

Supplemental information

CD177, a specific marker of neutrophil activation, is associated with coronavirus disease 2019 severity and death

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Supplementary Information

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Table S1. Characteristics of COVID-19 patients described in the transcriptomic analysis, related to Figure 4

	No.	Group 1 (N = 10)	Group 2 (N = 16)	Group 3 (N = 18)
Demographic characteristics				
Age - Median (IQR) - years	44	57 (48 - 74)	61 (51 - 66)	61 (53 - 68)
Male sex - No./total No. (%)	44	7/10 (70)	14/16 (88)	16/18 (89)
ICU or transfer to ICU or death - No /total No.(%)	44	6/10 (60)	13/16 (81)	17/18 (94)
Outcome - No./total No. (%)	44			
Death		4/10 (40)	4/16 (25)	5/18 (28)
Discharge alive		6/10 (60)	12/16 (75)	13/18 (72)
Median interval from first symptoms on admission (IQR)	44	7 (6 - 11)	11 (10 - 14)	13 (9 - 14)
Comorbidities - No./total No. (%)				
Any	44	2/10 (10)	7/16 (44)	4/18 (22)
Chronic cardiac disease	44	4/10 (10)	1/16 (6)	2/18 (11)
Hypertension	44	4/10 (40)	2/16 (12)	7/18 (39)
Chronic pulmonary disease	44	0/10 (0)	1/16 (6)	2/18 (11)
Asthma	44	1/10 (10)	1/16 (6)	0/18 (0)
Chronic kidney disease	44	0/10 (0)	0/16 (0)	3/18 (17)
Chronic neurological disorder	44	0/10 (0)	1/16 (6)	0/18 (0)
Obesity	44	3/10 (30)	5/16 (31)	5/18 (28)
Diabetes	44	1/10 (10)	4/16 (25)	6/18 (33)
Smoking History - No./total No. (%)				
Smoking	44	0/10 (0)	3/16 (19)	1/18 (6)
Laboratory findings on admission - Median (IQR)				
Hemoglobin - g/dL	44	13 (12 - 15)	13 (12 - 14)	12 (11 - 14)
WBC count - x10 ⁹ /L	44	5 (5 - 6)	6 (5 - 9)	9 (6 - 13)
Platelet count - x10 ⁹ /L	44	179 (156 - 198)	188 (165 - 288)	204 (115 - 359)
C-reactive protein (CRP) - mg/L	44	61 (20 - 82)	121 (60 - 196)	152 (108 - 244)
Blood Urea Nitrogen (urea) - mmol/L	44	6 (5 - 7)	5 (3 - 10)	8 (6 - 12)
Symptoms on admission - No./total No. (%)				
Fever	44	8/10 (80)	14/16 (88)	18/18 (100)
Cough	42	5/8 (63)	12/16 (75)	13/18 (72)
Sore throat	41	1/7 (14)	1/16 (6)	1/18 (6)
Wheezing	39	1/8 (13)	2/15 (13)	0/16 (0)
Myalgia	41	2/8 (25)	8/16 (50)	5/17 (29)
Arthralgia	40	1/8 (13)	2/15 (13)	4/17 (24)
Fatigue	42	2/8 (25)	8/16 (50)	8/18 (44)
Dyspnea	42	6/8 (75)	14/16 (88)	15/18 (83)
Headache	42	0/8 (0)	5/16 (31)	5/18 (28)
Altered consciousness	41	0/8 (0)	0/15 (0)	2/18 (11)

