**Supplemental Figure 1.** Gating strategy for dendritic cell (DC) subpopulations. Ca. 1x10E6 leukocytes were measured (storage of all cells). After doublet discrimination (R1) a gate on CD45+ mononuclear cells (R2) was set. R2 was used to exclude B cells, CD14+ monocytes and dead cells, and to gate on HLA-DR+ cells (R3). In R3, DC were defined as CD303+ plasmacytoid dendritic cell (pDC), CD1c+ myeloid dendritic cells (mDC), CD141+ mDC, and CD16+ DC.



**Supplemental Table 1**. Comparison of blood cell parameters between patient’s groups with anti-PD-1 antibody monotherapy in first-line versus second-line setting.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Initial values at onset of therapy | | | | Values at time point of third cycle | |
|  |  | PFS≤1 month | Progressive disease, PFS>1month | Clinical response | Progressive disease | Clinical response |
| N (% of patients) | First line | 5 (36) | 3 (21) | 6 (43) | 3 | 6 |
| Second line | 4 (19) | 9 (43) | 8 (38) | 9 | 8 |
| NLR | First line | 7.3±2.7 | 3.8±2.7 | 5.4±3.6 | 6.6±2.6 | 3.3±1.7 |
| Second line | 7.0±4.3 | 5.1±3.3 | 4.6±2.7 | 9.9±7.7 | 4.6±3.9 |
| HLA-DRlow MDSC (% of monocytes) | First line | 10.2±10.8 | 5.2±6.3 | 5.6±2.3 | 21.5±16.7 | 4.0±3.1 |
| Second line | 8.9±6.6 | 5.4±5.0 | 6.0±2.9 | 8.5±8.7 | 3.9±2.4 |
| Total DC  (% of leukocytes) | First line | 0.37±0.41 | 0.81±0.32 | 0.81±0.29 | 0.55±0.36 | 1.46±0.37 |
| Second line | 0.48±0.30 | 0.79±0.27 | 0.92±0.40 | 0.52±0.49 | 1.17±0.77 |

**Supplemental Table 2.** Relative changes in immune cell parameters of lung cancer patients undergoing PD-1 inhibitor monotherapy estimated at the time point of third and fifth cycle. The initial values at onset of therapy were set to 100%, values represent percentages with mean±standard deviation. Results of one-way analysis of variance (ANOVA) are given.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Time point of cycle 3 | | | | Time point of cycle 5 | | | |
|  | Progressive disease (n=14 ) | Stable disease  (n=7 ) | Partial/ complete response (n=7 ) | *P* value | Progressive disease (n=12 ) | Stable disease  (n=7 ) | Partial/ complete response (n=7 ) | *P* value |
| Neutrophil counts | 147.7±68.7 | 98.7±32.7 | 68.3±29.1 | 0.010 | 130.4±53.4 | 145.0±141.4 | 60.0±17.9 |  |
| Lymphocyte counts | 94.6±47.0 | 91.5±32.7 | 141.3±47.7 |  | 88.8±29.5 | 112.7±49.6 | 141.6±57.2 |  |
| NLR | 199.4±154.4 | 111.5±19.9 | 56.7±25.0 | 0.029 | 178.9±126.8 | 119.1±62.8 | 46.2±20.2 | 0.023 |
| CD3+ T cells | 88.5±43.3 | 88.8±29.4 | 137.6±33.8 | 0.024 | 90.1±30.1 | 100.0±39.7 | 139.1±54.2 |  |
| CD4+ T cells | 78.4±30.2 | 86.7±28.4 | 130.6±26.7 | 0.002 | 84.5±33.3 | 97.6±31.8 | 133.0±41.0 | 0.04 |
| CD8+ T cells | 99.5±57.6 | 93.6±37.6 | 161.2±76.0 |  | 93.9±30.0 | 105.4±56.3 | 147.2±62.8 |  |
| B cells | 83.2±32.1 | 81.9±35.7 | 118.8±39.9 |  | 83.4±24.9 | 98.6±36.4 | 127±38.6 | 0.03 |
| NK cells | 96.7±69.3 | 99.3±55.8 | 196.4±100.4 | 0.021 | 88.8±35.5 | 119.2±94.9 | 177.6±81.7 | 0.04 |
| HLA-DRlow MDSC | 267.3±238.8 | 81.0±42.7 | 60.3±30.2 | 0.022 | 211.6±119.3 | 122.0±76.0 | 57.5±21.6 | 0.006 |
| Total DC | 61.7±40.4 | 125.7±64.6 | 192.3±124.8 | 0.004 | 68.2±42.1 | 109.3±63.2 | 180.9±88.9 | 0.005 |
| CD16+DC | 64.6±42.0 | 133.6±83.4 | 209.6±119.8 | 0.005 | 72.4±70.3 | 122.7±110.6 | 225.5±125.6 | 0.015 |

