**Supplementary Information**

**Effect of SARS-CoV-2 proteins on vascular permeability**

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**Supplementary File 1A. Documented change by SARS-Cov-2.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Cell type** | **Function** | **Gene** | **Entrez Gene** | **Identified significant SARS-Cov-19 proteins** | **Distance** |
| Dendritic cells (T cell proliferation)    | Impaired dendritic cells, induces T-cell proliferation and cytokine production and signal for activation of the T-cell | CD801 | 941 | [e; m; spike; nsp10; nsp11; nsp15; nsp7; orf3a; orf6; orf7a; orf8; orf9b; orf9c]  | 2 |
|  | CD861 | 942 | [nsp10; nsp7]  | 2 |
|  | INFα1 | 3439 |   | 2 |
|  | INF β1 | 3456 |   | 2 |
| T cell                 | Impaired T cell maturation and activation, reduced proliferation | INF λ1-4 | 3458 |   | 2 |
|  | TNFα1,3,4 | 7124 | [nsp12; orf8] | 1 |
| Production of pro-inflammatory cytokines | IL-22,3,4 | 3558 | [m; spike; nsp11; nsp12; nsp2; nsp7; orf10; orf8; orf9c] | 2 |
|  |  IL-102,3,4 | 3586 | [spike; orf8; orf9c] | 2 |
|  | IL-72 | 3574 | [m; orf10; orf9c] | 2 |
|  |  IL-62,4 | 3569 | [nsp11; nsp14; nsp5; nsp6; nsp9; orf10; orf8; orf9b] | 2 |
|  |  IL-1β2 | 3553 | [orf8] | 2 |
|  | INF-ɑ2 | 3439 |   | 2 |
|  | MOP-12 |  |   |   |
|  | IP-102 | 3627 |   | 2 |
| reduced proliferation | CTLA-43 | 1493 | [nsp10; nsp15; nsp7; orf9b] | 1 |
|  | PD-11,3 | 5133 | [m; spike; nsp15; nsp4; orf6; orf9c] | 1 |
|  | Ki673 | 4288 | [n; nsp5; nsp7; nsp8; orf3a; orf3b; orf7a] | 1 |
|  |  IL-53 | 3567 | [spike; nsp10; orf8] | 2 |
|  |  IL-133 | 3596 | [m; spike; nsp10; nsp11; nsp12; nsp13; nsp2; nsp4; nsp6; nsp7; orf3a; orf3b; orf7a; orf8; orf9c] | 2 |
|  | IL-93,4 | 3578 |   |   |
|  | IL-223 | 50616 | [spike; orf9c] | 3 |
| NK | Decreased **IFN-γ production** by NK cells | INFλ5 | 3458 |   | 2 |
| Myeloid cells          | systemic inflammation may impair the myeloid cells functionality | HLA-DR6  |  |   |   |
|  | CD646   | 2209 |   | 2 |
|  | CD66b6 | 1088 | [m; spike; nsp10] | 2 |
|  | CRP6 | 1401 | [orf8] | 1 |
|  | Ferritin l6 | 2512 |   | 1 |
|  | ferritin h6 | 2495 | [nsp4] | 1 |
|  | D-dimer6 |  |   |   |
|  | ﬁbrinogen7 |   |   |
|  | LDH a6 | 3939 | [m; nsp11; nsp14; nsp4; nsp7; orf10; orf3b] | 1 |
|  | IL66 | 3569 | [nsp11; nsp14; nsp5; nsp6; nsp9; orf10; orf8; orf9b] | 2 |
| Lymphocyte | severe lymphocyte apoptosis | FAS7 | 355 | [nsp11; nsp2; nsp4; nsp7; orf3a; orf6; orf7a; orf9c] | 1 |
| Monocyte and macrophage            | Activation and transcription of proinflammatory genes | ACE24 | 59272 | [e; nsp10; nsp12; nsp15; nsp2; nsp4; nsp6; orf10; orf7a; orf8; orf9b; orf9c] | 1 |
| IL64 | 3569 | [nsp11; nsp14; nsp5; nsp6; nsp9; orf10; orf8; orf9b] | 2 |
|  |  IL-104 | 3586 | [spike; orf8; orf9c] | 2 |
|  | TNFα4 | 7124 | [nsp12; orf8] | 1 |
|  | ITGAM  cd1b4 | 3684 | [nsp11] | 2 |
|  | CD144 | 929 | [nsp5] | 2 |
