

## UNAIDS Treatment 2.0 based on made-in-B.C. "treatment as prevention" strategy

AIDS 2010 endorses BC-CfE initiative as key pillar in fight against HIV and AIDS



Michel Sidibé, executive director of UNAIDS, heralded BC-CfE's treatment-as-prevention strategy as the basis for Treatment 2.0.

Photo credit: ©IAS/Marcus Rose /Workers

A radical new approach to HIV treatment, dubbed "Treatment 2.0," aims to dramatically increase testing and treatment for HIV using the best available diagnostic tools and drugs, announced Michel Sidibé, executive director of the Joint United Nations Programme on HIV/AIDS (UNAIDS), at the XVIII International AIDS Conference in Vienna from July 18 to 23.

Mr. Sidibé, a world-renowned and longtime advocate of innovative ways to curb the HIV/AIDS epidemic, said Treatment 2.0 will reshape the global response to AIDS. It will help achieve two crucial benefits: a dramatic reduction in AIDS-related deaths and a decrease in new HIV infections.

The lifesaving concept of "treatment as prevention" – developed at the BC Centre for Excellence in HIV/AIDS (BC-CfE) – provided the building blocks for this new treatment approach. In his speech at the opening session of AIDS 2010, Mr. Sidibé cited the groundbreaking work coming out of B.C. as evidence supporting the UNAIDS' push for Treatment 2.0 – a global HIV treatment revolution.

"Treatment is a right, treatment is a smart investment. It reduces HIV transmission, TB, and maternal and child deaths," he told thousands of attendees in a sprawling auditorium onsite and countless others watching via video links worldwide.



Dr. Julio Montaner, director of the BC Centre for Excellence in HIV/AIDS, addresses the opening session of AIDS 2010. Dr. Montaner presided over the conference in Vienna. Photo credit: ©IAS/Marcus Rose /Workers

"Thanks to the support of British Columbia Premier Gordon Campbell, and the dedication of Julio Montaner, the world now knows that treatment as prevention is a reality that works for the three Ps: It works for the patient, it works for the people and it works for the pocket."

UNAIDS has estimated that if Treatment 2.0 is successfully implemented, it could avert 10 million HIV/AIDS deaths by 2025.

### B.C. research inspires Treatment 2.0

Mr. Sidibé's remarks at AIDS 2010 came soon after the BC-CfE released a study in Vienna showing that the introduction of highly active antiretroviral therapy (HAART) for HIV patients has halved the number of new HIV diagnoses in B.C. since 1996.

"Dr. Montaner's study, published in *The Lancet*, was the strongest confirmation yet that treatment and prevention are two sides of the same coin," said *The Economist*. "The study, together with previous work showing that HAART reduces the rate of transmission between discordant couples (in which only one partner is infected) by more than 90%, points to the conclusion that widespread use of antiretroviral drugs helps to explain the 17% fall in the rate of new HIV infections seen around the world between 2001 and 2008."

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In a front-page story, Dr. Montaner, director of the BC-CFE, told *The Province* newspaper that July 18 was a great day for British Columbia, as the made-in-B.C. initiative put the province at the forefront of the HIV and AIDS response.

"While treatment is highly cost-effective on its own merits because it is a life-saving, disease-preventing intervention, it has a multiplier effect on the prevention axis, which makes this a very attractive investment," he said.

Dr. Montaner stated that expanding HAART coverage will have multiple benefits including decreasing tuberculosis, decreasing the number of orphans and preserving and strengthening health systems in affected countries around the world.

"Universal access to care, treatment and prevention is the fundamental building block for maternal and child health. Let me say this once more, there cannot be maternal and child health without universal access," he said.

### G8 fails to fulfill universal access pledge

G8 nations promised in 2005 to fund universal access by 2010, but have not lived up to their commitment. Dr. Montaner noted that his own federal government, led by Canadian Prime Minister Stephen Harper, has failed to fully fund universal access and missed an opportunity to put the HIV strategy firmly back on track when it largely ignored universal access during recent G8 meetings in Canada.

He noted, however, that France's First Lady, Carla Bruni-Sarkozy, has strongly supported treatment as prevention and the need to deliver on the promise of universal access. "We ask her to ensure that her husband, the president of France, becomes a forceful advocate for that position when France hosts next year's G8 meeting," he said.

