BC Centre for Disease Control
An Agency of the Provincial Health Services Authority

Update on HIV Testing

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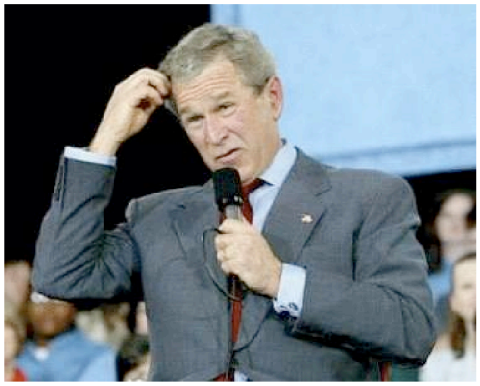
STI HIV
Prevention and Control

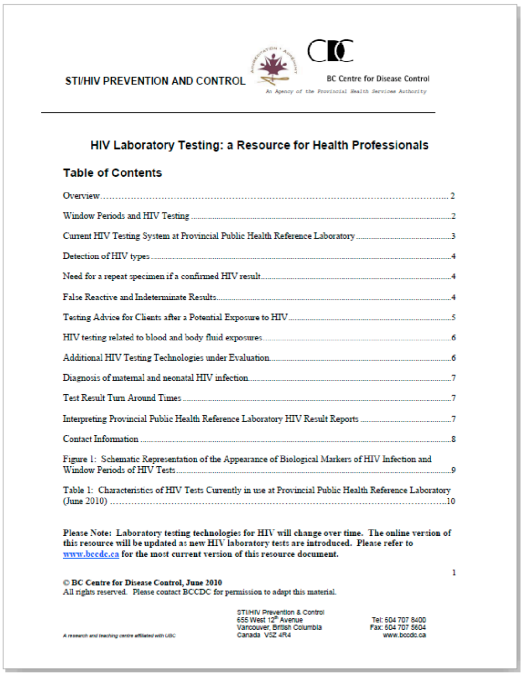
Objective

- What HIV tests are currently used in BC, what they involve, and what the results mean
- Review provincial HIV testing trends
- Discuss strategies for expanding HIV screening currently under consideration/development

1. Overview of current testing



• HIV testing can be confusing as new tests are being introduced frequently.



STI/HIV PREVENTION AND CONTROL

BC Centre for Disease Control
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HIV Laboratory Testing: a Resource for Health Professionals

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Please Note: Laboratory testing technologies for HIV will change over time. The online version of this resource will be updated as new HIV laboratory tests are introduced. Please refer to www.bccdc.ca for the most current version of this resource document.

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A research and teaching centre affiliated with UBC

1. www.bccdc.ca
2. Click on “Guidelines and Forms”
3. Click on “Communicable Disease Control Manual”
4. Under Chapter 5

• BCCDC has created the above resource for HIV laboratory testing that are conducted by the Provincial (PHSA) laboratories.

• Information includes: HIV tests available, window period information for specific HIV tests, and additional information that may be required to provide appropriate advice to clients undergoing HIV testing.

• Find the above resource at:

http://www.bccdc.ca/NR/rdonlyres/2982E293-BD82-436D-B193-F929B5CEEBEC/0/HIVTestinginBCResourceDocumentforHealthProfessionalsJune2010.pdf

Window period

Infection ⟶ **Detection**

- Difficult to measure (repeat blood donors)
- Based on models, averages, or estimates
- *Not* absolute:
  - Substantial individual variation (slow and fast responders)
  - Clinical acumen remains important

• The window period is the time interval between the time that a person becomes infected to the time it takes for a laboratory test to detect HIV.

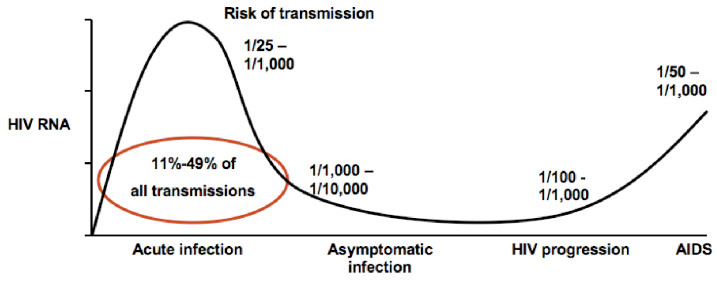
• The window period should be discussed with all patients during HIV pre and post test counselling.

• Window periods are not absolute. They are determined from models, averages or estimates based on studies of a small number of sero-converting individuals, typically among repeat blood donors.

• Individual variation is a factor as some people will have slower or faster antibody response to the virus.

