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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- Protection of COVID-19 vaccination and previous infection against Omicron BA.1 and Delta SARS-CoV-2 infections, the Netherlands, 22 November 2021- 19 January 2022 (https://www.medrxiv.org/content/10.1101/2022.02.06.22270457v1)
  SP Andeweg et al, MEDRXIV, February 7, 2022

  Protection from primary vaccination was 25% (95% confidence interval (CI): 21-29) and from previous infection 33% (95% CI: 31-35) against Omicron BA.1 infection. Protection against Delta infection was higher with 76% (95% CI: 75-76) for primary vaccination and 78% (95% CI: 76-80) for previous infection. Higher protection was observed in individuals with both primary vaccination and earlier infection compared with either one. Waning of vaccine- or infection-induced protection over time was observed against both variants. Booster vaccination considerably increased vaccine effectiveness against Omicron BA.1 to 76% (95% CI: 72-79) and 68% (95% CI: 67-69) with and without previous infection, respectively.

- Rapid increase in Omicron infections in England during December 2021: REACT-1 study (https://www.science.org/doi/10.1126/science.abn8347)
  P Elliott et al, Science, February 8, 2022

  We analyzed prevalence of SARS-CoV-2 and its dynamics in England from end November to mid-December 2021 among almost 100,000 participants from the REACT-1 study. Prevalence was high with rapid growth nationally and particularly in London during December 2021, and an increasing proportion of infections due to Omicron. We observed large falls in swab positivity among mostly vaccinated older children (12-17 years) compared with unvaccinated younger children (5-11 years), and in adults who received a third (booster) vaccine dose vs. two doses.

- Amplification Artifact in SARS-CoV-2 Omicron Sequences Carrying P681R Mutation, New York, USA. (https://pubmed.ncbi.nlm.nih.gov/35130474)
  Heguy Adriana et al. Emerging infectious diseases 2022 2 (4)

  Of 379 severe acute respiratory syndrome coronavirus 2 samples collected in New York, USA, we detected 86 Omicron variant sequences containing Delta variant mutation P681R. Probable explanations were co-infection with 2 viruses or contamination/amplification artifact. Repeated library preparation with fewer cycles showed the P681R calls were artifactual. Unusual mutations should be interpreted with caution.

- Boosting of Serum Neutralizing Activity Against the Omicron Variant Among Recovered COVID-19 Patients by BNT162b2 and Coronavac Vaccines (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4029746)
  L Lu et al, SSRN, February 8, 2022

In this prospective cohort study with 135 recovered COVID-19 patients, we determined the serum NAb titers against ancestral virus or variants using a live virus NAb assay. We used the receiver operating characteristic analysis to determine the optimal cutoff for a commercially-available surrogate NAb assay. Among individuals with prior COVID-19, one dose of BNT162b2 and two doses of CoronaVac could induce detectable serum Omicron NAb. Our result would be particularly important for guiding vaccine policies in countries with COVID-19 vaccine shortage.

- SARS-CoV-2 Omicron Spike recognition by plasma from individuals receiving BNT162b2 mRNA vaccination with a 16-weeks interval between doses (https://www.cell.com/cell-reports/fulltext/S2211-1247(22)00153-X)
  D Chatterjee et al, Cell Reports, February 2022

  Here we evaluate the recognition of Omicron Spike by plasma from a cohort of SARS-CoV-2 naïve and previously infected individuals that received their BNT162b2 mRNA vaccine 16-weeks apart. Omicron Spike is recognized less efficiently than D614G, Alpha, Beta, Gamma and Delta Spikes. We compare to plasma activity from participants receiving a short (4-weeks) interval regimen. Plasma from individuals of the long interval cohort recognize and neutralize better the Omicron Spike compared to those that received a short interval.
- Development of a T cell-based immunodiagnostic system to effectively distinguish SARS-CoV-2 infection and COVID-19 vaccination status (https://www.cell.com/cell-host-microbe/fulltext/S1931-3128(22)00089-0)
  ED Yu et al, Cell, February 9, 2022

  We report the development of two pools of experimentally-defined SARS-CoV-2 T cell epitopes, that in combination with spike, were used to discriminate four groups of subjects with different SARS-CoV-2 infection and COVID-19 vaccine status. The overall T cell-based classification accuracy was 89.2% and 88.5% in the experimental and validation cohorts. This scheme was applicable to different mRNA vaccines, different lengths of time post-infection/post-vaccination, and yielded increased accuracy when compared to serological readouts.

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