:45 AM – 1:15 PM                  Break for Lunch on Your Own
Tuesday Morning       1 Nov 2011          8:30 AM – 11:45 Noon

Concurrent Session - Platform

SESSION VI-B: NEUROPROTECTION, NEURODEGENERATION, NEUROEPIDEMIOLOGY, NEUROBEHAVIOR, AND SOLVENTS

Session Co-Chairs: Anumantha G Kanthasamy
Mary Ann Wilson

Topics and Speakers:

8:30 AM – 8:45 AM
Mercury’s Effects on Brain Selenoenzyme Activities
Nicholas Ralston, Energy & Environmental Research Center, University of North Dakota

8:45 AM – 9:00 AM
Protective Effects of Selenomethionine Against Methylmercury-Induced Neuronal Degeneration in Developing Rat Brain
Mineshi Sakamoto, National Institute for Minamata Disease, Japan

9:00 AM – 9:15 AM
Epigenetic Regulation of a Pro-Apoptotic Kinase PKCδ Gene Expression in Neurotoxicity Models: Implications for Gene-Environment Interactions in Neurodegeneration
Anumantha G Kanthasamy, Iowa State University

9:15 AM – 9:30 AM
The Occupational JP8 Exposure Neuroepidemiology Study (OJENES).
Susan Proctor, US Army Research Institute of Environmental Medicine

9:30 AM – 9:45 AM
Differential Expression of Neuroimmune Mediators Following Postnatal Exposure to Trichloroethylene
Sarah Blossom, University of Arkansas for Medical Sciences

9:45 AM – 10:00 AM
Sub-Chronically Exposure Benzo[a]pyrene Inhibiting the Long–Term Potentiation in Rat Hippocampal CA1 Area
Jinpeng Zheng, School of Public Health, Shanxi Medical University, China

10:00 AM – 10:15 AM
Fibromyalgia, Mood Disorders, and Intense Creative Energy: A1AT Polymorphisms Are Not Always Silent
Donald E. Schmechel, Duke University Medical Center

10:15 AM – 10:30 AM   Break

10:30 AM – 10:45 AM
Post-Doctoral Competition
Effects of Developmental Exposure to 3, 3’, 4, 4’-Tetrachloroazobenzene and T4 deficits on Neurobehavior and Hippocampal Morphology in Sprague-Dawley Rats.
Mamta Behl, NIH/National Institute of Environmental Health Sciences

10:45 AM – 11:00 AM
Lead Exposure Alters Dendritic Spine Maturation in Rodent Somatosensory Cortex
Mary Ann Wilson, Hugo W. Moser Research Institute at Kennedy Krieger and The Johns Hopkins Univ. School of Medicine

11:00 AM – 11:15 AM
Post-Doctoral Competition
Developmental Lead (PB2+) Exposure in Schizophrenia Mouse Model Creates New Behavioral Phenotype
Bagrat Abazyan, Johns Hopkins Hospital

11:15 AM – 11:30 AM
Post-Doctoral Competition
Interactive Effects of Lithium and Trimethyltin on Depression Associated Behavior: Possible Relevance to Mood Disorders
Steven Szabo, NIH/National Institute of Environmental Health Sciences
TWENTY-SEVENTH INTERNATIONAL NEUROTOXICOLOGY CONFERENCE

11:30 AM – 11:45 AM
Discussion

11:45 AM – 1:15 PM    Break for Lunch on Your Own

Tuesday Early Afternoon    1 Nov 2011    1:15 PM – 3:15 PM
Concurrent Session - Plenary
SESSION VII-A: SCHIZOPHRENIA
Session Chair:    Tomás Guilarte, Columbia University

Theme and Rationale: Schizophrenia is a neurodevelopmental disorder with a later life onset that like autism and ADHD exhibits a strong gender bias. There is growing evidence that susceptibility and/or severity of schizophrenia is determined by gene-environment interactions, and one common factor linked to schizophrenia is inflammation. This session will provide evidence to support a role for early life infections and the possible role of environmental contaminants in the etiology and/or progression of schizophrenia.

Topics and Speakers:

1:15 PM – 1:40 PM
Brain Development and Risk for Schizophrenia: Overall Overview from an Infection Perspective
John Gilmore, University of North Carolina
    will present his research focused on brain development and risk for schizophrenia and other neurodevelopmental disorders. He is Director of the UNC Schizophrenia Research Center, an NIMH-sponsored Conte Center for the Neuroscience of Mental Disorders.

1:40 PM – 2:05 PM
Neuroimmune Dysfunction in Schizophrenia: DISC1 Model
Mikhail Pletnikov, Johns Hopkins University
    will present his research on molecular and cellular mechanisms of abnormal brain development with relevance to neurodevelopmental psychiatric disorders such as schizophrenia and autism

2:05 PM – 2:30 PM
Prenatal Lead Exposure and Schizophrenia: The Connection
Mark Opler, NYU Medical Center
    will present research focused on the etiology, lifecourse, and treatment of schizophrenia and other psychiatric disorders especially as related to prenatal lead exposure. His past research focused on the impact of prenatal chemical exposures on the risk of psychotic disorders, resulting in a replicated finding using prospectively collected biological samples from US-based birth cohorts.

2:30 PM – 2:55 PM
Early Life Lead Exposure and Schizophrenia: Neurobiological Connections and Testable Hypothesis
Tomás Guilarte, Columbia University
    will present a novel hypothesis using a gene x environment interaction model of early life lead exposure in disrupted-in-schizophrenia 1 (DISC 1) mutant mice. DISC1 is a gene that has been strongly implicated as a risk factor for schizophrenia and allied mental disorders.

