Western
UNIVERSITY · CANADA

Canadian Centre for
Activity and Aging

www.westernu.ca/actage
toll-free: 1.866.661.1603
ccaa@westernu.ca

Leaders in Physical Activity Research and Program Development for Seniors

Exercise and the Brain – What do we need to Remember

June 21, 2014

Western Canadian Centre for Activity and Aging

Canadian Centre for
Activity and Aging

www.westernu.ca/actage
toll-free: 1.866.661.1603
ccaa@westernu.ca

Leaders in Physical Activity Research and Program Development for Seniors

Ontario ONTARIO BRAIN INSTITUTE INSTITUT ONTARIEN DU CERVEAU

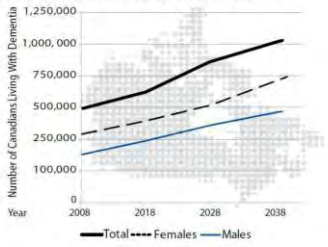
- The Ontario Brain Institute's vision is to improve brain health
- We are moving knowledge from the research space into the public domain
- We have summarized nearly 50 years of research on the topic of physical activity and Alzheimer's disease
- Want to help people understand how they can take control of their brain health and enable them to do so

Western Canadian Centre for Activity and Aging

ONTARIO BRAIN INSTITUTE | INSTITUT ONTARIEN DU CERVEAU

Why Alzheimer's

Prevalance of Dementia by Sex 2008 to 2038



Rising Tide. 2010 Alzheimer Society of Canada

What can be done

- The economic cost of Alzheimer's disease (AD) is more than $15B each year in Canada and rising fast
- The personal and societal costs are immeasurable
- Currently, there are few treatments available for Alzheimer's disease – although research is actively pursuing new options
- In the meantime, what can be done to bend the curve? What is cost-effective and actually works?

Rising Tide, 2010 Alzheimer Society of Canada

Western Canadian Centre for Activity and Aging

Presentation Title Here

Regular physical activity can:

- Reduce the risk of developing of Alzheimer's disease by approximately 40%.
- Reduce mortality and risk of recurrent breast cancer by approximately 50%.
- Lower the risk of colon cancer by over 60%.
- Reduce the incidence of heart disease and high blood pressure by ~40%.
- Lower the risk of stroke by 27%.
- Lower the risk of developing type II diabetes by 58%
- Be twice as effective in treating type II diabetes than insulin prescription

Western Canadian Centre for Activity and Aging

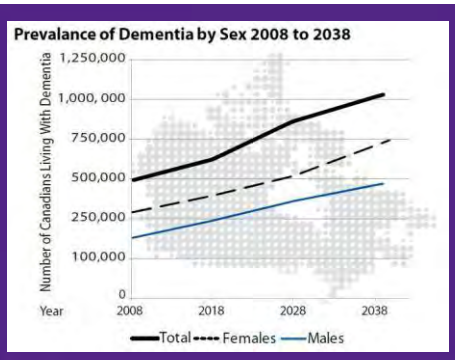
http://exercisesismedicine.org Exercise is Medicine

ONTARIO BRAIN INSTITUTE / INSTITUT ONTARIEN DU CERVEAU

Context

- The Ontario Brain Institute's vision is to improve brain health
- OBI is moving knowledge from the research space into the public domain
- Have summarized nearly 50 years of research on the topic of physical activity and Alzheimer's disease
- Want to help people understand how they can take control of their brain health and enable them to do so

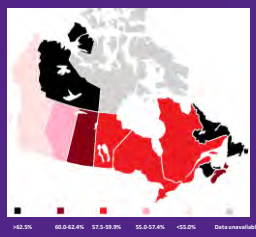
Western Canadian Centre for Activity and Aging



Rising Tide, 2010 Alzheimer Society of Canada

Western Canadian Centre for Activity and Aging

Most Canadians are physically inactive



Canada: 57.6%
Males: 51.4%
Females: 62.6%

Ontario: 59.7%
Males: 53.0%
Females: 65.2%

Data derived from the Canadian Community Health Survey 2009/2010. Chronic Disease Infobase. Surveillance Division. CCDPC, PHAC.

Western Canadian Centre for Activity and Aging

What do we mean by 'physically active'?

