

Supplementary Figures

Supplementary Fig. S1. scRNA-seq analysis of resident and circulating immune cells of human lungs

Supplementary Fig. S2. scRNA-seq analysis of resident immune cells of IPF and control lungs

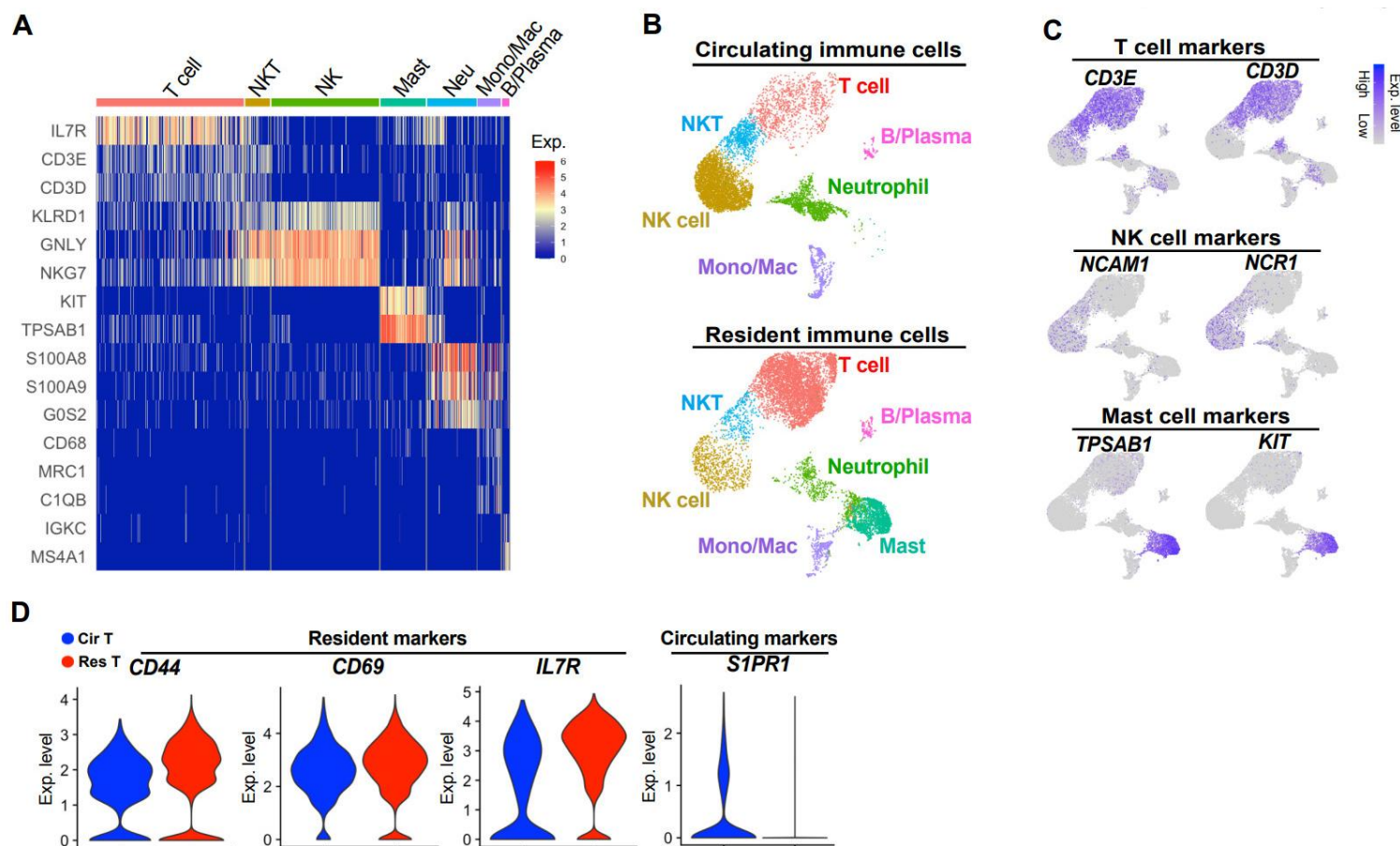
Supplementary Fig. S3. scRNA-seq analysis of resident CD8⁺ T cells in IPF lungs

