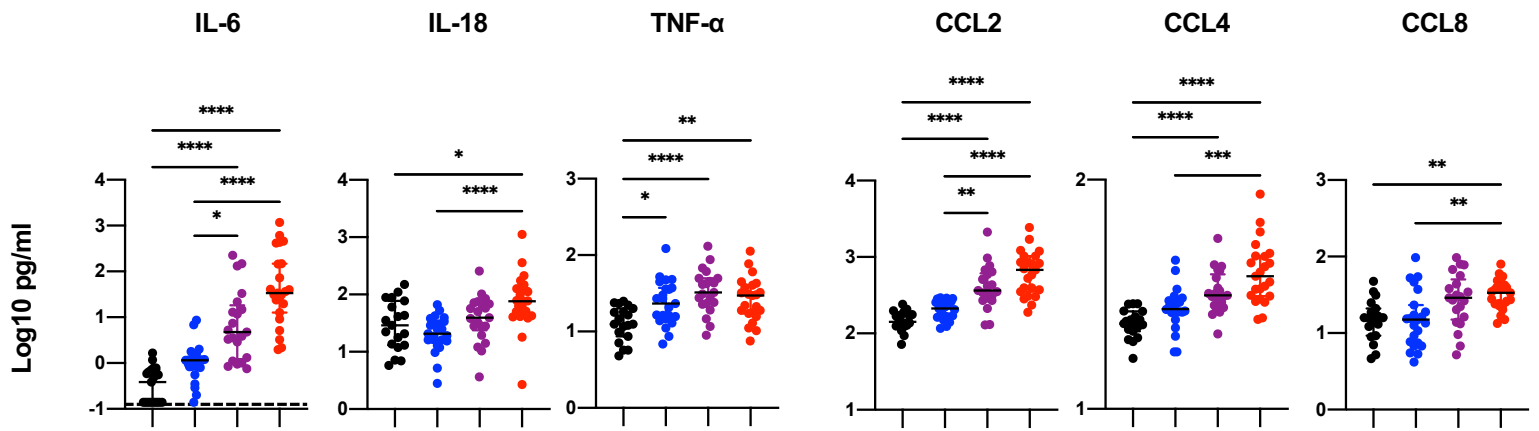


### Supplementary Figure 1. Characteristics of patients

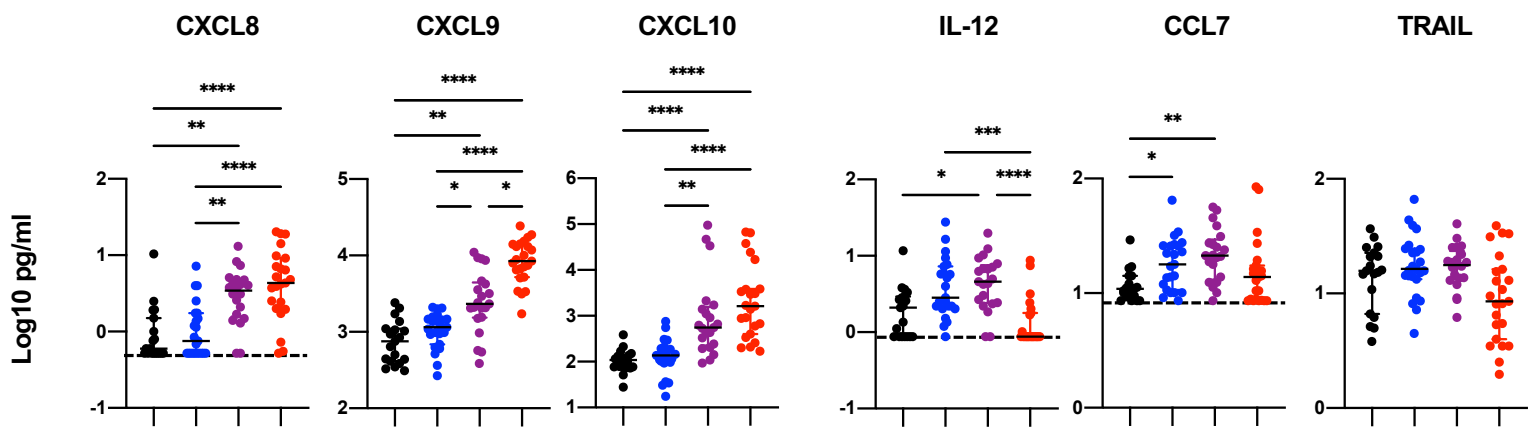
(A) Sample collection date is defined as days after symptom onset (DfSO) (B) Ages of patients. (C) SARS-CoV-2 Viral loads from plasma and nasopharyngeal swab (NP swab) of patients. The levels of viral load in plasma and nasopharyngeal swab were evaluated by quantitative reverse transcription polymerase chain reaction. The detection limits are indicated by dotted lines. The percent of samples with detectable viral loads are shown at the bottom. (D) Days between symptom onset and hospitalization, and length (days) of hospital stay of Mild and ICU patients. Significance testing among groups was performed using Kruskal-Wallis test with Dunn's multiple comparisons test. \*  $P < 0.05$ , \*\*  $P < 0.01$ , \*\*\*  $P < 0.001$ , \*\*\*\*  $P < 0.0001$ .