- Accumulate 150 minutes of activity per week*
- About 30min of brisk walking every day
- Bouts of 10 minutes
- Enough to get your heart-rate up, but you can still have a conversation
- I.e., this is something everyone can work toward. It is not marathon running

Western Canadian Centre for Activity and Aging

*current recommendation from the Physical Activity Guidelines for Older Adults

ONTARIO BRAIN INSTITUTE / INSTITUT ONTARIEN DU CERVEAU

Objectives of report

1. Examine if physical activity can help manage the *symptoms* of Alzheimer's Disease
   - Randomized controlled trials
2. Determine whether physical activity can delay the onset of Alzheimer's Disease
   - Prospective cohort studies
   - In adults 65+ with Alzheimer's disease those that were physically active showed significantly:
     - lower rates of depression
     - higher quality of life
     - improved real life activities (activities of daily living e.g., bathing, dressing, meal preparation)

Western Canadian Centre for Activity and Aging

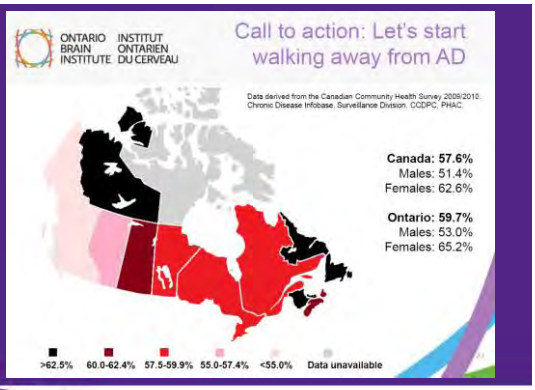
ONTARIO BRAIN INSTITUTE / INSTITUT ONTARIEN DU CERVEAU

PA and development of AD

- In adults 65+ without Alzheimer's disease:
  - Very physically active were 38% less likely to develop AD as compared to those who were inactive
  - If everyone met the current PA guidelines we could decrease the rate of diagnosis of AD by 1 in 7

	Being Conservative			
Activity Level	Avoidable Cases Ontario	Cost Savings Ontario	Avoidable Cases Canada	Cost Savings Canada
Entire population physically active	15,411	$88-970M/yr	41,349	$236M-2.6B/yr
20% of inactive population becomes active	2,667	$15-168M/yr	7,156	$40-451M/yr
10% of inactive population to become active	1,284	$7-81M/yr	3,445	$19-217M/yr

Western Canadian Centre for Activity and Aging



Western
Canadian Centre for Activity and Aging

Potential Impact

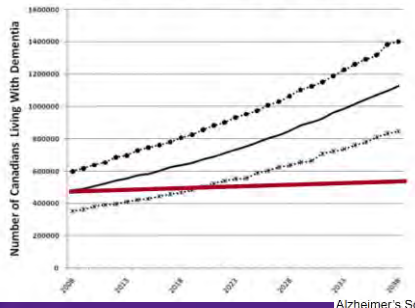
Delaying the onset of dementia **by 2 years** could reduce prevalence **by 25%**.

Delaying the onset of dementia **by 5 years** could reduce prevalence **by 50%**.

Brookmeyer et al 1998

Western
Canadian Centre for Activity and Aging

The Rising Tide



Alzheimer's Society of Canada. The Rising Tide 2010

Western
Canadian Centre for Activity and Aging

Evidence for Prevention

People who are very physically active have:

- 38% lower chance of Alzheimer's disease
- 38% lower chance of any type of dementia
- More likely to have stable or improved cognition with aging

OBI 2013; Hammer & Chida 2009; Middleton et al 2008

WATERLOO APPLIED HEALTH SCIENCES

Western Canadian Centre for Activity and Aging

Dementia as a preventable

Differences in cognitive scores associated with prior walking were equivalent to those we observed for women approximately 2 years apart in age.

Weuve et al. 2004

Western Canadian Centre for Activity and Aging

Just 1 Mile Keeps Your Brain from Shrinking

Our brains tend to shrink as we age, just like a piece of fruit on the counter. But you could help keep your brain plump and young just by walking about a mile a day.

That's right. In a 9-year study, people who walked just 6 to 9 miles each week preserved significantly more gray matter as they aged, compared with their more sedentary peers.

