Supplemental Figure Legends

**Supplemental Figure 1.** a and b: AME-133v is significantly more potent than Rituximab in ADCC assays in both FF/FV and VV genotypes. Peripheral blood mononuclear cells from FcγRIIIa genotyped healthy donors were tested in ADCC against SKW6.4 target cells. ADCC activity was monitored by colorimetric detection of lactate dehydrogenase released from damaged target cells. The raw absorbance response = \((\text{experimental A}-\text{basal A})/(\text{maximal A}-\text{basal A}) \times 100\), with maximal A determined by adding 2% Triton X-100 to the target cells and basal-release measured for a mixture of effector and target cells in the absence of sensitizing of IgG. Data was analyzed to compare the response in donors of both VV \((n=4)\) and VF/FF \((n=8)\) genotypes and was modeled to a 4-parameter fit sigmoidal dose response curve in GraphPad Prism to calculate EC₅₀. Data shown is mean plus/minus standard error of mean. c and d: Direct competition with varied concentrations of both AME-133v and biotinylated rituximab. Titrations of each antibody were prepared and mixed followed by the addition of the mixture to duplicate plates containing SKW6.4 B-cells. The plates were incubated at 37 degrees C for 2 hours, washed, incubated with NA-AP for 30 min., washed, developed and read at OD 560. The data from the duplicate plates were averaged, the standard deviations calculated and the data plotted as a function of both biotinylated rituximab (Fig.1, left panel) and AME-133v (Fig.1, right panel). e: Displacement of pre-bound rituximab with AME-133v. Titrations of biotinylated rituximab were added to the cells and equilibrated overnight (18 hours) at 37 degrees C. The next day AME-133v, PBS or a non-specific human IgG1 were added to the plates without removal of unbound rituximab. The concentration of AME-133v competitor \((25 \text{ ug/mL})\) used was equivalent to the highest rituximab concentration tested. The plates were incubated for varied times \((3, 6, 24 \text{ and 32 hours})\), washed and developed as described. The OD values obtained at each time point were plotted as a function of biotinylated rituximab concentration.

**Supplemental Figure 2.** Waterfall plot of best change in the sums of the products of greatest diameters (SPD) from baseline. The best change from baseline in SPD are shown for each patient. The grey bars indicate patients where PD was not observed.

**Supplemental Figure 3.** Depletion of CD19-expressing B-cells from the blood after infusion of AME-133v. Data shown are mean values by cohort at each visit.