



Nurturing the network

Professor Pierrette Gaudreau reveals how a highly collaborative network based in Quebec facilitates a diverse range of ageing research, communicates new findings to a wide audience and promotes healthy and active ageing

Could you give a brief synopsis of your research career to date? When did you first become interested in health and ageing?

I was the first doctoral student sponsored by the Faculty of Medicine at the University of Sherbrooke to undertake my training outside of Canada (at the National Institutes of Health in Bethesda, USA). I was also the first to map brain cholecystokinin receptors, using the new technique of autoradiography. During my postdoctoral studies at the University of Montreal, my research demonstrated that changes in the characteristics and abundance

of the pituitary growth hormone-releasing hormone receptor (GHRH-R) were a strong initiating factor to somatopause (ageing of the growth hormone axis leading to an increase in body fat mass). My studies also revealed that diabetes-induced glucotoxicity was deleterious to GHRH-R, somehow mimicking the ageing process.

Such findings led me to develop a research programme on the biology of ageing, which aimed to discover new signalling pathways involved in maintaining GHRH-R integrity and functionality in the course of ageing. Since then, I have made numerous scientific breakthroughs in the fields of peptide receptors and biology of ageing.

What are the main objectives of the Quebec Network for Research on Aging?

The Network is one of 17 virtual thematic networks funded by the Quebec Health Research Fund. It aims to provide leadership and excellence in research on ageing both at

Ageing in all areas

The **Quebec Network for Research on Aging** is cultivating close contact between researchers, policy makers, healthcare professionals and older people in Canada. This is facilitating large-scale studies into the numerous complex aspects of ageing

THE SOCIAL AND societal implications of ageing are not only felt by the individuals themselves, but also by families and carers, healthcare providers and national economies. For the individual, coming to terms with ageing and a reduced capacity to live an independent life can be harrowing. Equally, caring for an elderly relative can be both emotionally and financially challenging. Medical conditions in older people – from both disease and accidents – result in more hospitalisations and the need for carers. This can place a huge burden on national resources, especially if this care is inefficient. Further biological and sociological

research into ageing is therefore required in order to better understand both the personal and national issues at play.

The Quebec Network for Research on Aging was founded in 1995 to address the need for in-depth infrastructure, multidisciplinary research and communication in all areas of ageing research. Currently led by Professor Pierrette Gaudreau from the University of Montreal, Canada, the Network consists of over 500 researchers, graduate and postgraduate students, and plays a leading role in biological and social research, directly informing

the public, policy makers and healthcare professionals. "We use our multidisciplinary expertise to develop sound, rigorous and innovative research that will have an impact on the elderly population," Gaudreau highlights.

SUPPORTING SCIENCE

The Network's overarching mission covers three core themes. First, improving knowledge across all areas of ageing and promoting healthy ageing. Second, assessing the impact of novel interventions for preventing or slowing progression of physiological decline, chronic diseases, disability, frailty and loss of autonomy in older people. Third, advancing healthcare and service provision for the elderly population in order to maintain quality of life and wellbeing through all stages of the ageing process.

To achieve this mission, the Network supports interdisciplinary research between scientists in biology of ageing, clinical, healthcare and services, and epidemiological research, as well as social science. Several groups within the Network cover a diverse range of gerontological

a national and international level. We take a multidisciplinary approach and recruit researchers from numerous institutes across Quebec. The focus is broad, encompassing the biological, clinical, population, social and societal aspects of ageing in order to promote active and healthy ageing.

Additionally, we are developing state-of-the-art shared facilities and infrastructures. The research is guided by the priorities of the Canadian Institutes of Health Research, and influences the Quebec Government's policies for older people. We aim to make our research as accessible as possible to a wide audience: the population at large, influential organisations representing elderly individuals, healthcare professionals and managers, policy makers and industry.

How does the Network aim to increase knowledge in all areas of ageing, especially in the promotion of active and healthy ageing?

We focus on three major themes: cognitive and mental health, mobility, and continuum

of healthcare and services, which are all extremely important for older adults to maintain their functional autonomy. Moreover, we have groups of researchers that are specialists in the fields of cognition, mental health, incontinence and sexuality, rehabilitation and gerontechnologies, nutrition, healthcare and services, and social interaction and support. The various projects that are supported by the Network aim toward short-, medium- or long-term benefits for the older population to prevent, retard or minimise the harmful effects of ageing and associated chronic diseases.

Personally, what do you believe are the solutions to ensuring a healthy ageing population?

First, we need a better understanding of the underlying biological mechanisms of ageing, including gene-environment interactions. We also require novel, specific biomarker signatures that can predict different physiological dysregulations, degenerations and frailty states. This allows

for early intervention to maintain health and wellbeing. Moreover, we need to have a healthcare and services system that is fully adapted to older people's needs. This will ensure that optimal home care services and hospital stay for older adults who are autonomous will not result in a loss of functional autonomy later on.

Could you reveal some of the Network's biggest successes to date?

Our greatest successes so far have been the creation of numerous unique cohorts together with large data banks and biobanks, as well as preclinical animal models that are not commercially available.

The Network and its researchers are internationally recognised for these outstanding resources, which has opened up opportunities for participating in large, international research initiatives such as Horizon 2020.



The Network's contribution to a broad spectrum of ageing research is leading to improved policies, healthcare services and treatments to support people through the ageing process

research, such as mental health, cognition, nutrition, rehabilitation and gerontechnologies, and social interaction. It also strives to increase shared infrastructures among its scientists. This is reflected in the sharing of data, both electronic and biological, through databases and biobanks, as well as invaluable resources such as animal models. "These models provide a way to correlate molecular, cellular and tissue changes with functional measures," Gaudreau explains. "These help to decipher the important underlying mechanisms leading to successful or unsuccessful ageing."