Why important?

- Accuracy (False negatives)
- Time to test following event
- Detect acute HIV infections



(Brenner JID 2007; Fraser CROI 2006; Galvin Nature Rev Micro 2004; Hayes JID 2005)

• Understanding the window period will help determine whether a test is truly positive or negative.
• Also important for making recommendations for when individual should re-test. For example, re-testing after an exposure or when beginning a new relationship.
• The shorter the window period the more likely to detect individuals in the acute infection stage.
• The acute infection stage is the first 6-8 weeks after infection. This is the stage at which point individuals are highly infectious and more likely to transmit the virus to others..
• 11%-49% of all transmission occur during the acute infection stage.

Sources:

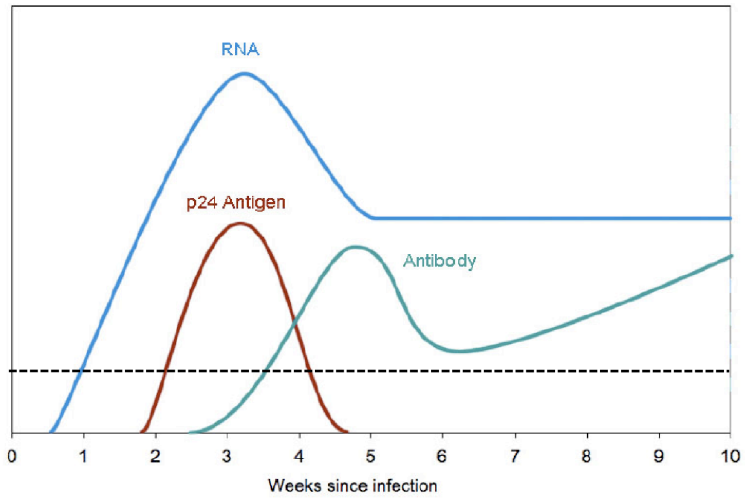
Brenner B.G. et al. (2007). High rates of forward transmission events after acute/early HIV-1 infection. *Journal of Infectious Diseases,* 195(7):951–9.

Fraser C, et al. (2006) Quantifying the impact of primary infection on HIV transmission and control. Program and abstracts of the 13th Conference on Retroviruses and Opportunistic Infections; February5-8, 2006; Denver, Colorado. Abstract 162.

Galvin SR, Cohen MS. The Role of Sexually Transmitted Diseases in HIV Transmission *Nature Reviews Microbiology* 2004

Hayes RJ, White RG (2005). Amplified HIV transmission during early-stage infection. JID; 193(4):604–5

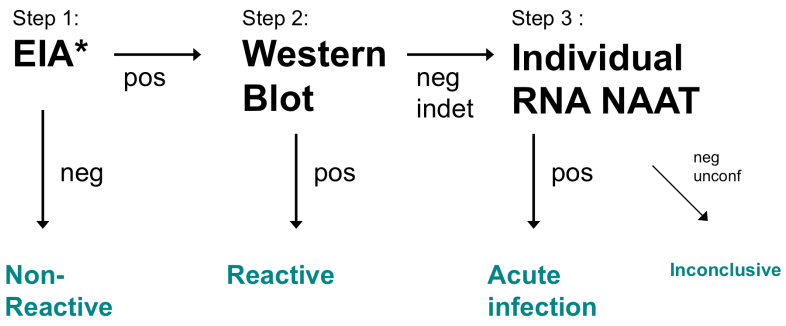
Appearance of markers of HIV infection



(BCCDC 2010)

- HIV tests are based on three different markers of HIV infection in the blood: viral RNA, p24 Antigen, antibody.
- The first marker to present is viral RNA, which is the presence of the virus in the blood.
- The second to appear is the P24 Antigen, which is a protein component of the HIV virus. The p24 antigen is transient.
- The last to appear in the blood are the antibodies.
- All three markers have different window periods as seen in the above graph.

Current algorithm (PHSA laboratories)



* Screening by 3rd generation EIA.
4th generation EIA is used as a supplemental test, if 3rd generation EIA is positive.

• The above diagram describes the testing algorithm at the PHSA laboratory.

•The first test is the 3rd generation enzyme immunoassay (EIA) test. This is used as the screening test and is highly sensitive. A 4th generation EIA test is available and has a shorter window period, however, it is currently used as a supplemental test to the 3rd generation EIA.

• If the EIA test is non-reactive, then the HIV test is considered negative.

