

Supplementary information for

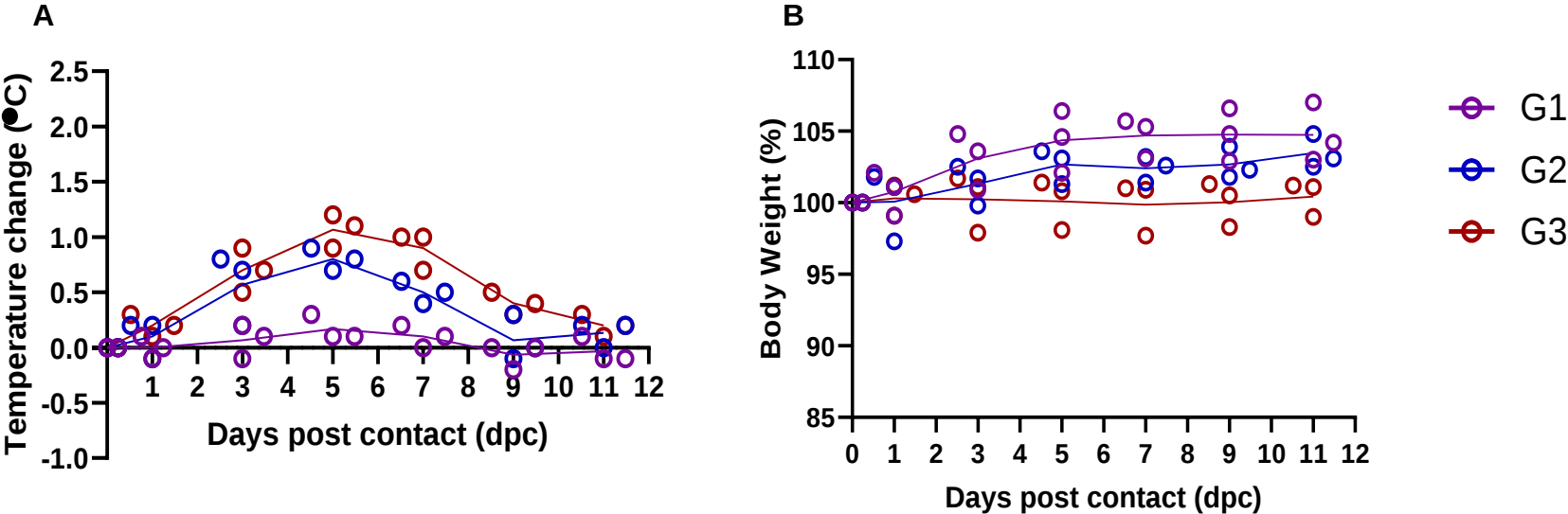
Age-dependent pathogenic characteristics of SARS-CoV-2 infection in ferrets

Kim et al.

Supplementary Fig. 1 – 6

Supplementary Table 1 - 4

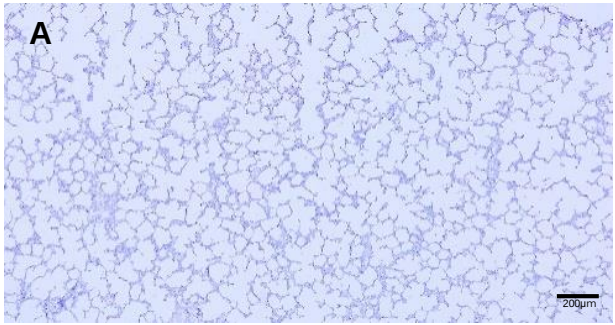
Fig. S1



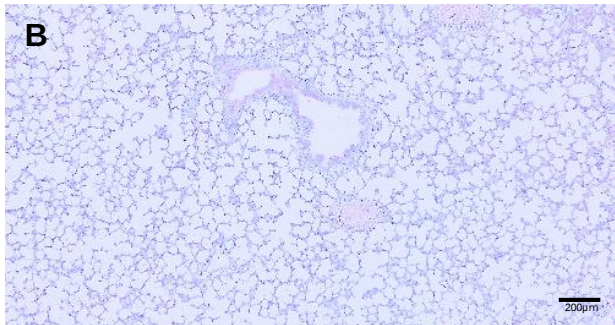
Supplementary Fig. 1. Change in body temperature and weight of direct contact ferrets. Temperature changes and relative body weight were measured in direct contact transmission ferrets from each different age group. Temperature is represented as °C and weight is demonstrated as a percentage of the initial body weight.

