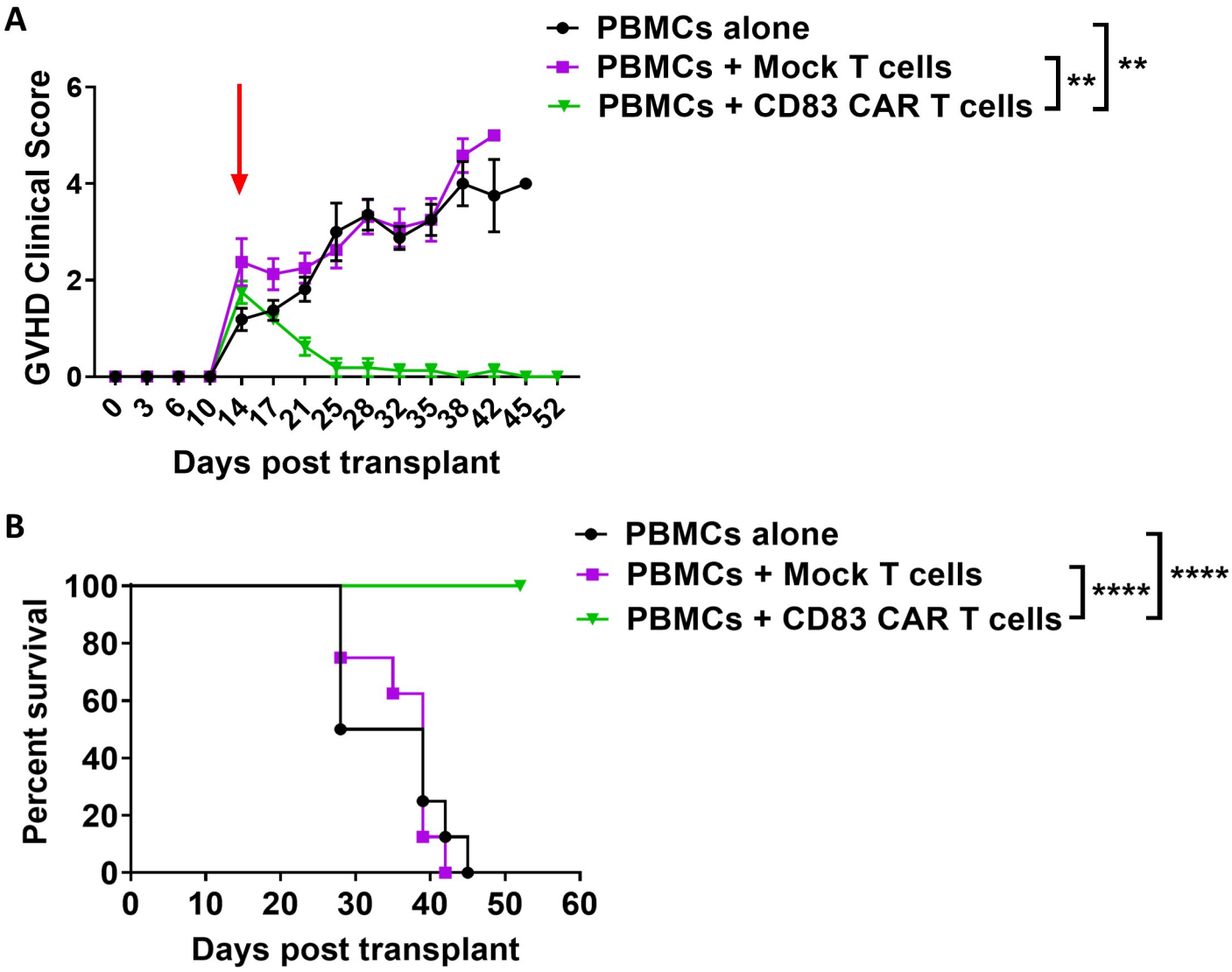
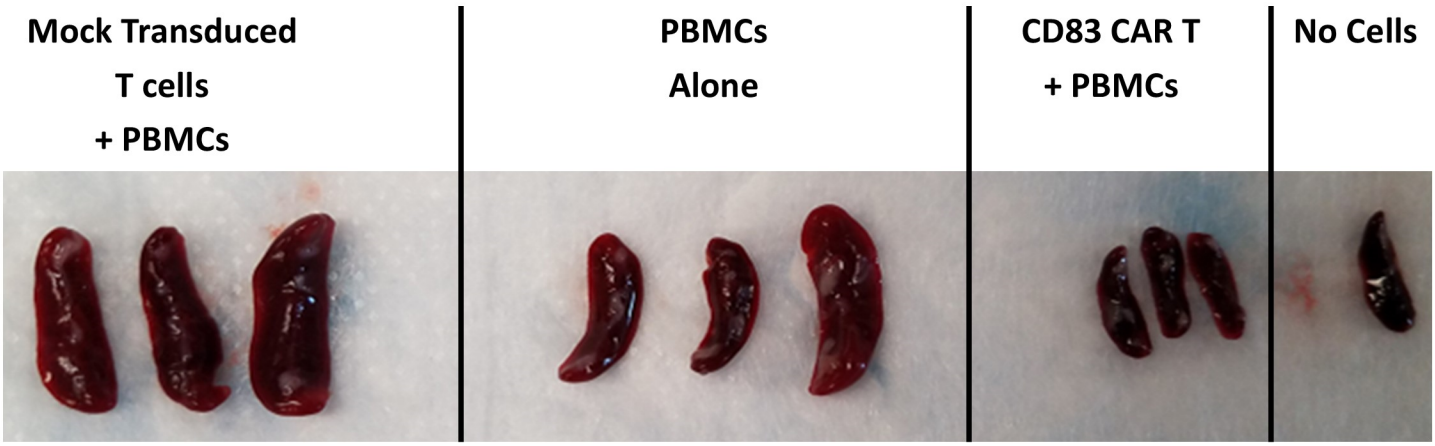
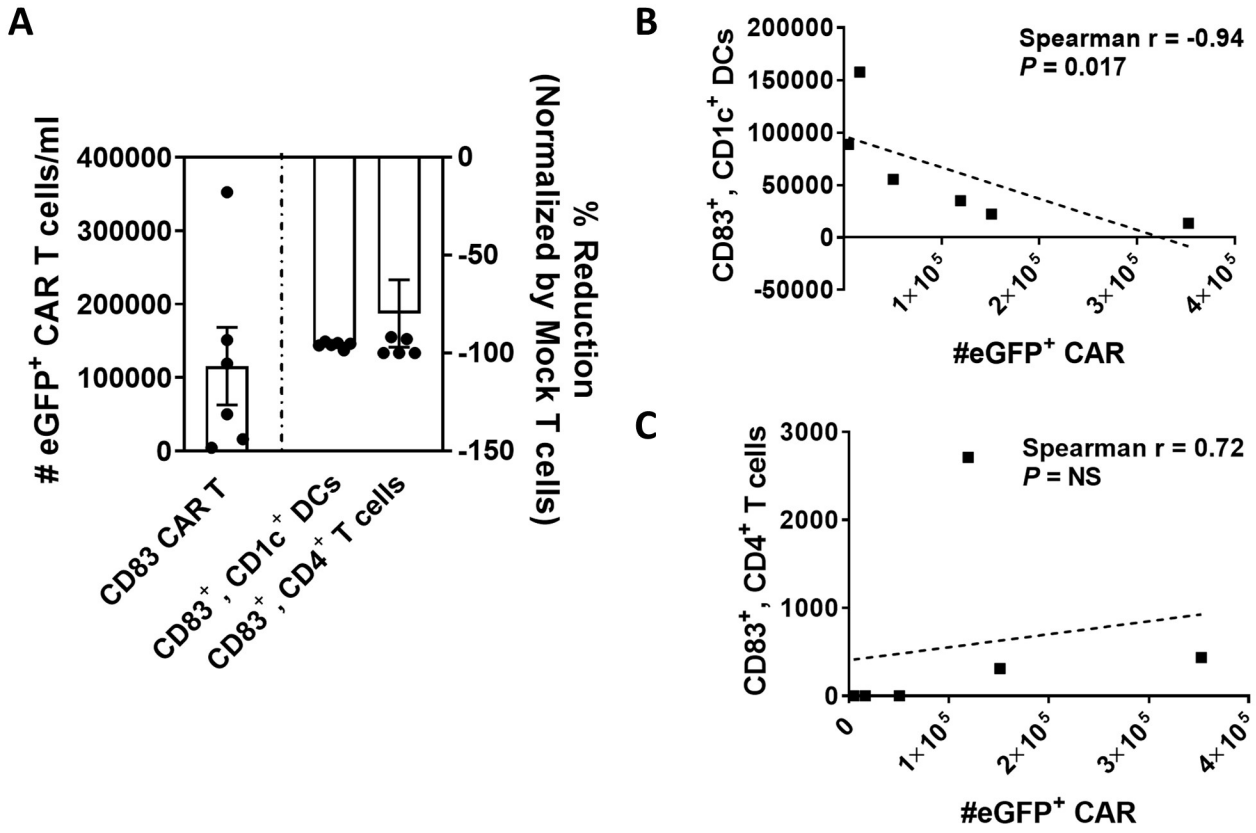


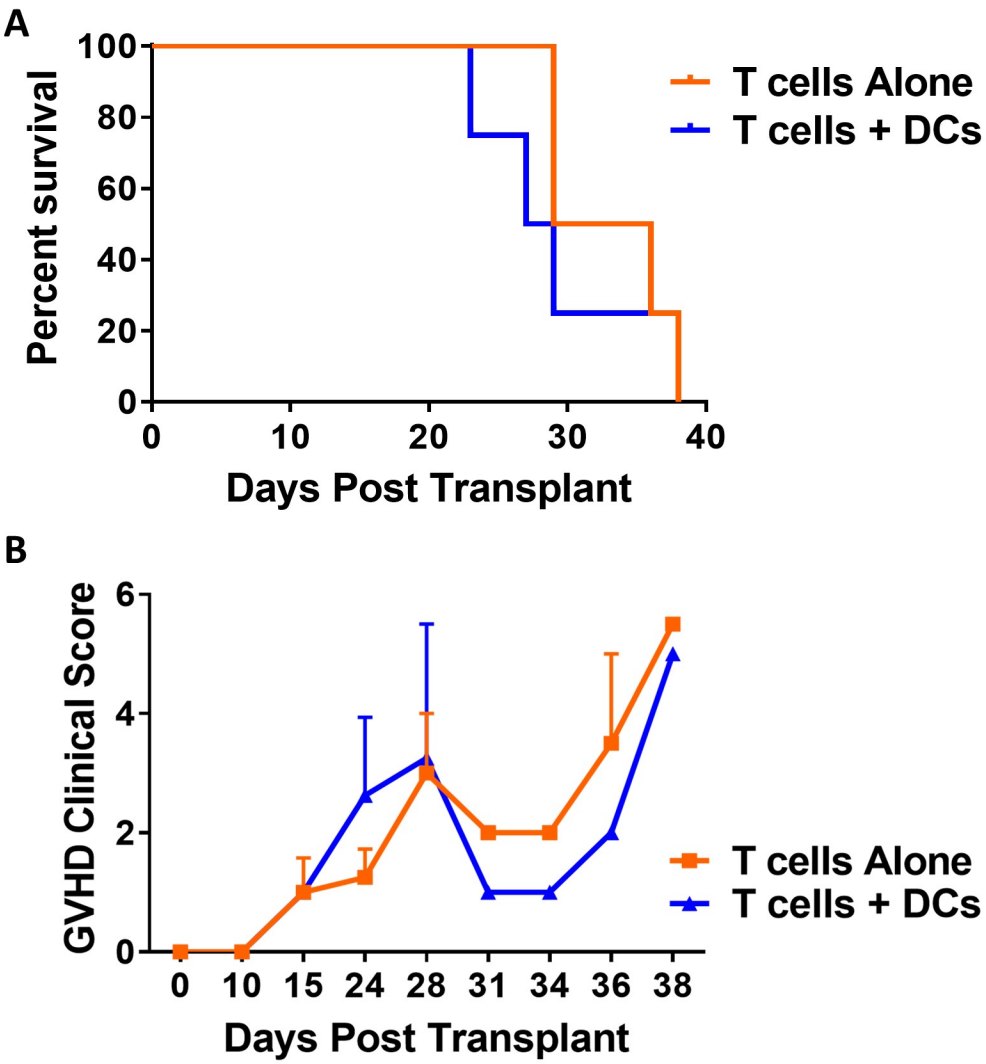
Supplemental Figure 1: Human CD83 CAR T cells treat and rescue mice from xenogeneic GVHD. NSG mice received 25x10^6 human PBMCs on day 0, followed by 1x10^6 autologous CD83 CAR T cells or mock transduced T cells on day +14. (A) GVHD clinical scores and (B) survival are shown. Red arrow shows when CD83 CAR or mock transduced T cells were administered. Pooled data from 2 independent experiments, 8 mice per experimental arm. ANOVA (A) or Log-rank test (B). ***P*=.001-.01 and *****P*<.0001.



