

BC researchers date “hibernating” HIV strains

Researchers at the BC Centre for Excellence in HIV/AIDS (BC-CfE) and Simon Fraser University, in partnership with the University of British Columbia and Western University, have developed a novel way for dating “hibernating” HIV strains, in an advancement for HIV cure research in the province. Published in *Proceedings of the National Academy of Sciences*, the research confirms that dormant HIV strains, which have integrated their DNA into that of the body’s cells, can persist in the body for decades and can reactivate many years later, which is why HIV treatment needs to be maintained for life. The study confirms that the latent HIV reservoir is genetically diverse and can contain viral strains dating back to transmission.

In order to date dormant HIV strains within the viral reservoir, researchers needed to compare these strains with those that evolved within an individual living with HIV over the entire history of their infection.

The research provides further clues in the pursuit of an HIV cure, which will ultimately require the complete eradication of dormant HIV strains, which are unreachable by antiretroviral treatments and the immune system. Through advances in antiretroviral therapy, an individual living with HIV can now live a longer, healthier life on treatment, which works by stopping HIV from infecting new cells. On sustained treatment, individuals can achieve a level of virus that is undetectable by standard blood tests, and an undetectable viral load means improved health and that the virus is not transmittable to others.

This research was funded by the Canadian Institutes of Health Research in partnership with the Canadian Foundation for AIDS Research

and the International AIDS Society, as well as the US National Institutes of Health. Dr Zabrina Brumme, Director, Laboratory with BC-CfE is lead author on the study.

Concussions loosen myelin around brain cells

Athletes may be returning to play sooner than they should. Detailed scans of concussed University of British Columbia hockey players found that the protective fatty tissue surrounding brain cell fibres was loosened 2 weeks after an injury, even though athletes felt fine and were deemed ready to return to the ice. The loosening of myelin slows the transmission of electrical signals between brain cells. Researchers previously showed in animals that this loosened myelin can completely deteriorate with subsequent blows—a condition that resembles multiple sclerosis.

This is the third study arising from the before-and-after study of 45 UBC hockey players. The athletes had their brains scanned with MRI before the season began; if they were concussed, they were rescanned 3 days afterward, 2 weeks afterward, and 2 months afterward. Eleven athletes were concussed during the season, and most of them underwent the additional MRI scans.

Conventional MRI imaging done in hospitals to assess brain injury does not reveal myelin loosening. Alex Rauscher, an associate professor in the Department of Pediatrics and the Canada Research Chair in Developmental Neuroimaging, and postdoctoral research fellow Alex Weber, used advanced digital analysis of the scans, using a UBC-developed, pixel-based statistical analysis to find changes that visual inspection could not reveal.

Previous analysis of the concussed athletes’ scans, published by

Rauscher in 2016, showed changes to the myelin in the corpus callosum, most susceptible to damage from sudden collisions against the interior of the skull, but researchers didn’t know whether the myelin was diminished, akin to multiple sclerosis, or altered in another way. In this recent study it was revealed that the loosening around the nerve fibres that connect brain cells was temporary, and the myelin had returned to normal when the concussed players were rescanned 2 months after their concussions.

The findings provide a convincing reason to keep concussed athletes on the bench even if they no longer exhibit any symptoms, as measured by a standard test of cognitive abilities, balance, coordination, and mood. Passing a concussion test may not be a reliable indicator of whether the brain has truly healed, and more waiting time may be advisable to prevent long-term damage.

The study “Pathological insights from quantitative susceptibility mapping and diffusion tensor imaging in ice hockey players pre and post-concussion,” is published in *Frontiers in Neurology*.

Gut enzymes key to producing universal blood

UBC researchers have identified a new group of enzymes that can turn any blood type into the universally usable type O.

Blood type is determined by the presence of antigens on the surface of red blood cells, and antigens can trigger an immune response if they are foreign to the body; therefore, transfusion patients should receive either their own blood type or type O to avoid a reaction.

Removing antigens from blood effectively transforms it into type O. Lead researcher Stephen Withers, a

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**GP IN ONCOLOGY TRAINING
Vancouver, 4 Feb–15 Feb 2019
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The BC Cancer Agency’s Family Practice Oncology Network offers an 8-week General Practitioner in Oncology training program beginning with a 2-week introductory session every spring and fall at the Vancouver Centre. This program provides an opportunity for rural family physicians, with the support of their community, to strengthen their oncology skills so that they may provide enhanced care for local cancer patients and their families. Following the introductory session, participants complete a further 30 days of customized clinic experience at the cancer center where their patients are referred. These can be scheduled flexibly over 6 months. Participants who complete the program are eligible for credits from the College of Family Physicians of Canada. Those who are REAP-eligible receive a stipend and expense coverage through UBC’s Enhanced Skills Program. For more information or to apply, visit www.fpon.ca, or contact Jennifer Wolfe at 604 219-9579.

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professor of chemistry at UBC, and his team previously developed enzymes that were capable of doing so, but this latest study identifies a more powerful group of enzymes found in the human gut.

