Supplementary Appendix

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This appendix has been provided by the authors to give readers additional information about the work.

Supplementary Appendix to Manuscript Entitled

Heterologous SARS-CoV-2 Booster Vaccinations – Preliminary Report

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Mix and Match Study Group
(listed in PubMed and ordered by lead institutions and enrollment)

Baylor College of Medicine (BCM), Houston TX, Vaccine Training and Evaluation Unit (VTEU)
Robert L. Atmar, M.D., Hana El Sahly, M.D., Jennifer A. Whitaker, M.D., and Wendy A. Keitel, M.D.

University of Maryland, Institute of Human Virology and Center for Vaccine Development and Global Health, Baltimore, MD, VTEU
Kirsten E. Lyke, M.D., Meagan Deming, M.D., Ph.D., Jennifer S. Husson, M.D., M.P.H., Angie Price, D.N.P., M.S.N., C.R.N.P.

Kaiser Permanente Washington Health Research Institute, Seattle, Washington, VTEU
Lisa A. Jackson, MD, MPH

University of Rochester Medical Center, Rochester, NY, VTEU
Angela Branche, M.D., David Dobryzynski, M.D., Ann R. Falsey, M.D., Ian Shannon, MS, RN,

The Hope Clinic of Emory University (Hope), Atlanta, GA, VTEU
Srilatha Edupuganti, M.D., M.P.H., Paulina A. Rebolledo, M.D., M.Sc., Nadine Rouphael, M.D., M.Sc.

Emory Children's Center (ECC), Atlanta, GA, VTEU
Christina Rostad, M.D., Andres F. Camacho-Gonzalez, M.D., M.Sc., Satoshi Kamidani, M.D.

University of Pittsburgh School of Medicine, Pittsburgh, PA, subsidiary to Vanderbilt University VTEU, Nashville, TN
Judith Martin, M.D., Kumaravel Rajakumar, M.D., M.S., Gysella B. Muniz M.D., Sonika Bhatnagar, M.D., M.P.H.

University of Washington, Seattle, WA, VTEU
Christine Johnston, M.D., M.P.H., Tara M. Babu, M.D., M.SCI., Anna Wald, M.D., M.P.H.

University of Texas Medical Branch (UTMB), League City, TX, subsidiary to BCM VTEU
Richard E. Rupp, M.D., Megan Berman, M.D., Laura Porterfield, M.D., Amber Stanford, PA-C

New York University – Bellevue Vaccine Center, New York, NY, VTEU
Mark J. Mulligan, M.D., FIDSA, Angelica Cifuentes Kottkamp, M.D., Jennifer Lee Dong, M.D.

New York University- Long Island Vaccine Center, Mineola, NY, subsidiary to NYU VTEU
Martín Bäcker, MD, Steven E. Carsons, MD, Diana Badillo, MD,

Cincinnati Children's Hospital Medical Center (CCHMC), Cincinnati, OH, VTEU
Rebecca Brady, M.D., Robert W. Frenck, Jr., M.D., Susan Parker, R.N., Michelle Dickey, A.P.R.N.

Seattle Children's Research Institute, Seattle, WA
Rhea N. Coler, M.Sc., Ph.D., Sasha E. Larsen, Ph.D.

Infectious Diseases Clinical Research Consortium (IDCRC) Laboratory Operations Unit (LOU)
Christine M. Posavad, Ph.D., John Hural, Ph.D

IDCRC Leadership
Kathleen M. Neuzil, M.D., David Stephens, M.D.

IDCRC Statistical and Data Science Unit (SDSU):
Elizabeth R. Brown, Sc.D., Clara Dominguez Islas, Ph.D.

Statistical Center for HIV/AIDS Research and Prevention (SCHARP), Seattle, WA:
Jillian Zemanek, M.P.H., Daniel Szydlo, M.S., Rahul Paul Choudhury, MS,

Division of Microbiology and Infectious Diseases (DMID), National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH), Bethesda, MD.
Sonja Crandon, B.S.N., Marina Lee, Ph.D., Seema Nayak, M.D., Paul C Roberts, Ph.D., John Beigel, M.D.

FHI360, Durham, NC
Janet I. Archer M.Sc.

NIH Laboratory - **Vaccine Research Center, Vaccine Immunology Program (VRC-VIP)**
Adrian McDermott, Ph.D., Sarah O'Connell, M.S., Bob Lin

Duke University Laboratory – Durham, NC
David Montefiori, Ph.D., Amanda Eaton, Ph.D.

Emory University Laboratory (FRNT), Atlanta, GA
Mehul S. Suthar, Ph.D., Lilin Lai, MD

Fred Hutch Seattle, WA (ICS)
M. Juliana McElrath, MD, PhD, Kristen W. Cohen, PhD, Stephen De Rosa, MD

Mix and Match Study Team Members

Baylor College of Medicine (BCM), Houston TX, Vaccine Training and Evaluation Unit (VTEU)
Robert L. Atmar, M.D.; Hana El Sahly, M.D.; Jennifer A. Whitaker, M.D.; Wendy A. Keitel, M.D.; Mary Healy, M.D.; Christine Akamine, M.D.; Pedro A. Piedra, M.D.; Chanei Henry, A.A.S.; Brandie Phillips, R.N.: Chianti Wade-Bowers, B.S.N, M.S.N.; Connie Rangel, R.N.; Logan Lee; Julia Guardado; Angelica Diaz, F.N.P.; Lisreina Toro; Tina Sierra; Janet Brown, J.D., R.Ph. : Cathy Faw, R.Ph.; Yvette Rugeley; Yolanda Rayford; Kayla Burrell; Jesus Banay; Tykel Eddy; Marinna Matta; Kathy Bosworth, B.A.

University of Maryland, Institute of Human Virology and Center for Vaccine Development and Global Health, Baltimore, MD, VTEU
Kirsten E. Lyke, M.D., Meagan E. Deming, M.D., Ph.D., Jennifer S. Husson, M.D., M.P.H., Angie Price, D.N.P., M.S.N., C.R.N.P., Joel Chua, M.D., Karen Kotloff, M.D., Myounghee Lee, Pharm.D., Ph.D., Lisa Anderson, R.N., B.S., Amy Nelson, R.N., M.S., Salma Sharaf, Young Chae Jessica Yoo, Lisa Langer, Pharm.D., Brenda Dorsey, R.N., B.S., M.S., CCRP., Alyson Kwon, M.S., CCRC, ACRP-PM., Sophie Harper, M.Sci., Paula Bernal, M.Sci, Ph.D., Eric Goldstein, Jeffrey Floyd, Regina Harley, M.S., Marcelo Sztein, M.D., Ming Bell, M.D., Leslie Howe, Erika Stiles, Andrew Chi, Pharm.D., Phuong Tran Nguyen, Pharm.D., Yogitha Pazhani, Pharm.D., Christine Aggabao, Pharm.D., Jeannie Murray.

Kaiser Permanente Washington Health Research Institute, Seattle, WA, VTEU
Lisa A. Jackson, MD, MPH, Lee Barr, R.N., Jesse Berg, B.S., Cassandra Bryant, B.S., Roger Calvert, PA-C, Barbara Carste, M.P.H., Joe Choe, B.S., Maya Dunstan, M.S., R.N., Jana ffitch, L.P.N., Colin Fields, M.D., Lynn Gross, PA-C, Erika Kiniry, M.P.H., Bonnie Lam, PharmD, De Vona Lang, Rebecca Lau, PharmD, Stella Lee, B.A., Paula Lins, PA-C, Amy Mohelnitzky, PA-C, Marilyn Nguyen, B.S., Matthew Nguyen, M.P.H., Hallie Phillips, M.Ed. Stephanie Pimienta, B.S., Melissa Resendiz Rivas, B.A., Melissa Boothe Scheer, PA-C, Janice Suyehira, M.D

Seattle Children's Research Institute, Seattle, WA subsidiary to Kaiser Permanente VTEU
Rhea N. Coler, M.Sc., Ph.D., Sasha E. Larsen, Ph.D., Evan Cross, B.Sc., Tiffany Pecor, B.S., Thomas Smytheman, B.Sc., Emma Johnson, B.S., Valerie A. Reese, M.S., Susan L. Baldwin, Ph.D., Brittany Williams, B.Sc., Suhavi Kaur, B.Sc., Zhiyi Zhu, Ph.D.

University of Rochester Medical Center, Rochester, NY, VTEU
Angela R. Branche, MD, David Dobryzynski, MD, Ann R. Falsey, MD, Ian Shannon, MS, RN, Patrick Kingsley, Arthur Zemanek, RN, Sophia Wiltse, Erin Nowicki, Sharon Moorehead, Kari Steinmetz, CCRC, Doreen Francis, RN, CCRC, Cynthia MacDonald, RN, Jeanne Holden-Wiltse, MPH, MBA, Christopher Lane, Elizabeth Fladt, Kyle Richards, PharmD, Stephen Bean, PharmD, Nicole Dornbush, PharmD, Carol Cole, PharmD

The Hope Clinic of Emory University (Hope), Atlanta, GA, VTEU
Srilatha Edupuganti, M.D., M.P.H., Paulina A. Rebolledo, M.D., M.Sc., Nadine Rouphael, M.D., M.Sc., Alexis Ahonen, M.S.N., Alicarmen Alvarez, R.N., Amy Anderson, R.N., Mary Atha, M.S.N., Sarah Bechnak, R.N., Mary Bower, R.N., Ellie Butler, Laura Clegg, R.N., Carla N. Cooke, P.A., Sharon Curate-Ingram, R.N., Renata Lynn Dennis, M.P.H., R.N., Francine Dyer, R.N., Srilatha Edupuganti, M.D., M.P.H., Tigisty Girmary, R.N., Rebecca

Gonzalez, Pharm.D., Daniel Graciaa, M.D., Natalie Gray, Cassie Grimsley-Ackerley, M.D., M.Sc., Lauren Hewitt, L.P.N., Christopher Huerta, Brandi Johnson, Colleen Kelley, M.D., M.P.H., Athena Koumanelis, Deborah Laryea, R.N., Cecilia Losada, Hollie Macenczak, R.N., Michelle Piane McCullough, Eileen Osinski, Bernadine Panganiban, Varun Phadke, M.D., Paulina A. Rebolledo, M.D., M.Sc., Nadine Rouphael, M.D., M.Sc., Erin Scherer, Ph.D., Jessica Traenkner, P.A., Kristen Unterberger, P.A., Jacob Usher, Michelle Wiles, R.N., T. Jean Winter, Jianguo Xu, R.Ph., Ph.D., Yongxian Xu

Emory Children's Center (ECC), Atlanta, GA, VTEU

Christina Rostad, M.D., Andres F. Camacho-Gonzalez, M.D., M.Sc., Satoshi Kamidani, M.D., Evan J. Anderson, M.D., Amari Barrett, Julia Bartol, Leisa Bower, R.N., Jessica Bowman, R.N., Andres F. Camacho-Gonzalez, M.D., M.Sc., Victoria Curry, R.N., Theda Gibson, M.S., Felicia Glover, Hui-Mien Hsiao, M.S., Amberly Hunter, Laila Hussaini, M.P.H., Inara Jooma, Satoshi Kamidani, M.D., Peggy Kettle, R.N., Marcia Lewis, R.N., Wensheng Li, Cindy Lubbers, R.N., Lisa Macoy, R.N., M.S.N., Molly Morrison, Amy Muchinsky, Heather Nurse, R.N., Etza Peters, R.N., Susan Rogers, R.Ph., Christina A. Rostad, M.D., Amber Samuel, Maya Stagg, Kathy Stephens, R.N., M.S.N., Kathryn Zaks, M.S.

University of Pittsburgh School of Medicine, Pittsburgh, PA, subsidiary to Vanderbilt University VTEU, Nashville, TN

Judith M. Martin, M.D., Kumaravel Rajakumar, M.D., M.S., Gysella B. Muniz M.D., Sonika Bhatnagar, M.D., M.P.H., Alejandro Hoberman, MD, Timothy Shope MD, MPH, Nader Shaikh, MD, MPH, Spenser Kinsey BSN RN, Jennifer Opal RN, Melissa Andrasko RN, Shannon Mance MPH BSN RN, Lisa Vavro BSN RN, Lalicia Roman AS BS MS, Kimberly McMurtry PharmD, Emily Dougherty MPH, Kevin Lynch BS, Sabrina Catalano BS, Jamie Fries RN, MaryAnn Sieber RN, Lucas Schratz MS, John F. Alcorn, Ph.D., Bo Zhai PhD

University of Washington, Seattle, WA, VTEU

Christine Johnston, M.D., M.P.H., Tara M. Babu, M.D., M.SCI., Anna Wald, M.D., M.P.H., Morissa Pertik, PA-C, T. Nui Pholsena, ARNP, Jina Taub, ARNP, Dana Varon, ARNP; Meredith Potochnic, PharmD; Matthew Dustrude, Kerry Laing, PhD, David M. Koelle, MD; Alyssa Braun, Anya Mathur, Dolly Singh, Jessica Heimonen, Jessica Moreno, Linsey McClellan, Maddie Humphreys, Ray Larsen, Taylor Krause, Mary Kirk, MPH, Matthew Seymour, MPH, Kirsten Hauge, MPH, Lawrence Hemingway, Christopher McClurkan, Max Krist, Victoria Campbell

University of Texas Medical Branch (UTMB), League City, TX, subsidiary to BCM VTEU

Richard E. Rupp, M.D., Megan Berman, M.D., Laura Porterfield, M.D., Amber Stanford, PA-C, Kristin Pollock, RN, Robert Cox, RN, Hala Ghoson, PharmD, Claire Marsh, BSN, RN, Amy McMahan, LVN, Esther Cox, Diane Barrett, MS;

NYU VETU, New York, NY

New York University – Langone Vaccine Center, Manhattan, New York, NY, VTEU

Mark J. Mulligan, MD, Mary Olson, NP, Marie Samanovic, PhD, Amber Cornelius, MS, Abdonnie Holder, James Wilson, Meron Tasissa, Hibah Khan, Sajjad Hussein, Doaa Ayoubi, Pharm.D., Ph.D., Mahnoor Ali

NYU Langone Vaccine Center Research Clinic at Bellevue Hospital, New York, NY - subsidiary to NYU VTEU:
Angelica Kottkamp, MD, Jennifer Dong, MD, Damian Inlall, Ellie Carmody, MD, Rebecca Boas, MD, Jennifer Knishinsky, MD, Reza Parungao, MD, Adam Schwartz, MD, Melinda Katz, MD, Natella Aronova, NP, Rita Mennuti, NP, Athina Agbayani, RN, Zeeshan Iqbal, Julia Wagner, Venissala Wongchai, Tiffany Salcito, Leeja Abraham, Denise Dong, Lance Goodman, Nadia Tadros, Danhong Jiang, Anna Jacobs, Pharm.D., Alina Neganova, RN

New York University- Long Island Vaccine Center, Mineola, NY, subsidiary to NYU VTEU
Martín Bäcker, M.D., Steven E. Carsons, M.D., Kimberly Byrnes, R.N.CCRC, Diana Badillo, M.D., Asif Noor, M.D., Sigridh Muñoz-Gómez, M.D., Claudia De La Matta Rodriguez, M.D., Urmee Saha, M.D., Sajumon Joseph, F.N.P., Reny Jose, F.N.P, Catherine Tsiakaros, R.N., Sarah J. Pastolero, R.N., Anita Farhi, R.N., Maung Aung, Alicia Vasile, B.S., R.Ph., April Correll, R.Ph., Louis Ragolia, Ph.D., Christopher Hall, Thomas Palaia, Fiona T. Fitzgerald, Madalyn Saporito, Lavern Harvey.

Cincinnati Children's Hospital Medical Center (CCHMC), Cincinnati, OH, VTEU
Rebecca C. Brady, M.D.; Robert W. Frenck, M.D.; Paul W. Spearman, M.D.; Grant C. Paulsen, M.D.; Eleanor Widdice, M.D.; Felicia A. Scaggs Huang, M.D.; Michelle Dickey, A.P.R.N.; Kristen Buschle, A.P.R.N.; Susan Parker, R.N.; Stacy Ranz, L.P.N.; Tammy Lewis-McCauley, L.P.N.; Margery Huron, R.N.; Sally McCartney, R.N.; Jamie Kidd, R.N.; Jennifer Whitaker, R.N.; Kristie Price, Pharm.D.; Sarah Boland, R.Ph.; Jesse LePage, B.S.; Monica Malone McNeal, M.S.; Laura Pace, B.A.; Theresa Baker, M.S.; Robert Zoellner, B.S.; Mary Pat McKee, M.S.; Nicole Vollman, B.A., Jesse LePage, Kristie Price

FHI360, Durham, NC
Janet I. Archer M.Sc., Kuleni Abebe M.Sc. Heather Dickerson B.A., Sandra B. Brindis B.A., Linda McNeil MA PMP, Mary Briggs, Katlyn Hurst B.Sc.

IDCRC Leadership and Administrative Team
Kathleen M. Neuzil, M.D., David Stephens, M.D., Monica M. Farley M.D., Jeanne Marrazzo, M.D., Robert L. Atmar M.D., Jeffery Lennox, M.D., Sidnee Paschal Young, MALS; Barbara E. Walsh, Kayla Smith, MPH; and Bridget A. Wynn

IDCRC Statistical and Data Science Unit (SDSU), Vaccine and Infectious Disease Division, Fred Hutchinson Cancer Research Center, Seattle, WA:
Elizabeth R. Brown, Sc.D., Clara Dominguez Islas, Ph.D.

Statistical Center for HIV/AIDS Research and Prevention (SCHARP), Fred Hutchinson Cancer Research Center, Seattle, WA:
Jillian Zemanek, M.P.H., Daniel Szydlo, M.S., Rahul Paul Choudhury, M.S., Brian Ingersoll, Wen-Min (Wendy) Hou, M.P.H., B.S.N, C.C.R.P., Kelly Maddox, Chloe Waters, Lauren Young, M.P.H., Karan A. Shah, M.S., Anisa C. Gravelle, M.S., Craig N Chin, Drew Edwards, Rudie Desravines, M.S., Mark Trumbull, M.S., Srikanth Nooney, Udhab Adhikari, Josh Larkin, Jackie Benson, Christine Thompson, Jean-Paul Pease.

IDCRC Laboratory Operations Unit (LOU): Christine M. Posavad, PhD; John Hural, PhD; Michael Stirewalt; Megan Meagher

Division of Microbiology and Infectious Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, MD.
Marina Lee, Ph.D., Mohamed Elsafy, M.D., Rhonda Pikaart-Tautges, B.S. Janice Arega, M.S., Binh Hoang, R. Ph., Dan Curtin, Olivia Sparer, B.A., Ranjodh Gill M.P.H, Hyung Koo, B.S.N., Elisa Sindall, B.S.N., Sonja Crandon, B.S.N., Seema Nayak, M.D., Paul C Roberts, Ph.D., John Beigel, M.D.

Thermo Fisher Scientific, Germantown, MD.
Jim Dunn

NIH Laboratory - **Vaccine Research Center, Vaccine Immunology Program (VRC-VIP)**
Adrian McDermott, Ph.D., Sarah O'Connell, MS., Bob Lin, Sandeep Narpala, Obrimpong Amoa- Awua, Supra Gajjala, Robin Carroll, Mike Castro, Christopher Moore, Mursal Naisan, Muhammed Naqvi, Jennifer Wang

Duke University Laboratory – Durham, NC
David Montefiori, Ph.D., Amanda Eaton, Ph.D.

Emory University Laboratory (FRNT), Atlanta, GA
Mehul S. Suthar, Ph.D., Lilin Lai, M.D.

Fred Hutch, Seattle, WA (ICS)
M. Juliana McElrath, MD, PhD, Kristen W. Cohen, PhD, Stephen De Rosa, MD, Carol Marty, Todd Haight

Supplemental Methods

Binding Assay Method Description

10-plex ECLIA

Testing for serum IgG binding to variants of concern was performed using a fit-for-purpose 10-plex MSD method.[1] Multiplexed Plates (96 well) precoated with up to ten antigens per panel are supplied by the manufacturer. On the day of the assay, the plate is blocked for 60 minutes with MSD Blocker A (5% BSA). The blocking solution is washed off and test samples are applied to the wells at 4 dilution (1:100, 1:500, 1:2500 and 1:10,000) unless otherwise specified and allowed to incubate with shaking for two hours. Plates are washed and Sulfo-tag labeled anti IgG antibody is applied to the wells and allowed to associate with complexed coated antigen – sample antibody within the assay wells. Plates are washed to remove unbound detection antibody. A read solution containing ECL substrate is applied to the wells, and the plate is entered into the MSD Sector instrument. A current is applied to the plate and areas of well surface where sample antibody has complexed with coated antigen and labeled reporter will emit light in the presence of the ECL substrate. The MSD Sector instrument quantitates the amount of light emitted and reports this ECL unit response as a result for each sample and standard of the plate. Magnitude of ECL response is directly proportional to the extent of binding antibody in the test article. All calculations are performed within Excel and the GraphPad Prism software, version 7.0. Readouts are provided as Area Under Curve (AUC).

4-plex ECLIA V.2

Testing was performed using the automated 4 plex MSD method. Quantification of IgG concentrations in serum/plasma were performed with a Beckman Biomek based automation platform. This variant 4plex is in the final stages of validation of the S-2P-B.1.351 and confirmation of validation of the S-2P-WA-1, all performed in alignment with the previously validated SARS-CoV-2 3plex as well as the FDA provided guidance on variant validation.

Briefly, MSD SECTOR® plates are precoated by MSD with Wa-1 SARS-CoV-2 spike (S-2P), B.1.351 receptor binding domain (RBD) protein, Nucleocapsid (N) protein and B.1.351 spike protein in each well in a specific spot-designation for each antigen. The assay will be performed with a Beckman Coulter Biomek based automation integration platform including the Biotek 405TS Plate Washer. Serum samples will be heat-inactivated for 30 minutes at 56oC prior to assay. Plates are blocked for 60 minutes at room temperature (RT) with MSD blocker A solution without shaking. Plates are washed and MSD reference standard (calibrator), QC test sample (pool of COVID-19 convalescent sera) and human serum test samples are added to the precoated wells in duplicates in an 8-point dilution series. Reference standard is added in triplicates. MSD Control sera (low, medium and high) are added undiluted in triplicates as per validated assay format. Additional assay controls might be added in triplicates. Samples are incubated at RT for 4 hours with shaking on a Titramax Plate shaker (Heidolph) at 1500 rpm. SARS-CoV-2 specific antibodies present in the sera or controls bind to the coated antigens. Plates are washed to remove unbound antibodies. Antibodies bound to the SARS-CoV-2 viral proteins are detected using an MSD

SULFO-TAGTM anti-human IgG detection antibody incubated for 60 minutes at RT and with shaking. Plates are washed and a read solution (MSD GOLDTM read buffer) containing electrochemiluminescence (ECL) substrate is applied to the wells, and the plate is entered into the MSD MESO Sector S 600 detection system. An electric current is applied to the plates and areas of well surface which form antigen-anti human IgG antibody SULFO-TAGTM complex will emit light in the presence of the ECL substrate.

The MSD MESO Sector S 600 detection system quantitates the amount of light emitted and reports the ECL unit response as a result for each test sample, control sample and reference standard of each plate. Analysis is performed with the MSD Discovery Workbench software, Version 4.0. Calculated ECLIA parameters to measure binding antibody activities will include interpolated concentrations or assigned arbitrary units (AU/mL) read from the standard curve. A 4-pl curve was used for the analysis. Data analysis was performed using Microsoft Excel and GraphPad Prism Version 8.0. The WA-1 S2P AU/mL readouts were previously bridged to the WHO International Standard on the validated version 1 4plex.[1] The established conversion factor is applied to the WA-1 S2P data set and data presented as BAU/mL for ease of cross study comparison.

High values of binding Antibody to the SARS-CoV-2 N-protein by 4-plex were classified as potentially indicative of prior infection if they were above 19389.75 AU/mL. The cutoff point was obtained using a reference sample of 89 subjects with reportable binding levels from 100 tested sera samples collected prior to 2009 in healthy individuals, and it was defined as 1.5 times the inter-quartile above the 3rd quartile of the antibody concentrations on the log-scale.

Reporting:

For concentrations that are below the Lower Limit of Detection (LLOQ), numeric values equivalent to LLOQ/2 are assigned before and for all descriptive reporting. For concentrations greater than the Upper Limit of Detection (ULOQ), actual values are reported. If actual values above the ULOQ are not provided, observations are replaced with a value equivalent to the ULOQ. Bridging to the WHO standard Binding Antibody Units per milliliter (BAU/mL) was done using a conversion factor of 0.0090, specific to the IgG SARS-CoV-2 Spike antigen.

Pseudovirus Neutralization Immunogenicity Method Description

The Duke NAb Laboratory for HIV and COVID-19 Vaccine Research and Development (Duke NAb Lab; PI: Dr. David Montefiori) assessed the magnitude and cross-variant SARS-CoV-2 neutralizing antibody responses in the DMID Protocol #21-0012 by using a fully validated assay in an environment that operates in compliance with Good Clinical Laboratory Practices (GCLP). The endpoint reported here is the SARS-CoV-2-specific neutralizing activity of antibodies in serum. Neutralizing antibodies were assessed with Spike-pseudotyped viruses in 293T/ACE2 cells as a function of reductions in luciferase (Luc) reporter activity.[2] Assays were performed on all samples with Spike-pseudotyped virus SARS-CoV-2 D614G. A subset of samples were assayed with Spike-pseudotyped virus SARS-CoV-2 B.1.617.2 AY.3 (Delta lineage variant) and with Spike-pseudotyped virus SARS-CoV-2 B.1.351 (Beta variant). These viruses were prepared by Dr. Montefiori's laboratory using a lentivirus for pseudotyping and a luciferase reporter gene for quantitative measurements of virus neutralization. Results are reported as Inhibitory Dilution 50 (ID50) and Inhibitory Dilution 80 (ID80) neutralization titers. These values represent the serum dilution that reduces relative luminescence units (RLU) by either 50% or 80% relative to the RLU in the virus control wells after subtraction of background RLU. This study was completed under the oversight of the Quality Assurance Unit for Duke Vaccine Immunogenicity Programs (QADVIP).

Neutralization of SARS-CoV-2 Spike-pseudotyped viruses was assessed in 293T/ACE2 cells as described in SOP "CFAR02-A0026 Measuring Neutralizing Antibodies Against SARS-CoV-2 Using Pseudotyped Virus and 293T/ACE2 Cells." This assay has been formally validated. Assay validation was performed with human serum samples and monoclonal antibodies using the D614G form of the Wuhan-1 Spike. This assay is in the process of being validated for B.1.351 but has not been validated using B.1.617.2, although the FDA recently allowed assay use for B.1.617.2. The assay is performed in 96-well flat-bottom clear standard non-coated or Poly-L-Lysine treated culture plates for high throughput capacity. Relative luminescence units are measured in 96-well flat bottom black/white plates for enhanced luminescence with minimal bleed-over. Use of a clonal cell line provided enhanced precision and uniformity.

SARS-CoV-2 Spike-pseudotyped viruses are prepared and titrated for infectivity by using mutated forms of an expression plasmid encoding codon-optimized full-length Spike of the Wuhan-1 strain (VRC7480) provided by Drs. Barney Graham and Kizzmekia Corbett at the Vaccine Research Center, National Institutes of Health (USA). Mutations were introduced into VRC7480 by site-directed mutagenesis using the QuikChange Lightning Site-Directed Mutagenesis Kit from Agilent Technologies. All mutations were confirmed by full-length Spike gene sequencing. The variants used here are:

Variant	**Spike mutations**
D614G	D614G
B.1.617.2 (Delta)	T19R, G142D, Δ156-157, R158G, L452R, T478K, D614G, P681R, D950N
B.1.351 (Beta)	L18F, D80A, D215G, ΔL242-244, K417N, E484K, N501Y, D614G and A701V

Pseudovirions are produced in HEK 293T/17 cells by transfection using Fugene 6 Transfection Reagent and a combination of Spike plasmid, lentiviral backbone plasmid (pCMV ΔR8.2) and firefly Luc reporter gene plasmid (pHR' CMV Luc) in a 1:17:17 ratio in Opti-MEM (Life Technologies). Transfection mixtures are added to pre-seeded HEK 293T/17 cells in T-75 flasks containing 12 ml of growth medium or T-225 flask containing 36 ml of growth medium and incubated for 16-20 hours at 37°C. Medium is removed and 15 ml (T-75 flask) or 45 ml (T-225 flask) of fresh growth medium added. Pseudovirus-containing culture medium is collected after an additional 2 days of incubation, clarified of cells by 0.45 µm micron filtration, and stored in aliquots at -80°C. Pseudovirions are titrated for infectious dose (TCID50) by making serial 3-fold or 5-fold dilutions in quadruplicate for a total of 11 dilutions in 96-well flat-bottom clear standard non-coated or poly-L-lysine-coated culture plates. An additional 4 wells serve as background controls; these wells received cells but no virus. Freshly suspended 293T/ACE2.MF cells are added (10,000 cells/well) and incubated for 66-72 hours. Medium is removed by gentle aspiration and 30 µl of Promega 1X lysis buffer added to all wells. After a 10-minute incubation at room temperature, 100-110 µl of Bright-Glo luciferase reagent is added to all wells, mixed, and 105 µl of the mixture added to a black/white plate (Perkin-Elmer). Luminescence is measured using a GloMax Navigator luminometer (Promega). TCID50 is calculated using the method of Reed and Muench.

Neutralization is measured by using lentiviral particles pseudotyped with SARS-CoV-2 Spike and containing a firefly luciferase (Luc) reporter gene for quantitative measurements of infection by relative luminescence units (RLU). A pre-titrated dose of virus is incubated with 8 serial 5-fold dilutions of serum samples in duplicate in a total volume of 150 µl for 1 hr at 37^{o}C in 96-well flat-bottom clear standard non-coated or poly-L-lysine-coated culture plates. Cells are detached using TrypLE Select Enzyme solution, suspended in growth medium (100,000 cells/ml) and immediately added to all wells (10,000 cells in 100 µL of growth medium per well). One set of 8 wells receives cells + virus (virus control) and another set of 8 wells receives cells only (background control). After 71-73 hrs of incubation, medium is removed by gentle aspiration and 30 µl of Promega 1X lysis buffer is added to all wells. After a 10 minute incubation at room temperature, 100 µl of Bright-Glo luciferase reagent is added to all wells. After 1-2 minutes, 110 µl of the cell lysate is transferred to a black/white plate. Luminescence is measured using a GloMax Navigator luminometer (Promega). Neutralization titers are the serum dilution at which RLUs are reduced by either 50% (ID50) or 80% (ID80) compared to virus control wells after subtraction of background RLUs. In some cases, ID50 and ID80 titers were calibrated to the WHO International Standards as described[3] and expressed as IU50/mL and IU80/mL. Serum samples are heat-inactivated for 30 minutes at 56^{o}C prior to assay.

For assay internal quality controls (IQC), a qualified positive control is tested on each assay plate. The positive control used for assays with D614G is DH1043NHS, which consists of a potent RBD-specific neutralizing monoclonal antibody (mAb), DH1043, diluted in heat inactivated normal human serum (NHS) at 40 µg/ml. The positive control used for assays with B.1.617.2 and B.1.351 is DH1047NHS, which consists of a potent RBD-specific neutralizing mAb, DH1047, diluted in heat inactivated NHS at 100

µg/ml. Both mAbs were produced in the Duke Protein Production Facility with permission for use obtained from Dr. Barton Haynes, Duke Human Vaccine Institute, Duke University Medical Center. DH1043NHS and DH1047NHS aliquots are stored at -80°C until use. Thawed aliquots are stored at 4°C for up to 3 months. Assay run controls consist of COVID-19 convalescent serum samples or SARS-CoV-2 vaccine recipients with high, medium and low ID50 and ID80 titers against the test virus, plus a normal human serum negative control. In addition, internal quality control samples (IQC-High, IQC-Medium, and IQC-Low) from the IQC Program for SARS-CoV-2 Antibody Assay Monitoring (SAAM) program operated by the External Quality Assurance Program Oversight Laboratory (EQAPOL) were included in each experiment. These values were submitted to EQAPOL and statistical summary reports of trendlines were provided using Nelson rules. Levey-Jennings plots were generated quarterly and checked for violations of standards that are based on the Westgard Rules. Violations of the Westgard Rules were investigated.

Specific to Pseudovirus D614G, the assay's lower limit of detection (LLOD), lower limit of quantification (LLOQ) and upper limit of quantification (ULOQ) are as follows:

ID50	ID80
LLOD = 10	LLOD = 10
LLOQ = 18.5	LLOQ = 14.3
ULOQ = 45118	ULOQ = 10232

Values below the Lower Limit of Detection (LLOD) are assigned a value equivalent to LLOD/2 = 10/2 = 5. Levels that are reported as above the LLOD but below the Lower Limit of Quantification (LLOQ) are kept as reported. Values that are greater than the upper limit of quantification (ULOQ) are when actual values are provided. If actual values above the ULOQ are not provided, observations are replaced with a value equivalent to the ULOQ.

Selected summaries of neutralizing titers calibrated to the WHO standard International Units (IU50/mL and IU80/mL), are presented. Conversion was done using calibration factors specifically for the SARS-CoV-2 D614G Pseudovirus: a factor of 0.242 for ID50 and a factor of 1.502 for ID80.[3]

T Cell Intracellular Cytokine Staining Assay Method Description

A validated intracellular cytokine staining (ICS) assay was used to examine SARS-CoV-2-specific CD4+ and CD8+ T-cell responses using a 27-color flow cytometry panel.[4,5]

Previously cryopreserved specimens were stimulated with two pools of peptides (15 amino acids overlapping by 11 amino acids) which cover the spike S1 and S2 sequences of the original SARS-CoV-2 Wuhan (WA-1) strain along with 4 additional peptides which cover the D614G mutation. The peptides were synthesized by Biosynthesis and provided as individual lyophilized aliquots and reconstituted at 100mg/ml in DMSO before pooling. Pools were diluted with water to a 100mcg/ml per peptide stock concentration and stored at -70 degrees. As a negative control, cells were incubated with DMSO, the diluent for the peptide pools. As a positive control, cells were stimulated with a polyclonal stimulant, staphylococcal enterotoxin B (SEB). There were no replicates except for the negative control, which had two replicates.

The ICS assay was planned to be conducted only for a subsample of 20 per treatment arm randomly selected from the cohort, stratifying by treatment and age strata. From the total of samples assayed, some observations were further excluded due to results not being reliable. Data reported herein includes participants with available samples and excludes those samples for which no valid result was obtained. Several criteria were used to determine if data from an assay were acceptable and could be statistically analyzed. The blood draw date must have been within the allowable visit window as determined by the protocol. After sample thawing and overnight incubation, the viability of the PBMC must have been 66% or greater for testing to have proceeded. If it was not, a new specimen for that participant at that timepoint was thawed for testing. If the PBMC viability of the second thawed aliquot was below this threshold, the ICS assay was not performed and no data were reported to the statistical center for the participant and timepoint. The total numbers of CD4+ and CD8+ T cells must also have exceeded certain thresholds. If the number of CD8+ T cells was < 5,000 or CD4+ T cells was < 10,000 for any of the SARS-CoV-2-peptide pools or for one of the negative control replicates for a particular sample, data for that stimulation were filtered. If both negative control replicates failed for number of T cells, the sample was retested. If one negative control replicate failed for number of T cells, the negative control replicate with sufficient cells was used.

To assess positivity for a peptide pool within a T-cell subset, a two-by-two contingency table was constructed comparing the SARS-CoV-2-peptide stimulated and negative control data. The four entries in each table were the number of cells positive for IFN- γ and/or IL-2 and the number of cells negative for IFN-γ and IL-2, for both the stimulated and the negative control data. If both negative control replicates were included, then the average number of total cells and the average number of positive cells were used. A one-sided Fisher's exact test was applied to the table, testing whether the number of cytokine-producing cells for the stimulated data was equal to that for the negative control data. Since multiple individual tests (for each peptide pool) were conducted simultaneously, a multiplicity adjustment was made to the individual peptide pool p-values using the Bonferroni-Holm adjustment method. If the adjusted p-value for a peptide pool was ≤0.00001, the response to the peptide pool for the T-cell subset was considered positive. Because the sample sizes (i.e., total cell counts for the T-cell subset) were large, e.g., as high as 100,000 cells, the Fisher's exact test has high power to reject the null hypothesis for very small differences. Therefore, the adjusted p-value significance threshold was chosen stringently (≤ 0.00001).

Random Effects Model - Analysis of Serologic Endpoints at the Site Level

Results from an alternative analysis for the main serological endpoints that incorporates random effects (RE) at the site level are depicted below. The Random Effects Table for IgG Binding and Neutralizing Antibody Responses (below) depicts the increase in IgG Binding Antibody levels (BAU/mL) to the S-2P-WA1 antigen and Pseudovirus Neutralizing Antibody titers (IU50/mL) to the D614G Pseudovirus, for participants in Groups 1E-9E, from baseline to Day 15, from the raw estimates (presented in Table 2 of the manuscript) and from the RE analysis. Additionally, the results from the RE analysis suggest relatively little variability between sites, and most of the total variability resulting from participant-to-participant variability.

Random Effects Alternative Model Table- SARS-CoV-2 IgG Binding and Neutralizing Antibody Responses

Group	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Primary EUA Immunization Vaccine	**Janssen Ad26.COV2-S 5x1010 vp**	**Moderna mRNA-1273 100-mcg**	**Pfizer/BioNTech BNT162b2 30-mcg**	**Janssen Ad26.COV2-S 5x1010 vp**	**Moderna mRNA-1273 100-mcg**	**Pfizer/BioNTech BNT162b2 30-mcg**	**Janssen Ad26.COV2-S 5x1010 vp**	**Moderna mRNA-1273 100-mcg**	**Pfizer/BioNTech BNT162b2 30-mcg**
Booster	**Moderna mRNA-1273 100-mcg**			**Janssen Ad26.COV2-S 5x10^{10} vp**			**Pfizer/BioNTech BNT162b2 30-mcg**		
IgG Serum Binding Antibody Titers (Binding Antibody Units/mL) to Wildtype (S-2P-WA-1)									
Day 15 geometric mean fold rise (95% CI), raw estimates	55.0 (40.1-75.4)	7.9 (6.2-10.1)	17.3 (13.3-22.4)	4.6 (3.7-5.7)	4.7 (3.6-6.2)	6.2 (4.7-8.1)	34.1 (25.8-45.1)	9.8 (8.1-11.9)	14.9 (11.8-18.7)
Day 15 geometric mean fold rise (95% CI), RE model	55.0 (40.1, 75.4)	7.9 (5.7, 10.9)	17.3 (12.5, 23.9)	4.6 (3.3, 6.3)	4.7 (3.4, 6.6)	5.9 (4.3, 8.2)	34.2 (24.9, 47.0)	9.8 (7.1, 13.6)	15.0 (10.8, 20.8)
Pseudovirus Neutralizing Antibody Titers (International Unit 50% (IU_{50}/mL) to D614G									
Day 15 geometric mean fold rise (95% CI), raw estimates	72.8 (52.5, 101.0)	9.9 (7.9, 12.6)	31.7 (23.8, 42.2)	4.2 (3.0-5.8)	6.2 (4.5-8.5)	12.5 (8.7-17.9)	36.4 (25.0-52.9)	12.0 (9.4-15.4)	20.0 (14.6-27.4)
Day 15 geometric mean fold rise (95% CI), RE model	72.8 (49.2, 107.8)	9.9 (6.7, 14.8)	31.7 (21.2-47.5)	4.2 (2.8, 6.2)	6.2 (4.1, 9.3)	11.7 (7.81, 17.5)	36.8 (24.8, 54.5)	12.0 (8.1, 18.0)	20.5 (13.6, 30.7)

Supplemental Table 1. Characteristics of mRNA-1273 boosted participants, by age and enrollment group.

	Janssen 18-55 (N=21)	Janssen 56+ (N=32)	Moderna 18-55 (N=26)	Moderna 56+ (N=25)	Pfizer 18-55 (N=25)	Pfizer 56+ (N=25)	Total (N=154)
Age (Years)							
N	21	32	26	25	25	25	154
Mean (SD)	42.7 (10.7)	66.1 (7.3)	39.2 (9.0)	67.6 (5.7)	39.6 (9.8)	70.1 (6.2)	54.9 (16.0)
Median	46.0	65.5	38.5	69.0	40.0	69.0	57.5
25th, 75th %tile	35.0 , 52.0	61.0 , 71.0	32.0 , 45.0	63.0 , 72.0	31.0 , 49.0	66.0 , 73.0	42.0 , 68.0
Min, Max	24.0 , 55.0	56.0 , 81.0	24.0 , 55.0	57.0 , 76.0	22.0 , 53.0	59.0 , 85.0	22.0 , 85.0
Age Group(Years)							
18-25	3 (14.3%)	0 (0.0%)	1 (3.8%)	0 (0.0%)	2 (8.0%)	0 (0.0%)	6 (3.9%)
26-35	3 (14.3%)	0 (0.0%)	7 (26.9%)	0 (0.0%)	8 (32.0%)	0 (0.0%)	18 (11.7%)
36-45	4 (19.0%)	0 (0.0%)	12 (46.2%)	0 (0.0%)	6 (24.0%)	0 (0.0%)	22 (14.3%)
46-55	11 (52.4%)	0 (0.0%)	6 (23.1%)	0 (0.0%)	9 (36.0%)	0 (0.0%)	26 (16.9%)
56-65	0 (0.0%)	16 (50.0%)	0 (0.0%)	9 (36.0%)	0 (0.0%)	6 (24.0%)	31 (20.1%)
>=66	0 (0.0%)	16 (50.0%)	0 (0.0%)	16 (64.0%)	0 (0.0%)	19 (76.0%)	51 (33.1%)
Sex at Birth							
Male	11 (52.4%)	16 (50.0%)	9 (34.6%)	10 (40.0%)	10 (40.0%)	11 (44.0%)	67 (43.5%)
Female	10 (47.6%)	16 (50.0%)	17 (65.4%)	15 (60.0%)	15 (60.0%)	14 (56.0%)	87 (56.5%)
Intersex	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Decline to answer	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ethnicity							
Hispanic or Latino	3 (14.3%)	1 (3.1%)	4 (15.4%)	0 (0.0%)	2 (8.0%)	1 (4.0%)	11 (7.1%)
Not Hispanic or Latino	18 (85.7%)	31 (96.9%)	22 (84.6%)	24 (96.0%)	23 (92.0%)	24 (96.0%)	142 (92.2%)
Not Reported	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Race							

	Janssen 18-55 (N=21)	Janssen 56+ (N=32)	Moderna 18-55 (N=26)	Moderna 56+ (N=25)	Pfizer 18-55 (N=25)	Pfizer 56+ (N=25)	Total (N=154)
American Indian or Alaska Native	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Asian	3 (14.3%)	1 (3.1%)	3 (11.5%)	2 (8.0%)	2 (8.0%)	2 (8.0%)	13 (8.4%)
Black or African American	1 (4.8%)	0 (0.0%)	0 (0.0%)	2 (8.0%)	0 (0.0%)	3 (12.0%)	6 (3.9%)
Multiracial	1 (4.8%)	0 (0.0%)	3 (11.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (2.6%)
Native Hawaiian or Other Pacific Islander	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other	0 (0.0%)	1 (3.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
White	16 (76.2%)	30 (93.8%)	20 (76.9%)	21 (84.0%)	23 (92.0%)	20 (80.0%)	130 (84.4%)
Height (cm)							
N	21	32	26	25	25	25	154
Mean (SD)	172.2 (10.9)	169.5 (10.9)	166.5 (10.1)	169.8 (10.4)	170.0 (8.5)	168.7 (12.2)	169.4 (10.5)
Median	168.9	170.7	165.8	169.0	169.3	169.3	168.7
25th, 75th %tile	165.0 , 179.5	162.4 , 178.0	162.0 , 174.0	162.6 , 177.8	165.0 , 175.3	160.0 , 178.4	162.4 , 177.0
Min, Max	153.5 , 196.8	151.4 , 189.2	144.8 , 187.5	151.0 , 185.8	154.0 , 188.0	152.0 , 198.1	144.8 , 198.1
Weight (kg)							
N	21	32	26	25	25	25	154
Mean (SD)	81.8 (20.8)	82.9 (24.0)	80.2 (17.9)	79.7 (17.6)	87.2 (27.4)	78.6 (19.4)	81.8 (21.4)
Median	84.1	86.1	76.3	77.7	78.2	76.6	78.3
25th, 75th %tile	58.6 , 101.7	67.4 , 98.6	71.1 , 87.2	65.0 , 92.1	70.6 , 102.4	65.7 , 88.0	66.9 , 95.5
Min, Max	47.5 , 108.5	42.5 , 142.6	49.3 , 126.9	57.0 , 124.1	50.3 , 173.0	46.0 , 117.4	42.5 , 173.0
BMI (kg/m^2)							
N	21	32	26	25	25	25	154
Mean (SD)	27.4 (6.0)	28.9 (9.0)	29.1 (6.9)	27.6 (5.1)	30.2 (9.1)	27.4 (5.2)	28.5 (7.2)
Median	26.4	27.1	27.4	27.7	27.2	27.0	27.1
25th, 75th %tile	21.9 , 30.9	21.9 , 33.6	24.1 , 31.0	23.1 , 31.4	24.2 , 34.5	23.5 , 30.4	23.5 , 31.8
Min, Max	18.8 , 37.9	18.5 , 61.4	21.2 , 50.4	19.7 , 37.6	18.5 , 56.3	18.9 , 39.7	18.5 , 61.4

Supplemental Table 2. Characteristics of Ad26.COV2.S boosted participants, by age and enrollment group.

