Supplemental information

# Structural mechanism of SARS-CoV-2 neutralization

by two murine antibodies targeting the RBD

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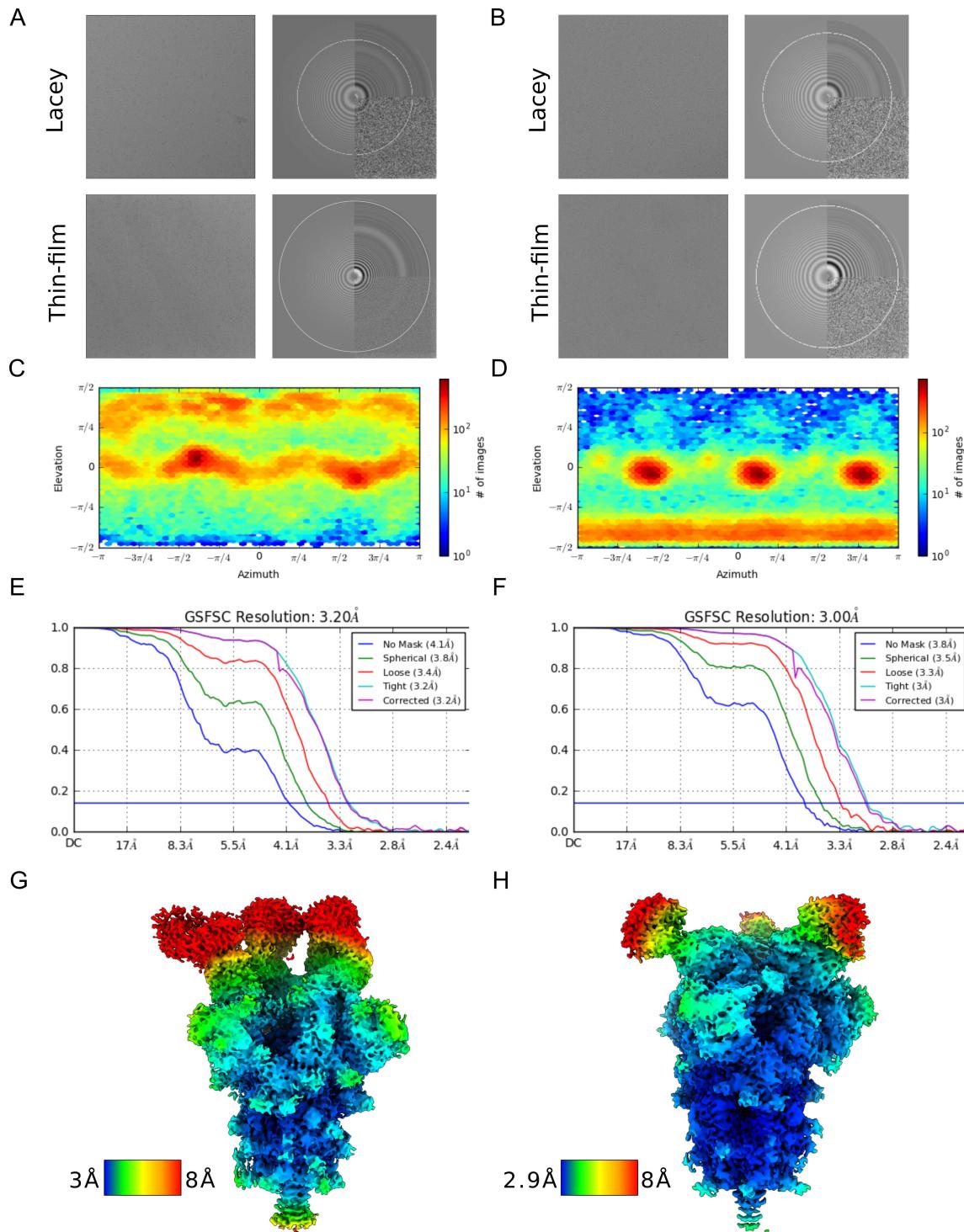
Figure S1: Cryo-EM validation for 2B04 and 2H04 maps. Related to figure 1. (A) Example micrographs and CTF estimates for 2B04-spike datasets imaged on holey lacey carbon grids or lacey carbon grids with ultra-thin carbon film. **(B)** Example micrographs and CTF estimates for 2H04-spike datasets imaged with holey lacey carbon grids or lacey carbon grids with ultra-thin carbon film. **(C)** Particle orientation distribution for 2B04-spike up/down/down reconstruction. **(D)** Particle orientation distribution for 2H04-spike down/down/down reconstruction. **(E)** GSFSC curve for 2B04-spike up/down/down refinement. **(F)** GSFSC curve for 2H04-spike down/down/down refinement. **(G)** Local resolution map for 2B04-spike up/down/down map. **(H)** Local resolution map for 2H04-spike down/down/down map.
