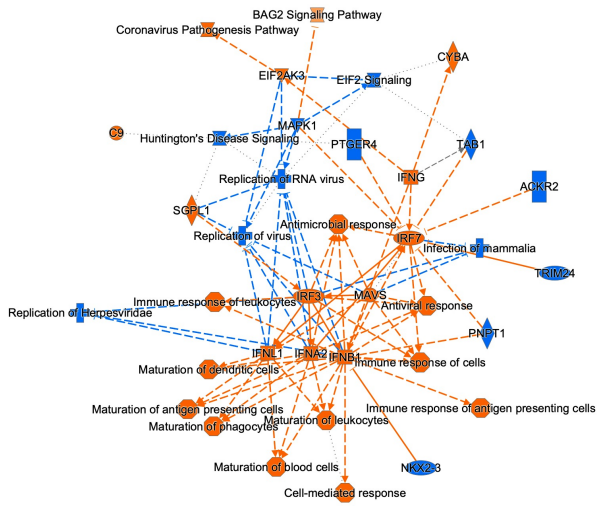
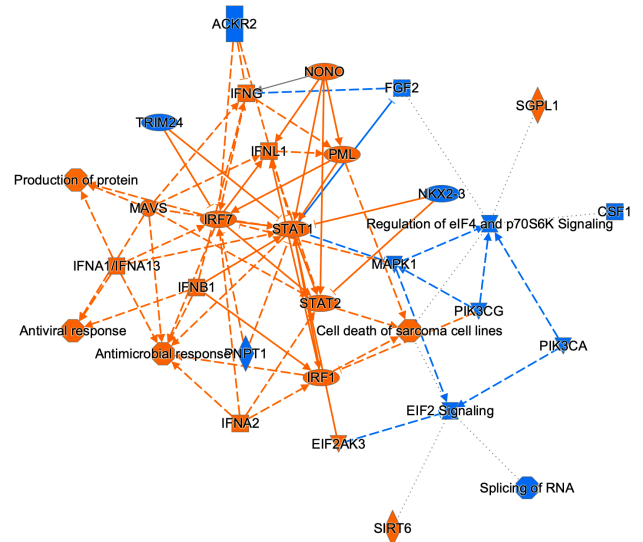


Supplemental Figure 1: Differential gene expression analysis, day 2 post SARS-CoV-2 challenge. The top 20 differentially expressed genes observed to be higher in unvaccinated animals than in the 30ug mRNA-1273 vaccinated animals on day 2 post challenge are shown in red. The top 20 differentially expressed genes observed to be higher in the 30ug mRNA-1273 vaccinated animals than in the unvaccinated animals on day 2 post challenge are shown in green.

