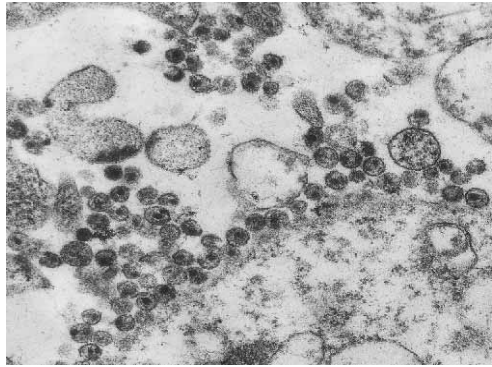


***Retro Viruses***

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## Human Immunodeficiency Virus (HIV)

Antibodies to HIV were first detected in commercial sex workers from south India in 1985. A disease that had a few thousand cases reported in early 1990s affects almost 5 million today in India and has killed about 2.7 million during the period according to UN reports.

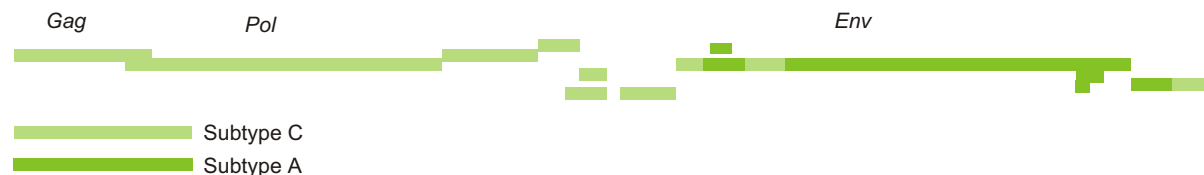


Electron micrograph of HIV-1 budding and released from an infected cell

## Epidemiology

- NIV was one of the first laboratories in the country to initiate investigations on HIV and AIDS.
- Sero-surveillance revealed HIV positivity in the high-risk groups, such as STD patients, sex workers and professional blood donors.
- Sero prevalence increased significantly in these groups during the period 1986-1992.
- NIV was one of the first laboratories in India to isolate HIV-1.

*HIV-1 A / C inter-subtype recombinant detected in Pune, India*



- Prevalence of anti-HIV-2 antibodies was also demonstrated.
- NIV initiated studies on homosexual men and detected antibodies to HIV-1 and HIV-2.

## Immunology

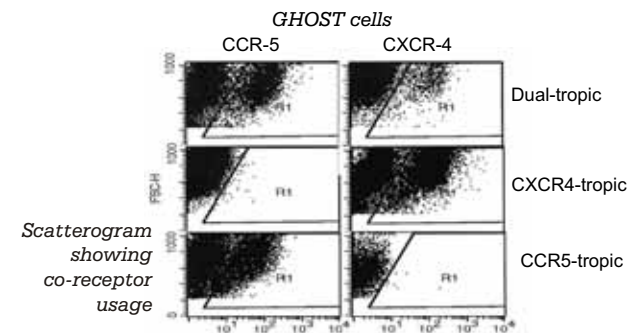
- $\beta 2$  microglobulin ( $\beta 2M$ ) is elevated in immune disorders and considered as a non-specific marker in HIV infection.
- Studies conducted between 1990-92 showed significant rise of  $\beta 2M$  in HIV positive asymptomatic individuals.
- A two-year follow-up also showed significant rise in  $\beta 2M$ .
- Increase in  $\beta 2M$  correlated with disease progression.
- Over 20% of HIV-infected individuals also showed circulating immune complexes (CIC). Of these, 75% had HIV-specific IgG and IgA CICs.

## Virology

- Six HIV-1 isolates from recent sero converters were fully sequenced (in collaboration with NARI, Pune and Johns Hopkins University, USA).
- Six subtype C viruses had characteristic three NF- $\kappa$ B binding motifs.
- A/C recombinant with multiple cross-overs was detected for the first time in India.

NIV was instrumental in establishing an infectivity assay, using genetically engineered (GHOST) cells. (A gift from NY Univ., USA) The assay can be used for assessing co-receptor usage, infectivity titers, neutralization titers and for screening of antiviral drugs.

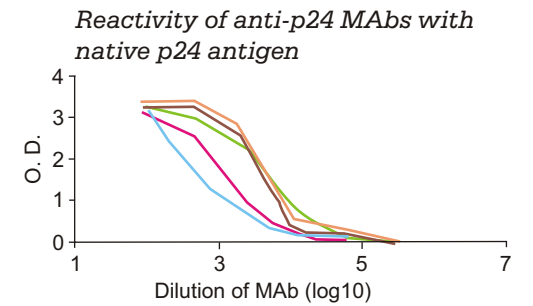
- Thirty-six HIV strains, isolated by NARI, were assessed for co-receptor usage by GHOST cell assay.
- Of these 35 were CCR-5 tropic. These viruses were isolated from individuals with different disease staging (asymptomatic to AIDS).
- One isolate (HIV-2) was dual tropic and utilized both CCR-5 and CXCR-4.
- The studies indicated lack of co-receptor switch from CCR-5 to CXCR-4 with advancement of the disease in Indian patients with subtype C infection.



## Diagnosis

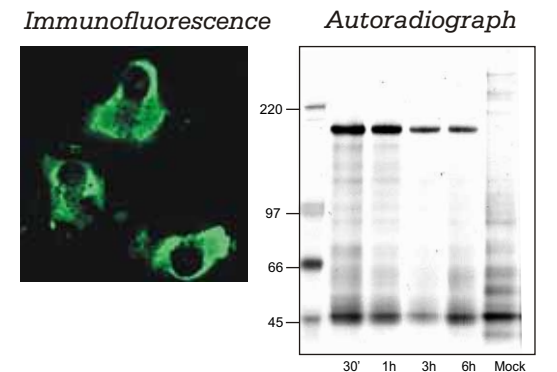
In an attempt to develop an indigenous diagnostic test for the detection of p24 antigen, anti-p24 monoclonal antibodies were developed. Native and recombinant baculovirus p24 proteins were used for raising and screening MAbs respectively.

Four monoclonal antibodies were developed, which could react with both native and recombinant antigen.



## Vaccines

- NIV was part of a tripartite collaboration with NARI and NICED for vaccine development.
- Recombinant vaccinia virus, expressing gp120 and gag proteins, were developed.
- Collaboration with IAVI and Bioption, Sweden, undertaken to develop SFV replicon.
- Recombinant developed with gag /pol/nef genes.
- Authentic expression of proteins demonstrated by IFA and autoradiography.



## Simian Retroviruses (SRV)

The simian retroviruses are known to infect a large number of Asian macaques, housed in biomedical research colonies in North America. Five serotypes have been identified with varying degrees of pathogenesis, from asymptomatic infection to SAIDS. There were no reports on natural SRV infection in the Indian simian population.

- Two species, the langur (*Semnopithecus entellus*) and rhesus macaques (*Macaca mulatta*) from Lucknow were screened for cross-reactive antibodies using HIV-1/HIV-2 test kits.
- One langur and six rhesus monkey sera showed cross reactive antibodies.
- Subsequent PCR and sequencing experiments revealed presence of SRV in the langur serum.
- Phylogenetic analysis revealed this to be a new SRV and was designated as SRV-6.