A

● Conv ● Out ● Mild ● ICU

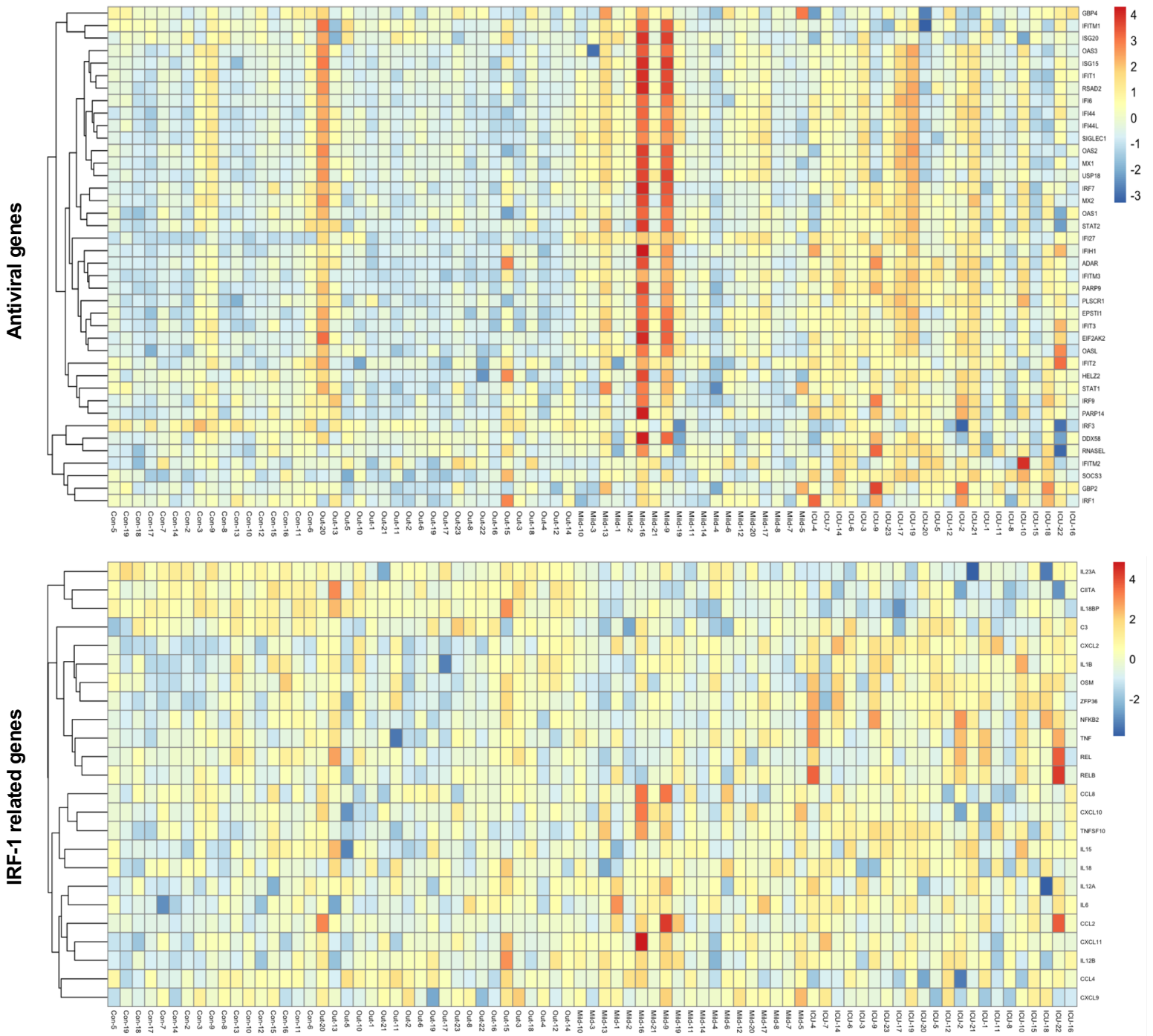


B



### Supplementary Figure 2. Plasma levels of interferon regulatory factor 1 (IRF-1)-regulated cytokines and chemokines.

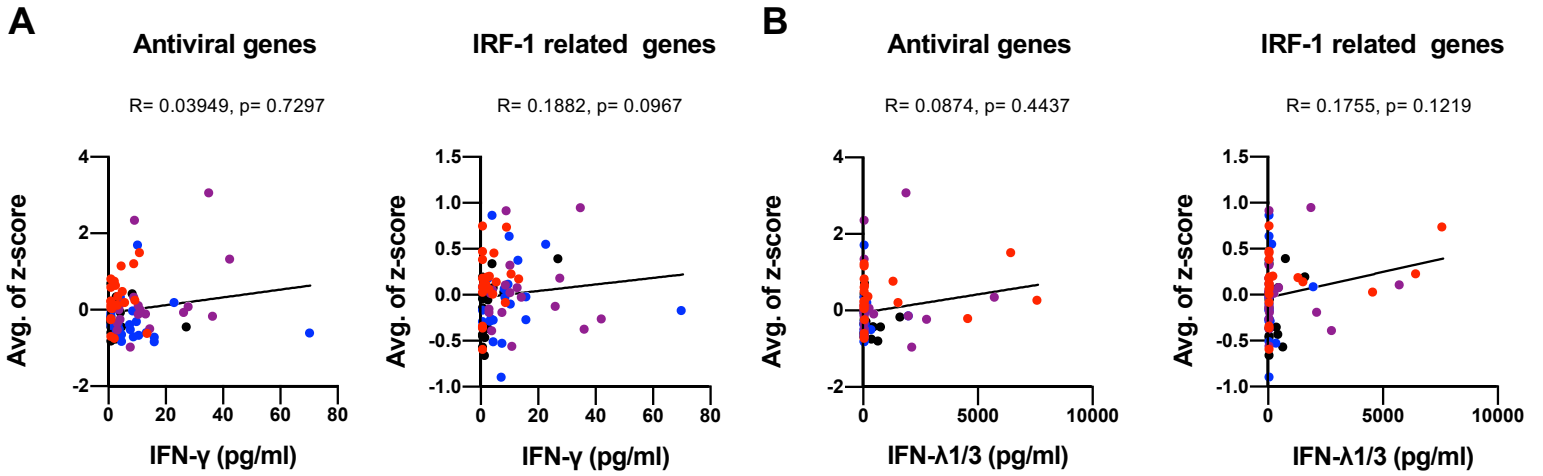
The detection limits are indicated by dotted lines. Significance testing among groups was performed using Kruskal-Wallis test with Dunn's multiple comparisons test. \* P<0.05, \*\* P<0.01, \*\*\* P<0.001, \*\*\*\* P<0.0001.



### Supplementary Figure 3. The expression of interferon-stimulated genes in PBMCs

Normalized mRNA expression levels of antiviral genes and IRF-1 related genes in PBMCs were transformed into z-score and visualized in the form of heatmap.

