# Supplementary Information

## Organ-specific genome diversity of replication-competent SARS-CoV-2

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Supplementary Table 1

| Case ID | Duration of disease in days | CCI | CCI subcategories | | | | | | | | | | | Invasive $O_2$ | Immuno-suppressive therapy | Antiviral treatment | Viral RNA in lungs | RNAemia | Viral RNA in extrap organs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CVD | CA | Str | HP | Dem | Dep | DPD | CKD | Diab | Dysl /Ob | Lymph | | | | | | |
| 01 | 21 (L) | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Y | N | N | Y | Y | N |
| 02 | 51 (L) | 4 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Y | N | N | N | N | N |
| 03 | 41 (L) | 4 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | N | N | N | N | Y | N |
| 04 | 8 (S) | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | N | Y, mild[1] | N | Y | Y | N |
| 05 | 27 (L) | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | N | N | N | Y | Y | N |
| 06 | 18 (S) | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | N | Y, severe[2] | N | Y | Y | Y |
| 07 | 3 (S) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | N | Y, severe[3] | N | Y | Y | Y |
| 08 | 18 (S) | 4 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | N | N | N | Y | N | N |
| 09 | 32 (L) | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | N | N | N | N | Y | N |
| 10 | 28 (L) | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | N | N | N | N | N | N |
| 11 | >22 (L) | 6 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | N | N | N | Y | N | N |
| 12 | 12 (S) | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | N | N | N | Y | Y | N |
| 13 | 88 (L) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Y | Y, severe[4] | Y, remdesivir[5] | Y | Y | Y |
| Summary | 22 [18-32] | 3 [2-4] | 11/13 | 4/13 | 2/13 | 5/13 | 1/13 | 1/13 | 5/13 | 7/13 | 1/13 | 3/13 | 2/13 | 3 Y 10 N | 3 Y 10 N | 1 Y 12 N | 9 Y 4 N | 9 Y 4 N | 3 Y 10 N |

**Table S1. Patient demographics and clinical data.** Data are summarized in the bottom row as either median and [interquartile range] (age, duration of disease, CCI), absolute number (sex, invasive $O_2$, immunosuppressive therapy, antiviral treatment), or relative number (CCI subcategories). Abbreviations: M= male, F= female, S= short-lived disease, L= long-lived disease, Y= yes, N= no. CCI= Charlson Comorbidity index, CVD= cardiovascular disease, CA= cardiac arrythmia, Str= stroke, HP= hemiplegia, Dem= dementia, Dep= depression, CPD= chronic pulmonary disease, CKD= chronic kidney disease, Diab= diabetes, Dysl= dyslypidemia, ob= obesitas, Lymph= lymphoma. Footnotes: [1]=Sulfasalzine 500 mg long-term, [2]=Rituximab 500 mg/$m^2$ and methotrexate 3.5 gr/$m^2$ long-term, [3]= Methylprednisolone 8 mg long-term and 32 mg short-term, [4]=Ritixumab 500 mg/$m^2$ long-term and methylprednisolone 32-64 mg short-term. [5]=Three-day treatment with remdesivir 13 days prior to death.

Supplementary Figure 1

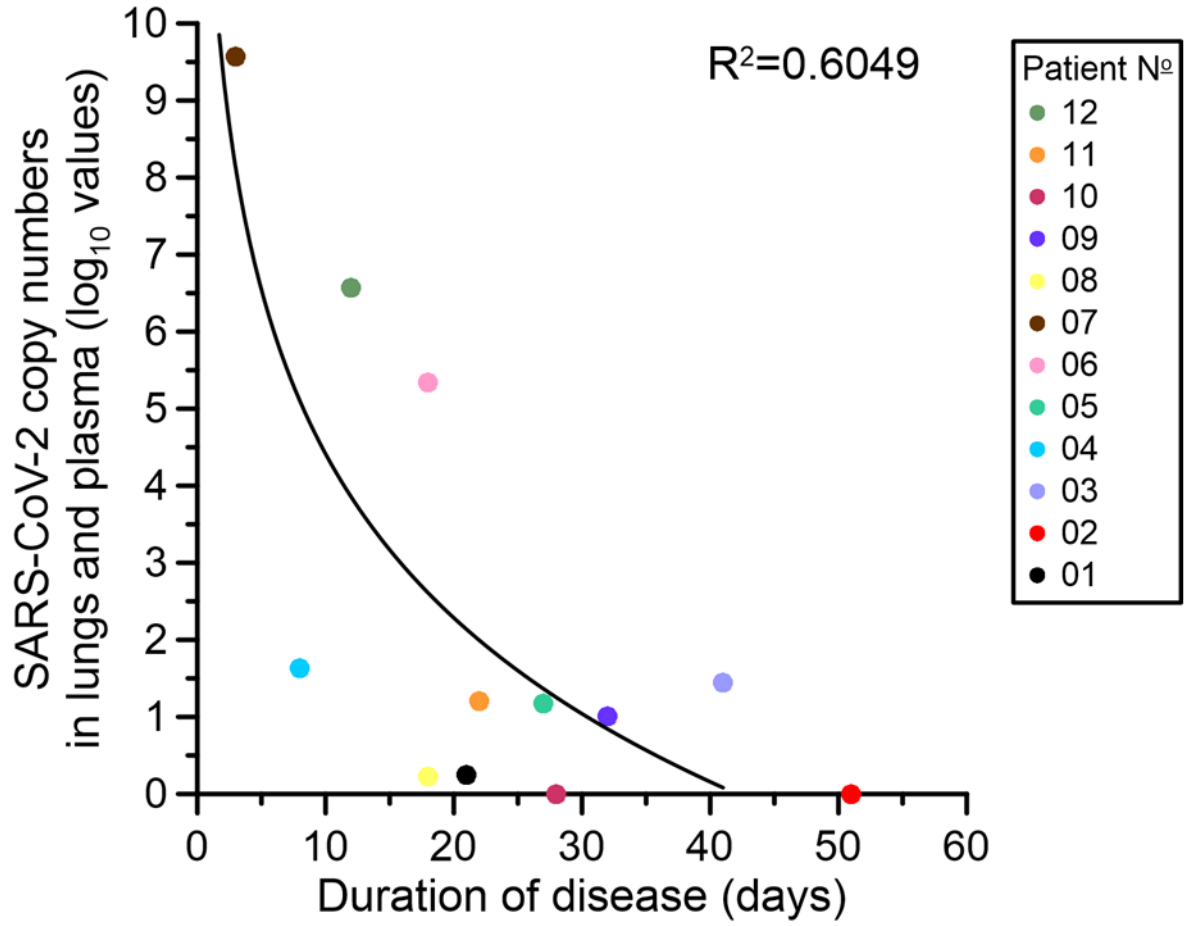


**Figure S1. SARS-CoV-2 RNA loads in lungs and plasma are negatively correlated with duration of COVID-19 in fatal cases.** The sum total of viral titers ($log_{10}$ values) in lungs and plasma was plotted against duration of disease for each case (different colors). The solid line represents the logarithmic regression line ($R^2$= 0.6049, P= 0.003, F=15.308, df=10). Case 13 was considered an outlier and removed from the dataset. Source data are provided as a Source Data file.

Supplementary Figure 2

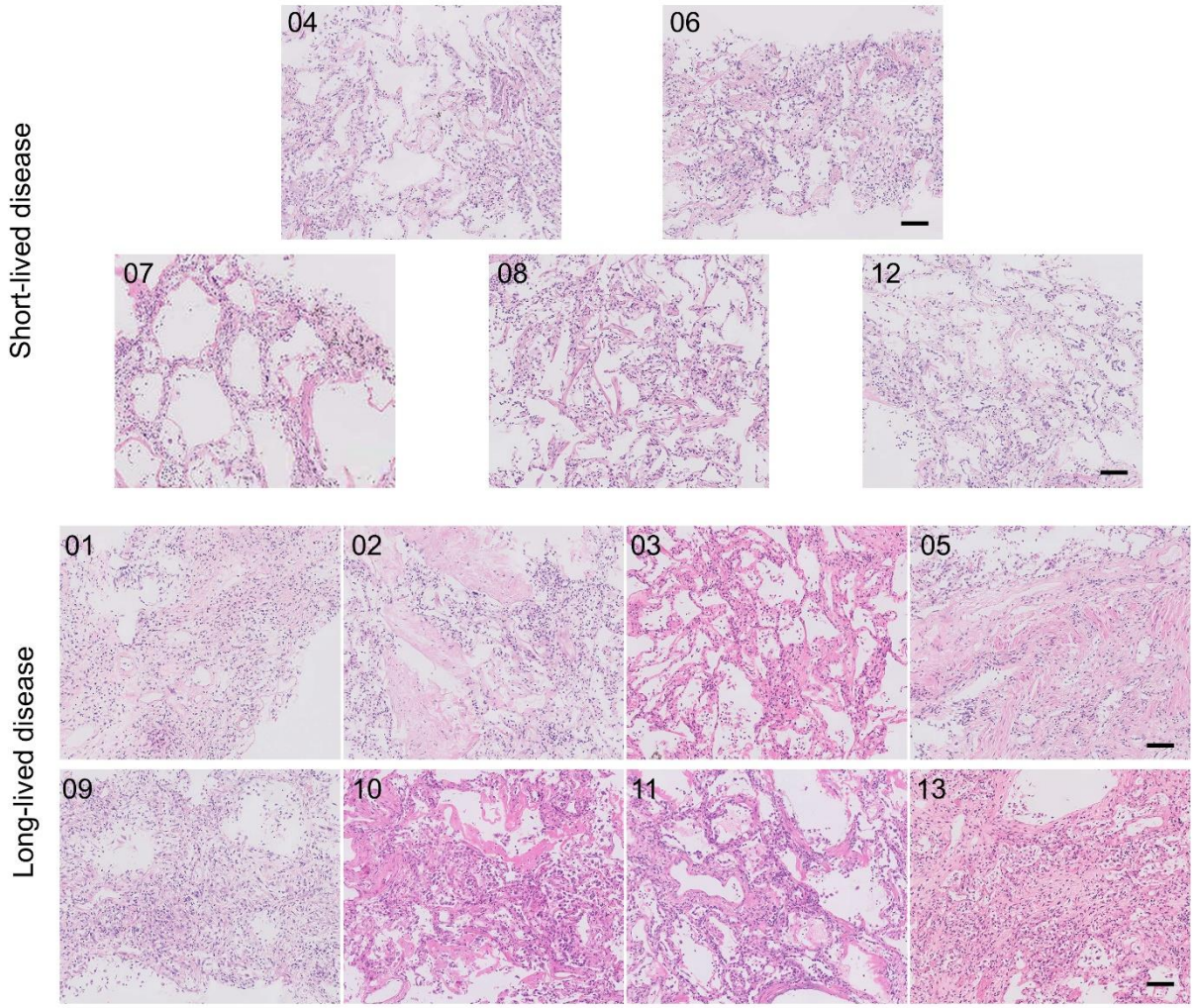


**Figure S2. Histopathological patterns of lung biopsies.** Hematoxylin (HE) staining of paraffin-embedded sections of lung tissues of our COVID-19 cohort. Cases with short-lived disease (№ 04, 06, 07, 08, and 12; upper panels) generally show histological patterns of acute exudative alveolar damage with reactive bronchial epithelia and edema, while cases with long-lived disease (№ 01, 02, 03, 05, 09, 10, 11 and 13; lower panels) are characterized by a remodeling pattern of acute respiratory distress with interstitial fibrosis and consolidation of airspace. Scale bars represent 100 µm.

