Reducing Disability and Promoting Longer, Healthier Lives

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Introduction

The message of today is one of good news and promise. The good news is that scientific advances show the way for improved health across the life span and the promise is for a healthier and longer life for Americans. (Chart 1)

Until recently, it was generally believed that improvements in health care and technology would save people from dying without curing them, producing a pandemic of old age disability and an exponentially increasing burden of health care services and costs. These dire predictions persisted until Kenneth Manton and colleagues at Duke University in Durham, North Carolina published his 1997 finds, based on waves of data from the National Long-Term Care Study, that demonstrated a dramatic and unexpected reduction in rates of disability among older persons. Manton calculated that at least 1.4 million fewer older Americans were disabled in 1994 than there would have been if disability rates had not improved since 1982, and thata these reductions accelerated over the 12 years (Chart 2). Manton's conclusions were met with considerable skepticism, and efforts were launched to either disprove or support these findings.

In early 1998, Vicki Freedman and Linda Martin of RAND, using different dataset and different measures of functional ability, found equally large declines from 1984 to 1993 in the prevalence of chronic disability, after controlling for changes in the composition of the population during the study period. They also found that improvements in functioning in absolute terms were greatest among those 80 and older. There is also new evidence, developed by Anthony Vita and colleagues at Stanford University in California, that persons with better health habits not only survive longer, but disability that does occur is postponed and compressed into fewer years at the end of life. These findings and those beginning to be reported by other scientists lend support to the position that physiological changes in capability underlie the trend toward declining disability. NIA focuses much of its efforts on two major goals: 1) increasing healthy life span; and 2) preventing disability.

Expanding Healthy Lifespan

Our understanding of the basic biology of normal aging, including the processes of cellular senescence and the genes that may contribute to increased longevity has increased dramatically in recent years. Caloric restriction is being investigated as an intervention in animals that may not only increase longevity, but also decrease the prevalence of age related malignancies and other diseases. Major advances have recently been made in understanding the role of telomeres and telomerase in aging and cancer.

Genetic influences in longevity and healthy lifespan are being identified. Several genes associated with longevity in lower life forms are being shown to have homologues in human beings, providing new targets for intervention.

Telemeres, repetitive DNA segments found on the ends of chromosomes, help maintain the integrity and function of chromosomes. When cells divide, telomeres normally lose segments and shorten until, at a critical length, cell division ceases and cells become senescent. Telomeres have therefore been regarded

as the cell's "molecular clock." The enzyme telomerase compensates for telomere loss by adding DNA segments to the ends of chromosomes in cells such as cancer cells, sperm and eggs. How and why telomerase reactivates to contirbute to cell immortalization is not known, but correlation between telomerase activation and cancerous gorwth has stimulated many scientists to view telomerase inhibition as a potential new approach to cancer therapy. Controlled activation of telomerase, on the other hand, may provide an avenue for healthy cell division by resetting or extending the timing of the molecular clock.

Preventing Disability

On the clinical research front, studies focus on the major causes of disability in the elderly, including cardiovascular disease, osteoporosis, falls and fractures, vision, and Alzheimer's disease.

Cardiovascular disease. For example, collaborative clinical trials funded by the NIA and the Naitnoal Heart, Lung, and Blood Institute confirmed the efficacy of lowering systolic blood pressure in significantly reducing the risk of major cardiovascular illness and stroke in older people. This includes dramatic reductions (80%) in the occurrence of heart failure in persons with previous myocardial infarctions. (Chart 3)

In another study this year, Paul Whelton of Tulane University and investigators at several other sites completed the Rial of Nonpharmacologic Interventions in the Elderly (TONE), co-funded by the NIA and the National Hart, Lung, and Blood Institute (NHLBI). The trial tested efficacy and safety of withdrawing antihypertensive medication and substituting weight loss, dietary sodium reduction, or both to control blood pressure in a group of 975 men and women ages 60-80 years. Compared to the control group, the risk of recurrence of hypertension and/or cardiovascular complications was lowered in all groups, but most significantly in those assigned to both weight loss and sodium reduction. TONE thus demonstrated the efficacy and safety of nonpharmacologic therapy of hypertension in older persons, and that older patients with hypertension were able to make and sustain the lifestyle changes necessary for these results (Chart 4).

Osteoporosis. The NIA and the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) have shared a long collaborative effort in preventing osteoporosis and in the use of hormone replacement toward this end. This year, four studies reported findings on the contribution of sex hormone levels and other factors in minimizing bone loss and osteoporosis in men and women. A study led by Lawrence Riggs at the Mayo Clinic in Rochester, Minnesota, identified estrogen deficiency as the cause of both the early accelerated and continued slower phases of bone loss in women and as a contributor to bone loss in aging men. Another research team, led by Steven Cummings at the University of California, San Francisco, studied the normally occurring levels of estrogen in nearly 900 women over age 65. These investigators found that women who had measurable blood levels of estrogen -- much lower than women currently achieve by taking hormone supplements -- had less than half the risk of experiencing a subsequent hip or vertebral fracture than women with undetectable levels of estrogen in the blood. This research team also found that the risk of hip fracture increased with higher blood levels of a protein that reduces the body's access to estrogen in the blood. Women with both high levels of this protein and undetectable levels of estrogen were found to be at a 7-fold higher risk for hip fracture and an 8-fold higher risk for vertebral fracture. These studies suggest that taking very low-dose estrogen supplements or by using new estrogen-like therapeutic agents may prevent bone fractures in women and men without causing adverse effects sometimes associated with estrogen therapies.

