

**Table S1.** Information on the 61 identified B-cell epitopes.

| Protein  | Start | End | Peptide                     | Length | Emini | Kolaskar | Selected for<br>Downstream Analysis |
|----------|-------|-----|-----------------------------|--------|-------|----------|-------------------------------------|
| Envelope | 5     | 11  | VSEETGT                     | 7      | 2.26  | 0.97     |                                     |
| Envelope | 63    | 70  | KNLNSSRV                    | 8      | 3.471 | 1.002    | Yes                                 |
| Membrane | 1     | 10  | MADSNGTITV                  | 10     | 0.56  | 0.977    |                                     |
| Membrane | 109   | 115 | MWSFNPE                     | 7      | 1.405 | 0.93     |                                     |
| Membrane | 161   | 171 | IKDLPKEITVA                 | 11     | 0.934 | 1.05     |                                     |
| Membrane | 173   | 176 | SRTL                        | 4      | 1.504 | 1.011    | Yes                                 |
| Membrane | 181   | 196 | LGASQRVAGDSGFAAY            | 16     | 0.361 | 1.034    |                                     |
| Membrane | 204   | 215 | YKLNTDHSSSSD                | 12     | 7.078 | 0.993    |                                     |
| Spike    | 19    | 43  | TTRTQLPPAYTNSFTRGVYYPDKVF   | 25     | 6.424 | 1.028    | Yes                                 |
| Spike    | 70    | 87  | VSGTNGTKRFDNPVLPFN          | 18     | 1.184 | 0.994    |                                     |
| Spike    | 90    | 99  | VYFASTEKSN                  | 10     | 1.573 | 1.019    | Yes                                 |
| Spike    | 109   | 113 | TLDSK                       | 5      | 1.724 | 0.993    |                                     |
| Spike    | 146   | 154 | HKNNKSWME                   | 9      | 4.547 | 0.9      |                                     |
| Spike    | 158   | 166 | RVYSSANNC                   | 9      | 0.766 | 1.052    |                                     |
| Spike    | 180   | 187 | EGKQGNFK                    | 8      | 2.738 | 0.918    |                                     |
| Spike    | 206   | 209 | KHTP                        | 4      | 2.463 | 1.002    | Yes                                 |
| Spike    | 217   | 222 | PQGFA                       | 6      | 0.809 | 1.02     |                                     |
| Spike    | 248   | 264 | YLTPGDSSSGWTAGAAA           | 17     | 0.43  | 0.998    |                                     |
| Spike    | 280   | 288 | NENGTITDA                   | 9      | 1.46  | 0.909    |                                     |
| Spike    | 293   | 301 | LDPLSETKC                   | 9      | 0.844 | 1.06     |                                     |
| Spike    | 311   | 315 | GIYQT                       | 5      | 0.879 | 1.022    |                                     |
| Spike    | 317   | 327 | NFRVQPTESIV                 | 11     | 0.817 | 1.046    |                                     |
| Spike    | 380   | 387 | YGVSPTKL                    | 8      | 0.95  | 1.073    |                                     |
| Spike    | 405   | 430 | DEVQRQIAPGQTGKIADYNYKLPDDFT | 26     | 5.81  | 1.001    | Yes                                 |
| Spike    | 438   | 448 | SNNLDSKVGGN                 | 11     | 1.294 | 0.957    |                                     |
| Spike    | 461   | 485 | LKPFERDISTEIYQAGSTPCNGVEG   | 25     | 0.803 | 1.011    |                                     |
| Spike    | 494   | 507 | SYGFQPTNGVGYQP              | 14     | 1.553 | 1.02     | Yes                                 |
| Spike    | 522   | 534 | ATVCGPKKSTNLV               | 13     | 0.38  | 1.069    |                                     |
| Spike    | 545   | 559 | GLTGTGVLTESNKKF             | 15     | 0.7   | 0.988    |                                     |
| Spike    | 564   | 582 | QFGRDIADTTDAVRDPQTL         | 19     | 2.476 | 0.995    |                                     |
| Spike    | 590   | 593 | CSFG                        | 4      | 0.25  | 1.097    |                                     |
| Spike    | 595   | 607 | VSVITPGTNTSNQ               | 13     | 0.803 | 1.013    |                                     |
| Spike    | 615   | 620 | VNCTEV                      | 6      | 0.309 | 1.119    |                                     |
| Spike    | 622   | 644 | VAIHADQLTPTWRVYSTGSNVFQ     | 23     | 0.414 | 1.051    |                                     |
| Spike    | 655   | 667 | HVNNSYECDIPIG               | 13     | 0.359 | 1.045    |                                     |
| Spike    | 671   | 688 | CASYQTQTNSPRRARSVA          | 18     | 3.531 | 1.027    | Yes                                 |
| Spike    | 699   | 715 | LGAENSVAYSNNIAIP            | 17     | 0.312 | 1.026    |                                     |
| Spike    | 731   | 736 | MTKTSV                      | 6      | 1.067 | 0.995    |                                     |
| Spike    | 745   | 749 | DSTEC                       | 5      | 0.97  | 1.01     |                                     |
| Spike    | 771   | 782 | AVEQDKNTQEVF                | 12     | 2.342 | 1.011    | Yes                                 |
| Spike    | 787   | 799 | QIYKTPPIKDFGG               | 13     | 1.465 | 1.006    | Yes                                 |
| Spike    | 805   | 816 | ILPDPSKPSKRS                | 12     | 4.69  | 1.019    | Yes                                 |
| Spike    | 833   | 836 | FIKQ                        | 4      | 0.853 | 1.047    |                                     |
| Spike    | 839   | 844 | DCLGDI                      | 6      | 0.223 | 1.07     |                                     |
| Spike    | 882   | 891 | ITSGWTFGAG                  | 10     | 0.187 | 0.965    |                                     |
| Spike    | 928   | 946 | NSAIGKIQDSLSTASALG          | 19     | 0.311 | 1.016    |                                     |
| Spike    | 950   | 958 | DVVNQNAQA                   | 9      | 0.974 | 1.038    |                                     |

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|       |      |      |                          |    |       |       |     |
|-------|------|------|--------------------------|----|-------|-------|-----|
| Spike | 968  | 971  | SNFG                     | 4  | 0.749 | 0.938 |     |
| Spike | 986  | 991  | KVEAEV                   | 6  | 0.869 | 1.077 |     |
| Spike | 1018 | 1021 | IRAS                     | 4  | 0.754 | 1.025 |     |
| Spike | 1023 | 1027 | NLAAT                    | 5  | 0.632 | 1.013 |     |
| Spike | 1039 | 1042 | RVDF                     | 4  | 0.853 | 1.053 |     |
| Spike | 1052 | 1058 | FPQSAPH                  | 7  | 1.381 | 1.059 | Yes |
| Spike | 1068 | 1091 | VPAQEKNFTTAPAICHDGKAHFPR | 24 | 1.063 | 1.03  | Yes |
| Spike | 1094 | 1097 | VFVS                     | 4  | 0.259 | 1.217 |     |
| Spike | 1108 | 1123 | NFYEPQIITDNTFVS          | 16 | 1.039 | 1.007 | Yes |
| Spike | 1135 | 1151 | NTVYDPLQPELDSFKEE        | 17 | 6.183 | 1.011 | Yes |
| Spike | 1153 | 1172 | DKYFKNHTSPDVDLGDISI      | 20 | 1.399 | 1.007 | Yes |
| Spike | 1190 | 1193 | AKNL                     | 4  | 1.087 | 1.005 | Yes |
| Spike | 1203 | 1209 | LGKYEQY                  | 7  | 2.512 | 1.035 | Yes |
| Spike | 1255 | 1265 | KFDEDDSEPV               | 11 | 2.654 | 1.003 | Yes |

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Table S2. Information on all identified T-cell epitopes.

| Protein  | Start | Length | Epi_AA    | HLA_Count | HLA_Score | HLA_Types   | Comments |
|----------|-------|--------|-----------|-----------|-----------|---|----------|
| Envelope | 4     | 9      | FVSEETGTL | 13        | 0.771     | HLA-A*02:06HLA-B*35:03,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01,HLA-B*39:01HLA-C*07:02,HLA-C*15:02,HLA-C*03:04,HLA-C*04:01,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |          |
| Envelope | 5     | 9      | VSEETGTLI | 1         | 0.034     | HLA-C*15:02   |          |
| Envelope | 6     | 9      | SEETGTLIV | 2         | 0.119     | HLA-B*40:01,HLA-B*40:02   |          |
| Envelope | 10    | 9      | GTLIVNSVL | 1         | 0.034     | HLA-C*15:02   |          |
| Envelope | 11    | 9      | TLIVNSVLL | 2         | 0.208     | HLA-A*02:07,HLA-A*02:01   |          |
| Envelope | 12    | 9      | LIVNSVLLF | 6         | 0.399     | HLA-A*24:02,HLA-A*26:01HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01  |          |
| Envelope | 13    | 9      | IVNSVLLFL | 7         | 0.484     | HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |          |
| Envelope | 15    | 9      | NSVLLFLAF | 3         | 0.166     | HLA-B*46:01,HLA-B*15:02,HLA-B*35:01   |          |
| Envelope | 16    | 9      | SVLLFLAFV | 4         | 0.295     | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |          |
| Envelope | 17    | 9      | VLLFLAFVV | 3         | 0.260     | HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |          |
| Envelope | 18    | 9      | LLFLAFVVF | 3         | 0.097     | HLA-A*32:01HLA-B*15:01,HLA-B*15:02  |          |
| Envelope | 20    | 9      | FLAFVVFL  | 4         | 0.295     | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |          |
| Envelope | 21    | 9      | LAFVVFLV  | 3         | 0.106     | HLA-B*51:01,HLA-B*54:01HLA-C*12:03  |          |
| Envelope | 23    | 9      | FVVFLVTL  | 7         | 0.440     | HLA-A*02:07,HLA-A*02:06HLA-B*46:01,HLA-B*35:03HLA-C*03:04,HLA-C*03:03,HLA-C*12:03   |          |
| Envelope | 25    | 9      | VFLVTLAI  | 2         | 0.198     | HLA-A*24:02HLA-C*14:02  |          |
| Envelope | 26    | 9      | FLLVTLAIL | 5         | 0.366     | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-C*03:03  |          |
| Envelope | 29    | 9      | VTAILTAL  | 9         | 0.460     | HLA-A*02:06,HLA-A*32:01HLA-B*46:01,HLA-B*58:01,HLA-B*57:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03   |          |
| Envelope | 31    | 9      | LAILTALRL | 8         | 0.452     | HLA-B*46:01,HLA-B*51:01,HLA-B*58:01,HLA-B*35:03HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |          |
| Envelope | 34    | 9      | LTALRLCAY | 6         | 0.269     | HLA-A*01:01HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*12:03   |          |
| Envelope | 38    | 9      | RLCAYCCNI | 5         | 0.308     | HLA-A*32:01,HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |          |
| Envelope | 41    | 9      | AYCCNIVNV | 1         | 0.156     | HLA-A*24:02   |          |
| Envelope | 45    | 9      | NIVNVSLVK | 1         | 0.211     | HLA-A*11:01   |          |
| Envelope | 48    | 9      | NVSLVKPSF | 2         | 0.064     | HLA-B*35:01,HLA-B*15:02   |          |

