

NIH Centers of Excellence

Claude D. Pepper Older Americans Independence Centers

Overview

Why the OAICs Were Established

In 1955, the U.S. Surgeon General established five Geriatric Research and Training Centers (GRTCs) to advance research on the health care problems of the elderly and to train future academic leaders in geriatrics. In 1989, Congress enacted legislation that redesignated the GRTCs as the Claude D. Pepper Older Americans Independence Centers (OAICs), in honor of former Florida Senator and Representative Claude Denson Pepper for his efforts to promote the health and well-being of older Americans. The OAICs, which are funded in 5-year periods, are authorized under Section 445A of the Public Health Service Act (42 U.S.C. 285e-3) to increase scientific knowledge leading to better ways to maintain or restore independence in older adults (see Table 4-2).

How OAICs Function Within the NIH Framework

The OAICs are funded by NIA through a center grant mechanism (P30). The ultimate goal of the OAIC program is to enhance the translation of basic and developmental research on aging to applications and interventions that increase or maintain independence for older persons.

Each OAIC:

- Provides intellectual leadership and innovation
- Stimulates translation of basic research findings into clinical applications, e.g., research to develop or test interventions or diagnostics based on new findings from aging research or other studies of fundamental biological processes
- Facilitates and develops novel multidisciplinary and interdisciplinary research strategies
- Stimulates incorporation of emerging technologies, methods, and scientific advances into research designs, as appropriate
- Serves as a source of advice to and collaboration with other institutions regarding technology, methodology, analysis, or other expertise
- Provides career development, guidance, and training for future leaders in basic, clinical, and translational research in geriatrics and related fields

Description of Disease or Condition

Aging research focuses on a range of conditions, including geriatric syndromes such as involuntary weight loss, dizziness, and incontinence, as well as diseases and disorders that are more common among older adults, such as

cancer, cardiovascular disorders, stroke, and loss of sensory functions such as hearing and sight. The ultimate goal is to advance the translation of basic and developmental research on aging to applications and interventions that increase or maintain independence for older adults.

Burden of Illness

There are currently 35 million Americans older than age 65. Of these, more than 4 million are older than 85, and approximately 65,000 have attained their 100th birthday. By 2030, the number of individuals age 65 and older is likely to double to 70.3 million and comprise 20 percent of the entire population, in contrast to 13 percent today. The number of the “oldest old”—people age 85 and older—is expected to grow to at least 19.4 million by 2050⁴.

The ratio of older people to other age groups is important to society because older people, particularly the oldest old, may be dependent on family members, the government, or both for financial, physical, and emotional support. In addition, a large part of older people's security depends on programs such as Social Security and Medicare, which are financed through the contributions of working-age individuals. When the entire population of “baby boomers” enters older age, around 2030, the challenge to meet their needs through social, governmental, and other health care services will expand markedly⁵.

Data compiled in 2003 indicate that U.S. health care expenditures totaled approximately \$1.87 trillion, more than any other industrialized country⁶. Researchers predict that increased longevity is likely to require more financing from Federal health care systems, including Medicare and Medicaid⁷. As life expectancy increases, it will be necessary to find ways to keep the additional years of life free of disease and disability. Today, for example, more than half of all Americans older than age 65 show evidence of osteoarthritis in at least one joint⁸. Over half of Americans older than age 50 have osteoporosis or low bone mass⁹. Cardiovascular disease, cancer, and diabetes remain common among older Americans.

Scope of NIH Activity: Research and Programmatic

OAICs are designed to develop or strengthen each awardee institution's programs to focus and sustain progress in a key area of aging research, contribute to greater independence for older persons, and offer opportunities for training and career development in aging research for young scientists. OAICs select a specific focus for their research activities from a range of topics, including:

- Specific aging-related physiologic changes, other factors, or interventions (e.g., physical activity) that affect risk for multiple conditions or disabilities in old age

⁴ Federal Interagency Forum on Aging Related Statistics. Older Americans 2000: Key Indicators of Well-Being. 2000.