Abdominal pain	38	0/8 (0)	1/14 (7)	3/16 (19)
Vomiting / nausea	41	1/8 (13)	2/15 (13)	5/18 (28)
Diarrhea	41	1/8 (13)	4/15 (27)	5/18 (28)
Clinical characteristics on admission - Median (IQR)				
SOFA score	23	3 (1 - 4)	6 (4 - 7)	6 (3 - 7)
SAPS2	24	37 (22 - 52)	29 (28 - 38)	46 (31 - 61)
Heart rate - beats per minute	44	85 (80 - 92)	87 (72 - 105)	90 (75 - 103)
Respiratory rate - breaths per minute	40	19 (18 - 20)	27 (24 - 33)	22 (19 - 33)
Systolic blood pressure - mmHg	43	118 (108 - 145)	139 (114 - 145)	135 (121 - 158)
Diastolic blood pressure - mmHg	43	74 (65 - 80)	78 (70 - 89)	74 (71 - 82)
Oxygen saturation - percent	44	95 (93 - 98)	96 (91 - 97)	93 (87 - 97)
Oxygen saturation on – No./total No. (%)	44			
Room air		4/10 (40)	3/16 (19)	7/18 (39)
Oxygen therapy		6/10 (60)	13/16 (81)	11/18 (61)
Treatments - No./total No. (%)				
Antiviral	43	5/10 (50)	10/16 (62)	14/17 (82)
Antibiotic	43	4/10 (40)	13/16 (81)	12/17 (71)
Corticosteroids	43	1/10 (10)	8/16 (50)	10/17 (59)
Antifungal	43	0/10 (0)	2/16 (12)	3/17 (18)
Hydroxychloroquine	43	0/10 (0)	3/16 (19)	3/17 (18)

