**Supplementary Materials**

The sample from peripheral blood, spleen and bone marrow were also analyzed using both viSNE and SPADE separately. The viSNE presents a two-dimensional data; each individual cell shows a scatter plot to present the labeled marker expression level for each cell. SPADE organizes cells into a hierarchy based on the related phenotype markers to identify cell types and shows the cellular heterogeneity Supplementary Figures (1-3).

Characterization of the immune cells from blood (supplementary figure 1), spleen (supplementary figure 2) and bone marrow (supplementary figure 3) by mass cytometry using SPADE (top), and viSNE (bottom).
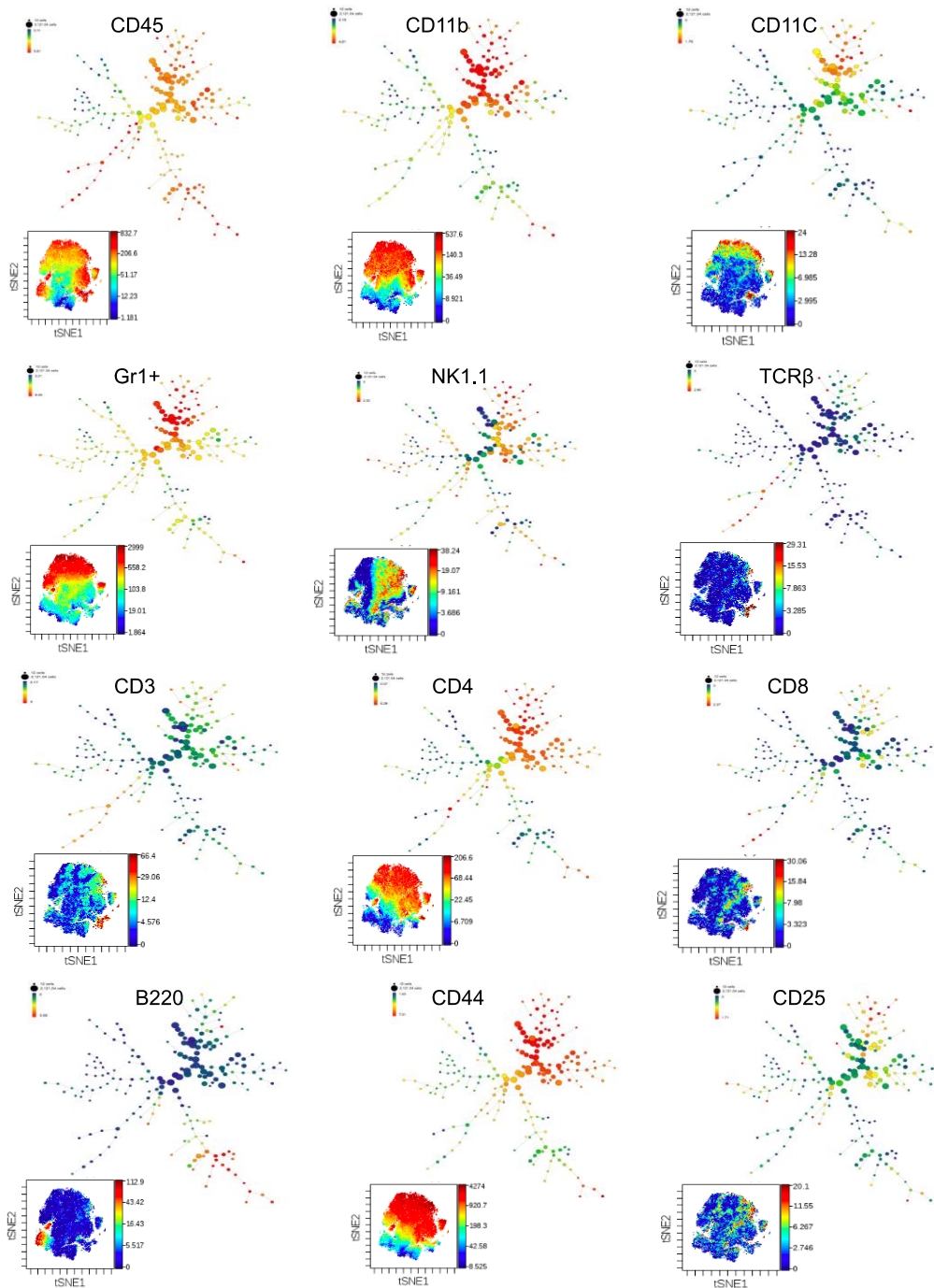
Supplementary Figure 1 Blood
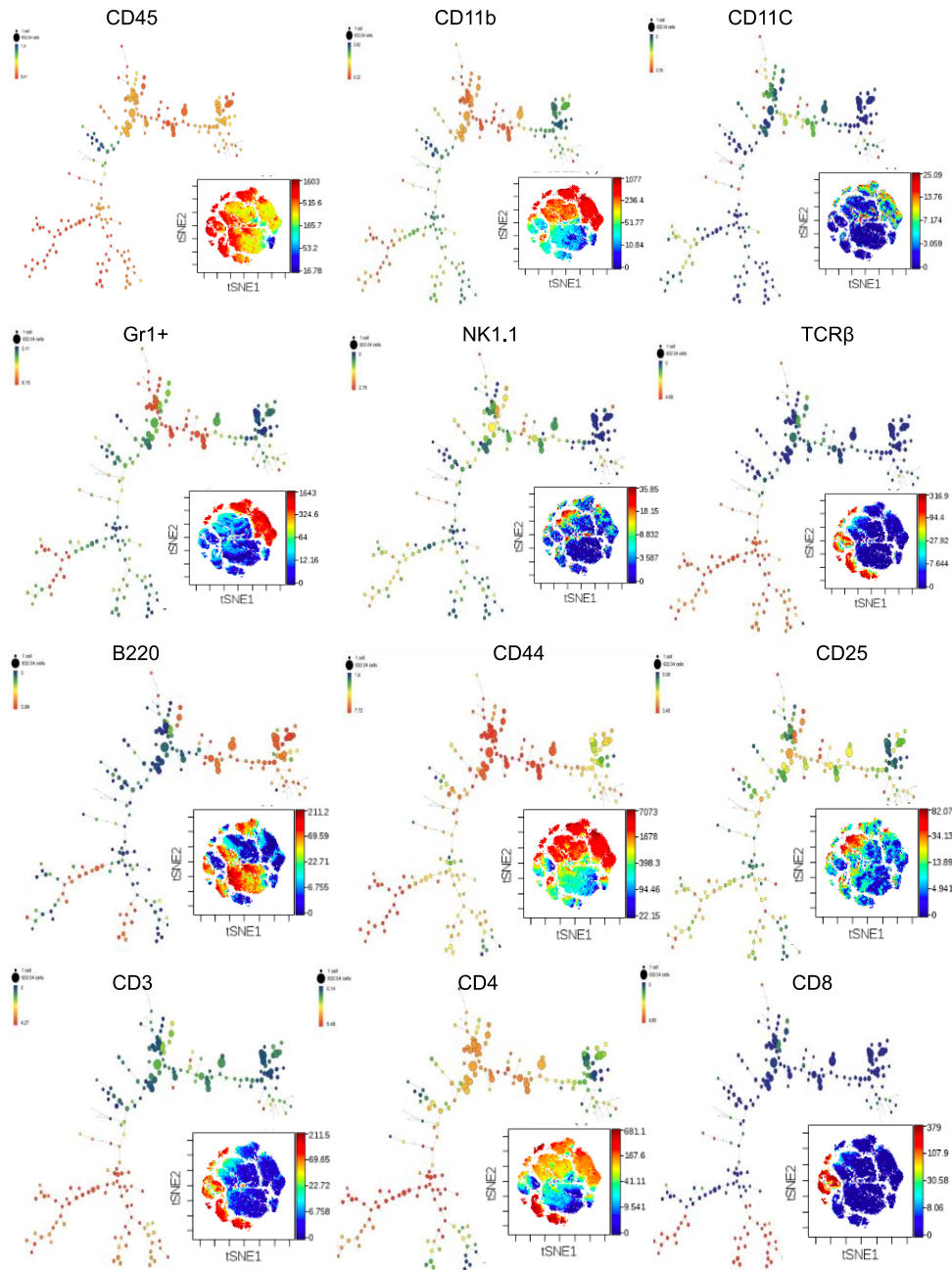
Supplementary Figure 1: Representative SPADE and ViSNE figures for cell type identification in peripheral blood, major cell surface markers used for cell identification including CD45, CD11b, CD11c, Gr1, B220, NK1.1, CD3, CD8, CD4, CD44, CD25 and TCRß Illustrative SPADE tree (Top) ViSNE (bottom) to present identified immune cell types in peripheral blood. In SPADE, the colored standards present the expression levels of markers' median, and the node sizes shows the numbers of cells. In ViSNE, the color gradients show the markers' intensity, and each dot presents a single cell.

