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Aging, Exercise, and the Predisposition to Falling

Philip E. Martin and Mark D. Grabiner

Age-related loss of mobility in older adults may often be an insidious process that can suddenly threaten an individual's functional independence and quality of life via injury and (or) institutionalization. Fall-related injury, particularly hip fracture, is a problem for which solutions are critically needed. Practical and effective solutions to the pandemic morbidity and mortality associated with falls in older adults have not yet been demonstrated on a large scale but have been approached from at least three directions: (a) identification of risk factors for falls, (b) identification of factors related to fall severity, and (c) factors associated with the structural strength of the proximal femur. The relationships among age-related changes in the musculoskeletal and neuromuscular systems, changes to complex motor performance, and increased incidence of falling have not been clearly delineated as a function of the continuum of successful, usual, and pathologic aging. Thus, these relationships may be less well-understood than commonly believed and, therefore, the basis on which some interventions are undertaken may be unsupported. The papers that follow developed from a symposium presented at the 1998 American College of Sports Medicine annual meeting. They address and challenge the robustness of some of the issues associated with age-related physical activity. Discussions both supporting and refuting commonly accepted relationships such as those among falling, balance, and strength are presented.

An Aging Society

The population of older adults in the U.S. is growing rapidly as life expectancy continues to increase steadily. In 1900, life expectancy in the U.S. for males and females was 46.6 and 49.1 years, respectively. By 1980, life expectancy increased for males and females to 69.8 and 77.5 years, respectively, and is conservatively projected to reach 75.0 and 83.1 years, respectively, by 2040 (Guralnik, Yanagishita, & Schneider, 1988; Schneider & Guralnik, 1990; Spencer, 1989). The increase in life expectancy, in part, underlies the rapidly increasing population of older adults in the U.S. Presently, there are between 35 and 40 million adults aged 65 or above. This number is expected to nearly

P.E. Martin is with the Exercise and Sport Research Institute at Arizona State University, Tempe, AZ 85284. M.D. Grabiner is with the Department of Biomedical Engineering at the Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44106.

double by 2040. The age group reflecting the highest rate of growth in the U.S. population, however, is the oldest old, aged 85 and above. While there are presently about 4 million adults aged 85 or older, this number is expected to grow to approximately 13 million by 2040 (Guralnik, Yanagishita, & Schneider, 1988; Schultz, 1992).

Physical Disability and Functional Dependence

A substantial proportion of the rapidly expanding gerontology literature addresses the issue of disability in older adults. Physical disability is most frequently assessed by examining limitations in activities of daily living such as transferring from a bed to a chair, using the toilet, dressing, bathing, preparing meals, and walking. The time over which significant disability develops in older adults can be quite variable (Gill et al., 1997; Guralnik & Simonsik, 1993). While physical disability is often the result of a progressive decline in musculoskeletal and neuromuscular function, it can also be accelerated by a major event such as a stroke or heart attack (Ferrucci et al., 1996). Whether the development of physical disability is progressive or acute, it is a major risk factor for functional dependency and institutionalization.

Falls and the Fear of Falling

Falls and fall-related injuries are among the most serious and common medical problems facing older adults. Approximately 30% of community-based individuals older than 65 years of age suffer a fall each year, and about half of those suffer multiple falls. Serious injuries, including hip fracture or fracture to other bones, result in 10–15% of falls (Province et al., 1995; Tinetti, Speechley, & Ginter, 1988; Tinetti & Williams, 1998). Falls are often considered to be a consequence of the decline in physical function. However, falling and the fear of falling are also viewed as major factors contributing to decreased mobility and increased functional dependence, perhaps as a strategy by older adults to decrease the potential for future events (Maki, 1997; Tinetti & Williams, 1998).

The Economic Burden of an Aging Society

The combination of a growing population of older adults and escalating health care costs contribute to a major public health problem with a staggering economic impact. In the U.S., older adults account for more than one third of health care spending. Nearly two thirds of the health care costs of older adults are covered by Medicare and represents the largest health care expenditure for the federal government (Lubitz, Beebe, & Baker, 1995; Lubitz & Riley, 1993; Schneider & Guralnik, 1990). By 2040, Medicare spending for individuals aged 65 and above could be as high as \$212 billion in 1987 dollars (Schneider & Guralnik, 1990). Nearly 50% of nursing home residents are 85 years and older, and about the same percentage of nursing home costs are associated with this age group. In 1985, nursing home care for 1.3 million older adult residents cost \$31.1 billion. By 2040, as many as 5.9 million older adults will reside in nursing homes at a cost in 1985 dollars of as much as \$139 billion (Schneider & Guralnik, 1990). Focusing more specifically on hip fractures, the number of fractures is expected to increase from approximately 220,000 in 1987 to as many as 840,000 by the year 2040. Similarly, the cost of medical care associated with the treatment for hip fractures will rise nearly four-fold, from approximately \$1.6 billion in 1987 to as much as \$6 billion in 2040 (Schneider & Guralnik, 1990).