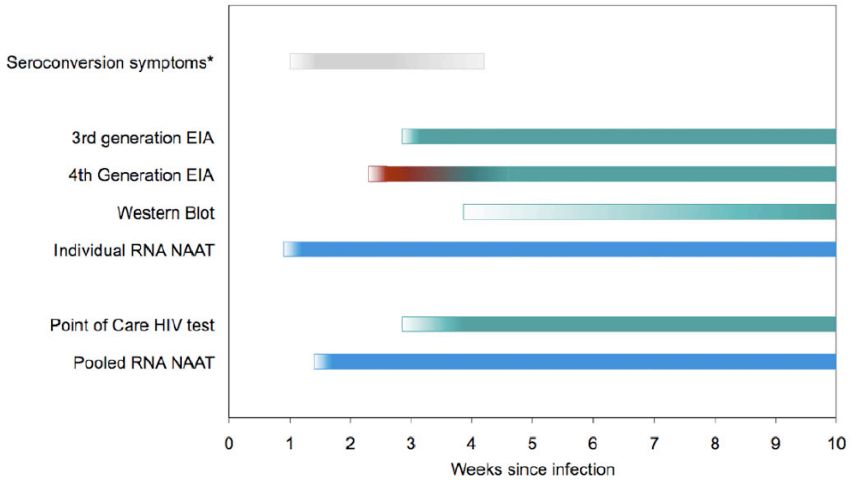
• If the EIA test is reactive, then confirmatory testing is completed using a Western Blot.

• A positive Western Blot is considered to be a confirmed HIV-positive diagnosis.

• If the Western Blot is negative or indeterminate, then an individual RNA NAAT test is completed.

• If the Individual RNA NAAT test is positive then the result is suggestive of acute infection.

Window periods of available tests



• The above slide displays the window periods for the various HIV tests that are available.

In practice

- By 4 to 6 weeks, greater than 95% will show detectable antibodies to HIV (have seroconverted)
- By 3 months, greater than 99% have seroconverted and will have a reactive Western Blot

• Revised Recommendation for HIV Testing Interval: 3 Months

• BCCDC is in the process of revising HIV policies and guidelines to reflect the current sensitivity of screening tests used to detect HIV.

•The Provincial Health Services Authority (PHSA) laboratory uses third-generation enzyme immunoassay (EIA) screening tests which detect HIV antibodies at an earlier stage compared with older tests.

•It is estimated that currently using these screening tests, approximately 95% of individuals will show detectable antibodies to HIV (i.e., seroconverted) by 4 to 6 weeks, with >99% of individuals having seroconverted by 3 months. Consequently, BCCDC is adopting 3 months as the recommended interval for HIV testing following a risk event or exposure. This is a change from previous recommendations of 3 to 6 months, and is consistent with the Canadian Guidelines on Sexually Transmitted Infections (2006 edition).

Testing after a potential exposure

- Early reassurance (i.e., low risk):
  - Test as early as 6 weeks, with testing repeated at 3 months if negative
- If more likely to be infected with HIV (i.e., positive partner, high risk exposure, seroconversion symptoms):
  - Test at time of presentation (baseline)
  - Test at 2-3 weeks following exposure
    - Write "4th generation EIA" or "p24 antigen" on PHSA lab requisition
  - Negative result and suspect HIV?
    - Can call lab and review with medical or clinical virologist (1-877-747-2522)

• General recommendations for individuals who are considered to be low risk for being infected with HIV is to test as early as 6 weeks after a potential exposure. And repeat test at 3 months if the initial test is negative.

• For individuals who have a greater risk of being infected with HIV, it is recommended that they be tested at the time of presentation (which establishes baseline, or could detect previous HIV infection)

•Individuals should then be re-tested at 2-3 weeks following the exposure.