**Supplemental Table 3.** Association of immune cell parameters with total dendritic cell (DC) frequencies analyzed by Spearman’s rank correlation. The correlation coefficient (CC) and *p* values are given.

|  |  |  |
| --- | --- | --- |
| **Correlation of NLR with total DC frequency** | CC | *p* |
| Onset of checkpoint blockade monotherapy | -0.456 | 0.009 |
| Cycle 3 | -0.675 | <0.001 |
| Cycle 5 | -0.702 | <0.001 |
| **Correlation of neutrophils with total DC frequency** |  |  |
| Onset of checkpoint blockade monotherapy | -0.305 |  |
| Cycle 3 | -0.648 | <0.001 |
| Cycle 5 | -0.686 | <0.001 |
| **Correlation of lymphocytes with total DC** |  |  |
| Onset of checkpoint blockade monotherapy | 0.272 |  |
| Cycle 3 | 0.506 | 0.007 |
| Cycle 5 | 0.412 | 0.04 |
| **Correlation of CD3+ T cells with total DC** |  |  |
| Onset of checkpoint blockade monotherapy | 0.358 | 0.041 |
| Cycle 3 | 0.573 | 0.002 |
| Cycle 5 | 0.354 |  |

**Supplemental Table 4**. Three variants of a prognostic score for patients undergoing PD-1 inhibitor therapy. In case of score C, ‘improvement’ means a decrease of NLR and/or HLA-DRlow monocytes, and an increase of total DC; ‘deterioration’ means the opposite.

|  |  |  |
| --- | --- | --- |
| Prognostic factor | | points |
| **Score A**: Risk score for patients starting immunotherapy | | |
| Smoking status | never-smoker  ever-smoker | 1  0 |
| Neutrophil-to-lymphocyte-ratio (NLR) | ≥5.2  <5.2 | 1  0 |
| HLA-DRlow monocytes | ≥11%  <11% | 1  0 |
| Total DC frequency | ≤0.4%  >0.4 | 1  0 |
| **Score B**: Response score for patients starting immunotherapy | | |
| Smoking status | ever-smoker  never-smoker | 1  0 |
| Neutrophil-lymphocyte-ratio (NLR) | <5.2  ≥5.2 | 1  0 |
| HLA-DRlow monocytes | <11%  ≥11% | 1  0 |
| Total DC frequency | >0.4%  ≤0.4% | 1  0 |
| Platelet count | <400,000/μl blood  ≥400,000/μl blood | 1  0 |
| Age | <75 years ≥75 years | 1 0 |
| **Score C**: Response score evaluated at time point of cycle 3, with the initial values at onset of therapy set to 100% | | |
| NLR HLA-DRlow monocytes Total DC frequency | Improvement ≥10% to the initial value | 2 points each |
| NLR HLA-DRlow monocytes Total DC frequency | <10% change to the start value | 1 point each |
| NLR HLA-DRlow monocytes Total DC frequency | Deterioration ≥10% to the initial value | 0 points |