Supplementary Figure 3

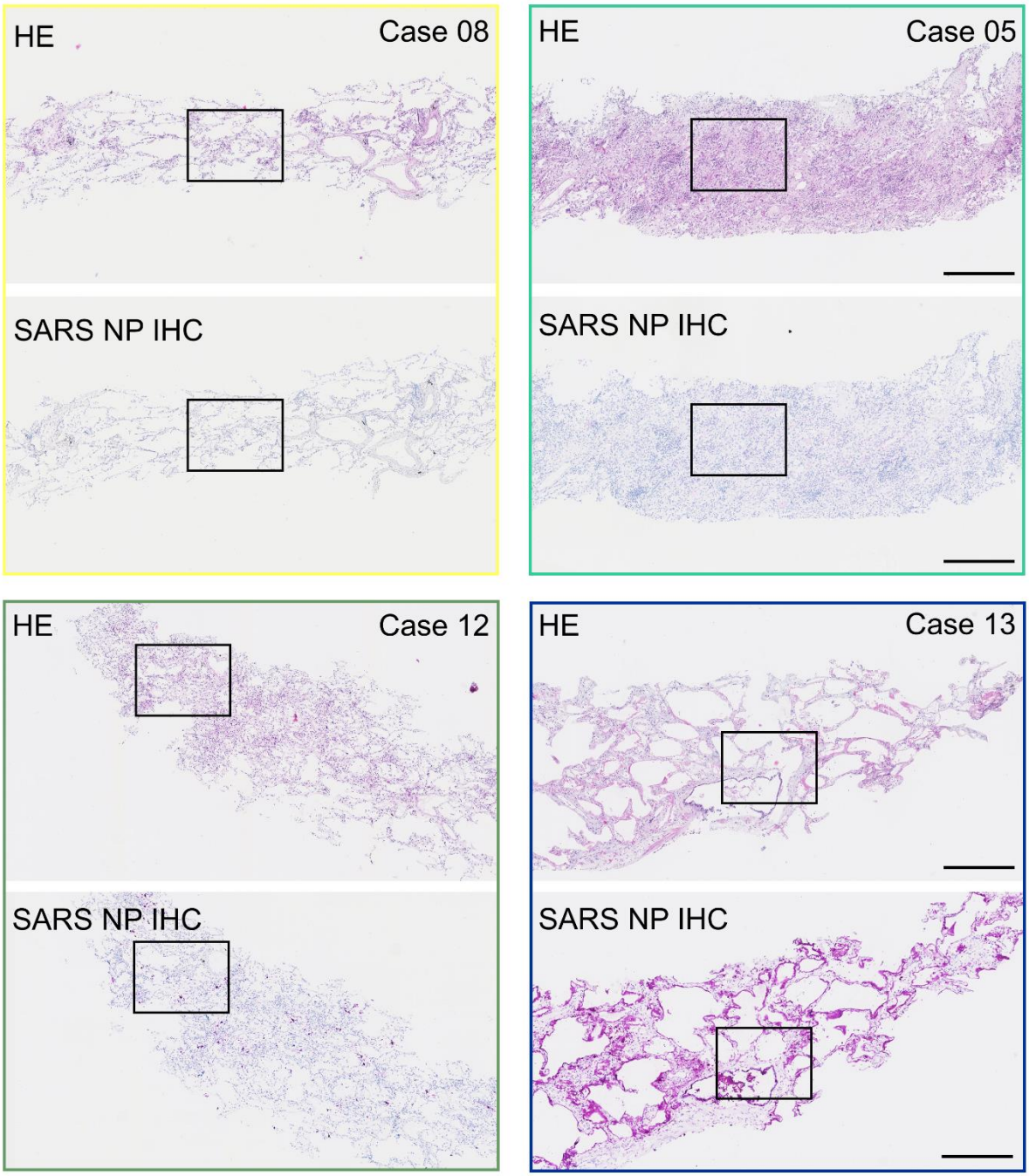


**Figure S3. Lower magnification images of HE- and SARS-CoV-2 NP IHC-stained paraffin-embedded sections shown in Fig. 1b.** Consecutive sections were either stained with hematoxylin-eosin (HE; upper images) or SARS-CoV-2 nucleocapsid protein (NP) immunohistochemistry (IHC; in purple; lower images). Picture delineations correspond to the respective case colors shown in the legend of Fig. 1a. The black squares represent selected areas shown in Fig. 1b (IHC) or corresponding areas on HE staining. Scale bars represent 500 µm.

Supplementary Figure 4

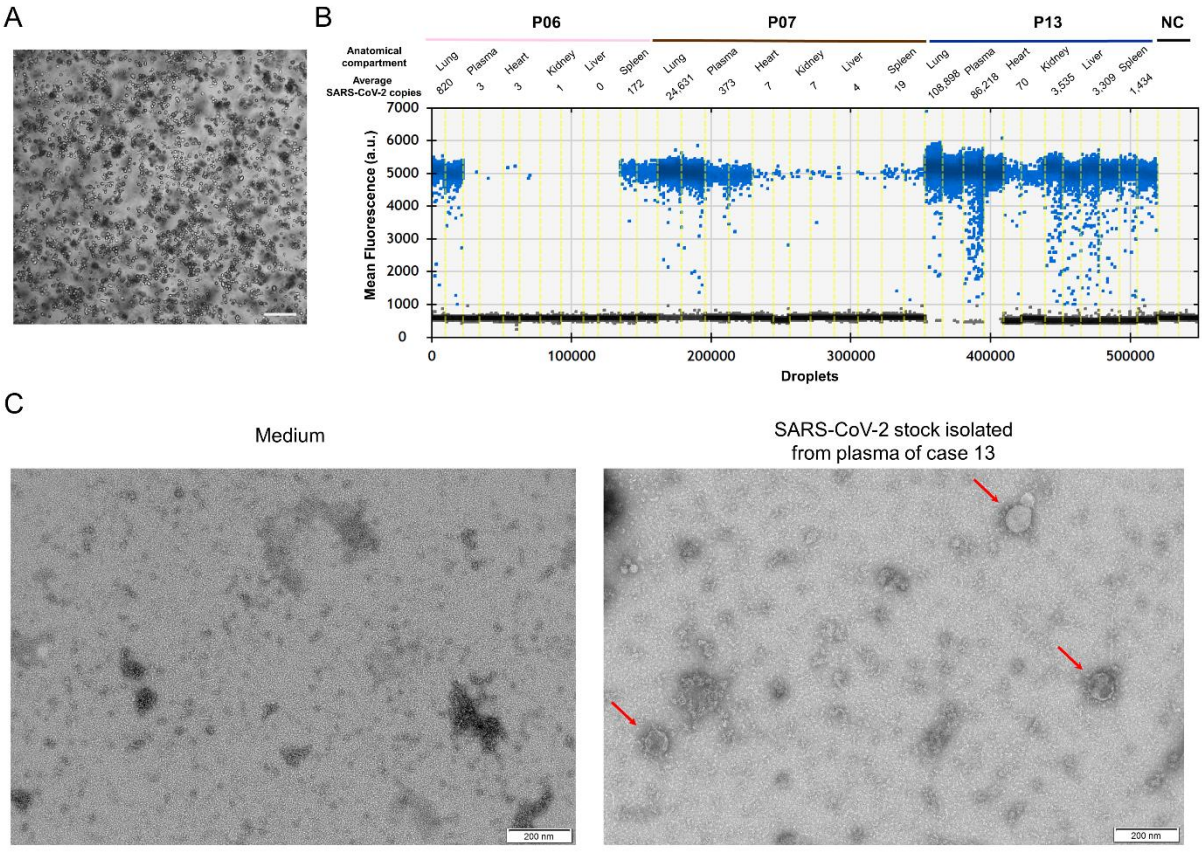


**Figure S4. Systemic spread of SARS-CoV-2.** (A) Inoculation of Vero E6 cells with SARS-CoV-2 from plasma of case 13 produced a lytic infection with characteristic rounding cytopathic effects (CPE) 2 days post inoculation. The scale bar represents 100 µm. (B) Tabulated absolute concentrations of SARS-CoV-2 genome copies in all organs and plasma of three patients with viral dissemination to multiple organs (case 06, 07 and 13) using ddPCR. (C) Transmission electron microscopy images of negative control (complete medium only) and plasma-derived viral progeny produced on Vero E6 cells. Arrows indicate virions and scale bars indicate 200 nm.