Fig. S2

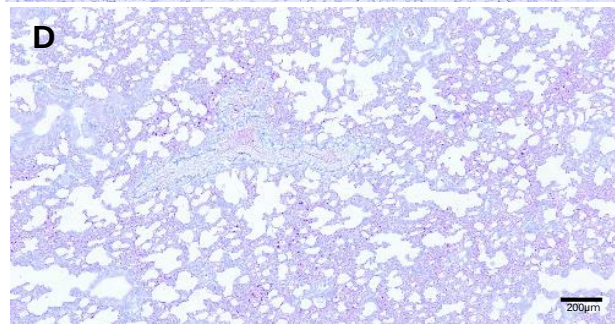
MOCK



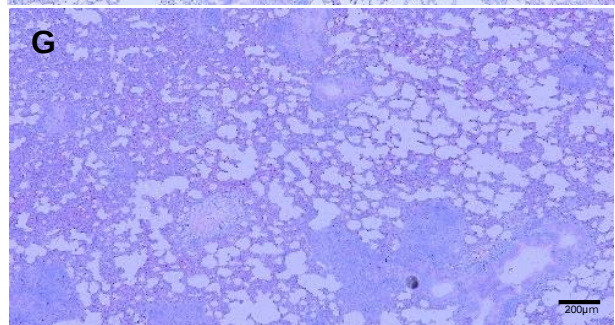
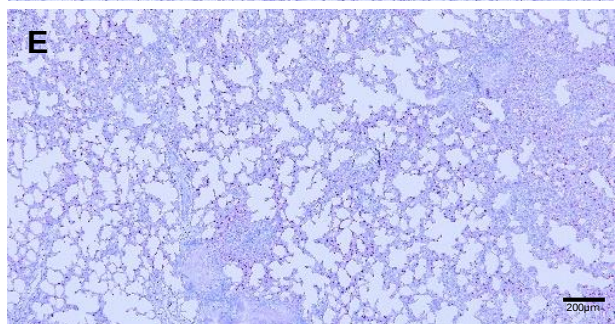
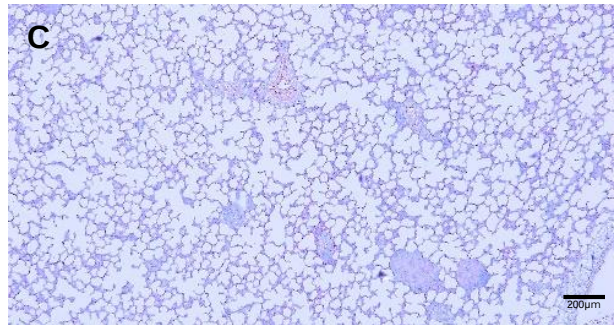
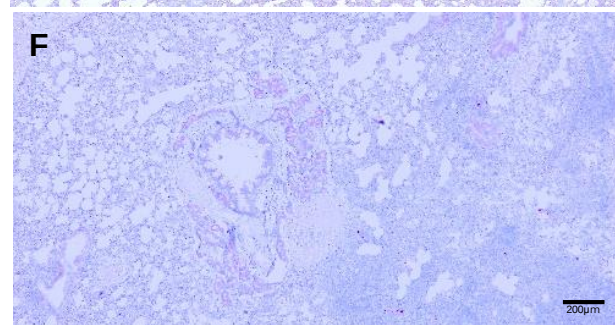
Juvenile (G1)



Young Adult (G2)



Aged Adult (G3)

