

Annual Report

of the

Trans-NIH Sleep Research Coordinating Committee

Fiscal Year 2002

NATIONAL CENTER ON SLEEP DISORDERS RESEARCH (NCSDR)
NATIONAL HEART, LUNG AND BLOOD INSTITUTE

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This report is available online at <http://www.nhlbisupport.com/sleep/research/research3.htm>

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INTRODUCTION

The Trans-NIH Sleep Research Coordinating Committee (T-NIH SRCC) was established in 1986 by the Director, National Institutes of Health (NIH) for the purpose of facilitating interchange of information on sleep and sleep-related research. The T-NIH SRCC meets quarterly to discuss ongoing activities in various NIH sleep-related programs. The SRCC membership in Fiscal Year 2002 included representatives from the following NIH Institutes and Centers:

National Heart, Lung, and Blood Institute (NHLBI)
National Institute on Aging (NIA)
National Institute on Alcohol Abuse and Alcoholism (NIAAA)
National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
National Institute of Child Health and Human Development (NICHD)
National Institute on Drug Abuse (NIDA)
National Institute of Mental Health (NIMH)
National Institute of Neurological Disorders and Stroke (NINDS)
National Institute of Nursing Research (NINR)
National Center for Complementary and Alternative Medicine (NCCAM)

In addition, the National Center for Research Resources (NCRR) also has a sleep-related portfolio and this information is included in the Financial Summary and Grant Listings.

The National Center on Sleep Disorders Research (NCSDR) was established within The National Heart, Lung, and Blood Institute (NHLBI) in 1993. As a research, advocacy and coordinating center, it is responsible for conducting and supporting research, training, health information dissemination, and other activities related to sleep disorders, and coordinating sleep-related programs with other NIH components, Federal agencies, and public entities. In conjunction with the creation of NCSDR, the Director of NIH transferred responsibility for the Trans-NIH SRCC to the NCSDR. The NCSDR maintains a complete file of annual reports from the initiation of the Committee in 1986.

ACTIVITIES OF [THE NATIONAL CENTER ON SLEEP DISORDERS RESEARCH \(NCSDR\)](#)

CARL E. HUNT, MD, DIRECTOR

Fiscal Year 2002 (ending September 30, 2002) has been an active year for the NCSDR. We have participated in the planning and conduct of workshops, new initiatives, and public education programs.

The enabling legislation creating the NCSDR directed the Director of NIH to develop a National Sleep Disorders Research Plan and to revise it as appropriate. In response to this mandate, a major project was initiated in Fiscal Year 2001 to revise the first Plan released in 1996. The 2003 revised National Sleep Disorders Research Plan will summarize the dramatic expansion in interdisciplinary sleep-related research and resulting new knowledge achieved since the 1996 Plan.

New Initiatives Released in Fiscal Year 2002

Pathophysiologic Mechanisms of Obesity-Associated CVD (Request For Applications [RFA]: \$16 Million)

Sponsors: NHLBI; NIDDK

Objectives: Biologic basis of obesity-related cardiovascular diseases and disorders, including:

- Atherosclerosis
- Thrombosis
- Hypertension
- Cardiomyopathies
- Heart Failure
- Arrhythmias/Sudden Death
- Sleep (Metabolic Syndrome)

Interrelationship Between Sleep and Heart, Lung, and Blood Diseases (RFA: \$3.4 Million)

Sponsors: NHLBI; NIDA

Objectives: Identify measurable characteristics of sleep useful for study of sleep and sleep disorders

- Diagnosis and severity
- Assess effectiveness of treatment or intervention

Pathophysiology and Treatment of Chronic Fatigue Syndrome (CFS) (Program Announcement [PA])

Sponsors: ORWH; ODS; OBSSR; NCCAM; NIAAA; NIAID; NIAMS; NICHD; NHLBI; NIEHS; NINR

Objectives: Provide a better understanding of both CFS pathogenesis and pathophysiology with the goal of developing improved diagnostic and intervention strategies.

Sleep-Related Workshops In Fiscal Year 2002

Sleep, Fatigue, and Medical Training: Setting an Agenda for Optimal Learning and Patient Care (October 2001)

Sponsors: American Academy of Sleep Medicine; Sleep Research Society; American Medical Association; NCSDR (NHLBI). (*Supported by a Conference Grant from the Agency for Healthcare Research and Quality*)

Objectives: The specific objectives of the conference were: (1) To discuss how sleep deprivation and fatigue affect performance; (2) To evaluate the effectiveness of countermeasures and other strategies designed to overcome the effects of fatigue; (3) To discuss how data from other industries may be applicable to the medical setting; and (4) To identify gaps in knowledge that must be filled before establishing any new meaning policies regarding sleep, fatigue, and medical training. A summary of this workshop is published in *SLEEP*, Vol. 26, No. 2, 2003 218-225.

Cardiovascular and Sleep-Related Consequences of Temporomandibular Joint Disorders (December 2001)

Sponsors: NHLBI: Division of Heart and Vascular Diseases (DHVD); NCSDR

Objectives: Review what is known, and subsequently develop research priorities, about cardiovascular and sleep-related consequences of temporomandibular disorders (TMD), including: (1) Pathophysiology and clinical consequences of sleep and TMD; (2) Physiology and biomechanics of breathing and swallowing; and (3) Neurological integration of the cardiovascular, respiratory, and pain pathways that influence these systems in health and in disease. The full report can be found online at <http://www.nhlbisupport.com/sleep/research/research-a.htm>

Restless Legs Syndrome (RLS): Diagnosis and Diagnostic and Epidemiological Tools (May 2002)

Sponsors NIA; Restless Legs Syndrome Foundation

Co-Sponsors: NINDS; NIMH; NINR; NCSDR/NHLBI

Objectives: To modify the current criteria for the diagnosis of restless legs syndrome, to develop new criteria for the diagnosis of restless legs syndrome in the cognitively impaired elderly and in children, to create standardized criteria for the identification of augmentation, and to establish consistent questions for use in epidemiology studies.

Cardiovascular Consequences of Sleep Disordered Breathing (September 2002)

Sponsors: NCSDR (NHLBI)

Objectives: This workshop assessed a broad array of new physiological, molecular, and genetic findings pertaining to the relationship of sleep apnea and risk of cardiovascular diseases, and recommended directions for developing the research needed to elucidate the underlying pathophysiological mechanisms.

Revision Of National Sleep Disorders Research Plan

The scope of the original Sleep Disorders Research Plan released by NIH in 1996 included basic science studies on the regulation and function of sleep and studies on sleep disorders, including basic research, clinical epidemiology, genetics, effects and cost of treatment. The Research Plan also addressed training needs for the field of sleep medicine. Implementation of recommendations from this Research Plan led to substantial growth in research funding by NIH, with a 130% increase in total grant dollars in Fiscal Year 2002 compared to 1996 and a 21% increase from Fiscal Year 2001 to Fiscal Year 2002. The 1996 Research Plan also provided direction for extensive public health education and intervention programs related to sleep and sleep disorders.

Much, however, has changed since 1996. New research and new knowledge have vastly expanded the array of questions to be addressed, and new technologies have yielded new tools and mechanisms for a highly interdisciplinary broad-based approach to sleep research. To build on these achievements, a Task Force was appointed in Fiscal Year 02 to review accomplishments, identify remaining knowledge gaps and promising new scientific directions, determine unforeseen new challenges, and to establish prioritized recommendations for future research related to sleep and sleep disorders. The Task Force members are listed below:

Chair: Dr. David White

Members:

Dr. Thomas Balkin	Dr. Gene Block*
Dr. Daniel Buysse	Dr. David Dinges
Dr. David Gozal	Dr. Steve Henriksen
Dr. Hannah Kinney	Dr. Carol Landis*
Dr. Emmanuel Mignot*	Dr. Judith Owens
Dr. Jerry Siegel	Dr. Esther Sternberg
Dr. Debra Weese-Mayer	Dr. Clifford Saper* (Consultant)

*(*2002 Sleep Disorders Research Advisory Board Member)*

The Task Force appointed to revise the Sleep Disorders Research Plan met three times and conducted multiple conference calls. Administrative and staff support were provided by NCSDR and the Trans-NIH SRCC. A draft of the revised plan was broadly circulated to solicit comments from biomedical professionals involved in sleep-related research and clinical practice, and relevant professional and public organizations representing individual scientific disciplines and sleep disorders. A special session was held at the 2002 Annual Meeting of the Associated Professional Sleep Societies to present the plan and receive comments, and the draft Plan was posted on the NCSDR web site for two months. Many comments were received and were carefully considered by the Task Force in preparation of the final Plan.

The 2003 revision of the National Sleep Disorders Research Plan will be released by NIH during Fiscal Year 2003. This Plan will fully represent the deliberations and recommendations of the Task Force, summarize the dramatic advances in knowledge since 1996, and identify current gaps in our knowledge base. The recommendations for future research will not only guide prioritization of future sleep research within NIH and other Federal and non-Federal entities, but should also be helpful in identifying opportunities for new investigators from an ever-increasing diversity of scientific and clinical disciplines. The recommendations regarding training of sleep research scientists, the education of health care professionals, and community-based public education programs should also stimulate much needed progress in these areas.

Other Activities During Fiscal Year 2002

National Children's Study: Drs. Carl E. Hunt and Mary Carskadon were appointed to the Development and Behavior Working Group to represent sleep-related issues during the planning and protocol-development phase of this large longitudinal study of 100,000 children age 0-21. Additional information about this study is available on-line at <http://nationalchildrensstudy.gov/>. Dr. Carskadon has been appointed by NCSDR/SDRAB as Chair of an ad hoc subcommittee to develop protocol recommendations for a core set of sleep-related data to be collected on all mothers and children. This subcommittee will complete its activities in Fiscal Year 2003.

American Academy of Pediatrics Annual Meeting (October, 2002)

Special Presentation: Sleepiness and Adolescents: A Deadly Combination

Moderators: Carl E. Hunt, MD; David Kaplan, MD

Speakers: Mary Carskadon, PhD; Ronald Dahl, MD; Richard Millman, MD

Sleep-Related Workshops Planned For Fiscal Year 2003

Effects of Sleep Disorders and Sleep Restriction on Adherence to Cardiovascular and Other Disease Treatment Regimens (March 11-12, 2003)

Sponsors: NHLBI (NCSDR, Division Of Lung Diseases, Division Of Epidemiology And Clinical Applications, Division Of Heart And Vascular Diseases, Division of Blood Diseases and Resources); NINDS

Objectives: (1) Further understanding of the relationship of sleep disorders and altered sleep-wake schedules to adherence of treatment for cardiovascular and other disease treatment regimens; (2) Delineate possible mechanisms through which sleep and its disorders impact adherence; and (3) identify potential opportunities for new research and for improved public health applications.

Congress on Sleep, Health and Aging (March 30-31, 2003)

Sponsors: National Sleep Foundation (NSF), in cooperation with NIA, NIMH, NCSDR (NHLBI), AAMC, Canadian Institutes of Health Research

Objectives: (1) Review the knowledge base about sleep and its disorders and the impact they have on health for those with chronic and age-related diseases, and (2) develop strategies to bridge the gap between science and the bedside.

Neuro-Immune Mechanisms and Chronic Fatigue Syndrome (CFS). Will Understanding Central Mechanisms Enhance the Search for the Causes, Consequences, and Treatment of CFS (June 12-13, 2003)

Sponsors: Office of Research on Women's Health, and the Trans-NIH Working Group for Research on Chronic Fatigue Syndrome (CFS)

Objectives: (1) To help elucidate the scientific understanding of CFS by examining the interface between the brain, immune system, and symptoms of CFS and related disorders. Explore the mechanisms by which hormones, cytokines, and other mediators act as intermediaries between the brain and other body systems. (2) Explore how new methodologies used in the study of these mediators and their central and peripheral actions could be applied to CFS and related disorders.

Publications

Hunt CE, Buysse DJ, Germain A, Hall M, Landis CA, Lee KA, Mignot E, Phillips B. Sleep and Sleep Disorders in Women. Clinical Updates in Women's Health Care. American College of Obstetrics & Gynecology Monograph Series. 2003; volume 2, in press.

SUMMARY OF PUBLIC COMMUNICATIONS

NCSDR receives inquiries from or about patients with a sleep disorder or sleep related concern, and from health care professionals, students or writers regarding sleep problems and sleep disorders. In Fiscal Year 2002, 27% of these inquiries to NCSDR were received by e-mail. This is consistent with the prior year (Fiscal Year 2001) in which 30% of all public inquiries were via e-mail. The NCSDR also has extensive media contacts related to newspapers, professional and lay publications, radio, the Internet and television that are coordinated by the Press Office [NHLBI, Office of the Director (OD)]. The Health Information Network [NHLBI, Office of Prevention, Education and Control (OPEC)] also coordinates media campaigns and activities regarding sleep information. These communications are summarized in the following table.

NCSDR CONTACTS (Fiscal Year 2002)

	<i>Totals</i>
TOTAL PUBLIC NCSDR CONTACTS (<i>E-Mail, Phone, Letters</i>)	864
(Primary Symptom Identified)	
<i>Snoring/Breathing/Apnea</i>	197
<i>Insomnia</i>	109
<i>Narcolepsy</i>	86
<i>Restless Legs Syndrome</i>	71
<i>General Sleep Problem or General Information</i>	401

PRESS OFFICE (NHLBI/OD) MEDIA CONTACTS

(<i>See Appendix B for complete detail</i>)	49
<i>Electronic Media (Internet, E-Mail)</i>	8
<i>Live (Radio, TV, Telephone Interviews)</i>	25
<i>Print Media</i>	16

OFFICE OF PREVENTION, EDUCATION & CONTROL (OPEC/NHLBI)

MEDIA: AUDIENCE IMPRESSIONS (Calendar Year 2002)

<i>Parents Magazine</i>	500,000
<i>Washington Parents</i>	100,000
<i>CBS Early Show</i>	6,000,000
<i>Sleep Savvy</i>	100,000
<i>San Antonio Express News</i>	600,000
<i>Baltimore Sun</i>	800,000
<i>Parade Magazine</i>	93,000,000
<i>Yahoo! News</i>	9,000,000
<i>Medscape.com</i>	2,900,000
<i>Intelihealth</i>	1,800,000
<i>Boston Herald</i>	600,000
<i>Los Angeles Times</i>	1,000,000

ACTIVITIES OF TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE MEMBER INSTITUTES

NATIONAL HEART, LUNG, AND BLOOD INSTITUTE (NHLBI)

MICHAEL TWERY, PHD - NHLBI REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

Scientific Research and Initiatives

The National Heart, Lung, and Blood Institute (NHLBI) sleep research program covers a wide spectrum ranging from neuroscience, genetics, and circadian rhythm to anatomy, physiology, behavioral science, epidemiology, clinical research, and health education. The program is aimed at understanding the molecular, genetic, and physiological regulation of sleep and the relationship of sleep disorders to cardiopulmonary disease. NHLBI is a major supporter of investigator-initiated sleep research at NIH (see Summary Table, page 39). The Institute initiated requests for applications (RFA) on Oxygen Sensing During Intermittent Hypoxia (RFA HL-00-004), Sleep and Sleep Disorders in Children (RFA HL-01-006), and the Interrelationship Between Sleep and Heart, Lung, and Blood Diseases (RFA HL-01-009). The Program on Genomic Applications for Heart, Lung, and Blood Research (HL-99-024) is identifying new animal models of sleep disorders, training sleep researchers in functional genomic approaches, and collaborating with sleep researchers in new studies of sleep disorder genetic epidemiology. An Innovative Research Grant Program (RFA HL-01-016) and a new program for Ancillary Pharmacogenetics Studies in Heart, Lung, Blood, and Sleep Disorders (RFA HL-03-001) encourage the addition of sleep research questions to ongoing investigations of heart, lung, and blood diseases. A new initiative to be awarded in Fiscal Year 2003 is on the Role of Sleep and Sleep-Disordered Breathing in Metabolic Syndrome (RFA HL-03-008). This initiative will stimulate research on the relationship of sleep deprivation and sleep-disordered breathing (SDB) to characteristics of the metabolic syndrome including obesity, high blood pressure, dyslipidemia, insulin resistance, and vascular inflammation.

A key source of many new scientific findings is the Specialized Centers of Research (SCOR) program on the Neurobiology of Sleep and Sleep Apnea (RFA HL-96-014). The objective of this SCOR program is to integrate the molecular, cellular, and genetic approaches to sleep control with clinical investigations on the etiology and pathogenesis of sleep disorders particularly sleep apnea. In addition, the ongoing multi-center Sleep Heart Health Study is employing clinical and epidemiological approaches to examine whether subjects with high blood pressure have sleep apnea; whether sleep apnea is a contributing risk factor for the development of cardiovascular and cerebrovascular disease; and how age, gender, and ethnicity influence the association between apnea, hypertension, and stroke. Innovative biomedical technologies are being developed to improve diagnostic and treatment approaches for sleep-disordered breathing under the Small Business Innovation Research (SBIR) Program.

NHLBI is also enhancing the awareness of medical students, physicians, and other health care professionals about sleep and sleep disorder diagnosis through the Sleep Academic Award program established in twenty medical schools. Sleep Academic Awardees have published over 35 reports on sleep medicine education since the program began in 1997. The American Academy of Sleep Medicine is facilitating electronic distribution of medical education resources developed under the Sleep Academic Award program through their website. NHLBI also supports programs to train students, scientists, and physicians in basic and clinical research in sleep, pulmonary physiology, and medicine. A number of new findings in the NHLBI sleep

program are highlighted by research into the epidemiology of sleep apnea and cardiovascular disease; a potential link between sleep apnea and abnormalities in metabolism affecting appetite; and sleep apnea and school performance in children.

Sleep Disturbance Linked to Coronary Heart Disease Risk

Sleep duration has been previously associated with the risk of all-cause mortality. New findings reveal that sleep duration is associated with an increased risk of coronary events in women independent of physiological factors such as age, obesity, and HDL cholesterol level, and lifestyle factors such as the use of aspirin, post-menopausal hormone therapy, smoking, alcohol consumption, and physical exercise. A study of 71,000 middle age women for over ten years found that 70% slept less than the reference group that slept eight hours per night. Sleep durations of seven, six, or less than five hours/night were associated with a 9%, 18%, and 45% increased risk of coronary events respectively compared to that of women sleeping eight hours. The study also found that 5% slept nine hours or longer and increased sleep duration was also associated with a 38% increased risk of coronary events compared to women sleeping eight hours. Women sleeping nine hours or longer reported snoring more frequently than other groups in this study. Snoring fragments sleep, and has been previously associated with an increased risk of sleep-disordered breathing, stroke, hypertension, and heart disease. The causes of long and short sleep duration in women are not well understood. Women who slept less than eight hours frequently reported that sleep was restricted by a shift work lifestyle. Hormonal status may also be a factor. Findings from a new study of 700 women indicate that the prevalence of sleep-disordered breathing in post-menopausal women is double that of pre-menopausal women.

Other recent studies have attempted to elucidate potential pathophysiological mechanisms linking SDB and cardiovascular disease. These studies indicate that mild to moderate SDB is associated with elevated levels of vascular endothelial growth factor (VEGF). The expression of this cytokine is highly sensitive to hypoxia, and has been correlated with the severity of vascular inflammation and the degree of new collateral artery formation in heart disease. Treatment of SDB in adults with continuous positive airway pressure (CPAP) lowers VEGF expression to normal levels. Children with SDB comparable to adults exhibit greater increases in VEGF. Whether this increased response reflects a greater susceptibility to SDB and age-dependent mechanisms is not clear. Whether CPAP lowers VEGF expression in children with SDB is also not known. Recent findings indicate that the severity of SDB is correlated with elevated levels of several vascular cell adhesion molecules and free radical species implicated in the development of atherosclerotic plaques. Adhesion molecule levels were not elevated during treatment of SDB with CPAP. Whether CPAP treatment can reverse atherosclerotic injury and cardiovascular disease resulting from sleep-disordered breathing needs to be studied.

Lack of Sleep Stimulates Appetite and Disturbs Metabolism

New findings indicate that shortening sleep duration can increase appetite and lead to unhealthy eating habits. A clinical study restricting the time in bed (sleep time) of lean young adult males to four hours per night increased total cortisol secretion, increased sympathetic tone, and decreased secretion of the hunger suppressing hormone, leptin. Nutritional assessment revealed that shortened sleep produced an increase in appetite for food equivalent to 1,000 additional calories per day with a preference for sweets and starchy foods. Carbohydrate metabolism was impaired during shortened sleep duration as indicated by a 40% slower rate of decline in blood glucose level after intravenous administration. Blood chemistry and appetite returned to normal when subjects were fully rested (7-8 hours of sleep). Follow-up studies

comparing hormonal changes in lean men and women with normal (7-8 hours/night) and short (less than 6.5 hours/night) sleep durations indicate that the short sleepers need to make 30 percent more insulin than normal sleepers in order to maintain blood sugar levels. The short sleepers were also found to exhibit insulin and blood sugar profiles comparable to those reported in the pre-diabetic elderly. These findings are consistent with other studies where chronic sleep disturbance (sleep-disordered breathing) is associated with an increased risk of diabetes.

Other studies indicate that a mild reduction in sleep duration produces hormonal changes comparable to those associated with an increased risk of obesity, diabetes, heart disease, and hypertension. Chronic voluntary sleep curtailment is a hallmark of modern society lifestyle. Nationally, the average nightly sleep has declined from an estimated 9 hours in 1910 to an average of 7.5 hours today. This trend generally parallels that of obesity prevalence. The relationship between shortened sleep duration and obesity may be greater in populations characterized by vulnerability to sleep disturbances such as pregnant women, shift workers, and low socioeconomic status groups. Whether the metabolic consequences of sleep curtailment during weekdays can be prevented by "catch-up" sleep on weekends is not known. Impaired sleep and untreated sleep disorders are known to impair quality of life and cognitive function. The present findings suggest that a regular pattern of shortened sleep duration may contribute to adverse lifestyle behaviors characterized by carbohydrates craving and reduced physical activity. These data indicate that physicians should consider the potential role of sleep duration in treatment decisions and behavioral interventions for the control of obesity and comorbid conditions. Additional data are needed to determine the extent to which life-styles producing a chronic pattern of shortened sleep duration are associated with an increased risk of obesity, diabetes, and cardiovascular disease.

Sleep Disordered Breathing Linked to Hyperactivity & Learning Problems in School Children

Previous studies have demonstrated that sleep-disordered breathing (SDB) in children is associated with poor academic performance. New findings from a survey of over 800 children ages 3 to 12 indicate that habitual snoring is associated with a greater than 2 fold increased risk of hyperactivity. Among young boys under the age of 8, habitual snoring was associated with a greater than 4 fold increased risk of hyperactive behavior. The findings indicate that excessive daytime sleepiness is also linked to inattention and hyperactivity. The mechanism linking snoring and sleepiness with hyperactivity is not understood, but sleep disruption, sleep deprivation, inadequate oxygen saturation, or other physiologic changes could play important roles. Children who are sleepy are likely to shift their attention frequently and create stimulation to keep themselves awake, especially at young ages when wakefulness is essential to rapid learning. If habitual snoring and sleepiness is a cause of hyperactive behavior, these findings suggest that a substantial percentage of hyperactive children (15%) suffer from co-morbid SDB and could be effectively treated by identification and treatment of the. Among hyperactive young boys, this figure rises to 39%. Other studies have linked adequate sleep to enhanced perceptual learning and associative memory functions. These findings indicate that learning and memory tasks are highly dependent on obtaining quality sleep. Reductions in the amount of deep (REM) sleep are associated with impaired learning and memory consolidation. Similar results have been obtained on the effect of napping. While short naps (30 minutes) lacking REM sleep were found to prevent performance deterioration associated with task "burnout" during sustained periods of training on a visual task, long naps (60 minutes) with REM sleep boosted performance. These findings indicate that sleep is likely to be a major contributor to learning potential in children, and that sleep restriction and sleep disorders may erode this potential.

NATIONAL INSTITUTE ON AGING (NIA)

ANDREW MONJAN, PHD, MPH - NIA REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

Problems with sleep are common with advancing years, and occur in over half of those people age 65 years and more. It has been estimated that insomnia affects about a third of the older population in this country. This inability to have restful sleep at night also results in excessive daytime sleepiness, attention and memory problems, depressed mood, falls, and lowered quality of life. Other factors associated with aging, such as disease, changes in environment, or concurrent age-related processes also may contribute to problems of sleep. Data indicate that in the elderly, age by itself does not predict incident complaints of insomnia, even in the presence of lowered sleep efficiency and decreased proportion of slow wave sleep. Rather, the prevalence of insomnia and other sleep disorders is high in the population due to the growing numbers of elderly and the associated comorbidities common in late life that affect sleep. It is now evident that disturbance in sleep can also lead to adverse changes in other body systems, especially the production of appropriate levels of hormones and proper metabolic functioning.

Program Activities

Program growth in the NIA Sleep portfolio grew to \$14.5 million in Fiscal Year 2001 and experienced a slight increase to \$14.6 million in Fiscal Year 2002 (see Financial Report Table, page 37). NIA cosponsored with the Restless Legs Syndrome (RLS) Foundation a workshop on "RLS: Diagnosis and Diagnostic and Epidemiological Tools" held May 1-3, 2002. NIA also is represented on the Sleep Disorders Research Advisory Board of the National Center on Sleep Disorders Research, NHLBI, and is working with them on the 2003 National Sleep Disorders Research Plan. NIA is working with the National Sleep Foundation (NSF) to develop their first Leadership Congress on Sleep, Health and Aging, which will be held March 31-April 1, 2003. In conjunction with this meeting, the NSF is conducting a national survey of sleep in older adults, and will report their findings at a press conference on April 2, 2003. NIA staff also were represented at a "Sleep, Health and Longevity Workshop" sponsored by the International Longevity Center-USA on October 3-6, 2002.

Research Advances

Sleep-Disordered Breathing (SDB) encompasses obstructive sleep apnea, hypopnea (shallow breaths), and upper airway resistance syndrome. Patients with obstructive sleep apnea or hypopnea may have frequent and repetitive episodes of oxygen desaturation, and all SDB patients have frequent arousals from sleep and resultant sleep deprivation. The clinical symptoms include loud snoring and excessive daytime sleepiness. The intermittent hypoxemia and episodes of brain activation (arousal) are associated with abrupt increases in systemic blood pressure, and SDB patients do not demonstrate the expected nocturnal dip in blood pressure.

Estimates from the Wisconsin Sleep Cohort Study suggest that 9% of women and 24% of middle-aged men have some degree of undiagnosed SDB (mild or worse) and that 2% of women and 4% of men would meet clinical guidelines for treatment. These data are essentially the same as in a study in Pennsylvania showing a prevalence of clinically defined sleep apnea of 1.2% in women and 3.9% in men with an age range of 20-100 years (mean 49 years). The prevalence of SDB in today's older population reflects the accumulation of cases with onsets occurring up to 30 years earlier. If today's middle-aged adults with an increased prevalence of overweight and obesity follow current population trends, then future prevalence rates for SDB in

older age groups will be higher than current estimates. In the Wisconsin cohort, 690 randomly selected participants were evaluated twice at 4-year intervals for SDB. The percentage change in the apnea-hypopnea index (AHI; apnea events + hypopnea events per hour of sleep) and odds of developing moderate-to-severe SDB (defined by an AHI=15+ events/hour of sleep), were evaluated with respect to change in weight. Relative to stable weight, a 10% weight gain predicted a significant 32% increase in the AHI and a 6-fold increase in the odds of developing moderate-to-severe SDB while a 10% weight loss predicted a 26% decrease in the AHI. These data indicate that clinical and public health programs that result in even modest weight control are likely to be effective in reducing SDB severity and reducing new occurrence of SDB.

