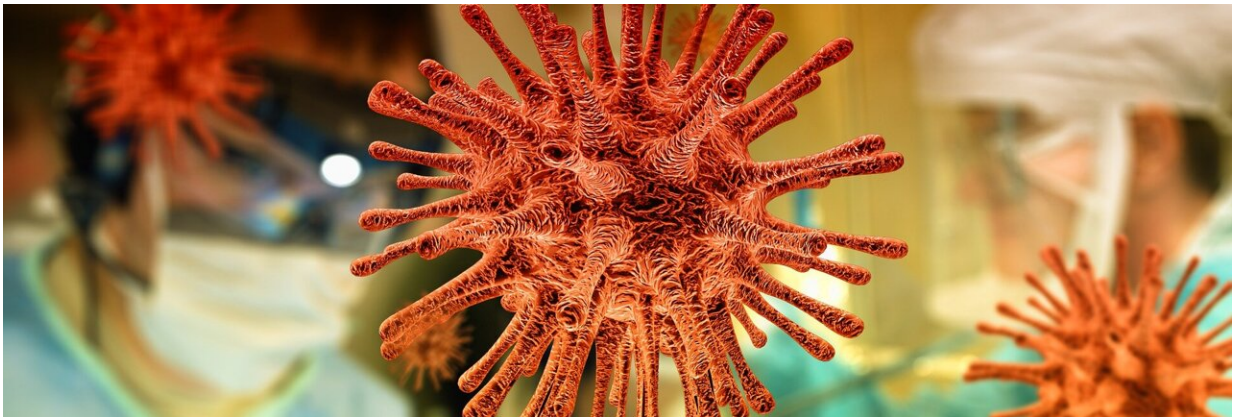


# Non-optimal codons enable coronaviruses' promiscuity

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Since March 2020 the Cancer Genomics and BioComputing of Complex Diseases Laboratory at the Azrieli Faculty of Medicine of Bar-Ilan University has been dedicated to the study of COVID-19. Motivated in particular to study the evolution of coronaviruses, the lab, led by Dr. Milana Frenkel-Morgenstern, has characterized and compared sequences of numerous relevant viruses.

In their most recent study, published in the journal of the Federation of European Biochemical Societies (FEBS), the research team focused on patterns of genetic coding used by viruses which infect a single or narrow range of hosts compared to those which infect a multiple or

broad range of hosts.

It was discovered that 'promiscuous', or multiple-[host](#), viruses utilize significantly non-optimal codons (the DNA sequences which encode amino acids of the protein) compared to single-host viruses. All of the coronaviruses adopt non-optimal codons to infect multiple hosts. However, instead of being weakly expressed, coronaviruses proteins have been observed to be highly expressed. This effect is provided by a special 'trick' of coronaviruses which mitigate degradation which dramatically increase their viral mRNA load during infections.

"Our findings suggest that coronaviruses, with their vast reservoir in many [animal species](#) and their promiscuous behavior of infecting multiple hosts, should all be considered potential human pandemic viruses," says Dr. Frenkel-Morgenstern, who led the research with the assistance of Dr. Alessandro Gorohovski, Dr. Sumit Mukherjee and doctoral student Gon Carmi. "Our study also highlights that non-optimal codon usage of coronaviruses should be taken into account in SARS-CoV-2 [vaccine development](#), as it may have a further effect on the structure and stability of proteins encoded by SARS-CoV-2."

**More information:** Gon Carmi et al, Non-optimal codon usage preferences of coronaviruses determine their promiscuity for infecting multiple hosts, *The FEBS Journal* (2021). [DOI: 10.1111/febs.15835](https://doi.org/10.1111/febs.15835)

Provided by Bar-Ilan University

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