



**Supplementary Fig. 4.** Analysis of the relationship between IL32 expression and immune infiltration. Immune, stromal, and ESTIMATE scores were calculated using the ESTIMATE algorithm. IL32 expression positively correlated with all three scores (stromal  $r=0.49$ , immune  $r=0.48$ , ESTIMATE  $r=0.51$ ), indicating its link to immune microenvironment remodelling. TIMER analysis showed IL32 negatively correlated with B cells and CD8+ T cells, but positively with macrophages and neutrophils. EPIC analysis confirmed these patterns and also showed negative correlation with cancer-associated fibroblasts (CAFs). IL32 expression is strongly associated with immune cell infiltration in GBM, particularly indicating an immunosuppressive environment with reduced cytotoxic T cell presence.