Emerging data implicate SDB as a risk factor for hallmarks of diabetes such as insulin resistance and impaired glucose tolerance. In addition, sleep deprivation and SDB may activate the sympathetic nervous system and proinflammatory cytokines, with cardiovascular impact. Moreover, SDB may be linked to abnormal lipid metabolism. Thus, SDB and sleep deprivation may play a significant role in the metabolic syndrome, defined as a clustering of three or more of the following risk determinants in an individual: abdominal obesity, elevated triglycerides, low level of high density lipoprotein cholesterol, high blood pressure, and high serum glucose. Using 2002 census data, the Third National Health and Nutrition Examination Survey yielded an estimate that that 47 million U.S. residents (24%) have the metabolic syndrome. Persons with the metabolic syndrome are at increased risk for developing diabetes mellitus (type 2 diabetes) and cardiovascular diseases. Metabolic syndrome also is associated with central obesity, and the increasing trends for obesity (BMI 30 or more) in the U.S. (NHANES, 1999-2000) show that the greatest prevalence (35.8% and 39.6% for men and women, respectively) and largest increase (12.0% and 11.0% for men and women, respectively) is in the 60-74 age groups.

However, SDB independent of obesity also is associated with the metabolic syndrome. Middle-aged men with sleep apnea, when compared to age- and BMI-matched non-apneic controls, were found to have higher levels of plasma leptin, TNF-alpha, and IL-6, and increased insulin resistance indices (increased fasting plasma glucose and insulin). In a community-based sample of 150 individuals who were minimally obese (120-160% of ideal body weight) with average age of 58.7 years, 46% were overweight (BMI 25 to 29.9) and 54% obese (BMI 30.0 or more). 62% had significant sleep apnea (AHI 5+), and 36% with AHI 20+. This SDB was associated with impaired glucose tolerance and insulin resistance independent of obesity.

A study of data from healthy men aged 16 to 83 years looked at 24-hour profiles of plasma growth hormone (GH) and the stress hormone cortisol, and sleep using polysomnographic sleep recordings including brain activity, movements, and breathing. It was found that the decrease in SWS, e.g., the deepest most recuperative stage of sleep, from early adulthood to later life was paralleled by a decrease in GH secretion. Association of sleep with cortisol concentrations, on the other hand, were independent of age and became significant only after the age of 50 years when sleep became more fragmented and REM sleep, e.g. the sleep that is associated with dreaming and memory storage, declined. The strong and robust relationship between SWS and GH secretion has led to the proposal that they both are under the control of similar types of neurons that may be located in different areas of the brain. Researchers have shown that drugs that increase one of the functions also increase the other. These data suggest that life-style behaviors and schedules resulting in chronic sleep restriction may increase susceptibility to the metabolic syndrome independent of SDB or other sleep disorders. Development of drugs that affect common mechanisms in sleep and GH production may help alleviate some of these problems.

Sleep disturbances can also lead to changes in other physiological systems, especially the production of appropriate levels of hormones and proper metabolic functioning. Studies of sleep deprivation in healthy adults provide additional data indicating potentially important effects on risk for insulin resistance and its association with obesity and hypertension (disorders included in the metabolic syndrome). Partial sleep deprivation of otherwise healthy control subjects produces a level of insulin resistance similar to that of diabetics. Carbohydrate metabolism, endocrine function, and gastrointestinal balance in young, healthy adults were studied after restricting sleep to four hours per night for six nights as compared to a fully rested condition obtained by extending the bed-time period to 12 hours per night for six nights. The state of sleep debt was associated with decreased glucose tolerance and insulin sensitivity, elevated evening cortisol levels, and increased sympathetic activity. The alterations in glucose tolerance and hypothalamo-pituitary-adrenal function were qualitatively and quantitatively similar to those observed in normal aging. It appears that, in healthy men, that there are distinct changes in sleep quality that occur through the adult age span, and these changes also mark specific alterations in hormonal systems that are essential for metabolic regulation.

It also has been proposed that the adverse impact of low socioeconomic status (SES) on health may be partly mediated by decrements in sleep duration and quality. Low SES is frequently associated with a diminished opportunity to obtain sufficient sleep or with environmental conditions that compromise sleep quality. In addition, data indicate that sleep loss can increase the stress load, possibly facilitating the development of chronic conditions which have an increased prevalence in low SES groups, such as obesity, diabetes, and hypertension.

Recent studies are investigating the associations between peri- and post-menopause and sleep problems. Four applications, parts of an Interactive Research Project Grant (IRPG), recently were funded to characterize the relationship between menopausal characteristics and sleep in a sample of 430 women, drawn from participants in the ongoing Study of Women's Health Across the Nation (SWAN) that will consist of 200 Caucasians, 150 African-Americans, and 80 Chinese Americans. This IRPG will recruit a sample of pre- and peri-menopausal women from the SWAN cohort, conduct ambulatory polysomnography at home and collect sleep diary data as well as data on menopausal characteristics (bleeding patterns, vasomotor symptoms, hormone levels, and related psychosocial and biological data) from the five years of SWAN core data. The specific aims are: (1) characterize sleep problems in a large multi-ethnic sample of mid-life women, (2) characterize relationships between menopausal characteristics and sleep problems, (3) evaluate the influence of relevant psychobiological and psychosocial factors on sleep problems during the early menopausal transition, and (4) establish baseline data on menopausal-related sleep problems for future longitudinal study.

Although sleep disruptions, insomnia, and the incidence of sleep disordered breathing increase in mid-life women, little is known about the relationship between menopause and sleep. The few data that now exist suggest that the sleep-menopause relationship is not one merely of age, but that a variety of relevant psychobiological factors contribute. Sleep in women during the menopausal transition often is reported to be disturbed. In one large epidemiological study utilizing polysomnography it was found that the likelihood of increased SDB over six months was significantly greater for women with peri- and post-, compared to pre-menopausal status. There was an independent risk of SDB (AHI>15) for menopausal compared to pre-menopausal women (OR=3.4) and peri- to pre-menopausal women (OR=1.4), independent of age or BMI. In addition, peri- and post- menopausal women using hormone replacement therapy (HRT) had a trend toward lower risk for SDB. Menopausal status, independent of symptoms such as hot flashes, did not predict sleep problems or depression. The association between age and these complaints was slight. Similarly, another study found that the prevalence of sleep apnea was

low in pre-menopausal women (0.6%) as well as post-menopausal women with HRT (0.5%). However, post-menopausal women without HRT had significantly higher prevalence (2.6%), similar to the prevalence found in men (3.9%). In this study, sleep apnea was strongly associated with BMI 32.3 or more. These associations need further investigation to control for the differences in health and health behaviors of women on HRT.

A number of cross-sectional and longitudinal research studies have shown that disturbed sleep has a negative impact on cognitive functioning and quality of life. A large epidemiological longitudinal study (HAAS) of older men (mean age of 76.6 years, range 71-93) investigated the association between sleep disturbances (insomnia and daytime sleepiness) and the incidence of dementia and cognitive decline. A significant association was found between the self-report of excessive daytime sleepiness, found in 8% of the cohort, and diagnosis of incident dementia three years later. The risk was two-fold (O.R. = 2.2) as compared to those not reporting daytime sleepiness, after adjusting for age and other factors. Incident cognitive decline also was significantly associated with excessive daytime sleepiness (O.R. = 1.4). In contrast, insomnia, found in 31% of the cohort, was not associated with either incident cognitive decline or dementia. APOE4, a risk factor for Alzheimer's disease, was reported to be strongly associated (O.R. = 2.0) with sleep apnea in a sample of middle-aged (30 to 60 years) adults in the Wisconsin longitudinal cohort study of sleep, independent of age, sex, BMI, and ethnicity. These data suggest that this relationship to SDB might be due to the elevated levels of LDL-cholesterol and triglycerides found with this allele. Such an association between SDB and APOE4 was not found in a much older (79-97 years of age) Japanese-American cohort, most likely reflecting differences in age, ethnic, and BMI factors. However, these findings do suggest that it might be warranted to search for common genetic factors affecting sleep disturbances such as SDB and cognitive decline.

Few studies have addressed the effect of insomnia on quality of life, specifically in older adults. In one of the few such studies, older adults with secondary insomnia had worse quality of life than those with primary insomnia. Health-related quality of life (HRQOL) was measured in a sample of elderly African-Americans screened for snoring and daytime sleepiness and found to be associated with sleep apnea after controlling for medical conditions, suggesting that sleep disturbances may impact upon daily living and health as much as other medical conditions such as depression and chronic obstructive pulmonary disease. In a population based study, it was found that sleep duration did not correlate with a Quality of Well-Being scale, although greater sleep satisfaction, younger age, less obesity, non-Hispanic white ethnicity, and higher levels of daytime illumination were associated.

Several therapeutic strategies, especially phototherapy and melatonin administration, are likely to become effective treatments for some of the insomnias associated with aging. The use of bright light therapy for phase disorders is now more commonplace. Behavioral modifications such as stimulus control and sleep restriction appear to be effective techniques for shortening the sleep latency and wake-after-sleep-onset times.

The relationship between sleep timing and timing of the circadian rhythm of plasma melatonin secretion was investigated in a group of healthy young and older subjects without sleep complaints. The timing of sleep and the phase of the circadian melatonin rhythm were earlier in the older subjects, although the duration of sleep was similar. Consequently, the older subjects were waking at a time when they had higher relative melatonin levels, in contrast with younger subjects, whose melatonin levels were relatively lower by wake time. These findings indicate that aging is associated not only with an advance of sleep timing and the timing of circadian

rhythms but also with a change in the internal phase relationship between the sleep-wake cycle and output of the circadian pacemaker.

Melatonin treatment is being tested for its sleep-inducing effects. A double-blind placebo-controlled clinical trial of melatonin was conducted in groups of older individuals (age 50 and older) with and without insomnia. Self-reports of insomnia were confirmed by actigraphy (measurements of body movements through the night period) at home as well as by polysomnography (measurements of brain activity, movements, and breathing) in the sleep laboratory. In addition to a placebo, each participant received different doses of melatonin (0.1, 0.3, and 3.0 mg) orally one-half hour before usual bedtime for one week in a random order, each followed by a one-week washout period. The highest dose (3.0 mg) is the dose commonly found in over-the-counter preparations and results in blood levels 10-20 times the normal physiological levels produced by the lower doses. The most effective dose for improving sleep quality, measured as sleep efficiency or the proportion of time in bed actually sleeping, was 0.3 mg. The highest dose, like the lowest dose, also improved sleep efficiency, although to a lesser extent. However, the 3 mg dose also significantly reduced nighttime body temperature and increased daytime melatonin levels. There was no relation between endogenous melatonin levels and sleep efficiency. Individuals with normal sleep were unaffected by any dose of melatonin.

There is an increasing experimental base defining the relationships between sleep deprivation and cognitive functioning. It now appears that sleep, both slow wave sleep early in the sleep period and REM sleep late in the sleep period are necessary for memory consolidation. Research at the molecular level examining the processes underlying the role of sleep in the consolidation of long-term memory is being conducted using specific phosphorylated cyclic AMP-responsive element binding protein (CREB)-mutant mice. Results indicate that like sleep deprivation, inhibition of protein kinase A (PKA) or protein synthesis disrupts memory consolidation only at discrete times following training and these times vary depending upon the strength of the training protocol. Total sleep deprivation in mice 0-5 hours but not 5-10 hours after training impairs retention of contextual fear conditioning (in which an animal learns to fear a new environment), a hippocampus-dependent task when tested at 24 hours or 12 days after training. This does not occur with retention of cued-fear (when an animal learns an association between a cue, such as a tone, and a shock) training, a hippocampus-independent but amygdala-dependent task. CREB levels within forebrain are higher in waking than in sleep, and levels of cAMP response element (CRE)-mediated transcription oscillate in the SCN in a circadian fashion. CREB alpha-delta mutant mice (lacking the alpha and delta isoforms of CREB) had increased durations of sleep (NREM, REM, total sleep time), less time awake, and normal circadian period than wild type, indicating that CREB protein contributes to the mechanisms by which wakefulness is maintained. CREB mutants also do not have the induction of CRE-mediated gene expression in the hippocampus following sleep deprivation, indicating the critical role played by CREB in its induction following sleep deprivation. Thus sleep may preferentially affect hippocampus-dependent and not amygdala-dependent memory consolidation, in a fashion similar to that of the PKA signaling pathway that is crucial for long-term memory storage.

Immediate early genes, such as c-fos, are induced in response to wakefulness. The c-Fos protein must bind to the transcription factor AP-1. Baseline levels of c-Fos and AP-1 binding activity were similar in young (3.5 months) and old (21.5 months) Sprague-Dawley rats. However, in response to 6 or 12 hours of sleep deprivation, old rats have significantly less c-Fos and AP-1 binding activity than young rats. This decline in molecular activity could be the basis of the decline in sleep that occurs with age. Studies over the last few years have shown the

important sleep regulatory functions of a hypothalamic circuit involving the ventral lateral preoptic nucleus (VLPO). The effect of prolonged wakefulness in rats on the expression of c-fos (as a marker of cellular activation) and galanin mRNA (as a marker for neurotransmitter synthesis) in VLPO neurons of older and younger rats resulted in no differences in the numbers of cells with age.

Future Directions

Although there is a growing body of research on the aging circadian system, relatively little exists on the aging sleep homeostatic mechanisms. The brain mechanisms underlying age-dependent changes in the sleep homeostatic mechanisms are beginning to be understood. More consistently applied neuroscience methods (e.g., neurophysiology, neuroanatomy, neuroimaging, and neuropharmacology) in animal and human aging studies are needed in order to better define the basis of age-related sleep changes. New studies are exploring the genetics of sleep. The relevance of the genetics of sleep to the problems of the older individual needs further stimulation. Similar to other recent findings that neuronal loss is not an inevitable consequence of aging, these data indicate that there is little evidence of an age-related loss of neurons that play a key role in the maintenance of sleep homeostasis. Thus, the age-related alterations in the control of sleep appear not to be due to loss of critical neurons but to subtle changes within the cells and in their interactions with other brain cells involved in the control of sleep and alertness. The elucidation of these factors, such as the role played by adenosine in the induction of sleep, can lead to the development of more effective and targeted pharmacological approaches to alleviate some of the problems of sleep that afflict over half of our older population.

The apparent distinct changes in sleep quality that occur through the adult age span and associated specific alterations in hormonal systems that are essential for metabolic regulation represent exciting areas of research that need to be pursued. In addition, these results indicate that sleep loss can increase the stress load, possibly facilitating the development of chronic conditions which have an increased prevalence in low SES groups, including obesity, diabetes, and hypertension,. A recent RFA, issued in collaboration with NHLBI, will target these issues. Development of drugs that affect common mechanisms in sleep and GH production may help alleviate some of these problems.

Another exciting area of newly developing research is the understanding of the relationships between sleep and cognitive functioning. This may be especially important in the older individual, given the increased risks for disturbed sleep and disturbed cognition. This is an exciting window of opportunity as research on the relationships between sleep, cognition, aging, and the neurophysiological and molecular mechanisms is just beginning to coalesce.

Development of novel, safe, efficacious treatments for sleep disturbances in the elderly is an important goal. This may include the development of novel behavioral, pharmacological, hormonal, and physical (e.g., light) treatments for conditions such as insomnia and sleep-wake disruptions in dementia. Melatonin treatment is being tested for its sleep-inducing effects. However, it appears to be most effective at physiological doses in dealing with circadian dysynchrony. Data from a small clinical trial indicate that melatonin is not soporific in older people without insomnia. Further replications with larger groups with objectively defined sleep problems with a broader range of medical co-morbidities are needed. Research also needs to be directed at the development of new and more effective therapeutic modalities that are targeted at correcting the underlying pathological mechanisms of sleep disorders rather than

treating them symptomatically. However, until that time, clinical trials on the safety and efficacy of hypnotic and somnolent agents are needed.

The boundaries of normal and abnormal age-related sleep changes, as well as guidelines for intervention, need better definition. Examples include defining when SDB or periodic limb movements during sleep require intervention.

A large proportion of older nursing home residents have problems in nighttime sleep and daytime wakefulness. They often are treated for their sleep problems with hypnotic agents that may put them at risk for falls and for confusion. Behavioral and environmental approaches may be more effective at dealing with these sleep problems. In addition, undiagnosed SDB may underlie some of these problems.

[NATIONAL INSTITUTE ON ALCOHOL ABUSE AND ALCOHOLISM \(NIAAA\)](#)

ELLEN WITT, PHD - NIAAA REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

In Fiscal Year 2002, The National Institute on Alcohol Abuse and Alcoholism (NIAAA) funded a total of 15 research projects related to alcohol and sleep, including regular Research Project Grants, Career Development Awards, and Center components. The specific areas of sleep-related research supported by NIAAA include: (1) the neural mechanisms of alcohol-induced sleep disturbances; (2) adolescent sleep/arousal patterns as a pathway to alcoholism in early adulthood; (3) the effects of prenatal alcohol exposure on development of circadian clock function; (4) the effects of alcohol exposure through breast milk on the development of neural systems associated with sleep and arousal; (5) assessment and medications for sleep disturbances in recovering alcoholics; (6) pharmacotherapy of alcoholism and comorbid insomnia; (7) sleep and immune function in African Americans; and (8) alcohol abuse liability in insomniacs.

Published research highlights during Fiscal Year 2002 from currently funded projects are summarized below:

Effects of Medication during Alcohol Detoxification on Mood and Sleep Disturbance

Outpatient treatment of alcohol withdrawal has received little attention, even though this may be the major setting for treatment of alcohol withdrawal. Furthermore, given that medical/psychiatric outcomes are subject to much less control in an outpatient setting, the choice of medication may be more critical in determining effective outcomes for outpatient detoxification than inpatient treatment. Therefore, the present study evaluates the differential effects of an anticonvulsant, carbamazepine, and a benzodiazepine, lorazepam, on several psychiatric and psychosocial domains (including sleep quality) in outpatient subjects with and without multiple prior detoxifications. It was found that carbamazepine is superior to lorazepam in ameliorating anxiety and sleep problems in patients with mild to moderate withdrawal. Both medications improve subjective evaluation of ability to return to work. However, individuals with multiple detoxifications have higher levels of self-reported anxiety and poorer self-reported sleep quality, and are less inclined to return to work. This study has important implications for improved models of outpatient detoxification. Future studies should focus on comparing anticonvulsant agents to longer acting benzodiazepines over extended periods to determine the impact on sleep and anxiety outcomes and to better understand how persistence of symptoms may predispose to relapse.

Alcohol and Insomnia

Two recent studies examined aspects of alcohol use by insomniacs. One study investigated whether insomniacs are self-treating their sleep problems and if so, how and with what substances, for how long, and with what risks. In a survey of a representative sample of adults aged 18-65 in the Detroit Metropolitan area, exclusive past-year use of alcohol for sleep was reported by 10%, prescription medications by 8%, and over the counter (OTC) medications by 10%. In this study, prescription drug users were older, had more severe insomnia, medicated for a longer duration, and had greater disability, neuroticism, and daytime fatigue than the other two groups. In contrast, the alcohol users had greater daytime sleepiness than the others. In this sample, insomnia of self-treating insomniacs (e.g., alcohol and OTC users) is less severe than those receiving medical treatment, but is still associated with some risks.

A second study evaluated whether zaleplon, a new selective gamma-aminobutyric acid (GABA) agonist hypnotic used to treat insomnia, would impair performance and cognition or potentiate the disruptive effects of ethanol. The performance-impairing and ethanol-potentiating effects of zaleplon were compared with those of triazolam, another drug used to treat insomnia. In absolute terms, zaleplon produced less performance impairment and shorter periods of ethanol-potentiated effects on cognition than triazolam. These results may have important implications for administration of hypnotics for treatment of insomnia.

Disordered Sleep, Nocturnal Cytokines, and Immunity in African American Alcoholics

Studies have shown an inter-relationship between sleep and three classes of cellular hormones, referred to as cytokines, that regulate immune system activity: T helper 1 (Th1, e.g. interferon), anti-inflammatory/Th2 (e.g., interleukin 10), and pro-inflammatory (IL-6) cytokines. For example, in humans, sleep onset, duration, and depth are correlated with levels of the pro-inflammatory cytokine, IL-6. In addition, levels of IL-2 and interferon gamma (INF) increase during sleep and decline with sleep loss. Substantial evidence now exists that African American alcoholics are at increased risk for infectious illnesses and also suffer from severe sleep disturbances marked by loss of sleep continuity and depth. Therefore, a recent study evaluated whether secretory patterns of cytokines and natural killer (NK) cell activity are altered in African American alcoholics to produce coincident changes in sleep and immunity. Coupled with losses of delta sleep and increases in REM sleep, alcoholics show lower levels of IL-6, suppression of the IL-6/IL-10 ratio, and reduction of NK activity. In addition, levels of IL-10 measured prior to sleep predict subsequent amounts of delta sleep. These results suggest that disordered sleep contributes to immune alterations in alcoholics. Moreover, the association between awake levels of the anti-inflammatory/Th2 cytokine, IL-10, and subsequent amounts of delta sleep support the possibility of a bi-directional interplay between cytokines and sleep in humans.

[NATIONAL INSTITUTE OF ARTHRITIS AND MUSCULOSKELETAL AND SKIN DISEASES \(NIAMS\)](#)

DEBORAH ADER, PHD - NIAMS REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

The NIAMS funded 7 grants in sleep-related research in Fiscal Year 2002. Three studies examine sleep in the context of fibromyalgia (FM), a syndrome characterized by widespread, chronic muscle pain, fatigue, cognitive disturbance, and impaired sleep. One of these studies is a cognitive-behavioral intervention for insomnia in FM patients. The second study examines the relationship between disrupted sleep patterns and night-time secretion of ACTH, cortisol, and cytokines. The third study investigates sleep and stress as predictors of pain, fatigue, distressed mood in FM.

Additional funded research investigates the role of impaired sleep as a major cause of fractures, disability and decline in cognition in older women. Finally, a newly funded study, using a murine model of arthritis, will experimentally induce partial chronic sleep deprivation to investigate the relationships between sleep fragmentation and immune- and non-immune-mediated arthritic processes.

Although the National Institute Of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) has no sleep-specific initiatives active at this time, disturbances of sleep and their relationship to disease process, symptoms, and disability in rheumatic diseases is identified as an area of interest in RFA 02-011, Multidisciplinary Biobehavioral Rheumatic Diseases Workshops.

[NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT \(NICHD\)](#)

MARIAN WILLINGER, PHD - NICHD REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

The Center for Research for Mothers and Children of the National Institute of Child Health and Human Development (NICHD) supports and promotes sleep research in infants, children, and in animals with early development resembling that of humans. These studies are designed to gain an understanding of the processes that may be involved in the normal development of behavioral state and physiologic control during sleep, as well as those that accompany Sudden Infant Death Syndrome (SIDS), learning deficits, and mental retardation. Highlights of progress from a few of the projects follow.

Research Highlights

One group of researchers at Stanford University is investigating the physiological basis for the restorative function of sleep. Glycogen is a natural starch in the body that serves as storage for energy. When the body needs energy for metabolism, the glycogen stores in tissues are converted to glucose, which is then used to generate energy. The investigators theorized that one of the restorative functions of sleep might be to build glycogen stores back up to so they can be used during wakefulness. After an animal is sleep deprived, there is a restorative sleep rebound. Glycogen stores are increased during quiet sleep, a stage that characterizes rebound sleep. The investigators found that during sleep deprivation, glycogen stores are depleted in those parts of the brain that are very metabolically active during sleep deprivation (*Am J Physiol R1CP2002; 283:R54-59*). The investigators are now examining how stress may affect the mobilization of glycogen stores during sleep deprivation.

Sleeping on the stomach increases the risk of SIDS. Public education campaigns in the United States (see below) and several countries have led to large reductions in the proportion of infants placed to sleep on their stomach, and declines in the rate of SIDS of 50% or more. There are many theories as to why sleeping on the stomach increases the risk of SIDS and why back sleep position is protective. One theory relates to sleep state. Infants sleeping on the stomach spend more time in quiet sleep and less time in active sleep compared with those who sleep on their backs. Quiet sleep is a deep sleep. Compared with active sleep, quiet sleep is characterized by fewer awakenings and the arousal threshold is increased. Researchers at Columbia University have found that after a feeding (the post-prandial period) infants enter a period of quiet sleep. In infants who sleep on their stomach the duration of this quiet sleep period increases with the carbohydrate in the diet (*Pediatr Res 2002; 52:399-404*). The growing infant expends a lot of energy during the absorption of nutrients during the post-prandial period. The energy expenditure may be increased by the nutrients in the diet, like carbohydrate, and by stomach sleep position, which puts a demand on thermoregulation and cardiovascular regulation. The increase in quiet sleep in the prone position after a feed may be a restorative response to metabolic demand as theorized by the researchers at Stanford (see above).

In Fiscal Year 2002, the NICHD awarded a Research Career Development Award to an investigator at the University of Pennsylvania who is planning a career focusing on patient oriented research in sleep medicine and epidemiology. The research project associated with this award is investigating the hypothesis that pregnancy is a period of accelerated sleep disordered breathing. Little is known about sleep disorders in pregnancy. Sleep disordered breathing could have potentially have adverse effects on the health of the pregnant woman, such as pregnancy induced hypertension, and on the developing fetus, such as growth restriction.

The "Back to Sleep" National Public Health Education Campaign

Based on growing epidemiological evidence that sleeping on the stomach increases the risk for SIDS, the American Academy of Pediatrics (AAP) recommended in spring of 1992 that healthy infants be placed to sleep on their side or back to reduce the risk of SIDS. In spring of 1994, the "Back to Sleep" coalition was formed between the U.S. PHS, the AAP, the Association of SIDS Program Professionals, and the SIDS Alliance, for the planning, development, and implementation of the "Back to Sleep" national public education campaign. In June of 1994, the campaign was launched. In 1996, the AAP revised the sleep position statement to recommend that back sleep position is preferred over side. Epidemiological studies have shown that side sleeping confers about twice the risk for SIDS relative to back, probably because babies roll from their side to their stomachs. The "Back to Sleep" campaign materials were revised to reflect this change. The NICHD has taken the lead in activities of the "Back to Sleep" campaign with support and participation from the Bureau of Maternal and Child Health, HRSA, and the National Center on Sleep Disorders Research, NHLBI.

In 1999, The National Black Child Development Institute (NBCDI) joined with the NICHD, the *Back to Sleep* campaign sponsors, and several other organizations in an outreach initiative to reduce SIDS in African American babies by urging parents and care givers to place healthy infants on their backs to sleep. The NBCDI and other organizations including the Alpha Kappa Alpha Sorority (AKA), Inc., Women in the NAACP (WIN), and National Coalition of 100 Black Women (NCBW) play a major role in promoting SIDS risk reduction activities throughout the U.S. To help these organizations initiate SIDS risk reduction programs in communities, the NICHD, Maternal and Child Health Bureau (MCHB) of HRSA, SIDS Alliance and partner organizations developed a *Resource Kit for Reducing the Risk of Sudden Infant Death Syndrome (SIDS) in African American Communities*. The Kit contains culturally appropriate materials such as fact sheets, brochures, magnets, a video, and a leader's guide to encourage people to lead discussion groups in various community settings on ways to reduce the risk of SIDS.

In Fiscal Year 2002, outreach activities continued to focus on underserved minorities. The leaders of these three organizations have committed to hosting three summits featuring the NICHD SIDS risk reduction campaign information and materials. Leaders and members of the AKA, NCBW, and WIN will participate in all three regional summits. Each organization will take the lead responsibility to organize and host one of the three regional meetings and will continue to serve as the catalyst for activity in that region. At a Partners' planning forum held in June 2002, the Partners established goals for the summit meetings such as to encourage a significant regional population to engage in SIDS risk reduction activities, build alliances within communities to assist in SIDS risk reduction activities, educate those with the power to make a change in policy or behavior, and create collaborative models and resources that can remain within communities.

