

Analysis of ORF5 protein signifies its importance in Norway rat Hepatitis E virus

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Abstract

Hepatitis E virus (HEV) is the chief cause of hepatitis E (inflammation of liver) across the globe. The Norway rat HEV genome consists of six open reading frames (ORFs), i.e., ORF1, ORF2, ORF3, ORF4, ORF5 and ORF5. The additional reading frame encoded protein ORF5 protein's structure and function remain to be explored. Therefore, the presented study was conceptualized to analyze the ORF5 protein for its physicochemical properties, primary structure, secondary structure, tertiary structure and functional characteristics using bioinformatics tools. The initial analysis revealed ORF5 protein as unstable, thermostable, hydrophilic and highly basic in nature. The primary structural analysis revealed higher percentages of amino acids Arg, Leu, Pro, Ser and Gly, which suggested that the ORF5 protein is richly endowed with some regulatory amino acids (Leu, Pro and Gly). The secondary structure of ORF5 protein showed all three major components (alpha-helix, beta-strand and random coil). The tertiary structure generated through homology modelling revealed mixed α/β structural fold with subsequently higher percentage of strands and abundance of coils. Moreover, the surface analysis revealed the several clefts and tunnels along with few pores, clearly suggested the ability of ORF5 protein towards interaction with other molecules. The ORF5 protein was also identified with several post-translationally modified sites including glycosylation, phosphorylation and myristoylation. The presence of these modified sites indicated the role of ORF5 protein in regulation. Thus, our analyses taken together interpret the ORF5 protein's essentiality in HEV. This data will help in exploring the prospective role of this additional genomic component of rat HEV through the sequence, structure and functional annotation of ORF5 protein.

Keywords rat HEV; open reading frame 5 (ORF5); physicochemical parameters; structural analysis; homology modeling; functional analysis.

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