Supplementary Figure 5

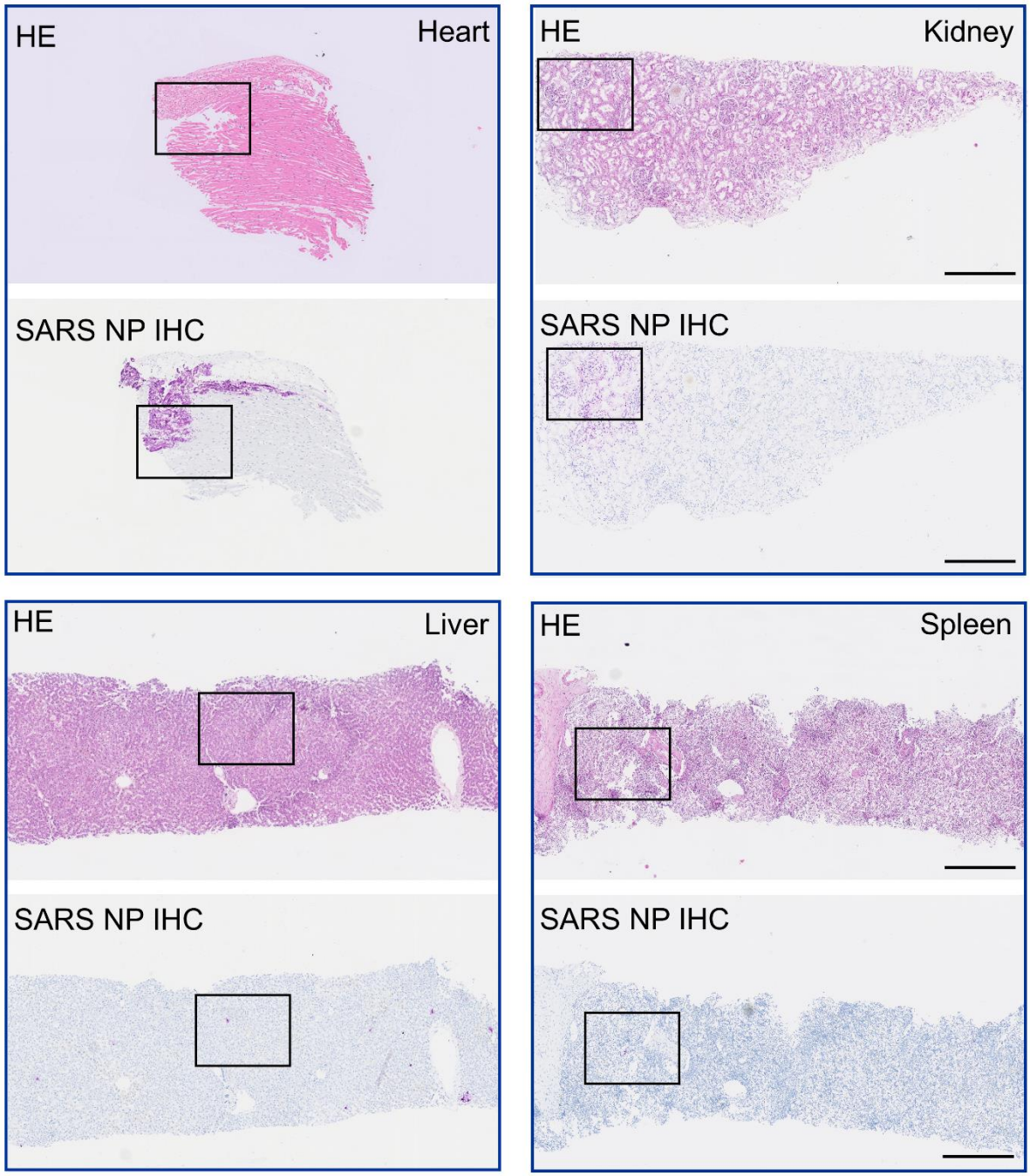


**Figure S5. Lower magnification images of HE- and SARS-CoV-2 NP IHC-stained paraffin-embedded sections shown in Fig. 1e.** Consecutive sections* of different extrapulmonary tissues were either stained with hematoxylin-eosin (HE; upper images) or SARS-CoV-2 nucleocapsid protein (NP) immunohistochemistry (IHC; in purple; lower images). Picture delineations correspond to the respective case colors shown in the legend of Fig. 1d. The black squares represent selected areas shown in Fig. 1e (IHC) or corresponding areas on HE staining. Scale bars represent 500 µm. *Cardiac tissue sections derived from the same tissue block, but were not consecutive.

Supplementary Figure 6

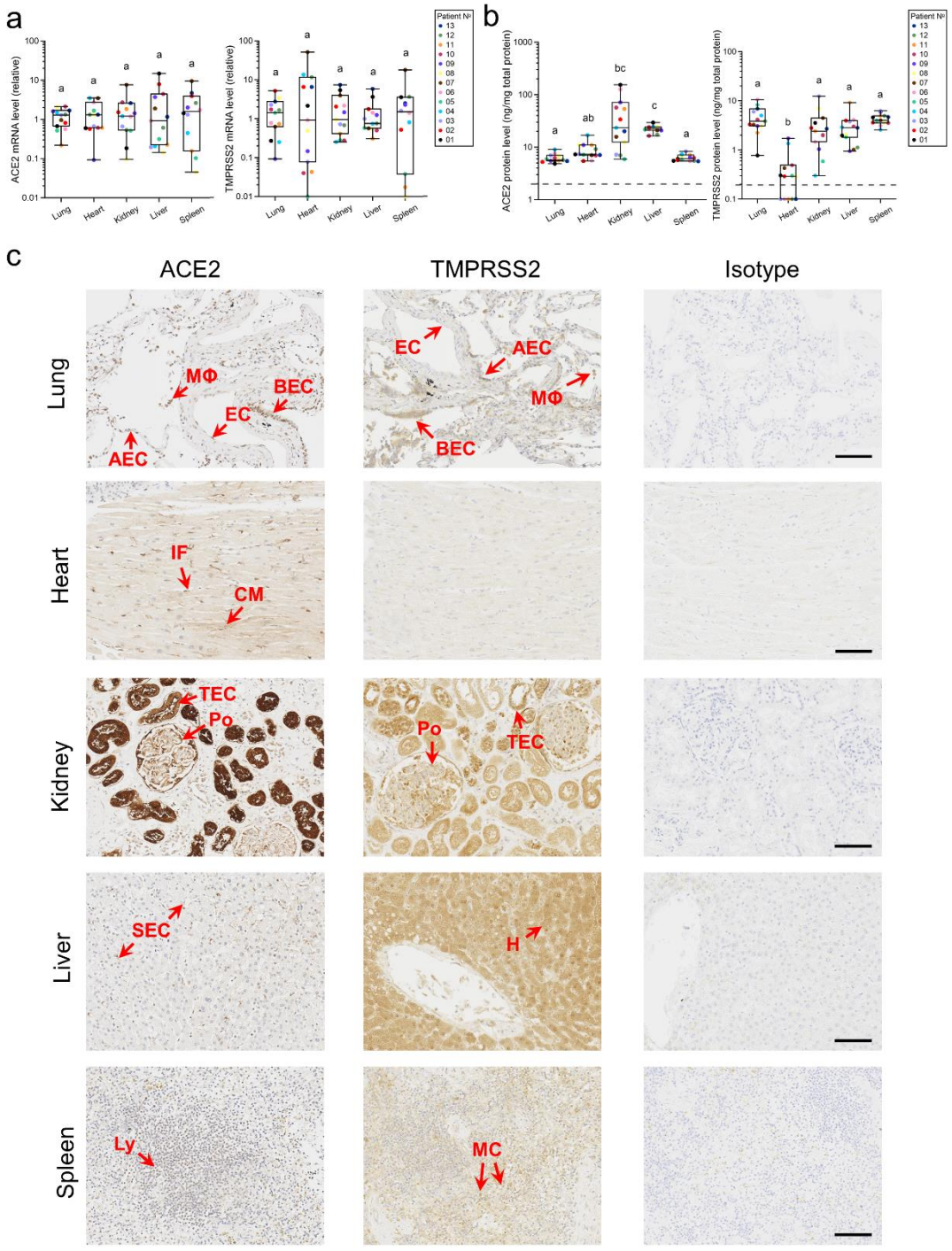


**Figure S6. Mapping of ACE2 and TMPRRS2 expression in selected postmortem tissues of severe COVID-19 cases.** Relative ACE2 and TMPRSS2 (a) mRNA and (b) protein levels in organs of different cases (n= 13, different colors). Central tendencies for mRNA and protein levels are illustrated as boxplots where the band indicates the median, the box indicates the first and third quartiles and the whiskers indicate the minimum and maximum of all of the data. One-way ANOVA was performed on log-transformed ACE2 mRNA levels and did not identify a significant difference in mean ACE2 mRNA values between different organs (P=1.000; F=0.000; df=63). A two-sided Kruskal-Wallis test did not identify a significant difference between TMPRSS2 mRNA values of different organs (P=0.999: df=4), but did identify significant differences between ACE2 and TMPRSS2 protein levels of different organs

(both P<0.001; df=4). Case 10 mRNA data were considered outliers and not included in the statistical test (n=12). The significance of pairwise two-sided comparisons (Bonferroni-corrected for the number of pairwise comparisons performed) is indicated by different letters on the plots. The P value for significant differences in ACE2 protein levels between different organs was <0.001, except for the comparison between heart and liver (P=0.034). The P value for significant differences in TMPRSS2 protein levels between different organs was <0.001 when comparing heart with lung and spleen and 0.014 and 0.012 when comparing heart with kidney and liver, respectively. Source data are provided as a Source Data file. (c) Representative images of ACE2 (long form only; left panels), TMPRSS2 (middle panels), and isotype control (right panels) staining (in brown) on paraffin-embedded sections of lung, heart, kidney, liver, and spleen tissue. Arrows indicate immune-stained cells. Abbreviations (in alphabetical order): AEC= alveolar epithelial cell, BEC= bronchiolar epithelial cell, CM= cardiomyocyte, EC= endothelial cell, H= hepatocyte, Ly= lymphocyte, Mϕ= macrophage, MC= myeloid cell, Po= podocyte, SEC= sinusoidal endothelial cell, TEC= tubular epithelial cell. Scale bars represent 100 µm.

## Supplementary Table 2

| Gene | Nt change | AA change | Frequency of detection per anatomical compartment (%) | | | |
|---|---|---|---|---|---|---|
| | | | Lungs | Plasma | Heart | Kidney |
| *5' UTR* | C241T | / | **99,86** | 99,97 | **99,97** | **99,97** |
| *ORF1a* | C398T | ORF1a:H45Y | **99,86** | 99,75 | **99,91** | **99,91** |
| *ORF1a* | C3037T | / | **99,88** | 99,76 | **99,72** | **99,84** |
| *ORF1b* | C13536T | / | **99,92** | 99,92 | **99,88** | **99,97** |
| *ORF1b* | C14408T | ORF1b:P314L | **99,6** | 99,77 | **99,7** | **99,56** |
| *ORF1b* | A20127G | / | **90,91** | 100 | **99,67** | **100** |
| *S* | C23731T | / | **100** | 99,82 | **99,28** | **98,96** |
| **Color range per percentage** | | | 0 | 25 | 50 | 100 |

**Table S2. SARS-CoV-2 genome single nucleotide variants (SNVs) in postmortem tissues and plasma of case 07.** Variants were mapped to clade 20D genome and called if case frequencies were higher than 20% in at least one anatomical compartment. SNV frequency is noted per organ. A heat map with different colors indicates the frequency of mutant detection per organ (the lower bar shows the color range of different percentages). Bold numbers indicate that the latter variant was also identified in SARS-CoV-2 progeny on Vero E6 cells of respective tissue samples (frequencies >1%).