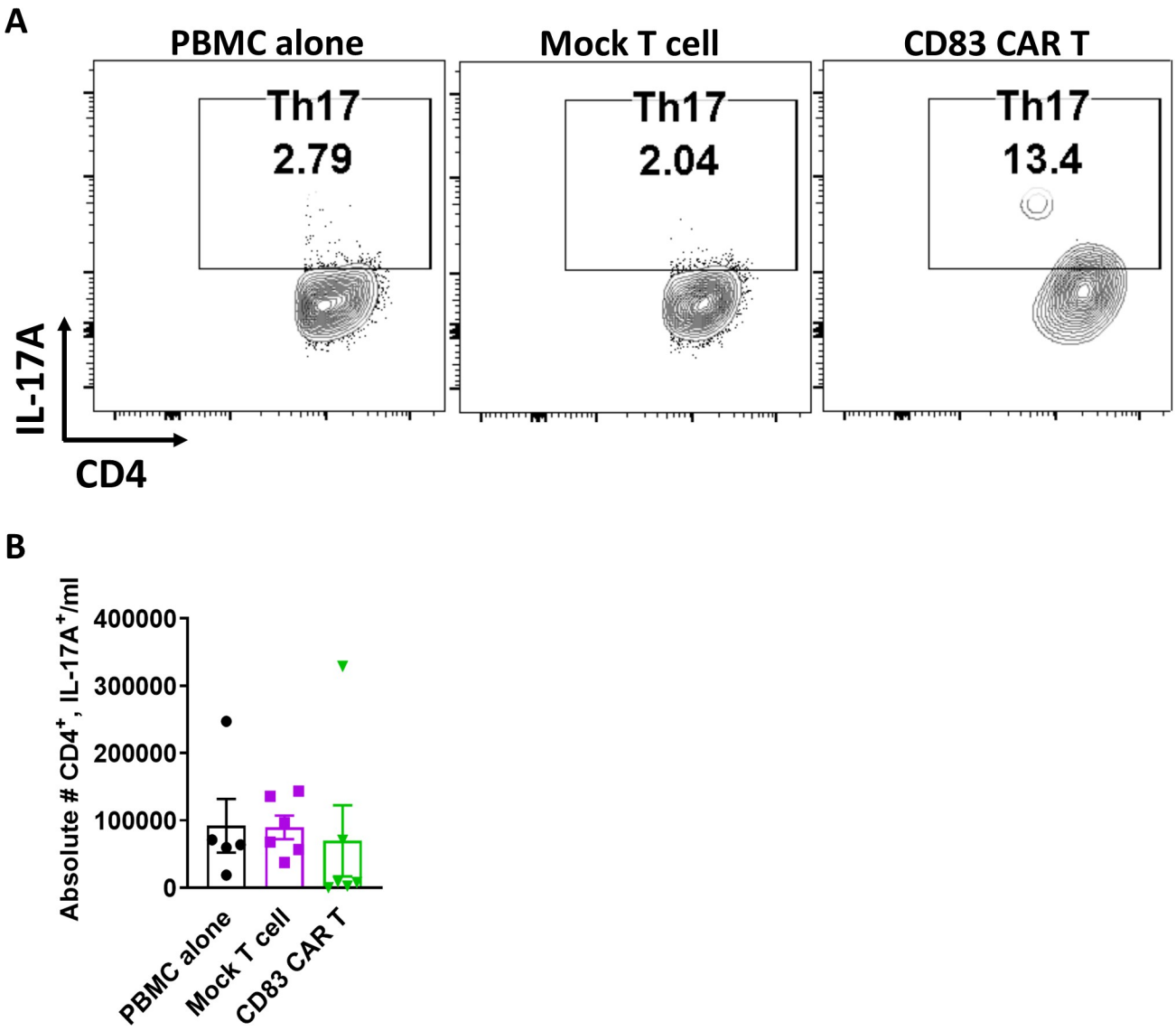
Supplemental Figure 2: Human CD83 CAR T cells reduce the expansion of donor cells in vivo. NSG mice were transplanted with $25x10^6$ human PBMCs plus $1x10^6$ CD83 CAR or mock transduced T cells. Control groups consisted of mice that received no PBMCs (negative control) and mice that received PBMCs without modified T cells (secondary positive control). Recipient mice were humanely euthanized at day +21 and their spleens were removed for gross assessment. A representative image shows mice that received PBMCs and CD83 CAR T cells exhibit reduced spleen size, supporting suppression of donor T cell expansion in vivo. 1 representative experiment of 2, up to 6 mice per experimental arm.



