This newsletter highlights the importance of strength training in keeping older adults healthy and fit, explaining how it can forestall declines in strength and muscle mass, along with their attendant negative impact upon other metabolic functions and activities of daily living. Physical inactivity is common throughout the nation. Approximately 11 percent of cases of heart failure in men and 14 percent in women are attributable to obesity alone. More than half of adults over age 45 years are inadequately active. Injuries to seniors are costly to the health care system and often have serious consequences for the seniors themselves. Aging is associated with marked alterations in body composition and joint structure. Research indicates that regular joint loading and motion are necessary to maintain articular cartilage function and synovial joint range of motion. There is growing recognition of the importance of strength training for all adults in light of the loss of muscle mass in midlife due to sedentary lifestyles. There is no age limit to the benefits of exercise, and regular activity can often slow or reverse the decreased mobility that contributes to disease and disability in old age. Research shows that regular physical activity can reduce the risk of subsequent depression in older adults. Overall, regular enjoyable exercise is the most significant route to better health. (SM)
STRENGTH TRAINING: A natural prescription for staying healthy and fit.

by Raymond Adams, BA, MLIS, Information Officer, GRC

Claude Rocan, Director General of the Centre for Healthy Human Development, Health Canada, noted that healthy aging is an issue that concerns everyone since demographic projections show that within the next 40 years, 25% of Canada’s society is expected to be 65 years of age or older.

A recent publication by the Health Canada Division of Aging and Seniors, identified four determinants that play key roles in healthy aging: healthy eating, injury prevention, physical activity, and smoking cessation. The same publication goes on to state that, “Scientific evidence increasingly indicates that physical activity can extend years of active independent living, reduce disability and improve the quality of life for older persons” whereas inactivity “…leads to declines in bone strength, muscle strength, heart and lung fitness and flexibility...[and] “…is a key contributor to most of the chronic and debilitating diseases associated with aging and for a significant number of preventable deaths.”

The U.S. Surgeon General has estimated “sedentary living to be as dangerous to one’s health as smoking a pack of cigarettes a day.” The World Health Organization (WHO) states that it is both beneficial and cost-effective to help sedentary individuals to take up moderate levels of physical activity [such as] walking, gardening and safe activities involving weight lifting. My previous article, “Walking: A Natural Prescription for Staying Healthy and Fit” (GRC News, 21(1)), discussed the positive gains from such aerobic activities as walking. This article will deal with the dramatic benefits that have been achieved with strength training which not only appears to forestall declines in strength and muscle mass, along with their attendant negative impact upon other metabolic functions and Activities of Daily Living (ADLs), but is useful for dealing with depression as well!

Physical inactivity is common throughout North American society. In the United States, US Senator Bill Frist (R-Tenn), the chamber’s only physician, and other US Senators introduced a bill that Frist says “addresses head on a nationwide epidemic...that is contributing substantially to more than 300,000 deaths per year” declaring obesity the second most preventable cause of death after tobacco use and saying that while “there is no single solution, no magic bullet...better information, improved nutrition, and greater opportunities for physical activity will guarantee progress.”

To put Frist’s figure on the annual mortality rate from obesity into dramatic perspective it should be noted that the United States military in World War II lost approximately 259,000 men and women on all fronts from December 7, 1941 to September 2, 1945.

A study, conducted by Dr. Ramachandran S. Vasan and his colleagues from the Framingham Heart Study, Massachusetts, which investigated the relationship between body mass index...
The Centre was established with the help of grants from Imperial Oil, the Real Estate Foundation of B.C., Shoppers Drug Mart and Social Sciences and Humanities Research Council of Canada.

Research Focus
The Gerontology Research Centre conducts research on aging and the aged, and consults on research design and program development and evaluation. Research activities are most intense in five areas:

- Aging and the built environment
- Health and aging
- Prevention of victimization and exploitation of the elderly
- Older adult education
- Changing demography and lifestyles

The Centre was established with the help of grants from Imperial Oil, the Real Estate Foundation of B.C., and consults on research design and program development and evaluation.

The Gerontology Information Centre, managed by a professional librarian, offers a specialized collection and assistance with information search and retrieval.

