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## BIOGRAPHICAL SKETCH

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NAME: Michael-John Sheridan Milloy

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eRA COMMONS USER NAME (credential, e.g., agency login):

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POSITION TITLE: Canopy Growth professor of cannabis science; Assistant Professor, Department of Medicine, Faculty of Medicine, University of BC

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EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

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INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Lester B. Pearson United World College of the Pacific, BC, Canada	IB	05/1992	
Trent University, Peterborough, ON, Canada	BSc (Hons)	05/2006	Molecular Ecology
U of British Columbia, Vancouver, BC, Canada	MSc	10/2008	Epidemiology
U of British Columbia, Vancouver, BC, Canada	PhD	05/2012	Epidemiology

### A. Personal Statement

As an epidemiologist and the principal investigator of the AIDS Care Cohort to evaluate Exposure to Survival Services (ACCESS), an ongoing US NIH-funded observational prospective cohort of HIV-positive individuals who use unregulated drugs, I have extensive experience investigating the behavioural, clinical, social and structural-level factors that promote or hinder the production of harms among marginalized people who use drugs, especially overdose, acquisition of HIV and HIV disease progression. To date, I have authored more than 250 peer-reviewed articles, including studies in high-impact journals such as *Clinical Infectious Diseases*, *AIDS*, *Addiction*, and *The Lancet*. I have also won several awards of merit, including the 2011 Bisby Fellowship from the Canadian Institutes of Health Research, and salary awards from the Canadian Institutes of Health Research and the Michael Smith Foundation for Health Research. In 2019, I was appointed the inaugural Canopy Growth Professor of Cannabis Science at the University of British Columbia, a position established through gifts to the university from Canopy Growth, a licensed producer of cannabis, and the Government of British Columbia's Ministry of Mental Health and Addictions. My current research focuses on the possible beneficial application of cannabis in the areas of substance use disorder and unregulated drug use, including controlled trials to assess the impact of cannabis on the risk of opioid overdose.

### B. Positions and Honors

#### Positions and Employment

2006-2008 Research assistant, University of British Columbia  
2008-2012 Research coordinator, ACCESS study, University of British Columbia  
2011-2014 Post-doctoral fellow, Faculty of Medicine, University of British Columbia  
2012-2014 Co-Principal Investigator, ACCESS study, University of British Columbia  
2014-present Principal investigator, ACCESS study, University of British Columbia  
2014-present Assistant professor, Department of Medicine, University of British Columbia  
2017-present Research scientist, British Columbia Centre on Substance Use, University of British Columbia  
2019-present Canopy Growth professor of cannabis science, University of British Columbia

#### Honors and Awards

2008-2011 Frederick Banting and Charles Best Canada Graduate Scholarship Doctoral Award, Canadian Institute of Health Research  
2011-2014 Research Trainee award, Michael Smith Foundation for Health Research  
2011-2014 Bisby Fellowship, Canadian Institutes of Health Research.  
2016-2021 Scholar Award, Michael Smith Foundation for Health Research  
2016-2021 New Investigator Award, Canadian Institutes of Health Research

### C. Contributions to Science.

These papers were among the first to identify the possible beneficial impacts of cannabis use on the risk of drug-related harms—including initiation of injection drug use, retention in evidence-based treatment for opioid use disorder, and use of opioids from the unregulated drug supply—among people at highest risk of overdose.

1. Reddon H, ... Milloy M-J. 2020. Frequent cannabis use and the cessation of injection of opioids. *American journal of public health*. PMID 32816538.
2. Lake S, ... Milloy M-J. 2019. Frequency of cannabis and illicit opioid use among people who use drugs and report chronic pain: A longitudinal analysis. *PLOS Medicine*. PMID 31743343.

These papers, the first to evaluate the impact of a seek, test, treat and retain-based initiative on illicit drug users, longitudinally described improvements in virologic status, including reductions in the rate of acquired drug resistance, coinciding with a community-wide intervention to scale-up access and adherence to antiretroviral therapy among people who use drugs, and increases in transmitted drug resistance.

1. Milloy et al., 2016. Increased prevalence of controlled viremia and decreased rates of HIV drug resistance among HIV-Positive people who use illicit drugs during a community-wide Treatment-as-Prevention initiative. *Clinical Infectious Diseases*. PMID 26553011
2. Socias ME, ... Milloy, M-J. 2017. Patterns of transmitted drug resistance and virological response to first- line antiretroviral treatment among human immunodeficiency virus-infected people who use illicit drugs in a Canadian Setting. *Clinical Infectious Diseases*. PMID 28482025.

These studies extended the risk environment framework, a model used to conceptualize risks of illicit drug-related harms, to analyses of HIV treatment among IDU. The first two studies were accompanied by commentaries noting their novelty and importance.

1. Milloy et al., 2011. Dose-response effect of incarceration events on nonadherence to HIV antiretroviral therapy among injection drug users. *Journal of Infectious Disease*. PMID 21459814
2. Milloy et al., 2012. Social and environmental predictors of plasma HIV RNA rebound among injection drug users treated with antiretroviral therapy. *JAIDS*. PMID 22134149
3. Milloy et al., 2012. Social and structural factors associated with HIV disease progression among illicit drug users: A systematic review. *AIDS*. PMID 22333747

These studies estimated the impact of Insite, North America's first supervised injection facility, on risk of fatal overdose among people who inject drugs in Vancouver, Canada. This evidence was cited in the Supreme Court of Canada's decision on Insite.

1. Milloy et al., 2008. Estimated drug overdose deaths averted by North America's first medically-supervised safer injection facility. *PLOS ONE*. PMID 18839040
2. Marshall BDL, Milloy M-J, ... Kerr T. 2011. Reduction in overdose mortality after the opening of North America's first medically supervised safer injecting facility: A retrospective population-based study. *Lancet*. PMID 21497898.

