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Supplemental Information

SARS-CoV-2 infection causes dopaminergic neuron senescence

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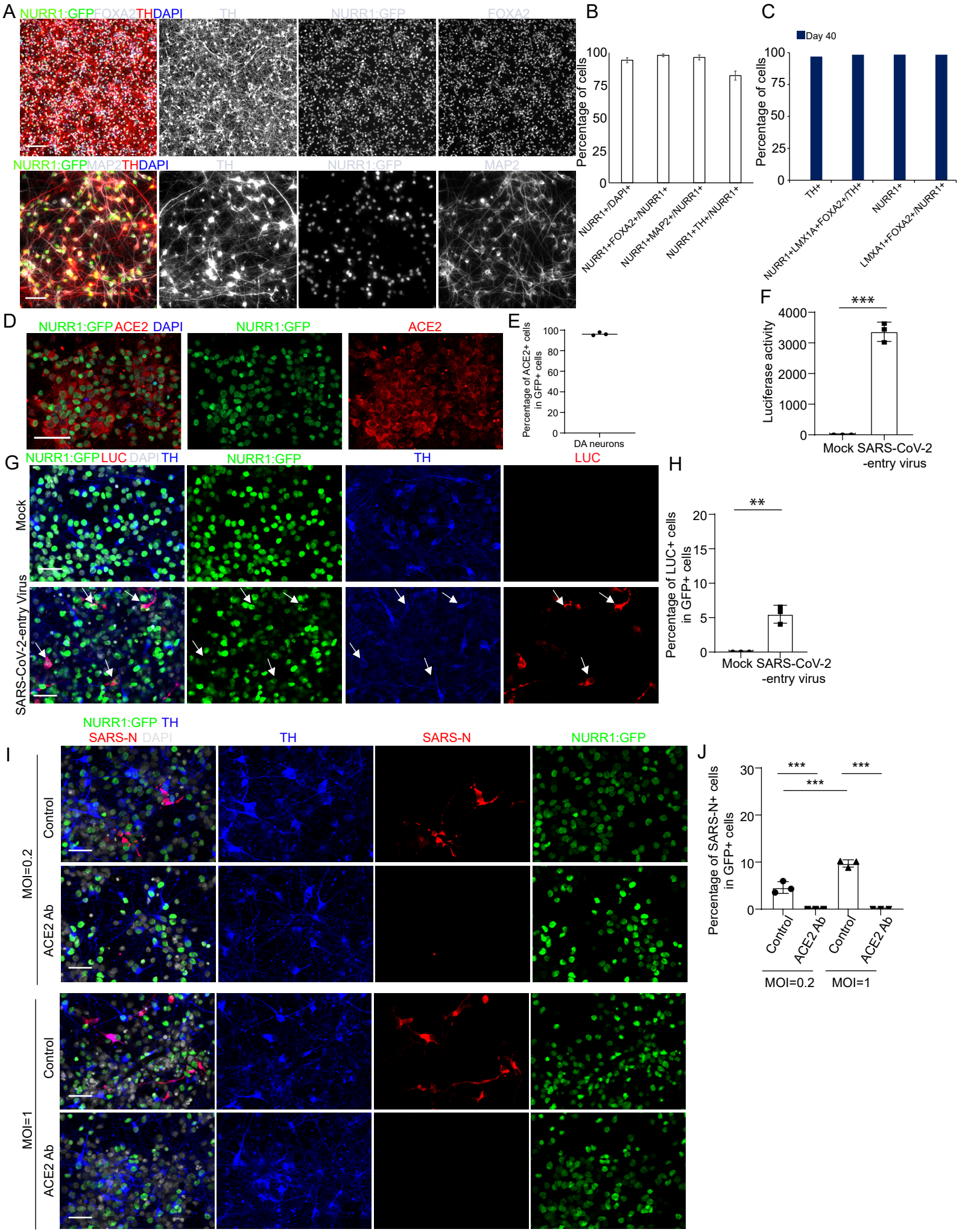
Figure S1


A
NURR1:GFP FOXA2 TH DAPI
TH
NURR1:GFP
FOXA2
NURR1:GFP MAP2 TH DAPI
TH
NURR1:GFP
MAP2
B
Percentage of cells
100
75
50
25
0
NURR1+/DAPI+
NURR1+FOXA2+/NURR1+
NURR1+MAP2+/NURR1+
NURR1+TH+/NURR1+
C
Day 40
Percentage of cells
100
75
50
25
0
TH+
NURR1+LMX1A+FOXA2+/TH+
NURR1+
LMXA1+FOXA2+/NURR1+
D
NURR1:GFP ACE2 DAPI
NURR1:GFP
ACE2
E
Percentage of ACE2+ cells in GFP+ cells
100
80
60
40
20
0
DA neurons
F
***
Luciferase activity
4000
3000
2000
1000
0
Mock
SARS-CoV-2 -entry virus
G
NURR1:GFP LUC DAPI TH
NURR1:GFP
TH
LUC
Mock
SARS-CoV-2-entry Virus
H
**
Percentage of LUC+ cells in GFP+ cells
20
15
10
5
0
Mock
SARS-CoV-2 -entry virus
I
NURR1:GFP TH SARS-N DAPI
TH
SARS-N
NURR1:GFP
MOI=0.2
Control
ACE2 Ab
MOI=1
Control
ACE2 Ab
J
***
***
***
Percentage of SARS-N+ cells in GFP+ cells
30
20
10
0
Control
ACE2 Ab
Control
ACE2 Ab
MOI=0.2
MOI=1

SUPPLEMENTAL INFORMATION

Figure S1. Characterization of hPSC-derived DA neurons. Related to Figure 1.

(A and B) Representative confocal images (A) and quantification (B) of NURR1: GFP H9-derived DA neurons stained with antibodies recognizing NURR1-GFP, TH, MAP2 or FOXA2. Scale bar=100 μm (upper panel) and 50μm (lower panel). n=3 independently biological replicates.

(C) Single cell RT-qPCR analysis of DA neuron marker genes from FACS based NURR1-GFP$^+$ purified cells at day40 (67 cells) from previous study [1].

(D and E) Representative confocal images (D) and quantification of ACE2$^+$ cells in NURR1-GFP$^+$ cells (E) of purified NURR1: GFP-derived DA neurons stained with ACE2 antibody. Scale bar=50 μm. n=3 independent biological replicates.

(F) Luciferase activity in lysates from purified NURR1: GFP-derived DA neurons at 24 hpi following exposure to SARS-CoV-2-entry virus at MOI=0.01. The Y-axis indicates the absolute luciferase activity between mock and infect groups. n=3 independent biological replicates.

(G and H) Representative confocal images (G) and quantification (H) of purified NURR1: GFP-derived DA neurons infected with SARS-CoV-2-entry virus (MOI=0.01) at 24 hpi using antibodies against luciferase and DA neuron markers. Scale bar=50 μm. n=3 independent biological replicates.

