

American Geriatrics Society
Support provided by: National Institutes of Health
"Does Mental and Physical Activity Promote Cognitive Vitality in Late Life?"
Third in the Annual R13 Conference Series, "From Bedside to Bench"
Hyatt Regency Philadelphia at Penn's Landing
201 South Christopher Columbus Boulevard - Philadelphia, Pennsylvania 19106
Phone: 215.928.1234 / Fax: 215.521.6543
March 1-3, 2006

Organizing Committee

Chairperson and Organizer: Howard Fillit, MD

Committee Members: Michelle C. Carlson, PhD; William T. Greenough, PhD; Arthur Kramer, PhD; George Rebok, PhD; Robert Wilson, PhD; Stephanie Studenski, MD, MPH, AGS Research

Committee Chair

National Institute of Aging Representative

Judith Salerno, MD, MS

W E D N E S D A Y , M A R C H 1 , 2 0 0 6

MEETING ROOM: **Columbus Ballroom C**

(5:30-8:30pm)

The conference will begin with an evening dinner.

Welcoming remarks: **Howard Fillit, MD**

A brief perspective on the conference topic.

T H U R S D A Y , M A R C H 2 , 2 0 0 6

MEETING ROOM: **Columbus Ballroom A&B**

(8:00-8:15am)

What is normal cognitive health with aging and how do we recognize and measure it?

Plenary Speaker:

Tim Salthouse, PhD

Measurement issues in clinical studies

Goal and content:

This talk will provide a brief overview of cross-sectional age comparisons of memory and other cognitive functions in humans and in non-human animals. Among the major results that will be emphasized are that age differences are evident in many different types of cognitive functioning, and not just memory, and that the age relations are continuous from early adulthood, and do not begin abruptly in late adulthood

(8:15-8:35am)

Experience, Exercise and Cognitive Activity--preclinical studies

Chair: **William Greenough, PhD**

Goal and content:

This session will focus largely on animal-based research into the effects of mental and physical exercise on cognitive vitality in aging. Studies in both rodents and non-human primates will be described. There is growing evidence that exercise enhances cognitive function, and studies involving the brain in animals have begun to address the cellular and molecular mechanisms involved in mediating these effects. Data to be presented implicate changes in brain vascularization, synapse formation, birth of new neurons, birth of new non-neuronal cells and a variety of molecular communicating mechanisms among cells as the causes of the cognitive effects.

(8:35-8:55am)

Exercise and the Aging Brain

Speaker: **Carl W. Cotman, PhD**

Goal and content:

Exercise is encoded in the brain as a series of molecular events that share in common the ability to support neuronal health and plasticity. One of the key molecules is brain derived neurotrophic factor (BDNF), a neurotrophic factor involved in learning and memory. BDNF is induced within a few days of voluntary running, is sustained for days and can be rapidly re-induced even when exercise is stopped for 1-2 weeks. In transgenic mouse models of Alzheimer's disease, voluntary running and behavioral enrichment can improve learning and decrease the build up of beta-amyloid. These data support the growing view that exercise and behavioral enrichment can serve in maintaining the brain.

(9:35-9:55am)

Exercise, Experience and Neurogenesis

Speaker: **Henriette Van Praag, PhD**

Goal and content:

Discuss effects of exercise on learning, synaptic plasticity, neurogenesis and angiogenesis in young and aged mice

(9:55-10:30am)

Audience Questions and Discussion

(10:30-10:45am)

~Break~

(10:45 - 11:30 am)

Physical Exercise and Influence of exercise training on human cognition and brain function

Chair: **Art Kramer, PhD**

Goal and content: The presentation will focus on what we know (and don't) about exercise training effects on brain and cognition of older adults. Given the other presentations on non-human animal research in the workshop the present presentation will concentrate on the human literature. However, parallels between the human and non-human research will be highlighted where appropriate. The research to be covered will include both cross-sectional and longitudinal studies of fitness training (and differences) on cognition, brain structure, and brain function, along with a discussion of some prospective epidemiological studies on the fitness-cognition link. The presentation will conclude with a discussion of where to go next and how multimodal interventions (e.g. fitness, cognitive training, nutrition, pharmacological interventions) might be examined in future studies of cognitive vitality and aging.