## Supplementary Table 3

| Gene | Nt change | AA change | Frequency of detection per anatomical compartment (%) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Lungs | Plasma | Heart | Kidney | Liver | Spleen |
| *ORF1a* | T322A | / | 40,81 | 0 | 6,57 | 0 | 0 | 0 |
| *ORF1a* | G1068A | NSP2:G268E | 0 | 0 | 0 | 0 | 0 | 28,5 |
| *ORF1a* | C1862T | NSP2:L533F | 33,28 | 5,9 | 8,78 | 0 | 0 | 3,11 |
| *ORF1a* | C2094T | NSP2:S610L | **99,56** | **99,55** | **99,62** | **100** | **100** | **99,62** |
| *ORF1a* | T2149C | / | 20,58 | 1,35 | <1 | <1 | <1 | <1 |
| *ORF1a* | T5395A | NSP3:F2328V | 39,67 | 5,95 | 4,12 | <1 | 11,9 | 4,03 |
| *ORF1a* | A5405G | NSP3:I1714V | 17,73 | 10,45 | 30,22 | 5,76 | 10,89 | 4,1 |
| *ORF1a* | T5406C | NSP3:I1714T | **10,63** | **12,5** | **28,95** | **89,21** | **32,82** | **6,63** |
| *ORF1a* | C7239T | NSP3:A2325V | 46,19 | 8,06 | 20,07 | <1 | 16,67 | 5,56 |
| *ORF1a* | T7247G | NSP3:F2328V | **29,24** | **14,66** | **6,78** | **87,36** | **37,5** | **6,77** |
| *ORF1a* | C7279T | / | **1,17** | 1,84 | <1 | **83,3** | <1 | <1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *ORF1a* | C8175T | NSP3:A2637V | **14,31** | **45,94** | **42,28** | 1,85 | **38,91** | **11,11** |
| *ORF1a* | A8387G | NSP3:N2708D | **1,92** | **2,89** | <1 | **88,86** | 2,5 | 1,32 |
| *ORF1a* | C9438T | NSP4:T3058I | **14,4** | **44,24** | **24,27** | 1,11 | **35,56** | **11,64** |
| *ORF1a* | C9491T | NSP4:H3076Y | 2,84 | 1,28 | 33,29 | <1 | 5,65 | 4,05 |
| *ORF1a* | A9737G | NSP4:S3158G | **39,58** | **9,44** | **7,07** | **44,79** | **13,87** | 5,96 |
| *ORF1a* | C10369T | / | 1,54 | <1 | <1 | <1 | 6,04 | 27,3 |
| *ORF1a* | C11008T | / | 20,69 | 2,92 | 5,3 | <1 | 3,69 | 2,17 |
| *ORF1a* | C12439T | NSP8:P4058L | **8,71** | **5,35** | **5,76** | **48,05** | **21,86** | **4,07** |
| *ORF1a* | C12513T | NSP8:T4083M | <1 | <1 | <1 | 7,04 | <1 | **62,73** |
| *ORF1a* | T13417C | / | **99,25** | **98,09** | **97,72** | **99,15** | **94,8** | **98,89** |
| *ORF1a* | A13433G | NSP10:M4390G | **1,13** | **1,59** | <1 | **30,19** | 1,84 | <1 |
| *ORF1b* | A13947T | / | **99,5** | **99,17** | **99,46** | **99,26** | **99,64** | **98,96** |
| *ORF1b* | C14786T | RdRp:A440V | 46,74 | 4,66 | 8,13 | <1 | 8,85 | 3,66 |
| *ORF1b* | C14937T | / | <1 | <1 | <1 | <1 | <1 | **64,31** |
| *ORF1b* | C15222T | / | 1,84 | 24,59 | 7,67 | 1,24 | 7,97 | 2,96 |
| *ORF1b* | C16092T | / | <1 | <1 | <1 | 30,42 | <1 | <1 |
| *ORF1b* | C17004T | / | 39 | 6,46 | 13,84 | 0 | 7,85 | 4,12 |
| *ORF1b* | T18024C | / | <1 | <1 | <1 | 27,86 | <1 | <1 |
| *ORF1b* | A18179G | NSP14:K1571R | **<1** | **27,26** | **4,86** | <1 | **6,34** | **3,35** |
| *ORF1b* | T18678C | / | **<1** | **30,76** | **6,55** | <1 | **7,03** | **3,55** |
| *ORF1b* | T18750C | / | <1 | <1 | <1 | 27,13 | <1 | <1 |
| *ORF1b* | C18979T | NSP14:H1838Y | <1 | <1 | <1 | 40,81 | <1 | <1 |
| *S* | C21789T | S:T76I | 41,05 | 7,19 | <1 | <1 | 11,52 | 4,13 |
| *S* | G22363T | / | **4,65** | 2,14 | **<1** | **43,97** | 3,4 | 1,06 |
| *S* | G22661T | S:V367F | **5,62** | **<1** | **10,34** | **3,07** | **1,9** | **68,08** |
| *S* | A22920T | S:Y453F | 52,52 | <1 | <1 | <1 | 11,13 | 5,06 |
| *S* | A23063T | S:N501Y | **18,46** | **14,29** | **20,69** | **39,63** | **31,27** | **5,04** |
| *S* | G23782A | S:M740I | 20,87 | 8,26 | <1 | <1 | 4,55 | 1,72 |
| *S* | G24316T | S:E918D | **<1** | **3** | **45,65** | <1 | **11,33** | **1,94** |
| *S* | T24450C | S:V963A | 36,09 | 6,21 | 16,15 | <1 | 11,27 | 3,15 |
| *S* | C24642T | S:T1027I | **44,18** | **27,94** | **27,48** | **49,78** | **23,26** | 7,74 |
| *E* | C26333T | E:T30I | **83,41** | **49,57** | **81,39** | **2,25** | **60,29** | **41,17** |
| *E* | C26351T | E:A36V | <1 | **<1** | **<1** | <1 | <1 | **33,61** |
| *ORF7a* | A27574T | ORF7a:T61S | **2** | 2,1 | **<1** | **88,65** | 3,16 | <1 |
| *N* | A28336T | / | <1 | <1 | <1 | <1 | <1 | **62,93** |
| *N* | C29200T | / | <1 | <1 | 54,51 | <1 | <1 | <1 |
| *N* | A29424G | N:Q384R | <1 | <1 | <1 | 27,03 | <1 | <1 |
| *ORF10* | C29592T | ORF10:T34M | **1,78** | 1,45 | **1,98** | **49,64** | 2,76 | <1 |
| *3' UTR* | G29744A | / | <1 | <1 | <1 | <1 | <1 | **61,12** |
| **Color range per percentage** | | | <1 | 20 | 40 | 60 | 80 | 100 |

**Table S3. SARS-CoV-2 genome single nucleotide variants (SNVs) in postmortem tissues and plasma of case 13.** The same table as Table 1 is shown as a heat map with different colors indicating the frequency of mutant detection per organ (the lower bar shows the color range of different percentages).

## Supplementary Figure 7

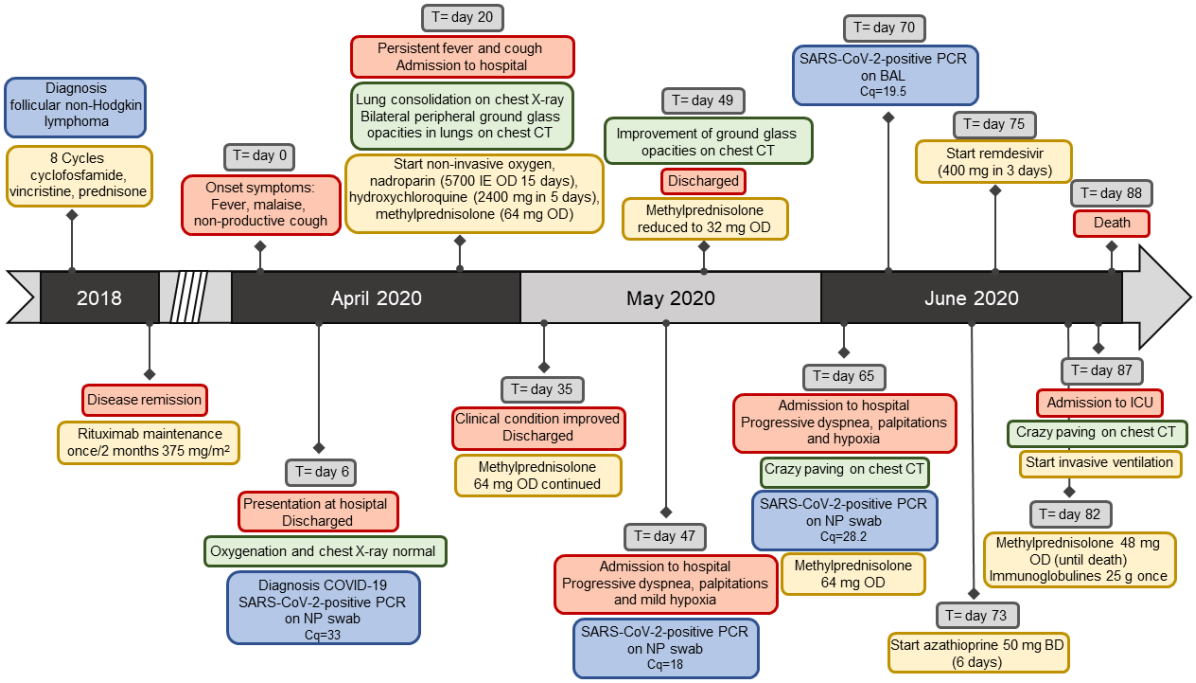


**Figure S7. Timeline of the clinical history and disease course in case 13.** Abbreviations (in alphabetical order): BAL= broncho-alveolar lavage, BD= twice a day, Cq= quantification cycle, CT= computed tomography, ICU= intensive care unit, NP swab= nasopharyngeal swab, OD= once a day, T= time point.

