**Supplementary Figure legends**

**Supplementary Figure 1**

TIGIT expression is coordinately with immune checkpoints. **A,** Representative FACS plots of TIGIT/LAG-3 or TIGIT/TIM-3 co-expression on CD8+ T cells from wild-type mice spleen (WT, *n* = 6), tumor-bearing mice spleen (TB, *n* = 6), and tumor-bearing mice TILs (*n* = 6). **B,** Representative FACS plots of TIGIT/LAG-3 and TIGIT/TIM-3 co-expression on CD4+ T cells from wild-type mice spleen (WT, *n* = 6), tumor-bearing mice spleen (TB, *n* = 6), and tumor-bearing mice TILs (*n* = 6). Data represent mean ± SD with two independent biological duplication.

**Supplementary Figure 2**

Strategy for sorting of mouse Tregs and CD8+ T cells. **A,** Representative FACS plots of CD4+CD25+Foxp3+ Tregs subsets pre-and post-sorting from single cell suspensions of lymph node. **B,** Representative FACS plots of CD3+CD8+ T cells subsets pre-and post-sorting from single cell suspensions of WT mice lymph node.

**Supplementary Figure 3**

CD155 (PVR) mRNA expression of HNSCC patients in TCGA database. **A,** CD155 mRNA expression of HNSCC was significantly upregulated than normal tissue (Cutoff: *p* = 0.01). **B,** CD155 mRNA expression of HNSCC patients was correlated with a poor overall survival (*n* = 518; *p* = 0.0023).

**Supplementary Figure 4**

The clinicopathological significance of CD155 in HNSCC. **A,** Representative H&E and IHC images of CD155 expression on human HNSCC (Grade I, II, and III) in the HNSCC tissue microarrays (Scale bar, 50 μm). **B,** Quantitation of CD155 expression score between T1+T2 (*n* = 145) and T3+T4 (*n* = 67). **C,** Quantitation of CD155 expression score between patients’ HNSCC tissue and matched metastatic lymph node (*n* = 35). Data represent mean ± SD.

**Supplementary Figure 5**

Representative multiplexed IHC image of human primary HNSCC samples. The merged image shows colocalization of CD155 (green), PDL1 (cyan) and CD11b (red). Scale bars: 50 μm. Nuclei were stained with DAPI (blue).

**Supplementary Figure 6**

Strategy for gating and sorting of mouse MDSCs. **A,** Representative FACS plots of CD155 expression on CD11b+Ly6G+Ly6Clo PMN-MDSCs and CD11b+Ly6G-Ly6Chi M-MDSCs subsets. **B,** Representative FACS plots of CD11b+Ly6G+Ly6Clo PMN-MDSCs and CD11b+Ly6G-Ly6Chi M-MDSCs subsets pre- and post-sorting from single cell suspensions of spleen.

**Supplementary Figure 7**

**A,** Representative images of H&E-stained slices of liver and kidney in the anti-TIGIT treatment group as compared with isotype IgG group. **B,** Quantitation of Gr-1+MDSCs cells on CD11b+ cells of spleens and TILs from Isotype and anti-TIGIT treatment.

**Supplementary Figure 8**

**A-C,** Representative FACS plots of CD4, CD8, CD4+CD25+Foxp3+ Tregs and CD11b+Gr-1+ expression with control antibody, anti-CD4, anti-CD8, anti-CD25 and anti-Gr1 depletion antibody. **D,** Quantitation of the expression of TIGIT on CD8+ T cells of spleens and TILs from Isotype and anti-PD1 treatment.