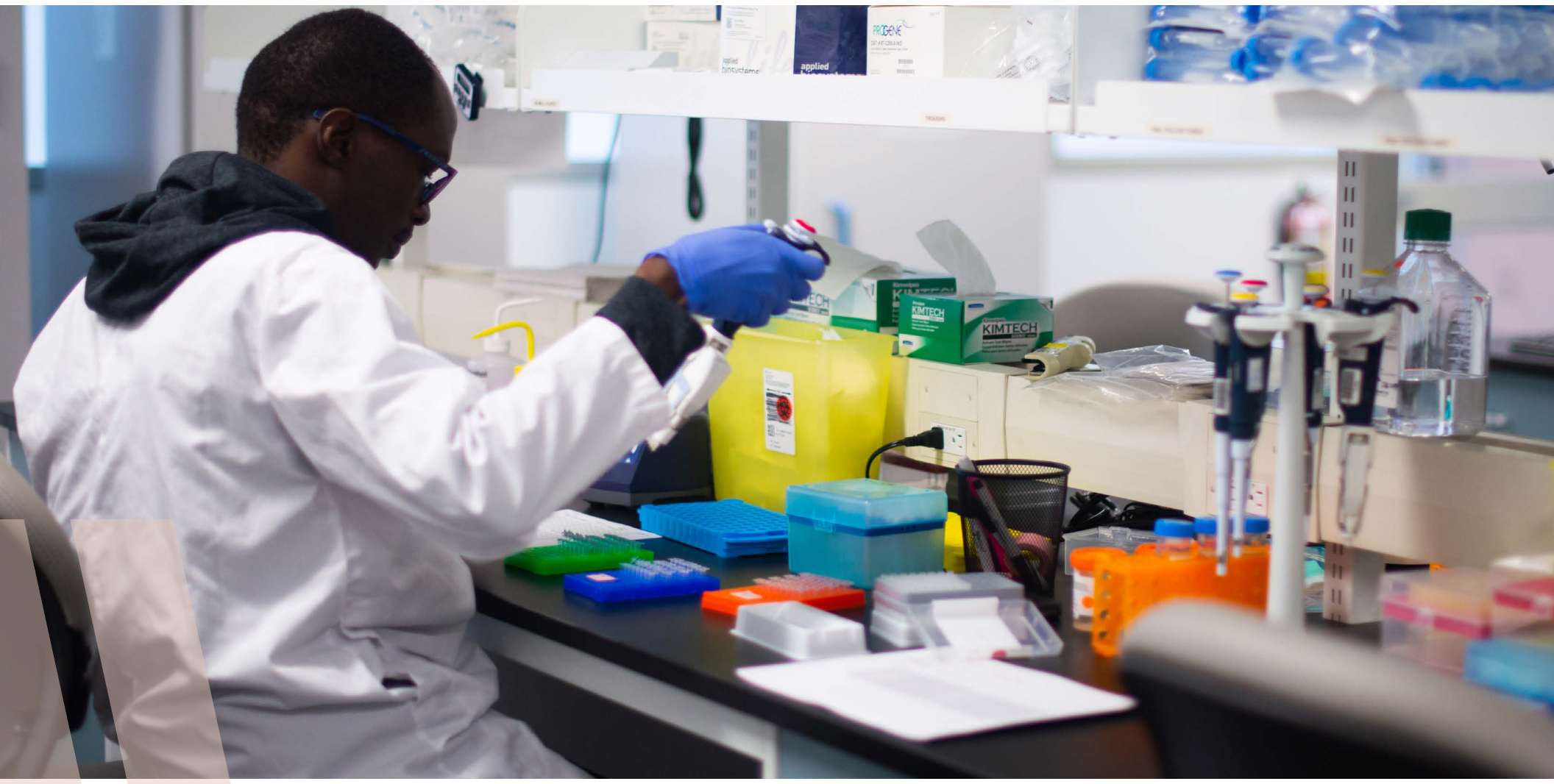
Journal of the BC Centre for Excellence in HIV/AIDS

forecast

BRITISH COLUMBIA CENTRE *for* EXCELLENCE *in* HIV/AIDS

NOV 2021 | St. Paul's Hospital, Vancouver, B.C.