|          |    |   |               |    |       |   |
|----------|----|---|---------------|----|-------|---|
| Envelope | 49 | 9 | VSLVKPSFY     | 3  | 0.089 | HLA-B*58:01,HLA-B*57:01HLA-C*12:03  |
| Envelope | 50 | 9 | SLVKPSFYV     | 4  | 0.295 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Envelope | 51 | 9 | LVKPSFYVY     | 6  | 0.247 | HLA-A*32:01HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*12:03   |
| Envelope | 55 | 9 | SFYVYSRVK     | 1  | 0.054 | HLA-A*30:01   |
| Envelope | 57 | 9 | YVYSRVKNL     | 10 | 0.614 | HLA-A*02:03,HLA-A*32:01HLA-C*07:02,HLA-C*15:02,HLA-C*03:04,HLA-C*04:01,HLA-C*14:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03  |
| Envelope | 59 | 9 | YSRVKNLNS     | 1  | 0.054 | HLA-A*30:01   |
| Envelope | 61 | 9 | RVKNLNSSR     | 2  | 0.084 | HLA-A*30:01,HLA-A*03:01   |
| Envelope | 67 | 9 | SSRVPDLLV     | 2  | 0.088 | HLA-A*30:01HLA-C*15:02  |
| Membrane | 6  | 9 | GTITVEELK     | 1  | 0.211 | HLA-A*11:01   |
| Membrane | 7  | 9 | TITVEELKK     | 1  | 0.211 | HLA-A*11:01   |
| Membrane | 15 | 9 | KLLEQWNL<br>V | 5  | 0.308 | HLA-A*32:01,HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Membrane | 18 | 9 | EQWNLVIGF     | 2  | 0.048 | HLA-A*32:01HLA-B*15:02  |
| Membrane | 21 | 9 | NLVIGFLFL     | 2  | 0.208 | HLA-A*02:07,HLA-A*02:01   |
| Membrane | 22 | 9 | LVIGFLFLT     | 2  | 0.175 | HLA-A*02:06,HLA-A*02:01   |
| Membrane | 23 | 9 | VIGFLFLTW     | 4  | 0.238 | HLA-A*24:02,HLA-A*32:01HLA-B*58:01,HLA-B*57:01  |
| Membrane | 26 | 9 | FLFLTWICL     | 2  | 0.208 | HLA-A*02:07,HLA-A*02:01   |
| Membrane | 27 | 9 | LFLTWICLL     | 1  | 0.042 | HLA-C*14:02   |
| Membrane | 29 | 9 | LTWICLLQF     | 3  | 0.082 | HLA-A*32:01HLA-B*58:01,HLA-B*57:01  |
| Membrane | 31 | 9 | WICLLQFAY     | 1  | 0.029 | HLA-B*35:01   |
| Membrane | 37 | 9 | FAYANRNRF     | 16 | 0.898 | HLA-A*32:01HLA-B*15:01,HLA-B*35:03,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01,HLA-B*51:01,HLA-B*57:01HLA-C*07:02,HLA-C*03:04,HLA-C*04:01,HLA-C*14:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |
| Membrane | 38 | 9 | AYANRNRF<br>L | 5  | 0.499 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02,HLA-C*06:02,HLA-C*04:01  |
| Membrane | 39 | 9 | YANRNRFY      | 12 | 0.663 | HLA-A*01:01,HLA-A*32:01HLA-B*15:01,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01,HLA-B*57:01HLA-C*07:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03   |
| Membrane | 40 | 9 | ANRNRFYI      | 1  | 0.054 | HLA-A*30:01   |
| Membrane | 41 | 9 | NRNRFYII      | 3  | 0.259 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02  |
| Membrane | 42 | 9 | RNRFLYIIK     | 1  | 0.054 | HLA-A*30:01   |

|          |    |   |               |    |       |   |
|----------|----|---|---------------|----|-------|---|
| Membrane | 43 | 9 | NRFLYIIKL     | 4  | 0.301 | HLA-B*39:01HLA-C*07:02,HLA-C*14:02,HLA-C*06:02  |
| Membrane | 44 | 9 | RFLYIIKLI     | 2  | 0.168 | HLA-A*24:02,HLA-A*32:01   |
| Membrane | 45 | 9 | FLYIIKLIF     | 2  | 0.062 | HLA-A*32:01HLA-B*15:01  |
| Membrane | 46 | 9 | LYIIKLIFL     | 3  | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02  |
| Membrane | 47 | 9 | YIIKLIFLW     | 4  | 0.238 | HLA-A*24:02,HLA-A*32:01HLA-B*58:01,HLA-B*57:01  |
| Membrane | 50 | 9 | KLIFLWLLW     | 4  | 0.238 | HLA-A*24:02,HLA-A*32:01HLA-B*58:01,HLA-B*57:01  |
| Membrane | 53 | 9 | FLWLLWPVT     | 3  | 0.260 | HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Membrane | 54 | 9 | LWLLWPVT<br>L | 3  | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02  |
| Membrane | 55 | 9 | WLLWPVTL<br>A | 4  | 0.295 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Membrane | 56 | 9 | LLWPVTLAC     | 1  | 0.085 | HLA-A*02:07   |
| Membrane | 57 | 9 | LWPVTLACF     | 2  | 0.198 | HLA-A*24:02HLA-C*14:02  |
| Membrane | 58 | 9 | WPVTLACFV     | 4  | 0.126 | HLA-B*35:01,HLA-B*51:01,HLA-B*54:01,HLA-B*35:03   |
| Membrane | 60 | 9 | VTLACFVLA     | 1  | 0.052 | HLA-A*02:06   |
| Membrane | 61 | 9 | TLACFVLA      | 4  | 0.295 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Membrane | 62 | 9 | LACFVLA       | 6  | 0.329 | HLA-A*02:06HLA-B*51:01,HLA-B*54:01HLA-C*03:04,HLA-C*03:03,HLA-C*12:03   |
| Membrane | 65 | 9 | FVLA          | 8  | 0.497 | HLA-A*32:01,HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-B*51:01HLA-C*15:02,HLA-C*03:04                         |
| Membrane | 67 | 9 | LA            | 3  | 0.082 | HLA-A*32:01HLA-B*58:01,HLA-B*57:01  |
| Membrane | 68 | 9 | AAVYRIN       | 4  | 0.214 | HLA-C*15:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03   |
| Membrane | 71 | 9 | YRINWITGG     | 1  | 0.152 | HLA-C*07:02   |
| Membrane | 72 | 9 | RINWITGGI     | 2  | 0.047 | HLA-A*32:01HLA-C*15:02  |
| Membrane | 76 | 9 | ITGGIAIAM     | 7  | 0.390 | HLA-B*46:01,HLA-B*15:02,HLA-B*35:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03                                    |
| Membrane | 80 | 9 | IAIAMACLV     | 7  | 0.322 | HLA-A*02:06HLA-B*58:01,HLA-B*51:01,HLA-B*54:01HLA-C*15:02,HLA-C*03:03,HLA-C*12:03                                     |
| Membrane | 82 | 9 | IAMACLVGL     | 10 | 0.599 | HLA-A*02:06,HLA-A*02:01HLA-B*46:01,HLA-B*58:01,HLA-B*35:03,HLA-B*35:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03 |
| Membrane | 83 | 9 | AMACLVGL<br>M | 6  | 0.430 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:01HLA-B*46:01,HLA-B*15:01,HLA-B*15:02  |

|          |     |   |               |    |       |   |
|----------|-----|---|---------------|----|-------|---|
| Membrane | 84  | 9 | MACLVGLM<br>W | 3  | 0.082 | HLA-A*32:01HLA-B*58:01,HLA-B*57:01  |
| Membrane | 87  | 9 | LVGLMWLS<br>Y | 3  | 0.098 | HLA-A*01:01HLA-B*35:01,HLA-B*15:02  |
| Membrane | 89  | 9 | GLMWLSYFI     | 5  | 0.308 | HLA-A*32:01,HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Membrane | 90  | 9 | LMWLSYFIA     | 3  | 0.260 | HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Membrane | 92  | 9 | WLSYFIASF     | 4  | 0.200 | HLA-A*32:01HLA-B*46:01,HLA-B*15:01,HLA-B*15:02  |
| Membrane | 93  | 9 | LSYFIASFR     | 1  | 0.211 | HLA-A*11:01   |
| Membrane | 94  | 9 | SYFIASFRL     | 4  | 0.439 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02,HLA-C*06:02  |
| Membrane | 95  | 9 | YFIASFRLF     | 8  | 0.625 | HLA-A*24:02HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*07:02,HLA-C*14:02,HLA-C*04:01   |
| Membrane | 96  | 9 | FIASFRLFA     | 4  | 0.240 | HLA-A*02:03,HLA-A*02:06,HLA-A*02:01HLA-B*54:01  |
| Membrane | 99  | 9 | SFRLFARTR     | 1  | 0.054 | HLA-A*30:01   |
| Membrane | 101 | 9 | RLFARTRSM     | 13 | 0.741 | HLA-A*02:03,HLA-A*30:01,HLA-A*32:01HLA-B*15:01,HLA-B*15:02,HLA-B*07:02HLA-C*07:02,HLA-C*03:04,HLA-C*04:01,HLA-C*14:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |
| Membrane | 102 | 9 | LFARTRSMW     | 2  | 0.198 | HLA-A*24:02HLA-C*14:02  |
| Membrane | 104 | 9 | ARTRSMWSF     | 2  | 0.241 | HLA-C*07:02,HLA-C*06:02   |
| Membrane | 105 | 9 | RTRSMWSFN     | 1  | 0.054 | HLA-A*30:01   |
| Membrane | 107 | 9 | RSMWSFNPE     | 1  | 0.054 | HLA-A*30:01   |
| Membrane | 108 | 9 | SMWSFNPET     | 1  | 0.123 | HLA-A*02:01   |
| Membrane | 110 | 9 | WSFNPETNI     | 5  | 0.268 | HLA-B*58:01,HLA-B*51:01HLA-C*15:02,HLA-C*03:04,HLA-C*12:03  |
| Membrane | 111 | 9 | SFNPETNIL     | 5  | 0.499 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02,HLA-C*06:02,HLA-C*04:01  |
| Membrane | 112 | 9 | FNPETNILL     | 2  | 0.211 | HLA-C*07:02,HLA-C*04:01   |
| Membrane | 116 | 9 | TNILLNVPL     | 1  | 0.018 | HLA-B*39:01   |
| Membrane | 122 | 9 | VPLHGTILT     | 1  | 0.030 | HLA-B*54:01   |
| Membrane | 125 | 9 | HGTILTRPL     | 1  | 0.100 | HLA-C*03:04   |
| Membrane | 126 | 9 | GTILTRPLL     | 1  | 0.034 | HLA-C*15:02   |
| Membrane | 130 | 9 | TRPLLESEL     | 3  | 0.259 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02  |
| Membrane | 131 | 9 | RPLLESELV     | 2  | 0.078 | HLA-B*51:01,HLA-B*07:02   |
| Membrane | 134 | 9 | LESELVIGA     | 1  | 0.019 | HLA-B*40:02   |
| Membrane | 136 | 9 | SELVIGAVI     | 3  | 0.145 | HLA-B*44:03,HLA-B*40:01,HLA-B*40:02   |
| Membrane | 138 | 9 | LVIGAVILR     | 1  | 0.211 | HLA-A*11:01   |
| Membrane | 142 | 9 | AVILRGHLR     | 1  | 0.211 | HLA-A*11:01   |