2:55 PM – 3:15 PM
Discussion

3:15 PM – 3:30 PM    Break

Tuesday Afternoon    1 Nov 2011    1:15 PM – 2:45 PM
Concurrent Session – Mini Symposium
SESSION VII-B: MERCURY AND NUTRIENTS
Session Chair:    Edwin van Wijngaarden, University of Rochester Medical Center

Theme and Rationale: Fish are an important source of protein and contain a variety of essential nutrients. These include the n-3 long chain polyunsaturated fatty acids (LCPUFA), selenium, iodine, vitamin B12, and certain other vitamins. Fish also contain small amounts of methylmercury (MeHg), a known neurotoxicant. Another important source of human exposure to mercury (Hg) occurs from dental amalgams which emit Hg vapor (Hg0). Whether child neurodevelopment is adversely affected from prenatal MeHg exposure from maternal fish consumption and/or Hg0 exposure from maternal dental amalgams is presently unclear. The Seychelles
Child Development Study (SCDS) in a series of investigations has examined whether any risks are associated with MeHg exposure that would result from daily ocean fish consumption during pregnancy. More recently, we have also investigated whether there is a dynamic interplay between and among nutrients in fish, MeHg, and Hg0 that will ultimately determine the influence they exert on child development. This session will provide new information regarding the nutritional status of mothers and children in the SCDS, and the association of exposure to toxicants and nutrients with developmental endpoints.

**Topics and Speakers:**

1:15PM - 1:30 PM  
**Prenatal Hg Vapor, MeHg, and LCPUFAs and Developmental Outcomes at 9 and 30 Months in the Seychelles Child Development Nutrition Study**  
Gene Watson, University of Rochester Medical Center

1:30 PM - 1:45 PM  
**Developmental Outcomes at Five Years of Age in the Seychelles Child Development Nutrition Study: Evidence of Associations with Dietary PUFA**  
Philip W. Davidson, University of Rochester Medical Center

1:45 PM - 2:00 PM  
**Post-Doctoral Competition**  
**Dietary Determinants of LCPUFA and Mercury Status in Pregnant Women and Their Children Aged 5 Years in the Seychelles Child Development Nutrition Study**  
Maria Mulhern, University of Ulster, UK

2:00 PM - 2:15 PM  
**Maternal Selenium Status in Relation to Child Development in the Seychelles Child Development Nutrition Study**  
Edwin van Wijngaarden, University of Rochester Medical Center

2:15 PM - 2:30 PM  
**Discussion of Posters**  
**Prenatal Methyl Mercury Exposure in Relation to Psychological and Behavioral Endpoints at 19 Years from the Seychelles Child Development Study Main Cohort**  
Edwin van Wijngaarden, University of Rochester Medical Center

**Post-Doctoral Competition**  
**Auditory Processing in Offspring of Mothers Who Consumed a Pregnancy Diet High in Fish**  
Adam Dziorny, University of Rochester Medical Center

2:30 PM – 2:45 PM  
**Discussion**

2:45 PM – 3:00 PM  
**Break**

**Tuesday Late Afternoon 1 Nov 2011 3:30 PM – 5:00 PM**

**Concurrent Session - Plenary**

**SESSION VIII-A: CHEMICALLY-INDUCED SEIZURE AND THE ROLE OF INFLAMMATION**

**Session Chair:**  
David Jett, NIH CounterACT, NINDS

**Theme and Rationale:** There is great interest in epilepsy amongst researchers studying neurodevelopmental disorders because epilepsy is a common co-morbidity in autism and a high percentage of children with seizure disorders have ADHD. This session will focus on environmentally-triggered seizures, the relationship of environmental exposures to epilepsy and the role of inflammation in both seizures and epilepsy. It is hoped this will stimulate discussion of a potential link between inflammation and chemically-induced seizure disorders.

**Topics and Speakers:**

3:30 PM – 3:45 PM  
**Introduction – Environmentally-Induced Seizures**  
David A. Jett, NIH CounterACT, NINDS

will provide an overview of how acute exposures to chemical agents cause epileptiform activity in the brain, and the short and long-term neurologic sequelae of these effects.
3:45 PM – 4:15 PM
Diazepam and Diazepam/Valproic Acid Treatments are Neuroprotective, Antiepileptogenic and Correlated with Increased Neurogenesis in the Dentate Gyrus of Rats Exposed to Soman
Debra L. Yourick, Walter Reed Army Institute of Research
will describe the occurrence of spontaneously recurring seizures after exposure to the nerve gas soman.

4:15 PM – 4:45 PM
Inflammation, Seizures and Epilepsy
Tallie Z. Baram, Danette Shepard Professor of Neurological Sciences, University of California Irvine
will describe inflammatory mediators-released by brain cells and peripheral immune cells-in both the origin of individual seizures and the epileptogenic process.

4:45 PM – 5:00 PM
Discussion
Discussion Leaders: David Jett and Pam Lein

6:30 PM: Return for Reception and Hosted Awards Banquet Honoring Theo Colborn

Tuesday Late Afternoon       1 Nov 2011          3:00 PM – 5:00 PM
Concurrent Session - Platform
SESSION VIII-B: DEVELOPMENTAL NEUROTOXICOLOGY, MECHANISMS
Session Co-Chairs: Aaron Bowman, Vanderbilt University Medical Center
Jean Harry, National Institute of Environmental Health Sciences/NIH

Topics and Speakers:
3:00 - 3:15 PM
Post-Doctoral Competition
Changes in Gene Expression after Phencyclidine Administration in Developing Rats: A Potential Animal Model for Schizophrenia
Fang Liu, National Center for Toxicological Research/U.S. Food & Drug Administration

3:15 PM – 3:30 PM
Angiogenesis Disruption: A Potential Contributing Mechanism in Developmental Neurotoxicity
Hassan El-Fawal, Albany College of Pharmacy and Health Sciences

3:30 PM – 3:45 PM
Pre-Doctoral Competition
Comparison of Chemical-Induced Changes in Proliferation and Apoptosis in Human and Mouse Neuroprogenitor Cells
Megan Culbreth, ISTD, NHEERL, US Environmental Protection Agency