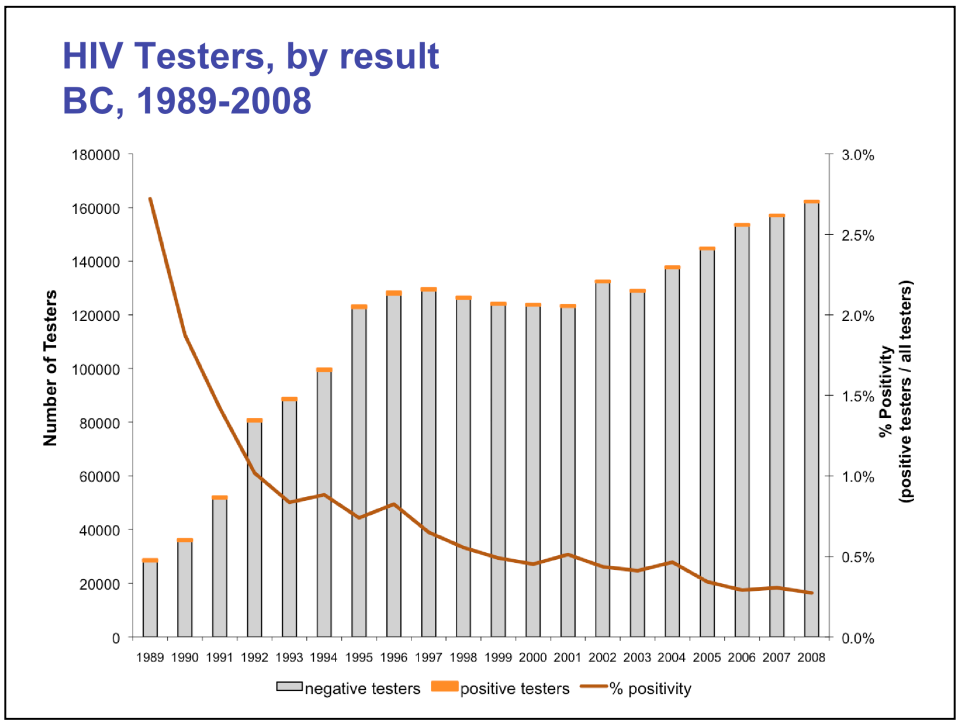
• If the test result is negative, but the result is unclear or it does not correspond to the clinical presentation of the patient, primary care providers can call the PHSA lab to talk to a virologist.

2. Provincial testing trends

- HIV test data from the PHSA Laboratories (BCCDC Site)
- >95% of all HIV tests in BC, does not include:
  - Tests conducted at St. Paul's Hospital, Victoria General Hospital
  - Point of Care HIV tests
- For analysis, test records are linked over time to construct testing histories (i.e., to identify first time and repeat testers, examine inter-test intervals)

• PHSA laboratories conduct approximately 95% of all the screening and confirmatory testing in BC. As a result, PHSA laboratories has the HIV testing data.

• The data does not include tests conducted at St. Paul's Hospital or Victoria General Hospital and it does not include Point of Care HIV tests.

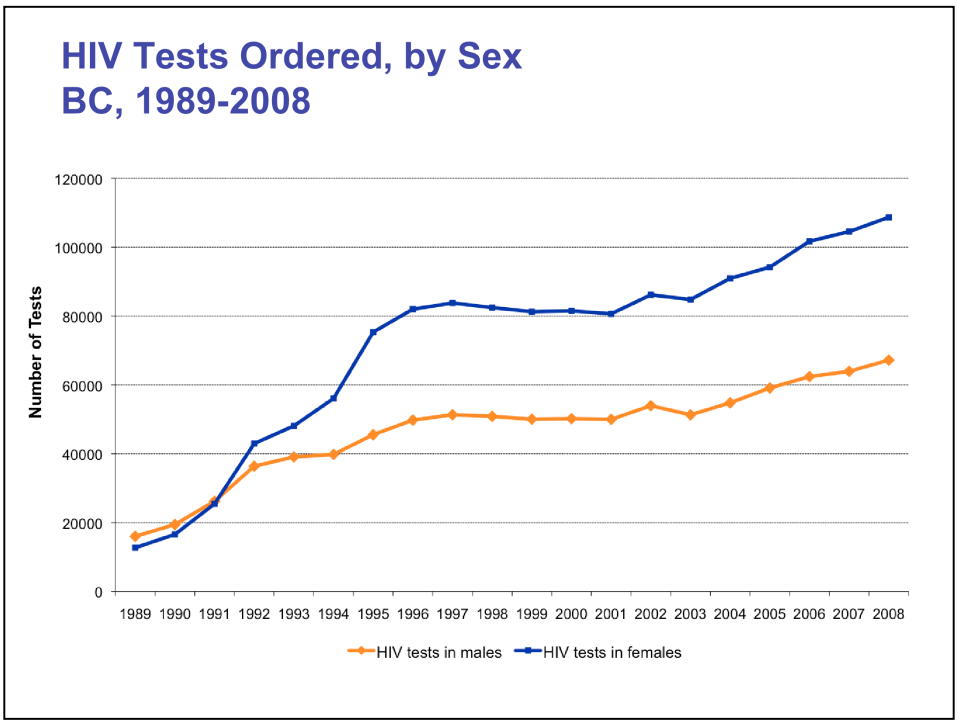


• This graph displays the HIV tests conducted since 1989.

• Over the past 8 years the number of HIV tests conducts has steadily increased.