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| Membrane | 144 | 9 | ILRGHLRIA  | 2  | 0.089 | HLA-A*02:03,HLA-A*30:01   |
| Membrane | 148 | 9 | HLRIAGHHL  | 4  | 0.161 | HLA-A*30:01HLA-B*15:01,HLA-B*15:02,HLA-B*07:02  |
| Membrane | 150 | 9 | RIAGHHLGR  | 2  | 0.241 | HLA-A*11:01,HLA-A*03:01   |
| Membrane | 164 | 9 | LPKEITVAT  | 4  | 0.092 | HLA-B*35:01,HLA-B*07:02,HLA-B*54:01,HLA-B*35:03   |
| Membrane | 168 | 9 | ITVATSRTL  | 6  | 0.337 | HLA-B*46:01,HLA-B*57:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |
| Membrane | 170 | 9 | VATSRTLSTY | 10 | 0.639 | HLA-A*01:01HLA-B*15:01,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01HLA-C*07:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |
| Membrane | 171 | 9 | ATSRTLSTYY | 8  | 0.473 | HLA-A*11:01,HLA-A*01:01,HLA-A*30:01HLA-B*58:01,HLA-B*15:01,HLA-B*15:02,HLA-B*57:01HLA-C*12:03                         |
| Membrane | 172 | 9 | TSRTLSTYYK | 3  | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   |
| Membrane | 173 | 9 | SRTLSTYYKL | 3  | 0.259 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02  |
| Membrane | 174 | 9 | RTLSTYYKLG | 1  | 0.054 | HLA-A*30:01   |
| Membrane | 179 | 9 | YKLGASQRV  | 1  | 0.089 | HLA-C*06:02   |
| Membrane | 188 | 9 | AGDSGFAAY  | 3  | 0.122 | HLA-A*01:01HLA-B*35:01HLA-C*04:01   |
| Membrane | 191 | 9 | SGFAAYSRY  | 7  | 0.475 | HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*07:02,HLA-C*06:02,HLA-C*12:03                                    |
| Membrane | 193 | 9 | FAAYSRYRI  | 6  | 0.369 | HLA-B*51:01HLA-C*15:02,HLA-C*03:04,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03  |
| Membrane | 196 | 9 | YSRYRIGNY  | 6  | 0.447 | HLA-B*46:01,HLA-B*15:01,HLA-B*15:02HLA-C*07:02,HLA-C*06:02,HLA-C*12:03  |
| Membrane | 198 | 9 | RYRIGNYKL  | 5  | 0.464 | HLA-A*24:02,HLA-A*30:01HLA-C*07:02,HLA-C*14:02,HLA-C*04:01  |
| Membrane | 209 | 9 | DHSSSDNI   | 1  | 0.018 | HLA-B*39:01   |
| Membrane | 211 | 9 | SSSDNIAL   | 3  | 0.205 | HLA-C*15:02,HLA-C*03:03,HLA-C*03:04   |
| Membrane | 212 | 9 | SSSDNIAL   | 6  | 0.465 | HLA-C*07:02,HLA-C*15:02,HLA-C*03:04,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03   |
| Membrane | 213 | 9 | SSSDNIALLV | 3  | 0.087 | HLA-A*01:01HLA-C*15:02,HLA-C*12:03  |
| Spike    | 2   | 9 | FVFLVLLPL  | 7  | 0.552 | HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-B*46:01HLA-C*03:04,HLA-C*03:03,HLA-C*12:03                                     |
| Spike    | 8   | 9 | LPLVSSQCV  | 5  | 0.148 | HLA-B*35:03,HLA-B*54:01,HLA-B*07:02,HLA-B*35:01,HLA-B*51:01   |
| Spike    | 10  | 9 | LVSSQCVNL  | 2  | 0.171 | HLA-C*03:04,HLA-C*03:03   |
| Spike    | 19  | 9 | TTRTLPPA   | 1  | 0.054 | HLA-A*30:01   |
| Spike    | 20  | 9 | TRTQLPPAY  | 2  | 0.241 | HLA-C*07:02,HLA-C*06:02   |

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| Spike | 21 | 9 | RTQLPPAYT     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 24 | 9 | LPPAYTNSF     | 5  | 0.178 | HLA-B*35:01,HLA-B*51:01,HLA-B*35:03,HLA-B*07:02HLA-C*04:01  |
| Spike | 28 | 9 | YTNSFTRGV     | 6  | 0.329 | HLA-A*02:03,HLA-A*02:06HLA-C*15:02,HLA-C*06:02,HLA-C*03:04,HLA-C*12:03  |
| Spike | 29 | 9 | TNSFTRGVY     | 1  | 0.035 | HLA-B*15:02   |
| Spike | 30 | 9 | NSFTRGVYY     | 7  | 0.569 | HLA-A*11:01,HLA-A*01:01HLA-B*35:01,HLA-B*15:02HLA-C*07:02,HLA-C*06:02,HLA-C*12:03                                     |
| Spike | 35 | 9 | GVYYPDKVF     | 3  | 0.097 | HLA-A*32:01HLA-B*15:01,HLA-B*15:02  |
| Spike | 37 | 9 | YYPDKVFRS     | 1  | 0.152 | HLA-C*07:02   |
| Spike | 38 | 9 | YPDKVFRSS     | 2  | 0.052 | HLA-B*54:01,HLA-B*07:02   |
| Spike | 41 | 9 | KVFRSSVLH     | 3  | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   |
| Spike | 42 | 9 | VFRSSVLHS     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 43 | 9 | FRSSVLHST     | 2  | 0.169 | HLA-B*39:01HLA-C*07:02  |
| Spike | 46 | 9 | SVLHSTQDL     | 2  | 0.171 | HLA-C*03:04,HLA-C*03:03   |
| Spike | 47 | 9 | VLHSTQDLF     | 4  | 0.253 | HLA-A*24:02,HLA-A*32:01HLA-B*15:01,HLA-B*15:02  |
| Spike | 48 | 9 | LHSTQDLFL     | 2  | 0.169 | HLA-B*39:01HLA-C*07:02  |
| Spike | 50 | 9 | STQDLFLPF     | 10 | 0.651 | HLA-A*24:02,HLA-A*26:01,HLA-A*32:01HLA-B*35:01,HLA-B*15:01,HLA-B*15:02HLA-C*07:02,HLA-C*03:04,HLA-C*03:03,HLA-C*12:03 |
| Spike | 51 | 9 | TQDLFLPFF     | 1  | 0.060 | HLA-C*04:01   |
| Spike | 55 | 9 | FLPFFSNVT     | 2  | 0.120 | HLA-A*02:03,HLA-A*02:07   |
| Spike | 56 | 9 | LPFFSNVTW     | 7  | 0.218 | HLA-B*35:03,HLA-B*58:01,HLA-B*54:01,HLA-B*07:02,HLA-B*35:01,HLA-B*51:01,HLA-B*57:01                                   |
| Spike | 57 | 9 | PFFSNVTWF     | 1  | 0.156 | HLA-A*24:02   |
| Spike | 59 | 9 | FSNVTWFH<br>A | 1  | 0.030 | HLA-B*54:01   |
| Spike | 60 | 9 | SNVTWFHAI     | 2  | 0.047 | HLA-A*32:01HLA-C*15:02  |
| Spike | 62 | 9 | VTWFHAIH<br>V | 4  | 0.228 | HLA-A*02:06,HLA-A*02:01HLA-C*15:02,HLA-C*12:03  |
| Spike | 65 | 9 | FHAIHVSGT     | 1  | 0.018 | HLA-B*39:01   |
| Spike | 69 | 9 | HVSGTNGT<br>K | 2  | 0.241 | HLA-A*11:01,HLA-A*03:01   |
| Spike | 75 | 9 | GTKRFDNPV     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 78 | 9 | RFDNPVLPF     | 5  | 0.422 | HLA-A*24:02,HLA-A*32:01HLA-C*07:02,HLA-C*14:02,HLA-C*04:01  |
| Spike | 81 | 9 | NPVLPFNDG     | 1  | 0.030 | HLA-B*54:01   |