● Conv ● Out ● Mild ● ICU



**Supplementary Figure 4. Correlation between the interferons levels and ISGs expression.**

Correlation between the levels of IFN- $\alpha$  (A), IFN- $\lambda$ 1/3 (B) and the average z-scores of antiviral genes and IRF-1 related genes. Spearman's rank test was used for the correlations. The regression line (solid) are shown.

<b>Supplementary Table 1. Characteristics of patients</b>				
	<b>Convalescent</b>	<b>Outpatients</b>	<b>Hospitalized</b>	<b>Hospitalized</b>
			<b>non-ICU</b>	<b>ICU</b>
<b>Numbers</b>	22.1% (19/86)	26.7% (23/86)	24.4% (21/86)	26.7% (23/86)
<b>Ages, median (IQR)</b>	33 (30-42)	34 (29-54)	54 (37-65)	60 (44-72)
<b>Male, no (%)</b>	6 (31.6 %)	7 (30.4 %)	8 (38.1 %)	16 (69.5 %)
<b>Race/Ethnicity</b>				
Asian/Non-Hispanic	5.3 % (1/19)	8.7 % (2/23)	-	-
Asian/Hispanic	-	-	4.8 % (1/21)	-
Asian/Unknown	-	-	-	-
Black or African American/Non-Hispanic	5.3 % (1/19)	8.7 % (2/23)	4.8 % (1/21)	13.0 % (3/23)
Black or African American/Hispanic	-	-	4.8 % (1/21)	4.3 % (1/23)
Black or African American/Unknown	-	-	-	4.3 % (1/23)
White/Non-Hispanic	78.9 % (15/19)	78.2 % (18/23)	33.3 % (7/21)	34.8 % (8/23)
White/Hispanic	10.5 % (2/19)	4.3 % (1/23)	9.5 % (2/21)	-
White/Unknown	-	-	-	4.3 % (1/23)
Unknown/Non-Hispanic	-	-	-	4.3 % (1/23)
Unknown/Hispanic	-	-	33.3 % (7/21)	21.7 % (5/23)
Unknown/Unknown	-	-	9.5 % (2/21)	13.0 % (3/23)
<b>Median interval from symptom onset to admission, days (IQR)</b>	-	-	8 (5-11.5)	6 (3-9)
<b>Median duration of hospitalized, days (IQR)</b>	-	-	6 (5-9.5)	38.5 (30-42.5)*
<b>Sample collection date, days after symptom onset (IQR)</b>	34 (30-38)	25 (20-35)	14 (11-16)	15 (11-19)
<b>Dexamethasone treatment**</b>				
Treated, no (%)	-	-	-	8/23 (34.8%)
Days, median (IQR)	-	-	-	1 (1-2)
Dose, mg/day (IQR)	-	-	-	12 (10-22.8)
* The patients deceased (n=6) and currently hospitalized (n=2) at the time of analysis were excluded.				
** Samples were collected prior to dexamethasone treatment.				