(I and J) Representative confocal images (I) and quantification (J) of purified NURR1: GFP-derived DA neurons infected with SARS-CoV-2 virus at different MOI (MOI=0.2 or MOI=1) and treated with ACE2 blocking antibody at 72 hpi using antibodies against SARS-N and DA neuron markers. Scale bar=50 μm. n=3 independent biological replicates.

Data was presented as mean ± STDEV. *P* values were calculated by unpaired two-tailed Student's t test. $^{**}P < 0.01$, $^{***}P < 0.001$.

Figure S2

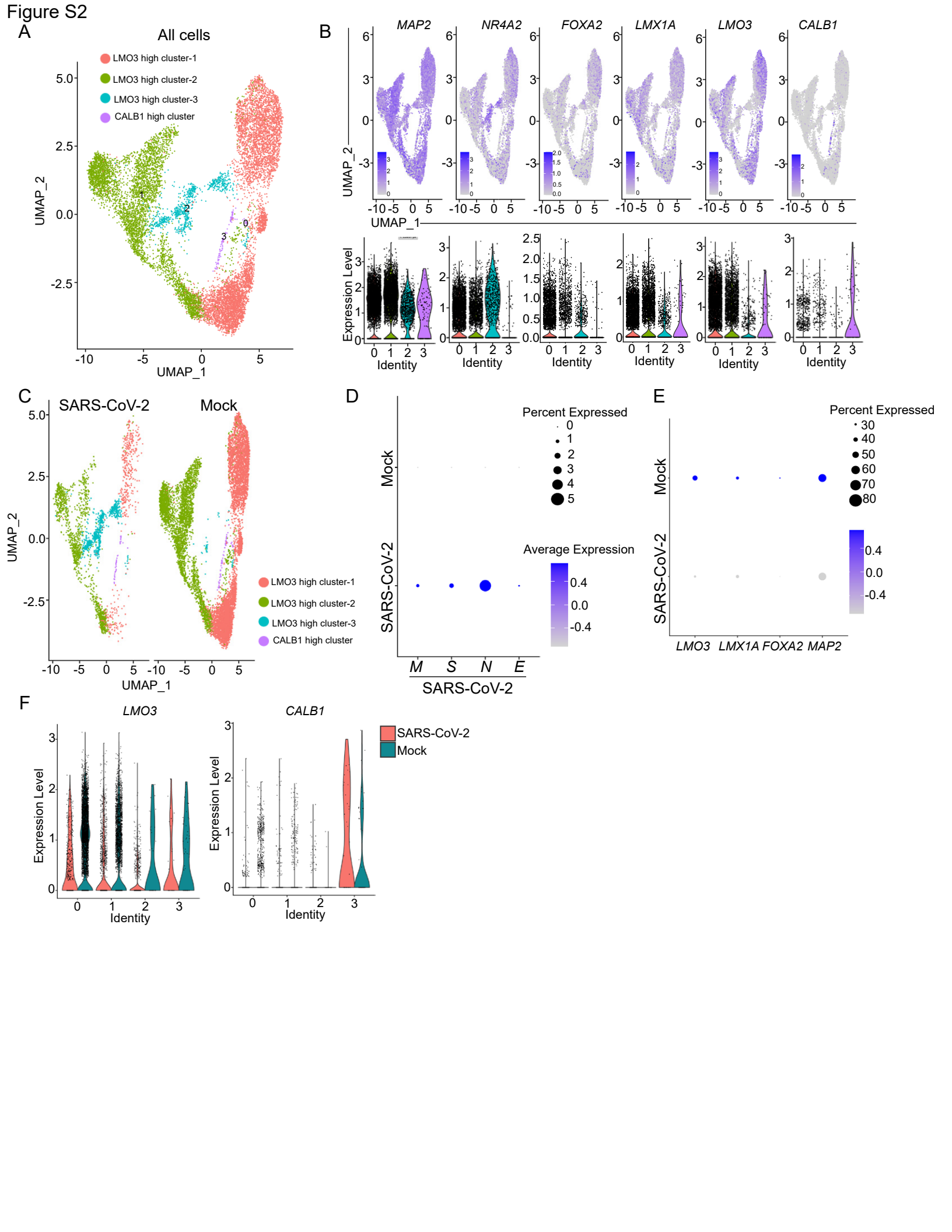

A
All cells
LMO3 high cluster-1
LMO3 high cluster-2
LMO3 high cluster-3
CALB1 high cluster
UMAP_2
UMAP_1
B
MAP2
NR4A2
FOXA2
LMX1A
LMO3
CALB1
UMAP_2
UMAP_1
Expression Level
Identity
C
SARS-CoV-2
Mock
UMAP_2
UMAP_1
LMO3 high cluster-1
LMO3 high cluster-2
LMO3 high cluster-3
CALB1 high cluster
D
Percent Expressed
Average Expression
Mock
SARS-CoV-2
M
S
N
E
SARS-CoV-2
E
Percent Expressed
Mock
SARS-CoV-2
LMO3
LMX1A
FOXA2
MAP2
F
LMO3
CALB1
Expression Level
Identity
SARS-CoV-2
Mock

Figure S2. hPSC-derived DA neurons are susceptible and permissive to SARS-CoV-2 infection. Related to Figure 2.

(A) UMAP analysis of the mock and SARS-CoV-2 infected purified NURR1: GFP-DA neurons at 48 hpi (MOI=0.2).

(B) UMAP and violin plot analysis of DA neuron marker genes.

(C) UMAP analysis of the mock and SARS-CoV-2 infected purified NURR1: GFP-DA neurons at 48 hpi (MOI=0.2).

(D) Dot plot analysis of SARS-CoV-2 viral transcripts in the mock and SARS-CoV-2 infected purified NURR1: GFP-DA neurons at 48 hpi (MOI=0.2).

(E) Dot plot analysis of expression levels of DA neuron marker genes in the mock and SARS-CoV-2 infected purified NURR1: GFP-DA neurons at 48 hpi (MOI=0.2).

(F) Violin plot analysis of expression levels of DA neuron marker genes in different populations of the mock and SARS-CoV-2 infected purified NURR1: GFP-DA neurons at 48 hpi (MOI=0.2).