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| Spike | 83  | 9 | VLPFNDGVY     | 3  | 0.187 | HLA-B*46:01,HLA-B*15:01,HLA-B*15:02   |
| Spike | 84  | 9 | LPFNDGVYF     | 8  | 0.274 | HLA-B*35:03,HLA-B*15:02,HLA-B*54:01,HLA-B*07:02,HLA-B*35:01,HLA-B*51:01HLA-C*03:03,HLA-C*12:03                                    |
| Spike | 89  | 9 | GVYFASTEK     | 3  | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   |
| Spike | 92  | 9 | FASTEKSNI     | 5  | 0.280 | HLA-B*51:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |
| Spike | 93  | 9 | ASTEKSNI      | 1  | 0.034 | HLA-C*15:02   |
| Spike | 97  | 9 | KSNIIRGWI     | 4  | 0.158 | HLA-A*30:01HLA-B*58:01,HLA-B*57:01HLA-C*15:02   |
| Spike | 102 | 9 | RGWIFGTTL     | 3  | 0.184 | HLA-A*32:01HLA-C*03:04,HLA-C*03:03  |
| Spike | 109 | 9 | TLDSKTQSL     | 4  | 0.314 | HLA-A*02:07HLA-B*39:01HLA-C*07:02,HLA-C*04:01   |
| Spike | 113 | 9 | KTQSLIVN      | 1  | 0.054 | HLA-A*30:01   |
| Spike | 118 | 9 | LIVNNATNV     | 3  | 0.206 | HLA-A*02:03HLA-C*03:04,HLA-C*03:03  |
| Spike | 119 | 9 | IVNNATNV<br>V | 3  | 0.153 | HLA-C*15:02,HLA-C*03:04,HLA-C*12:03   |
| Spike | 125 | 9 | NVVIKVCEF     | 2  | 0.063 | HLA-A*26:01HLA-B*15:02  |
| Spike | 127 | 9 | VIKVCEFQF     | 1  | 0.013 | HLA-A*32:01   |
| Spike | 132 | 9 | EFQFCNDPF     | 2  | 0.198 | HLA-A*24:02HLA-C*14:02  |
| Spike | 133 | 9 | FQFCNDPFL     | 11 | 0.808 | HLA-A*02:06,HLA-A*02:01HLA-B*40:01,HLA-B*15:01,HLA-B*15:02,HLA-B*39:01HLA-C*07:02,HLA-C*03:04,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |
| Spike | 135 | 9 | FCNDPFLGV     | 2  | 0.086 | HLA-A*02:06HLA-C*15:02  |
| Spike | 142 | 9 | GVYYHKNN<br>K | 3  | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   |
| Spike | 144 | 9 | YYHKNNKS<br>W | 4  | 0.439 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02,HLA-C*06:02  |
| Spike | 145 | 9 | YHKNNKSW<br>M | 2  | 0.241 | HLA-C*07:02,HLA-C*06:02   |
| Spike | 150 | 9 | KSWMESEFR     | 1  | 0.211 | HLA-A*11:01   |
| Spike | 151 | 9 | SWMESEFRV     | 1  | 0.156 | HLA-A*24:02   |
| Spike | 152 | 9 | WMESEFRVY     | 4  | 0.173 | HLA-B*35:01,HLA-B*15:01,HLA-B*15:02HLA-C*04:01  |
| Spike | 155 | 9 | SEFRVYSSA     | 1  | 0.019 | HLA-B*40:02   |
| Spike | 158 | 9 | RVYSSANNC     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 160 | 9 | YSSANNCTF     | 10 | 0.584 | HLA-B*15:01,HLA-B*58:01,HLA-B*15:02,HLA-B*35:01,HLA-B*57:01HLA-C*07:02,HLA-C*03:04,HLA-C*04:01,HLA-C*03:03,HLA-C*12:03            |
| Spike | 162 | 9 | SANNCTFEY     | 9  | 0.690 | HLA-A*11:01,HLA-A*01:01HLA-B*15:01,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01HLA-C*07:02,HLA-C*12:03                         |

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| Spike | 167 | 9 | TFEYVSQPF     | 5  | 0.438 | HLA-A*24:02HLA-B*35:01HLA-C*07:02,HLA-C*14:02,HLA-C*04:01   |
| Spike | 168 | 9 | FEYVSQPFL     | 3  | 0.179 | HLA-B*40:01,HLA-B*40:02HLA-C*04:01  |
| Spike | 169 | 9 | EYVSQPFLM     | 4  | 0.439 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02,HLA-C*06:02  |
| Spike | 171 | 9 | VSQPFLMDL     | 6  | 0.386 | HLA-B*57:01HLA-C*07:02,HLA-C*03:04,HLA-C*15:02,HLA-C*03:03,HLA-C*12:03  |
| Spike | 186 | 9 | FKNLREFVF     | 1  | 0.152 | HLA-C*07:02   |
| Spike | 187 | 9 | KNLREFVFK     | 2  | 0.266 | HLA-A*11:01,HLA-A*30:01   |
| Spike | 189 | 9 | LREFVFKNI     | 1  | 0.089 | HLA-C*06:02   |
| Spike | 190 | 9 | REFVFKNID     | 1  | 0.019 | HLA-B*40:02   |
| Spike | 192 | 9 | FVFKNIDGY     | 10 | 0.627 | HLA-A*26:01HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*07:02,HLA-C*03:04,HLA-C*14:02,HLA-C*03:03,HLA-C*12:03 |
| Spike | 193 | 9 | VFKNIDGYF     | 4  | 0.409 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02,HLA-C*04:01  |
| Spike | 195 | 9 | KNIDGYFKI     | 1  | 0.013 | HLA-A*32:01   |
| Spike | 196 | 9 | NIDGYFKIY     | 3  | 0.098 | HLA-A*01:01HLA-B*35:01,HLA-B*15:02  |
| Spike | 202 | 9 | KIYSKHTPI     | 6  | 0.408 | HLA-A*02:01,HLA-A*02:07,HLA-A*30:01,HLA-A*32:01HLA-C*15:02,HLA-C*03:04  |
| Spike | 204 | 9 | YSKHTPINL     | 7  | 0.567 | HLA-B*46:01HLA-C*07:02,HLA-C*15:02,HLA-C*03:04,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03                                    |
| Spike | 205 | 9 | SKHTPINLV     | 1  | 0.089 | HLA-C*06:02   |
| Spike | 208 | 9 | TPINLVRDL     | 3  | 0.089 | HLA-B*51:01,HLA-B*35:03,HLA-B*07:02   |
| Spike | 212 | 9 | LVRDLPQGF     | 3  | 0.187 | HLA-B*46:01,HLA-B*15:01,HLA-B*15:02   |
| Spike | 215 | 9 | DLPQGFSAL     | 1  | 0.028 | HLA-A*26:01   |
| Spike | 216 | 9 | LPQGFSALE     | 1  | 0.030 | HLA-B*54:01   |
| Spike | 218 | 9 | QGFSALEPL     | 1  | 0.100 | HLA-C*03:04   |
| Spike | 221 | 9 | SALEPLVDL     | 5  | 0.235 | HLA-B*35:03HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |
| Spike | 223 | 9 | LEPLVDLPI     | 2  | 0.119 | HLA-B*40:01,HLA-B*40:02   |
| Spike | 229 | 9 | LPIGINITR     | 2  | 0.059 | HLA-B*35:01,HLA-B*54:01   |
| Spike | 235 | 9 | ITRFQTLLA     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 236 | 9 | TRFQTLLAL     | 4  | 0.318 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02,HLA-C*04:01  |
| Spike | 240 | 9 | TLLALHRSY     | 4  | 0.126 | HLA-A*32:01HLA-B*35:01,HLA-B*15:01,HLA-B*15:02  |
| Spike | 241 | 9 | LLALHRSYL     | 7  | 0.525 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:01HLA-B*07:02HLA-C*03:04,HLA-C*03:03,HLA-C*06:02                                     |
| Spike | 258 | 9 | WTAGAAAY<br>Y | 10 | 0.565 | HLA-A*01:01,HLA-A*26:01HLA-B*58:01,HLA-B*35:01,HLA-B*15:01,HLA-B*15:02HLA-C*07:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |

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| Spike | 259 | 9 | TAGAAAYY<br>V | 4  | 0.161 | HLA-A*02:06HLA-B*51:01HLA-C*15:02,HLA-C*12:03  |
| Spike | 261 | 9 | GAAAYYVG<br>Y | 5  | 0.344 | HLA-A*11:01HLA-B*35:01,HLA-B*15:01,HLA-B*15:02HLA-C*12:03  |
| Spike | 262 | 9 | AAAYYVG<br>L  | 7  | 0.567 | HLA-B*46:01HLA-C*07:02,HLA-C*15:02,HLA-C*03:04,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03   |
| Spike | 265 | 9 | YYVGYLQPR     | 1  | 0.152 | HLA-C*07:02  |
| Spike | 267 | 9 | VGYLQPRTF     | 4  | 0.362 | HLA-B*46:01HLA-C*07:02,HLA-C*06:02,HLA-C*12:03   |
| Spike | 268 | 9 | GYLQPRTFLL    | 3  | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02   |
| Spike | 269 | 9 | YLQPRTFLL     | 13 | 0.996 | HLA-A*32:01,HLA-A*24:02,HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-C*07:02,HLA-C*03:04,HLA-C*04:01,HLA-C*14:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |
| Spike | 270 | 9 | LQPRTFLLK     | 2  | 0.241 | HLA-A*11:01,HLA-A*03:01  |
| Spike | 271 | 9 | QPRTFLLKY     | 1  | 0.029 | HLA-B*35:01  |
| Spike | 285 | 9 | ITDAVDCAL     | 6  | 0.318 | HLA-A*01:01HLA-C*15:02,HLA-C*03:04,HLA-C*04:01,HLA-C*03:03,HLA-C*12:03   |
| Spike | 288 | 9 | AVDCALDPL     | 4  | 0.283 | HLA-A*02:06HLA-C*03:04,HLA-C*03:03,HLA-C*04:01   |
| Spike | 292 | 9 | ALDPLSETK     | 2  | 0.241 | HLA-A*11:01,HLA-A*03:01  |
| Spike | 296 | 9 | LSETKCTLK     | 1  | 0.211 | HLA-A*11:01  |
| Spike | 298 | 9 | ETKCTLKSF     | 2  | 0.063 | HLA-A*26:01HLA-B*15:02   |
| Spike | 302 | 9 | TLKSFTVEK     | 3  | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01  |
| Spike | 304 | 9 | KSFTVEKGI     | 4  | 0.116 | HLA-A*32:01HLA-B*58:01,HLA-B*57:01HLA-C*15:02  |
| Spike | 310 | 9 | KGIYQTSNF     | 4  | 0.175 | HLA-A*32:01HLA-B*46:01,HLA-B*15:01,HLA-B*57:01   |
| Spike | 311 | 9 | GIYQTSNFR     | 2  | 0.241 | HLA-A*11:01,HLA-A*03:01  |
| Spike | 312 | 9 | IYQTSNFRV     | 3  | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02   |
| Spike | 318 | 9 | FRVQPTESI     | 3  | 0.259 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02   |
| Spike | 319 | 9 | RVQPTESIV     | 1  | 0.034 | HLA-C*15:02  |
| Spike | 321 | 9 | QPTESIVRF     | 2  | 0.040 | HLA-B*35:01,HLA-B*35:03  |
| Spike | 324 | 9 | ESIVRFPNI     | 2  | 0.084 | HLA-A*26:01HLA-B*51:01   |
| Spike | 326 | 9 | IVRFPNITN     | 1  | 0.054 | HLA-A*30:01  |
| Spike | 327 | 9 | VRFPNITNL     | 5  | 0.320 | HLA-B*39:01HLA-C*07:02,HLA-C*14:02,HLA-C*06:02,HLA-C*12:03   |
| Spike | 329 | 9 | FPNITNLCP     | 1  | 0.030 | HLA-B*54:01  |
| Spike | 334 | 9 | NLCPFGEVF     | 2  | 0.085 | HLA-B*15:01,HLA-B*15:02  |
| Spike | 336 | 9 | CPFGEVFNA     | 2  | 0.059 | HLA-B*35:01,HLA-B*54:01  |

