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## SARS-CoV-2 as a betacoronavirus comprises five structural proteins?

Dear editor,

We read with interest a review article by Bakhshandeh et al. (Bakhshandeh et al., 2021). The authors considered hemagglutinin esterase (HE) as one of the structural proteins of SARS-CoV-2 (Bakhshandeh et al., 2021). Although, scientific evidences show that the genome of SARS-CoV-2 lacks the HE gene and it has no hemagglutinin-esterase glycoprotein (Kumar et al., 2020; Anastasopoulou and Mouzaki, 2020; Crawford et al., 2020; Zhang et al., 2020). Thus, HE cannot be considered as an antigenic component in SARS-CoV-2 and it has no role in SARS-CoV-2 infection.

SARS-CoV-2 as a betacoronavirus contains a non-segmented positive-sense, single-stranded RNA (Pal et al., 2020). The genome of SARS-CoV-2 has been sequenced, and based on the genomic sequence, SARS-CoV-2 shared 79.6% sequence identity to SARS-CoV and 96% identity similar to bat coronavirus (Zhou et al., 2020). The genome organization of SARS-CoV-2 is 5'UTR-Rep-S-3a-3b-E-M-6-7a-7b-8-N-10-3'UTR (Abdel-Moneim and Abdelwhab, 2020). Coronaviruses comprise four structural proteins spike (S), envelope (E), membrane protein (M), and nucleoprotein (N) (Fani et al., 2021), however, some betacoronaviruses such as OC43-CoV, Bovine-CoV and HKU1-CoV and, murine hepatitis virus encode hemagglutinin esterase (Lang et al., 2020). Therefore SARS-CoV-2 lacks HE and comprises four structural proteins S, E, M and N.

### Declaration of competing interest

The authors declare that there is no conflict of interest for this manuscript entitle "SARS-CoV-2 as a betacoronavirus comprises five structural proteins?"

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