Table S2. All BCR related genes, related to Figure 3

ALL BCR related genes								
Genes	FDR	Log2 FC	Genes	FDR	Log2 FC	Genes	FDR	Log2 FC
<i>IGHV1-24</i>	0.030581621	5.407268	<i>IGHV3-73</i>	0.0220482	2.725353	<i>IGHV1-17</i>	0.01725323	2.231395
<i>IGLV3-10</i>	0.026473188	4.282412	<i>IGLV3-9</i>	0.0220482	2.712686	<i>IGLV2-28</i>	0.04153633	2.201201
<i>IGLV3-25</i>	0.012346539	3.90591	<i>IGLC1</i>	0.01725323	2.701069	<i>IGKV6D-21</i>	0.01234654	2.184745
<i>IGLV3-27</i>	0.022048198	3.885845	<i>IGHJ4</i>	0.01234654	2.669988	<i>IGLJ1</i>	0.04473672	2.173331
<i>IGLV1-36</i>	0.017253229	3.863016	<i>IGHJ1</i>	0.01725323	2.6633	<i>IGLV8-61</i>	0.01725323	2.173024
<i>IGLV3-1</i>	0.00397524	3.837419	<i>IGHV4-61</i>	0.0220482	2.656812	<i>IGKV1-6</i>	0.0220482	2.168246
<i>IGLV4-69</i>	0.017253229	3.739889	<i>IGKV3-15</i>	0.0009382	2.651675	<i>IGKV2D-40</i>	0.03438457	2.163532
<i>IGLV3-19</i>	0.01061534	3.735987	<i>IGKV4-1</i>	0.00028687	2.644773	<i>IGHV1OR15-4</i>	0.03058162	2.151865
<i>IGHV1-18</i>	0.017253229	3.667556	<i>IGHA1</i>	0.00397524	2.634013	<i>IGHV3-71</i>	0.0220482	2.089232
<i>IGHV3-21</i>	0.017253229	3.587602	<i>IGKV1-27</i>	0.04153633	2.63176	<i>IGKV1D-37</i>	0.00746691	2.06909
<i>IGLV6-57</i>	0.017253229	3.512432	<i>IGHV4-28</i>	0.01725323	2.614677	<i>IGHV3-72</i>	0.03058162	2.067323
<i>IGHV4-34</i>	0.017253229	3.463972	<i>IGLV2-11</i>	0.01234654	2.609628	<i>IGHV3-41</i>	0.0220482	2.055012
<i>IGHV4-39</i>	0.017253229	3.444361	<i>IGLV5-37</i>	0.04153633	2.605725	<i>IGHG4</i>	0.02647319	2.053045
<i>IGHV3-33</i>	0.000286867	3.435046	<i>IGKV3-20</i>	0.00028687	2.554925	<i>IGHV3-63</i>	0.01725323	2.051185
<i>IGHV3-11</i>	0.030581621	3.421957	<i>IGHV1-58</i>	0.02647319	2.543716	<i>IGKV2D-28</i>	0.01725323	2.018281
<i>IGHG3</i>	0.000938197	3.407473	<i>IGKV1-5</i>	0.00746691	2.511011	<i>IGKV3-7</i>	0.01725323	1.963918
<i>IGHV1-46</i>	0.022048198	3.39981	<i>IGKV2-29</i>	0.01725323	2.488949	<i>IGHGP</i>	0.04786254	1.915987
<i>IGHV3-15</i>	0.012346539	3.396577	<i>IGKV3-11</i>	0.0220482	2.489234	<i>IGHV3-60</i>	0.04153633	1.874073
<i>IGHV3-20</i>	0.022048198	3.383072	<i>IGKV1D-33</i>	0.04153633	2.460444	<i>IGKV2D-24</i>	0.04786254	1.87279
<i>IGHV3-43</i>	0.012346539	3.310178	<i>IGL3</i>	0.0220482	2.421166	<i>IGHV3OR16-9</i>	0.01725323	1.844052
<i>IGHV3-23</i>	0.000286867	3.299521	<i>IGLV3-16</i>	0.01725323	2.411455	<i>IGHG2</i>	0.04473672	1.749984
<i>IGHV2-26</i>	0.012346539	3.284427	<i>IGHV3-64</i>	0.03058162	2.405988	<i>IGLV7-43</i>	0.03810136	1.716134
<i>IGLV1-51</i>	0.012346539	3.25168	<i>IGHV6-21</i>	0.00053237	2.400168	<i>IGHV3-69-1</i>	0.03810136	1.711671
<i>IGLC3</i>	0.022048198	3.193759	<i>IGKV1-17</i>	0.0220482	2.398496	<i>IGKV1OR2-108</i>	0.04786254	1.670756
<i>IGLV1-44</i>	0.017253229	3.081442	<i>IGHV3-74</i>	0.00162353	2.393907	<i>IGKV1D-8</i>	0.01725323	1.649229
<i>IGLJ2</i>	0.012346539	3.054996	<i>IGLL1</i>	0.70867098	0.2706642	<i>IGHJ3P</i>	0.00746691	1.609411
<i>IGHV3-13</i>	0.026473188	3.03438	<i>IGHV3-19</i>	0.01725323	2.376945	<i>IGKJ5</i>	0.0220482	1.479375
<i>IGLC2</i>	0.030581621	3.02678	<i>IGKV3D-15</i>	0.01725323	2.367281	<i>IGHGP2</i>	0.00162353	1.42042
<i>IGKV1-33</i>	0.01061534	2.986319	<i>IGKV1D-39</i>	0.01725323	2.354587	<i>IGHVIII-2-1</i>	0.04473672	-0.664831
<i>IGKV2D-30</i>	0.04473672	2.971709	<i>IGHV4-55</i>	0.01234654	2.353481			
<i>IGKV1D-16</i>	0.01061534	2.964449	<i>IGKV1-9</i>	0.02647319	2.31918			
<i>IGHV4-59</i>	0.004544213	2.959443	<i>IGHJ2</i>	0.04473672	2.307147			
<i>IGLV1-40</i>	0.007466914	2.951791	<i>IGLV2-18</i>	0.02647319	2.304288			
<i>IGHJ3</i>	0.012346539	2.94855	<i>IGLV1-50</i>	0.04153633	2.300749			
<i>IGKV3OR2-268</i>	0.017253229	2.925686	<i>IGKC</i>	0.01725323	2.298358			
<i>IGHV5-51</i>	0.007466914	2.914603	<i>IGHV1OR15-9</i>	0.0220482	2.291757			
<i>IGLV10-54</i>	0.022048198	2.911357	<i>IGLV7-46</i>	0.02647319	2.273516			
<i>IGLV1-47</i>	0.007466914	2.907312	<i>IGKV2-24</i>	0.04786254	2.270762			
<i>IGHV3-49</i>	0.012346539	2.905982	<i>IGLC6</i>	0.04473672	2.264953			
<i>IGKV2-28</i>	0.017253229	2.882124	<i>IGLV2-5</i>	0.01061534	2.263166			
<i>IGLVI-70</i>	0.034384566	2.859006	<i>IGKV3D-20</i>	0.01234654	2.262339			
<i>IGHJ5</i>	0.017253229	2.846426	<i>IGLV4-3</i>	0.0220482	2.259118			
<i>IGLV2-23</i>	0.012346539	2.835207	<i>IGHM</i>	0.02647319	2.257772			
<i>IGLV2-8</i>	0.047862536	2.81604	<i>IGKV1-16</i>	0.02647319	2.258257			
<i>IGLV2-14</i>	0.000286867	2.802055	<i>IGHV1OR15-2</i>	0.03058162	2.257497			
<i>IGLV9-49</i>	0.012346539	2.800455	<i>IGKV5-2</i>	0.0153988	2.242023			
<i>IGLV3-21</i>	0.034384566	2.743388	<i>IGLV5-45</i>	0.01725323	2.235904			

