

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

Published on 12/02/2021

COVID-19 Genomics and Precision Public Health Weekly Update Content

- Pathogen and Human Genomics Studies
- Non-Genomics Precision Health Studies
- News, Reviews and Commentaries

Pathogen and Human Genomics Studies

 SARS-CoV-2 Genomic Surveillance Reveals Little Spread From a Large University Campus to the Surrounding Community. (https://pubmed.ncbi.nlm.nih.gov/34805437)
Valesano Andrew L et al. Open forum infectious diseases 2021 11 (11) ofab518

Phylogenetic analysis identified >200 introductions into the student population, most of which were not related to other student cases. There were 2 prolonged student transmission clusters, of 115 and 73 individuals, that spanned multiple on-campus residences. Remarkably, <5% of nonstudent genomes were descended from student clusters, and viral descendants of student cases were rare during a subsequent wave of infections in the community.

Emergence of SARS-CoV-2 Delta Variant, Benin, May-July 2021.
(https://pubmed.ncbi.nlm.nih.gov/34807815)
Yadouleton Anges et al. Emerging infectious diseases 2021 11 (1)

Severe acute respiratory syndrome coronavirus 2 Delta variant epidemiology in Africa is unknown. We found Delta variant was introduced in Benin during April-May 2021 and became predominant within 2 months, after which a steep increase in reported coronavirus disease incidence occurred. Benin might require increased nonpharmaceutical interventions and vaccination coverage.

 Neutralization of SARS-CoV-2 Variants in Transplant Recipients After Two and Three Doses of mRNA-1273 Vaccine: Secondary Analysis of a Randomized Trial. (https://pubmed.ncbi.nlm.nih.gov/34807716)
Kumar Deepali et al. Annals of internal medicine 2021 11 total of 117 transplant recipients were analyzed (60 in the mRNA-1273 group and 57 in the placebo group). Sera were obtained before and 4 to 6 weeks after the third dose. After 2 doses, the proportion of patients with positive neutralization for all 3 variants was small compared with wild-type virus. After the third dose of mRNA-1273 vaccine, the proportion with a positive neutralization response versus placebo was improved for all 3 variants as measured by both assays. Based on the pseudovirus neutralization assay against the Delta variant, 33 of 60 (55%) patients were positive in the mRNA-1273 group versus 10 of 57 (18%) in the placebo group (difference, 37 [95% CI, 19 to 53] percentage points).

 The N501Y spike substitution enhances SARS-CoV-2 infection and transmission (https://www.nature.com/articles/s41586-021-04245-0)
Y Liu et al, Nature, November 24, 2021

The Alpha variant has 19 nonsynonymous mutations across its viral genome, including 8 substitutions or deletions in the spike protein, which interacts with cellular receptors to mediate infection and tropism. Here, using a reverse genetics approach, we show that, of the 8 individual spike protein substitutions, only N501Y exhibited consistent fitness gains for replication in the upper airway in the hamster model as well as primary human airway epithelial cells. The N501Y substitution recapitulated the phenotype of enhanced viral transmission seen with the combined 8 Alpha spike mutations, suggesting it is a major determinant of increased transmission of this variant.

 Increased risk of infection with SARS-CoV-2 Beta, Gamma, and Delta variant compared to Alpha variant in vaccinated individuals (https://www.medrxiv.org/content/10.1101/2021.11.24.21266735v1)
SP Andeweg et al, MEDRXIV, November 24, 2021

We find evidence for an increased risk of infection by the Beta (B.1.351), Gamma (P.1), or Delta (B.1.617.2) variants compared to the Alpha (B.1.1.7) variant after vaccination. No clear differences were found between vaccines. However, the effect was larger in the first 14-59 days after complete vaccination compared to 60 days and longer. In contrast to vaccine-induced immunity, no increased risk for reinfection with Beta, Gamma or Delta variants relative to Alpha variant was found in individuals with infection-induced immunity.

