



Sleep for Science

Brown University

Bradley Hospital

William C. Dement
Sleep and Chronobiology Behavioral
Science Research Apprenticeship

Retreat Colloquium

25-27 August 2004

Whispering Pines Conference Center
URI Alton-Jones Campus
West Greenwich, RI

Wednesday	Event	Speaker	Topic
1200	Lunch		
1315		Kristen H. Archbold, RN, Ph.D., Young Investigator	Pre-frontal Cortex and Cerebellar Activation is Increased During an Auditory Paced Serial Addition Task (PASAT) and Alternate Finger Tapping Task in Moderate to Severe OSA: Preliminary fMRI Evidence
1430	Break		
1445		Talia Daley	Sleeping with...or without...Orexin
1500		Jamie Perryman	Cytokines are Wicked Cool
1515		Erin Clarke	Sleep Deprivation and Depression
1530		Stephanie Crowley, Brown Graduate Student	A Working Model to Predict Circadian Time in Adolescents
1600	Break		
1615		Jimmy Fraigne	VLPO: Sleep/Wake Regulation
Wednesday	Event	Speaker	Topic
1630		April Whiting	PTSD, Sleep, and Nightmares

1645



John Peachey

Imagery Rehearsal Therapy for
Chronic Nightmares

1700



Tucker Peck

How Insomnia Treatment Should
Be Improved

1730

Hors d'oeuvres

1800

Dinner

1930

Special Event

Thursday	Event	Speaker	Topic
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0800

Breakfast

0915



Philip R. Gehrman,
Ph.D., Young
Investigator

Insomnia and the Stress System

1030

Break

1045



Anne Strozeski

Sleep Behavior in Children

1100



Sarah Spaeth

Adenosine's Role in the Modulation
of the Homeostatic Sleep Drive

Thursday	Event	Speaker	Topic
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1115



Arlene Chung

Sleep, Alcohol, and Caffeine

1130



Eliza Van Reen,
Brown Graduate
Student

Effects of Alcohol on Sleep EEG

1200

Lunch

1315

Michael L. Stanchina,
M.D., Young
Investigator

The Pathophysiology of Obstructive
Sleep Apnea

1430

Break

1445



Haley Vlach

The Effectiveness of Melatonin
Therapy in Children and
Adolescents

1500



Rebecca Backer

Hyperarousal Theory of Insomnia

1515

Break

1530

**Special
Event**

All

Woodland Chat with Faculty

1630

**Fun &
Games**

All

1800

Dinner

1930

**FUN
NIGHT**

All

Friday	Event	Speaker	Topic
0800	Breakfast		
0915		Sara C. Mednick, Ph.D., Young Investigator	The Role of Napping in Perceptual Learning and Deterioration
1030	Break		
1045		Sarah Brand	Sleep Deprivation and the Military: Keeping Our Troops Awake
1100		Devon Turner	Sleep and Academic Performance
1115		Tracy L. Rupp, Brown Graduate Student	Effects of Wake Extension and Alcohol on Driving Simulation Performance: Preliminary Report
1140		Mary A. Carskadon, Ph.D.	Farewell
1200	Lunch		

Young Investigator Presentations

**Kristen H. Archbold, RN, Ph.D., Research Assistant Professor,
University of Washington School of Nursing, Biobehavioral
Nursing & Health Systems (BNHS), Seattle, WA**

Pre-frontal Cortex and Cerebellar Activation is Increased During an Auditory Paced Serial Addition Task (PASAT) and Alternate Finger Tapping Task in Moderate to Severe OSA: Preliminary fMRI Evidence

Obstructive Sleep Apnea (OSA) is associated with impaired performance on tests of cognitive functions, but the mechanisms leading to this impairment are unclear. We are examining the effects of OSA and hypoxia on regional cerebral blood flow patterns using functional magnetic resonance imaging (fMRI). We hypothesize that brain areas supporting the operation of executive functions (EFs) (e.g., dorsolateral prefrontal cortex (DLPFC), anterior cingulate gyrus) and coordination of complex motor movement (cerebellum) will demonstrate decreased levels of activation as measured by the blood oxygen level dependent (BOLD) signal during fMRI in OSA patients with hypoxia. Our preliminary data suggest that during neurocognitive testing the BOLD signal within the posterior DLPFC and cerebellum of OSA subjects with hypoxia is increased, which is contrary to our working hypothesis. Increased patterns of activation may indicate a need for the recruitment of larger areas of DLPFC and cerebellum in order for OSA patients with untreated hypoxia to perform an EF or coordinated complex motor task. Subject recruitment is on going and analysis of additional data will be necessary to substantiate these findings.

**Philip R. Gehrman, Ph.D., Assistant Professor of Psychology,
University of the Sciences in Philadelphia, Philadelphia, PA**

Insomnia and the Stress System

Insomnia is considered to be a disorder of “hyperarousal.” This hyperarousal can take many forms, including emotional (anxiety, depression), cognitive (worrying, racing thoughts), cortical (increased high frequency EEG activity), and somatic (elevated heart and metabolic rates). Little is known about the underlying neurobiological mechanisms that produce these various phenomena. There is growing interest in studying the relationship between the stress system and insomnia for a number of reasons. First, difficulty sleeping often occurs during periods of high stress. For most people, their sleep improves once the stress passes, but some people continue to have insomnia long after the stress is over. Second, the body responds to stress via two physiological systems, the HPA and SAM axes that can produce many of the changes seen in insomnia. Activation of the HPA axis leads to somatic arousal and higher levels of circulating cortisol. The SAM axis involves activation of the norepinephrine system, which can lead to cortical and somatic arousal. Lastly, activity of the limbic system, which triggers the stress response, is related to emotional and cognitive arousal. Given these multiple areas of connection, it is likely that the stress system plays a key role in the pathophysiology of insomnia. It has recently been shown that individuals with insomnia have higher levels of basal HPA activity, particularly around bedtime. It is not known, however, whether they have a greater physiological response to stress. I propose a study in which I will test this issue by exposing insomnia patients and controls to a psychological stressor and measuring the effects on cortisol, sleep and EEG activity.