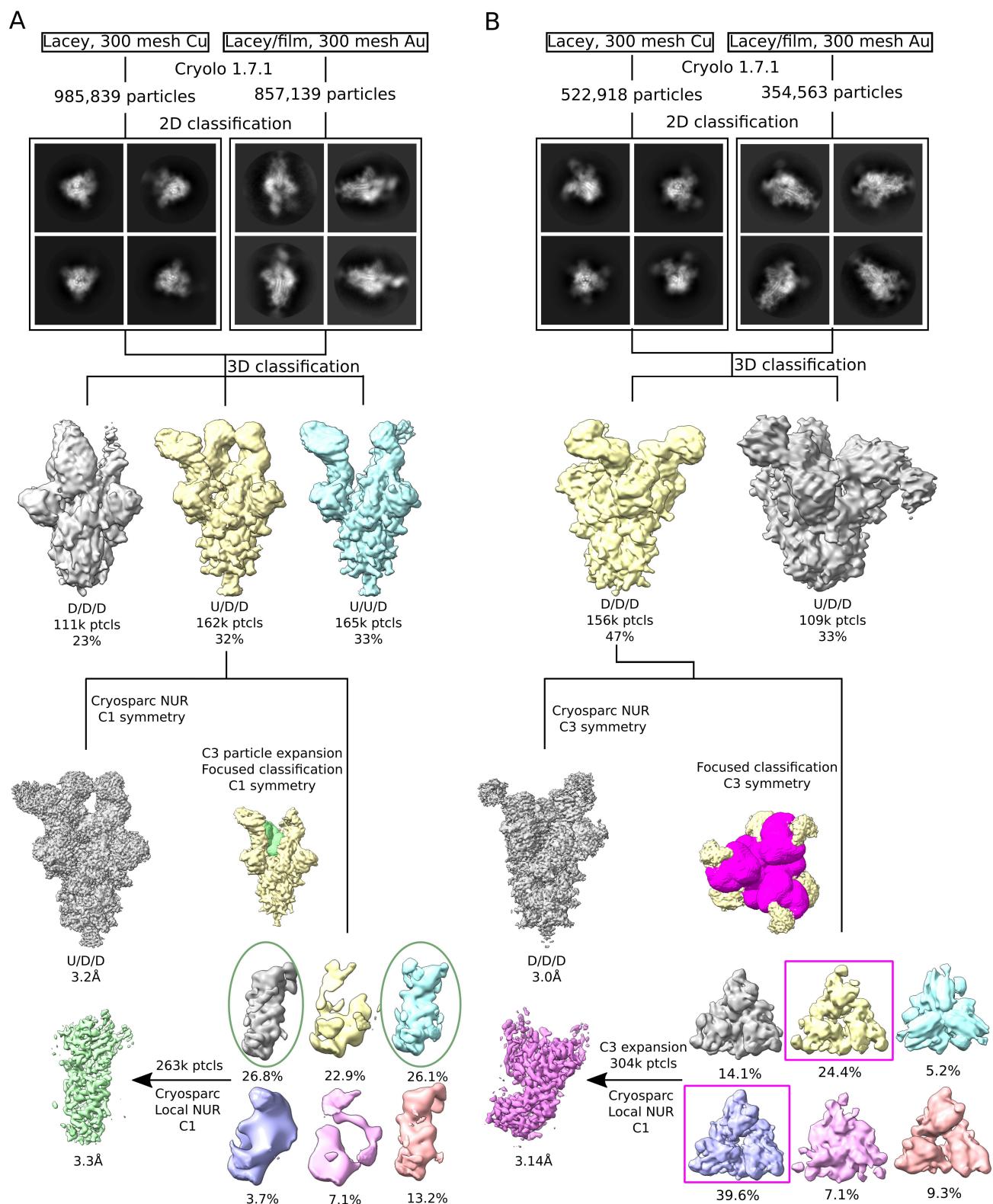
Figure S2: Cryo-EM processing strategy. Related to figures 1 and 2. (**A**) Flowchart depicting cryo-EM data processing steps for the 2B04-spike up/down/down and 2B04/RBD locally refined maps. (**B**) Flowchart depicting cryo-EM data processing steps for the 2H04-spike down/down/down and 2H04/RBD locally refined maps.
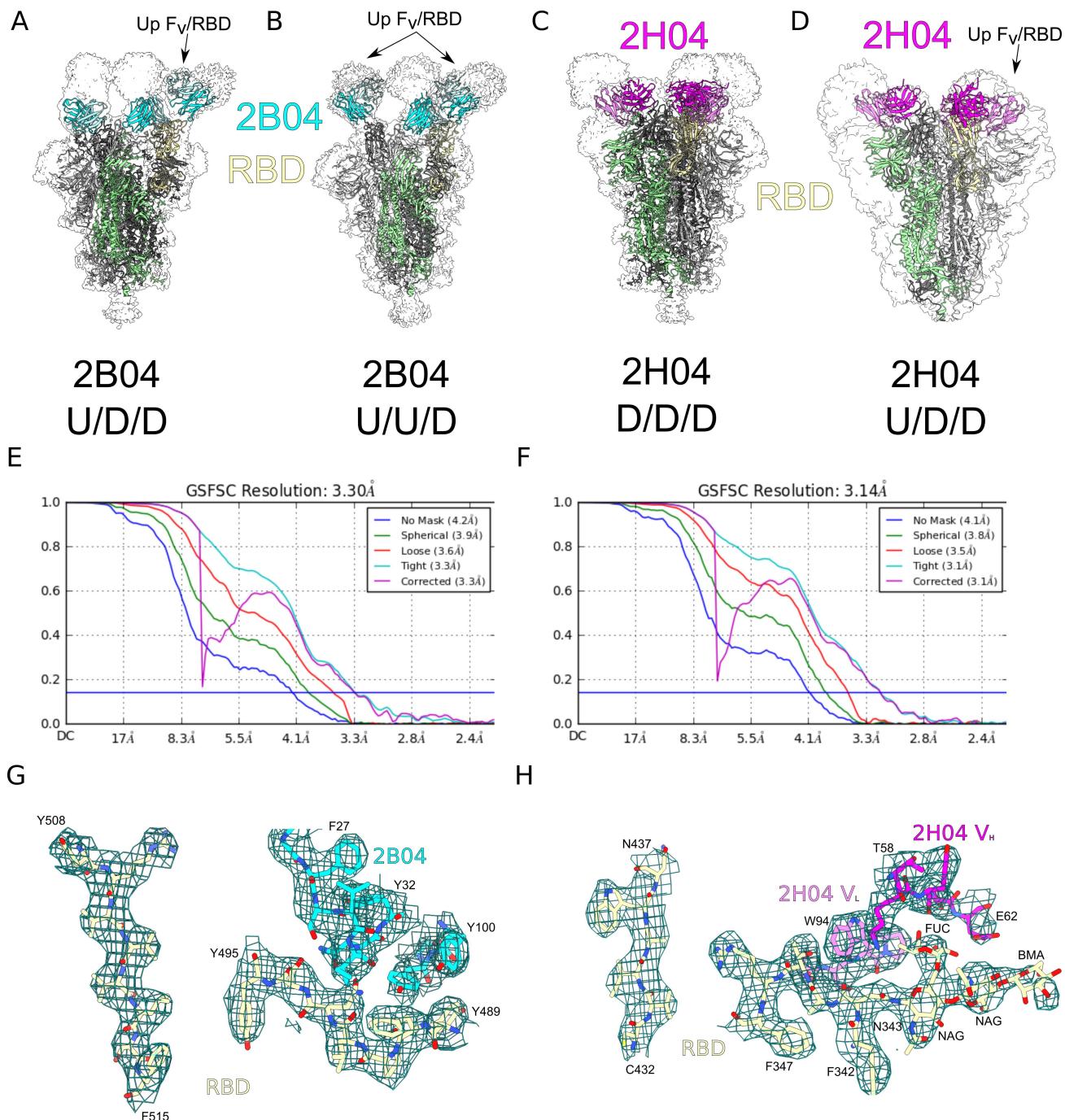
Figure S3: **Model fits into maps and validation for locally refined maps. Related to figures 1 and 2.** (**A**) Density map for 2B04 U/D/D spike reconstruction shown as an outline, with the model shown internally as a cartoon. S1/S2 is depicted in green, with the RBD portion shown in yellow. 2B04 is shown in cyan. (**B**) Density map for 2B04 U/U/D spike reconstruction shown as an outline, with the model shown internally as a cartoon and colored as in **A**. (**C**) Density map for 2H04 D/D/D spike reconstruction shown as an outline, with the model shown internally as a cartoon. S1/S2 is depicted in green, with the RBD portion shown in yellow. 2H04 is shown in magenta. (**D**) Density map for 2H04 U/D/D spike reconstruction shown as an outline, with the model shown internally as a cartoon and colored as in **C**. (**E**) GSFSC curve for the locally refined 2B04/RBD map. (**F**) GSFSC curve for the locally refined 2H04/RBD map. (**G**) Example density and model fits for an RBD beta-strand (left) and at the 2B04/RBD interface (right). RBD is colored in yellow, 2B04 heavy chain is colored in cyan. (**H**) Example density and model fits for an RBD beta-strand (left) and at the 2H04/RBD interface (right). RBD is shown in yellow. 2H04 heavy chain is shown in magenta, while the light chain is shown in violet.
