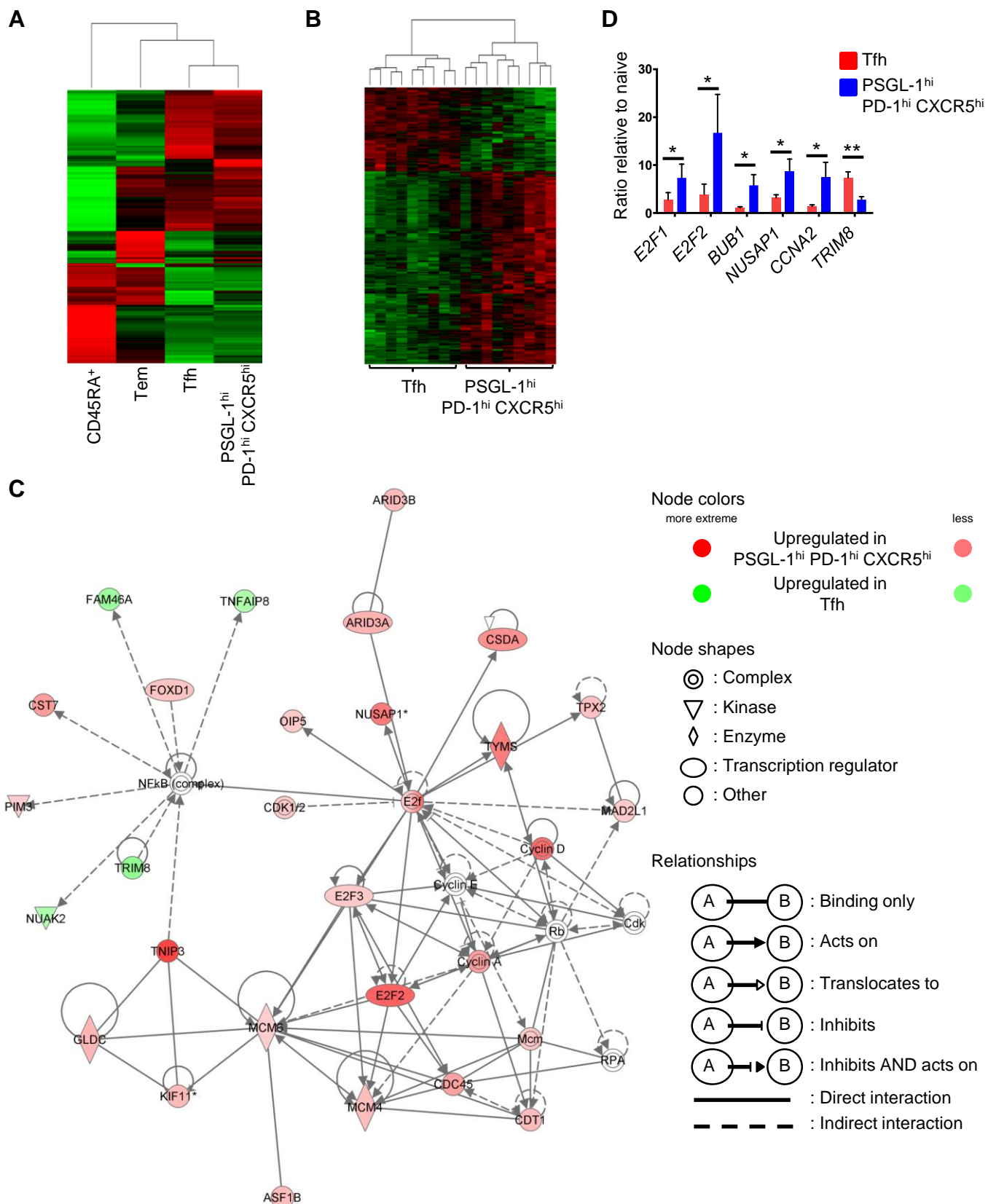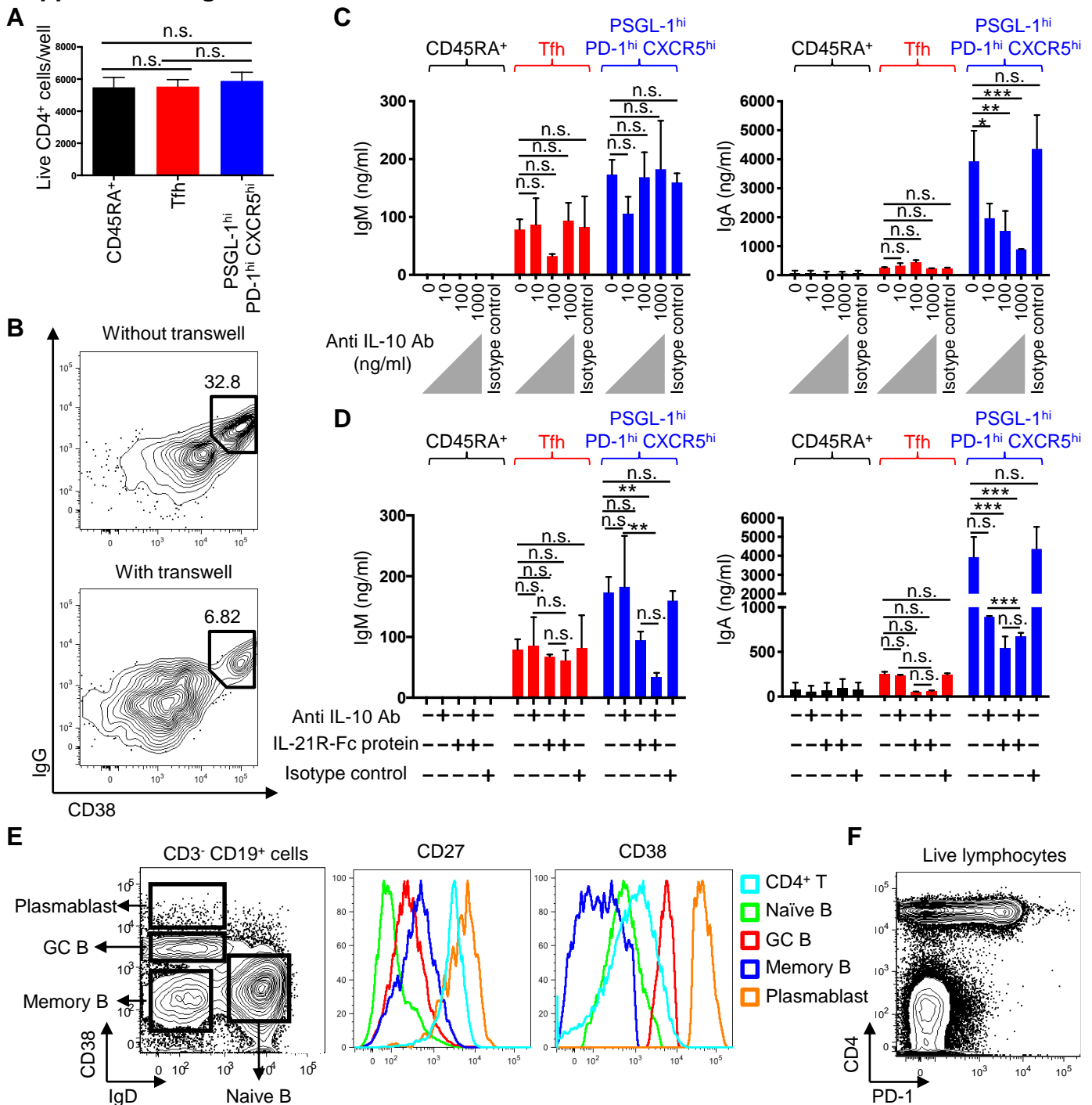# Supplemental Figure 1