COMMUNICATION IS KEY

The sharing of information is not only essential to research, but also crucial to disseminating

findings. With regard to policy makers, the Network maintains close relations with the governments of Quebec and Canada to ensure that the researchers' findings are efficiently translated into policies affecting older people. The effective communication of these findings to the older adult population is also important. This is achieved through direct collaboration with several organisations dedicated to providing information on ageing.

Coordinating with industry partners is another indispensable activity for the Network, as these organisations have the resources to translate findings into tangible benefits for people. It is also imperative for the Network to work closely with healthcare professionals to help them

provide better services and more effective treatment for ageing.

OLD MEETS NEW

Overall, the Network's contribution to a broad spectrum of ageing research is leading to improved policies, healthcare services and treatments to support people through the ageing process. But the continuation of this mission hinges on obtaining future funding that can bring in fresh minds to tackle the myriad challenges facing the field. "We hope that the Network continues to receive funding for research that impacts the lives of older adults and fosters an outstanding new generation of young researchers in the field," states Gaudreau. "Ultimately, we strongly believe that our multidisciplinary research will contribute to healthier ageing. We envision that research produced by the Network will allow for an increase in day-to-day autonomy for elderly people in Quebec and across the globe."

QUEBEC NETWORK FOR RESEARCH ON AGING

OBJECTIVES

- Support research on the biological, clinical, population, social and societal aspects of ageing
- Advance knowledge and help promote healthy and active ageing to the elderly population, NGOs, health professionals, policy makers and industry
- Improve healthcare and services for older people to maintain quality of life and wellbeing during ageing

KEY COLLABORATORS

Dr Luis Miguel Gutiérrez Robledo, National Institute of Geriatrics, Mexico • **Professor Jacques Epelbaum**, Centre of Psychiatry and Neurosciences, Paris Descartes University, France • **Dr Étienne Hirsch**, Neuroscience, Cognitive Science, Neurology and Psychiatry Institute, France • **Professor Emmanuel Moyse**, University of Tours, France • **Dr Alexander Friedrich Kurz**, Centre for Cognitive Disorders, Department of Psychiatry and Psychotherapy, Technical University of Munich, Germany • **Dr Patrizia Brigidi**; **Dr Claudi Franceschi**, University of Bologna, Italy

PARTNERS

Canada: **Montreal Research Center**, University Institute of Geriatrics • **Sherbrooke Research Center**, University Institute of Geriatrics • **Center of Excellence on Aging of Quebec** • **Douglas-Bell Canada Brain Bank**, Douglas Mental Health University Institute • **Institute of Aging** – Canadian Institutes of Health Research (CIHR) • **Canadian Consortium on Neurodegeneration in Aging** • **Canadian Longitudinal Study on Aging**

USA: **National Institute of Aging** – National Institutes of Health

FUNDING

Quebec Health Research Fund

France-Québec Council for University Cooperation

CIHR

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GAUDREAU has been Director of the Quebec Network for Research on Aging since 2010. She is Professor of Medicine at the University of

Montreal, Canada, and a researcher at the Montreal University Health Centre. Her research is mainly in the fields of neurosciences, cognition, endocrinology and nutrition, focusing on the molecular and cellular mechanisms contributing to healthy ageing.



INTERDISCIPLINARY INVESTIGATIONS

The Network incorporates a diverse range of research themes united by a desire to provide concrete benefits to elderly individuals. Here is a selection of studies currently underway:

COGNITION

Cognitive performance changes associated with age can be characterised by genetics, neuropsychology, neuroimaging and clinical approaches. Recently, a group of researchers and clinicians from the Network have developed a research platform, the Quebec consortium for the early identification of Alzheimer's disease.

Its main objective is to discover novel biomarker signatures of brain neurodegeneration (eg. mild cognitive impairment and early phases of Alzheimer's disease), before the expression of a full array of symptoms, using multiple research paradigms. It is believed that an early identification of this neurodegenerative disorder will substantially increase the chances of developing successful interventions to ameliorate the quality of life of numerous older adults.

GERIATRIC REHABILITATION AND GERONTECHNOLOGY

Such research is aimed at improving the rehabilitation services, including telerehabilitation, for the elderly population, and developing technologies to help older adults living in the community. Ongoing projects are focusing on the development of electronics for older people with cognitive impairments, use of smart environments to identify difficulties encountered in the daily activity of elderly individuals with memory problems, and development of a smart-powered wheel chair to increase social participation of older adults with disabilities.

FRAILITY

The Canadian Institutes of Health Research Team in Frailty and Aging has developed a research programme to advance knowledge on frailty predictors. Through this, it aims to improve treatment of frailty in social and health service settings.

<http://bit.ly/MR-frailty>

MOBILITY

The International Mobility in Aging Study aims to improve understanding of how to prevent or slow down loss of mobility. Since 2011, it has been investigating whether certain life experiences lead to mobility loss in later life.

<http://bit.ly/MR-mobility>

NUTRITION AND SUCCESSFUL AGEING

This theme explores why some people age with fewer complications than others, covering a wide range of dietary, genetic and other environmental factors. A large-scale population study called the Quebec Longitudinal Study of Nutrition as a Determinant of Successful Aging (NuAge) has led directly to the establishment of the NuAge biobank – a fantastic resource for both national and international research.

<http://bit.ly/MR-nutrition>