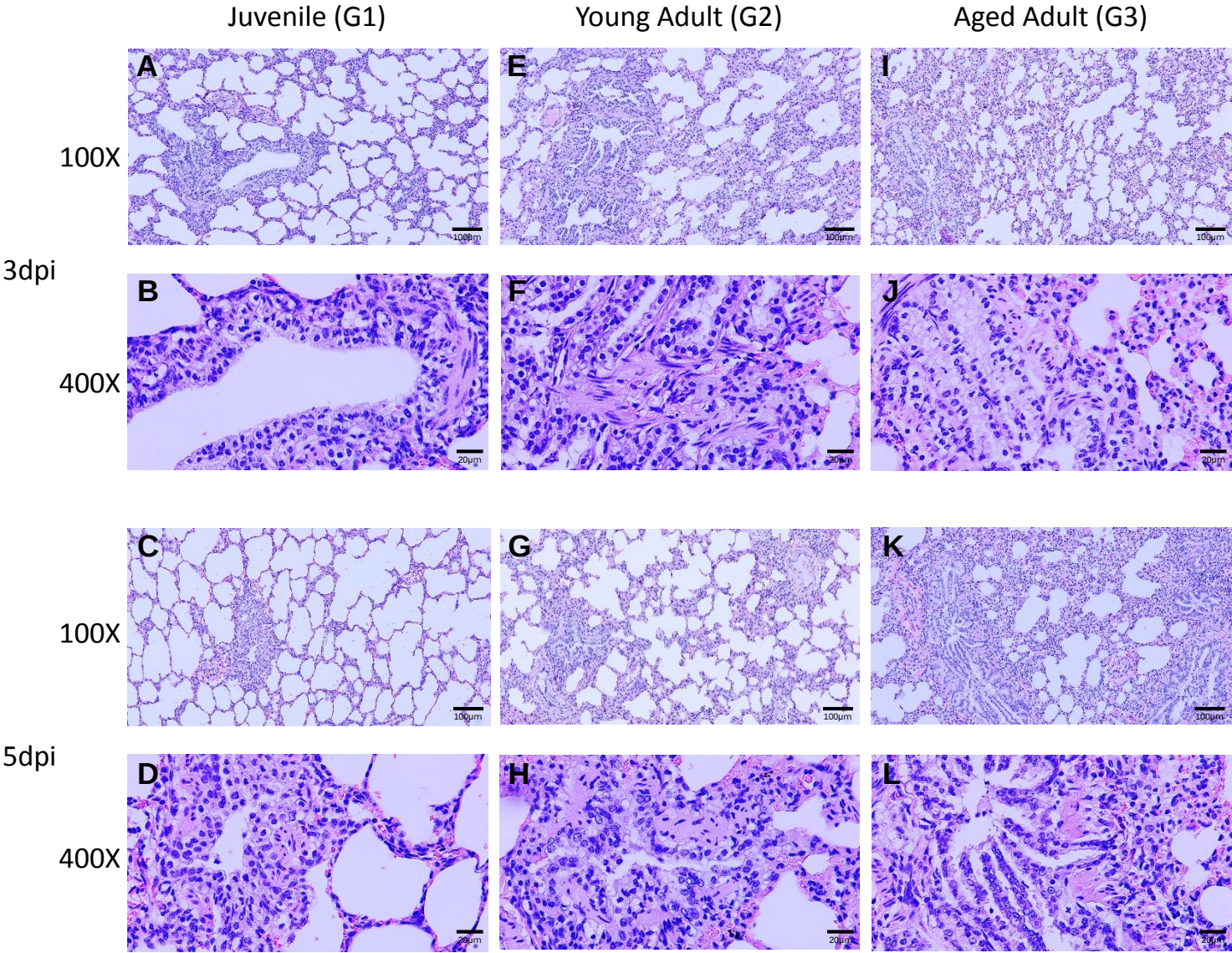


3dpi

5dpi

Supplementary Fig. 2. *In situ* lung analysis and histopathology of lungs from SARS-CoV-2 infected ferret groups. Ferrets were inoculated with $10^{5.8}$ TCID₅₀ of NMC-nCoV02 virus. Lung tissues were harvested on days 3 (B, D, and F) and 5 (C, E, and G) post-inoculation. Lung regions were compared by histopathology among the different age groups of ferrets: (A) mock infected, (B-C) juveniles (less than 6 months, G1 group), (D-E) young adults (1 to 2 years, G2 group), and (F-G) aged ferrets (older than 3 years). Magnification x40 and scale bar 200 μ m.

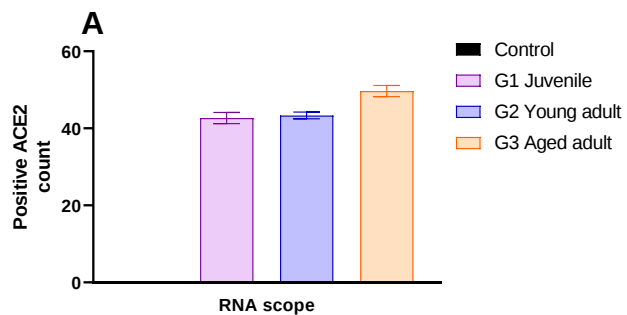
Fig. S3



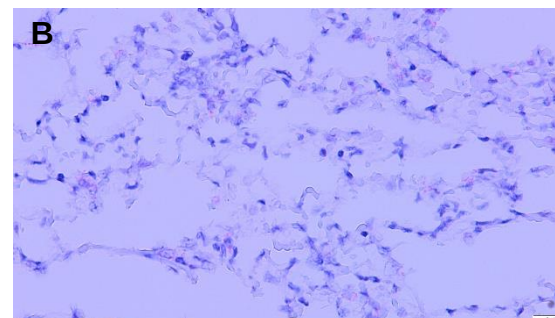
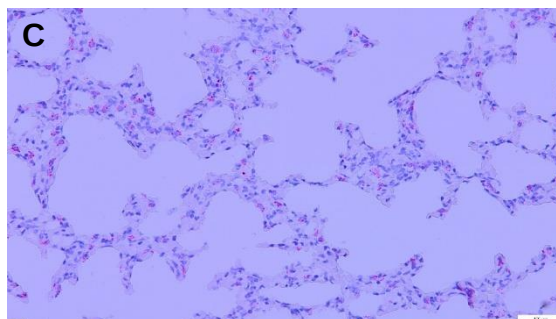
Supplementary Fig. 3. Histopathology of lungs from SARS-CoV-2 infected ferret groups. Ferrets were inoculated with $10^{5.8}$ TCID₅₀ of NMC-nCoV02 virus. Lung tissues were harvested on days 3 and 5 post-inoculation. Histopathological lung regions were compared among the different age groups of ferrets: (A-D) juvenile (less than 6 months, G1 group), (E-H) young adults (1 to 2 years, G2 group), and (I-L) aged ferrets (older than 3 years). Histopathological observations indicated that moderate interstitial pneumonia with thickened alveolar septa (A, C, E, G, I, and K, magnification 100x and scale bar 100µm). G3 group showed more severe lung damage and infiltration of lymphocytes compared G1 and G3 gorups (B, D, F, H, J, and L, magnification 400x and scale bar 20µm).

Fig. S4

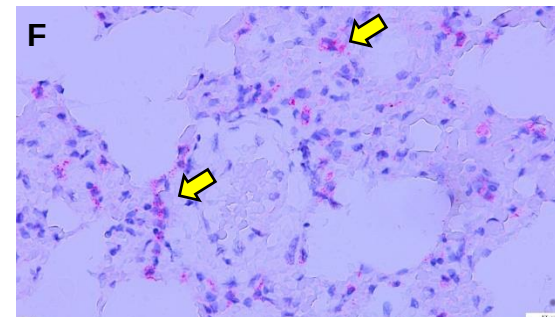
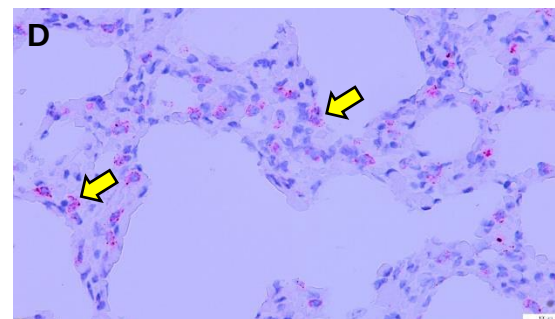
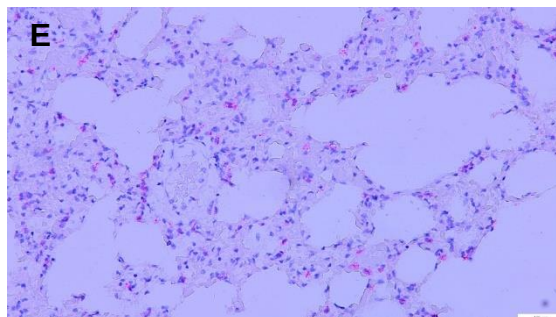
Control
(Spleen)