	Janssen 18-55 (N=26)	Janssen 56+ (N=24)	Moderna 18-55 (N=24)	Moderna 56+ (N=25)	Pfizer 18-55 (N=25)	Pfizer 56+ (N=26)	Total (N=150)
Age (Years)							
N	26	24	24	25	25	26	150
Mean (SD)	38.9 (9.0)	62.2 (5.3)	34.8 (9.0)	64.5 (5.6)	36.8 (9.3)	63.2 (5.7)	50.1 (15.3)
Median	38.5	61.5	34.5	66.0	36.0	61.0	55.0
25th, 75th %tile	30.0 , 44.0	58.0 , 64.0	27.0 , 41.5	59.0 , 68.0	30.0 , 45.0	59.0 , 67.0	37.0 , 63.0
Min, Max	24.0 , 54.0	56.0 , 77.0	20.0 , 51.0	56.0 , 75.0	20.0 , 53.0	56.0 , 76.0	20.0 , 77.0
Age Group(Years)							
18-25	1 (3.8%)	0 (0.0%)	3 (12.5%)	0 (0.0%)	2 (8.0%)	0 (0.0%)	6 (4.0%)
26-35	7 (26.9%)	0 (0.0%)	10 (41.7%)	0 (0.0%)	10 (40.0%)	0 (0.0%)	27 (18.0%)
36-45	12 (46.2%)	0 (0.0%)	7 (29.2%)	0 (0.0%)	7 (28.0%)	0 (0.0%)	26 (17.3%)
46-55	6 (23.1%)	0 (0.0%)	4 (16.7%)	0 (0.0%)	6 (24.0%)	0 (0.0%)	16 (10.7%)
56-65	0 (0.0%)	20 (83.3%)	0 (0.0%)	12 (48.0%)	0 (0.0%)	18 (69.2%)	50 (33.3%)
>=66	0 (0.0%)	4 (16.7%)	0 (0.0%)	13 (52.0%)	0 (0.0%)	8 (30.8%)	25 (16.7%)
Sex at Birth							
Male	13 (50.0%)	10 (41.7%)	17 (70.8%)	16 (64.0%)	17 (68.0%)	11 (42.3%)	84 (56.0%)
Female	13 (50.0%)	14 (58.3%)	7 (29.2%)	9 (36.0%)	8 (32.0%)	15 (57.7%)	66 (44.0%)
Intersex	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Decline to answer	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ethnicity							
Hispanic or Latino	2 (7.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.0%)	1 (3.8%)	5 (3.3%)
Not Hispanic or Latino	24 (92.3%)	23 (95.8%)	24 (100.0%)	25 (100.0%)	23 (92.0%)	25 (96.2%)	144 (96.0%)
Not Reported	0 (0.0%)	1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.7%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Race							

	Janssen 18-55 (N=26)	Janssen 56+ (N=24)	Moderna 18-55 (N=24)	Moderna 56+ (N=25)	Pfizer 18-55 (N=25)	Pfizer 56+ (N=26)	Total (N=150)
American Indian or Alaska Native	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Asian	3 (11.5%)	0 (0.0%)	5 (20.8%)	0 (0.0%)	5 (20.0%)	1 (3.8%)	14 (9.3%)
Black or African American	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	1 (3.8%)	2 (1.3%)
Multiracial	2 (7.7%)	1 (4.2%)	1 (4.2%)	0 (0.0%)	1 (4.0%)	1 (3.8%)	6 (4.0%)
Native Hawaiian or Other Pacific Islander	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	1 (0.7%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
White	21 (80.8%)	23 (95.8%)	18 (75.0%)	25 (100.0%)	17 (68.0%)	23 (88.5%)	127 (84.7%)
Height (cm)							
N	26	24	24	25	25	26	150
Mean (SD)	172.6 (11.3)	170.6 (9.2)	174.4 (9.5)	170.8 (9.6)	172.5 (9.8)	168.0 (11.2)	171.4 (10.2)
Median	172.4	169.0	174.7	173.1	172.9	165.1	172.5
25th, 75th %tile	163.5 , 183.4	163.5 , 178.1	171.2 , 180.2	162.6 , 177.1	167.6 , 177.8	157.5 , 177.5	163.5 , 178.5
Min, Max	152.4 , 191.6	153.0 , 188.0	152.0 , 190.0	152.0 , 185.0	152.4 , 191.0	152.4 , 189.0	152.0 , 191.6
Weight (kg)							
N	26	24	24	25	25	26	150
Mean (SD)	83.1 (21.3)	78.1 (14.8)	83.4 (18.4)	83.7 (23.2)	83.1 (18.3)	77.5 (17.5)	81.5 (19.0)
Median	76.2	78.5	87.9	82.9	78.5	72.2	79.0
25th, 75th %tile	70.0 , 98.2	67.9 , 90.4	66.6 , 96.5	63.5 , 95.5	73.0 , 93.8	62.5 , 91.6	67.5 , 93.4
Min, Max	52.6 , 137.2	54.1 , 104.8	42.2 , 117.9	51.5 , 143.0	53.9 , 117.5	50.2 , 112.0	42.2 , 143.0
BMI (kg/m^2)							
N	26	24	24	25	25	26	150
Mean (SD)	27.8 (6.3)	26.8 (4.7)	27.3 (5.5)	28.6 (7.2)	27.8 (4.8)	27.4 (5.4)	27.6 (5.7)
Median	26.7	26.8	27.9	26.6	27.2	26.9	26.9
25th, 75th %tile	23.8 , 28.8	23.0 , 30.2	23.8 , 29.9	23.6 , 33.9	24.2 , 32.1	22.5 , 29.2	23.7 , 30.9
Min, Max	18.9 , 46.5	20.0 , 37.6	17.0 , 38.1	18.9 , 42.3	19.1 , 35.9	19.6 , 39.4	17.0 , 46.5

Supplemental Table 3. Characteristics of BNT162b2 boosted participants, by age and enrollment group.

	Janssen 18-55 (N=31)	Janssen 56+ (N=22)	Moderna 18-55 (N=22)	Moderna 56+ (N=29)	Pfizer 18-55 (N=24)	Pfizer 56+ (N=26)	Total (N=154)
Age (Years)							
N	31	22	22	29	24	26	154
Mean (SD)	37.3 (9.0)	62.3 (4.9)	37.0 (9.2)	67.4 (5.5)	33.4 (8.4)	66.1 (5.2)	50.8 (16.6)
Median	39.0	61.5	36.5	68.0	34.0	66.0	54.5
25th, 75th %tile	29.0 , 44.0	59.0 , 65.0	30.0 , 45.0	64.0 , 71.0	26.5 , 39.5	63.0 , 70.0	36.0 , 65.0
Min, Max	22.0 , 53.0	56.0 , 74.0	23.0 , 52.0	56.0 , 75.0	19.0 , 51.0	57.0 , 80.0	19.0 , 80.0
Age Group(Years)							
18-25	4 (12.9%)	0 (0.0%)	4 (18.2%)	0 (0.0%)	3 (12.5%)	0 (0.0%)	11 (7.1%)
26-35	9 (29.0%)	0 (0.0%)	6 (27.3%)	0 (0.0%)	11 (45.8%)	0 (0.0%)	26 (16.9%)
36-45	14 (45.2%)	0 (0.0%)	7 (31.8%)	0 (0.0%)	8 (33.3%)	0 (0.0%)	29 (18.8%)
46-55	4 (12.9%)	0 (0.0%)	5 (22.7%)	0 (0.0%)	2 (8.3%)	0 (0.0%)	11 (7.1%)
56-65	0 (0.0%)	19 (86.4%)	0 (0.0%)	8 (27.6%)	0 (0.0%)	12 (46.2%)	39 (25.3%)
>=66	0 (0.0%)	3 (13.6%)	0 (0.0%)	21 (72.4%)	0 (0.0%)	14 (53.8%)	38 (24.7%)
Sex at Birth							
Male	15 (48.4%)	9 (40.9%)	11 (50.0%)	14 (48.3%)	14 (58.3%)	13 (50.0%)	76 (49.4%)
Female	16 (51.6%)	13 (59.1%)	11 (50.0%)	15 (51.7%)	10 (41.7%)	13 (50.0%)	78 (50.6%)
Intersex	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Decline to answer	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ethnicity							
Hispanic or Latino	1 (3.2%)	1 (4.5%)	1 (4.5%)	1 (3.4%)	3 (12.5%)	2 (7.7%)	9 (5.8%)
Not Hispanic or Latino	30 (96.8%)	21 (95.5%)	21 (95.5%)	28 (96.6%)	21 (87.5%)	24 (92.3%)	145 (94.2%)
Not Reported	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Race							
American Indian or Alaska Native	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

	Janssen 18-55 (N=31)	Janssen 56+ (N=22)	Moderna 18-55 (N=22)	Moderna 56+ (N=29)	Pfizer 18-55 (N=24)	Pfizer 56+ (N=26)	Total (N=154)
Asian	1 (3.2%)	0 (0.0%)	2 (9.1%)	0 (0.0%)	1 (4.2%)	0 (0.0%)	4 (2.6%)
Black or African American	0 (0.0%)	0 (0.0%)	2 (9.1%)	0 (0.0%)	0 (0.0%)	1 (3.8%)	3 (1.9%)
Multiracial	1 (3.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (12.5%)	1 (3.8%)	5 (3.2%)
Native Hawaiian or Other Pacific Islander	1 (3.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.8%)	1 (0.6%)
Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
White	28 (90.3%)	22 (100.0%)	18 (81.8%)	29 (100.0%)	20 (83.3%)	23 (88.5%)	140 (90.9%)
Height (cm)							
N	31	22	22	29	24	26	154
Mean (SD)	172.3 (10.0)	170.6 (9.1)	172.2 (9.5)	169.2 (9.1)	172.7 (11.5)	169.7 (8.3)	171.1 (9.6)
Median	171.0	172.3	173.4	168.5	171.6	170.2	171.2
25th, 75th %tile	162.7 , 180.3	165.0 , 175.3	162.6 , 179.0	164.0 , 175.6	166.1 , 177.8	162.3 , 175.3	164.0 , 177.6
Min, Max	157.0 , 201.0	152.4 , 190.5	152.4 , 186.0	152.4 , 186.0	146.1 , 193.0	154.9 , 182.9	146.1 , 201.0
Weight (kg)							
N	31	22	22	29	24	26	154
Mean (SD)	83.3 (29.4)	72.3 (14.3)	81.0 (17.3)	80.6 (18.3)	79.5 (17.9)	82.3 (19.4)	80.1 (20.5)
Median	80.5	70.8	78.6	83.3	73.7	81.6	77.1
25th, 75th %tile	58.6 , 89.6	61.6 , 77.3	65.9 , 89.9	67.7 , 92.0	69.3 , 84.9	67.9 , 95.9	65.9 , 89.6
Min, Max	47.2 , 162.2	50.3 , 103.2	55.0 , 121.0	47.6 , 119.5	55.3 , 132.8	46.7 , 118.6	46.7 , 162.2
BMI (kg/m^2)							
N	31	22	22	29	24	26	154
Mean (SD)	27.9 (9.4)	24.7 (3.7)	27.2 (4.3)	28.1 (5.8)	27.0 (7.5)	28.5 (5.8)	27.3 (6.6)
Median	26.5	24.8	26.4	27.3	24.4	28.8	26.3
25th, 75th %tile	20.3 , 30.5	22.9 , 26.4	24.3 , 30.0	24.6 , 32.0	22.0 , 29.2	23.9 , 32.4	23.0 , 30.5
Min, Max	17.9 , 59.5	18.0 , 34.2	21.1 , 35.0	17.6 , 40.4	19.7 , 51.9	17.7 , 38.7	17.6 , 59.5

Supplemental Table 4. Participants experiencing unsolicited AEs after study boost vaccination in Stage 1 (groups 1 to 3 boosted with mRNA-1273) reported overall and for each Preferred Term within System Organ Class (MedDRA code classification),by Group, relationship to study product and maximum severity (numbers in brackets correspond to severity grades mild, moderate, severe, potentially life-threatening and death, respectively).

System Organ Class/MedDRA Preferred Term[1]	Group 1 Ad26.COV2.S (n=53)		Group 2 mRNA-1273 (n=51)		Group 3 BNT162b2 (n=50)	
System Organ Class	**Related**	**Unrelated**	**Related**	**Unrelated**	**Related**	**Unrelated**
Participants with at least one AE[2], overall	8 [6,1,1,0,0]	13 [9,3,0,1,0]	8 [6,2,0,0,0]	14 [8,5,1,0,0]	18 [10,8,0,0,0]	24 [15,9,0,0,0]
Blood and lymphatic system disorders						
Lymphadenopathy	0	0	3 [3,0,0,0,0]	0	1 [1,0,0,0,0]	0
Ear and labyrinth disorders						
Ear pain	0	0	0	0	1 [1,0,0,0,0]	0
Tinnitus	0	0	0	1 [1,0,0,0,0]	0	0
Eye disorders						
Ocular pruritus	0	0	0	0	1 [1,0,0,0,0]	0
Gastrointestinal disorders						
Cheilitis	0	0	0	0	1 [1,0,0,0,0]	0
Constipation	0	0	0	0	0	1 [0,1,0,0,0]
Diarrhea	1 [0,1,0,0,0]	0	1 [1,0,0,0,0]	0	1 [1,0,0,0,0]	1 [0,1,0,0,0]
Dry mouth	1 [1,0,0,0,0]	0	0	0	0	0
Gastroesophageal reflux	0	0	0	0	0	1 [0,1,0,0,0]
Vomiting	1 [0,0,1,0,0]	0	0	0	0	0
General disorders and administration site conditions						
Fatigue	0	0	0	0	0	1 [1,0,0,0,0]
Feeling abnormal	0	0	0	0	0	1 [1,0,0,0,0]
Injection site pain	0	0	1 [1,0,0,0,0]	0	0	0
Injection site pruritus	0	0	0	0	1 [1,0,0,0,0]	0
Injection site warmth	1 [1,0,0,0,0]	0	0	0	0	0
Noncardiac chest pain	0	0	0	1 [0,1,0,0,0]	0	0
Thirst	0	0	0	0	0	1 [1,0,0,0,0]
Vaccination site hematoma	0	1 [1,0,0,0,0]	0	0	0	0

Venous puncture site hematoma	0	0	0	0	0	1 [1,0,0,0,0]
Infections and infestations						
Otitis externa	0	0	0	1 [1,0,0,0,0]	0	0
Pharyngitis, streptococcal	0	0	0	0	0	1 [0,1,0,0,0]
Rhinovirus infection	0	0	0	0	0	1 [1,0,0,0,0]
Sinusitis	0	0	0	1 [0,1,0,0,0]	0	0
Tooth abscess	0	1 [0,1,0,0,0]	0	0	0	0
Upper respiratory tract infection	0	0	0	0	0	2 (2,0,0,0,0)
Urinary tract infection	0	1 [1,0,0,0,0]	0	0	0	0
Viral upper respiratory tract infection	0	1 [0,1,0,0,0]	0	0	0	0
Injury, poisoning and procedural complications						
Contusion	0	0	0	0	0	1 [1,0,0,0,0]
Ligament sprain	0	0	0	1 [1,0,0,0,0]	0	0
Investigations						
Blood thyroid stimulating hormone increased	0	1 [1,0,0,0,0]	0	0	0	0
Metabolism and nutrition disorders						
Decreased appetite	0	0	0	0	1 [0,1,0,0,0]	0
Musculoskeletal and connective tissue disorders						
Arthralgia	0	0	0	0	0	1 [1,0,0,0,0]
Back pain	0	1 [1,0,0,0,0]	0	0	0	1 [0,1,0,0,0]
Flank pain	0	0	0	1 (0,0,1,0,0)	0	0
Musculoskeletal discomfort	0	0	1 [1,0,0,0,0]	0	0	0
Myalgia	0	1 [1,0,0,0,0]	0	0	0	0
Neck pain	0	0	0	0	0	1 [0,1,0,0,0]
Pain in extremity	0	1 [1,0,0,0,0]	0	0	1 [0,1,0,0,0]	0
Plantar fasciitis	0	0	0	1 [0,1,0,0,0]	0	0
Nervous System disorders						
Dizziness	2 [2,0,0,0,0]	0	0	0	3 [0,3,0,0,0]	0
Headache	0	1 [1,0,0,0,0]	0	0	0	1 [0,1,0,0,0]
Paresthesia	0	0	0	1 [1.0,0,0,0]	0	0
Psychiatric disorders	0	0	0	0	1 [1,0,0,0,0]	1 [0,1,0,0,0]

Insomnia	0	0	0	0	1 [1,0,0,0,0]	0
Restlessness	0	0	0	0	0	1 [0,1,0,0,0]
Renal and urinary disorders						
Acute kidney injury	0	1 [0,0,0,1,0]	0	0	0	0
Reproductive system and breast disorders						
Vaginal hemorrhage	0	0	0	0	1 [1,0,0,0,0]	1 [1,0,0,0,0]
Respiratory, thoracic and mediastinal disorders						
Asthma	0	0	0	0	0	1 [1,0,0,0,0]
Cough	0	0	0	2 [1,1,0,0,0]	0	1 [1,0,0,0,0]
Nasal congestion	0	0	0	1 [1,0,0,0,0]	0	0
Rhinorrhea	0	0	0	0	0	1 [0,1,0,0,0]
Skin and subcutaneous tissue disorders						
Dermatitis, atopic	0	0	0	1 [0,1,0,0,0]	0	0
Hyperhydrosis	0	0	0	0	1 [0,1,0,0,0]	0
Night sweats	0	0	1 [0,1,0,0,0]	0	2 [1,1,0,0,0]	0
Pruritus	0	0	0	1 [1,0,0,0,0]	0	0
Psoriasis	0	0	0	0	0	1 [1,0,0,0,0]
Rash, pruritic	0	0	1 [0,1,0,0,0]	0	0	0
Sensitive skin	0	0	0	0	1 [1,0,0,0,0]	0
Solar lentigo	0	0	0	0	0	1 [1,0,0,0,0]
Vascular disorders						
Hypertension	2 [2,0,0,0,0]	2 [1,1,0,0,0]	0	0	0	0

[1] Only those AEs which have been assigned MedDRA codes by clinical staff are summarized within organ system class. A total of 4 AEs had not been assigned MeDRA codes at the time of the data snapshot for these groups.

[2] For participants reporting multiple events, overall or withing the same MedDRA term, the maximum severity grade is counted.

Supplemental Table 5. Participants experiencing unsolicited AEs after study boost vaccination in Stage 2 (groups 4 to 6 boosted with Ad26.COV2.S) overall and for each Preferred Term within System Organ Class (MedDRA code classification), by Group, relationship to study product and maximum severity (numbers in brackets correspond to severity grades mild, moderate, severe, potentially life-threatening and death, respectively).

System Organ Class/MedDRA Preferred Term[1]	Group 4 Ad26.COV2.S (n=50)		Group 5 mRNA-1273 (n=49)		Group 6 BNT162b2 (n=51)	
	Related	Unrelated	Related	Unrelated	Related	Unrelated
Participants with at least one AE[2], overall	3 [3,0,0,0,0]	18 [13,5,0,0,0]	7 [3,2,2,0,0]	10 [7,2,0,1,0]	8 [3,4,1,0,0]	14 [13,1,0,0,0]
Blood and lymphatic system disorders						
Lymphadenopathy	0	0	1 [1,0,0,0,0]	0	1 [0,1,0,0,0]	0
Anemia	0	0	0	0	0	1 [0,1,0,0,0]
Cardiac disorders						
Bradycardia	0	1 [1,0,0,0,0]	0	0	0	0
Eye disorders						
Eye pain	0	0	0	0	0	1 [1,0,0,0,0]
Eye pruritus	0	1 [1,0,0,0,0]	0	0	0	0
Gastrointestinal disorders						
Abdominal pain	0	1 [1,0,0,0,0]	0	0	0	0
Aphthous ulcer	0	0	0	1 [1,0,0,0,0]	0	0
Constipation	0	1 [1,0,0,0,0]	0	0	0	0
Diarrhea	0	1 [1,0,0,0,0]	1 [1,0,0,0,0]	0	0	1 [1,0,0,0,0]
Mouth swelling	0	0	0	1 [1,0,0,0,0]	0	0
Oral mucosa erosion	0	0	0	1 [1,0,0,0,0]	0	0
Toothache	0	0	0	0	0	1 [1,0,0,0,0
Vomiting	0	0	1 [0,0,1,0,0]	0	0	1 [1,0,0,0,0
General disorders and administration site conditions						
Axillary pain	0	0	1 [1,0,0,0,0]	0	0	0
Chest discomfort	0	1 [1,0,0,0,0]	0	0	0	0
Cyst	0	1 [1,0,0,0,0]	0	0	0	0

Fatigue	0	1 [0,1,0,0,0]	1 [0,0,1,0,0]	1 [1,0,0,0,0]	0	0
Feeling abnormal	0	0	1 [0,1,0,0,0]	0	2 (0,1,1,0,0)	0
Injection site bruising	0	0	0	1 [1,0,0,0,0]	1 [1,0,0,0,0]	0
Injection site reaction	0	0	0	0	1 [1,0,0,0,0]	0
Swelling	0	0	1 [1,0,0,0,0]	0	0	1 [1,0,0,0,0]
Venous puncture site bruise	0	1 [1,0,0,0,0]	0	0	0	0
Hepatobiliary disorders						
Acute cholecystitis	0	0	0	1 [0,0,0,1,0]	0	0
Infections and infestations						
Covid-19	0	0	0	1 [1,0,0,0,0]	0	
Cellulitis	0	1 [1,0,0,0,0]	0	0	0	0
Herpes simplex	0	1 [1,0,0,0,0]	0	0	0	0
Localized infection	0	1 [1,0,0,0,0]	0	0	0	0
Nasopharyngitis	0	1 [0,1,0,0,0]	0	0	0	0
Upper respiratory tract infection	0	2 [1,1,0,0,0]	0	1 [1,0,0,0,0]	0	1 [1,0,0,0,0]
Injury, poisoning and procedural complications						
Burn, second degree	0	0	0	1 [0,1,0,0,0]	0	0
Contusion	1 [1,0,0,0,0]	0	0	0	0	
Skin laceration	0	1 [1,0,0,0,0]	0	0	0	0
Investigations						
Blood pressure increased	0	0	0	2 [2,0,0,0,0]	0	0
Metabolism and nutrition disorders						
Gout	0	0	0	0	1 [0,1,0,0,0]	0
Musculoskeletal and connective tissue disorders						
Back pain	1 [1,0,0,0,0]	0	0	0	0	1 [1,0,0,0,0]
Myalgia	0	0	0	0	0	1 [1,0,0,0,0]
Nervous System disorders						
Dizziness	1 [1,0,0,0,0]	3 [2,1,0,0,0]	0	1 [1,0,0,0,0]	2 [0,2,0,0,0]	1 [1,0,0,0,0]
Headache	0	0	0	0	0	1 [0,1,0,0,0]
Hypoaesthesia	0	0	0	0	0	1 [0,1,0,0,0]
Memory impairment	0	0	1 [1,0,0,0,0]	0	0	0

Migraine	0	1 [0,1,0,0,0]	1 [1,0,0,0,0]	0	0	0
Notalgia paresthetica	0	0	0	1 [1,0,0,0,0]	0	0
Paresthesia	0	0	0	0	0	3 [3,0,0,0,0]
Syncope	0	0	0	0	0	1 [1,0,0,0,0]
Psychiatric disorders						
Anxiety	0	1 [1,0,0,0,0]	0	0	0	0
Confusional state	0	0	0	1 [1,0,0,0,0]	0	0
Insomnia	0	0	1 [0,1,0,0,0]	0	2 [1,0,1,0,0]	0
Stress	0	0	1 [1,0,0,0,0]	0	0	0
Reproductive system and breast disorders						
Intermenstrual bleeding	0	1 [1,0,0,0,0]	0	0	0	0
Respiratory, thoracic and mediastinal disorders						
Cough	0	0	0	0	0	1 [1,0,0,0,0]
Dyspnea	0	1 [1,0,0,0,0]	0	0	0	0
Nasal congestion	0	0	0	0	0	1 [1,0,0,0,0]
Oropharyngeal pain	0	1 [1,0,0,0,0]	1 [1,0,0,0,0]	0	1 [1,0,0,0,0]	1 [1,0,0,0,0]
Respiratory symptom	0	0	0	1 [0,1,0,0,0]	0	0
Rhinorrhea	0	0	0	0	0	1 [0,1,0,0,0]
Sneezing	0	1 [0,1,0,0,0]	0	0	0	1 [0,1,0,0,0]
Throat irritation	0	0	0	0	0	1 [0,1,0,0,0]
Skin and subcutaneous tissue disorders						
Blood blister	0	0	0	0	0	1 [0,1,0,0,0]
Erythema	0	1 [0,1,0,0,0]	0	0	0	0
Ingrown nail	0	0	0	0	0	1 [0,1,0,0,0]
Surgical and medical procedures						
Wisdom teeth removal	0	0	0	1 [0,1,0,0,0]	0	0
Vascular disorders						
Diastolic hypertension	0	1 [0,1,0,0,0]	0	1 [0,1,0,0,0]	0	0

[1] Only those AEs which have been assigned MedDRA codes by clinical staff are summarized within organ system class. All AEs had been assigned MeDRA codes at the time of the data snapshot for these groups.

[2] For participants reporting multiple events, overall or withing the same MedDRA term, the maximum severity grade is counted.

Supplemental Table 6. Participants experiencing unsolicited AEs after study boost vaccination in Stage 3 (groups 7E to 9E boosted with BNT162b2) reported overall and for each Preferred Term within System Organ Class (MedDRA code classification), by Group, relationship to study product and maximum severity (numbers in brackets correspond to severity grades mild, moderate, severe, potentially life-threatening and death, respectively)

System Organ Class/MedDRA Preferred Term[1]	**Group 7 Ad26.COV2.S (n=52)**		**Group 8 mRNA-1273 (n=51)**		**Group 9 BNT162b2 (n=50)**	
	Related	**Unrelated**	**Related**	**Unrelated**	**Related**	**Unrelated**
Participants with at least one AE[2], overall	6 [4,2,0,0,0]	11 [6,5,0,0,0]	10 [9,1,0,0,0]	14 [9,5,0,0,0]	6 [3,3,0,0,0]	12 [5,6,1,0,0]
Blood and lymphatic system disorders						
Lymphadenopathy	2 [2,0,0,0,0]	0	2 [2,0,0,0,0]	0	3 [1,2,0,0,0]	0
Cardiac disorders						
Bradycardia	0	1 [1,0,0,0,0]	0	1 [0,1,0,0,0]	0	1 [0,0,1,0,0]
Ear and labyrinth disorders						
Hypoacusis	0	0	1 [1,0,0,0,0]	0	0	0
Positional vertigo	0	1 [0,1,0,0,0]	0	0	0	0
Eye disorders						
Conjunctival hemorrhage	1 [1,0,0,0,0]	0	0	0	0	0
Gastrointestinal disorders						
Abdominal pain, upper	0	0	0	0	0	1 [0,1,0,0,0]
Constipation	0	0	0	0	0	1 [0,1,0,0,0]
Diarrhea	0	0	1 [1,0,0,0,0]	0	0	1 [0,1,0,0,0]
Oral paresthesia	0	0	1 [1,0,0,0,0]	0	0	0
General disorders and administration site conditions						
Axillary pain	1 [0,1,0,0,0]	0	1 [1,0,0,0,0]	0	1 [1,0,0,0,0]	0
Cyst	0	1 [0,1,0,0,0]	0	0	0	0
Injection site bruising	0	0	0	0	0	1 [1,0,0,0,0]
Injection site pain	0	0	1 [0,1,0,0,0]	0	0	0
Injection site pruritus	0	0	1 [1,0,0,0,0]	0	1 [1,0,0,0,0]	0
Injection site warmth	0	0	1 [1,0,0,0,0]	0	0	0

Thirst	0	0	0	0	1 [1,0,0,0,0]	0
Vessel puncture site bruise	0	0	0	2 [2,0,0,0,0]	0	0
Vessel puncture site hemorrhage	0	0	0	0	0	1 [0,1,0,0,0]
Immune system disorders						
Seasonal allergy	0	1 [0,1,0,0,0]	0	0	0	0
Infections and infestations						
Bacterial keratitis	0	0	0	0	0	1 [1,0,0,0,0]
Respiratory tract infection	0	0	0	1 [1,0,0,0,0]	0	0
Upper respiratory tract infection	0	1 [1,0,0,0,0]	0	0	0	1 [1,0,0,0,0]
Injury, poisoning and procedural complications						
Arthropod bite	0	1 [1,0,0,0,0]	0	0	0	0
Contusion	0	0	0	1 [1,0,0,0,0]	0	1 [1,0,0,0,0]
Ligament sprain	0	0	0	1 [1,0,0,0,0]	0	0
Muscle strain	0	1 [1,0,0,0,0]	0	0	0	0
Nasal injury	0	0	0	1 [1,0,0,0,0]	0	0
Skin laceration	0	3 [2,1,0,0,0]	0	0	0	0
Investigations						
Blood pressure increased	0	0	0	2 [1,1,0,0,0]	0	0
Heart rate decreased	0	0	0	1 [1,0,0,0,0]	0	0
Metabolism and nutrition disorders						
Gout						
Musculoskeletal and connective tissue disorders						
Back pain	0	0	0	2 [0,2,0,0,0]	0	0
Muscle spasms	0	0	0	1 [0,1,0,0,0]	0	0
Musculoskeletal chest pain	0	0	0	1 [1,0,0,0,0]	0	0
Musculoskeletal discomfort	0	0	0	0	1 [0,1,0,0,0]	0
Myalgia	0	0	0	0	0	1 [0,1,0,0,0]
Osteoporosis	0	1 [0,1,0,0,0]	0	0	0	0
Pain in extremity	1 [0,1,0,0,0]	1 [1,0,0,0,0]	0	0	0	0
Nervous System disorders						
Ophthalmic migraine	0	0	0	1 [1,0,0,0,0]	0	0

Paresthesia	0	0	0	1 [1,0,0,0,0]	0	0
Product issues						
Device physical property issue	0	0	0	1 [0,1,0,0,0]	0	0
Psychiatric disorders						
Anxiety	0	0	0	1 [0,1,0,0,0]	0	1 [1,0,0,0,0]
Depression	0	0	0	1 [0,1,0,0,0]	0	0
Insomnia	2 [2,0,0,0,0]	0	0	0	0	0
Reproductive system and breast disorders						
Dysmenorrhea	0	1 [0,1,0,0,0]	0	0	0	0
Intermenstrual bleeding	0	1 [1,0,0,0,0]	0	0	0	0
Respiratory, thoracic and mediastinal disorders						
Cough	0	0	0	1 [1,0,0,0,0	0	2 [1,1,0,0,0]
Nasal congestion	0	0	0	0	0	1 [0,1,0,0,0]
Oropharyngeal pain	0	1 [1,0,0,0,0]	0	1 [1,0,0,0,0]	0	0
Paranasal sinus discomfort	0	0	0	0	0	1 [0,1,0,0,0]
Respiratory disorder	0	0	0	1 [1,0,0,0,0]	0	0
Throat irritation	0	0	0	1 [1,0,0,0,0]	0	0
Skin and subcutaneous tissue disorders						
Contact dermatitis	0	1 [1,0,0,0,0]	0	0	0	0
Erythema	0	1 [1,0,0,0,0]	0	0	0	0
Hyperhidrosis	0	0	1 [0,1,0,0,0]	0	0	0
Rash	0	0	1 [1,0,0,0,0]	0	0	0
Transient acantholytic dermatosis	0	0	0	0	0	1 [1,0,0,0,0]
Urticaria	2 [1,1,0,0,0]	0	0	0	0	0
Vascular disorders						
Flushing	0	0	1 [1,0,0,0,0]	0	0	0
Hypertension	0	0	0	0	0	1 [1,0,0,0,0]
White coat hypertension	0	0	0	0	0	1 [0,1,0,0,0]

[1] Only those AEs which have been assigned MedDRA codes by clinical staff are summarized within organ system class. Only 1 AE had not been assigned MeDRA codes at the time of the data snapshot for these groups.

[2] For participants reporting multiple events, overall or withing the same MedDRA term, the maximum severity grade is counted.

Note: One additional AE (Syncope, Nervous System Disorders, Grade 3, not related to boost vaccination) was reported for a participant enrolled into Group 7 but who did not receive the boost vaccination and terminated study early.

Supplemental Table 7. Local Solicited Events Stage 1 (groups 1E to 3E boosted with mRNA-1273) by Symptom, Maximum Severity, Age and Enrollment Group

	Ad26.COV2.S 18-55 years (N=21)	Ad26.COV2.S 56+ years (N=32)	mRNA-1273 18-55 years (N=26)	mRNA-1273 56+ years (N=25)	BNT162b2 18-55 years (N=25)	BNT162b2 56+ years (N=25)	Total (N=154)
Erythema/redness[1]							
None/Not Gradable	20 (95.2%)	29 (90.6%)	22 (84.6%)	18 (72.0%)	22 (88.0%)	22 (88.0%)	133 (86.4%)
Mild	1 (4.8%)	3 (9.4%)	4 (15.4%)	7 (28.0%)	3 (12.0%)	3 (12.0%)	21 (13.6%)
Moderate	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Erythema/redness largest diameter[2] (cm)							
N	3	3	6	7	4	4	27
Mean (SD)	0.8 (0.4)	4.6 (5.7)	3.0 (3.7)	4.2 (4.9)	0.4 (0.3)	0.4 (0.4)	2.5 (3.7)
Median	1.0	2.5	2.0	3.0	0.3	0.3	0.8
25th, 75th %tile	0.3, 1.0	0.2, 11.0	0.2, 3.3	0.5, 6.0	0.2, 0.6	0.1, 0.8	0.2, 3.0
Min, Max	0.3, 1.0	0.2, 11.0	0.2, 10.0	0.2, 14.0	0.1, 0.7	0.1, 1.0	0.1, 14.0
Induration/swelling[1]							
None/Not Gradable	17 (81.0%)	25 (78.1%)	15 (57.7%)	16 (64.0%)	15 (60.0%)	20 (80.0%)	108 (70.1%)
Mild	3 (14.3%)	7 (21.9%)	8 (30.8%)	8 (32.0%)	8 (32.0%)	4 (16.0%)	38 (24.7%)
Moderate	1 (4.8%)	0 (0.0%)	2 (7.7%)	1 (4.0%)	2 (8.0%)	1 (4.0%)	7 (4.5%)
Severe	0 (0.0%)	0 (0.0%)	1 (3.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
Induration/swelling largest diameter[2] (cm)							
N	4	7	11	9	8	5	44
Mean (SD)	3.5 (2.6)	3.8 (2.3)	5.5 (4.5)	3.0 (2.5)	2.1 (1.7)	1.9 (2.1)	3.5 (3.1)
Median	4.0	4.0	5.3	3.0	1.5	0.8	3.0
25th, 75th %tile	1.6, 5.5	2.0, 6.0	2.0, 8.0	0.8, 4.0	0.7, 4.0	0.4, 3.0	0.8, 5.0
Min, Max	0.1, 6.0	0.2, 7.0	0.6, 15.0	0.3, 8.0	0.3, 4.0	0.1, 5.0	0.1, 15.0
Pain and/or tenderness[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	1 (0.6%)
None	1 (4.8%)	12 (37.5%)	1 (3.8%)	6 (24.0%)	2 (8.0%)	6 (24.0%)	28 (18.2%)
Mild	14 (66.7%)	17 (53.1%)	17 (65.4%)	12 (48.0%)	12 (48.0%)	14 (56.0%)	86 (55.8%)
Moderate	6 (28.6%)	3 (9.4%)	7 (26.9%)	7 (28.0%)	11 (44.0%)	4 (16.0%)	38 (24.7%)
Severe	0 (0.0%)	0 (0.0%)	1 (3.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)

[1] For a given sign or symptom, each participant's solicited AE will be counted once under the maximum severity for all post-administration assessments.

[2] For erythema/redness and induration/swelling, at each assessment time the maximum diameter at the injection site is recorded. For a given largest diameter, each participant will be counted once under the maximum largest diameter for all post-administration assessments.

Supplemental Table 8. Local Solicited Events Stage 2 (groups 4E to 6E boosted with Ad26.COV2.S) by Symptom, Maximum Severity, Age and Enrollment Group

	Janssen 18-55 (N=26)	Janssen 56+ (N=24)	Moderna 18-55 (N=24)	Moderna 56+ (N=25)	Pfizer 18-55 (N=25)	Pfizer 56+ (N=26)	Total (N=150)
Erythema/redness[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None/Not Gradable	23 (88.5%)	20 (83.3%)	24 (100.0%)	23 (92.0%)	20 (80.0%)	23 (88.5%)	133 (88.7%)
Mild	3 (11.5%)	4 (16.7%)	0 (0.0%)	2 (8.0%)	5 (20.0%)	2 (7.7%)	16 (10.7%)
Moderate	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.8%)	1 (0.7%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Erythema/redness largest diameter[2] (cm)							
N	3	6	3	3	5	2	22
Mean (SD)	0.2 (0.1)	0.6 (0.5)	0.6 (0.8)	0.4 (0.5)	1.6 (1.8)	1.2 (0.2)	0.8 (1.0)
Median	0.1	0.5	0.1	0.1	0.4	1.2	0.4
25th, 75th %tile	0.1 , 0.3	0.2 , 1.0	0.1 , 1.5	0.1 , 0.9	0.2 , 3.0	1.0 , 1.3	0.1 , 1.0
Min, Max	0.1 , 0.3	0.1 , 1.5	0.1 , 1.5	0.1 , 0.9	0.2 , 4.1	1.0 , 1.3	0.1 , 4.1
Induration/swelling[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None/Not Gradable	20 (76.9%)	21 (87.5%)	23 (95.8%)	24 (96.0%)	23 (92.0%)	23 (88.5%)	134 (89.3%)
Mild	6 (23.1%)	3 (12.5%)	1 (4.2%)	1 (4.0%)	2 (8.0%)	2 (7.7%)	15 (10.0%)
Moderate	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.8%)	1 (0.7%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Induration/swelling largest diameter[2] (cm)							
N	6	4	1	3	3	2	19
Mean (SD)	1.4 (1.6)	0.7 (0.9)	0.1 (.)	0.3 (0.2)	3.0 (1.1)	0.7 (0.4)	1.2 (1.4)
Median	0.6	0.3	0.1	0.2	3.0	0.7	0.4
25th, 75th %tile	0.3 , 2.5	0.2 , 1.2	0.1 , 0.1	0.2 , 0.5	2.0 , 4.1	0.4 , 1.0	0.2 , 2.0
Min, Max	0.1 , 4.2	0.2 , 2.0	0.1 , 0.1	0.2 , 0.5	2.0 , 4.1	0.4 , 1.0	0.1 , 4.2
Pain and/or tenderness[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	5 (19.2%)	8 (33.3%)	4 (16.7%)	10 (40.0%)	6 (24.0%)	9 (34.6%)	42 (28.0%)
Mild	19 (73.1%)	14 (58.3%)	17 (70.8%)	14 (56.0%)	15 (60.0%)	12 (46.2%)	91 (60.7%)
Moderate	2 (7.7%)	2 (8.3%)	3 (12.5%)	0 (0.0%)	4 (16.0%)	5 (19.2%)	16 (10.7%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	0 (0.0%)	1 (0.7%)

[1] For a given sign or symptom, each participant's solicited AE will be counted once under the maximum severity for all post-administration assessments.

[2] For erythema/redness and induration/swelling, at each assessment time the maximum diameter at the injection site is recorded. For a given largest diameter, each participant will be counted once under the maximum largest diameter for all post-administration assessments.

Supplemental Table 9. Local Solicited Events Stage 3(groups 7E to 9E boosted with BNT162b2) by Symptom, Maximum Severity, Age and Enrollment Group

	Janssen 18-55 (N=30)	Janssen 56+ (N=22)	Moderna 18-55 (N=22)	Moderna 56+ (N=29)	Pfizer 18-55 (N=24)	Pfizer 56+ (N=26)	Total (N=153)
Erythema/redness[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None/Not Gradable	26 (86.7%)	22 (100.0%)	20 (90.9%)	26 (89.7%)	22 (91.7%)	23 (88.5%)	139 (90.8%)
Mild	3 (10.0%)	0 (0.0%)	2 (9.1%)	3 (10.3%)	2 (8.3%)	2 (7.7%)	12 (7.8%)
Moderate	1 (3.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.8%)	2 (1.3%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Erythema/redness largest diameter[2] (cm)							
N	5	2	3	5	3	3	21
Mean (SD)	7.6 (7.2)	0.2 (0.1)	1.8 (2.3)	1.8 (2.3)	1.4 (0.8)	11.5 (11.8)	4.4 (6.5)
Median	7.0	0.2	0.5	0.6	1.7	10.0	1.0
25th, 75th %tile	1.0 , 12.7	0.1 , 0.2	0.5 , 4.5	0.4 , 2.0	0.5 , 2.0	0.6 , 24.0	0.5 , 5.7
Min, Max	0.4 , 17.0	0.1 , 0.2	0.5 , 4.5	0.1 , 5.7	0.5 , 2.0	0.6 , 24.0	0.1 , 24.0
Induration/swelling[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None/Not Gradable	26 (86.7%)	20 (90.9%)	19 (86.4%)	25 (86.2%)	22 (91.7%)	22 (84.6%)	134 (87.6%)
Mild	2 (6.7%)	1 (4.5%)	3 (13.6%)	3 (10.3%)	2 (8.3%)	4 (15.4%)	15 (9.8%)
Moderate	2 (6.7%)	1 (4.5%)	0 (0.0%)	1 (3.4%)	0 (0.0%)	0 (0.0%)	4 (2.6%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Induration/swelling largest diameter[2] (cm)							
N	5	2	4	7	3	5	26
Mean (SD)	5.2 (3.0)	0.7 (0.5)	4.3 (2.8)	3.7 (3.1)	1.5 (1.0)	5.8 (10.3)	4.0 (4.9)
Median	5.0	0.7	5.0	5.0	1.5	0.6	2.9
25th, 75th %tile	3.4 , 6.4	0.3 , 1.0	2.7 , 6.0	0.5 , 7.0	0.5 , 2.4	0.5 , 3.8	0.5 , 5.5
Min, Max	1.5 , 9.5	0.3 , 1.0	0.3 , 7.0	0.2 , 7.0	0.5 , 2.4	0.2 , 24.0	0.2 , 24.0
Pain and/or tenderness[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	1 (3.3%)	3 (13.6%)	3 (13.6%)	11 (37.9%)	1 (4.2%)	4 (15.4%)	23 (15.0%)
Mild	25 (83.3%)	17 (77.3%)	18 (81.8%)	16 (55.2%)	20 (83.3%)	15 (57.7%)	111 (72.5%)
Moderate	4 (13.3%)	2 (9.1%)	1 (4.5%)	2 (6.9%)	3 (12.5%)	7 (26.9%)	19 (12.4%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

[1] For a given sign or symptom, each participant's solicited AE will be counted once under the maximum severity for all post-administration assessments.

[2] For erythema/redness and induration/swelling, at each assessment time the maximum diameter at the injection site is recorded. For a given largest diameter, each participant will be counted once under the maximum largest diameter for all post-administration assessments.

