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

Published on 12/09/2021

COVID-19 Genomics and Precision Public Health Weekly Update Content

Pathogen and Human Genomics Studies

- Increased risk of SARS-CoV-2 reinfection associated with emergence of the Omicron variant in South Africa (https://www.medrxiv.org/content/10.1101/2021.11.11.21266068v2.full)
  JRC Pulliam et al, MEDRXIV, December 2, 2021

  > Population-level evidence suggests that the Omicron variant is associated with substantial ability to evade immunity from prior infection. In contrast, there is no population-wide epidemiological evidence of immune escape associated with the Beta or Delta variants. This finding has important implications for public health planning, particularly in countries like South Africa with high rates of immunity from prior infection.

- mRNA vaccines induce durable immune memory to SARS-CoV-2 and variants of concern (https://www.science.org/doi/10.1126/science.abm0829)
  RR Goel et al, Science, December 3, 2021

  > The study examined B and T lymphocyte responses in individuals who received SARS-CoV-2 messenger RNA vaccines. They performed a 6-month longitudinal study of individuals who never had SARS-CoV-2 infection compared with people who had recovered from SARS-CoV-2. Humoral and cellular immune memory was observed in vaccinated individuals, as were functional immune responses against the Alpha (B.1.1.7), Beta (B.1.351), and Delta (B.1.617.2) viral variants. Analysis of T cell activity suggested that robust cellular immune memory may prevent hospitalization by limiting the development of severe disease.

- Immunogenicity of Extended mRNA SARS-CoV-2 Vaccine Dosing Intervals (https://jamanetwork.com/journals/jama/fullarticle/2786992?)
  B Grunau et al, JAMA, December 3, 2021

  > Longer mRNA vaccine dosing intervals demonstrated improved immunogenicity, which was consistent when responses were measured based on timing of the first or second dose. These data suggest that extending dosing intervals may be particularly advantageous against the Delta variant. A delayed second-dose strategy could yield faster partial protection to a larger proportion of the population when vaccine supplies are limited.

- Probable Transmission of SARS-CoV-2 Omicron Variant in Quarantine Hotel, Hong Kong, China, November 2021 (https://wwwnc.cdc.gov/eid/article/28/2/21-2422_article)
  H Gu et al, EID journal, December 3, 2021

  > We report detection of severe acute respiratory syndrome coronavirus 2 Omicron variant (B.1.1.529) in an asymptomatic, fully vaccinated traveler in a quarantine hotel in Hong Kong, China. The Omicron variant was also detected in a fully vaccinated traveler staying in a room across the corridor from the index patient, suggesting transmission despite strict quarantine precautions.

- Severe breakthrough COVID-19 cases in the SARS-CoV-2 delta (B.1.617.2) variant era (https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(21)00306-2/fulltext)
  SY Wang et al, Lancet Microbe, December 3, 2021

  > Despite compelling evidence that SARS-CoV-2 vaccines are highly effective in preventing COVID-19 infections, breakthrough cases have been emerging at an increasing rate. The shifting landscape of breakthrough COVID-19 cases is likely to involve multiple factors, including demonstrated waning of antibody response after full vaccination7, 8 and emergence of variant strains of SARS-CoV-2.

- Omicron and Delta Variant of SARS-CoV-2: A Comparative Computational Study of Spike protein (https://www.biorxiv.org/content/10.1101/2021.12.02.470946v1)
  S Kumar et al, BIORXIV December 3, 2021

  > We used computational studies to examine the Delta and Omicron variants in this work and found that the Omicron variant had a higher affinity for human ACE2 than the Delta variant due to a significant number of mutations in the SARS-CoV-2 receptor binding domain, indicating a higher potential for transmission. Based on docking studies, the Q493R, N501Y, S371L, S373P, S375F, Q498R, and T478K mutations contribute significantly to high binding affinity with human ACE2. In comparison to the Delta variant, both the entire spike protein and the RBD in Omicron include a high proportion of hydrophobic amino acids such as leucine and phenylalanine. These amino acids are located within the protein's core and are required for structural stability.

