



Recombination of Viruses

Why in News?

The recent study published in **Nature Microbiology** revealed a few things about the **mutation in viruses, increased fitness and recombination of viruses**.

What are Key Points of the Research?

- According to it, **RNA viruses** have a **higher rate of mutations** compared with **DNA viruses**.
 - However, unlike other RNA viruses, [coronaviruses](#) have **fewer mutations**.
- This is because coronaviruses have a genetic **“proofreading mechanism”** that corrects some of the errors made during replication.
- This is applicable to **SARS-CoV-2 viruses too**.
- As a result, SARS-CoV-2 viruses have more accurate mutations or attained more fitness than that of other **single-stranded RNA viruses**.
- **Increased fitness** of the virus means **increased infectiousness of the virus** and the ability of the mutations to **allow the virus to escape from immunity**.
- Such mutations that provide increased fitness to the virus increase in numbers and **become the dominant strain or variant**.
- Further, when a person is simultaneously infected with two different SARS-CoV-2 variants or strains or sub-lineages, chunks of genetic material from one variant can get mixed with the other. **This is called recombination**.
 - For example, recombination of Delta and Omicron variants.

DNA VIRUSES VERSUS RNA VIRUSES

DNA viruses refer to viruses whose genetic information is stored in the form of DNA	RNA viruses refer to viruses whose genetic information is stored in the form of RNA
Contain DNA as their genetic material	Contain RNA as their genetic material
Most are double-stranded	Most are single-stranded
Replicated inside the nucleus of the host cell	First transcribed and then replicated in the cytoplasm
Viral DNA is first transcribed into RNA, and then mRNA is translated into viral proteins	Can bypass transcription during protein synthesis since they already contain RNA in the genome
Stable due to the lower mutation rate	Unstable due to the higher mutation rate
Shows an accurate replication	Shows an error-prone replication
Contain a large genome	Contain a small genome
Newly-synthesized viral DNA is packed into a pre-formed capsid called procapsid	Newly-synthesized viral RNA is not packed in a procapsid
Include Class I, II, and VII of the Baltimore classification of viruses	Include Class III, IV, V, and VI of the Baltimore classification of viruses
Ex: Adenoviruses, Herpesviruses, Poxviruses, Parvoviruses, and Hepadnaviruses	Ex: Reoviruses, Picornaviruses, Togaviruses, Rhabdoviruses, and Retroviruses
Smallpox, herpes, and chickenpox are diseases of DNA viruses	Aids, Ebola hemorrhagic fever, SARS, common cold, etc. are some diseases of RNA viruses

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What is Mutation?

- Mutation is an **alteration in the genetic material (the genome) of a cell** of a living organism or of a virus that is more or less permanent and that can be transmitted to the cell's or the virus's descendants.
- The genomes of organisms are all composed of **Deoxyribonucleic Acid (DNA)**, whereas **viral genomes can be of DNA or Ribo Nucleic Acid (RNA)**.

[Source: TH](#)

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