Collaborative study examines COVID-19 vaccine immune responses in people living with HIV

BC Centre for Excellence in HIV/AIDS (BC-CfE) researchers, collaborating with counterparts at Simon Fraser University, the University of BC, Providence Health Care and the CIHR Canadian HIV Trials Network (CTN) recently published a study looking at COVID-19 vaccine immune responses in people living with HIV (PLWH).

Due to the explosive growth of COVID-19 variants, and the ongoing discussion about third vaccine shots and their necessity, the researchers released their findings earlier than originally planned. The need to expedite the research was also spurred by the timeline for decisions regarding additional COVID-19 vaccine doses for some key populations in BC including PLWH. By providing local data, the collaborative hoped to generate data that would assist decision-makers.

Titled, "*Humoral immune responses to COVID-19 vaccination in people living with HIV receiving suppressive antiretroviral therapy*", the publication is currently in its pre-print stage pending peer review.

The study recruited 100 people living with HIV, all of whom were on suppressive antiretroviral therapy and where 98% of this group had a CD4$^+$ T cell count greater than 200 cells/mm^3, (a CD4$^+$ T cell count below 200 cells/mm^3 is an indicator of immunodeficiency). The study also recruited 152 individuals without HIV, ranging from 22 to 88 years of age, as a control group. Participants provided blood samples prior to COVID-19 vaccination, if feasible, one month after the first vaccine dose, and one month after the second dose. The researchers measured the levels of circulating antibodies against the receptor-binding domain (RBD) of the SARS-CoV-2 spike protein, the ability of these antibodies to disrupt the interaction between RBD and its cellular receptor ACE2, and the ability of these antibodies to block infection of cells by SARS-CoV-2, the virus that causes COVID-19, after one and two doses of COVID-19 vaccine.

Study results indicated that after a single COVID-19 vaccine dose, and after accounting for sociodemographic, health and vaccine-related variables, the antibody responses to COVID-19 vaccines in people living with HIV were lower than those of controls, although the magnitude of this difference was relatively modest. However, after two COVID-19 vaccine doses, this effect disappeared. That is, after two doses of COVID-19 vaccine, the antibody responses of people living with HIV were comparable to those of controls.

The study found that, rather than HIV, older age, a higher number of chronic health conditions, and having received two doses of the AstraZeneca vaccine (as opposed to a mixed or dual mRNA vaccine regimen), were the most significant correlates of weaker antibody responses after two doses.

Importantly, among PLWH the researchers observed no significant relationship between either their most recent nor their lowest ever recorded CD4$^+$ T-cell counts and responses to COVID-19 vaccination following two vaccine doses.

This indicates that, for PLWH who are currently receiving suppressive antiretroviral therapy, having had low CD4$^+$ T-cell counts in the past will not necessarily compromise their immune responses to COVID-19 vaccines presently.

In concluding their study, the researchers interpreted the results as suggesting that PLWH whose viral loads are well-controlled on antiretroviral therapy and whose CD4$^+$ T-cell counts currently are in a healthy range should generally not require a third COVID-19 vaccine dose as part of their initial immunization series. The study notes how other factors such as older age, co-morbidities, type of initial vaccine regimen and durability of vaccine responses will influence when PLWH may benefit from additional doses.

The researchers also emphasize that the study's findings may not be generalizable to PLWH who are not receiving treatment and/or whose CD4$^+$ T-cell counts are currently less than 200 cells/mm^3, and that further studies of these groups are needed.

Dr. Zabrina Brumme, the BC-CfE Laboratory Director and the lead author of this study, said "In the coming weeks and months, we will be continuing this study to monitor the durability of these responses, and we look forward to sharing additional results as they come in"

This study was made possible through funding from Genome BC, the Michael Smith Foundation for Health Research, the BCCDC foundation for Public Health, the Canada Foundation for Innovation and the Public Health Agency of Canada through the COVID-19 Immunity Task Force. It is also part of a pan-Canadian study of immune responses in PLWH headed by Dr. Aslam Anis of the CIHR Canadian HIV Trials Network. The views expressed in this publication are those of the researchers and not necessarily those of the funding agencies.

