

CIHR/CMAJ: TOP ACHIEVEMENTS IN HEALTH RESEARCH

Celebrating top achievements in health research 2012

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The Canadian Institutes of Health Research and the *CMAJ* host an annual competition to celebrate top achievements in health research in Canada. Launched in 2008, the awards highlight achievements that have had a substantial impact on health, health care and health research “by improving our understanding of health and human diseases, tackling health challenges, and improving our health system.”^{1,2} The awards honour research in 4 areas: biomedical; clinical; health services; and social, cultural, environmental and population health.²

In the fourth competition (2012), 5 winners were carefully selected by an international review committee. The winners include Dr. Mark Wainberg; Dr. Darren Warburton; Dr. Larry Chambers, Dr. Lisa Dolovich, Dr. Janusz Kaczorowski, Michael Paterson and Dr. Lehana Thebane for the Bruyère Research Institute; Dr. Brenda Hemmelgarn, Dr. Braden Manns and Dr. Marcello Tonelli for the Interdisciplinary Chronic Disease Collaboration (ICDC); and Dr. Garnette Sutherland. Following are synopses of the 5 winning achievements. The top 2 winning achievements are available in full online (Appendices 1 and 2, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.130237/-/DC1).

Discovery of 3TC and antiviral drug resistance

Who: Dr. Mark Wainberg is Professor of Microbiology and Director of the McGill University AIDS Centre, Montréal, Que.

What: Mark Wainberg is a world-renowned HIV/AIDS researcher who has revolutionized our understanding of this disease. He is well known for his initial identification of an antiviral drug, his research on antiviral drug resistance and his advocacy work in increasing access to anti-HIV drugs in developing countries.

In 1989, Dr. Wainberg was involved in the discovery of lamivudine (3TC), one of the most widely used drugs in the treatment of HIV. Since

then, his contributions to the fight against HIV/AIDS have increased our understanding of the disease at the medical, epidemiological and political levels.

Dr. Wainberg has played an essential role in researching HIV drug resistance. He was the first researcher to show that subtype differences among HIV strains could result in differing profiles of mutations responsible for drug resistance. Subtype C viruses, the most prevalent form of HIV in the world today, are responsible for more than 50% of all new HIV transmissions; subtype B viruses, the predominant subtype in North America, are responsible for fewer than 10% of all new infections worldwide. Based in large part on Dr. Wainberg's data, the World Health Organization (WHO) recently removed stavudine (d4T) from its list of recommended treatment options, because it was found to select for the K65R mutation, which occurs more frequently with subtype C than with other subtypes.

Dr. Wainberg is an advocate of novel testing procedures based on polymerase chain reaction analysis, which have the power to inform patients that they are HIV positive well before seroconversion occurs, thereby potentially reducing HIV transmission. Through phylogenetic tree analysis of all new HIV infections identified in the province of Quebec during an 8-year period, Dr. Wainberg has shown that about 50% of all new transmissions in Quebec are likely attributable to people newly infected with the virus, probably because viral loads are highest soon after infection takes place. Unfortunately, these patients have often not yet undergone seroconversion, and the infection may remain undiagnosed.

As president of the International AIDS Society between 1998 and 2000, Dr. Wainberg helped to select Durban, South Africa, as the venue for the XIII International Conference on AIDS. The conference attracted thousands of journalists to a country where HIV/AIDS is prevalent and access to antiretroviral treatment is limited. The resulting media attention highlighted the issue of access to anti-HIV drugs in developing countries.

Competing interests: None declared.

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CMAJ 2013, DOI:10.1503/cmaj.130237

The health benefits of physical activity: innovation in knowledge translation

Who: Dr. Darren Warburton is Associate Professor, School of Kinesiology, Faculty of Education, University of British Columbia; Research Supervisor, Experimental Medicine Program, Faculty of Medicine, University of British Columbia, Vancouver, BC.

What: Through his work concerning physical activity, Dr. Warburton has shown an ability to translate his research findings to the Canadian public and the international community. Because physical activity is an effective preventive strategy against chronic conditions and premature death, its performance should not be restricted to people in perfect health. Given the dose–response relation of physical activity and health, Dr. Warburton and colleagues theorize that an exercise volume far less than that recommended by international agencies may be sufficient to elicit health benefits. In addition to his important contributions to the field of cardiovascular physiology research, Dr. Warburton has been involved in numerous knowledge-translation activities aimed at increasing the activity levels of all Canadians.

Dr. Warburton headed an international effort to evaluate and revise the Physical Activity Readiness Questionnaire for Everyone (PAR-Q+) and the electronic Physical Activity Medical Readiness Questionnaire (ePARmed-X+). His team conducted 10 systematic reviews to update and reform the questionnaires. In turn, the questionnaires have enhanced the ability of health, fitness and medical professionals to provide evidence-based advice on physical activity. The PAR-Q+ and ePARmed-X+ have been adopted worldwide.

In addition, Dr. Warburton codirected the Physical Activity Line (PAL), an innovative online and telephone resource. PAL relies on qualified exercise professionals to provide end-users with the tools to improve their health through regular physical activity. Without any formal marketing, the PAL website receives 10 000–20 000 hits each month.