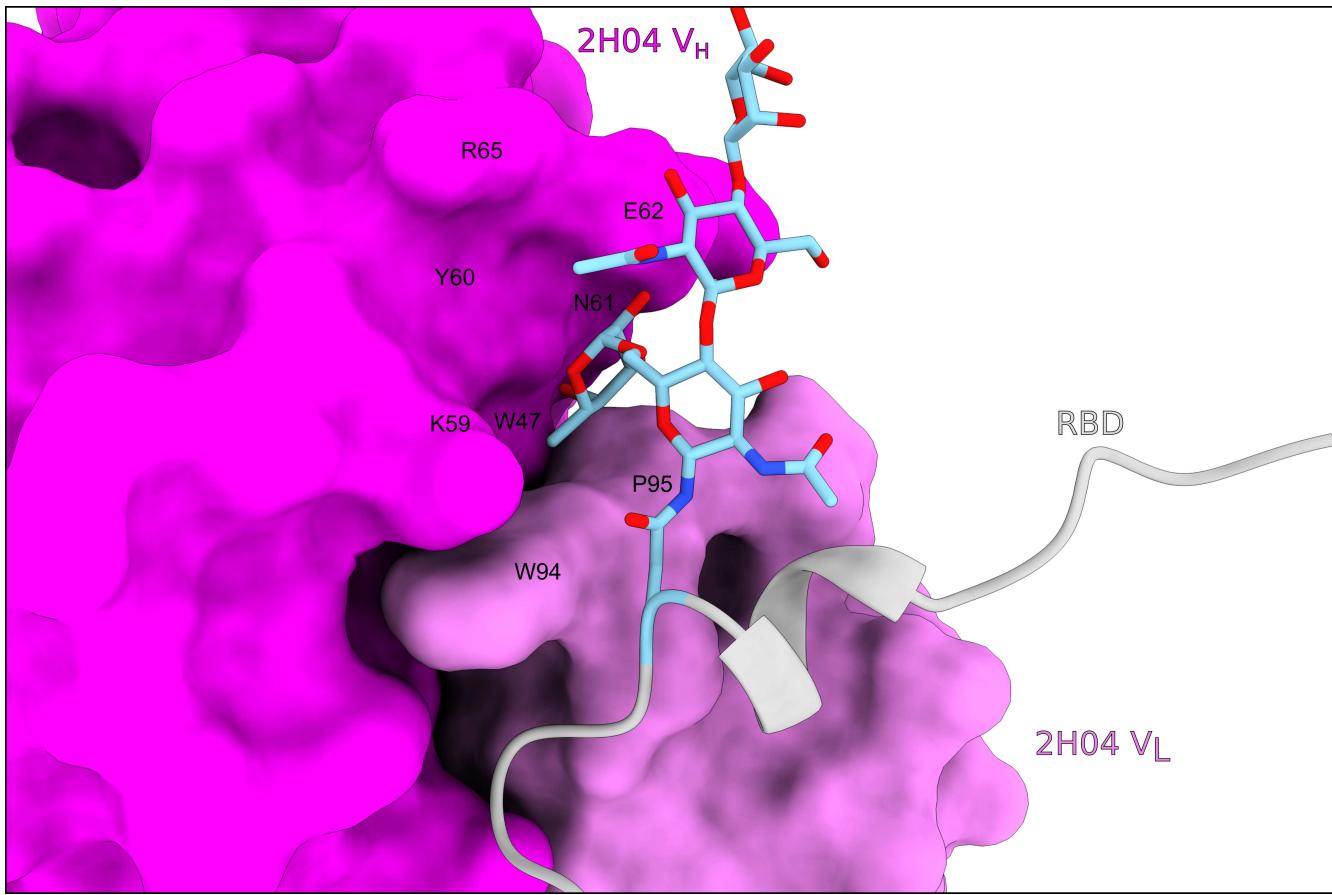
**Figure S4: 2H04 contacts the core fucose of the N343 glycan on SARS-CoV-2 RBD. Related to figure 2.** 2H04 is depicted as a surface, with the heavy chain colored magenta and the light chain colored violet. The N343 glycan is depicted as atoms in blue, with the remainder of the N-terminal strand of the RBD depicted in silver as a cartoon ribbon. Residues at the interface between the core fucose and 2H04 are labelled in black text.
