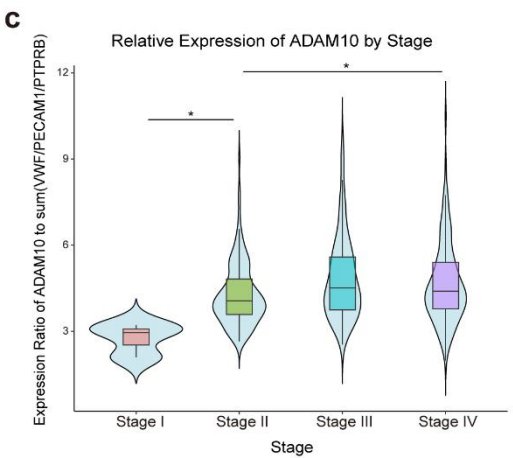
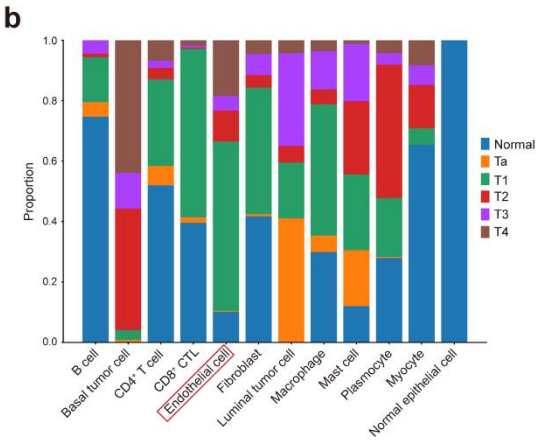


Supplementary Fig. 1



a, Unified Manifold Approximation and Projection (UMAP) visualization of the scRNA-seq data from 47 samples of 3 GEO datasets before batch correction. **b**, UMAP plots representing different cell-type compositions across the samples, with cells colored according to the expression levels of their canonical marker genes: B cells (*CD79A*, *MS4A1*, *CD19*), Basal Tumor cells (*CDH3*, *SDK1*, *CDKAL1*), CD4⁺ T cells (*CD4*, *CD3E*, *CD3D*), CD8⁺ CTL (*GZMA*, *CD8A*, *GZMB*), Endothelial cells (*VWF*, *PECAM1*, *PTPRB*), Fibroblasts (*COL1A2*, *COL3A1*, *DCN*), Luminal Tumor cells (*KRT19*, *KRT18*, *KRT8*), Macrophages (*CD68*, *CD163*, *C1QA*), Mast cells (*MS4A2*, *IL1RL1*, *CPA3*), Plasmocytes (*IGKC*, *IGHG1*, *JCHAIN*), Myocytes (*MYH11*, *DES*, *MYL9*), and Normal urothelium cells (*KRT13*, *SYTL2*, *DGKN*). **c**, Violin plot showing the expression ratio of ADAM10 relative to the combined expression levels of VWF, PECAM1, and PTPRB in different bladder cancer stages in TCGA-BLCA cohort.

Supplementary Table 1. Patient information

GEO dataset	Revised ID	Original ID	Tissue	Age	Sex	Recurrence	TNM Stage	Histology type	Grade
GSE135337	N1	BCN	Normal	not mentioned	not mentioned	not mentioned	/	/	/
	BC1	BC1	BC	67	M	not mentioned	Ta	Urothelial carcinoma	low
	BC2	BC2	BC	67	M	not mentioned	T1	Urothelial carcinoma	high
	BC3	BC3	BC	38	M	not mentioned	T1	Urothelial carcinoma	high
	BC4	BC4	BC	80	M	not mentioned	T2N0M0	Urothelial carcinoma	high
	BC5	BC5	BC	81	M	not mentioned	T3N0M0	Urothelial carcinoma	high
	BC6	BC6	BC	58	M	not mentioned	Ta	Urothelial carcinoma	low
	BC7	BC7	BC	66	M	not mentioned	Ta	Urothelial carcinoma	low
GSE169379	BC8	8	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC9	36	BC	not mentioned	not mentioned	No	T3	not mentioned	high
	BC10	54	BC	not mentioned	not mentioned	not mentioned	T2	not mentioned	high
	BC11	59	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC12	72	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC13	371	BC	not mentioned	not mentioned	No	T3	not mentioned	high
	BC14	419	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC15	446	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC16	485	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC17	489	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC18	518	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC19	590	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC20	593	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC21	674	BC	not mentioned	not mentioned	Yes	T2	not mentioned	high
	BC22	702	BC	not mentioned	not mentioned	No	T4	not mentioned	high
	BC23	739	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC24	752	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC25	763	BC	not mentioned	not mentioned	Yes	T2	not mentioned	high
	BC26	824	BC	not mentioned	not mentioned	No	T1	not mentioned	high
	BC27	896	BC	not mentioned	not mentioned	Yes	T2	not mentioned	high
	BC28	912	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC29	913	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC30	1126	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC31	1204	BC	not mentioned	not mentioned	No	T2	not mentioned	high
	BC32	1246	BC	not mentioned	not mentioned	Yes	T2	not mentioned	high
	N2	Normal	Normal	not mentioned	not mentioned	not mentioned	/	/	/

GSE222315	BC33	BCa1	BC	57	M	No	T1N1M0	not mentioned	high
	BC34	BCa2	BC	69	F	Yes	T1N0M0	not mentioned	high
	BC35	BCa3	BC	65	M	Yes	T1N1M0	not mentioned	high
	BC36	BCa4	BC	60	M	No	T1N0M0	not mentioned	high
	BC37	BCa5	BC	74	M	No	T1N1M0	not mentioned	high
	BC38	BCa6	BC	62	M	No	T1N1M0	not mentioned	high
	BC39	BCa7	BC	62	M	Yes	T1N0M0	not mentioned	high
	BC40	BCa8	BC	64	F	No	T1N0M0	not mentioned	high
	BC41	BCa9	BC	68	F	Yes	T1N0M0	not mentioned	high
	N3	NAT2	Normal	69	F	not mentioned	/	/	/
	N4	NAT3	Normal	65	M	not mentioned	/	/	/
	N5	NAT4	Normal	60	M	not mentioned	/	/	/
	N6	NAT5	Normal	74	M	not mentioned	/	/	/

Supplementary Table 2. Primary antibodies

Name	Catalog	Dilution	Supplier
EpCAM	ab213500	1:200	Abcam
CD31	ab9498	1:200	Abcam
SOX5	ab94396	1:200	Abcam
PLVAP	ab321889	1:200	Abcam