



Centre de recherche  
sur le vieillissement  
Research Centre  
on Aging

# Encrâge

NEWSLETTER  
on current research projects

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Centre de santé et de services sociaux –  
Institut universitaire de gériatrie de Sherbrooke  
Health and Social Services Centre –  
University Institute of Geriatrics of Sherbrooke



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For more than 25 years, the Research Centre on Aging has been pursuing its mission under the Health and Social Services Centre – University Institute of Geriatrics of Sherbrooke (CSSS-IUGS).

The CDRV has more than 45 active researchers and some 20 associate researchers. It is affiliated with most of the faculties of the Université de Sherbrooke. The CDRV is among 19 research centres which are recognized and funded by the Fonds de recherche du Québec - Santé (FRQS).

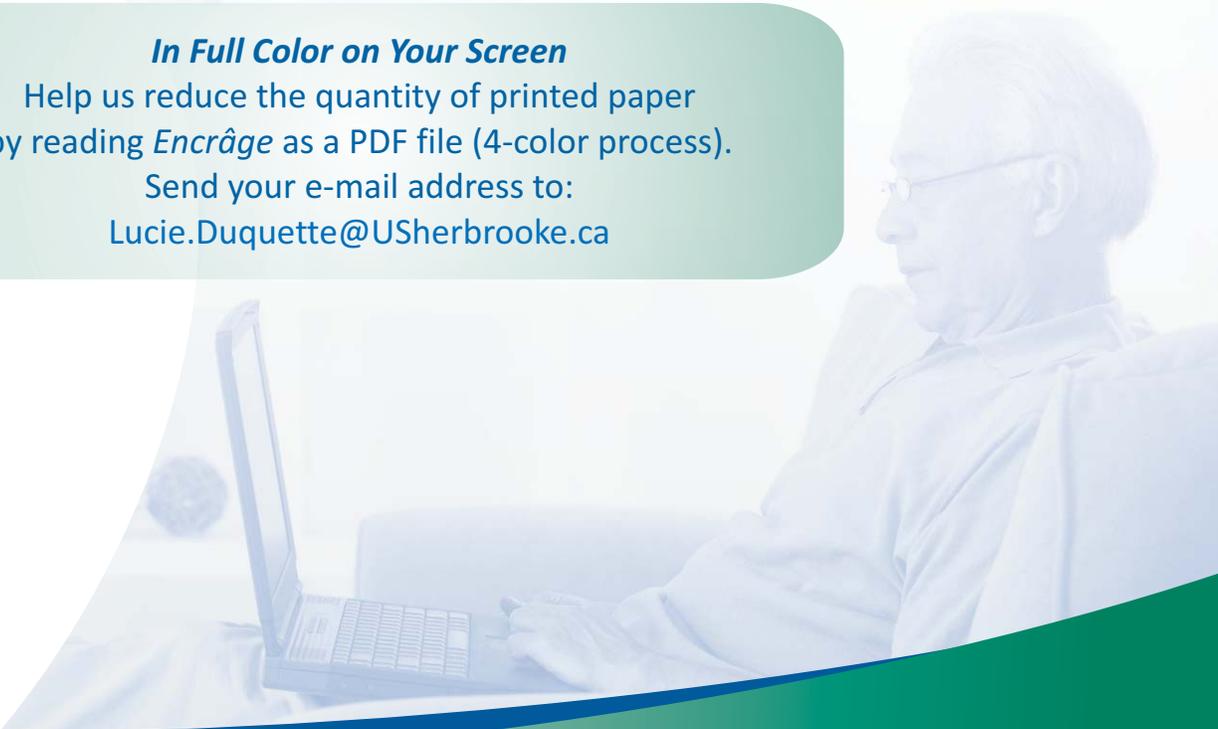
The Research Centre on Aging is a partner of the web site “Recherche Clinique Sherbrooke” providing information about a number of clinical-research projects in Estrie.

**[www.recherche-clinique-sherbrooke.com](http://www.recherche-clinique-sherbrooke.com)**

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## AT THE HEART OF THE LARGEST STUDY ON AGING IN CANADA

### The Canadian Longitudinal Study on Aging (CLSA)

is a long-term national study that will follow approximately 50,000 Canadian men and women between the ages of 45 and 85 for at least 20 years.