Dr. Montaner added that governments around the world will now say they face a crisis of resources when asked for money to provide funding for universal access, but resources are not the issue.

"The challenge is not finding money, but changing priorities," Dr. Montaner noted. "When there is a Wall Street emergency or an energy crisis, billions upon billions of dollars are quickly mobilized. People's health deserves a similar financial response and much higher priority."

Meanwhile, high-level speakers at the conference – including former U.S. President Bill Clinton and billionaire philanthropist Bill Gates – added their thoughts on ways forward to combat HIV and AIDS. A total of 193 countries were represented at the conference and 19,100 people participated at AIDS 2010, and all were left with a sobering reminder from Dr. Montaner as they left the conference.

"As we say farewell to each other and pack our bags to leave Vienna, we must remember that another 7,000 people will become infected today, as they did yesterday and will again tomorrow," said Dr. Montaner. "This epidemic is our life's work. Let's ensure that the epidemic ends, soon and forever."



Thousands of AIDS 2010 delegates and local residents marched for human rights to be included as a key component in treating HIV-positive individuals and programs to prevent new HIV infections. Photo credit: © IAS/Steve Forrest/Workers

## Vienna Declaration unites global leaders in call to end failed drug war



Dr. Evan Wood, chair of the Vienna Declaration, the official declaration of AIDS 2010, called for governments to embrace evidence-based drug policies to improve community health.

In an overwhelming show of solidarity from clinicians, researchers and public policy experts, the B.C.-led Vienna Declaration ([www.viennadeclaration.com](http://www.viennadeclaration.com)), the official declaration of the XVIII International AIDS Conference, has been endorsed by nearly 16,000 signatories.

"It has been a real outpouring of consensus from the scientific community," said Dr. Evan Wood, chair of the Vienna Declaration and director of the Urban Health Research Initiative at the BC Centre for Excellence in HIV/AIDS (BC-CfE).

But it's not just science that has rallied behind the Vienna Declaration; supporters include Nobel Laureates, religious leaders, former heads of state and even the U.S.-based Law Enforcement Against Prohibition (LEAP). LEAP consists of 30,000 current and former police officers, judges and prison wardens – people who have worked on the frontlines of the "war on drugs."

The Vienna Declaration calls upon governments around the world to "implement and evaluate a science-based public health approach to address the individual and community harms stemming from illicit

drug use." This is a perfectly reasonable and basic demand if we consider the devastating consequences caused by the drug war.

Countless lives have been lost, including those of innocent civilians. Entire countries such as Colombia and Mexico have been destabilized, breaking up families and destroying livelihoods. An estimated \$2.5 trillion in tax dollars have been wasted on the drug war during the last 40 years.

Having witnessed firsthand the drug war and its severe failings, three former Latin American presidents – Ernesto Zedillo (Mexico), César Gaviria (Colombia) and Fernando Henrique Cardoso (Brazil) – have signed the Vienna Declaration. This should serve as an example to those currently in power.

"The war on drugs approach has really failed to reach its stated objectives and has resulted in a range of unintended consequences, including the enrichment of organized crime, as well as a range of health-related harms – most pertinent to the AIDS 2010 conference, the prevalence of HIV among injection drug users," Dr. Wood told *The Canadian Press*.

### Raging HIV epidemic in Eastern Europe and Central Asia

Outside of sub-Saharan Africa, injection drug use is the primary source of new HIV infections in countries in Eastern Europe and Central Asia. In Russia, for example, one in 100 adults is HIV-infected and injection drug users account for 83 per cent of all HIV cases. Nonetheless, proven harm reduction tools such as needle exchange and methadone treatment for heroin addicts are illegal in Russia. This despite the fact that methadone is on the World Health Organization's list of essential medicines.

Georgia, one of the many countries in Eastern Europe facing a rapid spread of HIV, showed the way forward to its counterparts in the region. Three Georgian leaders signed the Vienna Declaration during AIDS 2010.

"Georgia supports evidence-based drug policy in our efforts to protect community health and safety," said Sandra Roelofs, the First Lady of Georgia. "Our signatures on the Vienna Declaration reinforce our recognition that harm reduction can provide numerous benefits and highlights the need to design policies that align with emerging science."