While the decline in SIDS rates has occurred in all segments of the population, the decline has been less in American Indian communities. Today, American Indian infants are more than twice as likely to die from SIDS as white infants.

The Aberdeen Area Infant Mortality Study, a study of Northern Plains Indians, found that infants were less likely to die of Sudden Infant Death Syndrome (SIDS) if their mothers received visits from public health nurses before and after giving birth. This study was funded by three agencies of the Department of Health and Human Services: the Indian Health Service (IHS), NICHD, and the Centers for Disease Control and Prevention (CDC). The Aberdeen study found that binge

drinking (five or more drinks at a time) during the mother's first trimester of pregnancy made it eight times more likely that her infant would die of SIDS. Any maternal alcohol use during the periconceptional period (three months before pregnancy or during the first trimester) was associated with a six-fold increased risk of SIDS. The study also found that infants were more likely to die of SIDS if they wore two or more layers of clothing while they slept (*JAMA* 2002;288:2717-2723).

The NICHD has begun to work with American Indian tribal communities to develop SIDS risk reduction strategies. The NICHD hosted a meeting in June of 2002 with members from the American Indian community to discuss infant mortality and SIDS in the Northwest and the Northern Plains. The group was presented with general information on SIDS, statistics illustrating the racial disparities in incidence and prevalence rates of SIDS, and descriptions and examples of existing programs and materials that have been implemented successfully. In addition, participants had the opportunity to interact with each other and to discuss the information presented. That meeting brought together individuals representing American Indian communities in four areas of Indian country - Aberdeen, Bemidji, Billings, Portland- that have the highest rates of SIDS. Participating were representatives from various American Indian organizations and federal agencies, including the Aberdeen Area Tribal Chairmen's Health Board, the Northwest Portland Area Indian Health Board, the Bemidji Area Indian Health Board, the Billings Area Indian Health Service, the Aberdeen Area Indian Health Service, the Inter-tribal Council of Michigan, the Minnesota State Department of Health, the Association of American Indian Physicians, the American Indian Research and Policy Center Institute, the Red Lake Tribal Council, the CDC, National Indian Women's Health Resource Center, and American Indian Education Programs.

[NATIONAL CENTER FOR COMPLEMENTARY AND ALTERNATIVE MEDICINE \(NCCAM\)](#)

NANCY PEARSON, PhD - NCCAM REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

Many individuals use complementary and alternative medicine (CAM) therapies to treat sleep disorders. These CAM therapies include the use of dietary supplements such as melatonin and valerian; mind/body approaches such as meditation, and therapies that are part of non-western traditional medical systems, such as acupuncture and yoga. Part of NCCAM's mission is to investigate CAM therapies and train CAM researchers in the context of rigorous science. As part of this mission, we support research and research training related to the use of CAM therapies for sleep disorders. Some examples of research that NCCAM currently supports in this area are given below.

Insomnia

Chronic insomnia is a significant health problem for many individuals, is often difficult to treat, and can last for years. Furthermore, pharmacological treatments can produce unwanted side effects. As a result, many individuals have turned to alternative therapies in search of more effective treatments and fewer side effects. NCCAM is interested in determining whether or not these alternative treatments, which are already in the public domain, are effective. Currently, NCCAM supports a study using yoga as a treatment for insomnia. Although yoga has been recommended for treatment of insomnia by yoga practitioners, its effectiveness has not been scientifically established. The main goal of this ongoing clinical study is to establish whether a regimen of yoga practice will improve sleep onset latency measured by both subjective and objective criteria.

Sleep Deprivation Related to Neurodegenerative Diseases

Neurodegenerative diseases, such as Parkinson's disease and Alzheimer's disease are often accompanied by sleep disturbances due to pain and/or neurological changes related to the progression of the disease. NCCAM currently supports an ongoing clinical study investigating the efficacy and safety of valerian for the treatment of sleep disturbances in Parkinson's disease. Valerian is derived from the root of the plant *Valeriana officinalis* and is commonly sold as a dietary supplement in the United States and Europe. Although it is advertised as having hypnotic properties effective in treating sleep disorders, insufficient scientific data exist to determine its true effectiveness. Some evidence does exist in a mouse model to suggest that it reduces spontaneous locomotor activity, which is a problem in Parkinson's disease, where excessive nocturnal motor activity is related to sleep deprivation. The results of this study should clarify whether valerian is effective in treating sleep disturbances in Parkinson's disease patients.

In addition, NCCAM supports a study on the use of high intensity light therapy for Alzheimer's disease patients in nursing homes. The long term care of Alzheimer's disease patients and patients with other dementias is a growing public health issue and economic burden. Among the most difficult long term care management issues for these patients are treatment of sleep/wake disorders, depressive symptoms, and agitation. This study will investigate whether high intensity light installed in nursing home common rooms for various periods of time will contribute to a lessening of these problems. If results are positive this could provide a low-risk alternative treatment that is relatively inexpensive once the lighting is installed.

Basic Science Research

NCCAM supports basic science research aimed at understanding the underlying biological mechanisms of CAM therapeutic modalities including those used to treat sleep disorders. For example, an NCCAM-supported project completed in 2002 performed a detailed pharmacokinetic study of a complex botanical derived from valerian root. As mentioned above, valerian is sold as a dietary supplement for sleep disorders. In addition, as part of an initiative on Basic and Preclinical Research on Complementary and Alternative Medicine (PA-02-124), NCCAM continues to encourage and solicit research on interactions between CAM and conventional therapeutics, including but not limited to interactions between dietary supplements and pharmacological drugs. Desired areas of future research also include the interactions between pharmacological drugs used to treat sleep disorders and dietary supplements such as valerian and melatonin.

NATIONAL INSTITUTE ON DRUG ABUSE (NIDA)

HAROLD GORDON, PHD - NIDA REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

The National Institute on Drug Abuse (NIDA) is continuing to expand its portfolio on sleep studies. There are widespread sleep disturbances both during and following withdrawal from the use of psychoactive drugs among addicted individuals. Indeed, sleep disturbances often outlast other withdrawal symptoms and are often a cause for relapse. It is clear that the neural systems involved in the addiction process are also involved in sleep. Sleep researchers and drug abuse researchers are likely studying the same neural systems perhaps without realizing it.

Recent research is focusing on individuals taking the drug MDMA (“ecstasy”), which has sleep disturbances likely due to its effect on the serotonergic brain. Toxicology studies in animals and human subjects are attempting to determine what permanent and temporary damage results from its use. Studies focus on both serotonergic and dopaminergic systems and several consequent behaviors including sleep disturbances. The studies are relatively new and definitive results are still pending. The expectation is that sleep disturbances will help inform the neural mechanisms of action of MDMA and associated consequences to these brain systems.

NIDA also has been supporting several studies of the effect of cocaine on sleep in a naturalistic setting. That is, how is the normal sleep architecture affected during use and subsequent withdrawal from cocaine? And also, since the serotonergic system is affected, how do medications that affect the serotonergic system, such as selective serotonin reuptake inhibitors, interact in these individuals?

The role of dopamine in sleep regulation and in mediating the effects of wake-promoting therapeutics is being studied by using stimulant drugs by Mignot and colleagues. In one study, dopamine measurements in narcoleptic dogs revealed that amphetamine increased extracellular dopamine. However, in mice, deletion of the dopamine transporter (DAT) gene reduced non-rapid eye movement sleep time and increased wakefulness consolidation independently from locomotor effects. Thus, dopamine transporters play an important role in sleep regulation and are necessary for the specific wake-promoting action of amphetamines. Studies are on-going to determine the effect on wakefulness by acute administration of cocaine and of methamphetamine. (*Wisor JP, Nishino S, Sora I, Uhl GH, Mignot E, Edgar DM, 2001. J Neurosci 21(5):1787-94.*)

Among the effects of marijuana and withdrawal from marijuana are mood alterations and sleep disturbances. Haney, Foltin and colleagues at Columbia University have been attempting to determine pharmacological treatments for marijuana withdrawal. Symptoms of marijuana withdrawal include increased irritability, depression and anxiety, as well as decreased sleep quality. Nefazodone, an antidepressant with sedative properties, only attenuated some symptoms of marijuana withdrawal (e.g., anxiety) but did not reduce irritability or disturbances of sleep. Bupropion was also tried because it relieves similar symptoms in nicotine withdrawal. In fact, bupropion increased mood and sleep disturbances. These studies contribute to our knowledge of which neural systems are affected by psychoactive drugs. Future studies will focus on the effects of marijuana in HIV positive individuals (*Haney M, Hart CL, Ward AS, Foltin RW, Psychopharmacology 2002; Haney M, Ward AS, Comer SD, Hart CL, Foltin RW, Fischman MW, Psychopharmacology 2001, 155(2):171-179.*)

At the molecular level, studies are being carried out on fatty acid amides, which are lipids involved in signaling and which include the endocannabinoid, anandamide, and the sleep-inducing substance, oleamide. They are implicated in several functions including sleep. For example, oleamide has been isolated from the cerebral fluid of sleep-deprived cats and anandamide binds to the cannabinoid receptor. Oleamide has been proposed to induce its behavioral effects by serving as a competitive substrate for the brain enzyme fatty acid amide hydrolase and inhibiting the degradation of endogenous anandamide. In addition, these substances affect opioid systems and modulate pain. Studies of these mechanisms will provide insight into the effects of the cannabinoid and opioid systems as well as their interactions in the brain.

New studies supported by NIDA are being initiated and developed. For example, Irwin and colleagues at UCLA will be studying cytokines because of the connection between cocaine addiction and risk of infectious disease. Cytokines are associated with the immune response to infection and are known to affect sleep architecture. The study will evaluate the reciprocal relationship between sleep and cytokine expression. The advent of more powerful imaging techniques, such as larger magnets for magnetic resonance imaging and better analysis techniques, will lead to enhanced studies of brain function and sleep. For example, one can compare the brain function following sleep deprivation in non-users of drugs to sleep deprivation that results from drug taking. Studies such as these are mutually informative—of sleep and its brain mechanisms on the one hand, and of drug-affected neural systems, on the other.

NATIONAL INSTITUTE OF MENTAL HEALTH (NIMH)

ISRAEL LEDERHENDLER, PHD - NIMH REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

Treating Insomnia

In any year, insomnia affects approximately 30% of the adult population. In about 10-15% of the population, insomnia constitutes a clinical disorder characterized by significant distress or functional impairment. Well-controlled epidemiological studies show that insomnia follows a chronic course for 50-80% of those affected. Insomnia thus represents a significant health burden on American society through increased health care costs, increased rates of serious accidents, and measurable decreases in occupational functioning.

Insomnia is a problem of special interest to NIMH since it is a significant risk factor for the later development of depressive and anxiety disorders. At least six independent studies have demonstrated this relationship in young and older adults with follow-up periods of 1 to 35 years. The effective treatment of insomnia would significantly help Americans who suffer physical and emotional trauma. In the absence of information about the long-term use of hypnotics, psychotherapeutic/behavioral treatments for chronic insomnia are often recommended.

Persistent primary insomnia (PPI) is a subset of chronic insomnia that affects about 5% of the general population and 20% of patients who present clinically for treatment of sleep-related complaints. It is a disorder of middle-stage sleep maintenance that is predictive of the development of clinical depression and associated with increased use of health care services. Behavioral interventions designed to correct habits that disrupt sleep and perpetuate insomnia have proven both effective and durable over a six-month follow-up period. But results with PPI patients have been mixed. Several studies have suggested that combining cognitive therapy (which addresses attitudes and education about sleep) with standard behavioral techniques is a more comprehensive approach that is effective with both sleep-onset and sleep-maintenance problems, and that has more durable effects than medications.

A study of seventy-five patients with PPI were assigned randomly to 6 weeks of treatment with a) a hybrid Cognitive Behavioral Therapy (CBT) involving sleep education, stimulus control methods, and time-in-bed restrictions; b) progressive muscle relaxation training; or c) a quasi-desensitization approach that constituted a behavioral placebo treatment relative to PPI. Patients were assessed on multiple sleep outcome measures, and followed up 6 months after completion of treatment. The results indicated that CBT led to more improvement on most sleep measures, and a greater normalization of sleep and subjective symptoms. For example, the extent of reduction in (middle and terminal stage) wake time after sleep onset (WASO) averaged 54% for patients treated with CBT compared to 16% for those receiving relaxation training and 12% for those in the behavioral placebo condition. In addition, the CBT-treated patients in this trial showed larger improvements in dysfunctional attitudes toward sleep, as measured on an attitudinal questionnaire measure. Even when compared with less specific or less comprehensive kinds of psychotherapeutic approach, CBT led to clinically meaningful sleep improvements within 6 weeks, and the improvements appeared to endure through the following 6 months.

A sleep-oriented CBT thus appears to be a promising intervention for Persistent Primary Insomnia. However, since chronic insomnia is often a lifelong complaint it remains important to develop safe, rapidly acting, long-term treatments. There is a pressing need to evaluate how

many and which groups of patients can best be helped by these behavioral methods and whether combination therapy with appropriate medication provides additional benefit.

Disaster survivors: Findings from a variety of studies tell us that estimates of post disaster mental illness vary and that in nearly half of the studies, 25% or more of the samples suffered from criterion-level psychopathology. The possibility that a simple sleep treatment program can lead to improvements in the psychological health of survivors stems from research with fire evacuees in Los Alamos, NM, following the Cerro Grande Fire of May 2000. The study was initiated 8 months after the devastating Fire in 66 men and women who suffered from moderate to severe insomnia and post-traumatic stress disorder (PTSD) symptoms. One third of the group also reported chronic nightmares. Nearly 50% of these individuals had previously sought various treatments for sleep and PTSD symptoms soon after the fire, but most had not received any formal therapy or been prescribed medications prior to enrolling in this study. Forty-nine participants reported improvement in insomnia and 53 reported improvement in PTSD symptoms after treatment.

The program consisted of six weekly 90-minute sessions in a large group format. The program diverged from traditional PTSD treatment approaches by not discussing traumatic events and by not having patients “re-live” their traumatic experiences. Instead, the program integrated several standard evidence-based techniques and clinical sleep medicine instructions that teach people how to “stop losing sleep over losing sleep.” As in many insomnia management efforts, trauma survivors were encouraged to examine and improve sleep quality and not to focus on sleep quantity. In addition, nightmare sufferers learned imagery rehearsal therapy to treat their disturbing dreams. The results showed that insomnia improvement correlated in a statistically significant manner with improvements in PTSD, anxiety, and depression symptoms during every stage of the treatment. The findings show promise that insomnia treatments within 8 months of some forms of trauma will reduce PTSD symptoms. They strongly encourage further studies where those victims who developed symptoms of PTSD are directly compared to those who did not.

Insomnia in the Elderly: Poor sleep quality is a salient feature of the physiological and psychological changes seen with advancing age, increasingly referred to as “the somatopause”. In two large samples including 3,000 elderly individuals, careful health screening reduced the percent of subjects with sleep complaints or disorders to 2.3% in contrast to the commonly cited figure for significant sleep complaint of 50% in the general older population. These findings support the emerging epidemiological literature that most sleep complaints that increase in prevalence with advancing age, are probably secondary to associated medical, psychiatric and health-related burdens.

Furthermore, healthy older individuals did not complain of significantly disturbed sleep despite the fact that their objectively measured sleep was significantly more disturbed than that of younger non-complaining adults. This indicates that many healthy older individuals appear to adapt their perception of what is “acceptable” sleep and therefore do not necessarily complain of the disturbed sleep they may typically experience. These findings suggest that even declines in objective sleep quality that can reasonably be related as primary to aging *per se*, do not necessarily result in complaints of poor subjective sleep quality in older men and women. Rather, much of the sleep disturbance seen with advancing age is the result of primary sleep disorders or to effects that are secondary to other health burdens. Even the changes in sleep that seem to be “age-dependent”, that is, the result of “non-pathological aging”, need not necessarily be perceived as significant disturbances of sleep.

Hypocretin/Orexin

The neuropeptide Hypocretin/Orexin (HCRT) has received intense attention in the sleep research community since the discovery of the connection between the genes responsible for their expression and symptoms of narcolepsy. Studies using molecular genetics in mice and dogs, as well as histopathological analyses of human disease, lead to the conclusion that narcolepsy is indeed caused by failure of signaling mediated by these molecules. The HCRT system, originating in the hypothalamus, is widespread throughout many brain regions and is therefore likely to influence a number of systems. In fact, the original discovery of these neurons was connected to feeding. Thus in addition to its critical role in sleep/wake regulation HCRT may link energy homeostasis to the modulation of sleep/wake cycles and other behavioral states. One attractive hypothesis is that the orexin system may modulate wakefulness in response to internal energy homeostasis in order to support various drives emanating from the hypothalamus. Fasting, mating, or nesting, for example, may initially increase arousal. HCRT neurons may also participate in high-arousal processes such as those associated with stress. However, recent findings suggest that some HCRT neurotransmission may vary across the circadian cycle and that waking per se is not associated with increased HCRT neurotransmission. The effects on wakefulness may be exerted through the diurnal rhythms.

HCRT and Arousal: The dependence of HCRT neurotransmission on the state or degree of neuronal activity was determined by measuring electrical activity within both HCRT-synthesizing neurons and neurons expressing HCRT-1 receptor across several conditions. These conditions were associated with varying levels of waking (diurnal sleeping, spontaneous diurnal waking, spontaneous nocturnal waking, or diurnal novelty stress). The immediate early gene product Fos, and either prepro-HCRT or HCRT1-receptors were visualized with double-labeling procedures in locus coeruleus, or basal forebrain - regions associated with arousal. Relative to diurnal sleeping, nocturnal waking and stress increased Fos expression within HCRT-synthesizing neurons. But within HCRT1-receptor-bearing neurons, only stress increased Fos expression. Thus HCRT neurotransmission may be a signal indicating level of arousal.

Antipsychotic Drugs and Weight Gain: The side effects of some antipsychotic drugs (APDs) include sleep disturbance and weight gain. Since one of the homeostatic contributions of the HCRT system is energy balance, the interactions among APDs, sleep, and eating may be related to the activation of orexin neurons. In recent animal studies, APDs with significant weight gain liability were compared to those with low or absent weight gain liability. High liability APDs increased Fos expression in orexin neurons, but APDs with low or absent weight gain liability did not. The weight gain liability of APDs was correlated with the degree of Fos induction in orexin neurons of the lateral hypothalamus. In contrast, amphetamine, which causes weight loss, increased Fos expression in orexin neurons of the medial but not lateral hypothalamus. The effects of amphetamine and clozapine were then compared on orexin neurons innervating the prefrontal cortex. Clozapine, an APD with weight gain liability, induced Fos in 75% of the orexin neurons that project to the cortex, but amphetamine induced Fos in less than a third of these cells. These data suggest that APD-induced weight gain is associated with activation of distinct orexin neurons and emphasize the presence of anatomically and functionally heterogeneous populations of orexin neurons. Some of the interactions among sleep disturbance and other aspects of arousal and energy regulation may thus need to be understood as a disrupted neurobehavioral system involving altered levels of expression of HCRT.

Circadian Rhythms

Melanopsin: A Circadian Photopigment?: Animals have an internal biological clock in a region of the brain called the suprachiasmatic nucleus (SCN). This structure is important for the regulation of behavior and physiology. Cycles of sleeping and waking, body temperature, eating, and levels of arousal, connect to this clock and are reset daily by daylight. Photoreceptors in the eye detect the light and signal the clock, but the identities of the photoreceptors and the light-reactive photopigment have remained elusive. Several independent groups have now discovered a class of Retinal Ganglion Cells (RGC) that contain a molecule, melanopsin and send information to the circadian clock. Most RGCs project to brain areas involved in vision. But about 1% or 2% of those in the rodent retina go to other parts of the brain, including the SCN; melanopsin is now a leading candidate to be a circadian photopigment. This light-detection system is suited to respond to the level of illumination rather than to images. It is entirely independent from the rods and cones, and sends information to multiple brain regions including the SCN. Such a system may have an important impact on general well-being since light levels (among other functions) can modulate mood, activity, and performance.

Oscillators Outside the Suprachiasmatic Nucleus (SCN): The SCN in mammals is frequently referred to as the master circadian pacemaker driving daily rhythms. This has been the dominant view in chronobiology for many years. However, this view is changing somewhat as evidence for the presence of circadian oscillators outside the mammalian SCN is increasing. Recent studies in rats, using cultured neural tissues from different brain areas, monitored the intrinsic *Per1* expression patterns in these tissues and their response to changes in the light cycle. *Per1* is one of a number of genes that have been found in the last five years to be involved in the production of oscillations from SCN cells. In culture, many brain areas that expressed the *Per* gene were arrhythmic but 14 of 27 brain areas examined were rhythmic. The pineal and pituitary glands both expressed rhythms that persisted for eight hours in vitro, with peak expression during the subjective night. Nuclei in the olfactory bulb and the ventral hypothalamus expressed rhythmicity with peak expression at night, whereas other brain areas were either weakly rhythmic and peaked at night, or arrhythmic. After a 6 hr advance or delay in the light cycle, the pineal, paraventricular nucleus of the hypothalamus, and arcuate nucleus each adjusted the phase of their rhythmicity suggesting the presence of mechanisms enabling entrainment, although the kinetics of each region seemed to be different. These results indicate that the brain contains multiple, damped circadian oscillators outside the SCN. The phasing of these oscillators to one another may play a more general role in the coordination of brain activity than previously suspected.

New Approaches to the Functions of Sleep and Rhythms

Replay of Birdsong During Sleep: One of the possible functions of sleep that has received attention recently is its role in normal waking cognition, including memory. One specific aspect of this function is the hypothesis that waking experience is replayed during sleep, thereby strengthening or fine-tuning neural connections. Songbirds such as the zebra finch have become a fascinating partner in this research that has previously studied primarily rodents and humans. The zebra finch brings well-understood neural circuitry supporting highly quantifiable behavior to the problem. The high vocal center (HVC) is a nucleus that sends neural signals for song production to the muscles of the vocal organ and receives auditory input. Auditory responses within this pathway are greatly enhanced under anesthesia or in sleep, highlighting the scientific potential in this system for exploring the process of signal replay during sleep, and suggest the presence of a gating mechanism that controls auditory input in relation to various physiological states. The initial avian studies used observational methods to determine the state

of the organism. Two important issues required further attention: one concerns the definition of relevant physiological states, the other concerns the primary site of the gate. Recent progress has demonstrated the feasibility of using electroencephalography (EEG) to identify the wake/sleep state in zebra finches. These measurements have shown that HVC auditory responses do indeed change with physiological states, and that the HVC response to auditory stimuli is greatest during slow-wave sleep.

The bird's own song (BOS) is a critical feature of the process by which birds acquire their unique vocalization. It is interesting that during slow-wave sleep, but not during wakefulness, multiunit extracellular HVC recordings showed preferential responding to the BOS compared to nonspecific song, or BOS played in reverse. HVC response to BOS changed within milliseconds as one physiological state replaced the other. Abrupt changes in the EEG occurred when the bird fell asleep, awoke spontaneously, or was awakened by the experimenter. Concomitant with these changes, the BOS response of HVC increased with sleep and decreased with waking. A robust decrease in HVC firing that was correlated with waking occurred within 750 ms of light onset. The response of HVC neurons to the BOS occurred only during sleep and ceased upon waking. Similar changes in the downstream follower nucleus, RA, were reported previously, without EEG measures, but they were not found in this study. Thus, auditory gating in HVC is associated with sleep but the sleep-related gating properties of nucleus RA are less clear. The activity of the song system during sleep may be a form of replay of learned information. Since it appears that auditory input (BOS) also triggers this activity, the replay of information may also include the bird's well-established, crystallized, adult song. Perhaps this system makes use of similar mechanisms of memory consolidation to maintain as well as acquire behaviors.

Circadian Modulation of Learning: One commonly ignored connection between sleep, circadian rhythms, and daily functioning, is their connection to the perception of time. In fact, one important feature of the circadian clock is to allow temporal coordination of the organism with the external world and the sleep/wake cycle. The dominant cue that may be used for this purpose is the daily cycle of light and dark. Animals and humans certainly associate time of day and food availability. Vigilance and performance are modulated by circadian phase, and this may influence learning abilities. In fact, SCN lesions were reported to eliminate a 24-h rhythm in performance on a passive avoidance task, and rats subjected to desynchronization of the circadian light-dark cycle experienced impaired recall of a spatial task. The magnitude of long-term potentiation (LTP) in the hippocampus has also been reported to vary with circadian phase. And finally, hippocampal synaptic activity in rats was highest in the middle of the dark phase and lowest in the middle of the light phase while the opposite effect was reported in diurnal squirrel monkeys.

A recent investigation of the relationship of circadian phase to learning and memory demonstrated that different aspects of memory, namely acquisition, recall and long-term extinction for simple associative memory in mice are modulated by the circadian system. Mice were trained in the day or night using either tone conditioning or context fear conditioning. When comparing the performance of animals during the day and night, the mice generally acquired the conditioning faster in the day than in the night. Recall for context and tone consistently peaked during the day for at least 3 days after training, irrespective of the time of training. Finally, extinction exhibited sensitivity to circadian phase in that mice trained at night exhibited a greater degree of extinction than mice trained during the day. The finding that the mice learned this task better in the day, when they are normally inactive, than at night is contrary to the expectation that performance would be best during the night when nocturnal organisms are normally active. Greater daytime efficacy for acquisition and recall may be a feature of aversive conditioning tasks since, for nocturnal animals, daytime may induce additional fearfulness that may enhance

performance. Extinction however, may benefit from an opposite relationship to emotional state. Furthermore, different neural substrates supporting different forms of learning conditioning may be differently influenced by time of day. Since time is a critical parameter of the environment, it would seem adaptive for organisms to use time as a variable in learning. Associating certain times of day with either rewarding stimuli or potential dangers may thus be beneficial.

[NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE \(NINDS\)](#)

PAUL NICHOLS, PHD - NINDS REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE *

The NINDS supports a wide variety of research on the neurological and neuroscience aspects of sleep, including studies of basic mechanisms, sleep disorders, associated complications, circadian biology, and instrumentation.

The NINDS is active in the support of studies of the cause and treatment of narcolepsy, a neurological disorder characterized by excessive daytime sleepiness, an inability to move shortly after awakening, and sudden episodes of muscle weakness. Researchers at the NINDS-supported Center for Narcolepsy and Related Disorders at Stanford University, led by Dr. Emmanuel Mignot, were first to report the discovery of a gene that causes narcolepsy in a canine model of the disease. The gene carries instructions for making a receptor by which nerve cells respond to a brain-signaling molecule called hypocretin or orexin. Although narcolepsy in humans is not caused by a single gene (identical twins are usually discordant), the animal studies still offer clues to the etiology. Human narcolepsy is related to low levels of hypocretin-containing neurons in the hypothalamus. Dr. Mignot and colleagues have cloned the canine narcolepsy gene (*Hcrtr2*) and are now developing transgenic mouse models of the disease.

An increase in MHC-II antigens has been linked to symptom onset in the narcoleptic canines, suggesting that development of symptoms resulting from a mutation of the hypocretin receptor-2 gene may involve the immune system. Investigators in the laboratory of Dr. Jerome Siegel at UCLA administered immunosuppressive and anti-inflammatory drugs to narcoleptic dogs. They found that oral administration of these drugs delayed disease onset and prevented the development of severe symptoms. Most human narcoleptics share an MHC-II haplotype, suggesting that immune-related factors may play a role in causing human narcolepsy as well. This treatment was the first shown to affect symptom development in animal narcolepsy, and may be an important step in the development of treatment regimes for human narcolepsy.