Steps Worth Taking

What's so great about a big brain? It likely means more mental power. In the study, not only did the walkers have less brain shrinkage, but also that translated into a twofold reduction in their risk for cognitive impairment. What's more, the researchers also looked at the benefits of physical activity in people already suffering from cognitive impairment or Alzheimer's disease and found that a mere 5 miles a week of walking seemed to slow progression of the condition. So when it comes to brains, bigger really is better. (Learn what childhood game helps prevent Alzheimer's disease, and other ways to minimize age-related brain drain.)

Nurture Your Noggin

Although the study didn't prove that physical activity was the direct cause of the brain benefits in the participants, similar studies have shown that aerobic exercise boosts both the production and the survival of new brain cells. And it's possible that physical activity may also trigger the birth of additional nutrient-delivering blood vessels in the brain, all of which would translate into a bigger, better brain as you grow older. So strap on those walking shoes! (Here's how to pick the right pair of sneakers.)

Western Canadian Centre for Activity and Aging

Recall: Potential Impact

Delaying the onset of dementia **by 2 years** could reduce prevalence **by 25%**.

Delaying the onset of dementia **by 5 years** could reduce prevalence **by 50%**.

Western
Canadian Centre for Activity and Aging

When to begin?

Physical activity may be most effective if we start in early life:

- People who were active as teenagers have 35% lower rate of cognitive impairment
- People who were active in later life (age 30+) had 20-30% lower rates of dementia

Middleton et al. 2010

Western
Canadian Centre for Activity and Aging

What to do

- Most studies have investigated aerobic exercise
  - For example, walking, jogging, swimming
- Newer studies suggest strength training may be at least as beneficial as aerobic activity

Colcombe & Kramer 2003; Liu-Ambrose et al. 2010, Cassilhas et al. 2007; Nagamatsu et al. 2012

Western
Canadian Centre for Activity and Aging

Guidelines

- Adhere to the guidelines for older adults:
  - 150 minutes of moderate to vigorous activity per week
  - Strengthening activities 2x per week

❖ Note: No evidence (yet) that more intense is better (for the brain) than less intense activity

Western
Canadian Centre for Activity and Aging

Total Daily Physical Activity

- We measured the amount of energy people expended in ALL daily physical activity
  - Not just exercise!
- People who spent the most energy had 90% lower risk of cognitive impairment over 2 to 5 years

Middleton et al. 2011

Western
Canadian Centre for Activity and Aging

Total Daily Physical Activity

- People in the highest group of energy expenditure spent about 330kcal per day
- Could be:
  - 30 minutes of moderate to vigorous exercise
  - OR, chores, gardening, standing & walking performed over the course of the day

Middleton et al. 2011

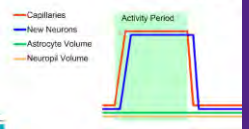
Western
Canadian Centre for Activity and Aging

Why does physical activity work?

- Brain size increases with physical activity
  - New neurons and blood vessels
- Likely due to enhanced growth factors:
  - Brain-derived
  - Vascular endothelial

Erickson et al. 2011; Thomas et al. 2012
Dishman et al. 2006

WATERLOO APPLIED HEALTH SCIENCES



Western Canadian Centre for Activity and Aging

Acknowledgements

Panel Chairs
Dr. Kathleen Martin Ginis, Dept. Kinesiology, McMaster University
Mr. Hans Messersmith, Quality and Methods Program in Evidence-Based Care, McMaster University

Consensus panel
Dr. Amy Latimer-Cheung, School of Kin & Health Studies, Queen's University
Ms. Mary Duggan, Canadian Society for Exercise Physiology
Dr. Audrey Hicks, Dept. Kinesiology, McMaster University
Dr. Jennifer Heisz, Dept. Kinesiology, McMaster University
Dr. Chris Ardern, School of Kinesiology and Health Science, York University
Dr. Michael Rotondi, School of Kinesiology and Health Science, York University
Dr. Laura Middleton, Dept. of Kinesiology, University of Waterloo
Dr. Don Paterson, Canadian Centre for Activity and Aging, Western University
Mary Burnett, Alzheimer Society of Brant
Ms. Christa Costas-Bradstreet, ParticipACTION
Dr. Jordan Antflick, Ontario Brain Institute

Research Assistant
Dr. Chelsea Pelletier, Dept. Kinesiology, McMaster University

Western Canadian Centre for Activity and Aging

Alzheimer Society ONTARIO

Minds in Motion®

A community-based social program that incorporates physical and mental stimulation for people with early to mid-stage signs of Alzheimer's disease and other dementias and their care partners.

