Centers for Disease Control and Prevention

Archived Editions (COVID-19 Genomics and Precision Public Health Weekly Update)

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COVID-19 Genomics and Precision Public Health Weekly Update Content

Pathogen and Human Genomics Studies

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  Buturovic Ljubomir et al. Scientific reports 2022 1 (1) 889

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Accorsi Emma K et al. JAMA 2022 1

  What is the association between 3 doses of mRNA COVID-19 vaccine and symptomatic SARS-CoV-2 infection with the Omicron and Delta variants? In this test-negative case-control analysis that included 70?155 tests from symptomatic adults, the likelihood of vaccination with 3 mRNA vaccine doses (vs unvaccinated) was significantly lower among both Omicron (odds ratio, 0.33) and Delta (odds ratio, 0.065) cases than SARS-CoV-2–negative controls; a similar pattern was observed with 3 vaccine doses vs 2 doses (Omicron odds ratio, 0.34; Delta odds ratio, 0.16).

- Mutations in SARS-CoV-2 variants of concern link to increased spike cleavage and virus transmission (https://www.cell.com/cell-host-microbe/fulltext/S1931-3128(22)00042-7)
A Escalera et al, Cell Host and Microbe, January 20, 2022

  SARS-CoV-2 lineages have diverged into highly prevalent variants termed Variants of Concern (VOCs). Here, we characterized emerging SARS-CoV-2 spike polymorphisms in vitro and in vivo to understand their impact on transmissibility, virus pathogenicity and fitness. We demonstrate that the substitution S:655Y, represented in the Gamma and Omicron VOCs, enhances viral replication and spike protein cleavage.

- Trends in Disease Severity and Health Care Utilization During the Early Omicron Variant Period Compared with Previous SARS-CoV-2 High Transmission Periods — United States, December 2020–January 2022 (https://www.cdc.gov/mmwr/volumes/71/wr/mm7104e4.htm?s_cid=mm7104e4_w)
AD Luliano et al, MMWR, January 25, 2022

  The SARS-CoV-2 B.1.1.529 (Omicron) variant became predominant in the United States by late December 2021, leading to a surge in COVID-19 cases and associated ED visits and hospitalizations. Despite Omicron seeing the highest reported numbers of COVID-19 cases and hospitalizations during

the pandemic, disease severity indicators, including length of stay, ICU admission, and death, were lower than during previous pandemic peaks.

- Myocarditis Cases Reported After mRNA-Based COVID-19 Vaccination in the US From December 2020 to August 2021 (https://jamanetwork.com/journals/jama/fullarticle/2788346)
  ME Oster et al, JAMA< January 25, 2022

  In this descriptive study of 1626 cases of myocarditis in a national passive reporting system, the crude reporting rates within 7 days after vaccination exceeded the expected rates across multiple age and sex strata. The rates of myocarditis cases were highest after the second vaccination dose in adolescent males aged 12 to 15 years (70.7 per million doses of the BNT162b2 vaccine), in adolescent males aged 16 to 17 years (105.9 per million doses of the BNT162b2 vaccine), and in young men aged 18 to 24 years (52.4 and 56.3 per million doses of the BNT162b2 vaccine and the mRNA-1273 vaccine, respectively).

- Carditis After COVID-19 Vaccination With a Messenger RNA Vaccine and an Inactivated Virus VaccineFREE A Case–Control Study (https://www.acpjournals.org/doi/10.7326/M21-3700)
  TTT Lai et al, Ann Int Med, January 25, 2022

  A total of 160 case patients and 1533 control participants were included. Incidence of carditis per 100 000 doses of CoronaVac and BNT162b2 administered was estimated to be 0.31 (95% CI, 0.13 to 0.66) and 0.57 (CI, 0.36 to 0.90), respectively. Multivariable analyses showed that recipients of the BNT162b2 vaccine had higher odds of carditis (adjusted odds ratio [OR], 3.57 [CI, 1.93 to 6.60]) than unvaccinated persons. Stratified by sex, the OR was 4.68 (CI, 2.25 to 9.71) for males and 2.22 (CI, 0.57 to 8.69) for females receiving the BNT162b2 vaccine. The ORs for adults and adolescents receiving the BNT162b2 vaccine were 2.41 (CI, 1.18 to 4.90) and 13.79 (CI, 2.86 to 110.38), respectively.