⁵ U.S. Department of Health and Human Services. 65+ in the United States: 2005, Current Population Reports, Special Studies. U.S. Department of Health and Human Services/NIH/NIA and the U.S. Department of Commerce/Economics and Statistics Administration/U.S. Census Bureau: December 2005.

⁶ For more information, see <http://www.cdc.gov/nchs/products/pubs/pubd/hsu/healthexpenditures.htm>

⁷ [Spillman BC, Lubitz J. N Engl J Med 2000;342:1409-15](#), PMID: 10805827; [Feder J, et al. Health Aff 2000;19:40-56](#), PMID: 10812780

⁸ For more information, see http://www.niams.nih.gov/Health_Info/Osteoarthritis/default.asp

⁹ For more information, see <http://www.nof.org/advocacy/prevalence/index.htm>

- Interactions of multiple diseases, disabilities, and interventions (e.g., medications) in older persons and their relationship to the risk of morbidity, progression of disability, and efficacy of prevention or treatment strategies
- Factors contributing to the amelioration or delay of multiple deleterious aging changes by modulating risk factors or fundamental aging mechanisms
- Causes, prevention, and treatment of a geriatric syndrome that is related to multiple pathologies or disabilities
- Causes, assessment, prevention, and treatment (including rehabilitation) of a specific type of disability in older people
- Issues related to specific conditions that contribute to a loss of independence in older persons, e.g., the role of aging changes in the etiology of debilitating physical condition(s); special problems in the diagnosis, treatment, or prevention of the condition in old age; complications, disability, or symptoms from the condition found principally in older people

NIH Funding for FY 2006 and FY 2007

NIH funding for the OAICs was \$13.6 million in FY 2006 and \$13.7 million in FY 2007.

Outcomes: FY 2006 and FY 2007 Progress Report

Programmatic and Research Accomplishments

- The [Duke University OAIC](#) supports studies to develop and evaluate interventions designed to help older Americans anticipate, cope with, and recover from disability arising from late-life disease and aging. An analysis of several biomarkers has linked these biomarkers to osteoarthritis; research is continuing to evaluate genes for their potential association with osteoarthritis and facioscapulohumeral dystrophy, one of the most common inherited neuromuscular disorders, which primarily affects the skeletal muscles of the face and upper arms. A Demonstration and Information Dissemination Project has helped to translate research findings from programs such as the Osteoporosis Intervention Study into clinical practice. The Genetic Ascertainment of Large African American Family for Osteoarthritis and Early Onset Cardiovascular Disease project of the Duke OAIC has analyzed the genetics of one of the largest intact extended families in the United States and is evaluating this family for evidence of osteoarthritis and early-onset heart disease.
- The **Harvard University OAIC** promotes research to help elderly individuals maintain independence well into late life by supporting a series of studies focused on the development of interventions to overcome common disabling geriatric conditions. Examples include studies of the causes and consequences of delirium after coronary bypass surgery; the relationship between cardiovascular risk factors and the development of frontal lobe dysfunction (impairments in executive function, gait, and continence) in African American elders; and the use of subsensory mechanical noise to improve somatosensation—such as the ability to perceive pain and temperature variations—and balance in healthy older people and patients with diabetes and stroke. For example, one study indicates that caution should be used in administering isoflurane, a common inhalation anesthetic, to individuals with excessive levels of amyloid-beta protein in the brain, including AD patients, among others¹⁰.