Estrie is at the heart of the largest study on aging in the world. Indeed, the Research Centre on Aging was selected among the eleven data-collection sites across the country to accumulate information about biological, medical, psychological, social, and economic changes in people. Some 20 000 residents across Canada will be interviewed by telephone once every three years. Some 30 000 others will visit one of data-collection sites, including the one in Sherbrooke.

So far, Sherbrooke's population has shown a very good response to the invitation to participate in this study, whether for a telephone interview or to visit the research centre. According to researcher H  l  ne Payette, head of the Sherbrooke site, "we have already met with nearly 700 people of the 3 000 who will be contacted in the region for a meeting at the centre. The data collected over 20 years will help us to better understand the causes of diseases and disabilities. The information will also shed light on why some people stay healthy as they age and others develop diseases," explained Payette.

The research centre also houses a call center for the participants taking part solely in the telephone interviews. At the start of 2013, Sherbrooke interviewers had already conducted more than 3 200 interviews with Quebec participants and French-speaking participants from other Canadian provinces.

#### *In Tangible Terms*

In tangible terms, Estrie residents within 50 km of Sherbrooke will be contacted by L  ger Marketing to determine their interest in taking part in the study. People from 45 to 85 years old who are interested will receive an information kit about the study and will then be visited by a member of the research team. Once every three years, they will be requested to come to the Research Centre on Aging for a visit lasting two



  tude longitudinale canadienne sur le vieillissement  
Canadian Longitudinal Study on Aging



and a half hours, including an interview and the taking of biological and physical information.

"In 2026," stated Professor Payette, "one person out of five in Canada will be older than 65. The proportion of the elderly will double in some provinces. Aging is becoming a major issue for the development of our communities. The Canadian Longitudinal Study on Aging will yield a wealth of information enabling researchers to provide better responses for population health and well-being."

CLSA is codirected by Parminder Raina, lead investigator, at McMaster University, along with Susan Kirkland at Dalhousie University, and Christina Wolfson at McGill University, who are principal co-investigators in the study. Moreover, a team of 160 researchers from coast to coast are taking part in this project.

## MEDITERRANEAN DIET: THE VIRTUES OF OLIVE OIL

### A Research Centre Team Demonstrates Olive Oil's Positive Effects on Blood Cholesterol (HDL)

Cholesterol is essential for the body, which requires it to convert hormones and to structure and stabilize cell membranes.

We have all heard about good and bad cholesterol.

Good cholesterol (HDL) is called good because it carries excess cholesterol to the liver for elimination from the body. The bad form (LDL) is carried from the intestines to the various cells in the body, including macrophages (or immune-system cells). When there is too much LDL cholesterol, the macrophages become bloated with it and build up on arterial walls, forming plaque. Over time, this plaque calcifies and then causes hardening of the arteries. The plaque can also break free and cause a stroke or heart attack (myocardial infarction). As we age, the risk of cardiovascular problems increases.

Scientists have long thought that olive oil, the centerpiece of the Mediterranean diet, might have health benefits because it reduces blood cholesterol levels. Indeed, people living in the Mediterranean region have fewer cardiovascular problems than those everywhere in the world... and it's not just because of sunnyskies!

The oxidative stress and atherosclerosis research team led by Professor Abdel Khalil has sought to understand the fundamental biological mechanism of this effect. But how does olive oil really affect blood cholesterol levels and how does its effects show up?

Under this research program, 60 patients in good health between the ages of 25 and 83 years agreed to take 25 mL of cold-pressed, extra-virgin olive oil every day for 12 weeks without changing their normal diet. The olive-oil intake did not result in excessive weight gain among the participants, although comparative blood samples taken before and after the experiment showed a change in blood composition.



#### *Faster and Better*

To start, Professor Khalil's team extracted HDL and macrophages from the plasma of patients and put them in a culture to measure the interaction between them. The result was that, after a 12-week diet of olive oil, HDL's capacity for transporting excess cholesterol increased significantly. "What is interesting," pointed out Professor Khalil, "is that their capacity increased even though their blood concentration remained practically the same." In other words, HDL levels remained stable, but HDL performed better.