Restless Legs Syndrome (RLS) is a common neurological disorder characterized by unpleasant sensations of the legs and an urge to move them for relief. Because symptoms are intensified by inactivity and lying down, RLS patients often have difficulty falling asleep and staying asleep. Untreated RLS causes exhaustion and fatigue, which can affect occupational performance, social activities, and family life. It has been estimated that about 80% of RLS patients also have periodic limb movement disorder (PLMD), or nocturnal myoclonus, which is characterized by repetitive stereotyped movements of the limbs, primarily the legs, during sleep. In order to increase the amount of research in RLS and PLMD, the National Institute of Neurological Disorders and Stroke (NINDS), the National Institute on Aging (NIA), the National Heart, Lung, and Blood Institute (NHLBI), and the National Institute of Mental Health (NIMH) issued a Program Announcement in 2001 encouraging applications that would enhance our understanding of the pathogenesis of these disorders and develop more effective treatment strategies.

The genetics of RLS are complex. Several studies have shown familial associations, and Dr. Guy Rouleau and his colleagues at Montreal General Hospital reported significant linkage to chromosome 12q in a large French-Canadian RLS pedigree. Studies are continuing to locate and characterize the specific gene involved. This result has not been confirmed in other studies, suggesting genetic heterogeneity.

* See Appendix A for current NINDS Trans-NIH SRCC contact information

Central dopamine mechanisms are thought to be involved in the etiology of several sleep disorders, including RLS, PLMD, and narcolepsy, as well as Parkinson's disease. Dopaminergic agents have been used, with varying degrees of success, to treat all of these disorders. NINDS grantee Dr. David Rye at Emory University is studying possible mechanisms by which dopamine affects behaviors including arousal in rodent and nonhuman primate models. He has described a previously unknown mesothalamic dopamine system in which the thalamus receives dopaminergic projections from the same dopaminergic cells as those that degenerate in Parkinson's disease. These results suggest a new and direct pathogenic mechanism of action of dopamine that may be acting in the etiology of RLS and PLMD.

In another study showing the dopamine connection between periodic limb movements and narcolepsy, Dr. Mignot and his colleagues have observed PLMD-like movements in their narcoleptic canines. Dopamine agonists that are selective for the D2 and D3 receptor subtypes have been effective in humans for the treatment of PLMD, and Dr. Mignot found that this same class of drugs alleviated the abnormal leg movements in the narcoleptic canines. At the same time, cataplectic symptoms were aggravated, leading to the hypothesis that the dopamine system is involved in both sleep-related motor inhibition (cataplexy) and activation (PLMD). These dogs may prove to be the first animal model of PLMD.

A recent report from the laboratory of Dr. Christopher Early at The Johns Hopkins Bayview Medical Center suggests that the hypocretin system may be affected in RLS as well as narcolepsy. Unlike narcolepsy, patients with RLS had slightly increased CSF levels of hypocretin. The increase was found only among early-onset RLS patients, the subgroup for which genetics seems to play a larger role. These results suggest that excessive daytime sleepiness in these RLS patients may be prevented by the higher than normal levels of hypocretin.

The NINDS supports both basic and clinical research in the area of circadian biology. Studies in a variety of animal models have identified genes responsible for the regulation of the circadian clock. One of the clinical studies being supported was submitted in response to a Program Announcement sponsored by the National Institute on Aging (NIA) and co-sponsored by NINDS, "Earth Based Research Relevant to the Space Environment." In this grant, Dr. Charles Czeisler, of Brigham and Women's Hospital, Boston, will determine the extent to which the intrinsic period of the human circadian pacemaker can be influenced by prior entrainment to non-24 hour day lengths. A manned exploration to Mars is scheduled for 2018, and astronauts will need to adapt to the 24.65 hour Martian day.

In another clinical study, Dr. Scott Rivkees at Yale University is testing the hypothesis that early cycled lighting in preterm nurseries can help establish circadian patterns and will lead to earlier establishment of rest-activity cycles, and improve infant growth, behavior, and parent-infant interactions. Preliminary results suggest that preterm infants in the cycled lighting group immediately show day-night differences in rest and activity patterns, while similar patterns are not observed in control infants until after 3 weeks at home.

NATIONAL INSTITUTE OF NURSING RESEARCH (NINR)

MARY LEVECK, PHD, RN - NINR REPRESENTATIVE TO THE TRANS-NIH SLEEP RESEARCH COORDINATING COMMITTEE

NINR's sleep research portfolio consists of three general areas: (1) the impact of sleep deprivation across the lifespan in healthy populations; (2) the impact of sleep disturbance in patients with chronic illnesses; and (3) the management of sleep disturbances. The following are examples of the research studies funded by NINR.

Sleep Deprivation in Healthy Populations

The most pervasive form of sleep loss is partial sleep deprivation. Partial sleep deprivation is found among shift workers, medical workers, and as a result of lifestyle choices. An NINR funded study will determine the amount and timing of chronic partial sleep deprivation at which alertness and waking functions are compromised.

Another group that experiences sleep deprivation is new parents after the birth of their first infant. Sleep deprivation can lead to significant psychosocial morbidity including marital unhappiness, reduced quality of life, depression, and child abuse. A recently funded study will test an environmental-behavioral intervention to minimize the sleep disruption and fatigue experienced by new parents.

Recent findings from an NINR funded meta-analysis on sleep changes across the lifespan indicate that as one ages, one goes to bed and gets up earlier but takes longer to fall asleep and experiences more frequent and longer awakenings. Thus, less time is spent sleeping. A significant amount of the age related changes are due to the health status of the individual. These changes are linear. This investigator is now evaluating the normal non-linear changes that occur in sleep with increasing age. This research will help to determine normal and abnormal sleep patterns in men and women as they age.

Sleep Disturbance in the Chronically Ill

There are many chronic health conditions that interfere with sleep. Sleep disturbances are associated with Alzheimer's disease, dementia, rheumatoid arthritis, fibromyalgia, AIDS, asthma, and urinary incontinence. Sleep disturbance is exacerbated by pain and by conditions requiring hospitalization.

In a recent study, 23% of pregnant women reported Restless Legs Syndrome (RLS), a sleep disturbance characterized by unpleasant sensations in the legs. In comparison to other pregnant women, these women with RLS had lower serum levels of folate and a more depressed mood state.

Fibromyalgia (FM) is a common rheumatic condition in women between the ages of 40 and 60, and the symptoms include fatigue, non-restorative sleep, chronic pain, and distress. Preliminary findings from a study of healthy women indicate that sleep disruption results in a reduced pain threshold, and increased discomfort and fatigue. These symptoms are similar to those of FM, and suggest there may be a complicated interrelationship between sleep and FM.

A majority of patients on hemodialysis report difficulty sleeping. It is known that daytime sleep affects nighttime sleep patterns, and recent research has demonstrated that the hemodialysis procedure might induce daytime sleepiness as it alters the core body temperature and triggers

the production of sleep-inducing substances such as interleukin-1. Further, a recent study co-funded by several NIH Institutes found that end-stage renal patients who receive hemodialysis in the morning had longer survival rates than those who received hemodialysis in the afternoon. Possible explanations for differential survival in association with morning vs. afternoon dialysis include salutary effects of sleep in the morning.

Fatigue, pain, and sleep disturbance are common problems encountered by patients receiving radiation therapy. Studies are underway to determine the patterns of change in sleep disturbance, fatigue, and pain over the course of radiation therapy, and to examine the relationship between opioid use, pain, and sleep in oncology patients.

Management of Sleep Disturbances

NINR funds a variety of different interventions to improve sleep. Sleep difficulties can affect daytime physical and social functioning, and have been associated with an increased incidence of depression. One study is evaluating whether melatonin and behavioral techniques are an effective intervention for jet lag that has been found to impair judgment and performance. In another study, a new nurse investigator is using behavioral treatments to improve sleep in community dwelling elders who frequently experience insomnia.

Disturbed sleep with nighttime wandering is common in patients with Alzheimer's disease, and has been cited as the most frequent cause for nursing home placement. Researchers are testing innovative strategies (e.g., melatonin, light, nighttime alarm systems) to improve nighttime sleep in these individuals. The improved sleep may decrease the agitation commonly found in individuals with Alzheimer's disease. In addition, the improved sleep in patients with Alzheimer's disease may also increase the sleep experienced by caregivers, and subsequently may delay or reduce the need for institutionalization of the demented patient.

Training and Career Development

NINR is committed to the training and career development of new investigators in the area of sleep research. NINR supports pre-doctoral fellowships, mentored research scientist development awards, and institutional training grants focusing on sleep research. The research foci of these awards include studying the relationships among sleep, stress, and immune function in persons with HIV; exploring the relationships between maternal and infant circadian rhythms during early life; developing an intervention using neurofeedback for treatment of insomnia; and examining sleep patterns of women at risk for preterm labor.

FINANCIAL REPORT AND FUNDED SLEEP RESEARCH DETAIL

**A Complete Listing of Funded Sleep Research For Each Trans-NIH SRCC
Institute for Fiscal Year 2002 is Provided in the Following Pages**

	<i>Sleep Disorders Research</i> (Dollars in thousands)									
	1995 Actual	1996 Actual	1997 Actual	1998 Actual	1999 Actual	2000 Actual	2001 Actual	2002 Actual	2003 <i>Estimate</i>	2004 <i>Estimate</i>
NHLBI*	13,674	16,450	19,219	22,932	31,845	35,128	37,579	45,155	48,090	49,292
NINDS*	8,018	9,453	11,598	13,639	15,231	12,495**	17,603	22,918	24,537	25,081
NICHD*	6,627	7,368	7,217	9,131	7,116	6,797	7,084	7,344	7,900	8,200
NIA*	7,847	7,800	9,179	11,818	13,296	13,034	14,533	14,600	15,700	16,300
NIMH*	29,721	27,231	28,601	34,027 [§]	39,219	40,667	50,742	56,647	61,161	63,438
NIDA*	1,084	1,201	1,042	1,586	2,163	2,553	2,517	3,235	3,500	3,600
NIAAA*	793	551	728	766	736	1,132	1,681	4,342	4,560	4,700
NINR*	2,107	2,842	3,565	3,394	3,503	4,635	5,375	8,091	8,415	8,583
NCRR	2,944	3,247	3,570	5,542	6,637	7,117	7,193	11,490	12,794	13,496
NIAMS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	300	330	340
NCCAM	N/A	N/A	N/A	N/A	N/A	N/A	177	900	970	1,000
NHGRI	N/A	N/A	N/A	N/A	N/A	N/A	599	0	0	0
Total	72,815	76,143	84,719	102,835[§]	119,746	123,558	145,083	175,022	187,957	194,030

* Fiscal Year 2001 Trans-NIH Sleep Research Coordinating Committee Member Institute

[§] Revised from Trans-NIH Annual Report for Fiscal Year 1998

** This reduction in Fiscal Year 2000 funding compared to Fiscal Year 1999 was due to a one-time change in the method of identifying sleep-related grants.

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

NATIONAL INSTITUTE ON AGING

Grant No	PI	Title	Institution	Funding
5 R01AG18199	Abel, Edwin	Sleep Memory: A Molecular And Genetic Analysis	University Of Pennsylvania	\$237,750
5 R29AG13885	Alessi, Cathy	Environmental Interventions On Sleep In The Nursing Home	University Of California Los Angeles	\$95,760
3 R44AG15789	Alsten, Christopher	High Tech/Low Cost Home Treatment For Geriatric Insomnia	Inner Health, Inc.	\$45,550
5 R44AG15789	Alsten, Christopher	High Tech/Low Cost Home Treatment For Geriatric Insomnia	Inner Health, Inc.	\$180,956
3 R01AG08415	Ancoli-Israel, Sonia	Cognitive Benefits Of Treating Sleep Apnea In Dementia	University Of California San Diego	\$7,590
5 R01AG08415	Ancoli-Israel, Sonia	Cognitive Benefits Of Treating Sleep Apnea In Dementia	University Of California San Diego	\$257,203
5 R01AG18760	Behan, Mary	Age,Gender, Serotonin And Respiratory Control	University Of Wisconsin Madison	\$246,986
5 K01AG00810	Benloucif, Susan	Sleep/Wake Rhythms In Aging--Treatment With Nimodipine	Northwestern University	\$109,164
3 R01AG10643	Bliwise, Donald	Sundown Syndrome In A Skilled Nursing Facility	Emory University	\$53,951
5 K24 AG00972	Buyse, Daniel	Rational Pharmacotherapy Of Primary Insomnia	University Of Pittsburgh	\$101,009
5 R01AG16303	Carley, David	Neurobiology Of Sleep Apnea In Aging	University Of Illinois At Chicago	\$322,202
5 R01AG04307	Chase, Michael	Sleep Mechanisms In The Aged Cat	University Of California Los Angeles	\$418,449
5 R01AG19186	Cole, Philip	Serotonin N Acetyltransferase Mechanism And Inhibition	Johns Hopkins University	\$163,500
5 R01AG17431	Connell, Bettye	Environmental Interventions To Reduce Nh Noise At Night	Emory University	\$335,891
5 P01AG09975	Czeisler, Charles	Sleep, Aging And Circadian Rhythm Disorders	Brigham And Women's Hospital	\$1,211,342
5 R01AG06072	Duffiscal Year, Jeanne	Disrupted Sleep In The Elderly--Circadian Etiology	Brigham And Women's Hospital	\$466,345
2 R01AG13418	Duncan, Marilyn	Neural Mechanisms Resetting The Aged Circadian Pacemaker	University Of Kentucky	\$301,466
5 R01AG16362	Earley, Christopher	Determining The Genetics Of Restless Legs Syndrome	Johns Hopkins University	\$396,432
1 R01AG20287	Earley, Christopher	Response To Iron Treatment For Restless Leg Syndrome	Johns Hopkins University	\$523,747
2 P01AG14359	Gambetti, Pierluigi	Pathogenetic Mechanisms Of Prion Diseases	Case Western Reserve University	\$187,500
3 P01AG14359	Gambetti, Pierluigi	Pathogenetic Mechanisms Of Prion Diseases	Case Western Reserve University	\$75,000
1 R01AG19361	Gold, Ellen	Sleep During The Peri-Menopause In A Multi-Ethnic Cohort	University Of California Davis	\$212,553
5 K23AG01021	Gooneratne, Nalaka	Role Of Melatonin In Secondary Insomnia In The Elderly	University Of Pennsylvania	\$140,181
1 R01AG19362	Hall, Martica	Sleep During The Perimenopause In A Multi-Ethnic Cohort	University Of Pittsburgh	\$462,383
1 R01AG19363	Kravitz, Howard	Sleep During The Perimenopause In A Multi-Ethnic Cohort	Rush-Presbyterian-St Lukes Medical Ctr	\$190,205
5 R01AG12364	Kripke, Daniel	Illumination In Human Aging: Sleep And Mood Effects	University Of California San Diego	\$137,598
5 R01AG12364	Kripke, Daniel	Illumination In Human Aging: Sleep And Mood Effects	University Of California San Diego	\$313,000
5 R01AG15763	Kripke, Daniel	Verification Of Circadian Abnormalities In Aging	University Of California San Diego	\$454,605
1 R01AG21826	Lewy, Alfred	Melatonin Entrainment Of Elderly Blind Free-Runners	Oregon Health & Science University	\$298,492
5 R01AG14738	Lichstein, Kenneth	Treatment Of Hypnotic Dependence In Older Adults	University Of Memphis	\$288,193
5 R01AG15347	Manev, Hari	Aging And Neuronal 5 Lipoxygenase	University Of Illinois At Chicago	\$86,042

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
1 R01AG20082	Moe, Karen	Progesterone And Sleep In Older Women	University Of Washington	\$284,373
5 R01AG13396	Monk, Timothy	Phase Shift Tolerance In Older People	University Of Pittsburgh	\$243,651
5 R01AG12112	Murphy, Patricia	Homeostatic Factors In Age Related Sleep Disturbance	Weill Medical College Of Cornell Univ	\$294,800
5 R01AG15370	Murphy, Patricia	Sex Hormones Sleep And Circadian Rhythmicity In Aging	Weill Medical College Of Cornell Univ	\$208,523
5 R01AG17430	Ouslander, Joseph	Transferring Behav Research Into Nursing Home Practice	Emory University	\$569,295
5 P01AG17628	Pack, Allan	The Mechanisms Of Alterations In Sleep With Age	University of Pennsylvania	\$878,685
3 T32AG00256	Pack, Allan	Md/Phd Program In Sleep And Chronobiology	University of Pennsylvania	\$335,641
5 R01AG17491	Rybarczyk, Bruce	Behavioral Treatment For Comorbid Geriatric Insomnia	Rush-Presbyterian-St Lukes Medical Ctr	\$334,796
5 R01AG15853	Shiromani, Priyattam	Homeostatic Regulation Of Sleep In Aging	Harvard University (Medical School)	\$212,270
1 R01AG19360	Sowers, Maryfran	Sleep During The Perimenopause In A Multi-Ethnic Cohort	University Of Michigan At Ann Arbor	\$215,578
5 P01AG18784	Spiegel, David	Stress, The Hpa And Health In Aging	Stanford University	\$426,817
5 R01AG18200	Turek, Fred	Stress Effects On Sleep: Influence Of Genes And Gender	Northwestern University	\$333,000
3 R01AG19914	Urbanski, Henryk	Effect Of Aging And Caloric Restriction On Circadian Ph*	Oregon Health & Science University	\$20,180
5 R01AG19914	Urbanski, Henryk	Effect Of Aging And Caloric Restriction On Circadian Ph*	Oregon Health & Science University	\$259,289
3 R37AG02224	Wise, Phyllis	Neuroendocrine And Neurochemical Function During Aging	University Of California Davis	\$37,116
7 R37AG02224	Wise, Phyllis	Neuroendocrine And Neurochemical Function During Aging	University Of California Davis	\$297,000
5 R01AG12914	Yesavage, Jerome	Treatments For Insomnia	Stanford University	\$477,311
2 R01AG14124	Young, Terry	Menopause And Midlife Aging Effects On Sleep Disorders	University Of Wisconsin Madison	\$375,595
1 R01AG17636	Zhdanova, Irina	Melatonin And Aging In Non-Human Primates	Boston University	\$475,478
NIA TOTAL				\$14,600,443

NATIONAL INSTITUTE ON ALCOHOL ABUSE AND ALCOHOLISM

Grant No	PI	Title	Institution	Funding
5 K24AA00304	Brower, Kirk J.	Pharmacotherapy of Alcoholism and Comorbid Insomnia	University of Michigan	\$115,895
5 R01AA13252	Carskadon, Mary	Alcohol, Sleep, and Circadian Rhythms in Young Humans	Emma Pendleton Bradley Hospital	\$697,689
5 R21AA13251	Crum, Rosa	Sleep Disturbances and Risk for Alcohol Disorders	Johns Hopkins University	\$122,625
5 R01AA12504	Dahl, Ronald E.	Sleep/Arousal in Adolescence: Pathways to Alcohol	University of Pittsburgh	\$246,168
5 R21AA13241	De Lecea, Luis	The Hypocretins and Alcohol Dependence	Scripps Research Institute	\$185,200
5 R01AA13242	Earnest, David	Development, Alcohol and Circadian Clock Function	Texas A & M University	\$216,000
5 R01AA06059	Ehlers, Cindy L.	EEG, ERP, and Sleep Measures of Alcohol's Effects	Scripps Research Institute	\$324,100

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
P 50AA06420	Ehlers, Cindy L.	Eletrophysiological Evaluation of Sleep/Waking in Recovering Alcoholics	Scripps Research Institute	\$177,608
5 R01AA13243	Friedmann, Peter	Trazadone for Sleep Disturbance -Early Alcohol Recovery	Rhode Island Hospital	\$493,291
1 R21AA13246	Godwin, Dwayne	Cellular Mechanisms of Ethanol's Influence on Sleep	Wake Forest University	\$144,084
2 R01AA12087	Howland, Jonathan	Hangover, Congeners, Sleep and Occupational Performance	Boston University	\$475,662
5 R01AA13239	Irwin, Michael	Alcoholism: Sleep and Cytokines in African Americans	University of California-Los Angeles	\$381,458
5 P50AA10761	Malcolm, Robert J	Gabapentin and Lorazepam in Outpatient Toxication	Medical University of South Carolina	\$155,538
5 R01AA13253	Roehrs, Timothy A	Insomnia as a Path to Alcohol Abuse	Case Western Reserve-Henry Ford Hosp.	\$313,268
1 R01AA13248	Simasko, Steven M	Mechanisms of Alcohol Effects on Sleep	Washington State University	\$293,300
NIAAA TOTAL				\$4,341,886

NATIONAL INSTITUTE OF ARTHRITIS & MUSCULOSKELETAL & SKIN DISEASES

Grant No	PI	Title	Institution	Funding
5R01AR35582-18	Cauley, Jane	Study of Osteoporotic Fractures	University of Pittsburgh	\$64,482
5R01AR35583-18	Hillier, Teresa	Study of Osteoporotic Fractures	Kaiser Foundation Research Institute	\$74,226
5R01AR35584-18	Hochberg, Marc	Study of Osteoporotic Fractures	University of Maryland	\$56,198
5R01AR46303-04	Okifuji, Akiko	Sex Hormones, Stress, and Pain in Fibromyalgia	University of Utah	\$33,845
R21AR48403-01A1	Postlethwaite, Arnold	Sleep Fragmentation Effects on Murine CII-Induced AR	University of Tennessee	\$71,500
NIAMS TOTAL				\$300,251

NATIONAL INSTITUTE OF CHILD HEALTH AND HUMAN DEVELOPMENT

Grant No	PI	Title	Institution	Funding
2Y01 HD07042		Child Sleep Positions SIDS	U.S. Bureau Of The Census	\$125,000
5P30 HD26979	Arens, Raanan	MRI Of The Upper Airway Of Children With OSAS	Children's Hospital Of Philadelphia	\$24,387
5P30 HD03352	Berridge, Craig W	Neurobiology Of Orexin/Hypocretin-Induced Arousal	University Of Wisconsin Madison	\$29,987
1R01 NR08381	Carskadon, Mary A	Phase Preference, Sleepiness, And Adolescent Development	Emma Pendleton Bradley Hospital	\$100,000
5R01HD38461	Chervin, Ronald D	Behavioral Effect Of Obstructive Sleep Apnea In Children	University Of Michigan At Ann Arbor	\$200,000
3U10HD29067	Corwin, Michael J	Collaborative Home Infant Monitoring Evaluation (CHIME)	Boston University	\$89,230

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
5 P01HD36379	Darnall, Robert A	Animal Physiology Core	Children's Hospital (Boston)	\$648,018
5R01HD18686	Davis, Frederick C	Development Of Mammalian Circadian Rhythms	Northeastern University	\$213,975
5R01HD32774	Fifer, William P	Perinatal Assessment Of At Risk Populations	New York State Psychiatric Institute	\$431,449
5P01HD36379	Filiano, James J	Comparative Chemical Anatomy Of The Ventral Medulla	Children's Hospital (Boston)	\$89,488
5R01HD22695	Harper, Ronald M	Physiological Development In SIDS	University Of California Los Angeles	\$236,898
5R01HD37315	Heller, Craig H	Development Of Sleep Homeostasis In The Developing Rat	Stanford University	\$308,545
5P30HD18655	Kinney, Hannah C	Brainstem Maturation In Sudden Infant Death Syndrome	Children's Hospital (Boston)	\$41,912
5P30HD18655	Kinney, Hannah C	Ventral Medulla And The Sudden Infant Death Syndrome	Children's Hospital (Boston)	\$41,912
5P01HD36379	Kinney, Hannah C	Protective Responses And Brainstem Analysis In SIDS	Children's Hospital (Boston)	\$69,431
5P01HD36379	Kinney, Hannah C	Anatomy Core	Children's Hospital (Boston)	\$344,066
5R37HD20991	Kinney, Hannah C	Brainstem Maturation In The Sudden Infant Death Syndrome	Children's Hospital (Boston)	\$284,400
1R01HD40291	Klerman, Elizabeth B	Impact Of Sleep Disruption On Menstrual Cycle Dynamics	Brigham And Women's Hospital	\$217,668
5 R01HD18478	Koos, Brian J	Hypoxia And Control Of Fetal Breathing Movements	University Of California Los Angeles	\$353,684
5R01HD36520	Krueger, James M	Mechanisms Of Sleep Responses To Viral Infections	Washington State University	\$326,250
5K24HD01476	Legro, Richard S	Insulin Resistance In Pcos--Sequelae And Treatment	Pennsylvania State Univ Hershey Med Ctr	\$135,027
5P01HD36379	Leiter, James C	The Ventral Medulla And Response To Afferent Stimulation	Children's Hospital (Boston)	\$131,146
1R01HD42125	Lewy, Alfred J	Melatonin Studies Of Totally Blind Children	Oregon Health & Science University	\$338,970
5P30HD24061	Marcus, Carole L	Pathophysiology Of Childhood Obstructive Sleep Apnea	Kennedy Krieger Research Institute, Inc.	\$68,004
1Z01HD09998	Mc Grath, John	Back To Sleep Campaign	NICHD	\$705,447
5P01HD36379	Nattie, Eugene E	The Ventral Medulla Breathing & Central Chemoreception	Children's Hospital (Boston)	\$135,775
1K23HD41465	Pien, Grace W	Longitudinal Study--Sleep-Disordered Breathing/Pregnancy	University Of Pennsylvania	\$130,194
1F32HD42395	Row, Barry W	Stress & Memory Following Postnatal Intermittent Hypoxia	University Of Louisville	\$36,592
5P01HD13063	Sahni, Rakesh	Response To Nutrient And Oxygen Supply	Columbia University Health Sciences	\$225,839
1R03HD42479	Schuckers, Stephanie	Predicting Life-Threatening Events In Chime Infant Data	West Virginia University	\$73,000
7R03HD42479	Schuckers, Stephanie	Predicting Life-Threatening Events In Chime Infant Data	Clarkson University	\$78,500
5R01HD28931	Sica, Anthony	Monitoring A SIDS Model In Neonatal Swine	Suny Downstate Medical Center	\$330,702
5P01HD36379	St John, Walter M	Protective Ventilatory Responses To Hypoxia	Children's Hospital (Boston)	\$124,975
5R01HD38357	Super, Charles M	Socialization Of Infants' State, Attention, & Affect	University Of Connecticut Storrs	\$320,011
5 R01HD10993	Thach, Bradley T	Control Of Breathing In Recovery From Apnea	Washington University	\$333,272
NICHD TOTAL				\$7,343,754