• As testing has increased the proportion of positive test results has decreased as testing is now including people at low risk of HIV infection.

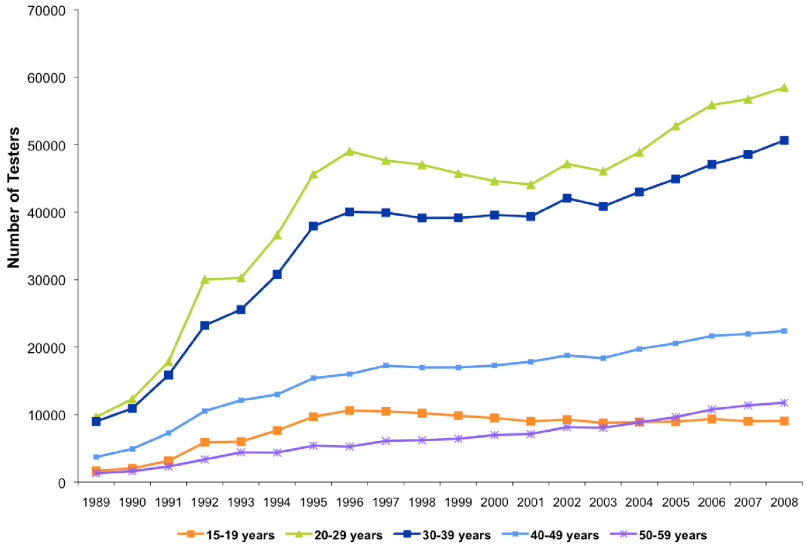
• Currently in BC, 0.2% of HIV tests are positive tests.



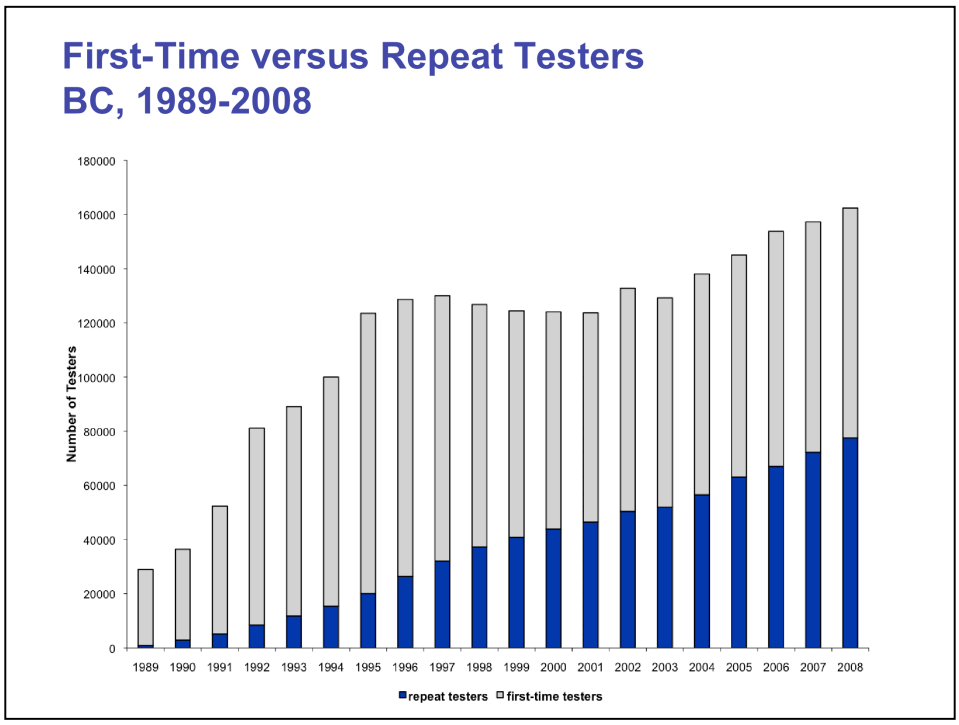
• This graph describes ordered HIV tests by gender.

• The trend for males and females is similar, however, more tests are conducted among females. This is primarily due to prenatal testing.

HIV Testers by Select Age Groups BC, 1989-2009



- Most tests are completed among people 20-40 years of age.
- In the youth category, ages 15-19 years, there has been a stable number of tests every year. This is the only group among which testing has not increased.



• This graph displays repeat testers in the PHSA laboratories database.

• There is an increasing number of repeat testers because testing is becoming more common and frequent.