3:45 PM – 4:00 PM
Pre-Doctoral Competition
Potential Contribution of Resident Microglia During Chemical Injury-Induced Neurogenesis
Christopher McPherson, National Institute of Environmental Health Sciences/NIH

4:00 PM – 4:15 PM
Ahr<sup>A</sup>Cyp1a2(-/-) Mice Show Increased Susceptibility to PCB-Induced Developmental Neurotoxicity
Christine Curran, Northern Kentucky University

4:15 PM – 4:30 PM
Pre-Doctoral Competition
Omega-3 Fatty Acid Supplementation and Blood Level Associations with ADHD Symptoms: A Meta Analytic Review of Current Research
Elizabeth Hawkey, Oregon Health & Science University School of Medicine
4:30 PM – 4:45 PM
Obesity, Environmental Obesogens, and the View from Neurotoxicology
Bernard Weiss, University of Rochester School of Medicine and Dentistry

4:45 PM – 5:00 PM
Discussion

6:30 PM: Return for Reception and Hosted Awards Banquet Honoring Theo Colborn

Tuesday Evening  1 Nov 2011  6:30 PM – 9:30 PM

Tuesday Evening, November 1st

6:30 PM – 7:00 PM
Reception
(No-Host Bar)

7:00 PM – 9:30 PM
Hosted Awards Banquet Honoring Theo Colborn

Recognition of Neurotoxicology Conference Sponsors

Presentation of Student Poster and Trainee Travel Awards

Recognition of Theo Colborn
“In gratitude, for legions of children not yet born,
but because of you, shielded from harm.”

“Conversation with Theo”

Wednesday Early Morning  2 Nov 2011  8:00 AM – 9:20 AM

Platform Session

SESSION IX: OXIDATIVE STRESS, IMMUNOPATHOGENESIS, AUTISM, SEX DIFFERENCES

Session Co-Chairs:  Jill James, University of Arkansas for Medical Sciences
Elizabeth Sajdel-Sulkowska, Brigham and Women’s Hospital/Harvard Medical School

Topics and Speakers:

8:00 AM - 8:20 AM
Evidence of Oxidative Damage and Inflammation Associated with Low Glutathione Redox Status in the Autism Brain
Jill James, University of Arkansas for Medical Sciences

8:20 AM - 8:40 AM
Environmentally-Induced Oxidative Stress and Disruption of Local Brain Thyroid Hormone Homeostasis
Elizabeth M. Sajdel-Sulkowska, Brigham and Women’s Hospital/Harvard Medical School

8:40 AM - 9:00 AM
Immunopathogenesis in Autism: Regulatory T Cells and Markers of Autoimmunity in Mice Developmentally Exposed to Perfluorooctanoic Acid (PFOA)
Jamie DeWitt, Brody School of Medicine, East Carolina University

9:00 AM - 9:20 AM
Sex Differences in the Persisting Neurobehavioral Impacts of Low-Level Neonatal Pesticide Exposure in Rats
Ed Levin, Duke University Medical Center
SESSION X: RISK ASSESSMENT OF NEUROTOXIC AGENTS

Session Chair: Susan Makris, US EPA/ORD/NCEA

Theme and Rationale: A number of environmental toxicants have been linked with adverse neurotoxicological consequences in adults and children. This symposium will discuss approaches to the risk assessment of neurotoxic agents, as implemented by the US EPA. Speaker presentations will highlight some of the issues and challenges faced by environmental risk assessors, and provide a forum to discuss advances and research needs in this area.

Topics and Speakers:

Susan Makris, U.S. EPA, National Center for Environmental Assessment

9:45 AM - 10:00 AM Use of Mechanistic Data in Risk Assessment of Neurotoxicants
Ambuja Bale, U.S. EPA, National Center for Environmental Assessment

10:00 AM - 10:15 AM Challenges to Using High-Throughput Assays for Evaluating Developmental Neurotoxicity: A Thyroid Disrupting Chemical Case Study
Deborah Segal, U.S. EPA, National Center for Environmental Assessment

10:15 AM - 10:30 AM Break

10:30 AM - 10:45 AM Consideration of Neuroglia in Chemical Assessments
Andrew Kraft, U.S. EPA, National Center for Environmental Assessment

10:45 AM - 11:00 AM -Oms and Mixtures in Developmental Neurotoxicity Risk Assessment
David Szabo, U.S. EPA, National Center for Environmental Assessment

SESSION XI: PANEL DISCUSSION ON COMMON FACTORS IN AUTISM, ADHD AND SCHIZOPHRENIA

Theme and Rationale: Following up the individual sessions on ASD, ADHD and Schizophrenia, this session will be devoted to a “cross-cutting” panel discussion on common factors relating Autism, ADHD and Schizophrenia. A set of questions have been included to facilitate discussion; all conference attendees are invited to participate.

Session Chairs: Isaac Pessah, University of California, Davis
Pamela Lein, University of California, Davis

Panelists: Tomas Guilarte, Columbia University
Martha Herbert, Harvard University
Jill James, University of Arkansas for Medical Sciences
David Jett, NIH CounterACT, NINDS
Ed Levin, Duke University Medical Center
Susan Makris, U.S. EPA, National Center for Environmental Assessment
Elizabeth M. Sajdel-Sulkowska, Brigham and Women’s Hospital/ Harvard Medical School
Susan Schantz, University of Illinois, Champaign-Urbana
Richard Seegal, Wadsworth Center, New York State Department of Health
Tom Zoeller, University of Massachusetts
Discussion is invited from all conference participants

Questions to be Addressed:

1. Given the growing evidence of convergent mechanisms underlying neurodevelopmental disorders with distinct clinical outcomes, what factors determine specificity?

2. What strategies can be employed to identify/confirm environmental risk factors for neurodevelopmental disorders?

3. What factors are key to the development of useful animal models for neurodevelopmental disorders including ADHD, autism or schizophrenia?