(11:30-11:55pm)

The Beneficence of Physical Activity on Cognitive Vitality:

Perceptions and Feelings Matter

Speakers: **W. Jack Rejeski, PhD, Jeffrey A. Katula, PhD, and Edward McAuley, PhD**

Goal and content:

The positive influence that physical activity has on generic measures of older adults' health-related quality of life and on various indices of their psychological well-being is mediated, in part, by improvements in body satisfaction, performance related self-efficacy beliefs, and physical symptoms. These findings are relevant to this conference in that various markers of both positive and negative affect are plausible determinants of cognitive vitality. This presentation will review research on this topic and discuss the implications of these data for the design of interventions that seek to promote cognitive vitality in aging.

(11:55-12:15pm)

Molecular Mechanisms for the Effects of Lifestyle on Cognitive Abilities

Speaker: **Fernando Gomez-Pinilla, PhD**

Goal and content:

Emerging evidence supporting the role of neurotrophins on synaptic plasticity and cognitive function will be discussed. As well as how dysfunction in the BDNF signaling system may confer susceptibility to neurological disorders affecting cognitive abilities. Mechanisms by which BDNF and IGF-1 can promote cognitive enhancement under the modulatory role of exercise and cognitive challenges (Vaynman et al., 2004) will be addressed. How behaviorally induced BDNF levels may alleviate dysfunction consequential from brain insults (Griesbach et al, 2004, Wu et al, 2003, 2004) will be considered. Dietary factors powerfully and silently modulate neuronal health on daily basis. Dietary factors can impact hippocampal-dependent cognition via BDNF. Consumption of an unhealthy diet rich in saturated fat decreases BDNF (Molteni et al, 2002) and compromises learning and memory in rats; however, these deficits can be ameliorated by exercise (Molteni et al, 2004). In turn, consumption of a healthy diet rich in Omega 3 fatty acids can beneficially impact the brain via the action of BDNF (Wu et al, 2004). I will discuss how diet and

exercise can affect analogous molecular systems and this feature may define a molecular mechanism by which lifestyle affects brain plasticity, and provide for a way to counteract cognitive deficits.

(12:15-12:30pm) *Audience Questions and Discussion*

(12:30-1:00pm) *~Working Lunch~*

(1:00-1:20pm)
Cognitive Activity across the Life Span: Risk of Dementia in Old Age

Chair: **Robert Wilson, PhD**

Goal and content:

Several large prospective studies have observed that older people who more frequently engage in cognitively stimulating activities are less likely to develop Alzheimer's disease than their less cognitively active peers. This presentation will examine this association using data from the Rush Memory and Aging Project, a longitudinal clinical-pathologic study of risk factors for common chronic conditions of old age, focusing in particular on the relation of cognitive activity in childhood and middle age to late life dementia.

(1:20-1:40pm)

Depression and Cognition

Speaker: **Deborah Barnes, MD, MPH**

Goal and content:

Depression is common in older adults and is associated with poor performance on cognitive tests. This presentation will provide a brief overview of the epidemiologic evidence that depressive symptoms are associated with increased risk of cognitive decline and dementia in older adults. In addition, data suggesting that this association is not due to underlying vascular disease will be presented. Other potential explanations for the association between depressive symptoms and dementia will be discussed.

(1:40-2:00pm)

Social Networks and Cognition

Speaker: **David Bennett, MD**

Goal and content:

Discuss the relation of social networks to AD neuropathology and cognitive function

(2:00-2:20pm)

Neural Reserve and Cognition

Speaker: **Yaakov Stern, PhD**

Goal and content:

Discuss the neural networks underlying cognitive reserve

(2:20-2:40pm) *Audience Questions and Discussion*

(2:40-3:00pm) *~Break~*

(3:00-3:20pm) Data from Epidemiologic Studies on Mental and Physical Activity

Chair: **Michelle Carlson, PhD**

Goal and content:

This session will describe methods and findings from epidemiologic studies on the associations between mental and physical exercise and cognitive health in aging. Growing evidence from numerous large-scale studies suggests that lifestyle activities in mid- and later life may positively impact on cognitive health. We will review these findings across studies, and consider the strengths and limitations of observational research. Such studies collectively have the potential to yield insight by characterizing what aging adults do in their daily lives, how patterns of activity are associated with age-related cognitive changes, and how common medical comorbidities, such as hypertension and

diabetes, may modify these associations. Such examination will help to inform and refine the design of 'everyday' activity interventions to measure the doses and types of activity needed to derive maximal and sustainable cognitive benefits.