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

NATIONAL INSTITUTE ON DRUG ABUSE

Grant No	PI	Title	Institution	Funding
1R01DA15648-01	Boger, Dale L	Inhibitors of Fatty Acid Amide Hydrolase (FAAH)	Scripps Research Institute	\$57,875
1F31DA15259-01	Bubar, Marcy J	Role of 5HT2cR in Behavioral Effects of Chronic MDMA	University Of Texas Medical Br Galveston	\$3,841
5F32DA14446-02	Burnette, James M	Circadian Gene Modulation Of Cocaine Responsiveness	University Of Virginia Charlottesville	\$38,320
5R01DA13264-02	Buydens-Branchey, Laure B	Effects Of Buspirone In Withdrawal From Opiates	Narrows Institute For Biomedical Res Inc	\$15,600
3R01DA13264-02S1	Buydens-Branchey, Laure B	Effects Of Buspirone In Withdrawal From Opiates Supplement	Narrows Institute For Biomedical Res Inc	\$3,417
5R01DA13173-02	Cravatt, Benjamin F	Structure/Function Studies Of Fatty Acid Amide Hydrolase	Scripps Research Institute	\$81,025
1R01DA15197-01	Cravatt, Benjamin F	Enzymes That Regulate Fatty Acid Amide Function In Vivo	Scripps Research Institute	\$77,075
5R21DA14188-02	Dugovic, Christine	Importance Of Sleep & Genotype In Drug Abuse Studies	Northwestern University	\$147,000
5R01DA08105-09	Foltin, Richard W	Laboratory Analysis Of Cocaine Abstinence	New York State Psychiatric Institute	\$102,648
2R01DA03889-19	Griffiths, Roland R	Experimental Analysis of Novel Drugs of Abuse	Johns Hopkins University	\$105,281
5R01DA12698-03	Haney, Margaret	Thc And Marijuana--Effects In Individuals With HIV/AIDS	New York State Psychiatric Institute	\$23,473
1F31DA15272-01	Herin, David V	Role of 5-HT2A Receptors in MDMA induced Behavior	University Of Texas Medical Br Galveston	\$3,841
5R01DA11744-04	Hobson, J A	Drug Abuse, Sleep And Cognition	Massachusetts Mental Health Institute	\$361,812
1R01DA16541-01	Irwin, Michael R	Cocaine Dependence: EEG Sleep and Cytokines	University Of California Los Angeles	\$381,250
1R01DA13574-01A2	Lichstein, Kenneth L	Treating Addiction to Sleep Medication	University Of Memphis	\$569,402
3R01DA12137-03S1	Liguori, Anthony	Sleep Deprivation And Alcohol Effects In Marijuana Users Supplement	Wake Forest University Health Sciences	\$7,560
6R01DA12137-04	Liguori, Anthony	Sleep Deprivation And Alcohol Effects In Marijuana Users	Wake Forest University Health Sciences	\$273,271
5R01DA03994-16	Lukas, Scott E	Polydrug Abuse-Imaging And Behavior	Mc Lean Hospital (Belmont, MA)	\$58,507
1T32DA15036-01	Lukas, Scott E	Training in Drug Abuse and Brain Imaging	Mc Lean Hospital (Belmont, MA)	\$19,162
2R01DA10886-04A2	Mcginnis, Marilyn Y	Anabolic Androgenic Steroid Effects on Brain & Behavior	Mount Sinai School Of Medicine Of NYU	\$17,925
5R01DA11927-05	Mignot, Emmanuel J	Sleep Homeostasis And Stimulant Drugs Of Abuse	Stanford University	\$129,387
2R01DA05938-09A1	Ricaurte, George A	MDMA Neurotoxicity in Humans: Occurrence & Consequences	Johns Hopkins University	\$142,348
5R01DA14030-02	Roberts, David C	A Novel Animal Model of Cocaine Addiction	Wake Forest University	\$54,047
5R01DA11448-05	Roehrs, Timothy A	Sleepiness And The Reinforcing Effect Of Methylphenidate	Case Western Reserve Univ-Henry Ford HSC	\$276,206
5R01DA14874-02	Tancer, Manuel E	Consequences of MDMA in Humans	Wayne State University	\$118,329
1R21DA15753-01	Yin, Jerry C	Circadian Influences in Drosophila Memory Formation	Cold Spring Harbor Laboratory	\$166,000
NIDA TOTAL				\$3,234,601

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

NATIONAL HEART, LUNG AND BLOOD INSTITUTE

Grant No	PI	Title	Institution	Funding
5R01HL067209-02	Aloia, Mark S	Motivating Adherence To CPAP In Obstructive Sleep Apnea	Brown University	\$436,413
5R01HL062408-04	Arens, Raanan	MRI Of The Upper Airway Of Children With OSAS	Children'S Hospital Of Philadelphia	\$378,836
5K25HL004420-02	Ayappa, Indu A	Automated (Ai) Analysis Of Sleep Disordered Breathing	New York University School Of Medicine	\$147,690
5R01HL053443-09	Badr, M S	Central Sleep Apnea--Role Of Longterm Facilitation	Wayne State University	\$204,789
5K24HL004174-04	Badr, M. S	Sleep Apnea--Determinants And Consequences	Wayne State University	\$71,486
5R01HL067604-03	Benloucif, Susan J	Responsiveness Of The Aging Circadian Clock To Light	Northwestern University	\$220,500
5R01HL063772-02	Bixler, Edward O	Prevalence Of Sleep Disordered Breathing In Children	Pennsylvania State Univ Hershey Med Ctr	\$269,325
1R01HL071510-01	Block, Gene D	Sleeping Sickness/Cytokine Effects On Biological Clock	University Of Virginia Charlottesville	\$222,000
5K07HL003897-05	Boehlecke, Brian A	Sleep Medicine Education And Practice Improvement Plan	University Of North Carolina Chapel Hill	\$97,410
5R01HL065356-03	Carney, Robert M	Depression, Sleep Disorders And Coronary Heart Disease	Washington University	\$559,885
1R01HL068303-01A1	Chase, Michael H	Web-Based Sleep Research Protocols And Standards	Websciences International	\$370,125
5R01HD038461-04	Chervin, Ronald D	Behavioral Effect Of Obstructive Sleep Apnea In Children	University Of Michigan At Ann Arbor	\$140,286
5R01HL064582-04	Colwell, Christopher S	Regulation Of The Mammalian Circadian System	University Of California Los Angeles	\$164,230
5R01HL052992-07	Czeisler, Charles A	Bright Light Treatment Of Shift Rotation Insomnia	Brigham And Women'S Hospital	\$360,463
5T32HL007901-05	Czeisler, Charles A	Training In Sleep, Circadian & Respiratory Neurobiology	Brigham And Women'S Hospital	\$124,721
1R01HL072722-01	Decker, Michael J	Episodic Neonatal Hypoxia Impairs Sleep And Cognition	Emory University	\$350,724
5U01HL064243-04	Dement, William C	Determinants Of Compensatory Sleep Phenotype In Mice	Stanford University	\$277,531
1U01HL068060-01A1	Dement, William C	Apples: Apnea Positive Pressure Long-Term Efficacy Study	Stanford University	\$3,223,476
5R01HL062561-04	Dempsey, Jerome A	Causes Of Sleep-Induced Breathing Instabilities	University Of Wisconsin Madison	\$400,756
5R01HL063042-03	Dick, Thomas E	Control-Respiratory Modulation Of Sympathetic Activity	Case Western Reserve University	\$253,000
5R01HL044915-12	Dimsdale, Joel E	Sleep Apnea & Hypertension--Role Of Symp Nervous System	University Of California San Diego	\$584,750
2R01HL050775-09	Duckles, Sue	Vascular Reactivity: Gender And Hormonal Influence	University Of California Irvine	\$359,592
5R01HL066267-02	Durand, Dominique M	Activation Of Tongue Muscles In Obstructive Sleep Apnea	Case Western Reserve University	\$153,000
5R01HL064245-05	Fang, Jidong	'Sleep And Synaptic Plasticity'	Pennsylvania State Univ Hershey Med Ctr	\$346,275
5K23HL004400-03	Fogel, Robert B	Androgens & Sleep: Apnea Epidemiology & Pathophysiology	Brigham And Women'S Hospital	\$133,920
5R01HL025739-20	Forster, Hubert V	Control Of Breathing During Physiologic Conditions	Medical College Of Wisconsin	\$185,152
3R01HL070301-01S1	Foster, Gary D	Sleep Apnea In Look Ahead Participants	University Of Pennsylvania	\$13,916
5R01HL070301-02	Foster, Gary D	Sleep Apnea In Look Ahead Participants	University Of Pennsylvania	\$538,388
5R01HL056876-05	Fregosi, Ralph F	Neuromuscular Control Of The Pharyngeal Airway	University Of Arizona	\$202,592
5R01HL067007-07	Gillette, Martha U	Cellular Regulators Of Circadian Timing	University Of Illinois Urbana-Champaign	\$317,044
5R01HL062404-04	Glaze, Daniel G	Obstructive Sleep Apnea In Children	Baylor College Of Medicine	\$413,150

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
5R01HL062371-04	Gottlieb, Daniel J	Neurobehavioral Consequences Of Sleep Apnea In Children	Boston University	\$413,704
5R01HL063912-03	Gozal, David A	REM Sleep Deprivation, Hypoxia, And Hippocampal Function	University Of Louisville	\$324,000
3R01HL065270-03S1	Gozal, David A	Neurocognitive Function In Snoring Children	University Of Louisville	\$141,255
5R01HL065270-04	Gozal, David A	Neurocognitive Function In Snoring Children	University Of Louisville	\$505,085
1R01HL069932-01	Gozal, David A	Postnatal Brain Susceptibility To Intermittent Hypoxia	University Of Louisville	\$357,500
5R01HL069706-03	Greco, Mary A	Regulation Of Chat Expression During Sleep-Wakefulness	Sri International	\$361,344
5K07HL003763-05	Guilleminault, Christian	Educational Program On Sleep And Chronobiology Medicine	Stanford University	\$104,613
1R01HL070919-01	Haddad, Gabriel G	Sleep Mechanisms In Children: Role Of Metabolism	Yeshiva University	\$417,500
5R01HL022418-23	Harper, Ronald M	Neural Control Of Cardiorespiratory Function	University Of California Los Angeles	\$229,188
9R44HL069672-02	Havey, Gary D	Video Polysomnograph For Home Sleep Tests Via Phone Line	Advanced Medical Electronics Corporation	\$340,100
5R01HL064148-04	Heller, H. C	Genetic Variation Influencing Sleep Regulation	Stanford University	\$355,671
5K23HL004190-04	Imadojemu, Virginia A	Neurocirculatory Responses In Obstructive Sleep Apnea	Pennsylvania State Univ Hershey Med Ctr	\$129,708
5R01HL059873-06	Jackson, Francis R	Studies Of A Neural Pacemaker Output Pathway	Tufts University Boston	\$344,925
2R44HL067734-02	Kayyali, Hani A	Novel Patient Interface Monitor For Psg/CPAP Titration	Biomec, Inc.	\$450,593
1R43HL070455-01	Krausman, David T	Apnea Detection System For Nicu Monitoring	Individual Monitoring Sys, Inc. (Im Sys)	\$148,851
5R44HL062077-03	Krausman, David T	Wrist- Worn Ambulatory Oximeter	Individual Monitoring Sys, Inc. (Im Sys)	\$441,119
5R01HL061280-04	Kripke, Daniel F	Phase Response Curves For Exercise And Bright Light	University Of California San Diego	\$582,326
5R01HL063342-03	Kryger, Meir H	Impact Of Sleep Disorders On Health	University Of Manitoba	\$88,428
5R01HL047600-10	Kubin, Leszek K	Premotor Control Of Upper Airway And REM Sleep Atonia	University Of Pennsylvania	\$277,375
1R01HL071097-01	Kubin, Leszek K	Hypothalamo-Brainstem Control Of Sleepiness And Arousal	University Of Pennsylvania	\$396,250
1R13HL071048-01	Kubin, Leszek K	8th Sleep And Breathing Symposium	University Of Pennsylvania	\$14,515
5R01HL027520-18	Kuna, Samuel T	Respiratory Related Motor Output To Upper Airway Muscles	University Of Pennsylvania	\$356,625
5R01HL061272-05	Kuna, Samuel T	Pharyngeal Airway Function	University Of Pennsylvania	\$296,283
5R01HL064150-04	Leonard, Christopher S	K+-Channels Regulating REM-Related Cholinergic Neurons	New York Medical College	\$274,225
2R44HL066829-02	Levendowski, Daniel J	Validation Of In-Home Sleep Apnea Risk Evaluation System	Advanced Brain Monitoring, Inc.	\$838,890
1R44HL070484-01	Levendowski, Daniel J	Biobehavioral Measurements Of Alertness In Sleep Apnea	Advanced Brain Monitoring, Inc.	\$139,428
5R01HL066195-03	Levy, Andrew P	Hypoxia Inducible Vegf Production In Sleep Apnea	Technion-Israel Institute Of Technology	\$125,000
5K23HL004056-04	Loredo, Jose S	Chemoreceptors And Hypertension And Sleep Apnea	University Of California San Diego	\$133,066
5R01HL040881-14	Lydic, Ralph B	Cholinergic Mechanisms Of Breathing During Sleep	University Of Michigan At Ann Arbor	\$293,158
5R01HL057120-07	Lydic, Ralph B	Opioid Induced REM Sleep Inhibition	University Of Michigan At Ann Arbor	\$357,653
5R01HL065272-04	Lydic, Ralph B	Cholinergic Phenotype In Murine Models Of Sleep	University Of Michigan At Ann Arbor	\$226,500
2R01HL058585-05A1	Marcus, Carole L	Pathophysiology Of Childhood Obstructive Sleep Apnea	Johns Hopkins University	\$327,000
5R01HL064277-04	Marks, Gerald A	Sleep/Wake-Related Neuronal Activity In The	University Of Texas Sw Med Ctr/Dallas	\$195,000

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
1R01HL071515-01	Mignot, Emmanuel	Sleep Disordered Breathing, Apoe And Lipid Metabolism	Stanford University	\$387,748
5R44HL070327-03	Modarrezzadeh, Mohammad N	Wireless Evoked Potential System For Measuring Alertness	Cleveland Medical Devices, Inc.	\$317,061
5R01HL041016-12	Muller, James E	Triggers Of Ventricular Arrhythmias (Tova) Study	Massachusetts General Hospital	\$528,714
5U01HL053941-09	O'connor, George T	Sleep Heart Health Study	Boston University	\$314,562
5R01HL063767-03	O'donnell, Christopher P	Leptin And Ventilatory Control During Sleep	Johns Hopkins University	\$286,125
5R01HL066324-03	O'donnell, Christopher P	Cholinergic Aspects Of The Carotid Body In Sleep Apnea	Johns Hopkins University	\$286,125
5K07HL003896-05	Owens, Judith A	Biopsychosocial Model Of Sleep Education	Rhode Island Hospital (Providence, Ri)	\$88,064
5P50HL060287-05	Pack, Allan I	Scor In Neurobiology Sleep And Sleep Apnea	University Of Pennsylvania	\$1,877,480
5R01HL060756-04	Pack, Allan I	Treatment Of Sleep Apnea In The Elderly	University Of Pennsylvania	\$568,457
5T32HL007953-03	Pack, Allan I	Training In Sleep And Sleep Disorders	University Of Pennsylvania	\$377,973
5R01HL069699-02	Pavrides, Constantine	Gene Regulation And Synaptic Plasticity In Sleep	Rockefeller University	\$336,417
1K08HL068715-01	Polotsky, Vsevolod Y	Sleep Disordered Breathing And Glucose Regulation	Johns Hopkins University	\$131,490
5R01HL059596-06	Ptacek, Louis J Ii	Characterization Of Advanced Sleep Phase Syndrome	University Of Utah	\$422,096
5K23HL004065-04	Punjabi, Naresh M	Early Identification And Treatment Of Sleep Apnea	Johns Hopkins University	\$157,082
5U01HL053937-09	Punjabi, Naresh M	The Sleep Heart Health Study	Johns Hopkins University	\$529,307
5R01HL062373-04	Quan, Stuart F	Prevalence And Correlates Of Childhood Sleep Apnea	University Of Arizona	\$373,243
5U01HL053938-09	Quan, Stuart F	The Sleep Heart Health Study	University Of Arizona	\$415,550
1R01HL072702-01	Quattrochi, James J	Cellular And Molecular Mechanisms Of REM Sleep Control	Massachusetts Mental Health Institute	\$250,550
5U01HL053931-09	Rapoport, David M	Sleep Heart Health Study	New York University School Of Medicine	\$480,086
5R01HL046380-12	Redline, Susan S	Familial Aggregation And Natural History Of Sleep Apnea	Case Western Reserve University	\$619,433
3R01HL046380-12S1	Redline, Susan S	Familial Aggregation And Natural History Of Sleep Apnea	Case Western Reserve University	\$38,250
1R01HL070916-01	Redline, Susan S	Outcomes Of Sleep Disordered Breathing In Adolescents	Case Western Reserve University	\$366,600
5U01HL063463-04	Redline, Susan S	The Sleep Heart Health Study: Reading Center Application	Case Western Reserve University	\$528,431
5U01HL063429-04	Resnick, Helaine E	Sleep Heart Health Study	Missouri Breaks Research, Inc.	\$181,032
5U01HL053916-09	Robbins, John A	Sleep Heart Health Study	University Of California Davis	\$208,971
5K23HL004426-03	Rosen, Carol L	Evaluation Of Diagnostic Tests For Pediatric Sleep Apnea	Case Western Reserve University	\$127,035
5K07HL003890-05	Rosen, Gerald M	Mn Regional Sleep Disorders Center Sleep Academic Award	Minneapolis Medical Research Fdn, Inc.	\$85,971
1F32HL071469-01	Rubin, Arnon	Expression Of Sleep Disordered Breathing In Inbred	Johns Hopkins University	\$50,116
5U01HL064360-04	Samet, Jonathan M	Data Coordinating Center For Sleep Heart Study	Johns Hopkins University	\$759,135
1R01HL068652-01A1	Samson, Willis K	Orexinergic Pathways In Central Autonomic Control	St. Louis University	\$389,218
5K07HL003646-05	Sateia, Michael J	New Technology And Outreach In Sleep Education	Dartmouth College	\$86,400
1K24HL067948-01A1	Schwab, Richard J	Pathogenesis And Genetics Of Obstructive Sleep Apnea	University Of Pennsylvania	\$139,466
5R01HL050381-09	Schwartz, Alan R	Upper Airway Control Of Transtracheal Insufflation	Johns Hopkins University	\$357,364

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
1R01HL071506-01	Schwartz, Alan R	Cardiovascular Stress Of Sleep Apnea And Heart Failure	Johns Hopkins University	\$366,255
5R44HL068500-03	Seifert, Gregory J	Body-Worn Wire-Free Micro-Recording Sleep Sensors	Advanced Medical Electronics Corporation	\$337,900
5U01HL053934-09	Shahar, Eyal	The Sleep Heart Health Study	University Of Minnesota Twin Cities	\$357,603
5R01HL061596-04	Shirahata, Machiko	Carotid Body Excitation--New Concept	Johns Hopkins University	\$248,506
5P50HL060296-05	Siegel, Jerome M	Control Of Airway Motor Neurons During Sleep/Wakefulness	University Of California Los Angeles	\$1,477,598
5R37HL041370-14	Siegel, Jerome M	Control Of Muscle Tone By The Nucleus Magnocellularis	University Of California Los Angeles	\$211,050
5K07HL003899-05	Skatrud, James B	Sleep Medicine Curriculum	University Of Wisconsin Madison	\$87,574
5R01HL050531-08	Smith, Curtis A	Carotid Chemo/Baroreceptors Role In Apnea And Hyperpnea	University Of Wisconsin Madison	\$233,925
5R01HL037379-16	Smith, Philip L Phili	Obesity And Neural Control In Sleep Disordered Breathing	Johns Hopkins University	\$435,590
5R01HL065176-04	Somers, Virend K	Cardiovascular Disease Mechanisms In Sleep Apnea	Mayo Clinic Rochester	\$292,039
1F32HL069690-01	Stanchina, Michael L	Lung Volumes And Obstructive Sleep Apnea	Brigham And Women's Hospital	\$54,352
5K07HL003650-05	Strohl, Kingman P	Sleep Academic Award--Recognition Of Sleep Disorders	Case Western Reserve University	\$82,823
5R01HL064278-04	Strohl, Kingman P	Sleep And Entertainment Of SCN Function	Case Western Reserve University	\$290,250
5T32HL007913-04	Strohl, Kingman P	Sleep Medicine Neurobiology And Epidemiology	Case Western Reserve University	\$218,154
5R01HL062401-04	Suratt, Paul M	Obstructive Apnea In Children	University Of Virginia Charlottesville	\$364,839
1K23HL004457-01A1	Thomas, Robert J	Working Memory In Obstructive Sleep Apnea-An Fmri Study	Beth Israel Deaconess Medical Center	\$149,396
5R01HL070522-13	Toth, Linda A	Sleep Patterns During Infectious Disease	Southern Illinois University Carbondale	\$246,750
3R01HL070522-13S1	Toth, Linda A	Sleep Patterns During Infectious Disease	Southern Illinois University Carbondale	\$74,999
5T32HL007909-05	Turek, Fred W	Training Grant In Sleep Research	Northwestern University	\$218,119
1R01HL072694-01	Van Cauter, Eve	Extended Work Schedule And Health: Role Of Sleep Loss	University Of Chicago	\$381,250
1R01HL070154-01	Van Dongen, Hans P	Individual Differences In Response To Sleep Deprivation	University Of Pennsylvania	\$383,344
5R01HL065225-03	Veasey, Sigrid C	Differential Vulnerability To Morbidities Of Sleep Apnea	University Of Pennsylvania	\$237,750
5R01HL064415-03	Vgontzas, Alexandros N	The Role Of Cytokines In Sleepiness And Sleep Apnea	Pennsylvania State Univ Hershey Med Ctr	\$234,900
5R01HL062589-04	Vidruk, Edward H	Medullary Respiratory Neurons And Sleep Apnea	University Of Wisconsin Madison	\$281,148
1R01HL070784-01	Waters, Karen A	The Metabolic Syndrome In Pediatric Obstructive Apnea	Children'S Hospital At Westmead	\$108,000
5P50HL060292-05	White, David P	Harvard Center On Sleep Neurobiology And Sleep Apnea	Harvard University (Medical School)	\$1,585,873
5R01HL048531-10	White, David P	Sleep, Airway Patency And The Pharyngeal Musculature	Brigham And Women'S Hospital	\$423,750
5R01HL062252-04	Young, Terry B	Epidemiology Of Sleep-Disordered Breathing In Adults	University Of Wisconsin Madison	\$976,987
5K07HL003891-05	Zee, Phyllis C	Multidisciplinary Educational Program In Sleep Medicine	Northwestern University	\$88,746
			Total Extramural	\$44,549,561
			Loan Repayment	\$103,829
			OPEC	\$88,000
			RMS	\$414,000
			NHLBI TOTAL	\$45,155,390

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

NATIONAL INSTITUTE OF MENTAL HEALTH

Grant No	PI	Title	Institution	Funding
5R03MH063269-02	Adam, Emma K	Contextual Influences On Adolescent Cortisol Activity	Northwestern University	\$73,500
5R01MH061354-03	Alam, Md N	Control Of Sleep And Arousal	Sepulveda Research Corporation	\$118,100
5R01MH062641-02	Albers, H Elliott	Neurobiology Of Social Behavior	Georgia State University	\$250,250
5T32MH019132-12	Alexopoulos, George S.	Research Training In Geriatric Mood Disorders	Weill Medical College Of Cornell Univ	\$131,739
5P30MH049762-10	Alexopoulos, George S.	CRC/Geriatric Mood Disorders	Weill Medical College Of Cornell Univ	\$1,226,049
5K08MH001844-03	Anderson, Matthew P	Ca Channels In Thalamic & Hippocampal Rhythmic Activity	Brigham And Women's Hospital	\$158,504
5R01MH056953-04	Armitage, Roseanne	Childhood Depression--Physiological Correlates	University Of Texas SW Med Ctr/Dallas	\$328,060
5R01MH061515-02	Armitage, Roseanne	Sex Differences In Sleep Regulation In Depression	University Of Texas SW Med Ctr/Dallas	\$413,670
5R01MH045361-15	Baghdoyan, Helen A	Cholinergic Mechanisms Of REM Sleep Generation	University Of Michigan At Ann Arbor	\$204,312
5R01MH049741-11	Barlow, Robert B	Computational Models Of Retinal And Brain Function	Upstate Medical University	\$223,359
5R01MH052226-08	Benca, Ruth M	Acute Effects Of Light On Sleep	University Of Wisconsin Madison	\$395,726
5R01MH060338-03	Benca, Ruth M	Amygdala And Sleep	University Of Wisconsin Madison	\$288,000
5R01MH062359-02	Berridge, Craig W	Neurobiology Of Orexin/Hypocretin-Induced Arousal	University Of Wisconsin Madison	\$218,250
5R01MH059166-03	Bittman, Eric L	Neural Regulation Of Circadian Rhythms And Photoperiods	University Of Massachusetts Amherst	\$230,250
1R01MH062599-01A2	Black, John L	Hypocretin System Immune Diathesis In Human Narcolepsy	Mayo Clinic Rochester	\$368,008
5R01MH062517-02	Block, Gene D	Neural Basis Of Mammalian Circadian Organization	University Of Virginia Charlottesville	\$258,232
1K02MH066424-01	Blumberg, Mark S	Homeostasis And Behavioral State Organization In Infants	University Of Iowa	\$104,529
5R01MH053032-08	Brenowitz, Eliot A	Comparative Studies Of Vocal Control	University Of Washington	\$324,527
5R01MH048802-10	Breslau, Naomi	Posttraumatic Stress Disorder--A Follow Up Study	Case Western Reserve Univ-Henry Ford HSC	\$193,378
1F31MH067318-01	Broome, Bede M	Characteristics Of Sleep In Insects	California Institute Of Technology	\$35,267
5R21MH063364-02	Brown, Ronald L	Retinal Input To The Circadian System	Oregon Health & Science University	\$151,000
2R01MH064867-05A1	Bucan, Maja	Genetics Of Rest:Activity Behavior In The Mouse	University Of Pennsylvania	\$331,620
5F30MH012351-02	Buchanan, Gordon F	Cholinergic Influence On Circadian Function	University Of Illinois Urbana-Champaign	\$33,490
2R01MH024652-27	Buysse, Daniel J	Psychobiology And Treatment Response In Primary Insomnia	University Of Pittsburgh At Pittsburgh	\$453,636
5R01MH060939-03	Cahill, Gregory M	Mutational Analysis Of Vertebrate Circadian Rhythmicity	University Of Houston-University Park	\$190,738
5K02MH001099-10	Campbell, Scott S	Chronobiology Of Age Related Sleep Disturbance	Weill Medical College Of Cornell Univ	\$107,730
5R01MH045067-14	Campbell, Scott S	Bright Light Treatment Of Sleep Disturbance In Elderly	Weill Medical College Of Cornell Univ	\$209,585
5R01MH052415-09	Carskadon, Mary A	Adolescent Sleep: Circadian And Homeostatic Processes	Emma Pendleton Bradley Hospital	\$591,005
5R25MH058879-05	Carskadon, Mary A	Sleep And Chronobiology Summer Research Apprenticeship	Emma Pendleton Bradley Hospital	\$78,731
5R01MH050471-07	Cartwright, Rosalind D	Sex Differences In Mood Disorders	Rush-Presbyterian-St Lukes Medical Ctr	\$253,750
5R25MH059677-04	Chase, Michael H	Training Workshop In Basic Sleep Research	University Of California Los Angeles	\$113,788