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| Spike | 339 | 9 | GEVFNATRF      | 3 | 0.145 | HLA-B*44:03,HLA-B*40:01,HLA-B*40:02   |     |
| Spike | 340 | 9 | EVFNATRFA      | 2 | 0.058 | HLA-A*26:01HLA-B*54:01  |     |
| Spike | 342 | 9 | FNATRFASV      | 1 | 0.052 | HLA-A*02:06   |     |
| Spike | 343 | 9 | NATRFASVY      | 4 | 0.185 | HLA-B*46:01,HLA-B*15:02,HLA-B*35:01HLA-C*12:03  |     |
| Spike | 344 | 9 | ATRFASVYA      | 1 | 0.054 | HLA-A*30:01   |     |
| Spike | 345 | 9 | TRFASVYAW      | 4 | 0.271 | HLA-A*32:01HLA-B*39:01HLA-C*07:02,HLA-C*06:02   |     |
| Spike | 348 | 9 | ASVYAWNRR<br>K | 2 | 0.266 | HLA-A*11:01,HLA-A*30:01   | RBD |
| Spike | 349 | 9 | SVYAWNRRK<br>R | 2 | 0.241 | HLA-A*11:01,HLA-A*03:01   | RBD |
| Spike | 350 | 9 | VYAWNRRKR<br>I | 3 | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02  | RBD |
| Spike | 354 | 9 | NRKRISNCV      | 1 | 0.089 | HLA-C*06:02   | RBD |
| Spike | 355 | 9 | RKRISNCVA      | 1 | 0.054 | HLA-A*30:01   | RBD |
| Spike | 357 | 9 | RISNCVADY      | 4 | 0.127 | HLA-A*03:01,HLA-A*32:01HLA-B*15:01,HLA-B*15:02  | RBD |
| Spike | 361 | 9 | CVADYSVLY      | 9 | 0.647 | HLA-A*11:01,HLA-A*01:01,HLA-A*26:01HLA-B*35:01,HLA-B*15:01,HLA-B*15:02HLA-C*07:02,HLA-C*06:02,HLA-C*12:03 | RBD |
| Spike | 366 | 9 | SVLYNSASF      | 6 | 0.297 | HLA-A*32:01HLA-B*35:01,HLA-B*15:01,HLA-B*15:02HLA-C*03:04,HLA-C*03:03                                     | RBD |
| Spike | 369 | 9 | YNSASFSTF      | 8 | 0.602 | HLA-A*24:02HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*03:04,HLA-C*03:03,HLA-C*04:01             | RBD |
| Spike | 370 | 9 | NSASFSTFK      | 3 | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   | RBD |
| Spike | 372 | 9 | ASFSTFKCY      | 7 | 0.480 | HLA-A*11:01,HLA-A*01:01HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*12:03                         | RBD |
| Spike | 374 | 9 | FSTFKCYGV      | 3 | 0.105 | HLA-A*02:06HLA-C*15:02,HLA-C*12:03  | RBD |
| Spike | 378 | 9 | KCYGVSPTK      | 1 | 0.054 | HLA-A*30:01   | RBD |
| Spike | 379 | 9 | CYGVSPTKL      | 3 | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02  | RBD |
| Spike | 392 | 9 | FTNVYADSF      | 9 | 0.615 | HLA-A*26:01HLA-B*58:01,HLA-B*46:01,HLA-B*15:01,HLA-B*15:02HLA-C*07:02,HLA-C*03:04,HLA-C*03:03,HLA-C*12:03 | RBD |
| Spike | 394 | 9 | NVYADSFVI      | 6 | 0.274 | HLA-A*02:06,HLA-A*32:01HLA-B*51:01HLA-C*15:02,HLA-C*03:04,HLA-C*12:03                                     | RBD |
| Spike | 399 | 9 | SFVIRGDEV      | 1 | 0.042 | HLA-C*14:02   | RBD |
| Spike | 402 | 9 | IRGDEV RQI     | 2 | 0.241 | HLA-C*07:02,HLA-C*06:02   | RBD |
| Spike | 409 | 9 | QIAPGQTGK      | 2 | 0.241 | HLA-A*11:01,HLA-A*03:01   | RBD |

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| Spike | 410 | 9 | IAPGQTGKI     | 1 | 0.056 | HLA-B*51:01   | RBD |
| Spike | 411 | 9 | APGQTGKIA     | 1 | 0.022 | HLA-B*07:02   | RBD |
| Spike | 413 | 9 | GQTGKIADY     | 1 | 0.049 | HLA-B*15:01   | RBD |
| Spike | 417 | 9 | KIADYNYKL     | 7 | 0.518 | HLA-A*02:01,HLA-A*02:07,HLA-A*02:06,HLA-A*32:01HLA-C*07:02,HLA-C*15:02,HLA-C*04:01            | RBD |
| Spike | 424 | 9 | KLPDDFTGC     | 2 | 0.137 | HLA-A*02:07,HLA-A*02:06   | RBD |
| Spike | 425 | 9 | LPDDFTGCV     | 3 | 0.098 | HLA-B*51:01,HLA-B*54:01,HLA-B*35:03   | RBD |
| Spike | 433 | 9 | VIAWNSNN<br>L | 2 | 0.171 | HLA-C*03:04,HLA-C*03:03   | RBD |
| Spike | 444 | 9 | KVGGNYNY<br>L | 2 | 0.088 | HLA-A*30:01HLA-C*15:02  | RBD |
| Spike | 448 | 9 | NYNYLYRLF     | 4 | 0.439 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02,HLA-C*06:02  | RBD |
| Spike | 453 | 9 | YRLFRKSNL     | 4 | 0.301 | HLA-B*39:01HLA-C*07:02,HLA-C*14:02,HLA-C*06:02  | RBD |
| Spike | 454 | 9 | RLFRKSNLK     | 3 | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   | RBD |
| Spike | 456 | 9 | FRKSNLKPF     | 2 | 0.241 | HLA-C*07:02,HLA-C*06:02   | RBD |
| Spike | 458 | 9 | KSNLKPFER     | 1 | 0.211 | HLA-A*11:01   | RBD |
| Spike | 462 | 9 | KPFERDIST     | 2 | 0.052 | HLA-B*54:01,HLA-B*07:02   | RBD |
| Spike | 464 | 9 | FERDISTEI     | 3 | 0.179 | HLA-B*40:01,HLA-B*40:02HLA-C*04:01  | RBD |
| Spike | 478 | 9 | TPCNGVEGF     | 1 | 0.029 | HLA-B*35:01   | RBD |
| Spike | 481 | 9 | NGVEGFNC<br>Y | 2 | 0.064 | HLA-B*35:01,HLA-B*15:02   | RBD |
| Spike | 487 | 9 | NCYFPLQSY     | 2 | 0.064 | HLA-B*35:01,HLA-B*15:02   | RBD |
| Spike | 489 | 9 | YFPLQSYGF     | 4 | 0.409 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02,HLA-C*04:01  | RBD |
| Spike | 490 | 9 | FPLQSYGFQ     | 1 | 0.030 | HLA-B*54:01   | RBD |
| Spike | 495 | 9 | YGFQPTNGV     | 5 | 0.324 | HLA-B*51:01HLA-C*03:04,HLA-C*06:02,HLA-C*04:01,HLA-C*12:03                                    | RBD |
| Spike | 497 | 9 | FQPTNGVGY     | 3 | 0.187 | HLA-B*46:01,HLA-B*15:01,HLA-B*15:02   | RBD |
| Spike | 503 | 9 | VGYQPYRVV     | 4 | 0.264 | HLA-B*51:01HLA-C*03:04,HLA-C*06:02,HLA-C*12:03  | RBD |
| Spike | 504 | 9 | GYQPYRVVV     | 3 | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02  | RBD |
| Spike | 505 | 9 | YQPYRVVVL     | 8 | 0.593 | HLA-A*02:07HLA-B*39:01HLA-C*07:02,HLA-C*03:04,HLA-C*04:01,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 | RBD |
| Spike | 507 | 9 | PYRVVLSF      | 1 | 0.156 | HLA-A*24:02   | RBD |
| Spike | 509 | 9 | RVVLSFEL      | 7 | 0.413 | HLA-A*02:07,HLA-A*02:06,HLA-A*32:01HLA-B*58:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04             | RBD |
| Spike | 511 | 9 | VVLSFELLH     | 1 | 0.211 | HLA-A*11:01   | RBD |

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| Spike | 512 | 9 | VLSFELLHA     | 2 | 0.158 | HLA-A*02:03,HLA-A*02:01  | RBD |
| Spike | 515 | 9 | FELLHAPAT     | 1 | 0.019 | HLA-B*40:02  |     |
| Spike | 526 | 9 | GPKKSTNLV     | 1 | 0.022 | HLA-B*07:02  |     |
| Spike | 529 | 9 | KSTNLVKNK     | 3 | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01  |     |
| Spike | 533 | 9 | LVKNKCVN<br>F | 2 | 0.085 | HLA-B*15:01,HLA-B*15:02  |     |
| Spike | 535 | 9 | KNKCVNFN<br>F | 1 | 0.013 | HLA-A*32:01  |     |
| Spike | 550 | 9 | GVLTESNKK     | 2 | 0.241 | HLA-A*11:01,HLA-A*03:01  |     |
| Spike | 554 | 9 | ESNKKFLPF     | 3 | 0.092 | HLA-A*26:01HLA-B*35:01,HLA-B*15:02   |     |
| Spike | 560 | 9 | LPFQQFGRD     | 1 | 0.030 | HLA-B*54:01  |     |
| Spike | 568 | 9 | DIADTTDAV     | 1 | 0.028 | HLA-A*26:01  |     |
| Spike | 576 | 9 | VRDPQTLEI     | 4 | 0.318 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02,HLA-C*04:01   |     |
| Spike | 582 | 9 | LEILDITPC     | 1 | 0.019 | HLA-B*40:02  |     |
| Spike | 584 | 9 | ILDITPCSF     | 5 | 0.229 | HLA-A*01:01HLA-B*35:01,HLA-B*15:02HLA-C*03:03,HLA-C*04:01                                      |     |
| Spike | 587 | 9 | ITPCSFGGV     | 2 | 0.137 | HLA-A*02:07,HLA-A*02:06  |     |
| Spike | 590 | 9 | CSFGGVSVI     | 5 | 0.268 | HLA-B*58:01,HLA-B*51:01HLA-C*15:02,HLA-C*03:04,HLA-C*12:03                                     |     |
| Spike | 603 | 9 | NTSNQVAV<br>L | 3 | 0.190 | HLA-C*03:04,HLA-C*03:03,HLA-C*12:03  |     |
| Spike | 604 | 9 | TSNQVAVLY     | 8 | 0.501 | HLA-A*11:01,HLA-A*01:01HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01,HLA-B*57:01HLA-C*12:03  |     |
| Spike | 612 | 9 | YQDVNCTE<br>V | 6 | 0.409 | HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-B*39:01HLA-C*03:03,HLA-C*04:01                          |     |
| Spike | 624 | 9 | IHADQLTPT     | 1 | 0.018 | HLA-B*39:01  |     |
| Spike | 625 | 9 | HADQLTPT<br>W | 4 | 0.158 | HLA-B*58:01,HLA-B*35:01,HLA-B*57:01HLA-C*04:01   |     |
| Spike | 628 | 9 | QLTPTWRVY     | 3 | 0.113 | HLA-B*35:01,HLA-B*15:01,HLA-B*15:02  |     |
| Spike | 630 | 9 | TPTWRVYST     | 2 | 0.052 | HLA-B*54:01,HLA-B*07:02  |     |
| Spike | 634 | 9 | RVYSTGSNV     | 8 | 0.415 | HLA-A*02:03,HLA-A*30:01,HLA-A*32:01HLA-C*15:02,HLA-C*03:04,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |     |
| Spike | 635 | 9 | VYSTGSNVF     | 3 | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02   |     |
| Spike | 642 | 9 | VFQTRAGCL     | 2 | 0.102 | HLA-C*14:02,HLA-C*04:01  |     |
| Spike | 643 | 9 | FQTRAGCLI     | 3 | 0.169 | HLA-A*02:06HLA-B*39:01HLA-C*03:04  |     |
| Spike | 644 | 9 | QTRAGCLIG     | 1 | 0.054 | HLA-A*30:01  |     |