This study replicated an experimental study among *Macacca mulatta*, a model organism for lentiviral infection, and showed that individuals self-reporting at least daily use of cannabis during the first year following HIV acquisition had significantly lower plasma HIV-1 RNA viral loads. This was the first study in humans to demonstrate an association between exposure to cannabis and HIV disease.

1. Milloy et al., 2015. High-intensity cannabis use associated with lower plasma human immunodeficiency virus-1 RNA viral load among recently infected people who use injection drugs. *Drug alcohol rev*. PMID 25389027

### **Complete List of Published Work:**

Papers: <http://www.ncbi.nlm.nih.gov/myncbi/browse/collection/46012601/?sort=date&direction=ascending>

#### **D. Research Support (Select)**

- CIHR SMN-139148 (Wood) 04/01/2015 – 11/30/2019  
The British Columbia Addiction Network  
We seek to establish a collaborative team of addiction researchers, service providers, and affected community members positioned to establish a network and undertake addiction clinical trials as part of CRISM.  
Role: Co-I
- NIH/NIDA R25 DA037756 (Wood) 04/01/2014 – 03/31/2019  
HIV researchers mentoring the next generation of addiction clinician scientists  
The goal of the program is to provide addiction medicine physicians with a one-year intensive addiction research fellowship to develop the skills required for a career in addiction research.  
Role: (co-I)
- NIH/NIDA R01 DA038632 (Johnson) 07/01/2014 – 06/30/2019  
Enhancing discovery of HIV host genetics using drug abuse and other interactions  
The major goal of this project is to identify genetic factors contributing to susceptibility to HIV-1 infection. Role: (co-I)
- NIH/NIDA U01 Da0388866 (Kerr) 03/01/2015 – 11/30/2019  
Vancouver drug users study: evaluating the natural history of injection drug use  
This R01 aims to evaluate the impact of evolving drug use patterns, as well as a range of social, structural, and environmental factors on HIV incidence, morbidity, and mortality among a cohort of HIV-negative injection drug users in Vancouver, Canada.  
Role: (co-I)
- CIHR FDN Foundation Scheme (Wood) 07/01/2015 – 06/30/2022  
Positioning Canada as an international leader in addiction research and education to improve care and reduce costs to the health care system  
This study includes observational and interventional research investigating novel approaches to substance abuse prevention and treatment for street-involved populations, and will continue to serve as a major platform for education and knowledge translation into improved health policies, services and outcomes.  
Role: (co-I)
- CIHR CBR-362965 (Milloy & McNeil) 04/01/2016 – 03/31/2019  
Exploring the impact of single room occupancy accommodations housing on HIV prevention & treatment among people who use drugs  
This study builds a novel community-based participatory research study upon an existing program of ethno-spatial epidemiological research to explore the influence of social, structural, and physical conditions in SRA housing on HIV prevention and treatment among PWUD.  
Role: (co-PI)
- U01DA021525 (Milloy) 06/01/2017 – 04/30/2022  
NIDA  
Impacts of universal access to HIV/AIDS care among HIV+ injection drug users  
A study to examine barriers to access and adherence to HIV/AIDS treatment among injection drug users in a setting of universal access to HIV care  
Role: (PI)
- Vancouver Coastal Health Research Institute Team Grant 06/01/2016 – 12/31/2017  
Downtown East Side, client transience study  
This grant seeks to investigate in- and out of Downtown Eastside (DTES) migration patterns by linking VCH data with longitudinal cohort data from >3000 people who use drugs in Vancouver, thereby providing crucial insights for DTES Second Generation planning (i.e., integrated health system planning).  
Role: (co-I)
- CIHR MOP-125946 (DeBeck) 04/01/2013 – 03/31/2018

Prescription opioid misuse among at-risk youth: Investigating drug use trajectories and associated risk behaviors to inform policy responses

Our aim is to generate a body of evidence that will inform policy responses to address the crisis of prescription opioid misuse among at-risk youth.

Role: (co-I)

Health & Medical/Education Research (McNeil & Lampkin) 04/01/2015 – 03/31/2017

Vancouver Foundation

Exploring the health and social impacts of evictions among people who use drugs in Vancouver's downtown eastside

This is a community-based participatory research (CBPR) study to examine evictions and how they influence health and social outcomes among PWUD in the downtown eastside of Vancouver Canada.

Role: (co-I)

CIHR 297734 (Hogg) 04/01/2013 – 03/31/2015

*A mixed method evaluation of a supportive housing intervention for people living with HIV and at risk of homelessness*

In this study we will observe how the health and well-being of people living with HIV is affected by the introduction of a supportive housing intervention and yield important information regarding the link between health and housing.

Role: (co-I)

CIHR MOP-136827 (Kerr/Richardson) 10/01/2014 – 09/30/2017

The impact of alternative social assistance disbursement on drug-related harm: a randomized controlled trial

This study seeks to examine the ability of alternative disbursement schedules to mitigate the severity of drug-related harms coinciding with synchronized government cheque issue days.UM1 AI068636

Role: (Co-I)

CSM-133332 (Wood) 02/01/2014 – 01/31/2015

CIHR

The British Columbia Centre for Addiction Clinical Trials

In this study we seek to develop a collaborative team of substance misuse researchers, service providers, the affected community, and collaborating organizations.

Role: (co-I)

MOP-111039 (Kerr) 01/01/2011 – 03/31/2016

CIHR

The Vancouver Interdisciplinary collaboration on supervised drug consumption research

A study to examine the long-term impacts of supervised drug consumption facilities on drug-use patterns and street-level violence.

Role: (co-I)