Effectiveness of BNT162b2 Vaccine against Delta Variant in Adolescents.
(https://pubmed.ncbi.nlm.nih.gov/34670036)
Reis Ben Y et al. The New England journal of medicine 2021 10 (22) 2101-2103

We sought to estimate the vaccine effectiveness of BNT162b2 against the delta variant among vaccinated adolescents for whom an unvaccinated match was found. We used data from Clalit Health Services, the largest health care organization in Israel, to conduct an observational cohort study involving adolescents between the ages of 12 and 18 years who had no prior SARS-CoV-2 infection noted in their electronic medical record and who had been vaccinated between June 8 and September 14, 2021. Our results show that the BNT162b2 mRNA vaccine was highly effective in the first few

weeks after vaccination against both documented infection and symptomatic Covid-19 with the delta variant among adolescents between the ages of 12 and 18 years.

 SARS-CoV-2 antigen-detecting rapid tests for the delta variant (https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(21)00302-5/fulltext)
M Bekliz et al, Lancet Microbe, November 24, 2021

In this study, the accuracy of 11 Ag-RDTs to detect variants of concern was determined. Analytical validation with cultured virus might be a proxy for clinical accuracy, but it is not a replacement for clinical evaluations. Nevertheless, we showed that, despite slight differences in sensitivity, Ag-RDTs remain, in principle, effective to detect variants of concern, including the now-dominant delta variant.

 Immune correlates analysis of the mRNA-1273 COVID-19 vaccine efficacy clinical trial (https://www.science.org/doi/10.1126/science.abm3425)
PB Gilbert et al, Science, November 23, 2021

In the coronavirus efficacy (COVE) phase 3 clinical trial, vaccine recipients were assessed for neutralizing and binding antibodies as correlates of risk for COVID-19 disease and as correlates of protection. These immune markers were measured at second vaccination and 4 weeks later, with values reported in standardized WHO International Units. All markers were inversely associated with COVID-19 risk and directly associated with vaccine efficacy.

• Efficacy and safety of the CVnCoV SARS-CoV-2 mRNA vaccine candidate in ten countries in Europe and Latin America (HERALD): a randomised, observer-blinded, placebo-controlled, phase 2b/3 trial. (https://pubmed.ncbi.nlm.nih.gov/34826381)

Kremsner Peter G et al. The Lancet. Infectious diseases 2021 11

Between Dec 11, 2020, and April 12, 2021, 39 680 participants were enrolled and randomly assigned to receive either CVnCoV (n=19 846) or placebo (n=19 834), of whom 19 783 received at least one dose of CVnCoV and 19 746 received at least one dose of placebo. After a mean observation period of 48.2 days (SE 0.2), 83 cases of COVID-19 occurred in the CVnCoV group (n=12 851) in 1735.29 person-years and 145 cases occurred in the placebo group (n=12 211) in 1569.87 person-years, resulting in an overall vaccine efficacy against symptomatic COVID-19 of 48.2% (95.826% CI 31.0-61.4; p=0.016). Vaccine efficacy against moderate-to-severe COVID-19 was 70.7%.

 Comparative Effectiveness of BNT162b2 and mRNA-1273 Vaccines in U.S. Veterans (https://www.nejm.org/doi/full/10.1056/NEJMoa2115463?query=featured_home)
BA Dickerman et al, NEJM, December 1, 2021

Each vaccine group included 219,842 persons. Over 24 weeks of follow-up in a period marked by alpha-variant predominance, the estimated risk of documented infection was 5.75 events per 1000 persons (95% confidence interval [CI], 5.39 to 6.23) in the BNT162b2 group and 4.52 events per 1000 persons (95% CI, 4.17 to 4.84) in the mRNA-1273 group. The excess number of events per 1000 persons for BNT162b2 as compared with mRNA-1273 was 1.23 (95% CI, 0.72 to 1.81) for documented

infection, 0.44 (95% CI, 0.25 to 0.70) for symptomatic Covid-19, 0.55 (95% CI, 0.36 to 0.83) for hospitalization for Covid-19, 0.10 (95% CI, 0.00 to 0.26).