Supplementary Fig. S4. scRNA-seq analysis of resident CD4⁺ T cells in IPF lungs

Supplementary Fig. S5. scRNA-seq analysis of resident Treg cells in IPF lungs

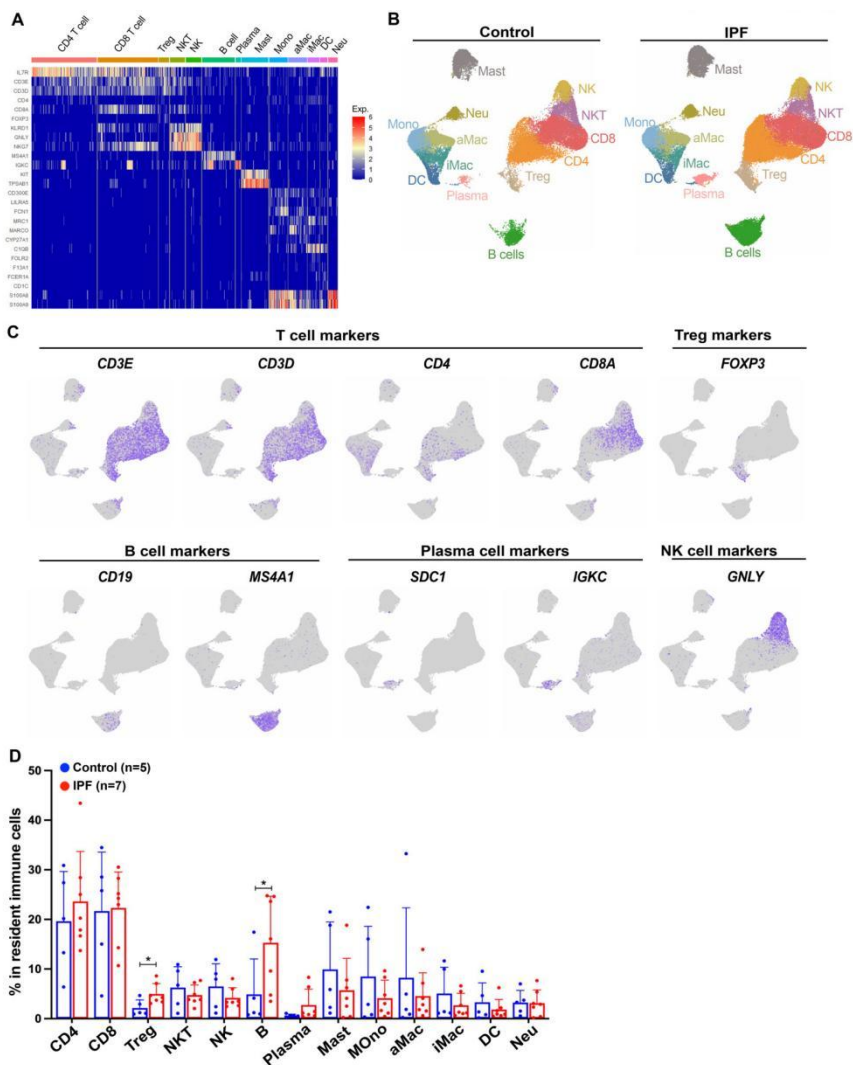
Supplementary Fig. S6. scRNA-seq analysis of resident B and plasma cells in IPF lungs

Supplementary Fig. S7. scRNA-seq analysis of resident lymphocytes and fibroblasts in IPF lungs