Western Canadian Centre for Activity and Aging

Why Minds in Motion®, Why Now?

Nearly 200,000 Ontarians over the age of 65—or one out of ten—are now living with dementia, an increase of 16% over the past four years. By 2020, close to one quarter of a million seniors in Ontario will be living with dementia.

Dementia Amidst Complexity: Evidence from Ontario (2012)

We must also put an increased focus on providing more services that promote staying healthy, active, and well-connected with others in ways that are respectful of changing societal needs and preferences and our overall diversity.

Dr. Samir Sinha, MD, DPhil, FRCPC, Provincial Lead, Ontario Seniors Strategy
Living Longer Living Well (2013)

Among older adults with Alzheimer's disease, routine/regular physical activity can improve performance of activities of daily living, depression, mobility and balance.

Consensus Statement, Ontario Brain Institute (2013)

Physical activity combined with cognitively stimulating activities that challenge the whole brain and social engagement contribute to improved brain health.

See www.baycrest.org

Western
Canadian Centre for Activity and Aging

What is Minds in Motion®?

- A program of the Alzheimer Society
- Model developed by the Alzheimer Society of British Columbia
- Consists of:
  - ✓ A once-weekly, two hour program, delivered over eight weeks
  - ✓ 45 minutes to one hour of physical activity
  - ✓ 45 minutes to one hour of mentally stimulating activities
  - ✓ Opportunity to socialize and develop new friendships with others experiencing similar circumstances

Western
Canadian Centre for Activity and Aging

British Columbia's Program – A Success!

- Benefits to individuals with dementia include, but are not limited to:
  - ✓ Improved balance, mobility, flexibility and alertness
  - ✓ Increased confidence and comfort with their own situation
  - ✓ Increased social connectedness

Western
Canadian Centre for Activity and Aging

British Columbia's Program – A Success!

- Benefits to both individuals with dementia and their care partners include, but are not limited to:
  - ✓ Sharpened mental functioning, sometimes lasting two to three days
  - ✓ Reduced sense of isolation
  - ✓ Having the opportunity to join others in a 'normalized' environment

As detailed in British Columbia's *Summary of Findings from the 2012-2013 Minds in Motion® Evaluation*

Western
Canadian Centre for Activity and Aging

Minds in Motion® in Ontario

- Introducing an evidence-based framework and partnership model in 12 communities over the next two years
- Programs delivered in Municipal Recreation Centres, Older Adult Centres or similar community-based multi-service centres (e.g., YMCA)
- Continued development based on evaluation findings
- Gradual roll-out of established program across all of Ontario

Western
Canadian Centre for Activity and Aging

Ontario's Program – Evidence Based Framework

- Staying true to British Columbia's program
- Partnering for further development and/or evaluation with:
  - ✓ University of Western-based Canadian Centre for Activity and Aging
  - ✓ Ontario Brain Institute
  - ✓ A team from the Brock University Department of Recreation and Leisure Studies
  - ✓ At team from the University of Waterloo Department of Kinesiology

Western
Canadian Centre for Activity and Aging

Ontario's Program – Intended Outcomes

- For program participants:
  - ✓ Increased level of participation in physical activity and recreational opportunities
  - ✓ Maintenance or improvement in level of functional ability
  - ✓ Enhanced social support networks
  - ✓ Greater community connectivity and inclusion
- For volunteers, students, delivery staff and broader community:
  - ✓ Increased capacity through exposure, training and learning from one another

Western
Canadian Centre for Activity and Aging

CCAAs New Course

Contact your AS for more info

SFIC Recommended

FE4D

Training to be launched in the Fall

4 course registrations

Western
Canadian Centre for Activity and Aging

Minds in Motion Pilot Project Implementation

Research Reviews

Cardiovascular Exercise and the Mind

Cardiovascular exercises have been identified as one of the healthiest and most beneficial activities for people of all ages. Through countless population and animal studies, the benefits of exercising have proven to be far more intriguing and perhaps, more motivating than the benefit of weight loss alone.