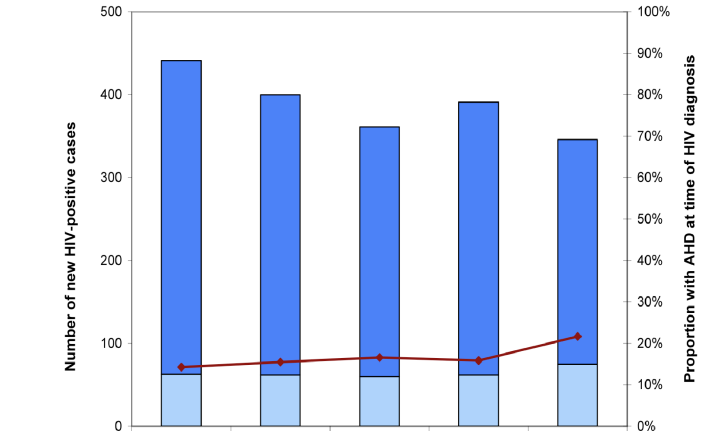
Comparison of first-time to repeat testers BC, 2004-2008

- First-time ("First known HIV Test at diagnosis"): 38.6%
- First-time testers were more likely to be (multi-variate analysis):
  - Age > 65 years
  - South Asian, Hispanic, Black (compared to Caucasian)
  - Have Advanced HIV Disease at diagnosis
- First-time testers were less likely to be:
  - MSM, IDU, STW
  - Have an HIV positive partner

Gilbert et al. Characteristics of persons with a first known HIV test at the time of HIV diagnosis in BC, 2003-2008. CAHR, Vancouver, 2009.

•The data from this slide was derived from individuals who were newly diagnosed with HIV and then looking back to investigate if they had a previous HIV negative test.

Persons with advanced HIV disease at diagnosis, BC, 2004-2008*

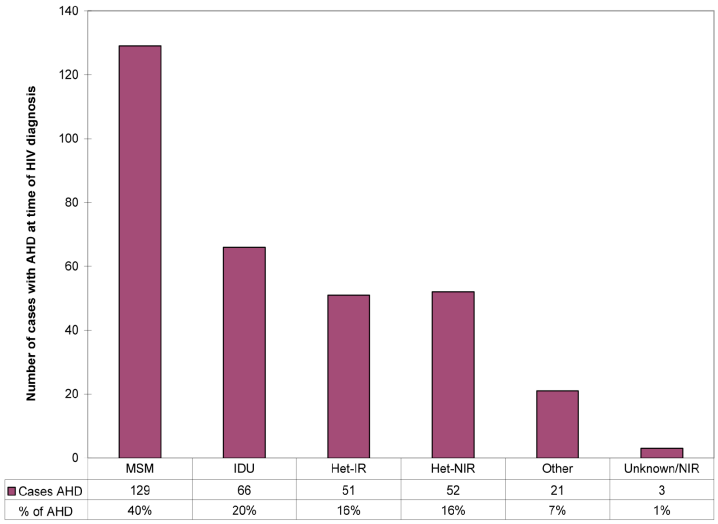


	2004	2005	2006	2007	2008
Cases not AHD	378	338	301	329	271
Cases AHD	63	62	60	62	75
Proportion AHD	14%	16%	17%	16%	22%

(BCCDC data; Advanced HIV disease defined as having an AIDS case report form within 12 months of diagnosis or a first CD4+ < 200 cells/mm3)

• Data from this report shows that up to 1 in 5 people diagnosed with HIV have advanced HIV disease at the time of diagnosis.

Breakdown of persons with advanced HIV disease at diagnosis by exposure category, BC, 2004-2008

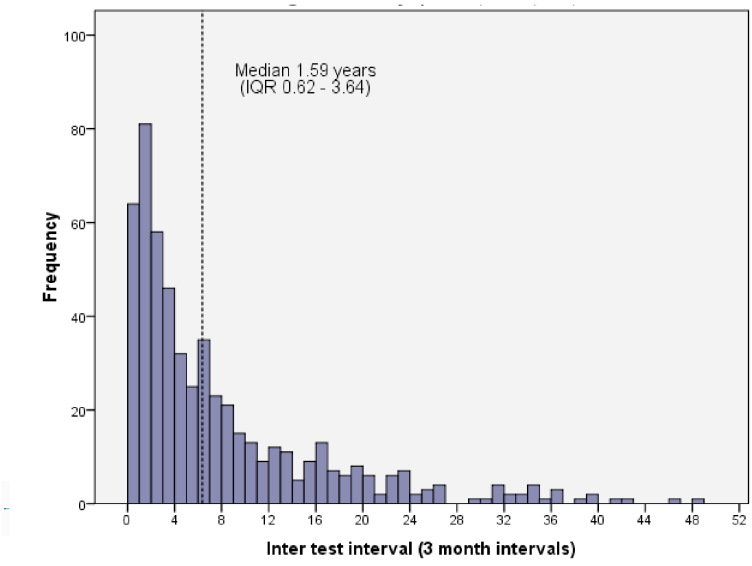


	MSM	IDU	Het-IR	Het-NIR	Other	Unknown/NIR
Cases AHD	129	66	51	52	21	3
% of AHD	40%	20%	16%	16%	7%	1%