Supplemental Table 10. Systemic Solicited Events Stage 1 (groups 1E to 3E boosted with mRNA-1273) by Symptom, Maximum Severity, Age and Enrollment Group

	Ad26.COV2.S 18-55 years (N=21)	Ad26.COV2.S 56+ years (N=32)	mRNA-1273 18-55 years (N=26)	mRNA-1273 56+ years (N=25)	BNT162b2 18-55 years (N=25)	BNT162b2 56+ years (N=25)	Total (N=154)
Malaise and/or fatigue[1]							
None	4 (19.0%)	13 (40.6%)	5 (19.2%)	6 (24.0%)	2 (8.0%)	11 (44.0%)	41 (26.6%)
Mild	10 (47.6%)	14 (43.8%)	10 (38.5%)	10 (40.0%)	11 (44.0%)	5 (20.0%)	60 (39.0%)
Moderate	6 (28.6%)	2 (6.3%)	10 (38.5%)	8 (32.0%)	11 (44.0%)	9 (36.0%)	46 (29.9%)
Severe	1 (4.8%)	3 (9.4%)	1 (3.8%)	1 (4.0%)	1 (4.0%)	0 (0.0%)	7 (4.5%)
Myalgia[1]							
None	16 (76.2%)	17 (53.1%)	5 (19.2%)	8 (32.0%)	3 (12.0%)	11 (44.0%)	60 (39.0%)
Mild	0 (0.0%)	10 (31.3%)	8 (30.8%)	10 (40.0%)	15 (60.0%)	10 (40.0%)	53 (34.4%)
Moderate	5 (23.8%)	4 (12.5%)	12 (46.2%)	7 (28.0%)	6 (24.0%)	4 (16.0%)	38 (24.7%)
Severe	0 (0.0%)	1 (3.1%)	1 (3.8%)	0 (0.0%)	1 (4.0%)	0 (0.0%)	3 (1.9%)
Headache[1]							
None	13 (61.9%)	24 (75.0%)	4 (15.4%)	14 (56.0%)	5 (20.0%)	12 (48.0%)	72 (46.8%)
Mild	6 (28.6%)	5 (15.6%)	14 (53.8%)	10 (40.0%)	14 (56.0%)	8 (32.0%)	57 (37.0%)
Moderate	1 (4.8%)	3 (9.4%)	7 (26.9%)	1 (4.0%)	6 (24.0%)	5 (20.0%)	23 (14.9%)
Severe	1 (4.8%)	0 (0.0%)	1 (3.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.3%)
Nausea[1]							
None	15 (71.4%)	29 (90.6%)	19 (73.1%)	21 (84.0%)	18 (72.0%)	21 (84.0%)	123 (79.9%)
Mild	5 (23.8%)	3 (9.4%)	7 (26.9%)	2 (8.0%)	6 (24.0%)	2 (8.0%)	25 (16.2%)
Moderate	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.0%)	1 (4.0%)	2 (8.0%)	5 (3.2%)
Severe	1 (4.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
Chills[1]							
None	15 (71.4%)	28 (87.5%)	15 (57.7%)	15 (60.0%)	10 (40.0%)	18 (72.0%)	101 (65.6%)
Mild	5 (23.8%)	1 (3.1%)	5 (19.2%)	6 (24.0%)	8 (32.0%)	3 (12.0%)	28 (18.2%)
Moderate	1 (4.8%)	2 (6.3%)	4 (15.4%)	3 (12.0%)	6 (24.0%)	4 (16.0%)	20 (13.0%)
Severe	0 (0.0%)	1 (3.1%)	2 (7.7%)	1 (4.0%)	1 (4.0%)	0 (0.0%)	5 (3.2%)
Arthralgia[1]							
None	18 (85.7%)	25 (78.1%)	16 (61.5%)	16 (64.0%)	15 (60.0%)	17 (68.0%)	107 (69.5%)
Mild	2 (9.5%)	5 (15.6%)	4 (15.4%)	6 (24.0%)	8 (32.0%)	5 (20.0%)	30 (19.5%)
Moderate	1 (4.8%)	2 (6.3%)	5 (19.2%)	3 (12.0%)	2 (8.0%)	3 (12.0%)	16 (10.4%)
Severe	0 (0.0%)	0 (0.0%)	1 (3.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
Fever[1]							
None	18 (85.7%)	29 (90.6%)	21 (80.8%)	21 (84.0%)	18 (72.0%)	23 (92.0%)	130 (84.4%)
Mild	0 (0.0%)	1 (3.1%)	4 (15.4%)	4 (16.0%)	4 (16.0%)	1 (4.0%)	14 (9.1%)
Moderate	3 (14.3%)	1 (3.1%)	0 (0.0%)	0 (0.0%)	3 (12.0%)	1 (4.0%)	8 (5.2%)
Severe	0 (0.0%)	1 (3.1%)	1 (3.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (1.3%)

Supplemental Table 11. Systemic Solicited Events Stage 2 (groups 4E to 6E boosted with Ad26.COV2.S) by Symptom, Maximum Severity, Age and Enrollment Group

	Janssen 18-55 (N=26)	Janssen 56+ (N=24)	Moderna 18-55 (N=24)	Moderna 56+ (N=25)	Pfizer 18-55 (N=25)	Pfizer 56+ (N=26)	Total (N=150)
Malaise and/or fatigue[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	6 (23.1%)	13 (54.2%)	3 (12.5%)	8 (32.0%)	4 (16.0%)	9 (34.6%)	43 (28.7%)
Mild	13 (50.0%)	5 (20.8%)	7 (29.2%)	8 (32.0%)	9 (36.0%)	7 (26.9%)	49 (32.7%)
Moderate	7 (26.9%)	6 (25.0%)	14 (58.3%)	6 (24.0%)	12 (48.0%)	9 (34.6%)	54 (36.0%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (12.0%)	0 (0.0%)	1 (3.8%)	4 (2.7%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Myalgia[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	9 (34.6%)	16 (66.7%)	6 (25.0%)	11 (44.0%)	6 (24.0%)	14 (53.8%)	62 (41.3%)
Mild	11 (42.3%)	6 (25.0%)	10 (41.7%)	11 (44.0%)	9 (36.0%)	8 (30.8%)	55 (36.7%)
Moderate	6 (23.1%)	2 (8.3%)	7 (29.2%)	1 (4.0%)	8 (32.0%)	4 (15.4%)	28 (18.7%)
Severe	0 (0.0%)	0 (0.0%)	1 (4.2%)	2 (8.0%)	2 (8.0%)	0 (0.0%)	5 (3.3%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Headache[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	10 (38.5%)	16 (66.7%)	9 (37.5%)	15 (60.0%)	13 (52.0%)	15 (57.7%)	78 (52.0%)
Mild	9 (34.6%)	6 (25.0%)	5 (20.8%)	5 (20.0%)	7 (28.0%)	8 (30.8%)	40 (26.7%)
Moderate	7 (26.9%)	2 (8.3%)	8 (33.3%)	3 (12.0%)	4 (16.0%)	3 (11.5%)	27 (18.0%)
Severe	0 (0.0%)	0 (0.0%)	2 (8.3%)	2 (8.0%)	1 (4.0%)	0 (0.0%)	5 (3.3%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Nausea[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	20 (76.9%)	21 (87.5%)	16 (66.7%)	21 (84.0%)	18 (72.0%)	23 (88.5%)	119 (79.3%)
Mild	4 (15.4%)	3 (12.5%)	5 (20.8%)	2 (8.0%)	3 (12.0%)	2 (7.7%)	19 (12.7%)
Moderate	2 (7.7%)	0 (0.0%)	2 (8.3%)	0 (0.0%)	3 (12.0%)	1 (3.8%)	8 (5.3%)
Severe	0 (0.0%)	0 (0.0%)	1 (4.2%)	2 (8.0%)	1 (4.0%)	0 (0.0%)	4 (2.7%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Chills[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	19 (73.1%)	22 (91.7%)	8 (33.3%)	18 (72.0%)	12 (48.0%)	22 (84.6%)	101 (67.3%)
Mild	5 (19.2%)	1 (4.2%)	4 (16.7%)	2 (8.0%)	4 (16.0%)	3 (11.5%)	19 (12.7%)
Moderate	2 (7.7%)	1 (4.2%)	11 (45.8%)	3 (12.0%)	7 (28.0%)	1 (3.8%)	25 (16.7%)
Severe	0 (0.0%)	0 (0.0%)	1 (4.2%)	2 (8.0%)	2 (8.0%)	0 (0.0%)	5 (3.3%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Arthralgia[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	19 (73.1%)	20 (83.3%)	12 (50.0%)	20 (80.0%)	15 (60.0%)	17 (65.4%)	103 (68.7%)

	Janssen 18-55 (N=26)	Janssen 56+ (N=24)	Moderna 18-55 (N=24)	Moderna 56+ (N=25)	Pfizer 18-55 (N=25)	Pfizer 56+ (N=26)	Total (N=150)
Mild	5 (19.2%)	4 (16.7%)	6 (25.0%)	3 (12.0%)	3 (12.0%)	5 (19.2%)	26 (17.3%)
Moderate	2 (7.7%)	0 (0.0%)	6 (25.0%)	1 (4.0%)	5 (20.0%)	4 (15.4%)	18 (12.0%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.0%)	2 (8.0%)	0 (0.0%)	3 (2.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Fever[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	24 (92.3%)	23 (95.8%)	13 (54.2%)	20 (80.0%)	18 (72.0%)	22 (84.6%)	120 (80.0%)
Mild	1 (3.8%)	1 (4.2%)	6 (25.0%)	3 (12.0%)	6 (24.0%)	2 (7.7%)	19 (12.7%)
Moderate	1 (3.8%)	0 (0.0%)	3 (12.5%)	1 (4.0%)	0 (0.0%)	2 (7.7%)	7 (4.7%)
Severe	0 (0.0%)	0 (0.0%)	2 (8.3%)	1 (4.0%)	1 (4.0%)	0 (0.0%)	4 (2.7%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Supplemental Table 12. Systemic Solicited Events Stage 3 (groups 7E to 9E boosted with BNT162b2) by Symptom, Maximum Severity, Age and Enrollment Group

	Janssen 18-55 (N=30)	Janssen 56+ (N=22)	Moderna 18-55 (N=22)	Moderna 56+ (N=29)	Pfizer 18-55 (N=24)	Pfizer 56+ (N=26)	Total (N=153)
Malaise and/or fatigue[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	11 (36.7%)	7 (31.8%)	5 (22.7%)	11 (37.9%)	4 (16.7%)	6 (23.1%)	44 (28.8%)
Mild	10 (33.3%)	11 (50.0%)	11 (50.0%)	13 (44.8%)	8 (33.3%)	12 (46.2%)	65 (42.5%)
Moderate	8 (26.7%)	4 (18.2%)	6 (27.3%)	4 (13.8%)	12 (50.0%)	7 (26.9%)	41 (26.8%)
Severe	1 (3.3%)	0 (0.0%)	0 (0.0%)	1 (3.4%)	0 (0.0%)	1 (3.8%)	3 (2.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Myalgia[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	15 (50.0%)	16 (72.7%)	11 (50.0%)	19 (65.5%)	7 (29.2%)	17 (65.4%)	85 (55.6%)
Mild	7 (23.3%)	5 (22.7%)	8 (36.4%)	9 (31.0%)	11 (45.8%)	6 (23.1%)	46 (30.1%)
Moderate	8 (26.7%)	1 (4.5%)	3 (13.6%)	1 (3.4%)	6 (25.0%)	3 (11.5%)	22 (14.4%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Headache[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	16 (53.3%)	17 (77.3%)	8 (36.4%)	15 (51.7%)	12 (50.0%)	13 (50.0%)	81 (52.9%)
Mild	8 (26.7%)	3 (13.6%)	10 (45.5%)	14 (48.3%)	7 (29.2%)	10 (38.5%)	52 (34.0%)
Moderate	6 (20.0%)	2 (9.1%)	4 (18.2%)	0 (0.0%)	5 (20.8%)	2 (7.7%)	19 (12.4%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.8%)	1 (0.7%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Nausea[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	25 (83.3%)	20 (90.9%)	18 (81.8%)	24 (82.8%)	19 (79.2%)	23 (88.5%)	129 (84.3%)
Mild	2 (6.7%)	2 (9.1%)	3 (13.6%)	3 (10.3%)	1 (4.2%)	2 (7.7%)	13 (8.5%)
Moderate	3 (10.0%)	0 (0.0%)	1 (4.5%)	2 (6.9%)	4 (16.7%)	1 (3.8%)	11 (7.2%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Chills[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	25 (83.3%)	18 (81.8%)	20 (90.9%)	28 (96.6%)	16 (66.7%)	22 (84.6%)	129 (84.3%)
Mild	4 (13.3%)	4 (18.2%)	0 (0.0%)	1 (3.4%)	6 (25.0%)	3 (11.5%)	18 (11.8%)
Moderate	1 (3.3%)	0 (0.0%)	2 (9.1%)	0 (0.0%)	2 (8.3%)	1 (3.8%)	6 (3.9%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Arthralgia[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	23 (76.7%)	22 (100.0%)	18 (81.8%)	24 (82.8%)	20 (83.3%)	21 (80.8%)	128 (83.7%)
Mild	4 (13.3%)	0 (0.0%)	1 (4.5%)	4 (13.8%)	3 (12.5%)	3 (11.5%)	15 (9.8%)

	Janssen 18-55 (N=30)	Janssen 56+ (N=22)	Moderna 18-55 (N=22)	Moderna 56+ (N=29)	Pfizer 18-55 (N=24)	Pfizer 56+ (N=26)	Total (N=153)
Moderate	3 (10.0%)	0 (0.0%)	3 (13.6%)	0 (0.0%)	1 (4.2%)	2 (7.7%)	9 (5.9%)
Severe	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.4%)	0 (0.0%)	0 (0.0%)	1 (0.7%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Fever[1]							
Missing	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
None	29 (96.7%)	22 (100.0%)	22 (100.0%)	28 (96.6%)	23 (95.8%)	24 (92.3%)	148 (96.7%)
Mild	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (3.4%)	0 (0.0%)	2 (7.7%)	3 (2.0%)
Moderate	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.2%)	0 (0.0%)	1 (0.7%)
Severe	1 (3.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.7%)
Potentially life-threatening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Supplemental Table 13. mRNA-1273 IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Binding Antibody Units (BAU/mL) as bridged to the WHO International Standard

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), BAU/mL	51.69 (32.43-103.90)	657.67 (420.07-1603.04)	401.87 (213.85-638.90)
Minimum - Maximum, BAU/mL	13.39-756.07	222.91-16396.44	16.59-4312.41
Geometric Mean (95% CI), BAU/mL	59.02 (45.88-75.92)	871.73 (680.37-1116.90)	356.60 (262.48-484.48)
Day 15 Visit (14 days post-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), BAU/mL	3596.55 (1895.79-6368.17)	6658.87 (4628.83-8833.33)	6213.50 (2912.03-12224.15)
Minimum - Maximum, BAU/mL	233.97-18514.83	2457.54-34515.83	1396.84-22863.69
Geometric Mean (95% CI), BAU/mL	3243.55 (2539.97-4142.01)	6864.85 (5839.80-8069.82)	6155.01 (4895.42-7738.70)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), BAU/mL	3080.46 (1925.42-4676.29)	5450.82 (4158.46-8488.38)	4769.97 (3211.63-8931.80)
Minimum - Maximum, BAU/mL	437.76-11147.65	1979.01-39019.01	1634.84-18726.02
Geometric Mean (95% CI), BAU/mL	2985.97 (2478.22-3597.76)	6223.69 (5281.92-7333.38)	5230.81 (4273.75-6402.19)

[1] Values below the lower limit of detection (LLOD = 0.3076 BAU/mL) were assigned a value equal to LLOD/2. Values greater than the upper limit of quantification (ULOQ = 172226.25 BAU/mL) were taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Bridging to the WHO standard Binding Antibody Units per milliliter (BAU/mL) was done using a conversion factor of 0.0090, specific to the IgG SARS-CoV-2 Spike antigen.

Supplemental Table 14. mRNA-1273 IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group, Age Group and Timepoint – Results are reported as Binding Antibody Units (BAU/mL) as bridged to the WHO International Standard

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), BAU/mL	49.30 (29.72-85.56)	55.40 (33.64-108.78)	619.47 (420.07-1312.86)	979.73 (428.79-1834.03)	444.63 (277.19-718.73)	360.54 (110.25-486.98)
Minimum - Maximum, BAU/mL	14.85-756.07	13.39-755.18	278.22-4673.33	222.91-16396.44	16.59-4312.41	26.34-2567.20
Geometric Mean (95% CI), BAU/mL	56.40 (37.03-85.90)	60.80 (43.63-84.72)	776.75 (573.04-1052.87)	982.84 (650.78-1484.32)	467.95 (297.17-736.86)	271.75 (179.47-411.48)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), BAU/mL	3596.55 (1546.84-6666.55)	3408.12 (1991.00-6338.71)	6778.23 (5465.02-7744.00)	6404.24 (3950.89-11053.30)	9108.29 (5219.95-14236.65)	4010.63 (2545.63-7854.52)
Minimum - Maximum, BAU/mL	233.97-14453.32	980.44-18514.83	3411.91-24976.08	2457.54-34515.83	1955.46-22863.69	1396.84-21621.37
Geometric Mean (95% CI), BAU/mL	2777.85 (1693.75-4555.85)	3590.82 (2761.20-4669.69)	6840.99 (5821.02-8039.69)	6889.75 (5112.66-9284.54)	8195.56 (6160.57-10902.77)	4622.52 (3291.95-6490.91)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Median (P_{25}, P_{75}), BAU/mL	3344.07 (2152.94-4605.07)	2810.34 (1681.10-4775.19)	5384.11 (4335.43-7456.04)	6265.13 (3934.83-9769.30)	6066.52 (3782.81-12020.71)	4158.08 (2507.19-6081.03)
Minimum - Maximum, BAU/mL	1266.67-9196.84	437.76-11147.65	2456.08-18276.92	1979.01-39019.01	1634.84-16131.36	1705.32-18726.02
Geometric Mean (95% CI), BAU/mL	3265.90 (2556.23-4172.60)	2823.33 (2155.18-3698.62)	6103.13 (5047.81-7379.09)	6351.60 (4774.63-8449.40)	6338.65 (4813.41-8347.20)	4349.89 (3239.04-5841.72)

[1] Values below the lower limit of detection (LLOD = 0.3076 BAU/mL) were assigned a value equal to LLOD/2. Values greater than the upper limit of quantification (ULOQ = 172226.25 BAU/mL) were taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Bridging to the WHO standard Binding Antibody Units per milliliter (BAU/mL) was done using a conversion factor of 0.0090, specific to the IgG SARS-CoV-2 Spike antigen.

Supplemental Table 15. Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Binding Antibody Units (BAU/mL) as bridged to the WHO International Standard

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Median (P_{25}, P_{75}), BAU/mL	79.30 (34.04-138.32)	620.97 (436.21-1076.63)	318.33 (195.63-537.74)
Minimum - Maximum, BAU/mL	0.15-4096.29	100.43-3578.91	29.67-2420.15
Geometric Mean (95% CI), BAU/mL	71.28 (47.86-106.16)	638.75 (513.74-794.17)	320.63 (250.66-410.13)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Median (P_{25}, P_{75}), BAU/mL	349.23 (207.26-486.53)	2535.08 (1555.66-5370.72)	1705.55 (1112.86-3816.95)
Minimum - Maximum, BAU/mL	1.25-3788.08	959.34-26276.95	410.34-10018.47
Geometric Mean (95% CI), BAU/mL	325.97 (235.76-450.70)	3029.40 (2433.18-3771.70)	1904.73 (1497.80-2422.23)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Median (P_{25}, P_{75}), BAU/mL	365.56 (254.31-576.25)	3849.45 (2305.87-8597.92)	2819.75 (1554.31-4646.02)
Minimum - Maximum, BAU/mL	46.26-3212.50	770.40-50354.53	581.17-10641.30
Geometric Mean (95% CI), BAU/mL	368.64 (290.75-467.40)	4560.09 (3544.18-5867.21)	2599.64 (2085.90-3239.90)

[1] Values below the lower limit of detection (LLOD = 0.3076 BAU/mL) were assigned a value equal to LLOD/2. Values greater than the upper limit of quantification (ULOQ = 172226.25 BAU/mL) were taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Bridging to the WHO standard Binding Antibody Units per milliliter (BAU/mL) was done using a conversion factor of 0.0090, specific to the IgG SARS-CoV-2 Spike antigen.

Supplemental Table 16. Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group, Age Group and Timepoint – Results are reported as Binding Antibody Units (BAU/mL) as bridged to the WHO International Standard

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Median (P_{25}, P_{75}), BAU/mL	73.68 (34.62-117.27)	87.70 (31.96-146.83)	693.82 (416.81-1320.74)	617.88 (472.54-916.28)	320.13 (234.49-624.26)	260.72 (137.53-463.04)
Minimum - Maximum, BAU/mL	13.43-4096.29	0.15-3103.22	147.62-3578.91	100.43-1529.31	126.72-2197.49	29.67-2420.15
Geometric Mean (95% CI), BAU/mL	72.89 (47.00-113.05)	69.57 (33.89-142.81)	741.01 (527.19-1041.54)	553.88 (415.67-738.05)	402.17 (296.94-544.68)	257.86 (175.28-379.34)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Median (P_{25}, P_{75}), BAU/mL	336.52 (178.33-481.38)	360.07 (228.24-627.44)	3038.39 (1716.07-7483.29)	2423.78 (1506.75-4080.00)	2056.07 (1155.79-4188.74)	1596.47 (913.33-2805.14)
Minimum - Maximum, BAU/mL	75.56-3176.44	1.25-3788.08	968.14-26276.95	959.34-12265.54	410.34-9043.37	459.21-10018.47
Geometric Mean (95% CI), BAU/mL	326.13 (231.85-458.76)	325.80 (179.50-591.36)	3592.36 (2526.38-5108.12)	2572.13 (1955.19-3383.75)	2113.48 (1456.86-3066.05)	1730.39 (1243.98-2406.99)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Median (P_{25}, P_{75}), BAU/mL	351.09 (169.05-552.72)	372.53 (306.25-626.16)	4204.09 (2687.00-10786.12)	3733.10 (1914.13-5759.10)	2705.64 (1575.88-4862.34)	2848.98 (1437.32-4026.91)
Minimum - Maximum, BAU/mL	93.31-2288.23	46.26-3212.50	1549.22-50354.53	770.40-26269.63	624.93-10641.30	581.17-9385.55
Geometric Mean (95% CI), BAU/mL	342.14 (243.17-481.38)	397.20 (278.98-565.51)	5363.02 (3680.67-7814.34)	3903.67 (2743.65-5554.14)	2734.70 (1997.17-3744.59)	2471.25 (1776.11-3438.45)

[1] Values below the lower limit of detection (LLOD = 0.3076 BAU/mL) were assigned a value equal to LLOD/2. Values greater than the upper limit of quantification (ULOQ = 172226.25 BAU/mL) were taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Bridging to the WHO standard Binding Antibody Units per milliliter (BAU/mL) was done using a conversion factor of 0.0090, specific to the IgG SARS-CoV-2 Spike antigen.

Supplemental Table 17. BNT162b2 IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Binding Antibody Units (BAU/mL) as bridged to the WHO International Standard

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), BAU/mL	77.38 (40.56-134.69)	636.23 (355.94-837.20)	226.53 (130.59-366.82)
Minimum - Maximum, BAU/mL	5.02-4279.92	99.56-1881.23	17.04-1234.78
Geometric Mean (95% CI), BAU/mL	75.07 (54.83-102.78)	534.37 (444.77-642.02)	223.52 (177.36-281.69)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), BAU/mL	2579.84 (1648.92-3756.46)	5196.95 (3778.99-6793.52)	3346.37 (1997.14-6150.49)
Minimum - Maximum, BAU/mL	420.32-24305.59	1626.48-20018.49	607.22-19207.12
Geometric Mean (95% CI), BAU/mL	2562.81 (2051.90-3200.93)	5255.82 (4513.33-6120.45)	3344.91 (2711.30-4126.58)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Median (P_{25}, P_{75}), BAU/mL	2263.26 (1452.07-3163.68)	5002.97 (3661.62-7253.76)	2933.14 (2067.62-4933.03)
Minimum - Maximum, BAU/mL	295.90-17984.38	2098.91-18558.17	971.07-10684.70
Geometric Mean (95% CI), BAU/mL	2276.95 (1833.34-2827.90)	5272.72 (4566.60-6088.03)	3163.73 (2648.88-3778.65)

[1] Values below the lower limit of detection (LLOD = 0.3076 BAU/mL) were assigned a value equal to LLOD/2. Values greater than the upper limit of quantification (ULOQ = 172226.25 BAU/mL) were taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Bridging to the WHO standard Binding Antibody Units per milliliter (BAU/mL) was done using a conversion factor of 0.0090, specific to the IgG SARS-CoV-2 Spike antigen.

Supplemental Table 18. BNT162b2 IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group, Age Group and Timepoint – Results are reported as Binding Antibody Units (BAU/mL) as bridged to the WHO International Standard

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Median (P_{25}, P_{75}), BAU/mL	78.47 (38.41-136.23)	51.21 (40.56-134.69)	778.71 (464.23-934.22)	434.59 (251.25-740.84)	258.87 (172.08-423.79)	208.82 (116.16-315.68)
Minimum - Maximum, BAU/mL	7.66-4279.92	5.02-543.77	355.94-1150.09	99.56-1881.23	81.30-1234.78	17.04-696.23
Geometric Mean (95% CI), BAU/mL	82.01 (52.32-128.53)	66.29 (42.13-104.30)	700.61 (588.17-834.55)	435.11 (328.82-575.77)	275.09 (202.03-374.56)	184.54 (130.76-260.43)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Median (P_{25}, P_{75}), BAU/mL	2996.63 (1710.50-4484.79)	2383.21 (1163.60-3278.58)	5659.91 (4462.95-7993.60)	4504.18 (3427.45-6225.34)	3647.23 (2130.66-7072.20)	2963.57 (1915.82-5746.37)
Minimum - Maximum, BAU/mL	735.92-24305.59	420.32-19884.77	1955.62-20018.49	1626.48-14296.01	844.68-19207.12	607.22-8348.38
Geometric Mean (95% CI), BAU/mL	2857.28 (2155.76-3787.09)	2209.54 (1515.61-3221.20)	5986.73 (4795.19-7474.34)	4761.47 (3849.70-5889.19)	3770.47 (2689.69-5285.53)	3008.67 (2284.58-3962.26)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Median (P_{25}, P_{75}), BAU/mL	2400.29 (1425.15-4468.68)	2074.55 (1478.99-2747.44)	4884.17 (4293.79-7834.55)	5121.77 (3434.05-7146.87)	3089.88 (2086.12-5760.52)	2776.40 (1776.85-3893.77)
Minimum - Maximum, BAU/mL	552.87-9415.05	295.90-17984.38	2198.83-11496.32	2098.91-18558.17	1413.87-10684.70	971.07-8710.48
Geometric Mean (95% CI), BAU/mL	2481.40 (1881.07-3273.32)	2025.04 (1402.45-2924.02)	5412.44 (4437.10-6602.17)	5173.80 (4185.01-6396.23)	3400.65 (2619.32-4415.05)	2960.37 (2288.38-3829.70)

[1] Values below the lower limit of detection (LLOD = 0.3076 BAU/mL) were assigned a value equal to LLOD/2. Values greater than the upper limit of quantification (ULOQ = 172226.25 BAU/mL) were taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Bridging to the WHO standard Binding Antibody Units per milliliter (BAU/mL) was done using a conversion factor of 0.0090, specific to the IgG SARS-CoV-2 Spike antigen.

Supplemental Table 19. mRNA-1273 IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AU/mL	5743.14 (3603.02-11544.51)	73074.91 (46674.29-178115.24)	44652.64 (23761.14-70988.74)
Minimum - Maximum, AU/mL	1487.37-84008.26	24767.47-1821826.39	1842.83-479156.78
Geometric Mean (95% CI), AU/mL	6557.38 (5097.45-8435.45)	96858.43 (75596.99-124099.58)	39622.40 (29164.26-53830.77)
Day 15 Visit (14 days post-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AU/mL	399616.59 (210642.93-707574.14)	739874.63 (514314.23-981480.87)	690388.67 (323558.75-1358239.16)
Minimum - Maximum, AU/mL	25996.95-2057203.30	273060.19-3835092.35	155203.93-2540410.44
Geometric Mean (95% CI), AU/mL	360394.06 (282219.42-460223.04)	762761.15 (648866.84-896647.10)	683890.33 (543935.26-859855.97)
N* (non-missing pre- and post-boost)	53	51	50
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (93.3%-100.0%)	96.1% (86.5%-99.5%)	98.0% (89.4%-99.9%)
Participants with ≥ 4-fold rise[2], 95% CI	98.1% (89.9%-100.0%)	84.3% (71.4%-93.0%)	98.0% (89.4%-99.9%)
Geometric Mean Fold Rise[2], 95% CI	54.96 (40.05-75.41)	7.88 (6.20-10.01)	17.26 (13.30-22.41)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), AU/mL	342273.03 (213935.38-519588.26)	605646.46 (462050.56-943153.32)	529996.43 (356848.00-992421.69)
Minimum - Maximum, AU/mL	48639.88-1238627.37	219889.52-4335445.06	181648.46-2080669.29
Geometric Mean (95% CI), AU/mL	331774.51 (275357.48-399750.62)	691521.14 (586879.73-814820.23)	581201.20 (474861.66-711354.20)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (93.2%-100.0%)	96.1% (86.5%-99.5%)	98.0% (89.1%-99.9%)
Participants with ≥ 4-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	76.5% (62.5%-87.2%)	98.0% (89.1%-99.9%)
Geometric Mean Fold Rise[2], 95% CI	51.15 (38.91-67.23)	7.14 (5.59-9.11)	15.43 (11.99-19.87)

[1] Antibody values below the lower limit of quantification (LLOQ = 34.18 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 19136250 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 20.mRNA-1273 IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group, Age Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), AU/mL	5477.34 (3302.50-9506.49)	6155.47 (3737.77-12086.33)	68830.48 (46674.29-145873.55)	108858.67 (47643.77-203780.89)	49403.56 (30799.17-79859.16)	40059.81 (12249.78-54109.19)
Minimum - Maximum, AU/mL	1650.51-84008.26	1487.37-83909.44	30913.71-519258.33	24767.47-1821826.39	1842.83-479156.78	2926.42-285244.22
Geometric Mean (95% CI), AU/mL	6266.41 (4114.23-9544.40)	6755.64 (4848.08-9413.77)	86305.59 (63671.29-116986.10)	109204.33 (72309.23-164924.81)	51994.24 (33019.28-81873.43)	30194.39 (19941.06-45719.79)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), AU/mL	399616.59 (171871.27-740727.48)	378679.66 (221221.76-704300.58)	753136.29 (607224.29-860444.78)	711581.90 (438987.42-1228144.27)	1012031.77 (579994.32-1581849.69)	445626.00 (282847.83-872724.17)
Minimum - Maximum, AU/mL	25996.95-1605924.80	108937.75-2057203.30	379100.97-2775119.55	273060.19-3835092.35	217273.51-2540410.44	155203.93-2402374.88
Geometric Mean (95% CI), AU/mL	308650.10 (188194.26-506205.06)	398979.52 (306800.27-518854.38)	760110.29 (646779.63-893299.09)	765527.85 (568073.26-1031615.00)	910617.97 (684507.29-1211418.92)	513613.83 (365771.72-721212.59)
N* (non-missing pre- and post-boost)	21	32	26	25	25	25
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	100.0% (86.8%-100.0%)	92.0% (74.0%-99.0%)	96.0% (79.6%-99.9%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	95.2% (76.2%-99.9%)	100.0% (89.1%-100.0%)	88.5% (69.8%-97.6%)	80.0% (59.3%-93.2%)	96.0% (79.6%-99.9%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	49.25 (25.93-93.56)	59.06 (41.84-83.37)	8.81 (6.78-11.44)	7.01 (4.60-10.69)	17.51 (11.10-27.63)	17.01 (12.70-22.79)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Median (P_{25}, P_{75}), AU/mL	371563.79 (239215.14-511673.91)	312260.52 (186789.12-530576.46)	598234.47 (481714.08-828449.30)	696126.11 (437203.05-1085477.67)	674057.27 (420312.61-1335634.55)	462009.16 (278576.82-675669.97)
Minimum - Maximum, AU/mL	140741.44-1021871.10	48639.88-1238627.37	272897.85-2030769.35	219889.52-4335445.06	181648.46-1792373.29	189479.72-2080669.29
Geometric Mean (95% CI), AU/mL	362878.23 (284025.86-463621.89)	313703.47 (239464.89-410957.39)	678125.99 (560867.75-819898.90)	705732.85 (530514.76-938821.86)	704294.51 (534823.48-927466.32)	483321.16 (359892.95-649080.08)
N* (non-missing pre- and post-boost)	20	32	26	25	24	25
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (83.2%-100.0%)	100.0% (89.1%-100.0%)	100.0% (86.8%-100.0%)	92.0% (74.0%-99.0%)	95.8% (78.9%-99.9%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	100.0% (83.2%-100.0%)	96.9% (83.8%-99.9%)	84.6% (65.1%-95.6%)	68.0% (46.5%-85.1%)	95.8% (78.9%-99.9%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	59.70 (37.97-93.88)	46.44 (32.45-66.45)	7.86 (6.11-10.10)	6.46 (4.16-10.05)	14.86 (9.40-23.48)	16.01 (12.24-20.93)

[1] Antibody values below the lower limit of quantification (LLOQ = 34.18 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 19136250 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 21. Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Median (P_{25}, P_{75}), AU/mL	8811.09 (3782.66-15369.22)	68996.79 (48467.74-119625.82)	35369.49 (21737.18-59749.44)
Minimum - Maximum, AU/mL	17.10-455143.36	11158.39-397656.63	3296.39-268905.68
Geometric Mean (95% CI), AU/mL	7919.93 (5317.81-11795.31)	70971.97 (57082.53-88241.03)	35625.45 (27850.89-45570.26)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Median (P_{25}, P_{75}), AU/mL	38803.05 (23029.38-54058.43)	281675.13 (172850.86-596746.78)	189505.90 (123651.31-424105.29)
Minimum - Maximum, AU/mL	138.97-420898.25	106593.09-2919661.56	45593.83-1113163.49
Geometric Mean (95% CI), AU/mL	36219.34 (26195.90-50078.09)	336599.73 (270353.77-419078.23)	211637.19 (166422.09-269136.75)
N* (non-missing pre- and post-boost)	50	49	50
Participants with ≥ 2-fold rise[2], 95% CI	86.0% (73.3%-94.2%)	83.7% (70.3%-92.7%)	92.0% (80.8%-97.8%)
Participants with ≥ 4-fold rise[2], 95% CI	48.0% (33.7%-62.6%)	53.1% (38.3%-67.5%)	60.0% (45.2%-73.6%)
Geometric Mean Fold Rise[2], 95% CI	4.57 (3.66-5.72)	4.74 (3.64-6.18)	6.17 (4.68-8.14)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Median (P_{25}, P_{75}), AU/mL	40617.95 (28256.13-64027.24)	427716.33 (256207.80-955324.82)	313306.05 (172700.65-516224.68)
Minimum - Maximum, AU/mL	5140.40-356944.36	85600.03-5594947.50	64574.67-1182366.62
Geometric Mean (95% CI), AU/mL	40960.22 (32305.60-51933.39)	506677.18 (393797.99-651912.33)	288848.70 (231767.09-359988.85)
N* (non-missing pre- and post-boost)	48	47	50
Participants with ≥ 2-fold rise[2], 95% CI	95.8% (85.7%-99.5%)	89.4% (76.9%-96.5%)	94.0% (83.5%-98.7%)
Participants with ≥ 4-fold rise[2], 95% CI	58.3% (43.2%-72.4%)	70.2% (55.1%-82.7%)	74.0% (59.7%-85.4%)
Geometric Mean Fold Rise[2], 95% CI	5.30 (4.01-7.00)	7.02 (5.15-9.58)	7.92 (5.96-10.53)

[1] Antibody values below the lower limit of quantification (LLOQ = 34.18 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 19136250 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 22. Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group, Age Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Median (P_{25}, P_{75}), AU/mL	8186.43 (3846.19-13029.68)	9744.73 (3551.28-16314.85)	77090.87 (46312.48-146748.70)	68653.58 (52504.16-101808.41)	35570.03 (26054.41-69362.25)	28968.84 (15281.40-51448.67)
Minimum - Maximum, AU/mL	1491.79-455143.36	17.10-344802.21	16402.24-397656.63	11158.39-169923.47	14080.03-244165.54	3296.39-268905.68
Geometric Mean (95% CI), AU/mL	8099.26 (5222.23-12561.32)	7730.13 (3765.78-15867.83)	82334.24 (58576.92-115726.93)	61542.20 (46185.21-82005.53)	44685.22 (32993.78-60519.56)	28651.11 (19475.81-42149.02)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Median (P_{25}, P_{75}), AU/mL	37390.68 (19814.27-53486.25)	40007.96 (25360.05-69716.10)	337598.64 (190674.14-831476.74)	269308.58 (167416.14-453333.83)	228452.05 (128421.40-465415.09)	177386.01 (101481.46-311682.55)
Minimum - Maximum, AU/mL	8395.34-352937.99	138.97-420898.25	107571.06-2919661.56	106593.09-1362837.84	45593.83-1004818.68	51023.12-1113163.49
Geometric Mean (95% CI), AU/mL	36237.08 (25760.99-50973.43)	36200.13 (19944.01-65706.44)	399151.24 (280709.22-567568.50)	285792.61 (217243.47-375971.80)	234831.24 (161873.35-340671.95)	192265.90 (138220.44-267443.62)
N* (non-missing pre- and post-boost)	26	24	24	25	24	26
Participants with ≥ 2-fold rise[2], 95% CI	88.5% (69.8%-97.6%)	83.3% (62.6%-95.3%)	91.7% (73.0%-99.0%)	76.0% (54.9%-90.6%)	95.8% (78.9%-99.9%)	88.5% (69.8%-97.6%)
Participants with ≥ 4-fold rise[2], 95% CI	50.0% (29.9%-70.1%)	45.8% (25.6%-67.2%)	45.8% (25.6%-67.2%)	60.0% (38.7%-78.9%)	54.2% (32.8%-74.4%)	65.4% (44.3%-82.8%)
Geometric Mean Fold Rise[2], 95% CI	4.47 (3.30-6.06)	4.68 (3.29-6.67)	4.85 (3.22-7.30)	4.64 (3.21-6.73)	5.64 (3.88-8.21)	6.71 (4.38-10.28)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Median (P_{25}, P_{75}), AU/mL	39010.08 (18783.62-61413.25)	41391.67 (34028.23-69573.06)	467120.98 (298555.23-1198457.51)	414788.84 (212681.58-639899.76)	300626.63 (175097.49-540260.22)	316552.96 (159701.72-447434.66)
Minimum - Maximum, AU/mL	10367.81-254247.22	5140.40-356944.36	172135.51-5594947.50	85600.03-2918848.17	69436.54-1182366.62	64574.67-1042839.17
Geometric Mean (95% CI), AU/mL	38015.42 (27019.08-53487.11)	44133.13 (30997.92-62834.32)	595891.61 (408963.86-868259.62)	433740.78 (304850.21-617126.24)	303855.41 (221907.70-416065.38)	274583.13 (197345.75-382049.76)
N* (non-missing pre- and post-boost)	24	24	23	24	25	25
Participants with ≥ 2-fold rise[2], 95% CI	95.8% (78.9%-99.9%)	95.8% (78.9%-99.9%)	95.7% (78.1%-99.9%)	83.3% (62.6%-95.3%)	92.0% (74.0%-99.0%)	96.0% (79.6%-99.9%)

[1] Antibody values below the lower limit of quantification (LLOQ = 34.18 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 19136250 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 23. BNT162b2 IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AU/mL	8597.27 (4507.07-14965.97)	70692.45 (39548.52-93021.68)	25169.72 (14510.02-40758.20)
Minimum - Maximum, AU/mL	558.14-475546.54	11062.48-209025.58	1893.55-137197.67
Geometric Mean (95% CI), AU/mL	8341.58 (6092.72-11420.50)	59374.50 (49418.79-71335.84)	24835.30 (19706.29-31299.25)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), AU/mL	286648.40 (183213.12-417384.45)	577438.86 (419888.09-754835.54)	371819.03 (221904.01-683387.97)
Minimum - Maximum, AU/mL	46702.05-2700621.15	180719.99-2224277.09	67468.64-2134124.23
Geometric Mean (95% CI), AU/mL	284756.57 (227989.10-355658.68)	583979.61 (501481.37-680049.56)	371656.51 (301255.72-458509.34)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	100.0% (93.0%-100.0%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	94.1% (83.8%-98.8%)	95.9% (86.0%-99.5%)
Geometric Mean Fold Rise[2], 95% CI	34.11 (25.75-45.19)	9.84 (8.14-11.88)	14.88 (11.83-18.71)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Median (P_{25}, P_{75}), AU/mL	251473.02 (161340.91-351520.53)	555885.53 (406846.49-805973.26)	325904.59 (229735.29-548114.24)
Minimum - Maximum, AU/mL	32878.13-1998264.57	233212.64-2062018.49	107896.61-1187189.42
Geometric Mean (95% CI), AU/mL	252994.89 (203704.82-314211.59)	585857.96 (507399.61-676448.20)	351525.69 (294320.12-419850.02)
N* (non-missing pre- and post-boost)	52	50	48
Participants with ≥ 2-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	100.0% (92.9%-100.0%)	100.0% (92.6%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	94.0% (83.5%-98.7%)	95.8% (85.7%-99.5%)
Geometric Mean Fold Rise[2], 95% CI	30.30 (22.91-40.09)	9.79 (7.94-12.06)	14.12 (11.14-17.91)

[1] Antibody values below the lower limit of quantification (LLOQ = 34.18 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 19136250 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 24. BNT162b2 IgG Serum Binding Antibody Response to S-2P-WA-1 by 4-plex ECLIA V.2 by Group, Age Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Median (P_{25}, P_{75}), AU/mL	8718.61 (4267.36-15136.52)	5690.34 (4507.07-14965.97)	86523.77 (51581.66-103801.95)	48288.14 (27916.38-82315.64)	28763.36 (19120.18-47087.62)	23201.85 (12906.28-35075.66)
Minimum - Maximum, AU/mL	851.12-475546.54	558.14-60418.45	39548.52-127788.15	11062.48-209025.58	9033.17-137197.67	1893.55-77359.37
Geometric Mean (95% CI), AU/mL	9111.80 (5813.67-14280.98)	7365.48 (4681.23-11588.88)	77845.87 (65352.14-92728.08)	48345.85 (36535.10-63974.67)	30565.21 (22447.67-41618.22)	20504.37 (14529.04-28937.18)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Median (P_{25}, P_{75}), AU/mL	332959.15 (190055.88-498310.50)	264801.44 (129288.51-364286.34)	628878.61 (495883.52-888178.04)	500464.31 (380827.25-691704.01)	405247.57 (236739.65-785799.47)	329285.04 (212869.00-638485.94)
Minimum - Maximum, AU/mL	81769.30-2700621.15	46702.05-2209418.77	217291.65-2224277.09	180719.99-1588445.93	93852.88-2134124.23	67468.64-927597.84
Geometric Mean (95% CI), AU/mL	317475.84 (239529.15-420787.65)	245504.67 (168400.65-357911.58)	665191.69 (532799.19-830481.70)	529051.98 (427743.93-654354.11)	418940.71 (298853.96-587281.22)	334296.76 (253842.36-440250.90)
N* (non-missing pre- and post-boost)	30	22	22	29	23	26
Participants with ≥ 2-fold rise[2], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	100.0% (84.6%-100.0%)	100.0% (88.1%-100.0%)	100.0% (85.2%-100.0%)	100.0% (86.8%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	90.9% (70.8%-98.9%)	96.6% (82.2%-99.9%)	91.3% (72.0%-98.9%)	100.0% (86.8%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	34.69 (23.17-51.92)	33.33 (22.06-50.36)	8.54 (6.52-11.20)	10.94 (8.37-14.31)	13.41 (9.58-18.77)	16.30 (11.70-22.72)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Median (P_{25}, P_{75}), AU/mL	266699.13 (158349.65-496520.31)	230505.29 (164332.17-305270.64)	542685.78 (477087.64-870505.48)	569085.29 (381560.86-794096.31)	343319.99 (231791.54-640058.03)	308489.19 (197427.27-432640.92)
Minimum - Maximum, AU/mL	61430.34-1046116.68	32878.13-1998264.57	244314.77-1277369.37	233212.64-2062018.49	157096.39-1187189.42	107896.61-967830.81
Geometric Mean (95% CI), AU/mL	275710.74 (209007.40-363702.01)	225004.36 (155827.36-324891.34)	601382.04 (493011.17-733574.35)	574867.15 (465000.64-710692.01)	377850.15 (291035.37-490561.47)	328930.04 (254264.05-425522.09)
N* (non-missing pre- and post-boost)	30	22	21	29	23	25
Participants with ≥ 2-fold rise[2], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	100.0% (83.9%-100.0%)	100.0% (88.1%-100.0%)	100.0% (85.2%-100.0%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	90.5% (69.6%-98.8%)	96.6% (82.2%-99.9%)	91.3% (72.0%-98.9%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	30.13 (20.11-45.12)	30.55 (20.37-45.82)	7.48 (5.91-9.47)	11.89 (8.73-16.19)	11.80 (8.97-15.50)	16.67 (11.31-24.56)

