

Supplementary Figure Legends

Supplementary Figure 1

(A)UMAP plot of all cells splitted by lobes and colored by age groups.

Supplementary Figure 2

(A)Volcano plot of DEGs between AP_Aged and AP_Young.

(B)Volcano plot of DEGs between VDLP_Aged and VDLP_Young.

(C,E,G,I) Bar plot of GO enriched pathways up or down regulated in luminal cells(C),basal cells(E),mesenchymal cells(G) and myeloid cells(I) between AP_Aged and AP_Young.

(D,F,H,J) Bar plot of GO enriched pathways up or down regulated in luminal cells(C),basal cells(E),mesenchymal cells(G) and myeloid cells(I) between VDLP_Aged and VDLP_Young.

Supplementary Figure 3

(A)Feature plot of Spink1 splitted by age groups.

(B-E)Dot plot of GO enriched pathways in epithelium(B), mesenchymal cells(C), myeloid cells(D), and T cells(E) of young mice prostates.

Supplementary Figure 4

(A)UMAP plot of cells from middle (6-month) and aged (24-month) mice prostates.

(B)Volcano plot of DEGs between aged and middle mice.

(C-F)Bar plot of GO enriched pathways up or down regulated in luminal cells(C),basal cells(D),mesenchymal cells(E) and myeloid cells(F) between aged and middle mice.

(G,H)ROS gene set scores of every cell types grouped by aged and middle mice.

(I,J)SASP gene set scores of every cell types grouped by aged and middle mice

(K,L)Regeneration gene set scores of every cell types grouped by aged and middle mice.

Supplementary Figure 5

(A)Dim plot of ADP(luminal cells) grouped by lobes.

(B)Dim plot of luminal cells obtained from GSE165741.

(C)Bar plot of epithelial cell subsets ratio grouped by AP_Aged vs AP_Young and VDLP_Aged vs VDLP_Young.

Supplementary Figure 6

(A,B)Dot plot of GO enriched pathways in ADP(luminal cells) of aged and young mice prostates.

(C,D)Dot plot of GO enriched pathways in basal_Krt15high cells of aged and young mice prostates.

(E,F)Dot plot of GO enriched pathways in luminal_Foxi1 cells of aged and young mice prostates.

- (G,H)Dot plot of GO enriched pathways in luminal progenitor cells of aged and young mice prostates.
- (I,J)Dot plot of GO enriched pathways in proliferation cells of aged and young mice prostates.
- (K,L)Dot plot of GO enriched pathways in VP(luminal cells) of aged and young mice prostates.

Supplementary Figure 7

- (A)Bar plot of mesenchymal cell subsets ratio grouped by AP_Aged vs AP_Young and VDLP_Aged vs VDLP_Young.
- (B,C)Dot plot of GO enriched pathways in Fibro_Gpx3 cells of aged and young mice prostates.
- (D,E)Dot plot of GO enriched pathways in Fibro_Lgr5 cells of aged and young mice prostates.
- (F,G)Dot plot of GO enriched pathways in Fibro_Myoc cells of aged and young mice prostates.
- (H,I)Dot plot of GO enriched pathways in pericyte cells of aged and young mice prostates.

Supplementary Figure 8

- (A)Violin plot of EMT score grouped by aged and young mice.
- (B)Violin plot of Cdh1 and Vim grouped by aged and young mice.
- (C)Western blot of EMT markers quantified in aged and young mice prostates.
- (D-F)Multicolour immunofluorescence staining of mouse prostate verified the EMT phenotype of basal cell in VP (D), DP (E) and LP (F) lobe.
- (G)Expression of EMT marker genes changed with pseudotime.
- (H)Circle plot of mesenchymal-epithelium interactions in Fn1 signaling pathway.

Supplementary Figure 9

- (A)Immunofluorescence staining of mouse prostate(left) and number of macrophages per 40x magnification field(right).
- (B)Bar plot of myeloid cell subsets ratio grouped by AP_Aged vs AP_Young and VDLP_Aged vs VDLP_Young.
- (C,D)Dot plot of GO enriched pathways in Mac_Cx3cr1 cells of aged and young mice prostates.
- (E,F)Dot plot of GO enriched pathways in Mac_Lyve1 cells of aged and young mice prostates.
- (G,H)Dot plot of GO enriched pathways in Mac_Lyz1 cells of aged and young mice prostates.
- (I,J)Dot plot of GO enriched pathways in monocytes of aged and young mice prostates.