variable	term	estimate	p.value	padj
IFN-a	(Intercept)	1.263558992	1.65E-21	1.98E-20
IFN-a	Disease_status: Outpatients	0.034274439	0.598793839	0.81173016
IFN-a	Disease_status: Mild	0.124406297	0.147742765	0.72148196
IFN-a	Disease_status: ICU	0.060921745	0.482596687	0.81173016
IFN-a	Age	-5.35E-04	0.74408598	0.81173016
IFN-a	Gender: Male	0.051555506	0.292284542	0.72148196
IFN-a	Race: Asian	0.010639658	0.921736974	0.92173697
IFN-a	Race: Black or African American	0.025454544	0.735575288	0.81173016
IFN-a	Race: Unknown or not reported	-0.087889765	0.300617481	0.72148196
IFN-a	Ethnicity: Hispanic or Latino	0.028389978	0.714875161	0.81173016
IFN-a	Ethnicity: Unknown or not reported	0.040534781	0.69099958	0.81173016
IFN-a	SinceOnset: >2 weeks	-0.071974314	0.20949554	0.72148196
IFN-g	(Intercept)	0.237132465	0.245218762	0.60873919
IFN-g	Disease_status: Outpatients	0.510026912	4.74E-04	0.00568897
IFN-g	Disease_status: Mild	0.546483468	0.003797391	0.02278435
IFN-g	Disease_status: ICU	-0.183462124	0.326130091	0.60873919
IFN-g	Age	0.004013789	0.256194647	0.60873919
IFN-g	Gender: Male	0.03691287	0.724909541	0.79081041
IFN-g	Race: Asian	-0.238296242	0.307762495	0.60873919
IFN-g	Race: Black or African American	0.116449757	0.472961748	0.70944262
IFN-g	Race: Unknown or not reported	0.109470103	0.547741868	0.73032249
IFN-g	Ethnicity: Hispanic or Latino	-0.03169506	0.849489435	0.84948944
IFN-g	Ethnicity: Unknown or not reported	0.084943673	0.698407998	0.79081041
IFN-g	SinceOnset: >2 weeks	-0.113741723	0.355097863	0.60873919
IFN-L1/3	(Intercept)	2.464930474	1.14E-13	1.37E-12
IFN-L1/3	Disease_status: Outpatients	-0.332013506	0.079704304	0.23911291
IFN-L1/3	Disease_status: Mild	0.133607923	0.587149655	0.70457959
IFN-L1/3	Disease_status: ICU	0.009362987	0.970069488	0.97006949
IFN-L1/3	Age	-0.006611138	0.16374569	0.39298966
IFN-L1/3	Gender: Male	0.370378469	0.009967631	0.05980578
IFN-L1/3	Race: Asian	0.311619819	0.319481451	0.47922218
IFN-L1/3	Race: Black or African American	-0.228234726	0.294809573	0.47922218
IFN-L1/3	Race: Unknown or not reported	0.29289257	0.23171406	0.46342812
IFN-L1/3	Ethnicity: Hispanic or Latino	-0.508304797	0.025539966	0.10215986
IFN-L1/3	Ethnicity: Unknown or not reported	-0.204588504	0.486641458	0.64885528
IFN-L1/3	SinceOnset: >2 weeks	-0.039250973	0.811260971	0.88501197

### Supplementary Table 2. Multivariable analysis of plasma cytokines/chemokines

A multivariable linear regression model for each of the 15 cytokines and chemokines was built. The rows with "(intercept)" give the average value of a dependent variable for a "baseline" sample. The baseline was set as Convalescent, Female, White, Not Hispanic or Latino, <= 2 weeks, and 0 years old. All the other rows show the estimated effect for a specific independent variable or its level.

(continued)

variable	term	estimate	p.value	padj
IL-6	(Intercept)	-0.904531575	7.61E-04	0.00228277
IL-6	Disease_status: Outpatients	0.428412775	0.018200877	0.03640175
IL-6	Disease_status: Mild	1.025579936	3.45E-05	2.07E-04
IL-6	Disease_status: ICU	1.722095114	2.77E-10	3.33E-09
IL-6	Age	0.016068439	5.71E-04	0.00228217
IL-6	Gender: Male	0.057187991	0.668289831	0.71556717
IL-6	Race: Asian	-0.141120825	0.63397945	0.71556717
IL-6	Race: Black or African American	0.075116142	0.71556717	0.71556717
IL-6	Race: Unknown or not reported	-0.580850457	0.013927206	0.03342529
IL-6	Ethnicity: Hispanic or Latino	0.292401758	0.171410798	0.2571162
IL-6	Ethnicity: Unknown or not reported	0.272514776	0.329789035	0.43971871
IL-6	SinceOnset: >2 weeks	-0.217064742	0.166869658	0.2571162
IL-12	(Intercept)	0.145198108	0.356719532	0.66816875
IL-12	Disease_status: Outpatients	0.324784948	0.003553299	0.04263959
IL-12	Disease_status: Mild	0.350918161	0.015339166	0.092035
IL-12	Disease_status: ICU	-0.242757339	0.09498193	0.28494579
IL-12	Age	5.60E-04	0.837014642	0.91270907
IL-12	Gender: Male	0.008889135	0.912709073	0.91270907
IL-12	Race: Asian	-0.119975268	0.505823485	0.75873523
IL-12	Race: Black or African American	0.286843255	0.02441032	0.09764128
IL-12	Race: Unknown or not reported	0.066134504	0.638471479	0.85129531
IL-12	Ethnicity: Hispanic or Latino	0.01461343	0.909912931	0.91270907
IL-12	Ethnicity: Unknown or not reported	0.161898578	0.340851007	0.66816875
IL-12	SinceOnset: >2 weeks	0.08177504	0.389765106	0.66816875
IL-18	(Intercept)	1.371088069	3.03E-10	3.64E-09
IL-18	Disease_status: Outpatients	-0.145006109	0.267712943	0.45893647
IL-18	Disease_status: Mild	0.062640535	0.713966081	0.8567593
IL-18	Disease_status: ICU	0.332707389	0.058049978	0.25346533
IL-18	Age	-1.12E-04	0.972816825	0.97281682
IL-18	Gender: Male	0.183407415	0.063366332	0.25346533
IL-18	Race: Asian	0.222660089	0.306098093	0.45914714
IL-18	Race: Black or African American	0.110115821	0.466141788	0.62152238
IL-18	Race: Unknown or not reported	-0.215728366	0.205200301	0.45893647
IL-18	Ethnicity: Hispanic or Latino	0.252280889	0.107802676	0.32340803
IL-18	Ethnicity: Unknown or not reported	0.232758897	0.256032618	0.45893647
IL-18	SinceOnset: >2 weeks	-0.007607181	0.946889329	0.97281682