## Supplementary Figure 8

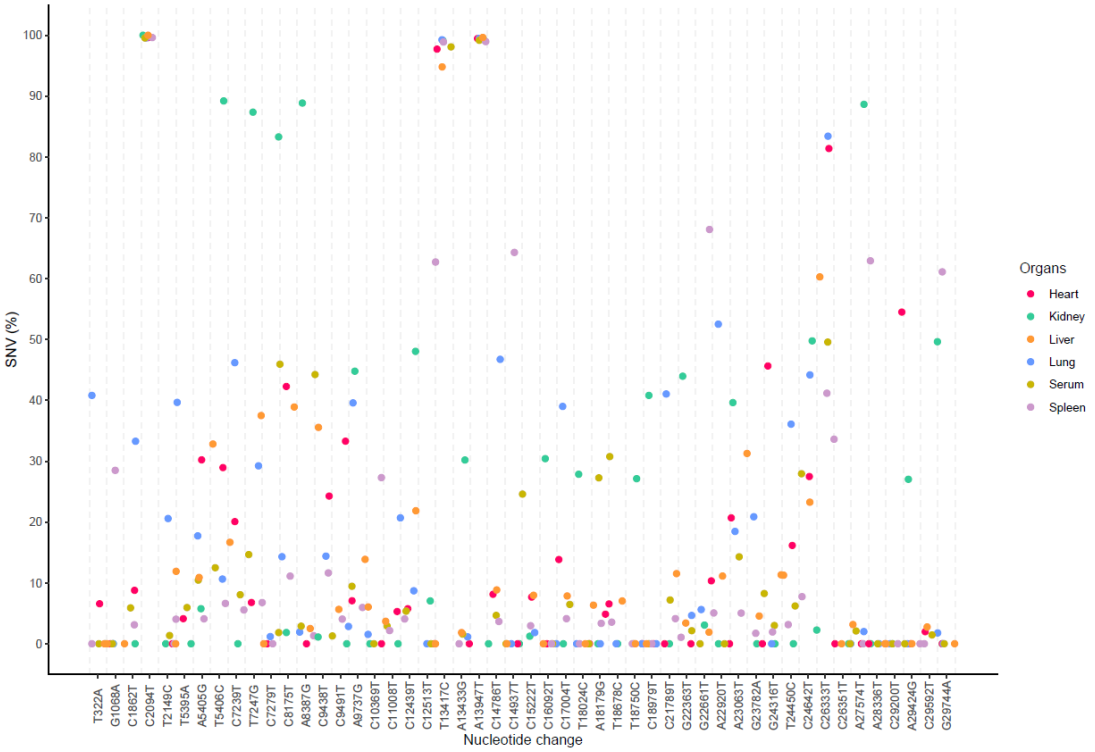


**Figure S8. Scatter plot of SARS-CoV-2 SNV frequencies in postmortem tissues and plasma of case 13 ranked per anatomical compartment.** Nucleotide positions and single nucleotide variation (SNV) frequencies are indicated on the X axis and the Y axis, respectively. Different colors indicate different organs (shown in the figure legend).

## Supplementary Table 4

| Gene | Nt position | Size (bp) | Fequency of detection per anatomical compartment | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Lungs | Plasma | Heart | Kidney | Liver | Spleen |
| S | 21645-23592 | 1947 | <1 | <1 | <1 | <1 | <1 | 19,29 |
| S | 21737-23665 | 1928 | <1 | <1 | <1 | 12,16 | <1 | <1 |
| S | 21892-23078 | 1186 | <1 | <1 | <1 | <1 | 52,62 | <1 |
| S | 22063-22485 | 422 | <1 | <1 | <1 | <1 | 11,61 | <1 |
| ORF8 | 27998-28089 | 91 | <1 | 1,27 | <1 | 83,86 | 10,35 | <1 |
| Color range per percentage | | | <1 | 20 | 40 | 60 | 80 | 100 |

**Table S4. SARS-CoV-2 genome deletions in postmortem tissues and plasma of case 13.** Variants were mapped to clade 20B genome and deletion frequencies were estimated using Sniffles (v1.0.11). A heat map with different colors indicates the frequency of mutant detection per organ (the lower bar shows the color range of different percentages).

## Supplementary Figure 9

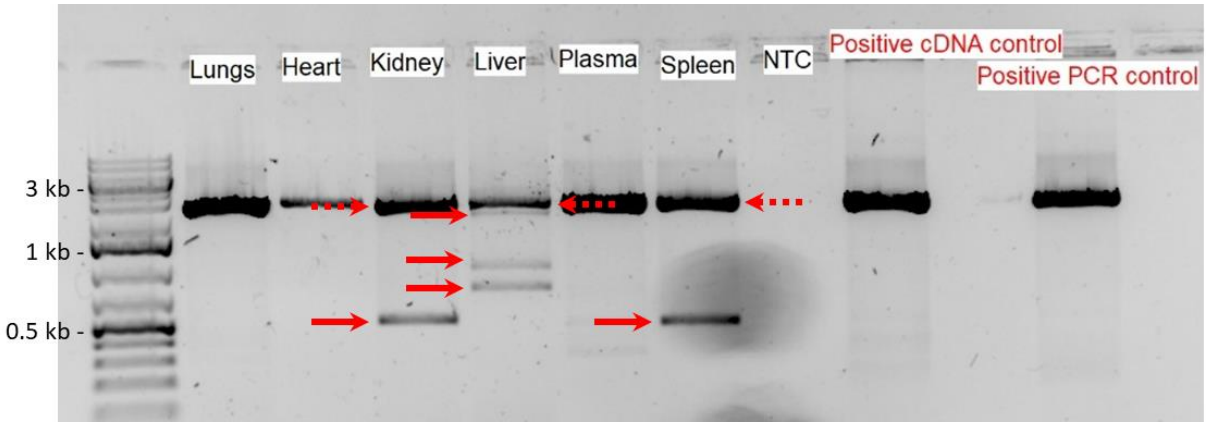


**Figure S9. PCR product patterns amplified by the primer pair A6 targeting the partial S gene (nts 21,386-23,824) (case 13).** Samples are cDNA derived from different tissues, a negative control (NTC; no template), positive cDNA control (newly synthetized cDNA from a SARS-CoV-2-positive nasopharyngeal swab), or positive PCR control (stored cDNA from a SARS-CoV-2-positive nasopharyngeal swab). Regular arrows indicate products of SARS-CoV-2 variants with large genomic deletions and the dashed arrows indicate the predicted product (2483 bp).

## Supplementary Table 5

| Name | Forward (5'-3') | Reverse (5'-3') |
|---|---|---|
| ACE2 | CATTGGAGCAAGTGTTGGATCTT | GAGCTAATGCATGCCATTCTCA |
| TMPRSS2 | ACCGGAAAACCCCTATCCCG | TGCAGACGACGGGGTTGGAA |
| ACTB | GGCTGTATTCCCCTCCATCG | CCAGTTGGTAACAATGCCATGT |
| GAPDH | AGGTCGGTGTGAACGGATTTG | GGGGTCGTTGATGGCAACA |
| YWHA | TGTCACGGTGTGGACGC | ATGACGTCAAACGCTTCTGG |
| SARS-CoV-2 N1* | GACCCCAAAATCAGCGAAAT | TCTGGTTACTGCCAGTTGAATCTG |

**Table S5. Primer sequences used for qPCR and ddPCR.** *For the SARS-CoV-2 N1 qPCR assay, a TaqMan® probe was used. This probe was labeled at the 5'-end with the reporter molecule 6-carboxyfluorescein (FAM) and with the quencher Black Hole Quencher 1 (BHQ-1) at the 3'-end (Integrated DNA Technologies).