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| Spike | 652 | 9 | GAEHVNNS<br>Y | 2  | 0.063 | HLA-A*01:01HLA-B*35:01  |
| Spike | 654 | 9 | EHVNNSYEC     | 1  | 0.018 | HLA-B*39:01   |
| Spike | 658 | 9 | NSYECDIPI     | 3  | 0.190 | HLA-B*51:01HLA-C*15:02,HLA-C*03:04  |
| Spike | 660 | 9 | YECDIPIGA     | 1  | 0.019 | HLA-B*40:02   |
| Spike | 664 | 9 | IPIGAGICA     | 4  | 0.092 | HLA-B*35:01,HLA-B*07:02,HLA-B*54:01,HLA-B*35:03   |
| Spike | 666 | 9 | IGAGICASY     | 5  | 0.235 | HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*12:03  |
| Spike | 679 | 9 | NSPRRARSV     | 1  | 0.089 | HLA-C*06:02   |
| Spike | 680 | 9 | SPRRARSVA     | 2  | 0.052 | HLA-B*54:01,HLA-B*07:02   |
| Spike | 683 | 9 | RARSVASQS     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 684 | 9 | ARSVASQSI     | 3  | 0.259 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02  |
| Spike | 685 | 9 | RSVASQSII     | 4  | 0.158 | HLA-A*30:01HLA-B*58:01,HLA-B*57:01HLA-C*15:02   |
| Spike | 687 | 9 | VASQSIIAY     | 8  | 0.399 | HLA-A*01:01HLA-B*15:01,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01HLA-C*03:03,HLA-C*12:03   |
| Spike | 689 | 9 | SQSIIAYTM     | 4  | 0.174 | HLA-B*15:01,HLA-B*39:01,HLA-B*15:02HLA-C*03:03  |
| Spike | 691 | 9 | SIIAYTMSL     | 15 | 0.909 | HLA-A*02:01,HLA-A*02:07,HLA-A*02:06,HLA-A*32:01HLA-B*15:01,HLA-B*35:03,HLA-B*15:02,HLA-B*46:01,HLA-B*07:02,HLA-B*39:01HLA-C*07:02,HLA-C*03:04,HLA-C*15:02,HLA-C*14:02,HLA-C*03:03 |
| Spike | 693 | 9 | IAYTMSLGA     | 3  | 0.149 | HLA-B*54:01HLA-C*03:04,HLA-C*12:03  |
| Spike | 697 | 9 | MSLGAENSV     | 5  | 0.261 | HLA-A*02:06HLA-B*51:01HLA-C*15:02,HLA-C*03:04,HLA-C*12:03   |
| Spike | 699 | 9 | LGAENSVAY     | 6  | 0.306 | HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01HLA-C*03:03,HLA-C*12:03  |
| Spike | 704 | 9 | SVAYSNNNSI    | 4  | 0.140 | HLA-A*32:01HLA-B*07:02HLA-C*15:02,HLA-C*03:03   |
| Spike | 705 | 9 | VAYSNNNSIA    | 3  | 0.149 | HLA-B*54:01HLA-C*03:04,HLA-C*12:03  |
| Spike | 706 | 9 | AYSNNNSIAI    | 3  | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02  |
| Spike | 710 | 9 | NSIAIPTNF     | 8  | 0.426 | HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01,HLA-B*57:01HLA-C*03:04,HLA-C*03:03,HLA-C*12:03  |
| Spike | 712 | 9 | IAIPTNFTI     | 12 | 0.556 | HLA-A*02:06,HLA-A*32:01HLA-B*35:03,HLA-B*58:01,HLA-B*46:01,HLA-B*35:01,HLA-B*51:01,HLA-B*57:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03                                     |
| Spike | 714 | 9 | IPTNFTISV     | 5  | 0.148 | HLA-B*35:03,HLA-B*54:01,HLA-B*07:02,HLA-B*35:01,HLA-B*51:01   |
| Spike | 718 | 9 | FTISVTTEI     | 11 | 0.737 | HLA-A*02:01,HLA-A*02:06,HLA-A*26:01HLA-B*46:01,HLA-B*58:01HLA-C*15:02,HLA-C*03:04,HLA-C*04:01,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03   |

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| Spike | 721 | 9 | SVTTEILPV     | 6 | 0.348 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-C*15:02,HLA-C*12:03 |
| Spike | 725 | 9 | EILPVSM TK    | 1 | 0.211 | HLA-A*11:01  |
| Spike | 727 | 9 | LPVSM TKTS    | 1 | 0.030 | HLA-B*54:01  |
| Spike | 732 | 9 | TKTSVDCTM     | 1 | 0.018 | HLA-B*39:01  |
| Spike | 733 | 9 | KTSVDCTMY     | 3 | 0.104 | HLA-A*01:01HLA-B*58:01,HLA-B*57:01                                     |
| Spike | 734 | 9 | TSVDCTMYI     | 5 | 0.253 | HLA-A*02:06HLA-B*58:01HLA-C*15:02,HLA-C*06:02,HLA-C*12:03              |
| Spike | 746 | 9 | STEC SNLL     | 2 | 0.068 | HLA-A*01:01HLA-C*15:02   |
| Spike | 751 | 9 | NLLQYGSF      | 1 | 0.035 | HLA-B*15:02  |
| Spike | 755 | 9 | QYGSFCTQL     | 3 | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02                                     |
| Spike | 757 | 9 | GSFCTQLNR     | 1 | 0.211 | HLA-A*11:01  |
| Spike | 759 | 9 | FCTQLNRAL     | 3 | 0.182 | HLA-B*35:03HLA-C*03:04,HLA-C*03:03                                     |
| Spike | 762 | 9 | QLNRALTGI     | 1 | 0.035 | HLA-A*02:03  |
| Spike | 764 | 9 | NRALTGI AV    | 3 | 0.259 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02                                     |
| Spike | 773 | 9 | EQDKNTQE<br>V | 1 | 0.018 | HLA-B*39:01  |
| Spike | 777 | 9 | NTQEVFAQ<br>V | 2 | 0.086 | HLA-A*02:06HLA-C*15:02   |
| Spike | 780 | 9 | EVFAQVKQI     | 2 | 0.084 | HLA-A*26:01HLA-B*51:01   |
| Spike | 781 | 9 | VFAQVKQIY     | 2 | 0.194 | HLA-C*07:02,HLA-C*14:02  |
| Spike | 782 | 9 | FAQVKQIYK     | 3 | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01                                    |
| Spike | 786 | 9 | KQIYKTPPI     | 4 | 0.237 | HLA-A*02:01,HLA-A*02:06,HLA-A*32:01HLA-B*15:01                         |
| Spike | 787 | 9 | QIYKTPPIK     | 3 | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01                                    |
| Spike | 789 | 9 | YKTPPIKDF     | 2 | 0.241 | HLA-C*07:02,HLA-C*06:02  |
| Spike | 794 | 9 | IKDFGGFNF     | 1 | 0.060 | HLA-C*04:01  |
| Spike | 797 | 9 | FGGFNF SQI    | 2 | 0.156 | HLA-B*51:01HLA-C*03:04   |
| Spike | 798 | 9 | GGFNFSQIL     | 1 | 0.019 | HLA-C*12:03  |
| Spike | 803 | 9 | SQILPDPSK     | 1 | 0.211 | HLA-A*11:01  |
| Spike | 810 | 9 | SKPSKRSFI     | 1 | 0.089 | HLA-C*06:02  |
| Spike | 814 | 9 | KRSFIEDLL     | 3 | 0.259 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02                                     |
| Spike | 815 | 9 | RSFIEDLLF     | 6 | 0.185 | HLA-A*32:01HLA-B*58:01,HLA-B*15:01,HLA-B*57:01HLA-C*15:02,HLA-C*12:03  |
| Spike | 817 | 9 | FIEDLLFNK     | 1 | 0.211 | HLA-A*11:01  |
| Spike | 818 | 9 | IEDLLFNKV     | 2 | 0.119 | HLA-B*40:01,HLA-B*40:02  |