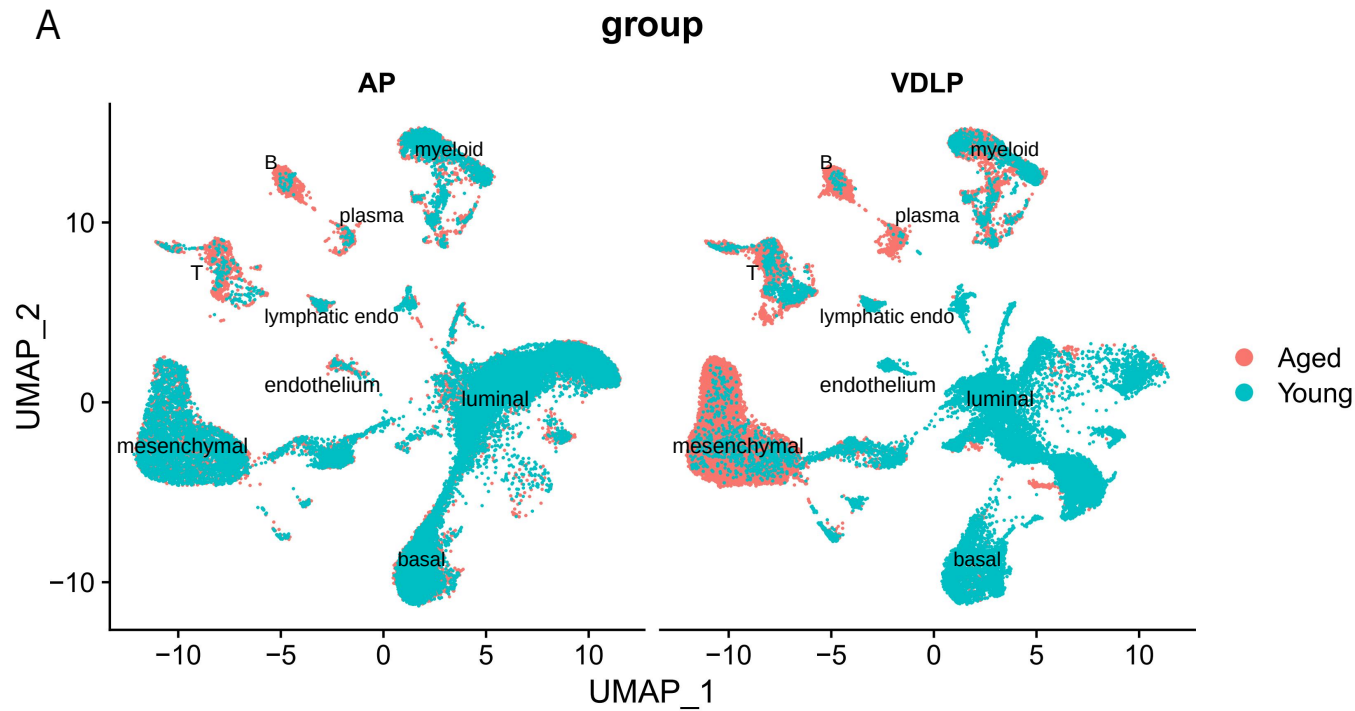
Supplementary Figure 10

- (A)Immunofluorescence staining of mouse prostate (left) and number of T cell per

40x magnification field(right).

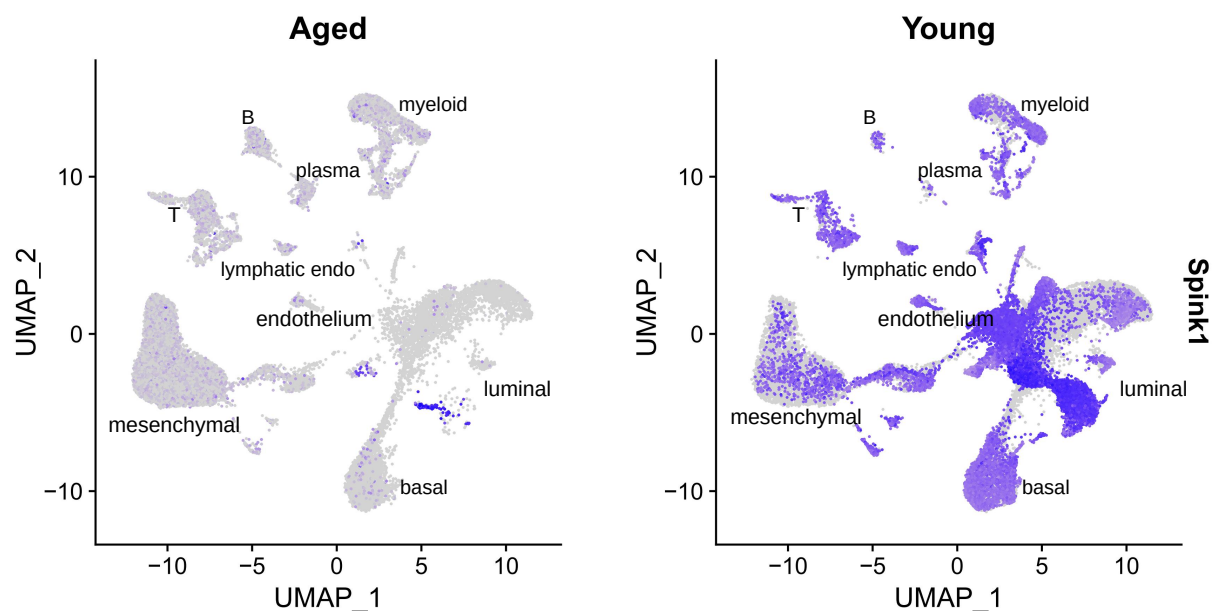
(B)Bar plot of T cell subsets ratio grouped by AP_Aged vs AP_Young and VDLP_Aged vs VDLP_Young.

(C)Dot plot of GO enriched pathways in T cell subpopulations.

