Supplementary Figure 1. Immune modulation 1 hr after induction (T2, teal) and at start of active labor (T5, purple) in comparison to pre-induction (baseline, T1, gray) (N = 15, n = 48). Shown are representative features. (A–H) Features significantly different (p < 0.05, Wilcoxon signed-rank test for T1 vs. T2 or rank-sum test for T1 vs. T3-5) in univariate paired comparisons. (I–P) Features
significantly different (p < 0.05) in univariate unpaired comparisons. Related to Fig. 2 and Supplementary Table 2.
**Supplementary Figure 2.** Top features most informative for the prediction model (N = 15, n = 48). Number (1-26) indicates feature rank based on occurrence in a bootstrap model. Related to Fig. 3.
Supplementary Figure 3. Gating strategy for mass cytometry analyses. Live, non-erythroid cell populations (blue subpopulations) were used for analysis.
| Antibody | Manufacturer | Atomic Symbol | Atomic Mass | Clone | Comment | Catalogue Number | RRID |
|----------|--------------|---------------|-------------|-------|---------|-----------------|------|
| Barcode 1 | Trace Sciences | Pd | 102 | | | Barcode | |
| Barcode 2 | Trace Sciences | Pd | 104 | | | Barcode | |
| Barcode 3 | Trace Sciences | Pd | 105 | | | Barcode | |
| Barcode 4 | Trace Sciences | Pd | 106 | | | Barcode | |
| Barcode 5 | Trace Sciences | Pd | 108 | | | Barcode | |
| Barcode 6 | Trace Sciences | Pd | 110 | | | Barcode | |
| CD235 | BioLegend | In | 113 | HIR2 | Phenotype | 306615 | AB_2562825 |
| CD61 | BD | In | 113 | V1-PL2 | Phenotype | 555752 | AB_396093 |
| CD45 | Biolegend | In | 115 | H130 | Phenotype | 304045 | AB_2562821 |
| CD66 | BD | La | 139 | B1.1/CD66 | Phenotype | 551354 | AB_394166 |
| CD7 | BD | Pr | 141 | M-T701 | Phenotype | 555359 | AB_395762 |
| CD19 | BioLegend | Nd | 142 | HIB19 | Phenotype | 302247 | AB_2562815 |
| CD45RA | BioLegend | Nd | 143 | HI100 | Phenotype | 304143 | AB_2562822 |
| CD11b | BioLegend | Nd | 144 | ICRF-44 | Phenotype | 301337 | AB_2562811 |
| CD4 | BioLegend | Nd | 145 | RPA-T4 | Phenotype | 300541 | AB_2562809 |
| CD8a | BioLegend | Nd | 146 | RPA-T8 | Phenotype | 301053 | AB_2562810 |
| CD11c | BioLegend | Sm | 147 | Bu15 | Phenotype | 337221 | AB_2562834 |
| CD123 | BioLegend | Nd | 148 | 6H6 | Phenotype | 306027 | AB_2562823 |
| pCREB (pS133) | CST | Sm | 149 | 87G3 | Function | 9198 | AB_2561044 |
| pSTAT3 (Tyr694) | CST | Nd | 150 | C11C5 | Function | 9359 | AB_823649 |
| p38 | BD | Eu | 151 | 36p38 | Function | 612289 | AB_399606 |
| TCRγδ | BD | Sm | 152 | B1 | Phenotype | 555715 | AB_396059 |
| pSTAT1 (pY701) | BD | Eu | 153 | 14/P-STAT1 | Function | 612133 | AB_399504 |
| pSTAT3 (Tyr705) | CST | Sm | 154 | M9C6 | Function | 4113 | AB_2198588 |
| p56 | BD | Eu | 155 | D57.2.2E | Function | 4858 | AB_916156 |
| lkB | CST | Gd | 156 | L35A5 | Function | 4814S | |
| CD69 | BD | Gd | 157 | FN50 | Phenotype | 555529 | AB_395914 |