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
5K01MH001508-06	Chow, Carson C	Synchrony In Neuronal Networks	University Of Pittsburgh At Pittsburgh	\$114,167
5R01MH044234-13	Church, Russell M	Temporal Discrimination Learning	Brown University	\$185,863
5K08MH001642-02	Clark, Camellia P	Sleep Deprivation, EEG, & Functional MRI In Depression	University Of California San Diego	\$167,724
1F31MH065793-01	Cohen-Zion, Mairav	Sleep And Circadian Rhythms In Children With ADHD	University Of California San Diego	\$25,108
5R44MH060034-03	Cooke, Arthur V	Advanced At-Home Screening Device For Sleep Apnea	Active Signal Technologies, Inc.	\$372,995
1R01MH064799-01A1	Crystal, Jonathon D	Mechanisms Of Time Discrimination	University Of Georgia	\$231,000
5R01MH045130-12	Czeisler, Charles A.	Treatment Of Circadian Sleep Disorders With Bright Light	Brigham And Women's Hospital	\$695,053
5K02MH001362-07	Dahl, Ronald E	Sleep/Arousal & Affect Regulation: Puberty Development	University Of Pittsburgh At Pittsburgh	\$116,989
1R24MH067346-01	Dahl, Ronald E	Affect Regulation And Adolescent Brain Maturation	University Of Pittsburgh At Pittsburgh	\$373,750
5R01MH059839-04	Datta, Subimal	Cellular And Neurochemical Mechanisms Of REM Sleep	Boston University	\$249,134
2R01MH058543-05A2	De Lecea, Luis	Neuropeptide Cortistatin And Sleep	Scripps Research Institute	\$397,530
5T32MH020051-03	De Vries, Geert J	Training In Neuroendocrinology	University Of Massachusetts Amherst	\$159,246
1F32MH066507-01	Dodge, James C	Suprachiasmatic Regulation Of Reproductive Physiology	University Of Massachusetts Amherst	\$38,320
5R01MH052685-07	Dubocovich, Margarita L	Melatonin-Light Interaction On Circadian Activity	Northwestern University	\$299,378
1R01MH063466-01A1	Dubocovich, Margarita L	Melatonin Receptors As Therapeutic Targets In Primates	Northwestern University	\$329,872
5R01MH059995-04	Dudek, Francis Edward	Local Neuronal Circuits Of The Suprachiasmatic Nucleus	Colorado State University	\$237,058
5R01MH044651-13	Dunlap, Jay C	Identification And Analysis Of Clock Controlled Genes	Dartmouth College	\$410,999
5R01MH060147-02	Earnest, David J	Role Of Bdnf In The Photic Control Of Circadian Rhythms	Texas A&M University Health Science Ctr	\$180,000
5K23MH001830-03	Epperson, Cynthia N	Neuronal Dysfunction In Premenstrual Dysphoric Disorder	Yale University	\$142,423
5K02MH001435-05	Erskine, Mary S	Neuroendocrine Responses To Mating In The Female	Boston University	\$98,033
1R21MH063199-01A1	Fallone, Gahan P	Adolescent ADHD: Sleep, Symptoms, And Medication	Emma Pendleton Bradley Hospital	\$140,000
1R01MH062521-01A2	Feinberg, Irwin	Longitudinal Measurements Of Sleep EEG In Adolescence	University Of California Davis	\$443,296
5T32MH017168-19	Fluharty, Steven J	Predoctoral Training In Behavioral Neuroscience	University Of Pennsylvania	\$194,351
3R01MH062003-01A1S1	Foa, Edna B	Relationship Between Bio. And Psych. Correlates Of PTSD	University Of Pennsylvania	\$89,156
5R01MH062003-02	Foa, Edna B	Relationship Between Bio. And Psych. Correlates Of PTSD	University Of Pennsylvania	\$377,896
1R01MH067568-01	Frank, Marcos G	Sleep And Neural Plasticity In Developing Neocortex	University Of California San Francisco	\$263,521
1R01MH063089-01A1	Freedman, Robert F	Sleep Disturbance In Menopause	Wayne State University	\$372,500
5F31MH064312-02	Freeman, Amanda A	Dopaminergic Mesothalamic System: Anatomy & Physiology	Emory University	\$22,991
5T32MH019927-09	Fritz, Gregory K	Research Training In Child Mental Health	Rhode Island Hospital (Providence, Ri)	\$271,062
1F31MH067320-01	Gerdin, Matthew J	Melatonin Regulation Of Mt2 Melatonin Receptors	Northwestern University	\$24,629
5R01MH058606-03	Gilden, David L	Fluctuations In Cognitive And Perceptual Activity	University Of Texas Austin	\$106,824
5R01MH039531-15	Giles, Donna E.	Is EEG Sleep Abnormal In Those At Risk For Depression	University Of Rochester	\$349,236
5R01MH060350-03	Giles, Donna E.	Familial Risks For Mood Disorders In Adult Offspring	University Of Rochester	\$159,500

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
5R01MH051246-07	Girdler, Susan S.	Neuroendocrine Modulation Of Stress Responses In PMS	University Of North Carolina Chapel Hill	\$347,145
1F31MH067413-01	Gooley, Joshua J	Characteristics Of Retinal Cells That Contain Melanopsin	Beth Israel Deaconess Medical Center	\$27,130
5R01MH061461-02	Green, Carla B	In Vivo Studies Of Vertebrate Circadian Clock Genes	University Of Virginia Charlottesville	\$184,380
1R13MH065262-01	Green, Carla B	Pineal Cell Biology Gordon Conference	Gordon Research Conferences	\$15,000
5K01MH001554-05	Hall, Martica	Sleep As A Mediator Of The Stress/Health Relationship	University Of Pittsburgh At Pittsburgh	\$113,098
5R01MH061423-03	Hardin, Paul E	Circadian Regulatory Circuits In Drosophila	University Of Houston-University Park	\$221,250
5R01MH060013-03	Hasselmo, Michael E	Neuromodulation And Cortical Memory Function	Boston University	\$239,791
5R01MH061492-03	Hasselmo, Michael E	Cholinergic Regulation Of Entorhinal Network Function	Boston University	\$253,120
1F31MH064255-01A1	Haynes, Patricia L	Circadian Impact Of Psychosocial Factors In Depression	University Of California San Diego	\$25,018
5R44MH057186-03	Heitmann, Anneke	Software System For Prediction Of Shiftwork Alertness	Circadian Technologies, Inc.	\$190,377
5F31MH064329-02	Hellman, Kevin M	Memory Consolidation And Sleep	University Of Pennsylvania	\$36,268
5R01MH063104-03	Herzog, Erik D	Cellular Basis Of Circadian Rhythms In Mammals	Washington University	\$192,500
5R01MH048832-09	Hobson, J Allan	State Dependent Aspects Of Cognition	Harvard University (Medical School)	\$326,738
5R01MH057832-05	Hooper, Scott L	Phase Maintenance, Neuron Properties To Muscle Response	Ohio University Athens	\$149,079
5R01MH059847-03	Horvath, Tamas L	Gonadal Steroid Regulation Of The Biological Clock	Yale University	\$245,250
5R01MH059890-04	Jennes, Lothar H	Neuroendocrine Mechanisms Of Reproductive Aging	University Of Kentucky	\$216,855
5K02MH001179-09	Johnson, Carl H	Molecular/Genetic Analysis Of Biological Clocks	Vanderbilt University	\$95,434
2R01MH043836-14A2	Johnson, Carl H	Molecular/Genetic Analysis Of Biological Clocks In Cells	Vanderbilt University	\$339,750
1R21MH065910-01	Johnson, Carl H	Cell-Permeant Clock Proteins	Vanderbilt University	\$143,350
5R01MH061385-03	Johnson, Eric O	Epidemiology Of Insomnia & Mental Illness In Adolescence	Case Western Reserve Univ-Henry Ford Hsc	\$322,495
5R01MH060119-03	Jones, Barbara E	Role Of Basal Forebrain Neurons In Sleep Wake States	Mc Gill University	\$75,000
2R44MH062251-02	Kalpin, Scott L	Sleep Study Sensors With Embedded Wireless Links	Advanced Medical Electronics Corporation	\$326,054
5R01MH045923-13	Kandel, Eric R	Molecular Biological Approaches: Ltp In The Hippocampus	Columbia University Health Sciences	\$298,375
3P30MH052129-07S2	Katz, Ira R	Depression In Late Life--Psychiatric/Medical Comorbidity	University Of Pennsylvania	\$189,721
5K02MH001180-07	Keshavan, Matcheri S.	Brain Maturation And Vulnerability To Schizophrenia	University Of Pittsburgh At Pittsburgh	\$117,223
2R44MH062244-02	Kilgore, James L	Coupled Enzyme Process For Tryptamine Synthesis	Biocatalytics, Inc.	\$432,075
5R01MH058853-04	King, Abby C	Promoting Exercise, Sleep And Well Being In Older Adults	Stanford University	\$437,021
1R03MH063400-01A1	Kinkead, Becky L	Neurotensin In Estrous Cycle Regulation Of PPI	Emory University	\$76,000
5R01MH062525-02	Kocsis, Bernat	Cooperation Among Subcortical Networks Underlying Memory	Massachusetts Mental Health Institute	\$1
7R01MH062525-03	Kocsis, Bernat	Cooperation Among Subcortical Networks Underlying Memory	Harvard University (Medical School)	\$254,848
5F32MH012408-02	Kriegsfeld, Lance J	Nitric Oxide And Circadian Organization	Columbia Univ New York Morningside	\$46,192
5P30MH030915-25	Kupfer, David J	Mhirc For The Study Of Mood And Anxiety Disorders	University Of Pittsburgh At Pittsburgh	\$2,314,729
1F31MH065831-01	Lebourgeois, Monique K	The Validation Of A New Measure Of Sleep In Children	University Of Southern Mississippi	\$25,035

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
1K01MH001958-01A1	Lewin, Daniel S	Psychological Sequelae Of Disturbed Sleep In Pediatrics	University Of Pittsburgh At Pittsburgh	\$32,240
7K01MH001958-02	Lewin, Daniel S	Psychological Sequelae Of Disturbed Sleep In Pediatrics	Children's Research Institute	\$84,850
5R01MH056874-05	Lewy, Alfred J	Melatonin For Circadian Sleep Disorders In The Blind	Oregon Health & Science University	\$377,500
5R03MH062327-02	Li, Fuzhong	Tai Chi Training And Sleep Enhancement In The Elderly	Oregon Research Institute	\$80,130
5T32MH019929-09	Lisman, John E	Neuroscience: From Channels To Behavior	Brandeis University	\$189,543
5K08MH002012-02	Lopez, Faustino	Sleep Deprivation And 5-Ht Autoregulatory Processes	University Of California Los Angeles	\$155,883
5R01MH062602-02	Lucas, Jeffrey R	Integrating Energy Storage, Hippocampus And Hormones	Purdue University West Lafayette	\$181,504
5R37MH046742-13	Marder, Eve E	Intrinsic Plasticity In Oscillatory Neural Networks	Brandeis University	\$298,186
5R01MH059831-04	Margoliash, Daniel	Neurophysiology Of Sensorimotor Learning	University Of Chicago	\$329,233
1R01MH068028-01	Margoliash, Daniel	Temporal Patterns In Sleep Mechanisms Of Learning	University Of Chicago	\$281,303
5R01MH060291-04	Mason, Peggy	Physiology Of Raphe Magnus Cells During Wake And Sleep	University Of Chicago	\$193,143
5R01MH058811-04	Max, Marianna	Adenovirus Mediated Regulation Of Pineal Photoresponses	Mount Sinai School Of Medicine Of Nyu	\$153,392
4R37MH039683-19	Mccarley, Robert W	Synaptic Basis Of Sleep Cycle Control	Harvard University (Medical School)	\$510,952
5R01MH062522-02	Mccarley, Robert W	Orexin And The Control Of Sleep And Wakefulness	Harvard University (Medical School)	\$205,097
5K01MH001644-04	Mccurry, Susan M	Treating Neuropsychiatric Problems In Dementia	University Of Washington	\$124,916
5R01MH047480-11	Mcginty, Dennis J	Sleep Control By Thermosensitive Neurons	University Of California Los Angeles	\$220,500
5R01MH063341-02	Mcmahon, Douglas G	Molecular Physiology Of Circadian Pacemaking	University Of Kentucky	\$32,495
7R01MH063341-03	Mcmahon, Douglas G	Molecular Physiology Of Circadian Pacemaking	Vanderbilt University	\$282,105
5R37MH046823-12	Mcnaughton, Bruce L	Hebb Marr Networks The Hippocampus And Spatial Memory	University Of Arizona	\$340,875
5K24MH001917-04	Mellman, Thomas A.	Midcareer-Investigator Award In Patient-Oriented Researc	Dartmouth College	\$102,233
5R01MH054006-06	Mellman, Thomas A.	REM Sleep & Memory Processing During Development Of PTSD	Dartmouth College	\$304,618
2R01MH056647-06A1	Menaker, Michael	Circadian Oscillators In Cultured Mammalian Tissue	University Of Virginia Charlottesville	\$288,800
1R03MH067079-01	Mintz, Eric M	Regulation Of Circadian Activity Rhythms By Hypocretins	Kent State University At Kent	\$70,721
5R01MH060413-02	Morin, Charles M	Behavioral And Pharmacological Treatment For Insomnia	Laval University	\$225,000
1R01MH064471-01A1	Morin, Lawrence P	Intrinsic Anatomy Of The Circadian Rhythm System	State University New York Stony Brook	\$205,045
5R01MH042903-15	Morrison, Adrian R	Brainstem Mechanisms Of Alerting	University Of Pennsylvania	\$315,944
1R44MH066488-01	Mulchahey, James J	Melatonin Analog For Sleep Disorders	Phase Two Discovery, Inc.	\$100,000
5R01MH060641-03	Mullington, Janet M	Effects Of Chronic Sleep Restriction & Human Host Respon	Beth Israel Deaconess Medical Center	\$275,525
2R01MH057535-12A2	Nelson, Randy J	Environment, Behavior, And Reproduction In Rodents	Ohio State University	\$331,688
1P50MH066172-01	Nestler, Eric J.	Neural Substrates /Appetitive Behavior /Mood /Motivation	University Of Texas SW Med Ctr/Dallas	\$1,802,521
5R29MH057157-05	Neylan, Thomas C.	Sleep And Arousal Disturbances In PTSD	Northern California Institute Res & Educ	\$87,580
5K01MH001600-05	Nishino, Seiji	Pharmacological Studies Of Human And Canine Narcolepsy	Stanford University	\$115,523
5R01MH061566-02	Nofzinger, Eric A.	Sleep-Guided PET Studies In Depression	University Of Pittsburgh At Pittsburgh	\$337,031

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
1K24MH066227-01	Nofzinger, Eric A.	Sleep Imaging Studies In Depression	University Of Pittsburgh At Pittsburgh	\$97,924
5R01MH018343-32	Nottebohm, Fernando	The Biology Of Neuronal Replacement	Rockefeller University	\$401,719
5F32MH012956-02	Novak, Colleen M	Sleep And Melatonin In Diurnal And Nocturnal Rodents	Georgia State University	\$46,192
1R01MH062335-01A2	Obrietan, Karl H	Mapk Signaling And Circadian Timing	Ohio State University	\$295,000
5R01MH064843-02	Opp, Mark R	Cytokine Neurotransmitter Interactions And Sleep	University Of Michigan At Ann Arbor	\$290,340
1R03MH063823-01A1	Park, Jae H	Regulation Of Drosophila Circadian Output Pathways	University Of Tennessee Knoxville	\$72,500
1R01MH066197-01	Park, Jae H	Transcriptional Regulation Of PDF In Drosophila	University Of Tennessee Knoxville	\$270,080
5R01MH059919-03	Parry, Barbara L	Menopausal Depression: Chronobiologic Basis	University Of California San Diego	\$536,373
1R01MH063462-01A2	Parry, Barbara L	Probing Premenstrual Dysphoric Disorder With Light	University Of California San Diego	\$362,666
5R01MH059392-02	Perlis, Michael L	Beta EEG Activity In Insomnia	University Of Rochester	\$239,250
5R01MH062296-02	Pickard, Gary E	Retinal Neurons Afferent To The Circadian System	Colorado State University	\$326,250
7R01MH060670-03	Poe, Gina R	REM Sleep And Memory	University Of Michigan At Ann Arbor	\$201,034
5F32MH012875-02	Prendergast, Brian J	Neuroendocrine Regulation Of Biological Timing	Ohio State University	\$48,148
1K23MH065434-01	Press, Daniel Z	Imaging Procedural+Working Memory In Parkinson's Disease	Beth Israel Deaconess Medical Center	\$133,653
5F31MH065054-02	Prichard, Jennifer R	Subcortical Visual System Development	University Of Wisconsin Madison	\$25,683
5R01MH062405-02	Provencio, Ignacio	Photic Regulation Of Circadian Rhythms	Henry M. Jackson Fdn For The Adv Mil/Med	\$259,350
5F32MH013023-02	Rattenborg, Niels C	Sleep And Prefrontal Cortex Asymmetry In Depression	University Of Wisconsin Madison	\$44,212
5R01MH062490-02	Rea, Michael A	Neurochemical Regulation Of Circadian Timing	University Of Houston-University Park	\$243,840
5T32MH016804-22	Reynolds, Charles F	Clinical Research Training In Psychiatry	University Of Pittsburgh At Pittsburgh	\$453,917
5R01MH037869-19	Reynolds, Charles F	Geriatric Depression--Neurobiology Of Treatment	University Of Pittsburgh At Pittsburgh	\$667,697
5R01MH063968-02	Richardson, Gary S.	Autonomic Dysregulation In Primary Insomnia	Case Western Reserve Univ-Henry Ford Hsc	\$321,750
1R01MH065606-01	Roberts, Robert E.	Epidemiology Of Disturbed Sleep Among Adolescents	University Of Texas Hlth Sci Ctr Houston	\$621,756
5T32MH015330-25	Ross, Christopher A	Interdisciplinary Training In Psychiatry & Neuroscience	Johns Hopkins University	\$196,803
5R01MH059338-04	Roth, Thomas D	Daytime Sleepiness--Prevalence, Consequences, And Risks	Case Western Reserve Univ-Henry Ford HSC	\$398,920
5R01MH060385-03	Ruby, Norman F	Circadian Rhythm Entrainment	Stanford University	\$197,365
3P01MH041712-15S1	Ryan, Neal D.	Psychobiology Of Childhood Anxiety And Depression	University Of Pittsburgh At Pittsburgh	\$35,441
2P01MH041712-16A1	Ryan, Neal D.	Neurobehavioral Changes In Pediatric Affective Disorder	University Of Pittsburgh At Pittsburgh	\$1,320,261
1K23MH001828-01A2	Salomon, Ronald M	Dynamic Measures Of Neurochemistry In Mood Disorders	Vanderbilt University	\$169,045
5R01MH061716-04	Sanford, Larry D	Phenotypical Expression Of Anxiety And Sleep	Eastern Virginia Med Sch/Med Col Hamp Rd	\$319,602
5R01MH064827-02	Sanford, Larry D	Limbic Modulation Of Arousal And Alerting	Eastern Virginia Med Sch/Med Col Hamp Rd	\$236,075
5R01MH041138-15	Satinoff, Evelyn	Fever Responses And Their Regulation In Aged Rats	University Of Delaware	\$281,195
5K08MH001507-05	Scammell, Thomas E	Adenosine And The Preoptic Regulation Of Sleep	Beth Israel Deaconess Medical Center	\$159,919
5R01MH062589-02	Scammell, Thomas E	Circadian And Aminergic Regulation Of Orexin Neurons	Beth Israel Deaconess Medical Center	\$278,242

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
5T32MH020002-04	Sejnowski, Terrence J	Training Program In Cognitive Neuroscience	University Of California San Diego	\$283,032
5F31MH012934-02	Shifflett, Michael W	Behavioral And Neural Plasticity In Food-Storing Birds	Cornell University Ithaca	\$38,273
5R01MH055772-05	Shirmani, Priyattam J	Hypothalamic Regulation Of Sleep	Harvard University (Medical School)	\$231,875
5R01MH064109-02	Siegel, Jerome M	Hypocretin Release In Disease States And Behavior	University Of California Los Angeles	\$305,000
1R13MH065572-01	Silver, Rae	Society For Research On Biological Rhythms Meeting	Barnard College	\$13,500
2R01MH053433-07A2	Smale, Laura	The Psychobiology Of Rhythms In Diurnal Mammals	Michigan State University	\$328,023
5K02MH001621-06	Smith, Gwenn S.	Monoaminergic Function In Geriatric Neuropsychiatry	Long Island Jewish Medical Center	\$103,679
1R01MH063323-01A1	Szymusiak, Ronald S	Median Preoptic Nucleus And The Control Of Sleep	Sepulveda Research Corporation	\$226,109
5U01MH061915-02	Takahashi, Joseph S	Mouse Mutagenesis: Phenotype-Driven Neuroscience Screens	Northwestern University	\$2,738,217
5K01MH001798-03	Thakkar, Mahesh	Electrophysiology & Pharmacology Of Sleep-Wakefulness	Harvard University (Medical School)	\$127,160
5R01MH065135-02	Tononi, Giulio	Functional Changes Induced By Sleep Deprivation	University Of Wisconsin Madison	\$254,625
1R43MH062887-01A2	Tucker, Don M	Dense Array EEG For Neonatal Sleep Monitoring	Electrical Geodesics, Inc.	\$107,963
5T32MH018399-17	Turner, Eric E	Fellowship In Biological Psychiatry And Neuroscience	University Of California San Diego	\$325,904
5R21MH065062-02	Vazquez, Delia M	Depression Risk, Infant-Mother Attachment And Cortisol	University Of Michigan At Ann Arbor	\$508,075
5K02MH001158-09	Vitiello, Michael V.	Age Related Sleep Impairment--Possible Interventions	University Of Washington	\$117,612
1R21MH065497-01	Waschek, James A	Gene Targeting To Study Light-Induced Circadian Changes	University Of California Los Angeles	\$152,625
5R01MH059943-04	Weitz, Charles J	Mammalian Per Gene Regulation By The Clock Protein	Harvard University (Medical School)	\$313,141
5F32MH063579-02	Wijnen, Herman	Output Of The Circadian Clock	Rockefeller University	\$44,212
1R01MH061976-01A2	Wilson, Matthew A	Hippocampal Prefrontal Cortical Interactions In Memory	Massachusetts Institute Of Technology	\$323,140
5R01MH062119-02	Wohlgemuth, William K	Combined Behavioral/Pharmacological Therapy For Insomnia	Duke University	\$241,811
5R01MH059284-03	Yamuy, Jack	Neurotrophin Control Of REM Sleep	University Of California Los Angeles	\$190,625
3R01MH064104-01S1	Yehuda, Rachel	Relationship Between Bio And Psych Correlates Of PTSD	Mount Sinai School Of Medicine Of NYU	\$154,293
5R01MH050030-05	Young, Elizabeth Ann	Stress And Reproductive Hormones In Depression	University Of Michigan At Ann Arbor	\$333,657
5R01MH061171-35	Zucker, Irving	Photoperiod, Behavior And Brain Function	University Of California Berkeley	\$339,239
Intramural				
1Z01MH002767-05	Baler, Ruben David	Regulation Of Temporal And Spatial Gene Expression In Th		\$724,054
1Z01MH000509-19	Mirsky, A F	Attention Disorders As Assessed By Event Related Brain P		\$241,351
1Z01MH002228-17	Nash, Howard A	Genetic Neurobiology Of Drosophila		\$2,717,616
1Z01MH002765-06	Rubinow, David	Reproductive Endocrine Related Mood Disorders--Different		\$434,432
1Z01MH002772-05	Wehr, Thomas A	The Regulation Of Habitual Sleep Duration		\$144,811
1Z01MH000422-31	Zatz, Martin	Regulation Of Circadian Rhythms		\$2,172,162
NIMH TOTAL				\$56,647,143

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE

Grant No	PI	Title	Institution	Funding
3R01NS040782-01S1	Allen, Charles N	Presynaptic Mechanisms In The Suprachiasmatic Nucleus	Oregon Health & Science University	\$25,652
5R01NS040782-02	Allen, Charles N	Presynaptic Mechanisms In The Suprachiasmatic Nucleus	Oregon Health & Science University	\$459,721
5R01NS024698-16	Aston-Jones, Gary S	Afferent Control Of Locus Coeruleus	University Of Pennsylvania	\$344,885
5R01NS014857-24	Berger, Albert J	Respiratory System Integration By The Brainstem	University Of Washington	\$242,914
5R01NS041971-02	Borjigin, Jimo	Molecular Dissection Of Melatonin Synthesis In Vivo	Carnegie Institution Of Washington, Dc	\$204,750
1T32NS044851-01	Block, Gene D	Temporal Biology Training Program	University Of Virginia Charlottesville	\$126,698
5R01NS036590-05	Brainard, George C	Ocular Control Of Melatonin Regulation: Action Spectrum	Thomas Jefferson University	\$339,490
5F32NS011134-02	Burgoon, Penny W	Neurotransmitter Regulation In The Circadian Clock	University Of Illinois Urbana-Champaign	\$48,148
5P01NS039546-03	Cassone, Vincent M	Coordination Of Circadian Physiology Of Diverse Species	Texas A&M University System	\$985,833
2R01NS023426-14A1	Chase, Michael H	Neurotransmitter Control Of Sleep And Wakefulness	University Of California Los Angeles	\$313,089
5R01NS009999-27	Chase, Michael H	State Dependent Control Of Motoneuron Activity	University Of California Los Angeles	\$289,079
5R01NS040982-02	Czeisler, Charles A	After-Effects Of Entrainment On Human Circadian Period	Brigham And Women's Hospital	\$317,500
5R01NS041886-02	Czeisler, Charles A	Circadian Adaptation To Non-24-Hour Sleep-Wake Schedules	Brigham And Women's Hospital	\$317,500
5R01NS030816-10	Dark, John G	Annual Rhythms Of Energy Balance And Behavior	University Of California	\$263,200
5R01NS034004-08	Datta, Subimal	Mechanisms Underlying The Cognitive Function Of Sleep	Boston University	\$326,000
5R01NS036758-04	Delpire, Eric J	Molecular Physiology Of Brain Cation-C1 Cotransporters	Vanderbilt University	\$71,173
5U54NS041069-03	Duffiscal Year, Lawrence	Alaskan Basic Neuroscience Program	University Of Alaska Fairbanks	\$155,093
5R01NS034958-08	Ederly, Isaac	Clock Mechanism Underlying Rhythmic Behavior	Rutgers The St Univ Of NJ New Brunswick	\$345,911
5R01NS042088-02	Ederly, Isaac	Seasonal Adaptation Of A Circadian Clock	Rutgers The St Univ Of NJ New Brunswick	\$262,979
5R01NS033310-09	Engel, Jerome J	In Vivo Studies Of The Epileptic Hippocampus	University Of California Los Angeles	\$88,548
2T32NS007222-21	Feldman, Eva L	Training In Clinical And Basic Neuroscience	University Of Michigan At Ann Arbor	\$7,101
5R01NS024742-14	Feldman, Jack L	Transmission Of Respiratory Drive To Motoneurons	University Of California Los Angeles	\$36,490
5P01NS015655-22	Frey, Kirk A	Pet Study Of Biochemistry And Metabolism Of The Cns	University Of Michigan At Ann Arbor	\$649,461
2R01NS020246-17A1	Garcia-Rill, Edgar E	Central Modulation Of Rhythms	University Of Arkansas Med Scis Ltl Rock	\$277,400
5R01NS022155-16	Gillette, Martha U	Physiological Substrates Of A Circadian Oscillator	University Of Illinois Urbana-Champaign	\$377,613
5R01NS035859-06	Gillette, Martha U	Cholinergic Regulation Of The Circadian Clock	University Of Illinois Urbana-Champaign	\$264,492
5R01NS035229-06	Glass, John D	Neurologic Regulation Of The SCN Circadian Clock	Kent State University At Kent	\$323,633
5Z01NS002979-04	Goldstein, David	Clinical Neurocardiology: Catecholamine Systems In Stress And Disease	NINDS	\$273,497
5N44NS012309-00	Greeley, Harold	Alertness Monitoring Device	Create, Inc.	\$308,144
1R13MH065262-01	Green, Carla B	Pineal Cell Biology Gordon Conference	Gordon Research Conferences	\$5,000
5Z01NS002667-18	Hallett, Mark	Physiological Analysis Of Involuntary Movements	NINDS	\$121,257

