



The Canadian Association for Neuroscience

One in three Canadians will suffer from a neurological disorder, an injury to their brain or nervous system, or a psychiatric illness in his or her lifetime. **Dr Samuel David**, President of CAN, explains how the Canadian neuroscience community is tackling this significant health concern



Could you begin by outlining the overarching mission of the Canadian Association for Neuroscience (CAN), and why this organisation was established?

CAN's mission is to promote neuroscience research in Canada. We accomplish this in several different ways: we promote communications amongst neuroscientists by holding a three-day annual meeting; we advocate the interests of neuroscientists at national and international levels; we contribute to the advancement of neuroscience education; and we disseminate the results of current neuroscience discoveries made in this country to the general public.

The Association was established in the 1970s to ensure that the views of the Canadian neuroscience community were represented to policy makers and the public, but also within the larger Society for Neuroscience, which is a North American society and the largest association of neuroscientists in the world (with about 42,000 members).

How has the field of neuroscience evolved over the years and where do you see it heading in the future?

Neuroscience as a scientific discipline is only about 40 years old. Prior to that it was recognised by its sub-specialties (neurochemistry, neuroanatomy, neurophysiology, neuropharmacology). Neuroscience now encompasses all these areas, and neuroscientists use an integrated approach to their work. This means greater collaboration and interactions between scientists.

Today, neuroscience is more pertinent than ever, and will continue to be so in the future. When you consider that one in three Canadians will suffer from a neurological disorder, an injury to their brain or nervous system, or a psychiatric illness in his or her lifetime, it becomes evident that neuroscience research is of crucial importance for everyone. Although there are over 1,000 known conditions that affect the nervous system, neuroscientists are now finding commonalities amongst these that allow for a more mixed approach to developing therapies and cures.

A researcher in your own right, you are engaged in three distinct areas: central nervous system (CNS) and peripheral nerve injury, multiple sclerosis and neurodegenerative disease. Does your work at McGill University inform your role as President of CAN?

As a scientist working in a number of different areas of neuroscience, I think I bring a broader understanding of the needs of neuroscientists to the Association. I am also the Director of the Canadian Institutes of Health Research-(CIHR) funded Training Programme in Neuroinflammation based at McGill University, which brings together 16 laboratories from three universities in the Montreal area. This group includes clinicians, neurobiologists, geneticists, virologists, and many cell and molecular biologists like myself. My background therefore helps me gather people together to exchange ideas, foster collaborations and mentor trainees.

What are the challenges and benefits of presiding over the Association?

Being the President of CAN is a great opportunity and a challenge, too. Although CAN is over 30 years old, it has only been an active association in its present form (holding annual scientific meetings, promoting neuroscience via the website and involving itself in various forums) for the past seven years. Our current challenge is to grow the Association to include as many of the established researchers, postdoctoral fellows and graduate students as possible across the country.

Our annual three-day meeting held in different Canadian cities each year are well attended by between 700-1,000 people, but we hope do better. There is a great deal of energy and enthusiasm at these meetings. It is a forum for exchanging ideas, presenting our ongoing work and establishing collaborations. Above all, it is an excellent forum for trainees (postdoctoral fellows and graduate students) to present their work, obtain feedback from others, and make contact with established senior scientists from across the country.

We are also working to encourage and help trainees attend the annual meeting by providing more travel awards. In addition, we aim to do more to promote neuroscience research and to spread knowledge of neuroscience discoveries to the public. We want to be a resource for information about neuroscience and key scientists throughout Canada who can be contacted for their expertise.

Could you provide examples of some of the latest Canadian neuroscience discoveries?

Many great neuroscience discoveries are made in Canada. Just last week, a team led by Dr Nahum Sonenberg (which includes researchers at McGill and the Université de Montréal) published an article in *Nature* describing how they were able to reverse autism-like symptoms in a mouse model of the condition. The main focus of Nahum's research is on the processes whereby the body makes new proteins, and how cancer arises and progresses. Now they have shown that aberrant changes to this process likely contribute to autism spectrum disorders. This is a great example of the collaborative nature of neuroscience research.