# Supplementary Table 6

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

Authors are sorted alphabetically

| Accession ID | Originating Laboratory | Submitting Laboratory | Authors |
|---|---|---|---|
| EPI_ISL_1020171, EPI_ISL_1020172, EPI_ISL_1020173, EPI_ISL_1020174 | AZ Klina | AZ Klina | Dr. C. Vael |
| EPI_ISL_1029957, EPI_ISL_1029958, EPI_ISL_1029959, EPI_ISL_1029960, EPI_ISL_1029961, EPI_ISL_1029962, EPI_ISL_1029963, EPI_ISL_1029964, EPI_ISL_1029965, EPI_ISL_1029966, EPI_ISL_1029968, EPI_ISL_1029969, EPI_ISL_1029971, EPI_ISL_1029972, EPI_ISL_1029973 | | | |
| see above | Cliniques universitaires Saint-Luc | UCLouvain/IREC/MBLG | Jean Ruelle, Lysa Pinsmaye, Benoit Kabamba Mukadi |
| EPI_ISL_1180935 | LHUB-ULB | LHUB-ULB | Charlotte Michel, Olivier Vandenberg, Marie Hallin |
| EPI_ISL_407976 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Elke Wollants, Annabel Rector, Els Keyaerts, Lies Laenen, Marc Van Ranst, and Piet Maes |
| EPI_ISL_415153 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Joan Marti-Carreras, Tony Wawina, Marc Van Ranst, Piet Maes |
| EPI_ISL_415154 | KU Leuven, Clincal and Epidemiological Virology | KU Leuven, Clincal and Epidemiological Virology | Bert Vanmechelen, Joan Marti-Careras, Tony Wawina, Marc Van Ranst, Piet Maes. |
| EPI_ISL_415155 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Joan Marti-Carreras, Tony Wawina, Marc Van Ranst, Piet Maes |
| EPI_ISL_415156, EPI_ISL_415157, EPI_ISL_415158, EPI_ISL_415159 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Joan Marti-Carreras, Tony Wawina, Piet Maes |
| EPI_ISL_416467, EPI_ISL_416468, EPI_ISL_416469, EPI_ISL_416470, EPI_ISL_416471, EPI_ISL_416472, EPI_ISL_416475, EPI_ISL_416476 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Tony Wawina, Joan Marti-Carreras, Piet Maes |
| EPI_ISL_416997, EPI_ISL_417004, EPI_ISL_417006, EPI_ISL_417008, EPI_ISL_417009, EPI_ISL_417012, EPI_ISL_417013, EPI_ISL_417014, EPI_ISL_417015, EPI_ISL_417016, EPI_ISL_417017, EPI_ISL_417018, EPI_ISL_417019, EPI_ISL_417020, EPI_ISL_417021, EPI_ISL_417022, EPI_ISL_417023, EPI_ISL_417025 | | | |
| see above | Department of Clinical Microbiology | GIGA Medical Genomics | Durkin Keith, Artesi Maria, Bontems Sébastien, Boreux Raphaël, Meex Cécile, Melin Pierrette, Hayette Marie-Pierre, Bours Vincent. |
| EPI_ISL_417422, EPI_ISL_417424, EPI_ISL_417425, EPI_ISL_417426, EPI_ISL_417427, EPI_ISL_417428, EPI_ISL_417429, EPI_ISL_417430 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Joan Marti-Carerras, Tony Wawina, Bert Vanmechelen, Piet Maes |
| EPI_ISL_418270 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Tony Wawina, Joan Marti-Carreras, Bert Vanmechelen, Piet Maes |
| EPI_ISL_418624, EPI_ISL_418625, EPI_ISL_418626, EPI_ISL_418627, EPI_ISL_418628, EPI_ISL_418629, EPI_ISL_418630, EPI_ISL_418631, EPI_ISL_418632, EPI_ISL_418633, EPI_ISL_418634, EPI_ISL_418635, EPI_ISL_418636, EPI_ISL_418638, EPI_ISL_418639, EPI_ISL_418640, EPI_ISL_418645, EPI_ISL_418646, EPI_ISL_418648, EPI_ISL_418649, EPI_ISL_418650, EPI_ISL_418651, EPI_ISL_418652, EPI_ISL_418653, EPI_ISL_418654, EPI_ISL_418655, EPI_ISL_418656, EPI_ISL_418657, EPI_ISL_418659, EPI_ISL_418660, EPI_ISL_418661, EPI_ISL_418663, EPI_ISL_418664 | | | |
| see above | Department of Clinical Microbiology | GIGA Medical Genomics | Keith Durkin, Maria Artesi, Sébastien Bontems, Raphaël Boreux, Cécile Meex, Pierrette Melin, Marie-Pierre Hayette, Vincent Bours. |
| EPI_ISL_418792, EPI_ISL_418793 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Tony Wawina, Joan Marti-Carreras, Piet Maes |
| EPI_ISL_418794, EPI_ISL_418795, EPI_ISL_418796, EPI_ISL_418797, EPI_ISL_418798, EPI_ISL_418800, EPI_ISL_418805, EPI_ISL_418806, EPI_ISL_418863, EPI_ISL_418981, EPI_ISL_418982, EPI_ISL_418983, EPI_ISL_418984, EPI_ISL_418985, EPI_ISL_418986, EPI_ISL_418987 | | | |
| see above | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Joan Marti-Carreras, Tony Wawina, Piet Maes |
| EPI_ISL_418988 | Institute information KU Leuven, Clinical and Epidemiological Virology | Institute information KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Joan Marti-Carreras, Tony Wawina, Piet Maes |
| EPI_ISL_418989 | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Bert Vanmechelen, Joan Marti-Carreras, Tony Wawina, Piet Maes |
| EPI_ISL_419259 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Basiel Cole, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_419264 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Basiel Cole, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_419265 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Basiel Cole, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_419266 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Basiel Cole, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_420314, EPI_ISL_420315, EPI_ISL_420316, EPI_ISL_420317, EPI_ISL_420318, EPI_ISL_420319, EPI_ISL_420320, EPI_ISL_420321, EPI_ISL_420322, EPI_ISL_420323, EPI_ISL_420324, EPI_ISL_420325, EPI_ISL_420326, EPI_ISL_420327, EPI_ISL_420328, EPI_ISL_420329, EPI_ISL_420330, EPI_ISL_420331, EPI_ISL_420332, EPI_ISL_420333, EPI_ISL_420334, EPI_ISL_420335, EPI_ISL_420336, EPI_ISL_420337, EPI_ISL_420338, EPI_ISL_420339, EPI_ISL_420340, EPI_ISL_420341, EPI_ISL_420342, EPI_ISL_420343, EPI_ISL_420344, EPI_ISL_420345, EPI_ISL_420346, EPI_ISL_420347, EPI_ISL_420348, EPI_ISL_420349, EPI_ISL_420350, EPI_ISL_420351, EPI_ISL_420352, EPI_ISL_420353, EPI_ISL_420354, EPI_ISL_420355, EPI_ISL_420356, EPI_ISL_420357, EPI_ISL_420358, EPI_ISL_420359, EPI_ISL_420360, EPI_ISL_420361, EPI_ISL_420362, EPI_ISL_420363, EPI_ISL_420364, EPI_ISL_420365, EPI_ISL_420366, EPI_ISL_420367, EPI_ISL_420368, EPI_ISL_420369, EPI_ISL_420370, EPI_ISL_420371, EPI_ISL_420372, EPI_ISL_420373, EPI_ISL_420374, EPI_ISL_420375, EPI_ISL_420376, EPI_ISL_420377, EPI_ISL_420378, EPI_ISL_420379, EPI_ISL_420380, EPI_ISL_420381, EPI_ISL_420382, EPI_ISL_420383, EPI_ISL_420384, EPI_ISL_420385, EPI_ISL_420386, EPI_ISL_420387, EPI_ISL_420388, EPI_ISL_420389, EPI_ISL_420390, EPI_ISL_420391, EPI_ISL_420392, EPI_ISL_420393, EPI_ISL_420394, EPI_ISL_420395, EPI_ISL_420396, EPI_ISL_420397, EPI_ISL_420398, EPI_ISL_420399, EPI_ISL_420400, EPI_ISL_420401, EPI_ISL_420402, EPI_ISL_420403, EPI_ISL_420404, EPI_ISL_420405, EPI_ISL_420406, EPI_ISL_420407, EPI_ISL_420408, EPI_ISL_420409, EPI_ISL_420410, EPI_ISL_420411, EPI_ISL_420412, EPI_ISL_420413, EPI_ISL_420414, EPI_ISL_420415, EPI_ISL_420416, EPI_ISL_420417, EPI_ISL_420418, EPI_ISL_420419, EPI_ISL_420420, EPI_ISL_420421, EPI_ISL_420422, EPI_ISL_420423, EPI_ISL_420424, EPI_ISL_420425, EPI_ISL_420426, EPI_ISL_420427, EPI_ISL_420428, EPI_ISL_420429, EPI_ISL_420430, EPI_ISL_420431, EPI_ISL_420432, EPI_ISL_420433, EPI_ISL_420434, EPI_ISL_420435, EPI_ISL_420436, EPI_ISL_420437, EPI_ISL_420438, EPI_ISL_420439, EPI_ISL_420440, EPI_ISL_420441, EPI_ISL_420442, EPI_ISL_420443, EPI_ISL_420444, EPI_ISL_420445, EPI_ISL_420446, EPI_ISL_420447, EPI_ISL_420448, EPI_ISL_420449, EPI_ISL_420450, EPI_ISL_420451, EPI_ISL_420452, EPI_ISL_420453, EPI_ISL_420454 | | | |
| see above | KU Leuven, Clinical and Epidemiological Virology | KU Leuven, Clinical and Epidemiological Virology | Joan Marti-Carreras, Bert Vanmechelen, Tony Wawina, Piet Maes |
| EPI_ISL_421182, EPI_ISL_421183, EPI_ISL_421184, EPI_ISL_421185, EPI_ISL_421186, EPI_ISL_421187, EPI_ISL_421188, EPI_ISL_421189, EPI_ISL_421190, EPI_ISL_421191, EPI_ISL_421192, EPI_ISL_421193, EPI_ISL_421194, EPI_ISL_421195, EPI_ISL_421196, EPI_ISL_421198, EPI_ISL_421200, EPI_ISL_421201, EPI_ISL_421202, EPI_ISL_421203, EPI_ISL_421204, EPI_ISL_421205, EPI_ISL_421206, EPI_ISL_421207, EPI_ISL_421210, EPI_ISL_421212, EPI_ISL_421213, EPI_ISL_421214, EPI_ISL_424629, EPI_ISL_424630, EPI_ISL_424631, EPI_ISL_424633, EPI_ISL_424636, EPI_ISL_424637, EPI_ISL_424640, EPI_ISL_424641, EPI_ISL_424642, EPI_ISL_424643, EPI_ISL_424644, EPI_ISL_424645, EPI_ISL_424646, EPI_ISL_424647, EPI_ISL_424649, EPI_ISL_424650, EPI_ISL_424651, EPI_ISL_424652, EPI_ISL_424653, EPI_ISL_424654, EPI_ISL_424655, EPI_ISL_424657, EPI_ISL_424658, EPI_ISL_424660, EPI_ISL_424661, EPI_ISL_424662, EPI_ISL_424664 | | | |
| see above | Department of Clinical Microbiology | GIGA Medical Genomics | Keith Durkin, Maria Artesi, Sébastien Bontems, Raphaël Boreux, Cécile Meex, Pierrette Melin, Marie-Pierre Hayette, Vincent Bours. |
| EPI_ISL_425048, EPI_ISL_425050 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Basiel Cole, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_425052, EPI_ISL_425053, EPI_ISL_425054, EPI_ISL_425055 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Basiel Cole, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_425056, EPI_ISL_425057, EPI_ISL_425058 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Basiel Cole, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_425059, EPI_ISL_425060, EPI_ISL_425061 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Basiel Cole, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_425062, EPI_ISL_425063, EPI_ISL_425064 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Jozefien De Clercq, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |

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| EPI_ISL_427349, EPI_ISL_427350, EPI_ISL_427351, EPI_ISL_427352, EPI_ISL_427354, EPI_ISL_427357, EPI_ISL_427358, EPI_ISL_427359, EPI_ISL_427364, EPI_ISL_427366, EPI_ISL_427370, EPI_ISL_427371, EPI_ISL_427372, EPI_ISL_427379, EPI_ISL_427385, EPI_ISL_427388, EPI_ISL_427390 | | | |
| see above | Department of Clinical Microbiology | GIGA Medical Genomics | Keith Durkin, Maria Artesi, Sébastien Bontems, Raphaël Boreux, Cécile Meex, Pierrette Melin, Marie-Pierre Hayette, Vincent Bours. |
| EPI_ISL_434347, EPI_ISL_434348, EPI_ISL_434349, EPI_ISL_434351, EPI_ISL_434352, EPI_ISL_434354, EPI_ISL_434355 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Jozefien De Clercq, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_434357, EPI_ISL_434360, EPI_ISL_434361, EPI_ISL_434362 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Jozefien De Clercq, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_434366, EPI_ISL_434368, EPI_ISL_434369, EPI_ISL_434370, EPI_ISL_434371 | Hospital AZ Rivierenland | Institute of Tropical Medicine | Philippe Selhorst, Colin Anthony |
| EPI_ISL_434372, EPI_ISL_434373, EPI_ISL_434374, EPI_ISL_434375, EPI_ISL_434376, EPI_ISL_434377, EPI_ISL_434378, EPI_ISL_434379, EPI_ISL_434380, EPI_ISL_434381, EPI_ISL_434382, EPI_ISL_434383 | | | |
| see above | Hospital AZ Rivierenland | Institute of Tropical Medicine | Philippe Selhorst, Colin Anthony, |
| EPI_ISL_434384 | Hospital AZ Rivierenland | Institute of Tropical Medicine | Philippe Selhorst, Colin Anthony |
| EPI_ISL_447120, EPI_ISL_447121, EPI_ISL_447122, EPI_ISL_447123, EPI_ISL_447124, EPI_ISL_447127, EPI_ISL_447128, EPI_ISL_447129, EPI_ISL_447130, EPI_ISL_447133, EPI_ISL_447134, EPI_ISL_447135, EPI_ISL_447136, EPI_ISL_447137, EPI_ISL_447138, EPI_ISL_447139, EPI_ISL_447140, EPI_ISL_447141, EPI_ISL_447148, EPI_ISL_447152, EPI_ISL_447153, EPI_ISL_447155 | | | |
| see above | Department of Clinical Microbiology | GIGA Medical Genomics | Keith Durkin, Maria Artesi, Sébastien Bontems, Raphaël Boreux, Cécile Meex, Pierrette Melin, Marie-Pierre Hayette, Vincent Bours. |
| EPI_ISL_450724, EPI_ISL_450725, EPI_ISL_450726, EPI_ISL_450727, EPI_ISL_450728, EPI_ISL_450729, EPI_ISL_450730, EPI_ISL_450731, EPI_ISL_450732, EPI_ISL_450734, EPI_ISL_450736, EPI_ISL_450737 | | | |
| see above | Hospital AZ Rivierenland | Institute of Tropical Medicine | Philippe Selhorst, Colin Anthony |
| EPI_ISL_451164, EPI_ISL_451166, EPI_ISL_451167, EPI_ISL_451168, EPI_ISL_451169, EPI_ISL_451170, EPI_ISL_451173 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Jozefien De Clercq, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_451175, EPI_ISL_451177, EPI_ISL_451178, EPI_ISL_451179, EPI_ISL_451180, EPI_ISL_451181 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Jozefien De Clercq, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_451935 | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | Prof. Isabelle Salmon, Dr. Nicky D'Haene |
| EPI_ISL_452140 | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | Isabelle Salmon, Nicky D'Haene |
| EPI_ISL_452142 | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | Isabelle Salmon, Nikcy D'Haene |
| EPI_ISL_452148, EPI_ISL_452149 | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | Isabelle Salmon, Nicky D'Haene |
| EPI_ISL_452150 | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | Prof. Isabelle Salmon, Dr Nicky D'Haene |
| EPI_ISL_452151 | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | Prof. Isabelle Salmon, Dr.Nikcy D'Haene |
| EPI_ISL_452152 | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | CUB Hopital Erasme Laboratoire d'Anatomie Pathologique | Prof. Isabelle Salmon, Dr Nicky D'Haene |
| EPI_ISL_455958, EPI_ISL_455961, EPI_ISL_455962, EPI_ISL_455963, EPI_ISL_455965, EPI_ISL_455966, EPI_ISL_455967, EPI_ISL_455968, EPI_ISL_455969, EPI_ISL_455970, EPI_ISL_455972, EPI_ISL_455973, EPI_ISL_455974, EPI_ISL_455975, EPI_ISL_455976, EPI_ISL_455977, EPI_ISL_455978, EPI_ISL_455979 | | | |
| see above | Department of Clinical Microbiology | GIGA Medical Genomics | Keith Durkin, Maria Artesi, Sébastien Bontems, Raphaël Boreux, Cécile Meex, Pierrette Melin, Marie-Pierre Hayette, Vincent Bours. |
| EPI_ISL_458156, EPI_ISL_458157, EPI_ISL_458158, EPI_ISL_458159, EPI_ISL_458160, EPI_ISL_458161, EPI_ISL_458162, EPI_ISL_458163, EPI_ISL_458164, EPI_ISL_458165, EPI_ISL_458166, EPI_ISL_458167, EPI_ISL_458168, EPI_ISL_458169, EPI_ISL_458170, EPI_ISL_458171, EPI_ISL_458172, EPI_ISL_458173, EPI_ISL_458174, EPI_ISL_458175, EPI_ISL_458176, EPI_ISL_458177, EPI_ISL_458178, EPI_ISL_458179, EPI_ISL_458180, EPI_ISL_458181, EPI_ISL_458182, EPI_ISL_458183, EPI_ISL_458184, EPI_ISL_458185, EPI_ISL_458186, EPI_ISL_458187, EPI_ISL_458188, EPI_ISL_458189, EPI_ISL_458190, EPI_ISL_458191, EPI_ISL_458192, EPI_ISL_458193, EPI_ISL_458194, EPI_ISL_458195, EPI_ISL_458196, EPI_ISL_458197, EPI_ISL_458198, EPI_ISL_458199, EPI_ISL_458200, EPI_ISL_458201, EPI_ISL_458202, EPI_ISL_458203, EPI_ISL_458204, EPI_ISL_458205, EPI_ISL_458206, EPI_ISL_458207, EPI_ISL_458208, EPI_ISL_458209, EPI_ISL_458210, EPI_ISL_458211, EPI_ISL_458212, EPI_ISL_458213, EPI_ISL_458214, EPI_ISL_458215, EPI_ISL_458216, EPI_ISL_458217, EPI_ISL_458218, EPI_ISL_458219, EPI_ISL_458220, EPI_ISL_458221, EPI_ISL_458222, EPI_ISL_458223, EPI_ISL_458224, EPI_ISL_458225, EPI_ISL_458226, EPI_ISL_458227, EPI_ISL_458228, EPI_ISL_458229, EPI_ISL_458230, EPI_ISL_458231, EPI_ISL_458232, EPI_ISL_458233, EPI_ISL_458234, EPI_ISL_458235, EPI_ISL_462151, EPI_ISL_462152, EPI_ISL_462153, EPI_ISL_462154, EPI_ISL_462155, EPI_ISL_462156, EPI_ISL_462157, EPI_ISL_462158, EPI_ISL_462159, EPI_ISL_462160, EPI_ISL_462161, EPI_ISL_462162, EPI_ISL_462163, EPI_ISL_462164, EPI_ISL_462165, EPI_ISL_462166, EPI_ISL_462167, EPI_ISL_462168, EPI_ISL_462169, EPI_ISL_462170, EPI_ISL_462171, EPI_ISL_462172, EPI_ISL_462173, EPI_ISL_462174, EPI_ISL_462175, EPI_ISL_462176, EPI_ISL_462177, EPI_ISL_462178, EPI_ISL_462179, EPI_ISL_462180, EPI_ISL_462181, EPI_ISL_462182, EPI_ISL_462183, EPI_ISL_462184, EPI_ISL_462185, EPI_ISL_462186, EPI_ISL_462187, EPI_ISL_462188, EPI_ISL_462189, EPI_ISL_462190, EPI_ISL_462191, EPI_ISL_462192, EPI_ISL_462193, EPI_ISL_462194, EPI_ISL_462195, EPI_ISL_462196, EPI_ISL_462197, EPI_ISL_462198, EPI_ISL_462199, EPI_ISL_462200, EPI_ISL_462201, EPI_ISL_462202, EPI_ISL_462203, EPI_ISL_462204, EPI_ISL_462205, EPI_ISL_462206, EPI_ISL_462207, EPI_ISL_462208, EPI_ISL_462209, EPI_ISL_462210, EPI_ISL_462211, EPI_ISL_462212, EPI_ISL_462213, EPI_ISL_462214, EPI_ISL_462215, EPI_ISL_462216, EPI_ISL_462217, EPI_ISL_462218, EPI_ISL_462219, EPI_ISL_462220, EPI_ISL_462221, EPI_ISL_462222, EPI_ISL_462223, EPI_ISL_462224, EPI_ISL_462225, EPI_ISL_462226, EPI_ISL_462227, EPI_ISL_462228, EPI_ISL_462229, EPI_ISL_462230, EPI_ISL_462231, EPI_ISL_462232, EPI_ISL_462233, EPI_ISL_462234, EPI_ISL_462235, EPI_ISL_462236, EPI_ISL_462237, EPI_ISL_462238, EPI_ISL_462239, EPI_ISL_462240, EPI_ISL_462241, EPI_ISL_462242, EPI_ISL_462243, EPI_ISL_462244, EPI_ISL_462245, EPI_ISL_462246, EPI_ISL_462247, EPI_ISL_462248, EPI_ISL_462249, EPI_ISL_462250, EPI_ISL_462251, EPI_ISL_462252, EPI_ISL_462253, EPI_ISL_462254, EPI_ISL_462255, EPI_ISL_462256, EPI_ISL_462257, EPI_ISL_462258, EPI_ISL_462259, EPI_ISL_462260, EPI_ISL_462261, EPI_ISL_462262, EPI_ISL_462263, EPI_ISL_462264, EPI_ISL_462265, EPI_ISL_462266, EPI_ISL_462267, EPI_ISL_462268, EPI_ISL_462269, EPI_ISL_462270, EPI_ISL_462271, EPI_ISL_462272, EPI_ISL_462273, EPI_ISL_462274, EPI_ISL_462275, EPI_ISL_464065, EPI_ISL_464066, EPI_ISL_464067, EPI_ISL_464068, EPI_ISL_464069, EPI_ISL_464070, EPI_ISL_464071, EPI_ISL_464072, EPI_ISL_464073, EPI_ISL_464074, EPI_ISL_464075, EPI_ISL_464076, EPI_ISL_464077, EPI_ISL_464078, EPI_ISL_464079, EPI_ISL_464080, EPI_ISL_464081, EPI_ISL_464082, EPI_ISL_464083, EPI_ISL_464084, EPI_ISL_464085, EPI_ISL_464086, EPI_ISL_464087, EPI_ISL_464088, EPI_ISL_464089, EPI_ISL_464090 | | | |
| see above | KU Leuven, Rega Institute, Clinical and Epidemiological Virology | KU Leuven, Rega Institute, Clinical and Epidemiological Virology | Tony Wawina-Bokalanga, Bert Vanmechelen, Joan Marti-Carerras, Piet Maes |
| EPI_ISL_468727, EPI_ISL_468728, EPI_ISL_468729, EPI_ISL_468730, EPI_ISL_468731, EPI_ISL_468732, EPI_ISL_468733, EPI_ISL_468734, EPI_ISL_468735 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_468736, EPI_ISL_468737, EPI_ISL_468738, EPI_ISL_468739, EPI_ISL_468740, EPI_ISL_468741, EPI_ISL_468743, EPI_ISL_468744, EPI_ISL_468745, EPI_ISL_468746 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_471427, EPI_ISL_471429, EPI_ISL_471430, EPI_ISL_471431, EPI_ISL_471435, EPI_ISL_471436 | Department of Clinical Microbiology | GIGA Medical Genomics | Keith Durkin, Maria Artesi, Sébastien Bontems, Raphaël Boreux, Cécile Meex, Axelle Chaslain, Céline Fombellida-Lopez, Pierrette Melin, Marie-Pierre Hayette, Vincent Bours. |
| EPI_ISL_475060, EPI_ISL_475061, EPI_ISL_475062, EPI_ISL_475063, EPI_ISL_475064, EPI_ISL_475065, EPI_ISL_475066, EPI_ISL_475067, EPI_ISL_475068, EPI_ISL_475069, EPI_ISL_475070 | | | |
| see above | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_475071, EPI_ISL_475072, EPI_ISL_475073, EPI_ISL_475074, EPI_ISL_475075, EPI_ISL_475076, EPI_ISL_475077, EPI_ISL_475078, EPI_ISL_475079, EPI_ISL_475080, EPI_ISL_475081, EPI_ISL_475082 | | | |
| see above | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_476941, EPI_ISL_476942, EPI_ISL_476943, EPI_ISL_476944, EPI_ISL_476945, EPI_ISL_476946, EPI_ISL_476947, EPI_ISL_476948, EPI_ISL_476949, EPI_ISL_476950, EPI_ISL_476951, EPI_ISL_476952, EPI_ISL_476953, EPI_ISL_476954, EPI_ISL_476955, EPI_ISL_476956, EPI_ISL_476957, EPI_ISL_476958, EPI_ISL_476959, EPI_ISL_476960, EPI_ISL_476961, EPI_ISL_476962, EPI_ISL_476963, EPI_ISL_476964, EPI_ISL_476965, EPI_ISL_476966, EPI_ISL_476967, EPI_ISL_476968, EPI_ISL_476969, EPI_ISL_476970, EPI_ISL_476971, EPI_ISL_476972, EPI_ISL_476973, EPI_ISL_476974, EPI_ISL_476975, EPI_ISL_476976, EPI_ISL_476977, EPI_ISL_476978, EPI_ISL_476979, EPI_ISL_476980, EPI_ISL_476981, EPI_ISL_476982, EPI_ISL_476983, EPI_ISL_476984, EPI_ISL_476985, EPI_ISL_476986, EPI_ISL_476987, EPI_ISL_476988, EPI_ISL_476989, EPI_ISL_476990, EPI_ISL_476991, EPI_ISL_476992, EPI_ISL_476993, EPI_ISL_476994, EPI_ISL_476995, EPI_ISL_476996, EPI_ISL_476997, EPI_ISL_476998, EPI_ISL_476999, EPI_ISL_477000, EPI_ISL_477001, EPI_ISL_477002, EPI_ISL_477003, EPI_ISL_477004, EPI_ISL_477005, EPI_ISL_477006, EPI_ISL_477007 | | | |