| CD33 | BioLegend | Gd | 158 | WM53 | Phenotype | 303419 | AB_2562818 |
| pMPK2 (Thr334) | CST | Tb | 159 | 27B7 | Function | 3007 | AB_490936 |
| Tbet | Thermo Fisher | Gd | 160 | 4B10 | Phenotype | 14582580 | AB_763635 |
| cPARP | BD | Dy | 161 | F21-852 | Function | 552596 | AB_394437 |
| FoxP3 | Thermo Fisher | Dy | 162 | PCH101 | Phenotype | 14477828 | AB_467554 |
| CD45RO | Fluidigm | Dy | 164 | UCHL1 | Phenotype | 3164007B | AB_2811092 |
| CD16 | BioLegend | Ho | 165 | 3G8 | Phenotype | 302051 | AB_2562814 |
| pNFkB (pS529) | BD | Er | 166 | k108951250 | Function | 558393 | AB_647284 |
| pERK1/2 (pY204) | CST | Yb | 167 | D13.14.4E | Function | 4370 | AB_2315112 |
| pSTAT6 (Tyr641) | BioLegend | Er | 168 | A15137E | Function | 686902 | AB_2616820 |
| CD25 | BioLegend | Tm | 169 | M-A251 | Phenotype | 356102 | AB_2561752 |
| CD3 | BioLegend | Er | 170 | UCHT1 | Phenotype | 300402 | AB_314056 |
| CCR5 | Fluidigm | Yb | 171 | NP6G4 | Phenotype | 3171017a | |
| CD62L | Thermo Scientific | Yb | 172 | DREG200 | Phenotype | 304143 | AB_2562826 |
| CCR2 | BioLegend | Yb | 173 | K036C2 | Phenotype | 357202 | AB_2561851 |
| HLA-DR | BioLegend | Yb | 174 | L243 | Phenotype | 307651 | AB_2562826 |
| CD14 | BioLegend | Yb | 175 | M5E2 | Phenotype | 301843 | AB_2562813 |
| CD56 | BD | Yb | 176 | NCAM16.2 | Phenotype | 559043 | AB_397180 |
| DNA1/2 | Fluidigm | Ir | 191/192 | | | DNA | |

**Supplementary Table 1.** Mass cytometry antibody panel.
| Feature  | Feature  | Feature  | Feature  | Feature  | Feature  | Feature  | Feature  | Feature  | Feature  | Feature  | Feature  | Feature  |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| T2 1 hr post-induction vs. T1 baseline | p (paired) | p adj | FC | T2 1 hr post-induction vs. T1 baseline | p (paired) | p adj | FC | T2 1 hr post-induction vs. T1 baseline | p (paired) | p adj | FC | T2 1 hr post-induction vs. T1 baseline | p (paired) | p adj | FC | T2 1 hr post-induction vs. T1 baseline | p (paired) | p adj | FC |
| CD69posCD8Tmem_pCREB_basal | 3.51E-05 | 0.0241 | -0.151 | CD8Tmem_pCREB_basal | 8.70E-05 | 0.0246 | -0.100 | CD8Tem_pCREB_basal | 0.00011 | 0.0246 | -0.117 | CD8Tcells_pCREB_basal | 0.00031 | 0.0466 | -0.075 | CCR5posCCR2posCD8Tem_pCREB_basal | 0.00052 | 0.0466 | -0.155 | CD69posCD4Tmem_pNF-κB_basal | 0.00056 | 0.0466 | -0.116 | CD8Tef_pCREB_basal | 0.00067 | 0.0466 | -0.087 | CD8Tmem_pCREB_basal | 0.00071 | 0.0466 | -0.046 | CD4Tem_pCREB_basal | 0.00077 | 0.0466 | -0.074 | Bcells_pCREB_basal | 0.00084 | 0.0466 | -0.040 | TCRgdposNKT_pCREB_basal | 0.00084 | 0.0466 | -0.113 | CCR2posMCs_pNF-κB_basal | 0.00086 | 0.0466 | -0.097 | CD8Tef_pERK_basal | 0.00091 | 0.0466 | -0.022 | cMCs_pNF-κB_basal | 0.00100 | 0.0466 | -0.102 | CCR5posCCR2posCD8Tem_prpS6_basal | 0.00107 | 0.0466 | -0.022 | CD8Tcm_pCREB_basal | 0.00111 | 0.0466 | -0.077 | CD8Tef_pCREB_basal | 0.00121 | 0.0466 | -0.065 | CCR5posCCR2posCD4Tem_pCREB_basal | 0.00128 | 0.0466 | -0.037 | DCs_prpS6_basal | 0.00130 | 0.0466 | -0.010 | TCRgdposT_pCREB_basal | 0.00139 | 0.0466 | -0.088 | CD62LposCD8Tnaive_pCREB_basal | 0.00143 | 0.0466 | -0.036 |