Falls and fractures. Dietary supplements have also proved effective in reducing the risk of fracture. A trial of daily supplementation with calcium and vitamin D has shown to halve the risk of debilitating bone fractures in people over age 65. This study performed at Tufts University found that participants

taking 500 mg of calcium and 700 IU of vitamin D daily had about half the bone fractures compared with the placebo group. In addition, multiple risk intervention strategies developed by researchers at Yale University have proved effective in reducing the incidence of falls and fractures and resulted in considerable cost savings. (Charts 5&6) Interventions include exercises for strength, balance and endurance, as well as medication adjustment and environmental design.

Vision. In the field of vision research, work is continuing on the age-related changes in visual processing that impact on the ability of older individuals to drive, an activity that profoundly affects an individual's independence. Researchers are trying to determine factors, such as impairments and medical conditions, that place certain older drivers at increased risk for crashes. Previous retrospective research by Cynthia Owsley at the University of Alabama at Birmingham and colleagues indicated that declines in visual processing speed and visual attention skills are strongly associated with a history of driving problems. These investigators developed a measurement of these visual processing skills, which they call Useful Field of View (UFOV). The researchers tested the UFOV of a group of older people and later followed up on their history of vehicular crashes. These researchers also reported that older drivers with a 40 percent or greater impairment in the UFOV were more than twice as likely to incur a crash during the three-year follow-up period than older drivers with a lesser impairment. The inability to divide attention at brief durations was determined to be the main risk factor for future vehicle crashes for older adults. In a separate study, Mary Tinetti and colleagues at the Claude D. Pepper Older Americans Independence Center at Yale University have developed a test battery that could be performed in a clinician's office of visual, cognitive, and physical abilities potentially relevant to driving. The study tracked the occurrence of a crash, moving violation, or being stopped by police over a period averaging six years. Among the 125 community-living drivers who participated, 50 reported one of these adverse events. Elements of the test that were significantly related to these events included near visual acuity worse than 10/40, limited neck rotation, and poor performance on a test of visual attention. The battery effectively detected disabilities in drivers at risk for adverse driving events, but abnormalities were also found in many who had no adverse events. These findings suggest it may be possible to identify individuals potentially at risk for self-reported driving events using simple tests of functional ability. Further research may help determine interventions to correct or compensate for the impairments.

Alzheimer's disease. A major area of NIA research is Alzheimer's disease. NIA in collaboration with other Federal agencies and private organizations, is launching an Alzheimer's Disease Prevention Initiative with the goal of actually arresting Alzheimer's disease and preventing future cases. Research has indicated that the neuropathologic changes of Alzheimer's disease begin as much as several decades before the clinical symptoms are recognized. The ultimate goal of this initiative is to intervene early in Alzheimer's disease pathology to prevent the disease from ever manifesting itself clinically.

Promoting healthy lifestyles. Health promotion efforts are aimed at the initiation and maintenance of healthy lifestyles, disease prevention, and improved access to health care. Promoting healthy life styles includes proper diet; exercise; cessation of tobacco, alcohol, and medication misuse; adherence to prescribed medical regimens; preventive health care and screening, and early diagnosis and treatment of disease. Particular emphasis is on investigations of factors that my contribute to observed health disparities among older racial and ethnic populations. Efforts to reduce disparities include the development of culturally appropriate screening tools and health care services.

To help ensure that the public benefits from these advances, the NIA provides accurate and timely information on the results of aging research and on related health data to older consumers, patients and family members, health care professionals, the media, and others. In 1998, NIA's publication information program received the first Emmy award given to a Federal agency for a nationally televised public service announcement, "Mme, Eterno, Looking for the Fountain of Youth." This announcement encouraged viewers to seek more information about increasingly popular "anti-aging" therapies, which

are often not fully characterized for efficacy or potential danger. Also in 1998, NIA, with astronaut and Senator John Glenn, the National Aeronautics and Space Administration, and other Federal agency partners, launched a national education campaign for keeping fit after 50. The project is tied to release of a new book, free to the public, "Exercise: A Guide from the National Institute on Aging," that shows older Americans how to step up their physical activity to improve health and well-being with age.

Conclusion

The challenge for the future is to maintain the current trend of decline in disability over the next 50 years, which could reduce the growth in or even keep the absolute number of disabled older Americans level in the face of the demographic increase in this population expected with the gray of the baby boom generation. Moreover, we must address the increasing number of individuals expected to have Alzheimer's disease, as well as tackling the functional disabilities related to cardiovascular disease, cancer, vision, hearing and musculoskeletal disorders by improving primary and secondary prevention and reducing excess disability.

As illustrated by the Alliance's report, prevention or delay of increasing disability will substantially reduce health care costs. Advances in science as well as innovations in an evolving health care system require redoubled efforts to improve strategies for health promotion and improved service delivery. We must also continue basic and applied research to better understand the etiology, risk factors, and natural history of disease as well as preventive factors and strategies. Research must also focus on strategies to improve quality and efficiency of services to older persons and their families.

A recent poll of persons ages 18 to 75 taken by AARP showed that 9 out of 10 Americans understood that adoption of healthy habits at any point in life, the earlier the better, could improve health in old age. Even better, 4 out of 5 people, across the life span had already changed health habits to ensure a healthier old age. The best news is that millions of Americans are living healthier lives, based, in part, on findings from aging-related research.