



**Forum on Neuroscience and Nervous System Disorders**  
Board on Health Sciences Policy

**AGENDA**

**Sex Differences and Implications for  
Translational Neuroscience Research - A Workshop**

March 8 and 9, 2010

Franciscan Ballroom  
Sir Francis Drake Hotel  
450 Powell Street, San Francisco, CA

**Background:** Basic research that involves delineating meaningful drug effects and behavioral and physiological responses that differ between the sexes can be costly and time consuming because they require additional experiment groups and protocols. However, epidemiological and clinical studies indicate substantial sex differences in response to drugs. The sex differences cut across other parameters such as socioeconomic factors, race, age, etc. In the current era of translational research and personalized medicine, it is increasingly important to take sex differences into account, so that these drug effects can be more accurately understood. This is particularly important in the neurosciences because of the complex nature of many disorders of the nervous system including mental, neurological, and substance use disorders. Consequently, the Institute of Medicine's Forum on Neuroscience and Nervous System Disorders is hosting a workshop to explore the key principles and strategies used by basic translational researchers and industry in studying sex differences in the neurosciences for the therapy development pathway.

**Meeting Objectives:** The objectives of this workshop are to:

- Briefly outline the public health importance of studying sex difference in the nervous system, in health and sickness, including the potential application to healthcare delivery.
- Identify the scientific principles that should be considered when designing pre-clinical experiments that will examine sex differences, including strategies to bridge between pre-clinical and clinical studies
  - § Discuss when and how sex differences should and should not be considered.
- Explore the key principles and strategies used by academic clinicians to effectively utilize basic research for pre-clinical and clinical application and study (i.e., phase 0-4), including approaches used by researchers to decide how and when to take into consideration the potential importance of sex differences.
- Explore how and when industry considers and addresses studying sex differences, given regulatory guidelines.
- Examine the advantages, constraints, and implication of performing "valid analysis" versus requiring statistical outcomes between the sexes.
- Identify the next steps that will be critical to establishing a set of principles that could be used by a variety of stakeholders in considering when and how to incorporate studying sex differences into translational research efforts.

## **AGENDA**

### **Sex Differences and Implications for Translational Neuroscience Research - A Workshop**

DAY 1 - March 8

Franciscan Ballroom  
Sir Francis Drake Hotel  
450 Powell Street, San Francisco, CA

8:30 a.m. Welcome, Introductions, and Workshop Objectives

Rae Silver, *co-Chair*  
Professor of Natural and Physical Sciences  
Columbia University

Stevin Zorn, *co-Chair*  
Executive Vice President  
Neuroscience Research  
Lundbeck

#### **SESSION I: SEX DIFFERENCES IN RESEARCH: NEED, DESIGN, STUDY**

##### Session Objective

- § Briefly outline the public health importance of studying sex difference in the nervous system, in health and sickness, including the potential application to healthcare delivery.
- § Identify the scientific principles that should be considered when designing pre-clinical experiments that will examine sex differences, including strategies to bridge between pre-clinical and clinical studies
  - Discuss when and how sex differences should and should not be considered.
- § Explore the key principles and strategies used by academic clinicians and industry to effectively utilize basic research for pre-clinical and clinical application and study (i.e., phase 0-4), including approaches used by researchers to decide how and when to take into consideration the potential importance of sex differences.

##### Opening Remarks

8:40 a.m. What are some of the challenges for sex differences research and how can they be overcome?

Vivian Pinn  
Associate Director for Research on Women's Health  
Office of the Director  
Director, Office of Research on Women's Health  
National Institutes of Health

9:00 a.m.      What are the scientific principles for studying sex differences in health and disease?

Arthur Arnold  
Professor and Chair  
Department of Physiological Science  
University of California, Los Angeles

9:20 a.m.      When and how should sex differences in drug response be studied?

Jeff Mogil  
Chair in Pain Studies  
Department of Psychology  
McGill University

9:40 a.m.      What factors will affect the successful translation of sex differences from preclinical to clinical studies?

