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Unique sequential and structural determinants of human Apolipoprotein B mRNA-editing enzyme catalytic Polypeptide-like 3G (APOBEC3G)

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Inhibition of virion infectivity factor (Vif) defective Human Immunodeficiency Virus type 1 (HIV-1ΔVif) replication with the human apolipoprotein B mRNA-editing enzyme catalytic polypeptide-like 3G (APOBEC3G) opened a new era of potential innate antiviral therapeutics. Among the seven members of APOBEC3 family, six have shown antiviral potentials either involving Vif sensitivity or independently. The human APOBEC3G besides its binding with viral protein Vif also possess highest antiviral effect.

We retrieved proteins showing >80% homology with the human APOBEC3G from the National Center for Biotechnology Information (NCBI) and evaluated their unique sequential features using contemporary bioinformatics approaches.

Our analyses identified a total of seven mammalian APOBEC3G proteins showing homology with human APOBEC3G when a cutoff value of >80% homology was selected. Human APOBEC3G showed three unique amino acids Phenyalanine (F), Methionine (M) and Threonine (T) at position 204, 227 and 311 respectively. The BLAST search involving 5 peripheral amino acids on each side of these unique amino acids did not identify any other protein short stretch showing amino acid pattern like human APOBEC3G. Homology analysis of these three unique amino acids of human APOBEC3G with other APOBECs revealed that Methionine at position 227 and peripheral short stretch of amino acid is quite unique in human APOBEC3G. The human APOBEC3G is considered a potent innate defense against HIV-1 in humans. Unique molecular signatures identified in this important protein will assist us in understanding innate mechanisms of HIV-1 control.

Biography

Muhammad Mukhtar, received his Ph.D. in biosciences from the Drexel University and served at various positions at the Thomas Jefferson University of Philadelphia. Currently, he is serving as Vice Chancellor of one of highly progressive universities in Pakistan. In recent past, Dr. Mukhtar's laboratory has studied the mechanisms of human immunodeficiency virus type I entry into the brain, a sanctuary site for the virus during highly active antiretroviral therapy, and also explored the role of cholesterol-depleting drugs (Statins) in HIV-1-related neuronal injury. As Principal or Co-Investigator he has received several awards from the US National Institutes of Health, Pfizer Inc. and Higher Education Commission of Pakistan. The author of several book chapters and dozens of peer-reviewed articles, Dr. Mukhtar holds specialized certificates in Research Management and Public Health. Committed to the role of technology in biomedical research, he serves on the editorial boards of several national and international biomedical journals.