



COMPARISON OF VARIANT OF CONCERN OF OMICRON (B.1.1.529 COVID-19) AND DELTA (B.1.617.2 COVID-19)

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ABSTRACT

The recent emergence of variants such as delta and omicron significantly have high transmissibility, high immune escape potential, high risk of re infections & also high rates of hospitalizations. The world health organization established an informal virus evolution expert working group designed a technical advisory group on SARS cov- 2 virus evolution (TAG-VE), it described that a difference in entry pathway between omicron and delta variant may have implications on clinical manifestations or disease severity. Due to more mutations in the spike protein in these variants, COVID-19 severity increased and reduced the efficacy of vaccines. Although variant of concern - omicron shows more contagious & more severe compared with delta. However, immunization rates have plateau, due to a lack of focus on the various behavioral aspect of vaccine uptake. Variant-specific vaccines may be required to treat COVID-19 due to omicron which is an emerging variant of concern.

KEYWORDS: Variant of concern, Delta variant, Omicron variant.

INTRODUCTION

According to WHO, National Collaborating center for infectious diseases for disease control & prevention. Generally, this COVID-19 is a zoonotic disease (humans - animals transmission followed by animal-human transmission) & this came from SARS- COV-2 stemmed from animals like bats, snakes & pangolins found in the market of Wuhan coronaviruses are a large family of RNA viruses that causes illness ranging from the common cold to more severe disease. This novel coronavirus (COVID-19) was identified in 2019 in Wuhan, China it belongs to the family - corona viridine, subfamily - orthocoronavirinae.

A threat level of coronavirus

1. Variant of concern – These are more severe, more contagious, prior vaccines & antibodies will not work Examples: alpha (B.1.1.7), beta (B.1.351), gamma (P.1), delta (B.1.617.2), delta plus (B.1.617.2.1/AY.1), omicron (B.1.1529).
2. variant of interest –These are discrete clusters and sudden spikes in the number of cases, prior vaccines & antibodies may or may not work Examples: epsilon (B.1.427), zeta (P.2), eta (B.1525), theta (P.3), iota (B.1526), kappa (B.16171), lambda (C.37).
3. Variant of high consequence – These are very severe, increased proportional of hospitalizations, the antibody does not work. Currently, no SARS-

COV-2 variants are designed as variants of high consequence

Life Cycle of the Pandemic Coronavirus

COVID-19 is a contagious viral respiratory illness typically spread when an infected person coughs or sneezes, into the air that lands on surfaces, if you breathe these respiratory droplets, or touch surfaces and then touch your face. The virus can enter your body and infect you.

Upper respiratory infections – sore throat, dry cough, shortness of breath, fever, headache, fatigue

Lower respiratory infections – cough with mucus, shortness of breath, chest tightness, wheezing upon exhalation, lips appear blue.

Stage-1 viral entry – viral spike protein binds to the ACE receptors, then host molecule TMPRSS-2 cleaves, the spike protein, exposing parts that fuse the viral membrane with that of the host

Stage-2 inside the cell – viral RNA is translated into a non-structural protein that quickly suppresses the translation of host messenger RNA

Stage-3 remodeling the cell – virus transforms into endoplasmic reticulum-an internal membrane network into vesicles. These vesicles protect the viral RNA to be replicated and translate

Stage-4 exit – once the newly made molecules assemble into a complete virus particle this leaves the cell through

an organelle called the Golgi apparatus.
Stage-5 – a host enzyme named furin makes a crucial cut a site of five amino acids on the spike protein, this

prepares the virus to strike another cell variants have a higher proportion of snipped spike proteins, helping them to infect cells more effectively.