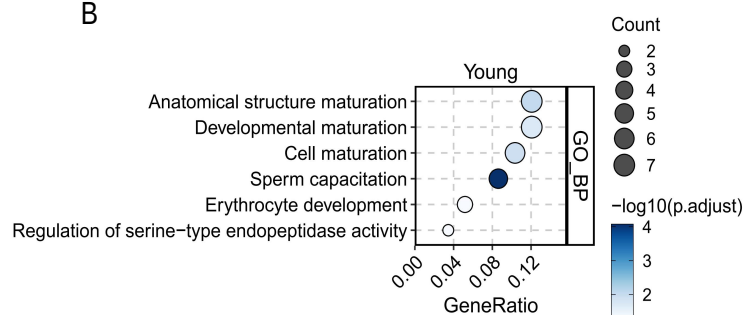




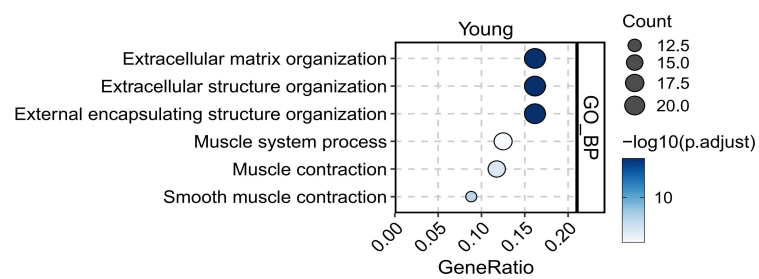
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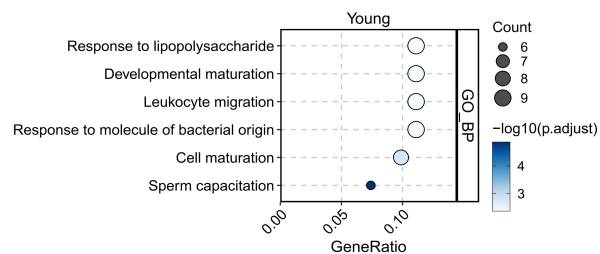
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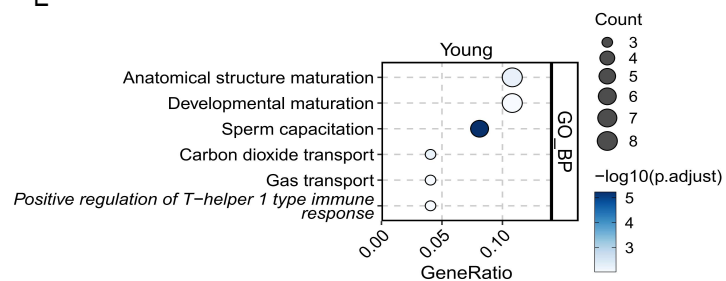
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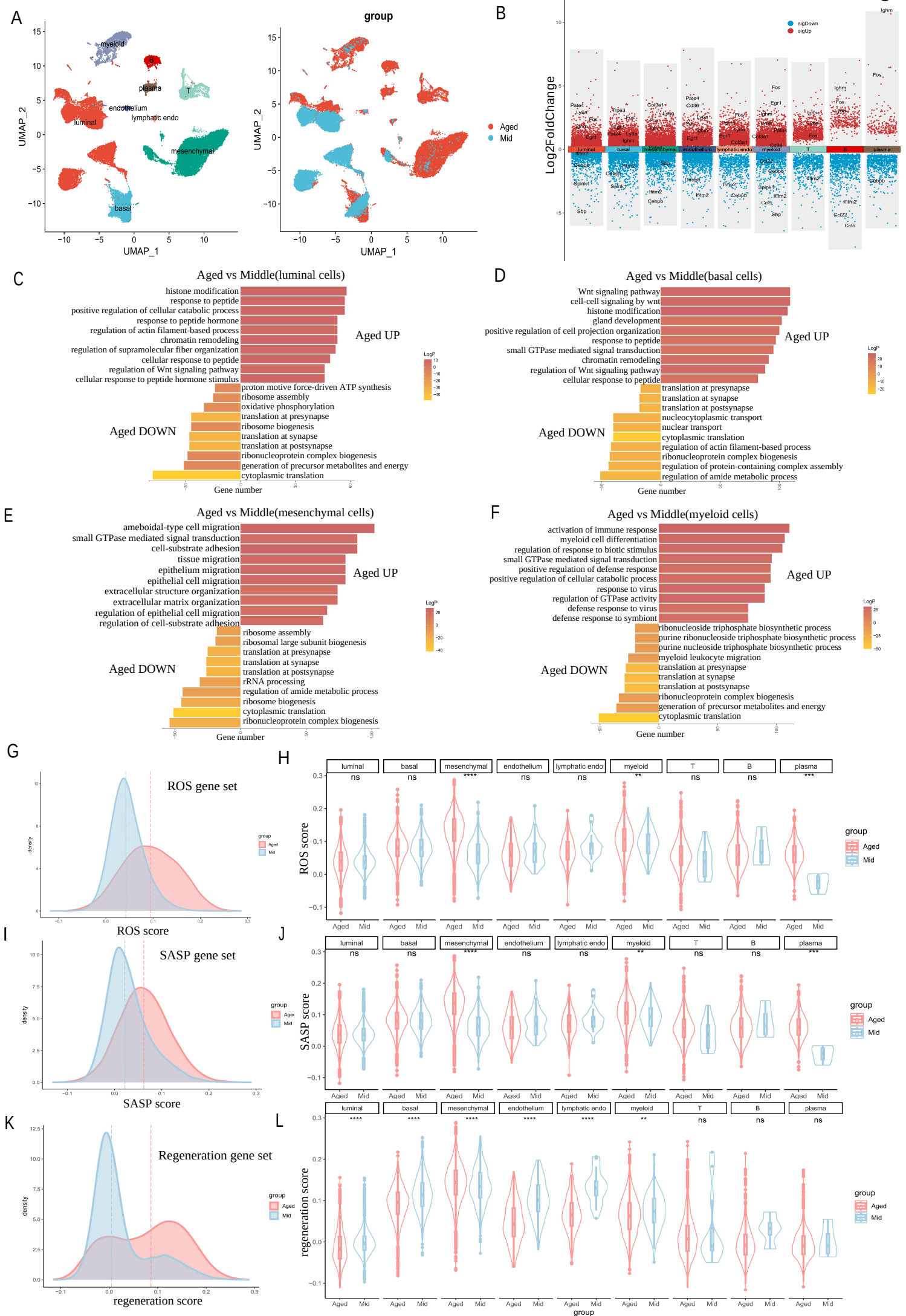


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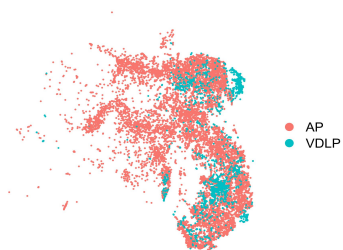