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
3U54NS039407-03S1	Haxhiu, Musa A	Neuronal And Chemical Control Of Breathing An Airways Fu	Howard University	\$43,790
3U54NS039407-03S2	Haxhiu, Musa A	Neuronal And Chemical Control Of Breathing An Airways Fu	Howard University	\$73,798
3U54NS039407-04S1	Haxhiu, Musa A	Neuronal And Chemical Control Of Breathing An Airways Fu	Howard University	\$103,148
5U54NS039407-04	Haxhiu, Musa A	Neuronal And Chemical Control Of Breathing An Airways Fu	Howard University	\$658,605
5R01NS034774-07	Huguenard, John R	Inhibitory Controls In The Thalamic Reticular Nucleus	Stanford University	\$30,712
5N44NS002366-00	Jewett, Don	Attention In Evoked Responses At High-Repetition Rates	Abratech Corp.	\$316,255
2R01NS027250-15	Krueger, James M	Sleep Regulation-The Involvement Of Ghrelin	Washington State University	\$327,847
5R01NS025378-17	Krueger, James M	Interleukin 1--A Promoter Of Slow Wave Sleep	Washington State University	\$332,419
5R01NS031453-10	Krueger, James M	Sleep Regulation And Tumor Necrosis Factor	Washington State University	\$362,500
2R01NS027881-08	Leonard, Christopher S	Synaptic Modulation Of Mesopontine Cholinergic Neurons	New York Medical College	\$294,892
1R01NS046062-01	Lindsey, Bruce G	Computational Studies Of The Respiratory Brainstem	University Of South Florida	\$299,239
5R01NS038523-02	Longstreth, W T	Epidemiology Of Narcolepsy	University Of Washington	\$566,112
3R41NS040590-01A1	Maki, Richard A	Hypocretins And Their Role In The Control Of Sleep	Neurocrine Biosciences, Inc.	\$54,979
1R01NS042698-01A1	Malow, Beth A	Effects Of Treating Obstructive Sleep Apnea In Epilepsy	University Of Michigan At Ann Arbor	\$492,316
3R01NS042698-01A1	Malow, Beth A	Effects Of Treating Obstructive Sleep Apnea In Epilepsy	University Of Michigan At Ann Arbor	\$75,666
5K02NS002099-04	Malow, Beth A	Facilitation Of Epileptic Activity By Sleep And Arousal	University Of Michigan At Ann Arbor	\$132,300
5F31NS042480-02	Marcus, Jacob N	Orexin Modulation Of Sympathetic Outflow	Harvard University (Medical School)	\$41,090
5T32NS007292-17	Marder, Eve E	Neurobiology: Genes, Channels, And Behavior	Brandeis University	\$88,178
5U54NS039409-04	Martinez, Joe L	Experience-Dependent Structural Plasticity In Cns	University Of Texas San Antonio	\$34,112
5P50NS023724-16	Mignot, Emmanuel J	Center For Narcolepsy And Related Disorder	Stanford University	\$1,232,300
5R37NS033797-09	Mignot, Emmanuel J	Molecular Genetics Of Human Narcolepsy	Stanford University	\$388,675
3R44NS037636-02S1	Minasyan, Georgiy R	Definition And Detection Of Clinical EEG Features	Astro-Med, Inc.	\$80,897
5R44NS037636-03	Minasyan, Georgiy R	Definition And Detection Of Clinical EEG Features	Astro-Med, Inc.	\$401,030
5F32NS011158-02	Mitchell, Jennifer W	Cellular Organization Of The Circadian Light Response	University Of Illinois Urbana-Champaign	\$44,212
5R01NS037571-04	Mitler, Merrill M	Narcolepsy--Multicenter Genetic And Family Study	Scripps Research Institute	\$789,950
5R01NS022168-17	Morin, Lawrence P	Behavior, Biological Rhythms And Brain	State University New York Stony Brook	\$311,091
5R01NS038050-03	Mueller, Gregory P	Fatty Acid And Peptide Amidation--A Shared Mechanism	Henry M. Jackson Fdn For The Adv Mil/Med	\$222,750
2R44NS043129-02	Nichols, L D	A New Method For Treating Sleep Disorders	Biotek, Inc.	\$254,557
5P01NS035985-05	Olsen, Richard W	Plasticity Of Gaba Receptors	University Of California Los Angeles	\$198,252
1R43NS040561-01A1	Pal, Ivan	Expert System For Arousal Scoring During Sleep	Bio-Logic Systems Corporation	\$99,900
5F31NS041857-03	Paul, Ketema N	Minority Predoctoral	Georgia State University	\$35,403
5R01NS035615-06	Pickard, Gary E	5ht Presynaptic Inhibition Of Retinal Input To The SCN	Colorado State University	\$362,500
5K08NS002021-05	Quigg, Mark S	Chronobiology Of Partial Epilepsy	University Of Virginia Charlottesville	\$127,845

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
5R01NS039303-04	Reppert, Steven M	Circadian Clock Mechanism In The SCN	Univ Of Massachusetts Med Sch Worcester	\$323,965
5R01NS032624-09	Rivkees, Scott A	Developing Circadian Rhythmicity	Yale University	\$372,322
5R01NS030989-10	Rudy, Bernardo	Expression And Function Of K+ Channel Genes In Brain	New York University School Of Medicine	\$37,125
1R01NS043374-01	Rye, David B	Circuitry Of Midbrain Dopamine In Sleep & Wake	Emory University	\$334,178
5R01NS036697-04	Rye, David B	Brainstem Substrates Of Dopamine Modulated Movements	Emory University	\$103,960
5R01NS040221-04	Rye, David B	Sleep/Dopamine Phenotypes In Genetically Distinct Mice	Emory University	\$284,285
2R44NS042451-02A1	Schmidt, Robert N	A New Device For Untethered Home Sleep Studies	Cleveland Medical Devices, Inc.	\$460,453
5R01NS040788-02	Schwartz, William J	Hypothalamic Reconstruction Using Neural Precursor Cells	Univ Of Massachusetts Med Sch Worcester	\$54,810
5R01NS040110-02	Selverston, Allen I	Stability And Flexibility Of Oscillatory Neural Circuits	University Of California San Diego	\$372,200
5R01NS031720-07	Shaffery, James P	Brain Maturation: Function For Rapid Eye-Movement Sleep	University Of Mississippi Medical Center	\$56,062
5R37NS014610-23	Siegel, Jerome M	Immunological Factors In Narcolepsy	University Of California Los Angeles	\$358,727
2R01NS037919-05	Silver, Rae	Physiological Dissection Of The SCN	Barnard College	\$325,964
1R43NS044626-01	Smith, Jack R	Time Domain Description Of Polysomnography Data	Neurotronics, Inc.	\$100,000
5R01NS040109-03	Smith, Roderic L	Developmental Epilepsy And Conditional Gabaa Function	University Of Colorado Hlth Sciences Ctr	\$75,500
5R21NS041921-02	Soja, Peter J	Excitability Of Lumbar Afferent Terminals During Sleep	University Of British Columbia	\$125,000
2R01NS037056-05A1	Storm, Daniel R	Calcium And Camp Regulation Of The Circadian Clock	University Of Washington	\$320,694
5R01NS021749-18	Taghert, Paul H	Developmental Regulation Of Neuropeptide Expression	Washington University	\$75,771
5R01NS030914-09	Tepley, Norman	Development Of Low Frequency Meg Hardware And Software	Case Western Reserve Univ-Henry Ford Hsc	\$105,897
5S11NS038483-04	Tosini, Gianluca	Plasticity Of Mammalian Circadian Axis	Morehouse School Of Medicine	\$318,741
5R01NS040220-05	Toth, Linda A	Murine Sleep Phenotype During Microbial Infections	Southern Illinois University Carbondale	\$225,195
5Y01NS008002-00	Trudeau, Sara L	Human Specimen Bank	Va W. Los Angeles Health Care Center	\$15,915
1R01NS041454-01A1	Van Den Pol, Anthony N	Hypocretin Neurons	Yale University	\$279,585
1R01NS040829-01A2	Walters, Arthur S	Study Of L-Dopa In ADHD And RLS/PLMs	JFK Medical Center	\$110,466
5R01NS029728-11	Watts, Alan G	Neuropeptides And Their Physiological Control	University Of Southern California	\$258,968
1R01NS043491-01	Weitz, Charles J	Secreted SCN Factors And Circadian Locomotor Activity	Harvard University (Medical School)	\$505,024
5R01NS040254-03	Yellon, Steven M	Neuroendocrine/Immune Interactions: Role Of Melatonin	Loma Linda University	\$267,510
NINDS TOTAL				\$22,917,888

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

NATIONAL INSTITUTE OF NURSING RESEARCH

Grant No	PI	Title	Institution	Funding
1R01NR008125-01	Alley, Linda G	Pain, Opioids, And Sleep In Cancer Patients	Emory University	\$324,976
1R01NR007762-01A1	Berger, Ann M	Fatigue & Breast Cancer-A Behavioral Sleep Intervention	University Of Nebraska Medical Center	\$312,375
1R01NR008032-01	Carlson, Barbara W	Respiratory Periodicity And Cognitive Decline In Elders	University Of North Carolina Chapel Hill	\$333,114
5F31NR007844-02	Carno, Margaret-Ann	Impact Of Changes In Circadian Rhythms In Pediatrics ICU	University Of Pittsburgh At Pittsburgh	\$24,261
1R01NR008381-01	Carskadon, Mary A	Phase Preference, Sleepiness, And Adolescent Development	Brown University	\$244,000
1R01NR005188-01A2	Cohen, Marlene Z	Symptom Management In Blood And Marrow Transplantation	University Of Texas Hlth Sci Ctr Houston	\$362,133
5R01NR004281-07	Dinges, David F.	Neurobehavioral Effects Of Partial Sleep Deprivation	University Of Pennsylvania	\$411,327
5R01NR007677-03	Eastman, Charmane I	Reducing Jet-Lag With Practical Circadian Treatments	Rush-Presbyterian-St Lukes Medical Ctr	\$286,000
5R29NR004951-05	Epstein, Dana R	Behavioral Intervention For Insomnia In Older Adults	U.S. Carl T. Hayden Vet Affairs Med Ctr	\$36,468
5R01NR003880-06	Floyd, Judith A	Aging-Related Sleep Changes: A Meta-Analysis	Wayne State University	\$201,150
5R01NR001094-15	Heitkemper, Margaret M	A Nursing Study Of Gut Function In Menstruating Women	University Of Washington	\$396,953
5R01NR005005-02	Higgins, Patricia A	Adult Failure To Thrive In Long-Term Ventilator Patients	Case Western Reserve University	\$388,228
1R01NR008150-01	Jones, Kim D	Maximizing Beneficial Exercise Effects In Fibromyalgia.	Oregon Health & Science University	\$478,861
5P20NR007812-02	Larson, Janet L	Center For Research On Cardiovascular And Respiratory He	University Of Illinois At Chicago	\$238,392
5R01NR005345-02	Lee, Kathryn A	Sleep Disruption In New Parents: An Intervention Trial	University Of California San Francisco	\$389,831
5T32NR007088-07	Lee, Kathryn A	Nursing Research Training In Symptom Management	University Of California San Francisco	\$450,543
5R01NR004959-03	Merritt, Sharon L	Pupillometric Sleepiness In Treated Sleep Disorders	University Of Illinois At Chicago	\$406,799
5R01NR004835-04	Miaskowski, Christine A.	Fatigue, Pain, And Sleep Problems During Radiation	University Of California San Francisco	\$370,584
5T32HL007953-03	Pack, Allan I	Training In Sleep And Sleep Disorders	University of Pennsylvania	\$100,000
5P20NR007798-02	Parker, Kathy P	Symptoms, Symptoms Interactions, And Health Outcome	Emory University	\$232,899
5K01NR000145-03	Phillips, Kenneth D	Psychoneuroimmunological Correlates Of Sleep In HIV	University Of South Carolina At Columbia	\$84,794
1R01NR007771-01A1	Richards, Kathy C	Effect Of Activities And Exercise On Sleep In Dementia	University Of Arkansas Med Scis Ltl Rock	\$426,641
5R01NR005075-02	Sidani, Souraya	Alternative Methods For Clinical Research	University Of Toronto	\$348,731
5R01NR004828-03	Smith, Carol E	Rural Dwelling Older Adults: CPAP Adherence Support	University Of Kansas Medical Center	\$502,279
5F31NR007946-02	Strange, Laura B	Sleep Patterns Of Women At Risk For Preterm Labor	Emory University	\$45,849
5K01NR007649-02	Thomas, Karen A.	Maternal Entrainment Of Infant Circadian Rhythm	University Of Washington	\$86,265
1R01NR007656-01A1	Wilkie, Diana J	Massage Therapy Effects In Hospice Patients With Cancer	University Of Washington	\$269,565
1R01NR007759-01A1	Zimmerman, Lani M	Symptom Management Intervention In Elderly CABG Patients	University Of Nebraska Medical Center	\$338,291
NINR TOTAL				\$8,091,309

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

NATIONAL CENTER FOR RESEARCH RESOURCES

Grant No	PI	Title	Institution	Funding
M01RR002635-18	Adler, Gail K	Interactions Between The HPA Axis And Ans In Women With Fibromyalgia	Brigham And Women's Hospital	\$7,457
M01RR000827-28	Ancoli-Israel, Sonia	Cognitive Benefits Of Treating Sleep Apnea In Dementia	University Of California San Diego	\$12,331
M01RR000240-38	Arens, Raanan	MRI Imaging Of The Upper Airway Of Children With OSAS	Children's Hospital Of Philadelphia	\$27,554
M01RR000096-41	Ayappa, Indu	Flow Limitation In The Diagnosis & Quantitation Of Sleep Disordered Breathing	New York University School Of Medicine	\$14,117
M01RR000096-41	Ayappa, Indu	Automated Analysis Of Sleep Disordered Breathing	New York University School Of Medicine	\$44,705
M01RR000073-40	Badar, Tehmina	Assessment Of Sleep Disorders In Brain Injured Adults	University Of Texas Medical Br Galveston	\$24,402
M01RR000039-42	Bailey, James	Cool Dialysate And Sleep Propensity In Chronic Hemodialysis	Emory University	\$18,556
C06RR017747-01	Balamuth, David P	Lab Const: Sleep	University Of Pennsylvania	\$400,000
M01RR000042-42	Barkan, Ariel L	Effect Of Ghrh Antagonist On Gh Pulsatility & Sleep Architecture	University Of Michigan At Ann Arbor	\$101,215
M01RR003186-17	Benca, Ruth M	Prefrontal Activation Asymmetry And REM Sleep Expression In Depression	University Of Wisconsin Madison	\$24,389
M01RR000048-41	Benloucif, Susan J	Response To Light In Patients With Delayed Sleep Phase Syndrome	Northwestern University	\$532
M01RR000048-41	Benloucif, Susan J	A Pilot Study On The Phase Shifting Response To 2-Hour Light Exposure	Northwestern University	\$355,439
M01RR000096-41	Berger, Kenneth	Kinetics Of Co2 Balance During Sleep In Patients W/ Ventilatory Sleep Disorders	New York University School Of Medicine	\$11,764
M01RR000096-41	Berger, Kenneth	Carbon Dioxide Homeostasis During Periodic Breathing In Obstructive Sleep Apnea	New York University School Of Medicine	\$4,706
M01RR000533-34	Berk, John L	Snoring And Sleep Apnea In Patients With Systemic Amyloidosis	Boston University	\$3,146
M01RR000042-42	Bhatt-Mehta, Varsha	Salivary Sampling Of Systemic Caffeine Concentrations For Apnea Of Prematurity	University Of Michigan At Ann Arbor	\$53,138
M01RR010732-08	Bixler, Edward O	Sleep Disordered Breathing In Children	Pennsylvania State Univ Hershey Med Ctr	\$4,601
M01RR000645-31	Boulos, Ziad	Study Of Light Visor Treatment For Jet Lag	Columbia University Health Sciences	\$45,418
P20RR011091-08	Boychuk, Rodney B	Tongue Thrusting, Mouth Breathing, Oral & Dental Abnormalities	University Of Hawaii At Manoa	\$36,790
M01RR000042-42	Brower, Kirk J	Gabapentin Treatment Of Alcohol And Sleep Problems	University Of Michigan At Ann Arbor	\$48,077
M01RR000056-41	Buysse, Daniel	Identifying And Treating Insomnia In Primary Care	University Of Pittsburgh At Pittsburgh	\$25,903
M01RR000056-41	Buysse, Daniel	Circadian Patterns Of Sleep Tendency In The Elderly	University Of Pittsburgh At Pittsburgh	\$37,678
M01RR008084-09	Cavallo, Anita	Melatonin On Blood Pressure In Type I Diabetes	Children's Hospital Med Ctr (Cincinnati)	\$6,374
M01RR000042-42	Chervin, Ronald D	Primary Sleep Disorders In Hyperactive Children	University Of Michigan At Ann Arbor	\$3,036
M01RR000042-42	Chervin, Ronald D	Behavioral Effects Of Obstructive Sleep Apnea In Children	University Of Michigan At Ann Arbor	\$44,586
M01RR005096-13	Clejan, Sanda	Blood Histamine And Plasma Ascorbic Acid Levels In The Development Of Chd	Tulane University Of Louisiana	\$1,218
M01RR002635-18	Cohen, Richard	Effects Of Disruptive Sleep On Hormonal And Renal Response To Posture	Brigham And Women's Hospital	\$82,029
M01RR000125-39	Cohen, Susan Dsn	Perimenopausal Symptoms Management With Acupuncture	Yale University	\$69,514
M01RR001271-21	Conte, Felix	Evaluation Of Gonadotropin Secretion In Children	University Of California San Francisco	\$3,725
M01RR010732-08	Craig, Timothy	Role Of Nasal Antihistamines On Perennial Rhinitis Induced Sleep Disturbance	Pennsylvania State Univ Hershey Med Ctr	\$5,981
M01RR000042-42	Crofford, Leslie J	Hpa Axis Dysregulation In Fibromyalgia	University Of Michigan At Ann Arbor	\$4,555

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
M01RR002635-18	Czeisler, Charles A	Disrupted Sleep In The Elderly: Circadian Etiology	Brigham And Women's Hospital	\$27,607
M01RR002635-18	Czeisler, Charles A	Investigation Of Day/Night Csf Orexin-A Variation In Healthy Male Subjects	Brigham And Women's Hospital	\$26,497
M01RR002635-18	Czeisler, Charles A	Clinical Trial Of Melatonin As Hypnotic	Brigham And Women's Hospital	\$63,941
M01RR000833-28	Darko, Denis F	Sleep EEG Delta And Night Plasma Levels Of Tnf-Alpha In Healthy Humans	Scripps Research Institute	\$12,054
M01RR000833-28	Darko, Denis F	Melatonin Treatment For Sleep Disturbances During Menopause	Scripps Research Institute	\$2,301
M01RR000827-28	Dimsdale, Joel E	Effects Of Opioid Medications On Sleep And Fatigue	University Of California San Diego	\$8,078
M01RR000827-28	Dimsdale, Joel E	Sleep Apnea And Hypertension: Role Of The Sympathetic Nervous System	University Of California San Diego	\$116,074
M01RR000040-42	Dinges, David	Neurobehavioral Effects Of Partial Sleep Deprivation	University Of Pennsylvania	\$420,385
M01RR000040-42	Dinges, David	Countermeasures To Neurobehavioral Deficits From Sleep Loss	University Of Pennsylvania	\$147,555
M01RR000040-42	Dinges, David	Maintaining Neurobehavioral Performance Capacity During Susops	University Of Pennsylvania	\$95,361
M01RR000079-39	Dodd, Marilyn	Exercise Cancer Pilot	University Of California San Francisco	\$31,575
M01RR000079-39	Dowling, Glenna	Circadian Parkinson's	University Of California San Francisco	\$46,149
M01RR000827-28	Drummond, Sean Pa	Influence Of Task Difficulty On Cerebral Response Following Sleep Deprivation	University Of California San Diego	\$30,188
M01RR002635-18	Duffiscal Year, Jeanne	Light, Sleep Timing And Circadian Phase In Older People	Brigham And Women's Hospital	\$2,856
M01RR002719-17	Earley, Christopher	Dopaminergic Function In Restless Legs Syndrome	Johns Hopkins University	\$77,098
M01RR002719-17	Earley, Christopher	Determining The Genetics Of The Restless Legs Syndrome	Johns Hopkins University	\$23,820
M01RR000051-41	Eckel, Robert H	Effects Of Maintained Weight Loss In Severely-Obese Humans On Sleep Dynamics	University Of Colorado Hlth Sciences Ctr	\$35,041
M01RR001066-25	Elman, Igor	Nefazodone In The Early Remission Of Alcohol Dependence	Massachusetts General Hospital	\$5,406
M01RR002635-18	Fogel, Robert	Effect Of CPAP On Upper Airway Activity In Older Vs. Younger Men At Sleep Onset	Brigham And Women's Hospital	\$20,150
P51RR000169-41	Fuller, Charles A	Primate Circadian Rhythms In The Martian Environment	University Of California Davis	\$43,154
M01RR000585-31	Gay, Peter C	Treatment Of Patients With Sleep-Disordered Breathing: A Randomized Comparativ	Mayo Clinic Rochester	\$1,496
M01RR000052-41	Geraghty, Michael Thomas	Achondroplasia: Risk Factors For Morbidity And Mortality	Johns Hopkins University	\$86
M01RR000827-28	Gillin, J Christia	Effect Of A Tryptophan-Free Amino Acid Drink On Mood And Sleep	University Of California San Diego	\$2,976
M01RR000827-28	Gillin, J Christia	Sleep Regulation In Depression: Effect Of Selective REM Sleep Suppression	University Of California San Diego	\$851
M01RR000827-28	Gillin, J Christia	Sleep Physiology In Normal, Neuropsychiatric And Medical Patients	University Of California San Diego	\$5,102
M01RR000042-42	Gilman, Sid	Neurochemical And Sleep Disorders In Multiple System Atrophy	University Of Michigan At Ann Arbor	\$9,109
M01RR010732-08	Gordin, Vitaly	Melatonin Reversal Of Opioid-Induced Sleep Disturbance	Pennsylvania State Univ Hershey Med Ctr	\$19,094
M01RR000533-34	Gottlieb, Daniel J	Neurobehavioral Consequences Of Sleep Apnea In Children	Boston University	\$157,783
P20RR015576-03	Gozal, Evelyne	Cobre: Ul: Signaling Pathways In Neuronal Susceptibility To Hypoxia	University Of Louisville	\$232,381
M01RR002635-18	Grady, Scott	Hypoglycemic Counterregulation In Narcolepsy	Brigham And Women's Hospital	\$476
K23RR016068-03	Gurubhagavatula, Indira	Compare Screening Tools For Obstructive Sleep Apnea In Hypertension Pts	University Of Pennsylvania	\$129,347
M01RR000040-42	Gurubhagavatula, Indira	Study Of Effects Of CPAP On Hypertension	University Of Pennsylvania	\$8,746
M01RR000056-41	Hall, Martica	Sleep As A Mediator Of The Stress-Health Relationship	University Of Pittsburgh At Pittsburgh	\$56,517

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
M01RR000750-30	Hall, Stephen	The Effect Of St.John's Wort On The Efficacy Of Oral Contraception	Indiana Univ-Purdue Univ At Indianapolis	\$111,328
M01RR000052-41	Harris, James C	Correlation Of Regional Cerebral Blood Flow With REM Sleep Eye Movement Counts:	Johns Hopkins University	\$86
M01RR000052-41	Harris, James C	Correlation Of Regional Cerebral Blood Flow With REM Sleep Eye Movement ...	Johns Hopkins University	\$37
M01RR000645-31	Hart, Carl	Drug Abuse, Cognition, And Sleep	Columbia University Health Sciences	\$38,100
U54NS039407-04	Haxhiu, Musa	Central Determinants Of Airway Instability During Sleep	Howard University	\$137,710
M01RR001032-27	Herzog, Andrew G	Hormone Replacement In Menopausal Women With Epilepsy	Beth Israel Deaconess Medical Center	\$9,429
M01RR000048-41	Hill, Pamela D	Milk Availability And Lactation Status In Mothers Of Preterm And Term Infants	Northwestern University	\$22,914
M01RR013987-03	Hill, Pamela D	Milk Availability And Lactation Status In Mothers Of Preterm & Term Infants	University Of Illinois At Chicago	\$10,951
P41RR013622-04	Hilton, Michael F	Sleep Apnea & Reduced Waking Cardiac Vagal Tone	Beth Israel Deaconess Medical Center	\$12,165
M01RR016500-01	Hochberg, Marc C	Study Of Osteoporotic Fractures	University Of Maryland Balt Prof School	\$71,896
M01RR002635-18	Hollenberg, Norman	Ventilatory Stability In Normals And Sleep Apneics	Brigham And Women's Hospital	\$10,154
M01RR002635-18	Hollenberg, Norman	New Treatment For Cheyne-Stokes Respiration	Brigham And Women's Hospital	\$952
M01RR002635-18	Hollenberg, Norman	Effect Of Pressure & Flow On Pharyngeal Muscle Function.	Brigham And Women's Hospital	\$2,062
P41RR013622-04	Hoshiyama, Masaki	Dynamics Of Rapid Eye Movements During Sleep	Beth Israel Deaconess Medical Center	\$18,247
M01RR000064-38	Hunt, Steven	Mortality And Morbidity Related To Gastric Bypass Surgery	University Of Utah	\$277,860
M01RR000827-28	Irwin, Michael R	EEG Sleep And Immunity In Neuropsychiatric Patients	University Of California San Diego	\$8,929
P41RR013622-04	Ivanov, Plamen Ch	Cardiac Dynamics During Sleep & Exercise	Beth Israel Deaconess Medical Center	\$24,330
P41RR005959-13	Johnson, G Allan	Presentations By G Allan Johnson, PhD	Duke University	\$6,768
M01RR000334-36	Johnson, Kyle	Identification Of Free-Running Rhythms In Totally Blind Children	Oregon Health & Science University	\$32,093
M01RR0006022-13	Kass, Lewis	Respiratory Disorders Of Sleep In Children	Yale University	\$206,526
M01RR000056-41	Keshavan, Matcheri	Effect Of Olanzapine On Delta Sleep Deficits In Schizophrenia	University Of Pittsburgh At Pittsburgh	\$11,774
M01RR000056-41	Keshavan, Matcheri	EEG Sleep, Cortical Abnormalities & Neurodevelopment In Psychosis	University Of Pittsburgh At Pittsburgh	\$34,145
M01RR002635-18	Khalsa, Sat Bir	Clinical Trial Of The Effect Of Bright Light In Men vs. Women	Brigham And Women's Hospital	\$59,023
M01RR000043-42	Khoo, Michael	Cardiorespiratory Transfer In Obstructive Sleep Apnea	University Of Southern California	\$94,332
P41RR001861-18	Khoo, Michael C	Dynamic Modeling Of State Cardiorespiratory Interactions	University Of Southern California	\$152,430
M01RR002635-18	Klerman, Elizabeth	Phototherapy Treatment Of Shift Rotation Insomnia	Brigham And Women's Hospital	\$35,858
M01RR002635-18	Klerman, Elizabeth	Clinical Trial Of Light Pulses On Circadian Entrainment	Brigham And Women's Hospital	\$172,467
M01RR002635-18	Klerman, Elizabeth	Homeostatic Sleep Regulation In Older People	Brigham And Women's Hospital	\$77,745
M01RR000833-28	Kline, Lawrence E	Nasal Inflammation In Obstructive Sleep Apnea Treated With Nasal CPAP	Scripps Research Institute	\$6,315
G12RR017581-01	Koban, Michael	Act 3: Sleep Deprivation Stress & Energy Metabolism	Morgan State University	\$156,957
M01RR0006192-09	Kranzler, Henry	Nefazodone	University Of Connecticut Sch Of Med/Dnt	\$15,180
M01RR000046-42	Labyak, Susan E	Sleep Patterns In Children With Juvenile Rheumatoid Arthritis	University Of North Carolina Chapel Hill	\$2,802
M01RR000334-36	Lafranchi, Stephen H	Effects Of Growth Hormone Treatment In Prader-Willi Patients	Oregon Health & Science University	\$66,655