Characteristics of Omicron and Delta Variant

Characteristics	Omicron variant (O)	Delta variant (δ)
Lineage	B.1.1529	B.1.167.2
Detection	South Africa	India
Reinfections	More common in omicron	Less common compared with omicron
Mutations	Total 50 mutation, 32 mutations in spike protein Receptor binding domain – N440K, E484A, N501Y.	Total 18 mutations, 9 mutations in spike protein Receptor binding domain- L452R, T478K
Spike protein substitutions	A67V, del69-70, T95I, del142-144, Y145D, del211, L212I, ins214EPE, G339D, S371L, S373P, S375F, K417N, N440K, G446S, S477N, T478K, E484A, Q493R, G496S, Q498R, N501Y, Y505H, T547K, D614G, H655Y, N679K, P681H, N764K, D796Y, N856K, Q954H, N969K, L981F	T19R, (V70F), T95I, G142D, E156-, F157-, R158G, (A222V), (W258L), (K417N), L452R, T478K, D614G, P681R, D950N
Emerged from	1 Immune compromised patients 2 Reverse zoonosis 3 Treatment of covid-19 patient with mutagenic drug Molnupiravir	Delta variant emerge when the original strain has one or more mutations
Transmissible	Ten times More transmissible than delta variant. easy spread from person to person compared to other variants	Less transmissible when compared to omicron
Mechanism	Omicron variant show weaker cell-cell fusion activity when compared to delta	Delta variant shows strong cell-cell fusion activity.
	Omicron infection is not enhanced by TMPRSS2 but is largely mediated via the endocytic pathway	Delta variant enhances TMPRSS2 in the host cells
Deletions	Only one deletion 211	Six deletions – 69,70,143,144,145
Symptoms	Mild symptoms when compared with delta variants- high fever, scratchy throat, congested nose, bodyache.	Mild fever, dry cough, no nasal congestion, loss of taste&smell,
Vaccines	Low chances of being controlled by the vaccines	Delta variant is controlled by vaccines
Effects	Omicron infect the upper respiratory tract.	Delta variant infect lungs
Therapy	Monoclonal antibodies show partial to total resistance	Monoclonal antibodies work upto 90%
Mechanism inhibitors	Bafilomycin-A1, chloroquine inhibiting endocytic pathway of omicron	Camostat- inhibiting TMPRSS2 pathway

Vaccines Effectiveness on Omicron and Delta

Variant A vaccine activates the immune system to produce antibodies that remain in your body to fight against exposure to viruses in the future. The 2 doses of COVID-19 vaccines are unlikely to protect against omicron infection & while vaccine effectiveness against omicron infection is substantially lower than against delta infection and 3rd dose of mRNA vaccines improves antibody activity against the virus & affords, some level of protection (estimate 70 – 75%) against omicron infection, however, the duration of protection and effectiveness is unknown.

Diagnosis - comicon & delta variant is detected by antigen testing because here the test target on nucleoprotein and also NAAT (nucleic acid amplification testing) which commonly known as reverse- transcription polymerase chain (RT-PCR), this

test targets 2 or more genes including nucleocapsid(N), envelope (E), spike(S) genes and hence positive NAAT- confirms upper respiratory infections & negative NAAT – confirms lower respiratory infections

Viral load can be measured by Cycle threshold – refers to the number of cycles in an RT-PCR assay needed to amplify viral RNA to reach a detectable level. Lower CT levels reflect higher viral levels

- Less or equal 29 – strong positive reactions – abundant target nucleic acid
- 30 – 37 – positive reactions – moderate amount of target nucleic acid
- 38 – 40 – weak reactions – minimal amounts of target nucleic acid.

Pharmacotherapy

Anti-SARS-COV-2 therapy includes symptomatic therapy, monoclonal antibodies (cocktails – sotrovimab, bamlanivimab+etesevimab, Casirivimab+imdevimab-administered together for the treatment of mild-moderate COVID-19 in age up to 60 years), antiviral drugs (remdesivir), corticosteroids (dexamethasone, hydrocortisone, budesonide), interleukin-6 receptor blockers & oxygen therapy.

Currently, Researchers are still working on a correct therapeutic activity for COVID patients to save the public.

CONCLUSION

Primary immunization, does not protect omicron so, the Rate of infectivity of omicron variant is 5 times more than delta variant & hence, therefore, continue to exercise extreme caution with anti-COVID precautions should be followed (get vaccinated, wear a mask, maintain physical distancing, ventilate indoor spaces, keep good hygiene, self-isolate, avoiding crowded spaces).

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