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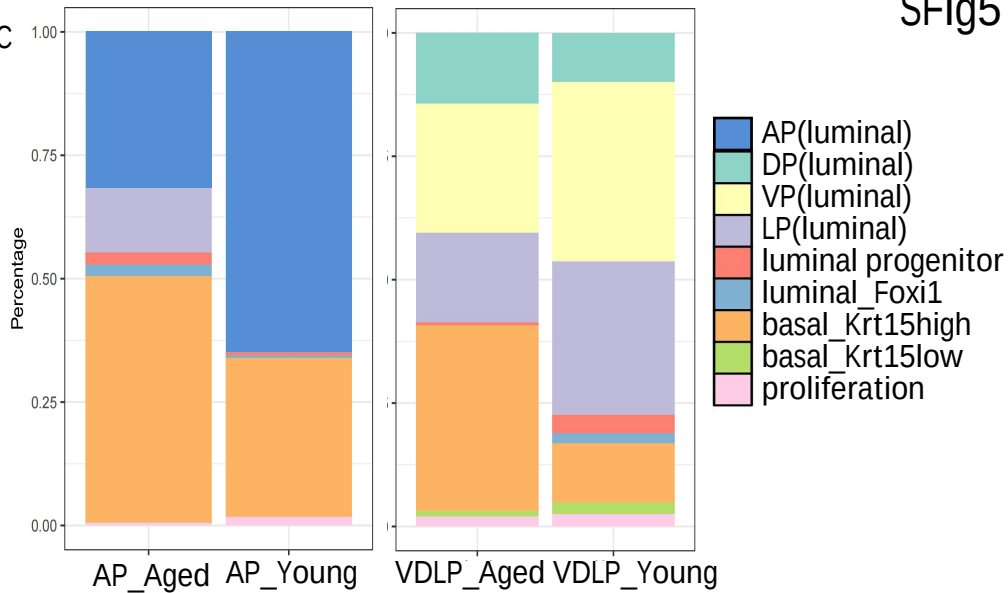
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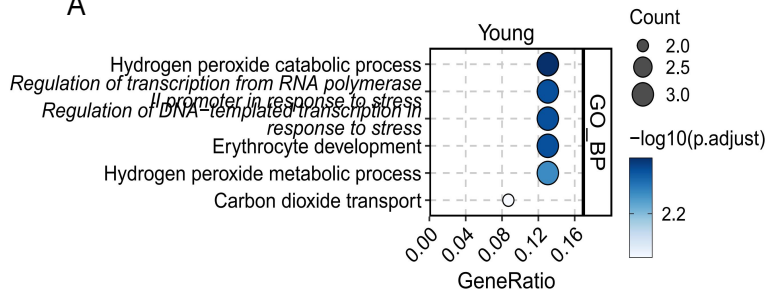
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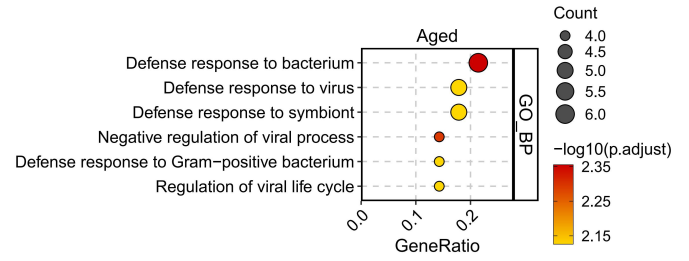
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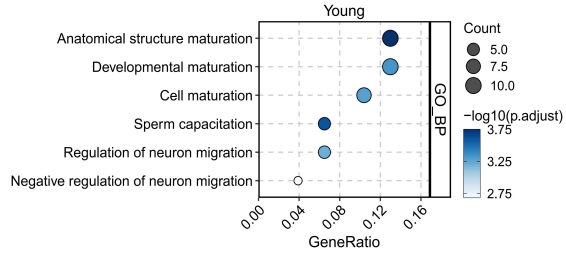
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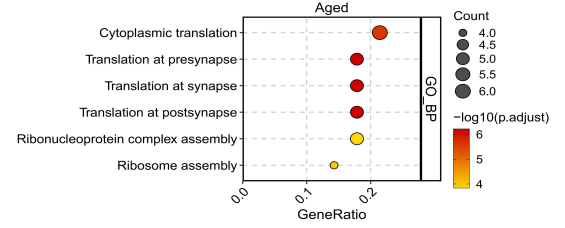
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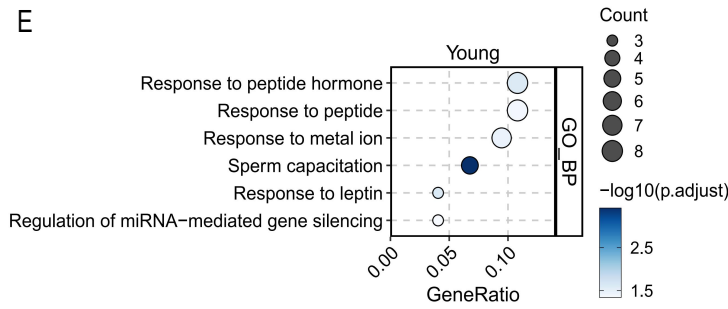