Table S3. Characteristics of healthy donors (HD) involved in the various assays, related to STAR Methods

Assay	Immune cell phenotypes	Serum cytokine measurement	RNA-seq	Serum CD177 measurement
n	18	5	10	16
Age – years - Median (IQR)	36 (30 - 45)	30 (28 - 51)	33 (29 - 38)	26 (22 – 50)
Male sex - nbr/total nbr (%)	16/18 (89)	2/5 (40)	10/10 (100)	6/16 (38)

Figure S1 Phenotype gating strategy of immune cells, related to Figure 1

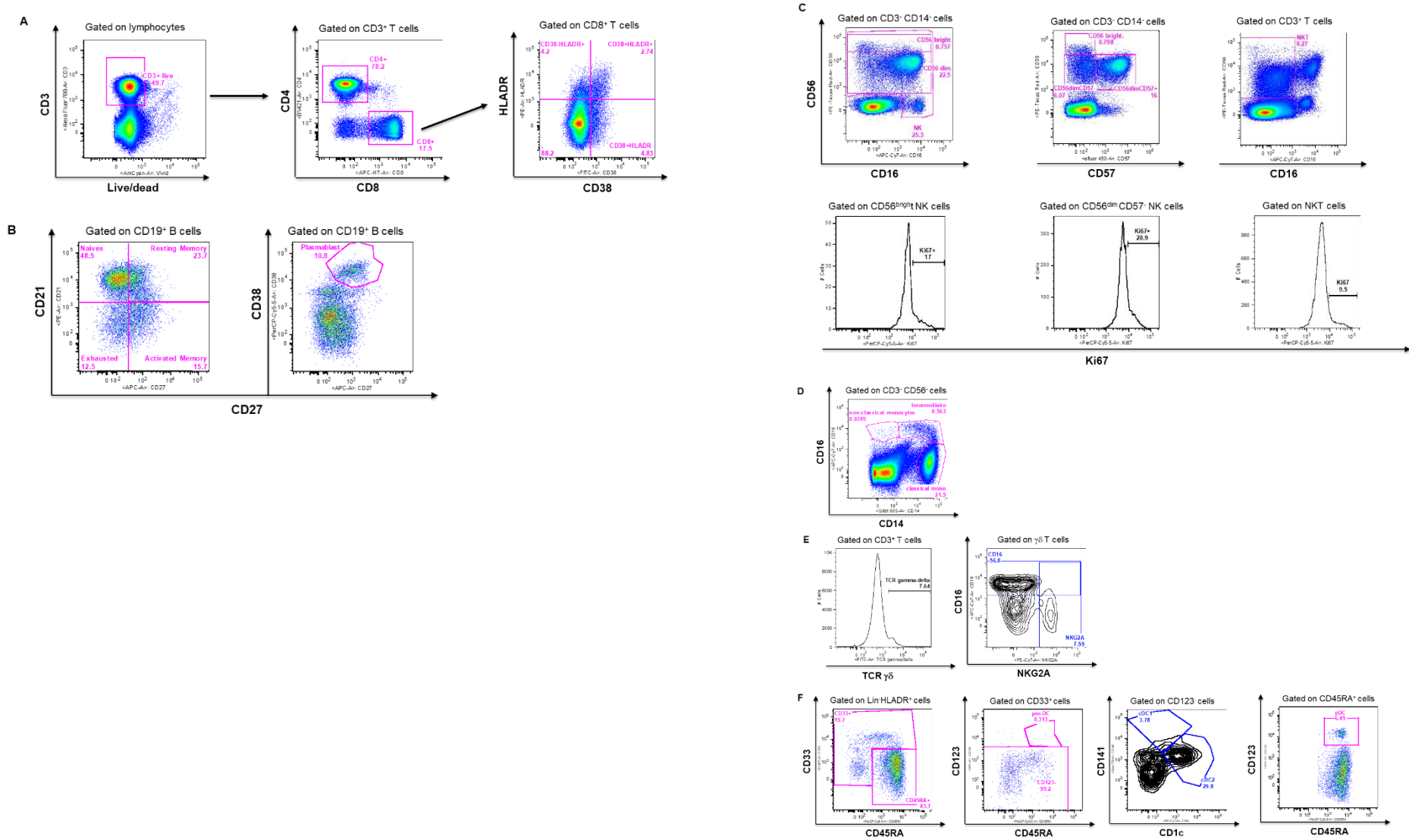


Figure S2. Heatmap of standardized immune-cell subset phenotypic characterization in PBMCs, related to Figure 1

