Update on Omicron Variant

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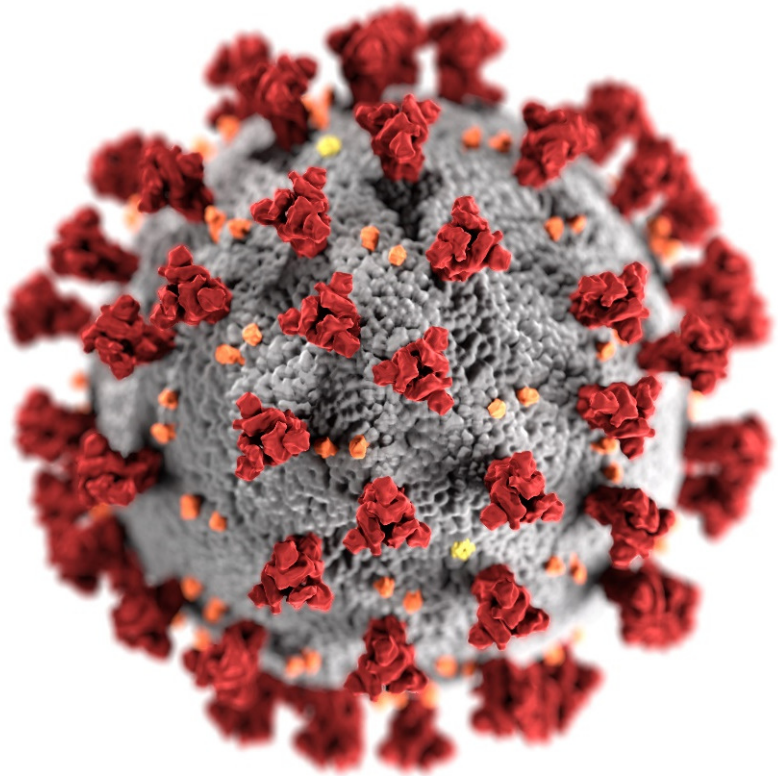
ACIP Meeting
December 16, 2021



cdc.gov/coronavirus

Timeline: Omicron variant of SARS-CoV-2 (B.1.1.529)

November 24, 2021
First reported to World Health Organization (WHO)

First detected in specimens collected on **November 11** in Botswana and on **November 14** in South Africa

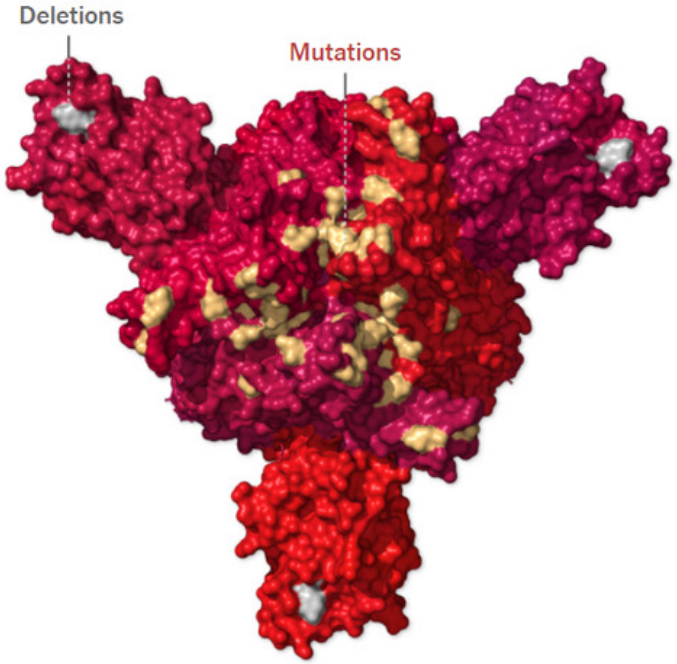
November 26, 2021 designated as a variant of concern by WHO, and by U.S. SARS-CoV-2 Interagency Group (SIG) on **November 30**

December 1, 2021
First confirmed U.S. case identified

https://www.cdc.gov/coronavirus/2019-ncov/variants/omicron-variant.html

Characteristics of SARS-CoV-2 Omicron variant of concern

- Detection of cases in multiple countries
- Potential increased transmissibility
- 30 mutations in spike gene (S-gene)
  - 15 in receptor binding domain
- Potential reduction in efficacy of some antibody treatments
- Potential reduction in neutralization by sera from vaccinated or convalescent individuals