 Covid-19 Vaccine Effectiveness in New York State (https://www.nejm.org/doi/full/10.1056/NEJMoa2116063?query=featured_home)
ES Rosenberg et al, NEJM, December 1,2021

There were 150,865 cases of Covid-19 and 14,477 hospitalizations with Covid-19. During the week of May 1, 2021, when the delta variant made up 1.8% of the circulating variants, the median vaccine effectiveness against Covid-19 was 91.3% (range, 84.1 to 97.0) for BNT162b2, 96.9% (range, 93.7 to 98.0) for mRNA-1273, and 86.6% (range, 77.8 to 89.7) for Ad26.COV2.S. Subsequently, effectiveness declined contemporaneously in all cohorts, from a median of 93.4% (range, 77.8 to 98.0) during the week of May 1 to a nadir of 73.5% (range, 13.8 to 90.0) around July 10, when the prevalence of the delta variant was 85.3%.

 Myocarditis after Covid-19 Vaccination in a Large Health Care Organization (https://www.nejm.org/doi/full/10.1056/NEJMoa2110737?query=featured_home)
G Witberg et al, NEJM, December 2, 2021

Among more than 2.5 million vaccinated HCO members who were 16 years of age or older, 54 cases met the criteria for myocarditis. The estimated incidence per 100,000 persons who had received at least one dose of vaccine was 2.13 cases (95% confidence interval [CI], 1.56 to 2.70). The highest incidence of myocarditis (10.69 cases per 100,000 persons; 95% CI, 6.93 to 14.46) was reported in male patients between the ages of 16 and 29 years.

 Viral Dynamics of SARS-CoV-2 Variants in Vaccinated and Unvaccinated Persons (https://www.nejm.org/doi/full/10.1056/NEJMc2102507)
SM Kissler et al, NEJM, December 1,2021

We compared SARS-CoV-2 viral dynamics among 36 participants who were infected with the B.1.1.7 (alpha) variant, 36 participants with the B.1.617.2 (delta) variant, and 41 participants with a variant that was not of current interest or concern, along with 37 vaccinated and 136 unvaccinated participants. We found no meaningful difference in the mean peak viral load (with a lower peak cycle threshold [Ct] indicating a higher viral load), proliferation duration, clearance duration, or duration of acute infection of either the alpha or the delta variant as compared with variants not of interest or concern.

Non-Genomics Precision Health Studies

 SARS-CoV-2 Genomic Surveillance Reveals Little Spread From a Large University Campus to the Surrounding Community. (https://pubmed.ncbi.nlm.nih.gov/34805437)
Valesano Andrew L et al. Open forum infectious diseases 2021 11 (11) ofab518 Phylogenetic analysis identified >200 introductions into the student population, most of which were not related to other student cases. There were 2 prolonged student transmission clusters, of 115 and 73 individuals, that spanned multiple on-campus residences. Remarkably, <5% of nonstudent genomes were descended from student clusters, and viral descendants of student cases were rare during a subsequent wave of infections in the community.

Emergence of SARS-CoV-2 Delta Variant, Benin, May-July 2021.
(https://pubmed.ncbi.nlm.nih.gov/34807815)
Yadouleton Anges et al. Emerging infectious diseases 2021 11 (1)

Severe acute respiratory syndrome coronavirus 2 Delta variant epidemiology in Africa is unknown. We found Delta variant was introduced in Benin during April-May 2021 and became predominant within 2 months, after which a steep increase in reported coronavirus disease incidence occurred. Benin might require increased nonpharmaceutical interventions and vaccination coverage.