Figure S3

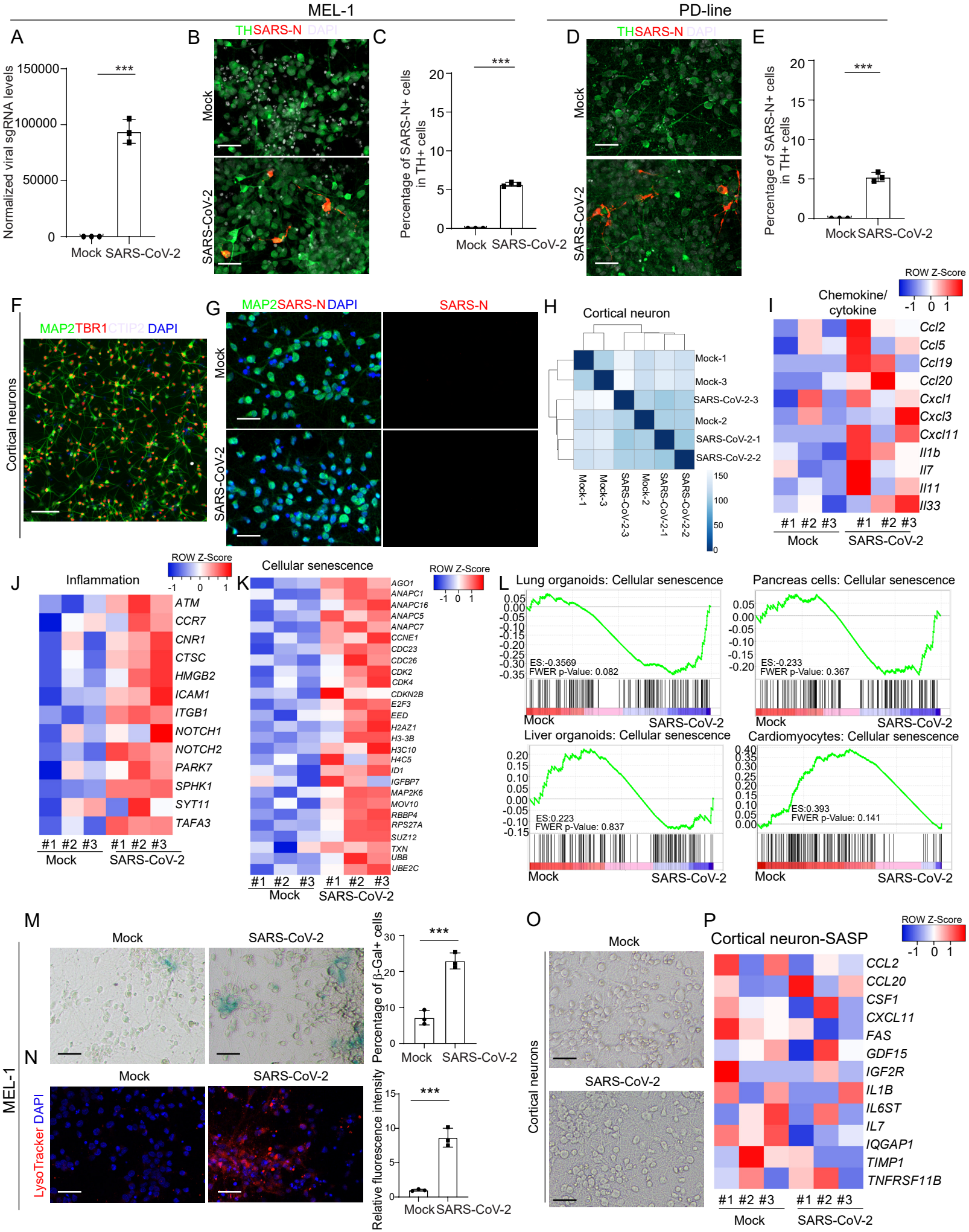

MEL-1
PD-line
A
Normalized viral sgRNA levels
150000
100000
50000
0
***
Mock SARS-CoV-2
B
TH SARS-N DAPI
Mock
SARS-CoV-2
C
Percentage of SARS-N+ cells in TH+ cells
20
15
10
5
0
***
Mock SARS-CoV-2
D
TH SARS-N DAPI
Mock
SARS-CoV-2
E
Percentage of SARS-N+ cells in TH+ cells
20
15
10
5
0
***
Mock SARS-CoV-2
F
MAP2 TBR1 CTIP2 DAPI
Cortical neurons
G
MAP2 SARS-N DAPI
SARS-N
Mock
SARS-CoV-2
H
Cortical neuron
Mock-1
Mock-3
SARS-CoV-2-3
Mock-2
SARS-CoV-2-1
SARS-CoV-2-2
150
100
50
0
I
Chemokine/ cytokine
ROW Z-Score
-1 0 1
Ccl2
Ccl5
Ccl19
Ccl20
Cxcl1
Cxcl3
Cxcl11
Il1b
Il7
Il11
Il33
#1 #2 #3 #1 #2 #3
Mock SARS-CoV-2
J
Inflammation
ROW Z-Score
-1 0 1
ATM
CCR7
CNR1
CTSC
HMGB2
ICAM1
ITGB1
NOTCH1
NOTCH2
PARK7
SPHK1
SYT11
TAFA3
#1 #2 #3 #1 #2 #3
Mock SARS-CoV-2
K
Cellular senescence
ROW Z-Score
-1 0 1
AGO1
ANAPC1
ANAPC16
ANAPC5
ANAPC7
CCNE1
CDC23
CDC26
CDK2
CDK4
CDKN2B
E2F3
EED
H2AZ1
H3-3B
H3C10
H4C5
ID1
IGFBP7
MAP2K6
MOV10
RBBP4
RPS27A
SUZ12
TXN
UBB
UBE2C
#1 #2 #3 #1 #2 #3
Mock SARS-CoV-2
L
Lung organoids: Cellular senescence
ES:-0.3569
FWER p-Value: 0.082
Mock SARS-CoV-2
Pancreas cells: Cellular senescence
ES:-0.233
FWER p-Value: 0.367
Mock SARS-CoV-2
Liver organoids: Cellular senescence
ES:0.223
FWER p-Value: 0.837
Mock SARS-CoV-2
Cardiomyocytes: Cellular senescence
ES:0.393
FWER p-Value: 0.141
Mock SARS-CoV-2
M
Mock
SARS-CoV-2
Percentage of β-Gal+ cells
30
20
10
0
***
Mock SARS-CoV-2
N
MEL-1
Mock
SARS-CoV-2
LysoTracker DAPI
Relative fluorescence intensity
15
10
5
0
***
Mock SARS-CoV-2
O
Mock
SARS-CoV-2
Cortical neurons
P
Cortical neuron-SASP
ROW Z-Score
-1 0 1
CCL2
CCL20
CSF1
CXCL11
FAS
GDF15
IGF2R
IL1B
IL6ST
IL7
IQGAP1
TIMP1
TNFRSF11B
#1 #2 #3 #1 #2 #3
Mock SARS-CoV-2

Figure S3. SARS-CoV-2 infection of hPSC-derived DA neurons triggered senescence phenotype. Related to Figure 1 and Figure 3.

(A) RT-qPCR analysis of total RNA extracted from MEL1-derived DA neurons at 48 hpi of SARS-CoV-2 infection (MOI=0.2) for viral N sgRNA. The graph depicts the mean sgRNA level normalized to ACTB. n=3 independent biological replicates.