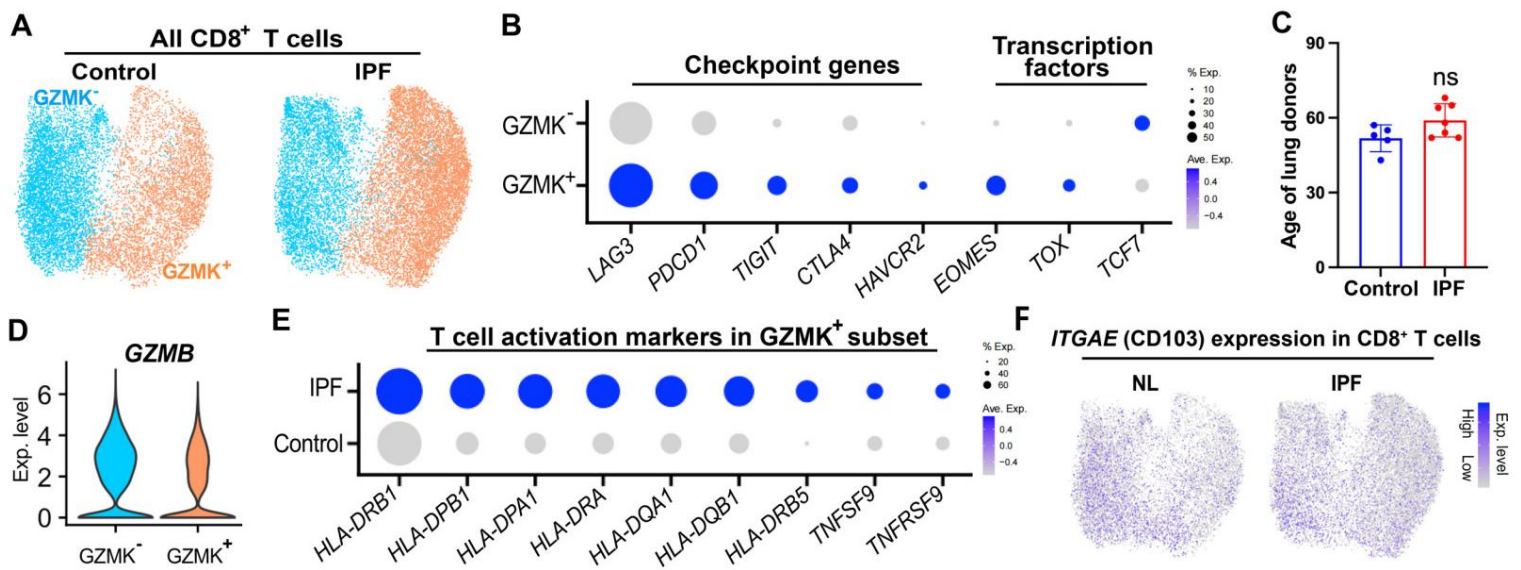
Supplementary Fig. S1. scRNA-seq analysis of resident and circulating immune cells of human lungs

(A) Heatmap showing the markers in each cell type of resident (Res) and circulating (Cir) immune cells of human lungs. (B) Separated UMAP plots showing cell clusters in the Res and Cir immune populations. (C) Feature plots showing the signature gene expression of T, NK, and mast cells. (D) Violin plots showing resident and circulating marker expression in Res and Cir T cells.



