



drishti

Nomenclature & Classification of Corona Variants

 drishtias.com/printpdf/nomenclature-classification-of-corona-variants

Why in News

Recently, India's Health Ministry said that a new **double mutant variant** of the **coronavirus** had been detected in addition to many other strains or **Variants of Concern (VOCs)** found in 18 states in the country.

Key Points

Virus Variant:

- Variants of a virus have **one or more mutations that differentiate it from the other variants** that are in circulation. While most mutations are deleterious for the virus, **some make it easier for the virus to survive.**
- The **SARS-CoV-2** (Corona) virus is **evolving fast because of the scale at which it has infected people around the world.** High levels of circulation mean it is easier for the virus to change as it is able to replicate faster.
- The **original pandemic virus (founder variant) was Wu.Hu.1** (Wuhan virus). In a few months, variant **D614G** emerged and became globally dominant.

The mutating coronavirus SARS-CoV-2 has spawned several variants that have scientists worried. Here's a lowdown on those detected in India's exploding second wave



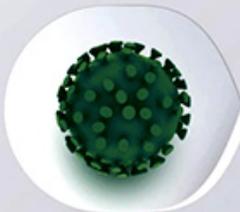
B.1.1.7 UK variant

- Between 40 and 70% more infectious than other variants
- Raises death risk by about 60%
- Vaccines seem to work against it



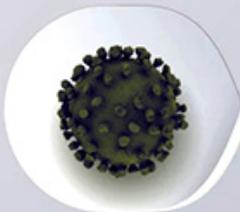
P1 Brazil variant

- More contagious than the initial coronavirus strain, can re-infect
- May be more virulent but further research needed
- E484K, 'escape mutation', helps the virus dodge antibodies



B.1.351 South Africa variant

- Found in at least 20 countries, including the UK
- Mutation called N501 appears to make it more contagious
- Another mutation, called E484K, could help virus dodge a person's immune system and may affect how vaccines work



B.1.617 Double Mutant

- E484Q mutation is similar to another variant, the E484K, found in fast-spreading Brazil and South Africa regions
- Includes L452R mutation, which helps the virus escape our body's natural immune response
- This variant has been detected in at least 10 other countries, including the US, the UK, Australia, and New Zealand

- **Classification:**

- The **US Centers for Disease Control and Prevention (CDC)** classifies variants into three categories:
 - **Variant of Interest (VOI):**
 - A variant with specific genetic markers that have been associated with **changes to receptor binding, reduced neutralization by antibodies** generated against previous infection or vaccination, **reduced efficacy of treatments, potential diagnostic impact, or predicted increase in transmissibility or disease severity.**
 - An example of VOI is the **B.1.617 variant** of the virus which has **two mutations**, referred to as **E484Q and L452R.**
 - This variant is classified as a **VOI** by the **World Health Organization (WHO)** as well.
 - Both are separately found in many other coronavirus variants, but they have been **reported together for the first time in India.**
 - **Variant of Concern (VOC):**
 - A variant for which there is **evidence of an increase in transmissibility, more severe disease** (e.g., increased hospitalizations or deaths), **significant reduction in neutralization by antibodies** generated during previous infection or vaccination, **reduced effectiveness of treatments or vaccines, or diagnostic detection failures.**
 - The **B.1.1.7 (UK variant), B.1.351 (South Africa Variant), P.1 (Brazil Variant), B.1.427, and B.1.429** variants circulating in the US are classified as VOCs.
 - **Variant of High Consequence:**
 - A variant of high consequence has **clear evidence that prevention measures or medical countermeasures have significantly reduced effectiveness** relative to previously circulating variants.
 - So far, the CDC has **not found variants of high consequence in circulation in the US.**
- **Variants Under Investigation (VUI):**
 - **Public Health England (PHE)** says that if the variants of SARS-CoV-2 are considered to have **epidemiological, immunological or pathogenic properties**, they are raised for formal investigation.
 - At this point, the variants emerging from the **B.1.617 lineage are designated as VUI.**

- **Nomenclature:**
 - Phylogenetic Assignment of Global Outbreak Lineages (PANGOLIN):**
 - It was developed to implement the dynamic nomenclature of SARS-CoV-2 lineages, known as the Pango nomenclature.
 - It **uses a hierarchical system based on genetic relatedness** – an invaluable tool for genomic surveillance.
 - It **uses alphabets (A, B, C, P) and numerals starting with 1**. Variant lineages are at the emerging edge of the pandemic in different geographies. **Lineage B is the most prolific.**
- **Concerns Related to Different Variants:**
 - **Increased Transmission:**

In many countries, including India, variants, **by virtue of increased transmissibility**, have kicked off new wave(s) of epidemic transmission.
 - **Increased Severity:**

Regarding virulence (propensity to cause severe/life-threatening disease), the **UK variant is worse**. The South Africa and Brazil variants do not seem to have higher virulence.
 - **Lowered Immunity:**
 - The third concern is regarding the immunity cover offered by vaccination using antigens made from **D614G variant** — which applies to most vaccines in current use.
 - **Lowered efficacy of vaccines** was found more with the South African and less with the Brazil variant. Hence, reinfection can occur in spite of immunity by earlier **D614G** infection or vaccination.
 - Vaccine efficacy may be lower now than what was determined in phase-3 trials as VOC were not then widely prevalent.
 - Fortunately, **mRNA vaccines** have broader immunity for different reasons, and they protect better against these two variants.
- **Possible Solution:**
 - Karolinska Institute in Sweden has created an antigen using new variant RBD (Receptor Binding Domain) peptide with adjuvant, and inoculated monkeys already primed with an older vaccine.
 - A RBD is a short immunogenic fragment from a virus that binds to a specific endogenous receptor sequence to gain entry into host cells.
 - An adjuvant is a substance that enhances the immune system's response to the presence of an antigen.
 - The resultant booster response was not only high but also broad, **covering new variants**. This approach, called '**hetero boosting**' by a different vaccine, **offers a way to manage the 'vaccine-escape' variants until newer vaccines become available**.

Way Forward

- The **pandemic** has shown the **critical importance of biomedical research and capacity building** – for saving lives and economic growth.
- We **need a foundation of broad-based research**, in universities, medical colleges and biotechnology companies, **all of which must be funded, encouraged, appreciated, and talent rewarded.**
- While some endeavours have been initiated, they must take off in a big way, and **India must invest heavily in biosciences. After a decade, its products and profit will make us healthier and wealthier.**

Source: IE