|  | FCGR3Acd164 | 2214 | [nsp10] | 2 |
|  | CD684 | 968 | [m; orf6; orf7a] | 1 |
|  | CD804 | 941 | [e; m; spike; nsp10; nsp11; nsp15; nsp7; orf3a; orf6; orf7a; orf8; orf9b; orf9c] | 2 |
|  | CD1634 | 9332 | [n] | 1 |
|  | MRC1 cd2064 | 4360 | [orf8] | 2 |
|  | PDCD1  PD14 | 5133 |   | 1 |
| PB mononuclear cells   | Activation of proinflammatory genes | IL1B4 | 3553 | [orf8] | 2 |
|  | CXCL24 | 2920 | [nsp4; nsp9] | 2 |
|  | CXCL84 | 3576 |   | 2 |
| PBMC              | Activation of proinflammatory genes | GDF118 | 10220 | [nsp1; nsp5\_c145a; orf8] | 1 |
|  | NOG8 | 9241 | [spike; nsp5\_c145a; orf3a; orf8; orf9c] | 2 |
|  | IL108 | 3586 | [spike; orf8; orf9c] | 2 |
|  | CXCL108 | 3627 | nsp4 | 2 |
|  | TNFSF108 | 8743 | [spike; nsp11; nsp12; nsp14; nsp15; orf10; orf3a; orf9b] | 1 |
|  | NRG18 | 3084 | [spike; nsp11; nsp15; nsp4; nsp6; orf3a; orf6; orf7a; orf8; orf9c] | 1 |
|  | TIMP18 | 7076 | [nsp10; nsp6; nsp9; orf8] | 2 |
|  | C58 | 727 | [nsp11; nsp4; orf9c] | 2 |
|  | IL188 | 3606 | [nsp2; orf7a] | 2 |
|  | AREG8 | 374 | [e; nsp12; nsp6] | 2 |
|  | CCL48 | 6351 | [spike; nsp4; orf9c] | 1 |
|  | CMTM28 | 146225 | [orf3a; orf9c] | 1 |
|  | CXCL88 | 3576 |   | 2 |
|  | IFNλ8 | 3458 | [spike; nsp11; nsp13; nsp4; nsp7; orf9c] | 2 |
| Lymphocytes                 | SARS-CoV-2 infection may cause lymphocyte apoptosis | CTSL8 | 1514 | [nsp14] | 1 |
|  | CTSB8 | 1508 | [m; nsp11; nsp4; nsp5\_c145a; nsp6; orf9b] | 1 |
|  | DDIT48 | 54541 | [orf9b] | 2 |
|  | RRAS8 | 6237 | [m; nsp2] | 1 |
|  | CTSD8 | 1509 | [m; nsp11; nsp14; nsp2; nsp4; nsp5\_c145a; nsp6; nsp7; orf10; orf6; orf8] | 1 |
|  | BIRC58 | 332 | [nsp14; nsp15] | 1 |
|  | TNFSF108 | 8743 | [spike; nsp11; nsp12; nsp14; nsp15; orf10; orf3a; orf9b] | 1 |
|  | CTSZ8 | 1522 |   | 1 |
|  | NTRK18 | 4914 |   | 1 |
|  | IGFBP38 | 3486 | [nsp1; nsp14; nsp15; nsp4; orf8; orf9b] | 1 |
|  | CCNB18 | 891 | [nsp1; nsp11; nsp13] | 1 |
|  | RRM28 | 6241 | [nsp1; orf6] | 2 |
|  | CCNB28 | 9133 | [nsp1; nsp10; nsp11; nsp13; nsp14; nsp15; nsp2; orf8; orf9b] | 1 |
|  | GTSE18 | 51512 | [nsp10; nsp12; nsp13] | 1 |
|  | CDK18 | 983 | [nsp1; orf3b] | 1 |
|  | STEAP38 | 55240 | [spike; nsp4; nsp6; orf3a; orf7a] | 2 |
|  | TP53I38 | 9540 |   | 2 |
| BALF            | Activation of proinflammatory cytokines | CXCL28 | 2920 | [nsp4; nsp9] | 2 |
|  | TGFB28 | 7042 | [e; nsp4; nsp9; orf6; orf8; orf9b] | 2 |
|  | CCL3L18 | 6349 | [spike; nsp4] | 2 |
|  | CXCL68 | 6372 | [nsp4; nsp9] | 2 |
|  | CCL88 | 6355 | [nsp4; nsp9] | 2 |
|  | SCGB3A18 | 92304 |   | 2 |
|  | TNFSF108 | 8743 | [spike; nsp11; nsp12; nsp14; nsp15; orf10; orf3a; orf9b] | 1 |
|  | CCL28,9 | 6347 | [nsp4; nsp9] | 2 |
|  | CXCL18 | 2919 | [orf10] | 1 |
|  | IL338 | 90865 | [e; nsp10; nsp5; orf8; orf9b] | 2 |
|  | GRN8 | 2896 | [nsp1; nsp11] | 1 |
|  | CXCL168 | 58191 |   | 1 |
| Immune cells of BALF          | higher levels of inflammatory cytokines in lung macrophages from patients with severe COVID-19 infection. | IL-89 | 3576 |   | 2 |