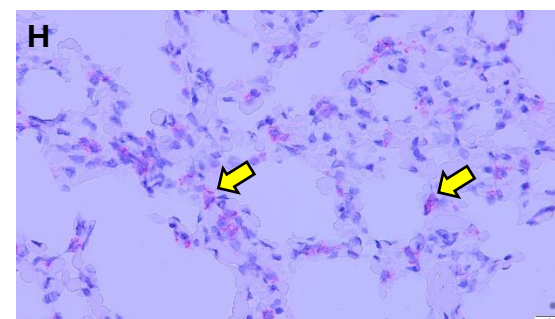
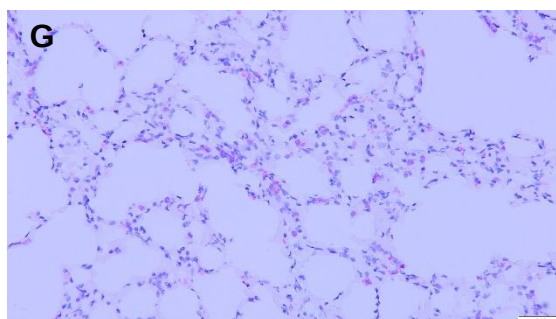
Juvenile



Young adult

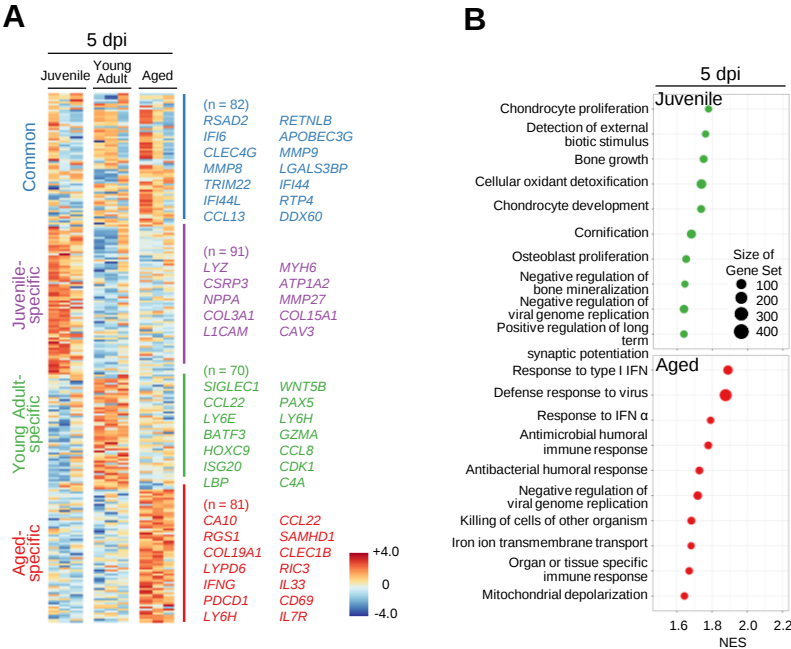


Aged adult



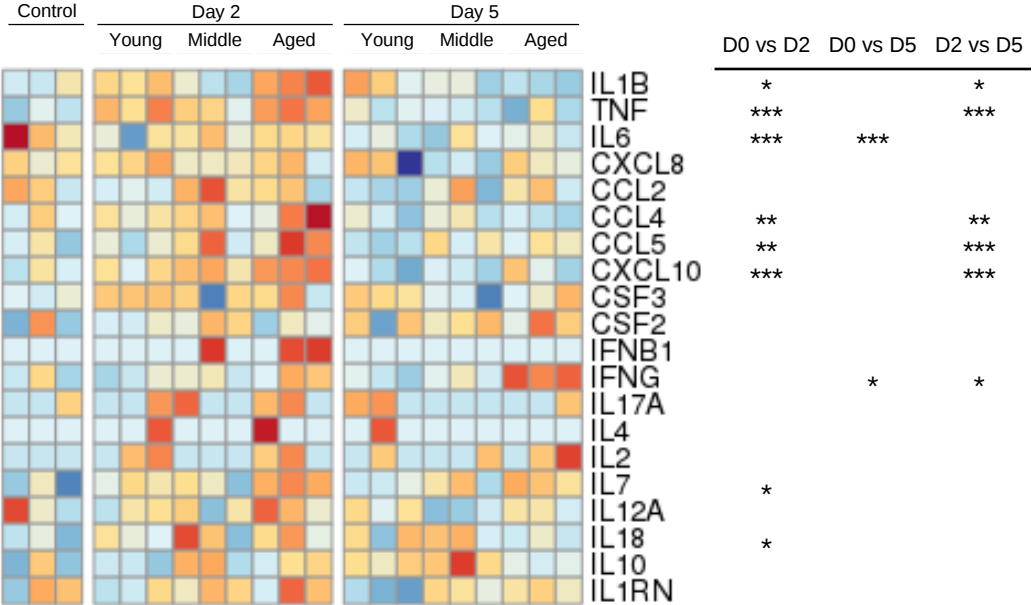
Supplementary Fig. 4. RNAscope *in situ* hybridization of ferret ACE2 receptor expression in lung tissues. To quantitate ACE2 expression in ferret lungs, RNAscope *in situ* hybridization was performed using an ACE2 probe (Advanced Cell Diagnostics, cat. #848151) and visualized using RNAscope 2.5 HD Reagent Kit RED (Advanced Cell Diagnostics, cat. #322360). Positive ACE2 cumulative number from ACE2 stained lung cells in each slide (using 400x magnification) (A). ACE2-positive cells (Yellow arrows) in lung tissues of control (B), juvenile (≤ 6 months, G1 group) (C-D), young adult ($1 \leq \text{age} \leq 2$ years, G2 group) (E-F), and aged ferrets ($3\text{-year} \leq \text{ages}$) (G-H). Magnification 200x (A, C, E, and G). Magnification 400x (B, D, F, and H).