Publications
The Centre publishes books, reports, a fact sheet and two newsletters: GRC News and Seniors’ Housing Update.

Conferences
The Centre regularly organizes two conferences: a biennial housing conference and the John K. Friesen Conference which takes place each spring.

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In Canada, information presented by Dr. Sandra O’Brien-Cousins of the Faculty of Physical Education and Recreation, University of Alberta noted that “half of all adults over the age of 45 are inadequately active.” Dr. O’Brien-Cousins’ claim is supported by a recent government of Canada publication, Seniors in Canada: A report card, which shows that the majority of Canadian seniors (70% of women and 67% of men) are inactive as well as by National Population Health Survey (NPHS) data that shows that older adults represent the most sedentary segment of the Canadian adult population with 59% of seniors between the ages of 55 to 64 years of age being inactive, increasing to 74% of seniors who were 75 or older.

Robert Mazzeo (Associate Professor and Associate Chair of the Department of Kinesiology & Applied Physiology at the University of Colorado at Boulder), an exercise physiologist and chairman of the American College of Sports Medicine (ACSM), states that the major health risk for the frail elderly are immobility, falls, and fractures which are related to muscle weakness noting that strength training and balance exercises can help older adults build muscle strength and improve function so that they can safely walk and do other aerobic activities. All of the causes of seniors’ injuries, falls are by far the biggest problem, accounting for over 87% of unintentional injuries resulting in hospitalization for those 71 years of age or over, and 75% of the deaths resulting from injury.

Injuries to seniors are costly to the health care system and often have serious consequences to seniors themselves. The Canadian Fitness and Lifestyle Research Institute (CFLRI) notes that:

- One quarter of deaths from heart disease in 1993 were the result of physical inactivity.
- The 16% increase between 1981 and 1995 in the number of Canadians active enough to reduce the risk of heart disease translated into savings of $700 million over that period and $190 million in 1995 alone.
- The Conference Board of Canada estimated that a 1% increase in physical activity could lead to annual health care savings of $10.2 million for ischemic heart disease (i.e. anemia due to obstruction of the blood supply mainly as a result of arterial narrowing), $877,000 for adult-onset diabetes and $407,000 for colon cancer.

For Canadians 65 years of age or older, direct and indirect cost to the health care system for fall-related injuries alone is estimated at $2.8 billion annually. In 1989-1990, there were 25,000 cases of hip fractures in Canada generating costs of $400 million and resulting in death in over 12% of the cases and 75% of survivors not regaining their prior functional capacity.

Aging is associated with marked alterations in body composition including a decline in body weight that is at least partially explained by a process known as sarcopenia. Sarcopenia from the Greek for “flesh reduction”, like osteoporosis and arthritis, is a serious degenerative condition that negatively impacts upon physical function (e.g. increased risk for falls and vulnerability to injury) and metabolic function (e.g. increased risk of obesity, impaired glucose intolerance, changes to the body’s ability to regulate temperature, and weaker bones) because muscle is the body’s most metabolically active tissue. Muscular strength in the back, arm, and legs drops as much as 60%, between the ages of 30 and 80 largely reflecting a progressive loss of muscle mass at an average of 4% per decade from 25 to 50, and 10% per decade thereafter. Along with neuromuscular changes and decreased hormone levels, reduced exercise (particularly contractions against high loads) appears to be responsible. Age-related changes in joint structures (i.e. articular cartilage, ligaments, and synovium or connective tissue) can lead to stiffness, limited range of motion, and increased vulnerability to injury. It has been observed that regular joint loading and motion are necessary to maintain articular cartilage function and synovial joint range of motion whereas reduced activity...
adversely alters the mechanical properties of cartilage. In women, one of the more important changes due to the hormonal alterations that occur with menopause is the dramatic decrease in bone mineral density (BMD) that leads to greater risk of hip or vertebral fractures.

There is growing evidence that training of sufficient intensity can increase strength by approximately 5% per session in older individuals which is similar to gains in younger ones.