PSGL-1^hi PD-1^hi CXCR5^hi T cells proliferate via E2F pathway. (A) Hierarchal clustering of CD45RA+ naïve, effector memory (Tem), follicular helper T (Tfh) and PSGL-1^hi PD-1^hi CXCR5^hi T cells. Data were obtained from three independent chips from three different tonsils. (B) Differentially expressed genes between Tfh and PSGL-1^hi PD-1^hi CXCR5^hi T cells. (C) Top functional network of differentially expressed genes between Tfh and PSGL-1^hi PD-1^hi CXCR5^hi T cells by Ingenuity Pathway Analysis. (D) qPCR of E2F and its related proteins in Supplemental Figure 1C. N = 4, paired t test. *P < 0.05, **P < 0.01. Bars indicate the mean and the SD.

Supplemental Figure 2

PSGL-1^{hi} PD-1^{hi} CXCR5^{hi} T cells help memory B cells produce immunoglobulins (Igs) in a contact- and cytokine- (IL-10/21) dependent manner. (A) Tonsillar CD45RA⁺ naïve, Tfh, and PSGL-1ʰⁱ PD-1ʰⁱ CXCR5ʰⁱ T cells were cocultured with autologous memory B cells without exogenous stimulation. 5 days later, cells were collected and live CD4⁺ T cells were quantified. N = 3. One-way ANOVA test. Bars indicate the mean and the SD. (B) PSGL-1ʰⁱ PD-1ʰⁱ CXCR5ʰⁱ T cells were cocultured with autologous memory B cells with/without transwell. IgG intracellular staining was performed 5 days after the coculture. Representative data from two independent experiments. (C) Indicated dose of anti-IL-10 antibody was added to T cell plus memory B cell cocultures in the presence of anti-CD3 and anti-CD28 for 5 days. Representative data from three independent experiments. One-way ANOVA test. *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$. Bars indicate the mean and the SD. (D) Anti-IL-10 (1 μg/ml) antibody and/or IL-21R-Fc (1 μg/ml) protein were added to T cell plus memory B cell cocultures in the presence of anti-CD3 and anti-CD28 for 5 days. IgM and IgA in supernatants were measured by ELISA. Representative data from two independent experiments. One-way ANOVA test. **$P < 0.01$, ***$P < 0.001$. Bars indicate the mean and the SD. (E) Tonsillar B (CD3⁻ CD19⁺) cell subsets and CD27 and CD38 expression. Representative plots from three independent experiments. (F) PD-1 surface staining of total live lymphocytes. Representative plots from eight independent experiments.