**Supplemental** **Figure Legends**

**Supplemental Figure S1:** Inhibition of PI3 kinase signaling leads to loss of T cell function. Activated T cells were cultured at pH 6.6 or 7.4 for 24h in presence or absence of the PI3K inhibitor BEZ-235. Culture supernatants were collected to measure IFN-γ production by ELISA. (n= 3 per group).

**Supplemental Figure S2:** **OT-1 T cell metabolism.** OT-1 T cells were cultured with OVASIINFEKL peptide for 48 hours at either pH 6.6 or 7.4. Cells were subsequently metabolically profiled using a Seahorse XF-96 analyzer. (A) Representative results of a glucose stress tests (GST) which measures extracellular acidification rate (ECAR) following addition of glucose, oligomycin and 2-deoxy glucose; (B) rRepresentative results of a mitochondrial stress test (MST) which measures the oxygen consumption rate (OCR) in glucose-containing media following sequential additions of oligomycin, FCCP and Rotenone/Antimycin A. See Materials and Methods for description of GST and MST. (C) Acidosis inhibits T cell glycolysis. Data show the glucose-stimulated increase in ECAR; (D) Acidic cells are more oxidative. Data show the basal OCR for activated cells incubated at pH 6.6 or 7.4. n= 6 per group. A two-tailed Student t-test was used to calculate statistical significance.

**Supplemental Figure S3:** Knocking out the acid sensor, TDAG8, does not rescue IFN-gamma production by T cells. T cells were isolated from TDAG8 k/o or wild-type (WT) mice and stimulated in the presence of 10 ug/ml plate-bound anti-CD3 antibodies for 48 hours at pH 6.6 or 7.4. Supernatants were collected and IFN-gamma was measured by ELISA. Data shows results from two independent experiments.

**Supplemental Figure S4:** Representative B16 tumors in mice treated with anti-CTLA4 antibodies with or without buffer therapy. Mice were inoculated with 5x10^4 B16-ova Albumin subcutaneously. Mice were divided in to 4 groups (n=10 in each ) , first group received drinking water that contained no additives (Tap) , second group received water containing 200mM sodium bicarbonate. Three days post tumor inoculation they received Anti-CTLA4 antibody at a concentration of 100ug and at a 50ug every three days for 3 weeks. The control group received normal rat IgG (IgG) antibody. Tumor pictures were taken at time of euthanization.

**Supplemental Figure S5:** Buffer therapy has little effect on systemic T cell activity in B16- bearing mice treated with anti-PD-1 antibody. Splenocytes from treatment groups were restimulated with irradiated B16 tumor cells for 24h and culture supernatants were collected for IFN-γ ELISA.