- In vivo kinetics of SARS-CoV-2 infection and its relationship with a person's infectiousness (https://www.pnas.org/content/118/49/e2111477118)
  R Ke et al, PNAS, December 7, 2021

Quantifying the kinetics of SARS-CoV-2 infection and individual infectiousness is important for understanding SARS-CoV-2 transmission and evaluating intervention strategies. Here, we developed within-host models of SARS-CoV-2 infection, and by fitting them to clinical data, we estimated key within-host viral dynamic parameters. Using data on how viral load changes during infection, we further evaluated the effectiveness of PCR and antigen-based testing strategies for averting transmission and identifying infected individuals.

- Omicron Has Reached the US—Here's What Infectious Disease Experts Know About the Variant (https://jamanetwork.com/journals/jama/fullarticle/2787065)
  J Abbasi, JAMA, December 6, 2021
- Duration of SARS-CoV-2 Natural Immunity and Protection against the Delta Variant: A Retrospective Cohort Study. (https://pubmed.ncbi.nlm.nih.gov/34864907)
  Kim Priscilla et al. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 2021 12

  Among 325,157 patients tested before 31 December 2020, 50,327 (15.5%) tested positive. After 01 July 2021 (Delta dominant period), 40 (0.08%) of the initially positive and 1,494 (0.5%) of the initially negative patients tested positive. Protection of prior infection against reinfection with Delta was 85.4% (95% CI, 80.0-89.3). For the long-term effectiveness analysis, among 152,656 patients tested before 30 August 2020, 11,186 (7.3%) tested positive. After at least 90 days, 81 (0.7%) of the initially positive patients and 7,167 (5.1%) of the initially negative patients tested positive. Overall protection of previous infection was 85.7% (95% CI, 82.2-88.5) and lasted up to 13 months.
- Outbreak of SARS-CoV-2 in hospitalized hemodialysis patients: an epidemiologic and genomic investigation. (https://pubmed.ncbi.nlm.nih.gov/34866561)
  Marvil Charles E et al. Infection control and hospital epidemiology 2021 12 1-14

  We performed an epidemiological investigation and SARS-CoV-2 genome sequencing to define the source and scope of an outbreak in a cluster of hospitalized patients. Lack of appropriate respiratory hygiene led to SARS-CoV-2 transmission to patients and healthcare workers during a single hemodialysis session, highlighting the importance of infection prevention precautions.
- Robust immune responses are observed after one dose of BNT162b2 mRNA vaccine dose in SARS-CoV-2 experienced individuals (https://www.science.org/doi/10.1126/scitranslmed.abi8961)
  MI Samanovic et al, Science, December 7, 2021

  Little is known about how immune responses induced by mRNA vaccines differ in individuals who recovered from COVID-19. Here, we evaluated longitudinal immune responses to two-dose BNT162b2 mRNA vaccination in 15 adults who had experienced COVID-19, compared to 21 adults who did not have prior COVID-19. Consistent with prior studies of mRNA vaccines, we observed robust cytotoxic CD8+ T cell responses in both cohorts following the second dose. Furthermore, SARS-CoV-2-naive individuals had progressive increases in humoral and antigen-specific antibody-secreting cell (ASC) responses following each dose of vaccine, whereas SARS-CoV-2-experienced individuals

demonstrated strong humoral and antigen-specific ASC responses to the first dose but these responses were not further enhanced after the second dose of the vaccine.

- BNT162b2 Vaccine Booster and Mortality Due to Covid-19 (https://www.nejm.org/doi/full/10.1056/NEJMoa2115624?query=featured_home)
  R Arbel et al, NEJM, December 8, 2021

  A total of 843,208 participants met the eligibility criteria, of whom 758,118 (90%) received the booster during the 54-day study period. Death due to Covid-19 occurred in 65 participants in the booster group (0.16 per 100,000 persons per day) and in 137 participants in the nonbooster group (2.98 per 100,000 persons per day). The adjusted hazard ratio for death due to Covid-19 in the booster group, as compared with the nonbooster group, was 0.10 (95% confidence interval, 0.07 to 0.14; P<0.001). Participants who received a booster at least 5 months after a second dose of BNT162b2 had 90% lower mortality due to Covid-19 than participants who did not receive a booster.