¹⁰ [Xie Z, et al. *J Neurosci* 2007;27:1247-54](#), PMID: 17287498

- The **Johns Hopkins University OAIC** supports research to determine causes and potential interventions for frailty in older adults. New studies include a project to develop methods that will infer parameters to measure frailty and to test hypotheses about the causes of frailty in older adults. Another project involves compiling genetic data from several resources, including the Women's Health and Aging I and II studies, InCHIANTI, the Baltimore Longitudinal Study of Aging, and HealthABC, to provide sufficient analytical power to detect causes of frailty. A pilot study to describe the relationship between brain-derived and peripheral cholesterol levels and cognitive and physical frailty found that high, not low, total cholesterol was associated with better psychomotor speed. The next step is to determine whether these findings also extend to physical speed and might be a predictor of physical frailty. Another pilot study to evaluate the role of glucocorticoid resistance in frail elderly people demonstrated that frailty is strongly associated with increased daytime salivary cortisol levels and that it is much more strongly related to these increases than to chronological age.
- The **University of California, Los Angeles OAIC** supports the development and testing of clinical interventions to prevent disability. Its activities include a study to refine an intervention for optimizing using home staff efficiency in providing feeding assistance to residents and then to test the efficacy of this model in a randomized clinical trial to determine quality of life and health outcomes. A separate, pilot, randomized clinical trial involves an intervention to improve visual functioning in older people. Information from this preliminary study will be utilized in a larger randomized clinical trial to determine whether visual and overall functioning of older people can be enhanced through a multidimensional intervention that corrects reversible causes of visual impairment, improves lighting in the home environment, and provides access to low-vision aids. Another ongoing study evaluates an age-appropriate intervention designed to improve diabetes self-care practices by enhancing the self-efficacy, empowerment, and diabetes-specific knowledge among African Americans older than age 65, a group that tends to experience substantially worse process and outcomes of care. The OAIC provides ongoing operational assistance to the new Resource Center for Minority Aging Research, one of six centers funded for the 2002-2007 cycle of this NIH initiative.
- The **University of Maryland, Baltimore OAIC** conducts mechanistic and outcome-based research in exercise rehabilitation and provides research training in gerontology and geriatrics to improve the lifestyle and functional independence of older Americans with disabilities. The center emphasizes exercise rehabilitation based on preliminary findings that exercise can improve the devastating health consequences and functional declines associated with stroke, hip fracture, and peripheral arterial occlusive disease—chronic conditions that often decrease functionality and independence in the elderly. Preliminary studies show that specific exercises such as treadmill exercise training improves lower body strength and increases fitness reserves among gait-impaired stroke patients and that an upper body workout improves motor function in the partially paralyzed upper extremities of stroke patients who have completed conventional rehabilitation and are 1-5 years beyond the incident stroke. Evidence of improved brain function accompanying task-specific exercise provides further support to the observation that recovery not only is enhanced through exercise but also continues months and years after the stroke. Thus, task-oriented exercise programs that improve upper and lower body functional capabilities and quality of life might allow these patients to remain at home and function independently, maintaining their lifestyle, reducing caregiver burden, and lowering their utilization of health care resources.
- The **University of Texas OAIC** research focuses on age-related sarcopenia, a progressive loss of muscle mass that leads to muscle weakness, limited mobility, and increased susceptibility to injury, and the contribution of sarcopenia to loss of independence in older persons. OAIC researchers discovered in an animal model that a specific protein, UNC-45, previously demonstrated to be critical to the proper formation of muscle, acts as a chaperone for muscle proteins known as myosins and helps myosins fold into stable structures that clump together to form thicker filaments that give heart and skeletal muscle its striated appearance. Normally,

electrochemical signals cause the myosin filaments to contract, producing, for example, a heartbeat or an arm movement. When myosin proteins are not yet fully stable, a cellular cleanup system, known as the ubiquitin proteasomal system, may mistake them as unstable or malfunctioning and break down the myosin. Further study of the cellular basis of muscle weakness and loss of muscle mass in aging is under way. Researchers affiliated with another study are using a porcine model to clarify the mechanisms by which amino-acid supplementation can regulate muscle protein synthesis with the goal of designing appropriate nutritional support in a variety of clinical settings. The OAIC also supports the Longitudinal Study of Mexican American Elderly Health, a population-based longitudinal study that focuses on predictors of continued physical independence among 3,000 older Mexican Americans living in five southwestern States.