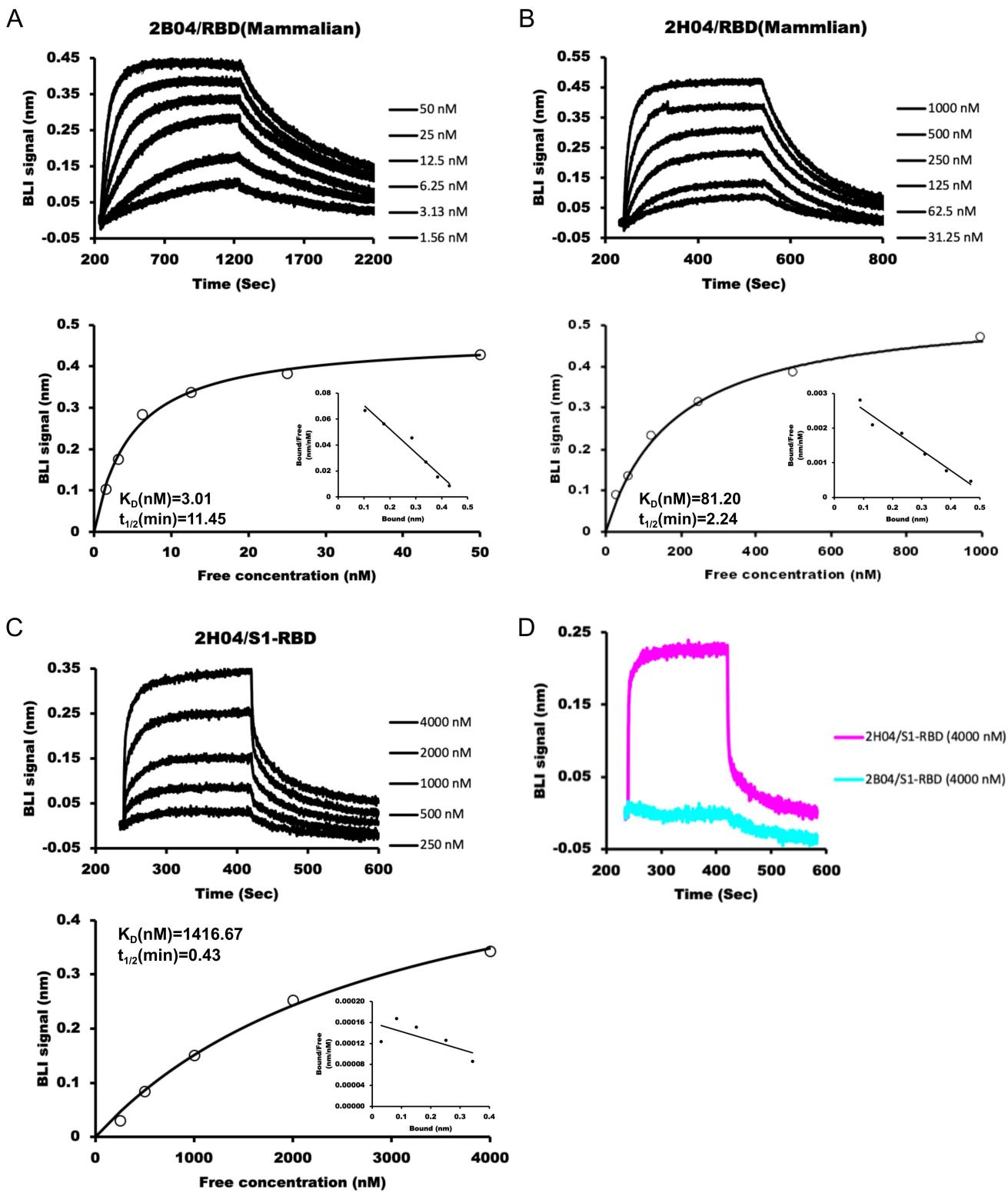
Figure S5: Binding affinity of 2B04 and 2H04 to mammalian cell-derived SARS-CoV-2 RBD. Related to figure 6. (**A**) Binding of 2B04 to mammalian cell-derived SARS-CoV-2 RBD. (**B**) Binding of 2H04 to mammalian cell-derived SARS-CoV-2 RBD. (**C**) Binding of 2H04 to bacterially derived SARS-CoV RBD. (**D**) Binding of 2B04 to bacterially derived SARS-CoV RBD. Kinetic values were fitted to a 1:1 Langmuir binding model (K_D, kinetic). Steady-state analysis is shown below kinetic plots (K_D, equilibrium) with inset Scatchard plots. Data were analyzed using Biaevaluation 3.1 (GE Healthcare). One representative trace of two or three independent experiments is shown.
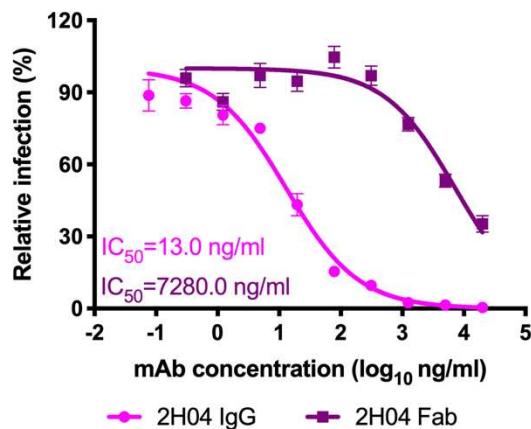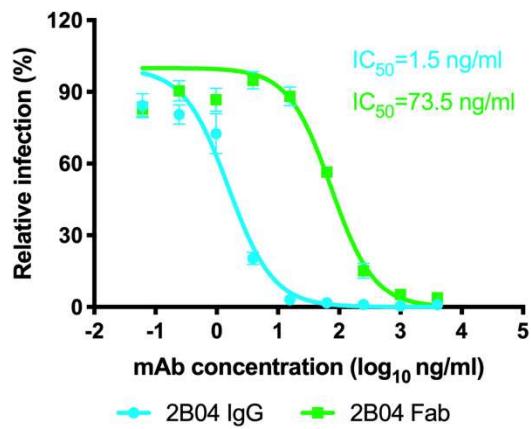
Figure S6: Neutralization profiles of 2B04 and 2H04 IgG versus Fab. Related to figure 6. Serial dilutions of 2B04 or 2H04 mAbs or Fabs were pre-mixed with GFP expressing VSV-SARS-CoV-2 for 1 hour, followed by addition of the mixture to Vero E6-TMPRSS2 cells. GFP^{+} infected cells were quantified by flow cytometry 8 hours post of infection. Data are pooled from three independent experiments performed in duplicate. Error bars indicate SEM.
