

### Supplementary information

**Supplementary Figure 1.** N-803 as a scaffold for creation of novel fusion molecule N-820.

A schematic diagram showing construction of novel fusion molecules using N-803 as a scaffold and a therapeutic antibody as an example. (A) N-803 structure:IL-15N72D:IL-15R $\alpha$ SuFc complex consisting of IL-15N72D associated with the dimeric IL-15R $\alpha$ SuFc fusion protein. (B) Structure of rituximab showing the variable region consisting of the light and heavy chains. (C) Variable gene segment of the antibody light chain linked to the 5' end of the variable gene segment of the antibody heavy chain via a Gly4Ser3 linker to create a single chain antibody. (D) A single chain antibody construct genetically fused to the 5' end of the IL-15N72D mutein and a single chain antibody construct genetically fused to the 5' end of the IL-15R $\alpha$ SuFc construct. (E) A soluble novel N-803-based fusion molecule N-820 is produced. The fusion protein is comprised of four single chain antibody domains: two are fused to the two IL-15N72D muteins and two are fused to the two IL-15R $\alpha$ SuFc fusion constructs.

IL-15, interleukin-15.

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**Supplementary Figure 2.** N-820 significantly enhanced *in-vitro* cytotoxicity of exPBNK cells and the release of cytolytic granules from exPBNK cells against CD20+ Follicular lymphoma and Burkitt Lymphoma. The purified exPBNK cells were co-cultured with DOHH2 (Follicular lymphoma), Ramos (Burkitt Lymphoma), or Daudi (Burkitt Lymphoma) in combination with 10nM IgG, 10nM N-803, 10nM N-820, 10nM Rituximab,

10nM N-803+ 10nM Rituximab, or 10nM obinutuzumab for 2-3 days. The combination of exPBNK cells with N-820 significantly killed DOHH2 (left panel), Ramos (middle panel), or Daudi (right panel) and significantly enhanced granzyme B release as compared to other control groups (A) (n=4). A CD20- acute leukemia cell line RS4;11 cells were used as another control. The combination of exPBNK cells with N-820 did not significantly killed RS4;11 (B, left) and did not significantly enhanced granzyme B release as compared to other control groups (B, right) (n=4). \*p<0.05, \*\*p<0.01, \*\*\*p<0.001, ns=not significant, Ritux=Rituximab.