The research team also found that, after 12 weeks on the diet, the cells had more receptors on their surface membranes to attach to the HDL, which accounts for the improved HDL-cellular interaction. This difference is significant because the cells' capacity to "lock on" to cholesterol for transport had quintupled.

"If you compare HDL to a train," said Professor Khalil, "it's as if we have shown that the train (HDL) was moving faster and that the wagons (receptors) were also being loaded more rapidly."

#### *New Research*

The interesting aspect of extra-virgin olive oil is its concentration of polyphenols, which are also found in fruit and vegetables. Professor Khalil's team also conducted another experiment in which they prepared a "scientific soup" composed of cells and polyphenols

extracted directly from olive oil. The result was an increase in the number of membrane receptors on the cells, which is unequivocal proof of olive oil's direct effect on their capacity to attach themselves more effectively to HDL.

"This study was conducted with healthy individuals," said Professor Khalil. "The next step would be to reproduce this study with people with cholesterol problems." He also wants to determine if olive oil's

effects on blood change with the age of patients, including the elderly.

Many issues remain unclear. "While HDL plays a protective role in cardiovascular diseases, analysis of the data from certain studies indicates that 44% of individuals who had a heart problem also had normal HDL levels. What prevented their HDL—good cholesterol—from functioning properly? Is there a link with aging?"

## POSTMENOPAUSAL WOMEN: MAINTAINING MUSCLE MASS

### Avoid Cold Cuts as a Source of Animal Protein

Sherbrooke researchers have demonstrated that eating animal protein does not always increase the risk of postmenopausal women developing type 2 diabetes, as research has tended to show up to now. In fact, the source of the animal protein is the key issue and such women should refrain from eating prepared meats, such as deli meats, sausage, bacon, and cold cuts.

#### *Maintaining Muscle Mass*

Based on the results of a clinical study, animal protein, which is essential for maintaining muscle mass as people age, should come from healthy, unprocessed foods such as dairy products, eggs, fish and chicken as well as of moderate quantities of red meat. The research was directed by Professor Isabelle Dionne, an investigator with the Research Centre on Aging (HSSC-UIGS), in cooperation with doctoral student Mathieu Maltais. "After menopause, women need protein to maintain muscle mass," explained Isabelle Dionne. "Sedentary women who are overweight are at a higher risk of developing diabetes. As a result, they need to pay close attention to the sources of animal protein in their diet."

"The groups of women we followed ate animal protein but avoided cold cuts and prepared meats," pointed out Professor Dionne. "The participants were therefore able to maintain muscle mass with no evident increase in insulin resistance."



#### *Combining Protein and Exercise*

This study adds to the findings of Isabelle Dionne's team, which demonstrate the benefits of consuming animal protein as part of a healthy diet combined with strength-training program. "Loss of muscle mass in people over the age of 50 is physiologically inevitable, but physical training and diet can help reverse the trend," explained Professor Dionne. Maintaining muscle mass is essential in the aging to maintain muscle strength and the capacity to engage in physical activity, while fighting against body fat, insulin resistance, and loss of bone density. Muscle mass has therefore been recognized as a factor in reducing the risk of falls and fractures among the elderly.

## New Research

Professor Dionne's team is conducting research on physical exercise and diet among people age 60 to 75 years. Many projects are under way that require the participation of sedentary men and women to engage in training supervised by kinesiologists in a specially equipped training room at the Research Centre on Aging. These research projects aim at studying the effects of exercise on sedentary nonsmokers by having them undertake a 12-to-16 week program of physical activity tailored to their individual condition.

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## ADVANCE DIRECTIVES: SAYING WHAT YOU WANT



A team of researchers under the direction of Professor Gina Bravo is investigating the efficacy of advance directives, which enable individuals to express their wishes about end-of-life care before they become unable to. This study is funded by the Canadian Institutes of Health Research (CIHR).