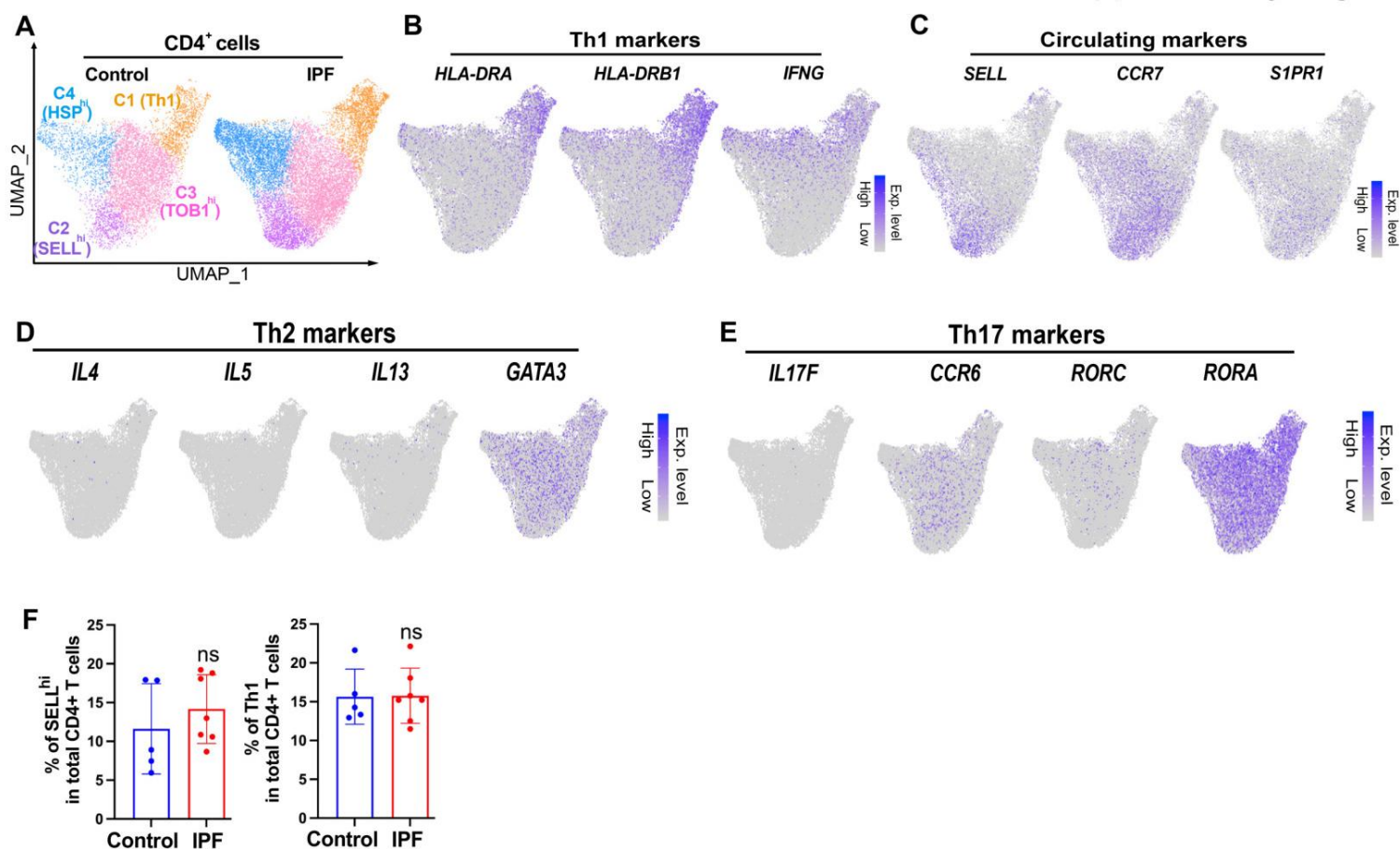
Supplementary Fig. S2. scRNA-seq analysis of resident immune cells of IPF and control lungs

(A) UMAP plots showing the markers in each cell type. (B) Separated UMAP plots showing cell clusters in the resident immune populations of IPF vs. control lungs. (C) Feature plots showing the signature gene expression of T, Treg, B, plasma, and NK cells. (D) Percentage of each cell type in total resident immune cells in IPF vs. control lungs analyzed from scRNA-seq.



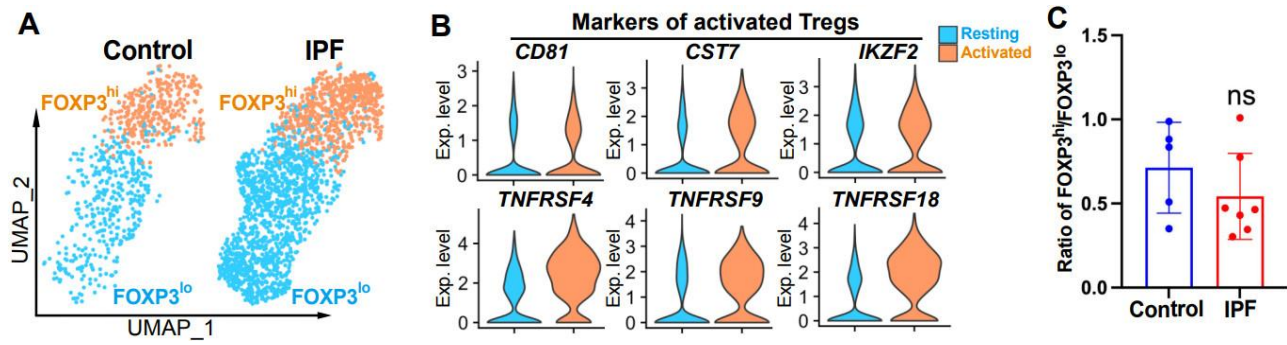
Supplementary Fig. S3 scRNA-seq analysis of resident CD8⁺ T cells in IPF lungs

(A) UMAP plots showing cell clusters in CD8⁺ T cells of IPF and control lungs. (B) Dot plots showing the expression of checkpoint genes transcription factors in GZMK⁺ vs. GZMK⁻ CD8⁺ T cells. (C) Analysis of the difference in age of IPF and control lung donors. ns: no significance. (D) Violin plots showing the expression of *GZMB* in GZMK⁺ vs. GZMK⁻ CD8⁺ T cells. (E) Dot plots showing the expression of T cell activation markers in GZMK⁺ CD8⁺ T cells, IPF vs. control. (F) Feature plots showing the expression of *ITGAE* in CD8⁺T cells.



