



Examining the Influence of HLA and Non-HLA Factors on HIV Pre-Exposure Prophylaxis and Blood Donor

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DESCRIPTION

HIV is a virus that attacks the immune system, reducing the body's ability to fight off infections. It is one of the most common and severe infections worldwide, with an estimated 37 million people living with HIV in 2018. In many parts of the world, it continues to be a major public health challenge. Despite numerous advances in treatment and prevention, HIV remains a significant cause of illness and death. It is particularly concerning for donor selection and blood infections, which can put both donors and recipients at risk. In order to reduce this risk, it is important to understand how genetic factors play a role in both pre-exposure Prophylaxis (PrEP) and donor deferral. Examining the influence of HLA and non-HLA factors on HIV pre-exposure prophylaxis and donor deferral can help improve safety measures for donors as well as recipients of blood transfusions. The Human Leukocyte Antigen (HLA) system is one of the main components involved in immunological responses to pathogens like HIV-1 viruses. These HLA molecules are also associated with drug therapy effectiveness, as well as resistance or susceptibility to certain strains of the virus. The genetic makeup of individuals can determine their response or lack thereof to certain types of treatments as well as their likelihood of being infected by HIV-1 viruses. Non-HLA loci have also been identified that play an important role in determining an individual's response to PrEP drugs used for preventing HIV infection [1-4].

The Human Leukocyte Antigen (HLA) is an important component of the human immune system that helps to protect against infections and diseases. It plays a critical role in HIV transmission by regulating the recognition and destruction of infected cells. In particular, HLA molecules are responsible for identifying antigens from viruses, bacteria, and other pathogens that are present in blood or bodily fluids. If these antigens are not properly identified, HIV can be transmitted more easily. Donor selection, which is the process of identifying potential donors who are at minimal risk of transmitting infections through blood transfusions, has been greatly aided by advances

in HLA technology. Through this technology, potential donors can be tested for their HLA type prior to donation to ensure that only those with compatible HLA types are selected as donors. This helps to reduce the risk of transmitting blood-borne infections such as HIV through transfusions. Non-HLA factors also play a role in determining an individual's susceptibility to contracting HIV. For instance, while certain genotypes may influence an individual's risk of infection with HIV, other factors such as lifestyle choices like unprotected sexual behavior or drug use can also increase their risk significantly. Additionally, some individuals may have weaker immune systems than others due to underlying conditions like diabetes or cancer treatments that make them more susceptible to contracting HIV from exposure to infected bodily fluids. These non-HLA factors should be taken into consideration when examining the influence of HLA and non-HLA factors on pre-exposure Prophylaxis (PrEP) for HIV prevention and donor selection for blood donation deferral programs. PrEP is a preventive measure that involves taking medication daily to reduce the risk of contracting HIV from sexual activity or injection drug use [5].

Donor selection is a crucial process for blood banks as it is important to ensure that blood donations are safe. To minimize the risk of transmitting infections through donated blood, donor deferral criteria based on Human Leukocyte Antigen (HLA) has been proposed. *HLA* is a gene found in humans which codes for proteins responsible for recognizing foreign molecules, such as pathogenic viruses and bacteria. Antibodies to certain viruses, including HIV, can be found in the bloodstream of those who have been exposed to them and these antibodies can be detected through a blood test. In some cases, individuals have an inherited predisposition to developing antibodies to certain viruses due to their HLA type [6-8]. This means that if an individual carries one or more genes associated with HIV exposure or infection, they are likely to test positive for HIV antibodies even if they have not been exposed to the virus. This can result in false positives when testing potential donors for HIV, resulting in unnecessary donor deferral if not addressed properly. Additionally, pre-exposure Prophylaxis (PrEP) is

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another factor which needs to be taken into consideration when evaluating potential donors and determining donor selection criteria. PrEP involves taking antiretroviral drugs before possible exposure to HIV in order to reduce the risk of contracting the virus [9].

Donor selection is a critical process that helps to ensure that blood donations are safe and effective for transfusion. Infection from virus, bacteria or parasites can be transmitted through a blood transfusion if the donor is not properly screened. For this reason, donors must meet certain criteria before they are accepted. The primary factors considered during donor selection include Human Leukocyte Antigen (HLA) compatibility and non-HLA factors such as medical history, lifestyle choices, and family history. The HLA system is a set of genes located on chromosome 6 that codes for proteins that regulate the body's immune response to foreign antigens. HLA testing identifies potential compatibility between donor and recipient, allowing for safer transplants [10].

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