|  | IL-69 | 3569 | [nsp11; nsp14; nsp5; nsp6; nsp9; orf10; orf8; orf9b] | 2 |
|  | IL-1β9 | 3553 | [orf8] | 2 |
|  | TNFα9 | 7124 | [nsp12; orf8] | 1 |
|  | CCL39 | 6348 | [m; nsp4; nsp7; orf9c] | 1 |
|  | CCL49 | 6351 | [spike; nsp4; orf9c] | 1 |
|  | CCL79 | 6354 | [spike; orf8] | 1 |
|  | CXCL99 | 4283 | [orf9c] | 1 |
|  | CXCL109 | 3627 | [nsp4] | 2 |
|   | CXCL119 | 6373 | [nsp4] | 2 |
| Primary lung epithelial cells                                         | glycolysis | HK2\*10 | 3099 | [nsp1; nsp11; nsp6; orf6; orf8; orf9b] | 1 |
| glycolysis | GPI10 | 2821 | [nsp11; nsp14; orf3] | 1 |
| glycolysis | PFKP10 | 5214 | [nsp11; nsp14; nsp15; nsp5\_c145a; orf7a] | 1 |
| glycolysis | ENO2\*10 | 2026 | [nsp11; nsp14; nsp15; nsp4; nsp5\_c145a; nsp7; orf10] | 1 |
| glycolysis | PKM\*10 | 5315 | [nsp11; nsp5; nsp7; orf7a; orf9b] | 1 |
| glycolysis | LDHA10 | 3939 | [m; nsp11; nsp14; nsp4; nsp7; orf10; orf3b] | 1 |
| glycolysis | ALDOA10 | 226 | [nsp11; nsp5\_c145a; orf3b; orf6] | 1 |
| glycolysis | PGK110 | 5230 | [nsp11; nsp14; nsp5\_c145a; orf3b; orf6] | 1 |
| glycolysis | BPGM\*10 | 669 | [nsp15] | 2 |
| Pentose-Phosphate | PGD10 | 5226 | [m; nsp11; nsp14; nsp15; nsp4; nsp5\_c145a; nsp9; orf3b; orf6; orf9b] | 1 |
| Pentose-Phosphate | PGLS10 | 25796 | [nsp10; nsp11; nsp15; nsp4; nsp5\_c145a] | 1 |
| Pentose-Phosphate | RBKS10 | 64080 | [nsp11; nsp13; nsp15; nsp4; orf3a] | 2 |
| mitochondria | DNAJC15\*10 | 29103 | [nsp7] | 2 |
| mitochondria | ATP1A1\*10 | 476 | [m; nsp11; nsp6; nsp7; orf10; orf3b; orf6] | 1 |
| mitochondria | UQCRB10 | 7381 | [m; spike; nsp11; nsp2; nsp4; nsp5\_c145a; nsp6; nsp7; orf3b; orf6] | 1 |
| mitochondria | IDH1\*10 | 3417 | [nsp10; nsp11; nsp14; nsp15; nsp4; nsp5\_c145a; orf3b; orf6] | 1 |
| mitochondria | CDK1\*10 | 983 | [nsp1; orf3b] | 1 |
| palmitoylation | ZDHHC1410 | 79683 |   | 2 |
| palmitoylation | IFITM1\*10 | 8519 |   | 2 |
| palmitoylation | IFITM3\*10 | 10410 | [nsp6; orf3b] | 1 |
| lipogenesis | ACAA110 | 30 | [spike; nsp11; nsp12; nsp14; nsp15; nsp5\_c145a; nsp6; orf3b] | 1 |
| lipogenesis | HMGCS1\*10 | 3158 | [nsp13] | 1 |
| lipogenesis | ACAT210 | 39 | [n; nsp10; nsp11; nsp14; nsp15; nsp4; nsp5\_c145a; nsp6; orf3b; orf6; orf7a; orf9b] | 1 |
| lipogenesis | BCKDK10 | 10295 | [nsp14; nsp6; orf7a] | 0 |
| lipogenesis | MVD10 | 4597 | [nsp10; nsp11; nsp14; nsp2; nsp4; orf3b; orf9b] | 2 |
| lipogenesis | FDFT110 | 2222 | [nsp6; nsp7; orf3a; orf3b] | 1 |
| lipogenesis | SQLE\*10 | 6713 | [m; nsp4; nsp6; orf9c] | 2 |
| lipogenesis | DGAT110 | 8694 | [m; spike; nsp6; orf3a; orf9c] | 2 |
| lipogenesis | MTTP10 | 4547 | [nsp7; orf8] | 2 |
| oxidative stress | NFKB1\*10 | 4790 | [nsp13; nsp5] | 1 |
| oxidative stress | JUN10 | 3725 | [e; m; n; nsp1; nsp10; nsp12; nsp13; nsp15; nsp4; nsp5; nsp7; nsp8; nsp9; orf10; orf3b; orf6; orf7a; orf9b] | 1 |
| oxidative stress | FOXO1\*10 | 2308 | [nsp1; nsp11; nsp14; nsp15; nsp2; nsp5] | 1 |