4. Given the associations between hypothyroxinemia and resistance to thyroid hormones (RTH) and ADHD, what are the biochemical and structural changes that mediate ADHD-like behaviors?

Open Q&A Session

Wednesday Noon      2 Nov 2011          12:00 Noon – 1:00 PM

Complimentary Box Lunches for Registrants Courtesy of AS and LDDI

Informal Discussion with Theo Colborn

Wednesday Afternoon      2 Nov 2011          1:00 PM – 4:00 PM

LEARNING AND DEVELOPMENTAL DISABILITIES INITIATIVE / AUTISM SOCIETY WORKSHOP:

“Environmental Influences on Neurodevelopment:
Translating the Emerging Science into Public Health Policy”

Workshop Co-Chairs: Donna Ferullo, Director of Program Research, The Autism Society
Elise Miller, Director, Collaborative on Health and the Environment (CHE)

1:00 PM – 1:45 PM
Summary Science: Children, Environment and Brain Development
Martha Herbert, Harvard Medical School/Massachusetts General Hospital
Susan Schantz, University of Illinois at Urbana-Champaign

1:45 PM – 2:30 PM
Policy Approaches to Protecting Neurodevelopment
Richard Denison, Environmental Defense Fund and Campaign for Safer Chemicals, Healthy Families
Tom Zoeller, University of Massachusetts at Amherst
Legislative Action for Children’s Health in the Community  
Kay Hagan, U.S. Senator from North Carolina  

How NGOs Use Science to Move Policy with Expert Q and A  
Donna Ferullo, Director, Environmental Health Initiative, The Autism Society  
John Willson, President, North Carolina Chapter, Learning Disabilities of America  
Beth Mettersmith, Director, North Carolina Campaign, MomsRising  
Billie Karel, Program Director, ToxicFree North Carolina  
All Previous Speakers  

Formal closing of the LDDI/AS Workshop  
Workshop Co-Chairs: Donna Ferullo, The Autism Society  
Elise Miller, Collaborative on Health and the Environment (CHE)  

NOTE: All NEUROTOX 27 papers being presented from Poster in Monday Evening Poster Session V are grouped by category and listed below. The numbers correspond with the numbers in the Abstract Book and on the Poster Boards.  

NEUROTOX 27  
SESSION V: POSTER SESSION  
Monday Evening, October 31, 2011  
7:15 PM – 9:30 PM  

STUDENT POSTER AWARD COMPETITION  
- Judging will be done between 7:15 PM – 8:30 PM  
- Students please stand by your poster during this time  

PAPERS PRESENTED FROM POSTER  

ENVIRONMENTAL RISK FACTORS FOR NEURODEVELOPMENTAL DISORDERS  

P-64  
Prenatal Mercury Exposure and ADHD-Related Behavior in Children. SK Sagiv\(^1\), SW Thurston\(^3\), DC Bellinger\(^4,5\), CA Amarasiriwardena\(^1,5\), SA Korrick\(^1,5\),  
\(^1\)Boston University School of Public Health, Boston, MA; \(^2\)Harvard Medical School, Boston, MA;  
\(^3\)University of Rochester School of Medicine and Dentistry, Rochester, NY; \(^4\)Children’s Hospital, Boston MA; \(^5\)Harvard School of Public Health, Boston, MA.  
Keywords: Methylmercury, Neurodevelopment, Attention Deficit Hyperactivity  

P-65  
Post-Doctoral Poster Award Competition  
Prenatal Exposure to Phthalates and Attention-Deficit Hyperactivity Disorder in Children. AMiodovnik and SH Swan. Department of Preventive Medicine, Mount Sinai School of Medicine, New York, NY, USA  
Keywords: Prenatal Exposure, Phthalates, Attention-Deficit Hyperactivity Disorder  
Mentor: Shanna H. Swan
P-66
Post-Doctoral Poster Award Competition

EFFECTS OF FLUPENTHIXOL AND AMPHETAMINE ON DELAY DISCOUNTING IN THE LONG EVANS RAT. PA Eubig, TE Noe, and SL Schantz. Department of Comparative Biosciences, College of Veterinary Medicine, University of Illinois at Urbana-Champaign, Urbana, Illinois, U.S.A.

Keywords: Impulsivity, Delay Discounting Task, ADHD

P-67
Post-Doctoral Poster Award Competition

POLYBROMINATED DIPHENYL ETHERS AND SOCIAL AND EMOTIONAL DEVELOPMENT IN TODDLERS. K Hoffman1, JL Daniels1, M Adgent1, B Davis Goldman1 and A Sjödin3. 1University of North Carolina, Chapel Hill North Carolina USA. 2 National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina USA. 3 Centers for Disease Control and Prevention, Atlanta GA USA

Keywords: PBDE Exposure, Social and Behavioral, Breastmilk

Mentor: Julie Daniels

P-68
Pre-Doctoral Poster Award Competition

THE IMPACT OF BISPHENOL-A (BPA) EXPOSURE ON NEURO-DEVELOPMENT AND SUBSEQUENT VISUOSPACIAL LEARNING AND MEMORY. JN Franklin and JC DeWitt. Department of Pharmacology and Toxicology, Brody School of Medicine, East Carolina University, Greenville, NC, USA.

Keywords: Bisphenol-A, Neurodevelopmental, Barnes Maze

Mentor: Jamie DeWitt

P-69
EFFECT OF SODIUM (META) ARSENITE ON RAT FETAL BRAIN. M Kuwagata, M Senuma, T Ogawa and S Shioda. Department of Anatomy, Showa University School of Medicine, Shinagawa, Tokyo, Japan

Keywords: Developmental Neurotoxicity, Arsenite, Rat Fetal Brain

P-70 (Also presented from Poster & Discussed in Session VII-B #43)
PRENATAL METHYL MERCURY EXPOSURE IN RELATION TO PSYCHOLOGICAL AND BEHAVIORAL ENDPOINTS AT 19 YEARS FROM THE SEYCHELLES CHILD DEVELOPMENT STUDY MAIN COHORT. E van Wijngaarden, SW Thurston, GJ Myers, JJ Strain, B Weiss, T Zarcone, G Watson, G Zareba, E McSorley, J Wallace, M Mulhern, A McAfee, CF Shamlaye, PW Davidson. University of Rochester School of Medicine and Dentistry.

