Commentary

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Fish a Brief Note on HIV Integration

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Acquired Immune Deficiency Syndrome (AIDS) originated from the Human Immunodeficiency Virus (HIV). People with HIV possess what is referred to as an HIV infection. When contaminated semen, vaginal secretions, or blood come in contact with the mucous membranes or injured skin of an uncontaminated person, HIV gets transmitted to the uncontaminated individual refers to a horizontal transfer, which gives rise to another infection. Moreover, HIV can also be transmitted from HIV pregnant women to their uninfected baby in the course of pregnancy or delivery which usually refers to vertical transmission, or through breastfeeding. As a consequence of HIV infection, a segment of these individuals will develop and go on to build up therapeutically considerable AIDS.

HIV is a retrovirus, which constitutes a huge and distinctive family of RNA viruses that make a DNA transcript of their RNA genome after contamination of a host cell. A crucial step in the reproduction cycle of HIV-1 and other retroviruses is the integration of this viral DNA into the host DNA. The RNA genome of progeny virions and the template for relocation of viral proteins are made when the incorporated viral DNA is reproduced.

HIV integration is the positioning of HIV genetic material into the genome of the infected cell. The HIV integration mechanism involves the following six successive steps:

Step 1: Here, in this step, the process takes place in the cytoplasm of the host cell following the completion of reverse transcription of the HIV RNA into complementary DNA (cDNA). This step involves the binding of integrase - most likely in the dimer form - to each end of the newly formed HIV cDNA. The binding takes place at specific sequences in the long terminal repeat regions. The integrase-HIV DNA complex is part of an intracellular nucleoprotein particle known as the Pre Integration Complex (PIC). This complex consists of linear HIV DNA, viral proteins, and host proteins. The viral proteins include integrase, nucleocapsid, matrix, Viral protein R (Vpr), and reverse transcriptase. Several host proteins can also form part of this complex, although it is unclear whether some or all join the preintegration complex before nuclear transport.

Step 2: Here, in this step, the process is also held in the host cytoplasm, the integrase dimer cleaves the viral DNA at each 3' end. This cleavage response eliminates GT dinucleotide on the 3'- side of a saved CA dinucleotide area. The cleavage of the dinucleotide at each popular DNA 3'- end produces a dinucleotide 5' "overhang" and a responsive transitional that contains a 3'- hydroxyl bunch. This 3' handling step is the first of two key synergist responses performed by the integrase chemical, and it readies the viral DNA for incorporation into the host DNA. In an elective perspective on the DNA restricting and 3'- handling response, the tetramer type of integrase (not the dimer) ties to the closures of the HIV DNA and afterward cuts the 3' closes.

Step 3: Here, in the third step of the integration process, the PIC complex is transferred into the nucleus of the host cell, entering through one of the nuclear pore complexes.

Inside the core, the host protein focal point epithelium-determined development factor/p75, usually alluded to in abridged structure as LEDGF/p75, ties to the preintegration perplexing and the host DNA. The LEDGF/p75 fills in as a tying protein (or extension) between the preintegration complicated and the host DNA. The grouping of restricting of the LEDGF/p75, the host DNA, and the preintegration complex remaining parts muddled. In one form, the LEDGF/p75 ties first to the preintegration intricate and afterward to the host DNA. Then again, LEDGF/p75 may tie first to the host DNA and afterward to the preintegration complex. Notwithstanding the succession, it is accepted that the presence of LEDGF/p75 results in the integrase dimers moving toward one another to frame a tetramer.

In the subsequent stage, the strand relocates response, held inside the host cell nucleus, and includes the basic advance of embedding the HIV DNA into a target site of the host DNA. The area of inclusion contains a gently preserved palindromic grouping. This strand relocates response is begun as the HIV integrase catalyzes the HIV DNA 3'- hydroxyl bunch assault on the host DNA. The assault by the HIV DNA happens on inverse strands of the host DNA in an amazed manner, normally 4-6 base matches separated. This prompt response leads to the partition of the bonds in the host DNA base sets situated between the incredible cuts, and the joining of the HIV 3'-hydroxyl bunches with the host DNA 5' phosphate closes. Now, the recently joined viral-have DNA site uncoils.