(B and C) Representative confocal images (B) and quantification of the percentage of SARS-N^+ cells in TH^+ cells (C) of MEL1-DA neurons infected with SARS-CoV-2 (MOI=0.1) at 72 hpi using antibodies against SARS-CoV-2 Nucleocapsid protein (SARS-N) and marker for DA neurons. Scale bar=50μm. n=3 independent biological replicates.

(D and E) Representative confocal images (D) and quantification of the percentage of SARS-N^+ cells in TH^+ cells (E) of SNCA PD line-2copy-DA neurons infected with SARS-CoV-2 (MOI=0.1) at 72 hpi using antibodies against SARS-CoV-2 Nucleocapsid protein (SARS-N) and marker for DA neurons. Scale bar=50 μm. n=3 independent biological replicates. N=3 independent biological replicates.

(F) Representative confocal images of H9-cortical neurons using antibodies against MAP2, TBR1, and CTIP2. Scale bar=100 μm. n=3 independent biological replicates.

(G) Representative confocal images of H9-cortical neurons infected with SARS-CoV-2 (MOI=0.1) at 72 hpi using antibodies against SARS-CoV-2 Nucleocapsid protein (SARS-N) and MAP2. Scale bar=50μm. n=3 independent biological replicates.

(H) Clustering analysis of the mock or SARS-CoV-2 infected H9-derived cortical neurons at 48 hpi (MOI=0.2).

(I and **J)** Heatmap of chemokine/cytokines (I) and inflammation associated genes (J) in the mock or SARS-CoV-2 infected NURR1: GFP H9-derived DA neurons at 48 hpi (MOI=0.2).

(K) Heatmap of senescence associated genes in the mock or SARS-CoV-2 infected NURR1: GFP H9-derived DA neurons at 48 hpi (MOI=0.2).

(L) Gene set enrichment analysis (GSEA) of cellular senescence pathway in the mock or SARS-CoV-2 infected hPSC-derived lung organoids (GSE155241), pancreas cells (GSE151803), liver organoids (GSE151803) and cardiomyocytes (GSE151880).

(M) β-Gal staining and quantification of the mock or SARS-CoV-2 infected MEL1-derived DA neurons at 72 hpi (MOI=0.1). Scale bar=75μm. n=3 independent biological replicates.

(N) Representative confocal images and quantification of MEL1-DA neurons infected with the mock or SARS-CoV-2 (MOI=0.1) at 72 hpi using LysoTracker. Scale bar=50μm. n=3 independent biological replicates.

(O) β-Gal staining and quantification of the mock or SARS-CoV-2 infected H9-derived cortical neurons at 72 hpi (MOI=0.1). Scale bar=75μm. n=3 independent biological replicates.

(P) Heatmap of SASP associated genes in the mock or SARS-CoV-2 infected H9-derived cortical neurons at 48 hpi (MOI=0.2).

Data was presented as mean ± STDEV. *P* values were calculated by unpaired two-tailed Student's t test. $*P < 0.05$, $**P < 0.01$, and $***P < 0.001$.