- Protection against Covid-19 by BNT162b2 Booster across Age Groups (https://www.nejm.org/doi/full/10.1056/NEJMoa2115926)
  YM Bar-ON et al, NEJM, December 8, 2021

  The rate of confirmed infection was lower in the booster group than in the nonbooster group by a factor of approximately 10 (range across five age groups, 9.0 to 17.2) and was lower in the booster group than in the early postbooster group by a factor of 4.9 to 10.8. The adjusted rate difference ranged from 57.0 to 89.5 infections per 100,000 person-days in the primary analysis and from 34.4 to 38.3 in the secondary analysis. The rates of severe illness in the primary and secondary analyses were lower in the booster group by a factor of 17.9 (95% confidence interval [CI], 15.1 to 21.2) and 6.5 (95% CI, 5.1 to 8.2), respectively, among those 60 years of age or older and by a factor of 21.7 (95% CI, 10.6 to 44.2) and 3.7 (95% CI, 1.3 to 10.2) among those 40 to 59 years of age.

- Tracking the Emergence of SARS-CoV-2 Alpha Variant in the United Kingdom (https://www.nejm.org/doi/full/10.1056/NEJMc2103227?query=featured_home)
  AS Walker et al, NEJM, December 8, 2021

  Our direct population-level analysis confirmed that the SARS-CoV-2 alpha variant was associated with a higher infection rate than other variants that were circulating in the United Kingdom during the study period. Careful monitoring for the emergence of such variants with enhanced transmissibility is needed.

Non-Genomics Precision Health Studies

- Increased risk of SARS-CoV-2 reinfection associated with emergence of the Omicron variant in South Africa (https://www.medrxiv.org/content/10.1101/2021.11.11.21266068v2.full)
  JRC Pulliam et al, MEDRXIV, December 2, 2021

Population-level evidence suggests that the Omicron variant is associated with substantial ability to evade immunity from prior infection. In contrast, there is no population-wide epidemiological evidence of immune escape associated with the Beta or Delta variants. This finding has important implications for public health planning, particularly in countries like South Africa with high rates of immunity from prior infection.

- mRNA vaccines induce durable immune memory to SARS-CoV-2 and variants of concern (https://www.science.org/doi/10.1126/science.abm0829)
  RR Goel et al, Science, December 3, 2021

  The study examined B and T lymphocyte responses in individuals who received SARS-CoV-2 messenger RNA vaccines. They performed a 6-month longitudinal study of individuals who never had SARS-CoV-2 infection compared with people who had recovered from SARS-CoV-2. Humoral and cellular immune memory was observed in vaccinated individuals, as were functional immune responses against the Alpha (B.1.1.7), Beta (B.1.351), and Delta (B.1.617.2) viral variants. Analysis of T cell activity suggested that robust cellular immune memory may prevent hospitalization by limiting the development of severe disease.

- Immunogenicity of Extended mRNA SARS-CoV-2 Vaccine Dosing Intervals (https://jamanetwork.com/journals/jama/fullarticle/2786992?)
  B Grunau et al, JAMA, December 3, 2021

  Longer mRNA vaccine dosing intervals demonstrated improved immunogenicity, which was consistent when responses were measured based on timing of the first or second dose. These data suggest that extending dosing intervals may be particularly advantageous against the Delta variant. A delayed second-dose strategy could yield faster partial protection to a larger proportion of the population when vaccine supplies are limited.

- Probable Transmission of SARS-CoV-2 Omicron Variant in Quarantine Hotel, Hong Kong, China, November 2021 (https://wwwnc.cdc.gov/eid/article/28/2/21-2422_article)
  H Gu et al, EID journal, December 3, 2021

  We report detection of severe acute respiratory syndrome coronavirus 2 Omicron variant (B.1.1.529) in an asymptomatic, fully vaccinated traveler in a quarantine hotel in Hong Kong, China. The Omicron variant was also detected in a fully vaccinated traveler staying in a room across the corridor from the index patient, suggesting transmission despite strict quarantine precautions.

- Severe breakthrough COVID-19 cases in the SARS-CoV-2 delta (B.1.617.2) variant era (https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(21)00306-2/fulltext)
  SY Wang et al, Lancet Microbe, December 3, 2021

  Despite compelling evidence that SARS-CoV-2 vaccines are highly effective in preventing COVID-19 infections, breakthrough cases have been emerging at an increasing rate. The shifting landscape of

breakthrough COVID-19 cases is likely to involve multiple factors, including demonstrated waning of antibody response after full vaccination7, 8 and emergence of variant strains of SARS-CoV-2.