[1] Antibody values below the lower limit of quantification (LLOQ = 34.18 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 19136250 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 25. Variants of Concern: mRNA-1273 IgG Serum Binding Antibody Response to S-2P-WA-1 (control) by FFP 10-plex ECLIA by Group and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AUC	2413.00 (1462.00-4576.00)	25099.00 (15291.00-38925.00)	14594.50 (9700.00-21076.00)
Minimum - Maximum, AUC	666.40-27530.00	7284.00-61246.00	803.40-52077.00
Geometric Mean (95% CI), AUC	2697.45 (2136.46-3405.74)	24433.50 (21151.71-28224.47)	12778.71 (10112.23-16148.31)
Day 15 Visit (14 days post-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AUC	50079.00 (42724.00-61228.00)	62009.00 (57699.00-64364.00)	59662.50 (50137.00-64557.00)
Minimum - Maximum, AUC	27685.00-68253.00	41495.00-68226.00	35262.00-71101.00
Geometric Mean (95% CI), AUC	49895.42 (46968.56-53004.67)	59946.41 (58142.70-61806.07)	56717.60 (54079.44-59484.45)
N* (non-missing pre- and post-boost)	53	51	50
Participants with ≥ 2-fold rise[1], 95% CI	100.0% (93.3%-100.0%)	60.8% (46.1%-74.2%)	90.0% (78.2%-96.7%)
Participants with ≥ 4-fold rise[1], 95% CI	96.2% (87.0%-99.5%)	19.6% (9.8%-33.1%)	50.0% (35.5%-64.5%)
Geometric Mean Fold Rise[1], 95% CI	18.50 (14.78-23.15)	2.45 (2.15-2.80)	4.44 (3.59-5.49)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), AUC	44069.50 (38133.00-51951.00)	56424.00 (49663.00-60948.00)	53684.00 (45454.00-60740.00)
Minimum - Maximum, AUC	12350.00-64775.00	36823.00-71430.00	31533.00-65741.00
Geometric Mean (95% CI), AUC	42935.10 (39639.33-46504.89)	54913.99 (52894.45-57010.64)	51232.84 (48351.07-54286.38)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[1], 95% CI	98.1% (89.7%-100.0%)	52.9% (38.5%-67.1%)	89.8% (77.8%-96.6%)
Participants with ≥ 4-fold rise[1], 95% CI	92.3% (81.5%-97.9%)	11.8% (4.4%-23.9%)	46.9% (32.5%-61.7%)
Geometric Mean Fold Rise[1], 95% CI	16.19 (12.87-20.36)	2.25 (1.97-2.56)	4.12 (3.35-5.07)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 26. Variants of Concern: mRNA-1273 IgG Serum Binding Antibody Response to S-2P-WA-1 (control) by FFP 10-plex ECLIA by Group, Age Group, and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), AUC	2342.00 (1435.00-4981.00)	2463.00 (1573.50-3999.00)	23736.50 (17728.00-38221.00)	25941.00 (14966.00-38925.00)	15371.00 (11212.00-22136.00)	13850.00 (6372.00-17394.00)
Minimum - Maximum, AUC	799.80-27530.00	666.40-23981.00	11569.00-61246.00	7284.00-55018.00	803.40-50653.00	1783.00-52077.00
Geometric Mean (95% CI), AUC	2729.68 (1836.36-4057.59)	2676.50 (1974.95-3627.27)	24582.44 (20215.31-29892.99)	24279.56 (19340.74-30479.56)	14551.90 (10404.34-20352.83)	11221.59 (7966.67-15806.37)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), AUC	51935.00 (45830.00-61228.00)	49906.50 (39617.00-61490.50)	61870.50 (59515.00-63656.00)	62293.00 (55973.00-64392.00)	62664.00 (54879.00-64951.00)	55935.00 (48192.00-64121.00)
Minimum - Maximum, AUC	36970.00-68253.00	27685.00-66048.00	43701.00-67600.00	41495.00-68226.00	48735.00-67277.00	35262.00-71101.00
Geometric Mean (95% CI), AUC	52153.68 (48030.00-56631.39)	48466.85 (44457.43-52837.87)	61109.71 (59107.84-63179.39)	58760.05 (55709.42-61977.73)	59698.34 (57036.09-62484.85)	53885.68 (49632.83-58502.94)
N* (non-missing pre- and post-boost)	21	32	26	25	25	25
Participants with ≥ 2-fold rise[1], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	65.4% (44.3%-82.8%)	56.0% (34.9%-75.6%)	88.0% (68.8%-97.5%)	92.0% (74.0%-99.0%)
Participants with ≥ 4-fold rise[1], 95% CI	95.2% (76.2%-99.9%)	96.9% (83.8%-99.9%)	11.5% (2.4%-30.2%)	28.0% (12.1%-49.4%)	44.0% (24.4%-65.1%)	56.0% (34.9%-75.6%)
Geometric Mean Fold Rise[1], 95% CI	19.11 (12.93-28.23)	18.11 (13.58-24.14)	2.49 (2.07-2.99)	2.42 (1.98-2.96)	4.10 (2.95-5.70)	4.80 (3.58-6.44)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Median (P_{25}, P_{75}), AUC	44944.50 (38847.00-51447.00)	44069.50 (34544.00-51951.00)	56749.50 (51300.00-59756.00)	55406.00 (48277.00-61278.00)	57753.50 (49832.00-61372.00)	46843.00 (38581.00-59845.00)
Minimum - Maximum, AUC	29471.00-62586.00	12350.00-64775.00	41341.00-64312.00	36823.00-71430.00	38787.00-65741.00	31533.00-65490.00
Geometric Mean (95% CI), AUC	44970.53 (41258.38-49016.67)	41710.01 (36961.54-47068.51)	55525.00 (53122.66-58035.98)	54285.67 (50908.38-57887.02)	54622.72 (51413.74-58031.99)	48176.65 (43789.71-53003.08)
N* (non-missing pre- and post-boost)	20	32	26	25	24	25
Participants with ≥ 2-fold rise[1], 95% CI	95.0% (75.1%-99.9%)	100.0% (89.1%-100.0%)	57.7% (36.9%-76.6%)	48.0% (27.8%-68.7%)	91.7% (73.0%-99.0%)	88.0% (68.8%-97.5%)
Participants with ≥ 4-fold rise[1], 95% CI	95.0% (75.1%-99.9%)	90.6% (75.0%-98.0%)	7.7% (0.9%-25.1%)	16.0% (4.5%-36.1%)	37.5% (18.8%-59.4%)	56.0% (34.9%-75.6%)
Geometric Mean Fold Rise[1], 95% CI	17.20 (11.53-25.66)	15.58 (11.61-20.92)	2.26 (1.88-2.71)	2.24 (1.83-2.73)	3.95 (2.85-5.49)	4.29 (3.26-5.66)
Participants with ≥ 4-fold rise[1], 95% CI	95.0% (75.1%-99.9%)	90.6% (75.0%-98.0%)	7.7% (0.9%-25.1%)	16.0% (4.5%-36.1%)	37.5% (18.8%-59.4%)	56.0% (34.9%-75.6%)
Geometric Mean Fold Rise[1], 95% CI	17.20 (11.53-25.66)	15.58 (11.61-20.92)	2.26 (1.88-2.71)	2.24 (1.83-2.73)	3.95 (2.85-5.49)	4.29 (3.26-5.66)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 27. Variants of Concern: Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-WA-1 (control) by FFP 10-plex ECLIA by Group and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Median (P_{25}, P_{75}), AUC	3031.50 (1455.00-4965.00)	19057.00 (14608.00-33786.00)	10495.00 (6865.00-17920.00)
Minimum - Maximum, AUC	53.72-50700.00	3173.00-47335.00	1275.00-44083.00
Geometric Mean (95% CI), AUC	2706.54 (1987.71-3685.33)	19727.12 (16571.28-23483.96)	10813.77 (8790.20-13303.18)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Median (P_{25}, P_{75}), AUC	10998.50 (6611.00-14542.00)	45849.00 (37372.00-59381.00)	38346.00 (32645.00-50536.00)
Minimum - Maximum, AUC	77.03-48198.00	23983.00-68352.00	12782.00-62657.00
Geometric Mean (95% CI), AUC	9822.92 (7485.72-12889.85)	45825.57 (42581.21-49317.13)	36136.92 (32136.69-40635.07)
N* (non-missing pre- and post-boost)	50	49	50
Participants with ≥ 2-fold rise[1], 95% CI	82.0% (68.6%-91.4%)	55.1% (40.2%-69.3%)	72.0% (57.5%-83.8%)
Participants with ≥ 4-fold rise[1], 95% CI	42.0% (28.2%-56.8%)	16.3% (7.3%-29.7%)	42.0% (28.2%-56.8%)
Geometric Mean Fold Rise[1], 95% CI	3.63 (2.96-4.45)	2.32 (1.96-2.75)	3.43 (2.79-4.22)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Median (P_{25}, P_{75}), AUC	10949.50 (7134.00-16366.00)	52868.00 (42994.00-62659.00)	45376.00 (35829.00-52548.00)
Minimum - Maximum, AUC	1753.00-50071.00	25284.00-70644.00	17572.00-65009.00
Geometric Mean (95% CI), AUC	10536.86 (8586.26-12930.59)	51025.30 (47728.29-54550.05)	41488.05 (37555.26-45832.69)
N* (non-missing pre- and post-boost)	48	47	50
Participants with ≥ 2-fold rise[1], 95% CI	89.6% (77.3%-96.5%)	61.7% (46.4%-75.5%)	78.0% (64.0%-88.5%)
Participants with ≥ 4-fold rise[1], 95% CI	43.8% (29.5%-58.8%)	19.1% (9.1%-33.3%)	46.0% (31.8%-60.7%)
Geometric Mean Fold Rise[1], 95% CI	3.97 (3.20-4.94)	2.55 (2.12-3.06)	3.77 (3.05-4.67)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 28. Variants of Concern: Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-WA-1 (control) by FFP 10-plex ECLIA by Group, Age Group, and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Median (P_{25}, P_{75}), AUC	2935.50 (1546.00-4615.00)	3197.00 (1350.50-5669.50)	20270.00 (15106.00-36667.50)	18843.00 (14298.00-28695.00)	12333.00 (9136.00-19188.00)	9131.50 (4894.00-16277.00)
Minimum - Maximum, AUC	437.80-50700.00	53.72-47732.00	5910.00-47335.00	3173.00-40665.00	4217.00-40327.00	1275.00-44083.00
Geometric Mean (95% CI), AUC	2700.05 (1856.41-3927.06)	2713.60 (1596.43-4612.55)	22335.74 (17537.37-28446.98)	17509.94 (13521.90-22674.17)	13392.14 (10449.69-17163.13)	8803.93 (6358.95-12188.99)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Median (P_{25}, P_{75}), AUC	10654.00 (5301.00-14471.00)	11174.00 (7490.00-18668.00)	50139.50 (37916.00-62454.00)	42749.00 (37372.00-49570.00)	40456.50 (32666.00-51659.50)	37308.50 (25454.00-45638.00)
Minimum - Maximum, AUC	2758.00-47107.00	77.03-48198.00	28672.00-68352.00	23983.00-67326.00	12782.00-62657.00	13501.00-62236.00
Geometric Mean (95% CI), AUC	9809.76 (7425.83-12959.00)	9837.20 (5935.98-16302.35)	48843.60 (43773.91-54500.45)	43103.86 (39018.66-47616.76)	37923.14 (31768.77-45269.75)	34562.86 (29290.79-40783.86)
N* (non-missing pre- and post-boost)	26	24	24	25	24	26
Participants with ≥ 2-fold rise[1], 95% CI	84.6% (65.1%-95.6%)	79.2% (57.8%-92.9%)	45.8% (25.6%-67.2%)	64.0% (42.5%-82.0%)	66.7% (44.7%-84.4%)	76.9% (56.4%-91.0%)
Participants with ≥ 4-fold rise[1], 95% CI	42.3% (23.4%-63.1%)	41.7% (22.1%-63.4%)	12.5% (2.7%-32.4%)	20.0% (6.8%-40.7%)	29.2% (12.6%-51.1%)	53.8% (33.4%-73.4%)
Geometric Mean Fold Rise[1], 95% CI	3.63 (2.75-4.81)	3.63 (2.63-5.00)	2.19 (1.73-2.76)	2.46 (1.90-3.19)	2.96 (2.34-3.76)	3.93 (2.79-5.52)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Median (P_{25}, P_{75}), AUC	10175.50 (5466.50-15171.50)	11114.00 (8449.50-17268.50)	54196.00 (46617.00-63975.00)	51993.50 (41424.00-58574.50)	45258.00 (36321.00-52548.00)	45494.00 (35829.00-50275.00)
Minimum - Maximum, AUC	2750.00-44680.00	1753.00-50071.00	35513.00-69381.00	25284.00-70644.00	18835.00-64456.00	17572.00-65009.00
Geometric Mean (95% CI), AUC	9732.68 (7229.91-13101.82)	11407.49 (8445.28-15408.70)	53486.66 (48992.00-58393.66)	48772.85 (43989.43-54076.42)	42255.57 (36903.93-48383.28)	40734.47 (34858.93-47600.35)
N* (non-missing pre- and post-boost)	24	24	23	24	25	25
Participants with ≥ 2-fold rise[1], 95% CI	87.5% (67.6%-97.3%)	91.7% (73.0%-99.0%)	52.2% (30.6%-73.2%)	70.8% (48.9%-87.4%)	76.0% (54.9%-90.6%)	80.0% (59.3%-93.2%)
Participants with ≥ 4-fold rise[1], 95% CI	41.7% (22.1%-63.4%)	45.8% (25.6%-67.2%)	17.4% (5.0%-38.8%)	20.8% (7.1%-42.2%)	36.0% (18.0%-57.5%)	56.0% (34.9%-75.6%)
Geometric Mean Fold Rise[1], 95% CI	3.76 (2.84-4.97)	4.20 (2.95-5.99)	2.30 (1.81-2.93)	2.81 (2.10-3.75)	3.16 (2.49-4.00)	4.51 (3.15-6.47)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 29. Variants of Concern: BNT162b2 IgG Serum Binding Antibody Response to S-2P-WA-1 (control) by FFP 10-plex ECLIA by Group and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AUC	3107.00 (2030.00-5702.00)	21077.00 (14770.00-30985.00)	10091.00 (6887.00-15435.00)
Minimum - Maximum, AUC	348.80-51711.00	5532.00-43467.00	990.60-41508.00
Geometric Mean (95% CI), AUC	3232.04 (2455.97-4253.35)	20133.71 (17513.09-23146.47)	9854.17 (8032.98-12088.24)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), AUC	44122.50 (40500.50-50083.00)	58149.00 (51298.00-62146.00)	50144.00 (40247.00-59475.00)
Minimum - Maximum, AUC	16445.00-66728.00	40402.00-69494.00	18919.00-66342.00
Geometric Mean (95% CI), AUC	43169.12 (39952.94-46644.19)	56101.01 (53869.08-58425.42)	47387.78 (44094.47-50927.05)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[1], 95% CI	98.1% (89.7%-100.0%)	68.6% (54.1%-80.9%)	91.8% (80.4%-97.7%)
Participants with ≥ 4-fold rise[1], 95% CI	90.4% (79.0%-96.8%)	21.6% (11.3%-35.3%)	65.3% (50.4%-78.3%)
Geometric Mean Fold Rise[1], 95% CI	13.29 (10.39-17.00)	2.79 (2.45-3.17)	4.79 (3.96-5.80)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Median (P_{25}, P_{75}), AUC	40645.50 (35509.00-47018.50)	55456.50 (49238.00-61258.00)	45799.50 (37789.50-58317.00)
Minimum - Maximum, AUC	13652.00-66993.00	37414.00-65222.00	24155.00-62699.00
Geometric Mean (95% CI), AUC	38379.70 (34915.87-42187.16)	53856.90 (51582.38-56231.71)	45582.42 (42454.14-48941.22)
N* (non-missing pre- and post-boost)	52	50	48
Participants with ≥ 2-fold rise[1], 95% CI	98.1% (89.7%-100.0%)	64.0% (49.2%-77.1%)	91.7% (80.0%-97.7%)
Participants with ≥ 4-fold rise[1], 95% CI	90.4% (79.0%-96.8%)	20.0% (10.0%-33.7%)	56.3% (41.2%-70.5%)
Geometric Mean Fold Rise[1], 95% CI	11.82 (9.31-15.00)	2.67 (2.32-3.07)	4.57 (3.79-5.52)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 30. Variants of Concern: BNT162b2 IgG Serum Binding Antibody Response to S-2P-WA-1 (control) by FFP 10-plex ECLIA by Group, Age Group, and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Median (P_{25}, P_{75}), AUC	3364.00 (2139.00-7309.00)	2674.00 (1799.00-5479.00)	27875.00 (19731.00-32738.00)	16368.00 (11364.00-24025.00)	11994.50 (7080.00-19453.00)	8728.50 (5374.00-13798.00)
Minimum - Maximum, AUC	360.00-51711.00	348.80-16893.00	14954.00-39432.00	5532.00-43467.00	4898.00-41508.00	990.60-21392.00
Geometric Mean (95% CI), AUC	3482.28 (2341.83-5178.14)	2909.65 (1973.70-4289.44)	25688.25 (22616.25-29177.51)	16736.07 (13611.95-20577.22)	12421.00 (9535.25-16180.08)	7958.24 (5892.45-10748.26)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Median (P_{25}, P_{75}), AUC	45064.50 (40561.00-52852.00)	43270.00 (40440.00-47859.00)	60025.50 (57292.00-62146.00)	55373.00 (48318.00-61816.00)	51234.00 (40753.00-61623.00)	47270.50 (38894.00-54527.00)
Minimum - Maximum, AUC	19479.00-65164.00	16445.00-66728.00	42061.00-67523.00	40402.00-69494.00	30854.00-66342.00	18919.00-63223.00
Geometric Mean (95% CI), AUC	44833.40 (40895.83-49150.08)	40998.76 (35652.78-47146.33)	58362.50 (55479.03-61395.84)	54444.04 (51250.58-57836.48)	49607.94 (45084.73-54584.96)	45506.75 (40768.84-50795.28)
N* (non-missing pre- and post-boost)	30	22	22	29	23	26
Participants with ≥ 2-fold rise[1], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	54.5% (32.2%-75.6%)	79.3% (60.3%-92.0%)	87.0% (66.4%-97.2%)	96.2% (80.4%-99.9%)
Participants with ≥ 4-fold rise[1], 95% CI	86.7% (69.3%-96.2%)	95.5% (77.2%-99.9%)	4.5% (0.1%-22.8%)	34.5% (17.9%-54.3%)	56.5% (34.5%-76.8%)	73.1% (52.2%-88.4%)
Geometric Mean Fold Rise[1], 95% CI	12.73 (8.91-18.21)	14.09 (9.93-20.00)	2.27 (1.99-2.59)	3.25 (2.69-3.94)	3.92 (3.05-5.04)	5.72 (4.32-7.57)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Median (P_{25}, P_{75}), AUC	41102.50 (35764.00-49520.00)	40601.50 (34797.00-42584.00)	55850.00 (49862.00-61258.00)	54010.00 (47755.00-60943.00)	46421.00 (38455.00-60244.00)	45178.00 (37680.00-56675.00)
Minimum - Maximum, AUC	14291.00-63362.00	13652.00-66993.00	39779.00-65222.00	37414.00-65154.00	26263.00-62699.00	24155.00-62089.00
Geometric Mean (95% CI), AUC	39784.51 (35235.53-44920.77)	36543.64 (31145.78-42877.01)	54611.07 (51041.02-58430.83)	53317.28 (50245.50-56576.86)	46406.28 (41680.06-51668.42)	44837.40 (40516.66-49618.91)
N* (non-missing pre- and post-boost)	30	22	21	29	23	25
Participants with ≥ 2-fold rise[1], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	47.6% (25.7%-70.2%)	75.9% (56.5%-89.7%)	87.0% (66.4%-97.2%)	96.0% (79.6%-99.9%)

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Participants with ≥ 4-fold rise[1], 95% CI	86.7% (69.3%-96.2%)	95.5% (77.2%-99.9%)	4.8% (0.1%-23.8%)	31.0% (15.3%-50.8%)	43.5% (23.2%-65.5%)	68.0% (46.5%-85.1%)
Geometric Mean Fold Rise[1], 95% CI	11.30 (8.01-15.94)	12.56 (8.90-17.72)	2.09 (1.83-2.38)	3.19 (2.60-3.91)	3.59 (2.91-4.43)	5.72 (4.27-7.66)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 31. Variants of Concern: mRNA-1273 IgG Serum Binding Antibody Response to S-2P-B.1.617.2 by FFP 10-plex ECLIA by Group, and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AUC	1242.00 (766.80-2467.00)	14633.00 (9436.00-26071.00)	8672.50 (5043.00-12092.00)
Minimum - Maximum, AUC	379.30-14547.00	4217.00-48856.00	551.80-39146.00
Geometric Mean (95% CI), AUC	1476.47 (1150.35-1895.04)	15403.76 (12977.13-18284.16)	7696.02 (6085.21-9733.22)
Day 15 Visit (14 days post-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AUC	42452.00 (33463.00-51259.00)	50961.00 (46336.00-56205.00)	49369.00 (42693.00-62433.00)
Minimum - Maximum, AUC	16847.00-67696.00	32687.00-67612.00	26082.00-68586.00
Geometric Mean (95% CI), AUC	41068.75 (37703.03-44734.92)	50783.41 (48434.48-53246.25)	48494.17 (44985.03-52277.04)
N* (non-missing pre- and post-boost)	53	51	50
Participants with ≥ 2-fold rise[1], 95% CI	100.0% (93.3%-100.0%)	82.4% (69.1%-91.6%)	94.0% (83.5%-98.7%)
Participants with ≥ 4-fold rise[1], 95% CI	98.1% (89.9%-100.0%)	41.2% (27.6%-55.8%)	80.0% (66.3%-90.0%)
Geometric Mean Fold Rise[1], 95% CI	27.82 (21.99-35.18)	3.30 (2.84-3.82)	6.30 (5.15-7.70)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), AUC	38121.50 (26116.50-43802.00)	45409.00 (40469.00-52419.00)	45689.00 (36182.00-53931.00)
Minimum - Maximum, AUC	9150.00-62317.00	27937.00-72794.00	22181.00-64597.00
Geometric Mean (95% CI), AUC	33975.19 (30621.37-37696.35)	45362.31 (42900.93-47964.90)	43282.66 (39796.07-47074.70)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[1], 95% CI	100.0% (93.2%-100.0%)	70.6% (56.2%-82.5%)	95.9% (86.0%-99.5%)
Participants with ≥ 4-fold rise[1], 95% CI	96.2% (86.8%-99.5%)	31.4% (19.1%-45.9%)	77.6% (63.4%-88.2%)
Geometric Mean Fold Rise[1], 95% CI	23.26 (18.27-29.61)	2.94 (2.54-3.41)	5.80 (4.79-7.03)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 32. Variants of Concern: mRNA-1273 IgG Serum Binding Antibody Response to S-2P-B.1.617.2 by FFP 10-plex ECLIA by Group, Age Group and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), AUC	1250.00 (776.60-2467.00)	1177.50 (708.75-2530.00)	14338.50 (9532.00-24934.00)	15445.00 (9216.00-27383.00)	8950.00 (6876.00-11391.00)	8085.00 (2922.00-12748.00)
Minimum - Maximum, AUC	412.00-11609.00	379.30-14547.00	5125.00-48856.00	4217.00-44714.00	551.80-38878.00	1517.00-39146.00
Geometric Mean (95% CI), AUC	1524.34 (1027.61-2261.20)	1445.87 (1028.98-2031.66)	15714.65 (12470.98-19802.00)	15086.96 (11502.86-19787.82)	8697.59 (6236.81-12129.30)	6809.78 (4804.84-9651.34)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), AUC	43991.00 (39883.00-52980.00)	41390.00 (30589.00-50958.50)	51340.00 (48818.00-54865.00)	50156.00 (44360.00-56205.00)	55425.00 (43714.00-63179.00)	47082.00 (36742.00-57327.00)
Minimum - Maximum, AUC	25830.00-66703.00	16847.00-67696.00	38734.00-67612.00	32687.00-67195.00	34440.00-67899.00	26082.00-68586.00
Geometric Mean (95% CI), AUC	43660.88 (39044.00-48823.71)	39451.87 (34850.19-44661.17)	52074.41 (49485.42-54798.84)	49474.72 (45504.43-53791.41)	52877.84 (48832.00-57258.88)	44473.91 (39298.38-50331.05)
N* (non-missing pre- and post-boost)	21	32	26	25	25	25
Participants with ≥ 2-fold rise[1], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	84.6% (65.1%-95.6%)	80.0% (59.3%-93.2%)	92.0% (74.0%-99.0%)	96.0% (79.6%-99.9%)
Participants with ≥ 4-fold rise[1], 95% CI	95.2% (76.2%-99.9%)	100.0% (89.1%-100.0%)	42.3% (23.4%-63.1%)	40.0% (21.1%-61.3%)	76.0% (54.9%-90.6%)	84.0% (63.9%-95.5%)
Geometric Mean Fold Rise[1], 95% CI	28.64 (19.67-41.71)	27.29 (19.86-37.49)	3.31 (2.69-4.08)	3.28 (2.62-4.11)	6.08 (4.42-8.36)	6.53 (4.99-8.55)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Median (P_{25}, P_{75}), AUC	39130.50 (30021.00-42924.50)	36764.00 (25193.50-44011.50)	45627.50 (41882.00-49577.00)	44787.00 (39107.00-52707.00)	48817.50 (40077.00-57736.00)	42227.00 (31930.00-49345.00)
Minimum - Maximum, AUC	20733.00-58763.00	9150.00-62317.00	28569.00-64575.00	27937.00-72794.00	28305.00-64597.00	22181.00-63636.00
Geometric Mean (95% CI), AUC	36090.60 (31869.67-40870.58)	32716.49 (28050.24-38159.00)	45958.32 (42860.41-49280.14)	44750.65 (40786.44-49100.15)	47549.74 (43248.09-52279.25)	39546.95 (34588.59-45216.12)
N* (non-missing pre- and post-boost)	20	32	26	25	24	25
Participants with ≥ 2-fold rise[1], 95% CI	100.0% (83.2%-100.0%)	100.0% (89.1%-100.0%)	73.1% (52.2%-88.4%)	68.0% (46.5%-85.1%)	95.8% (78.9%-99.9%)	96.0% (79.6%-99.9%)
Participants with ≥ 4-fold rise[1], 95% CI	95.0% (75.1%-99.9%)	96.9% (83.8%-99.9%)	30.8% (14.3%-51.8%)	32.0% (14.9%-53.5%)	75.0% (53.3%-90.2%)	80.0% (59.3%-93.2%)
Geometric Mean Fold Rise[1], 95% CI	24.30 (16.41-35.99)	22.63 (16.38-31.27)	2.92 (2.38-3.60)	2.97 (2.37-3.71)	5.80 (4.24-7.93)	5.81 (4.52-7.46)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 33. Variants of Concern: Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-B.1.617.2 by FFP 10-plex ECLIA by Group, and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Median (P_{25}, P_{75}), AUC	1875.00 (800.40-2706.00)	11832.00 (8763.00-20078.00)	6838.00 (5090.00-11000.00)
Minimum - Maximum, AUC	8.50-47338.00	1551.00-35757.00	930.40-32652.00
Geometric Mean (95% CI), AUC	1485.86 (1040.83-2121.16)	11948.60 (9858.92-14481.21)	7121.54 (5782.42-8770.80)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Median (P_{25}, P_{75}), AUC	7000.00 (4367.00-10211.00)	33747.00 (23795.00-46331.00)	26955.50 (18223.00-40665.00)
Minimum - Maximum, AUC	33.82-43505.00	14199.00-69524.00	7031.00-55058.00
Geometric Mean (95% CI), AUC	6269.28 (4670.91-8414.61)	32833.40 (29392.07-36677.65)	25498.94 (21934.14-29643.10)
N* (non-missing pre- and post-boost)	50	49	50
Participants with ≥ 2-fold rise[1], 95% CI	88.0% (75.7%-95.5%)	61.2% (46.2%-74.8%)	78.0% (64.0%-88.5%)
Participants with ≥ 4-fold rise[1], 95% CI	48.0% (33.7%-62.6%)	24.5% (13.3%-38.9%)	44.0% (30.0%-58.7%)
Geometric Mean Fold Rise[1], 95% CI	4.22 (3.41-5.22)	2.75 (2.26-3.34)	3.69 (2.98-4.57)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Median (P_{25}, P_{75}), AUC	7257.50 (4686.00-9413.50)	40515.00 (29706.00-52266.00)	36397.00 (22725.00-43173.00)
Minimum - Maximum, AUC	960.20-42226.00	13719.00-72036.00	10427.00-62507.00
Geometric Mean (95% CI), AUC	6755.88 (5448.46-8377.03)	39441.68 (35539.50-43772.32)	30718.44 (26765.96-35254.58)
N* (non-missing pre- and post-boost)	48	47	50
Participants with ≥ 2-fold rise[1], 95% CI	91.7% (80.0%-97.7%)	72.3% (57.4%-84.4%)	86.0% (73.3%-94.2%)
Participants with ≥ 4-fold rise[1], 95% CI	47.9% (33.3%-62.8%)	34.0% (20.9%-49.3%)	48.0% (33.7%-62.6%)
Geometric Mean Fold Rise[1], 95% CI	4.64 (3.61-5.96)	3.24 (2.63-4.00)	4.25 (3.40-5.32)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 34. Variants of Concern: Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-B.1.617.2 by FFP 10-plex ECLIA by Group, Age Group, and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Median (P_{25}, P_{75}), AUC	1898.50 (927.70-2599.00)	1875.00 (682.70-2905.00)	15032.50 (9199.50-23326.50)	11401.00 (8075.00-15795.00)	8115.00 (6209.00-11676.00)	5572.50 (3402.00-8583.00)
Minimum - Maximum, AUC	204.50-47338.00	8.50-33237.00	2689.00-35757.00	1551.00-23946.00	2657.00-32652.00	930.40-31786.00
Geometric Mean (95% CI), AUC	1597.17 (1047.35-2435.64)	1374.01 (740.43-2549.74)	14026.60 (10600.32-18560.34)	10243.94 (7829.85-13402.35)	9010.87 (6973.58-11643.34)	5679.53 (4134.08-7802.72)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Median (P_{25}, P_{75}), AUC	7420.50 (4004.00-10002.00)	6656.50 (4558.50-10843.00)	37376.00 (24439.50-49330.00)	28081.00 (23035.00-39797.00)	30556.50 (20080.50-43254.50)	24654.50 (15815.00-34496.00)
Minimum - Maximum, AUC	963.20-43505.00	33.82-35239.00	15317.00-69524.00	14199.00-60096.00	7031.00-55058.00	8630.00-54759.00
Geometric Mean (95% CI), AUC	6571.26 (4783.48-9027.21)	5957.77 (3487.85-10176.77)	35829.01 (30377.34-42259.07)	30193.51 (25932.83-35154.21)	27278.34 (21635.80-34392.43)	23959.61 (19462.92-29495.21)
N* (non-missing pre- and post-boost)	26	24	24	25	24	26
Participants with ≥ 2-fold rise[1], 95% CI	88.5% (69.8%-97.6%)	87.5% (67.6%-97.3%)	54.2% (32.8%-74.4%)	68.0% (46.5%-85.1%)	75.0% (53.3%-90.2%)	80.8% (60.6%-93.4%)
Participants with ≥ 4-fold rise[1], 95% CI	50.0% (29.9%-70.1%)	45.8% (25.6%-67.2%)	20.8% (7.1%-42.2%)	28.0% (12.1%-49.4%)	41.7% (22.1%-63.4%)	46.2% (26.6%-66.6%)
Geometric Mean Fold Rise[1], 95% CI	4.11 (3.10-5.45)	4.34 (3.07-6.13)	2.55 (1.92-3.40)	2.95 (2.21-3.92)	3.19 (2.43-4.20)	4.22 (3.03-5.88)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Median (P_{25}, P_{75}), AUC	7240.00 (3744.50-9748.50)	7257.50 (5168.00-9323.50)	41849.00 (36358.00-57300.00)	38005.00 (27786.00-45899.00)	35962.00 (23923.00-43450.00)	36832.00 (20483.00-40641.00)
Minimum - Maximum, AUC	1211.00-42226.00	960.20-33558.00	22428.00-72036.00	13719.00-65792.00	10427.00-62507.00	12036.00-57163.00
Geometric Mean (95% CI), AUC	6545.32 (4719.97-9076.58)	6973.22 (5143.36-9454.11)	42905.54 (37291.61-49364.60)	36384.85 (31114.47-42547.97)	32303.18 (26696.73-39087.01)	29211.45 (23657.53-36069.22)
N* (non-missing pre- and post-boost)	24	24	23	24	25	25
Participants with ≥ 2-fold rise[1], 95% CI	91.7% (73.0%-99.0%)	91.7% (73.0%-99.0%)	65.2% (42.7%-83.6%)	79.2% (57.8%-92.9%)	84.0% (63.9%-95.5%)	88.0% (68.8%-97.5%)
Participants with ≥ 4-fold rise[1], 95% CI	50.0% (29.1%-70.9%)	45.8% (25.6%-67.2%)	26.1% (10.2%-48.4%)	41.7% (22.1%-63.4%)	44.0% (24.4%-65.1%)	52.0% (31.3%-72.2%)
Geometric Mean Fold Rise[1], 95% CI	4.23 (3.18-5.64)	5.08 (3.29-7.83)	2.93 (2.20-3.90)	3.57 (2.59-4.93)	3.58 (2.75-4.68)	5.04 (3.48-7.29)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 35. Variants of Concern: BNT162b2 IgG Serum Binding Antibody Response to S-2P-B.1.617.2 by FFP 10-plex ECLIA by Group, and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AUC	2090.00 (1102.00-2955.00)	13629.00 (7405.00-17406.00)	6433.50 (4252.00-10855.00)
Minimum - Maximum, AUC	95.44-46836.00	3954.00-29343.00	998.40-36991.00
Geometric Mean (95% CI), AUC	1845.42 (1385.10-2458.72)	12196.16 (10499.06-14167.57)	6454.35 (5287.39-7878.87)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), AUC	38821.00 (31769.00-44287.00)	46598.00 (38376.00-52678.00)	39905.00 (32966.00-49915.00)
Minimum - Maximum, AUC	11892.00-67654.00	30565.00-66759.00	19000.00-63834.00
Geometric Mean (95% CI), AUC	35658.21 (32202.52-39484.75)	45950.77 (43553.56-48479.92)	39149.54 (35848.37-42754.69)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[1], 95% CI	98.1% (89.7%-100.0%)	96.1% (86.5%-99.5%)	95.9% (86.0%-99.5%)
Participants with ≥ 4-fold rise[1], 95% CI	96.2% (86.8%-99.5%)	39.2% (25.8%-53.9%)	77.6% (63.4%-88.2%)
Geometric Mean Fold Rise[1], 95% CI	19.27 (14.96-24.82)	3.77 (3.30-4.30)	6.02 (5.04-7.19)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Median (P_{25}, P_{75}), AUC	32647.00 (22007.00-39024.50)	44136.00 (37742.00-48488.00)	34549.00 (29898.50-46180.00)
Minimum - Maximum, AUC	7831.00-67012.00	22781.00-62979.00	15515.00-57968.00
Geometric Mean (95% CI), AUC	29432.53 (25981.55-33341.89)	42609.58 (40021.14-45365.45)	34783.68 (31460.42-38458.00)
N* (non-missing pre- and post-boost)	52	50	48
Participants with ≥ 2-fold rise[1], 95% CI	98.1% (89.7%-100.0%)	92.0% (80.8%-97.8%)	95.8% (85.7%-99.5%)
Participants with ≥ 4-fold rise[1], 95% CI	96.2% (86.8%-99.5%)	34.0% (21.2%-48.8%)	62.5% (47.4%-76.0%)
Geometric Mean Fold Rise[1], 95% CI	15.90 (12.44-20.34)	3.46 (2.99-3.99)	5.33 (4.47-6.36)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 36. Variants of Concern: BNT162b2 IgG Serum Binding Antibody Response to S-2P-B.1.617.2 by FFP 10-plex ECLIA by Group, Age Group, and Timepoint – Results are reported as Area Under Curve (AUC)

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Median (P_{25}, P_{75}), AUC	2209.00 (1108.00-3313.00)	1506.00 (1075.00-2712.00)	16398.00 (12659.00-20728.00)	12115.00 (6283.00-16045.00)	8030.00 (4941.50-12396.50)	5097.00 (3170.00-7654.00)
Minimum - Maximum, AUC	246.40-46836.00	95.44-8892.00	7081.00-29090.00	3954.00-29343.00	2873.00-36991.00	998.40-14898.00
Geometric Mean (95% CI), AUC	2088.91 (1386.48-3147.19)	1549.71 (1030.96-2329.49)	15840.57 (13553.24-18513.94)	10001.91 (8066.74-12401.33)	8372.13 (6350.18-11037.90)	5076.45 (3876.31-6648.17)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Median (P_{25}, P_{75}), AUC	40147.50 (32696.00-44807.00)	36658.00 (29942.00-40070.00)	48676.50 (45223.00-52895.00)	44826.00 (37406.00-51147.00)	42958.00 (35384.00-50746.00)	38714.50 (31331.00-43458.00)
Minimum - Maximum, AUC	12392.00-66657.00	11892.00-67654.00	36787.00-66759.00	30565.00-63244.00	19571.00-63834.00	19000.00-61469.00
Geometric Mean (95% CI), AUC	37792.25 (33577.31-42536.29)	32941.02 (27354.65-39668.24)	48591.57 (45261.24-52166.95)	44043.56 (40768.77-47581.41)	41699.17 (36547.98-47576.39)	37024.35 (32758.13-41846.17)
N* (non-missing pre- and post-boost)	30	22	22	29	23	26
Participants with ≥ 2-fold rise[1], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	95.5% (77.2%-99.9%)	96.6% (82.2%-99.9%)	91.3% (72.0%-98.9%)	100.0% (86.8%-100.0%)
Participants with ≥ 4-fold rise[1], 95% CI	93.3% (77.9%-99.2%)	100.0% (84.6%-100.0%)	22.7% (7.8%-45.4%)	51.7% (32.5%-70.6%)	69.6% (47.1%-86.8%)	84.6% (65.1%-95.6%)
Geometric Mean Fold Rise[1], 95% CI	17.93 (12.39-25.95)	21.26 (14.93-30.26)	3.07 (2.60-3.62)	4.40 (3.66-5.29)	4.84 (3.79-6.20)	7.29 (5.71-9.31)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Median (P_{25}, P_{75}), AUC	33923.50 (21729.00-42557.00)	31276.00 (22285.00-36335.00)	44817.00 (40172.00-49361.00)	43763.00 (36624.00-48240.00)	35379.00 (30383.00-50350.00)	32954.00 (29730.00-43578.00)
Minimum - Maximum, AUC	7831.00-67012.00	10322.00-66309.00	25257.00-62979.00	22781.00-61039.00	15515.00-57968.00	17051.00-57172.00
Geometric Mean (95% CI), AUC	30918.37 (26140.69-36569.27)	27520.78 (22569.75-33557.90)	43714.94 (39659.83-48184.66)	41826.65 (38364.87-45600.80)	36409.51 (31293.49-42361.94)	33352.12 (28943.33-38432.47)
N* (non-missing pre- and post-boost)	30	22	21	29	23	25

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Participants with ≥ 2-fold rise[1], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	85.7% (63.7%-97.0%)	96.6% (82.2%-99.9%)	91.3% (72.0%-98.9%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[1], 95% CI	93.3% (77.9%-99.2%)	100.0% (84.6%-100.0%)	9.5% (1.2%-30.4%)	51.7% (32.5%-70.6%)	52.2% (30.6%-73.2%)	72.0% (50.6%-87.9%)
Geometric Mean Fold Rise[1], 95% CI	14.67 (10.30-20.90)	17.76 (12.48-25.27)	2.66 (2.32-3.04)	4.18 (3.40-5.15)	4.19 (3.39-5.18)	6.65 (5.13-8.63)

[1] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 37. mRNA-1273 IgG Serum Binding Antibody Response to S-2P-B.351 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AU/mL	1998.35 (1358.40-4816.59)	32872.20 (20022.23-76593.92)	19390.99 (9419.07-30827.52)
Minimum - Maximum, AU/mL	480.55-37058.45	10719.23-763362.65	1061.79-149256.77
Geometric Mean (95% CI), AU/mL	2436.81 (1900.63-3124.23)	39230.55 (30365.17-50684.24)	17836.45 (13344.14-23841.09)
Day 15 Visit (14 days post-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AU/mL	176405.96 (93170.85-321604.32)	312131.56 (253345.94-453896.92)	338950.54 (175715.92-664499.32)
Minimum - Maximum, AU/mL	11195.05-1116017.71	151282.31-1588556.65	70588.24-1493816.81
Geometric Mean (95% CI), AU/mL	166729.55 (128702.03-215993.04)	341172.58 (294060.01-395833.24)	351184.95 (281100.91-438742.33)
N* (non-missing pre- and post-boost)	53	51	50
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (93.3%-100.0%)	98.0% (89.6%-100.0%)	98.0% (89.4%-99.9%)
Participants with ≥ 4-fold rise[2], 95% CI	100.0% (93.3%-100.0%)	82.4% (69.1%-91.6%)	98.0% (89.4%-99.9%)
Geometric Mean Fold Rise[2], 95% CI	68.42 (49.63-94.32)	8.70 (6.81-11.11)	19.69 (15.41-25.16)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), AU/mL	146786.34 (89370.40-230397.08)	292418.82 (210742.80-429583.03)	260739.75 (166061.87-525538.32)
Minimum - Maximum, AU/mL	27932.41-595373.80	120383.65-1588329.49	80635.07-1430145.19
Geometric Mean (95% CI), AU/mL	146550.28 (120698.12-177939.68)	298904.15 (255279.00-349984.49)	289827.66 (236944.61-354513.55)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (93.2%-100.0%)	98.0% (89.6%-100.0%)	98.0% (89.1%-99.9%)
Participants with ≥ 4-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	80.4% (66.9%-90.2%)	98.0% (89.1%-99.9%)
Geometric Mean Fold Rise[2], 95% CI	60.43 (45.83-79.69)	7.62 (5.98-9.72)	16.95 (13.40-21.43)

[1] Antibody values below the lower limit of quantification (LLOQ = 10.254 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 5740875 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 38. mRNA-1273 IgG Serum Binding Antibody Response to S-2P- B.351 by 4-plex ECLIA V.2 by Group, Age Group, and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), AU/mL	1998.35 (1401.58-3129.67)	2109.52 (1322.90-5116.42)	31513.18 (20057.93-62099.75)	44954.18 (20022.23-84967.89)	23015.84 (13448.81-36572.07)	15282.88 (7358.28-24168.26)
Minimum - Maximum, AU/mL	713.15-22286.72	480.55-37058.45	12735.80-209983.35	10719.23-763362.65	1061.79-149256.77	2565.02-99270.94
Geometric Mean (95% CI), AU/mL	2404.74 (1606.74-3599.06)	2458.08 (1760.55-3431.98)	36005.89 (26331.32-49235.05)	42890.91 (27892.74-65953.73)	22930.78 (14820.06-35480.35)	13873.87 (9422.41-20428.37)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75}), AU/mL	176941.57 (77797.50-282713.03)	157525.10 (105141.74-329008.21)	315396.71 (268581.71-373093.62)	305207.51 (189683.16-480103.10)	475332.75 (303023.73-802945.04)	270475.03 (139251.88-406768.32)
Minimum - Maximum, AU/mL	11195.05-727992.53	59366.78-1116017.71	181765.04-1279337.11	151282.31-1588556.65	97346.76-1493816.81	70588.24-1433707.12
Geometric Mean (95% CI), AU/mL	137839.88 (81062.85-234383.97)	188905.04 (144182.84-247499.04)	336779.24 (286442.31-395961.95)	345802.46 (265153.78-450981.08)	450444.95 (338483.78-599439.80)	273797.87 (196582.76-381342.06)
N* (non-missing pre- and post-boost)	21	32	26	25	25	25
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	100.0% (86.8%-100.0%)	96.0% (79.6%-99.9%)	96.0% (79.6%-99.9%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	84.6% (65.1%-95.6%)	80.0% (59.3%-93.2%)	96.0% (79.6%-99.9%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	57.32 (30.28-108.51)	76.85 (53.86-109.66)	9.35 (7.02-12.46)	8.06 (5.29-12.29)	19.64 (12.76-30.25)	19.73 (15.07-25.84)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Median (P_{25}, P_{75}), AU/mL	164820.43 (122002.23-221725.73)	134968.15 (71319.34-234394.81)	276079.02 (211865.61-361683.43)	301165.29 (203328.48-433458.39)	337240.36 (189759.84-600599.23)	221617.99 (165022.36-363494.17)
Minimum - Maximum, AU/mL	58329.38-382241.55	27932.41-595373.80	129071.56-985545.37	120383.65-1588329.49	80635.07-1006829.14	99009.05-1430145.19
Geometric Mean (95% CI), AU/mL	162350.76 (126972.60-207586.27)	137465.71 (103504.24-182570.49)	295868.54 (241771.39-362070.10)	302094.23 (233066.94-391565.28)	340495.81 (256045.04-452800.81)	248294.31 (185642.40-332090.42)
N* (non-missing pre- and post-boost)	20	32	26	25	24	25
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (83.2%-100.0%)	100.0% (89.1%-100.0%)	100.0% (86.8%-100.0%)	96.0% (79.6%-99.9%)	95.8% (78.9%-99.9%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	100.0% (83.2%-100.0%)	96.9% (83.8%-99.9%)	80.8% (60.6%-93.4%)	80.0% (59.3%-93.2%)	95.8% (78.9%-99.9%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	68.41 (44.00-106.36)	55.92 (38.56-81.10)	8.22 (6.34-10.65)	7.04 (4.56-10.89)	16.01 (10.47-24.50)	17.90 (13.99-22.90)