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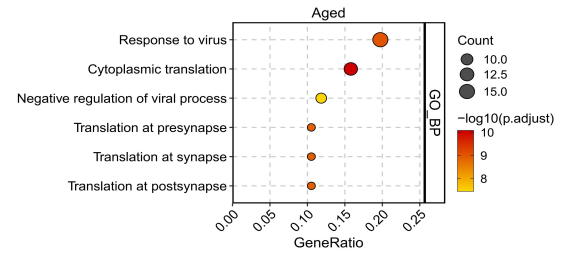
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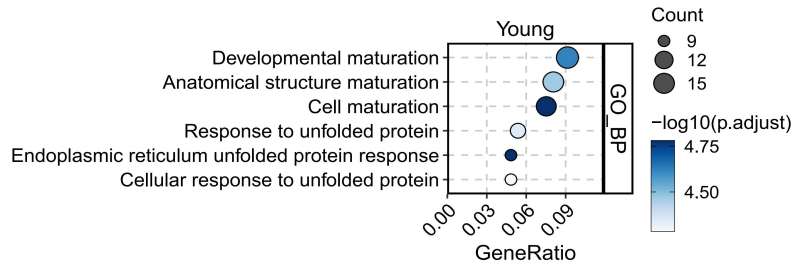
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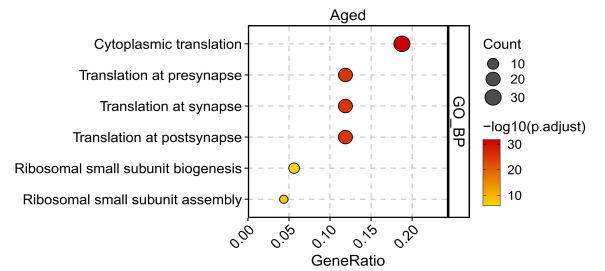
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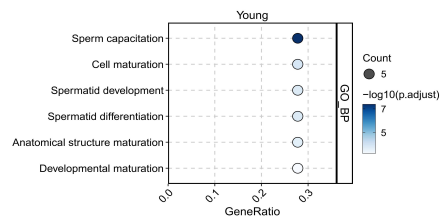
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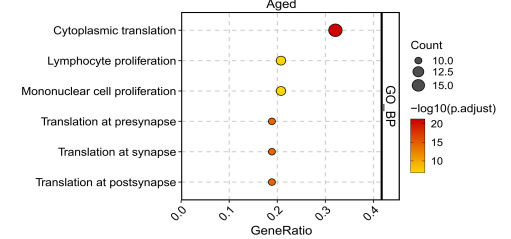
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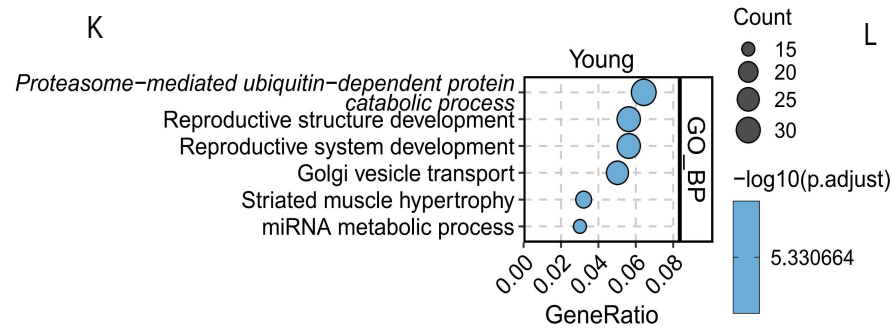
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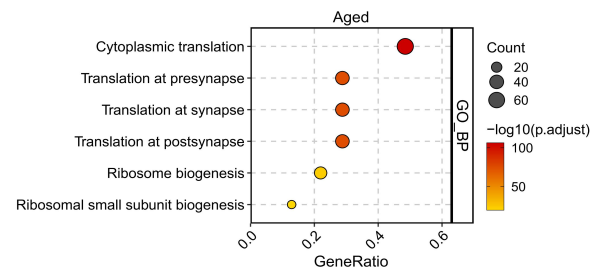