It is well known that deterioration with decreased replenishment of cells accompany the process of aging. Of interest is the loss of neurons (the cells of our brain), and the fact that these cells cannot replace themselves once lost. Their declining number is a perfectly normal process of aging, starting from the moment of our birth and reaching 50% loss by the age of 90. It is relieving to note that this normal loss of neurons is not responsible for the decrease in cognitive function observed in older adults. This worrisome loss of cognitive function is due to the loss of synaptic plasticity and its maintenance. Synapses are fundamental mechanisms of neuronal communication. It has been shown that with age, many of these pathways weaken and disappear due to disuse and decreased activity. So where does cardiovascular exercise come in with regards to brain health?

Western
Canadian Centre for Activity and Aging

Steps to Program Planning

- 5 steps in total
- Underpinned by a person-centered approach to keep the focus on the individual.

Western

Step 1: Engaging participants

- Engage with individual participants by listening and talking to them and understanding their responses
- Including watching or taking part in activities
- Caregivers, family and friends have a useful contribution to make as well
- Find historical activities, interests or passions of individuals
- Be mindful of elder speak

Western

Step 2: Assessment of potential

- Identifying what to include rather than exclude.
- Focus on what individuals can do, would like to do and would likely benefit from most, and how these things tie into available opportunities.
- I.e. if people fall regularly, propose activities that will improve their strength and balance and reduce their risk of falls and fractures, rather than limit physical activity opportunities.

Western

Step 2: Assessment of potential

- Avoid temptation of lowering our expectations for people living with dementia
- "think big" in terms of what each individual can achieve.

Western
Canadian Centre for Activity and Aging

Step 3: Screening

- Understand the full health status of people living with dementia
- Avoid exercises that are not recommended for them
- Know what type of dementia they have and where they are on the dementia journey
- Most conditions (co-morbidities) are reasons for people living with dementia to participate in physical activity, but clearly health status and treatments (e.g., anxiety and medications) must be informed.

Western
Canadian Centre for Activity and Aging

Step 4: Auditing possibilities

- Assess potential activity possibilities and match these to individuals and their interests and needs
- The local environment, facilities, groups, events and people will create many opportunities

Western
Canadian Centre for Activity and Aging

Step 5: Evaluation and Success

Evaluate:

- The extent to which an individual could initiate and maintain physical activity participation
- Quantitative and Qualitative Assessments of the physical activity experience- including, most importantly, feedback from the individual, caregivers and family members.

Western

Step 5: Evaluation and Success

- Measures of success should be flexible.
- Success can be measured by engagement and enjoyment as by statistics or achievements on any particular test.
- Single case studies and individuals histories/diaries can prove just as powerful and meaningful to all concerned.
- Monitor and review skills and experiences in implementing wellness programs.

Western

Key Program Components

- **Physical tasks**
  - leg strengthening exercises, performing a Sit to Stand, improving stand balance and undertaking a regular walking program
- **Motivational strategies**
  - including activity with personal meaning and relevance to increase motivational goal-setting
- **Behavioral support**
  - reinforcing regular physical activity, successes and achievements (immediate feedback during and after walks)
- **Environmental support**
  - using the built environment to assist the program - handrails

Western

Implementation

Physical activity strategies

- Break down elements of physical tasks into smaller tasks
- Use simple, precise verbal instructions
- Provide alternative strength and balance activities
- Use Mary's historical activities (dance) to stimulate balance activities through participation in a twice weekly dance group.

Western

Implementation

Motivational strategies

- Adopt the key message "Get Up and Go"
- Set appropriate tasks and goals
- Break tasks down into smaller and achievable goals
- Find ways of recording the experience to prompt Mary and remind her of successes and achievements

Western

Implementation

Behavioral support strategies

- Reinforcing regular physical activity, rewards, and achievements
- Initiate walking through wellness staff's cues and prompts for self-starting
- Reinforce behavior through dementia staff, family and friend visitors

Western

Implementation

Environmental support strategies

- Using the built environment to support the program
- Use safe walking routes to reinforce activity
  - Cued by colourful wall stickers,
- Plan to walk at key times in the day when there is limited movement of others in the center and gardens, to create a relaxed, quiet, and 'uncluttered' environment