[1] Antibody values below the lower limit of quantification (LLOQ = 10.254 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 5740875 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 39. Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-B.351 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Median (P_{25}, P_{75}), AU/mL	3736.75 (1412.97-5593.49)	29529.79 (20883.74-51059.97)	16525.07 (11593.35-27558.47)
Minimum - Maximum, AU/mL	5.12-292072.17	4316.03-158701.48	1903.03-90620.45
Geometric Mean (95% CI), AU/mL	2924.81 (1935.04-4420.83)	28906.08 (23180.03-36046.61)	17257.52 (13706.93-21727.82)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Median (P_{25}, P_{75}), AU/mL	17892.28 (9242.73-25147.64)	121496.14 (78706.00-267988.09)	87172.77 (51372.88-207866.98)
Minimum - Maximum, AU/mL	5.12-198352.75	36315.67-1379442.33	16945.86-519497.30
Geometric Mean (95% CI), AU/mL	15031.97 (10075.70-22426.24)	138257.72 (110105.02-173608.78)	99536.65 (77764.17-127405.01)
N* (non-missing pre- and post-boost)	50	49	50
Participants with ≥ 2-fold rise[2], 95% CI	88.0% (75.7%-95.5%)	81.6% (68.0%-91.2%)	92.0% (80.8%-97.8%)
Participants with ≥ 4-fold rise[2], 95% CI	58.0% (43.2%-71.8%)	53.1% (38.3%-67.5%)	56.0% (41.3%-70.0%)
Geometric Mean Fold Rise[2], 95% CI	5.14 (3.99-6.63)	4.78 (3.62-6.33)	5.96 (4.53-7.84)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Median (P_{25}, P_{75}), AU/mL	17303.82 (10205.86-27264.98)	152346.11 (101785.43-390262.88)	123098.32 (61284.43-228209.90)
Minimum - Maximum, AU/mL	1973.31-156007.31	34811.45-2580883.46	24145.26-548889.05
Geometric Mean (95% CI), AU/mL	16487.07 (12985.88-20932.23)	183215.13 (142153.82-236137.05)	119673.02 (94487.99-151570.91)
N* (non-missing pre- and post-boost)	48	47	50
Participants with ≥ 2-fold rise[2], 95% CI	93.8% (82.8%-98.7%)	85.1% (71.7%-93.8%)	90.0% (78.2%-96.7%)
Participants with ≥ 4-fold rise[2], 95% CI	58.3% (43.2%-72.4%)	61.7% (46.4%-75.5%)	64.0% (49.2%-77.1%)
Geometric Mean Fold Rise[2], 95% CI	5.80 (4.31-7.81)	6.22 (4.53-8.53)	6.79 (5.12-8.98)

[1] Antibody values below the lower limit of quantification (LLOQ = 10.254 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 5740875 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 40. Ad26.COV2.S IgG Serum Binding Antibody Response to S-2P-B.351 by 4-plex ECLIA V.2 by Group, Age Group, and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Median (P_{25}, P_{75}), AU/mL	3578.62 (1412.97-5496.80)	3856.29 (1380.04-5598.25)	33268.51 (20848.28-61871.19)	29529.79 (20883.74-37342.46)	17490.70 (13823.16-31332.83)	13766.31 (6707.58-21663.99)
Minimum - Maximum, AU/mL	561.53-292072.17	5.12-63092.06	6051.53-158701.48	4316.03-70235.11	6466.42-90620.45	1903.03-85304.83
Geometric Mean (95% CI), AU/mL	3215.42 (1979.43-5223.20)	2639.54 (1284.07-5425.86)	34775.92 (24928.43-48513.48)	24205.35 (17980.27-32585.65)	21213.06 (15945.35-28220.99)	14151.43 (9863.11-20304.25)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Median (P_{25}, P_{75}), AU/mL	18303.14 (9242.73-22951.40)	17376.54 (9741.25-28140.14)	150537.80 (90529.36-354225.71)	103658.87 (72999.71-160420.71)	100079.26 (51532.32-235108.10)	81180.35 (44949.80-150829.28)
Minimum - Maximum, AU/mL	3022.48-198352.75	5.12-73796.63	36315.67-1379442.33	41526.23-431376.88	16945.86-440331.42	27123.92-519497.30
Geometric Mean (95% CI), AU/mL	16877.36 (11693.23-24359.85)	13259.78 (6162.65-28530.23)	164462.66 (112851.73-239677.04)	117037.92 (89134.45-153676.54)	108523.79 (73468.40-160305.84)	91902.83 (65874.71-128215.07)
N* (non-missing pre- and post-boost)	26	24	24	25	24	26
Participants with ≥ 2-fold rise[2], 95% CI	88.5% (69.8%-97.6%)	87.5% (67.6%-97.3%)	87.5% (67.6%-97.3%)	76.0% (54.9%-90.6%)	87.5% (67.6%-97.3%)	96.2% (80.4%-99.9%)
Participants with ≥ 4-fold rise[2], 95% CI	65.4% (44.3%-82.8%)	50.0% (29.1%-70.9%)	41.7% (22.1%-63.4%)	64.0% (42.5%-82.0%)	50.0% (29.1%-70.9%)	61.5% (40.6%-79.8%)
Geometric Mean Fold Rise[2], 95% CI	5.25 (3.78-7.30)	5.02 (3.31-7.64)	4.73 (3.07-7.29)	4.84 (3.28-7.14)	5.43 (3.66-8.05)	6.49 (4.32-9.77)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Median (P_{25}, P_{75}), AU/mL	17632.84 (8218.90-26443.80)	17303.82 (12379.85-27327.81)	161849.83 (125270.49-390870.18)	146286.50 (91084.35-278454.11)	116455.09 (69418.68-238297.24)	128132.77 (47252.77-202959.40)
Minimum - Maximum, AU/mL	4129.22-156007.31	1973.31-57220.75	50952.67-2580883.46	34811.45-706108.31	24145.26-548889.05	26950.35-479601.92
Geometric Mean (95% CI), AU/mL	16275.68 (11185.93-23681.33)	16701.20 (12068.31-23112.61)	212658.29 (141963.62-318557.33)	158831.65 (114057.34-221182.55)	127926.21 (90618.65-180593.23)	111952.28 (79173.27-158302.34)
N* (non-missing pre- and post-boost)	24	24	23	24	25	25
Participants with ≥ 2-fold rise[2], 95% CI	91.7% (73.0%-99.0%)	95.8% (78.9%-99.9%)	91.3% (72.0%-98.9%)	79.2% (57.8%-92.9%)	88.0% (68.8%-97.5%)	92.0% (74.0%-99.0%)

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Participants with ≥ 4-fold rise[2], 95% CI	66.7% (44.7%-84.4%)	50.0% (29.1%-70.9%)	56.5% (34.5%-76.8%)	66.7% (44.7%-84.4%)	60.0% (38.7%-78.9%)	68.0% (46.5%-85.1%)
Geometric Mean Fold Rise[2], 95% CI	5.32 (3.84-7.37)	6.33 (3.76-10.66)	5.83 (3.62-9.39)	6.62 (4.21-10.41)	6.03 (4.14-8.78)	7.63 (4.92-11.85)

[1] Antibody values below the lower limit of quantification (LLOQ = 10.254 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 5740875 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 41. BNT162b2 IgG Serum Binding Antibody Response to S-2P-B.351 by 4-plex ECLIA V.2 by Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75}), AU/mL	3501.53 (1605.09-6512.64)	27416.05 (14512.33-41354.71)	12124.07 (6884.80-17548.85)
Minimum - Maximum, AU/mL	153.79-233523.48	6453.21-70730.37	1215.49-77816.98
Geometric Mean (95% CI), AU/mL	3303.47 (2404.08-4539.32)	24561.32 (20531.67-29381.85)	11593.12 (9332.11-14401.92)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75}), AU/mL	138300.52 (89112.96-222893.27)	260525.12 (171791.49-355427.82)	184620.16 (112077.73-286645.00)
Minimum - Maximum, AU/mL	25136.17-1375820.54	96109.28-1090776.68	40455.53-962595.99
Geometric Mean (95% CI), AU/mL	140699.51 (112108.63-176581.89)	254378.68 (219781.65-294421.82)	187309.22 (151901.80-230969.91)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	100.0% (93.0%-100.0%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	96.1% (86.5%-99.5%)	98.0% (89.1%-99.9%)
Geometric Mean Fold Rise[2], 95% CI	42.59 (31.73-57.17)	10.36 (8.68-12.36)	16.05 (12.79-20.13)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Median (P_{25}, P_{75}), AU/mL	118094.12 (72457.83-178109.54)	266647.98 (197388.58-335237.09)	153562.53 (110576.26-280807.21)
Minimum - Maximum, AU/mL	18500.11-1062529.94	66695.69-749237.86	52392.45-588797.67
Geometric Mean (95% CI), AU/mL	122943.29 (98443.22-153540.83)	253480.27 (220251.78-291721.79)	175389.64 (145222.04-211824.08)
N* (non-missing pre- and post-boost)	52	50	48
Participants with ≥ 2-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	100.0% (92.9%-100.0%)	100.0% (92.6%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	98.1% (89.7%-100.0%)	94.0% (83.5%-98.7%)	97.9% (88.9%-99.9%)
Geometric Mean Fold Rise[2], 95% CI	37.21 (27.68-50.02)	10.19 (8.35-12.43)	14.99 (11.90-18.90)

[1] Antibody values below the lower limit of quantification (LLOQ = 10.254 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 5740875 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 42. BNT162b2 IgG Serum Binding Antibody Response to S-2P-B.351 by 4-plex ECLIA V.2 by Group, Age Group and Timepoint – Results are reported as Arbitrary Units (AU/mL)

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Median (P_{25}, P_{75}), AU/mL	3515.44 (1783.67-6513.96)	2334.28 (1507.00-5536.31)	35588.39 (23893.26-44611.47)	19394.15 (11152.78-33241.50)	12705.32 (8996.08-24720.49)	9331.22 (6647.80-16290.59)
Minimum - Maximum, AU/mL	376.57-233523.48	153.79-18718.63	12992.99-57568.83	6453.21-70730.37	4694.31-77816.98	1215.49-32624.23
Geometric Mean (95% CI), AU/mL	3812.10 (2437.96-5960.77)	2699.81 (1696.83-4295.63)	32064.07 (26456.18-38860.67)	20064.50 (15391.88-26155.63)	14571.76 (10609.14-20014.46)	9387.02 (7003.45-12581.81)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Median (P_{25}, P_{75}), AU/mL	145235.51 (107855.78-235039.91)	108136.61 (80678.22-174995.31)	275866.96 (255177.87-383946.92)	203210.15 (165143.09-307090.82)	200328.63 (130896.70-399337.36)	162644.23 (107531.08-265279.88)
Minimum - Maximum, AU/mL	36872.59-1375820.54	25136.17-1222689.23	96109.28-1090776.68	97789.63-613507.78	40455.53-962595.99	49885.22-543888.63
Geometric Mean (95% CI), AU/mL	158849.46 (118882.71-212252.49)	119244.49 (81532.68-174399.38)	289024.65 (233617.57-357572.62)	230893.67 (188319.95-283092.09)	208610.90 (148526.68-293001.27)	170285.93 (129539.55-223849.00)
N* (non-missing pre- and post-boost)	30	22	22	29	23	26
Participants with ≥ 2-fold rise[2], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	100.0% (84.6%-100.0%)	100.0% (88.1%-100.0%)	100.0% (85.2%-100.0%)	100.0% (86.8%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	95.5% (77.2%-99.9%)	96.6% (82.2%-99.9%)	95.7% (78.1%-99.9%)	100.0% (86.8%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	41.47 (27.20-63.21)	44.17 (28.65-68.09)	9.01 (6.93-11.72)	11.51 (9.01-14.70)	13.97 (10.00-19.53)	18.14 (13.15-25.03)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Median (P_{25}, P_{75}), AU/mL	122632.57 (82949.97-240641.58)	109107.66 (61147.42-144570.42)	275694.83 (200576.67-329401.18)	260282.00 (174534.52-359543.76)	150591.31 (130021.15-358550.79)	156533.75 (102256.17-205273.80)
Minimum - Maximum, AU/mL	26359.82-636450.93	18500.11-1062529.94	115368.47-606064.17	66695.69-749237.86	63612.56-588797.67	52392.45-572808.71
Geometric Mean (95% CI), AU/mL	135572.61 (101613.54-180880.75)	107595.76 (74408.02-155586.00)	262393.06 (218832.55-314624.66)	247215.76 (199850.94-305806.08)	187347.08 (143395.94-244769.33)	165064.01 (124415.87-218992.38)
N* (non-missing pre- and post-boost)	30	22	21	29	23	25

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Participants with ≥ 2-fold rise[2], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	100.0% (83.9%-100.0%)	100.0% (88.1%-100.0%)	100.0% (85.2%-100.0%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	95.2% (76.2%-99.9%)	93.1% (77.2%-99.2%)	95.7% (78.1%-99.9%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	35.39 (22.92-54.64)	39.85 (26.39-60.19)	7.84 (6.31-9.75)	12.32 (9.16-16.57)	12.27 (9.26-16.25)	18.03 (12.52-25.97)

[1] Antibody values below the lower limit of quantification (LLOQ = 10.254 AU/mL) were assigned a value equal to LLOQ/2. Values greater than the upper limit of quantification (ULOQ = 5740875 AU/mL) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.
[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no missing observations at both pre- and post-boost timepoints.

Supplemental Table 43. SARS-CoV-2 Pseudovirion Neutralization Antibody - mRNA-1273 Neutralization Antibody Response (International Units/ml for 50% neutralization, IU50/ml) to Pseudovirus D614G[1], by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	52	50	50
Median (P_{25}, P_{75})	8.30 (3.85-16.17)	82.60 (42.65-180.68)	28.68 (14.55-39.17)
Minimum - Maximum	1.21-1589.04	9.89-1174.00	1.21-676.16
Geometric Mean (95% CI)	8.91 (6.19-12.82)	88.65 (67.78-115.93)	24.79 (17.96-34.21)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	50	50
Median (P_{25}, P_{75})	791.05 (264.84-1214.46)	867.04 (634.26-1073.84)	859.27 (439.77-1171.36)
Minimum - Maximum	136.45-7207.20	166.13-6587.61	118.44-5430.32
Geometric Mean (95% CI)	676.12 (517.53-883.31)	901.81 (727.54-1117.83)	785.76 (596.43-1035.20)
Day 29 Visit (28 days post-boost)			
N (non-missing)	43	48	43
Median (P_{25}, P_{75})	501.71 (200.10-797.01)	725.99 (417.50-1041.86)	525.91 (201.77-1140.77)
Minimum - Maximum	49.33-3189.84	119.08-3793.02	85.88-2604.75
Geometric Mean (95% CI)	431.65 (322.59-577.59)	700.01 (568.58-861.82)	495.72 (370.39-663.47)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 10) are assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ =18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 44. SARS-CoV-2 Pseudovirion Neutralization Antibody - mRNA-1273 Neutralization Antibody Response (International Units/ml for 50% neutralization, IU50/ml) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75})	8.28 (3.39-17.07)	8.89 (4.09-16.17)	86.52 (42.65-183.44)	81.36 (43.73-173.14)	31.76 (20.50-42.45)	19.44 (10.40-37.90)
Minimum - Maximum	1.21-1589.04	1.21-132.66	25.25-1174.00	9.89-441.96	1.21-676.16	1.21-264.05
Geometric Mean (95% CI)	9.33 (4.34-20.07)	9.38 (6.32-13.93)	92.40 (64.19-133.02)	90.54 (58.98-138.98)	31.42 (19.68-50.14)	19.56 (12.39-30.88)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75})	793.03 (375.84-1279.03)	760.24 (250.35-1121.52)	867.04 (724.10-1170.13)	925.75 (633.87-1064.03)	934.26 (854.75-1209.55)	577.51 (252.83-957.42)
Minimum - Maximum	136.45-7207.20	193.85-4264.81	264.81-4702.89	166.13-6587.61	175.58-5430.32	118.44-3752.66
Geometric Mean (95% CI)	756.60 (475.95-1202.75)	636.60 (457.35-886.12)	953.87 (743.66-1223.51)	865.70 (602.26-1244.38)	1077.25 (760.11-1526.70)	573.15 (379.29-866.08)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Median (P_{25}, P_{75})	599.37 (232.13-797.13)	468.91 (207.11-810.88)	780.47 (456.75-1058.74)	725.75 (430.78-976.35)	809.17 (319.85-1259.92)	454.61 (162.09-832.20)
Minimum - Maximum	152.57-3189.84	49.33-2875.00	119.08-3793.02	237.00-5113.19	115.59-2653.02	85.88-2604.75
Geometric Mean (95% CI)	524.38 (350.50-784.51)	415.35 (299.05-576.88)	699.87 (523.48-935.69)	752.26 (540.90-1046.21)	671.86 (467.28-966.01)	402.66 (267.00-607.25)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 10) are assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ =18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 45. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibody Response (International Units/ml for 50% neutralization, IU50/ml) to Pseudovirus D614G[1], by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Median (P_{25}, P_{75})	7.35 (2.77-13.75)	59.01 (38.73-108.99)	19.42 (8.72-34.48)
Minimum - Maximum	1.21-2291.64	5.39-621.28	1.21-569.93
Geometric Mean (95% CI)	7.57 (4.87-11.75)	61.69 (44.98-84.61)	18.55 (13.37-25.72)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Median (P_{25}, P_{75})	30.46 (19.32-40.63)	385.53 (183.86-706.08)	194.80 (99.01-480.33)
Minimum - Maximum	1.21-2573.17	45.30-4177.09	29.10-5220.93
Geometric Mean (95% CI)	31.42 (22.28-44.33)	382.07 (290.49-502.52)	216.38 (157.82-296.68)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Median (P_{25}, P_{75})	31.16 (19.34-38.83)	502.46 (225.60-962.37)	306.06 (135.99-657.79)
Minimum - Maximum	6.10-1158.57	59.54-14897.09	35.26-1491.06
Geometric Mean (95% CI)	29.71 (22.27-39.64)	528.40 (383.07-728.87)	266.81 (196.47-362.34)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 2.42) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 4.477) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10919) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 46. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibody Response (International Units/ml for 50% neutralization, IU50/ml) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Median (P_{25}, P_{75})	7.11 (2.77-11.24)	7.58 (2.14-20.49)	74.88 (41.98-152.82)	49.87 (35.20-92.15)	22.74 (15.68-39.03)	15.01 (7.85-29.82)
Minimum - Maximum	1.21-834.19	1.21-2291.64	7.79-621.28	5.39-408.96	3.58-569.93	1.21-207.53
Geometric Mean (95% CI)	6.88 (3.94-11.99)	8.39 (4.02-17.52)	75.04 (48.10-117.08)	51.11 (32.03-81.54)	24.21 (15.69-37.36)	14.35 (8.74-23.56)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Median (P_{25}, P_{75})	31.83 (17.07-41.00)	29.24 (23.96-39.95)	459.18 (189.31-941.30)	273.18 (173.41-687.24)	340.93 (110.68-531.22)	165.78 (99.01-439.80)
Minimum - Maximum	6.30-1202.80	1.21-2573.17	97.07-4177.09	45.30-1263.88	29.10-5220.93	35.05-1048.57
Geometric Mean (95% CI)	28.96 (18.44-45.48)	34.33 (19.64-60.01)	467.53 (305.82-714.75)	314.76 (219.01-452.39)	255.23 (150.99-431.43)	185.79 (125.46-275.13)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Median (P_{25}, P_{75})	30.53 (11.75-37.12)	31.23 (23.35-41.67)	576.77 (307.50-1066.64)	441.35 (188.54-753.52)	283.87 (169.40-547.61)	328.25 (80.96-686.72)
Minimum - Maximum	6.79-595.45	6.10-1158.57	176.50-14897.09	59.54-2831.88	35.34-1491.06	35.26-1437.47
Geometric Mean (95% CI)	26.48 (17.57-39.90)	33.33 (21.65-51.32)	701.66 (430.99-1142.33)	402.66 (262.44-617.78)	287.24 (189.77-434.78)	247.83 (153.48-400.20)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 2.42) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 4.477) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10919) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 47. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Antibody Response (International Units/ml for 50% neutralization, IU50/ml) to Pseudovirus D614G[1], by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75})	8.08 (5.20-14.44)	54.86 (33.00-121.10)	23.10 (8.07-38.37)
Minimum - Maximum	1.21-1112.57	7.03-236.40	1.21-494.63
Geometric Mean (95% CI)	9.37 (6.44-13.64)	57.61 (45.04-73.68)	21.42 (15.29-30.00)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75})	353.87 (199.60-632.52)	806.60 (457.21-1121.13)	452.15 (224.52-843.78)
Minimum - Maximum	1.21-5616.56	106.91-1869.00	36.91-3057.04
Geometric Mean (95% CI)	343.54 (243.65-484.39)	693.55 (577.97-832.25)	437.17 (333.81-572.53)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Median (P_{25}, P_{75})	227.24 (165.50-429.77)	601.77 (352.12-788.65)	242.01 (177.47-709.11)
Minimum - Maximum	35.73-2859.29	128.90-1264.90	58.03-1356.06
Geometric Mean (95% CI)	242.39 (189.86-309.45)	515.22 (436.11-608.68)	306.10 (244.22-383.64)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 2.42) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 4.477) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10919) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 48. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibody Response (International Units/ml for 50% neutralization, IU50/ml) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Median (P_{25}, P_{75})	6.69 (3.49-16.21)	8.36 (6.19-13.75)	101.62 (50.76-145.76)	39.86 (25.34-83.81)	25.49 (14.72-73.93)	19.45 (6.20-33.30)
Minimum - Maximum	1.21-1112.57	1.21-72.88	30.83-188.74	7.03-236.40	3.69-185.27	1.21-494.63
Geometric Mean (95% CI)	8.90 (4.93-16.07)	10.07 (6.66-15.24)	84.48 (64.87-110.03)	43.08 (30.04-61.79)	29.56 (18.73-46.65)	15.91 (9.71-26.06)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Median (P_{25}, P_{75})	327.07 (199.76-843.61)	353.87 (198.90-628.55)	991.39 (631.21-1284.23)	695.21 (342.01-1003.88)	710.67 (172.40-899.16)	358.93 (226.75-785.69)
Minimum - Maximum	1.21-5616.56	40.12-4645.35	274.10-1869.00	106.91-1738.45	99.60-3057.04	36.91-1489.52
Geometric Mean (95% CI)	332.06 (198.04-556.77)	359.85 (228.49-566.70)	879.77 (691.53-1119.27)	579.06 (448.52-747.58)	502.24 (320.17-787.84)	386.67 (275.39-542.91)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Median (P_{25}, P_{75})	227.24 (187.11-441.07)	205.53 (128.75-413.09)	582.32 (453.44-766.83)	602.75 (287.84-788.65)	243.88 (178.04-720.91)	235.05 (176.90-588.38)
Minimum - Maximum	35.73-2859.29	43.30-2090.10	168.80-1038.11	128.90-1264.90	81.58-1356.06	58.03-1026.40
Geometric Mean (95% CI)	262.62 (192.47-358.34)	217.29 (142.98-330.22)	552.53 (441.05-692.19)	489.78 (382.70-626.83)	317.38 (223.12-451.48)	296.06 (216.61-404.66)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 2.42) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 4.477) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10919) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 49. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Antibody Response (International Units/ml for 80% neutralization, IU80/ml) to Pseudovirus D614G[1], by Group and Timepoint

	Group 1E Dosed Janssen Boost Moderna (N=53)	Group 2E Dosed Moderna Boost Moderna (N=51)	Group 3E Dosed Pfizer/BioNTech Boost Moderna (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75})	20.51 (7.51-30.93)	164.63 (99.03-423.31)	72.49 (26.44-101.48)
Minimum - Maximum	7.51-1726.84	26.04-2246.50	7.51-968.95
Geometric Mean (95% CI)	20.85 (15.23-28.54)	187.18 (143.77-243.69)	54.23 (39.64-74.17)
Day 15 Visit (14 days post-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75})	2232.26 (649.69-2763.79)	2433.35 (1356.91-2879.72)	2124.84 (779.63-3099.58)
Minimum - Maximum	360.32-10761.37	499.36-14106.93	245.26-14060.20
Geometric Mean (95% CI)	1557.95 (1213.08-2000.85)	2151.61 (1747.43-2649.28)	1794.74 (1357.69-2372.49)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75})	871.74 (561.93-1533.70)	1549.64 (799.40-2612.94)	946.82 (548.61-2454.82)
Minimum - Maximum	127.78-4598.67	394.01-13397.74	165.15-5225.61
Geometric Mean (95% CI)	913.36 (730.99-1141.22)	1502.26 (1217.64-1853.41)	1113.18 (843.80-1468.55)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 10) are assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ =18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided

Supplemental Table 50. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibody Response (International Units/ml for 80% neutralization, IU80/ml) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75})	21.01 (7.51-30.93)	20.13 (7.51-29.89)	156.59 (112.32-417.93)	170.54 (95.51-423.31)	79.68 (39.88-97.16)	36.81 (21.83-101.48)
Minimum - Maximum	7.51-1726.84	7.51-192.19	60.56-2246.50	26.04-687.74	7.51-968.95	7.51-524.31
Geometric Mean (95% CI)	24.01 (13.23-43.58)	19.00 (13.14-27.48)	196.13 (137.56-279.64)	178.30 (117.39-270.82)	73.28 (48.57-110.56)	40.13 (25.07-64.23)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Median (P_{25}, P_{75})	2272.42 (717.06-2763.79)	1821.38 (610.08-2766.87)	2461.49 (1695.05-2948.50)	2226.21 (1095.08-2717.64)	2568.71 (1943.14-3221.35)	985.20 (606.99-2519.10)
Minimum - Maximum	360.32-10529.95	380.64-10761.37	584.63-7706.82	499.36-14106.93	459.45-14060.20	245.26-11122.18
Geometric Mean (95% CI)	1718.31 (1125.89-2622.44)	1460.93 (1055.08-2022.91)	2236.43 (1771.59-2823.23)	2066.82 (1431.98-2983.08)	2558.66 (1791.23-3654.87)	1258.91 (840.03-1886.65)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Median (P_{25}, P_{75})	1031.81 (599.32-1413.07)	836.35 (528.86-1611.96)	1520.75 (910.45-2620.19)	1564.48 (762.63-2077.43)	2042.43 (712.03-3086.01)	763.42 (381.91-1851.50)
Minimum - Maximum	219.21-4598.67	127.78-3840.32	394.01-5735.07	487.20-13397.74	232.91-5091.38	165.15-5225.61
Geometric Mean (95% CI)	1030.31 (724.43-1465.35)	847.10 (627.79-1143.03)	1510.64 (1154.09-1977.33)	1493.60 (1057.63-2109.28)	1515.39 (1064.34-2157.58)	827.88 (547.51-1251.81)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 10) are assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ =18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided

Supplemental Table 51. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV.2 Neutralization Antibody Response (International Units/ml for 80% neutralization, IU80/ml) to Pseudovirus D614G[1], by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Median (P_{25}, P_{75})	20.81 (7.51-26.97)	120.73 (85.19-177.23)	36.97 (23.16-80.65)
Minimum - Maximum	7.51-2950.97	7.51-909.19	7.51-939.44
Geometric Mean (95% CI)	20.01 (14.24-28.10)	118.28 (89.09-157.03)	40.72 (30.29-54.74)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Median (P_{25}, P_{75})	83.66 (37.63-111.34)	722.80 (476.33-1318.36)	504.34 (169.79-901.64)
Minimum - Maximum	7.51-1647.81	113.02-9595.98	93.59-8290.50
Geometric Mean (95% CI)	77.87 (58.32-103.98)	795.37 (609.54-1037.87)	487.03 (360.66-657.68)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Median (P_{25}, P_{75})	91.75 (35.04-110.69)	817.94 (563.41-2362.93)	694.71 (384.27-1048.88)
Minimum - Maximum	7.51-1591.95	132.57-22165.86	107.77-3386.52
Geometric Mean (95% CI)	75.93 (57.36-100.51)	1117.46 (818.14-1526.30)	592.11 (446.83-784.62)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 2.42) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 4.477) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10919) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 52. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV.2 Neutralization Antibody Response (International Units/ml for 80% neutralization, IU80/ml) to Pseudovirus D614G[1], by Group, Age Group, and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Median (P_{25}, P_{75})	19.54 (7.51-25.07)	22.01 (7.51-35.59)	133.91 (91.63-236.66)	120.73 (75.54-153.57)	40.33 (30.20-103.12)	31.23 (18.00-58.93)
Minimum - Maximum	7.51-961.67	7.51-2950.97	22.91-909.19	7.51-629.06	7.51-939.44	7.51-341.09
Geometric Mean (95% CI)	18.30 (11.96-27.99)	22.04 (12.46-38.98)	142.49 (96.45-210.50)	98.92 (64.66-151.32)	54.27 (35.92-81.98)	30.89 (20.25-47.13)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Median (P_{25}, P_{75})	87.39 (34.59-117.76)	83.66 (40.26-110.54)	833.63 (523.94-2295.74)	608.30 (475.45-971.66)	688.48 (239.44-940.72)	445.85 (169.79-766.18)
Minimum - Maximum	20.83-1596.75	7.51-1647.81	190.71-9595.98	113.02-3080.22	100.66-8290.50	93.59-2709.98
Geometric Mean (95% CI)	75.33 (50.20-113.05)	80.73 (51.80-125.81)	985.35 (648.64-1496.83)	647.55 (459.90-911.76)	568.66 (352.56-917.20)	422.12 (283.79-627.86)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Median (P_{25}, P_{75})	86.91 (27.86-113.80)	94.55 (47.13-109.72)	1016.96 (715.91-2613.99)	760.25 (446.05-2001.01)	686.43 (474.78-1048.88)	702.99 (166.99-949.84)
Minimum - Maximum	20.60-1092.29	7.51-1591.95	427.80-22165.86	132.57-5682.99	111.88-3386.52	107.77-3330.32
Geometric Mean (95% CI)	71.14 (47.90-105.67)	81.04 (52.90-124.14)	1469.41 (919.71-2347.66)	859.57 (565.25-1307.13)	647.63 (440.53-952.08)	541.35 (350.09-837.10)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 2.42) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 4.477) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10919) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 53. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibody Response (International Units/ml for 80% neutralization, IU80/ml) to Pseudovirus D614G[1], by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Median (P_{25}, P_{75})	22.07 (15.52-29.43)	131.10 (83.58-202.68)	41.71 (23.44-101.08)
Minimum - Maximum	7.51-2790.94	22.05-487.93	7.51-841.30
Geometric Mean (95% CI)	24.38 (18.00-33.03)	115.35 (91.40-145.58)	47.46 (35.11-64.15)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Median (P_{25}, P_{75})	724.05 (522.68-1147.38)	1983.97 (790.79-2670.27)	789.18 (557.98-2228.31)
Minimum - Maximum	7.51-9758.22	243.43-3251.20	112.42-5212.69
Geometric Mean (95% CI)	774.33 (572.06-1048.13)	1496.56 (1240.64-1805.27)	997.00 (777.43-1278.58)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Median (P_{25}, P_{75})	590.59 (454.44-810.47)	1054.61 (722.33-2155.31)	612.24 (490.38-1568.06)
Minimum - Maximum	114.82-4245.64	332.72-3142.43	135.90-2791.70
Geometric Mean (95% CI)	577.08 (459.03-725.49)	1136.69 (960.51-1345.19)	748.10 (593.52-942.96)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 2.42) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 4.477) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10919) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 54. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibody Response (International Units/ml for 80% neutralization, IU80/ml) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Median (P_{25}, P_{75})	22.07 (7.51-29.57)	21.83 (15.95-29.43)	178.53 (115.91-226.78)	99.17 (39.94-145.47)	53.07 (30.83-132.14)	33.27 (18.83-93.22)
Minimum - Maximum	7.51-2790.94	7.51-141.79	83.58-455.82	22.05-487.93	7.51-406.71	7.51-841.30
Geometric Mean (95% CI)	25.16 (15.68-40.36)	23.33 (16.43-33.13)	175.04 (140.65-217.84)	84.06 (59.82-118.13)	61.89 (41.06-93.30)	37.15 (23.84-57.87)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Median (P_{25}, P_{75})	690.24 (520.59-2158.09)	732.77 (524.76-1130.98)	2433.38 (1240.54-2715.45)	1171.31 (685.21-2475.80)	1310.23 (513.16-2602.46)	742.02 (592.39-1530.39)
Minimum - Maximum	7.51-9758.22	111.34-8612.65	623.00-3251.20	243.43-3204.07	208.63-5212.69	112.42-3294.62
Geometric Mean (95% CI)	795.77 (505.86-1251.81)	746.03 (497.29-1119.21)	1903.29 (1496.67-2420.40)	1247.05 (954.57-1629.14)	1166.90 (772.06-1763.66)	867.45 (635.36-1184.31)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Median (P_{25}, P_{75})	596.47 (508.44-919.78)	560.12 (416.92-729.42)	1118.91 (820.78-1906.94)	1050.72 (667.23-2155.31)	612.55 (480.57-1981.56)	611.51 (498.96-1176.79)
Minimum - Maximum	114.82-4245.64	117.52-4141.90	431.33-2507.72	332.72-3142.43	152.32-2791.70	135.90-2781.47
Geometric Mean (95% CI)	611.06 (451.23-827.49)	533.77 (366.44-777.50)	1178.80 (923.11-1505.32)	1107.14 (868.65-1411.11)	776.45 (531.43-1134.43)	722.94 (534.20-978.37)

[1] Calibration to the WHO standard International Units (IU50/mL and IU80/mL) was done using a calibration factor of 0.242 for ID50 and a calibration factor of 1.502 for ID80, both specific to the SARS-CoV-2 D614G pseudovirus.

[2] Values below the lower limit of detection (LLOD = 2.42) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 4.477) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10919) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 55. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID50) to Pseudovirus D614G[1], by Group and Timepoint

	Group 1E Dosed Janssen Boost Moderna (N=53)	Group 2E Dosed Moderna Boost Moderna (N=51)	Group 3E Dosed Pfizer/BioNTech Boost Moderna (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Positive Response(%)[2]	48 (90.6%)	51 (100.0%)	48 (96.0%)
Median (P_{25}, P_{75})	34.39 (16.44-68.34)	346.41 (176.25-758.00)	118.50 (60.11-161.87)
Minimum - Maximum	5.00-6566.30	40.88-4851.22	5.00-2794.06
Geometric Mean (95% CI)	38.68 (26.71-56.03)	378.03 (288.46-495.41)	102.44 (74.23-141.38)
Day 15 Visit (14 days post-boost)			
N (non-missing)	53	51	50
Positive Response(%)[2]	53 (100.0%)	51 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	3277.00 (1101.56-4954.53)	3587.25 (2620.92-4508.45)	3550.70 (1817.21-4840.33)
Minimum - Maximum	563.83-29781.84	686.48-27221.54	489.42-22439.32
Geometric Mean (95% CI)	2816.89 (2166.33-3662.82)	3758.61 (3043.39-4641.93)	3246.95 (2464.58-4277.67)
N* (non-missing pre- and post-boost)	53	51	50
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (93.3%-100.0%)	96.1% (86.5%-99.5%)	100.0% (92.9%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	100.0% (93.3%-100.0%)	84.3% (71.4%-93.0%)	100.0% (92.9%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	72.82 (52.52-100.97)	9.94 (7.87-12.56)	31.69 (23.80-42.21)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	51	49
Positive Response(%)[2]	52 (100.0%)	51 (100.0%)	49 (100.0%)
Median (P_{25}, P_{75})	2050.89 (891.90-3317.40)	3001.00 (1780.09-4374.95)	2311.42 (1015.85-4713.91)
Minimum - Maximum	203.86-13181.15	492.07-21128.87	354.88-10962.91
Geometric Mean (95% CI)	1877.30 (1464.90-2405.79)	2996.19 (2424.66-3702.44)	2138.09 (1624.06-2814.81)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[3], 95% CI	98.1% (89.7%-100.0%)	96.1% (86.5%-99.5%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	94.2% (84.1%-98.8%)	80.4% (66.9%-90.2%)	100.0% (92.7%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	48.65 (33.24-71.20)	7.93 (6.27-10.02)	22.33 (16.80-29.67)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 56. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID50) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Positive Response(%)[2]	17 (81.0%)	31 (96.9%)	26 (100.0%)	25 (100.0%)	24 (96.0%)	24 (96.0%)
Median (P_{25}, P_{75})	34.21 (14.01-70.53)	36.74 (16.91-66.83)	357.54 (176.25-758.00)	336.21 (180.70-715.45)	131.25 (84.72-175.40)	80.34 (42.99-156.61)
Minimum - Maximum	5.00-6566.30	5.00-548.18	104.33-4851.22	40.88-1826.30	5.00-2794.06	5.00-1091.12
Geometric Mean (95% CI)	38.55 (17.92-82.94)	38.77 (26.11-57.57)	381.82 (265.23-549.68)	374.12 (243.73-574.28)	129.82 (81.33-207.21)	80.84 (51.22-127.60)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Positive Response(%)[2]	21 (100.0%)	32 (100.0%)	26 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	3277.00 (1553.04-5285.23)	3141.50 (1034.49-4634.38)	3582.81 (2992.16-4835.23)	3825.41 (2619.30-4396.81)	3860.59 (3532.00-4998.14)	2386.42 (1044.76-3956.27)
Minimum - Maximum	563.83-29781.84	801.02-17623.19	1094.25-19433.45	686.48-27221.54	725.53-22439.32	489.42-15506.86
Geometric Mean (95% CI)	3126.46 (1966.74-4970.03)	2630.59 (1889.87-3661.64)	3941.63 (3072.98-5055.83)	3577.29 (2488.68-5142.07)	4451.43 (3140.94-6308.68)	2368.38 (1567.32-3578.86)
N* (non-missing pre- and post-boost)	21	32	26	25	25	25
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	100.0% (86.8%-100.0%)	92.0% (74.0%-99.0%)	100.0% (86.3%-100.0%)	100.0% (86.3%-100.0%)
Participants with ≥4-fold rise[3], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	92.3% (74.9%-99.1%)	76.0% (54.9%-90.6%)	100.0% (86.3%-100.0%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	81.11 (42.41-155.14)	67.85 (47.00-97.93)	10.32 (7.79-13.68)	9.56 (6.42-14.23)	34.29 (22.57-52.11)	29.30 (19.25-44.58)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Positive Response(%)[2]	20 (100.0%)	32 (100.0%)	26 (100.0%)	25 (100.0%)	24 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	2476.73 (959.23-3293.91)	1937.65 (855.84-3350.75)	3225.10 (1887.40-4374.95)	2998.95 (1780.09-4034.49)	3343.67 (1321.71-5206.28)	1878.56 (669.79-3438.85)
Minimum - Maximum	630.45-13181.15	203.86-11880.17	492.07-15673.64	979.32-21128.87	477.62-10962.91	354.88-10763.42

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age ≥56 yo (N=25)
Geometric Mean (95% CI)	2166.85 (1448.35-3241.78)	1716.32 (1235.73-2383.82)	2892.02 (2163.14-3866.49)	3108.51 (2235.11-4323.20)	2776.28 (1930.90-3991.77)	1663.90 (1103.32-2509.29)
N* (non-missing pre- and post-boost)	20	32	26	25	24	25
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (83.2%-100.0%)	96.9% (83.8%-99.9%)	96.2% (80.4%-99.9%)	96.0% (79.6%-99.9%)	100.0% (85.8%-100.0%)	100.0% (86.3%-100.0%)
Participants with ≥4-fold rise[3], 95% CI	90.0% (68.3%-98.8%)	96.9% (83.8%-99.9%)	80.8% (60.6%-93.4%)	80.0% (59.3%-93.2%)	100.0% (85.8%-100.0%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	56.58 (27.43-116.70)	44.27 (28.10-69.72)	7.57 (5.55-10.34)	8.31 (5.71-12.09)	24.30 (15.10-39.11)	20.58 (14.47-29.28)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Positive response is defined as an ID titer above the LLOD.

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with non-missing observations at both pre- and post-boost timepoints.