Supplementary Figure2 Spleen
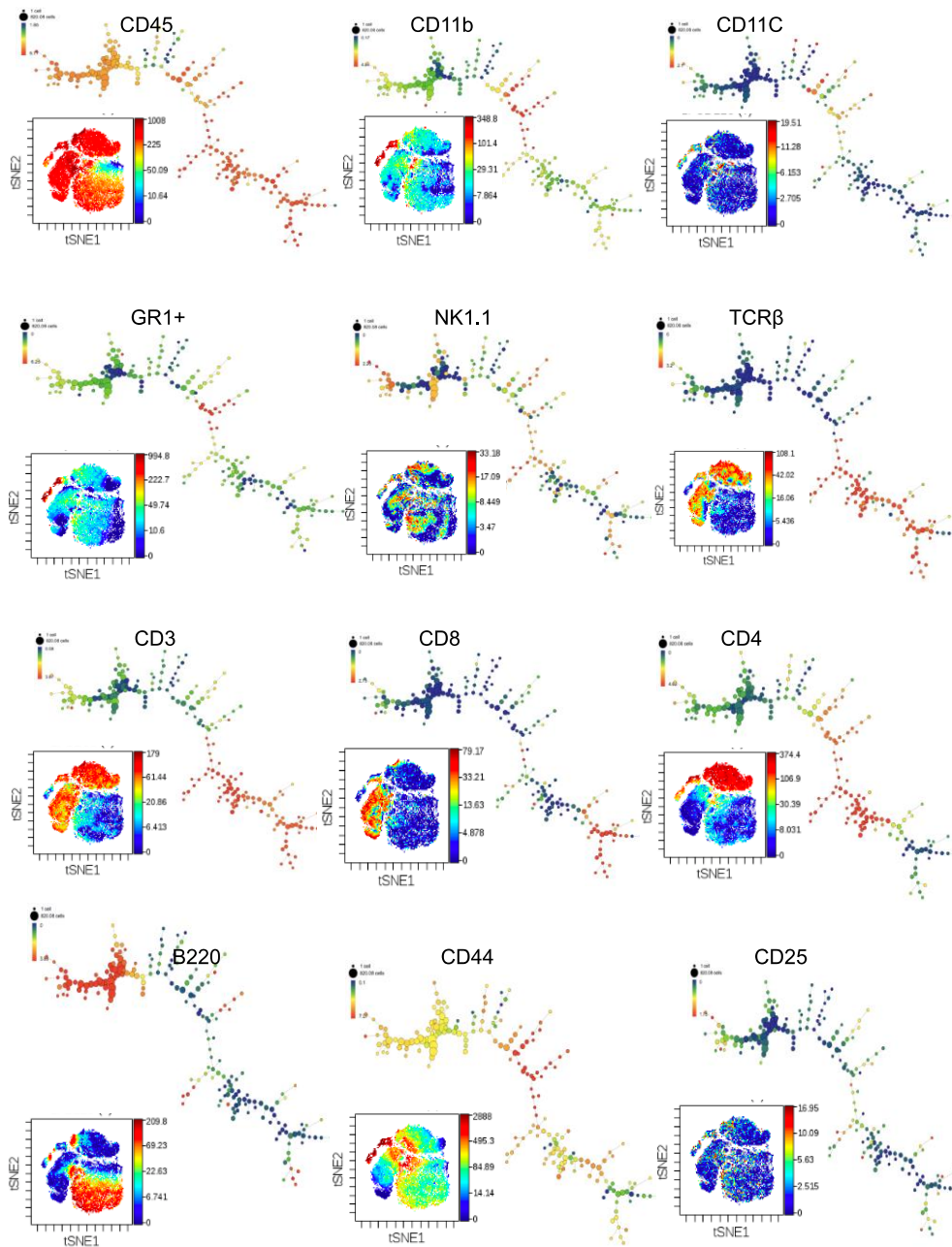
Supplementary Figure 2: Representative SPADE and ViSNE figures for cell type identification in blood, major cell surface markers used for cell identification including CD45, CD11b, CD11c, Gr1, B220, NK1.1, CD3, CD8, CD4, CD44, CD25 and TCR ß Illustrative SPADE tree (Top) ViSNE (bottom) to present identified immune cell type in the spleen. In SPADE, the colored standards present the expression levels of markers' median, and the node sizes shows the numbers of cells. In ViSNE, the color gradients show the markers' intensity, and each dot presents a single cell.

Supplementary Figure3 Bone marrow

Supplementary Figure 3: Representative SPADE and ViSNE figures for cell type identification in bone marrow, major cell surface markers used for cell identification including CD45, CD11b, CD11c, Gr1, B220, NK1.1, CD3, CD8, CD4, CD44, CD25 and TCR ß. Illustrative SPADE tree (Top) ViSNE (bottom) to present identified immune cell type in bone marrow. In SPADE, the colored standards present the

expression level of markers' median, and the node sizes shows the numbers of cells. In ViSNE, the color gradients show the markers' intensity, and each dot presents a single cell.