Figure S4

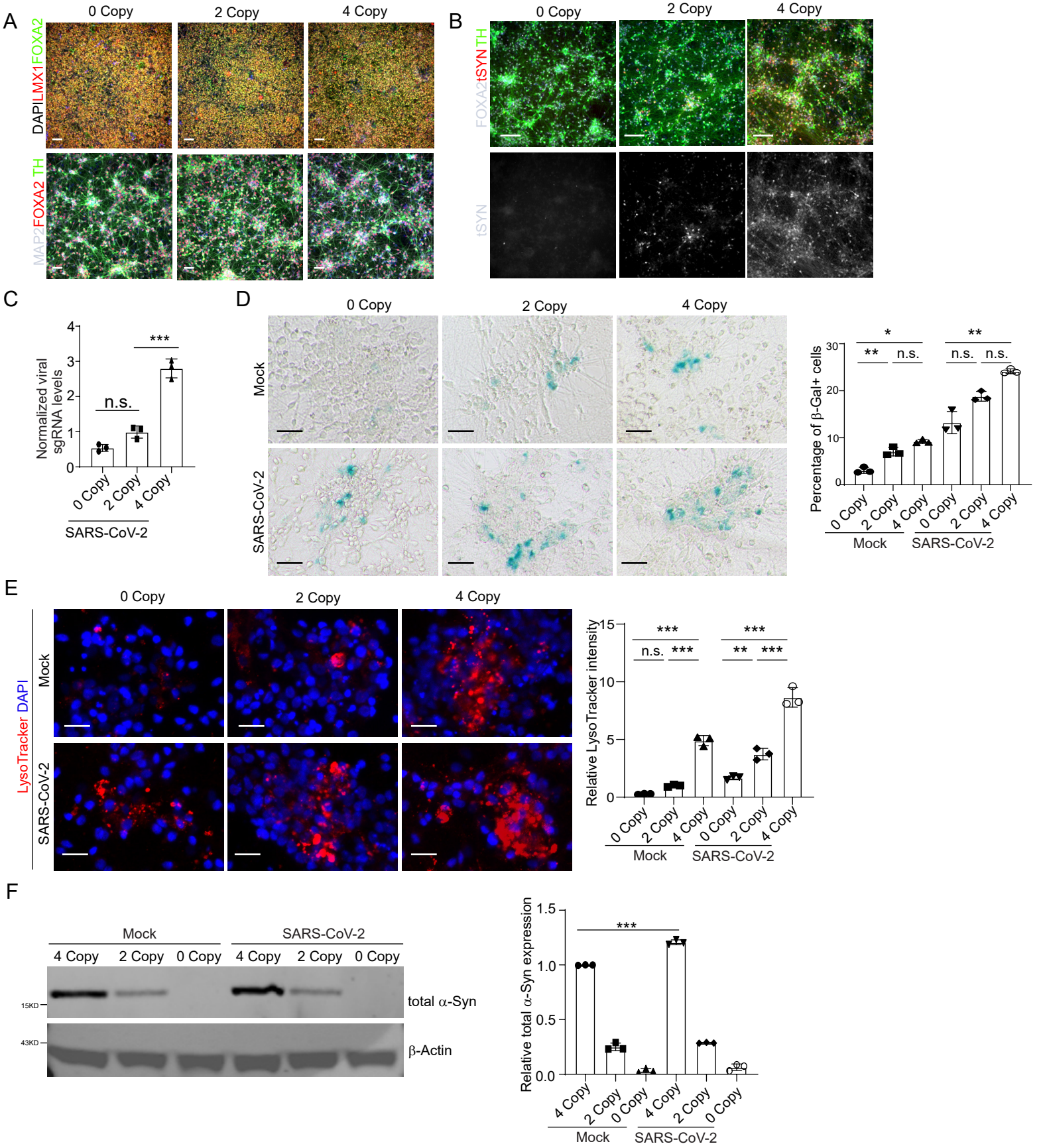

A
0 Copy
2 Copy
4 Copy
DAPILMX1FOXA2
MAP2FOXA2 TH
B
0 Copy
2 Copy
4 Copy
FOXA2tSYN TH
tSYN
C
Normalized viral sgRNA levels
n.s.
***
0 Copy
2 Copy
4 Copy
SARS-CoV-2
D
0 Copy
2 Copy
4 Copy
Mock
SARS-CoV-2
Percentage of β-Gal+ cells
*
**
n.s.
**
n.s.
n.s.
0 Copy
2 Copy
4 Copy
0 Copy
2 Copy
4 Copy
Mock
SARS-CoV-2
E
0 Copy
2 Copy
4 Copy
LysoTracker DAPI
Mock
SARS-CoV-2
Relative LysoTracker intensity
***
n.s.
***
***
**
***
0 Copy
2 Copy
4 Copy
0 Copy
2 Copy
4 Copy
Mock
SARS-CoV-2
F
Mock
SARS-CoV-2
4 Copy
2 Copy
0 Copy
4 Copy
2 Copy
0 Copy
15KD
43KD
total α-Syn
β-Actin
Relative total α-Syn expression
***
4 Copy
2 Copy
0 Copy
4 Copy
2 Copy
0 Copy
Mock
SARS-CoV-2

Figure S4. SARS-CoV-2 infection on SNCA 0 copy, 2 copy and 4 copy PD-iPSC-derived DA neurons. Related to Figure 3.

(A) Representative confocal images of *SNCA* lines-derived DA neurons at day 20 (upper) and day 45 (lower) using antibodies against markers for DA neurons. Scale bar=50 μm. n=3 independent biological replicates.

(B) Representative confocal images of *SNCA* lines-derived DA neurons at day 45 using antibodies against total a-Syn and markers for DA neurons. Scale bar=50 μm. n=3 independent biological replicates.

(C) qRT-PCR analysis of total RNA extracted from *SNCA* lines-derived DA neurons at 48 hpi of SARS-CoV-2 infection (MOI=0.2) for viral N sgRNA. The graph depicts the mean sgRNA level normalized to *ACTB*. n=3 independent biological replicates.

(D) β-Gal staining and quantification of the mock or SARS-CoV-2 infected *SNCA* lines-derived DA neurons at 72 hpi (MOI=0.1). Scale bar=75μm. n=3 independent biological replicates.

(E) Representative confocal images and quantification of *SNCA* lines-derived DA neurons infected with the mock or SARS-CoV-2 (MOI=0.1) at 72 hpi stained with LysoTracker. Scale bar=50 μm. n=3 independent biological replicates.

(F) Western blot analysis and quantification of senescence related proteins of total α-Syn in mock or SARS-CoV-2 infected *SNCA* lines-derived DA neurons at 48 hpi (MOI=0.2). n=3 independent biological replicates.

Data was presented as mean ± STDEV. *P* values were calculated by unpaired two-tailed Student's t test. n.s. no significance, **P* < 0.05, ***P* < 0.01, and ****P* < 0.001.

