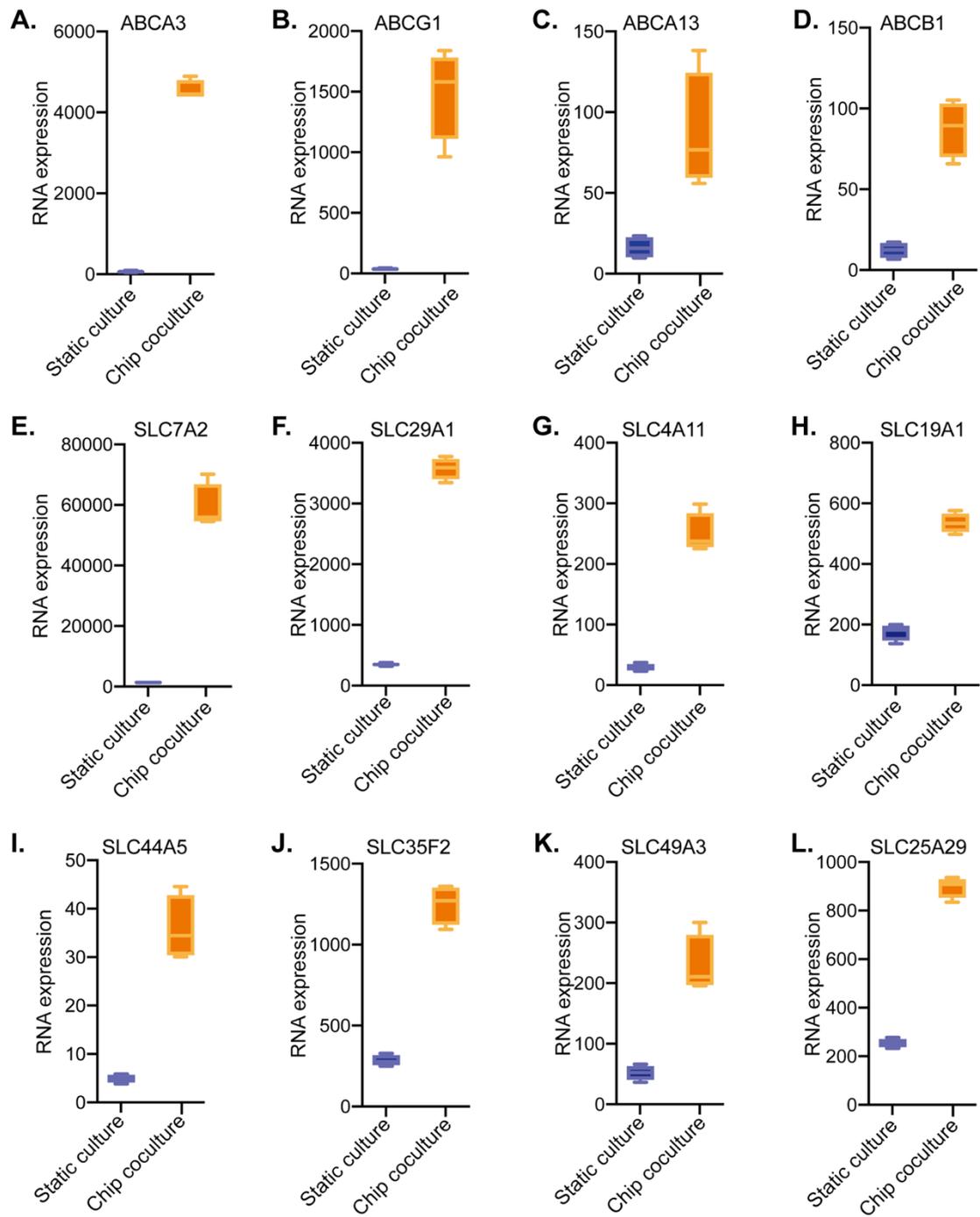
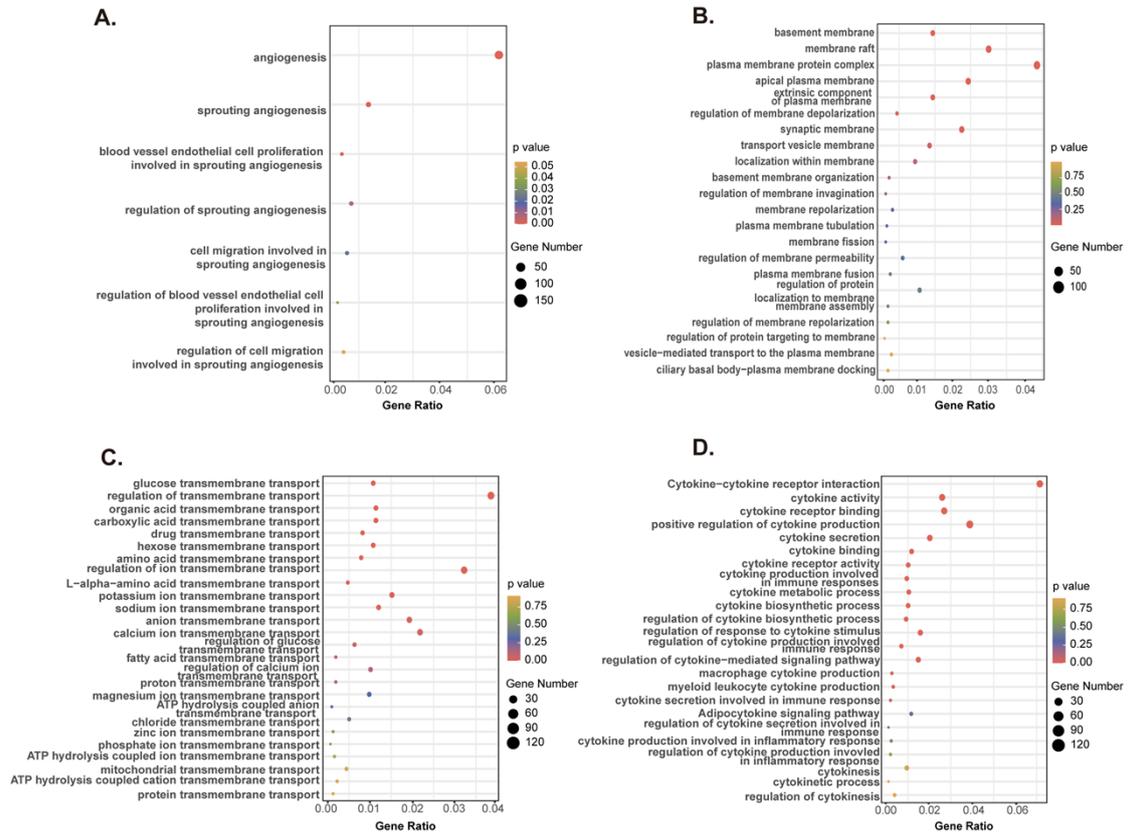


**Figure S1.** Computational flow filed in the hBCSFB-on-chip in the absence of cells in different profiles. (A) Velocity profile at the section Z-X in  $X=0.5$  mm (the second half of the section was omitted). (B) Computational velocity profile at the section Z-X. (C) Velocity profile at the section Z-Y in  $X=0.1$  mm. (D) Computational velocity profile at the section Z-Y.



**Figure S2.** Box plots of RNA-seq analysis showing expression levels of ABC and SLC families profiling of hCPECs in the hBCSFB-on-chip and static cultures.



**Figure S3.** Transcriptional profiling of HCPECs upon inflammatory stimulation in the blood side of the BCSFB-on-chip. (A-D) Bubble plots of GO gene set enrichment analysis of all the differentially expressed genes in HCPECs cultured in the BCSFB-on-chip. Y-axis labels represent the enrichment components, and gene ratio score is shown on X-axis. The size of the bubble represents the number of genes assigned in each pathway, and the color accords with the enrichment significance.