Jon Levine  
Professor  
Department of Neurobiology and Physiology  
Northwestern University

10:00 a.m.      When and how should sex differences in disease susceptibility be studied?

Kathryn Sandberg  
Professor of Medicine and Physiology  
Director, Center for Study of Sex Differences  
Georgetown University Medical Center

10:20 a.m.      BREAK

10:35 a.m.      Panel Presentations: Depression

Katherine Wisner  
Professor of Psychiatry, Obstetrics, and Gynecology  
University of Pittsburgh School of Medicine  
Director, Women's Behavioral HealthCARE  
University of Pittsburgh Medical Center

Jill Goldstein  
Professor of Psychiatry and Medicine  
Departments of Psychiatry and Medicine at Harvard Medical School  
Director of Research, Connors Center for Women's Health & Gender Biology  
Brigham and Women's Hospital

Etienne Sibille  
Associate Professor  
Department of Psychiatry  
Center for Neuroscience  
Translational Neuroscience Program  
University of Pittsburgh

Carla Canuso  
Senior Director, External Innovation  
Neuroscience Therapeutic Area  
Johnson & Johnson Pharmaceutical Research and Development, L.L.C.

11:25 a.m. Discussion with panelists and attendees

Richard Nakamura, *Moderator*  
Director of the Division of Intramural Research Programs  
NIMH

11:55 a.m. LUNCH

12:50 p.m. Panel Presentations: Pain and pain perception

Karen Berkley  
Professor of Psychology and Neuroscience  
Department of Psychology  
Florida State University

Emeran Mayer  
Professor  
Departments of Medicine, Physiology, Psychiatry & Biobehavioral Sciences  
Director, UCLA Center for Neurovisceral Sciences & Women's Health  
University of California, Los Angeles

Linda LeResche  
Professor  
Department of Oral Medicine  
School of Dentistry  
University of Washington

1:20 p.m. Discussion with panelists and attendees

Chi-Ming Lee, *Moderator*  
Executive Director, Translational Science  
AstraZeneca Pharmaceuticals

1:50 p.m. Panel Presentations: Sleep Medicine

Roseanne Armitage  
Professor, Department of Psychiatry  
Adjunct Professor, Department of Psychology  
Director, Sleep and Chronophysiology Laboratory  
University of Michigan

Jeanne Duffy  
Assistant Professor of Medicine  
Division of Sleep Medicine  
Harvard Medical School  
Director, Chronobiology Core  
Division of Sleep Medicine  
Department of Medicine  
Brigham & Women's Hospital

Rachel Manber  
Professor, Psychiatry & Behavioral Science  
Director, Stanford Sleep Medicine Clinic  
Stanford University

Martica Hall  
Associate Professor  
Psychiatry, Psychology, and Clinical and Translational Sciences  
University of Pittsburgh School of Medicine

2:30 p.m. Discussion with panelists and attendees

Rae Silver, *Moderator*  
Professor of Natural and Physical Sciences  
Columbia University

3:00 p.m. BREAK

3:15 p.m. Panel Presentations: Multiple Sclerosis and Neuro-inflammation

Robert Fox  
Staff Neurologist and Medical Director  
Mellen Center for Multiple Sclerosis at Cleveland Clinic

Halina Offner  
Professor of Neurology and Anesthesiology and Perioperative Medicine  
Oregon Health & Science University

Rhonda Voskuhl  
Professor of Neurology  
Director, Multiple Sclerosis Research and Treatment Program  
University of California, Los Angeles

3:45 p.m. Discussion with panelists and attendees

Paul Hoffman, *Moderator*  
Associate Chief of Staff for Research and Program Development  
North Florida/South Georgia Veterans Health System

## SESSION II: REVIEW

Based on today's presentations and discussions, a panel will synthesize and discuss key points and ideas that examined:

- § The principles that should be considered when designing pre-clinical experiments that will examine sex differences, including strategies to bridge between pre-clinical and clinical studies
  - When and how sex differences should and should not be considered.
- § The key principles and strategies used by academic clinicians and industry to effectively utilize basic research for pre-clinical and clinical application and study (i.e., phase 0-4), including approaches used by researchers to decide how and when to take into consideration the potential importance of sex differences.