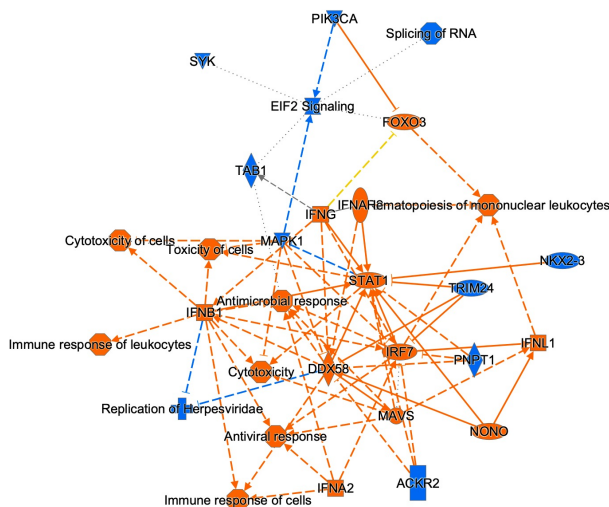
Myeloid cells



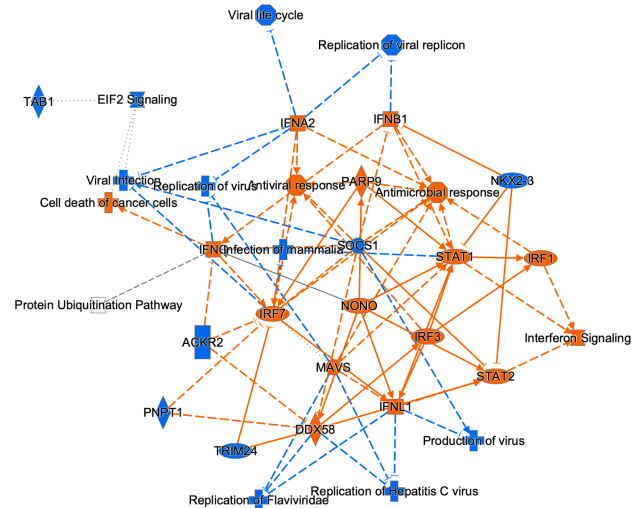
Dendritic cells



Lymphocytes

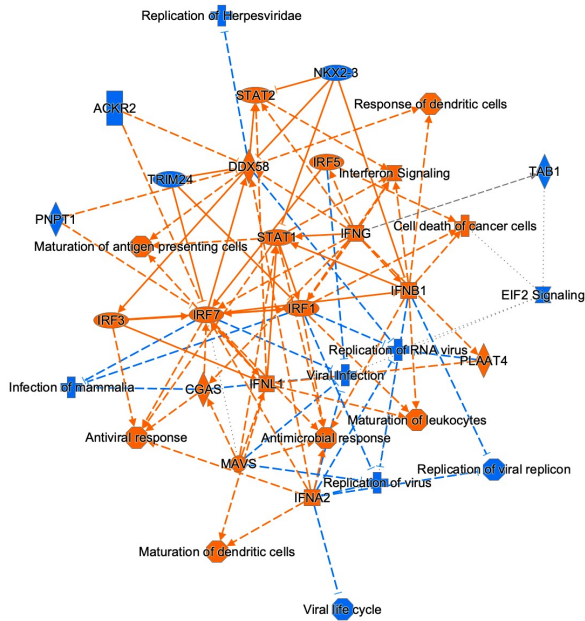


Epithelial cells

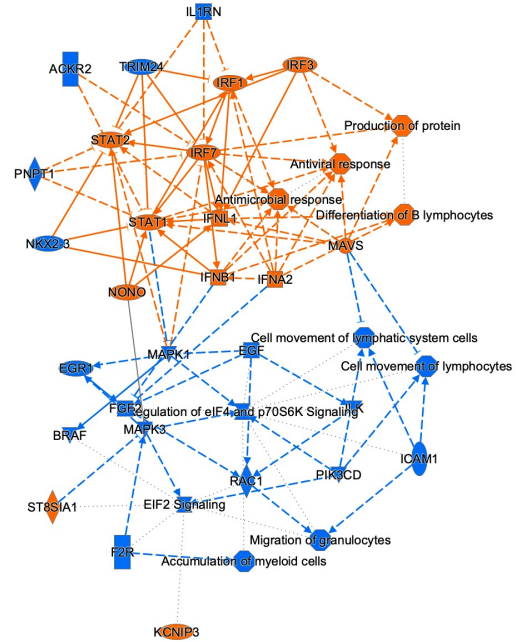


Supplemental Figure 2: Graphical summary of cell signaling networks impacted by SARS-CoV-2 infection in unvaccinated animals (day 2 post challenge) relative to uninfected animals. Differential gene expression analysis was performed to identify genes induced or suppressed by SARS-CoV-2 infection relative to uninfected animals. The resultant differentially expressed genes were analyzed using the Ingenuity Pathway Analysis (IPA) software package. **Orange nodes:** cell processes activated by SARS-CoV-2 infection relative to uninfected animals. **Blue nodes:** cell processes inhibited by SARS-CoV-2 infection relative to uninfected animals. **Orange lines:** interactions that lead to activation of connected nodes. **Blue line:** interactions that lead to inhibition of connected nodes. **Solid line:** direct interaction. **Dashed line:** indirect interaction.

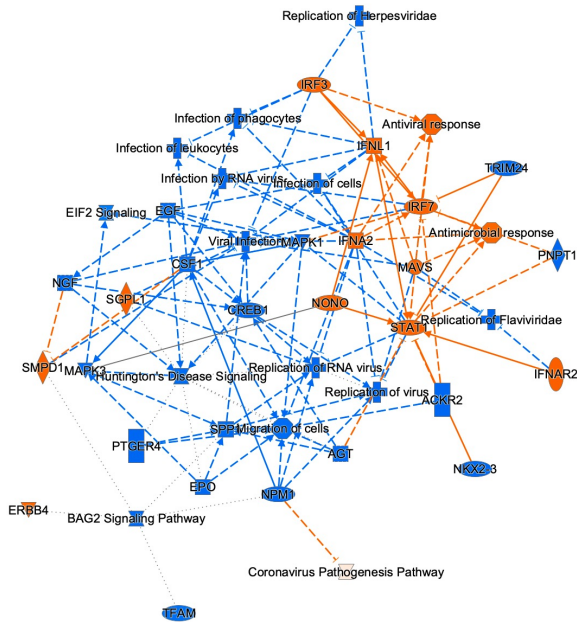
Myeloid cells



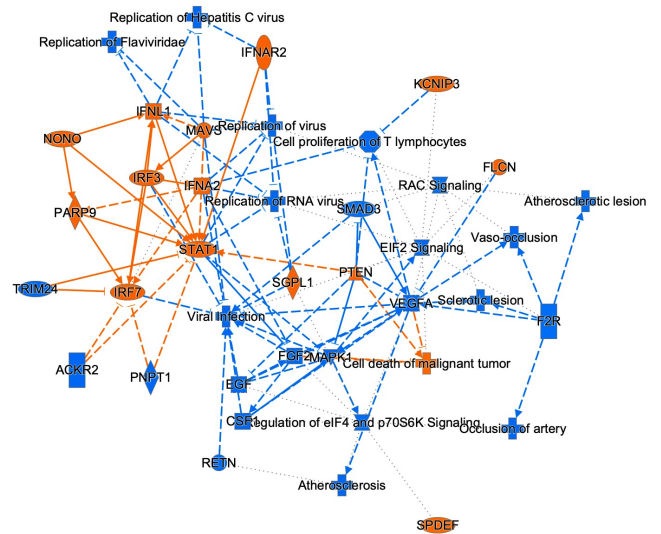
Dendritic cells



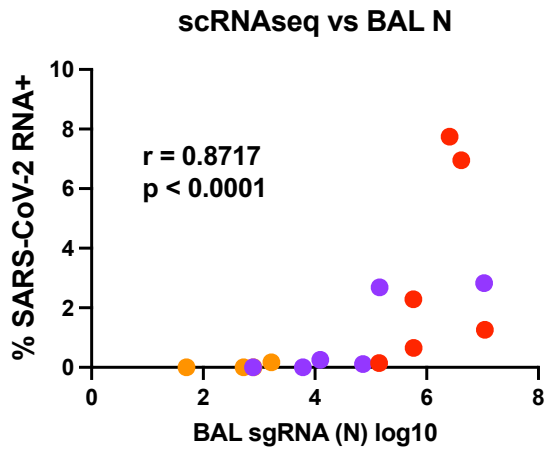
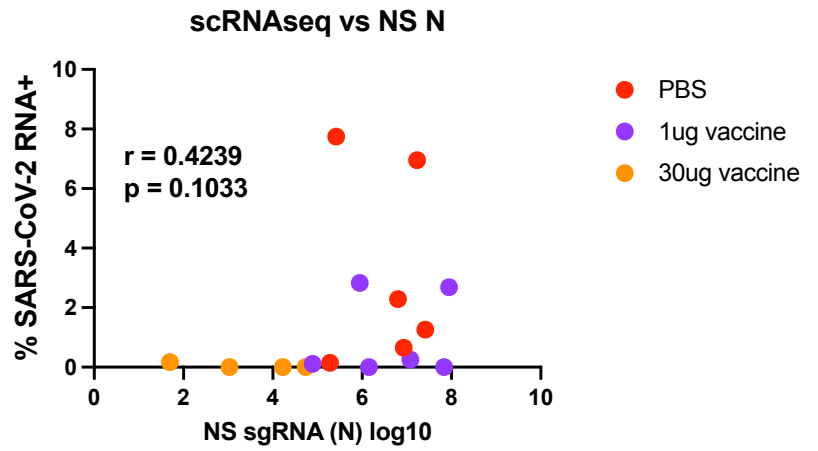
Lymphocytes