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From left to right: George Tsereteli, Georgia's deputy chairman of Parliament; Sandra Roelofs, First Lady of Georgia; and Irakli Giorgobiani, Georgia's vice-minister of labour, health and social affairs signed the Vienna Declaration at AIDS 2010. Photo credit: ©IAS/Steve Forrest/Workers

## Harper government picks ideology over science

Unfortunately, Canada's federal government failed to follow suit. The federal Conservatives announced that they will not support the Vienna Declaration because it is inconsistent with Canada's National Anti-Drug Strategy and current federal drug policy. This is yet another example of the Harper government's refusal to let science – not ideology – guide their drug policy.

Lamenting the federal government's misguided stance on drug policy, Stephen Lewis, the co-director of AIDS-Free World and one of the high-profile signatories of the declaration, told *The Globe and Mail*: "The benefits of harm reduction are so absolutely clear that you have to be contemptuous of the evidence, and of science more generally, to take the position of the Canadian government. Their position is absolutely indefensible."

Five provincial chief medical health officers in Canada, including Dr. Perry Kendall from B.C., and the Canadian Public Health Association have signed the Vienna Declaration.

Another of the signatories is Mr. David Bratzer, a LEAP member and an acting police officer based in B.C. Having spent years patrolling the streets and witnessing firsthand the harms caused by our country's current drug laws, Mr. Bratzer is convinced that "drug prohibition is a national policy failure."

"Bill S-10 is the federal government's third attempt in as many years to create mandatory minimum sentences for certain drug offences," wrote Mr. Bratzer in a column published in the *Ottawa Citizen*. "The HIV infection rates in federal prisons are similar to some African countries, according to the statistics provided by the Correctional Service of Canada. So, for many of these addicts, part of their sentence will include a substantial risk of contracting HIV."

## The way forward

Dr. Wood pointed to the examples of Portugal, the Netherlands and Switzerland as countries that have successfully implemented alternative regulatory models to tackle illicit drug use. According to a 2009 report by the libertarian Cato Institute, in the decade since Portugal legalized drug use, the AIDS rate in the country has dropped by half, overdose deaths fell, many citizens sought treatment, drug use among young people fell and – contrary to initial fears – drug tourism did not develop.

The institute called the policy "a resounding success."

"If we continue to criminalize drug users and lock them up, instead of focusing on treatment and prevention programs, we will only be wasting precious taxpayer dollars," said Dr. Wood. "Science must triumph over ideology if we are to defeat the war on drugs, which has been nothing short of a global catastrophe."

## Retired BC-CfE educator Irene Goldstone helped build foundations of HIV/AIDS education in British Columbia



Irene Goldstone

When Irene Goldstone arrived at St. Paul's Hospital in 1982 as director of medical nursing, Vancouver's earliest AIDS cases were emerging at an alarming rate, stretching resources to their limits as health care professionals struggled to treat an ever-growing patient population that included many colleagues. Stigma was pervasive and treatment options were few.

"It was a tumultuous environment," said Goldstone, who recently retired after 18 years as the director of professional education and care evaluation at the BC Centre for Excellence in HIV/AIDS (BC-CfE). "It was very tough on the staff – it was very draining both emotionally and in terms of the physical hard work of caring for people."

Reflecting on those difficult early days, Goldstone is proud of her role in the remarkable progress that has since been achieved in HIV/AIDS care. Over nearly three decades of tireless work, she has been instrumental in improving the quality of care and establishing the foundations of HIV/AIDS education in B.C.

Among her many achievements, Goldstone collaborated in the development of the St. Paul's Hospital inpatient HIV/AIDS program, including the establishment of Canada's first integrated palliative care unit for people with cancer and AIDS. She also served as chair and co-chair of the BC AIDS Conference, which functioned as Canada's de facto national AIDS forum from its founding in 1987 through the late 1990s.

Goldstone joined the newly founded BC-CfE in 1992 with a mandate to develop HIV/AIDS programs and resources for students and practising health care professionals. The following year, she worked with University of British Columbia associate professor Anne Wyness to establish the first HIV-specific course for nurses in Canada. This program, which has been offered through distance education since 2001, incorporates theory from a variety of disciplines to help nursing students expand their understanding of HIV/AIDS care.

In 1997, Goldstone collaborated in the development of an inter-professional HIV/AIDS elective through the UBC College of Health Disciplines. The course trains students from a broad range of disciplines – including medicine, nursing, pharmacy, and social work – and has inspired similar programs currently under development at Memorial University and the University of Toronto.

Goldstone's body of work has earned significant accolades from her colleagues.