Keywords: Methylmercury, Nutrition, Child Development

P-71 (Also presented from Poster & Discussed in Session VII-B #44)
Post-Doctoral Poster Award Competition

AUDITORY PROCESSING IN OFFSPRING OF MOTHERS WHO CONSUMED A PREGNANCY DIET HIGH IN FISH. AC Dziorny, MS Orlando, T Love, D Harrington, GJ Myers, PW Davidson. Department of Environmental Medicine, University of Rochester School of Medicine, Rochester, NY, USA

Keywords: Methylmercury, Polyunsaturated Fatty Acids, Auditory Processing

Mentor: Philip Davidson

ENVIRONMENTAL RISK FACTORS FOR PERIPHERAL NEUROTOXICITY AND NEURODEGENERATIVE DISEASES

P-72
ANALYSIS OF ASSOCIATIONS OF LONG-TERM AVERAGE OZONE AND PM2.5 CONCENTRATIONS WITH PARKINSON’S DISEASE AMONG FARMERS AND SPOUSES ENROLLED IN THE AGRICULTURAL HEALTH STUDY. E Kirrane1, J.A. Davis1, T. Luben1, C. Bowman1, J.A. Hoppin1, A. Blair2, H. Chen2, M. Patel2, D.P. Sandler2, C. Tanner2, L. Vinikoor-Imler3, M. Ward4, F. Kamei5. 1 US Environmental Protection Agency, Research Triangle Park, NC, USA. 2NIH/National Institute for Environmental Health Sciences, Research Triangle Park, NC, USA. 3National Cancer Institute, Washington, DC, USA. 4The Parkinson’s Institute, Sunnyvale, CA, USA.

Keywords: Ozone, Air Pollution, Parkinson’s Disease

P-73
NEUROTOXICITY EVALUATION OF N-BUTYLBENZENESULFONAMIDE (NBBS). C Rider1, M Behl1, K Janardhan2 CA McPherson3, and GJ Harry1. 1Toxicology Operations Branch, NTP, NIEHS, 2Cellular/Molecular Pathology Branch, NIEHS and Integrated Laboratory Systems, 3NTP Lab, NIEHS, RTP, NC

Keywords: Sciatic nerve, screening neurotoxicity, plasticizer
P-74
Pre-Doctoral Poster Award Competition
BRAIN ACCUMULATION AND TOXICITY OF MANGANESE IN MICE: AN MRI STUDY. Krishna, Saritha; Dodd, Celia A; Hekmatyar, Shahryar K; and Filippov, Nikolay M. Department of Physiology and Pharmacology, University of Georgia, Athens, GA, United States.
Keywords: manganese, MRI, Mice
Mentor: Nikolay M. Filippov

GENE-ENVIRONMENT INTERACTIONS THAT INFLUENCE NERVOUS SYSTEM DEVELOPMENT AND FUNCTION

P-75
MUTATIONS IN RYANODINE RECEPTOR INCREASE NON-COPLANAR PCB 95 MEDIATED CALCIUM OSCILLATIONS IN PRIMARY CORTICAL NEURONS. DD Bose, H Chen, SC Maxwell, PJ Lein and IN Pessah. Department of Veterinary Molecular Biosciences, University of California, Davis, CA, USA.
Keywords: PCB 95, Ryanodine Receptors, Calcium Signaling

P-76
Pre-Doctoral Poster Award Competition
ASSESSING MOTOR FUNCTION IN THREE GENOTYPES OF MICE EXPOSED TO POLYCHLORINATED BIPHENYLS DURING GESTATION AND LACTATION. JP Fowler, AA Ashworth, MA McKay, CJ Strohmaier, and CP Curran. Department of Biological Sciences, Northern Kentucky University, Highland Heights, KY, USA.
Keywords: Polychlorinated Biphenyls, Genetic Susceptibility, Motor Function
Mentor: Christine Curran

P-77
SEARCHING GENE CANDIDATES RESPONSIBLE FOR MENTAL DISORDERS IN THE FETAL MOUSE UNDERNUTRITION MODEL. T Ogawa, R Rakwal, J Shibato, C Sawa, T Saito, A Murayama, H Kageyama, M Kuwagata and S Shioda. Department of Anatomy, Showa University School of Medicine, Shinagawa, Tokyo, Japan
Keywords: Prenatal Undernutrition, Mental Disorder, Immune System

P-78 (Also presented from Platform in Session VI-B #33)
Post-Doctoral Poster Award Competition
Keywords: Gene-Environment, DISC1, Lead
Mentor: Mikhail Pletnikov & Tomás Guilarte

P-79 (Also presented from Platform in Session VIII-B #48)
Post-Doctoral Poster Award Competition
CHANGES IN GENE EXPRESSION AFTER PHENCYCLIDINE ADMINISTRATION IN DEVELOPING RATS: A POTENTIAL ANIMAL MODEL FOR SCHIZOPHRENIA. Fang Liu, Cheng Wang. Division of Neurotoxicology, National Center for Toxicological Research/U.S. Food & Drug Administration, Jefferson, AR, United States
Keywords: Neuronal Development, DNA Microarray, Gene Expression, Phencyclidine (PCP), Schizophrenia, Apoptosis
Mentor: Cheng Wang