A number of benefits are attributed to such directives, such as: They help extend the patient's decisional autonomy. They improve end-of-life medical care and avoid the delivery of unwanted care. They lighten the burden on families confronted with decisions, which reduce the risk of intrafamily conflicts, diminish stress, and facilitate grieving.

But is this really the case? Scientific literature provides little certainty, which is why Gina Bravo initiated a research program on this subject with six other researchers, including three from the Research Centre on Aging (Dr. Marcel Arcand, Professor Danièle Blanchette, and Professor Marie-France Dubois).

As part of her research, Professor Bravo wants to assess the effectiveness of an intervention conducted with professionals to increase the proportion of the elderly who commit their care preferences in writing. Moreover, she wants to determine if such a program would improve consistency between the decisions made by a family member with those that an individual would make if still able to do so. This program also aims at determining if it is possible to increase the number of people who would agree to take part in a research project even when they have become incapacitated in order to enhance our knowledge and develop better care.

The research team is currently recruiting dyads (pairs) of participants: one older than age 70 living at home and capable of making decisions; the other a family member that this person has chosen and who could make decisions in his name, in the event of incapacity.

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## FALLS AND FRACTURES: PROFESSIONAL COLLABORATION

During their lifetimes, about 50% of Canadian women and 30% of Canadian men age 50 or older will fracture a bone due to brittle bones, usually a wrist, hip, or vertebra. Brittle fractures most often occur as the result of a fall or minor trauma that would not result in a fracture in a healthy individual. Such fractures require specific medical follow-up; treatment of brittle fractures represents major costs to health-care systems.

It's one of the reasons that optimal treatment should allow for coordination between professionals who treat fractures and those who help prevent falls. A team of 15 researchers, codirected by Professor Isabelle Gaboury (Université de Sherbrooke) and Professor Hélène Corriveau (Research Centre on Aging), has initiated research under the name of OPTI-FRAC (for osteoporosis, prevention, intervention, interdisciplinary, brittle fracture, and falls) aimed at better integrating and coordinating existing programs and services in the Quebec system to prevent brittle fractures.



In tangible terms, the project aims at better disseminating information between first-line medical teams (emergency rooms, family medicine groups), orthopedic surgeons, and practitioners in fall-prevention programs. About ten sites across Quebec will offer people age 50 or more the opportunity to take part in this project, if they have a fracture. The research team received a major grant from the Canadian Institutes of Health Research (CIHR), in partnership with the Department of Health and Social Services, the HSSC–University Institute of Geriatrics of Sherbrooke, and many other partners.

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## CURE : REHABILITATION CARE

### **Researchers at the Research Centre on Aging involved in the New CURE Rehabilitation Clinic**

The Clinique universitaire de réadaptation de l'Estrie (CURE), a solidarity cooperative, provides physiotherapy and occupational therapy services, giving priority to people who do not have access to this type of service. This clinic also contributes to the training of students and research development. Professors Johanne Desrosiers, Mélanie Lévasseur, and Michel Tousignant, all researchers with the Research Centre on Aging, are involved in this project.

CURE gives priority to clients who do not have access to rehabilitation services, in particular, individuals who do not have insurance or who have exhausted their coverage. People covered by the Société de



l'assurance automobile du Québec or the Commission de la santé et de la sécurité du travail are referred to physiotherapy clinics in their region.

“The clinic primarily targets the rehabilitation of patients with musculoskeletal problems, such as sport injuries; sprains; and back, knee, and shoulder pain as well as more general conditions such as fibromyalgia, rheumatoid arthritis, and osteoarthritis,” pointed out Catherine Apinis, CURE executive director. “In the relatively near future, we would like to broaden our areas to include neurology problems and to develop the occupational therapy component.”

CURE also wants to provide quality internships to students trained at the School of Rehabilitation in the Faculty of Medicine and Health Sciences at the Université de Sherbrooke. "The clinic's mission is related to our school's philosophy of training high-caliber rehabilitation professionals," stated Johanne Desrosiers, director of the School of Rehabilitation and Vice-Dean to Rehabilitation.

On the research side, the clinic will provide for validating new therapeutic approaches through patient follow-up and assessment.

