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IP-10 is a Key Player in HIV Infection

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Editorial

IP-10 (CXCL-10) is a chemokine that is involved in the trafficking of immune cells to inflammatory areas in response to interferon (IFN). In the context of human immunodeficiency virus (HIV) infection, numerous studies have revealed abnormally high plasma IP-10 levels, and IP-10 is regarded as a key pro-inflammatory component in the HIV disease process. This paper covers the biological properties of IP-10, the positive correlation between plasma IP-10 levels and HIV disease progression, the action of IP-10 on human immune cells, and probable related mechanisms. The role of IP-10 in HIV monitoring and treatment is discussed in depth in this article. Human immunodeficiency virus (HIV) infection is a severe public health problem, with over one million deaths worldwide each year. When HIV enters the human body, it triggers a powerful "cytokine storm." Interferon- (IFN-)-induced protein 10 (IP-10) is one of the better-understood cytokines involved. IP-10, also known as chemokine (C-X-C motif) ligand (CXCL) 10, is a secreted polypeptide with a mass of 10 kDa that belongs to the CXC chemokine family. Luster extracted its mRNA from IFN-stimulated monocytes for the first time in 1985. IP-10 is encoded by the IP-10 gene on chromosome 4q21 and produces chemokine dimers with multiple loops, one turn of 3–10 helices at the N-terminus, and three antiparallel beta strands packed against an alpha helix at the C-terminus. The protein sequence shares a lot of similarities with a group of proteins that have chemotactic and mitogenic functions and are linked to inflammation and cell proliferation.

When IP-10 is secreted into an immunological environment, it must combine with its receptor, chemokine (C-X-C motif) receptor 3 (CXCR3), to execute its activity. CXCR3 is a seven-transmembrane G protein-coupled receptor that also serves as a receptor for two additional chemokines: a gamma interferon-induced monokine (CXCL9) and an IFN-inducible T-cell alpha chemoattractant (CXCL11). CXCR3 is divided into three types: CXCR3-A, CXCR3-B, and CXCR-alt. CXCR3-A is the most common isoform, followed by CXCR3-B, and CXCRalt, that is only expressed at low levels and frequently co-expressed with CXCR3-A. CXCR3 is found on Th1 lymphocytes, NK cells, and NKT cells, among other cell types, and it is through this receptor that IP-10 recruits lymphocytes.

In this article, we concentrate on new studies on IP10 and HIV infection, as well as evidence indicating IP-10 plasma levels are rapidly up-regulated after HIV infection and are significantly greater in people who are co-infected with HIV and other disease-causing agents. IP-10 plasma levels are strongly linked to HIV disease progression and can be decreased by antiretroviral therapy, but not to normal levels (ART). IP-10 levels are also higher in HIV-positive persons' sperm, vaginal tract, cerebrospinal fluid, and lymph nodes. T cells and NK cells are suppressed by high levels of IP-10, which promotes HIV latency and replication. IP-10 production is triggered by HIV infection and is controlled by a number of signalling mechanisms. IP-10 is also a promising indicator and therapeutic target in HIV infection, and it could lead to new ways of monitoring and protecting against the disease.

Several investigations have shown that plasma IP-10 levels are abnormally high after HIV infection and are closely linked to HIV disease progression. Furthermore, even following antiretroviral therapy, plasma IP-10 levels in HIV patients are higher than in healthy controls. During HIV infection, IP-10 levels are also raised in other tissues and bodily fluids. High IP-10 levels can increase HIV susceptibility in high-risk populations, as well as accelerate HIV replication and impair immune cell function in HIV-positive people. Increases in might be caused by a combination of HIV particles or HIV proteins, as well as TLR7/9, which can be controlled by microRNA-21 during HIV infection. Furthermore, IP-10's substantial correlation with HIV plasma viral load suggests that it could be used as an indication of HIV infection and/or a therapeutic target for HIV treatment.

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