| oxidative stress | GCLC\*10 | 2729 | [nsp14; nsp15; nsp9; orf9b] | 1 |
| oxidative stress | HMOX2\*10 | 3163 | [m; nsp2; nsp4; nsp6; nsp7; orf3b; orf9c] | 1 |
| oxidative stress | IL6\*10 | 3569 | [nsp11; nsp14; nsp5; nsp6; nsp9; orf10; orf8; orf9b] | 2 |
| oxidative stress | SOD210 | 6648 | [m; nsp11; nsp14; nsp15; nsp5\_c145a; nsp6; orf3b; orf6; orf8] | 1 |
| ER stress | ERN110 | 2081 | [nsp10; nsp11; nsp4; nsp5\_c145a; nsp6; nsp9; orf3a; orf8; orf9b; orf9c] | 1 |
| ER stress | EIF2AK210 | 5610 | [n] | 1 |
| ER stress | ATF410 | 468 | [nsp9] | 1 |
| ER stress | CEBPB10 | 1051 |   | 2 |
| ER stress | DNAJB910 | 4189 | [nsp11; orf7a; orf9c] | 2 |
|  Cardiomyocytes                                              | cardiac muscle tissue developmentregulation of viral processactin filament organizationproteosomal protein catabolic processcellular respirationregulation of lymphocyte activationsensory perception of smellpos. reg. of receptor sig.pathway via JAK-STAT | ATP2A211 | 488 | [m; nsp2; nsp6; nsp7; orf3b; orf6; orf7a; orf9c] | 1 |
|  | ENO311 | 2027 | [nsp11; nsp13; nsp4; orf3b; orf6; orf9b] | 1 |
|  | ACTB11 | 60 | [m; spike; nsp5; nsp7; orf10; orf3b; orf9c] | 1 |
|  | TPM211 | 7169 |   | 1 |
|  | TPM411 | 7171 | [nsp11; nsp6; orf3b] | 1 |
|  | CALM311 | 808 | [nsp11; nsp13; nsp7] | 1 |
|  | TPM111 | 7168 | [spike; nsp11; nsp13; orf3b] | 1 |
|  | CALM211 | 805 | [nsp11; nsp13; nsp7] | 1 |
|  | MYL911 | 10398 | [e] | 1 |
|  | MYL611 | 4637 | [nsp11; nsp13; nsp15; orf10; orf3b] | 1 |
|  | TNNC111 | 7134 | [orf9b] | 2 |
|  | CKM11 | 1158 | [e; orf10; orf6; orf9b] | 1 |
|  | MYL711 | 58498 |   | 2 |
|  | MYH1111 | 4629 | [nsp11; nsp14; orf3b] | 1 |
|  | MYLK11 | 4638 | [e] | 2 |
|  | MYL411 | 4635 | [n; nsp10] | 2 |
|  | TNNI111 | 7135 |   | 2 |
|  | TPM311 | 7170 | [nsp11; nsp6; orf6] | 1 |
|  | MYH611 | 4624 | [nsp14; orf9c] | 1 |
|  | TNNI311 | 7137 | [nsp10; nsp11; nsp13; nsp15; orf3a; orf9b] | 1 |
|  | CAPZB11 | 832 | [nsp11; nsp5\_c145a; orf9b] | 1 |
|  | ACTC111 | 70 | [nsp1] | 1 |
|  | MYOM211 | 9172 |   | 2 |
|  | TMOD111 | 7111 | [spike; orf6] | 1 |
|  | TTN11 | 7273 | [orf3a] | 1 |
|  | MYH811 | 4626 | [e] | 1 |
|  | MYO1G11 | 64005 | [nsp15; nsp2; nsp6; nsp7; orf3b] | 1 |
|  | TRIM6311 | 84676 |   | 1 |
|  | TNNT311 | 7140 | [nsp10; nsp13] | 1 |
|  | NEB11 | 4703 | [e; nsp1] | 2 |
|  | MYL311 | 4634 |   | 2 |
|  | OBSCN11 | 84033 | [nsp6; nsp9; orf3a] | 1 |
|  | MYH211 | 4620 | [spike] | 1 |
|  | MYO7A11 | 4647 | [orf3b] | 2 |
|  | MYO3A11 | 53904 |   | 2 |
|  | MYH711 | 4625 |   | 1 |
|  | MYH1511 | 22989 | [nsp7; orf8; orf9c] | 2 |
|  | MYO3B11 | 140469 | [m; nsp10; nsp5\_c145a] | 1 |
|  | MYO1H11 | 283446 |   | 1 |
|  | MYO15A11 | 51168 | [nsp13] | 2 |
|  | MYLK211 | 85366 | [nsp1; nsp4; orf7a] | 2 |
|  | MYO7B11 | 4648 | [m] | 2 |
|  | MYO1A11 | 4640 | [nsp9] | 1 |
|  | MYH411 | 4622 |   | 1 |
|  | MYH111 | 4619 |   | 1 |