Supplemental Table 57. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID50) to Pseudovirus D614G[1], by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Positive Response(%)[2]	39 (78.0%)	49 (100.0%)	49 (96.1%)
Median (P_{25}, P_{75})	30.37 (11.47-56.81)	243.83 (160.05-450.37)	80.23 (36.03-142.48)
Minimum - Maximum	5.00-9469.57	22.27-2567.26	5.00-2355.09
Geometric Mean (95% CI)	31.27 (20.13-48.57)	254.91 (185.86-349.62)	76.63 (55.25-106.28)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Positive Response(%)[2]	49 (98.0%)	49 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	125.87 (79.84-167.91)	1593.09 (759.77-2917.69)	804.96 (409.14-1984.84)
Minimum - Maximum	5.00-10632.92	187.18-17260.72	120.25-21574.07
Geometric Mean (95% CI)	129.85 (92.05-183.17)	1578.80 (1200.37-2076.54)	894.14 (652.14-1225.94)
N* (non-missing pre- and post-boost)	50	49	50
Participants with ≥ 2-fold rise[3], 95% CI	72.0% (57.5%-83.8%)	81.6% (68.0%-91.2%)	94.0% (83.5%-98.7%)
Participants with ≥ 4-fold rise[3], 95% CI	50.0% (35.5%-64.5%)	61.2% (46.2%-74.8%)	82.0% (68.6%-91.4%)
Geometric Mean Fold Rise[3], 95% CI	4.15 (2.97-5.80)	6.19 (4.49-8.54)	12.50 (8.74-17.87)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Positive Response(%)[2]	48 (100.0%)	47 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	128.77 (79.91-160.46)	2076.29 (932.24-3976.74)	1264.69 (561.94-2718.12)
Minimum - Maximum	25.21-4787.49	246.03-61558.21	145.69-6161.39
Geometric Mean (95% CI)	122.76 (92.01-163.79)	2183.49 (1582.94-3011.88)	1102.53 (811.85-1497.27)
N* (non-missing pre- and post-boost)	48	47	50
Participants with ≥ 2-fold rise[3], 95% CI	70.8% (55.9%-83.0%)	83.0% (69.2%-92.4%)	92.0% (80.8%-97.8%)
Participants with ≥ 4-fold rise[3], 95% CI	54.2% (39.2%-68.6%)	72.3% (57.4%-84.4%)	80.0% (66.3%-90.0%)
Geometric Mean Fold Rise[3], 95% CI	4.01 (2.87-5.60)	8.41 (5.64-12.54)	14.26 (9.46-21.50)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 58. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID50) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Positive Response(%)[2]	21 (80.8%)	18 (75.0%)	24 (100.0%)	25 (100.0%)	25 (100.0%)	24 (92.3%)
Median (P_{25}, P_{75})	29.37 (11.47-46.44)	31.32 (8.86-84.68)	309.43 (173.48-631.48)	206.06 (145.45-380.80)	93.99 (64.79-161.28)	62.04 (32.42-123.20)
Minimum - Maximum	5.00-3447.06	5.00-9469.57	32.18-2567.26	22.27-1689.90	14.79-2355.09	5.00-857.55
Geometric Mean (95% CI)	28.42 (16.30-49.55)	34.67 (16.61-72.38)	310.10 (198.76-483.80)	211.19 (132.37-336.96)	100.05 (64.85-154.37)	59.30 (36.12-97.34)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Positive Response(%)[2]	26 (100.0%)	23 (95.8%)	24 (100.0%)	25 (100.0%)	24 (100.0%)	26 (100.0%)
Median (P_{25}, P_{75})	131.51 (70.54-169.44)	120.82 (99.02-165.09)	1897.44 (782.28-3889.67)	1128.83 (716.55-2839.82)	1408.78 (457.37-2195.11)	685.02 (409.14-1817.36)
Minimum - Maximum	26.05-4970.24	5.00-10632.92	401.12-17260.72	187.18-5222.63	120.25-21574.07	144.83-4332.95
Geometric Mean (95% CI)	119.66 (76.19-187.92)	141.87 (81.17-247.99)	1931.94 (1263.71-2953.53)	1300.68 (904.98-1869.38)	1054.66 (623.92-1782.77)	767.74 (518.44-1136.91)
N* (non-missing pre- and post-boost)	26	24	24	25	24	26
Participants with ≥ 2-fold rise[3], 95% CI	76.9% (56.4%-91.0%)	66.7% (44.7%-84.4%)	87.5% (67.6%-97.3%)	76.0% (54.9%-90.6%)	95.8% (78.9%-99.9%)	92.3% (74.9%-99.1%)
Participants with ≥4-fold rise[3], 95% CI	61.5% (40.6%-79.8%)	37.5% (18.8%-59.4%)	58.3% (36.6%-77.9%)	64.0% (42.5%-82.0%)	83.3% (62.6%-95.3%)	80.8% (60.6%-93.4%)
Geometric Mean Fold Rise[3], 95% CI	4.21 (2.88-6.16)	4.09 (2.26-7.41)	6.23 (3.76-10.33)	6.16 (3.98-9.54)	12.02 (7.14-20.24)	12.95 (7.64-21.93)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Positive Response(%)[2]	24 (100.0%)	24 (100.0%)	23 (100.0%)	24 (100.0%)	25 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	126.14 (48.57-153.37)	129.04 (96.47-172.18)	2383.35 (1270.66-4407.58)	1823.74 (779.09-3113.71)	1173.00 (699.99-2262.84)	1356.39 (334.54-2837.70)
Minimum - Maximum	28.07-2460.53	25.21-4787.49	729.33-61558.21	246.03-11701.99	146.04-6161.39	145.69-5939.94
Geometric Mean (95% CI)	109.41 (72.61-164.86)	137.73 (89.46-212.06)	2899.43 (1780.94-4720.37)	1663.87 (1084.48-2552.81)	1186.95 (784.17-1796.61)	1024.11 (634.20-1653.74)
N* (non-missing pre- and post-boost)	24	24	23	24	25	25
Participants with ≥ 2-fold rise[3], 95% CI	79.2% (57.8%-92.9%)	62.5% (40.6%-81.2%)	87.0% (66.4%-97.2%)	79.2% (57.8%-92.9%)	92.0% (74.0%-99.0%)	92.0% (74.0%-99.0%)

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Participants with ≥4-fold rise[3], 95% CI	62.5% (40.6%-81.2%)	45.8% (25.6%-67.2%)	78.3% (56.3%-92.5%)	66.7% (44.7%-84.4%)	84.0% (63.9%-95.5%)	76.0% (54.9%-90.6%)
Geometric Mean Fold Rise[3], 95% CI	4.06 (2.70-6.10)	3.97 (2.27-6.96)	8.89 (5.02-15.75)	7.97 (4.37-14.53)	11.86 (7.25-19.40)	17.14 (8.62-34.07)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 59. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID50) to Pseudovirus D614G[1], by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Positive Response(%)[2]	45 (84.9%)	51 (100.0%)	49 (98.0%)
Median (P_{25}, P_{75})	33.39 (21.49-59.68)	226.71 (136.36-500.42)	95.47 (33.33-158.55)
Minimum - Maximum	5.00-4597.42	29.04-976.88	5.00-2043.94
Geometric Mean (95% CI)	38.72 (26.61-56.35)	238.04 (186.10-304.48)	88.50 (63.17-123.98)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Positive Response(%)[2]	51 (98.1%)	51 (100.0%)	49 (100.0%)
Median (P_{25}, P_{75})	1462.26 (824.79-2613.72)	3333.08 (1889.30-4632.77)	1868.38 (927.78-3486.68)
Minimum - Maximum	5.00-23208.91	441.76-7723.13	152.53-12632.42
Geometric Mean (95% CI)	1419.60 (1006.82-2001.62)	2865.92 (2388.29-3439.06)	1806.48 (1379.39-2365.81)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[3], 95% CI	98.1% (89.7%-100.0%)	100.0% (93.0%-100.0%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	98.1% (89.7%-100.0%)	94.1% (83.8%-98.8%)	98.0% (89.1%-99.9%)
Geometric Mean Fold Rise[3], 95% CI	36.39 (25.03-52.91)	12.04 (9.44-15.36)	20.10 (14.73-27.42)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Positive Response(%)[2]	52 (100.0%)	50 (100.0%)	48 (100.0%)
Median (P_{25}, P_{75})	939.03 (683.88-1775.91)	2486.66 (1455.03-3258.90)	1000.04 (733.35-2930.22)
Minimum - Maximum	147.66-11815.24	532.66-5226.85	239.81-5603.55
Geometric Mean (95% CI)	1001.61 (784.55-1278.72)	2129.00 (1802.11-2515.19)	1264.86 (1009.19-1585.29)
N* (non-missing pre- and post-boost)	52	50	48
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (93.2%-100.0%)	98.0% (89.4%-99.9%)	97.9% (88.9%-99.9%)
Participants with ≥ 4-fold rise[3], 95% CI	94.2% (84.1%-98.8%)	88.0% (75.7%-95.5%)	89.6% (77.3%-96.5%)
Geometric Mean Fold Rise[3], 95% CI	25.68 (18.71-35.24)	8.87 (7.02-11.21)	13.97 (10.24-19.04)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 60. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID50) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Positive Response(%)[2]	24 (77.4%)	21 (95.5%)	22 (100.0%)	29 (100.0%)	24 (100.0%)	25 (96.2%)
Median (P_{25}, P_{75})	27.64 (14.44-66.99)	34.53 (25.56-56.81)	419.90 (209.77-602.32)	164.70 (104.70-346.33)	105.32 (60.82-305.50)	80.38 (25.60-137.60)
Minimum - Maximum	5.00-4597.42	5.00-301.14	127.40-779.92	29.04-976.88	15.26-765.60	5.00-2043.94
Geometric Mean (95% CI)	36.79 (20.38-66.41)	41.62 (27.50-62.98)	349.09 (268.04-454.66)	178.03 (124.12-255.34)	122.14 (77.40-192.75)	65.73 (40.13-107.67)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Positive Response(%)[2]	29 (96.7%)	22 (100.0%)	22 (100.0%)	29 (100.0%)	23 (100.0%)	26 (100.0%)
Median (P_{25}, P_{75})	1351.52 (825.44-3485.97)	1462.26 (821.91-2597.30)	4096.66 (2608.29-5306.72)	2872.75 (1413.26-4148.25)	2936.64 (712.41-3715.54)	1483.20 (937.00-3246.64)
Minimum - Maximum	5.00-23208.91	165.77-19195.68	1132.64-7723.13	441.76-7183.68	411.58-12632.42	152.53-6155.03
Geometric Mean (95% CI)	1372.15 (818.36-2300.71)	1486.97 (944.19-2341.75)	3635.43 (2857.55-4625.07)	2392.79 (1853.39-3089.18)	2075.37 (1323.03-3255.54)	1597.81 (1137.97-2243.44)
N* (non-missing pre- and post-boost)	30	22	22	29	23	26
Participants with ≥ 2-fold rise[3], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	100.0% (84.6%-100.0%)	100.0% (88.1%-100.0%)	100.0% (85.2%-100.0%)	100.0% (86.8%-100.0%)
Participants with ≥4-fold rise[3], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	90.9% (70.8%-98.9%)	96.6% (82.2%-99.9%)	100.0% (85.2%-100.0%)	96.2% (80.4%-99.9%)
Geometric Mean Fold Rise[3], 95% CI	36.89 (20.42-66.62)	35.73 (23.33-54.72)	10.41 (7.72-14.05)	13.44 (9.24-19.54)	16.21 (10.01-26.23)	24.31 (15.99-36.96)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Positive Response(%)[2]	30 (100.0%)	22 (100.0%)	21 (100.0%)	29 (100.0%)	23 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	939.03 (773.17-1822.62)	849.30 (532.02-1706.98)	2406.28 (1873.73-3168.70)	2490.70 (1189.44-3258.90)	1007.79 (735.71-2978.97)	971.27 (730.98-2431.32)
Minimum - Maximum	147.66-11815.24	178.93-8636.76	697.52-4289.73	532.66-5226.85	337.13-5603.55	239.81-4241.32

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Geometric Mean (95% CI)	1085.21 (795.32-1480.75)	897.89 (590.82-1364.54)	2283.19 (1822.52-2860.31)	2023.88 (1581.39-2590.19)	1311.50 (921.98-1865.61)	1223.41 (895.08-1672.17)
N* (non-missing pre- and post-boost)	30	22	21	29	23	25
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (88.4%-100.0%)	100.0% (84.6%-100.0%)	95.2% (76.2%-99.9%)	100.0% (88.1%-100.0%)	95.7% (78.1%-99.9%)	100.0% (86.3%-100.0%)
Participants with ≥4-fold rise[3], 95% CI	93.3% (77.9%-99.2%)	95.5% (77.2%-99.9%)	81.0% (58.1%-94.6%)	93.1% (77.2%-99.2%)	82.6% (61.2%-95.0%)	96.0% (79.6%-99.9%)
Geometric Mean Fold Rise[3], 95% CI	29.17 (18.08-47.06)	21.57 (14.44-32.24)	6.29 (4.77-8.30)	11.37 (8.14-15.88)	10.14 (6.72-15.30)	18.75 (11.90-29.55)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 61.: SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID80) to Pseudovirus D614G[1], by Group and Timepoint

	Group 1E Dosed Janssen Boost Moderna (N=53)	Group 2E Dosed Moderna Boost Moderna (N=51)	Group 3E Dosed Pfizer/BioNTech Boost Moderna (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Positive Response(%)[2]	32 (60.4%)	51 (100.0%)	44 (88.0%)
Median (P_{25}, P_{75})	13.65 (5.00-20.59)	109.61 (65.93-281.83)	48.26 (17.60-67.56)
Minimum - Maximum	5.00-1149.69	17.33-1495.67	5.00-645.11
Geometric Mean (95% CI)	13.88 (10.14-19.00)	124.62 (95.72-162.25)	36.10 (26.39-49.38)
Day 15 Visit (14 days post-boost)			
N (non-missing)	53	51	50
Positive Response(%)[2]	53 (100.0%)	51 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	1486.19 (432.55-1840.07)	1620.08 (903.40-1917.26)	1414.67 (519.06-2063.64)
Minimum - Maximum	239.89-7164.69	332.46-9392.10	163.29-9360.99
Geometric Mean (95% CI)	1037.25 (807.65-1332.12)	1432.50 (1163.40-1763.84)	1194.90 (903.92-1579.56)
N* (non-missing pre- and post-boost)	53	51	50
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (93.3%-100.0%)	98.0% (89.6%-100.0%)	100.0% (92.9%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	100.0% (93.3%-100.0%)	94.1% (83.8%-98.8%)	100.0% (92.9%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	74.73 (55.33-100.93)	11.50 (9.18-14.40)	33.10 (25.50-42.96)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	51	49
Positive Response(%)[2]	52 (100.0%)	51 (100.0%)	49 (100.0%)
Median (P_{25}, P_{75})	580.38 (374.12-1021.10)	1031.72 (532.22-1739.64)	630.38 (365.25-1634.37)
Minimum - Maximum	85.07-3061.70	262.33-8919.93	109.95-3479.10
Geometric Mean (95% CI)	608.09 (486.68-759.80)	1000.17 (810.68-1233.96)	741.13 (561.79-977.73)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[3], 95% CI	98.1% (89.7%-100.0%)	96.1% (86.5%-99.5%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	96.2% (86.8%-99.5%)	80.4% (66.9%-90.2%)	100.0% (92.7%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	43.94 (31.86-60.61)	8.03 (6.44-10.01)	21.77 (16.69-28.39)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 18.5) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 45118) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Positive response is defined as an ID titer above the LLOD.

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with non-missing observations at both pre- and post-boost timepoints.

Supplemental Table 62. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID80) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	32	26	25	25	25
Positive Response(%)[2]	14 (66.7%)	18 (56.3%)	26 (100.0%)	25 (100.0%)	24 (96.0%)	20 (80.0%)
Median (P_{25}, P_{75})	13.99 (5.00-20.59)	13.40 (5.00-19.90)	104.25 (74.78-278.25)	113.54 (63.59-281.83)	53.05 (26.55-64.68)	24.51 (14.53-67.56)
Minimum - Maximum	5.00-1149.69	5.00-127.95	40.32-1495.67	17.33-457.89	5.00-645.11	5.00-349.07
Geometric Mean (95% CI)	15.99 (8.81-29.01)	12.65 (8.75-18.30)	130.58 (91.58-186.18)	118.71 (78.15-180.31)	48.79 (32.34-73.61)	26.72 (16.69-42.76)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	32	26	25	25	25
Positive Response(%)[2]	21 (100.0%)	32 (100.0%)	26 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	1512.93 (477.40-1840.07)	1212.64 (406.18-1842.13)	1638.81 (1128.53-1963.05)	1482.16 (729.08-1809.35)	1710.19 (1293.70-2144.71)	655.93 (404.12-1677.17)
Minimum - Maximum	239.89-7010.62	253.42-7164.69	389.23-5131.04	332.46-9392.10	305.89-9360.99	163.29-7404.92
Geometric Mean (95% CI)	1144.01 (749.60-1745.96)	972.66 (702.45-1346.81)	1488.97 (1179.49-1879.64)	1376.04 (953.39-1986.07)	1703.50 (1192.56-2433.34)	838.15 (559.27-1256.09)
N* (non-missing pre- and post-boost)	21	32	26	25	25	25
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	100.0% (86.8%-100.0%)	96.0% (79.6%-99.9%)	100.0% (86.3%-100.0%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	100.0% (83.9%-100.0%)	100.0% (89.1%-100.0%)	96.2% (80.4%-99.9%)	92.0% (74.0%-99.0%)	100.0% (86.3%-100.0%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	71.56 (42.03-121.83)	76.89 (52.58-112.43)	11.40 (8.57-15.17)	11.59 (7.99-16.83)	34.92 (24.40-49.96)	31.37 (20.93-47.02)
Day 29 Visit (28 days post-boost)						
N (non-missing)	20	32	26	25	24	25
Positive Response(%)[2]	20 (100.0%)	32 (100.0%)	26 (100.0%)	25 (100.0%)	24 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	686.96 (399.01-940.79)	556.83 (352.10-1073.21)	1012.49 (606.16-1744.46)	1041.60 (507.74-1383.11)	1359.81 (474.06-2054.60)	508.27 (254.27-1232.69)
Minimum - Maximum	145.95-3061.70	85.07-2556.80	262.33-3818.29	324.37-8919.93	155.07-3389.74	109.95-3479.10
Geometric Mean (95% CI)	685.96 (482.31-975.60)	563.98 (417.97-761.00)	1005.75 (768.37-1316.47)	994.41 (704.15-1404.31)	1008.91 (708.62-1436.47)	551.18 (364.52-833.43)

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer/BioNTech, Boost Moderna] Age ≥56 yo (N=25)
N* (non-missing pre- and post-boost)	20	32	26	25	24	25
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (83.2%-100.0%)	96.9% (83.8%-99.9%)	96.2% (80.4%-99.9%)	96.0% (79.6%-99.9%)	100.0% (85.8%-100.0%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	95.0% (75.1%-99.9%)	96.9% (83.8%-99.9%)	84.6% (65.1%-95.6%)	76.0% (54.9%-90.6%)	100.0% (85.8%-100.0%)	100.0% (86.3%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	42.94 (24.67-74.76)	44.58 (29.40-67.61)	7.70 (5.72-10.38)	8.38 (5.92-11.85)	23.03 (15.18-34.94)	20.63 (14.36-29.63)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 14.3) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10232) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

[2] Positive response is defined as an ID titer above the LLOD.

3 Relative to pre-vaccination (Day 1 Visit) levels, among participants with non-missing observations at both pre- and post-boost timepoints.

Supplemental Table 63. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID80) to Pseudovirus D614G[1], by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Positive Response(%)[2]	30 (60.0%)	48 (98.0%)	44 (86.3%)
Median (P_{25}, P_{75})	13.85 (5.00-17.96)	80.38 (56.72-118.00)	24.62 (15.42-53.70)
Minimum - Maximum	5.00-1964.69	5.00-605.32	5.00-625.46
Geometric Mean (95% CI)	13.32 (9.48-18.71)	78.75 (59.31-104.55)	27.11 (20.16-36.44)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Positive Response(%)[2]	49 (98.0%)	49 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	55.70 (25.06-74.13)	481.23 (317.13-877.74)	335.78 (113.05-600.30)
Minimum - Maximum	5.00-1097.07	75.25-6388.80	62.31-5519.64
Geometric Mean (95% CI)	51.85 (38.83-69.23)	529.54 (405.82-690.99)	324.25 (240.12-437.87)
N* (non-missing pre- and post-boost)	50	49	50
Participants with ≥ 2-fold rise[3], 95% CI	78.0% (64.0%-88.5%)	85.7% (72.8%-94.1%)	96.0% (86.3%-99.5%)
Participants with ≥ 4-fold rise[3], 95% CI	48.0% (33.7%-62.6%)	69.4% (54.6%-81.7%)	90.0% (78.2%-96.7%)
Geometric Mean Fold Rise[3], 95% CI	3.89 (2.99-5.06)	6.72 (4.94-9.16)	12.74 (9.28-17.47)
Day 29 Visit (28 days post-boost)			
N (non-missing)	48	47	50
Positive Response(%)[2]	47 (97.9%)	47 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	61.09 (23.33-73.69)	544.57 (375.11-1573.19)	462.52 (255.84-698.32)
Minimum - Maximum	5.00-1059.89	88.26-14757.56	71.75-2254.68
Geometric Mean (95% CI)	50.55 (38.19-66.92)	743.98 (544.70-1016.18)	394.21 (297.49-522.38)
N* (non-missing pre- and post-boost)	48	47	50
Participants with ≥ 2-fold rise[3], 95% CI	77.1% (62.7%-88.0%)	85.1% (71.7%-93.8%)	94.0% (83.5%-98.7%)
Participants with ≥ 4-fold rise[3], 95% CI	43.8% (29.5%-58.8%)	78.7% (64.3%-89.3%)	84.0% (70.9%-92.8%)
Geometric Mean Fold Rise[3], 95% CI	3.85 (2.96-5.02)	9.26 (6.32-13.57)	14.31 (10.12-20.23)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 14.3) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10232) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 64. SARS-CoV-2 Pseudovirion Neutralization Antibody - Ad26.COV2.S Neutralization Antibodies Titer (ID80) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Positive Response(%)[2]	16 (61.5%)	14 (58.3%)	24 (100.0%)	24 (96.0%)	24 (96.0%)	20 (76.9%)
Median (P_{25}, P_{75})	13.01 (5.00-16.69)	14.65 (5.00-23.69)	89.15 (61.01-157.56)	80.38 (50.29-102.24)	26.85 (20.11-68.65)	20.79 (11.98-39.23)
Minimum - Maximum	5.00-640.26	5.00-1964.69	15.25-605.32	5.00-418.82	5.00-625.46	5.00-227.09
Geometric Mean (95% CI)	12.18 (7.96-18.64)	14.67 (8.30-25.95)	94.86 (64.21-140.14)	65.86 (43.05-100.75)	36.13 (23.92-54.58)	20.57 (13.48-31.37)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Positive Response(%)[2]	26 (100.0%)	23 (95.8%)	24 (100.0%)	25 (100.0%)	24 (100.0%)	26 (100.0%)
Median (P_{25}, P_{75})	58.18 (23.03-78.41)	55.70 (26.81-73.60)	555.01 (348.83-1528.45)	405.00 (316.54-646.91)	458.37 (159.42-626.31)	296.84 (113.05-510.11)
Minimum - Maximum	13.87-1063.08	5.00-1097.07	126.97-6388.80	75.25-2050.74	67.01-5519.64	62.31-1804.25
Geometric Mean (95% CI)	50.15 (33.42-75.27)	53.75 (34.49-83.76)	656.02 (431.85-996.56)	431.13 (306.19-607.03)	378.60 (234.73-610.65)	281.04 (188.94-418.02)
N* (non-missing pre- and post-boost)	26	24	24	25	24	26
Participants with ≥ 2-fold rise[3], 95% CI	84.6% (65.1%-95.6%)	70.8% (48.9%-87.4%)	91.7% (73.0%-99.0%)	80.0% (59.3%-93.2%)	95.8% (78.9%-99.9%)	96.2% (80.4%-99.9%)
Participants with ≥ 4-fold rise[3], 95% CI	46.2% (26.6%-66.6%)	50.0% (29.1%-70.9%)	66.7% (44.7%-84.4%)	72.0% (50.6%-87.9%)	91.7% (73.0%-99.0%)	88.5% (69.8%-97.6%)
Geometric Mean Fold Rise[3], 95% CI	4.12 (3.04-5.58)	3.66 (2.31-5.81)	6.92 (4.32-11.08)	6.55 (4.23-10.13)	11.80 (7.36-18.93)	13.66 (8.68-21.52)
Day 29 Visit (28 days post-boost)						
N (non-missing)	24	24	23	24	25	25
Positive Response(%)[2]	24 (100.0%)	23 (95.8%)	23 (100.0%)	24 (100.0%)	25 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	57.86 (18.55-75.77)	62.95 (31.38-73.05)	677.07 (476.64-1740.34)	506.16 (296.97-1332.23)	457.01 (316.10-698.32)	468.04 (111.18-632.38)
Minimum - Maximum	13.71-727.22	5.00-1059.89	284.82-14757.56	88.26-3783.61	74.48-2254.68	71.75-2217.26
Geometric Mean (95% CI)	47.37 (31.89-70.35)	53.95 (35.22-82.65)	978.30 (612.32-1563.02)	572.28 (376.33-870.26)	431.18 (293.30-633.88)	360.42 (233.08-557.32)
N* (non-missing pre- and post-boost)	24	24	23	24	25	25
Participants with ≥ 2-fold rise[3], 95% CI	83.3% (62.6%-95.3%)	70.8% (48.9%-87.4%)	91.3% (72.0%-98.9%)	79.2% (57.8%-92.9%)	92.0% (74.0%-99.0%)	96.0% (79.6%-99.9%)

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Participants with ≥ 4-fold rise[3], 95% CI	45.8% (25.6%-67.2%)	41.7% (22.1%-63.4%)	82.6% (61.2%-95.0%)	75.0% (53.3%-90.2%)	88.0% (68.8%-97.5%)	80.0% (59.3%-93.2%)
Geometric Mean Fold Rise[3], 95% CI	4.03 (2.92-5.57)	3.68 (2.36-5.73)	9.79 (5.71-16.79)	8.78 (4.92-15.69)	11.93 (7.63-18.67)	17.15 (9.87-29.79)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 14.3) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10232) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 65.: SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID80) to Pseudovirus D614G[1], by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	53	51	50
Positive Response(%)[2]	40 (75.5%)	51 (100.0%)	45 (90.0%)
Median (P_{25}, P_{75})	14.69 (10.33-19.59)	87.28 (55.65-134.94)	27.77 (15.61-67.29)
Minimum - Maximum	5.00-1858.15	14.68-324.85	5.00-560.12
Geometric Mean (95% CI)	16.23 (11.99-21.99)	76.80 (60.85-96.92)	31.60 (23.38-42.71)
Day 15 Visit (14 days post-boost)			
N (non-missing)	52	51	49
Positive Response(%)[2]	51 (98.1%)	51 (100.0%)	49 (100.0%)
Median (P_{25}, P_{75})	482.06 (347.99-763.90)	1320.88 (526.49-1777.81)	525.42 (371.49-1483.56)
Minimum - Maximum	5.00-6496.82	162.07-2164.58	74.85-3470.50
Geometric Mean (95% CI)	515.54 (380.86-697.83)	996.38 (825.99-1201.91)	663.78 (517.60-851.25)
N* (non-missing pre- and post-boost)	52	51	49
Participants with ≥ 2-fold rise[3], 95% CI	98.1% (89.7%-100.0%)	100.0% (93.0%-100.0%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	96.2% (86.8%-99.5%)	94.1% (83.8%-98.8%)	98.0% (89.1%-99.9%)
Geometric Mean Fold Rise[3], 95% CI	31.05 (22.76-42.35)	12.97 (10.48-16.06)	20.74 (15.86-27.13)
Day 29 Visit (28 days post-boost)			
N (non-missing)	52	50	48
Positive Response(%)[2]	52 (100.0%)	50 (100.0%)	48 (100.0%)
Median (P_{25}, P_{75})	393.20 (302.56-539.59)	702.14 (480.91-1434.96)	407.62 (326.49-1043.98)
Minimum - Maximum	76.45-2826.66	221.52-2092.17	90.48-1858.65
Geometric Mean (95% CI)	384.21 (305.61-483.02)	756.79 (639.49-895.60)	498.07 (395.15-627.80)
N* (non-missing pre- and post-boost)	52	50	48
Participants with ≥ 2-fold rise[3], 95% CI	98.1% (89.7%-100.0%)	100.0% (92.9%-100.0%)	100.0% (92.6%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	98.1% (89.7%-100.0%)	90.0% (78.2%-96.7%)	91.7% (80.0%-97.7%)
Geometric Mean Fold Rise[3], 95% CI	23.14 (17.99-29.76)	9.83 (7.83-12.34)	15.48 (11.69-20.51)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 14.3) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10232) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 66. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID80) to Pseudovirus D614G[1], by Group, Age Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	31	22	22	29	24	26
Positive Response(%)[2]	22 (71.0%)	18 (81.8%)	22 (100.0%)	29 (100.0%)	23 (95.8%)	22 (84.6%)
Median (P_{25}, P_{75})	14.69 (5.00-19.69)	14.54 (10.62-19.59)	118.86 (77.17-150.99)	66.02 (26.59-96.85)	35.33 (20.53-87.97)	22.15 (12.54-62.07)
Minimum - Maximum	5.00-1858.15	5.00-94.40	55.65-303.48	14.68-324.85	5.00-270.78	5.00-560.12
Geometric Mean (95% CI)	16.75 (10.44-26.87)	15.53 (10.94-22.06)	116.54 (93.64-145.03)	55.97 (39.83-78.65)	41.21 (27.34-62.12)	24.73 (15.88-38.53)
Day 15 Visit (14 days post-boost)						
N (non-missing)	30	22	22	29	23	26
Positive Response(%)[2]	29 (96.7%)	22 (100.0%)	22 (100.0%)	29 (100.0%)	23 (100.0%)	26 (100.0%)
Median (P_{25}, P_{75})	459.55 (346.60-1436.81)	487.87 (349.37-752.98)	1620.10 (825.92-1807.89)	779.83 (456.20-1648.34)	872.32 (341.65-1732.66)	494.02 (394.40-1018.90)
Minimum - Maximum	5.00-6496.82	74.13-5734.12	414.78-2164.58	162.07-2133.20	138.90-3470.50	74.85-2193.49
Geometric Mean (95% CI)	529.81 (336.79-833.43)	496.69 (331.08-745.14)	1267.17 (996.45-1611.45)	830.26 (635.53-1084.65)	776.90 (514.02-1174.21)	577.53 (423.01-788.49)
N* (non-missing pre- and post-boost)	30	22	22	29	23	26
Participants with ≥ 2-fold rise[3], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	100.0% (84.6%-100.0%)	100.0% (88.1%-100.0%)	100.0% (85.2%-100.0%)	100.0% (86.8%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	93.3% (77.9%-99.2%)	100.0% (84.6%-100.0%)	86.4% (65.1%-97.1%)	100.0% (88.1%-100.0%)	100.0% (85.2%-100.0%)	96.2% (80.4%-99.9%)
Geometric Mean Fold Rise[3], 95% CI	30.38 (18.96-48.69)	31.98 (21.41-47.75)	10.87 (8.19-14.43)	14.83 (10.85-20.29)	18.14 (11.93-27.58)	23.35 (16.20-33.67)
Day 29 Visit (28 days post-boost)						
N (non-missing)	30	22	21	29	23	25
Positive Response(%)[2]	30 (100.0%)	22 (100.0%)	21 (100.0%)	29 (100.0%)	23 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	397.12 (338.51-612.37)	372.92 (277.58-485.63)	744.94 (546.46-1269.60)	699.55 (444.23-1434.96)	407.82 (319.95-1319.28)	407.13 (332.20-783.48)
Minimum - Maximum	76.45-2826.66	78.24-2757.59	287.17-1669.59	221.52-2092.17	101.41-1858.65	90.48-1851.84
Geometric Mean (95% CI)	406.83 (300.42-550.93)	355.37 (243.97-517.64)	784.82 (614.59-1002.21)	737.11 (578.33-939.49)	516.94 (353.82-755.28)	481.32 (355.66-651.38)

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
N* (non-missing pre- and post-boost)	30	22	21	29	23	25
Participants with ≥ 2-fold rise[3], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	100.0% (83.9%-100.0%)	100.0% (88.1%-100.0%)	100.0% (85.2%-100.0%)	100.0% (86.3%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	96.7% (82.8%-99.9%)	100.0% (84.6%-100.0%)	81.0% (58.1%-94.6%)	96.6% (82.2%-99.9%)	87.0% (66.4%-97.2%)	96.0% (79.6%-99.9%)
Geometric Mean Fold Rise[3], 95% CI	23.33 (16.14-33.72)	22.88 (16.05-32.61)	6.56 (5.04-8.54)	13.17 (9.65-17.97)	12.03 (8.01-18.09)	19.52 (13.19-28.90)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2. Values between the LLOD and the lower limit of quantification (LLOQ = 14.3) are taken as reported, or a value of LLOQ/2 is assigned if observations are reported as <LLOQ but no value is provided. Values greater than the upper limit of quantification (ULOQ = 10232) are taken as reported, or a ceiling value equivalent to the ULOQ is assigned if values are not provided.

Supplemental Table 67. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.617.2 (Delta)[1], by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	51	50	49
Positive Response(%)[2]	25 (49.0%)	50 (100.0%)	42 (85.7%)
Median (P_{25}, P_{75})	5.00 (5.00-14.38)	107.62 (36.61-193.16)	30.03 (15.66-43.84)
Minimum - Maximum	5.00-5475.92	12.18-895.38	5.00-550.19
Geometric Mean (95% CI)	11.75 (7.83-17.64)	97.94 (73.08-131.28)	29.44 (21.35-40.59)
Day 15 Visit (14 days post-boost)			
N (non-missing)	51	50	50
Positive Response(%)[2]	51 (100.0%)	50 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	694.60 (207.43-1007.09)	921.42 (717.04-1546.43)	1020.69 (479.72-2738.72)
Minimum - Maximum	87.17-10563.34	199.41-5114.52	128.20-5081.50
Geometric Mean (95% CI)	552.26 (413.69-737.25)	1080.83 (888.05-1315.46)	989.48 (733.87-1334.14)
N* (non-missing pre- and post-boost)	50	50	49
Participants with ≥ 2-fold rise[3], 95% CI	94.0% (83.5%-98.7%)	96.0% (86.3%-99.5%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	94.0% (83.5%-98.7%)	86.0% (73.3%-94.2%)	100.0% (92.7%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	48.30 (32.09-72.71)	11.04 (8.59-14.17)	33.65 (24.81-45.65)
Day 29 Visit (28 days post-boost)			
N (non-missing)	18	20	19
Positive Response(%)[2]	18 (100.0%)	20 (100.0%)	19 (100.0%)
Median (P_{25}, P_{75})	587.90 (382.48-793.70)	691.54 (463.35-1177.51)	600.90 (240.87-1696.30)
Minimum - Maximum	79.99-3723.96	163.11-3296.81	101.33-8113.99
Geometric Mean (95% CI)	542.79 (326.62-902.04)	735.02 (507.00-1065.60)	654.46 (370.54-1155.94)
N* (non-missing pre- and post-boost)	18	20	19
Participants with ≥ 2-fold rise[3], 95% CI	88.9% (65.3%-98.6%)	95.0% (75.1%-99.9%)	100.0% (82.4%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	88.9% (65.3%-98.6%)	70.0% (45.7%-88.1%)	100.0% (82.4%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	35.15 (14.69-84.06)	7.48 (4.90-11.43)	24.40 (15.29-38.94)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 68. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.617.2 (Delta)[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	30	26	24	25	24
Positive Response(%)[2]	10 (47.6%)	15 (50.0%)	26 (100.0%)	24 (100.0%)	24 (96.0%)	18 (75.0%)
Median (P_{25}, P_{75})	5.00 (5.00-13.97)	7.56 (5.00-14.38)	104.42 (36.61-195.88)	110.63 (37.70-184.15)	30.03 (24.53-43.84)	29.59 (7.83-44.09)
Minimum - Maximum	5.00-5475.92	5.00-286.40	12.18-895.38	18.77-671.32	5.00-550.19	5.00-191.87
Geometric Mean (95% CI)	14.16 (5.88-34.11)	10.32 (7.14-14.91)	101.62 (65.44-157.78)	94.12 (62.10-142.65)	37.35 (23.75-58.73)	22.97 (14.38-36.69)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	30	26	24	25	25
Positive Response(%)[2]	21 (100.0%)	30 (100.0%)	26 (100.0%)	24 (100.0%)	25 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	773.06 (291.31-1007.09)	557.99 (191.86-983.76)	873.42 (717.04-1487.63)	1022.09 (700.50-1721.91)	1259.29 (781.01-3238.25)	702.46 (284.96-1609.68)
Minimum - Maximum	113.44-10563.34	87.17-3059.32	199.41-3378.05	292.72-5114.52	215.60-5081.50	128.20-4589.75
Geometric Mean (95% CI)	668.16 (416.03-1073.09)	483.32 (331.03-705.67)	998.59 (767.38-1299.45)	1177.58 (863.14-1606.57)	1382.41 (952.37-2006.64)	708.24 (449.78-1115.22)
N* (non-missing pre- and post-boost)	21	29	26	24	25	24
Participants with ≥ 2-fold rise[2], 95% CI	90.5% (69.6%-98.8%)	96.6% (82.2%-99.9%)	96.2% (80.4%-99.9%)	95.8% (78.9%-99.9%)	100.0% (86.3%-100.0%)	100.0% (85.8%-100.0%)
Participants with ≥4-fold rise[2], 95% CI	90.5% (69.6%-98.8%)	96.6% (82.2%-99.9%)	84.6% (65.1%-95.6%)	87.5% (67.6%-97.3%)	100.0% (86.3%-100.0%)	100.0% (85.8%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	47.19 (23.15-96.20)	49.12 (29.18-82.71)	9.83 (6.86-14.08)	12.51 (8.66-18.08)	37.01 (23.28-58.85)	30.48 (19.91-46.64)
Day 29 Visit (28 days post-boost)						
N (non-missing)	9	9	10	10	9	10
Positive Response(%)[2]	9 (100.0%)	9 (100.0%)	10 (100.0%)	10 (100.0%)	9 (100.0%)	10 (100.0%)
Median (P_{25}, P_{75})	734.60 (509.46-955.80)	459.77 (382.48-700.72)	691.54 (601.01-957.26)	701.61 (336.11-1388.36)	1147.44 (647.20-2424.42)	286.01 (173.96-595.16)
Minimum - Maximum	89.10-3723.96	79.99-2568.75	226.40-2668.49	163.11-3296.81	532.21-8113.99	101.33-1696.30
Geometric Mean (95% CI)	667.63 (302.37-1474.13)	441.29 (200.10-973.22)	735.14 (465.54-1160.85)	734.91 (369.82-1460.42)	1445.30 (695.73-3002.42)	320.79 (169.92-605.63)
N* (non-missing pre- and post-boost)	9	9	10	10	9	10

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Participants with ≥ 2-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥4-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	70.0% (34.8%-93.3%)	70.0% (34.8%-93.3%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	32.88 (9.80-110.28)	37.57 (8.01-176.31)	7.64 (3.57-16.35)	7.33 (4.21-12.75)	34.71 (14.94-80.63)	17.77 (10.32-30.57)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 69. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.617.2 (Delta)[1], by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Positive Response(%)[2]	17 (34.0%)	48 (98.0%)	43 (84.3%)
Median (P_{25}, P_{75})	5.00 (5.00-15.82)	124.32 (44.17-212.27)	34.91 (18.52-64.10)
Minimum - Maximum	5.00-5759.79	5.00-2135.71	5.00-1774.30
Geometric Mean (95% CI)	10.27 (6.89-15.31)	107.24 (74.39-154.60)	35.11 (24.73-49.83)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Positive Response(%)[2]	48 (96.0%)	49 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	29.06 (22.98-68.44)	694.13 (441.12-1119.57)	531.89 (153.94-1008.43)
Minimum - Maximum	5.00-6947.18	124.73-12117.96	27.47-4518.57
Geometric Mean (95% CI)	42.93 (29.64-62.17)	759.42 (565.83-1019.25)	417.81 (290.52-600.88)
N* (non-missing pre- and post-boost)	50	49	50
Participants with ≥ 2-fold rise[3], 95% CI	78.0% (64.0%-88.5%)	83.7% (70.3%-92.7%)	92.0% (80.8%-97.8%)
Participants with ≥ 4-fold rise[3], 95% CI	56.0% (41.3%-70.0%)	65.3% (50.4%-78.3%)	74.0% (59.7%-85.4%)
Geometric Mean Fold Rise[3], 95% CI	4.18 (3.01-5.81)	7.08 (4.78-10.48)	12.87 (8.55-19.39)
GM Fold Decrease Relative to D614G[4], 95% CI	3.14 (2.66-3.72)	2.08 (1.74-2.48)	2.14 (1.80-2.54)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 70. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.617.2 (Delta)[1], by Group, Age Group, and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Positive Response(%)[2]	6 (23.1%)	11 (45.8%)	24 (100.0%)	24 (96.0%)	22 (88.0%)	21 (80.8%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	5.00 (5.00-19.57)	132.56 (44.34-307.15)	116.27 (42.85-183.98)	39.79 (21.70-88.48)	31.03 (14.53-45.20)
Minimum - Maximum	5.00-1070.20	5.00-5759.79	13.73-2135.71	5.00-647.07	5.00-1774.30	5.00-197.61
Geometric Mean (95% CI)	8.32 (5.07-13.65)	12.91 (6.65-25.04)	133.91 (75.82-236.53)	86.65 (53.11-141.38)	48.28 (27.09-86.02)	25.84 (17.17-38.89)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Positive Response(%)[2]	24 (92.3%)	24 (100.0%)	24 (100.0%)	25 (100.0%)	24 (100.0%)	26 (100.0%)
Median (P_{25}, P_{75})	27.25 (19.55-62.21)	31.46 (25.11-69.45)	861.70 (562.59-1127.62)	564.57 (366.54-958.47)	515.75 (198.64-1382.26)	588.34 (128.93-796.48)
Minimum - Maximum	5.00-2075.81	11.07-6947.18	149.69-12117.96	124.73-3982.07	47.32-4518.57	27.47-3490.84
Geometric Mean (95% CI)	36.93 (21.96-62.11)	50.52 (28.83-88.53)	946.62 (610.78-1467.13)	614.63 (409.13-923.34)	526.13 (307.14-901.29)	337.73 (202.27-563.91)
N* (non-missing pre- and post-boost)	26	24	24	25	24	26
Participants with ≥ 2-fold rise[3], 95% CI	84.6% (65.1%-95.6%)	70.8% (48.9%-87.4%)	83.3% (62.6%-95.3%)	84.0% (63.9%-95.5%)	95.8% (78.9%-99.9%)	88.5% (69.8%-97.6%)
Participants with ≥4-fold rise[3], 95% CI	57.7% (36.9%-76.6%)	54.2% (32.8%-74.4%)	58.3% (36.6%-77.9%)	72.0% (50.6%-87.9%)	75.0% (53.3%-90.2%)	73.1% (52.2%-88.4%)
Geometric Mean Fold Rise[3], 95% CI	4.44 (2.89-6.83)	3.91 (2.29-6.69)	7.07 (3.66-13.66)	7.09 (4.35-11.56)	12.66 (7.08-22.64)	13.07 (7.05-24.22)
GM Fold Decrease Relative to D614G[4], 95% CI	3.24 (2.52-4.17)	3.04 (2.39-3.87)	2.04 (1.65-2.52)	2.12 (1.58-2.84)	2.00 (1.62-2.48)	2.27 (1.73-2.99)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 71. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.617.2 (Delta)[1], by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	51	50	49
Positive Response(%)[2]	25 (49.0%)	50 (100.0%)	42 (85.7%)
Median (P_{25}, P_{75})	5.00 (5.00-14.38)	107.62 (36.61-193.16)	30.03 (15.66-43.84)
Minimum - Maximum	5.00-5475.92	12.18-895.38	5.00-550.19
Geometric Mean (95% CI)	11.75 (7.83-17.64)	97.94 (73.08-131.28)	29.44 (21.35-40.59)
Day 15 Visit (14 days post-boost)			
N (non-missing)	51	50	50
Positive Response(%)[2]	51 (100.0%)	50 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	694.60 (207.43-1007.09)	921.42 (717.04-1546.43)	1020.69 (479.72-2738.72)
Minimum - Maximum	87.17-10563.34	199.41-5114.52	128.20-5081.50
Geometric Mean (95% CI)	552.26 (413.69-737.25)	1080.83 (888.05-1315.46)	989.48 (733.87-1334.14)
N* (non-missing pre- and post-boost)	50	50	49
Participants with ≥ 2-fold rise[3], 95% CI	94.0% (83.5%-98.7%)	96.0% (86.3%-99.5%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	94.0% (83.5%-98.7%)	86.0% (73.3%-94.2%)	100.0% (92.7%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	48.30 (32.09-72.71)	11.04 (8.59-14.17)	33.65 (24.81-45.65)
Day 29 Visit (28 days post-boost)			
N (non-missing)	18	20	19
Positive Response(%)[2]	18 (100.0%)	20 (100.0%)	19 (100.0%)
Median (P_{25}, P_{75})	587.90 (382.48-793.70)	691.54 (463.35-1177.51)	600.90 (240.87-1696.30)
Minimum - Maximum	79.99-3723.96	163.11-3296.81	101.33-8113.99
Geometric Mean (95% CI)	542.79 (326.62-902.04)	735.02 (507.00-1065.60)	654.46 (370.54-1155.94)
N* (non-missing pre- and post-boost)	18	20	19
Participants with ≥ 2-fold rise[3], 95% CI	88.9% (65.3%-98.6%)	95.0% (75.1%-99.9%)	100.0% (82.4%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	88.9% (65.3%-98.6%)	70.0% (45.7%-88.1%)	100.0% (82.4%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	35.15 (14.69-84.06)	7.48 (4.90-11.43)	24.40 (15.29-38.94)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 72. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.617.2 (Delta)[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	30	26	24	25	24
Positive Response (%)[2]	10 (47.6%)	15 (50.0%)	26 (100.0%)	24 (100.0%)	24 (96.0%)	18 (75.0%)
Median (P_{25}, P_{75})	5.00 (5.00-13.97)	7.56 (5.00-14.38)	104.42 (36.61-195.88)	110.63 (37.70-184.15)	30.03 (24.53-43.84)	29.59 (7.83-44.09)
Minimum - Maximum	5.00-5475.92	5.00-286.40	12.18-895.38	18.77-671.32	5.00-550.19	5.00-191.87
Geometric Mean (95% CI)	14.16 (5.88-34.11)	10.32 (7.14-14.91)	101.62 (65.44-157.78)	94.12 (62.10-142.65)	37.35 (23.75-58.73)	22.97 (14.38-36.69)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	30	26	24	25	25
Positive Response (%)[2]	21 (100.0%)	30 (100.0%)	26 (100.0%)	24 (100.0%)	25 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	773.06 (291.31-1007.09)	557.99 (191.86-983.76)	873.42 (717.04-1487.63)	1022.09 (700.50-1721.91)	1259.29 (781.01-3238.25)	702.46 (284.96-1609.68)
Minimum - Maximum	113.44-10563.34	87.17-3059.32	199.41-3378.05	292.72-5114.52	215.60-5081.50	128.20-4589.75
Geometric Mean (95% CI)	668.16 (416.03-1073.09)	483.32 (331.03-705.67)	998.59 (767.38-1299.45)	1177.58 (863.14-1606.57)	1382.41 (952.37-2006.64)	708.24 (449.78-1115.22)
N* (non-missing pre- and post-boost)	21	29	26	24	25	24
Participants with ≥ 2-fold rise[2], 95% CI	90.5% (69.6%-98.8%)	96.6% (82.2%-99.9%)	96.2% (80.4%-99.9%)	95.8% (78.9%-99.9%)	100.0% (86.3%-100.0%)	100.0% (85.8%-100.0%)
Participants with ≥4-fold rise[2], 95% CI	90.5% (69.6%-98.8%)	96.6% (82.2%-99.9%)	84.6% (65.1%-95.6%)	87.5% (67.6%-97.3%)	100.0% (86.3%-100.0%)	100.0% (85.8%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	47.19 (23.15-96.20)	49.12 (29.18-82.71)	9.83 (6.86-14.08)	12.51 (8.66-18.08)	37.01 (23.28-58.85)	30.48 (19.91-46.64)
Day 29 Visit (28 days post-boost)						
N (non-missing)	9	9	10	10	9	10
Positive Response (%)[2]	9 (100.0%)	9 (100.0%)	10 (100.0%)	10 (100.0%)	9 (100.0%)	10 (100.0%)
Median (P_{25}, P_{75})	734.60 (509.46-955.80)	459.77 (382.48-700.72)	691.54 (601.01-957.26)	701.61 (336.11-1388.36)	1147.44 (647.20-2424.42)	286.01 (173.96-595.16)
Minimum - Maximum	89.10-3723.96	79.99-2568.75	226.40-2668.49	163.11-3296.81	532.21-8113.99	101.33-1696.30
Geometric Mean (95% CI)	667.63 (302.37-1474.13)	441.29 (200.10-973.22)	735.14 (465.54-1160.85)	734.91 (369.82-1460.42)	1445.30 (695.73-3002.42)	320.79 (169.92-605.63)
N* (non-missing pre- and post-boost)	9	9	10	10	9	10
Participants with ≥ 2-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥4-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	70.0% (34.8%-93.3%)	70.0% (34.8%-93.3%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	32.88 (9.80-110.28)	37.57 (8.01-176.31)	7.64 (3.57-16.35)	7.33 (4.21-12.75)	34.71 (14.94-80.63)	17.77 (10.32-30.57)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 73. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.617.2 (Delta)[1], by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	51	50	49
Positive Response(%)[2]	8 (15.7%)	50 (100.0%)	34 (69.4%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	34.48 (16.31-79.12)	14.83 (5.00-16.33)
Minimum - Maximum	5.00-430.95	10.18-301.67	5.00-198.76
Geometric Mean (95% CI)	6.76 (5.29-8.64)	36.70 (28.56-47.17)	13.20 (10.21-17.06)
Day 15 Visit (14 days post-boost)			
N (non-missing)	51	50	50
Positive Response(%)[2]	51 (100.0%)	50 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	295.59 (87.29-423.32)	380.14 (301.17-475.13)	392.31 (176.85-845.39)
Minimum - Maximum	46.44-1397.81	86.95-2053.61	46.23-1984.03
Geometric Mean (95% CI)	221.38 (172.11-284.75)	391.27 (321.26-476.54)	377.97 (279.42-511.28)
N* (non-missing pre- and post-boost)	50	50	49
Participants with ≥ 2-fold rise[2], 95% CI	98.0% (89.4%-99.9%)	98.0% (89.4%-99.9%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	94.0% (83.5%-98.7%)	90.0% (78.2%-96.7%)	100.0% (92.7%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	33.35 (24.66-45.09)	10.66 (8.67-13.10)	28.63 (22.04-37.19)
Day 29 Visit (28 days post-boost)			
N (non-missing)	18	20	19
Positive Response(%)[2]	18 (100.0%)	20 (100.0%)	19 (100.0%)
Median (P_{25}, P_{75})	287.44 (127.74-370.77)	306.60 (112.48-442.28)	275.92 (89.90-525.23)
Minimum - Maximum	23.59-597.39	79.66-1412.89	28.55-2020.17
Geometric Mean (95% CI)	211.56 (136.84-327.07)	266.93 (183.54-388.20)	222.35 (128.35-385.18)
N* (non-missing pre- and post-boost)	18	20	19
Participants with ≥ 2-fold rise[2], 95% CI	88.9% (65.3%-98.6%)	95.0% (75.1%-99.9%)	100.0% (82.4%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	88.9% (65.3%-98.6%)	90.0% (68.3%-98.8%)	100.0% (82.4%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	28.96 (14.68-57.12)	7.72 (5.45-10.94)	18.41 (12.84-26.40)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 74. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.617.2 (Delta)[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	30	26	24	25	24
Positive Response(%)[2]	3 (14.3%)	5 (16.7%)	26 (100.0%)	24 (100.0%)	21 (84.0%)	13 (54.2%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	5.00 (5.00-5.00)	31.03 (16.31-83.30)	41.99 (15.50-73.38)	15.18 (12.33-17.94)	12.46 (5.00-16.09)
Minimum - Maximum	5.00-430.95	5.00-28.35	10.18-301.67	11.03-147.82	5.00-198.76	5.00-84.46
Geometric Mean (95% CI)	7.65 (4.38-13.35)	6.21 (5.13-7.50)	38.33 (26.18-56.14)	35.01 (24.67-49.67)	16.33 (11.14-23.93)	10.57 (7.48-14.95)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	30	26	24	25	25
Positive Response(%)[2]	21 (100.0%)	30 (100.0%)	26 (100.0%)	24 (100.0%)	25 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	350.05 (102.39-422.67)	214.07 (84.20-429.27)	384.07 (271.49-475.13)	379.26 (311.64-504.04)	424.43 (360.99-1333.15)	342.47 (97.04-486.15)
Minimum - Maximum	67.73-1151.46	46.44-1397.81	86.95-1407.99	98.54-2053.61	86.53-1954.70	46.23-1984.03
Geometric Mean (95% CI)	254.86 (176.39-368.25)	200.59 (140.59-286.21)	390.59 (306.19-498.24)	392.01 (280.35-548.15)	537.57 (367.51-786.33)	265.75 (169.09-417.67)
N* (non-missing pre- and post-boost)	21	29	26	24	25	24
Participants with ≥ 2-fold rise[2], 95% CI	95.2% (76.2%-99.9%)	100.0% (88.1%-100.0%)	96.2% (80.4%-99.9%)	100.0% (85.8%-100.0%)	100.0% (86.3%-100.0%)	100.0% (85.8%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	90.5% (69.6%-98.8%)	96.6% (82.2%-99.9%)	88.5% (69.8%-97.6%)	91.7% (73.0%-99.0%)	100.0% (86.3%-100.0%)	100.0% (85.8%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	33.33 (19.71-56.37)	33.36 (22.72-48.99)	10.19 (7.55-13.75)	11.20 (8.26-15.18)	32.92 (22.57-48.02)	24.75 (16.90-36.25)
Day 29 Visit (28 days post-boost)						
N (non-missing)	9	9	10	10	9	10
Positive Response(%)[2]	9 (100.0%)	9 (100.0%)	10 (100.0%)	10 (100.0%)	9 (100.0%)	10 (100.0%)
Median (P_{25}, P_{75})	303.55 (253.17-418.99)	217.34 (116.41-345.26)	304.18 (209.60-361.56)	327.10 (97.82-482.69)	359.08 (293.29-595.73)	96.68 (64.51-275.92)
Minimum - Maximum	55.58-597.39	23.59-515.71	85.55-635.72	79.66-1412.89	128.75-2020.17	28.55-525.23
Geometric Mean (95% CI)	271.31 (152.91-481.42)	164.96 (78.44-346.90)	261.35 (168.74-404.79)	272.63 (134.43-552.91)	464.59 (228.77-943.48)	114.55 (60.11-218.29)
N* (non-missing pre- and post-boost)	9	9	10	10	9	10