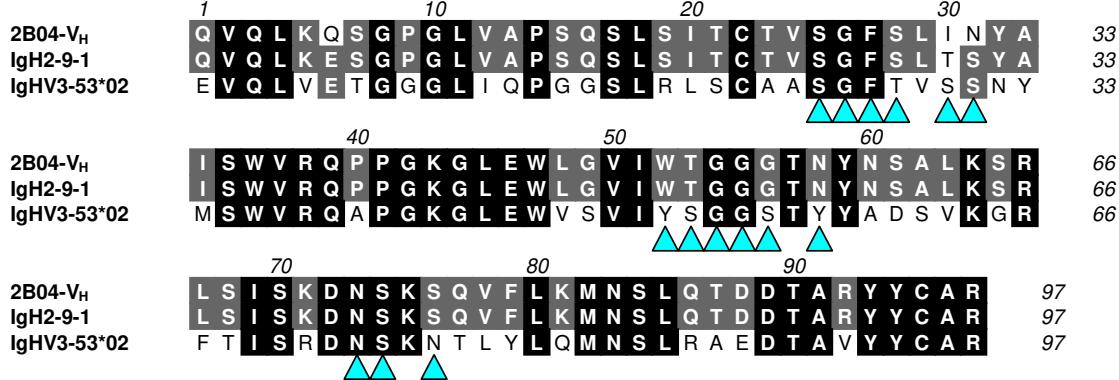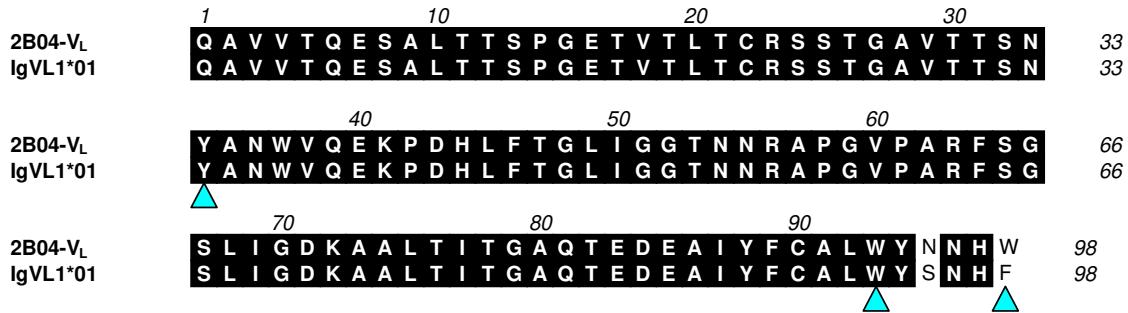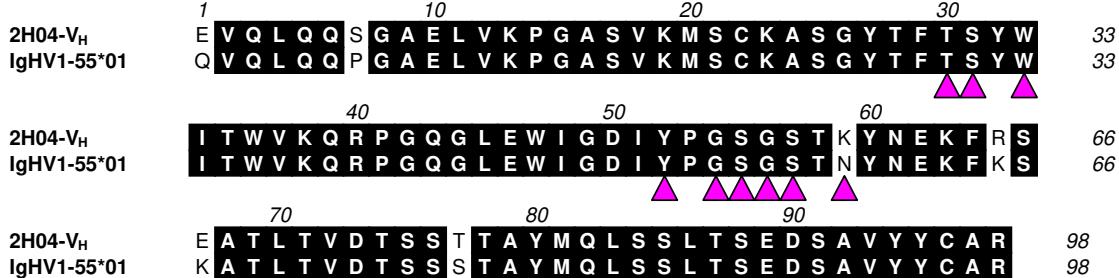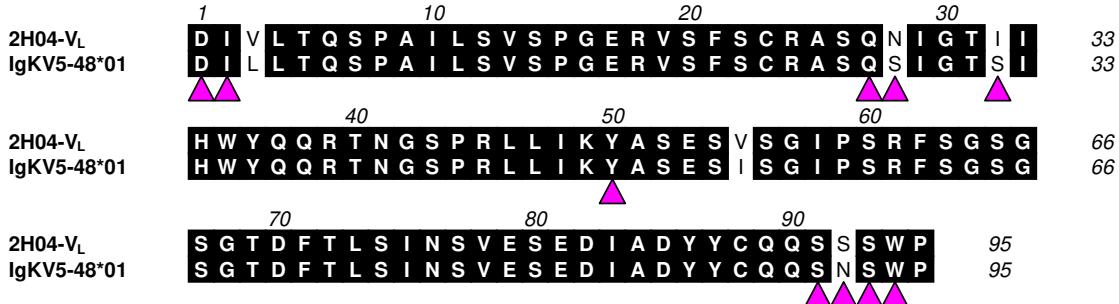
Figure S7: Comparison of 2B04 and 2H04 to germline Ig sequences. Related to figure 3. (**A**) Sequence alignment of 2B04 V_H to IgH2-9-1 (2B04 V_H parent germline sequence) and IgHV3-53*02 (germline sequence of human antibodies targeting an overlapping RBM epitope). Residues are colored from black to white according to degree of conservation. 2B04 contact residues on the SARS-CoV-2 RBD are shown as cyan triangles. (**B**) Sequence alignment of 2B04 V_L to IgVL1*01 (2B04 V_L parent germline sequence), colored as in **A**. (**C**) Sequence alignment of 2H04 V_H to IgHV1-55*01 (2H04 V_H parent germline sequence). Residues are colored from black to white according to degree of conservation. 2H04 contact residues on the SARS-CoV-2 RBD are shown as pink triangles. (**D**) Sequence alignment of 2H04 V_L to IgKV5-48*01, colored as in **C**.

Table S1: Cryo-EM data collection, processing, refinement, and validation statistics. Related to Figures 1 and 2.

	SARS-CoV-2 spike U/D/D with Fab 2B04 (full) PDB 7K9H EMD-22748	SARS-CoV-2 spike U/D/D with Fab 2B04 (local) PDB 7K9I EMD-22749	SARS-CoV-2 spike U/U/D with Fab 2B04 (full) EMD-22752	SARS-CoV-2 spike D/D/D with Fab 2H04 (full) PDB 7K9J EMD-22750	SARS-CoV-2 spike D/D/D with Fab 2H04 (local) PDB 7K9K EMD-22751	SARS-CoV-2 spike U/D/D with Fab 2H04 (full) EMD-22753
Data collection						
Magnification	105,000x	105,000x	105,000x	105,000x	105,000x	105,000x
Voltage (kV)	300	300	300	300	300	300
Electron exposure (e⁻/Å²)	67	67	67	67	67	67
Defocus range (μm)	0.5-2.5	0.5-2.5	0.5-2.5	0.5-2.5	0.5-2.5	0.5-2.5
Pixel size (Å/pixel)	1.1	1.1	1.1	1.1	1.1	1.1
Data processing						
Symmetry imposed	C1	C1	C1	C3	C1	C1
Initial partile images (no.)	1,842,978	1,842,978	1,842,978	877,481	877,481	877,481
Final particle images (no.)	162,281	263,342 (C3 exp)	165,840	155,896	304,667 (C3 exp)	109,868
Map resolution (Å)	3.2	3.3	3.35	3.0	3.14	3.55
FSC threshold	0.143	0.143	0.143	0.143	0.143	0.143
Map sharpening factor	-78.4	-61	-75	-94.3	-84.7	-64.1
Model refinement						
Initial PDB model used	6VYB, 6W41, 1GIG	6W41, 1GIG		6VXX, 6DG2, 1K4C	6VXX, 6DG2, 1K4C	
Model resolution (Å)	3.4	3.7		3.3	3.6	
FSC threshold	0.5	0.5		0.5	0.5	
Model composition						
Non-hydrogen atoms	27,022	3,295		29,766	3202	
Protein residues	3,391	423		3627	402	
Ligand residues	105	1		111	4	
B-factors (Å²)						
protein residues	115	93		100	82	
ligands (glycans)	118	99		140	76	
RMS deviations						
Bond lengths (Å)	0.006	0.005		0.004	0.006	
Bond angles (º)	0.724	0.710		0.737	0.927	
Validation						
Molprobity score	1.82	1.83		1.73	1.82	
Clashscore	10.02	11.92		8.76	11.03	
Poor rotamers (%)	0.18	0.00		0.57	0.00	
Ramachandran						
Favored (%)	95.70	96.40		96.18	96.19	
Allowed (%)	4.30	3.60		3.82	3.81	
Outliers (%)	0.00	0.00		0.00	0.00	

Table S2. GISAID citations. Related to Figure 4.