(3:20-3:50pm)

Methodologic issues and challenges studying cognitive aging in observational studies

Speaker: **Lenore Launer, PhD**

Goal and content:

In this talk, factors will be discussed that might bias findings of cognitive aging and activity based on observational studies. These factors should be applied when interpreting results.

(3:50-4:15pm)

Nurses' Health Study

Speaker: **Fran Grodstein, ScD**

Goal and content:

In this talk, data from the Nurses' Health Study exploring the relation of physical activity to cognitive decline will be presented. Important issues including amount and type of activity, as well as methodologic concerns, will be carefully discussed.

(4:15-4:40pm)

Epidemiologic data on the impact of social vs. non-social cognitive activities on function

Speaker: **Michelle Carlson, PhD**

Goal and content:

Longitudinal, prospective data from the Women's Health and Aging Study II and the Duke Twins Study on mid- and late- life lifestyle activity and cognitive health will be presented, and considered for their implications regarding the potential import of 'next generation' activity interventions that explore additive and synergistic cognitive effects of combined cognitive, physical, and social activity. Efforts to apply these hypotheses to a pilot study on the neurocognitive benefits of a multi-modal, 'everyday' activity intervention will be briefly described.

(4:40-5:00pm)

Audience Questions and Discussion

FRIDAY, MARCH 3, 2006

MEETING ROOM: **Columbus Ballroom A&B**

(8:00-8:15am)

Mental Exercise: Ongoing Intervention Trials

Chair: **George Rebok, PhD**

Goal and content: There is a growing body of evidence on the effectiveness of "mental exercise" programs on the cognitive functioning of older adults. There is also growing interest in the question of whether the skills acquired during cognitive training can be transferred to similar tasks having a more real-world component. This session will present the results from several ongoing intervention trials designed to improve cognitive and everyday function in community-dwelling older adults. Different approaches to intervention will be highlighted along with the various factors that can influence responsiveness to training and transfer to nontrained abilities. Suggestions for "next-generation" intervention programs that take into account the multiple pathways through which cognitive improvements in later adulthood can be achieved will be presented.

(8:15-8:45am)

Types of Mental Exercise in the ACTIVE Intervention Trial:

Training on Basic Cognitive Abilities and Collaboration Among Couples

Speaker: **Sherry Willis, PhD**

Goal and content:

Primary cognitive training research has focused primarily on basic mental abilities that have been shown in longitudinal studies to show early age-related decline. The goal of the presentation is to provide an overview of

findings from the prior intervention research and to discuss possible future directions. Work examining the association of game playing and cognitive ability will be reviewed.

(8:45-9:10am)

Issues of ethnicity in Cognitive Intervention Research

Speaker: **Graham McDougall, PhD, RN, FAAN**

Goal and content:

The SeniorWISE study, a Phase III clinical trial, tested an efficacy-based 12-hour memory enhancement intervention against a general health promotion intervention in a triethnic sample of older adults. This presentation will emphasize the differential benefits of training on the proximal and distal outcomes.

(9:10-9:35am)

Cognitive and Emotional Health Project: The Healthy Brain

Speaker: **Molly Wagster, PhD**

Goal and content:

Current evidence indicates that a large segment of our older adult population is at risk for cognitive impairment and/or emotional disorder. Advancing the understanding of both positive and negative changes in cognition and emotion in adulthood, and what can be done to preserve and enhance positive outcomes, is essential to the public health of the nation. One of the main goals of the trans-NIH Cognitive and Emotional Health Project has been to assess the state of longitudinal and epidemiologic research on demographic, social, and biologic determinants of cognitive and emotional health in aging adults and the pathways by which cognitive and emotional health may reciprocally influence each other. This presentation will highlight the activities of and resources stemming from the Cognitive and Emotional Health Project, the findings from the Critical Evaluation Study of the extant literature on the topic, and directions for the future.

(9:35-9:55am)

An Intergenerational Intervention for Cognitive and Behavioral Enhancement:

The Experience Corps Program

Speaker: **George Rebok, PhD**

Goal and content:

The Experience Corps is a community-based, model of senior service that seeks to create meaningful, socially valued roles for older adults, while simultaneously serving as a vehicle for health promotion by encouraging greater physical, cognitive, and social activity. This presentation will provide an overview of the model and the results of a randomized, controlled pilot trial in 6 public elementary schools with a sample of older community volunteers. Plans for scaling up the program to determine whether participation in Experience Corps slows physical and cognitive declines also will be discussed.