Key mutations (yellow) in the Omicron spike protein (top view)
Source: New York Times

https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-classifications.html
https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/scientific-brief-omicron-variant.html

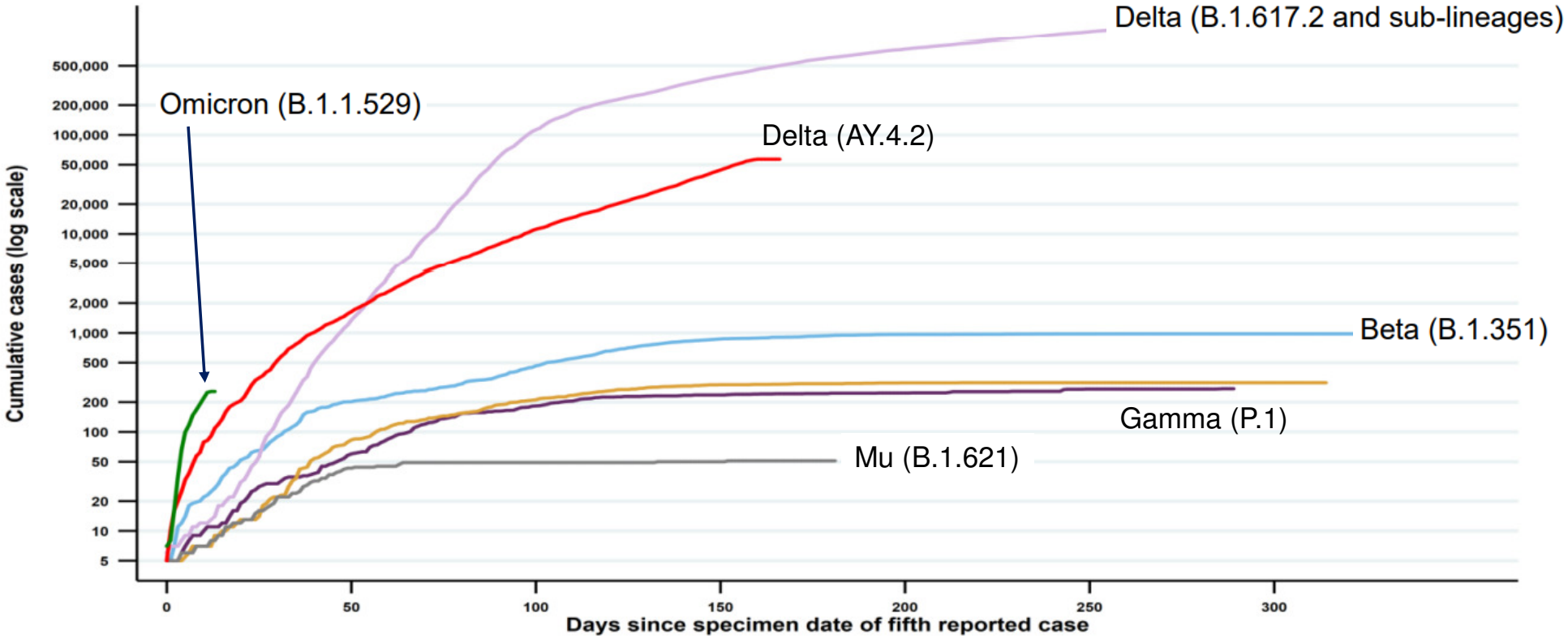
Omicron variant: What we know

- Likely to be more transmissible than original SARS-CoV-2
  - How easily Omicron spreads compared with Delta remains unknown
  - Likely that vaccinated people with breakthrough infection or people infected without symptoms can spread the virus to others
- More data are needed to know if Omicron infections cause more severe illness or death than infection with other variants
- Vaccines expected to protect against severe illness, hospitalizations, and deaths
  - Breakthrough infections in people who are fully vaccinated likely to occur
- Still determining how well existing treatments for COVID-19 work

https://www.cdc.gov/coronavirus/2019-ncov/variants/omicron-variant.html
https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/scientific-brief-omicron-variant.html

In U.K., Omicron cases growing rapidly despite Delta

With growth rate of 0.35 per day, Omicron predicted to surpass Delta by mid-December



https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040076/Technical_Briefing_31.pdf

