transmission map of Omicron, GISAID

Omicron variant – background

WHO designated Omicron as a variant of concern on 26 November 2021

CDC designated Omicron as a variant of concern on 30 November 2021

VOC

- Evidence of increase in transmissibility or
- More severe disease or
- Significant reduction in neutralization by antibodies generated during previous infection or vaccination or
- Diagnostic detection failures
Omicron – background

Omicron (B.1.1.529) first reported to WHO from South Africa on 24 November 2021

Omicron appears to be related to mid-2020 cases, not to any existing variant of concern
  not a descendent of the Delta variant
Omicron has three sub-lineages (BA.1, BA.2, BA.3)
  BA.2 does not contain the SGTF
Omicron – unknown origins

possible source of Omicron is continual viral persistence and evolution in a chronically infected immunocompromised person
  evidence seen in Alpha variant
speculate Omicron could be the result of a zoonotic spillover
phylogenetic tree of Nextstrain clade 21K (Omicron)
Nextstrain scatter plot of Omicron S1 mutations by sampling date
Omicron – characteristics

Omicron - more spike protein mutations than previous variants, some of particular concern
mutations in the furin cleavage site may affect transmissibility

mutations in the spike protein’s receptor binding domain may affect binding affinity to the ACE2 receptor

deletion in Spike 69/70 region is associated with S gene target failure in some widely used PCR tests
SARS-CoV-2 spike protein
Figure one: Graph showing weekly COVID-19 cases, hospitalisations, excess mortality, and percentage test positivity

TRANSMISSIBILITY:
The capacity to infect people

VIRULENCE:
The severity of symptoms

IMMUNE ESCAPE:
The ability to evade immune protections such as antibodies
transmission advantage

transmission advantage -
  increased transmissibility
  increased immune escape
might see different patterns of immune escape in
different settings
Omicron appears to be rapidly out-competing
Delta in South Africa
immune escape - two lines of evidence

risk of reinfection appears to be increasing in South Africa*

early results from neutralization assays - decreased neutralization of Omicron by sera for various combinations of vaccines and prior infection

better neutralization with prior infection + vaccination or 3 mRNA doses

https://www.medrxiv.org/content/10.1101/2021.11.11.21266068v2

†See “Immune escape references” slide for remaining references
Immune escape - neutralization results

Pfizer and BioNTech, 12/8/21. https://investors.biontech.de/static-files/47b4131a-0545-4a0b-a353-49b3a1d01789

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virulence

potential reduced clinical severity in South Africa -
true decrease in virulence
confounding
time lag for hospitalizations/deaths
protection from severe illness/death due to immunity
from prior infection or vaccination

impact on diagnostics

almost all NAAT and antigen tests will continue to detect Omicron
  one PCR test will fail to detect Omicron entirely (Tide Laboratories DTPM COVID-19 RT-PCR Test)
some PCR tests will have S-gene target failure (SGTF), which can help identify possible Omicron cases
  one lineage of Omicron does not have SGTF - absence of SGTF will not rule out Omicron