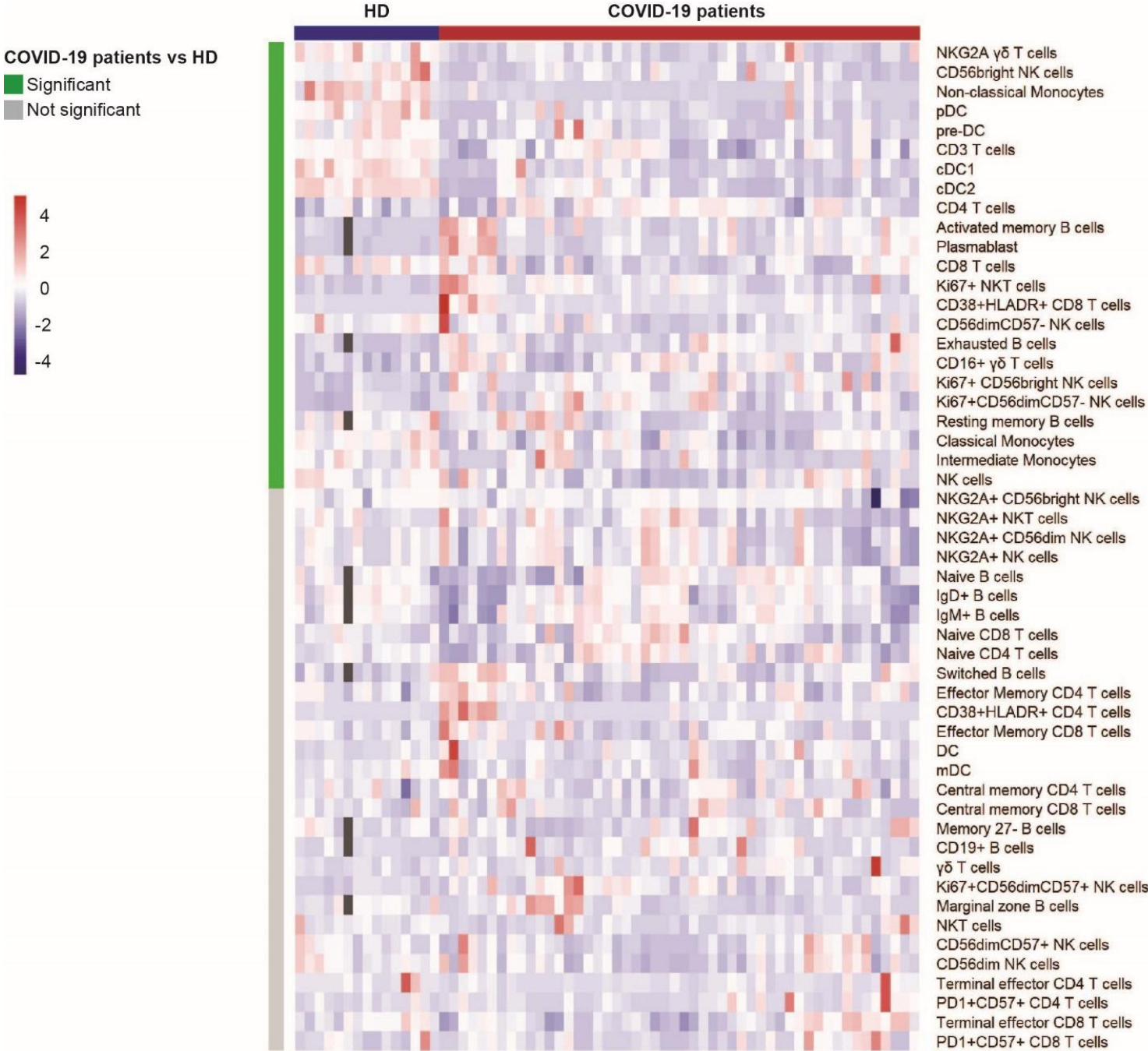


Figure S3. Quantification of soluble mediators differentially present in the serum of COVID19 patients, related to Figure 2