***For more information:***

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## OMEGA-3 FATTY ACIDS GOOD FOR THE BRAIN?

Around 11% of Canada's population aged over 65 years has Alzheimer's disease. Minor aging-related memory losses are often considered benign because they don't affect the individual's lifestyle. However, memory losses characterizing Alzheimer's disease profoundly affects the patient life together with his or her family daily life. Above all, there is currently no cure for Alzheimer's disease such that it is crucial to find prevention strategies.

One strategy supported by an increasing number of scientific studies is nutrition. Among food products, intake of fatty fish like salmon containing omega-3 fatty acids was associated with a lower risk of cognitive decline. In one study, the risk of cognitive decline dropped by nearly 60% among people eating more than 2 fatty fish serving per week. Salmon, tuna, sardines, herrings, and mackerel are the most concentrated in omega-3 fatty acids. However, after onset of the disease, intake of fatty fish has not shown promising results in slowing its progression. Therefore, consumption of fatty fish seems useful for preventing cognitive decline but not for curing or slowing the progression of the disease.

"Our research team recently showed that aging upset the balance of omega-3 fatty acids in the blood," said Mélanie Plourde, researcher at the Research Centre on Aging. Moreover, the distribution of omega-3 fatty acids in the blood of carriers of apolipoprotein E epsilon 4 (APOE4), a protein involved in the transport

of omega-3 in the blood, was imbalanced. Carrying APOE4 isoform is currently recognized as being the most important genetic risk factor of cognitive decline."

Nevertheless, not all APOE4 carriers develop Alzheimer's disease since this genetic factor is significantly influenced by lifestyle, such as physical activity, nutrition, and tobacco use.

Professor Plourde's team concluded from her last studies that an imbalance in omega-3 fatty acids in the blood may be intimately involved with a higher risk of cognitive decline.

Because she wants to develop fundamental knowledge and new nutrition strategies for sustaining healthy cognitive aging, her team is recruiting healthy men and women between the ages of 20 to 80 years, non-smokers and not currently taking omega-3 supplements.

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## ALZHEIMER : CAN WALKING STIMULATE THE BRAIN?

### Can physical exercise improve the brain function of people with Alzheimer's Disease?

Sugar-glucose is the brain's main source of energy. A regional reduction in its use by the brain is present in Alzheimer's disease. This decrease could be a factor contributing to the development of the disease, progressively leading to a decline in mental faculties (memory, reasoning, speech, mood, and judgment).

A major question still remains wholly unanswered: in such patients, does this reduced capacity of the brain to use energy pertain solely to sugar intake (glucose) or does it affect other sources of energy?

For a number of years, Professor Stephen Cunnane has been interested in these issues, particularly, the brain's use of ketones. Ketones are an alternative fuel that can provide the majority of the adult brain's energy needs during fasting or intense exercise. Could these ketones be used as energy by the brains of Alzheimer's patients? Certain studies suggest that regular exercise of light to moderate intensity can slow the progression of certain of clinical symptoms associated with Alzheimer's disease.

A study is underway at the Research Centre on Aging (HSSC-UIGS), in cooperation with the Centre de Recherche Clinique Étienne-LeBel (CRC-CHUS), to assess the potential benefits of a walking program for Alzheimer's patients. This study is based on modern neuroimaging techniques. One group of participants will take part in a walking program on a treadmill (30 to 40 minutes, 3 times a week for 3 months) and another will serve as a control group without the exercise program. All participants will have their memory, energy consumption (PET), and brain structure (MRI) assessed at the start of the project and 3 months later. This research project is now actively recruiting. Candidates must be sedentary, able to take part in a walking program, diagnosed with Alzheimer's disease, and taking cholinesterase inhibitors (Aricept, Exelon or Reminyl).

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## REDUCING PAIN

Pain is the most common reason for physician consultation. In Canada, one person out of five has chronic pain, with the proportion climbing to more than 50% among the elderly. Yet still today, health-care professionals sometimes come up short on ways to help a patient with persistent pain.