P-80
Post-Doctoral Poster Award Competition
NEUROPROGENITORS DIFFERENTIATED FROM PARK2 MUTANT STEM CELLS EXHIBIT ALTERED SENSITIVITY TO NEUROTOXIC METALS. Asad A. Aboud1*, Andrew M. Tidball1*, M. Diana Neely1, Michael Litt1, Peter Hedera1, Charles C. Hong1, Kevin C. Ess1, and Aaron B. Bowman1. 1Vanderbilt University Medical Center, Dept. of Neurology, 2Research Medicine, Veterans Administration TVHS, Cardiovascular Medicine Division, Nashville TN 37232-8552
Keywords: Induced Pluripotent Stem Cells, Metal Neurotoxicants, Parkinson's
Mentor: Aaron Bowman
Endocrine Disruption and Sex Differences in Neurodevelopmental Disorders

P-81
DEVELOPMENTAL EXPOSURE TO THE ORGANOPHOSPHATE CHLORPYRIFOS DIFFERENTLY AFFECTS SOCIAL BEHAVIOR AND RELATED BRAIN NEUROENDOCRINE MARKERS IN FEMALE AND MALE MICE. A. Venerosi1, L. Riccieri1, S. Tait3, A. De Felice1, A. Mantovani2 and G. Calamandrei1. 1Dept. Cell Biology and Neurosciences, 2Dept. Food Safety and Veterinary Public Health, Istituto Superiore di Sanità Rome, Italy
Keywords: Mouse Social Behavior, Developmental Exposure to Organophosphates, Chlorpyrifos as Endocrine Disruptor

P-82
SEX DIFFERENCES IN THE EFFECT OF PRENATAL ORGANOCHELORINE EXPOSURE ON ATTENTION AND IMPULSE CONTROL AT AGE 8 YEARS SK Sagiv1,2, SW Thurston3, DC Bellinger4,5, LM Altschul6, SA Korrick2,5. 1Boston University School of Public Health, Boston, MA; 2Harvard Medical School, Boston, MA; 3University of Rochester School of Medicine and Dentistry, Rochester, NY; 4Children’s Hospital, Boston MA; 5Harvard School of Public Health, Boston, MA.
Keywords: Organochlorines, Neurodevelopment, Sex Differences

P-83
Pre-Doctoral Poster Award Competition
EFFECTS OF LOW DOSE BISPHENOL A DURING GESTATION AND EARLY DEVELOPMENT ON MATERNAL BEHAVIOR IN LONG EVANS HOODED RATS. Chisholm NC1, Sadowski RN2, Park PY3, Neese SLbc, Schantz SLbc, Juraska JMab. 1Department of Psychology, 2Neuroscience Program and 3Comparative Biosciences, University of Illinois at Urbana –Champaign, Champaign, Illinois 61820
Keywords: Development, Maternal Behavior, Bisphenol A
Mentor: Janice Juraska

P-84
Pre-Doctoral Poster Award Competition
EFFECTS OF LOW DOSE BISPHENOL A ADMINISTERED TO MALES AND FEMALES DURING GESTATION AND EARLY POSTNATAL DEVELOPMENT ON ADULT BEHAVIOR IN THE RADIAL ARM MAZE. Chisholm NC1, Sadowski RN2, Park PY3, Neese SLbc, Schantz SLbc, Juraska JLatbc. 1Neuroscience Program, 2Psychology, 3Comp Biosciences, University of Illinois, Champaign IL
Keywords: BPA, Radial Arm Maze, Body Weight
Mentor: Janice Juraska

P-85 (Also presented from Platform in Session VI-B #31)
Post-Doctoral Poster Award Competition
EFFECTS OF DEVELOPMENTAL EXPOSURE TO 3, 3’, 4, 4’-TETRACHLOROAZOBENZENE AND T4 DEFICITS ON NEUROBEHAVIOR AND HIPPOCAMPAL MORPHOLOGY IN SPRAGUE-DAWLEY RATS. Mamta Behl1, Michelle J. Hoth1 and G. Jan Henry1, 2. 1Division of the National Toxicology Program and 2Laboratory of Toxicology and Pharmacology, National Institute of Environmental Health Sciences, Research Triangle Park, NC, 27709
Keywords: Developmental, Neurotoxicology, tetrachloroazobenzene
Mentors: Jean Harry & Michelle Hoth

P-86
DIFFERENCES IN ACTIVITY IN MALE AND FEMALE B6C3F1 MICE USING THE OPEN FIELD AND VOLUNTARY RUNNING WHEEL. Dr. Goulding1, GJ Harry2, GE Kissling3, TL Blankenship-Paris1 and DB Forsythe1. 1Comparative Medicine Branch1, Neurotoxicology Group2, Biostatistics Branch1, National Institute of Environmental Health Sciences, NIH, DHHS, Research Triangle Park, NC, USA
Keywords: Locomotor Activity, Sex Differences In Mice, Voluntary Running Wheel

Immune System Influences on Neurotoxicologic Responses

P-87 (Also presented from Platform in Session VIII-B #51)
Pre-Doctoral Poster Award Competition
POTENTIAL CONTRIBUTION OF RESIDENT MICROGLIA DURING CHEMICAL INJURY-INDUCED NEUROGENESIS. CA McPherson and GJ Harry. Neurotoxicology Group, NIEHS/NIH, RTP, NC, USA.
Keywords: Brain Injury, Neurogenesis, Microglia
Mentor: Jean Harry
P-88
A MODEL TO EXPLORE THE SPECTRUM OF DIVERSE MICROGLIAL FUNCTIONS WITH INJURY. S Das1,2, CA McPherson1, and GJ Harry1. 1Neurotoxicology Group, NIEHS, RTP, NC. 2 East Chapel Hill High School, Chapel Hill, NC, USA

Keywords: Model, Microbial Function, Injury

P-89
Post-Doctoral Poster Award Competition
PRENATAL INFLUENZA INFECTION IMPACTS OFFSPRING BRAIN DEVELOPMENT: DIFFUSION TENSOR IMAGING OF WHITE MATTER PATHWAYS IN THE RHESUS MONKEY. SJ Short and JH Gilmore. Department of Psychiatry, School of Medicine, University of North Carolina, Chapel Hill, NC, USA.

