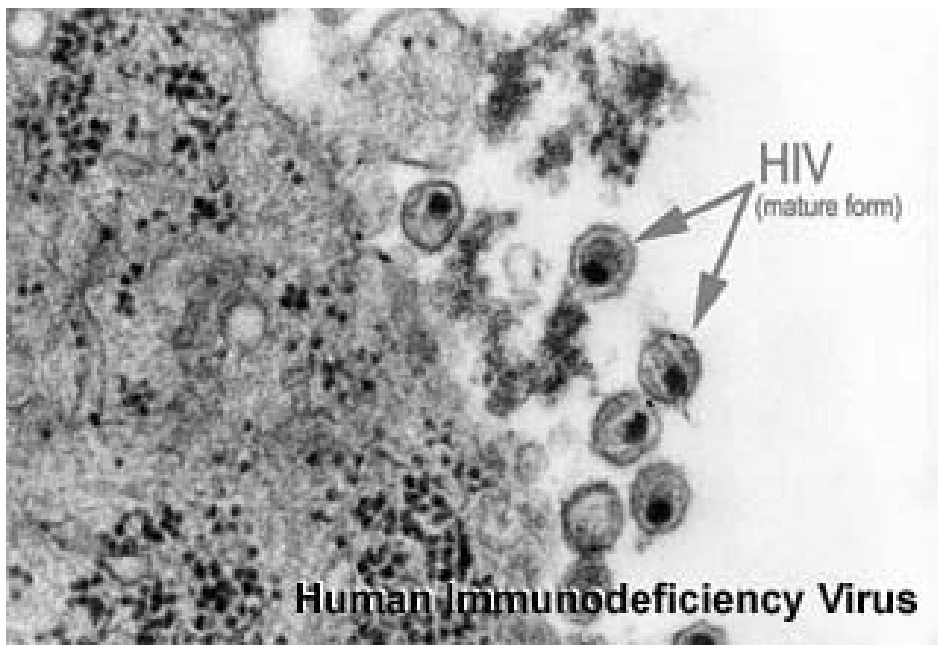


# HIV diagnostics and its status in Nepal



Human Immunodeficiency Virus

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Acquired Immune Deficiency Syndrome (AIDS) is a condition whereby single stranded RNA virus known as Human Immunodeficiency Virus infects immune cells, preferentially the CD4 subset of T-cells. The process of HIV infection starts as early as couple of weeks post infection and ultimately results in full blown condition known as Acquired Immunodeficiency Syndrome or AIDS.

The visible symptoms of AIDS as a medical condition is only observed during the acute phase, which can be anywhere from few years to more than 15 years post infection. The World Health Organization has classified HIV infection into four stages, stages 3 and 4 being symptomatic phases while the first two stages are primarily asymptomatic.

Although a number of direct and opportunistic symptoms are observed during the progression of HIV infection, the main cause for the lethality of HIV infection is its ability to directly destroy one of the major subsets of cells of the immune system- helper T cells (TH<sub>1</sub>). This RNA virus integrates itself into the host DNA of the T cells, enables its own multi-

plication and in the process destroys the host T cell. The end result is depletion of T cells and increased number of destructive HIV virus in the body. Thus, without CD4 to destroy other bacteria, viral pathogens, and infected individual may die from a simple infection such as common cold.

Since HIV primarily destroys CD4 T cells, the first line of diagnosis should be identification of the virus itself. The RNA virus can remain dormant within the host genome by not multiplying; not producing required coat proteins, not producing enzymes that facilitate its multiplication, for years. This does not mean the infected individual is safe. The virus can activate itself anytime, as long as it is in the body and within the infected immune cell.

## Molecular detection of HIV

To date, diagnosis of HIV in Nepal is primarily carried out using "indirect method." This type of method detects antibodies generated by the human immune system against an infecting organism, in this case HIV. The presence or absence of such antibodies against HIV in human serum is used as an indicator to confirm or negate infection by HIV. The tools that are used are Rapid Tests (or Lateral Flow technology) and/or Enzyme Linked Immunosorbent Assay (ELISA).

The biggest disadvantages of such methods are: a) those cannot quantify viral

particles and b) those fail to positively detect infection during "window period" post infection. The "window period" in HIV infection is when antibody production has not reached a detectable level even though an individual has already been infected with the virus. "Direct method" can overcome the disadvantages of the indirect method using molecular technology such as PCR and real time quantitative reverse transcriptase PCR (QPCR).

Regular PCR is not used as first line diagnostic tool in HIV infection (partly because WHO regulations allow use of rapid tests) whereas QPCR has never been used in Nepal, to date. The major benefits of molecular detection are earlier diagno-

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sis thereby enabling life prolonging anti-retroviral treatment much earlier during infection, and prompt detection in paediatric cases.

Immunological (Indirect) methodologies used to date in Nepal limits HIV detection in children who are younger than 18 months in age. Positive result obtained from infant may in fact be either "false positive" as those could be from the infected mother or "false negative" as the infant may not be producing its own antibodies against the virus. If QPCR is carried out in samples from infants, actual viral count can be done to confirm presence or absence of virus much earlier.

Another advantage of molecular detection in the Nepali context is regarding HIV mutation: HIV mutates fast, with some strains mutating faster than others leading to development of resistance against available therapy. To overcome this,

research into strain variation would also be of immense importance in assessing HIV therapy using DNA sequencing technology.

At least one organization in Nepal, Center for Molecular Dynamics Nepal (CMDN) has access to the latest molecular technology (PCR as well as QPCR along with DNA sequencing technology) in Kathmandu which enables both HIV diagnosis as well as ARV treatment monitoring in the form of viral load counts. This organization is also able to initiate research into HIV strain variation using DNA sequencing technology.

## Are the numbers lying?

A recurring, and somewhat nagging question is whether the percent of population infected with HIV, which stands at 1 percent according to National and UNAIDS official report is accurate. Taking into account the stigma surrounding HIV infection in many villages in Nepal (meaning infected individuals may not come forth), the reliability of results from majority of diagnostic laboratories of Nepal, lack of trained human resource in disease diagnostics, the occurrence of window period in HIV infection, this figure may not be as low as officially claimed.

The accuracy of the diagnostic methods used is probably the biggest factor in epidemiological studies. The best way to assess the incidence of HIV infection in Nepali population is to carry out the sampling as well as diagnostic procedures in Nepal in the shortest gap between the two as much as possible. It is an epidemiological fact that the larger the gap between sampling and diagnostics in HIV studies, the higher the chances of obtaining "false negative" (negative results in HIV positive individuals) results.

Therefore, in order for the government to bring about an effective policy to counter the HIV epidemic in Nepal, it needs to seriously tackle the issue of HIV diagnostics in the country. It needs to collaboratively work with public and/or private organizations that may be able to provide molecular diagnostic platform for HIV diagnosis and monitoring. Nepal has already entered the age of molecular diagnostics. The question is: Is the government ready to cooperate and collaborate?