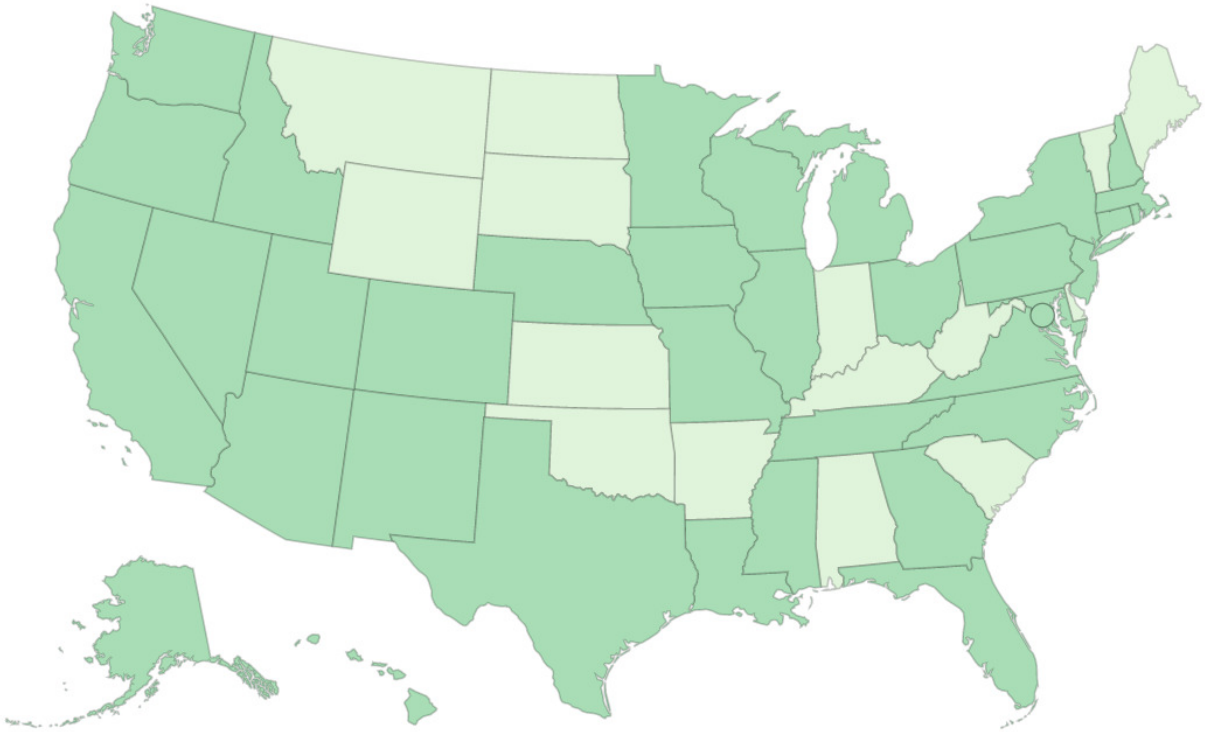
Findings on Omicron from other countries

- South Africa
  - Spread with doubling time of 3.4 days in province with high population immunity
  - Increased risk of reinfection associated with Omicron
- Norway
  - Christmas party outbreak — attack rate over 70%, most vaccinated with 2 mRNA doses; no hospitalizations

Grabowski et al. https://www.medrxiv.org/content/10.1101/2021.12.08.21267494v1
Pulliam et al. https://www.medrxiv.org/content/10.1101/2021.11.11.21266068v2
NIPH. https://www.fhi.no/en/news/2021/preliminary-findings-from-outbreak-investigation-after-christmas-party-in-o/

US COVID-19 Cases Caused by the Omicron Variant

As of December 15, 2021



Territories AS GU PR VI MP FM PW MH

- Not reported
- Reported ≥1 Omicron case

37 jurisdictions have reported at least one Omicron variant case

https://www.cdc.gov/coronavirus/2019-ncov/variants/omicron-variant.html

MMWR: SARS-CoV-2 Omicron Variant — United States, December 1–8, 2021

- As of December 8th, 43 cases with full details, identified in 22 states
- 33% with international travel history
  - Also domestic travel, large public events, household transmission
- 79% fully vaccinated; 32% with booster dose
  - Five of the 14 persons received additional dose <14 days before symptom onset
  - Persons with recent international travel or participation in large public events might be more likely to vaccinated
- 14% previously infected

https://www.cdc.gov/mmwr/volumes/70/wr/mm7050e1.htm?s_cid=mm7050e1_w

CDC response to Omicron

- Monitoring genomic surveillance and vaccine breakthrough
- Working with partners on scientific experiments to answer important questions about the Omicron variant
- Monitoring vaccine administration and vaccine effectiveness
- Supporting state, local, tribal, and territorial health departments
- Drafting recommendations related to travel, prevention strategies, and holiday activities

https://www.cdc.gov/coronavirus/2019-ncov/variants/omicron-variant.html
https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/scientific-brief-omicron-variant.html