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Participants with ≥ 2-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	90.0% (55.5%-99.7%)	90.0% (55.5%-99.7%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	30.15 (10.12-89.81)	27.82 (9.52-81.24)	7.90 (4.22-14.79)	7.54 (4.80-11.86)	28.22 (16.24-49.05)	12.54 (8.41-18.69)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 75. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.617.2 (Delta)[1], by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	50	49	51
Positive Response(%)[2]	10 (20.0%)	42 (85.7%)	31 (60.8%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	30.12 (17.38-68.19)	13.79 (5.00-18.94)
Minimum - Maximum	5.00-402.51	5.00-429.67	5.00-301.72
Geometric Mean (95% CI)	7.06 (5.43-9.16)	29.95 (22.32-40.18)	12.59 (9.63-16.45)
Day 15 Visit (14 days post-boost)			
N (non-missing)	50	49	50
Positive Response(%)[2]	42 (84.0%)	49 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	15.10 (12.96-20.04)	207.71 (103.09-355.33)	121.05 (60.65-348.57)
Minimum - Maximum	5.00-475.53	27.02-3491.67	14.02-920.96
Geometric Mean (95% CI)	17.74 (13.52-23.28)	209.24 (159.48-274.53)	126.16 (91.30-174.33)
N* (non-missing pre- and post-boost)	50	49	50
Participants with ≥ 2-fold rise[3], 95% CI	66.0% (51.2%-78.8%)	85.7% (72.8%-94.1%)	96.0% (86.3%-99.5%)
Participants with ≥ 4-fold rise[3], 95% CI	18.0% (8.6%-31.4%)	69.4% (54.6%-81.7%)	80.0% (66.3%-90.0%)
Geometric Mean Fold Rise[3], 95% CI	2.51 (2.03-3.11)	6.99 (4.99-9.79)	10.68 (7.70-14.81)
GM Fold Decrease Relative to D614G[4], 95% CI	2.99 (2.69-3.32)	2.53 (2.24-2.86)	2.57 (2.27-2.91)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 76. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.617.2 (Delta)[1], by Group, Age Group, and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	26	24	24	25	25	26
Positive Response(%)[2]	3 (11.5%)	7 (29.2%)	22 (91.7%)	20 (80.0%)	18 (72.0%)	13 (50.0%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	5.00 (5.00-11.07)	32.77 (17.41-78.45)	24.40 (17.38-58.92)	13.94 (5.00-22.30)	8.25 (5.00-16.43)
Minimum - Maximum	5.00-402.51	5.00-380.97	5.00-429.67	5.00-104.39	5.00-301.72	5.00-78.75
Geometric Mean (95% CI)	6.53 (4.52-9.43)	7.67 (5.15-11.42)	36.41 (23.19-57.17)	24.83 (16.69-36.94)	15.98 (10.43-24.48)	10.01 (7.19-13.94)
Day 15 Visit (14 days post-boost)						
N (non-missing)	26	24	24	25	24	26
Positive Response(%)[2]	20 (76.9%)	22 (91.7%)	24 (100.0%)	25 (100.0%)	24 (100.0%)	26 (100.0%)
Median (P_{25}, P_{75})	14.70 (11.92-20.04)	15.51 (13.67-21.52)	294.46 (130.94-371.67)	116.87 (97.19-339.52)	138.63 (85.08-427.87)	108.50 (50.38-233.15)
Minimum - Maximum	5.00-394.64	5.00-475.53	69.87-3491.67	27.02-1422.80	18.34-920.96	14.02-739.64
Geometric Mean (95% CI)	16.08 (10.80-23.94)	19.73 (13.31-29.25)	261.13 (178.03-383.00)	169.16 (114.27-250.42)	165.29 (104.08-262.48)	98.32 (62.04-155.81)
N* (non-missing pre- and post-boost)	26	24	24	25	24	26
Participants with ≥ 2-fold rise[3], 95% CI	65.4% (44.3%-82.8%)	66.7% (44.7%-84.4%)	87.5% (67.6%-97.3%)	84.0% (63.9%-95.5%)	100.0% (85.8%-100.0%)	92.3% (74.9%-99.1%)
Participants with ≥ 4-fold rise[3], 95% CI	19.2% (6.6%-39.4%)	16.7% (4.7%-37.4%)	62.5% (40.6%-81.2%)	76.0% (54.9%-90.6%)	79.2% (57.8%-92.9%)	80.8% (60.6%-93.4%)
Geometric Mean Fold Rise[3], 95% CI	2.46 (1.81-3.36)	2.57 (1.88-3.52)	7.17 (4.16-12.36)	6.81 (4.37-10.64)	11.69 (7.04-19.41)	9.82 (6.25-15.45)
GM Fold Decrease Relative to D614G[4], 95% CI	3.12 (2.68-3.63)	2.85 (2.43-3.33)	2.51 (2.22-2.84)	2.55 (2.05-3.17)	2.29 (1.91-2.75)	2.86 (2.41-3.39)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 77. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.617.2 (Delta)[1], by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	51	50	49
Positive Response(%)[2]	8 (15.7%)	50 (100.0%)	34 (69.4%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	34.48 (16.31-79.12)	14.83 (5.00-16.33)
Minimum - Maximum	5.00-430.95	10.18-301.67	5.00-198.76
Geometric Mean (95% CI)	6.76 (5.29-8.64)	36.70 (28.56-47.17)	13.20 (10.21-17.06)
Day 15 Visit (14 days post-boost)			
N (non-missing)	51	50	50
Positive Response(%)[2]	51 (100.0%)	50 (100.0%)	50 (100.0%)
Median (P_{25}, P_{75})	295.59 (87.29-423.32)	380.14 (301.17-475.13)	392.31 (176.85-845.39)
Minimum - Maximum	46.44-1397.81	86.95-2053.61	46.23-1984.03
Geometric Mean (95% CI)	221.38 (172.11-284.75)	391.27 (321.26-476.54)	377.97 (279.42-511.28)
N* (non-missing pre- and post-boost)	50	50	49
Participants with ≥ 2-fold rise[2], 95% CI	98.0% (89.4%-99.9%)	98.0% (89.4%-99.9%)	100.0% (92.7%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	94.0% (83.5%-98.7%)	90.0% (78.2%-96.7%)	100.0% (92.7%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	33.35 (24.66-45.09)	10.66 (8.67-13.10)	28.63 (22.04-37.19)
Day 29 Visit (28 days post-boost)			
N (non-missing)	18	20	19
Positive Response(%)[2]	18 (100.0%)	20 (100.0%)	19 (100.0%)
Median (P_{25}, P_{75})	287.44 (127.74-370.77)	306.60 (112.48-442.28)	275.92 (89.90-525.23)
Minimum - Maximum	23.59-597.39	79.66-1412.89	28.55-2020.17
Geometric Mean (95% CI)	211.56 (136.84-327.07)	266.93 (183.54-388.20)	222.35 (128.35-385.18)
N* (non-missing pre- and post-boost)	18	20	19
Participants with ≥ 2-fold rise[2], 95% CI	88.9% (65.3%-98.6%)	95.0% (75.1%-99.9%)	100.0% (82.4%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	88.9% (65.3%-98.6%)	90.0% (68.3%-98.8%)	100.0% (82.4%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	28.96 (14.68-57.12)	7.72 (5.45-10.94)	18.41 (12.84-26.40)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 78. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.617.2 (Delta)[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	21	30	26	24	25	24
Positive Response(%)[2]	3 (14.3%)	5 (16.7%)	26 (100.0%)	24 (100.0%)	21 (84.0%)	13 (54.2%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	5.00 (5.00-5.00)	31.03 (16.31-83.30)	41.99 (15.50-73.38)	15.18 (12.33-17.94)	12.46 (5.00-16.09)
Minimum - Maximum	5.00-430.95	5.00-28.35	10.18-301.67	11.03-147.82	5.00-198.76	5.00-84.46
Geometric Mean (95% CI)	7.65 (4.38-13.35)	6.21 (5.13-7.50)	38.33 (26.18-56.14)	35.01 (24.67-49.67)	16.33 (11.14-23.93)	10.57 (7.48-14.95)
Day 15 Visit (14 days post-boost)						
N (non-missing)	21	30	26	24	25	25
Positive Response(%)[2]	21 (100.0%)	30 (100.0%)	26 (100.0%)	24 (100.0%)	25 (100.0%)	25 (100.0%)
Median (P_{25}, P_{75})	350.05 (102.39-422.67)	214.07 (84.20-429.27)	384.07 (271.49-475.13)	379.26 (311.64-504.04)	424.43 (360.99-1333.15)	342.47 (97.04-486.15)
Minimum - Maximum	67.73-1151.46	46.44-1397.81	86.95-1407.99	98.54-2053.61	86.53-1954.70	46.23-1984.03
Geometric Mean (95% CI)	254.86 (176.39-368.25)	200.59 (140.59-286.21)	390.59 (306.19-498.24)	392.01 (280.35-548.15)	537.57 (367.51-786.33)	265.75 (169.09-417.67)
N* (non-missing pre- and post-boost)	21	29	26	24	25	24
Participants with ≥ 2-fold rise[2], 95% CI	95.2% (76.2%-99.9%)	100.0% (88.1%-100.0%)	96.2% (80.4%-99.9%)	100.0% (85.8%-100.0%)	100.0% (86.3%-100.0%)	100.0% (85.8%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	90.5% (69.6%-98.8%)	96.6% (82.2%-99.9%)	88.5% (69.8%-97.6%)	91.7% (73.0%-99.0%)	100.0% (86.3%-100.0%)	100.0% (85.8%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	33.33 (19.71-56.37)	33.36 (22.72-48.99)	10.19 (7.55-13.75)	11.20 (8.26-15.18)	32.92 (22.57-48.02)	24.75 (16.90-36.25)
Day 29 Visit (28 days post-boost)						
N (non-missing)	9	9	10	10	9	10
Positive Response(%)[2]	9 (100.0%)	9 (100.0%)	10 (100.0%)	10 (100.0%)	9 (100.0%)	10 (100.0%)
Median (P_{25}, P_{75})	303.55 (253.17-418.99)	217.34 (116.41-345.26)	304.18 (209.60-361.56)	327.10 (97.82-482.69)	359.08 (293.29-595.73)	96.68 (64.51-275.92)
Minimum - Maximum	55.58-597.39	23.59-515.71	85.55-635.72	79.66-1412.89	128.75-2020.17	28.55-525.23
Geometric Mean (95% CI)	271.31 (152.91-481.42)	164.96 (78.44-346.90)	261.35 (168.74-404.79)	272.63 (134.43-552.91)	464.59 (228.77-943.48)	114.55 (60.11-218.29)
N* (non-missing pre- and post-boost)	9	9	10	10	9	10
Participants with ≥ 2-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Participants with ≥ 4-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	90.0% (55.5%-99.7%)	90.0% (55.5%-99.7%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	30.15 (10.12-89.81)	27.82 (9.52-81.24)	7.90 (4.22-14.79)	7.54 (4.80-11.86)	28.22 (16.24-49.05)	12.54 (8.41-18.69)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 79. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.351 (Beta)[1], by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	20	20	20
Median (P_{25}, P_{75})	5.00 (5.00-13.33)	32.44 (14.81-58.54)	17.35 (13.16-23.07)
Minimum - Maximum	5.00-246.66	5.00-213.06	5.00-96.78
Geometric Mean (95% CI)	8.66 (5.50-13.63)	29.74 (17.80-49.69)	17.81 (13.14-24.15)
Day 15 Visit (14 days post-boost)			
N (non-missing)	20	20	20
Median (P_{25}, P_{75})	541.64 (181.66-683.88)	611.76 (249.00-1127.14)	661.71 (198.58-1600.13)
Minimum - Maximum	63.72-1311.06	82.36-4665.41	81.52-5627.48
Geometric Mean (95% CI)	407.53 (276.66-600.31)	572.08 (358.19-913.69)	582.60 (336.76-1007.90)
N* (non-missing pre- and post-boost)	20	20	20
Participants with ≥ 2-fold rise[2], 95% CI	95.0% (75.1%-99.9%)	100.0% (83.2%-100.0%)	100.0% (83.2%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	95.0% (75.1%-99.9%)	95.0% (75.1%-99.9%)	100.0% (83.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	47.06 (25.86-85.64)	19.23 (12.38-29.87)	32.70 (22.42-47.71)
Day 29 Visit (28 days post-boost)			
N (non-missing)	18	20	19
Median (P_{25}, P_{75})	331.99 (191.06-484.13)	569.92 (212.59-860.34)	374.93 (146.23-906.55)
Minimum - Maximum	38.12-1137.58	63.14-2009.86	61.96-3908.71
Geometric Mean (95% CI)	281.66 (188.71-420.39)	439.79 (283.81-681.50)	405.60 (233.58-704.32)
N* (non-missing pre- and post-boost)	18	20	19
Participants with ≥ 2-fold rise[2], 95% CI	94.4% (72.7%-99.9%)	100.0% (83.2%-100.0%)	100.0% (82.4%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	94.4% (72.7%-99.9%)	95.0% (75.1%-99.9%)	100.0% (82.4%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	32.34 (16.71-62.60)	14.79 (10.41-20.99)	23.26 (15.69-34.47)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 80. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.351 (Beta)[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	10	10	10	10	10	10
Median (P_{25}, P_{75})	5.00 (5.00-13.53)	5.00 (5.00-13.12)	32.44 (20.84-39.33)	33.32 (14.79-65.27)	22.61 (14.72-33.17)	14.16 (11.81-17.56)
Minimum - Maximum	5.00-22.38	5.00-246.66	5.00-213.06	5.00-202.24	13.15-96.78	5.00-23.43
Geometric Mean (95% CI)	7.21 (4.69-11.07)	10.41 (4.27-25.36)	29.09 (12.71-66.58)	30.42 (13.90-66.55)	24.84 (16.21-38.07)	12.77 (8.69-18.78)
Day 15 Visit (14 days post-boost)						
N (non-missing)	10	10	10	10	10	10
Median (P_{25}, P_{75})	544.66 (464.29-632.68)	364.83 (143.87-801.02)	611.76 (213.50-970.80)	671.54 (284.50-1197.28)	1251.82 (747.00-1682.16)	230.04 (133.48-512.86)
Minimum - Maximum	63.72-1311.06	123.51-1013.32	130.77-4665.41	82.36-2246.85	213.34-5627.48	81.52-2018.46
Geometric Mean (95% CI)	479.11 (276.06-831.54)	346.64 (183.27-655.65)	603.13 (286.71-1268.77)	542.62 (262.92-1119.91)	1199.67 (636.27-2261.93)	282.93 (140.86-568.27)
N* (non-missing pre- and post-boost)	10	10	10	10	10	10
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (69.2%-100.0%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥4-fold rise[2], 95% CI	100.0% (69.2%-100.0%)	90.0% (55.5%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	66.49 (33.92-130.33)	33.31 (11.25-98.66)	20.74 (9.20-46.71)	17.84 (10.41-30.56)	48.29 (31.18-74.80)	22.15 (12.37-39.64)
Day 29 Visit (28 days post-boost)						
N (non-missing)	9	9	10	10	9	10
Median (P_{25}, P_{75})	428.27 (235.32-514.67)	212.66 (132.05-472.21)	640.38 (188.83-727.23)	389.00 (236.02-965.87)	714.91 (374.93-980.71)	191.80 (104.49-422.80)
Minimum - Maximum	38.12-651.51	108.25-1137.58	121.44-1558.39	63.14-2009.86	267.52-3908.71	61.96-2234.84
Geometric Mean (95% CI)	303.54 (155.34-593.12)	261.36 (143.66-475.49)	468.05 (247.97-883.46)	413.23 (198.41-860.62)	774.25 (387.41-1547.38)	226.67 (106.81-481.05)
N* (non-missing pre- and post-boost)	9	9	10	10	9	10
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (66.4%-100.0%)	88.9% (51.8%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Participants with ≥4-fold rise[2], 95% CI	100.0% (66.4%-100.0%)	88.9% (51.8%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	45.18 (20.74-98.42)	23.15 (6.92-77.48)	16.09 (8.43-30.73)	13.59 (8.89-20.75)	31.42 (18.50-53.36)	17.74 (9.60-32.81)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 81. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.351 (Beta)[1], by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	20	20	20
Positive Response(%)[2]	2 (10.0%)	17 (85.0%)	10 (50.0%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	30.21 (15.57-40.06)	9.48 (5.00-20.71)
Minimum - Maximum	5.00-704.02	5.00-461.07	5.00-102.15
Geometric Mean (95% CI)	6.75 (4.00-11.39)	28.82 (17.22-48.23)	12.06 (7.39-19.68)
Day 15 Visit (14 days post-boost)			
N (non-missing)	20	20	20
Positive Response(%)[2]	16 (80.0%)	19 (95.0%)	20 (100.0%)
Median (P_{25}, P_{75})	19.65 (13.36-34.58)	524.70 (249.75-1376.78)	218.98 (95.90-539.31)
Minimum - Maximum	5.00-1035.06	5.00-4030.46	22.48-2843.44
Geometric Mean (95% CI)	24.90 (13.06-47.45)	449.28 (212.80-948.58)	233.11 (130.88-415.19)
N* (non-missing pre- and post-boost)	20	20	20
Participants with ≥ 2-fold rise[3], 95% CI	70.0% (45.7%-88.1%)	90.0% (68.3%-98.8%)	100.0% (83.2%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	40.0% (19.1%-63.9%)	90.0% (68.3%-98.8%)	100.0% (83.2%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	3.69 (2.17-6.26)	15.59 (8.34-29.13)	19.33 (12.67-29.49)
GM Fold Decrease Relative to D614G[4], 95% CI	6.31 (5.11-7.79)	4.30 (2.83-6.53)	3.34 (2.60-4.28)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

[4] Relative to D614G titer at same visit, among participants with positive responses to both.

Supplemental Table 82. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.351 (Beta)[1], by Group, Age Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	10	10	10	10	10	10
Positive Response(%)[2]	1 (10.0%)	1 (10.0%)	9 (90.0%)	8 (80.0%)	5 (50.0%)	5 (50.0%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	5.00 (5.00-5.00)	31.26 (15.00-92.06)	30.21 (20.36-38.41)	10.39 (5.00-29.64)	9.48 (5.00-16.43)
Minimum - Maximum	5.00-704.02	5.00-14.33	5.00-461.07	5.00-40.58	5.00-102.15	5.00-66.73
Geometric Mean (95% CI)	8.20 (2.68-25.11)	5.56 (4.38-7.05)	37.98 (14.81-97.38)	21.87 (12.26-39.00)	13.96 (5.84-33.36)	10.42 (5.54-19.60)
Day 15 Visit (14 days post-boost)						
N (non-missing)	10	10	10	10	10	10
Positive Response(%)[2]	8 (80.0%)	8 (80.0%)	10 (100.0%)	9 (90.0%)	10 (100.0%)	10 (100.0%)
Median (P_{25}, P_{75})	24.14 (16.31-88.10)	15.23 (13.19-24.30)	563.33 (147.25-2081.28)	455.94 (324.58-672.28)	527.14 (83.43-825.33)	188.65 (108.38-427.92)
Minimum - Maximum	5.00-1035.06	5.00-214.52	52.93-3608.70	5.00-4030.46	22.48-2843.44	49.70-482.54
Geometric Mean (95% CI)	35.52 (11.13-113.37)	17.45 (8.25-36.91)	497.51 (183.33-1350.15)	405.73 (108.24-1520.86)	301.84 (99.66-914.19)	180.03 (100.53-322.40)
N* (non-missing pre- and post-boost)	10	10	10	10	10	10
Participants with ≥ 2-fold rise[3], 95% CI	70.0% (34.8%-93.3%)	70.0% (34.8%-93.3%)	90.0% (55.5%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥4-fold rise[3], 95% CI	50.0% (18.7%-81.3%)	30.0% (6.7%-65.2%)	90.0% (55.5%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	4.33 (1.87-10.01)	3.14 (1.40-7.04)	13.10 (5.67-30.28)	18.56 (6.23-55.24)	21.62 (10.30-45.40)	17.28 (9.85-30.30)
GM Fold Decrease Relative to D614G[4], 95% CI	5.71 (3.87-8.43)	7.05 (5.74-8.66)	4.99 (3.15-7.90)	3.71 (1.69-8.18)	2.80 (1.96-4.01)	3.97 (2.72-5.81)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

[4] Relative to D614G titer at same visit, among participants with positive responses to both.

Supplemental Table 83. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.351 (Beta)[1], by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	20	20	20
Positive Response(%)[2]	6 (30.0%)	18 (90.0%)	17 (85.0%)
Median (P_{25}, P_{75})	5.00 (5.00-14.84)	35.21 (17.40-70.36)	18.37 (10.33-33.37)
Minimum - Maximum	5.00-61.69	5.00-191.24	5.00-200.79
Geometric Mean (95% CI)	7.99 (5.51-11.57)	34.42 (21.87-54.17)	19.67 (12.53-30.86)
Day 15 Visit (14 days post-boost)			
N (non-missing)	20	20	20
Positive Response(%)[2]	20 (100.0%)	20 (100.0%)	20 (100.0%)
Median (P_{25}, P_{75})	352.28 (175.35-598.36)	652.05 (451.77-932.29)	540.59 (271.38-727.66)
Minimum - Maximum	98.78-815.57	162.18-1616.71	120.51-1803.02
Geometric Mean (95% CI)	332.24 (241.41-457.23)	607.55 (451.31-817.89)	487.02 (340.72-696.13)
N* (non-missing pre- and post-boost)	20	20	20
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (83.2%-100.0%)	100.0% (83.2%-100.0%)	100.0% (83.2%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	100.0% (83.2%-100.0%)	95.0% (75.1%-99.9%)	95.0% (75.1%-99.9%)
Geometric Mean Fold Rise[3], 95% CI	41.60 (27.74-62.37)	17.65 (11.60-26.86)	24.76 (16.47-37.23)
GM Fold Decrease Relative to D614G[4], 95% CI	5.08 (4.17-6.19)	4.17 (3.51-4.97)	3.78 (3.08-4.65)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

[4] Relative to D614G titer at same visit, among participants with positive responses to both.

Supplemental Table 84. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID50) to Pseudovirus B.1.351 (Beta)[1], by Group, Age Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	10	10	10	10	10	10
Positive Response(%)[2]	3 (30.0%)	3 (30.0%)	10 (100.0%)	8 (80.0%)	9 (90.0%)	8 (80.0%)
Median (P_{25}, P_{75})	5.00 (5.00-11.65)	5.00 (5.00-18.03)	41.45 (25.26-71.43)	29.42 (15.83-69.02)	23.98 (12.51-57.92)	14.10 (10.02-23.91)
Minimum - Maximum	5.00-61.69	5.00-20.94	14.61-191.24	5.00-94.55	5.00-200.79	5.00-62.45
Geometric Mean (95% CI)	8.47 (4.33-16.56)	7.53 (4.70-12.08)	45.29 (25.10-81.72)	26.15 (12.20-56.03)	25.81 (12.04-55.34)	14.98 (8.39-26.74)
Day 15 Visit (14 days post-boost)						
N (non-missing)	10	10	10	10	10	10
Positive Response(%)[2]	10 (100.0%)	10 (100.0%)	10 (100.0%)	10 (100.0%)	10 (100.0%)	10 (100.0%)
Median (P_{25}, P_{75})	459.93 (192.65-615.71)	308.50 (153.78-468.26)	755.63 (507.35-986.21)	598.85 (336.39-764.27)	666.15 (540.52-809.20)	315.53 (245.75-651.56)
Minimum - Maximum	133.60-797.98	98.78-815.57	162.18-1616.71	199.10-1585.37	120.51-1735.92	121.69-1803.02
Geometric Mean (95% CI)	379.65 (240.10-600.31)	290.75 (172.46-490.18)	699.06 (442.15-1105.26)	528.02 (336.24-829.18)	624.59 (375.42-1039.15)	379.75 (219.62-656.64)
N* (non-missing pre- and post-boost)	10	10	10	10	10	10
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥4-fold rise[3], 95% CI	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	90.0% (55.5%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	44.83 (21.62-92.96)	38.60 (22.94-64.95)	15.43 (9.08-26.24)	20.19 (9.52-42.85)	24.20 (12.43-47.09)	25.35 (13.73-46.78)
GM Fold Decrease Relative to D614G[4], 95% CI	5.65 (4.00-7.97)	4.62 (3.56-6.01)	4.60 (3.52-6.00)	3.79 (2.93-4.92)	3.61 (2.55-5.13)	3.96 (2.95-5.32)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

[4] Relative to D614G titer at same visit, among participants with positive responses to both.

Supplemental Table 85. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.351 (Beta)[1], by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	20	20	20
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	15.28 (5.00-19.31)	5.00 (5.00-11.46)
Minimum - Maximum	5.00-53.19	5.00-84.98	5.00-28.14
Geometric Mean (95% CI)	5.88 (4.54-7.63)	12.95 (8.60-19.50)	7.17 (5.57-9.24)
Day 15 Visit (14 days post-boost)			
N (non-missing)	20	20	20
Median (P_{25}, P_{75})	254.38 (81.27-321.81)	293.42 (88.11-434.43)	265.37 (79.93-474.26)
Minimum - Maximum	23.57-419.13	28.01-1374.77	38.09-1931.82
Geometric Mean (95% CI)	175.31 (120.54-254.96)	217.74 (139.31-340.33)	213.16 (130.73-347.57)
N* (non-missing pre- and post-boost)	20	20	20
Participants with ≥ 2-fold rise[2], 95% CI	95.0% (75.1%-99.9%)	100.0% (83.2%-100.0%)	100.0% (83.2%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	95.0% (75.1%-99.9%)	95.0% (75.1%-99.9%)	100.0% (83.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	29.79 (18.20-48.76)	16.81 (11.53-24.50)	29.71 (20.65-42.76)
Day 29 Visit (28 days post-boost)			
N (non-missing)	18	20	19
Median (P_{25}, P_{75})	109.24 (83.55-210.97)	168.05 (80.44-375.39)	120.70 (59.47-366.57)
Minimum - Maximum	17.08-413.37	20.61-716.85	20.37-1544.45
Geometric Mean (95% CI)	119.08 (80.29-176.59)	166.83 (108.05-257.59)	139.63 (81.25-239.97)
N* (non-missing pre- and post-boost)	18	20	19
Participants with ≥ 2-fold rise[2], 95% CI	94.4% (72.7%-99.9%)	100.0% (83.2%-100.0%)	100.0% (82.4%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	88.9% (65.3%-98.6%)	95.0% (75.1%-99.9%)	100.0% (82.4%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	19.87 (11.44-34.51)	12.88 (9.35-17.74)	19.93 (13.10-30.33)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints.

Supplemental Table 86. SARS-CoV-2 Pseudovirion Neutralization Antibody – mRNA-1273 Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.351 (Beta)[1], by Group, Age Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥56 yo (N=25)
Day 1 Visit (Pre-boost)						
N (non-missing)	10	10	10	10	10	10
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	5.00 (5.00-5.00)	15.28 (12.32-16.27)	11.01 (5.00-19.90)	11.46 (5.00-13.61)	5.00 (5.00-5.00)
Minimum - Maximum	5.00-12.22	5.00-53.19	5.00-84.00	5.00-84.98	5.00-28.14	5.00-5.00
Geometric Mean (95% CI)	5.47 (4.47-6.69)	6.33 (3.71-10.81)	14.73 (8.38-25.91)	11.39 (5.67-22.89)	10.29 (6.83-15.51)	5.00 (5.00-5.00)
Day 15 Visit (14 days post-boost)						
N (non-missing)	10	10	10	10	10	10
Median (P_{25}, P_{75})	272.36 (133.08-302.90)	164.02 (73.70-340.71)	293.42 (88.40-358.15)	305.92 (87.82-450.72)	426.77 (279.31-520.91)	82.73 (65.97-250.27)
Minimum - Maximum	23.57-419.13	66.12-370.54	64.82-1374.77	28.01-614.16	86.79-1931.82	38.09-629.28
Geometric Mean (95% CI)	198.94 (108.61-364.42)	154.48 (88.73-268.94)	239.02 (123.22-463.67)	198.36 (95.47-412.14)	403.46 (229.56-709.08)	112.62 (59.92-211.65)
N* (non-missing pre- and post-boost)	10	10	10	10	10	10
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (69.2%-100.0%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	100.0% (69.2%-100.0%)	90.0% (55.5%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	36.39 (19.59-67.59)	24.39 (10.15-58.61)	16.23 (8.70-30.26)	17.42 (9.98-30.40)	39.20 (26.02-59.05)	22.52 (11.98-42.33)
Day 29 Visit (28 days post-boost)						
N (non-missing)	9	9	10	10	9	10
Median (P_{25}, P_{75})	129.27 (92.91-210.97)	88.84 (72.51-207.21)	199.05 (79.26-327.25)	138.68 (81.63-395.94)	347.36 (120.70-409.81)	72.61 (52.47-121.89)
Minimum - Maximum	17.08-315.44	44.94-413.37	50.97-485.52	20.61-716.85	90.86-1544.45	20.37-536.24
Geometric Mean (95% CI)	123.01 (62.91-240.49)	115.27 (64.47-206.09)	177.81 (100.20-315.55)	156.53 (72.28-338.96)	268.29 (128.64-559.56)	77.57 (39.33-152.99)
N* (non-missing pre- and post-boost)	9	9	10	10	9	10
Participants with ≥ 2-fold rise[2], 95% CI	100.0% (66.4%-100.0%)	88.9% (51.8%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥ 4-fold rise[2], 95% CI	88.9% (51.8%-99.7%)	88.9% (51.8%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (66.4%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[2], 95% CI	22.27 (11.02-45.03)	17.73 (6.41-49.00)	12.07 (7.25-20.09)	13.75 (8.42-22.45)	26.32 (15.06-46.00)	15.51 (7.87-30.60)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

Supplemental Table 87. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.351 (Beta)[1], by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
N (non-missing)	20	20	20
Positive Response(%)[2]	1 (5.0%)	15 (75.0%)	7 (35.0%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	14.29 (7.62-17.12)	5.00 (5.00-12.48)
Minimum - Maximum	5.00-300.07	5.00-122.83	5.00-57.89
Geometric Mean (95% CI)	6.14 (4.00-9.42)	13.81 (9.43-20.23)	7.93 (5.65-11.14)
Day 15 Visit (14 days post-boost)			
N (non-missing)	20	20	20
Positive Response(%)[2]	12 (60.0%)	19 (95.0%)	20 (100.0%)
Median (P_{25}, P_{75})	12.76 (5.00-16.02)	160.93 (87.65-403.60)	80.96 (35.62-254.55)
Minimum - Maximum	5.00-358.44	5.00-735.78	12.97-579.64
Geometric Mean (95% CI)	13.77 (7.85-24.17)	144.98 (79.92-263.03)	91.66 (52.93-158.75)
N* (non-missing pre- and post-boost)	20	20	20
Participants with ≥ 2-fold rise[3], 95% CI	55.0% (31.5%-76.9%)	90.0% (68.3%-98.8%)	100.0% (83.2%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	15.0% (3.2%-37.9%)	85.0% (62.1%-96.8%)	80.0% (56.3%-94.3%)
Geometric Mean Fold Rise[3], 95% CI	2.24 (1.45-3.48)	10.50 (6.19-17.79)	11.55 (7.77-17.17)
GM Fold Decrease Relative to D614G[4], 95% CI	4.72 (3.76-5.94)	4.68 (3.70-5.92)	3.07 (2.39-3.95)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

[4] Relative to D614G titer at same visit, among participants with positive responses to both.

Supplemental Table 88. SARS-CoV-2 Pseudovirion Neutralization Antibody – Ad26.COV2.S Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.351 (Beta)[1], by Group, Age Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	10	10	10	10	10	10
Positive Response(%)[2]	1 (10.0%)	0 (0.0%)	7 (70.0%)	8 (80.0%)	4 (40.0%)	3 (30.0%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	5.00 (5.00-5.00)	15.35 (5.00-29.32)	13.85 (12.05-15.76)	5.00 (5.00-15.03)	5.00 (5.00-10.78)
Minimum - Maximum	5.00-300.07	5.00-5.00	5.00-122.83	5.00-17.51	5.00-57.89	5.00-24.29
Geometric Mean (95% CI)	7.53 (2.98-19.01)	5.00 (5.00-5.00)	16.17 (7.55-34.63)	11.79 (8.45-16.46)	9.12 (4.90-16.97)	6.90 (4.63-10.29)
Day 15 Visit (14 days post-boost)						
N (non-missing)	10	10	10	10	10	10
Positive Response(%)[2]	8 (80.0%)	4 (40.0%)	10 (100.0%)	9 (90.0%)	10 (100.0%)	10 (100.0%)
Median (P_{25}, P_{75})	13.70 (10.64-54.41)	5.00 (5.00-13.52)	186.59 (68.20-497.50)	126.66 (99.94-309.71)	212.37 (25.49-371.69)	72.61 (45.75-181.65)
Minimum - Maximum	5.00-358.44	5.00-86.82	19.33-735.78	5.00-621.95	12.97-579.64	18.95-216.68
Geometric Mean (95% CI)	21.22 (8.17-55.10)	8.94 (4.61-17.31)	160.42 (66.28-388.27)	131.03 (49.26-348.52)	116.32 (42.13-321.16)	72.24 (38.63-135.07)
N* (non-missing pre- and post-boost)	10	10	10	10	10	10
Participants with ≥ 2-fold rise[3], 95% CI	70.0% (34.8%-93.3%)	40.0% (12.2%-73.8%)	90.0% (55.5%-99.7%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	20.0% (2.5%-55.6%)	10.0% (0.3%-44.5%)	80.0% (44.4%-97.5%)	90.0% (55.5%-99.7%)	80.0% (44.4%-97.5%)	80.0% (44.4%-97.5%)
Geometric Mean Fold Rise[3], 95% CI	2.82 (1.44-5.52)	1.79 (0.92-3.46)	9.92 (4.39-22.39)	11.11 (4.79-25.75)	12.75 (6.21-26.19)	10.47 (6.38-17.19)
GM Fold Decrease Relative to D614G[4], 95% CI	3.88 (2.82-5.34)	5.88 (4.24-8.16)	5.51 (4.25-7.16)	3.97 (2.61-6.04)	2.64 (1.90-3.69)	3.56 (2.34-5.42)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

[4] Relative to D614G titer at same visit, among participants with positive responses to both.

Supplemental Table 89. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.351 (Beta)[1], by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
N (non-missing)	20	20	20
Positive Response(%)[2]	3 (15.0%)	13 (65.0%)	8 (40.0%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	14.98 (5.00-21.32)	5.00 (5.00-13.98)
Minimum - Maximum	5.00-18.26	5.00-78.07	5.00-53.52
Geometric Mean (95% CI)	5.85 (4.86-7.03)	12.95 (8.73-19.20)	8.30 (5.94-11.59)
Day 15 Visit (14 days post-boost)			
N (non-missing)	20	20	20
Positive Response(%)[2]	20 (100.0%)	20 (100.0%)	20 (100.0%)
Median (P_{25}, P_{75})	113.38 (78.62-252.99)	286.86 (127.57-341.81)	179.35 (92.66-320.84)
Minimum - Maximum	52.10-339.38	71.18-487.51	58.62-559.83
Geometric Mean (95% CI)	136.76 (102.96-181.66)	222.71 (164.57-301.39)	179.29 (127.00-253.13)
N* (non-missing pre- and post-boost)	20	20	20
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (83.2%-100.0%)	100.0% (83.2%-100.0%)	100.0% (83.2%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	100.0% (83.2%-100.0%)	95.0% (75.1%-99.9%)	100.0% (83.2%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	23.39 (17.73-30.85)	17.20 (12.04-24.56)	21.61 (15.92-29.33)
GM Fold Decrease Relative to D614G[4], 95% CI	4.36 (3.71-5.12)	4.01 (3.44-4.67)	3.67 (3.14-4.29)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

[4] Relative to D614G titer at same visit, among participants with positive responses to both.

Supplemental Table 90. SARS-CoV-2 Pseudovirion Neutralization Antibody – BNT162b2 Neutralization Antibodies Titer (ID80) to Pseudovirus B.1.351 (Beta)[1], by Group, Age Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥56 yo (N=26)
Day 1 Visit (Pre-boost)						
N (non-missing)	10	10	10	10	10	10
Positive Response(%)[2]	2 (20.0%)	1 (10.0%)	8 (80.0%)	5 (50.0%)	5 (50.0%)	3 (30.0%)
Median (P_{25}, P_{75})	5.00 (5.00-5.00)	5.00 (5.00-5.00)	16.88 (12.07-21.82)	8.48 (5.00-20.82)	7.77 (5.00-19.65)	5.00 (5.00-10.18)
Minimum - Maximum	5.00-18.26	5.00-10.40	5.00-78.07	5.00-25.33	5.00-53.52	5.00-19.50
Geometric Mean (95% CI)	6.36 (4.42-9.14)	5.38 (4.56-6.35)	17.25 (9.17-32.44)	9.72 (5.77-16.39)	10.15 (5.52-18.64)	6.79 (4.69-9.81)
Day 15 Visit (14 days post-boost)						
N (non-missing)	10	10	10	10	10	10
Positive Response(%)[2]	10 (100.0%)	10 (100.0%)	10 (100.0%)	10 (100.0%)	10 (100.0%)	10 (100.0%)
Median (P_{25}, P_{75})	160.12 (84.86-259.76)	111.01 (73.46-176.21)	301.03 (169.19-411.78)	250.02 (88.62-324.33)	296.92 (149.14-344.74)	95.06 (89.04-291.52)
Minimum - Maximum	73.84-339.38	52.10-334.97	71.18-485.02	77.83-487.51	61.01-559.83	58.62-506.33
Geometric Mean (95% CI)	156.23 (100.96-241.75)	119.71 (77.70-184.43)	255.61 (165.35-395.13)	194.04 (118.87-316.76)	234.92 (143.32-385.04)	136.84 (82.23-227.73)
N* (non-missing pre- and post-boost)	10	10	10	10	10	10
Participants with ≥ 2-fold rise[3], 95% CI	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Participants with ≥ 4-fold rise[3], 95% CI	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)	90.0% (55.5%-99.7%)	100.0% (69.2%-100.0%)	100.0% (69.2%-100.0%)
Geometric Mean Fold Rise[3], 95% CI	24.58 (15.83-38.16)	22.25 (14.52-34.09)	14.82 (8.84-24.86)	19.96 (11.20-35.56)	23.15 (14.26-37.59)	20.16 (12.61-32.25)
GM Fold Decrease Relative to D614G[4], 95% CI	4.75 (3.84-5.88)	4.03 (3.09-5.27)	4.32 (3.51-5.33)	3.71 (2.88-4.79)	3.42 (2.69-4.36)	3.94 (3.10-4.99)

[1] Values below the lower limit of detection (LLOD = 10) were assigned the value of LLOD/2

[2] Positive response is defined as an ID titer above the LLOD

[3] Relative to pre-vaccination (Day 1 Visit) levels, among participants with no-missing observations at both pre- and post-boost timepoints

[4] Relative to D614G titer at same visit, among participants with positive responses to both.