These important challenges are core issues in the research that Professor Guillaume Léonard, newly arrived at the Research Centre on Aging (HSSC-UIGS), intends to carry out. "I am fascinated by the body's natural defense mechanisms against pain," he stated. "It's a central concern in just about every aspect of medicine and rehabilitation."

He is currently recruiting healthy participants between the ages of 20 and 75 years for a study on transcutaneous electrical nerve stimulation (TENS), a rehabilitation technique used to reduce pain.

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## PROBLEMS WITH BRAIN FUEL UPTAKE DURING AGING

### Medical Imaging to Monitor Brain Energy Uptake

With his research team at the Research Centre on Aging (HSSC-UIGS), Professor Stephen Cunnane is striving to better understand the brain's energy requirements during aging.

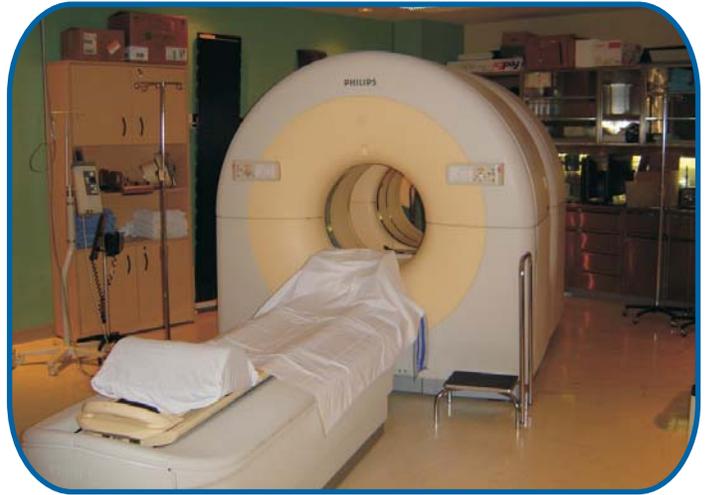
Current research indicates that the brain's main fuel; sugar-glucose intake decreases with age. This results in increased risk of memory disorders and in certain instances the development of Alzheimer's disease due to chronic energy depletion in the brain.

When glucose levels drop during fasting or intense exercise, ketones (derivatives of fat) are used as an alternative fuel for the brain. Yet current knowledge about the brain's use of ketones is still limited. With age, does the brain's decreased ability to use energy pertain only to glucose or does it also affect ketone uptake? In addition, is this drop in energy use by the brain accompanied by a reduction in intellectual performance?

These are the questions that Professor Cunnane wants to answer in cooperation with many experts at the Research Centre on Aging at the Sherbrooke University Hospital (CHUS) and the Centre de Recherche Clinique Étienne-Le Bel (CRC-CHUS). His research team uses many modern tools such as PET imaging to calculate energy consumption, as well as MRI to look at brain anatomy.

The initial results from a comparative study between a group of young adults (18–30 years) and a group of healthy seniors (65–85 years) revealed an aging-related reduction (15- 20%) in glucose use by specific regions of the brain, including the thalamus, frontal and temporal cortex. In particular, these areas are involved in memory, learning, reasoning, and speech.

Ketones also appear to be affected by age (20-30%), but this reduction touches mainly the parietal cortex.



Professor Cunnane is actively recruiting elderly participants in an attempt to confirm these results in a 4 year follow-up study.

This novel work on brain energy furthers our understanding of the biological events leading to cognitive decline associated with aging in an effort to explain neurodegenerative diseases such as Alzheimer's disease.

### VISIT OUR WEB SITE FOR OTHER ONGOING PROJECTS: [WWW.CDRV.CA](http://WWW.CDRV.CA)

- Pain and transcutaneous electrical nerve stimulation
- Sleep and cognition study
- Assess of a new portable telephone (65 years or older)
- Hip fractures
- Identifying the causes of Alzheimer's disease
- Omega-3 and Alzheimer's disease
- Weight loss and health (women)
- Weight loss and health program (men)
- Research on diabetes



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contribute to the development  
of the programs, which are subsequently used  
in a various of spheres of society  
to improve the health, care,  
and living conditions of the elderly.

This research also helps  
better define diseases  
that one day might be conquered.

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