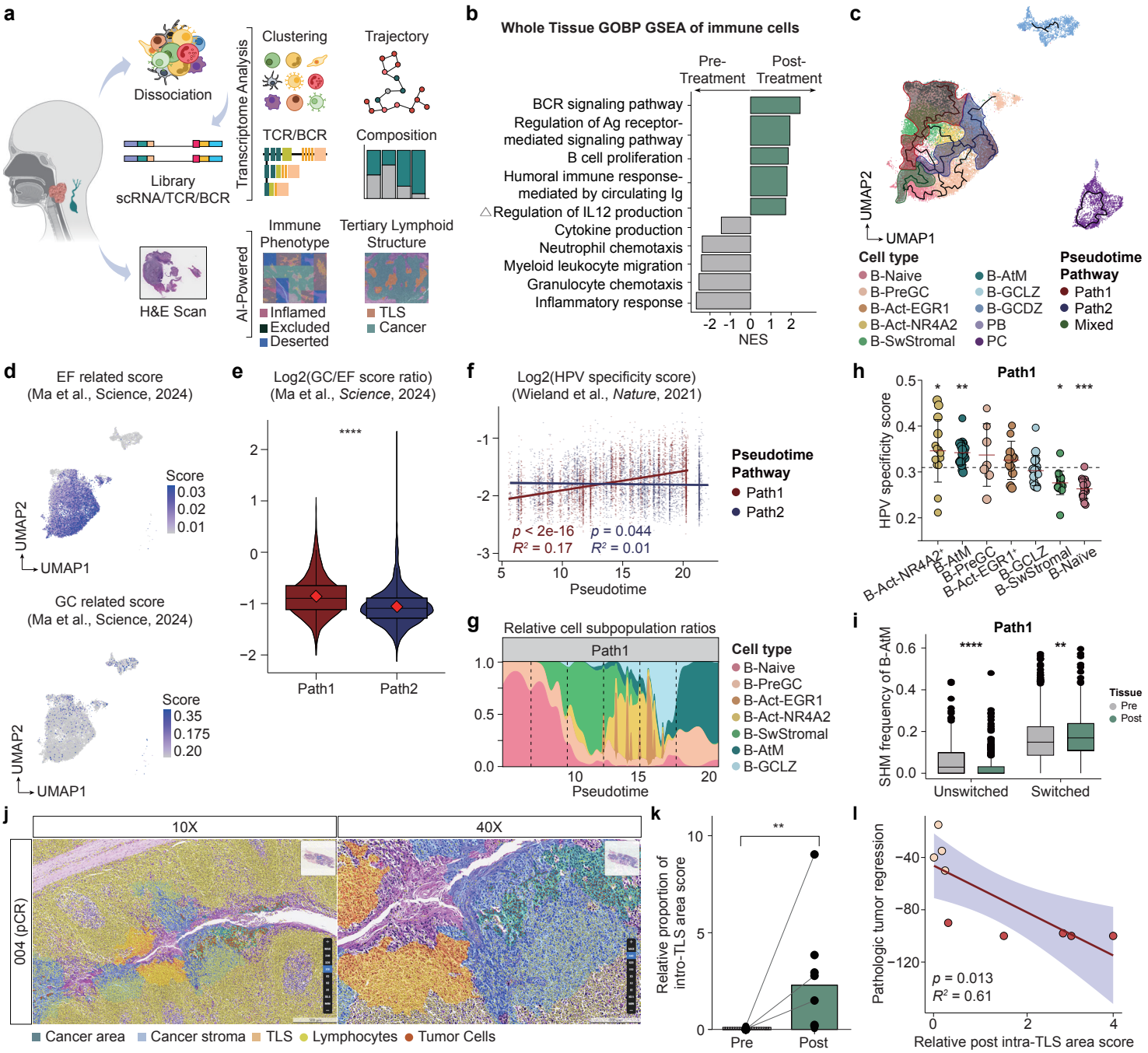

a
Dissociation
Library
scRNA/TCR/BCR
H&E Scan
Transcriptome Analysis
Clustering
Trajectory
TCR/BCR
Composition
AI-Powered
Immune Phenotype
Tertiary Lymphoid Structure
Inflamed
Excluded
Deserted
TLS
Cancer
b
Whole Tissue GOBP GSEA of immune cells
Pre-Treatment
Post-Treatment
BCR signaling pathway
Regulation of Ag receptor-mediated signaling pathway
B cell proliferation
Humoral immune response-mediated by circulating Ig
△Regulation of IL12 production
Cytokine production
Neutrophil chemotaxis
Myeloid leukocyte migration
Granulocyte chemotaxis
Inflammatory response
NES
c
UMAP2
UMAP1
Cell type
B-Naive
B-PreGC
B-Act-EGR1
B-Act-NR4A2
B-SwStromal
B-AtM
B-GCLZ
B-GCDZ
PB
PC
Pseudotime Pathway
Path1
Path2
Mixed
d
EF related score
(Ma et al., Science, 2024)
Score
0.03
0.02
0.01
UMAP2
UMAP1
GC related score
(Ma et al., Science, 2024)
Score
0.35
0.175
0.20
UMAP2
UMAP1
e
Log2(GC/EF score ratio)
(Ma et al., Science, 2024)
****
Path1
Path2
f
Log2(HPV specificity score)
(Wieland et al., Nature, 2021)
p < 2e-16
R² = 0.17
p = 0.044
R² = 0.01
Pseudotime
Pseudotime Pathway
Path1
Path2
g
Relative cell subpopulation ratios
Path1
Pseudotime
Cell type
B-Naive
B-PreGC
B-Act-EGR1
B-Act-NR4A2
B-SwStromal
B-AtM
B-GCLZ
h
Path1
HPV specificity score
B-Act-NR4A2+
B-AtM
B-PreGC
B-Act-EGR1+
B-GCLZ
B-SwStromal
B-Naive
i
Path1
SHM frequency of B-AtM
Unswitched
Switched
Tissue
Pre
Post
j
10X
40X
004 (pCR)
Cancer area
Cancer stroma
TLS
Lymphocytes
Tumor Cells
k
Relative proportion of intra-TLS area score
Pre
Post
l
Pathologic tumor regression
p = 0.013
R² = 0.61
Relative post intra-TLS area score

Figure 3