Fig. S5



Supplementary Fig. 5. Heatmap of age-specific differentially expressed genes (DEGs), compared to control at 5 dpi shows that genes related to tissue repair and T cell activation were upregulated in 5 dpi (A). The 'Common' gene sets were composed of genes differentially upregulated in more than two groups, while 'Juvenile-specific', 'Young adult-specific' and 'Aged-specific' gene sets were composed of genes uniquely upregulated in each group. Representative immune-related genes were listed next to the heatmap. Bar plots showing normalized enrichment score (NES) from enrichment analysis of representative GO biological pathway at 5 dpi (B).

Fig. S6



Supplementary Fig. 6. Expression of various cytokines and chemokines in lung tissues.

The heatmap shows the induction of cytokines and chemokines as measured via RNA sequencing in aged, juvenile, and young adult ferrets at two different time points (2 and 5 dpi). The color gradient represents expression levels. Asterisks indicate statistical significance compared with control (MOCK) as evaluated by two way ANOVA Tukey's multiple comparisons tests (* indicates $p < 0.05$, ** indicates $p < 0.005$, and *** indicates $p < 0.0005$).

Table S1. Clinical scores of individual ferrets infected with SARS-CoV-2

Group		0dpi	2dpi	4dpi	6dpi	8dpi	10dpi
G1 (Juvenile)	Cough	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	0.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	0.00	0.00	0.00	0.00
	Cough	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	0.00	0.00	0.00	0.00
	Cough	0.00	0.00	0.00	0.00		
	Runny nose	0.00	1.00	0.00	0.00		
	Movement, activity	0.00	0.00	0.00	0.00		
	Cough	0.00	0.00	0.00	0.00		
	Runny nose	0.00	1.00	0.00	0.00		
	Movement, activity	0.00	0.00	0.00	0.00		
	Cough	0.00	0.00				
	Runny nose	0.00	1.00				
	Movement, activity	0.00	1.00				
	Cough	0.00	0.00	0.00	0.00		
	Runny nose	0.00	0.00	0.00	0.00		
	Movement, activity	0.00	0.00	1.00	0.00		
	Cough	0.00	0.00				
	Runny nose	0.00	1.00				
	Movement, activity	0.00	1.00				
	Cough	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	0.00	0.00	0.00
	Movement, activity	0.00	1.00	0.00	0.00	0.00	0.00
	Cough	0.00	0.00				
	Runny nose	0.00	1.00				
	Movement, activity	0.00	1.00				
Average	Cough	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.56±0.50	0.33±0.47	0.00	0.00	0.00
	Movement, activity	0.00	0.44±0.50	0.17±0.37	0.00	0.00	0.00
G2 (Young adult)	Cough	0.00	0.00				
	Runny nose	0.00	1.00				
	Movement, activity	0.00	1.00				
	Cough	0.00	1.00	1.00	1.00		
	Runny nose	0.00	0.00	2.00	2.00		
	Movement, activity	0.00	0.00	2.00	2.00		
	Cough	0.00	1.00				
	Runny nose	0.00	0.00				
	Movement, activity	0.00	1.00				
	Cough	0.00	1.00				
	Runny nose	0.00	1.00				
	Movement, activity	0.00	2.00				
	Cough	0.00	0.00	1.00	1.00		

	Runny nose	0.00	0.00	1.00	1.00		
	Movement, activity	0.00	1.00	2.00	2.00		
	Cough	0.00	0.00	1.00	0.00		
	Runny nose	0.00	0.00	1.00	1.00		
	Movement, activity	0.00	1.00	2.00	1.00		
	Cough	0.00	0.00	1.00	1.00	0.00	0.00
	Runny nose	0.00	0.00	2.00	1.00	0.00	0.00
	Movement, activity	0.00	0.00	1.00	2.00	1.00	0.00
	Cough	0.00	0.00	1.00	1.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	1.00	0.00	0.00
	Movement, activity	0.00	0.00	2.00	2.00	1.00	0.00
	Cough	0.00	0.00	1.00	1.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	1.00	0.00	0.00
	Movement, activity	0.00	0.00	2.00	2.00	1.00	0.00
Average	Cough	0.00	0.33±0.47	1.00	0.83±0.37	0.00	0.00
	Runny nose	0.00	0.22±0.42	1.33±0.47	1.17±0.37	0.00	0.00
	Movement, activity	0.00	0.67±0.67	1.83±0.37	1.83±0.37	1.00	0.00
G3 (Aged adult)	Cough	0.00	1.00	1.00	1.00	0.00	0.00
	Runny nose	0.00	0.00	2.00	2.00	1.00	0.00
	Movement, activity	0.00	0.00	2.00	1.00	1.00	0.00
	Cough	0.00	1.00	1.00	1.00		
	Runny nose	0.00	0.00	2.00	1.00		
	Movement, activity	0.00	1.00	2.00	2.00		
	Cough	0.00	0.00	1.00	1.00		
	Runny nose	0.00	0.00	2.00	1.00		
	Movement, activity	0.00	0.00	2.00	2.00		
	Cough	0.00	1.00				
	Runny nose	0.00	1.00				
	Movement, activity	0.00	2.00				
	Cough	0.00	1.00				
	Runny nose	0.00	1.00				
	Movement, activity	0.00	2.00				
	Cough	0.00	0.00	1.00	1.00		
	Runny nose	0.00	0.00	1.00	1.00		
	Movement, activity	0.00	0.00	2.00	2.00		
	Cough	0.00	0.00	1.00	1.00	0.00	0.00
	Runny nose	0.00	0.00	2.00	1.00	0.00	0.00
	Movement, activity	0.00	0.00	2.00	2.00	1.00	1.00
	Cough	0.00	0.00	1.00	1.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	1.00	1.00	1.00
	Movement, activity	0.00	0.00	2.00	2.00	1.00	1.00
	Cough	0.00	1.00				
	Runny nose	0.00	2.00				
	Movement, activity	0.00	2.00				
Average	Cough	0.00	0.56±0.50	1.00	1.00	0.00	0.00