Another recent example of the very high quality research done in Canada is an article by Dr Kurt Haas at the University of British Columbia recently published in the journal *Cell*. He studies synaptic plasticity, which is the ability of neurons to make, break, strengthen or weaken connections between themselves. It is thought that the formation and strength of these connections are the basis of learning and memory. Kurt has developed a model system that allows him to investigate how neurons respond to their environment, and how this response is conditioned by the previous 'experiences' and reactions of each neuron. This system has enabled his team to identify molecules that are essential for this neuronal response and could be potential therapeutic targets in disorders where neurons do not react normally to stimuli. This is truly groundbreaking research that has implications



for many areas, including brain development, learning and memory and various neurodegenerative disorders.

A striking example of how basic discovery research can be rapidly brought to the clinic was recently reported by Dr Freda Miller at the Hospital for Sick Children in Toronto in the journal *Cell Stem Cell*. Stem cells produce all of the diverse cell types in the brain during development, but are much less active in the adult brain. Freda's study found that metformin, a commonly used and inexpensive diabetes drug, 'kick-starts' stem cells in the brains of mice, enabling them to learn better and to remember new tasks. Metformin has been used safely in children with diabetes for many years. The group at the Hospital for Sick Kids in Toronto is now starting a clinical trial to determine whether metformin combined with exercise (the latter is another way to 'boost' stem cells), will improve learning and memory in children with brain injuries.

In light of the uncertain economic climate, is neuroscience research expanding or contracting in Canada?

Neuroscience research is fortunately expanding in Canada. In spite of the uncertain economic climate, some new investments are being made to support this field. The Canadian Government recently launched the Canada Brain Research Fund through which it has committed up to CAD \$100 million for neuroscience research. This fund will be administered by Brain Canada, which aims to raise another CAD \$100 million from private donors. This new initiative represents an important vote of confidence in the Canadian neuroscience research community. This type of investment, while significant, is modest compared to the economic impact of brain diseases. Funding from the government to the CIHR, the foremost agency that supports the vast majority of biomedical and discovery research, has not increased significantly for the past few years. The investment by government, charities and foundations in neuroscience research is approximately CAD \$200 million per year, or about CAD \$7 per Canadian.

Health Canada has estimated the economic burden of neurological and psychiatric conditions in a given year to be over CAD \$22 billion, which represents 14 per cent of the total burden of disease in this country, more than cardiovascular disease and cancer. When the cost of living and neurological or psychiatric conditions are considered, Brain Canada estimates the burden to reach CAD \$60 billion. Of even greater concern is the pain and suffering of patients and their loved ones. Investing in research that could lead to new treatments or even cures for these afflictions is therefore essential.

Compared to other scientific fields, what proportion of students is choosing to study neuroscience?

Canada is a great place to study neuroscience. Students can choose to pursue their studies in many excellent laboratories doing cutting-edge research. We have outstanding neuroscience training programmes in many universities across the country. For example, the Integrated Program in Neuroscience at McGill University where I work has about 330 graduate students, and admits about 100 PhD and MSc students each year. This

programme integrates neuroscience training in laboratories located in various departments across the university campus thus bringing together scientists from diverse backgrounds.

Finally, what efforts are being made by the Association to inspire public confidence in healthcare?

We believe that the public recognises the importance of neuroscience research. Neurological conditions or injuries can affect anyone, irrespective of their age, origin or income level. Our role as neuroscientists is to understand the workings of the normal brain and how it malfunctions in injury and disease. With an ageing population increasingly vulnerable to neurodegenerative diseases, such as Alzheimer's and Parkinson's disease, neuroscientists will be depended upon to come up with new treatments that will not only alleviate suffering, but will also lower the enormous financial burden of healthcare costs.

Academic scientists are now relied upon by the pharmaceutical and biotechnology industries to develop breakthroughs that they can translate into new and more effective treatments for neurological and psychiatric conditions. We feel that the ability of scientists to generate these discoveries is directly proportional to the investment made by government and the private sector in discovery research. CAN is encouraging an increase in this investment by educating the public on the importance of brain research, through public lectures and our website.

The public is indeed eager to learn more about neuroscience, as we see every year at the CAN Public Lectures, which have been very well attended. In the past, we have had talks by Drs Max Cynader and Howard Feldman (2012) both University of British Columbia professors, who discussed improving memory and learning as we age in a lecture called 'Boosting brain power: new insights'. Dr Rémi Quirion, who is now Quebec's Chief Scientist, also spoke about exploring the brain as a final frontier. This was fitting, since he has appointed Julie Payette, a former astronaut and veteran of two space flights as Quebec's scientific ambassador to Washington. CAN plays an increasingly active role in communicating to the public the benefits of neuroscience discoveries and the need for continued research.



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