(BCCDC data; IR = identified risk, NIR = no identified risk)

- Investigating all the people with advanced HIV disease at the time of diagnosis by exposure category revealed that 40% are among the MSM population and 20% are among the IDU population.
- Het-IR = heterosexuals with identified risk factors.
- Het-NIR = heterosexuals with no identified risk factors.
- There is clearly an opportunity for health professionals to continue to assess barriers for specific populations.

Interval since last negative HIV test, newly diagnosed MSM, BC, 2003-2007

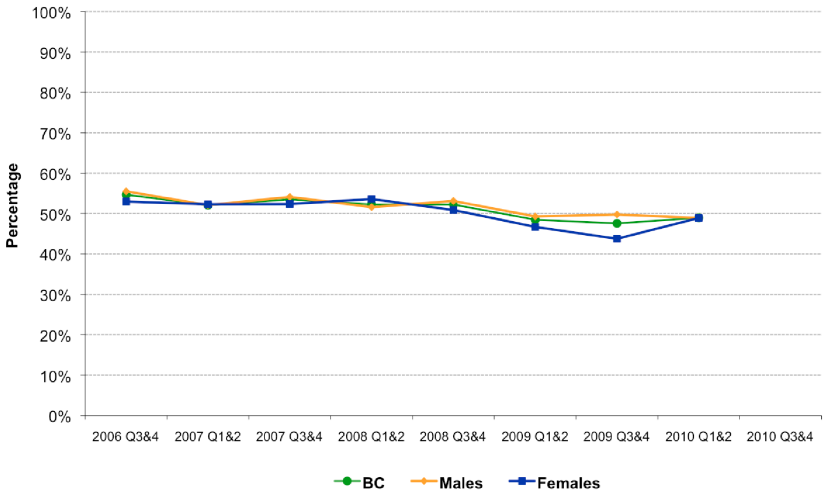


• This graph shows the interval between the last identified negative HIV test and the first positive test, for 64.1% of new positive MSM cases who had ever previously tested (previous slide).

• Median 1.6 years

• Suggests that increasing HIV testing frequency among testers is just as important as increasing HIV test uptake among MSM who haven't previously tested

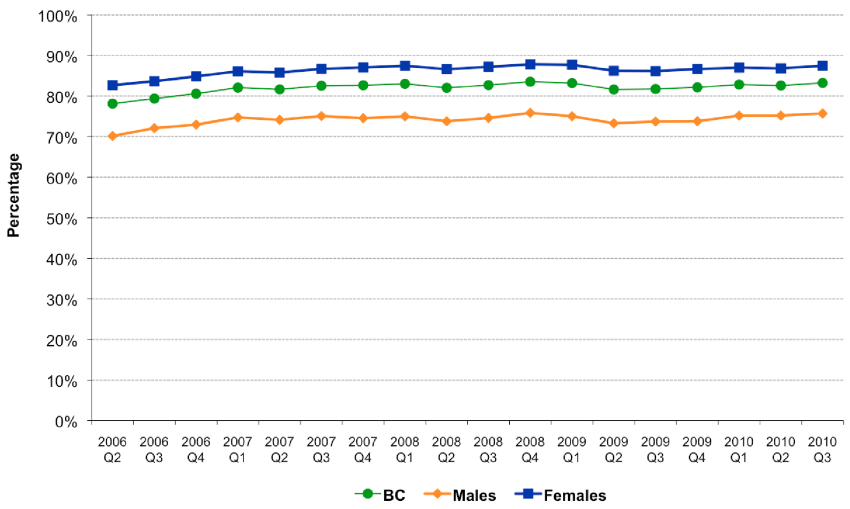
Percent of new HCV diagnoses with HIV test within 3 months, BC, 2006-2010*



(BCCDC data; individuals with prior known HIV positive test excluded)

- From BC data we know that individuals co-infected with HIV and HCV are more commonly diagnosed with HCV first.
- Only 50% of individuals with a new diagnosis of HCV have an HIV test within 3 months, excluding people who are known to be HIV positive.
- There is opportunity to increase testing within this population.