"Irene's efforts to bring the multidisciplinary course to UBC were heroic," said Dr. Michael O'Shaughnessy, founding director of the BC-CfE. "There were so many obstacles put in the way, and only her grit and determination ensured her success."

BC-CfE director Dr. Julio Montaner added: "Irene Goldstone's passion and commitment to helping those living with HIV and AIDS are unmatched. She has made incredible contributions to HIV/AIDS education and care, and we are all deeply grateful for her years of outstanding service."

Despite her retirement, Goldstone has accepted a position on the Dr. Peter AIDS Foundation board of directors and will remain an active presence in the HIV/AIDS community.

## Primary care interventions benefit HIV-positive Canadians

Increasing primary care interventions will improve health outcomes for HIV-positive Canadians, reduce emergency department use by this patient population and, in turn, decrease healthcare costs.

These were the findings of a study titled *Effect of viral load suppression and housing on Emergency Department use on a cohort of persons on antiretroviral treatment in British Columbia, Canada*, which was presented at the XVIII International AIDS Conference in Vienna.

"The findings clearly suggest a need at the primary care level for social interventions – harm reduction, comprehensive medication

adherence support, and supportive housing," said Dr. Robert Hogg, study lead and director of the Drug Treatment Program at the BC Centre for Excellence in HIV/AIDS (BC-CfE). "Engaging marginalized populations at this stage will keep them healthier longer."

BC-CfE researchers looked at 493 HIV-infected people taking highly active antiretroviral therapy (HAART). Of these, 153 people (31 per cent) used St. Paul's Hospital's emergency department, mainly for skin infections typical to injection drug use, followed by injuries and poisoning.

## HIV-positive Aboriginal Canadians receive same benefits from HAART



Dr. Robert Hogg

The results of a study presented at the XVIII International AIDS Conference in Vienna reinforced the need to expand highly active antiretroviral therapy (HAART) among HIV-positive Aboriginal Canadians. This expansion of clinical care should be coupled with appropriate supportive services to improve health outcomes.

“Ongoing research is proving time and time again that HAART remains the gold

standard for HIV treatment,” said Dr. Robert Hogg, co-author of the study and director of the Drug Treatment Program at the BC Centre for Excellence in HIV/AIDS (BC-CfE). “The results show that all Canadians with HIV can reap life-saving and life-enhancing benefits from HAART treatment and support further efforts to expand and improve the delivery of HAART treatment among Aboriginal populations.”

The study *Clinical Response to Highly Active Antiretroviral Therapy Among Aboriginal and Non-Aboriginal Individuals in British Columbia, Canada* was conducted by researchers at the BC-CfE and the Vancouver Native Health Society. They analyzed data from 400 HIV-positive individuals accessing HAART and found no association between Aboriginal ancestry and response to treatment.

Aboriginal persons in Canada are disproportionately represented in the HIV/AIDS epidemic, accounting for 27.3 per cent of HIV-positive tests in 2006 despite representing 3.8 per cent of the Canadian population.

“This study proves what we already know – response to treatment is not the problem,” said Ken Clement, chief executive officer of the Canadian Aboriginal AIDS Network. “The issue is getting Aboriginal people to access treatment. There is a lot of distrust towards the medical community so there needs to be more culturally relevant HIV programs available throughout the province.”

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## Dr. Montaner awarded the Order of British Columbia

### Receives two more honours for his life-long work to defeat HIV/AIDS

For his decades of path-breaking research in HIV/AIDS and his relentless dedication to improve the lives of people affected by the HIV virus, Dr. Julio Montaner, director of the BC Centre for Excellence in HIV/AIDS (BC-CfE), was recently named to the Order of British Columbia.

“The Order of British Columbia recognizes the excellence and achievements of our citizens. It’s the highest honour we can bestow on individuals in our province,” said Lieutenant-Governor Steven Point, Chancellor of the Order.

“This is a great honour for me,” Dr. Montaner told CBC’s *On the Coast* radio show. “It represents the culmination of a lifetime of commitment to HIV/AIDS and it comes at a particularly important time when we are trying to make inroads federally with our programs. So having this clear endorsement of the importance of the contribution that we have made during the last two-and-a-half decades is really very gratifying.”

Dr. Montaner also won two other prestigious distinctions recently.