Twenty years ago, Dr. W.M. Bortz in a review article in the Journal of the American Medical Association hypothesized that physical inactivity causes many of the functional losses commonly attributed to aging. “A review of biologic changes commonly attributed to the process of aging demonstrates the close similarity of most of these to changes subsequent to a period of enforced physical inactivity” [which prompts the suggestion that at least a portion of the changes that are commonly attributed to aging is in reality caused by disuse and, as such, is subject to correction.” Over the last decade, there has been a growing recognition of the importance of strength training for all adults in light of the loss of muscle mass in midlife due to sedentary lifestyles. Research points to the need for interventions to prevent functional decline. For example, Guralnik, et al. (1995), measured lower-extremity function (e.g. tests of walking speed, balance, and ability to rise from a chair) in 1122 subjects aged 71 years and older and found that those who scored poorly were nearly five times more likely to be disabled 4 years later. Similar findings have been reported in successive studies. For example, an American study concluded, “Muscle weakness is extremely common among elderly people, much of it stemming from disease and inactivity” with studies reporting “the prevalence of easily detected leg weakness to range from about 50% among community-living older persons to over 80% among nursing home residents.” A recent Dutch study similarly concluded that avoidance of activity promotes muscle weakness that, in turn, causes disability.

There is no age limit to the benefits of exercise. Regular activity can often slow or reverse the decreased mobility that contributes to disease and disability in old age. Clinical research demonstrates that for most elderly strength training even in the tenth decade of life. A now classic study, whose results were presented at the annual meeting of the American Federation for Clinical Research, in Washington D.C in 1989, was carried out by Dr. Maria A. Fiatarone and her colleagues who enrolled 10 frail nursing home residents (aged 86-96), from the Hebrew Rehabilitation Center for Aged in Boston MA, in an 8-week high-intensity resistance exercise program. (Currently, Dr. Maria A. Fiatarone Singh is a research scientist at the Nutrition, Exercise Physiology, and Sarcopenia Laboratory, Jean Mayer U.S. Department of Agriculture, Human Nutrition Research Center on Aging at Tufts University.) Of the 9 men and women who completed the study, both the strength as well as the size of their quadriceps (i.e. thigh muscles) increased throughout the program. The program entailed (1) the ability of the subjects to lift a weight through 90 degrees of knee flexion to maximal knee extension from a seated position and (2) a test of functional mobility by (a) measuring the subject’s time in rising from a straight backed chair without using his or her arms and (b) their speed during a 6-metre walk. Gains in muscle strength were highly significant and clinically meaningful with the average strength gain at 8 weeks measured at 174% plus/minus 31% on the right leg and 180% plus/minus 33% in the left leg while gains in muscle size of the quadriceps area was 10.9% plus/minus 7.0%.

With respect to functional mobility, there was a decrease in walking time from 43.4 plus/minus 25.7 seconds to
29.6 plus/minus 22.4 seconds with two subjects no longer needing canes to walk at the end of the study and one subject who could not initially rise from a chair without use of the arms becoming able to do so."

The therapeutic efficacy of weight-training upon clinical depression has also been studied with positive results. Dr. William J. Strawbridge, of the Public Health Institute, Berkeley, California, and his colleagues, who studied the effect of physical activity on prevalent and incident depression over a 5-year period in 1,947 subjects who were between 50 and 94 years of age, concluded that "Regular physical activity, such as walking, exercising, swimming, or playing active sports for older adults will reduce the risk of subsequent depression".15

Singh, et al. (2001) report that in the elderly population there is an advantage to the use of exercise rather than pharmacotherapy as a treatment for depression because of the increased prevalence of medication side effects in geriatric patients (such as the increased risk of falls and hip fractures as reported by Thapa, et al. (1998) and Ray, et al. (1987)) as well as the other beneficial side effects of exercise that have been demonstrated in this age group.16 The efficacy of exercise as an alternative treatment in clinically depressed young or middle-aged patients has been established in at least eight randomized controlled trials of varying duration that compared aerobic and non-aerobic forms of exercise including one by Blumenthal (1999) using 156 men and women (mean age 57) with major depression comparing aerobic exercise, antidepressant medication, and a combination of medication and exercise that at the end of 16 weeks suggested no significant difference between medication versus exercise and no additive effect of the two.17