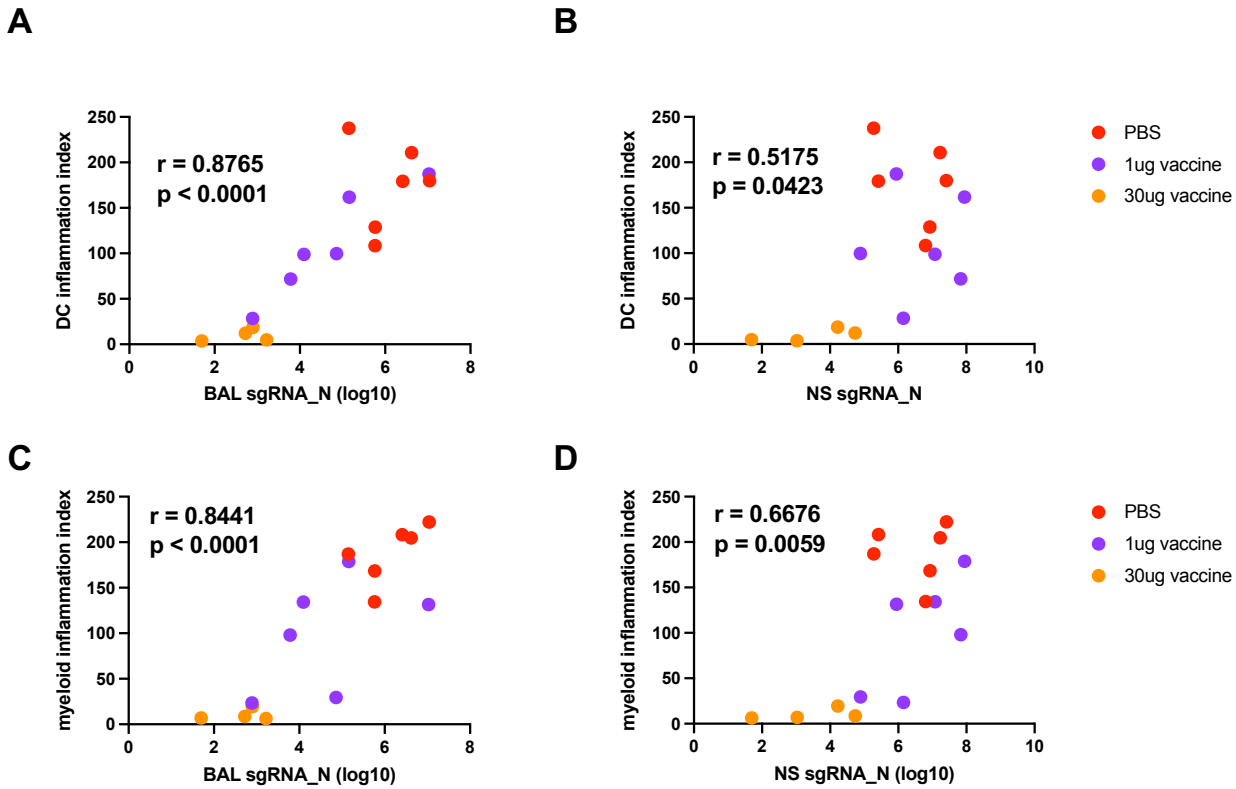
Epithelial cells



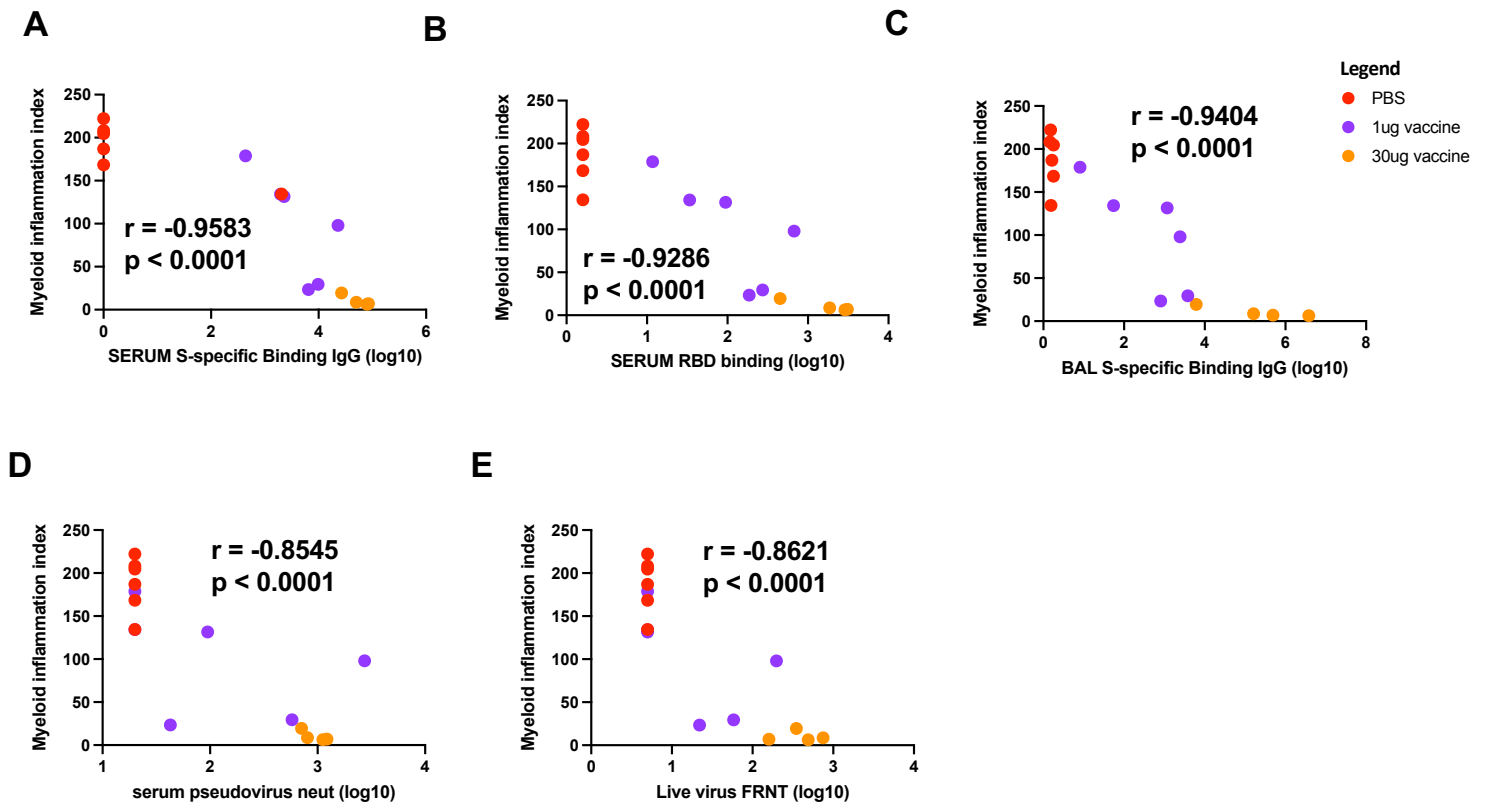
Supplemental Figure 3: Graphical summary of cell signaling networks impacted by SARS-CoV-2 infection in unvaccinated animals (day 2 post challenge) relative to vaccinated animals (day 2 post infection). Differential gene expression analysis was performed to identify genes induced or suppressed by SARS-CoV-2 infection relative to animals who were fully vaccinated and challenged with the same dose of SARS-CoV-2. The resultant differentially expressed genes were analyzed using the Ingenuity Pathway Analysis (IPA) software package. **Orange nodes:** cell processes activated by SARS-CoV-2 infection relative to un-infected animals. **Blue nodes:** cell processes inhibited by SARS-CoV-2 infection relative to un-infected animals. **Orange lines:** interactions that lead to activation of connected nodes. **Blue line:** interactions that lead to inhibition of connected nodes. **Solid line:** direct interaction. **Dashed line:** indirect interaction.