 Neutralization of SARS-CoV-2 Variants in Transplant Recipients After Two and Three Doses of mRNA-1273 Vaccine: Secondary Analysis of a Randomized Trial. (https://pubmed.ncbi.nlm.nih.gov/34807716)
Kumar Deepali et al. Annals of internal medicine 2021 11

total of 117 transplant recipients were analyzed (60 in the mRNA-1273 group and 57 in the placebo group). Sera were obtained before and 4 to 6 weeks after the third dose. After 2 doses, the proportion of patients with positive neutralization for all 3 variants was small compared with wild-type virus. After the third dose of mRNA-1273 vaccine, the proportion with a positive neutralization response versus placebo was improved for all 3 variants as measured by both assays. Based on the pseudovirus neutralization assay against the Delta variant, 33 of 60 (55%) patients were positive in the mRNA-1273 group versus 10 of 57 (18%) in the placebo group (difference, 37 [95% CI, 19 to 53] percentage points).

 The N501Y spike substitution enhances SARS-CoV-2 infection and transmission (https://www.nature.com/articles/s41586-021-04245-0)
Y Liu et al, Nature, November 24, 2021

The Alpha variant has 19 nonsynonymous mutations across its viral genome, including 8 substitutions or deletions in the spike protein, which interacts with cellular receptors to mediate infection and tropism. Here, using a reverse genetics approach, we show that, of the 8 individual spike protein substitutions, only N501Y exhibited consistent fitness gains for replication in the upper airway in the hamster model as well as primary human airway epithelial cells. The N501Y substitution recapitulated the phenotype of enhanced viral transmission seen with the combined 8 Alpha spike mutations, suggesting it is a major determinant of increased transmission of this variant.

 Increased risk of infection with SARS-CoV-2 Beta, Gamma, and Delta variant compared to Alpha variant in vaccinated individuals (https://www.medrxiv.org/content/10.1101/2021.11.24.21266735v1)
SP Andeweg et al, MEDRXIV, November 24, 2021 We find evidence for an increased risk of infection by the Beta (B.1.351), Gamma (P.1), or Delta (B.1.617.2) variants compared to the Alpha (B.1.1.7) variant after vaccination. No clear differences were found between vaccines. However, the effect was larger in the first 14-59 days after complete vaccination compared to 60 days and longer. In contrast to vaccine-induced immunity, no increased risk for reinfection with Beta, Gamma or Delta variants relative to Alpha variant was found in individuals with infection-induced immunity.

Effectiveness of BNT162b2 Vaccine against Delta Variant in Adolescents.
(https://pubmed.ncbi.nlm.nih.gov/34670036)
Reis Ben Y et al. The New England journal of medicine 2021 10 (22) 2101-2103

We sought to estimate the vaccine effectiveness of BNT162b2 against the delta variant among vaccinated adolescents for whom an unvaccinated match was found. We used data from Clalit Health Services, the largest health care organization in Israel, to conduct an observational cohort study involving adolescents between the ages of 12 and 18 years who had no prior SARS-CoV-2 infection noted in their electronic medical record and who had been vaccinated between June 8 and September 14, 2021. Our results show that the BNT162b2 mRNA vaccine was highly effective in the first few weeks after vaccination against both documented infection and symptomatic Covid-19 with the delta variant among adolescents between the ages of 12 and 18 years.

 SARS-CoV-2 antigen-detecting rapid tests for the delta variant (https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(21)00302-5/fulltext)
M Bekliz et al, Lancet Microbe, November 24, 2021

In this study, the accuracy of 11 Ag-RDTs to detect variants of concern was determined. Analytical validation with cultured virus might be a proxy for clinical accuracy, but it is not a replacement for clinical evaluations. Nevertheless, we showed that, despite slight differences in sensitivity, Ag-RDTs remain, in principle, effective to detect variants of concern, including the now-dominant delta variant.

 Immune correlates analysis of the mRNA-1273 COVID-19 vaccine efficacy clinical trial (https://www.science.org/doi/10.1126/science.abm3425)
PB Gilbert et al, Science, November 23, 2021

In the coronavirus efficacy (COVE) phase 3 clinical trial, vaccine recipients were assessed for neutralizing and binding antibodies as correlates of risk for COVID-19 disease and as correlates of protection. These immune markers were measured at second vaccination and 4 weeks later, with values reported in standardized WHO International Units. All markers were inversely associated with COVID-19 risk and directly associated with vaccine efficacy.