4:15 p.m. Panel Review and Discussion

Richard Nakamura  
Director of the Division of Intramural Research Programs  
NIMH

Chi-Ming Lee  
Executive Director, Translational Science  
AstraZeneca Pharmaceuticals

Rae Silver  
Professor of Natural and Physical Sciences  
Columbia University

Paul Hoffman  
Associate Chief of Staff for Research and Program Development  
North Florida/South Georgia Veterans Health System

4:45 p.m. Closing Discussion with Attendees

5:15 p.m. ADJOURN

## **AGENDA**

### **Sex Differences and Implications for Translational Neuroscience Research - A Workshop**

DAY 2 - March 9

Franciscan Ballroom  
Sir Francis Drake Hotel  
450 Powell Street  
San Francisco, CA 94102

9:00 a.m. Welcome and Review of Day One

Rae Silver, *co-Chair*  
Professor of Natural and Physical Sciences  
Columbia University

Stevin Zorn, *co-Chair*  
Executive Vice President  
Neuroscience Research  
Lundbeck

9:20 a.m. Keynote Talk

Morgan Sheng  
Vice President of Neuroscience  
Genentech

9:50 a.m. Panel Discussion: Reporting sex differences in research in publications

Sean Murphy (*Journal of Neurochemistry*)  
Professor  
Department of Neurological Surgery  
University of Washington School of Medicine

Marie-Francoise Chesselet (*Experimental Neurology*)  
Professor of Neurology  
Chair, Department of Neurobiology Reed Neurological Research Center  
University of California, Los Angeles

### SESSION III: FDA REGULATIONS AND PERSPECTIVES FROM INDUSTRY

#### Session Objective

- § Discuss the regulatory practices regarding including males and females in clinical trials
- § Explore how and when industry considers and addresses studying sex differences, given regulatory guidelines
- § Identify industry's constraints regarding assessing sex differences in all phases of clinical trials
- § Examine the advantages, constraints, and implication of performing “valid analysis” versus requiring statistical outcomes between the sexes

Stevin Zorn, *Session Chair*  
Executive Vice President  
Neuroscience Research  
Lundbeck

10:10 a.m.      Panel Presentations

Ameeta Parekh  
Director, Research and Development  
Office of Women's Health  
Food and Drug Administration

Carlos Zarate  
Clinical Professor, Psychiatry and Behavioral Sciences  
George Washington University  
Chief, Experimental Therapeutics  
Mood and Anxiety Disorders Program  
NIMH

Douglas Feltner  
Vice President, Global Translational Medicine and Neuroscience  
Pfizer

10:50 a.m.      Discussion with panelists and attendees

Stevin Zorn, *Session Chair*  
Executive Vice President  
Neuroscience Research  
Lundbeck



#### SESSION IV : NEXT STEPS

Session Objective: Identify the next steps that will be critical to establishing a set of principles that could be used by a variety of stakeholders in considering when and how to incorporate studying sex differences into research.

11:20 a.m.      Moderated Discussion with Attendees

Rae Silver, *co-Chair*  
Professor of Natural and Physical Sciences  
Columbia University

Stevin Zorn, *co-Chair*  
Executive Vice President  
Neuroscience Research  
Lundbeck

Wrap-up Discussion Questions:

- a) What are the key opportunities where understanding sex difference will have the greatest healthcare impact?
- b) What are some of the critical factors (e.g. biological, epidemiological, health economics, sociological, ethical) and how would they guide the consideration of studying sex differences to improve health care?
- c) When and how should sex differences in disease susceptibility be studied?
- d) When and how should sex differences in drug response be studied?
- e) What are some of the barriers which impede sex differences research and how can they be overcome?
- f) How can academic clinicians and basic researchers help improve translational neuroscience efforts in the area of sex differences research?
- g) What factors will affect the successful translation of sex differences from preclinical to clinical studies?

Noon              Adjourn