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| see above | KU Leuven, Rega Institute, Clinical and Epidemiological Virology | KU Leuven, Rega Institute, Clinical and Epidemiological Virology | Tony Wawina-Bokalanga, Joan Marti-Carerras, Bert Vanmechelen, Piet Maes |
| EPI_ISL_481221, EPI_ISL_481222, EPI_ISL_481224, EPI_ISL_481225 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_481227, EPI_ISL_481229, EPI_ISL_481230, EPI_ISL_481231, EPI_ISL_481232, EPI_ISL_481233 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Nick Vereecke, Laurens Lambrechts, Marthe Pauwels, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_484697, EPI_ISL_484698, EPI_ISL_484699, EPI_ISL_484700, EPI_ISL_484702, EPI_ISL_484703 | Department of Clinical Microbiology | GIGA Medical Genomics | Keith Durkin, Maria Artesi, Sébastien Bontems, Raphaël Boreux, Cécile Meex, Axelle Chaslain, Céline Fombellida-Lopez, Pierrette Melin, Marie-Pierre Hayette, Vincent Bours. |
| EPI_ISL_487432, EPI_ISL_487433, EPI_ISL_487434, EPI_ISL_487435, EPI_ISL_487436 | Queen Astrid Military Hospital | Institute of Tropical Medicine | Philippe Selhorst, Colin Anthony |
| EPI_ISL_498127, EPI_ISL_498128, EPI_ISL_498129, EPI_ISL_498130, EPI_ISL_498131, EPI_ISL_498132, EPI_ISL_498133, EPI_ISL_498134, EPI_ISL_498135, EPI_ISL_498136, EPI_ISL_498137, EPI_ISL_498138, EPI_ISL_498139, EPI_ISL_498141, EPI_ISL_498143, EPI_ISL_498144, EPI_ISL_498146, EPI_ISL_498628, EPI_ISL_498629 | | | |
| see above | Department of Clinical Microbiology | GIGA Medical Genomics | Keith Durkin, Maria Artesi, Sébastien Bontems, Raphaël Boreux, Cécile Meex, Axelle Chaslain, Céline Fombellida-Lopez, Pierrette Melin, Marie-Pierre Hayette, Vincent Bours. |
| EPI_ISL_522349, EPI_ISL_522350 | KU Leuven, Rega Institute, Clinical and Epidemiological Virology | KU Leuven, Rega Institute, Clinical and Epidemiological Virology | Tony Wawina-Bokalanga, Joan Marti-Carerras, Bert Vanmechelen, Piet Maes |
| EPI_ISL_577743, EPI_ISL_577744, EPI_ISL_577746 | Dutch COVID-19 response team | Erasmus Medical Center | Bas Oude Munnink, Reina Sikkema, David Nieuwenhuijse, Irina Chestakova, Anne van der Linden, Marjan Boter, Emmanuelle Munger, Corine GeurtsvanKessel, Annemiek van der Eijk, Richard Molenkamp, Marion Koopmans, on behalf of the Dutch national COVID-19 response team. |
| EPI_ISL_582127 | Antwerp University Hospital | Institute of Tropical Medicine | Philippe Selhorst, Colin Anthony |
| EPI_ISL_634878 | Lab voor klinische biologie | Onderzoeksgroep Virologie | Laurens Lambrechts, Nick Vereecke, Marthe Pauwels, Bruno Verhasselt, Linos Vandekerckhove, Hans Nauwynck, Sebastiaan Theuns |
| EPI_ISL_649154 | Queen Astrid Military Hospital | Institute of Tropical Medicine | Philippe Selhorst, Colin Anthony |
| EPI_ISL_734492, EPI_ISL_734493, EPI_ISL_734503, EPI_ISL_734504, EPI_ISL_734505, EPI_ISL_734506, EPI_ISL_734507, EPI_ISL_734508, EPI_ISL_734509, EPI_ISL_734510, EPI_ISL_734511, EPI_ISL_734512, EPI_ISL_734513, EPI_ISL_734514, EPI_ISL_734515, EPI_ISL_734516, EPI_ISL_734517, EPI_ISL_734518, EPI_ISL_734519, EPI_ISL_734520, EPI_ISL_734521, EPI_ISL_734522, EPI_ISL_734523, EPI_ISL_734524, EPI_ISL_734525, EPI_ISL_734526, EPI_ISL_734527, EPI_ISL_734528, EPI_ISL_734529, EPI_ISL_734530, EPI_ISL_734531, EPI_ISL_734532, EPI_ISL_734533, EPI_ISL_734534, EPI_ISL_734535, EPI_ISL_734536, EPI_ISL_734537, EPI_ISL_734538, EPI_ISL_734539, EPI_ISL_734540, EPI_ISL_734541, EPI_ISL_734542, EPI_ISL_734543, EPI_ISL_734544, EPI_ISL_734545, EPI_ISL_734546, EPI_ISL_734547, EPI_ISL_734548, EPI_ISL_734549, EPI_ISL_734550, EPI_ISL_734551, EPI_ISL_734552, EPI_ISL_734553, EPI_ISL_734554, EPI_ISL_734555, EPI_ISL_734556, EPI_ISL_734557, EPI_ISL_734558, EPI_ISL_734559, EPI_ISL_734560, EPI_ISL_734561, EPI_ISL_734562, 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EPI_ISL_738215, EPI_ISL_738216, EPI_ISL_738217, EPI_ISL_738218, EPI_ISL_738219, EPI_ISL_738220 | | | |
| see above | UZ Leuven, National Reference Laboratory for Coronaviruses, Laboratory Medicine, Leuven, Belgium | KU Leuven, Rega Institute, Clinical and Epidemiological Virology | Tony Wawina-Bokalanga, Joan Marti-Carerras, Bert Vanmechelen, Piet Maes |
| EPI_ISL_949244, EPI_ISL_949245, EPI_ISL_949246, EPI_ISL_949247 | Cliniques universitaires Saint-Luc | UCLouvain/IREC/MBLG | Jean Ruelle, Lysa Pinsmaye, Benoit Kabamba Mukadi |
| EPI_ISL_949248 | Cliniques Saint-Pierre Ottignies | UCLouvain/IREC/MBLG | Jean Ruelle, Lysa Pinsmaye, Benoit Kabamba Mukadi |
| EPI_ISL_949249, EPI_ISL_949250,EPI_ISL_949252 | Cliniques universitaires Saint-Luc | UCLouvain/IREC/MBLG | Jean Ruelle, Lysa Pinsmaye, Benoit Kabamba Mukadi |

## Table S6. GISAID references used to generate the circular maximum-likelihood phylogenetic tree.

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