GISAID

We gratefully acknowledge the following Authors from the Originating laboratories responsible for obtaining the specimens, as well as the Submitting laboratories where the genome data were generated and shared via GISAID, on which this research is based.

All Submitters of data may be contacted directly via www.gisaid.org

Accession ID	Originating Laboratory	Submitting Laboratory	Authors
EPI_ISL_430518	Victorian Infectious Diseases Reference Laboratory (VIDRL)	Microbiological Diagnostic Unit Public Health Laboratory and Victorian Infectious Diseases Reference Laboratory, The Peter Doherty Institute for Infection and Immunity	Caly L., Seemann T., Sait, M., Schultz M., Druce J., Sherry, N.
EPI_ISL_444976	Hospital Universitari Vall d'Hebron - Vall d'Hebron Institut de Recerca	Hospital Universitari Vall d'Hebron	Cristina Andrés, Maria Piñana, Damir Garcia-Cehic, Mercedes Guerrero-Murillo, Ariadna Rando, Juliana Esperalba, Maria Gema Codina, Tomàs Pumarola, Josep Quer, Andrés Antón
EPI_ISL_447508	Servicio de Microbiologia. Hospital Clinico Universitario de Valencia.	Sequencing and Bioinformatics Service and Molecular Epidemiology Research Group. FISABIO-Public Health	Mariana Reyes-Prieto, Vicente Soriano Chirona, Ivan Ansari, Llúcia Martinez-Priego, Giuseppe 'Auria, David Navarro, Eliseo Albert, Maria Alma Bracho, Lidia Ruiz Roldan, Neris Garcia-Gonzalez, Inma Galán Vendrell, Sandra Carbo, Loreto Ferrús Abad, Paula Ruiz-Hueso, Fernando Gonzalez-Candelas
EPI_ISL_448386	Quadram Institute Bioscience	COVID-19 Genomics UK (COG-UK) Consortium	Dave J. Baker, Gemma L. Kay, Alp Aydin, Thanh Le-Viet, Steven Rudder, Ana P. Tedim, Anastasia Kolyva, Maria Diaz, Leonardo de Oliveira Martins, Nabil-Fareed Alikhan, Lizzie Meadows, Rachael Stanley, Ngozi Elumogo, Muhammed Yasir, Nicholas M. Thomson, Alexander J Trotter, Rachel Gilroy, Samuel Bloomfield, Claire Stuart, Andrew Bell, Reenesh Prakash, Samir Dervisevic, Alison E. Mather, John Wain, Mark Webber, Andrew J. Page, Justin O'Grady
EPI_ISL_454530	NIV Influenza	NIV Influenza	Potdar V
EPI_ISL_455588	Trang Hospital	National Institute of Health, Department of medical Sciences, Ministry of Public Health, Thailand	Pilailuk,Okada; Siriporn,Phuygun; Thanutsapa,Thanadachakul; Sittiporn,Parnmen;Waraean,Wongboot; Sunthareeya,Waicharoen; Malinee,Chittaganpitch
EPI_ISL_460935	Dutch COVID-19 response team	Erasmus Medical Center	Bas Oude Munnink, David Nieuwenhuijse, Reina Sikkema, Claudia Schapendonk, Irina Chestakova, Anne van der Linden, Theo Bestebroer, Stefan van Nieuwkoop, Mark Pronk, Pascal Lexmond, Corien Swaan, Marion Haverkate, Madelief Moliers, Mart Stein, Sandra Kengne Kamga Mobou, Jeroen van Kampen, Jolanda Voermans, Aura Timen, Corine GeurtsvanKessel, Annemiek van der Eijk, Richard Molenkamp, Marion Koopmans, on behalf of the Dutch national COVID-19 response team.