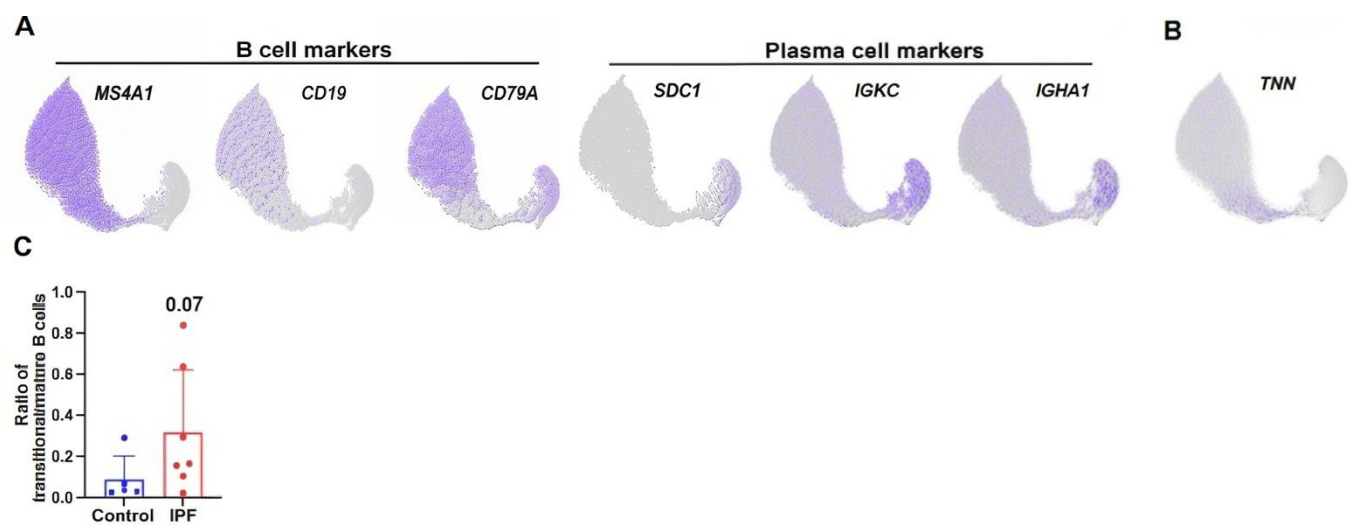
Supplementary Fig. S4 scRNA-seq analysis of resident CD4⁺ T cells in IPF lungs

(A) UMAP plots showing cell clusters in CD4⁺ T cells of IPF and control lungs. (B and C) Feature plots showing the expression of Th1 and circulating markers. (D and E) Feature plots showing the expression of Th2 and Th17 markers. (F) Percentage of SELL^{hi} and Th1 cells in total CD4⁺ T cells, respectively.