|  | MYH1311 | 8735 | [nsp5] | 1 |
|   | MYO1F11 | 4542 | [orf8] | 1 |
| Human bronchial epithelial cell line (16HBE)                 | Activation of proinflammatory cytokines | IKKβ, 12 | 3551 | [nsp12; nsp13; orf9b] | 1 |
|  | IFNλ12 | 3458 | [spike; nsp11; nsp13; nsp4; nsp7; orf9c] | 2 |
|  | TNF‐α12 | 7124 | [nsp12; orf8] | 1 |
|  |  LTa312 |  |   |   |
|  | GMCSF12 |  |   |   |
|  | IL‐1β12 | 3553 | [orf8] | 2 |
|  | IL‐212 | 3558 | [m; spike; nsp11; nsp12; nsp2; nsp7; orf10; orf8; orf9c] | 2 |
|  | IL‐612 | 3569 | [nsp11; nsp14; nsp5; nsp6; nsp9; orf10; orf8; orf9b] | 2 |
|  | IL‐812 | 3576 |   | 2 |
|  | IL‐1212 | 3593 | [nsp11; nsp15; nsp8; orf8] | 1 |
|  | IL‐1312 | 3596 | [m; spike; nsp10; nsp11; nsp12; nsp13; nsp2; nsp4; nsp6; nsp7; orf3a; orf3b; orf7a; orf8; orf9c] | 2 |
|  | IL‐3312 | 90865 | [e; nsp10; nsp5; orf8; orf9b] | 2 |
|  | IL‐412 | 3565 | [m; spike; nsp10; nsp2; nsp4; nsp6; nsp7; orf10; orf8; orf9b; orf9c] | 2 |
|  | IL‐512 | 3567 | [spike; nsp10; orf8] | 2 |
|  | IL‐1012 | 3586 | [spike; orf8; orf9c] | 2 |
|  | IL‐1712 | 3605 | [spike; nsp12; orf8; orf9c] | 1 |
|   | IL‐2212 | 50616 | [spike; orf9c] | 3 |
| Neuronal cells  | altered distribution of Tau | [Tau](https://www.ncbi.nlm.nih.gov/gene/4137)13 | 4137 | [n; nsp1; nsp10; nsp13; nsp7; nsp8; orf10; orf7a; orf9b] | 1 |
| apoptosis of neuronal cells | Caspase 313 | 836 | [nsp11; nsp12; nsp13; nsp14; nsp15; nsp4; nsp5\_c145a; orf3a] | 1 |
|   | UNC13A | 23025 | [n; orf6] | 1 |
|   | RAB27A | 5873 | [nsp7] | 2 |
|   | RAB3A | 5864 | [nsp1; nsp10; nsp11; nsp15; nsp7; orf6; orf9c] | 1 |
|   | RIMS1 | 22999 | [nsp7; orf9b] | 2 |
|   | RPH3A | 22895 | [nsp7] | 1 |
|   | SNAP25 | 6616 | [spike; nsp10; nsp11; nsp15; nsp2; nsp4; nsp6; orf3a; orf9b] | 2 |
|   | SNCA | 6622 | [nsp11; nsp5\_c145a; nsp6; nsp7; orf3b; orf8] | 1 |
|   | STX1A | 6804 | [orf3a] | 1 |
|   | STXBP1 | 6812 | [nsp10; nsp11; nsp15; nsp2; nsp4; orf3a] | 1 |
|   | STXBP5 | 134957 | [e; spike; nsp2; nsp6; orf3a; orf9b; orf9c] | 2 |
|   | Syp | 6855 | [nsp11] | 2 |
| Proximal tubule cells                        | decreased expression of the multi-ligand receptor megalin LRP2 | Megalin14 | 4036 | [nsp10; nsp14; nsp7; nsp9; orf3a] | 1 |
| decreased expression of the multi-ligand receptor megalin LRP3 | SLC22A1214 | 116085 | [spike; nsp6; nsp7; orf9b; orf9c] | 2 |
| decreased expression of the multi-ligand receptor megalin LRP4 | SLC34A114 | 6569 | [nsp11; nsp15; nsp7; orf9b] | 2 |
| decreased expression of the multi-ligand receptor megalin LRP5 | SLC34A314 | 142680 |   | 2 |
| decreased expression of the multi-ligand receptor megalin LRP6 |   SLC6A1914 | 340024 | [e; nsp10; nsp13; nsp14; nsp15; nsp4; nsp5; nsp6; nsp7; nsp9; orf10; orf3a; orf3b; orf8; orf9b] | 2 |
| amino acid transporter |  EAAT314 | 6505 | [spike; nsp6; nsp7; orf3b; orf9c] | 1 |
| amino acid transporter | PAT214 | 153201 | [n; spike; nsp1; nsp11; nsp12; nsp13; nsp14; nsp15; nsp6; nsp7; nsp8; nsp9; orf10; orf3a; orf3b; orf7a; orf9b] | 2 |