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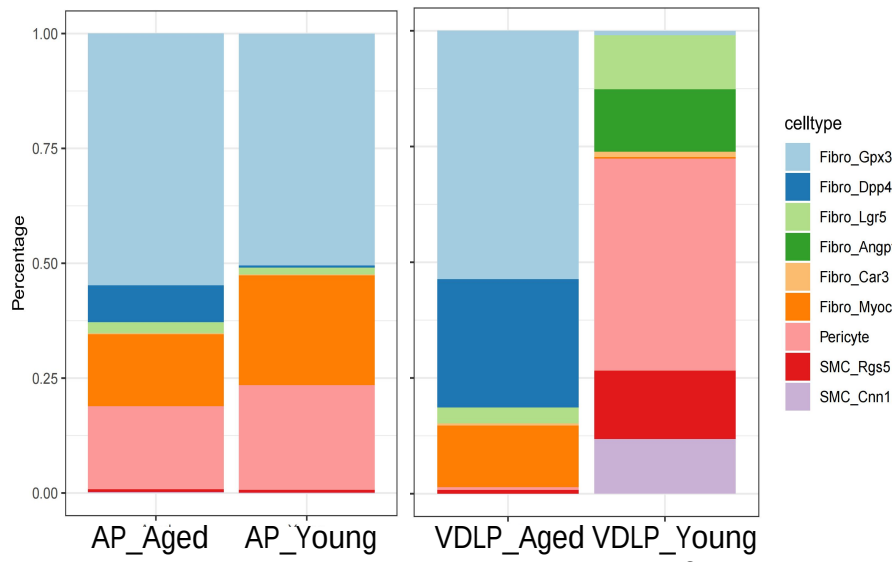
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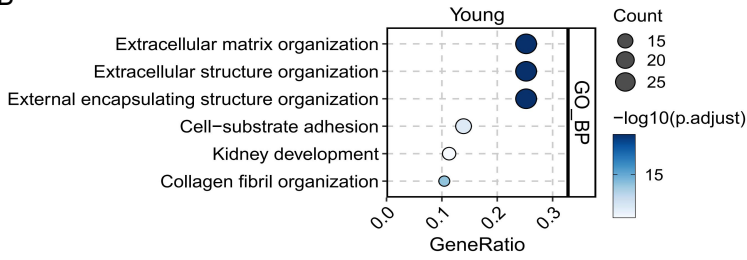
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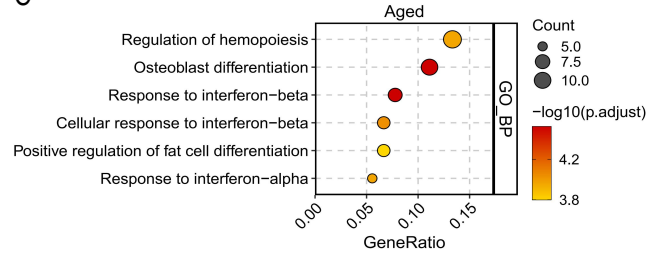
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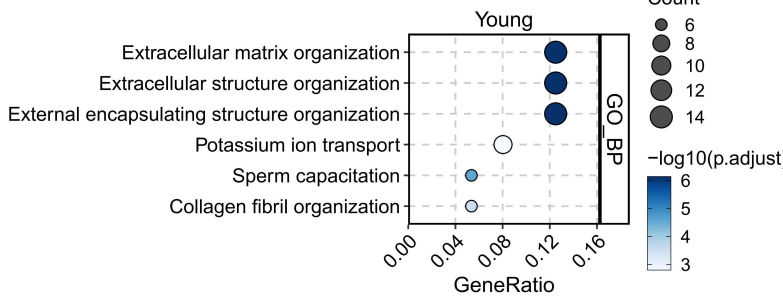
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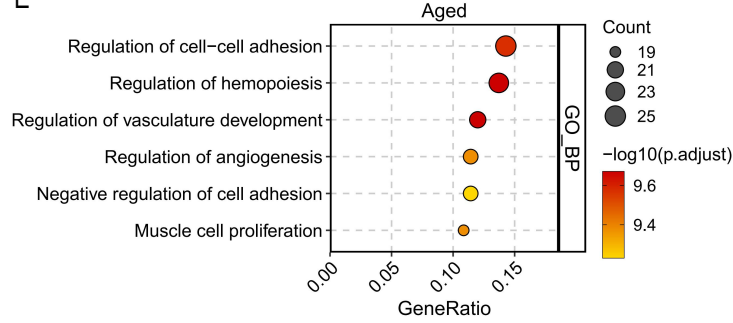
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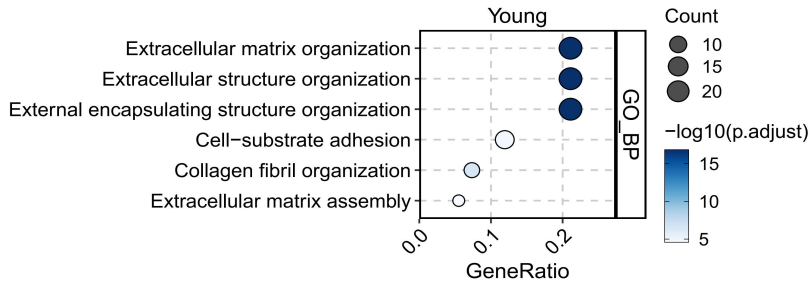