Singh, et al. (2001) conducted the first controlled resistance training study of greater than 8-weeks duration in a depressed population and the only such study using elderly persons (32 community-dwelling seniors [mean age 71.3] who satisfied the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) criteria for clinical depression) in which test subjects (that were given 10 weeks of supervised weight-lifting exercise followed by 10 weeks of unsupervised exercise) showed a 60% improvement compared with a 30% improvement of control subjects (that attended health lectures for 10 weeks) in a follow-up assessment at 20 weeks made with the Beck Depression Inventory (BDI), the Philadelphia Geriatric Morale Scale, and Ewart's Self Efficacy Scale and with the BDI and physical activity questionnaire at 26 months.18 The results led Singh and his colleagues to conclude that the exercise group "showed significantly reduced depression compared with the control group at both 20 weeks" (with 73% or 11/15 of the exercise group classified as nondepressed versus 36% of controls) and [in the] 26-month follow-up where the secondary analysis showed that active exercisers demonstrated a trend toward greater long-term response than either exercisers who had stopped lifting weights or controls with BDI results ranging from approximately 17 to 8.19

Dr. Bortz cautions that while physical inactivity is not the cause of aging, "[i]t is wrong to suggest that exercise might halt the fall of the grains of sand in the hourglass," exercise may forestall much of its effects. "It is proposed, however, that the aperture may be responsive to the toning influence of physical activity, and consequently the sand may drain more slowly" and to finally conclude that "[t]here is no drug in current or prospective use that holds as much promise for sustained health as a lifetime program of physical exercise".20 It is the results of studies such as the ones reviewed here that have led Health Canada two decades after Dr. Bortz wrote his article to conclude that, "Regular enjoyable exercise is currently the most significant route to better health, and is a more straightforward and economical means to lifelong health than medication and acute care".21

Teach us to live that we may dread Unnecessary time in bed. Get people up and we may save Our patients from an early grave. RAJ Asher 22

References
17 Krucoff, C. (March/April 2000).
23 Rubenstein, L. Z. (December, 1999). Preventing falls and other injuries in older...
Masters and Diploma/Minor Courses in Gerontology

by Anne Marie Barrett, Assistant to the Director/Student Advisor

Codes: C=Distance Education, DOW=Harbour Centre, SFU=Burnaby Campus, 800=graduate course.

Offers are subject to change. Check the website (www.harbour.sfu.ca/gero) for further information on the timetable. For information about enrolling in the Diploma, Masters or Minor in Gerontology contact: Anne Marie Barrett at (604)291-5065 or e-mail geradmin@sfu.ca

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31 Fiatarone, M.A., et al. (1990), 3030.
33 Fiatarone, M.A., et al. (1990), 3032.
41 Bortz II, W.M. (1982), 1203.
42 Health Canada (2002b), 1.
Recent Centre Activities

COMINGS & GOINGS
Mykle Ludvigsen has left the Centre. We wish him the very best in his new position in the Public Education and Communications Department of the Canadian Mental Health Association—BC Division.

VISITORS TO THE CENTRE
Dr. Shigeo Hori, Associate Professor, Department of Lifelong Education at Osaka University of Education, is at the GRC for three months to study educational gerontology.

GRANTS & CONTRACTS
- Meaning of home among immigrant older adults in Canada
  PI: Habib Chaudhury
  Funding Source: President’s Research Grant, SFU ($30,000)
  The use of single patient rooms versus multiple occupancy rooms in acute care environments
  PI: Habib Chaudhury and Atiya Mahmood
  Funding Source: Coalition of Health Environments Research (CHER) (US$30,000)
- Addressing distinct housing needs: An evaluation of senior’s housing in the south asian community
  PI: Habib Chaudhury & Atiya Mahmood
  Funding Source: Coalition of Health Environments Research (CHER) ($25,000)

CONFERENCE PRESENTATIONS
Presentations at the 31st Annual Scientific and Educational Meeting of the Canadian Association on Gerontology, Montreal, QC; October 2002.

