Supplementary information

The online version contains supplementary material.

Additional file 1: Table S1. Clinical characteristics of breast cancer patients.

Additional file 2: Table S2. Mapping statistics of samples.

Additional file 3. Table S3. Differentially expressed genes between clusters.

Additional file 4. Table S4. Differentially expressed genes between T cell clusters.

Figure S1. Primary cancer cells inclined to metastasis express high levels of S100A and APOD. A) Density of the number of UMIs, number of genes and percentage of mitochondrial counts. B) UMAP of all cells color-coded by sample. C) Sample percentage in each cluster. D) Sample percentage in CA and LN for each cluster. E) Violin plot of epithelial scores in each cluster. F) CNV heatmap of reference cells and malignant cells. G) Percentage of cancer cells of each sample in each cluster, and percentage of CA and LN cancer cells in each cluster.

Figure S2. Characteristics of T cells residing in primary breast cancers and paired sentinel LNs. A) Violin plot of nFeature_RNA, nCount_RNA, and percent.mt of T cells. B) UMAP of T cells color-coded by samples. C) Percentage of T cells of each sample in each cluster. D) Percentage of T cells of each sample for CA and LN in each cluster.

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Figure S3. Tumor reactivity of expanded T cell clones and non-expanded T cell clones. A) The details of TCR sequences used in the assays were presented. B) Patient autologous CD8 T cells transduced with TCR sequences were cultured alone or with autologous tumor cells, and IFNγ in the suppernant was measured by ELISA.

Figure S4. The presence of high endothelial venules and the co-localization of antigen presenting cells and activated T cells. Multiplex immunofluorescence imaging of tumor tissues. A) Yellow – PNAD+, purple – CD20+, green – CD3+, blue – DAPI. The staining was performed in sentinel lymph node as positive control of PNAD (HEV marker) and 2 primary breast tumors. B) Red – CD8+, white – CD103+, green – PD1+, blue – DAPI. The staining was performed in primary breast tumor.

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