Figure S5

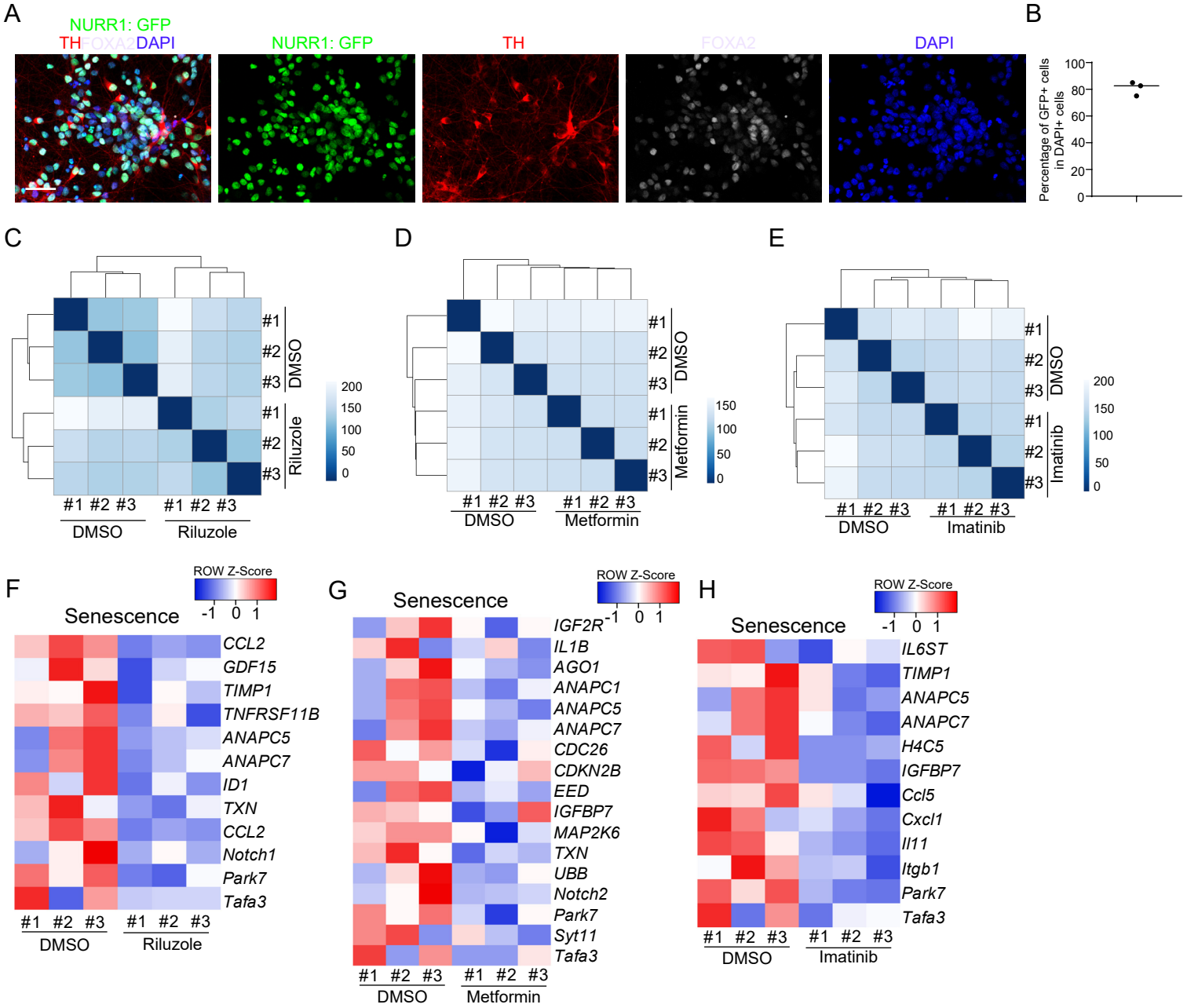

A
NURR1: GFP
TH FOXA2 DAPI
NURR1: GFP
TH
FOXA2
DAPI
B
Percentage of GFP+ cells in DAPI+ cells
100
80
60
40
20
0
C
#1
#2
#3
DMSO
Riluzole
200
150
100
50
0
#1 #2 #3
#1 #2 #3
DMSO
Riluzole
D
#1
#2
#3
DMSO
Metformin
150
100
50
0
#1 #2 #3
#1 #2 #3
DMSO
Metformin
E
#1
#2
#3
DMSO
Imatinib
200
150
100
50
0
#1 #2 #3
#1 #2 #3
DMSO
Imatinib
F
ROW Z-Score
-1 0 1
Senescence
CCL2
GDF15
TIMP1
TNFRSF11B
ANAPC5
ANAPC7
ID1
TXN
CCL2
Notch1
Park7
Tafa3
#1 #2 #3
#1 #2 #3
DMSO
Riluzole
G
ROW Z-Score
-1 0 1
Senescence
IGF2R
IL1B
AGO1
ANAPC1
ANAPC5
ANAPC7
CDC26
CDKN2B
EED
IGFBP7
MAP2K6
TXN
UBB
Notch2
Park7
Syt11
Tafa3
#1 #2 #3
#1 #2 #3
DMSO
Metformin
H
ROW Z-Score
-1 0 1
Senescence
IL6ST
TIMP1
ANAPC5
ANAPC7
H4C5
IGFBP7
Ccl5
Cxcl1
Il11
Itgb1
Park7
Tafa3
#1 #2 #3
#1 #2 #3
DMSO
Imatinib

Figure S5. Three drug candidates rescue senescence phenotype of SARS-CoV-2 infected hPSC-derived DA neurons. Related to Figure 4.

(A and B) Representative confocal images (A) and quantification of the percentage of NURR1-GFP^+ cells (B) of NURR1: GFP H9 lines-derived DA neurons for drug screening. Scale bar=50 μm. n=3 independent biological replicates. Data was presented as mean ± STDEV.

(C-E) Clustering analysis of gene expression profiles of DMSO or drug candidate-treated purified hPSC-derived DA neurons at 48 hpi upon SARS-CoV-2 infection (MOI=0.1).

(F-H) Heatmap of SASP associated genes of DMSO or drug candidate-treated purified hPSC-derived DA neurons at 48 hpi upon SARS-CoV-2 infection (MOI=0.1).

Figure S6

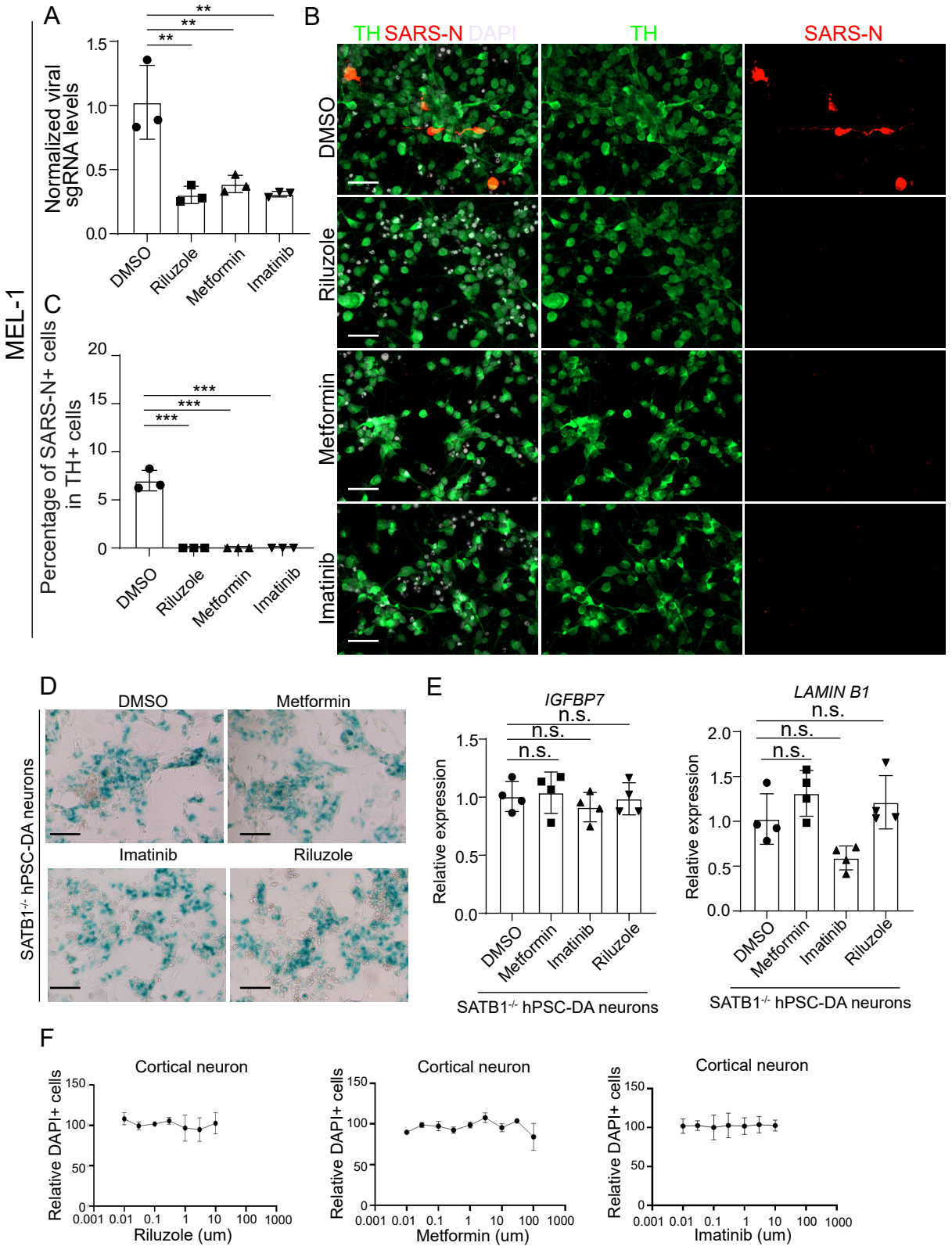

A
B
C
D
E
F
MEL-1
Normalized viral sgRNA levels
Percentage of SARS-N+ cells in TH+ cells
TH SARS-N DAPI
TH
SARS-N
DMSO
Riluzole
Metformin
Imatinib
SATB1-/- hPSC-DA neurons
IGFBP7
LAMIN B1
Relative expression
n.s.
Cortical neuron
Relative DAPI+ cells
Riluzole (um)
Metformin (um)
Imatinib (um)

Figure S6. Three drug candidates block SARS-CoV-2 infection of hPSC-derived DA neurons. Related to Figure 5 and Figure 6.