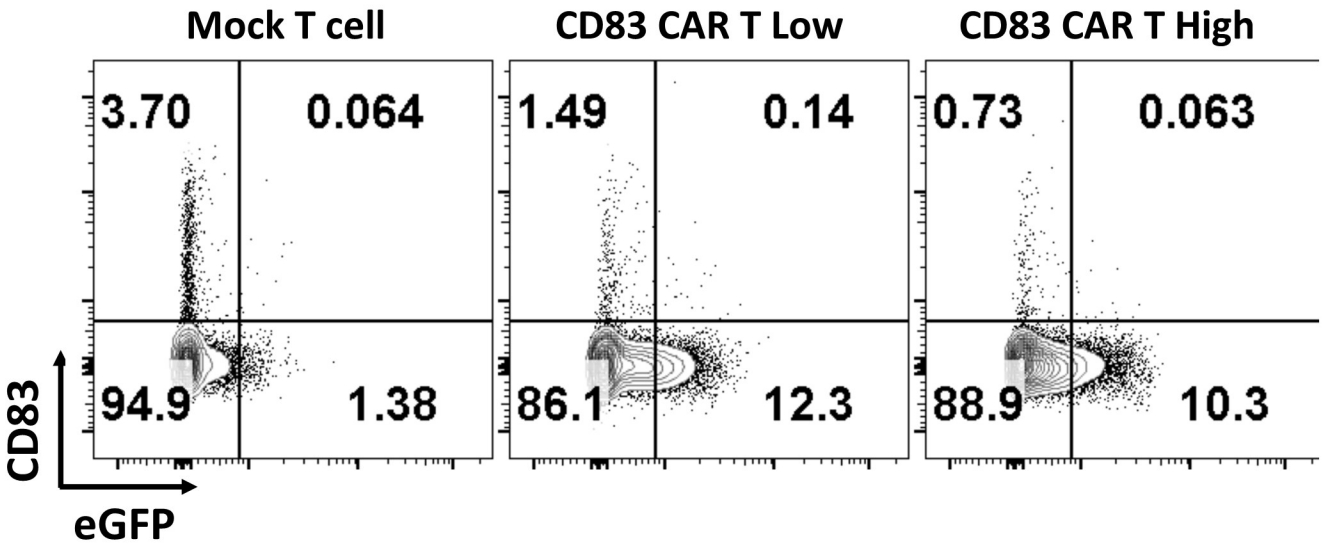
Supplemental Figure 3: Human CD83 CAR T cells eliminate CD83$^+$ targets at day +21. NSG mice were transplanted with 25x10^6 human PBMCs plus 1x10^6 CD83 CAR or mock transduced T cells. Recipient mice were humanely euthanized at day +21 and the amount of eGFP$^+$ CARs, CD83$^+$, CD1c$^+$ DCs, and CD83$^+$, CD4$^+$ T cells were analyzed by flow cytometry. A) Graph shows the amount of eGFP$^+$ CAR T cells in the recipient spleens at day +21, as well as the %reduction of CD83$^+$ targets in the spleen normalized by mice injected with mock T cells. B, C) Graphs show the linear regression (dotted line) of CD83$^+$ targets per the amount of eGFP+ CAR T cells recovered at day +21. Spearman rank-order correlation coefficient is shown (B, C). Pooled data from 2 independent experiments, up to 6 mice per experimental arm.