On June 16, 2010, Dr. Montaner became the first recipient of the Aubrey J. Tingle Prize, a \$10,000 award created in honour of the founding president and CEO of the Michael Smith Foundation for Health Research (MSFHR).

“Dr. Montaner’s work has contributed to important advances in the treatment and care of people with HIV/AIDS,” said Dr. John Challis, president and CEO of MSFHR. “It is very fitting that he receives this prize, dedicated to a B.C. scientist whose work has provincial and also global significance.”

Dr. Montaner donated his prize money to the University of British Columbia (UBC) HIV/AIDS and Social Justice Award Endowment.

On June 18, at their spring convocation ceremony, Dr. Montaner was also awarded an honorary doctorate of science from Simon Fraser University (SFU).

“SFU is very proud to recognize Dr. Montaner for his exemplary contribution to HIV/AIDS research and his fearless advocacy for worldwide universal access to HIV treatment, prevention and care,” said Dr. Michael Stevenson, president and vice-chancellor of SFU.

Dr. Montaner expressed his deep gratitude for receiving these honours: “I want to thank the MSFHR, SFU, as well as UBC and the National Institute on Drug Abuse (NIDA) for supporting and funding our research. A big thank you to the provincial government for their continuous backing and my co-workers who bring their passion, commitment and energy to work every single day,” said Dr. Montaner.



## HIV prevention key to curbing epidemic and cutting treatment costs

*KM Johnston, A Levy, Viviane Lima, Robert Hogg, Mark Tyndall, P Gustafson, A Briggs, Julio Montaner*

The first comprehensive economic evaluation of the net benefit of highly active antiretroviral therapy (HAART) in B.C. showed that while expanding HAART use is cost-effective for individual patients, the benefits become exponentially greater when HAART's ability to prevent HIV transmission is considered.

The formal economic analysis was led by researchers at the BC Centre

for Excellence in HIV/AIDS (BC-CfE). The results demonstrated that when benefits to survival and quality of life are accounted for, increasing HAART treatment coverage from the current estimated 50 per cent to 75 per cent of all clinically eligible British Columbians (HIV-infected individuals with CD4 cell counts below 350 cells/ul) would deliver a net benefit of US\$900 million over 30 years.

Authors of the study believe that the expansion of HAART is a very smart economic investment – not just a medical or ethical obligation. In the absence of a vaccine or cure, HAART remains the most compelling prevention tool available to contain the spread of HIV.

“Within B.C., the sub-populations most affected by HIV are hard-to-reach, marginalized groups such as sex trade workers, injection drug users and men who have sex with men. Prevention of new infections among these HIV-vulnerable groups must be a priority in order to meaningfully curb the growth of the epidemic,” said Dr. Karissa Johnston, one of the authors of the study. “In this context, the study findings lend further credence to the BC-CfE-pioneered Seek and Treat strategy.”

The B.C. government recently invested in a \$48-million, four-year pilot project to be implemented in Prince George and Vancouver's

Downtown Eastside. The pilot project will improve access to HIV/AIDS treatment and care among hard-to-reach populations and extend HAART treatment to all people in medical need living with HIV.

This study was undertaken from a taxpayer perspective. Only direct medical costs such as antiretroviral and non-antiretroviral medications, hospitalizations, physician visits and laboratory tests were considered. Researchers expect that the findings can be accurately applied to other areas that have healthcare systems similar to B.C. (*AIDS* – the official journal of the International AIDS Society)

## HAARTbeats

# Progress against HIV at risk if funding commitments remain unfulfilled, warn experts

The significant gains made so far in the fight against HIV/AIDS could be reversed if G8 nations fail to meet the pledge for universal access to HIV therapy and continue funding cuts to HIV prevention and treatment programs. This was the stern warning from leading HIV/AIDS experts in a policy report, *Universal Access in the Fight Against HIV/AIDS*, recently published in *Science*, an internationally recognized peer-reviewed journal.

In 2005, all G8 members committed to universal access to HIV prevention, treatment and care by 2010. As per current estimates, they are only 40 per cent of the way there. Furthermore, in 2009, the Joint United Nations Programme on HIV/AIDS (UNAIDS), estimated that \$25 billion will be required in 2010 for the AIDS response in low- and middle-income countries. That is \$11.3 billion more than is available today.

