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Commentary

Impact of Antiviral and Antibody Treatment in HIV Infection

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DESCRIPTION

The HIV viral infection is the primary cause of AIDS, a systemic illness. It is distinguished by a high degree of contagiousness in both genders. Reports state that the disease affected about 40 million individuals globally in 2019, with China accounting for 900,000 of the cases. According to reports, between 30,000 and 40,000 individuals pass away from AIDS every year. During the latent phase of HIV infection, no overt symptoms are present however, as the illness progresses, symptoms like fever, diarrhea, and a noticeable loss of body weight may appear.

Antiviral therapy is currently a key component of AIDS treatment. Thanks to combination Anti-Retroviral Therapy (cART), HIV is no longer a potentially lethal disease but rather a controllable virus. Currently, the recommended dosage is two or three antiretroviral medications. A number of classes of antiretroviral drugs have been developed and categorized according to how they work to stop the HIV replication cycle.

Nucleoside and Nonnucleoside Reverse Transcriptase Inhibitors (NRTIs and NNRTIs), Protease Inhibitors (PI), fusion inhibitors, entry inhibitors, and Integrase Inhibitors (INIs) are the several medication classes that are generally present. The rapid rise in resistant strains and treatment failure resulting from monotherapy can be attributed to the high rate of HIV genome mutation during viral replication. To fully stop viral replication and stop the emergence of treatment resistance, it is necessary to inhibit a wide range of enzymes and crucial host-virus interactions during the virus life cycle. By particularly targeting CD4+ T cells and CD8+ T lymphocytes, the primary immune cells, AIDS can obliterate or severely impair immunological function. According to some recent research, the expression of CD4+ T lymphocytes alone may not accurately represent the immunological function of AIDS patients; instead, the levels of CD4+/CD8+ T cells may. The primary specialized immune response cells in the body are CD4+ T cells and CD8+ T cells, and they are directly linked to the immunological state of the HIV-positive individuals. According to current immunology, HIV infection will cause a decrease in the quantity and quality of CD4 cells in peripheral blood, which will lead to a reduction in immune function.

Since CD4 cells are its primary marker, they could also be the primary marker used to assess the immunological response to AIDS treatment. Few research, meanwhile, have been done to determine the connection between AIDS patients' viral loads, HIV-1 RNA pol gene expression, and CD4+/CD8+ T cell counts following antiviral medication.

Despite the maintenance of viremia control, the prevention of drug resistance, and the long-lasting therapeutic benefits of traditional Anti-Retroviral Therapy (ART), HIV-1 infection is nonetheless incurable. Mild but enduring immune system abnormalities are another characteristic of persistent HIV infection despite Anti-Retroviral Therapy (ART), and bnAbs may help fight infection or more completely address the consequences of HIV infection on immune function.

The Human Immunodeficiency Virus (HIV) can be effectively suppressed by antiretroviral medication. To yet, however, it has not been able to completely eradicate the virus in those living with HIV. Since HIV suppression necessitates lifetime antiretroviral therapy, primarily daily, clinically viable substitutes that block viral replication using long-acting antiviral drugs must be developed. The off-target effect, poor stability, and inadequate bioavailability are obstacles in the way of developing these small compounds for clinical application.

Conversely, antibody-mediated treatment has become a significant therapeutic approach for the advancement of anti-HIV medications. Numerous antiviral antibodies, including broad neutralizing Antibodies (bnAbs) that target different strains of HIV, have demonstrated encouraging results in tests conducted in animals and in vitro, clinical trials are currently being conducted to assess these antibodies' potential applicability in clinical settings.

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