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| Spike | 821 | 9 | LLFNKVTLA     | 4  | 0.295 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Spike | 825 | 9 | KVTLADAGF     | 2  | 0.024 | HLA-A*32:01HLA-B*57:01  |
| Spike | 826 | 9 | VTADAGFI      | 1  | 0.034 | HLA-C*15:02   |
| Spike | 827 | 9 | TLADAGFIK     | 2  | 0.241 | HLA-A*11:01,HLA-A*03:01   |
| Spike | 829 | 9 | ADAGFIKQY     | 1  | 0.026 | HLA-B*44:03   |
| Spike | 833 | 9 | FIKQYGDCL     | 2  | 0.171 | HLA-C*03:04,HLA-C*03:03   |
| Spike | 852 | 9 | AQKFNGLT<br>V | 2  | 0.104 | HLA-A*30:01HLA-B*15:01  |
| Spike | 853 | 9 | QKFNGLTVL     | 4  | 0.278 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02,HLA-C*12:03  |
| Spike | 857 | 9 | GLTVLPPLL     | 2  | 0.208 | HLA-A*02:07,HLA-A*02:01   |
| Spike | 861 | 9 | LPPLLTDDEM    | 4  | 0.118 | HLA-B*35:01,HLA-B*51:01,HLA-B*35:03,HLA-B*07:02   |
| Spike | 865 | 9 | LTDEMIAQY     | 5  | 0.177 | HLA-A*01:01HLA-B*35:01,HLA-B*15:02HLA-C*04:01,HLA-C*12:03   |
| Spike | 868 | 9 | EMIAQYTSA     | 1  | 0.028 | HLA-A*26:01   |
| Spike | 869 | 9 | MIAQYTSAL     | 17 | 0.941 | HLA-A*32:01,HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-B*15:01,HLA-B*35:03,HLA-B*15:02,HLA-B*46:01,HLA-B*07:02,HLA-B*39:01HLA-C*15:02,HLA-C*03:04,HLA-C*04:01,HLA-C*14:02,HLA-C*03:03,HLA-C*06:02 |
| Spike | 870 | 9 | IAQYTSALL     | 7  | 0.373 | HLA-B*46:01,HLA-B*35:03,HLA-B*15:02HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |
| Spike | 871 | 9 | AQYTSALLA     | 1  | 0.052 | HLA-A*02:06   |
| Spike | 874 | 9 | TSALLAGTI     | 2  | 0.090 | HLA-B*51:01HLA-C*15:02  |
| Spike | 878 | 9 | LAGTITSGW     | 2  | 0.070 | HLA-B*58:01,HLA-B*57:01   |
| Spike | 880 | 9 | GTITSGWTF     | 6  | 0.323 | HLA-A*24:02,HLA-A*32:01HLA-B*58:01,HLA-B*15:01,HLA-B*15:02,HLA-B*57:01  |
| Spike | 886 | 9 | WTFGAGAA<br>L | 12 | 0.531 | HLA-A*02:06HLA-B*15:01,HLA-B*15:02,HLA-B*07:02,HLA-B*35:01,HLA-B*39:01HLA-C*15:02,HLA-C*03:04,HLA-C*04:01,HLA-C*14:02,HLA-C*03:03,HLA-C*12:03   |
| Spike | 888 | 9 | FGAGAALQI     | 5  | 0.336 | HLA-B*51:01HLA-C*03:04,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03  |
| Spike | 890 | 9 | AGAALQIPF     | 2  | 0.151 | HLA-B*46:01,HLA-B*15:01   |
| Spike | 892 | 9 | AALQIPFAM     | 9  | 0.460 | HLA-B*35:03,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01HLA-C*15:02,HLA-C*03:04,HLA-C*03:03,HLA-C*12:03  |
| Spike | 894 | 9 | LQIPFAMQM     | 11 | 0.721 | HLA-A*02:06HLA-B*46:01,HLA-B*15:01,HLA-B*39:01,HLA-B*15:02HLA-C*07:02,HLA-C*15:02,HLA-C*03:04,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03   |

|       |     |   |               |    |       |   |
|-------|-----|---|---------------|----|-------|---|
| Spike | 896 | 9 | IPFAMQMA<br>Y | 6  | 0.233 | HLA-B*35:03,HLA-B*15:02,HLA-B*54:01,HLA-B*35:01,HLA-B*51:01HLA-C*03:03  |
| Spike | 898 | 9 | FAMQMAYR<br>F | 16 | 0.902 | HLA-A*24:02,HLA-A*32:01HLA-B*15:01,HLA-B*35:03,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01,HLA-B*51:01,HLA-B*57:01HLA-C*03:04,HLA-C*04:01,HLA-C*14:02,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |
| Spike | 901 | 9 | QMAYRFNGI     | 2  | 0.048 | HLA-A*02:03,HLA-A*32:01   |
| Spike | 903 | 9 | AYRFNGIGV     | 2  | 0.097 | HLA-A*30:01HLA-C*14:02  |
| Spike | 904 | 9 | YRFNGIGVT     | 2  | 0.169 | HLA-B*39:01HLA-C*07:02  |
| Spike | 909 | 9 | IGVTQNVLY     | 1  | 0.029 | HLA-B*35:01   |
| Spike | 915 | 9 | VLYENQKLI     | 3  | 0.209 | HLA-A*02:03,HLA-A*02:07HLA-C*06:02  |
| Spike | 919 | 9 | NQKLIANQF     | 1  | 0.035 | HLA-B*15:02   |
| Spike | 922 | 9 | LIANQFNSA     | 3  | 0.117 | HLA-A*02:03,HLA-A*02:06HLA-B*54:01  |
| Spike | 923 | 9 | IANQFNSAI     | 8  | 0.429 | HLA-B*46:01,HLA-B*51:01,HLA-B*35:03,HLA-B*15:02HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |
| Spike | 925 | 9 | NQFNSAIGK     | 2  | 0.241 | HLA-A*11:01,HLA-A*03:01   |
| Spike | 937 | 9 | SLSSTASAL     | 6  | 0.312 | HLA-A*02:03HLA-B*15:01,HLA-B*15:02,HLA-B*07:02HLA-C*03:04,HLA-C*03:03   |
| Spike | 939 | 9 | SSTASALGK     | 3  | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   |
| Spike | 940 | 9 | STASALGKL     | 4  | 0.224 | HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03   |
| Spike | 943 | 9 | SALGKLQDV     | 5  | 0.276 | HLA-A*02:06HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |
| Spike | 950 | 9 | DVVNQNAQ<br>A | 1  | 0.028 | HLA-A*26:01   |
| Spike | 951 | 9 | VVNQNAQA<br>L | 5  | 0.237 | HLA-B*35:03,HLA-B*07:02HLA-C*15:02,HLA-C*03:04,HLA-C*03:03  |
| Spike | 955 | 9 | NAQALNTL<br>V | 1  | 0.056 | HLA-B*51:01   |
| Spike | 956 | 9 | AQALNTLV<br>K | 2  | 0.241 | HLA-A*11:01,HLA-A*03:01   |
| Spike | 958 | 9 | ALNTLVKQL     | 1  | 0.035 | HLA-A*02:03   |
| Spike | 962 | 9 | LVKQLSSNF     | 4  | 0.215 | HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01   |
| Spike | 964 | 9 | KQLSSNFGA     | 1  | 0.052 | HLA-A*02:06   |
| Spike | 965 | 9 | QLSSNFGAI     | 1  | 0.035 | HLA-A*02:03   |
| Spike | 968 | 9 | SNFGAISSV     | 2  | 0.053 | HLA-C*15:02,HLA-C*12:03   |

|       |      |   |               |    |       |   |
|-------|------|---|---------------|----|-------|---|
| Spike | 969  | 9 | NFGAISSVL     | 3  | 0.258 | HLA-A*24:02HLA-C*14:02,HLA-C*04:01  |
| Spike | 972  | 9 | AISSVLNDI     | 1  | 0.035 | HLA-A*02:03   |
| Spike | 973  | 9 | ISSVLNDIL     | 5  | 0.274 | HLA-B*58:01,HLA-B*57:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04  |
| Spike | 975  | 9 | SVLNDILSR     | 1  | 0.211 | HLA-A*11:01   |
| Spike | 976  | 9 | VLNDILSRL     | 6  | 0.457 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-B*46:01HLA-C*04:01   |
| Spike | 981  | 9 | LSRLDKVEA     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 983  | 9 | RLDKVEAEV     | 3  | 0.268 | HLA-A*02:07,HLA-A*02:01HLA-C*04:01  |
| Spike | 989  | 9 | AEVQIDRLI     | 3  | 0.145 | HLA-B*44:03,HLA-B*40:01,HLA-B*40:02   |
| Spike | 996  | 9 | LITGRLQSL     | 3  | 0.190 | HLA-C*03:04,HLA-C*03:03,HLA-C*12:03   |
| Spike | 999  | 9 | GRLQSLQTY     | 2  | 0.241 | HLA-C*07:02,HLA-C*06:02   |
| Spike | 1000 | 9 | RLQSLQTYV     | 4  | 0.295 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01   |
| Spike | 1004 | 9 | LQTYVTQQL     | 5  | 0.337 | HLA-B*40:01,HLA-B*15:01,HLA-B*39:01HLA-C*03:04,HLA-C*03:03  |
| Spike | 1005 | 9 | QTYVTQQLI     | 6  | 0.268 | HLA-B*58:01,HLA-B*51:01,HLA-B*57:01HLA-C*15:02,HLA-C*06:02,HLA-C*12:03  |
| Spike | 1012 | 9 | LIRAAEIRA     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 1014 | 9 | RAAEIRASA     | 3  | 0.156 | HLA-A*30:01HLA-B*54:01HLA-C*03:03   |
| Spike | 1016 | 9 | AEIRASANL     | 3  | 0.145 | HLA-B*44:03,HLA-B*40:01,HLA-B*40:02   |
| Spike | 1018 | 9 | IRASANLAA     | 1  | 0.018 | HLA-B*39:01   |
| Spike | 1020 | 9 | ASANLAAT<br>K | 3  | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   |
| Spike | 1021 | 9 | SANLAATK<br>M | 8  | 0.401 | HLA-B*46:01,HLA-B*15:02,HLA-B*35:03,HLA-B*35:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03                                    |
| Spike | 1026 | 9 | ATKMSECVL     | 1  | 0.054 | HLA-A*30:01   |
| Spike | 1048 | 9 | HLMSFPQSA     | 2  | 0.158 | HLA-A*02:03,HLA-A*02:01   |
| Spike | 1050 | 9 | MSFPQSAPH     | 2  | 0.131 | HLA-B*46:01,HLA-B*35:01   |
| Spike | 1052 | 9 | FPQSAPHGV     | 6  | 0.208 | HLA-B*35:03,HLA-B*54:01,HLA-B*07:02,HLA-B*35:01,HLA-B*51:01HLA-C*04:01  |
| Spike | 1054 | 9 | QSAPHGVVF     | 11 | 0.639 | HLA-A*32:01HLA-B*15:01,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01,HLA-B*57:01HLA-C*07:02,HLA-C*03:04,HLA-C*03:03,HLA-C*12:03 |
| Spike | 1055 | 9 | SAPHGVVFL     | 5  | 0.401 | HLA-C*07:02,HLA-C*03:04,HLA-C*04:01,HLA-C*03:03,HLA-C*12:03   |
| Spike | 1056 | 9 | APHGVVFL<br>H | 1  | 0.029 | HLA-B*35:01   |
| Spike | 1059 | 9 | GVVFLHVTY     | 3  | 0.097 | HLA-A*32:01HLA-B*15:01,HLA-B*15:02  |