EPI_ISL_461895	Queens Medical Centre, Clinical Microbiology Department / DeepSeq Nottingham	COVID-19 Genomics UK (COG-UK) Consortium	Gemma Clark, Wendy Smith, Manjinder Khakh, Hannah Howson-Wells, Jonathan Ball, Patrick McClure, Joseph Chappell, Theocharis Tsoleridis, Nadine Holmes, Matthew Carlisle, Christopher Moore, Fei Sang, Johnny Debebe, Victoria Wright, Matthew Loose
EPI_ISL_463539	Washington State Department of Health	Seattle Flu Study	Chu et al
EPI_ISL_464376, EPI_ISL_465520	Respiratory Virus Unit, Microbiology Services Colindale, Public Health England	Respiratory Virus Unit, Microbiology Services Colindale, Public Health England	PHE Covid Sequencing Team
EPI_ISL_466006	Max von Pettenkofer Institute, Virology; National Reference Center for Retroviruses, LMU München	Laboratory for Functional Genome Analysis, Dept. Genomics, Gene Center of the LMU Munich	Max Muenchhoff, Stefan Krebs, Alexander Graf, Oliver Keppler, Helmut Blum
EPI_ISL_467270	Hospital Clinico Universitario de Santiago de Compostela	SeqCOVID-SPAIN consortium/IBV(CSIC)	José Javier Costa Alcalde, Antonio Aguilera Guirao, Mª Luisa Pérez del Molino Bernal, Ampáro Coira Nieto, Gema Barbeito Castiñeiras, Rocio Trastoy Pena and SeqCOVID-SPAIN consortium
EPI_ISL_469369	PHE South West Regional Laboratory, National Infection Service	Wellcome Sanger Institute for the COVID-19 Genomics UK Consortium	Stephanie Hutchings, Hannah Pymont, Dr Peter Muir, Barry Vipond, Rich Hopes; and Alex Alderton, Roberto Amato, Sonia Goncalves, Ewan Harrison, David K. Jackson, Ian Johnston, Dominic Kwiatkowski, Cordelia Langford, John Sillitoe on behalf of the Wellcome Sanger Institute COVID-19 Surveillance Team (http://www.sanger.ac.uk/covid-team)
EPI_ISL_470242	Department of Pathology, University of Cambridge	Wellcome Sanger Institute for the COVID-19 Genomics UK Consortium	Luke W Meredith, M. Estée Török, Myra Hosmillo, William L. Hamilton, Martin D. Curran, Theresa Feltwell, Grant Hall, Anna Yakovleva, Fahad A Khokhar, Charlotte J. Houldcroft, Laura G Caller, Aminu S. Jahun, Sarah L. Caddy, Ian Goodfellow; and Alex Alderton, Roberto Amato, Sonia Goncalves, Ewan Harrison, David K. Jackson, Ian Johnston, Dominic Kwiatkowski, Cordelia Langford, John Sillitoe on behalf of the Wellcome Sanger Institute COVID-19 Surveillance Team (http://www.sanger.ac.uk/covid-team)
EPI_ISL_471833	Michigan Department of Health and Human Services, Bureau of Laboratories	Michigan Department of Health and Human Services, Bureau of Laboratories	Blankenship HM, Riner D, Soehnlen MK
EPI_ISL_472405	Queens Medical Centre, Clinical Microbiology Department / DeepSeq Nottingham	COVID-19 Genomics UK (COG-UK) Consortium	Gemma Clark, Wendy Smith, Manjinder Khakh, Vicki M Fleming, Michelle M Lister, Hannah Howson-Wells, Jonathan Ball, Patrick McClure, Joseph Chappell, Theocharis Tsoleridis, Nadine Holmes, Matthew Carlisle, Christopher Moore, Fei Sang, Johnny Debebe, Victoria Wright, Matthew Loose
EPI_ISL_472846, EPI_ISL_473042, EPI_ISL_473071	Wales Specialist Virology Centre Sequencing lab: Pathogen Genomics Unit	COVID-19 Genomics UK (COG-UK) Consortium	Catherine Moore, Johnathan Evans, Laura Gifford, Malorie Perry, Simon Cottrell, Angela Marchbank, Alec Birchley, Alexander Adams, Amy Gaskin, Bree Gatica-Wilcox, Jason Coombes, Joel Southgate, Lauren Gilbert, Lee Graham, Nicole Pacchiarini, Sara Kumziene-Summerhayes, Sarah Taylor, Sophie Jones, Sara Rey, Matthew Bull, Joanne Watkins, Sally Corden, Tom Connor
EPI_ISL_476136	Sutrunns VC	The Public Health Agency of Sweden	Oskar Karlsson Lindsjo, Maria Lind Karlberg, Mattias Haukland, Reza Advani, Olov Svartstrom, Anna-Malin Linde, Sandra Broddesson, Petra Edquist, Mia Brytting, Anna Risberg, Karin Tegmark-Wisell
EPI_ISL_479447	Wales Specialist Virology Centre Sequencing lab: Pathogen Genomics Unit	COVID-19 Genomics UK (COG-UK) Consortium	Catherine Moore, Johnathan Evans, Laura Gifford, Malorie Perry, Simon Cottrell, Angela Marchbank, Alec Birchley, Alexander Adams, Amy Gaskin, Bree Gatica-Wilcox, Jason Coombes, Joel Southgate, Lauren Gilbert, Lee Graham, Nicole Pacchiarini, Sara Kumziene-Summerhayes, Sarah Taylor, Sophie Jones, Sara Rey, Matthew Bull, Joanne Watkins, Sally Corden, Tom Connor
EPI_ISL_480361	University of Wisconsin-Madison AIDS Vaccine Research Laboratories	University of Wisconsin-Madison AIDS Vaccine Research Laboratories	Gage Moreno, Katarina Braun, et al. AIDS Vaccine Research Laboratories
EPI_ISL_480948	Florida Bureau of Public Health Laboratories	Florida Bureau of Public Health Laboratories	Sarah Schmedes, Jason Blanton
EPI_ISL_481886, EPI_ISL_488423	PHE South West Regional Laboratory, National Infection Service	Wellcome Sanger Institute for the COVID-19 Genomics UK Consortium	Stephanie Hutchings, Hannah Pymont, Dr Peter Muir, Barry Vipond, Rich Hopes; and Alex Alderton, Roberto Amato, Sonia Goncalves, Ewan Harrison, David K. Jackson, Ian Johnston, Dominic Kwiatkowski, Cordelia Langford, John Sillitoe on behalf of the Wellcome Sanger Institute COVID-19 Surveillance Team (http://www.sanger.ac.uk/covid-team)
EPI_ISL_494170, EPI_ISL_494194, EPI_ISL_494240, EPI_ISL_494256, EPI_ISL_494279, EPI_ISL_494311, EPI_ISL_494335, EPI_ISL_494348, EPI_ISL_494352	Originating lab: Wales Specialist Virology Centre Sequencing lab: Pathogen Genomics Unit	COVID-19 Genomics UK (COG-UK) Consortium	Catherine Moore, Johnathan Evans, Laura Gifford, Malorie Perry, Simon Cottrell, Angela Marchbank, Alec Birchley, Alexander Adams, Amy Gaskin, Bree Gatica-Wilcox, Jason Coombes, Joel Southgate, Lauren Gilbert, Lee Graham, Nicole Pacchiarini, Sara Kumziene-Summerhayes, Sarah Taylor, Sophie Jones, Sara Rey, Matthew Bull, Joanne Watkins, Sally Corden, Tom Connor