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(continued)

variable	term	estimate	p.value	padj
CCL2	(Intercept)	2.112698297	8.03E-34	9.64E-33
CCL2	Disease_status: Outpatients	0.129214391	0.057758967	0.11551793
CCL2	Disease_status: Mild	0.391132441	2.98E-05	1.19E-04
CCL2	Disease_status: ICU	0.565737734	1.62E-08	9.73E-08
CCL2	Age	0.003327838	0.052178065	0.11551793
CCL2	Gender: Male	0.06465106	0.202125015	0.26950002
CCL2	Race: Asian	-0.048046694	0.667915905	0.66791591
CCL2	Race: Black or African American	-0.167198895	0.034461485	0.10338445
CCL2	Race: Unknown or not reported	-0.135660014	0.123791964	0.21221479
CCL2	Ethnicity: Hispanic or Latino	0.056011132	0.486103287	0.55479034
CCL2	Ethnicity: Unknown or not reported	-0.0697408	0.50855781	0.55479034
CCL2	SinceOnset: >2 weeks	-0.084559003	0.154349715	0.23152457
CCL4	(Intercept)	1.365707541	2.00E-44	2.41E-43
CCL4	Disease_status: Outpatients	0.055039678	0.071077148	0.12184654
CCL4	Disease_status: Mild	0.088339757	0.027970775	0.08391232
CCL4	Disease_status: ICU	0.156870686	1.95E-04	0.00116889
CCL4	Age	0.001410161	0.066105549	0.12184654
CCL4	Gender: Male	0.047990231	0.036425693	0.08742166
CCL4	Race: Asian	-0.038466227	0.444228041	0.55741239
CCL4	Race: Black or African American	-0.020676545	0.554139159	0.60451545
CCL4	Race: Unknown or not reported	-0.044596221	0.257335246	0.38600287
CCL4	Ethnicity: Hispanic or Latino	0.026374324	0.464510322	0.55741239
CCL4	Ethnicity: Unknown or not reported	0.01024272	0.828319809	0.82831981
CCL4	SinceOnset: >2 weeks	-0.060235979	0.025082202	0.08391232
CCL7	(Intercept)	0.938467126	9.00E-14	1.08E-12
CCL7	Disease_status: Outpatients	0.183235246	0.011516695	0.06910017
CCL7	Disease_status: Mild	0.166029534	0.077430223	0.20277246
CCL7	Disease_status: ICU	-0.029786769	0.752529237	0.82094099
CCL7	Age	0.004125893	0.023131166	0.09252466
CCL7	Gender: Male	-0.023807097	0.654557362	0.82094099
CCL7	Race: Asian	-0.090368971	0.44492274	0.82094099
CCL7	Race: Black or African American	0.143156351	0.084488525	0.20277246
CCL7	Race: Unknown or not reported	0.030933768	0.737430361	0.82094099
CCL7	Ethnicity: Hispanic or Latino	0.043079472	0.611282761	0.82094099
CCL7	Ethnicity: Unknown or not reported	-0.003081843	0.977873312	0.97787331
CCL7	SinceOnset: >2 weeks	-0.029164197	0.639368634	0.82094099

