

Staying Prepared:

On Scaling up the Pace of COVID-19 Genome Sequencing

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Paper - III
(Sci. & Tech.)

❖ India needs to scale up the pace of its genome sequencing.

Three years after strict enforcement of its Zero-COVID strategy, China abandoned it abruptly, leading to a jump in cases each day an estimated 250 million people were infected in 20 days in December, according to the media, overwhelming hospitals and crematoria.

BF.7 variant and China

Based on 30 genome sequences deposited between October and December and 14 genome sequences in December alone from China, the BF.7 appears to be the dominant variant. Though this variant was found in many countries, including India, months ago, there is fear that the uncontrolled spread of the virus in China may result in newer variants with an even higher transmissibility.

For instance, the BF.7 sub-lineage with three additional immune escape mutations already seen in other variants has been found in some people arriving from China; these mutations may increase transmissibility further but will not increase disease severity. With a case surge in a few more countries, India has taken the right and proactive measures to be ready for any eventuality.

Status In India

With over 90% of the adult population already fully vaccinated by July this year, over one-fourth of adults also boosted, and a large percentage of the population also naturally infected, the chances of India witnessing large-scale deaths as seen during the second wave last year from existing variants are slim.



In fact, given that a large percentage of the population enjoys hybrid immunity from vaccination and natural infection leading to all Omicron sub-lineages causing only a mild disease, the focus in India should not be on daily new infections but only on any increase in hospitalisations, particularly ICU admissions.

Ministry of Health Urges Genome Sequencing

It is, therefore, not surprising that the Health Ministry has urged States to only ramp up genome sequencing (and not increase testing) to track new variants as the virus evolves by accumulating mutations. The pace of genome sequencing in India has to be scaled up soon after a dramatic slowdown this year.

Efforts by India To Avoid New Variants

The Government in an effort to minimise the chances of the spread of new variants has introduced 2% random post-arrival sampling of international passengers and mandatory RT-PCR tests for arrivals from China and four other countries. The Ministry has also advised States to ensure uninterrupted supply of medical oxygen and conduct a drill in health facilities to ensure operational readiness.

With seven COVID-19 vaccines, including the intranasal vaccine, manufactured using different vaccine platforms approved for use, India is vaccine self-sufficient. Besides homologous boosters, a couple of vaccines have got approval as a heterologous booster dose too.

Paxlovid

On the antiviral front, a Hyderabad-based company recently received WHO's prequalification for a generic version of Pfizer's COVID-19 oral antiviral drug, Paxlovid.

Genome Mapping

There is genetic material inside our cell which we call DNA, RNA. If all these substances are collected, then we call it genome. Gene mapping refers to a variety of techniques used to identify the location of a gene and the distance between genes. Genome mapping is used by scientists to help them discover new genes.

Genome Sequencing

Genome sequencing is the determination of the exact sequence of nucleotides within a DNA molecule. Under this, the order of the four elements present in DNA i.e. Adenine (A), Guanine (G), Cytosine (C) and Thiamine (T) is detected. With the help of DNA sequencing method, it is possible to detect people's diseases and treat them on time.

Genome Sequencing of Corona

- At the end of the year 2019, the initial cases of corona came in Wuhan, China, which has been wreaking havoc in the world for the last one and a half years. During this time the virus is constantly changing its form and has gone far ahead of the original strain. To identify new forms different from the original virus, scientists are taking samples of patients and examining them, this is being called genome sequencing.
- Viruses constantly change their genetic structure to keep themselves effective for a long time so that they cannot be killed. This is the process of survival, in which in an attempt to stay alive, viruses change form and make themselves stronger, which is called mutation.
- Many times after mutation, the virus becomes weaker than before, while sometimes this process of mutation makes the virus very dangerous. In such a situation, when they attack the host cell i.e. any cell of our body, then the cell makes thousands of copies of the virus within a few hours, due to which the load of the virus in the body increases rapidly and the patient soon becomes in critical condition of the disease. reaches.
- Many times existing medicines or vaccines do not work due to changes in the virus, in which case their formula has to be changed, during this time genome sequencing comes in handy. In fact, just like the human body is made up of DNA, similarly the virus is also made up of either DNA or RNA. Corona virus is made of RNA. Genome sequencing is the technique by which genetic information of this RNA is obtained. In simple language, genome sequence is useful in knowing how the virus is, how it attacks and how it grows.

How is genome sequencing done?

In this, a sample of the virus is taken from the patient's body and its genetic structure is detected through very powerful computers in the lab. From this his genetic code comes out. With the help of sequencing, scientists can understand where the mutation occurred in the virus. If the mutation has occurred in the spike protein of the corona virus, then it is more infectious as it is happening now. On the other hand, the spike protein is the thorny structure of the corona virus, through which the virus enters the human body.

BF.7 Variant

- SARS-CoV-2 Omicron BF.7 is a subvariant of the SARS-CoV-2 Omicron variant. Preliminary studies have indicated that it is highly contagious and spreads more quickly than other forms. Common symptoms of this variant are congestion, sore throat, cough, fatigue, and runny nose.
- It is responsible for the current wave of COVID-19 in China. In China, it was first reported in late September 2022 in Yantai and Shaoguan districts of China. Before China, this variant is doing rounds in USA and Europe from August 2022. BF.7 accounted for more than 5% of US cases and 7.26% of UK cases in October.
- Its first known confirmed B.1.1.529 infection was reported to WHO from South Africa on November 25, 2021. On November 26, 2021, WHO named this variant B.1.1.529 as Omicron.

Expected Question

Que. Consider the following statements:

DNA Barcoding can be a tool to:

(PYQ 2022)

1. Assess the age of a plant or animal.
2. Distinguish among species that look alike.
3. Identify undesirable animal or plant materials in processed foods.

Which of the statements given above is/are correct?

- (a) Only 1 (b) Only 3
(c) 1 and 2 (d) 2 and 3

Answer : D

Mains Expected Question & Format

Que.: What do you understand by genome sequencing? To avoid this in view of the current wave of COVID-19 in China, India needs to increase the pace of its genome sequencing. Discuss.

Answer Format :

- ❖ Explain genome sequencing.
- ❖ Briefly explain the current wave of COVID-19 in China and why genome sequencing is important for India.
- ❖ Explain how new variants of COVID-19 can be stopped by genome sequencing.

Note: - The question of the main examination given for practice is designed keeping in mind the upcoming UPSC mains examination. Therefore, to get an answer to this question, you can take the help of this source as well as other sources related to this topic.