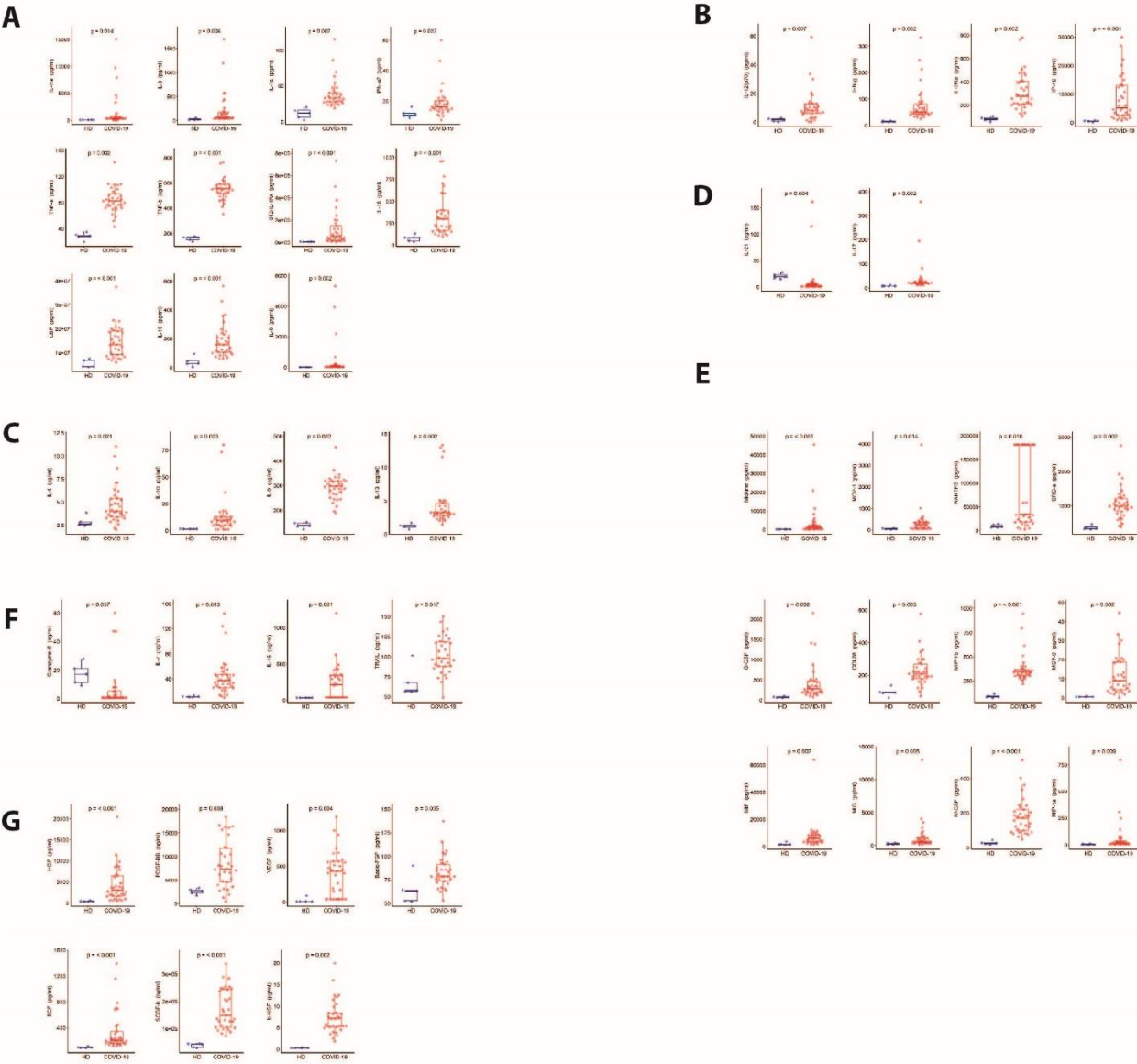


Figure S5. Integrative analysis from COVID-19 patients. Integrative score from MOFA+ of the patient groups defined by the hierarchical clustering of the RNA-seq shown as in Figure 5A. The higher CD177 expression in log2 cpm normalized counts across groups is represented by the intensity of the color. **Related to Figure 5**