| T3 Regular contractions vs. T1 baseline | p (unpaired) | p adj | FC | T3 Regular contractions vs. T1 baseline | p (unpaired) | p adj | FC | T3 Regular contractions vs. T1 baseline | p (unpaired) | p adj | FC | T3 Regular contractions vs. T1 baseline | p (unpaired) | p adj | FC | T3 Regular contractions vs. T1 baseline | p (unpaired) | p adj | FC | T3 Regular contractions vs. T1 baseline | p (unpaired) | p adj | FC |
| TCRgdposT_pCREB_basal | 0.00020 | 0.0807 | -0.121 | TCRgdposNKT_pCREB_basal | 0.00024 | 0.0807 | -0.131 | CD8Tcm_pSTAT5_basal | 0.00050 | 0.0809 | 0.082 | CD8Tcells_pCREB_basal | 0.00063 | 0.0809 | -0.078 | CD8Tef_pCREB_basal | 0.00074 | 0.0809 | -0.095 | CCR5posCCR2posCD8Tem_pCREB_basal | 0.00103 | 0.0809 | -0.151 | CD4Tem_pCREB_basal | 0.00115 | 0.0809 | -0.078 | CD8Tmem_pCREB_basal | 0.00126 | 0.0809 | -0.095 | CD69posCD8Tmem_pCREB_basal | 0.00127 | 0.0809 | -0.135 | CCR5posCCR2posCD4Tem_pCREB_basal | 0.00127 | 0.0809 | -0.070 | CD8Tem_pCREB_basal | 0.00130 | 0.0809 | -0.109 | CD69negCD56loCD16posNK_pCREB_basal | 0.00190 | 0.0967 | -0.105 |
### Supplementary Table 2.

| Feature | p (unpaired) | p adj | FC |
|---------|--------------|-------|----|
| mDCsHLADRhi_pSTAT3_basal | 3.63E-07 | 0.0002 | 1.297 |
| mDCs_pSTAT3_basal | 3.11E-06 | 0.0011 | 1.245 |
| CCR2posMCs_pSTAT3_basal | 9.72E-06 | 0.0018 | 0.851 |
| cMCs_pSTAT3_basal | 1.06E-05 | 0.0018 | 0.837 |
| mDCsHLADRlo_pSTAT3_basal | 1.66E-05 | 0.0023 | 1.202 |
| CCR2posintMCs_pSTAT3_basal | 5.07E-05 | 0.0049 | 0.766 |
| CD62LposCD4Tnaive_pSTAT3_basal | 5.74E-05 | 0.0049 | 1.763 |
| MDSCs_pSTAT3_basal | 5.12E-05 | 0.0049 | 0.837 |
| CD4posTnaive_pSTAT3_basal | 6.80E-05 | 0.0052 | 1.736 |
| intMCs_pSTAT3_basal | 0.00012 | 0.0085 | 0.661 |
| CD4Tcells_pSTAT3_basal | 0.00021 | 0.0119 | 1.400 |
| CD4Tcm_pSTAT3_basal | 0.00020 | 0.0119 | 1.147 |
| Tregs_pSTAT3_basal | 0.00026 | 0.0139 | 0.775 |
| CD69posCD4Tmem_pSTAT3_basal | 0.00044 | 0.0216 | 0.683 |
| CD62LposCD8Tnaive_pSTAT3_basal | 0.00050 | 0.0226 | 1.451 |
| CCR5posCCR2posCD4Tem_frequency_basal | 0.00053 | 0.0226 | -0.638 |
| CD4Tmem_pSTAT3_basal | 0.00065 | 0.0264 | 0.800 |
| Th1_pSTAT3_basal | 0.00070 | 0.0267 | 1.064 |
| CD69posCD8Tmem_pCREB_basal | 0.00118 | 0.0404 | -0.156 |
| pDCs_pSTAT3_basal | 0.00113 | 0.0404 | 0.831 |
| CD69posCD4Tmem_pSTAT5_basal | 0.00125 | 0.0407 | 0.389 |
| Granulocytes_pSTAT3_basal | 0.00132 | 0.0412 | 0.362 |
| CCR5posCCR2posCD4Tcm_pSTAT3_basal | 0.00158 | 0.0471 | 0.383 |

Univariate comparisons of timepoints during the latent phase of labor (T2, T3, and T5) vs. pre-induction baseline (T1). Features with FDR-adjusted p < 0.05 were considered significantly different. Fold-change (FC) indicates directionality of change vs. baseline. Related to Fig. 2 and Supplementary Figure 1.