Runny nose	0.00	0.44±0.68	1.67±0.47	1.17±0.37	0.67±0.47	0.33±0.47
Movement, activity	0.00	0.78±0.92	2.00	1.83±0.37	1.00	0.67±0.47

Observational clinical symptoms: Cough, rhinorrhea, movement, and activity.

Score: 0; normal, 1: occasional, mild reduced activity, 2: frequent, reduced activity.

* Scores were measured by observation of clinical symptoms for at least 20 minutes in each group of ferrets based on the following criteria: Cough: 0; no evidence of cough, 1; occasional cough, 2; frequent cough (score 2).

Rhinorrhea: 0; no nasal rattling or sneezing, 1; moderate nasal discharge on external nares, 2; severe nasal discharge on external nares.

Movement, activity: 0; normal movement and activity, 1; mild reduced movement and activity, 2; evidence of reduced movement and activity.

Table S2. Clinical symptom score in contact group ferrets.

Group		0dpc	1dpc	3dpc	5dpc	7dpc	9dpc	11dpc
G1 (Juvenile)	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G2 (Young adult)	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	1.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	1.00	0.00	0.00	0.00	0.00
	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	0.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	1.00	1.00	0.00	0.00	0.00
	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Average	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	0.67±0.47	0.33±0.47	0.00	0.00	0.00
	Movement, activity	0.00	0.00	1.00	0.33±0.47	0.00	0.00	0.00
G3 (Aged adult)	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	1.00	1.00	0.00	0.00
	Movement, activity	0.00	0.00	1.00	2.00	1.00	0.00	0.00
	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	1.00	0.00	0.00	0.00
	Movement, activity	0.00	0.00	1.00	1.00	1.00	0.00	0.00
	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	2.00	1.00	0.00	0.00
	Movement, activity	0.00	0.00	1.00	1.00	1.00	0.00	0.00
Average	Cough	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Runny nose	0.00	0.00	1.00	1.33±0.47	0.67±0.47	0.00	0.00
	Movement, activity	0.00	0.00	1.00	1.33±0.47	1.00	0.00	0.00

Observational clinical symptoms: Cough, rhinorrhea, movement, and activity.

Score: 0; normal, 1: occasional, mild reduced activity, 2: frequent, reduced activity.

* Scores were measured by observation of clinical symptoms for at least 20 minutes in each group of ferrets based on the following criteria: Cough: 0; no evidence of cough, 1; occasional cough, 2; frequent cough (score 2).

Rhinorrhea: 0; no nasal rattling or sneezing, 1; moderate nasal discharge on external nares, 2; severe nasal discharge on external nares.

Movement, activity: 0; normal movement and activity, 1; mild reduced movement and activity, 2; evidence of reduced movement and activity.

Table S3. Genes used In principal component analysis (PCA)

PC1	PC2
<i>CLCA1</i>	<i>RSAD2</i>
<i>DNAH9</i>	<i>ISG15</i>
<i>MUC5AC</i>	<i>MX1</i>
<i>BPIFB1</i>	<i>IFIT3</i>
<i>HBB</i>	<i>CMPK2</i>
<i>CDHR4</i>	<i>DHX58</i>
<i>ERICH3</i>	<i>OAS3</i>
<i>CFAP43</i>	<i>IFI6</i>
<i>ECT2L</i>	<i>USP18</i>
<i>HBA2</i>	<i>MX2</i>
<i>DNAH5</i>	<i>OAS1</i>
<i>LPO</i>	<i>OASL</i>
<i>DNAH10</i>	<i>APOBEC3G</i>
<i>CFAP65</i>	<i>HERC6</i>
<i>DNAH1</i>	<i>UBA7</i>
<i>ERN2</i>	<i>DDX58</i>
<i>TMC5</i>	<i>IFIT2</i>
<i>VMO1</i>	<i>IRF7</i>
<i>CAPS</i>	<i>RNF213</i>
<i>MAPK15</i>	<i>DDX60</i>
<i>AGR2</i>	<i>SAMD9L</i>
<i>RSPH1</i>	<i>GBP1</i>
<i>EML6</i>	<i>IFIH1</i>
<i>GP2</i>	<i>HERC5</i>
<i>BPIFA1</i>	<i>NLRC5</i>
<i>LAYN</i>	<i>CXCL10</i>
<i>CPA3</i>	<i>IFI44</i>
<i>DRC7</i>	<i>CXCL11</i>
<i>FOXJ1</i>	<i>IFI44L</i>
<i>DNAH11</i>	<i>SAMHD1</i>
<i>DNAI2</i>	<i>PARP14</i>
<i>DNAH7</i>	<i>BATF2</i>
<i>SPAG6</i>	<i>LGALS9C</i>
<i>ACE</i>	<i>UBE2L6</i>
<i>HYDIN</i>	<i>TRANK1</i>
<i>MUC13</i>	<i>STAT1</i>
<i>CCDC114</i>	<i>TRIM6-TRIM34</i>
<i>TFF3</i>	<i>EPSTI1</i>
<i>AK7</i>	<i>DTX3L</i>
<i>SCGB3A1</i>	<i>C3</i>
<i>CCDC180</i>	<i>LGALS3BP</i>
<i>CFAP52</i>	<i>TRIM22</i>
<i>LRRC43</i>	<i>ZNFX1</i>
<i>TTLL10</i>	<i>BST2</i>
<i>NME9</i>	<i>PYHIN1</i>
<i>TTC21A</i>	<i>C4A</i>
<i>VWA3A</i>	<i>NT5C3A</i>
<i>CCDC146</i>	<i>PARP12</i>
<i>STMND1</i>	<i>PARP15</i>
<i>CCDC40</i>	<i>ZBP1</i>
<i>UBXN10</i>	<i>OAS2</i>
<i>WDR63</i>	<i>EIF2AK2</i>
<i>CFAP45</i>	<i>PML</i>
<i>COL15A1</i>	<i>ETV7</i>