As director of the Sport Cardiology and Musculoskeletal Assessment Research Team for the 2010 Winter Olympic and Paralympic Games in Vancouver, British Columbia, Dr. Warburton implemented a primary prevention program for 25 000 volunteers. The program provided volunteers with tailored training programs and put them in contact with qualified exercise physiologists to avoid the high injury rates seen among

volunteers at previous winter games. This program is now being considered by other Olympic organizing committees.

Dr. Warburton's current research focuses on reducing the barriers to physical activity faced by people living with chronic medical conditions such as spinal cord injury, severe obesity, breast cancer, chronic kidney disease and osteoporosis. His research team plans to produce evidence-based clinical exercise prescriptions for patients living with a variety of chronic illnesses in the near future.

Cardiovascular health awareness program

Who: Dr. Larry Chambers, Dr. Lisa Dolovich, Dr. Janusz Kaczorowski, Michael Paterson and Dr. Lehana Thebane for the Bruyère Research Institute, Ottawa, Ont.

What: Since 2000, Dr. Chambers and his team have been developing the Cardiovascular Health Awareness Program (CHAP), which is designed to increase awareness of cardiovascular risk, facilitate the connection between community and health care supports and allow participants to acquire skills to self-manage their conditions.

Pilot studies in 3 Ontario communities showed that the team's idea of using pharmacy-based blood pressure–monitoring sessions led by volunteers and providing feedback to family physicians and pharmacists was a viable approach for mitigating under-detected hypertension. Community-wide implementation of CHAP began in 2004 and has since been shown to effectively reduce blood pressure and hospital admissions for cardiovascular disease.

Based on the success of CHAP, the Canadian Stroke Network, with other national partners, is exploring how the program might be expanded and implemented nationwide.

The Interdisciplinary Chronic Disease Collaboration

Who: Dr. Brenda Hemmelgarn, Dr. Braden Manns and Dr. Marcello Tonelli for the Interdisciplinary Chronic Disease Collaboration, Edmonton, Alta.

What: The Interdisciplinary Chronic Disease Collaboration (ICDC) focuses its research and knowledge-translation activities on hypertension, diabetes, chronic kidney disease and vascular disease.

The ICDC research model, which seeks to improve the quality of care for patients with chronic disease, is based on including decision-

makers (e.g., government, health care practitioners and patients) as integral members of the research team. The ICDC's three-phase research framework involves health technology assessment, patient survey and implementing interventions to overcome barriers to care. During the survey phase, the collaboration partnered with Statistics Canada to obtain data from 1800 Canadians with diabetes, high blood pressure or heart disease.

Since 2010, the collaboration has published more than 38 peer-reviewed articles. These articles include important research on the prognostic significance of proteinuria as an inexpensive predictor of risk in patients with chronic kidney disease. Furthermore, ICDC's work on health care delivery has helped improve patient outcomes. For example, the collaboration has shown that patients whose diabetes was managed in primary care networks in Alberta had improved outcomes compared with patients whose diabetes was managed outside of those networks. The ICDC is considered to be a shining example of collaboration and knowledge transfer.

Image-guided neurosurgery

Who: Dr. Garnette Sutherland is Professor, Department of Clinical Neurosciences, University of Calgary, Calgary, Alta., and Visiting Scientist, National Research Council of Canada Institute for Biodiagnostics, Winnipeg, Man.

What: Dr. Sutherland's contributions to neurosurgery have drastically improved surgical performance and patient outcomes.

Dr. Sutherland developed intraoperative magnetic resonance imaging (iMRI) surgery, which has been used in more than 1400 surgeries in Calgary, Alberta, and is now being marketed and distributed to the global community. The iMRI technique is used before neurosurgery to identify the disappearance of lesions, thereby avoiding unnecessary procedures. Used immediately after surgery and before closing, iMRI can help determine whether a tumour has been completely removed, obviating the need for "second-look surgery."

Coupled to the iMRI system is the neuroArm, a robotic neurosurgical device designed to perform microsurgery and stereotaxy under image-guidance. A substantial achievement in its own right, neuroArm has positioned Canada as a leader in medical robotics.

In addition, Dr. Sutherland also developed ceramic aneurysm clips to overcome the problem of artifacts on imaging caused by ferromagnetic materials in clipped aneurysms. These clips allow for better imaging than previously possible and are thus an important advance in aneurysm surgery.

References

1. CIHR/*CMAJ* top achievements in health research. call for applications. Ottawa (ON): Canadian Institutes of Health Research; 2012. Available: www.cihr-irsc.gc.ca/e/45560.html (accessed 2013 Feb. 12).
2. CIHR-*CMAJ* top achievements in health research 2012. Ottawa (ON): *CMAJ*; 2012. Available: www.cmaj.ca/site/misc/achievements.xhtml (accessed 2013 Feb. 12).

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CMA committees advise the Board of Directors and make recommendations on specific issues of concern to physicians and the public. Five core committees mainly consist of regional, resident and student representation while other statutory and special committees and task forces consist of individuals with interest and expertise in subject-specific fields. Positions on one or more of these committees may become available in the coming year.

For further information on how you can get involved, please contact:

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By getting involved, you will have an opportunity to make a difference.

We hope to hear from you!

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