

Supplementary tables

Supplementary Table 1 - Summary of single-cell RNA-seq experiments. This table provides the number (after quality control, see Methods) of individual cells profiled by droplet-based and SS2 scRNA-seq, as well as additional metadata for the samples. PCW= Post-conceptual weeks, CS= Canonical stage. Sheet 1 - cells included in the analysis in Fig. 1d (Decidua (n=11), placenta (n=5) and blood (n=6)); Sheet 2 - enriched EPCAM⁺ and HLA-G⁺ cells (Decidua (n=2), placenta (n=3)).

Supplementary Table 2 - Cell-type specific signature genes. This table provides the lists of marker genes (top 30 ordered by log fold change; *adj* *p*-value<0.1; Wilcoxon rank-sum test with bonferroni correction) for each of the identified clusters of decidual and placental cells, identified using 3' droplet-based and SS2 scRNA-seq data (Fig. 1d).

Supplementary Table 3 - List of interactions in the decidua dataset. This table provides the list of interaction pairs between decidual clusters in Fig. 1d resulting from our cell-cell communication pipeline. Sheet 1 - *p*-values; Sheet 2 - mean expression of the average receptor expression level of a cluster and the average ligand expression level of the interacting cluster; Sheet 3 - mean expression of the significant interactions ranked by specificity. Only droplets data was considered (n = 6). *p*-values were obtained by a permutation test (see Methods).

Supplementary Table 4 - List of interactions in the placenta dataset. This table provides the list of interactions pairs between placental clusters in Fig. 1d resulting from our cell-cell communication pipeline. Sheet 1 - *p*-values; Sheet 2 - mean expression of the average receptor expression level of a cluster and the average ligand expression level of the interacting cluster; Sheet 3 - mean expression of the significant interactions ranked by specificity. Only droplets data was considered (n = 5). *p*-values were obtained by a permutation test (see Methods).

Supplementary Table 5 - Ligand/receptor interacting pairs mediating the trophoblast differentiation. Sheet 1 - genes identified as varying significantly along the trajectory (*q*-value<0.1, likelihood ratio test with *p*-values adjusted for the False Discovery Rate; only binary ligand and receptor complexes from CellPhoneDB are considered); Sheet 2 - genes identified as varying significantly along the trajectory and involved in significantly enriched interactions with EVT, VCT and SCT in the placenta (*p*-value < 0.05; *p*-values were obtained by a permutation test); Sheet 3 - genes identified as varying significantly along the trajectory and involved in significantly enriched

interactions with EVT in the decidua (p -value < 0.05 ; p -values were obtained by a permutation test) ($n = 5$).

Supplementary Table 6 - Differentially expressed genes between the two decidual perivascular cell states and three stromal cell populations, and between the two glandular subpopulations.

This table provides the differentially expressed genes for each fibroblast (*i.e.* perivascular and stromal) and each epithelial subset derived *via* differential expression analysis (*adj* p -value < 0.1 ; Wilcoxon rank-sum test with bonferroni correction) ($n = 11$).

Supplementary Table 7 - Differentially expressed genes amongst the three dNK clusters. This table provides the differentially expressed genes between the three subpopulations of dNK cells (*adj* p -value < 0.1 ; Wilcoxon rank-sum test with bonferroni correction) ($n = 11$).

Supplementary Table 8 - KIR haplotype. This table provides the KIR haplotype for the five women profiled by SS2 (see Methods).

Supplementary Table 9 - dNK flow cytometry data. dNK percentage of cells for the women profiled by single-cell transcriptomics and flow-cytometry following the gate strategy shown in Fig. 5d (single-cell transcriptomics $n = 11$; flow cytometry $n = 6$) (sheet 1), row data flow cytometry experiment in Fig. 5g (PRF1 $n = 9$; GNLY $n = 7$; GZMA $n = 8$; GZMB $n = 10$) (sheet 2). Non parametric paired Wilcoxon test (* $p < 0.05$, ** $p < 0.01$).

Supplementary Table 10 - List of antibodies.

Supplementary Table 8. KIR haplotype

Donor ID	2DL1	2DL2	2DL3	2DS1	2DS2	2DP1	2DS4	2DS3	2DS5	2DL5	3DL1	3DS1	Cen	Cen	Tel	Tel
D1													CenA	CenB	TelA	TelB
D2													CenA	CenB	TelA	TelB
D3													CenA	CenB	TelA	TelB
D4													CenA	CenB	TelA	TelA
D5													CenA	CenA	TelA	TelB