Supplemental Table 91. T cell Response by Intracellular Cytokine Staining – mRNA-1273 percent of CD4 T cells Expressing IL-2 and/or IFNg in Response to Spike Peptide Pool (S1 + S2), by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	18	19	19
Median (P_{25}, P_{75})	0.06 (0.01-0.11)	0.24 (0.12-0.35)	0.14 (0.06-0.19)
Minimum - Maximum	-0.08-0.78	0.05-1.16	0.04-0.61
Participants with positive response[2]			
N (%)	6 (33%)	17 (89%)	12 (63%)
Median (P_{25}, P_{75})	0.13 (0.11-0.50)	0.24 (0.14-0.35)	0.18 (0.15-0.36)
Minimum - Maximum	0.06-0.78	0.06-1.16	0.09-0.61
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	20	19	19
Median (P_{25}, P_{75})	0.24 (0.10-0.40)	0.48 (0.29-0.65)	0.32 (0.15-0.50)
Minimum - Maximum	-0.00-0.68	0.17-1.37	0.06-1.06
Participants with positive response[2]			
N (%)	15 (75%)	19 (100%)	17 (89%)
Median (P_{25}, P_{75})	0.26 (0.23-0.45)	0.48 (0.29-0.65)	0.37 (0.23-0.50)
Minimum - Maximum	0.12-0.68	0.17-1.37	0.14-1.06

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 92.T cell Response by Intracellular Cytokine Staining – mRNA-1273 percent of CD4 T cells Expressing IL-2 and/or IFNg in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥ 56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥ 56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥ 56 yo (N=25)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	9	9	10	9	9	10
Median (P_{25}, P_{75})	0.07 (0.03-0.15)	0.04 (-0.01-0.09)	0.21 (0.12-0.35)	0.24 (0.13-0.34)	0.13 (0.05-0.19)	0.15 (0.09-0.18)
Minimum - Maximum	0.01-0.78	-0.08-0.11	0.06-0.39	0.05-1.16	0.04-0.61	0.05-0.46
Participants with positive response[2]						
N (%)	5 (56%)	1 (11%)	10 (100%)	7 (78%)	5 (56%)	7 (70%)
Median (P_{25}, P_{75})	0.15 (0.11-0.50)	0.11 (0.11-0.11)	0.21 (0.12-0.35)	0.27 (0.23-0.57)	0.19 (0.16-0.60)	0.18 (0.14-0.26)
Minimum - Maximum	0.06-0.78	0.11-0.11	0.06-0.39	0.13-1.16	0.13-0.61	0.09-0.46
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	10	10	9	10	9	10
Median (P_{25}, P_{75})	0.27 (0.12-0.45)	0.23 (0.07-0.26)	0.48 (0.29-0.65)	0.49 (0.34-0.61)	0.44 (0.26-0.50)	0.23 (0.14-0.38)
Minimum - Maximum	0.03-0.68	-0.00-0.60	0.17-0.97	0.19-1.37	0.06-1.06	0.08-0.91
Participants with positive response[2]						
N (%)	8 (80%)	7 (70%)	9 (100%)	10 (100%)	8 (89%)	9 (90%)
Median (P_{25}, P_{75})	0.35 (0.23-0.47)	0.26 (0.23-0.42)	0.48 (0.29-0.65)	0.49 (0.34-0.61)	0.46 (0.29-0.77)	0.25 (0.15-0.38)
Minimum - Maximum	0.12-0.68	0.13-0.60	0.17-0.97	0.19-1.37	0.23-1.06	0.14-0.91

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 93. T cell Response by Intracellular Cytokine Staining – mRNA-1273 percent of CD4 T cells Expressing IL-4 and/or IL-5/IL-13 and CD154 in Response to Spike Peptide Pool (S1 + S2), by Group, and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	18	19	19
Median (P_{25}, P_{75})	-0.00 (-0.01-0.00)	0.00 (-0.00-0.01)	-0.00 (-0.02-0.01)
Minimum - Maximum	-0.02-0.01	-0.02-0.14	-0.13-0.03
Participants with positive response[2]			
N (%)	0 (0%)	1 (5%)	0 (0%)
Median (P_{25}, P_{75})		0.14 (0.14-0.14)	
Minimum - Maximum		0.14-0.14	
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	20	19	19
Median (P_{25}, P_{75})	0.00 (-0.01-0.01)	0.03 (0.03-0.07)	0.01 (0.00-0.03)
Minimum - Maximum	-0.11-0.03	-0.02-0.14	-0.02-0.09
Participants with positive response[2]			
N (%)	1 (5%)	5 (26%)	0 (0%)
Median (P_{25}, P_{75})	0.03 (0.03-0.03)	0.09 (0.09-0.12)	
Minimum - Maximum	0.03-0.03	0.07-0.14	

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 94. T cell Response by Intracellular Cytokine Staining – mRNA-1273 percent of CD4 T cells Expressing IL-4 and/or IL-5/IL-13 and CD154 in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥ 56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥ 56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥ 56 yo (N=25)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	9	9	10	9	9	10
Median (P_{25}, P_{75})	-0.00 (-0.00-0.00)	-0.00 (-0.01--0.00)	0.00 (-0.00-0.01)	0.01 (-0.00-0.02)	-0.01 (-0.02-0.00)	-0.00 (-0.01-0.01)
Minimum - Maximum	-0.01-0.01	-0.02-0.00	-0.02-0.01	-0.01-0.14	-0.13-0.03	-0.13-0.03
Participants with positive response[2]						
N (%)	0 (0%)	0 (0%)	0 (0%)	1 (11%)	0 (0%)	0 (0%)
Median (P_{25}, P_{75})				0.14 (0.14-0.14)		
Minimum - Maximum				0.14-0.14		
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	10	10	9	10	9	10
Median (P_{25}, P_{75})	0.01 (0.00-0.01)	-0.00 (-0.01-0.01)	0.03 (0.03-0.06)	0.04 (0.03-0.07)	0.01 (0.01-0.02)	0.02 (0.00-0.03)
Minimum - Maximum	-0.02-0.03	-0.11-0.02	-0.02-0.12	0.01-0.14	-0.01-0.09	-0.02-0.05
Participants with positive response[2]						
N (%)	1 (10%)	0 (0%)	2 (22%)	3 (30%)	0 (0%)	0 (0%)
Median (P_{25}, P_{75})	0.03 (0.03-0.03)		0.10 (0.09-0.12)	0.09 (0.07-0.14)		
Minimum - Maximum	0.03-0.03		0.09-0.12	0.07-0.14		

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 95. T cell Response by Intracellular Cytokine Staining – mRNA-1273 percent of CD8 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] (N=53)	Group 2E [Dosed Moderna, Boost Moderna] (N=51)	Group 3E [Dosed Pfizer, Boost Moderna] (N=50)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	18	19	19
Median (P_{25}, P_{75})	0.32 (0.09-1.03)	0.02 (-0.00-0.06)	0.02 (-0.00-0.07)
Minimum - Maximum	-0.11-1.58	-0.01-0.16	-0.05-0.39
Participants with positive response[2]			
N (%)	14 (78%)	2 (11%)	3 (16%)
Median (P_{25}, P_{75})	0.70 (0.20-1.10)	0.11 (0.05-0.16)	0.26 (0.18-0.39)
Minimum - Maximum	0.09-1.58	0.05-0.16	0.18-0.39
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	20	19	19
Median (P_{25}, P_{75})	0.66 (0.12-2.49)	0.06 (0.02-0.14)	0.08 (0.02-0.35)
Minimum - Maximum	-0.01-7.82	0.00-1.29	-0.01-0.94
Participants with positive response[2]			
N (%)	16 (80%)	6 (32%)	9 (47%)
Median (P_{25}, P_{75})	1.00 (0.45-2.73)	0.35 (0.10-0.57)	0.35 (0.14-0.41)
Minimum - Maximum	0.11-7.82	0.10-1.29	0.05-0.94

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 96. T cell Response by Intracellular Cytokine Staining – mRNA-1273 percent of CD8 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 1E [Dosed Janssen, Boost Moderna] Age 18-55 yo (N=21)	Group 1E [Dosed Janssen, Boost Moderna] Age ≥ 56 yo (N=32)	Group 2E [Dosed Moderna, Boost Moderna] Age 18-55 yo (N=26)	Group 2E [Dosed Moderna, Boost Moderna] Age ≥ 56 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age 18-55 yo (N=25)	Group 3E [Dosed Pfizer, Boost Moderna] Age ≥ 56 yo (N=25)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	9	9	10	9	9	10
Median (P_{25}, P_{75})	0.20 (0.16-1.03)	0.41 (0.07-1.03)	0.02 (-0.00-0.03)	0.05 (0.02-0.06)	0.02 (0.01-0.05)	0.04 (-0.00-0.07)
Minimum - Maximum	0.02-1.58	-0.11-1.32	-0.01-0.16	-0.01-0.11	-0.02-0.39	-0.05-0.18
Participants with positive response[2]						
N (%)	8 (89%)	6 (67%)	1 (10%)	1 (11%)	2 (22%)	1 (10%)
Median (P_{25}, P_{75})	0.55 (0.17-1.27)	0.77 (0.41-1.10)	0.16 (0.16-0.16)	0.05 (0.05-0.05)	0.32 (0.26-0.39)	0.18 (0.18-0.18)
Minimum - Maximum	0.09-1.58	0.22-1.32	0.16-0.16	0.05-0.05	0.26-0.39	0.18-0.18
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	10	10	9	10	9	10
Median (P_{25}, P_{75})	0.80 (0.13-2.33)	0.66 (0.11-2.64)	0.04 (0.01-0.09)	0.09 (0.03-0.29)	0.09 (0.05-0.16)	0.05 (0.00-0.40)
Minimum - Maximum	-0.01-7.82	0.03-6.48	0.00-0.41	0.02-1.29	0.03-0.94	-0.01-0.88
Participants with positive response[2]						
N (%)	8 (80%)	8 (80%)	2 (22%)	4 (40%)	5 (56%)	4 (40%)
Median (P_{25}, P_{75})	1.11 (0.36-5.00)	0.80 (0.51-2.73)	0.26 (0.10-0.41)	0.43 (0.19-0.93)	0.16 (0.14-0.35)	0.40 (0.26-0.64)
Minimum - Maximum	0.13-7.82	0.11-6.48	0.10-0.41	0.10-1.29	0.05-0.94	0.11-0.88

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 97. T cell Response by Intracellular Cytokine Staining – Ad26.COV2.S percent of CD4 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	19	20	19
Median (P_{25}, P_{75})	0.10 (0.05-0.14)	0.34 (0.17-0.48)	0.11 (0.08-0.32)
Minimum - Maximum	-0.07-0.73	0.07-0.68	-0.00-0.68
Participants with positive response[2]			
N (%)	14 (74%)	19 (95%)	15 (79%)
Median (P_{25}, P_{75})	0.13 (0.08-0.16)	0.37 (0.18-0.50)	0.15 (0.10-0.34)
Minimum - Maximum	0.05-0.73	0.07-0.68	0.07-0.68
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	20	20	19
Median (P_{25}, P_{75})	0.09 (0.06-0.17)	0.39 (0.23-0.67)	0.18 (0.10-0.37)
Minimum - Maximum	0.01-0.47	0.09-1.17	0.01-0.96
Participants with positive response[2]			
N (%)	15 (75%)	20 (100%)	15 (79%)
Median (P_{25}, P_{75})	0.13 (0.07-0.19)	0.39 (0.23-0.67)	0.24 (0.17-0.41)
Minimum - Maximum	0.05-0.47	0.09-1.17	0.10-0.96

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 98. T cell Response by Intracellular Cytokine Staining – Ad26.COV2.S percent of CD4 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥ 56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥ 56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥ 56 yo (N=26)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	10	9	10	10	10	9
Median (P_{25}, P_{75})	0.13 (0.10-0.14)	0.06 (0.03-0.08)	0.39 (0.28-0.46)	0.27 (0.16-0.52)	0.20 (0.08-0.43)	0.10 (0.04-0.13)
Minimum - Maximum	-0.07-0.73	0.01-0.19	0.09-0.51	0.07-0.68	0.08-0.68	-0.00-0.34
Participants with positive response[2]						
N (%)	9 (90%)	5 (56%)	9 (90%)	10 (100%)	9 (90%)	6 (67%)
Median (P_{25}, P_{75})	0.14 (0.12-0.14)	0.08 (0.07-0.16)	0.41 (0.29-0.46)	0.27 (0.16-0.52)	0.26 (0.11-0.43)	0.12 (0.10-0.19)
Minimum - Maximum	0.06-0.73	0.05-0.19	0.15-0.51	0.07-0.68	0.08-0.68	0.07-0.34
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	10	10	10	10	10	9
Median (P_{25}, P_{75})	0.16 (0.07-0.25)	0.07 (0.05-0.12)	0.47 (0.28-0.69)	0.36 (0.18-0.56)	0.30 (0.18-0.51)	0.14 (0.06-0.18)
Minimum - Maximum	0.01-0.47	0.02-0.16	0.13-0.82	0.09-1.17	0.10-0.96	0.01-0.37
Participants with positive response[2]						
N (%)	8 (80%)	7 (70%)	10 (100%)	10 (100%)	9 (90%)	6 (67%)
Median (P_{25}, P_{75})	0.18 (0.12-0.25)	0.09 (0.06-0.13)	0.47 (0.28-0.69)	0.36 (0.18-0.56)	0.33 (0.22-0.51)	0.17 (0.14-0.24)
Minimum - Maximum	0.06-0.47	0.05-0.16	0.13-0.82	0.09-1.17	0.14-0.96	0.10-0.37

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 99. T cell Response by Intracellular Cytokine Staining – Ad26.COV2.S percent of CD4 T cells Expressing IL-4 and/or IL-5/IL-13 and CD154 in Response to Spike Peptide Pool (S1 + S2), by Group, and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	19	20	19
Median (P_{25}, P_{75})	-0.00 (-0.01-0.00)	0.03 (0.00-0.04)	0.00 (-0.00-0.01)
Minimum - Maximum	-0.02-0.01	-0.06-0.10	-0.03-0.15
Participants with positive response[2]			
N (%)	0 (0%)	4 (20%)	2 (11%)
Median (P_{25}, P_{75})		0.07 (0.05-0.08)	0.11 (0.07-0.15)
Minimum - Maximum		0.04-0.10	0.07-0.15
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	20	20	19
Median (P_{25}, P_{75})	0.00 (-0.00-0.01)	0.02 (0.01-0.03)	0.00 (-0.00-0.01)
Minimum - Maximum	-0.01-0.04	-0.00-0.24	-0.16-0.09
Participants with positive response[2]			
N (%)	1 (5%)	3 (15%)	2 (11%)
Median (P_{25}, P_{75})	0.04 (0.04-0.04)	0.20 (0.05-0.24)	0.07 (0.06-0.09)
Minimum - Maximum	0.04-0.04	0.05-0.24	0.06-0.09

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 100. T cell Response by Intracellular Cytokine Staining – Ad26.COV2.S percent of CD4 T cells Expressing IL-4 and/or IL-5/IL-13 and CD154 in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥ 56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥ 56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥ 56 yo (N=26)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	10	9	10	10	10	9
Median (P_{25}, P_{75})	-0.00 (-0.01-0.01)	-0.00 (-0.00-0.00)	0.03 (0.01-0.04)	0.01 (-0.00-0.06)	0.00 (-0.00-0.01)	0.00 (-0.00-0.00)
Minimum - Maximum	-0.02-0.01	-0.01-0.01	0.00-0.06	-0.06-0.10	-0.03-0.07	-0.01-0.15
Participants with positive response[2]						
N (%)	0 (0%)	0 (0%)	2 (20%)	2 (20%)	1 (10%)	1 (11%)
Median (P_{25}, P_{75})			0.05 (0.04-0.06)	0.08 (0.07-0.10)	0.07 (0.07-0.07)	0.15 (0.15-0.15)
Minimum - Maximum			0.04-0.06	0.07-0.10	0.07-0.07	0.15-0.15
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	10	10	10	10	10	9
Median (P_{25}, P_{75})	0.00 (0.00-0.01)	-0.00 (-0.00-0.00)	0.02 (0.01-0.03)	0.02 (0.00-0.03)	0.01 (0.00-0.02)	-0.00 (-0.00-0.00)
Minimum - Maximum	-0.01-0.04	-0.01-0.02	0.00-0.20	-0.00-0.24	-0.01-0.09	-0.16-0.06
Participants with positive response[2]						
N (%)	1 (10%)	0 (0%)	1 (10%)	2 (20%)	1 (10%)	1 (11%)
Median (P_{25}, P_{75})	0.04 (0.04-0.04)		0.20 (0.20-0.20)	0.15 (0.05-0.24)	0.09 (0.09-0.09)	0.06 (0.06-0.06)
Minimum - Maximum	0.04-0.04		0.20-0.20	0.05-0.24	0.09-0.09	0.06-0.06

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 101.: T cell Response by Intracellular Cytokine Staining - Ad26.COV2.S percent of CD8 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] (N=50)	Group 5E [Dosed Moderna, Boost Janssen] (N=49)	Group 6E [Dosed Pfizer, Boost Janssen] (N=51)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	19	20	19
Median (P_{25}, P_{75})	0.19 (0.08-1.10)	0.03 (0.01-0.05)	0.06 (0.04-0.10)
Minimum - Maximum	0.04-2.36	0.00-0.39	-0.00-1.11
Participants with positive response[2]			
N (%)	14 (74%)	2 (10%)	5 (26%)
Median (P_{25}, P_{75})	0.34 (0.17-1.43)	0.26 (0.13-0.39)	0.32 (0.10-0.51)
Minimum - Maximum	0.07-2.36	0.13-0.39	0.09-1.11
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	20	20	19
Median (P_{25}, P_{75})	0.15 (0.05-0.70)	0.11 (0.06-0.23)	0.13 (0.06-0.39)
Minimum - Maximum	-0.02-2.33	0.01-1.68	0.00-6.21
Participants with positive response[2]			
N (%)	11 (55%)	12 (60%)	12 (63%)
Median (P_{25}, P_{75})	0.51 (0.36-0.98)	0.14 (0.11-0.50)	0.33 (0.14-1.12)
Minimum - Maximum	0.11-2.33	0.09-1.68	0.06-6.21

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 102. T cell Response by Intracellular Cytokine Staining - Ad26.COV2.S percent of CD8 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 4E [Dosed Janssen, Boost Janssen] Age 18-55 yo (N=26)	Group 4E [Dosed Janssen, Boost Janssen] Age ≥ 56 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age 18-55 yo (N=24)	Group 5E [Dosed Moderna, Boost Janssen] Age ≥ 56 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age 18-55 yo (N=25)	Group 6E [Dosed Pfizer, Boost Janssen] Age ≥ 56 yo (N=26)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	10	9	10	10	10	9
Median (P_{25}, P_{75})	0.34 (0.14-1.10)	0.17 (0.07-0.21)	0.03 (0.02-0.04)	0.03 (0.01-0.10)	0.06 (0.04-0.09)	0.05 (0.04-0.10)
Minimum - Maximum	0.06-1.62	0.04-2.36	0.01-0.06	0.00-0.39	0.03-0.51	-0.00-1.11
Participants with positive response[2]						
N (%)	9 (90%)	5 (56%)	0 (0%)	2 (20%)	2 (20%)	3 (33%)
Median (P_{25}, P_{75})	0.41 (0.17-1.10)	0.21 (0.19-1.43)		0.26 (0.13-0.39)	0.30 (0.09-0.51)	0.32 (0.10-1.11)
Minimum - Maximum	0.08-1.62	0.07-2.36		0.13-0.39	0.09-0.51	0.10-1.11
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	10	10	10	10	10	9
Median (P_{25}, P_{75})	0.37 (0.11-0.89)	0.13 (0.03-0.36)	0.11 (0.09-0.15)	0.12 (0.03-0.31)	0.33 (0.11-0.41)	0.06 (0.03-0.14)
Minimum - Maximum	0.03-1.67	-0.02-2.33	0.01-1.46	0.01-1.68	0.03-3.61	0.00-6.21
Participants with positive response[2]						
N (%)	7 (70%)	4 (40%)	7 (70%)	5 (50%)	8 (80%)	4 (44%)
Median (P_{25}, P_{75})	0.51 (0.36-0.98)	0.67 (0.26-1.65)	0.12 (0.10-0.48)	0.31 (0.13-0.52)	0.38 (0.21-1.12)	0.18 (0.10-3.22)
Minimum - Maximum	0.11-1.67	0.16-2.33	0.09-1.46	0.12-1.68	0.11-3.61	0.06-6.21

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 103. T cell Response by Intracellular Cytokine Staining – BNT162b2 percent of CD4 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	20	19	20
Median (P_{25}, P_{75})	0.06 (0.03-0.11)	0.26 (0.15-0.53)	0.11 (0.08-0.20)
Minimum - Maximum	-0.02-0.29	0.08-1.42	-0.01-0.79
Participants with positive response[2]			
N (%)	8 (40%)	17 (89%)	15 (75%)
Median (P_{25}, P_{75})	0.12 (0.10-0.19)	0.29 (0.21-0.53)	0.12 (0.09-0.34)
Minimum - Maximum	0.08-0.29	0.09-1.42	0.08-0.79
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	19	19	20
Median (P_{25}, P_{75})	0.21 (0.11-0.35)	0.33 (0.25-0.60)	0.21 (0.18-0.42)
Minimum - Maximum	0.08-0.37	0.15-1.40	-0.16-1.09
Participants with positive response[2]			
N (%)	18 (95%)	19 (100%)	18 (90%)
Median (P_{25}, P_{75})	0.23 (0.11-0.35)	0.33 (0.25-0.60)	0.22 (0.19-0.44)
Minimum - Maximum	0.08-0.37	0.15-1.40	0.15-1.09

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 104. T cell Response by Intracellular Cytokine Staining – BNT162b2 percent of CD4 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥ 56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥ 56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥ 56 yo (N=26)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	10	10	10	9	10	10
Median (P_{25}, P_{75})	0.06 (0.04-0.09)	0.08 (0.03-0.17)	0.24 (0.15-0.45)	0.42 (0.21-0.54)	0.09 (0.07-0.12)	0.16 (0.09-0.21)
Minimum - Maximum	0.03-0.12	-0.02-0.29	0.08-0.63	0.09-1.42	-0.01-0.66	0.08-0.79
Participants with positive response[2]						
N (%)	3 (30%)	5 (50%)	9 (90%)	8 (89%)	6 (60%)	9 (90%)
Median (P_{25}, P_{75})	0.10 (0.09-0.12)	0.17 (0.13-0.20)	0.26 (0.19-0.45)	0.47 (0.21-0.82)	0.12 (0.09-0.60)	0.19 (0.10-0.21)
Minimum - Maximum	0.09-0.12	0.08-0.29	0.09-0.63	0.10-1.42	0.08-0.66	0.08-0.79
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	9	10	10	9	10	10
Median (P_{25}, P_{75})	0.29 (0.12-0.35)	0.17 (0.11-0.33)	0.31 (0.25-0.56)	0.54 (0.31-0.63)	0.22 (0.19-0.44)	0.20 (0.16-0.39)
Minimum - Maximum	0.10-0.37	0.08-0.37	0.21-0.84	0.15-1.40	0.15-1.09	-0.16-0.70
Participants with positive response[2]						
N (%)	9 (100%)	9 (90%)	10 (100%)	9 (100%)	10 (100%)	8 (80%)
Median (P_{25}, P_{75})	0.29 (0.12-0.35)	0.19 (0.11-0.33)	0.31 (0.25-0.56)	0.54 (0.31-0.63)	0.22 (0.19-0.44)	0.24 (0.19-0.53)
Minimum - Maximum	0.10-0.37	0.08-0.37	0.21-0.84	0.15-1.40	0.15-1.09	0.16-0.70

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 105. T cell Response by Intracellular Cytokine Staining – BNT162b2 percent of CD4 T cells Expressing IL-4 and/or IL-5/IL-13 and CD154 in Response to Spike Peptide Pool (S1 + S2), by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	20	19	20
Median (P_{25}, P_{75})	0.00 (0.00-0.01)	0.01 (0.01-0.03)	0.00 (-0.00-0.02)
Minimum - Maximum	-0.00-0.01	-0.08-0.12	-0.11-0.10
Participants with positive response[2]			
N (%)	0 (0%)	2 (11%)	1 (5%)
Median (P_{25}, P_{75})		0.08 (0.03-0.12)	0.10 (0.10-0.10)
Minimum - Maximum		0.03-0.12	0.10-0.10
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	19	19	20
Median (P_{25}, P_{75})	0.01 (-0.00-0.01)	0.03 (0.01-0.06)	0.02 (0.01-0.04)
Minimum - Maximum	-0.01-0.02	-0.12-0.11	-0.00-0.10
Participants with positive response[2]			
N (%)	0 (0%)	7 (37%)	2 (10%)
Median (P_{25}, P_{75})		0.09 (0.04-0.11)	0.08 (0.05-0.10)
Minimum - Maximum		0.03-0.11	0.05-0.10

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 106. T cell Response by Intracellular Cytokine Staining – BNT162b2 percent of CD4 T cells Expressing IL-4 and/or IL-5/IL-13 and CD154 in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥ 56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥ 56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥ 56 yo (N=26)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	10	10	10	9	10	10
Median (P_{25}, P_{75})	0.00 (0.00-0.01)	0.01 (0.00-0.01)	0.02 (0.00-0.03)	0.01 (0.01-0.01)	0.01 (0.00-0.02)	0.00 (-0.00-0.01)
Minimum - Maximum	-0.00-0.01	-0.00-0.01	-0.08-0.12	0.01-0.08	-0.02-0.10	-0.11-0.04
Participants with positive response[2]						
N (%)	0 (0%)	0 (0%)	2 (20%)	0 (0%)	1 (10%)	0 (0%)
Median (P_{25}, P_{75})			0.08 (0.03-0.12)		0.10 (0.10-0.10)	
Minimum - Maximum			0.03-0.12		0.10-0.10	
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	9	10	10	9	10	10
Median (P_{25}, P_{75})	0.01 (0.00-0.02)	0.00 (-0.00-0.01)	0.04 (0.01-0.09)	0.03 (0.01-0.04)	0.02 (0.01-0.05)	0.02 (0.00-0.03)
Minimum - Maximum	-0.00-0.02	-0.01-0.02	0.00-0.11	-0.12-0.10	-0.00-0.10	0.00-0.04
Participants with positive response[2]						
N (%)	0 (0%)	0 (0%)	4 (40%)	3 (33%)	2 (20%)	0 (0%)
Median (P_{25}, P_{75})			0.10 (0.08-0.11)	0.04 (0.03-0.10)	0.08 (0.05-0.10)	
Minimum - Maximum			0.06-0.11	0.03-0.10	0.05-0.10	

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 107. T cell Response by Intracellular Cytokine Staining – BNT162b2 percent of CD8 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] (N=53)	Group 8E [Dosed Moderna, Boost Pfizer] (N=51)	Group 9E [Dosed Pfizer, Boost Pfizer] (N=50)
Day 1 Visit (Pre-boost)			
Participants with available sample[1]			
N	20	19	20
Median (P_{25}, P_{75})	0.17 (0.08-1.17)	0.02 (0.01-0.03)	0.03 (0.01-0.16)
Minimum - Maximum	0.00-3.21	-0.07-0.33	-0.01-1.37
Participants with positive response[2]			
N (%)	17 (85%)	2 (11%)	6 (30%)
Median (P_{25}, P_{75})	0.29 (0.11-1.52)	0.29 (0.26-0.33)	0.28 (0.26-0.52)
Minimum - Maximum	0.07-3.21	0.26-0.33	0.07-1.37
Day 15 Visit (14 days post-boost)			
Participants with available sample[1]			
N	19	19	20
Median (P_{25}, P_{75})	0.83 (0.21-3.81)	0.08 (0.01-0.19)	0.11 (0.02-0.98)
Minimum - Maximum	0.07-8.66	-0.03-2.29	-0.05-4.30
Participants with positive response[2]			
N (%)	19 (100%)	11 (58%)	13 (65%)
Median (P_{25}, P_{75})	0.83 (0.21-3.81)	0.18 (0.09-0.36)	0.36 (0.11-1.08)
Minimum - Maximum	0.07-8.66	0.08-2.29	0.03-4.30

[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 108. T cell Response by Intracellular Cytokine Staining – BNT162b2 percent of CD8 T cells Expressing IL-2 and/or IFNγ in Response to Spike Peptide Pool (S1 + S2), by Group, Age Group, and Timepoint

	Group 7E [Dosed Janssen, Boost Pfizer] Age 18-55 yo (N=31)	Group 7E [Dosed Janssen, Boost Pfizer] Age ≥ 56 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age 18-55 yo (N=22)	Group 8E [Dosed Moderna, Boost Pfizer] Age ≥ 56 yo (N=29)	Group 9E [Dosed Pfizer, Boost Pfizer] Age 18-55 yo (N=24)	Group 9E [Dosed Pfizer, Boost Pfizer] Age ≥ 56 yo (N=26)
Day 1 Visit (Pre-boost)						
Participants with available sample[1]						
N	10	10	10	9	10	10
Median (P_{25}, P_{75})	0.14 (0.10-0.81)	0.23 (0.07-1.84)	0.01 (0.01-0.03)	0.03 (0.02-0.04)	0.03 (0.01-0.07)	0.03 (0.01-0.29)
Minimum - Maximum	0.00-3.21	0.01-2.25	0.00-0.04	-0.07-0.33	-0.00-0.26	-0.01-1.37
Participants with positive response[2]						
N (%)	9 (90%)	8 (80%)	0 (0%)	2 (22%)	3 (30%)	3 (30%)
Median (P_{25}, P_{75})	0.15 (0.11-0.81)	0.29 (0.13-1.89)		0.29 (0.26-0.33)	0.26 (0.07-0.26)	0.52 (0.29-1.37)
Minimum - Maximum	0.07-3.21	0.07-2.25		0.26-0.33	0.07-0.26	0.29-1.37
Day 15 Visit (14 days post-boost)						
Participants with available sample[1]						
N	9	10	10	9	10	10
Median (P_{25}, P_{75})	1.54 (0.31-2.57)	0.71 (0.18-4.66)	0.04 (0.01-0.09)	0.18 (0.08-0.36)	0.11 (0.04-0.87)	0.11 (0.00-1.08)
Minimum - Maximum	0.15-7.51	0.07-8.66	0.01-0.19	-0.03-2.29	0.01-4.30	-0.05-3.23
Participants with positive response[2]						
N (%)	9 (100%)	10 (100%)	4 (40%)	7 (78%)	7 (70%)	6 (60%)
Median (P_{25}, P_{75})	1.54 (0.31-2.57)	0.71 (0.18-4.66)	0.10 (0.08-0.14)	0.24 (0.15-0.54)	0.13 (0.10-1.08)	0.72 (0.11-1.57)
Minimum - Maximum	0.15-7.51	0.07-8.66	0.08-0.19	0.08-2.29	0.03-4.30	0.11-3.23

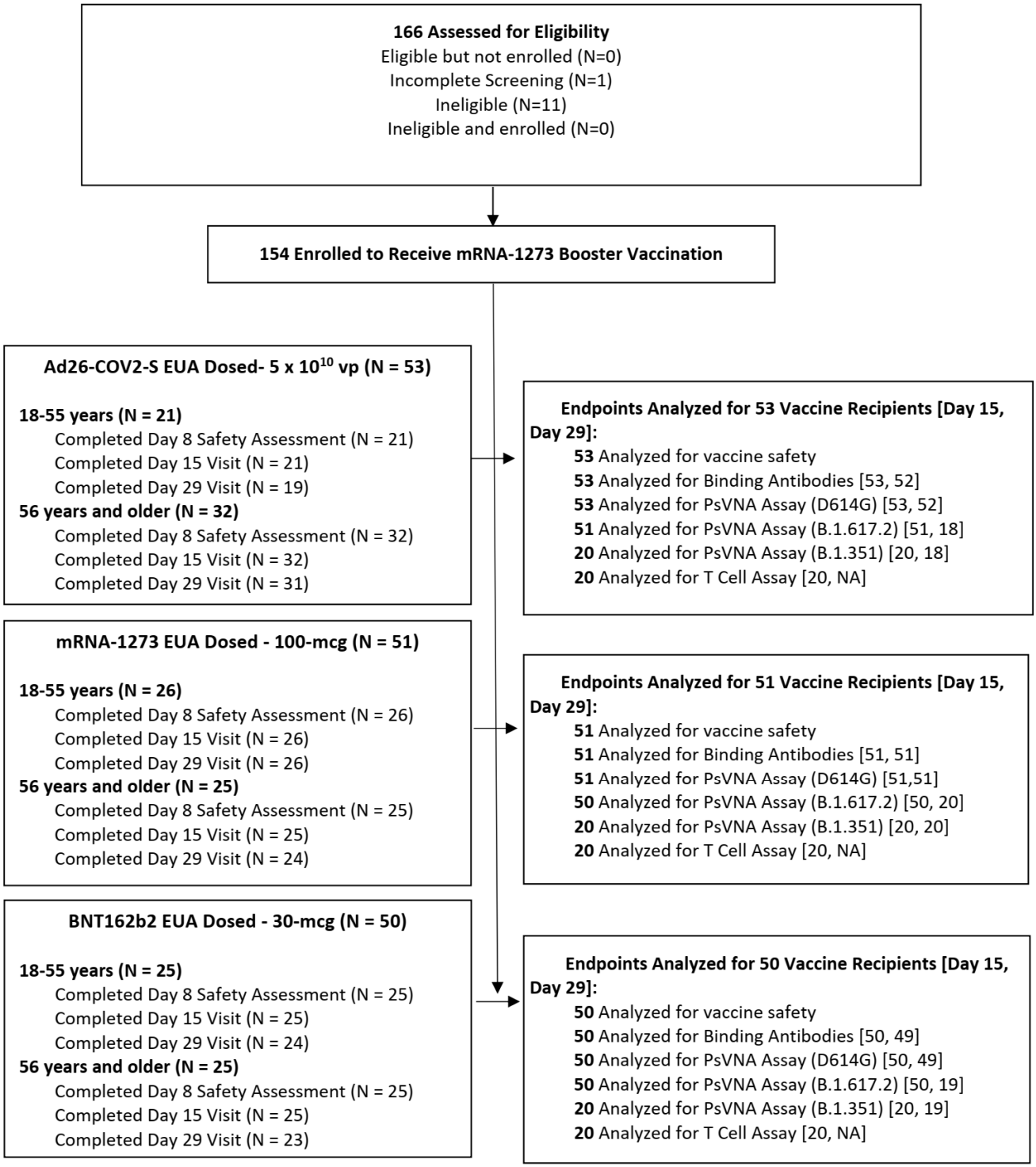
[1] Includes participants with assayed samples, excluding those for which the assay result was deemed unreliable.
[2] Defined as percent of cells expressing cytokine in response to the peptide pool being statistically significantly higher than in response to the negative control, by Fisher's exact test, while adjusting p-values for multiple comparisons.

Supplemental Table 109. Numbers of participants enrolled by study site and study group*

		Stage	1						2						3						
		Group	1E		2E		3E		4E		5E		6E		7E		8E		9E		
		Age (yrs)	18-55	≥56	18-55	≥56	18-55	≥56	18-55	≥56	18-55	≥56	18-55	≥56	18-55	≥56	18-55	≥56	18-55	≥56	**Totals**
Enrollment Dates by Stage			May 28 to June 25, 2021						July 13 to July 30, 2021						August 4 to August 13, 2021						
Site	**City**																				
Baylor College of Medicine	Houston, TX		3	3	6	5	5	5	1	1	2	2	2	3	2	3	3	2	3	3	**54**
Cincinnati Children's Hospital Medical Center	Cincinnati, OH		0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	3	2	2	**15**
Emory University	Atlanta, GA		4	1	5	5	5	6	4	2	2	3	3	2	3	1	2	3	1	3	**55**
Kaiser Permanente	Seattle, WA		6	16	3	3	3	4	3	5	2	5	2	3	5	0	3	2	2	1	**68**
New York University	New York, NY		0	2	0	0	0	0	2	1	5	2	2	3	5	2	1	4	2	3	**34**
University of Maryland	Baltimore, MD		0	0	0	0	0	0	7	5	3	4	7	4	4	4	2	3	4	2	**49**
University of Pittsburgh	Pittsburgh, PA		3	3	3	3	3	3	2	2	3	2	3	2	3	2	2	3	3	2	**47**
University of Rochester	Rochester, NY		2	7	5	3	3	3	4	2	3	4	2	3	2	2	2	3	2	3	**55**
University of Texas Medical branch - Galveston	Galveston, TX		0	0	1	3	3	1	0	2	1	0	2	3	2	3	3	3	3	5	**35**
University of Washington	Seattle, WA		3	0	3	3	3	3	3	4	3	3	2	3	3	2	1	3	2	2	**46**
		Totals	**21**	**32**	**26**	**25**	**25**	**25**	**26**	**24**	**24**	**25**	**25**	**26**	**31**	**22**	**22**	**29**	**24**	**26**	**458**

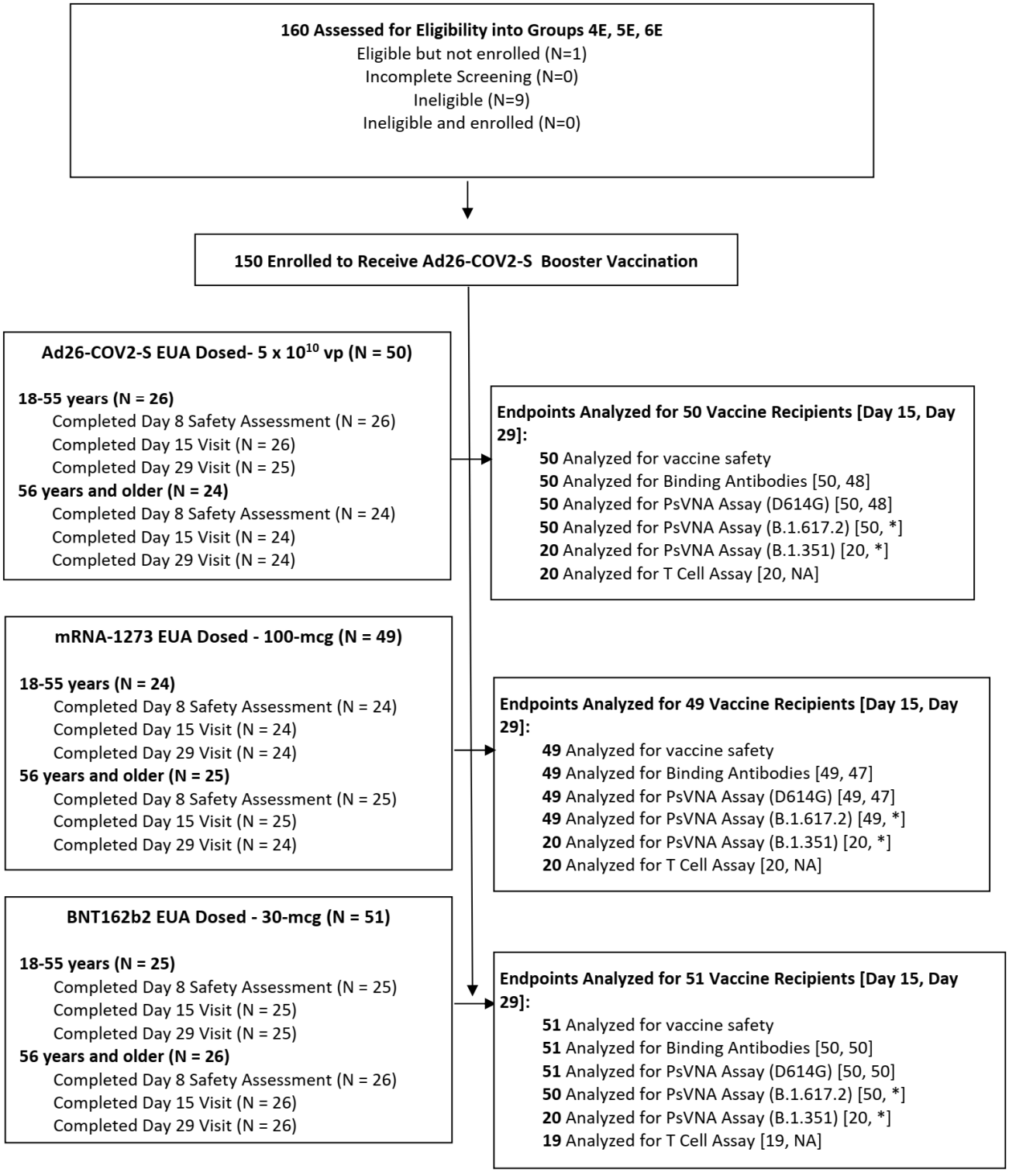
*Vaccine Treatment and Evaluation Units and their domestic subsites that are part of the Infectious Diseases Research Consortium (IDCRC, see https://idcrc.org/) were queried about interest and capacity to participate in this study. Ten sites (eight of ten primary VTEU sites and two of 11 subsites) expressed interest and capacity to participate in the clinical trial.

Supplemental Figure 1: Consort Diagram for Stage 1 (Groups 1-3)



Supplementary Figure 1. Stage 1 Enrollment, Booster Vaccinations and Study Endpoints Analyses

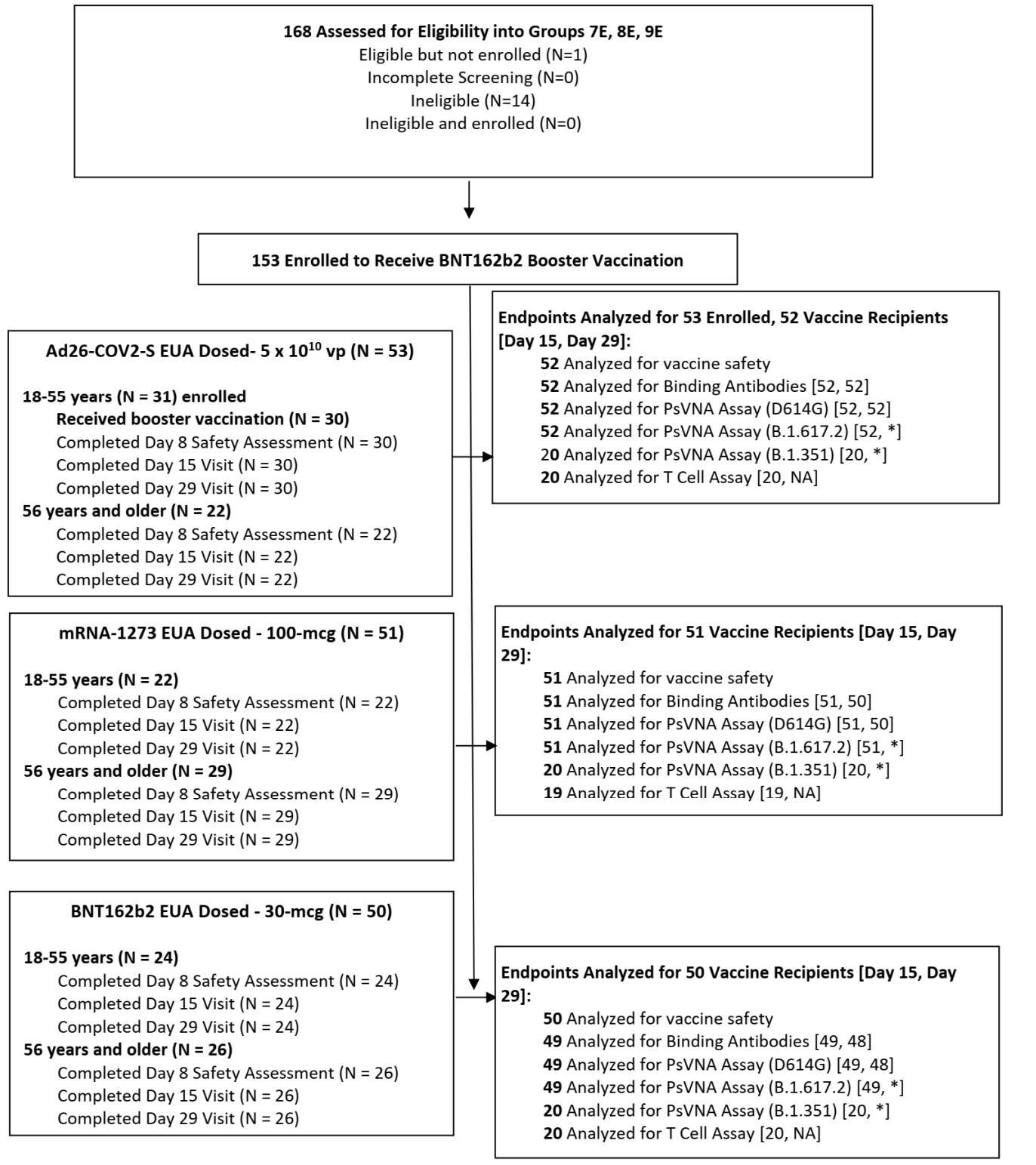
Supplemental Figure 2: Consort Diagram for Stage 2 (Groups 4-6)



* Results at these timepoints not yet available. To be updated for the Final Report.

Supplementary Figure 2. Stage 2 Enrollment, Booster Vaccinations and Study Endpoints Analyses

Supplemental Figure 3: Consort Diagram for Stage 3 (Groups 7-9)



* Results at these timepoints not yet available. To be updated for Final Report

Supplementary Figure 3. Stage 3 Enrollment, Booster Vaccinations and Study Endpoints Analyses

References:

1. Pegu A, O'Connell S, Schmidt SD, et al. Durability of mRNA-1273 vaccine-induced antibodies against SARS-CoV-2 variants. Science 2021. DOI: 10.1126/science.abj4176.
2. Naldini L, Blomer U, Gage FH, Trono D, Verma IM. Efficient transfer, integration, and sustained long-term expression of the transgene in adult rat brains injected with a lentiviral vector. Proc Natl Acad Sci U S A 1996;93(21):11382-8. DOI: 10.1073/pnas.93.21.11382.
3. Gilbert PB, Montefiori DC, McDermott A, et al. Immune Correlates Analysis of the mRNA-1273 COVID-19 Vaccine Efficacy Trial. medRxiv 2021. DOI: 10.1101/2021.08.09.21261290.
4. Sadoff J, Le Gars M, Shukarev G, et al. Interim Results of a Phase 1-2a Trial of Ad26.COV2.S Covid-19 Vaccine. N Engl J Med 2021. DOI: 10.1056/NEJMoa2034201.
5. Cohen KW, Linderman SL, Moodie Z, et al. Longitudinal analysis shows durable and broad immune memory after SARS-CoV-2 infection with persisting antibody responses and memory B and T cells. Cell Rep Med 2021;2(7):100354. DOI: 10.1016/j.xcrm.2021.100354.