(9:55-10:15am)

Audience Questions and Discussion

(10:15-10:30am)

~Break~

(10:30-11:00am)

Population based models for promoting activity and cognitive health in the community for older people

Chair: **Howard Fillit, MD**

Goal and content:

This session will provide an overview of the significance of cognitive vitality and cognitive decline from a population based perspective to individuals, society and payers. Issues of screening and assessment will be discussed, particularly as it relates to Medicare Advantage managed care programs. The health economics of cognitive decline and a brief review of population based models for promoting cognitive wellness will be presented.

(11:00-11:20am)

Computer based cognitive assessment in clinical care: Advantages of Mindstreams for objective longitudinal testing

Speaker: **Ely Simon, MD**

Goal and content:

Recent advances in computer-based psychometrics and information technologies have contributed to widespread availability and cost effectiveness of scientifically valid, standardized cognitive assessment. Mindstreams® by NeuroTrax provides research-quality data to clinicians, and it is now practical to track a wide range of cognitive

domains at the point of care. While most applications are in early detection and differential diagnosis of cognitive decline, Mindstreams has also been used to focus rehabilitative interventions and as outcomes measures to judge efficacy of treatment. This presentation will focus on application of computerized cognitive assessment maintenance of cognitive vitality for directing and measuring outcomes of cognitive intervention strategies.

(11:20-11:40am)

SilverSneakers® Fitness Program: Maintaining Health and Well-Being through Physical Activity

Speaker: **Mary Ferron, MSE**

Goal and content:

While there is strong evidence about the benefits of a physically activity, a majority of older adults lead sedentary lives. The SilverSneakers Fitness Program is a community based program offered through Medicare health plans to more than 2.4 million Americans. Attendees of this session will learn how this successful program impacts the health and well-being of its members through engagement, behavior change, and social programming to encourage adherence.

(11:40-12:00pm)

Community-based models for cognitive training

Speaker: **Cynthia Green, PhD**

Goal and content:

As researchers make significant progress in understanding the efficacy of training for enhanced cognitive vitality, the means of providing such training to the population at large must also be explored. This presentation will provide an overview of different models for providing community-based programs on cognitive vitality.

(12:00-12:20pm)

Web-based approaches for Cognitive Training and Memory Improvement in Older Adults

Speaker: **Robert Rager**

Goal and content:

The goal of this presentation is to outline Web-based methods that can be utilized to provide different methods of cognitive training. This presentation will focus on the findings from a Small Business Innovative Research Project recently funded by the National Institute on Aging, part of the National Institutes of Health awarded to Practical Memory Institute. The project, WebBased Cognitive Health Improvement for Older Adults (aka "Sharper Memory"), resulted in an online method of tracking memory improvement via the "Sharper Memory Monitor" as well as an online e-Newsletter to keep individuals abreast of recent innovations in cognitive science. The project focuses on the need for improved cognitive health literacy and practical interventions to enable individuals to take control of their own memory fitness for life. A short description of the project will be given as well as associated findings from pilot data.

(12:20-12:40pm)

Cultural diversity and assessment of cognitive aging

Speaker: **Jennifer Manly, PhD**

Goal and content:

Several studies have shown that ethnic minorities, especially African American and Hispanics, are at higher risk than Caucasians for cognitive impairment and dementia as older adults. The factors that underlie these ethnic differences can be illuminated by deconstructing race/ethnicity, and clarifying the independent influences of acculturation, quality of education, socioeconomic status, and racial socialization on cognitive measures. In other words, race/ethnicity serves as a proxy for more meaningful variables, which can be operationalized and used to predict cognitive function both between and within ethnic groups. The implications of this work for research on cognitive aging, cognitive reserve, and cognitive intervention studies among ethnically diverse individuals will be discussed.

(12:40-1:00pm)

Audience Questions and Discussion

(12:40-1:00pm)

~Working Lunch~

(1:00-3:00pm)

Toward a Research Agenda

Smaller Mixed Group Breakouts (facilitated and notes taken by a recorder) Goal and content: The goal will be to generate and refine in each breakout group a number of key questions and issues for developing a research agenda.

The groups will be comprised of a mix of conference speakers and participants, with a balance of NIH & panel members vs. participants from the field; researchers vs. clinicians; and geriatricians vs. other specialists.

(3:00pm) Meeting adjournment