A**B**

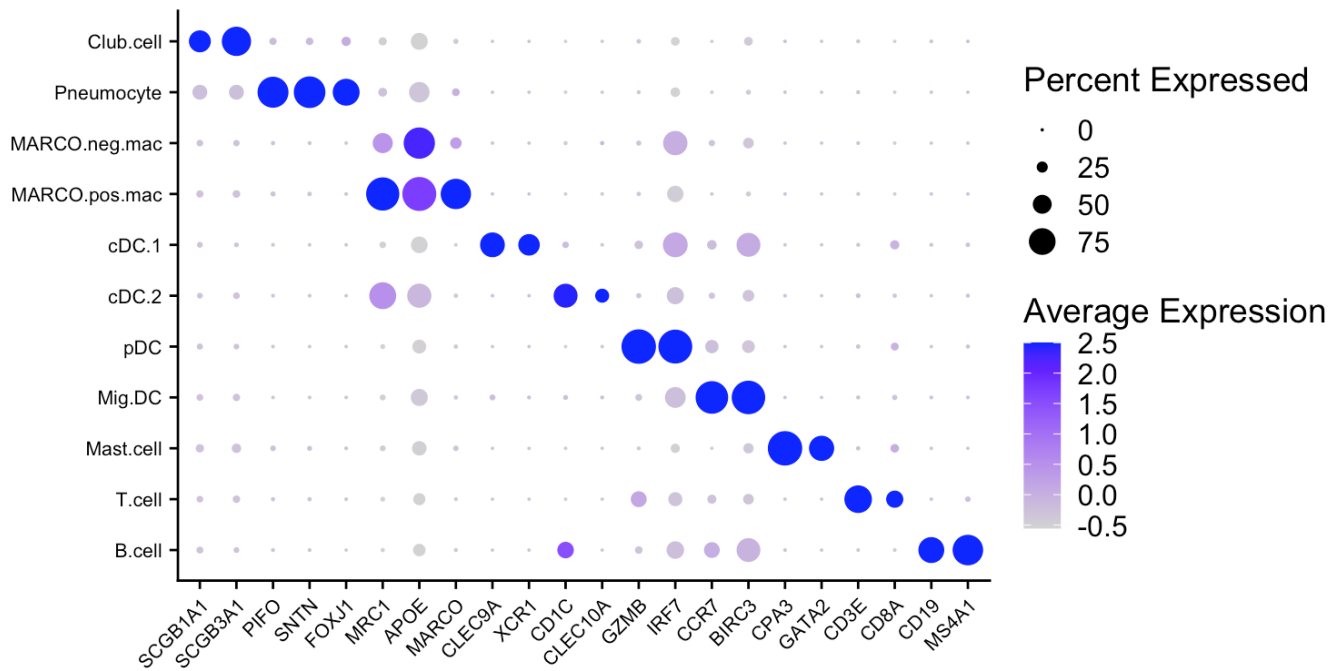
Supplemental Figure 4: Relationship between PCR and scRNAseq viral loads, day 2 post challenge. A) Relationship between BAL RNA load (N) and frequency of SARS-CoV-2 RNA+ cells. B) Relationship between NS RNA load (N) and frequency of SARS-CoV-2 RNA+ cells. Spearman correlation



Supplemental Figure 5: viral load vs inflammation scores, day 2 post infection. A) DC Inflammation index score vs BAL sgRNA (N gene). **B)** DC Inflammation index score vs NS sgRNA (N gene). **C)** Macrophage Inflammation index score vs BAL sgRNA (N gene). **D)** Macrophage Inflammation index score vs NS sgRNA (N gene). Spearman correlation