Percent of individuals tested for syphilis with a simultaneous HIV test, BC, 2006-2010*



(BCCDC data; individuals with prior known HIV positive test excluded)

- Overall in BC, 80% of people who are tested for syphilis are also tested for HIV.
- Simultaneous testing for Syphilis and HIV is higher in females than in males, probably the influence of prenatal testing.

3. Strategies for expanding testing

- 26% of HIV infected persons in Canada are unaware
- 3.5 times higher transmission risk in HIV unaware
- Knowledge of status can lead to behaviour change
- Disclosure of risk *to* providers, soliciting risk history *by* providers can be challenging
- Perception of risk & missed opportunities for testing
- Identified as priority in all regional and provincial HIV care, treatment and support strategies
- Major focus of the STOP HIV/AIDS Pilot project in Vancouver and Prince George (HIV Testing Strategies Subcommittee created)

(BCCDC data; Marks JAIDS 2005; Weinhardt AJPH 1999; Brenner JID 2007; Marks AIDS 2006; PHAC 2009; Bernstein Arch Int Med 2008)

Big Picture

- Comprehensive multi-level approaches are required in order to address all barriers to HIV testing
  - Individual: privacy concerns, stigma related to disease or test, embarrassment, risk perception
  - Provider: discomfort with sexual orientation or history, inaccurate knowledge
  - Sites: access, travel, hours, clinic environment
  - Society: criminalization of HIV non-disclosure, stigma

a. Expanding Point of Care HIV testing

- Increased acceptance and uptake of testing, receipt of test result
- Many programs/sites have implemented POC HIV testing around the province
- Expansion of POC in Vancouver and Prince George in relation to STOP HIV
- A provincial POC HIV testing program is in development

b. Expand provider-initiated HIV testing

- Limitations of strictly risk-based testing approaches
- Through STOP HIV, routinely offer HIV testing:
  - Individuals having a greater likelihood of HIV infection (e.g., seeking testing for or diagnosed with STI, HCV, TB; past history of STI; anyone requesting testing)
  - To all clients in settings with higher expected prevalence of HIV (e.g., STI clinics, youth clinics, addictions and mental health services, corrections, some acute care settings)
    - Likely cost-effective if > 0.1% prevalence of undiagnosed infections

• Data from the USA and France show that routine testing is cost-effective in settings where the prevalence of undiagnosed HIV infections is greater than 0.1%

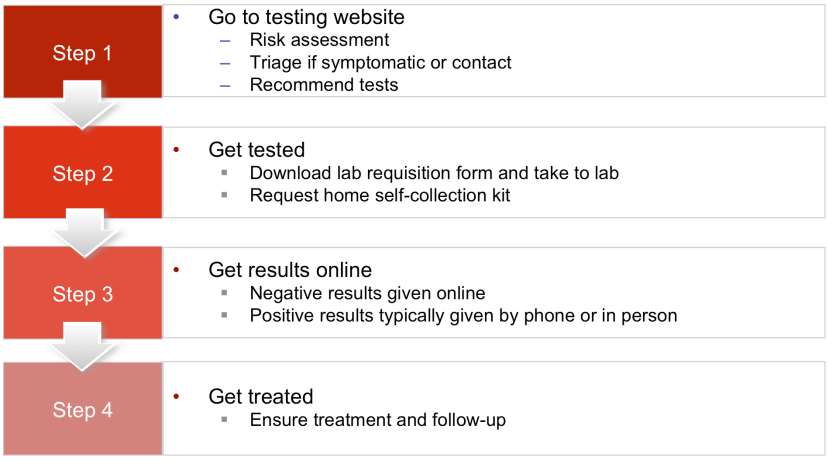
c. Update pre- and post-test counseling

- Comprehensive pre- and post-test counseling is barrier for some providers and clients, in some settings
- Comprehensive post-test counseling with people having a positive HIV test has benefit (behaviour change, access to care)
- Minimum standards for pre and post-test counselling are required (informed consent, window period, reporting)
- Guidelines for pre- and post-test counselling are being revised to include:
  - Streamlined approach (e.g., primary care, acute care)
  - Comprehensive approach (where have higher pre-test likelihood of HIV infection e.g., STI clinics)

d. Earlier and more frequent testing

- Identify acute infections, more timely referral to HIV primary care and HAART
- Testing after an event or exposure or when starting a new relationship (and not waiting 3-6 months to test)
- Persons with ongoing, high risk for HIV should test frequently
  - Need to make testing accessible and convenient

e. Internet-based testing



In closing

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• In conclusion, testing is one component of HIV/AIDS prevention, care and support.