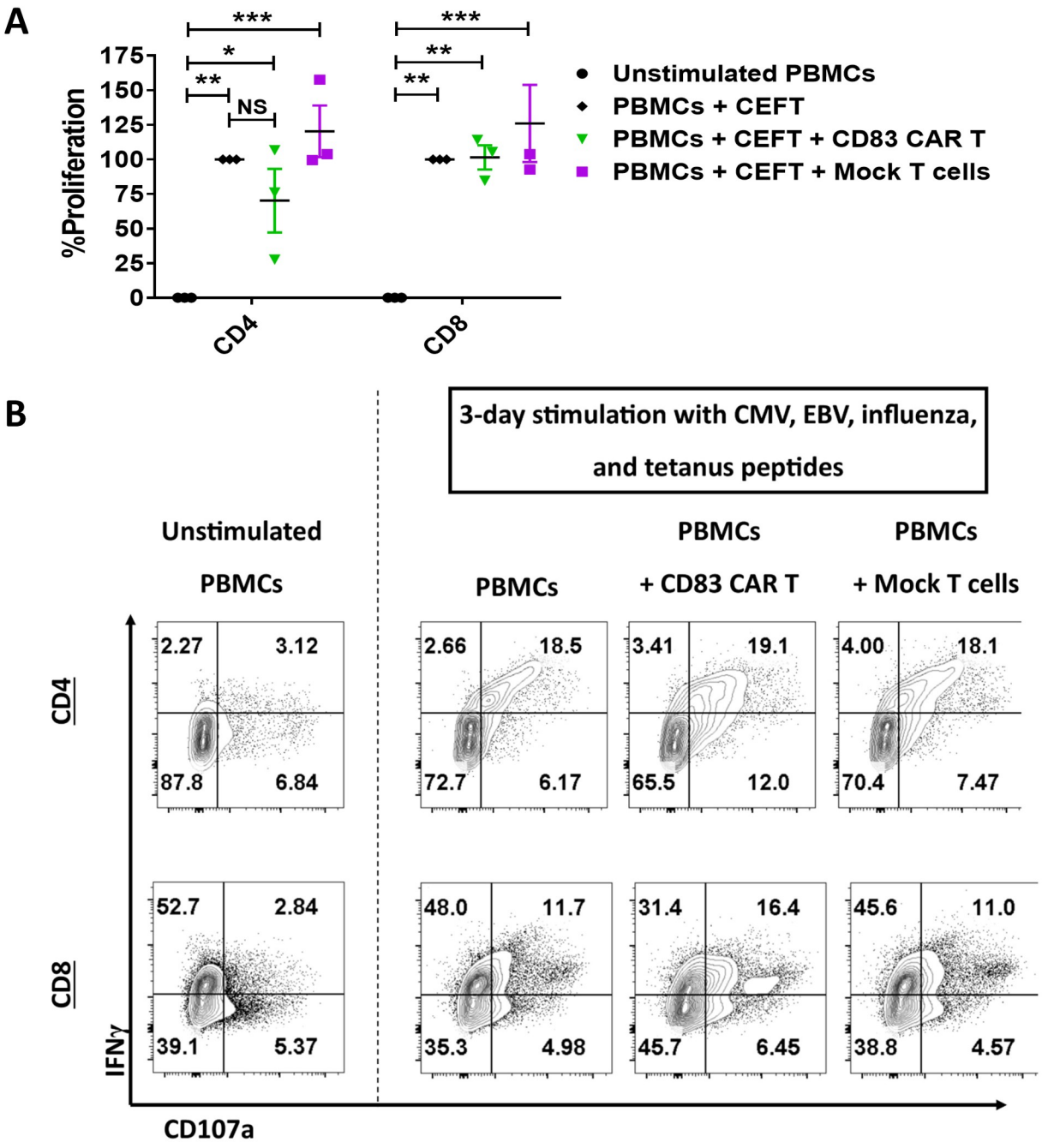
Supplemental Figure 4: DC-depletion does not prevent xenogeneic GVHD mediated by human T cells. NSG mice received $7.5x10^6$ purified human T cells alone or with $1.87x10^5$ autologous dendritic cells. The dendritic cells were isolated by magnetic bead purification (Miltenyi), and included plasmacytoid DCs, $CD1c^+$ type-1 myeloid DCs, and $CD1c^-$, $CD141^{bright}$ type-2 myeloid DCs. (A) Survival and (B) GVHD clinical scores are shown. A representative experiment is shown, 4 mice per experimental arm.