**Michael L. Stanchina, M.D., Assistant Professor, Department of
Medicine, Brown Medical School, Providence, RI**

The Pathophysiology of Obstructive Sleep Apnea

Previous studies in both awake and sleeping humans have demonstrated that lung volume changes substantially affect upper airway size, pharyngeal resistance and thus may influence pharyngeal patency. However, the isolated effects of lung volume changes on pharyngeal collapsibility, mechanics and genioglossus muscle activation during stable NREM sleep have not been systematically investigated. We studied 19 normal individuals (age: 30.4 ± 0.5 years, BMI: 24.5 ± 0.4 kg/m²) in an iron lung ventilator equipped with a variable positive/negative pressure attachment for manipulations of extrathoracic pressure. We measured change in end-expiratory lung volume (magnetometers), GGEMG (intramuscular electrodes), pharyngeal pressure and collapsibility under the following conditions: 1) Baseline, 2) Increased end expiratory lung volume (EELV) +1 Liter, and 3) Decreased EELV -0.6 Liter. Reduced lung volumes led to increased inspiratory airflow resistance (7.54 ± 2.80 vs. 4.53 ± 1.05 cm H₂O/L/s) and increased genioglossus muscle activation (GGEMG peak 14.9 ± 1.5 vs 8.5 ± 1.5 % of max) compared to baseline. The pharynx was also more collapsible at low lung volumes and less collapsible at high lung volumes. The upper airway muscles responded to changes in airway mechanics, but not adequately to prevent increased collapsibility. These results suggest that lung volume has an important influence on pharyngeal patency during NREM sleep in normal individuals.

**Sara C. Mednick, Ph.D., Postdoctoral Fellow, Systems Neurobiology
Lab, The Salk Institute for Biological Studies, La Jolla, CA**

The Role of Napping in Perceptual Learning and Deterioration

Recent research has found that a wide range of learning (e.g., visual, auditory, and motor) is dependent on nocturnal sleep. I will describe a series of experiments that show that napping can also facilitate perceptual learning in a retinotopic fashion, and will compare the relative benefits between napping and nocturnal sleep. I will also describe the effects of napping on perceptual deterioration that results from repeated visual presentations.

2004 William C. Dement Fellows

Rebecca Baker

Rising senior, Miami University of Ohio

Sarah Brand

2004 graduate, Connecticut College

Arlene Chung (Senior Fellow)

Rising junior, Brown University

Erin Clarke

2004 graduate, University of Southern
Mississippi

Stephanie Crowley (Senior Fellow)

2nd year psychology graduate student,
Brown University

Talia Daley (Senior Fellow)

Rising senior, Brown University

Jimmy Fraise

Entering master's student, Université de
Poitiers (IUP Gphy)

John Peachey

Rising junior, Southern Oregon
University

Tucker Peck

Rising senior, Brown University

Jamie Perryman

2nd year neurosciences graduate student,
University of Michigan

Sarah Babbitt Spaeth

Rising senior, Oberlin College

Anne Strozeski

Rising senior, Gettysburg College

Devon Turner

Rising sophomore, Snow College

Haley Vlach

Rising junior, Carnegie Mellon
University

Jenn Vriend

2004 graduate, Queen's University

April Whiting

Rising junior, Smith College

2004 William C. Dement Fellows

APPRENTICESHIP FACULTY

**Brown Medical School, Department of
Psychiatry and Human Behavior**

**Christine Acebo, Ph.D.
Mary A. Carskadon, Ph.D., Apprenticeship
Director
Gahan Fallone, Ph.D., Associate
Apprenticeship Director
Ron Seifer, Ph.D.**

**Valencia College, Department of Speech and
Communication**

Kathleen Perri

TEACHING ASSISTANT

Brown University, Department of Psychology

Eliza Van Reen

RETREAT VISITING FACULTY

Brown University, Department of Psychology

Rachel Herz, Ph.D.

CONSULTING PHYSICIANS

**Brown Medical School, Department of
Pediatrics**

**Elizabeth Forbes, M.D.
Judith Owens, M.D.**

Brown Medical School, Department of Medicine

Michael L. Stanchina, M.D.

E.P. BRADLEY HOSPITAL SLEEP LABORATORY, **RESEARCH FELLOWS AND STAFF**

**Henry Arantes, Research Technologist
David Bushnell, Research Assistant
Marcy D'Uva, Research Technologist
Patrick Dwyer, Research Assistant
Max Elliott, Administrative Secretary
Kristen Fortin, Research Technologist
Janet Foster, Research & Data Assistant
Alicia Helion, Cook and Data Assistant
Erin Kelleher, Research Assistant
Monique LeBourgeois, Ph.D., Postdoctoral
Research Fellow
David Luke, Ph.D., Lab Coordinator
Jennifer Maxwell, Data Coordinator
Jen Norton, Research Assistant
Dawn Roux, Research Assistant
Tracy Rupp, Graduate Student
Lori Swanton, Office Assistant
Jenn Vriend, Research Technologist**

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