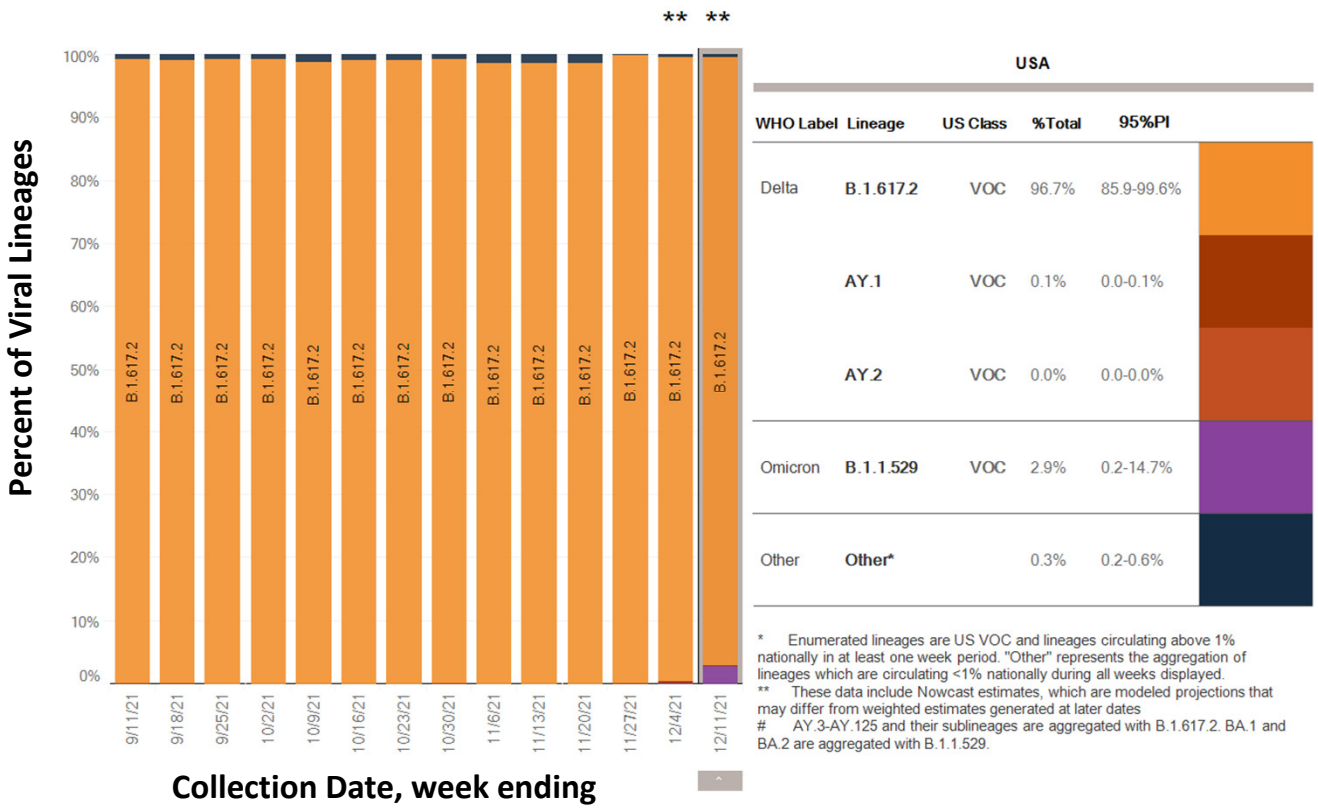
Genomic Surveillance in the United States