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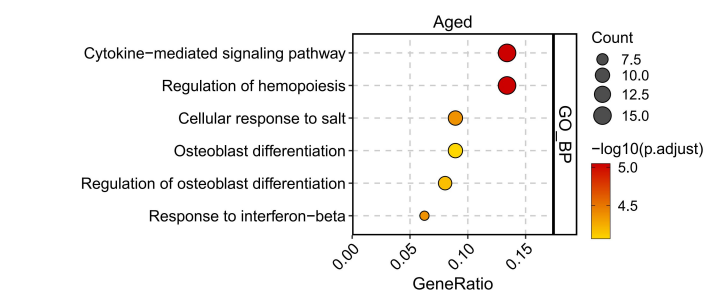
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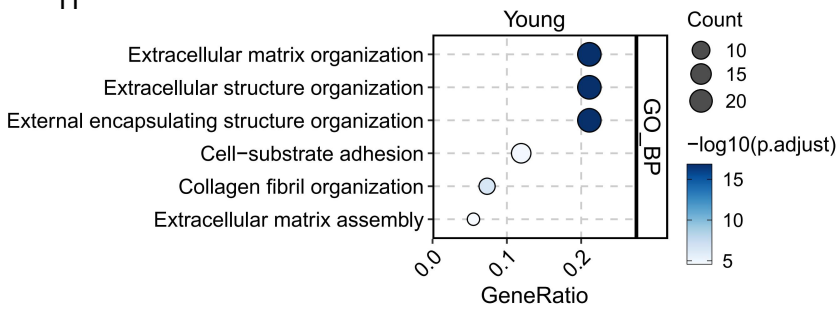
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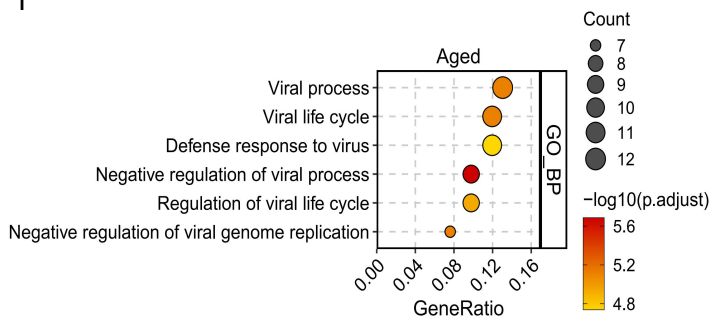
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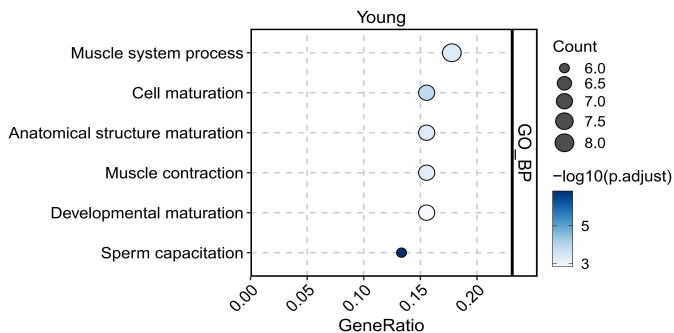
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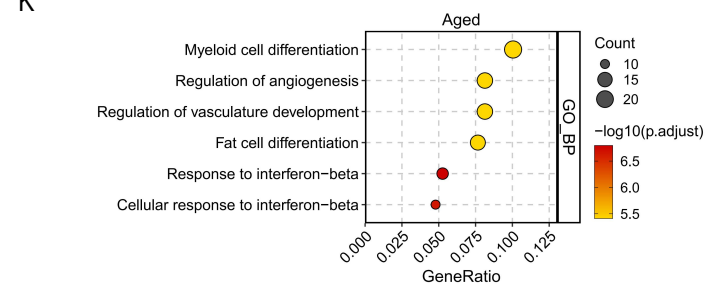
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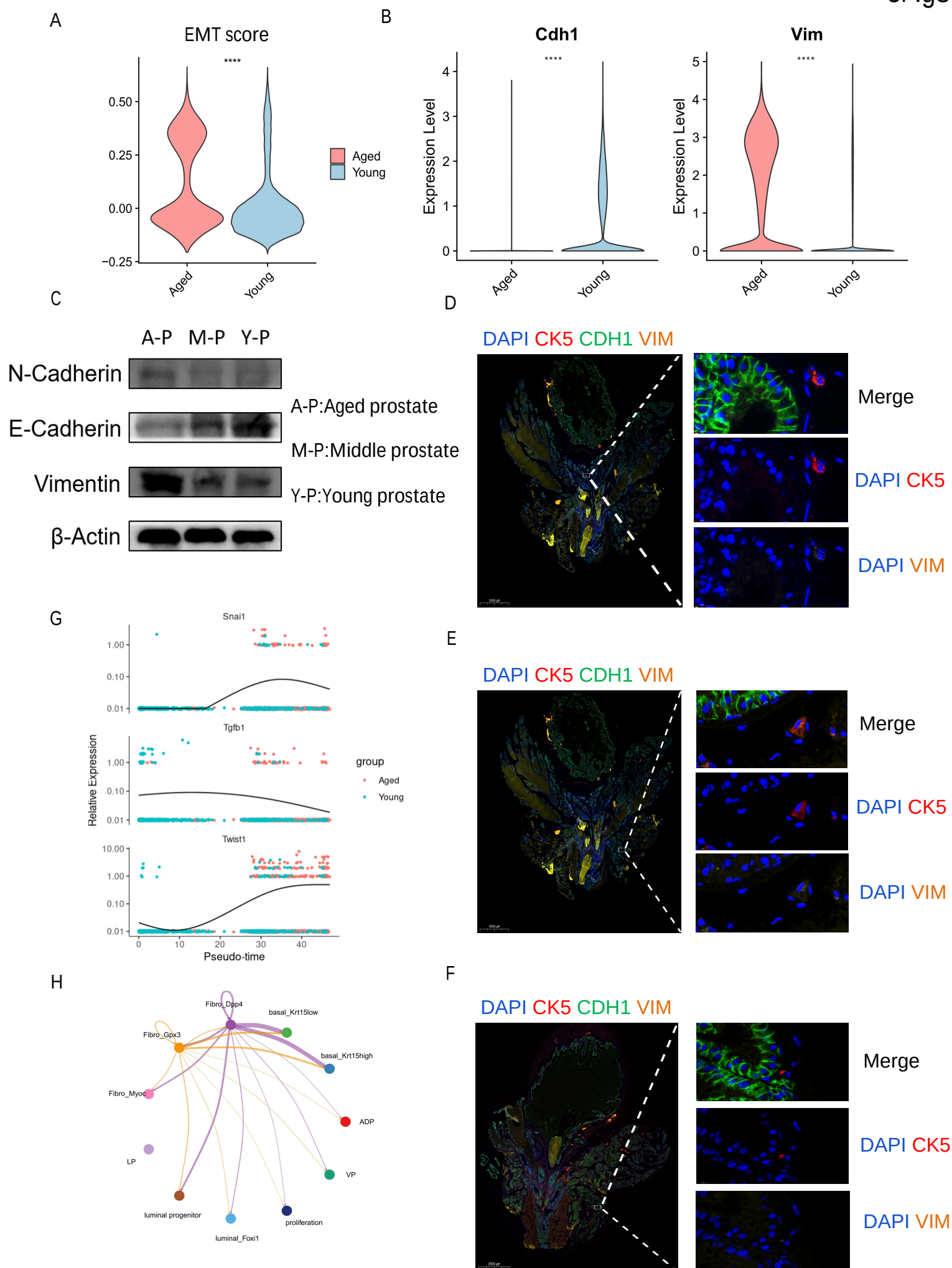