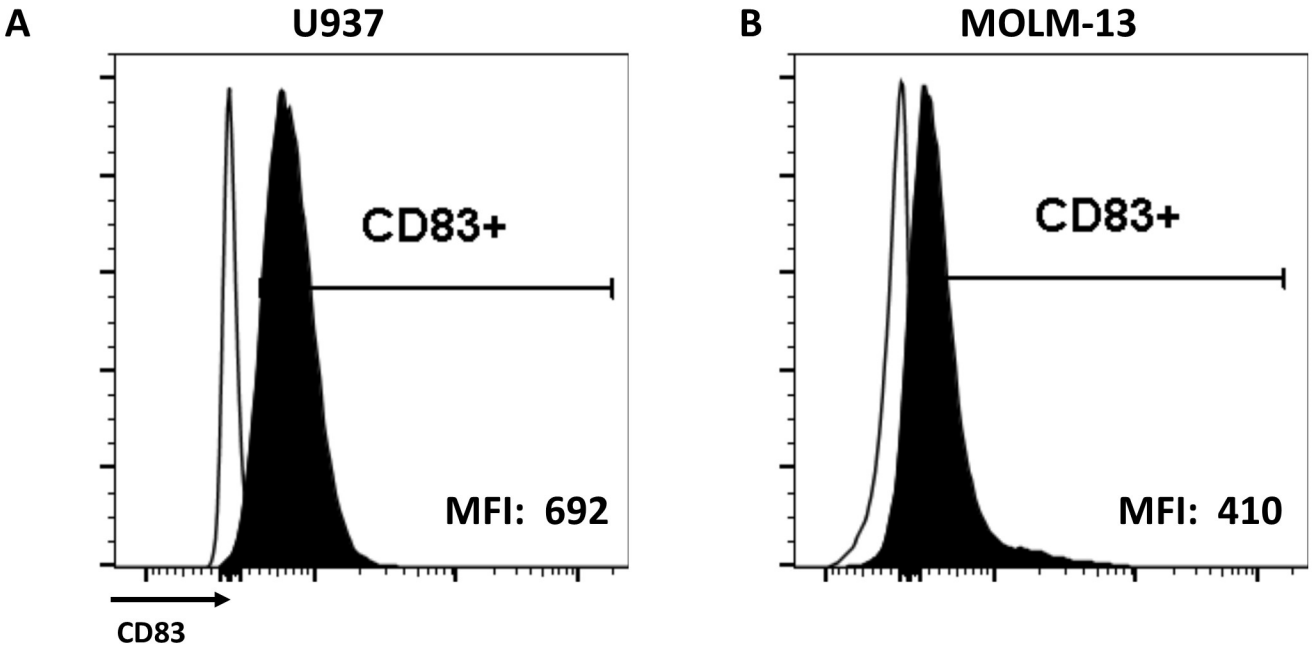
Supplemental Figure 5: Human CD83 CAR T cells do not reduce the amount of donor Th17 cells. NSG mice received 25x10^6 human PBMCs plus 1x10^6 CD83 CAR or mock transduced T cells as described. Mice were humanely euthanized on day +21 and the spleens were harvested. A) Representative contour plots show the frequency of human CD4$^+$, IL-17$^+$ Th17 cells in the mouse spleens at day +21. B) Graph shows the absolute number (mean ± SEM) of human Th17 cells in the mouse spleens at day +21. Pooled data from 2 independent experiments, up to 6 mice per experimental arm.