• Efficacy and safety of the CVnCoV SARS-CoV-2 mRNA vaccine candidate in ten countries in Europe and Latin America (HERALD): a randomised, observer-blinded, placebo-controlled, phase 2b/3 trial. (https://pubmed.ncbi.nlm.nih.gov/34826381)

Kremsner Peter G et al. The Lancet. Infectious diseases 2021 11

Between Dec 11, 2020, and April 12, 2021, 39 680 participants were enrolled and randomly assigned to receive either CVnCoV (n=19 846) or placebo (n=19 834), of whom 19 783 received at least one dose of CVnCoV and 19 746 received at least one dose of placebo. After a mean observation period of 48.2 days (SE 0.2), 83 cases of COVID-19 occurred in the CVnCoV group (n=12 851) in 1735.29 person-years and 145 cases occurred in the placebo group (n=12 211) in 1569.87 person-years, resulting in an overall vaccine efficacy against symptomatic COVID-19 of 48.2% (95.826% CI 31.0-61.4; p=0.016). Vaccine efficacy against moderate-to-severe COVID-19 was 70.7%.

 Comparative Effectiveness of BNT162b2 and mRNA-1273 Vaccines in U.S. Veterans (https://www.nejm.org/doi/full/10.1056/NEJMoa2115463?query=featured_home)
BA Dickerman et al, NEJM, December 1, 2021

Each vaccine group included 219,842 persons. Over 24 weeks of follow-up in a period marked by alpha-variant predominance, the estimated risk of documented infection was 5.75 events per 1000 persons (95% confidence interval [CI], 5.39 to 6.23) in the BNT162b2 group and 4.52 events per 1000 persons (95% CI, 4.17 to 4.84) in the mRNA-1273 group. The excess number of events per 1000 persons for BNT162b2 as compared with mRNA-1273 was 1.23 (95% CI, 0.72 to 1.81) for documented infection, 0.44 (95% CI, 0.25 to 0.70) for symptomatic Covid-19, 0.55 (95% CI, 0.36 to 0.83) for hospitalization for Covid-19, 0.10 (95% CI, 0.00 to 0.26).

 Covid-19 Vaccine Effectiveness in New York State (https://www.nejm.org/doi/full/10.1056/NEJMoa2116063?query=featured_home)
ES Rosenberg et al, NEJM, December 1,2021

There were 150,865 cases of Covid-19 and 14,477 hospitalizations with Covid-19. During the week of May 1, 2021, when the delta variant made up 1.8% of the circulating variants, the median vaccine effectiveness against Covid-19 was 91.3% (range, 84.1 to 97.0) for BNT162b2, 96.9% (range, 93.7 to 98.0) for mRNA-1273, and 86.6% (range, 77.8 to 89.7) for Ad26.COV2.S. Subsequently, effectiveness declined contemporaneously in all cohorts, from a median of 93.4% (range, 77.8 to 98.0) during the week of May 1 to a nadir of 73.5% (range, 13.8 to 90.0) around July 10, when the prevalence of the delta variant was 85.3%.

 Myocarditis after Covid-19 Vaccination in a Large Health Care Organization (https://www.nejm.org/doi/full/10.1056/NEJMoa2110737?query=featured_home)
G Witberg et al, NEJM, December 2, 2021

Among more than 2.5 million vaccinated HCO members who were 16 years of age or older, 54 cases met the criteria for myocarditis. The estimated incidence per 100,000 persons who had received at least one dose of vaccine was 2.13 cases (95% confidence interval [CI], 1.56 to 2.70). The highest incidence of myocarditis (10.69 cases per 100,000 persons; 95% CI, 6.93 to 14.46) was reported in male patients between the ages of 16 and 29 years.