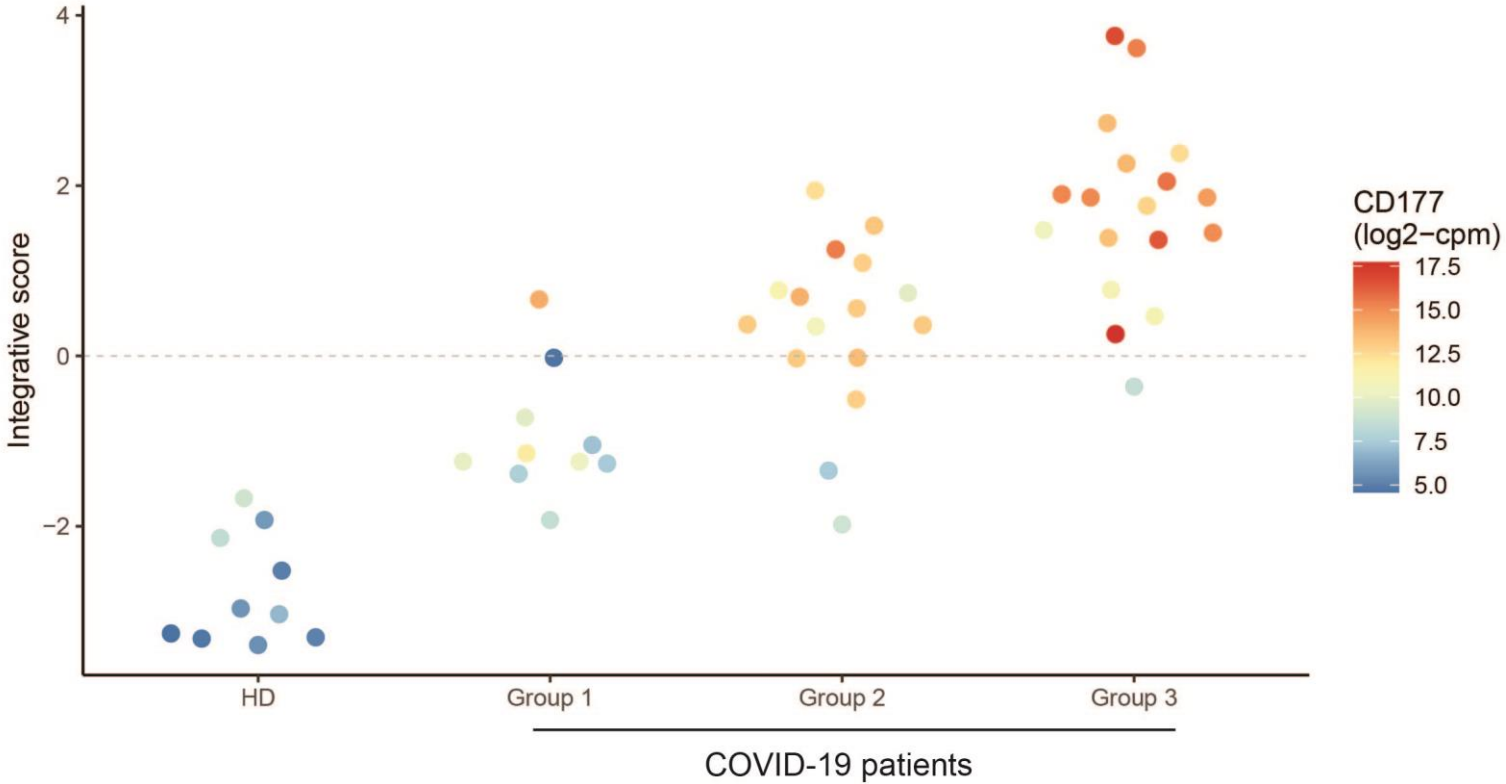


Figure S6. Association between CD177 serum concentration and **A.** SOFA (n = 41) and **B.** SAPS2 (n=40) risk scores. The blue line represents the linear regression and the grey area is the 95% confidence interval. **Related to Figure 6**