| Feature Rank | Feature                                      | Occurrence in 1000 model iterations | Variance | Ratio over most frequent decoy feature | p associated with complications | Coeff - EN |
|--------------|---------------------------------------------|-------------------------------------|----------|----------------------------------------|-------------------------------|------------|
| 1            | Th1_pSTAT3_basal                            | 98.31                               | 1.34     | 10.35                                  | 0.21                          | 418.1      |
| 2            | CD4Tcells_pSTAT3_basal                      | 97.87                               | 1.66     | 10.30                                  | 0.07                          | 0.0        |
| 3            | mDCsHLADRhi_pSTAT3_basal                   | 92.09                               | 2.86     | 9.69                                   | 0.10                          | 35.6       |
| 4            | CD4Tmem_pSTAT3_basal                        | 90.24                               | 4.20     | 9.50                                   | 0.21                          | 0.0        |
| 5            | CD4posTnaive_pSTAT3_basal                  | 86.01                               | 3.79     | 9.05                                   | 0.02                          | 3.6        |
| 6            | CD62LposCD4Tnaive_pSTAT3_basal             | 85.44                               | 3.76     | 8.99                                   | 0.02                          | 0.0        |
| 7            | CD4Tem_pSTAT3_basal                         | 83.04                               | 3.95     | 8.74                                   | 0.93                          | 0.0        |
| 8            | CD69posCD4Tmem_pSTAT3_basal                | 82.22                               | 4.45     | 8.65                                   | 0.18                          | 0.0        |
| 9            | mDCs_pSTAT3_basal                           | 79.31                               | 4.90     | 8.35                                   | 0.15                          | 350.3      |
| 10           | CD4Tcm_pSTAT3_basal                         | 70.72                               | 8.78     | 7.44                                   | 0.06                          | 0.0        |
| 11           | CD8Tcm_pSTAT5_basal                         | 67.22                               | 8.03     | 7.08                                   | 0.84                          | 222.2      |
| 12           | CCR2posMCs_pSTAT3_basal                    | 47.77                               | 5.67     | 5.03                                   | 0.28                          | 0.0        |
| 13           | Tregs_pSTAT3_basal                          | 47.51                               | 5.87     | 5.00                                   | 0.12                          | 0.0        |
| 14           | cMCs_pSTAT3_basal                           | 44.53                               | 5.55     | 4.69                                   | 0.30                          | 0.0        |
| 15           | CD62LposCD8Tnaive_pSTAT3_basal             | 36.82                               | 5.35     | 3.88                                   | 0.07                          | 0.0        |
| 16           | CD4Tef_pSTAT3_basal                         | 34.64                               | 4.73     | 3.65                                   | 0.64                          | 66.7       |
| 17           | CD8Tnaive_pSTAT3_basal                     | 29.28                               | 4.47     | 3.08                                   | 0.81                          | 0.0        |
| 18           | mDCsHLADRlo_pSTAT3_basal                   | 28.23                               | 6.19     | 2.97                                   | 0.26                          | 1.7        |
| 19           | CD4NKT_pSTAT3_basal                         | 26.88                               | 5.85     | 2.83                                   | 0.74                          | 0.0        |
| 20           | CCR5posCCR2posCD4Tcm_pSTAT3_basal           | 25.17                               | 4.48     | 2.65                                   | 0.11                          | 0.0        |
| 21           | CD8Tcm_pSTAT3_basal                         | 25.04                               | 6.15     | 2.64                                   | 0.94                          | 194.9      |
| 22           | CD69posCD4Tmem_pSTAT5_basal                | 20.98                               | 5.12     | 2.21                                   | 0.93                          | 0.0        |
| 23           | CCR2posintMCs_pSTAT3_basal                 | 19.64                               | 4.06     | 2.07                                   | 0.31                          | 0.0        |
| 24           | MDSCs_pSTAT3_basal                          | 14.04                               | 3.80     | 1.48                                   | 0.72                          | 0.0        |
| 25           | pDCs_pSTAT3_basal                           | 14.04                               | 3.58     | 1.48                                   | 0.09                          | 0.0        |
| 26           | CD56hiCD16negNK-IkB_LPS                     | 13.83                               | 8.48     | 1.46                                   | 0.91                          | 0.0        |
|              | Decoy196                                    | 9.50                                | 16.15    |                                        |                               |            |

**Supplementary Table 3.** Top informative features of the model predicting time since induction. Features were ranked based on number of bootstrap occurrences. Related to Fig. 3 and 4.