Bingham, P., & Doyle, V. The redesign of residential care services and the implementation of supportive living options for continuing care clients in Victoria, BC.

Brink, S. Elder care: The nexus for family, work and health policy.

Gnaedinger, N. Canada mortgage and housing’s senior seminars: “Crossing bridges.”

O’Rourke, N. An integrated model of well-being among older adults.

O’Rourke, N. Gender equivalence of responses to a brief version of the Zarit Burden Interview.

O’Rourke, N. Personality and sociodemographic variables as antecedents of well-being.

O’Rourke, N. Predictors of burden among a representative sample of dementia caregivers.

Spencer, C. Health promotion or health tyranny? The case of tobacco and alcohol use among seniors.


Other Conference Presentations


PUBLICATIONS


M.A. THESSES


Social and demographic trends suggest that increasingly adults will be caregivers of older adults and paid workers. For some, retirement timing will be precipitated by caregiving responsibilities. This thesis examines the long-term subjective health consequences of retiring to provide caregiving support to a family member. Bivariate and multivariate analyses were performed to test four hypotheses that people who retired to caregive (n=530) compare unfavorably to people who retired for other reasons (n=5,423) on indices of subjective health. Dependent variables were: perceived stress, self-rated health, life satisfaction and emotional well-being. The consequences to subjective health are defined as long-term, given that the average length of retirement in both groups was over 10 years.

The hypotheses developed for this thesis were guided by life course theory. This theory informs how off-timed and stressful events can effect health and well-being in later life. It was postulated that unexpected and/or difficult caregiving responsibilities in later life, together with premature retirement, constitute a potentially stressful event that may have lasting health effects.

In the bivariate analyses, weak associations were found between retiring to caregive and perceived stress, emotional well-being and life satisfaction. Results reveal that retiring to caregive negatively impacted all three. The fourth dependent variable, self-rated health was not statistically significant at the bivariate level. At the multivariate level, other variables were included to account for the potentially confounding effects of sociodemographic and retirement factors, stressors, and social support. Results for perceived stress and emotional well-being were in the expected direction. The odds of perceiving life as very stressful were slightly increased among those who retired to caregive. Also, well-being was poorer among those who retired for caregiving reasons. Notably, these two hypotheses were supported when controlling for the effect of current caregiving. Retiring to caregive did not have a statistically significant impact on self-rated health and life satisfaction in the multivariate analyses.

Overall, this thesis provided modest support for the hypothesis that retiring to caregive has long-term implications for subjective health. Life course theory proved useful as a framework for understanding how off-timed events may have lingering effects on current stress and emotional well-being. The implications of this thesis are that efforts are needed to help caregivers retain employment if desired, and reduce the strain of caregiving activities that lead caregivers to retire early. Recommendations are made for future research, which include collecting detailed caregiving data over time.
Alzheimer's disease. Unrelieved pain manifests as behaviours, potentially misidentified as dementia-related. This thesis hypothesizes that among older adults with arthritis, the presence of Alzheimer's disease is a barrier to prescription of analgesics, specifically non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen. Unrelieved pain manifests as behaviours which are managed with psychotropics, specifically neuroleptics among those with severe dementia raises some concerns.

NOMINATIONS INVITED FOR THE 2003 THIRD ANNUAL “SENIOR LEADERSHIP” AWARD

The SFU Gerontology Research Centre “Senior Leadership” Award recognizes the contribution that British Columbia seniors make as volunteers. Seniors eligible for nomination must be BC residents who have contributed their time and experience to Simon Fraser University or a post-secondary institution elsewhere in the province and/or who have provided exemplary volunteer service on behalf of their peers. Nominations are sought from any past and current SFU Gerontology Centre and Program faculty and staff, currently enrolled Gerontology students, Gerontology Program alumni as well as from BC seniors groups and seniors advocacy organizations. See our website: http://www.harbour.sfu.ca/gero/senior_leadership_award.htm

SUBMIT NOMINATIONS TO:
Sandra Cusack
Gerontology Research Centre
2800-515 West Hastings Street
Vancouver, BC V6B 5K3
email: scusack@sfu.ca

The deadline for nominations is October 1, 2003.
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