Keywords: Pregnancy, Influenza, Brain Development

Mentor: John H. Gilmore

P-90
Pre-Doctoral Poster Award Competition
DIFFERENTIAL IMMUNE RESPONSES TO THE ENVIRONMENTAL TOXICANT, BDE-49 IN CHILDREN WITH AUTISM SPECTRUM DISORDERS. Marjannie D. Eloj,1 Robert Boyce, 1 Isaac N. Pessah,2,3,4 Paul Ashwood4,5, and Judy Van de Water1,2,4. 1School of Medicine, Division of Rheumatology, Allergy and Clinical Immunology, University of California, Davis. 2The M.I.N.D. Institute, University of California, Davis. 3Department of Veterinary Molecular Biosciences, University of California, Davis. 4NIEHS Center for Children’s Environmental Health, University of California, Davis. 5Department of Medical Microbiology, University of California, Davis.

Keywords: Autism, Cytokines And Chemokines, Environmental Toxicants

Mentors: Name: Judy Van de Water

P-91
Pre-Doctoral Poster Award Competition
IMMUNOPATHOGENESIS IN AUTISM: REGULATORY T CELLS AND THE EFFECTS OF DEVELOPMENTAL EXPOSURE TO PERFLUOROOCTANESULFONIC ACID (PFOS) AND PERFLUOROOCTANIC ACID (PFOA) ON THE CEREBELLUM IN C57BL/6 MICE. IL Bryan and JC DeWitt. Department of Pharmacology and Toxicology, Brody School of Medicine, East Carolina University, Greenville, NC, USA.

Keywords: Autism, Perfluorooctanesulfonic Acid, Perfluorooctanoic Acid

Mentor: Jamie DeWitt

P-92
Post-Doctoral Poster Award Competition
BEHAVIORAL AND NEUROCHEMICAL ANALYSIS FOLLOWING SUBCHRONIC MANGANESE EXPOSURE IN MICE: MODULATION BY ACUTE LIPOPOLYSACCHARIDE ADMINISTRATION. CA Dodd, S Krishna, and NM Filipov. Department of Physiology and Pharmacology, University of Georgia, Athens, Georgia

Keywords: Manganese, Lipopolysaccharide, Drinking Water

Mentor: Nikolay M. Filipov

MODIFYING FACTORS AND INTERACTIONS THAT INFLUENCE NEUROTOXICITY

P-93
TOXIC EFFECTS OF WATER TREATMENT WITH FLUOSILICIC ACID. Myron J. Coplan1, Roger D. Masters2. 1Intellequity Consulting, 430 Center St., Newton, MA. 02456, 2Dept. of Government, Dartmouth College, Hanover, NH 03755.

Keywords:

P-94
Pre-Doctoral Poster Award Competition
INHIBITORY CONTROL PERFORMANCE IN RATS DEVELOPMENTALLY EXPOSED TO PCBS FOLLOWING MICROINJECTION OF BUPROPION INTO THE MEDIAL PREFRONTAL CORTEX. AE Meyer, MM Miller, JL Nelms, MA Ward, and HJK Sable. Department of Psychology, University of Memphis, Memphis, TN, USA.

Keywords: Polychlorinated Biphenyls, Medial Prefrontal Cortex, Bupropion

Mentor: Helen Sable
P-95  (Also presented from Platform in Session VI-B #34)
Post-Doctoral Poster Award Competition
INTERACTIVE EFFECTS OF LITHIUM AND TRIMETHYLTIN ON DEPRESSION ASSOCIATED BEHAVIOR: POSSIBLE RELEVANCE TO MOOD DISORDERS. Szabo ST1,2, Harry GJ1. 1 Neurotoxicology Group, NTP Labs, NIEHS, RTP, NC, USA. 2 Duke University, Psychiatry and Behavioral Sciences, Durham, NC, USA
Keywords: Organotin, Neurotoxin, Neuropsychiatry
Mentor: Jean Harry

P-96  (Also presented from Platform in Session VII-B #41)
Post-Doctoral Poster Award Competition
DIETARY DETERMINANTS OF LCP UFA AND MERCURY STATUS IN PREGNANT WOMEN AND THEIR CHILDREN AGED 5 YEARS IN THE SEYCHELLES CHILD DEVELOPMENT NUTRITION STUDY.  MS Mulhern1, AJ McAfee2, T Love3, MP Bonham3, EM McSorley4, JMW Wallace5, CF Shamlaye1,6, SW Thurston7, GJ Myers2, PW Davidson7 and JJ Strain8. 1Northern Ireland Centre for Food and Health, University of Ulster, Coleraine, BT52 1SA, 2University of Rochester, School of Medicine and Dentistry, US 3Monash University, Melbourne and 4Ministry of Health, Seychelles.
Keywords: Mercury, Long Chain Polyunsaturated Fatty Acids, Child Development
Mentor: Sean (JJ) Strain

P-97
Post-Doctoral Poster Award Competition
ESTIMATED DAILY METHYLMERCURY INTAKES FROM FISH BY PREGNANT WOMEN AND THEIR CHILDREN: SEYCHELLES CHILD DEVELOPMENT AND NUTRITION STUDY. AJ McAfee2, MS Mulhern1 EM McSorley4, MP Bonham3, JMW Wallace5, CF Shamlaye1, GE Watson4, GS Myers5, PW Davidson6 and JJ Strain7. 1Northern Ireland Centre for Food and Health, University of Ulster, Coleraine, UK, 2Department of Nutrition and Dietetics, Monash University, Melbourne, Australia, 3Ministry of Health, Victoria, Mahé, Republic of Seychelles and 4University of Rochester, School of Medicine and Dentistry, NY, USA
Keywords: Methylmercury, Fish Consumption, Child Development
Mentor: Sean (JJ) Strain