- Multifaceted genomic surveillance system for analyzing SARS-CoV-2 variants circulating in the United States
  - National SARS-CoV-2 Strain Surveillance
  - CDC-supported contracts with several commercial diagnostic laboratories
  - Partners deposit and tag randomly sampled viral sequence in public repositories (GISAID and NCBI)
- CDC estimates that if a variant is circulating at 0.1% frequency, there is a >99% chance that it will be detected in national genomic surveillance
- Enhanced genomic surveillance for S-gene Target Failure (SGTF) during November 28–December 10, 2021
  - Rapid screening for SGTF by PCR–based diagnostic for confirmation by genomic sequencing
- Also, expanded voluntary airport-based genomic surveillance programs in Atlanta, New York City, Newark, and San Francisco

https://www.cdc.gov/mmwr/volumes/70/wr/mm7050e1.htm?s_cid=mm7050e1_w
https://www.cdc.gov/coronavirus/2019-ncov/variants/omicron-variant.html

Estimated Proportions of SARS-CoV-2 lineages in the US

September 11 – December 11, 2021 with NOWCAST



USA

WHO Label	Lineage	US Class	%Total	95%PI
Delta	B.1.617.2	VOC	96.7%	85.9-99.6%
	AY.1	VOC	0.1%	0.0-0.1%
	AY.2	VOC	0.0%	0.0-0.0%
Omicron	B.1.1.529	VOC	2.9%	0.2-14.7%
Other	Other*		0.3%	0.2-0.6%

* Enumerated lineages are US VOC and lineages circulating above 1% nationally in at least one week period. "Other" represents the aggregation of lineages which are circulating <1% nationally during all weeks displayed.
** These data include Nowcast estimates, which are modeled projections that may differ from weighted estimates generated at later dates
# AY.3-AY.125 and their sublineages are aggregated with B.1.617.2. BA.1 and BA.2 are aggregated with B.1.1.529.

Variants of Concern

Delta (B.1.617.2, AY lineages) 96.7%

AY.1 ≤0.1%

AY.2 ≤0.1%

Omicron (B.1.1.529, BA lineages) 2.9%

CDC COVID Data Tracker As of 12/14/21; VOC=Variant of Concern; VOI=Variant of Interest

Neutralization of Omicron variant by sera from vaccinees

- Fifteen preliminary studies of vaccinee sera using both pseudoviruses and live viruses
  - 15–127-fold reduction compared with wild-type
  - 11-fold reduction compared with Delta
- Neutralization of Omicron below the limit of detection for most individuals who received two doses of mRNA or one dose of Janssen vaccines
- Neutralization of Omicron above the limit of detection in many vaccinated people who received a booster or who were previously infected
- Given limits of detection of assays, difficult to evaluate with laboratory tests whether people have the level of antibodies needed to protect against severe disease