|       |      |   |               |    |       |   |
|-------|------|---|---------------|----|-------|---|
| Spike | 1060 | 9 | VVFLHVTYV     | 8  | 0.468 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-B*54:01HLA-C*15:02,HLA-C*06:02,HLA-C*12:03   |
| Spike | 1062 | 9 | FLHVTYVPA     | 5  | 0.325 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-B*54:01  |
| Spike | 1065 | 9 | VTYVPAQEK     | 3  | 0.296 | HLA-A*11:01,HLA-A*30:01,HLA-A*03:01   |
| Spike | 1073 | 9 | KNFTTAPAI     | 1  | 0.013 | HLA-A*32:01   |
| Spike | 1086 | 9 | KAHFPREGV     | 2  | 0.088 | HLA-A*30:01HLA-C*15:02  |
| Spike | 1087 | 9 | AHFPREGVF     | 3  | 0.259 | HLA-B*39:01HLA-C*07:02,HLA-C*06:02  |
| Spike | 1088 | 9 | HFPREGVVF     | 1  | 0.042 | HLA-C*14:02   |
| Spike | 1089 | 9 | FPREGVFVS     | 2  | 0.059 | HLA-B*35:01,HLA-B*54:01   |
| Spike | 1094 | 9 | VFVSNATH<br>W | 1  | 0.156 | HLA-A*24:02   |
| Spike | 1095 | 9 | FVSNATHW<br>F | 12 | 0.890 | HLA-A*24:02,HLA-A*26:01HLA-B*46:01,HLA-B*35:01,HLA-B*15:01,HLA-B*15:02HLA-C*07:02,HLA-C*03:04,HLA-C*04:01,HLA-C*03:03,HLA-C*06:02,HLA-C*12:03 |
| Spike | 1096 | 9 | VSNATHWF<br>V | 2  | 0.092 | HLA-B*58:01HLA-C*15:02  |
| Spike | 1099 | 9 | GTHWFVTQ<br>R | 1  | 0.211 | HLA-A*11:01   |
| Spike | 1101 | 9 | HWFVTQRN<br>F | 3  | 0.350 | HLA-A*24:02HLA-C*07:02,HLA-C*14:02  |
| Spike | 1102 | 9 | WFVTQRNF<br>Y | 1  | 0.042 | HLA-C*14:02   |
| Spike | 1106 | 9 | QRNFYEPQI     | 1  | 0.089 | HLA-C*06:02   |
| Spike | 1109 | 9 | FYEPQIITT     | 1  | 0.152 | HLA-C*07:02   |
| Spike | 1113 | 9 | QIITDNTF      | 5  | 0.243 | HLA-A*26:01HLA-B*46:01,HLA-B*15:02,HLA-B*15:01,HLA-B*35:01  |
| Spike | 1120 | 9 | TFVSGNCDV     | 1  | 0.042 | HLA-C*14:02   |
| Spike | 1121 | 9 | FVSGNCDVV     | 8  | 0.519 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-C*15:02,HLA-C*03:03,HLA-C*03:04,HLA-C*12:03  |
| Spike | 1130 | 9 | IGIVNNTVY     | 3  | 0.166 | HLA-B*46:01,HLA-B*15:02,HLA-B*35:01   |
| Spike | 1137 | 9 | VYDPLQPEL     | 3  | 0.254 | HLA-C*07:02,HLA-C*14:02,HLA-C*04:01   |
| Spike | 1147 | 9 | SFKEELDKY     | 1  | 0.042 | HLA-C*14:02   |
| Spike | 1158 | 9 | NHTSPDVDL     | 1  | 0.018 | HLA-B*39:01   |
| Spike | 1161 | 9 | SPDVDLGDI     | 1  | 0.011 | HLA-B*35:03   |
| Spike | 1169 | 9 | ISGINASVV     | 1  | 0.034 | HLA-C*15:02   |

|       |      |   |               |   |       |  |
|-------|------|---|---------------|---|-------|--|
| Spike | 1171 | 9 | GINASVVNI     | 2 | 0.048 | HLA-A*02:03,HLA-A*32:01  |
| Spike | 1173 | 9 | NASVVNIQK     | 1 | 0.211 | HLA-A*11:01  |
| Spike | 1175 | 9 | SVVNIQKEI     | 1 | 0.034 | HLA-C*15:02  |
| Spike | 1181 | 9 | KEIDRLNEV     | 4 | 0.197 | HLA-A*02:06HLA-B*44:03,HLA-B*40:01,HLA-B*40:02   |
| Spike | 1185 | 9 | RLNEVAKN<br>L | 2 | 0.048 | HLA-A*02:03,HLA-A*32:01  |
| Spike | 1188 | 9 | EVAKNLNES     | 1 | 0.028 | HLA-A*26:01  |
| Spike | 1189 | 9 | VAKNLNESL     | 2 | 0.171 | HLA-C*03:04,HLA-C*03:03  |
| Spike | 1192 | 9 | NLNESLIDL     | 2 | 0.158 | HLA-A*02:03,HLA-A*02:01  |
| Spike | 1201 | 9 | QELGKYEQY     | 1 | 0.026 | HLA-B*44:03  |
| Spike | 1206 | 9 | YEQYIKWP<br>W | 2 | 0.046 | HLA-B*44:03,HLA-B*40:02  |
| Spike | 1207 | 9 | EQYIKWPW<br>Y | 1 | 0.035 | HLA-B*15:02  |
| Spike | 1208 | 9 | QYIKWPWYI     | 3 | 0.396 | HLA-A*24:02HLA-C*07:02,HLA-C*06:02   |
| Spike | 1209 | 9 | YIKWPWYIW     | 3 | 0.179 | HLA-A*24:02,HLA-A*32:01HLA-B*57:01   |
| Spike | 1212 | 9 | WPWYIWL<br>F  | 4 | 0.092 | HLA-B*35:01,HLA-B*54:01,HLA-B*35:03,HLA-B*07:02  |
| Spike | 1213 | 9 | PWYIWLGF      | 1 | 0.156 | HLA-A*24:02  |
| Spike | 1216 | 9 | IWLGFAGL      | 2 | 0.307 | HLA-A*24:02HLA-C*07:02   |
| Spike | 1217 | 9 | WLGFIAGL      | 1 | 0.035 | HLA-A*02:03  |
| Spike | 1218 | 9 | LGFIAGLIA     | 1 | 0.030 | HLA-B*54:01  |
| Spike | 1219 | 9 | GFIAGLIAI     | 1 | 0.042 | HLA-C*14:02  |
| Spike | 1220 | 9 | FIAGLIAIV     | 8 | 0.550 | HLA-A*02:03,HLA-A*02:07,HLA-A*02:06,HLA-A*02:01HLA-B*46:01HLA-C*15:02,HLA-C*03:04,HLA-C*12:03  |
| Spike | 1221 | 9 | IAGLIAIVM     | 4 | 0.210 | HLA-B*35:01,HLA-B*35:03HLA-C*03:04,HLA-C*03:03   |
| Spike | 1223 | 9 | GLIAIVMT      | 1 | 0.123 | HLA-A*02:01  |
| Spike | 1224 | 9 | LIAIVMTI      | 1 | 0.013 | HLA-A*32:01  |
| Spike | 1225 | 9 | IAIVMTIM      | 8 | 0.426 | HLA-B*35:03,HLA-B*58:01,HLA-B*15:02,HLA-B*46:01,HLA-B*35:01HLA-C*03:04,HLA-C*03:03,HLA-C*12:03 |
| Spike | 1229 | 9 | MVTIMLCC<br>M | 2 | 0.047 | HLA-B*35:03,HLA-B*15:02  |
| Spike | 1236 | 9 | CMTSCCSCL     | 1 | 0.085 | HLA-A*02:07  |
| Spike | 1237 | 9 | MTSCCSCLK     | 2 | 0.266 | HLA-A*11:01,HLA-A*30:01  |

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|       |      |   |               |   |       |                         |
|-------|------|---|---------------|---|-------|-------------------------|
| Spike | 1248 | 9 | CSCGSCCKF     | 2 | 0.070 | HLA-B*58:01,HLA-B*57:01 |
| Spike | 1257 | 9 | DEDDSEPVL     | 1 | 0.100 | HLA-B*40:01             |
| Spike | 1262 | 9 | EPVLKGVKL     | 2 | 0.033 | HLA-B*35:03,HLA-B*07:02 |
| Spike | 1264 | 9 | VLKGVKLH<br>Y | 2 | 0.085 | HLA-B*15:01,HLA-B*15:02 |

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**Table S3.** 33 identified T-cell epitopes for HLA allele A\*02:01 in vitro reported by Schulien and Quadeer and their binary prediction results by NetMHCpan-4.0 and NetCTL-1.2.

| Epitope    | Length | NetMHCpan-4.0 * | NetCTL-1.2 ** |
|------------|--------|-----------------|---------------|
| LLYDANYFL  | 9      | SB              | E             |
| KLWAQCVQL  | 9      | SB              | E             |
| YLQPRTFLL  | 9      | SB              | E             |
| ALWEIQQVV  | 9      | SB              | E             |
| RLQSLQTYV  | 9      | SB              | E             |
| LLLDRLNQL  | 9      | SB              | E             |
| ILFTRFFYV  | 9      | SB              | E             |
| YLYALVYFL  | 9      | SB              | E             |
| ALSKGVHVF  | 9      | SB              | E             |
| FIAGLIAIV  | 9      | SB              | E             |
| FLNGSCGSV  | 9      | WB              | E             |
| KIADYNYKL  | 9      | SB              | E             |
| LLFNKVTLA  | 9      | SB              | E             |
| FGDDTVIEV  | 9      | SB              | E             |
| VLAWLYAAV  | 9      | WB              | E             |
| FLLPSLATV  | 9      | SB              | E             |
| FLHVTYVPA  | 9      | WB              | E             |
| RLDKVEAEV  | 9      | SB              | E             |
| FLFLTWICL  | 9      |                 | E             |
| KLDDKDPNF  | 9      | WB              |               |
| GMSRIGMEV  | 9      | SB              | E             |
| LALLLLDRL  | 9      |                 |               |
| KIYSKHTPI  | 9      | WB              | E             |
| GLTVLPPLL  | 9      | SB              | E             |
| ALNTLVKQL  | 9      | WB              | E             |
| LITGRLQSL  | 9      |                 |               |
| RLNEVAKNL  | 9      | SB              |               |
| VLNDILSRL  | 9      | SB              | E             |
| LLLLDRLNQL | 10     | WB              |               |
| KLPDDFTGCV | 10     | SB              |               |
| RLITGRLQSL | 10     | WB              |               |
| KLNDLCFTNV | 10     | SB              |               |
| YLGTGPEAGL | 10     | WB              |               |

\* Binary results obtained from the NetMHCpan-4.0 web server under the default threshold. SB and WB are short for strong binding and weak binding, respectively. All SB and WB epitopes are regarded as T-cell epitopes. \*\* Binary results obtained from the NetCTL-1.2 web server under the default threshold. E means NetCTL-1.2 recognized this T-cell epitope.