MECHANISMS OF NEUROPROTECTION

P-98
GLUTATHIONE INDUCTION BY 3H-1,2-DITHIOLE-3-THIONE AS A DIRECT MECHANISM OF PROTECTION AGAINST ACROLEIN-INDUCED HUMAN NEUROBLASTOMA (SH-SY5Y) CELLS INJURY. Zhenguang Jia, Hong Zhu, Bhava R. Misra, Hara Misra, Yunbo Li. 1Department of Biology, University of North Carolina at Greensboro, Greensboro, North Carolina, USA. 2Division of Biomedical Sciences, Edward Via College of Osteopathic Medicine, Virginia Tech Corporate Research Center, Blacksburg, Virginia, USA.
Keywords: Acrolein, Cytotoxicity, Neuroprotection

P-99  (Also presented from Platform in Session VIII-B #53)
Pre-Doctoral Poster Award Competition
OMEGA-3 FATTY ACID SUPPLEMENTATION AND BLOOD LEVEL ASSOCIATIONS WITH ADHD SYMPTOMS: A META ANALYTIC REVIEW OF CURRENT RESEARCH. Elizabeth Hawkey B.A. and Joel T. Nigg, Ph.D. Department of Psychiatry, OHSU School of Medicine, Oregon Health & Science University, Portland, OR, USA.
Keywords: ADHD, Omega-3, Meta-Analysis
Mentor: Joel T. Nigg

P-100
Pre-Doctoral Poster Competition
NIMODIPINE IS NEUROPROTECTIVE AGAINST ADULT-ONSET MEHG NEUROTOXICITY. JM Bailey and MC Newland. Psychology Department, Auburn University, Auburn, AL, USA
Keywords: Methylmercury, Nimodipine, Behavior
Mentor: M. Christopher Newland

P-101
Post-Doctoral Poster Award Competition
AGE-ASSOCIATED ALTERATIONS OF MONOAmine OXIDASE, MEMBRANE FLUIDITY, NEUROLIPOFUCsIN AND GLUCOSE TRANSPORTER IN MALE RAT BRAIN: NEUROPROTECTIVE ROLE OF DEHYDROEPIANDROSTERONE. Pardeep Kumar, R.K. Kale and N.
Z. Baquer. School of Life Sciences, Jawaharlal Nehru University, New Delhi-110067, India

**Keywords:** Brain Aging, Dehydroepiandrosterone, Neuroprotection

**Mentors:** Prof. N. Z. Baquer & Prof. R.K. Kale

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**Evolving Methods, Models and Research Needs in Neurotoxicity Testing**

**P-102**

IN VITRO SCREENING OF DEVELOPMENTAL NEUROTOXICANTS IN RAT PRIMARY CORTICAL NEURONS USING HIGH CONTENT IMAGE ANALYSIS. J.A Harrill, B.R Robinette, T.M Freudenrich and W.R Mundy. 1 Institute for Chemical Safety Sciences, the Hamner Institutes for Health Sciences, RTP, NC, 2 Integrated Systems Toxicology Division, U.S.EPA, RTP, NC.

**Keywords:** Development, In Vitro, High Content Screening

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**P-103** (Also presented from Platform in Session VIII-B #50)

Pre-Doctoral Poster Award Competition

COMPARISON OF CHEMICAL-INDUCED CHANGES IN PROLIFERATION AND APOPTOSIS IN HUMAN AND MOUSE NEUROPROGENITOR CELLS. M.E Culbreth, W.R Mundy, T.J Shafer. 1 Student Services Contractor to ISTD, NHEERL, US EPA, RTP, NC; 2 ISTD, NHEERL, US EPA, RTP, NC.

**Keywords:** Neuroprogenitor, High-Throughput, Proliferation/Apoptosis

**Mentor:** Tim Shafer

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**P-104**

Post-Doctoral Poster Award Competition

MODULATION OF NA-K ATPASE ACTIVITY OF RAT BRAIN SYNAPTOSOME BY NOREPINEPHERINE AND SEROTONIN. Sukrat Sinha.

Center for Biotechnology, University of Allahabad, Allahabad-211002

**Keywords:** REM Sleep, Na-K ATPase, Norepinephrine, Serotonin

**Mentor:**

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**P-105**

Pre-Doctoral Poster Award Competition

A DROSOPHILA MODEL FOR FRIEDREICH’S ATAXIA. Luan Wang and Douglas Ruden. Institute of Environmental Health Sciences.

Wayne State University, Detroit, MI, USA

**Keywords:** Friedrech’s Ataxia, Frataxin, Heart

**Mentor:** Douglas Ruden

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**P-106** (Also presented from Platform in Session X #63)

Post-Doctoral Poster Award Competition

‘OMICs AND MIXTURES IN DEVELOPMENTAL NEUROTOXICOLOGY RISK ASSESSMENT. David Szabo, Ruchir Shah and Linda Birnbaum. Oak Ridge Institute for Science and Education, National Center for Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Washington DC; SRA International; and National Cancer Institute/National Institute of Environmental Health Sciences, Research Triangle Park, NC.

**Keywords:** Risk Assessment, Toxicogenomics, Mixtures

**Mentor:** Bob Sonawane & Kate Guyton

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**P-107**

THE BLUEPRINT FOR NEUROSCIENCE RESEARCH. Annette Kirshner PhD and Cindy Lawler PhD, Division of Extramural Research and Training, National Institute of Environmental Health Sciences, Research Triangle Park, NC

**Keywords:** Neuroscience Blueprint, History, Resources

**Mentor:**

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**P-108**

Post-Doctoral Poster Award Competition


**Keywords:** Nanomaterials, Neurotoxicology, Risk Assessment

**Mentor:** J. Michael Davis