FAM216B
DNAAF1
SLC44A4
C17orf97
WDR38
COL1A1
CSF3R
DNAH6
VWA3B
CAPSL
WDR66
ANKMY1
CFAP46
PLEKHS1
ZCCHC18
SNTN
CFAP126
CDHR3
APOA1
FRMPD2
ALAS2
DCDC2
ACOD1
TMEM2
COL3A1
CFAP99
FAM183A
CATIP
CFAP157
LRRC23
TOGARAM2
ALS2CR12
PTN
AC010255.3
MAP3K19
THBD

NUP153
AEBP1
HSH2D
HELZ2
PARP9
IL4I1
IFIT5
HLA-DQA1
PARM1
AC104389.5
PRG4
STAT2
C19orf66
IGHA2
APOL5
CHIT1
SIGLEC1
SP100
PLSCR1
TRIM25
ERAP2
TDRD7
RTP4

Table S4. A list of differentially expressed genes (DEGs)

[at 2 dpi]

Common	Juvenile	Young Adult	Aged
ZBP1	CCNJL	RARRES1	CA10
MX1	EPHA5	ESCO2	DNTT
RSAD2	BTNL9	CCL22	MUC5AC
MX2	CAV3	DDIAS	ISLR2
EBF2	GPX6	TMEM255B	KIAA1024
BTNL2	OSM	WNT5B	TTLL8
ACOD1	SORCS1	C10ORF99	BST2
SHISA3	LYZ	PAX5	ZNFX1
TMEM81	L1CAM	RBP5	FSHR
LGALS9C	SLC5A7	TMIGD2	TLR7
PML	GLTPD2	SIGLEC1	CLEC4F
CXCL10	EEF1A2	PAX8	MS4A2
IFI44L	COL3A1	ESPL1	HIST1H4E
SLFN14	LRIT3	LGSN	RIPOR3
CXCL11	MGAM2	FXVD2	TENM2
MYL7	CILP	LY6E	ST6GALNAC1
FAP	COL5A3	CDK1	CSF3R
CLEC4G	APLNR	MXRA5	CRYBG2
CD177	TFF2	KCNK2	C3AR1
TELOMERASE-VERT	MYH6	SCG3	TRAV21
TUBB1	SNAP25	LY6H	KRT24
TRANK1	IGHV7-4-1	ACOT6	VWCE
NUGGC	ITIH3	CDKN3	NLRC5
TNF	TNFAIP6	HIST1H4G	EPX
IFI6	NRK	SHOX2	XKRX
SAMD9L	LMOD2	SKA1	ACP7
UBE2L6	KRT23	CRABP2	S100A12
ASB16	ATP1A2	SECTM1	BATF2
HERC6	ADAMTS17	NOXO1	PIANP
HERC5	COMP	NCAPG	TTC36
CAPN9	CSRP3	C12ORF40	EN1
LY6G6C	ZSCAN10	C4A	KIAA1683
GBP1	DHRS7C	TRIM9	LMTK3
HES4	UCP3	CREB3L1	OMG
EPSTI1	ADORA1	TCTEX1D1	KIR3DL3
CPA3	HMCN2	LBP	GPR142
FER1L6	AL662899.1	ADAD1	CHIT1
APOBEC3G	CD300LG	OTX2	TREML1
DDX58	C10ORF90	MB21D1	ADGRF1
LVRN	ST18	NOTO	TCN1
EPHX4	SYT4	CPA4	PADI4
ISG15	CPA1	BATF3	IL17F
PARP15	TNNC1	GZMA	CDH17
IFI44	PLA2G4D	LY86	LTF
PARP14	TDRD9	TVP23A	RHAG
BPIFB1	ANK1	HTR3A	CHST4
WBSCR17	GJB1	SERPINB7	CEBPE
NT5C3A	PPP1R1A	XKR9	ELFN1
CRISP3	PLP1	PARP12	RAB44
PARM1	PADI1	ISG20	IL12B
LGALS3BP	SERPINB11	SPC24	RAG2
IL5RA	SLC22A1	APOC1	