| amino acid transporter | SIT114 | 54716 |   | 2 |
| amino acid transporter |  B^0AT114 | 340024 |   | 2 |
| amino acid transporter | B^0AT314 | 348932 |   | 1 |
| amino acid transporter |  ASCT214 | 6510 | [spike; nsp6; nsp7; orf3a; orf3b; orf8] | 2 |
| amino acid transporter | SNAT314 | 10991 | [orf6; orf9c] | 2 |
| amino acid transporter |  TAT114 | 117247 | [nsp14; nsp4; orf6; orf9c] | 2 |
| amino acid transporter | TMEM2714 | 57393 |   | 2 |
| amino acid transporter |  SLC7A914 | 11136 |   | 2 |
| amino acid transporter | SLC3A114 | 6519 | [nsp7] | 2 |
| impaired tubular handling of uric acid | URAT114 | 116085 |   | 2 |
| impaired tubular handling of uric acid |  OAT114 | 9356 | [nsp4; orf9c] | 2 |
| impaired tubular handling of uric acid | OAT314 | 9376 |   | 2 |
| impaired tubular handling of uric acid |  OAT414 | 55867 | [n; orf9c] | 2 |
| impaired tubular handling of uric acid |  GLUT914 | 56606 | [m; spike; nsp11; nsp15; nsp2; nsp6; nsp7; orf3b; orf8; orf9c] | 1 |
| impaired tubular handling of uric acid | ABCG214 | 9429 | [spike; nsp6; nsp7; orf3a; orf3b; orf9b] | 2 |
| impaired tubular handling of uric acid |  NPT114 | 6568 |   | 1 |
| impaired tubular handling of uric acid | NPT414 | 10786 |   | 2 |
| Enterocytes (gut organoids)                                  | Defense response to virus | IFI615 | 2537 |   | 2 |
|  | IFI2715 | 3429 |   | 2 |
|  | IFITM115 | 8519 |   | 2 |
|  | MX115 | 4599 | [orf9c] | 1 |
|  | RN7SK15 | 125050 | [e; nsp8] | 1 |
|  | ARC15 | 23237 | [nsp12] | 2 |
|  | DKK115 | 22943 | [nsp4; orf8; orf9c] | 2 |
|  | MT1G15 | 4495 | [nsp4] | 2 |
|  | SAMD915 | 54809 | [nsp15; nsp5\_c145a] | 2 |
|  | IFIT315 | 3437 | [n; nsp15] | 1 |
|  | C10orf9915 | 387695 |   | 1 |
|  | IFIT215 | 3433 | [n] | 1 |
|  | NKX3-115 | 4824 |   | 1 |
|  | LINC0094115 | 1E+08 |   |   |
|  | HSPA615 | 3310 |   | 1 |
|  | IFIT115 | 3434 | [n; nsp10; nsp15] | 1 |
|  | IFI44L15 | 10964 | [orf8; orf9b] | 2 |
|  | CMPK215 | 129607 |   | 1 |
|  | RSAD215 | 91543 | [nsp1; nsp11; nsp13; orf9b] | 2 |
|  | ISG1515 | 9636 | [m; nsp10; nsp11; nsp12; nsp6; nsp7; nsp8] | 2 |
|  | OAS215 | 4939 |   | 2 |
|  | CXCL1115 | 6373 | [nsp4] | 2 |
|  | IFI4415 | 10561 | [nsp11; nsp4; nsp5\_c145a; orf3b; orf8] | 1 |
|  | CXCL1015,16 | 3627 | [nsp4] | 2 |
|  | SLC34A215 | 10568 | [m; nsp6] | 2 |
|  | IFNλ16,17 | 3458 | [spike; nsp11; nsp13; nsp4; nsp7; orf9c] | 3 |
|  | IFN b117 | 3456 | [nsp10] | 2 |
|  | IFNL216 | 282616 |   | 2 |
|  | IFNL316 | 28617 |   | 1 |
|  | CCR116 | 1230 | [spike; nsp15; nsp4; orf9c] | 2 |
|  | CCR816 | 1237 | [nsp10; nsp2; orf9c] | 2 |
|  | IL1616 | 3603 |   | 2 |
|  | IL316 | 3562 | [nsp10; nsp11; nsp7; orf8; orf9b] | 2 |
|  | CCR216 | 729230 | [orf6; orf7a] | 2 |
|  | CCR516 | 1234 | [nsp4; orf3a] | 2 |
|   | IL516 | 3567 | [spike; nsp10; orf8] | 2 |

**Supplementary File 1B. Significant target for each viral protein.**

|  |  |  |