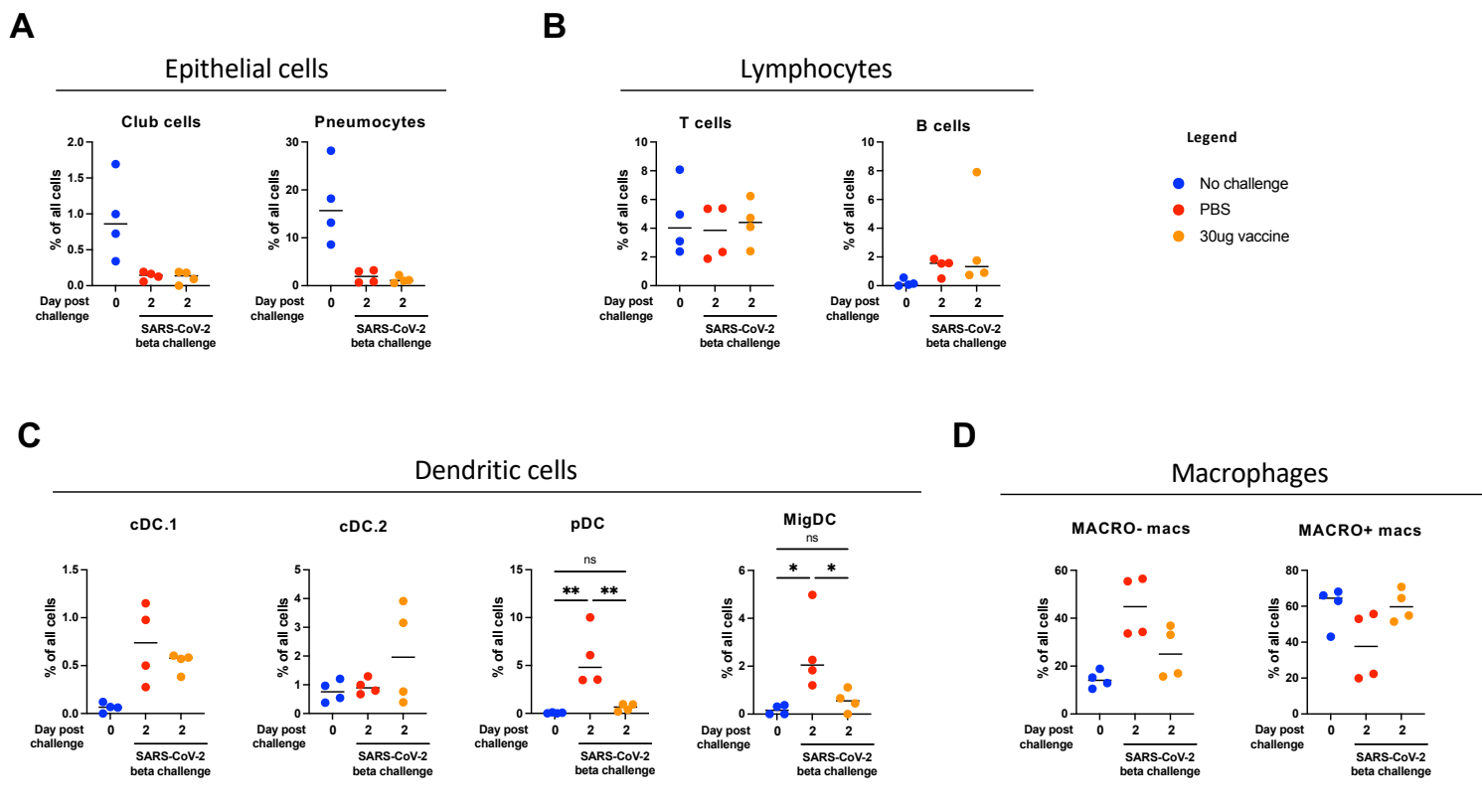


Supplemental Figure 6. Relationship between antibody titers and SARS-CoV-2 elicited inflammation. **A)** Relationship between pre-challenge serum S-specific IgG titers (wk 8 post vaccination) and myeloid inflammation on day 2 post challenge. **B)** Relationship between pre-challenge serum RBD-specific IgG titers (wk 8 post vaccination) and myeloid inflammation on day 2 post challenge. **C)** Relationship between pre-challenge BALF S-specific IgG titers (wk 6 post vaccination) and myeloid inflammation on day 2 post challenge. **D)** Relationship between pre-challenge serum pseudovirus neut titers titers (wk 8 post vaccination) and myeloid inflammation on day 2 post challenge. **E)** Relationship between pre-challenge serum live virus FRNT (wk 8 post vaccination) and myeloid inflammation on day 2 post challenge. Spearman correlation



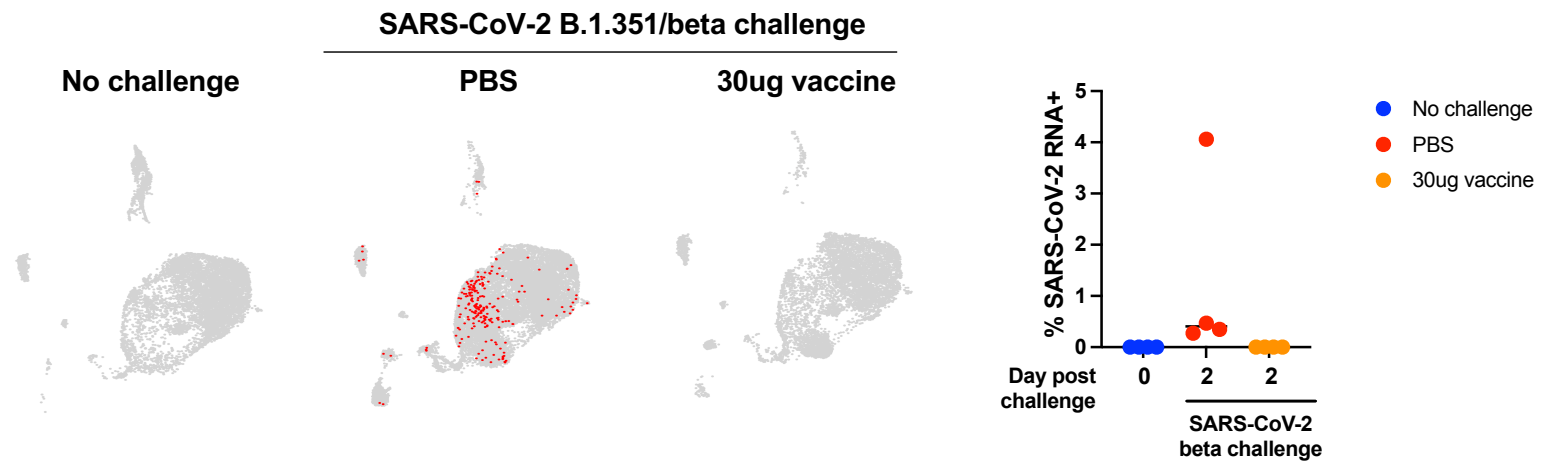
Supplemental Figure 7: identification and quantification of BALF cells by scRNAseq.

Expression of key lineage specific genes in all annotated cell types in BALF collected post SARS-CoV-2 strain B.1.351/beta challenge



Supplemental Figure 8: identification and quantification of BALF cells by scRNAseq following B.1.351/beta infection. A) Frequency of epithelial cell populations. B) Frequency of lymphocyte cell populations. C) Frequency of dendritic cell populations. D) Frequency of macrophage populations. ** p < 0.01, * p < 0.05, one-way ANOVA with correction for multiple comparisons

A) B)



Supplemental Figure 9: identification and quantification of SARS-CoV-2 B.1.351/beta variant RNA⁺ cells. A) Location of SARS-CoV-2 RNA⁺ cells. B) Frequency of SARS-CoV-2 RNA⁺ cell following SARS-CoV-2 B.1.351 challenge

Supplemental Table 1: Cellular networks impacted by SARS-CoV-2 infection within myeloid cells in unvaccinated animals (day 2 post challenge) relative to un-infected animals

Ingenuity Canonical Pathways	-log(p-value)	Ratio	z-score
EIF2 Signaling	5.06E+01	3.97E-01	-5.461
BAG2 Signaling Pathway	2.67E+01	4.76E-01	0.905
Coronavirus Pathogenesis Pathway	2.52E+01	2.91E-01	2.517
FAT10 Signaling Pathway	2.47E+01	5.71E-01	1
Mitochondrial Dysfunction	1.99E+01	2.81E-01	NaN
Huntington's Disease Signaling	1.94E+01	2.19E-01	-2.5
Oxidative Phosphorylation	1.83E+01	3.33E-01	0.164
Regulation of eIF4 and p70S6K Signaling	1.82E+01	2.63E-01	-0.632
Sirtuin Signaling Pathway	1.80E+01	2.09E-01	0.905
mTOR Signaling	1.58E+01	2.26E-01	-0.5
Inhibition of ARE-Mediated mRNA Degradation Pathway	1.54E+01	2.55E-01	0
Protein Ubiquitination Pathway	1.54E+01	2.00E-01	NaN
Role of Hypercytokinemia/hyperchemokineemia in the Pathogenesis of Influenza	1.46E+01	3.37E-01	5.014
Role of PKR in Interferon Induction and Antiviral Response	1.42E+01	2.65E-01	2.414
Interferon Signaling	1.28E+01	5.00E-01	3.153
Glucocorticoid Receptor Signaling	1.15E+01	1.34E-01	NaN
TREM1 Signaling	1.14E+01	3.12E-01	3.838
Estrogen Receptor Signaling	1.06E+01	1.47E-01	0.801
Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	1.02E+01	1.94E-01	2.959
NRF2-mediated Oxidative Stress Response	9.05E+00	1.69E-01	0.408
Unfolded protein response	9.00E+00	2.56E-01	1.807
Acute Phase Response Signaling	8.77E+00	1.84E-01	2.353
Activation of IRF by Cytosolic Pattern Recognition Receptors	8.61E+00	2.92E-01	1.698
HIF1 α Signaling	8.51E+00	1.73E-01	1.029
iNOS Signaling	8.42E+00	3.40E-01	2.309
Death Receptor Signaling	8.41E+00	2.40E-01	2.065
Hepatic Fibrosis Signaling Pathway	8.28E+00	1.33E-01	1.54
LXR/RXR Activation	8.17E+00	2.11E-01	-0.229
Ferroptosis Signaling Pathway	8.13E+00	2.05E-01	-0.392
Neuroinflammation Signaling Pathway	8.11E+00	1.45E-01	4.111