(A) RT-qPCR analysis of total RNA extracted from DMSO or drug candidates-pre-treated MEL1-derived DA neurons following SARS-CoV-2 infection (MOI=0.2) for viral N sgRNA at 48 hpi. The graph depicts the mean sgRNA level normalized to *ACTB*. n=3 independent biological replicates.

(B and C) Representative confocal images (B) and quantification of the percentage of SARS-N^+ cells in TH^+ cells (C) of DMSO or drug candidates-pre-treated MEL1-DA neurons following SARS-CoV-2 infection (MOI=0.2) at 72 hpi using antibodies against SARS-CoV-2 Nucleocapsid protein (SARS-N) and marker for DA neurons. Scale bar=50 μm. n=3 independent biological replicates.

(D) β-Gal staining and quantification of DMSO or drug candidates-treated *SATB1*$^{-/-}$ hPSC-derived DA neurons at 72 hpi (MOI=0.1). Scale bar=75μm. n=3 independent biological replicates.

(E) RT-qPCR analysis of senescence related genes of *IGFBP7* and *LAMIN B1* in DMSO or drug candidates-treated *SATB1*$^{-/-}$ hPSC-derived DA neurons at 48 hpi (MOI=0.2). n=3 independent biological replicates.

(F) Cytotoxicity curves of riluzole, metformin and imatinib in H9-derived cortical neurons. n=3 independent biological replicates.

Data was presented as mean ± STDEV. *P* values were calculated by unpaired two-tailed Student's t test. n.s. no significance, $^{**}P < 0.01$, and $^{***}P < 0.001$.

Figure S7

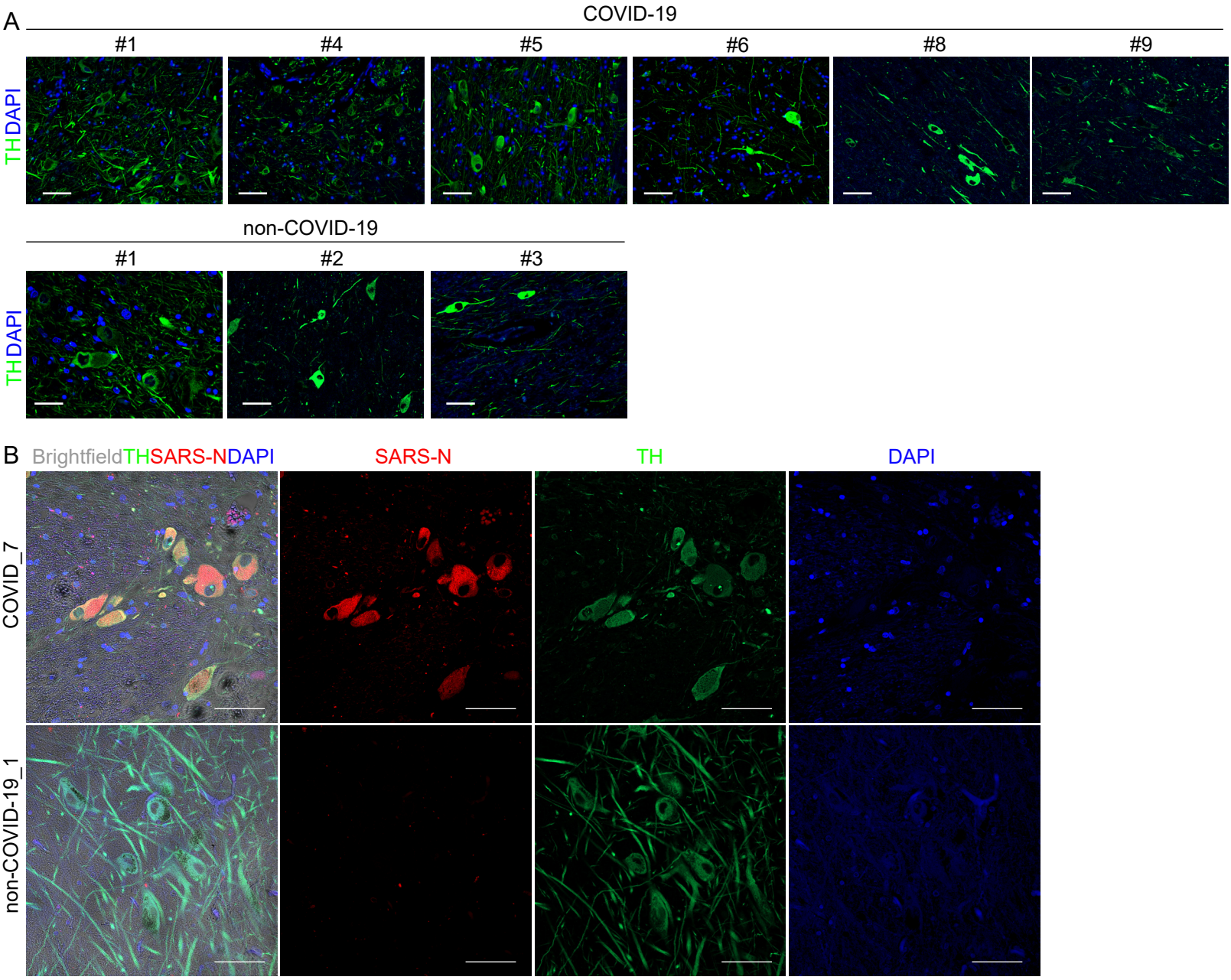

A
COVID-19
#1
#4
#5
#6
#8
#9
TH DAPI
non-COVID-19
#1
#2
#3
TH DAPI
B
Brightfield TH SARS-N DAPI
SARS-N
TH
DAPI
COVID_7
non-COVID-19_1

Figure S7. Inflammatory and senescence phenotypes were detected in autopsy substantia nigra samples of COVID-19 patients. Related to Figure 7.

(A) Representative confocal images of TH staining in the autopsy substantia nigra sections of COVID-19 patients versus non-COVID-19 patients. (Cohort 1: N=6 COVID-19 patients; N=3 non-COVID-19 patients). Scale bar=50μm.

(B) Representative confocal images of SARS-N and TH staining in the autopsy substantia nigra sections of COVID-19 patient versus non-COVID-19 patient. (Cohort 2: N=1 COVID-19 patients; N=1 non-COVID-19 patients). Scale bar=50μm.

Table S1. Demographics and pathological characterization of control autopsy cohort. Related to Figure 7 and Figure S7.

