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# Role of Glycoprotein Hemagglutinin-Esterase in COVID-19 Pathophysiology?

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One and a half year has passed since the outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) the causative agent of coronavirus disease 2019 (COVID-19) pandemic. Nowadays information on SARS-CoV-2 and its receptors are increasing. It's been showed that O-acetylated sialic acids (SAs) can interact with viral spike glycoprotein for the primary attachment of virus and its penetration into the host cells [1]. Most beta coronaviruses recognize 9-*O*-acetyl-SAs but it has changed to 4-*O*-acetyl-SA through the evolution of Coronaviruses [1]. Its viral ligand, the hemagglutinin esterase (HE) gene was transmitted to a beta coronavirus lineage A through horizontal gene adaption from a 9-*O*-acetyl-SA–specific HEF, as in influenza C [1, 2]. Adaption of HE occurs via cross-species transmission and HE evolution [1]. This fact demonstrates viral evolutionary compatibility to host glycans. Thus, studying emerging viruses like SARS-CoV-2 may result in better recognition of viral evolution process. For instance, as mentioned above, HE gene transfer is discovered in the beta coronaviruses, which choose 9-di-*O*-Ac-SAs. A more interesting example of such events happens in the murine CoVs, with attachment to two various subtypes of the canonical 9-*O*-Ac-SA (type I) and unique 4-*O*-Ac-SA (type II) [3]. But noticeably it must be mentioned that same as SARS-CoV-2, SARS-CoV genome has no HE gene [4]. Incorrectly a recent published article in the journal of stem cell reviews and reports states that SARS-CoV-2 has HE and hemagglutinin protein [5], also the authors has illustrated viral hemagglutinin glycoprotein on viral envelope. This is in contrast to previous studies which experimentally showed that SARS-CoV-2 lacks HE gene and glycoprotein. According to data from different full genome sequencing studies using next generation sequencing (NGS) and phylogenic analysis of SARS-CoV-2 virus has no HE gene and consequently HE glycoprotein [4]. Therefore this virus lacks HE gene and cannot carry HE protein (Fig. 1).

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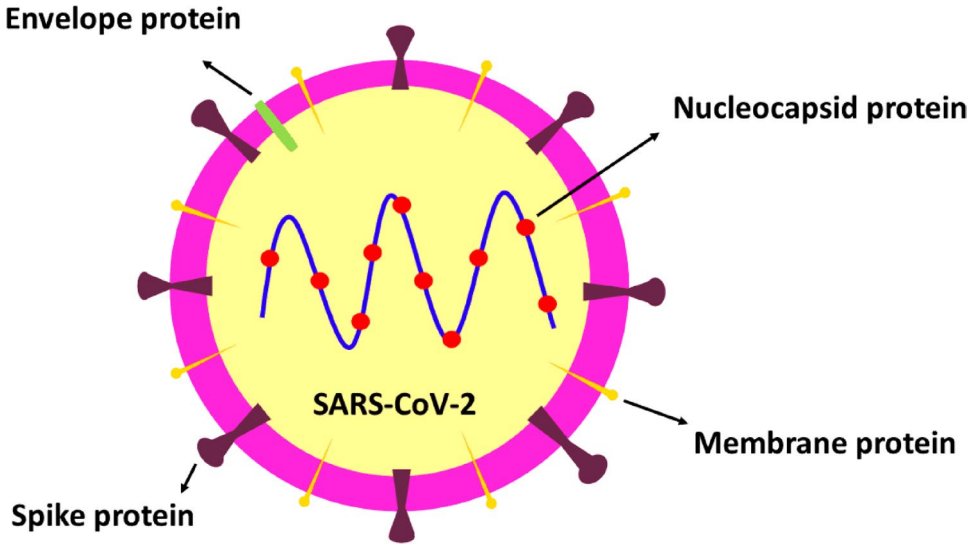


**Fig. 1** Structural proteins of SARS-CoV-2

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