» "These findings were very reassuring in that they indicated that people living with HIV who are currently receiving suppressive antiretroviral therapy, and whose CD4$^+$ T-cell counts are in a healthy range, generally mounted very strong antibody responses to the COVID-19 vaccines."

— BC-CfE Laboratory Director, Dr. Zabrina Brumme

RESEARCH

New research advances understanding of dynamics within HIV transmission clusters

Understanding the dynamics within HIV transmission clusters is critical information that can help prioritize public health resource allocation. Although HIV sequence clustering is routinely used to identify subpopulations experiencing elevated transmission, there's a risk of over-simplifying transmission dynamics within clusters as well as the risk that clustering methodology influences outcomes.

In a newly published study written by BC-CfE researchers, led by PhD student Angela McLaughlin, researchers investigated the similarities and sensitivities of HIV transmission risk factors as identified by phylogenetic clustering, viral diversification rate, changes in viral diversification rate, and a combined approach. Other BC-CfE authors of the study include Executive Director & Physician-in-Chief Dr. Julio Montaner, Senior Medical Director Dr. Rolando Barrios, Laboratory Director Dr. Zabrina Brumme, and Molecular Epidemiology & Evolutionary Genetics Group Senior Research Scientist Dr. Jeff Joy.

Lead author Angela McLaughlin

The study, titled "*Concordance of HIV transmission risk factors elucidated using viral diversification rate and phylogenetic clustering*," compared sociodemographic and clinical risk factors associated with belonging to phylogenetic clusters, elevated viral diversification rates, and historical branching rates in order to assess their relative concordance and sampling sensitivity.

The methodology for this study inferred phylogenetic trees based on HIV sequence data. From the resulting trees, clusters were identified and viral diversification rates were calculated. Factors associated with heightened transmission risk were compared across models of cluster membership, viral diversification rate, changes in diversification rate, and viral diversification rate among clusters.

Results from this comparison revealed viruses within larger clusters had higher diversification rates and lower changes in diversification rate than those within smaller clusters. However, rates within individual clusters, independent of size, varied widely.

Risk factors for both cluster membership and elevated viral diversification rate included being male, young, living in certain locations in BC, previous injection drug use, previous hepatitis C virus infection, or a high recent viral load.

This study shows how knowledge of viral diversification rate complements phylogenetic clustering, and offers a means of better evaluating transmission dynamics to guide provision of treatment and prevention services.

RESEARCH

BC-CfE researchers examine HIV diagnoses rates among Indigenous peoples worldwide

BC-CfE researchers recently published a study comparing rates and trends of HIV diagnoses among Indigenous Peoples in Canada, Australia, the USA, and New Zealand.

The study is titled "*Rates of new HIV diagnoses among Indigenous Peoples in Canada, Australia, New Zealand, and the United States: 2009–2017*" and the researchers used publicly available surveillance data to estimate the rate of HIV diagnoses per 100,000 people. Each of the four countries examined have passive population-based HIV surveillance programs.

As the researchers state in the study, "Despite similar colonial experiences, few cross-national comparisons assessing HIV diagnoses among Indigenous Peoples have been conducted. The studies that exist focus on differences between Indigenous and non-Indigenous peoples and attribute elevated rates of HIV among Indigenous Peoples to intergenerational trauma and lack of culturally safer healthcare services."

The authors concede that while comparisons between Indigenous and non-Indigenous populations can be useful, they say, "measuring the health of Indigenous Peoples using non-Indigenous populations as a benchmark perpetuates the othering of Indigenous People, a definition of health that centers whiteness, and the narrative that Indigenous People suffer a health deficit in settler states."

By examining divergences between Indigenous Peoples at the international level the study's authors, many of whom are Indigenous, sought to find indicators showing progress towards equity, reconciliation, and HIV destigmatization within healthcare systems. Furthermore, it's hoped the information discovered within the data could help towards better informing policy direction and development within the four nations.