Supplemental Table 2: Cellular networks impacted by SARS-CoV-2 infection within Dendritic Cells in unvaccinated animals (day 2 post challenge) relative to un-infected animals

Ingenuity Canonical Pathways	-log(p-value)	Ratio	z-score
EIF2 Signaling	3.52E+01	4.20E-01	-5.181
Mitochondrial Dysfunction	2.47E+01	4.04E-01	NaN
Oxidative Phosphorylation	2.06E+01	4.50E-01	2.263
Huntington's Disease Signaling	1.84E+01	2.90E-01	-0.6
Regulation of eIF4 and p70S6K Signaling	1.76E+01	3.41E-01	-2.138
FAT10 Signaling Pathway	1.74E+01	5.71E-01	0.447
Coronavirus Pathogenesis Pathway	1.71E+01	3.20E-01	0.126
Protein Ubiquitination Pathway	1.69E+01	2.84E-01	NaN
BAG2 Signaling Pathway	1.68E+01	4.64E-01	1.387
Sirtuin Signaling Pathway	1.64E+01	2.74E-01	-0.651
Inhibition of ARE-Mediated mRNA Degradation Pathway	1.53E+01	3.35E-01	-0.756
mTOR Signaling	1.31E+01	2.83E-01	-0.816
Estrogen Receptor Signaling	1.21E+01	2.20E-01	1.432
Role of PKR in Interferon Induction and Antiviral Response	1.07E+01	3.09E-01	0
CLEAR Signaling Pathway	1.01E+01	2.32E-01	1.364
Phagosome Maturation	1.00E+01	2.83E-01	NaN
Glucocorticoid Receptor Signaling	9.26E+00	1.84E-01	NaN
PI3K/AKT Signaling	9.06E+00	2.51E-01	-0.354
Interferon Signaling	8.77E+00	5.00E-01	3.153
Unfolded protein response	8.76E+00	3.33E-01	1.698
Insulin Secretion Signaling Pathway	8.70E+00	2.23E-01	4.648
Role of Hypercytokinemia/hyperchemokineemia in the Pathogenesis of Influenza	8.62E+00	3.37E-01	2.785
Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	7.78E+00	2.41E-01	-1.372
FcγR Receptor-mediated Phagocytosis in Macrophages and Monocytes	7.63E+00	3.09E-01	0.186
HER-2 Signaling in Breast Cancer	7.47E+00	2.25E-01	0.295
Hypoxia Signaling in the Cardiovascular System	7.28E+00	3.29E-01	1
Toll-like Receptor Signaling	7.03E+00	3.21E-01	0
ERK/MAPK Signaling	6.92E+00	2.22E-01	-0.48
Actin Cytoskeleton Signaling	6.76E+00	2.12E-01	-0.926
Necroptosis Signaling Pathway	6.61E+00	2.42E-01	2.596

Supplemental Table 3: Cellular networks impacted by SARS-CoV-2 infection within lymphocytes in unvaccinated animals (day 2 post challenge) relative to un-infected animals

Ingenuity Canonical Pathways	-log(p-value)	Ratio	z-score
EIF2 Signaling	2.72E+01	2.99E-01	-3.244
FAT10 Signaling Pathway	2.49E+01	5.89E-01	0
BAG2 Signaling Pathway	2.41E+01	4.64E-01	0
Inhibition of ARE-Mediated mRNA Degradation Pathway	1.88E+01	2.92E-01	-2.132
Coronavirus Pathogenesis Pathway	1.86E+01	2.61E-01	0.42
Huntington's Disease Signaling	1.69E+01	2.16E-01	-0.832
Mitochondrial Dysfunction	1.61E+01	2.63E-01	NaN
Sirtuin Signaling Pathway	1.56E+01	2.05E-01	1.605
Oxidative Phosphorylation	1.53E+01	3.15E-01	-0.845
Protein Ubiquitination Pathway	1.50E+01	2.07E-01	NaN
Death Receptor Signaling	1.39E+01	3.23E-01	1.347
PI3K Signaling in B Lymphocytes	1.17E+01	2.45E-01	2.414
Glucocorticoid Receptor Signaling	1.13E+01	1.41E-01	NaN
Role of PKR in Interferon Induction and Antiviral Response	1.02E+01	2.35E-01	1.134
Regulation of eIF4 and p70S6K Signaling	9.96E+00	2.07E-01	-1.897
Interferon Signaling	9.92E+00	4.44E-01	2.84
Apoptosis Signaling	9.77E+00	2.60E-01	0
Activation of IRF by Cytosolic Pattern Recognition Receptors	9.67E+00	3.23E-01	1.606
Estrogen Receptor Signaling	9.11E+00	1.47E-01	0.667
Role of Hypercytokinemia/hyperchemokineemia in the Pathogenesis of Influenza	8.70E+00	2.67E-01	3.962
Natural Killer Cell Signaling	8.61E+00	1.86E-01	1.029
Primary Immunodeficiency Signaling	8.34E+00	3.21E-01	NaN
JAK/STAT Signaling	7.64E+00	2.56E-01	1.606
TNFR2 Signaling	7.59E+00	4.06E-01	1.265
Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	7.47E+00	1.78E-01	1.512
mTOR Signaling	7.33E+00	1.70E-01	-1.155
HER-2 Signaling in Breast Cancer	7.03E+00	1.63E-01	2
Sumoylation Pathway	6.46E+00	2.14E-01	0.258
Induction of Apoptosis by HIV1	6.45E+00	2.62E-01	-1.069
Ferroptosis Signaling Pathway	6.19E+00	1.89E-01	-0.816

Supplemental Table 4: Cellular networks impacted by SARS-CoV-2 infection within epithelial cells in unvaccinated animals (day 2 post challenge) relative to un-infected animals