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
M01RR000069-40	Lane, Peter A	Sickle Cell Disease And Obstructive Sleep Apnea	University Of Colorado Hlth Sciences Ctr	\$14,885
M01RR010732-08	Leuenberger, Urs A	Alteration Of Sympathetic Act & Bp By CPAP In Sleep Apnea Patients	Pennsylvania State Univ Hershey Med Ctr	\$460
M01RR010732-08	Leuenberger, Urs A	Effects Of Posture On Maximal Peripheral Vasodilator Capacity	Pennsylvania State Univ Hershey Med Ctr	\$1,841
M01RR000056-41	Lewin, Daniel	The Neurocognitive Sequelae Of Obstructive Sleep Apnea In Children	University Of Pittsburgh At Pittsburgh	\$2,355
M01RR000334-36	Lewy, Alfred J	Melatonin For Circadian Sleep Disorders In The Blind	Oregon Health & Science University	\$288,839
C06RR017323-01	Linzer, Daniel I	Biol Res Facil: Sleep	Northwestern University	\$500,000
P41RR013622-04	Lo, Chung-Chuan	Dynamics Of Sleep Wake Transitions During Sleep	Beth Israel Deaconess Medical Center	\$24,330
M01RR000188-38	Lupski, James L	Clinical Correlations Of Contiguous Gene Syndromes	Baylor College Of Medicine	\$5,053
P51RR000168-41	Madras, Bertha K	The Development Of Novel Anti-Hyperactivity Medications	Harvard University (Medical School)	\$16,510
P51RR000168-41	Madras, Bertha K	Dopamine Transport Inhibitors Alleviate Some Parkinsonian Motor Deficits	Harvard University (Medical School)	\$16,510
M01RR000042-42	Malow, Beth A	Sleep Disorders Associated With Epilepsy	University Of Michigan At Ann Arbor	\$37,956
M01RR006192-09	Mansoor, George	Circadian Blood Pressure Profile	University Of Connecticut Sch Of Med/Dnt	\$36,630
K23RR015545-03	Mansoor, George A	Circadian Blood Pressure Profile: Sleep Quality & Hypertensive Organ Damage	University Of Connecticut Sch Of Med/Dnt	\$127,658
M01RR000052-41	Marcus, Carole L	Effects Of Noninvasive Positive Pressure Ventilation (Nippv) ...	Johns Hopkins University	\$12
M01RR000052-41	Marcus, Carole L	Arousal Threshold To Auditory Stimulation In Children With Osa	Johns Hopkins University	\$86
M01RR000052-41	Marcus, Carole L	Upper Airway Collapsibility	Johns Hopkins University	\$172
M01RR000052-41	Marcus, Carole L	Developmental Determinants Of Upper Airway Collapsibility	Johns Hopkins University	\$444
M01RR000052-41	Marcus, Carole L	Sleep Disordered Breathing In Children With Marfan's Syndrome	Johns Hopkins University	\$37
M01RR000052-41	Marcus, Carole L	Non-Invasive Measures Of Flow Limitation In Children With Sleep-Disordered...	Johns Hopkins University	\$74
K23RR016566-01	Mason, Thornton B li	Periodic Limb Movements In Williams Syndrome	Children's Hospital Of Philadelphia	\$131,652
M01RR001032-27	Matheson, Jean	The Influence Of Sleep On The Activation Of Complement In Normal Subjects.	Beth Israel Deaconess Medical Center	\$4,716
P41RR013622-04	Mietus, Joseph E	New Techniques For Heart Rate Variability Analysis	Beth Israel Deaconess Medical Center	\$42,577
P41RR013622-04	Mietus, Joseph E	Detection Of Sleep Apnea From Cardiac Interbeat Interval Time Series	Beth Israel Deaconess Medical Center	\$36,495
M01RR000997-27	Mitchell, Ron	Role Of Allergy Treatment In The Management Of Children With Sleep Apnea	University Of New Mexico Albuquerque	\$4,597
M01RR000037-42	Moe, Karen	Sleep In Older Women: Effects Of Estrogen	University Of Washington	\$310,415
M01RR000056-41	Monk, Timothy	Sleeping Short: Helping Medium Sleepers Sleep Short Successfully	University Of Pittsburgh At Pittsburgh	\$89,485
M01RR000056-41	Monk, Timothy	Performance & Sleep Consequences Of Repeated Phase Shifts Within Appendix K	University Of Pittsburgh At Pittsburgh	\$2,355
G12RR008124-10	Moss, Donald	Neurological & Metabolic Disorders: Stroke, REM Sleep, Obesity & Type Ii Diab	University Of Texas El Paso	\$159,222
M01RR001032-27	Mullington, Janet M	The Effects Of Cumulative Sleep Deficit In Human Host Response	Beth Israel Deaconess Medical Center	\$242,230
M01RR000047-42	Murphy, Patricia J.	Sex Hormones, Sleep And Circadian Rhythmicity In Aging	Weill Medical College Of Cornell Univ	\$5,930
M01RR000079-39	Neylan, Thomas C	Sleep PTSD	University Of California San Francisco	\$51,007
M01RR000056-41	Nofzinger, Eric	Effects Of Aging On Sleep: A Functional Neuroanatomic Perspective	University Of Pittsburgh At Pittsburgh	\$16,484
M01RR000334-36	Nutt, John G	Diurnal Patterns Of Motor Performance In Parkinson's Disease	Oregon Health & Science University	\$5,555

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
M01RR000080-40	Olson, Jane	Mapping Of Genes For Fibromyalgia Syndrome	Case Western Reserve University	\$1,954
P41RR003655-17	Olson, Jane M	Mapping Genes For Fibromyalgia Syndrome	Case Western Reserve University	\$3
M01RR000040-42	Pack, Allan I.	Autoset Cs Vs. Oxygen For The Treatment Of Cheyne-Stokes Respiration	University Of Pennsylvania	\$3,386
M01RR000040-42	Pack, Allan I.	Case-Control Study Of Insomnia In Non-Depressed Elderly	University Of Pennsylvania	\$55,298
M01RR000040-42	Pack, Allan I.	Treatment For Sleep Apnea In The Elderly	University Of Pennsylvania	\$37,242
M01RR000827-28	Parry, Barbara L	Chronobiology Of Postpartum Depression	University Of California San Diego	\$22,535
M01RR000827-28	Parry, Barbara L	Estradiol And Progesterone Circadian Rhythms In Postmenopause	University Of California San Diego	\$37,415
U54NS039407-04	Pete, G	Neurochemical Organization Of Central Chemosensory Neurons: Respiration	Howard University	\$137,709
M01RR000059-41	Phillips, Bradley G.	At-1 Receptor Blockade In Hypertensives With Obstructive Sleep Apnea	University Of Iowa	\$5,513
M01RR000059-41	Phillips, Bradley G.	Sleep Deprivation And Sympathetic Nerve Responses	University Of Iowa	\$38,223
M01RR000059-41	Phillips, Bradley G.	Hemodynamic And Sympathetic Nerve Responses To Insulin	University Of Iowa	\$367
M01RR000071-39	Pickering, Thomas	Psychosocial Factors And Cardiovascular Disease, (Program Project) Project #1	Mount Sinai School Of Medicine Of Nyu	\$4,548
M01RR000071-39	Pickering, Thomas	Sleep Heart Health Study	Mount Sinai School Of Medicine Of Nyu	\$505
M01RR000047-42	Pickering, Thomas G.	Race SES And Diurnal Blood Pressure Rhythms	Weill Medical College Of Cornell Univ	\$5,272
M01RR000833-28	Poceta, J Steven	Sleep And Alertness In Parkinson's And RLS	Scripps Research Institute	\$32,145
M01RR002172-20	Pomeroy, Scott	Hypothalamic Physiology In Children With Craniopharyngioma	Children's Hospital (Boston)	\$22,275
M01RR000827-28	Potkin, Steven G.	Pet Of The Brain In Narcolepsy: Comparison Of Sporadic And Familial Forms	University Of California San Diego	\$1,700
M01RR006192-09	Prestwood, Karen	Healthmat	University Of Connecticut Sch Of Med/Dnt	\$24,421
M01RR003186-17	Pridham, Karen F	Patterns Of Energy Expenditure In Premature Infants	University Of Wisconsin Madison	\$11,585
M01RR000064-38	Ptacek, Louis J	Genetic Linkage In Degenerative Neurologic Disease	University Of Utah	\$1,094
M01RR000997-27	Rabinowitz, Ian	Physiological Biomarkers Of Cancer-Treatment Related Fatigue	University Of New Mexico Albuquerque	\$77,807
M01RR000865-29	Rao, Uma	Pathways To Juvenile Depression: Biopsychosocial Models	University Of California Los Angeles	\$2,412
M01RR000096-41	Rapoport, David	Central V Obstructive Respiratory Events W/ A Nasal Cannula/Transducer In ICU	New York University School Of Medicine	\$7,059
P41RR003655-17	Redline, Susan	Genetic Analyses Of Obstructive Sleep Apnea	Case Western Reserve University	\$8,439
M01RR000080-40	Redline, Susan S.	Familial Aggregation Of Sleep Apnea (Ii)	Case Western Reserve University	\$84,407
M01RR000080-40	Redline, Susan S.	Epidemiology Of Sleep Disordered Breathing In Children	Case Western Reserve University	\$81,280
M01RR000056-41	Reynolds Iii, Charles	Paroxetine In The Treatment Of Chronic Primary Insomnia	University Of Pittsburgh At Pittsburgh	\$10,597
M01RR000056-41	Reynolds Iii, Charles	Geriatric Depression: Neurobiology Of Treatment	University Of Pittsburgh At Pittsburgh	\$68,291
M01RR014288-04	Richards, Kathleen C	Effect Of Social Activity And Exercise On Sleep In Cognitively Impaired Elders	University Of Arkansas Med Scis Ltl Rock	\$37,251
M01RR014288-04	Richards, Kathleen C	Effects Of Activity On Sleep	University Of Arkansas Med Scis Ltl Rock	\$1,960
M01RR000095-42	Richards, William	The Effect Of Fundoplication On Sleep Architecture And Nocturnal Gastro	Vanderbilt University	\$23,799
M01RR000095-42	Robertson, Rose Marie	Central Sympathetic Dysfunction In Orthostatic Intolerance	Vanderbilt University	\$5,950
M01RR000334-36	Sack, Robert L	Minimal Effective Melatonin Dose For Circadian Entrainment In Blind People	Oregon Health & Science University	\$27,773

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
P51RR000166-41	Sackett, Gene P	Sleep And Abnormal Behavior	University Of Washington	\$114,182
M01RR000056-41	Sanders, Mark	Functional Outcomes Of CPAP Compared With Placebo For OSA	University Of Pittsburgh At Pittsburgh	\$392
P51RR000166-41	Sandman, Curt	Pomc Particle Composition In Nonhuman Primates	University Of Washington	\$114,182
M01RR000080-40	Scher, Mark	Sleep And Outcome In High Risk Infants	Case Western Reserve University	\$49,628
M01RR002635-18	Shea, Steven	Circadian And Sleep/Wake Aspects Of Nocturnal Asthma	Brigham And Women's Hospital	\$52,993
M01RR000188-38	Shearer, William T	Nocturnal Asthma, Chronobiology And Sleep	Baylor College Of Medicine	\$27,070
M01RR000334-36	Singer, Clifford M	Melatonin For Sleep Disorders In Parkinson's Disease	Oregon Health & Science University	\$26,538
M01RR010732-08	Sinoway, Lawrence I	Effects Of Handgrip Ex & Hypoxia On Norepi In Muscle & Fat	Pennsylvania State Univ Hershey Med Ctr	\$920
M01RR003186-17	Skatrud, James B	Chemical Influences On Breathing Instability During Sleep	University Of Wisconsin Madison	\$1,524
M01RR003186-17	Skatrud, James B	Losartan And Daytime Blood Pressure Following Nocturnal Hypoxemia	University Of Wisconsin Madison	\$1,524
M01RR000044-41	Smith, Michael	EEG And Spect Measures Of CNS Activity In Chronic Insomnia	University Of Rochester	\$3,681
M01RR002719-17	Smith, Philip	Neurohumoral Effects Of Weight Loss In Sleep Apnea	Johns Hopkins University	\$626
M01RR002719-17	Smith, Philip	Neural Control Of Upper Airway Collapsibility	Johns Hopkins University	\$41,370
M01RR002719-17	Smith, Philip	Baseline Characterization Of Sleep Disordered Breathing	Johns Hopkins University	\$28,207
M01RR000585-31	Somers, Virend	Genetic Background Of Cardiovascular And Sleep Disorders In Humans	Mayo Clinic Rochester	\$56,835
M01RR000585-31	Somers, Virend	Cardiovascular Disease Mechanisms In Sleep Apnea	Mayo Clinic Rochester	\$33,403
M01RR000585-31	Somers, Virend	Spectral Oscillations In Neural Circulatory Control In Humans	Mayo Clinic Rochester	\$18,447
M01RR000847-29	Suratt, Paul M	Sleep Apnea In Children	University Of Virginia Charlottesville	\$87,772
M01RR000040-42	Teff, Karen	Effect Of Sleep Deprivation On Insulin Sensitivity: A Pilot Study	University Of Pennsylvania	\$282
M01RR001032-27	Thomas, Robert	Modafinil On Working Memory And Visual Perception Following Sleep Deprivation	Beth Israel Deaconess Medical Center	\$21,217
M01RR000847-29	Thorner, Michael O	Mot089 Mk-677 In Older Men And Women	University Of Virginia Charlottesville	\$728,450
M01RR000055-41	Van Cauter, Eve	Sleep And Testosterone Decline In Older Men	University Of Chicago	\$31,268
M01RR000055-41	Van Cauter, Eve	Paying The Sleep Debt To Improve Glucose Tolerance	University Of Chicago	\$80,695
M01RR000055-41	Van Cauter, Eve	Sleep And Glucose Regulation	University Of Chicago	\$289,489
M01RR000055-41	Van Cauter, Eve	Sleep-Wake Regulation In Gh Deficiency	University Of Chicago	\$83,721
M01RR000040-42	Van Dongen, Hans	Predicting Vulnerability To Performance Impairment From Sleep Loss	University Of Pennsylvania	\$115,110
M01RR010732-08	Vgontzas, Alexandros N	Il-6 Secretion And Quantity And Quality Of Sleep: Age And Gender Effects	Pennsylvania State Univ Hershey Med Ctr	\$460
M01RR010732-08	Vgontzas, Alexandros N	Effects Of Partial Sleep Deprivation On Sleepiness And Cytokine Secretions	Pennsylvania State Univ Hershey Med Ctr	\$10,582
M01RR000037-42	Vitiello, Michael	Growth Factors, Sleep And Cognition Ii	University Of Washington	\$184,332
P20RR015576-03	Wang, Guang Jian	Cobre: Ul: Cellular Mechanisms Of Neuronal Vulnerability To Intermittent Hypoxia	University Of Louisville	\$62,406
M01RR002635-18	White, David P	Lung Volumes And Sleep	Brigham And Women's Hospital	\$7,774
M01RR002635-18	White, David P	Influence Of Sleep Gender Related Hormones On The Control Of Pharyngeal	Brigham And Women's Hospital	\$10,154
M01RR002635-18	White, David P	Upper Airway Muscles And Sleep: Responses To Loading	Brigham And Women's Hospital	\$4,284

TRANS-NIH SLEEP RESEARCH – FISCAL YEAR 2002

Grant No	PI	Title	Institution	Funding
M01RR002635-18	White, David P	Obesity, Weight Loss And Sleep Effect On Pharyngeal Airway Anatomy And Function.	Brigham And Women's Hospital	\$1,904
M01RR002635-18	White, David P	Lung Volume Changes And Obstructive Sleep Apnea	Brigham And Women's Hospital	\$9,361
M01RR002635-18	Wright, Kenneth P	Clinical Trial Of The Effect Of Modafinil On Wakefulness And Sleep	Brigham And Women's Hospital	\$109,002
M01RR000827-28	Wu, Joseph C.	Antidepressant Effects Of Sleep Deprivation And Sertraline In Depressed Patients	University Of California San Diego	\$851
M01RR000070-40	Yesavage, Jerome A	Treatments For Insomnia.	Stanford University	\$50,878
M01RR003186-17	Young, Terry B	Epidemiology Of Sleep-Disordered Breathing	University Of Wisconsin Madison	\$598,193
M01RR000048-41	Zee, Phyllis C	Manipulations Of External Zeitgebers In The Elderly	Northwestern University	\$55,954
M01RR000048-41	Zee, Phyllis C	Sleep/Wake Rhythms In Aging: Responsiveness Of The Clock To Light	Northwestern University	\$47,428
NCCR TOTAL				\$11,490,286

NATIONAL CENTER FOR COMPLEMENTARY AND ALTERNATIVE MEDICINE

Grant No	PI	Title	Institution	Funding
R01AT000611-03	Bliwise, Donald	Polysomnographic Assessment Of Alternative Treatment	Emory University	\$167,837
R21AT000337-02	Garcia-Rill, Edgar	The Use Of Electroacupuncture To Modulate Arousal	University Of Arkansas Med Scis Ltl Rock	\$182,500
K01AT000066-03	Khalsa, Sat	Yoga As A Treatment For Insomnia	Brigham And Women's Hospital	\$133,920
R21AT000266-02	Khalsa, Sat	R21 Project: Yoga As A Treatment For Insomnia	Brigham And Women's Hospital	\$157,344
R21AT000511-02	Markowitz, John	Screening Herbs For Drug Interactions	Medical University Of South Carolina	\$35,320
R01AT000212-02	Sloane, Philip	High Intensity Light Therapy In Alzheimer's Disease	University Of North Carolina Chapel Hill	\$223,021
NCCAM TOTAL				\$899,942

NIH Fiscal Year 2002 TOTAL \$175,022,893

Appendix A

NIH Sleep Research Contacts

Trans NIH Sleep Research Coordinating Committee

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	* Paul Nichols, Ph.D.	6-9964	2-2060	6001 Executive Blvd 2116 MSC 9521	pn13w@nih.gov
<u>NINR</u>	Mary Leveck, Ph.D., R.N.	4-5963	4-3405	Building 31, Room 5B05	mary.leveck@nih.gov
<u>NCCAM</u>	Nancy Pearson, Ph.D.	4-0519	0-3621	6707 Democracy Blvd Room 401	pearsonn@mail.nih.gov

*Alternate

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NCSDR Web Sites

- Home Web Site: www.nhlbi.nih.gov/sleep
- Research: www.nhlbisupport.com/leep/research/research-a.htm
- Professional Education: www.nhlbisupport.com/sleep/profedu/profedu-a.htm
- Public and Patient Education: www.nhlbisupport.com/sleep/patpub/patpub-a.htm
- Sleep Disorders Research Advisory Board: www.nhlbi.nih.gov/meetings/sdrab/sleepros.htm
- Garfield Star Sleeper: www.nhlbi.nih.gov/health/public/sleep/starslp/index.htm
- Network Sleep Research Activities (SleepRFA-L): www.list.nih.gov/archives/sleepdfa-l.htm

Appendix B

Press Office (NHLBI/OD) Media Contacts – Calendar Year 2002

<i>Date of Inquiry</i>	<i>Media</i>	<i>Topic or Request</i>	<i>Expert</i>	<i>Interview or Info Sent</i>
12/20/2002	New York Daily News, Carol Ann Rinzler	foods that promote sleep		sent background information on foods and other substances that may impair or disrupt sleep, such as alcohol, caffeine, and nicotine
12/18/2002	Medicine, Sally Kuzemchak	insomnia and women, depression	Hunt, Lee (women's issues), Buysse (depression, sleep aids)	
12/18/2002	Wall Street Journal, Anne Marie Shaker	Inquired about curriculum sleep for HS biology students. Article is on schools providing nap times for teens because they are so sleep deprived; reporter was impressed that the Federal government is trying to do something about this.	Hunt	unknown
12/10/2002	Hearst Argyle TV, Erin McManamon	agenda for Dec 2002 SDRAB meeting		sent agenda
11/20/2002	Discover Magazine, Rachael Moeller Gorman	Provigil to treat shift work (phase) disorder	Hunt. Also suggested Mignot, Scammell, Ware	Twery provided general info re: research implications related to Provigil
11/19/2002	Ghost Village.com, Jeff Bolanger	sleep paralysis	Mignot	general info re: parasomnias and sleep paralysis
11/18/2002	Tidings, weekly pub of the Los Angeles Catholic Archdiocese, Brenda Rees	general, sleep and sleep disorders	Hunt	LA-area experts, including Siegel and Ancoli-Israel. General Web resources.
11/15/2002	Sleep Matters (NSF), Fred Whiting	Anniversary of REM discovery (comment)	Hunt	
11/12/2002	Ladies Home Journal, Meredith Franco	women and sleep		referred to NSF, Wasleben
11/12/2002	Living Well magazine, Angie Noel	confirm number of Americans who have sleep disorders		provided information

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11/8/2002	Weekly Reader, Rochelle Kreisman	Sleep Well/Do Well Campaign (cover story)	Hunt	
11/7/2002	NBC	Statistics regarding sleep apnea/CVD stats	Hunt or Quan	
11/2/2002	US Medicine, Mary Ellen Butler	Sleep apnea research	Hunt	
11/1/2002	Scripps Howard News Service, Colleen Schmidt	Food and sleep	Hunt	General info on foods that impair or disrupt sleep (caffeine, alcohol, nicotine)
10/23/2002	The School News, Katie Johnson	Sleep deprivation and its impact in K-12 schools (for Health and Wellness section)	Hunt, Owens, Rosen	Sent info on "Sleep Well Do Well," "Awake at the Wheel," HS curriculum
10/22/2002	American Medical News, Susan Landers	NCSDR comment on off-label use of modafinil	Hunt	Hunt interviewed.
10/11/2002	Health Magazine, Marty Munson	Effects of calcium on helping a person to; how does the body wake up	Hunt	Hunt interviewed.
10/4/2002	Entertainment Weekly, Jennifer Armstrong	Phenomenon of bed partner sexual arousal during sleep (from Survivor TV show)		Referred to Mahowald re: parasomnias.
10/3/2002	Today's Health (Five Star Productions), Lauren Newman	Seeking partner/sponsor to work on 30-minute program on snoring and sleep apnea		Referred to ASAA.
9/23/2002	Associated Press, Charles Sheehan	Sleep disorders and driving	Hunt	Resources on drowsy driving and problem sleepiness.
9/6/2002	Men's Fitness, Tom Weede	Hw to wind down for good night's sleep	Hunt	
9/4/2002	New York Times, Chip Brown	Parasomnias (sleep eating, sleep sex); general background on sleep research and sleep medicine, and NCSDR.	Hunt	Background information on night-eating and Kleine-Levin syndromes, (had interviewed Guilleminault and Mahowald)
8/19/2002	Men's Health, Joe Hooper	Effects of poor sleep habits on longevity and disease morbidity (eg, CVD, diabetes)	Hunt	
8/8/2002	Science magazine, Hillary	Pediatric sleep apnea	Suggested Hunt, Redline, Gozal, Marcus, Weese-Mayer	Also referred to AAP info and Garfield campaign

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Press Office (NHLBI/OD) Media Contacts – Calendar Year 2002

<i>Date of Inquiry</i>	<i>Media</i>	<i>Topic or Request</i>	<i>Expert</i>	<i>Interview or Info Sent</i>
8/2/2002	FDA Consumer magazine, Michelle Meadows	General, sleep and sleep disorders	Hunt	
7/23/2002	Cutting Edge Medical Report (Discovery Health), Danny Delpriori and Jamie Wood	Considering 30-minute episode on insomnia and sleep disorders; interested in modafinil; specifically interested in new disease management developments and new treatment options		Suggested topics: effects of sleep restriction, sleep apnea and CVD, sleep apnea in children and ADHD/poor school performance, insomnia, Xyrem for narcolepsy.
7/15/2002	Dublin Radio, Spin 1038, Eanya Gallagher	Penn State research re: sleep loss in women vs. men	Vgontzas	Provided contact info for Vgontzas; also suggested Hunt for interview.
7/15/2002	Oprah magazine, Katie O'Callahan (freelance)	Sleep and beauty, sleep hygiene, importance of sleep, effects of sleep loss	Hunt	Phone interview
7/12/2002	HLB Newsletter, Nathaniel Polster	NCSDR research plan		Sent info on Research Plan, and SDRAB Members
6/20/2002	Rosie magazine, Erin Szeto	Patients with insomnia	Mendelson, Zee, Owens, Walsh, Buysse, Sateia, Jacobs	Insomnia info on NCSDR Web site.
6/18/2002	Newsweek, Claudia Kalb, Karen Springen	Sleep deprivation in adults	Hunt, Dinges; SDRAB members	
6/17/2002	Waco Tribune, Christina Minor	Information on snoring and sleep apnea	Hunt	Sent Web links to resources (news release, fact sheets, ASAA)
5/21/2002	Alternative Medicine magazine, Joyce Slaton	Ways to insomnia-proof your bedroom	Hunt	
5/15/2002	Self Magazine, Megan Olden	Prevalence of sleep disorders; parasomnias	Buysse, Mahowald	
5/13/2002	Cheltenham Films, Wendy-Marita Cheltenham	T-V film with character who is suffering combined sleep disorders (parasomnias)	Mahowald	
5/8/2002	WNET-13 TV (PBS affiliate seen in the Tri-State region of NY, NJ, and CT), Irene Wielawski	"Keeping Kids Healthy" TV segment on the sleep needs of kids and teens; seeking local experts	Carskadon, Owens	Sent list of recent journal articles, adolescent sleep resources, "Sleep Well Do Well campaign," NSF background
5/6/2002	NPR, Kojo Nnamdi	(call-in segment) on sleep and sleep research	Twery	

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Press Office (NHLBI/OD) Media Contacts – Calendar Year 2002

<i>Date of Inquiry</i>	<i>Media</i>	<i>Topic or Request</i>	<i>Expert</i>	<i>Interview or Info Sent</i>
4/17/2002	Texas Education Agency, Joy Lynn Occhiuzzi	Requested Garfield PSA in beta format for airing on closed circuit system (1200 school districts in Texas)		Sent tape
3/27/2002	Parents Magazine, Irene Daria	Parent & physician interviews: Sleep and children; effectiveness of Duluth program ("Sleep Well Do Well")	Hunt, Chervin, Rogus, McGinnis, Owens, Sheldon	Background on Duluth program and participating teacher.
3/19/2002	American Scientist magazine, Karin Jegalian	Public funding of sleep research		Sent links to NCSDR Web site, annual report, etc.
2/27/2002	Health Magazine, Christie Aschwanden	Insomnia & SDB, comments on Krakow paper	Hunt	Interview
2/26/2002	Education World, Mary Daniels Brown (free lance)	Sleep deprivation in young children	Hunt	Interview
2/26/2002	NBC-TV Chicago, Mary Ann Ahern	Sleep and children	Hunt, Sheldon, Weese-Mayer	Garfield press kit, Web links, etc.; on-camera interview (taped) for 2/7/02 program
2/26/02	Pediatric News, Joanne Berger	Stats on ave. sleep duration (not need) of children, birth through young adulthood	Hunt	Interview
2/26/2002	Redbook, Amelia Farquehar (freelance)	Women and sleep, effects of sleep dep on parenting	Twery/Hunt; Owens, Moline, Walsleban, Ancoli-Israel, Young, Mindell	Interview Hunt
2/12/2002	Knight Ridder Tribune News in Motion, Josh Hatch	Sleep duration and mortality (Kripke study)	Hunt	On-camera interview
2/5/2002	Washington Post, Martha Frase-Blunt	Workplace napping	Hunt	Interview
2/4/2002	CBS Early Show	Children and sleep	Hunt	Hunt appearance on live interview w/Bryant Gumbel
11/16/01 - 6/17/02	Woman's Day, Linda Formichelli	General sleep issues	Hunt	Interview

Appendix C

Sleep Disorders Research Advisory Board

(Terms end June 30 of the Designated Year)

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