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(continued)

variable	term	estimate	p.value	padj
CCL8	(Intercept)	1.254503272	7.50E-15	9.00E-14
CCL8	Disease_status: Outpatients	-0.032263048	0.717833996	0.8614008
CCL8	Disease_status: Mild	0.059289363	0.61267353	0.81689804
CCL8	Disease_status: ICU	0.088197423	0.458603937	0.78617818
CCL8	Age	0.002583453	0.251920367	0.58242373
CCL8	Gender: Male	0.107052086	0.112496747	0.33749024
CCL8	Race: Asian	-0.157327117	0.291211867	0.58242373
CCL8	Race: Black or African American	0.17081842	0.101349572	0.33749024
CCL8	Race: Unknown or not reported	-0.014994626	0.897160555	0.90205998
CCL8	Ethnicity: Hispanic or Latino	0.064497656	0.545331452	0.81689804
CCL8	Ethnicity: Unknown or not reported	0.0171993	0.902059984	0.90205998
CCL8	SinceOnset: >2 weeks	-0.221159867	0.00587425	0.0352455
CXCL8	(Intercept)	-0.169724725	0.310064423	0.46509663
CXCL8	Disease_status: Outpatients	0.025980067	0.820944497	0.89557582
CXCL8	Disease_status: Mild	0.386445397	0.011962684	0.07177611
CXCL8	Disease_status: ICU	0.475703111	0.002541415	0.03049699
CXCL8	Age	0.006835098	0.020109855	0.08043942
CXCL8	Gender: Male	0.15554041	0.073629007	0.21040836
CXCL8	Race: Asian	-0.195464855	0.30775611	0.46509663
CXCL8	Race: Black or African American	-0.072745206	0.584400013	0.70128002
CXCL8	Race: Unknown or not reported	-0.017448087	0.906899569	0.90689957
CXCL8	Ethnicity: Hispanic or Latino	-0.087942434	0.521448928	0.69526524
CXCL8	Ethnicity: Unknown or not reported	-0.308140168	0.089561314	0.21040836
CXCL8	SinceOnset: >2 weeks	-0.164442599	0.105204181	0.21040836
CXCL9	(Intercept)	2.487941423	8.92E-31	1.07E-29
CXCL9	Disease_status: Outpatients	0.148277085	0.097053185	0.16637689
CXCL9	Disease_status: Mild	0.366588079	0.002224227	0.00667268
CXCL9	Disease_status: ICU	0.867537603	1.85E-10	1.11E-09
CXCL9	Age	0.008996177	1.23E-04	4.93E-04
CXCL9	Gender: Male	0.060966538	0.359455546	0.53918332
CXCL9	Race: Asian	-0.027949166	0.849529689	0.95731841
CXCL9	Race: Black or African American	-0.053413084	0.602567021	0.8034227
CXCL9	Race: Unknown or not reported	-0.209675507	0.071540334	0.14308067
CXCL9	Ethnicity: Hispanic or Latino	0.258844107	0.016307884	0.03913892
CXCL9	Ethnicity: Unknown or not reported	0.011170486	0.935780514	0.95731841
CXCL9	SinceOnset: >2 weeks	0.004152803	0.957318409	0.95731841

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A multivariable linear regression model for each of the 15 cytokines and chemokines was built. The rows with "(intercept)" give the average value of a dependent variable for a "baseline" sample. The baseline was set as Convalescent, Female, White, Not Hispanic or Latino,  $\leq 2$  weeks, and 0 years old. All the other rows show the estimated effect for a specific independent variable or its level.

