**Supplementary Figure Legends**

Supplementary Figure 1.

A) Freshly isolated PBMCs were cultured with chromium loaded HL-60 cells for 4 hours at E:T ratios of 20:1, 10:1, and 5:1. The listed reagents were added at the beginning of co-culture at a 30 nM concentration (note that 30 nM of IL-15 and 30 nM of 1633 BiKE were added for the third condition). Data are displayed as percent NK cell cytolytic activity. Statistical significance only shown for 20:1 E:T comparison (n=3). B) Healthy donor PBMCs were isolated and incubated for 24 hrs alone (light gray filled histograms), with HL-60 cells (dark gray histograms), with HL-60 cells plus 1633 BiKE (dashed black line), or with HL-60 cells plus 161533 TriKE (solid black line). Cells were then stained for flow cytometry and gated on CD56+CD3- NK cells. Representative histograms (top) and pooled MFI data (bottom) for CD69 (left), CD25 (center), and HLA-DR (right) expression. Bars denote mean ± SEM (n=3).

Supplementary Figure 2.

A) Healthy donor PBMCs were labeled with CellTrace, treated with 161533 TriKE and assessed a week later for proliferation. Representative histogram shows proliferation in NK (black) and T (gray) cells at the time of harvest (n=2). B) Proliferation of normal donor enriched NK cells was assessed after loading with CellTrace dye and incubation with no reagent, NCI IL-15, 1633 BiKE, or 161533 TriKE for 7 days. Representative CD56 vs. CD3 dot plots (top row) and CellTrace histograms (gated on CD56+CD3- NK cells (bottom row)) for each condition are shown. C) Pooled proliferation data for enriched normal donor NK cell assay. Bars denote mean ± SEM (n=2). D) CD33 expression was measured on HL-60 targets and primary AML blasts.