Ingenuity Canonical Pathways	-log(p-value)	Ratio	z-score
EIF2 Signaling	2.79E+01	2.46E-01	-4.596
Coronavirus Pathogenesis Pathway	1.37E+01	1.77E-01	0.667
Protein Ubiquitination Pathway	1.03E+01	1.35E-01	NaN
Oxidative Phosphorylation	8.79E+00	1.89E-01	-0.218
Interferon Signaling	8.23E+00	3.33E-01	3.317
Mitochondrial Dysfunction	7.91E+00	1.46E-01	NaN
BAG2 Signaling Pathway	7.70E+00	2.02E-01	1.414
Role of Hypercytokinemia/hyperchemokineemia in the Pathogenesis of Influenza	7.54E+00	1.98E-01	3.638
Sirtuin Signaling Pathway	7.36E+00	1.13E-01	-0.6
Regulation of eIF4 and p70S6K Signaling	6.89E+00	1.34E-01	NaN
FAT10 Signaling Pathway	6.77E+00	2.32E-01	NaN
Huntington's Disease Signaling	6.65E+00	1.10E-01	-1.414
mTOR Signaling	6.63E+00	1.23E-01	-0.816
Role of PKR in Interferon Induction and Antiviral Response	5.86E+00	1.40E-01	0.688
Unfolded protein response	5.73E+00	1.67E-01	3.317
Activation of IRF by Cytosolic Pattern Recognition Receptors	5.18E+00	1.85E-01	1.155
Antigen Presentation Pathway	4.84E+00	2.31E-01	NaN
Glucocorticoid Receptor Signaling	4.03E+00	7.23E-02	NaN
Putrescine Degradation III	3.83E+00	2.73E-01	-2.449
NRF2-mediated Oxidative Stress Response	3.82E+00	9.28E-02	0.258
Aryl Hydrocarbon Receptor Signaling	3.80E+00	1.07E-01	0.632
Telomere Extension by Telomerase	3.72E+00	3.33E-01	NaN
Coronavirus Replication Pathway	3.52E+00	1.78E-01	0.707
Complement System	3.31E+00	1.89E-01	-0.378
Inhibition of ARE-Mediated mRNA Degradation Pathway	3.25E+00	9.94E-02	0.378
Aldosterone Signaling in Epithelial Cells	3.17E+00	9.76E-02	NaN
Hypoxia Signaling in the Cardiovascular System	3.16E+00	1.32E-01	2
Phagosome Maturation	2.86E+00	9.43E-02	NaN
Estrogen Receptor Signaling	2.84E+00	7.09E-02	0.243
Clathrin-mediated Endocytosis Signaling	2.83E+00	8.81E-02	NaN

Supplemental Table 5: Cellular networks impacted by SARS-CoV-2 infection within myeloid cells in unvaccinated animals (day 2 post challenge) relative to vaccinated animals (day 2 post challenge)

Ingenuity Canonical Pathways	-log(p-value)	Ratio	z-score
EIF2 Signaling	4.75E+01	3.30E-01	-5.154
Coronavirus Pathogenesis Pathway	2.46E+01	2.41E-01	3.464
Regulation of eIF4 and p70S6K Signaling	1.71E+01	2.12E-01	NaN
mTOR Signaling	1.53E+01	1.84E-01	0
FAT10 Signaling Pathway	1.51E+01	3.75E-01	1
BAG2 Signaling Pathway	1.41E+01	2.86E-01	0
Role of Hypercytokinemia/hyperchemokinememia in the Pathogenesis of Influenza	1.29E+01	2.67E-01	4.796
Interferon Signaling	1.18E+01	4.17E-01	3.742
Huntington's Disease Signaling	1.05E+01	1.34E-01	-1.604
Mitochondrial Dysfunction	9.94E+00	1.64E-01	NaN
Protein Ubiquitination Pathway	9.12E+00	1.27E-01	NaN
Inhibition of ARE-Mediated mRNA Degradation Pathway	8.45E+00	1.55E-01	2.333
Sirtuin Signaling Pathway	8.42E+00	1.20E-01	0.186
Atherosclerosis Signaling	8.16E+00	1.68E-01	NaN
Role of Pattern Recognition Receptors in Recognition of Bacteria and Viruses	8.06E+00	1.54E-01	3.207
Oxidative Phosphorylation	8.02E+00	1.80E-01	-2.236
Role of PKR in Interferon Induction and Antiviral Response	7.85E+00	1.62E-01	2.837
Activation of IRF by Cytosolic Pattern Recognition Receptors	7.67E+00	2.31E-01	1.807
Necroptosis Signaling Pathway	7.34E+00	1.46E-01	3.128
LXR/RXR Activation	7.23E+00	1.63E-01	0
Acute Phase Response Signaling	7.21E+00	1.35E-01	2.524
Granulocyte Adhesion and Diapedesis	7.03E+00	1.32E-01	NaN
Death Receptor Signaling	6.80E+00	1.77E-01	1
TREM1 Signaling	6.63E+00	1.95E-01	3.873
Phagosome Maturation	6.61E+00	1.38E-01	NaN
Pathogenesis of Multiple Sclerosis	6.59E+00	6.67E-01	NaN
Iron homeostasis signaling pathway	6.34E+00	1.44E-01	NaN
HIF1 α Signaling	6.22E+00	1.20E-01	2.2
Neuroinflammation Signaling Pathway	6.03E+00	1.01E-01	4.017
Complement System	6.00E+00	2.70E-01	0.707

Supplemental Table 6: Cellular networks impacted by SARS-CoV-2 infection within dendritic cells in unvaccinated animals (day 2 post challenge) relative to vaccinated animals (day 2 post challenge)

Ingenuity Canonical Pathways	-log(p-value)	Ratio	z-score
EIF2 Signaling	4.51E+01	4.29E-01	-4.808
Regulation of eIF4 and p70S6K Signaling	2.33E+01	3.46E-01	-2.309
Mitochondrial Dysfunction	2.29E+01	3.51E-01	NaN
Coronavirus Pathogenesis Pathway	2.15E+01	3.15E-01	0.508
Oxidative Phosphorylation	2.12E+01	4.14E-01	2.236
Huntington's Disease Signaling	1.93E+01	2.61E-01	-0.962
BAG2 Signaling Pathway	1.82E+01	4.40E-01	0
FAT10 Signaling Pathway	1.68E+01	5.18E-01	0.447
Sirtuin Signaling Pathway	1.61E+01	2.40E-01	0.143
mTOR Signaling	1.56E+01	2.69E-01	-1.147
Protein Ubiquitination Pathway	1.47E+01	2.36E-01	NaN
Estrogen Receptor Signaling	1.26E+01	1.93E-01	0
TREM1 Signaling	1.15E+01	3.64E-01	-1.177
Inhibition of ARE-Mediated mRNA Degradation Pathway	1.12E+01	2.61E-01	-0.688
Glucocorticoid Receptor Signaling	1.09E+01	1.65E-01	NaN
Role of Hypercytokinemia/hyperchemokineemia in the Pathogenesis of Influenza	1.09E+01	3.37E-01	2.414
Role of PKR in Interferon Induction and Antiviral Response	9.92E+00	2.65E-01	0.539
Insulin Secretion Signaling Pathway	9.67E+00	2.01E-01	2.722
Interferon Signaling	9.32E+00	4.72E-01	2.5
Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	9.26E+00	2.25E-01	-1.808
PI3K/AKT Signaling	9.19E+00	2.21E-01	-1.225
Toll-like Receptor Signaling	8.97E+00	3.21E-01	0.535
Neuroinflammation Signaling Pathway	8.92E+00	1.86E-01	-0.42
HER-2 Signaling in Breast Cancer	8.77E+00	2.07E-01	-0.447
Necroptosis Signaling Pathway	8.64E+00	2.36E-01	1.808
Signaling by Rho Family GTPases	8.58E+00	1.94E-01	-1.859
RAC Signaling	8.53E+00	2.46E-01	-2.2
Hypoxia Signaling in the Cardiovascular System	8.50E+00	3.16E-01	-1.134
Activation of IRF by Cytosolic Pattern Recognition Receptors	7.72E+00	3.23E-01	1.606
Induction of Apoptosis by HIV1	7.72E+00	3.23E-01	0.471