The researchers sampled DNA from millions of microorganisms found in environmental samples—a technique known as metagenomics—to find an environment in which the desired enzymes might be found. They eventually focused on the mucosal lining of the human gut, which contains sugars that are similar in structure to blood antigens.

By homing in on the bacteria feeding on those sugars, they isolated the enzymes the bacteria use to pluck off the sugar molecules. They then produced quantities of those enzymes through cloning and found that they were capable of performing a similar action on blood antigens.

Withers and his colleagues—UBC microbiologist Steven Hallam and pathologist Jay Kizhakkedathu of the Centre for Blood Research at UBC—are applying for a patent on the new enzymes and are hoping to test them on a larger scale in the future, in preparation for clinical testing.

The study, funded by the Canadian Institutes of Health Research, was presented at the American Chemical Society’s annual meeting in Boston in August 2018.

Canadian Charter of Rights for People with Dementia

The Alzheimer Society of Canada’s Advisory Group of people with dementia has created a Canadian Charter of Rights for People with Dementia. Although people with dementia hold the same rights as every Canadian citizen, they face cultural, social, and economic barriers to claiming these rights, leaving many facing discrimination, isolation, and treatment that contravenes their basic rights as human beings. The

Advisory Group set out to define seven explicit rights to give a greater voice and authority to those with dementia and to ensure the people and organizations that support them know and protect their rights. These include the right to:

- Be free from discrimination of any kind.
- Benefit from all of Canada’s civic and legal rights.
- Participate in developing and implementing policies that affect their life.
- Access support and opportunities to live as independent and engaged citizens in their community.
- Be informed and supported so they can fully participate in decisions affecting their care and life from the point of diagnosis to palliative and end-of-life care.
- Expect that professionals involved in all aspects of their care are trained in dementia and human rights and are accountable to uphold these rights.
- Access effective complaint and appeal procedures when their rights are not protected or respected.

The Charter will also serve to guide the federal government as it develops and implements a national dementia strategy for Canada.

To read stories from individuals affected by dementia, learn more about the Charter, and download a free copy, visit www.alzheimer.ca/Charter.

Fit middle-aged athletes susceptible to cardiovascular risk factors

A recent UBC study highlights how important it is for middle-aged athletes to have their doctor check their cardiovascular risk factors, especially if they have high blood pressure, high cholesterol, or a family history of cardiovascular disease.

For the study, researchers followed 798 “masters athletes”—

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adults aged 35 and older who engage in moderate to vigorous physical activity at least 3 days per week. The participants included a range of athletes—runners, cyclists, triathletes, rowers, and hockey players.

Participants were asked questions about their health, family history, and physical activity levels. They also had their blood pressure checked and waist circumference measured. Some participants also took part in an exercise stress test. Those with abnormal results underwent further testing, such as a CT coronary angiogram, to determine if they had cardiovascular disease.

Of the 798 athletes, 94 (12%) were found to have significant cardiovascular disease. Ten participants were found to have severe coronary artery disease (blockage in their artery of 70% or greater) despite not having any symptoms.

This study's findings build on previous research that found masters athletes have a higher incidence of cardiovascular disease than non-athletes of the same age with similar risk factors. However, previous research has also found that, compared to non-athletes, masters athletes typically have more calcified plaque, which is known to be more stable and less likely to cause a heart attack.

While the findings may seem alarming, Barbara Morrison, the study's lead author and a PhD student in experimental medicine at UBC, emphasized that it doesn't mean masters athletes should stop exercising. She recommends people see their doctor for regular check-ups, including blood pressure and cholesterol monitoring, especially if they have a family history of heart attack or stroke, and exercise in moderation. When taken to the extreme, exercise may have the potential to do harm.

Coauthored by researchers at SportsCardiologyBC, BC Children's

Hospital, and Weill Cornell Medical College in New York, the study was funded by Mitacs Canada and the Canadian Institutes of Health Research. The study is titled "Assessment of cardiovascular risk and preparticipation screening protocols in masters athletes: The Masters Athlete Screening Study (MASS): A cross-sectional study," and is published in *BMJ Open Sport and Exercise Medicine*.

New CMPA president: Dr Debra Boyce



Dr Debra Boyce is the new president of the Canadian Medical Protective Association (CMPA), elected in late August. Dr Boyce is a family physician based in Peterborough, Ontario, with a history of working in community and hospital medical practice, and an active staff member at the Peterborough Regional Health Centre, and the Peterborough Family Health Team. She also serves as preceptor of the Peterborough-Kawartha Family Medicine Residency program, the Rural Ontario Medical Program, and as an associate professor at both McMaster and Queen's Universities.

First elected to the CMPA Council in 2008, Dr Boyce served on the Executive Committee and many of the association's governance committees. She also chaired the Case Review Committee, the Human Resources and Compensation Committee, and the Member and Stakeholder Relations Committee. Prior to her election as president, Dr Boyce served as the CMPA's second and first vice president.