



National Toxicology Program
U.S. Department of Health and Human Services

Shift Work at Night, Artificial Light at Night, and Circadian Disruption Workshop

March 10th, 2016 [2:30 PM to 5:30 PM, EST]
March 11th, 2016, [8:00 AM to 6:00 PM, EST]
Rodbell Auditorium in the David P. Rall Building
NIEHS, Research Triangle Park, NC

Agenda

Thursday, March 10, 2016

Welcome and Introduction

Dr. Kristina Thayer, NIEHS

Background and Workshop Objectives

Dr. Ruth Lunn, NIEHS

Circadian Disruption

Moderator: Dr. Windy Boyd, NIEHS

Rapporteur: Dr. Gloria Jahnke, NIEHS

Overview of circadian disruption, biomarkers, and experimental models

Dr. Fred Turek, Northwestern University

Discussion

How do we define circadian disruption for the purpose of informing NTP literature-based health hazard assessments?

Key discussants

Dr. David Blask, Tulane University

Dr. Michael Gorman, University of California at San Diego

Dr. Mike Smolensky, University of Texas at Austin

Dr. Fred Turek, Northwestern University

Friday, March 11, 2016

Welcome and Introduction

Dr. Linda Birnbaum; Director, NTP, NIEHS

Circadian Disruption Summary

Dr. Fred Turek, Summary of Thursday's discussion

Artificial Light at Night

Moderator: Dr. Claire Caruso, NIOSH

Rapporteur: Dr. Christina Lawson, NIOSH

Presentations

Overview of artificial light and its association with circadian disruption

Dr. Mariana Figueiro, Lighting Research Center at Rensselaer Polytechnic Institute

Overview of studies of health effects and biomarkers of circadian disruption in humans

Dr. Richard Stevens, University of Connecticut

Overview of studies of health effects and biomarkers of circadian disruption in experimental animals

Dr. Randy Nelson, Ohio State University

Discussion

- What characteristics of light are related to circadian disruption? How well do satellite images measure light that causes circadian disruption?
- How can the experimental evidence (e.g., animal models of outcomes and biomarkers and/or *in vitro* studies) and/or biomarker studies in humans inform the interpretation of studies of health effects in humans? How do we translate animal studies to human studies when it comes to sensitivity to light?
- Which animal exposure models are most representative of potential human exposures and should be considered by NTP? Conversely, which animal exposure models should be excluded?
- What biomarkers could be used to assess interventions to reduce light-induced circadian disruption?

Key discussants

Dr. David Blask, Tulane University

Dr. Michael Gorman, University of California at San Diego

Dr. Mariana Figueiro, Lighting Research Center at Rensselaer Polytechnic Institute

Dr. Randy Nelson, Ohio State University

Dr. Richard Stevens, University of Connecticut

Shift Work and Transmeridian Travel

Moderator: Dr. Tania Carreón-Valencia, NIOSH

Rapporteur: Dr. Pamela Schwingl, Integrated Laboratory Systems (Support Contract for the RoC)

Presentations

Overview of types and characteristics of shift work and the concept of shift work as a complex exposure scenario

Dr. Roel Vermeulen, Utrecht University, The Netherlands

Overview of studies of shift workers and health effects and/or biomarkers of circadian disruption in humans

Dr. Johnni Hansen, Danish Cancer Society

Overview of studies of health effects and biomarkers of circadian disruption in experimental animal model studies of shiftwork or jet lag

Dr. Andrew Coogan, Maynooth University, Ireland

Discussion

- What characteristics of shiftwork and transmeridian travel or social jet lag are related to circadian disruption?
- How can the experimental evidence (models and biomarkers) and/or biomarker studies in humans inform the interpretation of studies of health effects in humans?
- Which animal exposure models are most representative of human shift work and should be considered by NTP? Conversely, which animal exposure models should be excluded?
- What biomarkers can be used to assess interventions to reduce circadian disruption associated with shiftwork?

Key discussants

Dr. Andrew Coogan, Maynooth University, Ireland

Dr. Michael Gorman, University of California at San Diego

Dr. Johnni Hansen, Danish Cancer Society

Dr. Roel Vermeulen, Utrecht University, The Netherlands

Sleep and Other “Exposures” in Studies of ALAN/Shift Work in Humans

Moderator: Dr. Michael Twery, NHLBI

Rapporteur: Ms. Kyla Taylor, NIEHS

Discussion

- What is the relationship of sleep, meal timing, and circadian disruption?
- What health outcomes are potentially related to sleep duration and quality?
- What health outcomes are potentially related to decreased daylight/vitamin D? Are shift workers likely to have vitamin D deficiency?
- Should sleep, meal timing, and daylight (vitamin D) be considered as confounders, or effect modifiers in the human studies of artificial light at night and shift work?

Key discussants

Dr. Janet Hall, NIEHS

Dr. Satchidananda (Satchin) Panda, Salk Institute

Dr. Mike Smolensky, University of Texas at Austin

Dr. Fred Turek, Northwestern University

Artificial Light at Night, Shift Work at Night and Circadian Disruption

Suggested strategies to synthesize across studies of different types of “exposure scenarios” (e.g., shift work, artificial light at night) in order to reach conclusions for NTP’s literature-based assessments

Moderator: Dr. Roel Vermeulen, Utrecht University, The Netherlands

Rapporteur: Dr. Windy Boyd, NIEHS

Discussants: Entire panel

Discussion

- What biomarkers or experimental models of circadian disruption are common to both artificial light and shiftwork?
- What are intermediate biological responses or biomarkers of circadian disruption such as changes in hormonal levels (reproductive hormones, melatonin) that may play a role in pathogenesis?
- Can the mechanistic data help integrate across epidemiological studies of shift workers or people exposed to artificial light at night and make conclusions related to circadian disruption and/or artificial light at night?
- Are biomarkers of circadian disruption a good surrogate for predicting whether interventions to prevent disease associated with circadian disruption are working? Are biomarkers specific for health outcomes needed or are there common biomarkers across outcomes?

Research Opportunities

Moderator: Dr. Janet Hall, NIEHS

Rapporteur: Dr. Katie Pelch, NIEHS

Discussants: Entire panel

Discussion

- What short-term clinical (e.g., NIEHS clinical center, scientific community) or experimental studies in animals or cells (e.g., NTP laboratories, scientific community) on biomarkers of circadian disruption or intermediate endpoints can be done to help inform NTP’s literature-based assessments?
- What studies on biomarkers are needed to evaluate strategies to minimize circadian disruption from exposure to artificial light or in shift workers?

Adjourn