“If G8 member countries don't do more in terms of the quality and quantity of care for people with HIV, this will result in dire human and economic costs in the short and long term,” said Dr. Julio Montaner, director of the BC Centre for Excellence in HIV/AIDS (BC-CfE) and one of the authors of the policy report.

The report noted that many African countries are facing depleting stocks of antiretrovirals, reduced treatment coverage goals and an increasing risk of HIV drug resistance as a result of treatment interruptions. A moratorium on new enrollees in the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) has already caused an estimated 3,000 deaths.

The report was co-authored by Françoise Girard, director of public health program, Open Society Institute; Nathan Ford of Médecins Sans Frontières (Doctors Without Borders); and Dr. Elly Katabira, president of the International AIDS Society.

COMMUNITY PROFILE

# International working group promotes HIV/AIDS collaboration among Indigenous peoples

The first International Indigenous Working Group on HIV/AIDS (IIWGHA) was convened in Vienna on July 17 and 18 to promote collaboration and partnership among Indigenous peoples throughout the world facing the challenges of HIV and AIDS.

The forum, organized by the Canadian Aboriginal AIDS Network (CAAN) in advance of the XVIII International AIDS Conference, brought together representatives of Indigenous populations from eight countries to identify common issues and share best practices for addressing the HIV/AIDS epidemic.

Many of the factors linked to high HIV/AIDS rates among Aboriginal Canadians – the legacy of colonialism and residential schools, lack of housing and adequate health care, and poverty – are driving similar epidemics among Indigenous peoples in the United States, Latin America, and Oceania.

“We share a common vision for improved access to holistic care, treatment, and support for Indigenous peoples throughout the world,” said CAAN chief executive officer Ken Clement and chair Denise Lambert in a statement.

“This gathering is an opportunity to share knowledge, skills, community-generated solutions, and wise practices to respond to this global epidemic.”

Six core objectives were identified for the working group:

- increase the integration of HIV/AIDS and Indigenous peoples at the international level
- improve meaningful inclusion of Indigenous peoples in research, policy, and program development
- ensure Indigenous peoples are more accurately represented in HIV/AIDS epidemiological data
- increase support for capacity development to integrate HIV/AIDS and Indigenous peoples
- develop an Indigenous-specific approach to the social determinants of health
- ensure that Indigenous and Aboriginal HIV/AIDS issues are presented at the International AIDS Conference in Vienna and beyond

For more information about the IIWGHA, please visit [www.caan.ca](http://www.caan.ca).

## Quick Facts about CAAN

CAAN is a not-for-profit coalition of individuals and organizations that provides leadership, support, and advocacy for Aboriginal people living with and affected by HIV, regardless of where they reside.

**Location:** 6520 Salish Drive, Vancouver

**Contact:** 604-266-7616; [info@caan.ca](mailto:info@caan.ca)

## BC Centre for Excellence in HIV/AIDS

- > Improve the health of British Columbians with HIV through comprehensive research and treatment programs;
- > Develop cost-effective research and therapeutic protocols;
- > Provide educational support programs to health-care professionals;
- > Monitor the impact of HIV/AIDS on B.C. and conduct analyses of the effectiveness of HIV-related programs.

### Undeliverable copies, notices to

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### St. Paul's Hospital Pharmacy Hotline

1.888.551.6222

### Website

[www.cfenet.ubc.ca](http://www.cfenet.ubc.ca)

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[info@cfenet.ubc.ca](mailto:info@cfenet.ubc.ca)

Funding for the BC Centre for Excellence in HIV/AIDS is provided by the B.C. Ministry of Health through Pharmacare and the Provincial Health Services Authority.



## what's new

### Forefront Lecture Series

**What:** The impact of host immunity on HIV-1 fitness

**When:** Tuesday, September 7 from noon to 1:00 p.m.

**Where:** New Lecture Theatre, St. Paul's Hospital

Dr. Mark Brockman is an associate scientist in the laboratory program at the B.C. Centre for Excellence in HIV/AIDS. Dr. Brockman's research investigates HIV

virology, AIDS pathogenesis, and host immune responses to HIV protein function. His current studies focus on viral immune escape mutations, the ability of T-cells to recognize and kill HIV-infected cells, and identifying cellular reservoirs and their role in disease.

For more information or to be added to the Forefront mailing list, please contact Andrea Keesey at 604-682-2344 ext. 66537 or [akeesey@cfenet.ubc.ca](mailto:akeesey@cfenet.ubc.ca).