Western
Canadian Centre for Activity and Aging

Resources

Useful Websites

Alzheimer's Society of Ontario - http://www.alzheimer.ca/on
Canadian physical activity guidelines for older adults 65 years and older (PDF) – http://goo.gl/xlkmA
Canadian Physical Activity Guidelines – http://goo.gl/r8BTJ
Ontario Brain Institute – http://www.braininstitute.ca
Proceedings of the National Academy of Science of the United States of America – http://www.pnas.org
Statistics Canada – http://goo.gl/8byH8
UK Physical Activity Guidelines – http://goo.gl/8h7VH
US Department Guidelines – http://goo.gl/BFp6x
World Health Organization – http://goo.gl/dVjr8
World Health Organization Dementia - http://goo.gl/w6cP5

Western
Canadian Centre for Activity and Aging

Questions

Western
Canadian Centre for Activity and Aging

For more information about Alzheimer's disease and other dementias, visit alzheimerontario.ca or call 211 to contact the Society near you.

ONTARIO BRAIN INSTITUTE
INSTITUT ONTARIEN DU CERVEAU

HAMILTON AND HALTON Alzheimer Foundation
Where memories are lost... We'll be found.

Société Alzheimer Society ONTARIO

ParticipACTION Let's get moving

McMaster University

PACE Physical Activity Centre of Excellence

CSEP SCPE

Western Canadian Centre for Activity and Aging

ALCOA CVAA

References

Alzheimer's Society of Ontario. (2009). *Rising Tide: The Impact of Dementia in Ontario*. Retrieved from http://www.alzheimer.ca/en/on/Get-involved/Raise-your-voice/Rising-Tide.

American College of Sports Medicine. (2009). *Guidelines for exercise testing and prescription*. (8th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

American College of Sports Medicine. (2009). Position Stand: Exercise and physical activity for older adults. *Medicine and Science in Sports and Exercise, 41*(7), 1510-30.

American College of Sports Medicine. (2011). Position Stand: The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults: Guidance for prescribing exercise. *Medicine and Science in Sports and Exercise, 43*(7), 1334-59.

American College of Sports Medicine. (1998). *Resource Manual for Guidelines for Exercise Testing and Prescription*. Lea and Febiger, Philadelphia.

Beck, C.K., & Shue, V.M. (1994). Interventions for treating disruptive behaviour in demented elderly people. *Nursing Clinics of North America, 29*(1), 143-155.

Borg, G.A. (1982). Psychophysical bases of perceived exertion. *Medicine and Science in Sports and Exercise, 14*(5), 377-81.

Brill, P.A., Probst, J.C., Greenhouse, D.L., Schell, B., & Macera, C.A. (1998). Clinical feasibility of a free-weight strength training program for older adults. *Journal of the American Board of Family Practice, 11*(6), 445-45.

Brubaker, B.H. (1996). Self-care in Nursing Home Residents. *Journal of Gerontological Nursing, 22*(7), 22-30.

Campanelli, L.C. (1996). Mobility Changes in Older Adults: Implications for Practitioners. *Journal of Aging and Physical Activity, 4*, 105-118.

Canadian Centre for Activity and Aging, Physical Activity Resource Centre. (2013). *Advocating for Physical activity: A guide to better understanding fitness and aging and become an advocate for older adult physical activity in your community*. (1st ed.) London, ON.

Canadian Centre for Activity and Aging. (2008). *Ready, set, get fit! Exercise and education program for older adults* (1st ed.). London, ON.

Canadian Centre for Activity and Aging. (2013). *Seniors' Fitness Instructor's Course: Resource Manual*. London, ON: Canadian Centre for Activity and Aging.

Carter, N.D., Donaldson, M.G., Flicker, L., Heimonen, A., Janssen, P.A., Khan, K.M. et al. (2001). Results of a 10-week community based strength and balance training programme to reduce fall risk factors: a randomized controlled trial in 65-75 year old women with osteoporosis. *British Journal of Sports Medicine, 35*(5), 348.

Western Canadian Centre for Activity and Aging

For More Information:

Clara Fitzgerald

cfitzge4@uwo.ca

1-866-661-1603

http://www.uwo.ca/actage

FACEBOOK – Canadian Centre for Activity and Aging

Twitter @westernuCCAA

Western Canadian Centre for Activity and Aging


1878
Western
UNIVERSITY · CANADA