| --- | --- | --- |
| **SARS-Cov-2 Proteins** | **Human proteins which are most effect** | **Number of proteins** |
| **e** | [RN7SK; SLC6A19; MYL9; CKM; MYLK; MYH8; NEB; IL-33; JUN; CD80; ACE2; AREG; TGFB2; STXBP5] | 14 |
| m | [ISG15; SLC34A2; GLUT9; ATP2A2; ACTB; MYO3B; MYO7B; IL-2; IL-13; IL-4; LDHA; PGD; ATP1A1\*; UQCRB; SQLE\*; DGAT1; JUN; HMOX2\*; SOD2; CD80; IL-7; PD-1; CD66b; CD68; CTSB; RRAS; CTSD; CCL3] | 28 |
| n | [IFIT3; IFIT2; IFIT1; PAT2; OAT4; MYL4; ACAT2; JUN; EIF2AK2; Ki67; CD163; UNC13A; Tau] | 13 |
| S | [IFNλ; CCR1; IL-5; SLC22A12; EAAT3; PAT2; ASCT2; GLUT9; ABCG2; ACTB; TPM1; TMOD1; MYH2; IL-2; IL-13; IL-4; IL-10; IL-17; IL-22; UQCRB; ACAA1; DGAT1; CD80; PD-1; CD66b; NOG; TNFSF10; NRG1; CCL4; STEAP3; CCL3L1; CCL7; SNAP25; STXBP5] | 34 |
| nsp1 | [RSAD2; PAT2; ACTC1; NEB; MYLK2; HK2\*; CDK1\*; JUN; FOXO1\*; GDF11; IGFBP3; CCNB1; RRM2; CCNB2; GRN; RAB3A; Tau] | 17 |
| nsp10 | [IFIT1; ISG15; IFN b1; CCR8; IL-3; IL-5; Megalin; SLC6A19; MYL4; TNNI3; TNNT3; MYO3B; IL-13; IL-33; IL-4; PGLS; IDH1\*; ACAT2; MVD; JUN; ERN1; CD80; CD86; CTLA-4; CD66b; ACE2; FCGR3Acd16; TIMP1; CCNB2; GTSE1; RAB3A; SNAP25; STXBP1; Tau] | 34 |
| nsp11 | [RSAD2; ISG15; IFI44; IFNλ; IL-3; SLC34A1; PAT2; GLUT9; ENO3; TPM4; CALM3; TPM1; CALM2; MYL6; MYH11; TPM3; TNNI3; CAPZB; IL-2; IL-6; IL-12; IL-13; HK2\*; GPI; PFKP; ENO2\*; PKM\*; LDHA; ALDOA; PGK1; PGD; PGLS; RBKS; ATP1A1\*; UQCRB; IDH1\*; ACAA1; ACAT2; MVD; FOXO1\*; SOD2; ERN1; DNAJB9; CD80; FAS; ITGAM  cd1b; TNFSF10; NRG1; C5; CTSB; CTSD; CCNB1; CCNB2; GRN; RAB3A; SNAP25; SNCA; STXBP1; Syp; Caspase 3] | 61 |
| nsp12 | [ARC; ISG15; PAT2; IKKβ; TNF-α; IL-2; IL-13; IL-17; ACAA1; JUN; ACE2; TNFSF1; AREG; GTSE1; Caspase 3] | 15 |
| nsp13 | [RSAD2; IFNλ; SLC6A19; PAT2; ENO3; CALM3; TPM1; CALM2; MYL6; TNNI3; TNNT3; MYO15A; IKKβ; IL-13; RBKS; HMGCS1\*; NFKB1\*; JUN; CCNB1; CCNB2; GTSE1; Tau; Caspase 3] | 23 |
| nsp14 | [Megalin; SLC6A19; PAT2; TAT1; MYH11; MYH6; IL-6; GPI; PFKP; ENO2\*; LDHA; PGK1; PGD; IDH1\*; ACAA1; ACAT2; BCKDK; MVD; FOXO1\*; GCLC\*; SOD2; TNFSF10'; CTSL; CTSD; BIRC5; IGFBP3; CCNB2; Caspase 3] | 28 |
| nsp15 | [SAMD9; IFIT3; IFIT1; CCR1; SLC34A1; SLC6A19; PAT2; GLUT9; MYL6; TNNI3; MYO1G; IL-12; PFKP; ENO2\*; BPGM\*; PGD; PGLS; RBKS; IDH1\*; ACAA1; ACAT2; JUN; FOXO1\*; GCLC\*; SOD2; CD80; CTLA-4; PD-1; ACE2; TNFSF10; NRG1; BIRC5; IGFBP3; CCNB2; RAB3A; SNAP25; STXBP1; Caspase 3] | 38 |
| nsp2 | [CCR8; GLUT9; ATP2A2; MYO1G; IL-2; IL-13; IL-4; UQCRB; MVD; FOXO1\*; HMOX2\*; FAS; ACE2; IL-18; RRAS; CTSD; CCNB2; SNAP25; STXBP1; STXBP5] | 20 |
| nsp4 | [DKK1; MT1G; CXCL11; IFI44; CXCL10; IFNλ; CCR1; CCR5; SLC6A19; TAT1; OAT1; ENO3; MYLK2; IL-13; IL-4; ENO2\*; LDHA; PGD; PGLS; RBKS; UQCRB; IDH1\*; ACAT2; MVD; SQLE\*; JUN; HMOX2\*; ERN1; PD-1; ferritin h; FAS; ACE2; CXCL2; NRG1; C5; CCL4; CTSB; CTSD; IGFBP3; STEAP3; TGFB2; CCL3L1; CXCL6; CCL8; CCL2; CCL3; SNAP25; STXBP1; Caspase 3] | 49 |