- The **Wake Forest University OAIC** mission is to assess the risk factors of physical disability in older adults and to develop and test effective prevention therapies. Among the studies supported by the center is research on chronic obstructive pulmonary disease, a major cause of morbidity and mortality in the United States. Investigators are evaluating the effectiveness of a lifestyle intervention to increase physical activity to a greater extent than a traditional exercise therapy program and are comparing the impact of these two interventions on physical function, self-reported disability, health-related quality of life, and exercise capacity. The Pharmacological Intervention in the Elderly is a randomized controlled trial in older patients with diastolic heart failure to evaluate the effect of the drug enalapril on heart structure and function, exercise tolerance, and quality of life. Enalapril is one of the angiotensin-converting enzyme inhibitor drugs primarily used to treat hypertension and congestive heart failure. The goal of an observational pilot study is to examine physical function in obese individuals after a specific type of gastric bypass surgery to determine whether intensive weight loss associated with bariatric surgery will improve physical function. In addition, the Wake Forest center established the Maya Angelou Research Center on Minority Health to address issues related to racial and ethnic health disparities.
- The **Yale University Center OAIC** focuses on causes, prevention, treatment, and disability outcomes of multifactorial geriatric conditions. Research from this OAIC has contributed significantly to understanding the extent and frequency of transitions in and out of disability by identifying factors influencing these transitions and those predicting successful recovery from disability affecting activities of daily living. Findings from the studies provide a basis for developing multifactorial interventions to prevent disability. Multifactorial interventions to prevent falls in community settings are currently supported through the Yale OAIC; injuries and fractures resulting from falls are a major cause of disability among older adults. Epidemiologists and biostatisticians at the Yale OAIC are developing new statistical approaches to analyze data from multifactorial interventions and to identify contributions from individual components and thus to guide the refinement of these interventions.
- The **University of Michigan Center OAIC** seeks to advance research on health care problems of older adults. Among their projects is one to study the loss of balance and its consequences in older adults and to utilize a wearable motion sensor to capture important parameters of this process. A pilot project on elucidating the cellular and molecular events that regulate normal epidermal growth seeks to determine how alterations in these events precipitate hyperplastic growth, particularly as it occurs in aged skin. In another pilot study, investigators are examining genetic factors in hypertension among three generations of African American women.
- The **OAIC Coordinating Center at Wake Forest University** strengthens the OAIC program by facilitating information exchange and research collaborations among individual OAICs. The Coordinating Center builds on elements that are common to individual OAIC themes and assists in the development and implementation of projects in shared areas of interest. Major activities of the Coordinating Center are the coordination and

enhancement of the training programs across OAIC sites and the organization of seminars and other activities for trainees at the OAIC Annual Scientific Meeting

Recommendations for Improving the Effectiveness, Efficiency, and Outcomes of the OAICs

One recommendation of NIA's Geriatrics and Clinical Gerontology Program is to establish the Coordinating Center function as a part of the competitive OAIC Request for Applications (RFA) process. RFA AG-07-008 includes requests for applications for continuing the Coordinating Center functions. Another effort is to explore plans to expand the OAIC program.

Evaluation Plans

The general progress of each OAIC is reviewed by program staff at the time of noncompeting renewal. In addition, a formal midcycle review is conducted by a panel of experts external to the OAICs at 2-3 years into the funding cycle of each OAIC. The purpose of the review is to assess the progress of individual OAICs in meeting the goals set forth in their funded applications and to identify areas of concern that could be addressed prior to the next competing renewal. A written summary of the review is provided to each OAIC principal investigator for use in directing his or her center.

Future Directions

The number of qualified applicants for OAIC sites is increasing, and NIH expects that additional centers will be added gradually to bring the total number to 12 by 2010. NIH plans to continue funding the Claude D. Pepper OAICs through a continued, competitive peer-reviewed process open to new and renewal applications.