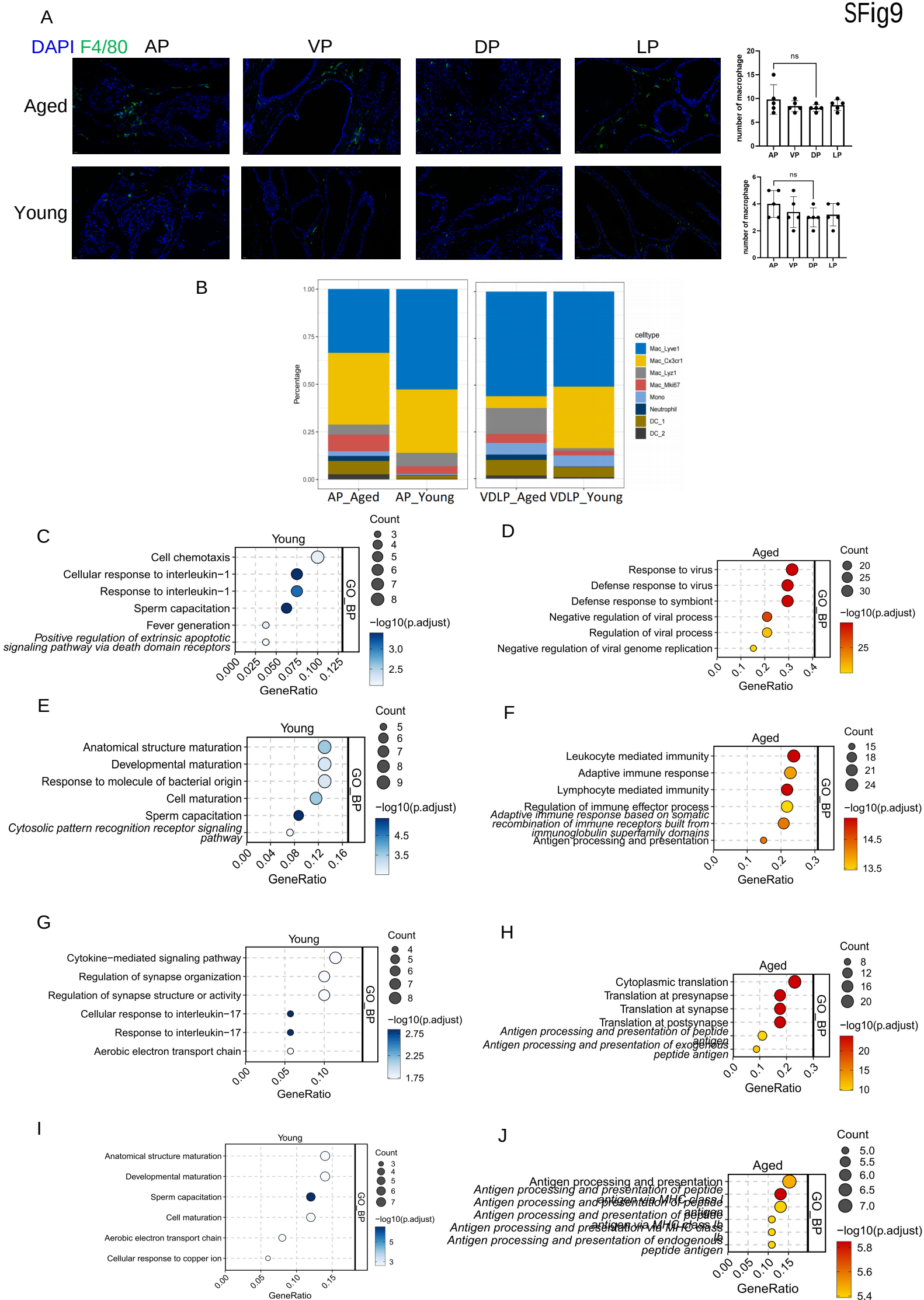
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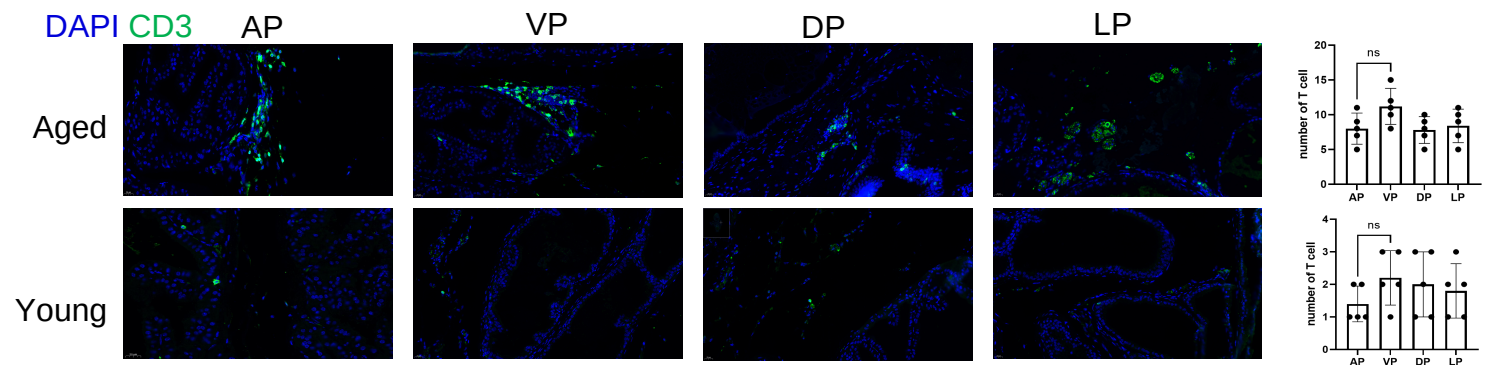
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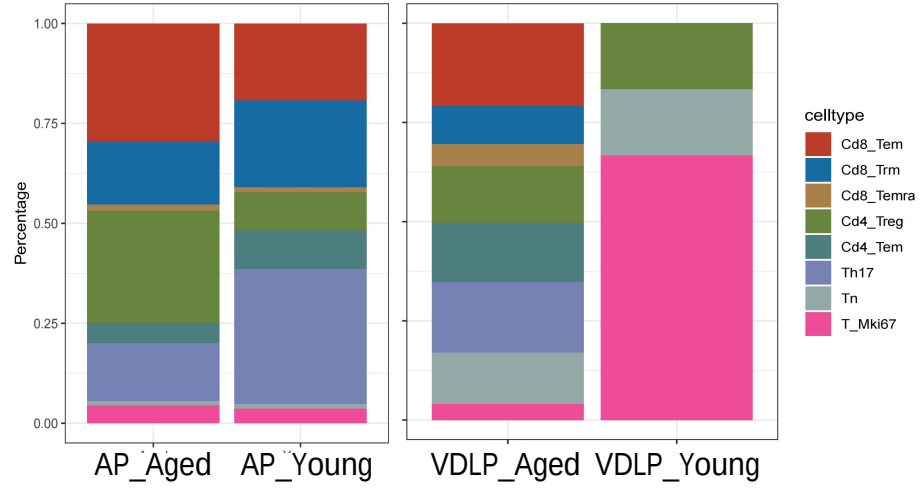




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