(continued)

variable	term	estimate	p.value	padj
CXCL10	(Intercept)	1.807247746	3.19E-09	3.83E-08
CXCL10	Disease_status: Outpatients	0.028661988	0.877373821	0.87737382
CXCL10	Disease_status: Mild	0.616330688	0.013204723	0.05281889
CXCL10	Disease_status: ICU	0.972488573	1.78E-04	0.00107081
CXCL10	Age	0.009108651	0.054222399	0.13013376
CXCL10	Gender: Male	0.280056118	0.047122686	0.13013376
CXCL10	Race: Asian	0.454603	0.144213091	0.21631964
CXCL10	Race: Black or African American	-0.078774005	0.714227764	0.85707332
CXCL10	Race: Unknown or not reported	-0.315244494	0.19421656	0.25895541
CXCL10	Ethnicity: Hispanic or Latino	0.354103112	0.113259301	0.1941588
CXCL10	Ethnicity: Unknown or not reported	-0.070036008	0.809762926	0.87737382
CXCL10	SinceOnset: >2 weeks	-0.270143332	0.100155509	0.1941588
TNF-a	(Intercept)	0.944103273	1.10E-11	1.32E-10
TNF-a	Disease_status: Outpatients	0.255958979	0.002259933	0.0135596
TNF-a	Disease_status: Mild	0.207321866	0.054420531	0.12013808
TNF-a	Disease_status: ICU	0.061060254	0.572386362	0.57238636
TNF-a	Age	0.005812244	0.005563958	0.02225583
TNF-a	Gender: Male	0.060853169	0.318770236	0.42502698
TNF-a	Race: Asian	-0.113025554	0.403831397	0.45200182
TNF-a	Race: Black or African American	0.076884236	0.414335003	0.45200182
TNF-a	Race: Unknown or not reported	-0.13954552	0.188613201	0.2829198
TNF-a	Ethnicity: Hispanic or Latino	0.238723994	0.015723505	0.04717052
TNF-a	Ethnicity: Unknown or not reported	0.241928792	0.060069039	0.12013808
TNF-a	SinceOnset: >2 weeks	-0.095926769	0.180254415	0.2829198
TRAIL	(Intercept)	1.098574269	5.14E-12	6.16E-11
TRAIL	Disease_status: Outpatients	0.119396276	0.199080777	0.33736729
TRAIL	Disease_status: Mild	0.169584158	0.16458742	0.33736729
TRAIL	Disease_status: ICU	-0.162102982	0.190304595	0.33736729
TRAIL	Age	-0.002670117	0.253025471	0.33736729
TRAIL	Gender: Male	0.089329691	0.199785359	0.33736729
TRAIL	Race: Asian	0.086273433	0.575336723	0.62764006
TRAIL	Race: Black or African American	0.157862476	0.143138801	0.33736729
TRAIL	Race: Unknown or not reported	-0.072409006	0.547333092	0.62764006
TRAIL	Ethnicity: Hispanic or Latino	0.026525159	0.810074005	0.81007401
TRAIL	Ethnicity: Unknown or not reported	0.240495189	0.099807311	0.33736729
TRAIL	SinceOnset: >2 weeks	0.097670283	0.230387849	0.33736729

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### Supplementary Table 3. Primers for IFN- $\gamma$ stimulated genes

Primer Name	Sequence (5' ->3')
<i>HLA-A</i> forward	AAA AGG AGG GAG TTA CAC TCA GG
<i>HLA-A</i> reverse	GCT GTG AGG GAC ACA TCA GAG
<i>HLA-B</i> forward	CTA CCC TGC GGA GAT CA
<i>HLA-B</i> reverse	ACA GCC AGG CCA GCA ACA
<i>B2M</i> forward	TGC TGT CTC CAT GTT TGA TGT ATCT
<i>B2M</i> reverse	TCT CTG CTC CCC ACC TCT AAG T
<i>HLA-DPA1</i> forward	ATG CGC CCT GAA GAC AGA ATG
<i>HLA-DPA1</i> reverse	ACA CAT GGT CCG CCT TGA TG
<i>HLA-DRA</i> forward	GCC AAC CTG GAA ATC ATG ACA
<i>HLA-DRA</i> reverse	AGG GCT GTT CGT GAG CAC A
<i>CIITA</i> forward	TTA TGC CAA TAT CGC GGA ACT G
<i>CIITA</i> reverse	CAT CTG GTC CTA TGT GCT TGA AA

## Supplemental acknowledgments

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