Table S2. Demographics and pathological characterization of COVID-19 autopsy cohort. Related to Figure 7 and Figure S7.

Table S3. Demographics and pathological characterization of PD(D) autopsy cohort. Related to Figure 7 and Figure S7.

Table S4. Patient information. Related to Figure 7 and Figure S7.

	Patient ID	**Gender**	**Age**	**Experiments**	**Source**
Cohort 1	COVID_1	Male	66	Fig. 7A-7E and Fig. S7A	Columbia University
	COVID_4	Female	78	Fig. 7A-7E and Fig. S7A	Columbia University
	COVID_5	Female	80	Fig. 7A-7E and Fig. S7A	Columbia University
	COVID_6	Male	80	Fig. 7A-7E and Fig. S7A	Columbia University
	COVID_7	Male	74	Fig. S7B	The Netherlands
	COVID_8	Male	67	Fig. 7A-7E, Fig. 7F and Fig. S7A	The Netherlands
	COVID_9	Male	59	Fig. 7A-7E, Fig. 7F and Fig. S7A	The Netherlands
	non-COVID_1	Male	72	Fig. 7A-7E, Fig. 7F and Fig. S7A	The Netherlands
	non-COVID_2	Male	61	Fig. 7A-7E, Fig. 7F and Fig. S7A	The Netherlands
	non-COVID_3	Female	61	Fig. 7A-7E and Fig. S7A	Columbia University
	non-COVID_4	Male	82	Fig. 7F	The Netherlands
Cohort 2	-	-	-	Fig. 7G-7H and Table S1-S3	The Netherlands

Table S5. Antibodies used for immunocytochemistry, intracellular flow cytometry analysis and western blotting analysis. Related to STAR Methods.

Usage	Antibody	Clone #	Host	Catalog #	Vendor	Dilution
Immunocytochemistry	Anti-SARS-CoV/SARS-CoV-2 Nucleocapsid	001	Rabbit	40143-R001	Sino Biological	1:500
Immunocytochemistry	ACE2	Polyclonal	Rabbit	ab15348	Abcam	1:500
Immunocytochemistry	Firefly luciferase Monoclonal Antibody (CS 17)	CS 17	Mouse	35-6700	Thermo Fisher Scientific	1:200
Immunocytochemistry and western blot	Anti-Alpha Synuclein	Syn211	Mouse	S5566-100UL	Millipore	1:250
Immunocytochemistry	Anti-MAP2 antibody	Polyclonal	Chicken	ab5392	Abcam	1:5000
Western blot	p21 Waf1/Cip1 (12D1) Rabbit mAb	12D1	Rabbit	2947	Cell Signaling	1:500
Western blot	Human Lamin B1 Antibody	919007	Mouse	MAB8525	R&D Systems	1:250
Immunocytochemistry	anti-α-Synuclein Phospho	P-syn/81A	Mouse	MMS-5091	Biolegend	1:1000
Immunocytochemistry	Goat polyclonal anti-FOXA2	Polyclonal	Goat	AF2400	R&D Systems	1:250
Immunocytochemistry	Recombinant Anti-TBR1 antibody	EPR8138 (2)	Rabbit	ab183032	Abcam	1:100
Immunocytochemistry	Anti-Ctip2 antibody	25B6	Rat	ab18465	Abcam	1:500
Immunocytochemistry	Anti-Tyrosine Hydroxylase antibody - Neuronal Marker	Polyclonal	Rabbit	ab112	Abcam	1:500

Immunocytochemistry	Human/Mouse Tyrosine Hydroxylase Antibody	779427	Mouse	MAB7566	R&D Systems	1:200
Immunocytochemistry	Anti-FOXA2 Antibody	M-20	Goat	sc-6554	Santa Cruz	1:150
Immunocytochemistry	Anti-GFP antibody	Polyclonal	Chicken	ab13970	Abcam	1:1000
Immunocytochemistry	Rabbit polyclonal anti-LMX-1	Polyclonal	Rabbit	AB10533	Millipore	1:1000
Immunocytochemistry	Donkey anti-Mouse IgG (H+L) Cross-Adsorbed Secondary Antibody, Alexa Fluor 488	Polyclonal	Donkey	A-21202	Thermo Fisher Scientific	1:500
Immunocytochemistry	Donkey anti-Rabbit IgG (H+L) Secondary Antibody, Alexa Fluor 594	Polyclonal	Donkey	A-21207	Thermo Fisher Scientific	1:500
Immunocytochemistry	Donkey anti-Mouse IgG (H+L) Secondary Antibody, Alexa Fluor 594 conjugate	Polyclonal	Donkey	A-21203	Thermo Fisher Scientific	1:500
Immunocytochemistry	Donkey anti-Mouse IgG (H+L) Secondary Antibody, Alexa Fluor 647	Polyclonal	Donkey	A-31571	Thermo Fisher Scientific	1:500
Immunocytochemistry	Alexa Fluor 488 AffiniPure Donkey Anti-Chicken IgY (IgG) (H+L)	Polyclonal	Donkey	703-545-155	Jackson Immunoresearch Labs	1:500
Immunocytochemistry	Donkey anti-Goat IgG (H+L) Cross-Adsorbed	Polyclonal	Donkey	A-21447	Thermo Fisher	1:500

	Secondary Antibody, Alexa Fluor 647				Scientific	
Immunocytochemistry	Donkey anti-Goat IgG Secondary Antibody, Alexa Fluor 555	Polyclonal	Donkey	A32816	Thermo Fisher	1:500
Immunocytochemistry	Donkey anti-Rabbit IgG Secondary Antibody, Alexa Fluor 647	Polyclonal	Donkey	A32795	Thermo Fisher	1:500

Table S6. Primers used for RT-qPCR. Related to STAR Methods.

Primer name	Sequence
ACTB-Forward	*CGTCACCAACTGGGACGACA*
ACTB-Reverse	*CTTCTCGCGGTTGGCCTTGG*
SARS-CoV-2-TRS-L	*CTCTTGTAGATCTGTTCTCTAAACGAAC*
SARS-CoV-2-TRS-N	*GGTCCACCAAACGTAATGCG*
LaminB1-F	*AAGCATGAAACGCGCTTGG*
LaminB1-R	*AGTTTGGCATGGTAAGTCTGC*
IGFBP7-F	*ATCCCGACACCTGTCCTCAT*
IGFBP7-R	*CCCAGCCAGTTACTTCATGCT*

Reference

1. Riessland, M., Kolisnyk, B., Kim, T.W., Cheng, J., Ni, J., Pearson, J.A., Park, E.J., Dam, K., Acehan, D., Ramos-Espiritu, L.S., et al. (2019). Loss of SATB1 Induces p21-Dependent Cellular Senescence in Post-mitotic Dopaminergic Neurons. Cell Stem Cell *25*, 514-530 e518. 10.1016/j.stem.2019.08.013.