EPI_ISL_494618	Scripps Medical Laboratory	Andersen lab at Scripps Research	SEARCH Alliance San Diego with Michael Quigley, Ellen Stefanski, Ian Mchardy
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EPI_ISL_495015	B.J. Medical College and Civil hospital	Gujarat Biotechnology Research Centre	Zarna Patel, Monika Gandhi, Pinal Trivedi, Maharshi Pandya, Nidhi Patel, Nitin Savaliya, Raghawendra Kumar, Dinesh Kumar, Zuber Saiyed, Komal Patel, Labdhi Pandya, Afzal Ansari, Nikha Trivedi, Pranay Shah, Kamlesh J Upadhyay, Sanjay Kapadia, Apurvasinh Puvar, Janvi Raval, R D Dixit, A M Kadri, Harsh Bakshi, Chaitanya Joshi, Madhvi Joshi
EPI_ISL_501014	Regional Virus Laboratory, Belfast Health and Social Care Trust	Wellcome Sanger Institute for the COVID-19 Genomics UK Consortium	Conall McCaughey, James McKenna, Tanya Curran, Susan Feeney, Alison Watt, Clara Cox, Mairead Connor, Zoltan Molnar, David Simpson, Derek Fairley; and Alex Alderton, Roberto Amato, Sonia Goncalves, Ewan Harrison, David K. Jackson, Ian Johnston, Dominic Kwiatkowski, Cordelia Langford, John Sillitoe on behalf of the Wellcome Sanger Institute COVID-19 Surveillance Team (http://www.sanger.ac.uk/covid-team)
EPI_ISL_509133	OHSU Lab Services Molecular Microbiology Lab	Oregon SARS-CoV-2 Genome Sequencing Center	Brendan L. O'Connell, Ruth V. Nichols, Sally B. Grindstaff, Alec J. Hirsch, Guang Fan, Daniel N. Streblow, William B. Messer, Andrew C. Adey, Benjamin N. Bimber, Brian J. O'Roak
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EPI_ISL_510839	Karolinska Universitetslaboratoriet	The Public Health Agency of Sweden	Oskar Karlsson Lindsjo, Maria Lind Karlberg, Mattias Haukland, Reza Advani, Olov Svartstrom, Anna-Malin Linde, Sandra Broddesson, Petra Edquist, Mia Brytting, Anna Risberg, Karin Tegmark-Wisell
EPI_ISL_512069	Sardar Vallabhbhai Patel Institute of Medical Sciences & Research	Gujarat Biotechnology Research Centre	Nikha Trivedi, Pranay Shah, Kamlesh J Upadhyay, Sanjay Kapadia, Apurvasinh Puvar, Janvi Raval, Zarna Patel, Monika Gandhi, Pinal Trivedi, Maharshi Pandya, Nidhi Patel, Nitin Savaliya, Raghawendra Kumar, Dinesh Kumar, Zuber Saiyed, Komal Patel, Labdhi Pandya, Afzal Ansari, R D Dixit, A M Kadri, Harsh Bakshi, Chaitanya Joshi, Madhvi Joshi
EPI_ISL_512239	San Diego County Public Health Laboratory	Andersen lab at Scripps Research	SEARCH Alliance San Diego with Tracy Basler, Jovan Shephard, Brett Austin
EPI_ISL_512381, EPI_ISL_512382, EPI_ISL_514452, EPI_ISL_514453	Queens Medical Centre, Clinical Microbiology Department / DeepSeq Nottingham	COVID-19 Genomics UK (COG-UK) Consortium	Gemma Clark, Wendy Smith, Manjinder Khakh, Vicki M Fleming, Michelle M Lister, Hannah Howson-Wells, Jonathan Ball, Patrick McClure, Joseph Chappell, Theocharis Tsoleridis, Nadine Holmes, Matthew Carlisle, Christopher Moore, Fei Sang, Johnny Debebe, Victoria Wright, Matthew Loose
EPI_ISL_515809	Medical Diagnostics Services (MDS)	KRISP, KZN Research Innovation and Sequencing Platform	Giandhari J, Pillay S, Lessells R, ChimukangaraB, Mdlalose K, York D, Khan S, Tegally H, Wilkinson E, de Oliveira T
EPI_ISL_516595	Viollier AG	Department of Biosystems Science and Engineering, ETH Zürich	Christian Beisel, Sarah Nadeau, Ivan Topolsky, Pedro Ferreira, Philipp Jablonski, Susana Posada-Céspedes, Tobias Schär, Ina Nissen, Natascha Santacroce, Elodie Burcklen, Christiane Beckmann, Maurice Redondo, Olivier Kobel, Christoph Noppen, Sophie Seidel, Noemie Santamaria de Souza, Niko Beerenwinkel, Tanja Stadler
EPI_ISL_518926	Microbiological Diagnostic Unit - Public Health Laboratory (MDU-PHL)	MDU-PHL	Seemann T., Schultz M., Sait, M., Sherry, N.
EPI_ISL_523389, EPI_ISL_523399	Dutch COVID-19 response team	Erasmus Medical Center	Bas Oude Munnink, David Nieuwenhuijse, Reina Sikkema, Claudia Schapendonk, Irina Chestakova, Anne van der Linden, Theo Bestebroer, Stefan van Nieuwkoop, Mark Pronk, Pascal Lexmond, Corien Swaan, Marion Haverkate, Madelief Moliers, Mart Stein, Sandra Kengne Kamga Mobou, Jeroen van Kampen, Jolanda Voermans, Aura Timen, Corine GeurtsvanKessel, Annemiek van der Eijk, Richard Molenkamp, Marion Koopmans, on behalf of the Dutch national COVID-19 response team.
EPI_ISL_524740	GMERS Medical College and Hospital, Gandhinagar	Gujarat Biotechnology Research Centre	Maharshi Pandya, Nidhi Patel, Nitin Savaliya, Raghawendra Kumar, Dinesh Kumar, Zuber Saiyed, Komal Patel, Labdhi Pandya, Afzal Ansari, Nikha Trivedi, Seema Bhatt, Gaurishankar Shrimali, Bhavesh Modi, Bharti Rajani, Apurvasinh Puvar, Janvi Raval, Zarna Patel, Monika Gandhi, Pinal Trivedi, R D Dixit, A M Kadri, Harsh Bakshi, Chaitanya Joshi, Madhvi Joshi
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EPI_ISL_526429	Queens Medical Centre, Clinical Microbiology Department / DeepSeq Nottingham	COVID-19 Genomics UK (COG-UK) Consortium	Gemma Clark, Wendy Smith, Manjinder Khakh, Vicki M Fleming, Michelle M Lister, Hannah Howson-Wells, Jonathan Ball, Patrick McClure, Joseph Chappell, Theocharis Tsoleridis, Nadine Holmes, Matthew Carlisle, Christopher Moore, Fei Sang, Johnny Debebe, Victoria Wright, Matthew Loose
EPI_ISL_528300	University Hospital Basel, Clinical Virology	University Hospital Basel, Clinical Bacteriology	Madlen Stange, Alfredo Mari, Tim Roloff, Helena MB Seth-Smith, Michael Schweitzer, Myrta Brunner, Karoline Leuzinger, Kirstine K. Soegaard, Alexander Gensch, Sarah Tschudin-Sutter, Simon Fuchs, Julia Bielicki, Hans