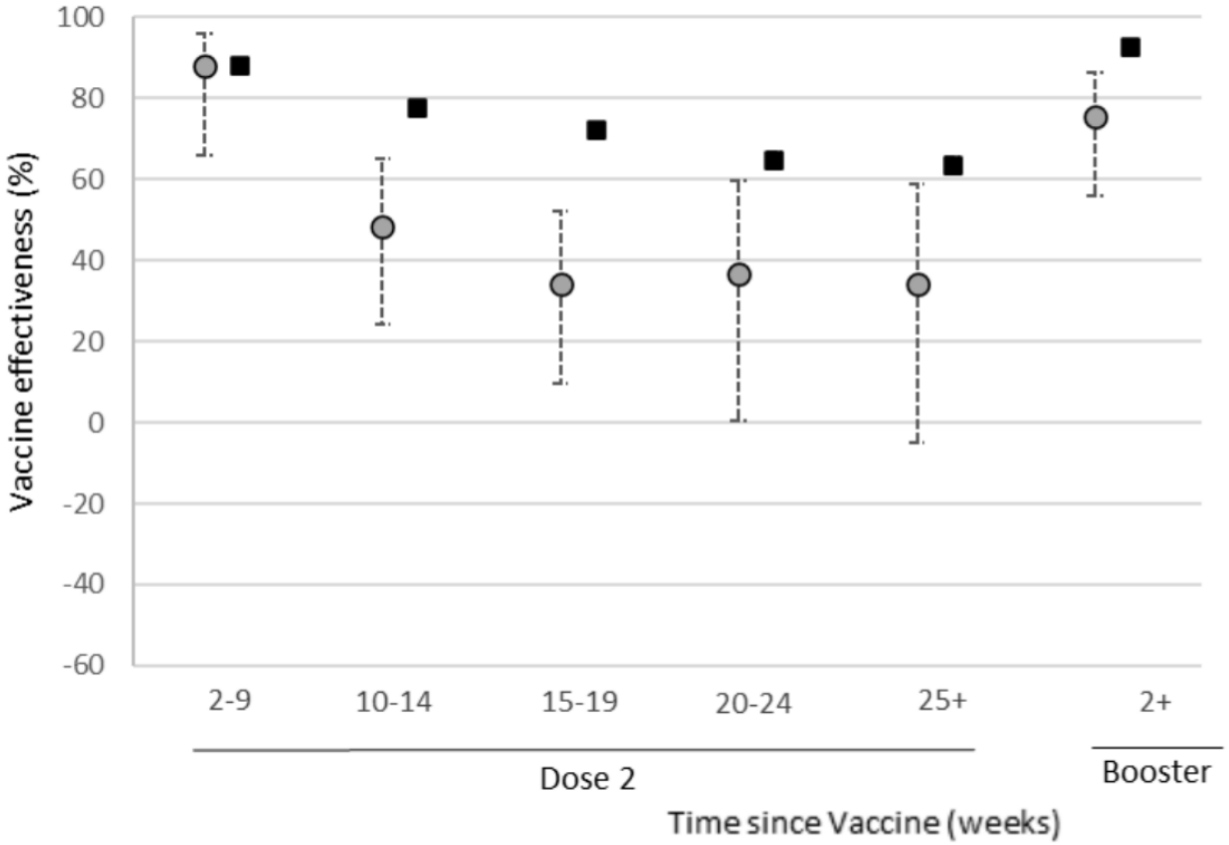
Wilhelm et al. https://www.medrxiv.org/content/10.1101/2021.12.07.21267432v1.full.pdf; Cele et al. https://www.medrxiv.org/content/10.1101/2021.12.08.21267417v2; Roessler et al. https://www.medrxiv.org/content/10.1101/2021.12.08.21267491v1; Dejnirattisai et al. https://www.medrxiv.org/content/10.1101/2021.12.10.21267534v1; Schmidt et al. https://drive.google.com/file/d/1zjJWsybGaa3egiyn5nQqTzBtl0kmvMUu/view; Pfizer investor brief: https://investors.biontech.de/static-files/47b4131a-0545-4a0b-a353-49b3a1d01789; Nemet et al. https://www.medrxiv.org/content/10.1101/2021.12.13.21267670v1; Ikemura et al. https://www.medrxiv.org/content/10.1101/2021.12.13.21267761v1; Lu et al. https://www.medrxiv.org/content/10.1101/2021.12.13.21267668v1; Garcia-Beltran et al. https://www.medrxiv.org/content/10.1101/2021.12.14.21267755v1/ ; Cameroni et al. https://www.biorxiv.org/content/10.1101/2021.12.12.472269v1.full.pdf ; Doria-Rose et al. https://doi.org/10.1101/2021.12.15.21267805; Planas et al. https://www.biorxiv.org/content/10.1101/2021.12.14.472630v1; Aggarwal et al. https://www.medrxiv.org/content/10.1101/2021.12.14.21267772v1; Liu et al. https://www.biorxiv.org/content/10.1101/2021.12.14.472719v1.full.pdf

Preliminary results for Omicron from South Africa

- Pfizer vaccine — 70% protection against COVID-19 hospitalization and 33% against infection, during current Omicron wave
  - Reduced compared with Delta (93% for hospitalization and 80% for infection)
  - Booster vaccination not evaluated
- Risk of hospital admission among adults with COVID-19 — 29% lower for Omicron variant compared with ancestral lineage during mid-2020, after adjusting for vaccination status

https://discovery-holdings-ltd.mynewsdesk.com/pressreleases/discovery-health-south-africas-largest-private-health-insurance-administrator-releases-at-scale-real-world-analysis-of-omicron-outbreak-based-dot-dot-dot-3150697.pdf

Pfizer mRNA vaccine effectiveness (VE) against infections with Delta and Omicron variants, United Kingdom



- Increased waning immunity for Omicron vs Delta— 35% vs 64% at 25+ weeks
- 76% VE against Omicron 2 weeks after 3rd dose (93% for Delta)