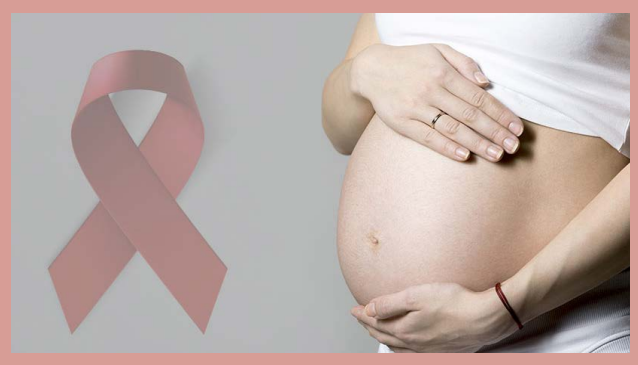
The study's results show that, as of 2017, rates of HIV among Indigenous Peoples were highest in Canada, followed by Australia, the US, and then New Zealand.

Despite the high diversity between the Indigenous Peoples of Canada, Australia, New Zealand, and the USA, these groups do share, according to the study's authors, "similar relationships with land, community, and understandings of wellness." The study goes on to note how the disparate regions are "connected through colonial policies of genocide employed to eradicate or assimilate Indigenous populations and cultures, including forced displacement from land, prohibition of ceremonies, residential, and day school systems in Canada and the USA, and Stolen Generations in Australia." The enduring effects of colonialism continue to create far-reaching sociostructural inequities for Indigenous Peoples, including disproportionate impacts from health challenges like HIV.

In concluding the study, the authors call for further research noting the large amount of incomplete data on HIV among Indigenous Peoples in Canada. The study also recommends more efforts are made to collect and standardize robust data on Indigenous Peoples worldwide. If this action isn't taken, there's a high risk of changes in the HIV epidemic occurring before Indigenous-led positive action can be taken, and also that ongoing work of Indigenous Communities in preventing HIV may be overlooked.

CHIWOS STUDY

CHIWOS examines pregnancy intentions among women living with HIV



While it is not widely known, women living with HIV who are on antiretroviral treatment with an undetectable HIV viral load can become pregnant and have children with no risk of HIV transmission to their sexual partners and an extremely low risk of transmission to infants.

Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) researchers, some of whom work at the BC-CfE, recognized that contemporary pregnancy intentions among women living with HIV in Canada were poorly understood. Examining this among their cohort, they've published their findings in *BMC Women's Health* titled, "*Patterns of changing pregnancy intentions among women living with HIV in Canada*".

Data from the CHIWOS study has shown that, among women living with HIV of reproductive age in Canada, "60% have never discussed their reproductive goals with a healthcare provider since being diagnosed with HIV. Additionally, uptake of effective contraceptive methods among women living with HIV who report wanting to avoid pregnancy is low, and the range of contraceptive methods used is more narrow compared to HIV negative women, underscoring the need and opportunity to better understand and address the sexual and reproductive health needs of women living with HIV."

The objectives of the recently published study were to measure and compare the pregnancy intentions of women living with HIV in Canada over time and to investigate the relationship between pregnancy intention within the study's survey windows and subsequent pregnancies.

Researchers observed diverse and dynamic pregnancy intentions over the 36-month follow-up period, as more than one-quarter of women changed their pregnancy intention over 18-months, and 42% did so over 36 months.

These findings highlight that women living with HIV have a diverse range of pregnancy intentions that change over time. Dr. Angela Kaida, an Associate Professor at Simon Fraser University's Faculty of Sciences, is a frequent collaborator with the BC-CfE and one of the study's authors. She shared that the work, "provides a crucial understanding of both the dynamic property of pregnancy intentions and the social contexts that influence the relationship between women's intentions and their reality."

BC Centre for Excellence in HIV/AIDS

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- Monitor the impact of HIV/AIDS on BC and conduct analyses of the effectiveness of HIV-related programs.

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Funding for the BC Centre for Excellence in HIV/AIDS is provided by the BC Ministry of Health.