- Viral infection and transmission in a large, well-traced outbreak caused by the SARS-CoV-2 Delta variant. (https://pubmed.ncbi.nlm.nih.gov/35075154)
  Li Baisheng et al. Nature communications 2022 1 (1) 460

  We report the first local transmission of Delta in mainland China. All 167 infections could be traced back to the first index case. Daily sequential PCR testing of quarantined individuals indicated that the viral loads of Delta infections, when they first become PCR-positive, were on average ~1000 times greater compared to lineage A/B infections during the first epidemic wave in China in early 2020, suggesting potentially faster viral replication and greater infectiousness of Delta during early infection. The estimated transmission bottleneck size of the Delta variant was generally narrow, with 1-3 virions in 29 donor-recipient transmission pairs.

- Waning of BNT162b2 Vaccine Protection against SARS-CoV-2 Infection in Qatar. (https://pubmed.ncbi.nlm.nih.gov/34614327)
  Chemaitelly Hiam et al. The New England journal of medicine 2021 10 (24) e83

- Homologous and Heterologous Covid-19 Booster Vaccinations.
  (https://pubmed.ncbi.nlm.nih.gov/35081293)
  Atmar Robert L et al. The New England journal of medicine 2022 1

  > In this phase 1–2, open-label clinical trial conducted at 10 sites in the United States, adults who had completed a Covid-19 vaccine regimen at least 12 weeks earlier and had no reported history of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection received a booster injection with one of three vaccines: mRNA-1273 (Moderna) at a dose of 100 μg, Ad26.COV2.S (Johnson & Johnson–Janssen) at a dose of 5×1010 virus particles, or BNT162b2 (Pfizer–BioNTech) at a dose of 30 μg. We found that homologous and heterologous booster vaccines had an acceptable safety profile and were immunogenic in adults who had completed a primary Covid-19 vaccine regimen at least 12 weeks earlier

- Myocarditis after BNT162b2 Vaccination in Israeli Adolescents.
  (https://pubmed.ncbi.nlm.nih.gov/35081295)
  Mevorach Dror et al. The New England journal of medicine 2022 1

  > The risk estimates of myocarditis among male recipients in the 21 days after the first and second doses were 0.56 cases per 100,000 after the first dose and 8.09 cases per 100,000 after the second dose; the risk estimates among female recipients were 0 cases per 100,000 after the first dose and 0.69 cases per 100,000 after the second dose. The risk of myocarditis after receipt of the second vaccine dose among male adolescents 12 to 15 years of age was estimated to be 1 case per 12,361; the corresponding risk among female adolescents was estimated to be 1 case per 144,439.

- SARS-CoV-2 Omicron Variant Neutralization after mRNA-1273 Booster Vaccination.
  (https://pubmed.ncbi.nlm.nih.gov/35081298)
  Pajon Rolando et al. The New England journal of medicine 2022 1

  > We show that after the primary two-dose series of the mRNA-1273 vaccine, neutralization titers against the omicron variant were 35.0 times lower than those against the D614G variant. These lower titers could lead to an increased risk of severe breakthrough infection. However, a booster dose of mRNA-1273 vaccine was associated with neutralization titers against the omicron variant that were 20.0 times higher than those assessed after the second dose of vaccine, and these titers may substantially reduce the risk of breakthrough infection. The decline in neutralization of the omicron variant 6 months after the booster injection was similar to the decline in neutralization titers against the D614G variant 7 months after the second dose.

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