 Viral Dynamics of SARS-CoV-2 Variants in Vaccinated and Unvaccinated Persons (https://www.nejm.org/doi/full/10.1056/NEJMc2102507)
SM Kissler et al, NEJM, December 1,2021

We compared SARS-CoV-2 viral dynamics among 36 participants who were infected with the B.1.1.7 (alpha) variant, 36 participants with the B.1.617.2 (delta) variant, and 41 participants with a variant that was not of current interest or concern, along with 37 vaccinated and 136 unvaccinated participants. We found no meaningful difference in the mean peak viral load (with a lower peak cycle threshold [Ct] indicating a higher viral load), proliferation duration, clearance duration, or duration of acute infection of either the alpha or the delta variant as compared with variants not of interest or concern.

News, Reviews and Commentaries

 SARS-CoV-2 Genomic Surveillance Reveals Little Spread From a Large University Campus to the Surrounding Community. (https://pubmed.ncbi.nlm.nih.gov/34805437)
Valesano Andrew L et al. Open forum infectious diseases 2021 11 (11) ofab518

Phylogenetic analysis identified >200 introductions into the student population, most of which were not related to other student cases. There were 2 prolonged student transmission clusters, of 115 and 73 individuals, that spanned multiple on-campus residences. Remarkably, <5% of nonstudent genomes were descended from student clusters, and viral descendants of student cases were rare during a subsequent wave of infections in the community.

Emergence of SARS-CoV-2 Delta Variant, Benin, May-July 2021.
(https://pubmed.ncbi.nlm.nih.gov/34807815)
Yadouleton Anges et al. Emerging infectious diseases 2021 11 (1)

Severe acute respiratory syndrome coronavirus 2 Delta variant epidemiology in Africa is unknown. We found Delta variant was introduced in Benin during April-May 2021 and became predominant within 2 months, after which a steep increase in reported coronavirus disease incidence occurred. Benin might require increased nonpharmaceutical interventions and vaccination coverage.

 Neutralization of SARS-CoV-2 Variants in Transplant Recipients After Two and Three Doses of mRNA-1273 Vaccine: Secondary Analysis of a Randomized Trial. (https://pubmed.ncbi.nlm.nih.gov/34807716)
Kumar Deepali et al. Annals of internal medicine 2021 11

total of 117 transplant recipients were analyzed (60 in the mRNA-1273 group and 57 in the placebo group). Sera were obtained before and 4 to 6 weeks after the third dose. After 2 doses, the proportion of patients with positive neutralization for all 3 variants was small compared with wild-type virus. After the third dose of mRNA-1273 vaccine, the proportion with a positive neutralization response versus placebo was improved for all 3 variants as measured by both assays. Based on the pseudovirus neutralization assay against the Delta variant, 33 of 60 (55%) patients were positive in the mRNA-

1273 group versus 10 of 57 (18%) in the placebo group (difference, 37 [95% CI, 19 to 53] percentage points).

 The N501Y spike substitution enhances SARS-CoV-2 infection and transmission (https://www.nature.com/articles/s41586-021-04245-0)
Y Liu et al, Nature, November 24, 2021

The Alpha variant has 19 nonsynonymous mutations across its viral genome, including 8 substitutions or deletions in the spike protein, which interacts with cellular receptors to mediate infection and tropism. Here, using a reverse genetics approach, we show that, of the 8 individual spike protein substitutions, only N501Y exhibited consistent fitness gains for replication in the upper airway in the hamster model as well as primary human airway epithelial cells. The N501Y substitution recapitulated the phenotype of enhanced viral transmission seen with the combined 8 Alpha spike mutations, suggesting it is a major determinant of increased transmission of this variant.