- Omicron and Delta Variant of SARS-CoV-2: A Comparative Computational Study of Spike protein (https://www.biorxiv.org/content/10.1101/2021.12.02.470946v1)
  S Kumar et al, BIORXIV December 3, 2021

  We used computational studies to examine the Delta and Omicron variants in this work and found that the Omicron variant had a higher affinity for human ACE2 than the Delta variant due to a significant number of mutations in the SARS-CoV-2 receptor binding domain, indicating a higher potential for transmission. Based on docking studies, the Q493R, N501Y, S371L, S373P, S375F, Q498R, and T478K mutations contribute significantly to high binding affinity with human ACE2. In comparison to the Delta variant, both the entire spike protein and the RBD in Omicron include a high proportion of hydrophobic amino acids such as leucine and phenylalanine. These amino acids are located within the protein's core and are required for structural stability.

- In vivo kinetics of SARS-CoV-2 infection and its relationship with a person's infectiousness (https://www.pnas.org/content/118/49/e2111477118)
  R Ke et al, PNAS, December 7, 2021

  Quantifying the kinetics of SARS-CoV-2 infection and individual infectiousness is important for understanding SARS-CoV-2 transmission and evaluating intervention strategies. Here, we developed within-host models of SARS-CoV-2 infection, and by fitting them to clinical data, we estimated key within-host viral dynamic parameters. Using data on how viral load changes during infection, we further evaluated the effectiveness of PCR and antigen-based testing strategies for averting transmission and identifying infected individuals.

- Omicron Has Reached the US—Here's What Infectious Disease Experts Know About the Variant (https://jamanetwork.com/journals/jama/fullarticle/2787065)
  J Abbasi, JAMA, December 6, 2021

- Duration of SARS-CoV-2 Natural Immunity and Protection against the Delta Variant: A Retrospective Cohort Study. (https://pubmed.ncbi.nlm.nih.gov/34864907)
  Kim Priscilla et al. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 2021 12

  Among 325,157 patients tested before 31 December 2020, 50,327 (15.5%) tested positive. After 01 July 2021 (Delta dominant period), 40 (0.08%) of the initially positive and 1,494 (0.5%) of the initially negative patients tested positive. Protection of prior infection against reinfection with Delta was 85.4% (95% CI, 80.0-89.3). For the long-term effectiveness analysis, among 152,656 patients tested before 30 August 2020, 11,186 (7.3%) tested positive. After at least 90 days, 81 (0.7%) of the initially positive patients and 7,167 (5.1%) of the initially negative patients tested positive. Overall protection of previous infection was 85.7% (95% CI, 82.2-88.5) and lasted up to 13 months.

- Outbreak of SARS-CoV-2 in hospitalized hemodialysis patients: an epidemiologic and genomic investigation. (https://pubmed.ncbi.nlm.nih.gov/34866561)
  Marvil Charles E et al. Infection control and hospital epidemiology 2021 12 1-14

  > We performed an epidemiological investigation and SARS-CoV-2 genome sequencing to define the source and scope of an outbreak in a cluster of hospitalized patients. Lack of appropriate respiratory hygiene led to SARS-CoV-2 transmission to patients and healthcare workers during a single hemodialysis session, highlighting the importance of infection prevention precautions.

- Robust immune responses are observed after one dose of BNT162b2 mRNA vaccine dose in SARS-CoV-2 experienced individuals (https://www.science.org/doi/10.1126/scitranslmed.abi8961)
  MI Samanovic et al, Science, December 7, 2021

  > Little is known about how immune responses induced by mRNA vaccines differ in individuals who recovered from COVID-19. Here, we evaluated longitudinal immune responses to two-dose BNT162b2 mRNA vaccination in 15 adults who had experienced COVID-19, compared to 21 adults who did not have prior COVID-19. Consistent with prior studies of mRNA vaccines, we observed robust cytotoxic CD8+ T cell responses in both cohorts following the second dose. Furthermore, SARS-CoV-2-naive individuals had progressive increases in humoral and antigen-specific antibody-secreting cell (ASC) responses following each dose of vaccine, whereas SARS-CoV-2-experienced individuals demonstrated strong humoral and antigen-specific ASC responses to the first dose but these responses were not further enhanced after the second dose of the vaccine.

- BNT162b2 Vaccine Booster and Mortality Due to Covid-19 (https://www.nejm.org/doi/full/10.1056/NEJMoa2115624?query=featured_home)
  R Arbel et al, NEJM, December 8, 2021

  > A total of 843,208 participants met the eligibility criteria, of whom 758,118 (90%) received the booster during the 54-day study period. Death due to Covid-19 occurred in 65 participants in the booster group (0.16 per 100,000 persons per day) and in 137 participants in the nonbooster group (2.98 per 100,000 persons per day). The adjusted hazard ratio for death due to Covid-19 in the booster group, as compared with the nonbooster group, was 0.10 (95% confidence interval, 0.07 to 0.14; P<0.001). Participants who received a booster at least 5 months after a second dose of BNT162b2 had 90% lower mortality due to Covid-19 than participants who did not receive a booster.

- Protection against Covid-19 by BNT162b2 Booster across Age Groups (https://www.nejm.org/doi/full/10.1056/NEJMoa2115926)
  YM Bar-ON et al, NEJM, December 8, 2021

  > The rate of confirmed infection was lower in the booster group than in the nonbooster group by a factor of approximately 10 (range across five age groups, 9.0 to 17.2) and was lower in the booster group than in the early postbooster group by a factor of 4.9 to 10.8. The adjusted rate difference ranged from 57.0 to 89.5 infections per 100,000 person-days in the primary analysis and from 34.4 to 38.3 in the secondary analysis. The rates of severe illness in the primary and secondary analyses were

lower in the booster group by a factor of 17.9 (95% confidence interval [CI], 15.1 to 21.2) and 6.5 (95% CI, 5.1 to 8.2), respectively, among those 60 years of age or older and by a factor of 21.7 (95% CI, 10.6 to 44.2) and 3.7 (95% CI, 1.3 to 10.2) among those 40 to 59 years of age.

- Tracking the Emergence of SARS-CoV-2 Alpha Variant in the United Kingdom (https://www.nejm.org/doi/full/10.1056/NEJMc2103227?query=featured_home)
  AS Walker et al, NEJM, December 8, 2021

  Our direct population-level analysis confirmed that the SARS-CoV-2 alpha variant was associated with a higher infection rate than other variants that were circulating in the United Kingdom during the study period. Careful monitoring for the emergence of such variants with enhanced transmissibility is needed.

News, Reviews and Commentaries

- Increased risk of SARS-CoV-2 reinfection associated with emergence of the Omicron variant in South Africa (https://www.medrxiv.org/content/10.1101/2021.11.11.21266068v2.full)
  JRC Pulliam et al, MEDRXIV, December 2, 2021

  Population-level evidence suggests that the Omicron variant is associated with substantial ability to evade immunity from prior infection. In contrast, there is no population-wide epidemiological evidence of immune escape associated with the Beta or Delta variants. This finding has important implications for public health planning, particularly in countries like South Africa with high rates of immunity from prior infection.

- mRNA vaccines induce durable immune memory to SARS-CoV-2 and variants of concern (https://www.science.org/doi/10.1126/science.abm0829)
  RR Goel et al, Science, December 3, 2021

  The study examined B and T lymphocyte responses in individuals who received SARS-CoV-2 messenger RNA vaccines. They performed a 6-month longitudinal study of individuals who never had SARS-CoV-2 infection compared with people who had recovered from SARS-CoV-2. Humoral and cellular immune memory was observed in vaccinated individuals, as were functional immune responses against the Alpha (B.1.1.7), Beta (B.1.351), and Delta (B.1.617.2) viral variants. Analysis of T cell activity suggested that robust cellular immune memory may prevent hospitalization by limiting the development of severe disease.

- Immunogenicity of Extended mRNA SARS-CoV-2 Vaccine Dosing Intervals (https://jamanetwork.com/journals/jama/fullarticle/2786992?)
  B Grunau et al, JAMA, December 3, 2021

  Longer mRNA vaccine dosing intervals demonstrated improved immunogenicity, which was consistent when responses were measured based on timing of the first or second dose. These data suggest that

extending dosing intervals may be particularly advantageous against the Delta variant. A delayed second-dose strategy could yield faster partial protection to a larger proportion of the population when vaccine supplies are limited.

- Probable Transmission of SARS-CoV-2 Omicron Variant in Quarantine Hotel, Hong Kong, China, November 2021 (https://wwwnc.cdc.gov/eid/article/28/2/21-2422_article)
  H Gu et al, EID journal, December 3, 2021

  We report detection of severe acute respiratory syndrome coronavirus 2 Omicron variant (B.1.1.529) in an asymptomatic, fully vaccinated traveler in a quarantine hotel in Hong Kong, China. The Omicron variant was also detected in a fully vaccinated traveler staying in a room across the corridor from the index patient, suggesting transmission despite strict quarantine precautions.

- Severe breakthrough COVID-19 cases in the SARS-CoV-2 delta (B.1.617.2) variant era (https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(21)00306-2/fulltext)
  SY Wang et al, Lancet Microbe, December 3, 2021

  Despite compelling evidence that SARS-CoV-2 vaccines are highly effective in preventing COVID-19 infections, breakthrough cases have been emerging at an increasing rate. The shifting landscape of breakthrough COVID-19 cases is likely to involve multiple factors, including demonstrated waning of antibody response after full vaccination7, 8 and emergence of variant strains of SARS-CoV-2.

- Omicron and Delta Variant of SARS-CoV-2: A Comparative Computational Study of Spike protein (https://www.biorxiv.org/content/10.1101/2021.12.02.470946v1)
  S Kumar et al, BIORXIV December 3, 2021

  We used computational studies to examine the Delta and Omicron variants in this work and found that the Omicron variant had a higher affinity for human ACE2 than the Delta variant due to a significant number of mutations in the SARS-CoV-2 receptor binding domain, indicating a higher potential for transmission. Based on docking studies, the Q493R, N501Y, S371L, S373P, S375F, Q498R, and T478K mutations contribute significantly to high binding affinity with human ACE2. In comparison to the Delta variant, both the entire spike protein and the RBD in Omicron include a high proportion of hydrophobic amino acids such as leucine and phenylalanine. These amino acids are located within the protein's core and are required for structural stability.

- In vivo kinetics of SARS-CoV-2 infection and its relationship with a person’s infectiousness (https://www.pnas.org/content/118/49/e2111477118)
  R Ke et al, PNAS, December 7, 2021

  Quantifying the kinetics of SARS-CoV-2 infection and individual infectiousness is important for understanding SARS-CoV-2 transmission and evaluating intervention strategies. Here, we developed within-host models of SARS-CoV-2 infection, and by fitting them to clinical data, we estimated key within-host viral dynamic parameters. Using data on how viral load changes during infection, we

further evaluated the effectiveness of PCR and antigen-based testing strategies for averting transmission and identifying infected individuals.

- Omicron Has Reached the US—Here's What Infectious Disease Experts Know About the Variant (https://jamanetwork.com/journals/jama/fullarticle/2787065)
  J Abbasi, JAMA, December 6, 2021

- Duration of SARS-CoV-2 Natural Immunity and Protection against the Delta Variant: A Retrospective Cohort Study. (https://pubmed.ncbi.nlm.nih.gov/34864907)
  Kim Priscilla et al. Clinical infectious diseases : an official publication of the Infectious Diseases Society of America 2021 12

  Among 325,157 patients tested before 31 December 2020, 50,327 (15.5%) tested positive. After 01 July 2021 (Delta dominant period), 40 (0.08%) of the initially positive and 1,494 (0.5%) of the initially negative patients tested positive. Protection of prior infection against reinfection with Delta was 85.4% (95% CI, 80.0-89.3). For the long-term effectiveness analysis, among 152,656 patients tested before 30 August 2020, 11,186 (7.3%) tested positive. After at least 90 days, 81 (0.7%) of the initially positive patients and 7,167 (5.1%) of the initially negative patients tested positive. Overall protection of previous infection was 85.7% (95% CI, 82.2-88.5) and lasted up to 13 months.

- Outbreak of SARS-CoV-2 in hospitalized hemodialysis patients: an epidemiologic and genomic investigation. (https://pubmed.ncbi.nlm.nih.gov/34866561)
  Marvil Charles E et al. Infection control and hospital epidemiology 2021 12 1-14

  We performed an epidemiological investigation and SARS-CoV-2 genome sequencing to define the source and scope of an outbreak in a cluster of hospitalized patients. Lack of appropriate respiratory hygiene led to SARS-CoV-2 transmission to patients and healthcare workers during a single hemodialysis session, highlighting the importance of infection prevention precautions.

- Robust immune responses are observed after one dose of BNT162b2 mRNA vaccine dose in SARS-CoV-2 experienced individuals (https://www.science.org/doi/10.1126/scitranslmed.abi8961)
  MI Samanovic et al, Science, December 7, 2021

  Little is known about how immune responses induced by mRNA vaccines differ in individuals who recovered from COVID-19. Here, we evaluated longitudinal immune responses to two-dose BNT162b2 mRNA vaccination in 15 adults who had experienced COVID-19, compared to 21 adults who did not have prior COVID-19. Consistent with prior studies of mRNA vaccines, we observed robust cytotoxic CD8+ T cell responses in both cohorts following the second dose. Furthermore, SARS-CoV-2-naive individuals had progressive increases in humoral and antigen-specific antibody-secreting cell (ASC) responses following each dose of vaccine, whereas SARS-CoV-2-experienced individuals demonstrated strong humoral and antigen-specific ASC responses to the first dose but these responses were not further enhanced after the second dose of the vaccine.

- BNT162b2 Vaccine Booster and Mortality Due to Covid-19
(https://www.nejm.org/doi/full/10.1056/NEJMoa2115624?query=featured_home)
R Arbel et al, NEJM, December 8, 2021

  A total of 843,208 participants met the eligibility criteria, of whom 758,118 (90%) received the booster during the 54-day study period. Death due to Covid-19 occurred in 65 participants in the booster group (0.16 per 100,000 persons per day) and in 137 participants in the nonbooster group (2.98 per 100,000 persons per day). The adjusted hazard ratio for death due to Covid-19 in the booster group, as compared with the nonbooster group, was 0.10 (95% confidence interval, 0.07 to 0.14; P<0.001). Participants who received a booster at least 5 months after a second dose of BNT162b2 had 90% lower mortality due to Covid-19 than participants who did not receive a booster.

- Protection against Covid-19 by BNT162b2 Booster across Age Groups
(https://www.nejm.org/doi/full/10.1056/NEJMoa2115926)
YM Bar-ON et al, NEJM, December 8, 2021

  The rate of confirmed infection was lower in the booster group than in the nonbooster group by a factor of approximately 10 (range across five age groups, 9.0 to 17.2) and was lower in the booster group than in the early postbooster group by a factor of 4.9 to 10.8. The adjusted rate difference ranged from 57.0 to 89.5 infections per 100,000 person-days in the primary analysis and from 34.4 to 38.3 in the secondary analysis. The rates of severe illness in the primary and secondary analyses were lower in the booster group by a factor of 17.9 (95% confidence interval [CI], 15.1 to 21.2) and 6.5 (95% CI, 5.1 to 8.2), respectively, among those 60 years of age or older and by a factor of 21.7 (95% CI, 10.6 to 44.2) and 3.7 (95% CI, 1.3 to 10.2) among those 40 to 59 years of age.

- Tracking the Emergence of SARS-CoV-2 Alpha Variant in the United Kingdom
(https://www.nejm.org/doi/full/10.1056/NEJMc2103227?query=featured_home)
AS Walker et al, NEJM, December 8, 2021

  Our direct population-level analysis confirmed that the SARS-CoV-2 alpha variant was associated with a higher infection rate than other variants that were circulating in the United Kingdom during the study period. Careful monitoring for the emergence of such variants with enhanced transmissibility is needed.

Page last updated: Dec 10, 2021

Content source: Office of Genomics and Precision Public Health (http://www.cdc.gov/genomics/), CDC Office of Science (https://www.cdc.gov/od/science/index.htm)