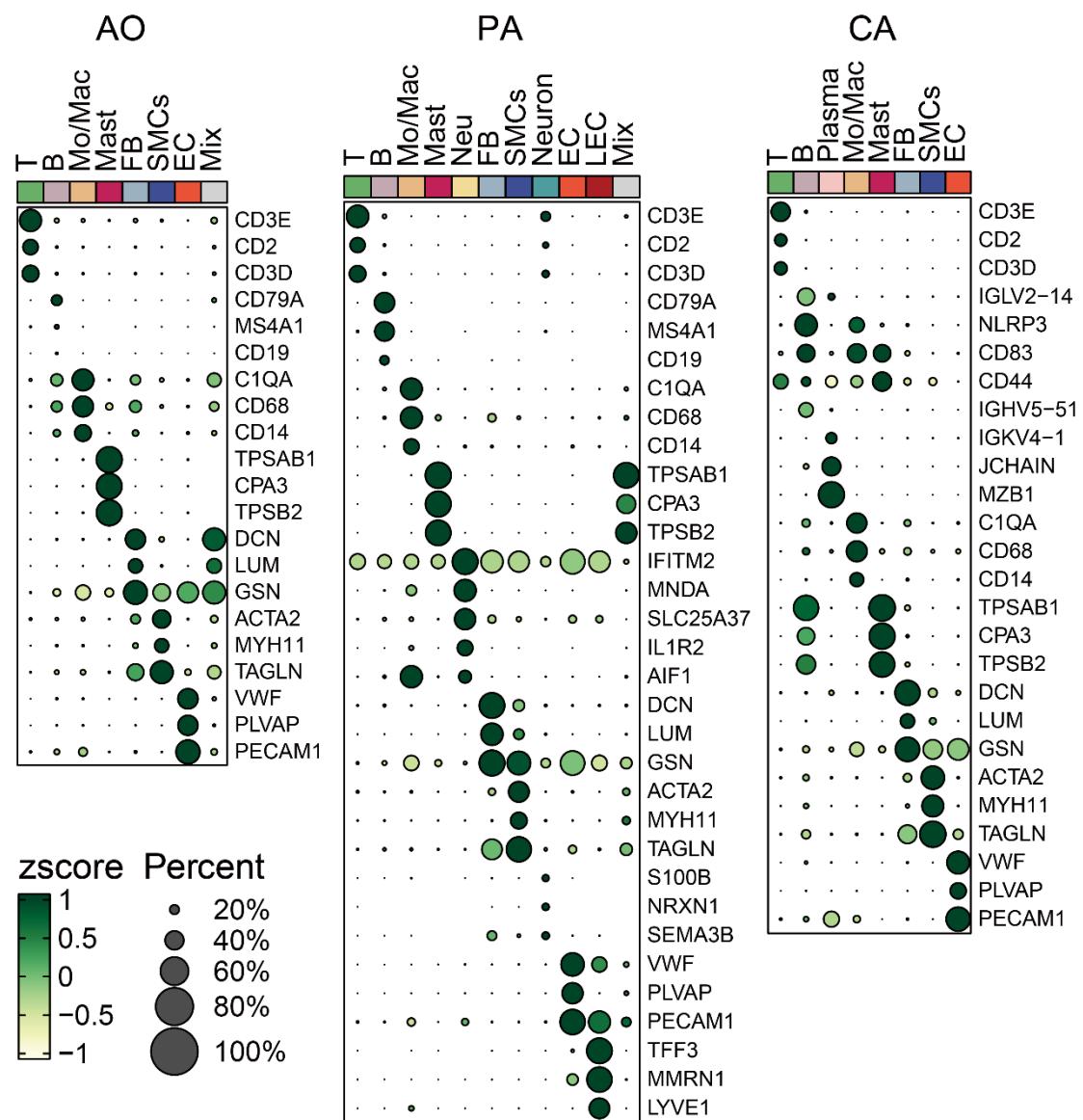
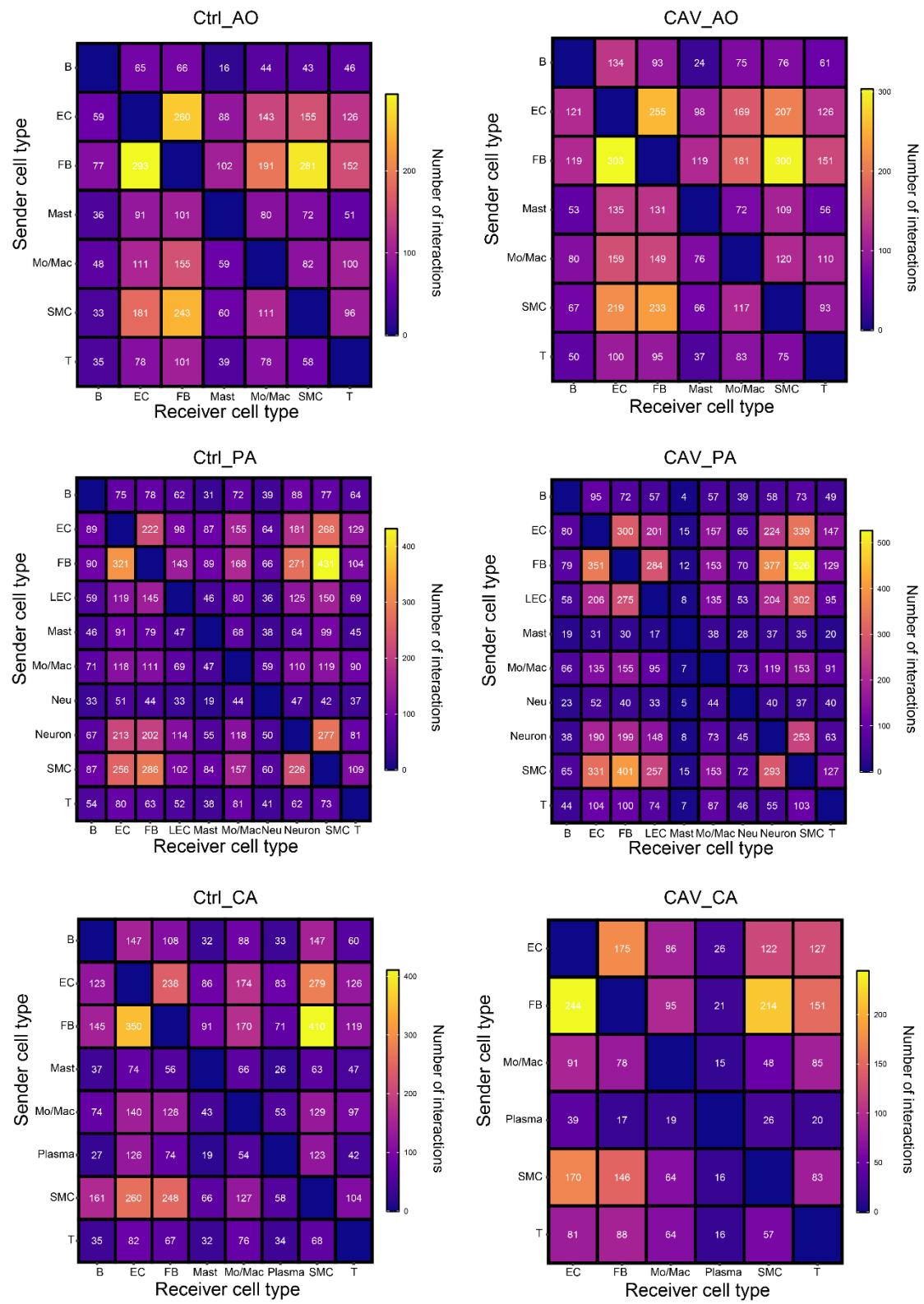


## Supplemental materials



**Figure S1. Marker gene expression profiles of major cell types across AO, PA, and CA.** Bubble plots show representative marker gene expression across different cell populations in AO, PA, and CA.



**Figure S2. Cell-cell interaction heatmaps show the number of interaction pairs among different cell types in the AO, PA, and CA in the CAV and Ctrl groups.**