Andrews et al.. https://khub.net/documents/135939561/430986542/Effectiveness+of+COVID-19+vaccines+against+Omicron+variant+of+concern.pdf/f423c9f4-91cb-0274-c8c5-70e8fad50074

Prevention strategies to slow US spread of Omicron variant

- Vaccination
  - Recommended for everyone aged ≥5 years
  - Boosters recommended for all persons aged ≥16 years
    - ≥2 months after initial Janssen vaccine, or
    - ≥6 months after completing primary series of Pfizer-BioNTech or Moderna
- Increased use of masking
- Improved ventilation
- Wider and more frequent testing, including self-testing
- Adherence to guidance on quarantine and isolation

https://www.cdc.gov/mmwr/volumes/70/wr/mm7050e1.htm?s_cid=mm7050e1_w

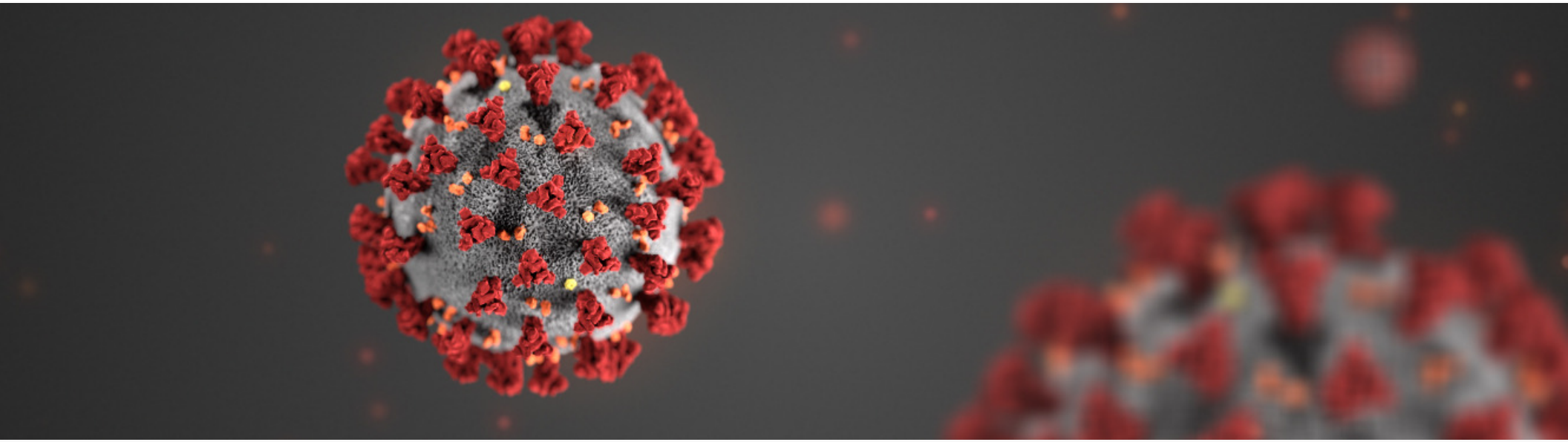
Boosters and Second-Generation Vaccines Against SARS-CoV-2 Variants

- Manufacturers conducting studies of second-generation vaccines against Omicron
- Moderna
  - Testing higher booster dosage (100 µg) of existing vaccine against Omicron
  - Evaluating two multivalent vaccines for Beta and Delta variants against Omicron
  - Developing Omicron-specific vaccine
- Pfizer
  - Evaluating Alpha, Beta, and Delta boosters against Omicron
  - Developing Omicron-specific vaccine
- No Omicron-specific booster vaccine studies shared to date

https://investors.modernatx.com/news/news-details/2021/Moderna-Announces-Strategy-to-Address-Omicron-B.1.1.529-SARS-CoV-2-Variant/default.aspx
Pfizer investor brief: https://investors.biontech.de/static-files/47b4131a-0545-4a0b-a353-49b3a1d01789

Summary

- Currently authorized vaccines offer protection against known variants — important to increase uptake of primary vaccination and boosters in eligible populations
- CDC is closely monitoring real-world vaccine effectiveness and breakthrough infections using multiple methods, populations, and outcomes
- CDC continues to monitor emerging variants — prevalence and impact on disease incidence, severity, and vaccine breakthrough
- ACIP will continue to review evidence submitted for boosters and any next-generation vaccines
- Changing landscape — CDC will communicate promptly about new evidence



For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov