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Opinion Article

Stavudine: A Prominent Antiretroviral Medication in HIV/AIDS Treatment

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DESCRIPTION

Stavudine, also known as d4T, is an antiretroviral medication that has played a significant role in the treatment of HIV/AIDS since its introduction in the late 1990s. As a Nucleoside Reverse Transcriptase Inhibitor (NRTI), stavudine works by inhibiting the reverse transcriptase enzyme, thereby preventing the replication of the Human Immunodeficiency Virus (HIV) that causes Acquired Immune Deficiency Syndrome (AIDS). Despite its declining use in recent years due to potential side effects and the availability of newer drugs, stavudine remains an important drug in resource-limited settings.

History

Stavudine was developed in the late 1980s and gained approval from the U.S. Food and Drug Administration (FDA) in 1994. It belongs to a class of antiretroviral drugs called Nucleoside Reverse Transcriptase Inhibitors (NRTIs), which work by blocking the action of the enzyme reverse transcriptase, thus preventing the replication of the HIV virus.

Mechanism of action

Stavudine is converted into its active form, stavudine triphosphate, inside human cells. Stavudine triphosphate interferes with the reverse transcriptase enzyme, preventing the virus from copying its genetic material Ribonucleic Acid (RNA) into Deoxyribonucleic acid (DNA), a necessary step for viral replication. By inhibiting this process, stavudine helps to reduce the viral load and slow down the progression of HIV infection.

Benefits of stavudine

Effective viral suppression: Stavudine, when used in combination with other antiretroviral drugs, has shown efficacy in suppressing viral replication and reducing HIV RNA levels in the bloodstream. This viral suppression is crucial for slowing down the progression of the disease and preventing the development of AIDS.

Improved immune function: By reducing viral replication, stavudine helps to preserve and restore the immune system's function. This allows individuals with HIV to maintain a healthier immune response, reducing the risk of opportunistic infections and other HIV-related complications.

Treatment during pregnancy: Stavudine has been used in the Prevention of Mother-to-Child Transmission (PMTCT) of HIV. When taken by pregnant women, it reduces the risk of transmitting the virus to the baby during pregnancy, labor and breastfeeding, contributing to the goal of eliminating pediatric HIV infections.

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Side effects and considerations

While stavudine has proven effective in HIV/AIDS treatment, it is associated with several side effects and considerations:

Peripheral neuropathy: Stavudine has been associated with peripheral neuropathy, a condition characterized by nerve damage resulting in numbness, tingling or pain in the hands and feet. This side effect can be dose-dependent and more common with long-term use.

Lactic acidosis and hepatic steatosis: Rare but severe side effects of stavudine include lactic acidosis (excessive buildup of lactic acid in the blood) and hepatic steatosis (accumulation of fat in

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the liver). Regular monitoring and proper management are necessary to minimize these risks.

Lipodystrophy: Stavudine has been linked to lipodystrophy, a condition characterized by fat redistribution in the body, resulting in loss of subcutaneous fat in the face, arms and legs, while fat accumulation occurs in the abdomen, breasts and back of the neck.

Current usage and guidelines

In recent years, the use of stavudine has declined in many countries, primarily due to the availability of newer, more tolerable tolerable antiretroviral drugs. International treatment guidelines now recommend alternative NRTIs, such as tenofovir or abacavir, over stavudine in first-line therapy. However, stavudine may still have a role in certain resource-limited settings where access to newer medications is limited or cost-prohibitive. The benefits of stavudine in suppressing HIV replication may outweigh the risks of side effects and it can be used judiciously.