Supplemental Table 7: Cellular networks impacted by SARS-CoV-2 infection within lymphocytes in unvaccinated animals (day 2 post challenge) relative to vaccinated animals (day 2 post challenge)

Ingenuity Canonical Pathways	-log(p-value)	Ratio	z-score
Coronavirus Pathogenesis Pathway	1.49E+01	1.92E-01	0.164
FAT10 Signaling Pathway	1.45E+01	3.75E-01	0.447
EIF2 Signaling	1.27E+01	1.70E-01	-1.528
Interferon Signaling	1.26E+01	4.44E-01	2.84
BAG2 Signaling Pathway	1.15E+01	2.62E-01	-2.646
Role of Hypercytokinemia/hyperchemokine in the Pathogenesis of Influenza	1.13E+01	2.56E-01	3.838
Death Receptor Signaling	1.11E+01	2.40E-01	0.853
Sirtuin Signaling Pathway	9.77E+00	1.34E-01	0.707
Protein Ubiquitination Pathway	9.39E+00	1.35E-01	NaN
Huntington's Disease Signaling	9.04E+00	1.31E-01	-2.138
Mitochondrial Dysfunction	8.54E+00	1.58E-01	NaN
Inhibition of ARE-Mediated mRNA Degradation Pathway	8.46E+00	1.61E-01	-0.302
Oxidative Phosphorylation	8.21E+00	1.89E-01	-4.146
Activation of IRF by Cytosolic Pattern Recognition Receptors	8.12E+00	2.46E-01	1.5
Primary Immunodeficiency Signaling	7.28E+00	2.50E-01	NaN
PI3K Signaling in B Lymphocytes	6.88E+00	1.54E-01	2.183
Antigen Presentation Pathway	6.42E+00	2.82E-01	NaN
Role of PKR in Interferon Induction and Antiviral Response	5.99E+00	1.47E-01	2.236
Crosstalk between Dendritic Cells and Natural Killer Cells	5.96E+00	1.76E-01	1.604
Glucocorticoid Receptor Signaling	5.87E+00	8.61E-02	NaN
Necroptosis Signaling Pathway	5.57E+00	1.34E-01	2.4
Phagosome Maturation	5.48E+00	1.32E-01	NaN
TREM1 Signaling	5.47E+00	1.82E-01	2.138
Natural Killer Cell Signaling	5.46E+00	1.21E-01	1.043
TNFR2 Signaling	5.34E+00	2.81E-01	-1.134
TNFR1 Signaling	5.08E+00	2.12E-01	-1.897
Role of Pattern Recognition Receptors in Recognition of Bacteria and Viruses	5.06E+00	1.28E-01	1.508
Neuroinflammation Signaling Pathway	4.93E+00	9.78E-02	1.569
Agranulocyte Adhesion and Diapedesis	4.92E+00	1.12E-01	NaN
NAD Signaling Pathway	4.72E+00	1.26E-01	1

Supplemental Table 8: Cellular networks impacted by SARS-CoV-2 infection within lymphocytes in unvaccinated animals (day 2 post challenge) relative to vaccinated animals (day 2 post challenge)

Ingenuity Canonical Pathways	-log(p-value)	Ratio	z-score
EIF2 Signaling	3.47E+01	2.77E-01	-4.49
Coronavirus Pathogenesis Pathway	2.19E+01	2.27E-01	1.043
Regulation of eIF4 and p70S6K Signaling	1.71E+01	2.12E-01	-2.236
mTOR Signaling	1.46E+01	1.79E-01	-1.897
Role of Hypercytokinemia/hyperchemokineemia in the Pathogenesis of Influenza	8.35E+00	2.09E-01	2.828
Actin Cytoskeleton Signaling	8.09E+00	1.27E-01	-1.8
Interferon Signaling	7.15E+00	3.06E-01	2.53
Mitochondrial Dysfunction	6.65E+00	1.35E-01	NaN
Germ Cell-Sertoli Cell Junction Signaling	6.65E+00	1.35E-01	NaN
RAC Signaling	5.76E+00	1.38E-01	-2
Remodeling of Epithelial Adherens Junctions	5.73E+00	1.91E-01	-1.633
ILK Signaling	5.45E+00	1.15E-01	-1.789
Ferroptosis Signaling Pathway	5.43E+00	1.36E-01	-1.414
Sirtuin Signaling Pathway	5.39E+00	9.93E-02	0.218
Production of Nitric Oxide and Reactive Oxygen Species in Macrophages	5.25E+00	1.15E-01	-3.13
Role of PKR in Interferon Induction and Antiviral Response	5.24E+00	1.32E-01	0
Complement System	5.04E+00	2.43E-01	-1.342
Integrin Signaling	4.99E+00	1.08E-01	-1.606
Leukotriene Biosynthesis	4.90E+00	4.00E-01	-0.447
Signaling by Rho Family GTPases	4.72E+00	9.70E-02	-2.132
Leukocyte Extravasation Signaling	4.66E+00	1.09E-01	-1.213
Oxidative Phosphorylation	4.58E+00	1.35E-01	-1.807
RHOGDI Signaling	4.44E+00	1.02E-01	0.728
Activation of IRF by Cytosolic Pattern Recognition Receptors	4.42E+00	1.69E-01	0.905
Atherosclerosis Signaling	4.29E+00	1.22E-01	NaN
NRF2-mediated Oxidative Stress Response	4.25E+00	9.70E-02	-1.941
Sertoli Cell-Sertoli Cell Junction Signaling	4.24E+00	1.02E-01	NaN
Eicosanoid Signaling	4.23E+00	1.62E-01	0.447
IL-8 Signaling	4.12E+00	1.00E-01	-2.524
Epithelial Adherens Junction Signaling	3.86E+00	1.08E-01	0.243