| nsp5 | [SLC6A19; ACTB; MYH13; IL-6; IL-33; PKM\*; NFKB1\*; JUN; FOXO1\*; Ki67; CD14] | 11 |
| nsp5\_c145a | [SAMD9; IFI44; CAPZB; MYO3B; PFKP; ENO2\*; ALDOA; PGK1; PGD; PGLS; UQCRB; IDH1\*; ACAA1; ACAT2; SOD2; ERN1; GDF11; NOG; CTSB; CTSD; SNCA; Caspase 3] | 22 |
| nsp6 | [ISG15; SLC34A2; SLC22A12; SLC6A19; EAAT3; PAT2; ASCT2; GLUT9; ABCG2; ATP2A2; TPM4; TPM3; MYO1G; OBSCN; IL-6; IL-13; IL-4; HK2\*; ATP1A1\*; UQCRB; IFITM3\*; ACAA1; ACAT2; BCKDK; FDFT1; SQLE\*; DGAT1; HMOX2\*; SOD2; ERN1; ACE2; NRG1; TIMP1; AREG; CTSB; CTSD; STEAP3; SNAP25; SNCA; STXBP5] | 40 |
| nsp7 | [ISG15; IFNλ; IL-3; Megalin; SLC22A12; SLC34A1; SLC6A19; EAAT3; PAT2; ASCT2; SLC3A1; GLUT9; ABCG2; ATP2A2; ACTB; CALM3; CALM2; MYO1G; MYH15; IL-2; IL-13; IL-4; ENO2\*; PKM\*; LDHA; DNAJC15\*; ATP1A1\*; UQCRB; FDFT1; MTTP; JUN; HMOX2\*; CD80; CD86; CTLA-4; Ki67; FAS; CTSD; CCL; RAB27A; RAB3A; RIMS1; RPH3A; SNCA; Tau] | 45 |
| nsp8 | [RN7SK; ISG15; PAT2; IL-12; JUN; Ki67; Tau] | 7 |
| nsp9 | [Megalin; SLC6A19; PAT2; OBSCN; MYO1A; IL-6; PGD; JUN; GCLC\*; ERN1; ATF4; CXCL2; TIMP1; TGFB2; CXCL6; CCL8; CCL2] | 17 |
| orf10 | [SLC6A19; PAT2; ACTB; MYL6; CKM; IL-2; IL-6; IL-4; ENO2\*; LDHA; ATP1A1\*; JUN; IL-7; ACE2; TNFSF10; CTSD; CXCL1; Tau] | 35 |
| orf3a | [CCR5; Megalin; SLC6A19; PAT2; ASCT2; ABCG2; TNNI3; TTN; OBSCN; IL-13; RBKS; FDFT1; DGAT1; ERN1; CD80; Ki67; FAS; NOG; TNFSF10; NRG1; CMTM2; STEAP3; SNAP25; STX1A; STXBP1; STXBP5; Caspase 3] | 27 |
| orf3b | [IFI44; SLC6A19; EAAT3; PAT2; ASCT2; GLUT9; ABCG2; ATP2A2; ENO3; ACTB; TPM4; TPM1; MYL6; MYH11; MYO1G; MYO7A; IL-3; GPI; LDHA; ALDOA; PGK1; PGD; ATP1A1\*; UQCRB; IDH1\*; CDK1\*; IFITM3\*; ACAA1; ACAT2; MVD; FDFT1; JUN; HMOX2\*; SOD2; Ki67; SNCA] | 36 |
| orf6 | [CCR2; SNAT3; TAT1; ATP2A2; ENO3; CKM; TPM3; TMOD1; HK2\*; ALDOA; PGK1; PGD; ATP1A1\*; UQCRB; IDH1\*; ACAT2; JUN; SOD2; CD80; PD-1; FAS; CD68; NRG1; CTSD; RRM2; TGFB2; UNC13A; RAB3A] | 28 |
| orf7a | [CCR2; PAT2; ATP2A2; MYLK2; IL-13; PFKP; PKM\*; ACAT2; BCKDK; JUN; DNAJB9; CD80; Ki67; FAS; ACE2; CD68; NRG1; IL-18; STEAP3; Tau] | 20 |
| orf8 | [DKK1; IFI44L; IFI44; IL-3; IL-5; SLC6A19; ASCT2; GLUT9; MYH15; MYO1F; TNF-α; IL-1β; IL-2; IL-6; IL-12; IL-13; IL-33; IL-4; IL-10; IL-17; HK2\*; MTTP; SOD2; ERN1; CD80; CRP; ACE2; MRC1 cd206; GDF11; NOG; NRG1; TIMP1; CTSD; IGFBP3; CCNB2; TGFB2; CCL7; SNCA] | 38 |
| orf9b | [IFI44L; RSAD2; IL-3; SLC22A12; SLC34A1; SLC6A19; PAT2; ABCG2; ENO3; TNNC1; CKM; TNNI3; CAPZB; IKKβ; IL-6; IL-33; IL-4; HK2\*; PKM\*; PGD; ACAT2; MVD; JUN; GCLC\*; ERN1; CD80; CTLA-4; ACE2; TNFSF10; CTSB; DDIT4; IGFBP3; CCNB2; TGFB2; RIMS1; SNAP25; STXBP5; Tau] | 38 |
| orf9c | [MX1; DKK1; IFNλ; CCR1; CCR8; SLC22A12; EAAT3; SNAT3; TAT1; OAT1; OAT4; GLUT9; ATP2A2; ACTB; MYH6; MYH15; IL-2; IL-13; IL-4; IL-10; IL-17; IL-22; SQLE\*; DGAT1; HMOX2\*'; ERN1; DNAJB9; CD80; IL-7; PD-1; FAS; ACE2; NOG; NRG1; C5; CCL4; CMTM2; CCL3; CXCL9; RAB3A; STXBP5] | 41 |

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