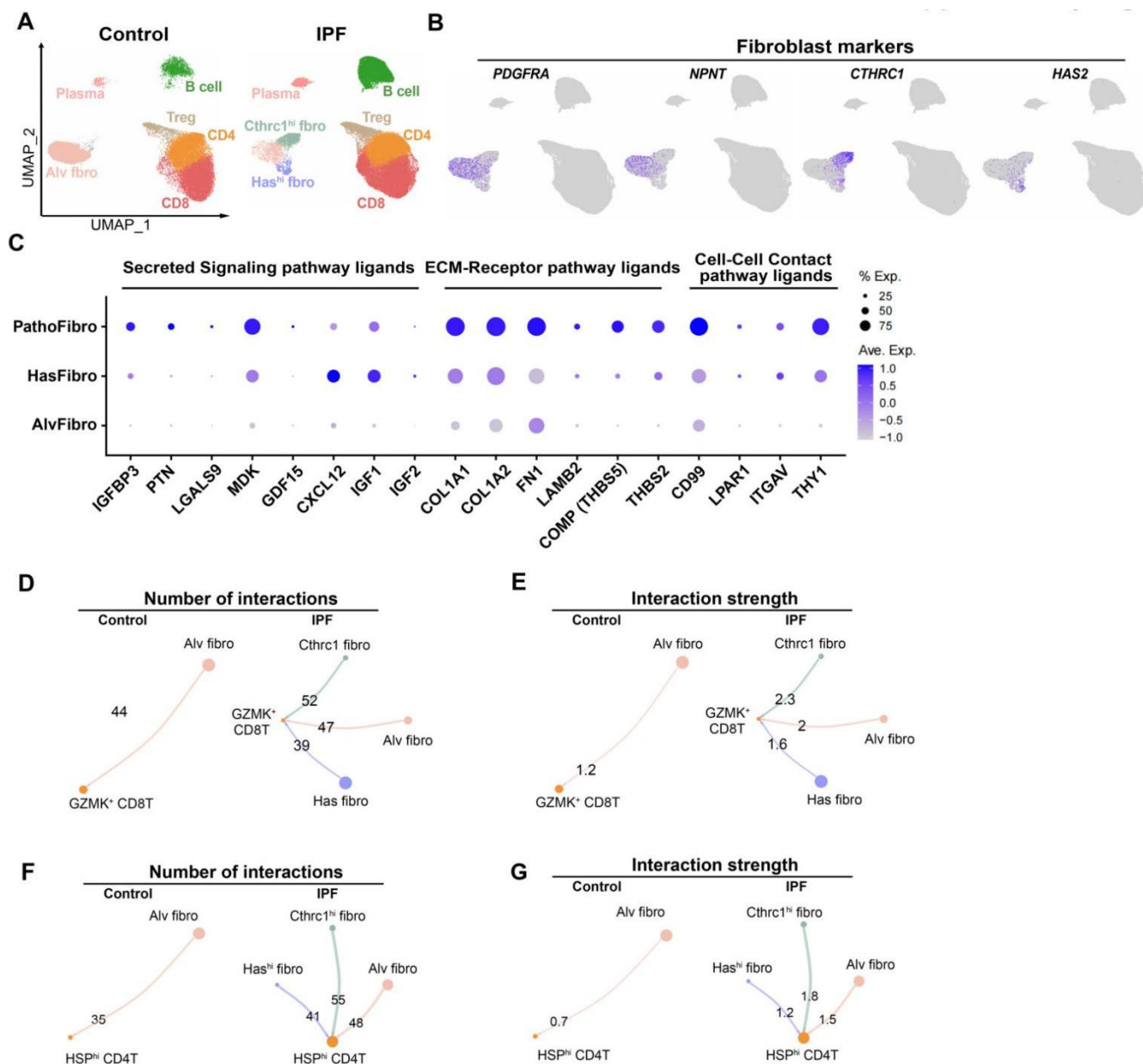
Supplementary Fig. S5 scRNA-seq analysis of resident Treg cells in IPF lungs

(A) UMAP plots showing cell clusters in Tregs of IPF and control lungs. (B) Violin plots showing the expression of activation markers in Tregs subsets. (C) Ratio of FOXP3^{hi} vs. FOXP3^{low} Tregs in IPF and control lungs.



Supplementary Fig. S6 scRNA-seq analysis of resident B and plasma cells in IPF lungs

(A and B) Feature plots showing the expression of mature B, transitional B, and plasma cell markers. (C) Ratio of transitional vs. mature B cells in IPF vs. control lungs.



Supplementary Fig. S7 scRNA-seq analysis of resident lymphocytes and fibroblasts in IPF lungs

(A) UMAP plots showing lymphocyte and fibroblast clusters in IPF and control lungs. (B) Expression of signature genes in each fibroblast subset. (C) Expression of the ligands involved in the Secreted Signaling, ECM-Receptor, and Cell-Cell Contact pathways in fibroblast subsets. (D and E) Cellchat analysis of fibroblast subsets' interactions with GZMK⁺ CD8⁺ T cells. (F and G) Cellchat analysis of fibroblast subsets' interactions with HSP^{hi} CD4⁺ Tcon cells.