IFIT5	COL15A1	CD8B
LPO	CD1C	GLRB
IFIT2	RLBP1	MAP7D2
GATA1	THBS4	DNASE1L3
IFIT3	SLC6A5	MXD3
DDX60	NPPC	SPC25
RNF213	EGFLAM	AC104389.5
HELZ2	MMP27	ANKRD33B
BPIFA1	CHSY3	GRIA2
TDO2	NPPA	COL19A1
CLCA1	UGT1A6	RTP4
RAG1	CYTL1	TRIM71
MMP8	MYOZ2	LRR1
DTX3L	CSMD2	CDCA8
EIF2AK2	GABRD	PKMYT1
PYHIN1	UGT1A8	GPR83
OAS1	GPIHBP1	TMEM221
MMP9	TCP11	IL4I1
ETV7		LIPG
CYP26A1		CCNB3
OAS2		C5
OAS3		PLAC8
IRF7		CCL8
TFF1		GJA3
UBA7		PI3
DUOX2		TREX1
OTOG		OIP5
CPXM1		HOXC9
TRIM6-TRIM34		
CAMP		
NTRK1		
STAT1		
TIMD4		
GPR31		
C1QTNF3-AMACR		
PARP9		
5S_RRNA_23163		
NLRP14		
F9		
HSH2D		
CMPK2		
SERPINC1		
HDC		
CD5L		
USP18		
OASL		
SAMHD1		
IFIH1		
CLEC1B		
DHX58		
AGR2		
TRIM22		

[at 5 dpi]

Common	Juvenile	Young Adult	Aged
LUM	EPHA7	ZBP1	RARRES1
MMP8	MMP1	IL10	CA10
MX1	GPX6	CD70	CCL22
TMEM255B	TM4SF4	MACC1	CNTN6
DTX3L	SORCS1	PAX5	KCNIP3
EIF2AK2	LYZ	MYBPC1	AMBN
RSAD2	L1CAM	PLXDC1	ETV7
WNT5B	EMCN	ETNPPL	SFRP5
MX2	AZGP1	LGALS9C	CYP26A1
PYHIN1	COL3A1	DISP2	LRFN5
KERA	MFAP2	RBP7	MANSC4
SHISA3	SCN10A	DPM3	IFNG
OAS1	ELF5	TMIGD2	CD207
MMP9	LIX1	LGALS12	ATP13A5
IFI44L	COL5A3	SIGLEC1	MKX
MYL7	TFF2	CILP	PDCD1
OAS3	ACOT1	FXYD2	CD69
FAP	DSG3	LY6E	LY6H
MYL4	TFF1	MELTF	VIP
TFF3	MS4A2	ATP13A4	KANK4
ARPP21	SNAP25	THRSP	AC090227.1
SCG2	ST6GALNAC1	COX20	LNP1
MXRA5	TNFAIP6	ACOT6	CRYBG2
KCNK2	NRK	S100A9	ANKRD35
SCG3	HEPACAM2	S100A8	CD80
CLEC4G	TRANK1	VIT	NOXO1
C17ORF78	KRT23	RAMP3	C4BPB
CD177	MPO	RBPJL	HTR2B
TELOMERASE-VERT	CXCL14	NYAP2	THY1
RETNLB	SNX31	DGKB	UBE2L6
UBA7	EPX	HAAO	C4A
AC140504.1	ADCY8	UCP2	SLC5A5
IFI6	ADAMTS12	JCHAIN	CLGN
SAMD9L	HAPLN3	OC90	SLC22A13
HERC6	ADAMTS17	SLC7A4	PROKR1
HERC5	CAPN9	NEURL1B	THPO
CA4	MDK	DUOX2	FLRT1
FAM196B	TNN	MAP1LC3C	C10ORF10
TRIM6-TRIM34	HAS2	CA6	GBP1
PCK1	CD300LB	MALRD1	NXPH2
EPSTI1	SLC26A10	SPP1	TINAG
CAMP	FCER1A	S100A12	SLC25A48
GPR158	CPXM1	PLK5	CTBS
APOBEC3G	OTX2	BATF3	CCDC30
DDX58	GPC5	P2RY12	GPR39
TIMD4	CPA3	CDKN2A	RIC3
ISG15	ST18	LRRRC75B	IL33
PARP15	CUBN	PVRIG	LGI1
IFI44	KCNK13	GZMA	CGREF1
PARP9	LVRN	EPHX4	TMPRSS11A
PARP14	PLA2G4D	XKR9	SCD5
BPIFB1	DDX11	CHIT1	PPBP
PARP12	ANXA10	SULT2B1	ADGRF1
NLRP14	SHCBP1	DHRS9	TCN1

NA	RFLNB	APOC1	STAC2
NT5C3A	GJB1	COL8A1	ACSBG1
GAP43	F9	PADI4	CDH16
HSH2D	RIT2	DNASE1L3	AC104389.5
KLHDC8A	KIT	MATN4	IL7R
CMPK2	GLRB	SLC22A1	GRIA2
PCOLCE2	CD226	CYGB	GSG1L2
LTF	PLCB1	CYSRT1	COL19A1
ZNF215	PADI1	RIMS3	C1R
FGF13	SERPINB11	RAB42	SERPINC1
SPC25	LY6L	PLAC1	DOC2A
CRISP3	CFI	PWWP2B	C1S
CCL13	PCDH12	TREX1	SEMA3E
RTP4	COL15A1	MUC15	PLA2G7
LGALS3BP	COL11A2	GYG2	LYPD6
IFIT5	HDC	NKAIN1	GPR83
ABCA13	IL5RA		SAMHD1
IFIT2	LPO		NDST3
USP18	C1ORF54		CLEC1B
OASL	CD1C		PLAC8
IFIT3	PCDH17		RGS1
DDX60	RNF213		KCNMB2
IFIH1	ADAMTS6		PTCHD1
BPIFA1	THBD		AP1S3
DHX58	EDNRB		ENPP3
PI3	CHSY3		ANKRD55
PGLYRP1	C1QTNF6		OLR1
TRIM22	TESPA1		
	PDGFD		
	UGT1A6		
	SLITRK6		
	CLCA1		
	NOS2		
	TRPM6		
	EPHB2		
	AHSP		
	GABRD		
