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The genetics behind coronavirus replication

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Virus, a microorganism that cannot be seen by a human's naked eye is currently the largest threat towards humanity and a force to reckon with. The coronavirus is a large enveloped RNA virus that acts by releasing its genetic material into the host cell where the copies of the virus are made and the cell releases these copies to spread infection. The newly released viruses inside the human body attack the human immune system and prevent activation of the immune system, therefore leaving the human body defenceless. The virus replicates at a rate that is faster than the rate at which the human immune system can kill them. On entry into the host cell, the virus particle is uncoated, and its genome enters the cell cytoplasm. The coronavirus RNA genome acts as a messenger RNA and can be directly translated. The host ribosomes translate the initial overlapping open reading frames, ORF1a and ORF1b of the virus genome into two large overlapping polyproteins, protein phosphatase 1 (pp1a) and pp1ab. The polyprotein pp1ab yields 16 non-structural proteins. Products of these proteins include various replication proteins, such as RNA-dependent RNA polymerase, RNA helicase, and exoribonuclease. A number of the non-structural proteins act together to form a multi-protein replication-transcription complex. The main replication-transcription protein is the RNA-dependent RNA polymerase (RdRp) which is directly involved in the replication and transcription of RNA from an RNA strand. Hence, current research for developing vaccines is being focused on preventing the formation of this protein product, the RNA-dependent RNA polymerase. Therefore, if this initial product is not formed, we can prevent the virus from replicating inside the host and thus prevent infection.

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