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APOBEC FAMILY OF CYTIDINE DEAMINASE AND ITS ROLE IN IMMUNE RESPONSE

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The human immune system is constantly fighting different pathogens and infections. Among the key players in this battle are the APOBEC family of cytidine deaminases – group of enzymes, which serve as a powerful intrinsic genome realization regulation and defense mechanism. This family of immunoproteins works by editing DNA and/or RNA sequences, introducing mutations that can destroy the pathogen (ability first of all – viruses) to replicate. The APOBEC3 subgroup is especially important in the inhibition of many viral infections such as HTLV, HCV, HBV, HPV, HSV-1, HHV-6 and EBV through a series of editing-dependent and independent mechanisms. They use two main strategies: they can either directly mutate viral DNA through deamination or they can block viral (and even bacterial) replication without causing mutations. Nevertheless, a large number of viruses have developed some mechanisms that can withstand cytidine deaminase. For instance, HIV-1 counteracts these effects with the help of Vif protein that induces APOBEC3 degradation before it destroys the virus. Furthermore, in case of incomplete destruction these enzymes are able to make a contribution to the evolvement of viruses and drug resistance. Overexpression of APOBEC3 can lead to mutagenic effects, damaging the body's own DNA increasing cancer development particularly in HBV- and HCV-associated hepatocellular carcinoma.

In conclusion, the APOBEC family of cytidine deaminase represents a double-edged sword in human immunity. Understanding the dual role of APOBEC deaminases, as both antiviral restriction factors and potential mutators of the host genome-is critical for developing therapeutic strategies that enhance antiviral immunity while minimizing genotoxic risks.