 Increased risk of infection with SARS-CoV-2 Beta, Gamma, and Delta variant compared to Alpha variant in vaccinated individuals (https://www.medrxiv.org/content/10.1101/2021.11.24.21266735v1)
SP Andeweg et al, MEDRXIV, November 24, 2021

We find evidence for an increased risk of infection by the Beta (B.1.351), Gamma (P.1), or Delta (B.1.617.2) variants compared to the Alpha (B.1.1.7) variant after vaccination. No clear differences were found between vaccines. However, the effect was larger in the first 14-59 days after complete vaccination compared to 60 days and longer. In contrast to vaccine-induced immunity, no increased risk for reinfection with Beta, Gamma or Delta variants relative to Alpha variant was found in individuals with infection-induced immunity.

 Effectiveness of BNT162b2 Vaccine against Delta Variant in Adolescents. (https://pubmed.ncbi.nlm.nih.gov/34670036)
Reis Ben Y et al. The New England journal of medicine 2021 10 (22) 2101-2103

We sought to estimate the vaccine effectiveness of BNT162b2 against the delta variant among vaccinated adolescents for whom an unvaccinated match was found. We used data from Clalit Health Services, the largest health care organization in Israel, to conduct an observational cohort study involving adolescents between the ages of 12 and 18 years who had no prior SARS-CoV-2 infection noted in their electronic medical record and who had been vaccinated between June 8 and September 14, 2021. Our results show that the BNT162b2 mRNA vaccine was highly effective in the first few weeks after vaccination against both documented infection and symptomatic Covid-19 with the delta variant among adolescents between the ages of 12 and 18 years.

 SARS-CoV-2 antigen-detecting rapid tests for the delta variant (https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(21)00302-5/fulltext)
M Bekliz et al, Lancet Microbe, November 24, 2021 In this study, the accuracy of 11 Ag-RDTs to detect variants of concern was determined. Analytical validation with cultured virus might be a proxy for clinical accuracy, but it is not a replacement for clinical evaluations. Nevertheless, we showed that, despite slight differences in sensitivity, Ag-RDTs remain, in principle, effective to detect variants of concern, including the now-dominant delta variant.

 Immune correlates analysis of the mRNA-1273 COVID-19 vaccine efficacy clinical trial (https://www.science.org/doi/10.1126/science.abm3425)
PB Gilbert et al, Science, November 23, 2021

In the coronavirus efficacy (COVE) phase 3 clinical trial, vaccine recipients were assessed for neutralizing and binding antibodies as correlates of risk for COVID-19 disease and as correlates of protection. These immune markers were measured at second vaccination and 4 weeks later, with values reported in standardized WHO International Units. All markers were inversely associated with COVID-19 risk and directly associated with vaccine efficacy.

 Efficacy and safety of the CVnCoV SARS-CoV-2 mRNA vaccine candidate in ten countries in Europe and Latin America (HERALD): a randomised, observer-blinded, placebo-controlled, phase 2b/3 trial. (https://pubmed.ncbi.nlm.nih.gov/34826381)

Kremsner Peter G et al. The Lancet. Infectious diseases 2021 11

Between Dec 11, 2020, and April 12, 2021, 39 680 participants were enrolled and randomly assigned to receive either CVnCoV (n=19 846) or placebo (n=19 834), of whom 19 783 received at least one dose of CVnCoV and 19 746 received at least one dose of placebo. After a mean observation period of 48.2 days (SE 0.2), 83 cases of COVID-19 occurred in the CVnCoV group (n=12 851) in 1735.29 person-years and 145 cases occurred in the placebo group (n=12 211) in 1569.87 person-years, resulting in an overall vaccine efficacy against symptomatic COVID-19 of 48.2% (95.826% CI 31.0-61.4; p=0.016). Vaccine efficacy against moderate-to-severe COVID-19 was 70.7%.

 Comparative Effectiveness of BNT162b2 and mRNA-1273 Vaccines in U.S. Veterans (https://www.nejm.org/doi/full/10.1056/NEJMoa2115463?query=featured_home)
BA Dickerman et al, NEJM, December 1, 2021

Each vaccine group included 219,842 persons. Over 24 weeks of follow-up in a period marked by alpha-variant predominance, the estimated risk of documented infection was 5.75 events per 1000 persons (95% confidence interval [CI], 5.39 to 6.23) in the BNT162b2 group and 4.52 events per 1000 persons (95% CI, 4.17 to 4.84) in the mRNA-1273 group. The excess number of events per 1000 persons for BNT162b2 as compared with mRNA-1273 was 1.23 (95% CI, 0.72 to 1.81) for documented infection, 0.44 (95% CI, 0.25 to 0.70) for symptomatic Covid-19, 0.55 (95% CI, 0.36 to 0.83) for hospitalization for Covid-19, 0.10 (95% CI, 0.00 to 0.26).

 Covid-19 Vaccine Effectiveness in New York State (https://www.nejm.org/doi/full/10.1056/NEJMoa2116063?query=featured_home)
ES Rosenberg et al, NEJM, December 1,2021 There were 150,865 cases of Covid-19 and 14,477 hospitalizations with Covid-19. During the week of May 1, 2021, when the delta variant made up 1.8% of the circulating variants, the median vaccine effectiveness against Covid-19 was 91.3% (range, 84.1 to 97.0) for BNT162b2, 96.9% (range, 93.7 to 98.0) for mRNA-1273, and 86.6% (range, 77.8 to 89.7) for Ad26.COV2.S. Subsequently, effectiveness declined contemporaneously in all cohorts, from a median of 93.4% (range, 77.8 to 98.0) during the week of May 1 to a nadir of 73.5% (range, 13.8 to 90.0) around July 10, when the prevalence of the delta variant was 85.3%.

 Myocarditis after Covid-19 Vaccination in a Large Health Care Organization (https://www.nejm.org/doi/full/10.1056/NEJMoa2110737?query=featured_home)
G Witberg et al, NEJM, December 2, 2021

Among more than 2.5 million vaccinated HCO members who were 16 years of age or older, 54 cases met the criteria for myocarditis. The estimated incidence per 100,000 persons who had received at least one dose of vaccine was 2.13 cases (95% confidence interval [CI], 1.56 to 2.70). The highest incidence of myocarditis (10.69 cases per 100,000 persons; 95% CI, 6.93 to 14.46) was reported in male patients between the ages of 16 and 29 years.

 Viral Dynamics of SARS-CoV-2 Variants in Vaccinated and Unvaccinated Persons (https://www.nejm.org/doi/full/10.1056/NEJMc2102507)
SM Kissler et al, NEJM, December 1,2021

We compared SARS-CoV-2 viral dynamics among 36 participants who were infected with the B.1.1.7 (alpha) variant, 36 participants with the B.1.617.2 (delta) variant, and 41 participants with a variant that was not of current interest or concern, along with 37 vaccinated and 136 unvaccinated participants. We found no meaningful difference in the mean peak viral load (with a lower peak cycle threshold [Ct] indicating a higher viral load), proliferation duration, clearance duration, or duration of acute infection of either the alpha or the delta variant as compared with variants not of interest or concern.

Disclaimer: Articles listed in COVID-19 Genomics and Precision Public Health Weekly Update are selected by the CDC Office of Public Health Genomics to provide current awareness of the scientific literature and news. Inclusion in the update does not necessarily represent the views of the Centers for Disease Control and Prevention nor does it imply endorsement of the article's methods or findings. CDC and DHHS assume no responsibility for the factual accuracy of the items presented. The selection, omission, or content of items does not imply any endorsement or other position taken by CDC or DHHS. Opinion, findings and conclusions expressed by the original authors of items included in the Clips, or persons quoted therein, are strictly their own and are in no way meant to represent the opinion or views of CDC or DHHS. References to publications, news sources, and non-CDC Websites are provided solely for informational purposes and do not imply endorsement by CDC or DHHS.

Page last reviewed: Oct 1, 2021 Page last updated: Dec 03, 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)