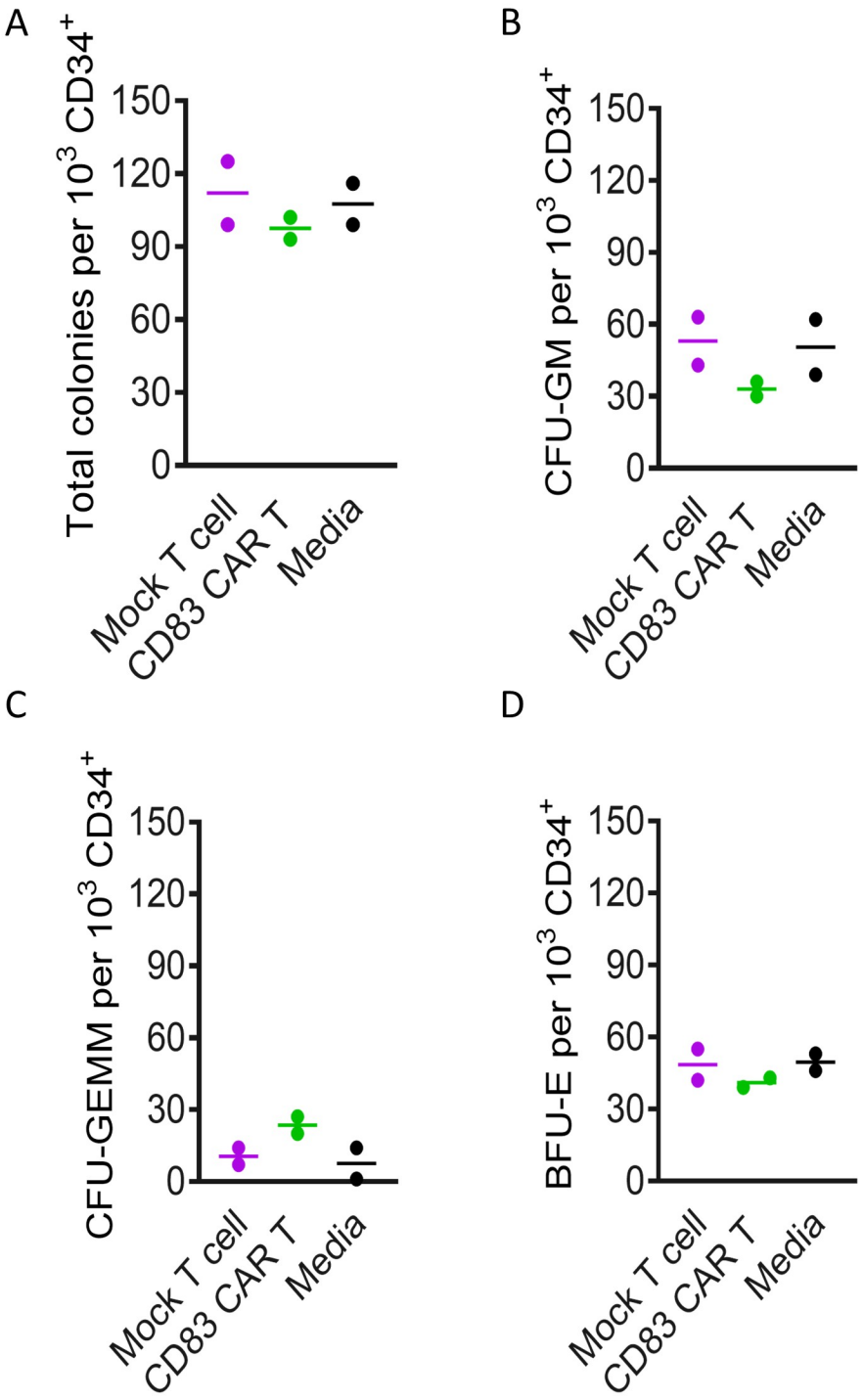
Supplemental Figure 6: Human CD83 CAR T cells are present at day +100. NSG mice received $25x10^6$ human PBMCs plus 1-$10x10^6$ CD83 CAR or $10x10^6$ mock transduced T cells. The contour plots show the amount of $CD83^+$ target cells versus $eGFP^+$ CD83 CAR T cells from the spleens of representative mice that survived up to the day +100 endpoint. Data from 1 representative experiment of 3 is shown.



Supplemental Figure 7: Human CD83 CAR T cells permit anti-viral immunity. Human peripheral blood mononuclear cells (PBMCs) were stimulated with cytomegalovirus, Epstein-Barr virus, influenza, and tetanus (CEFT) peptide for 3 days, in the presence of CD83-targeted CAR or mock transduced T cells (T cell to CAR ratio ~10:1). A) Graph shows % proliferation ± SEM of CEFT-stimulated $CD4^+$ and $CD8^+$ T cells after 3 days of culture with CD83 CAR or mock transduced T cells. n=3 independent experiments. B) Representative contour plots show the frequency of $CD4^+$ and $CD8^+$ T cells that produce IFNγ and degranulate after CEFT stimulation in the presence of CD83 CAR or mock transduced T cells. 1 of 3 representative experiments is shown. ANOVA (A). **P*<.05, ***P*=.001-.01, and ****P*=.0001-.001. NS = not significant.

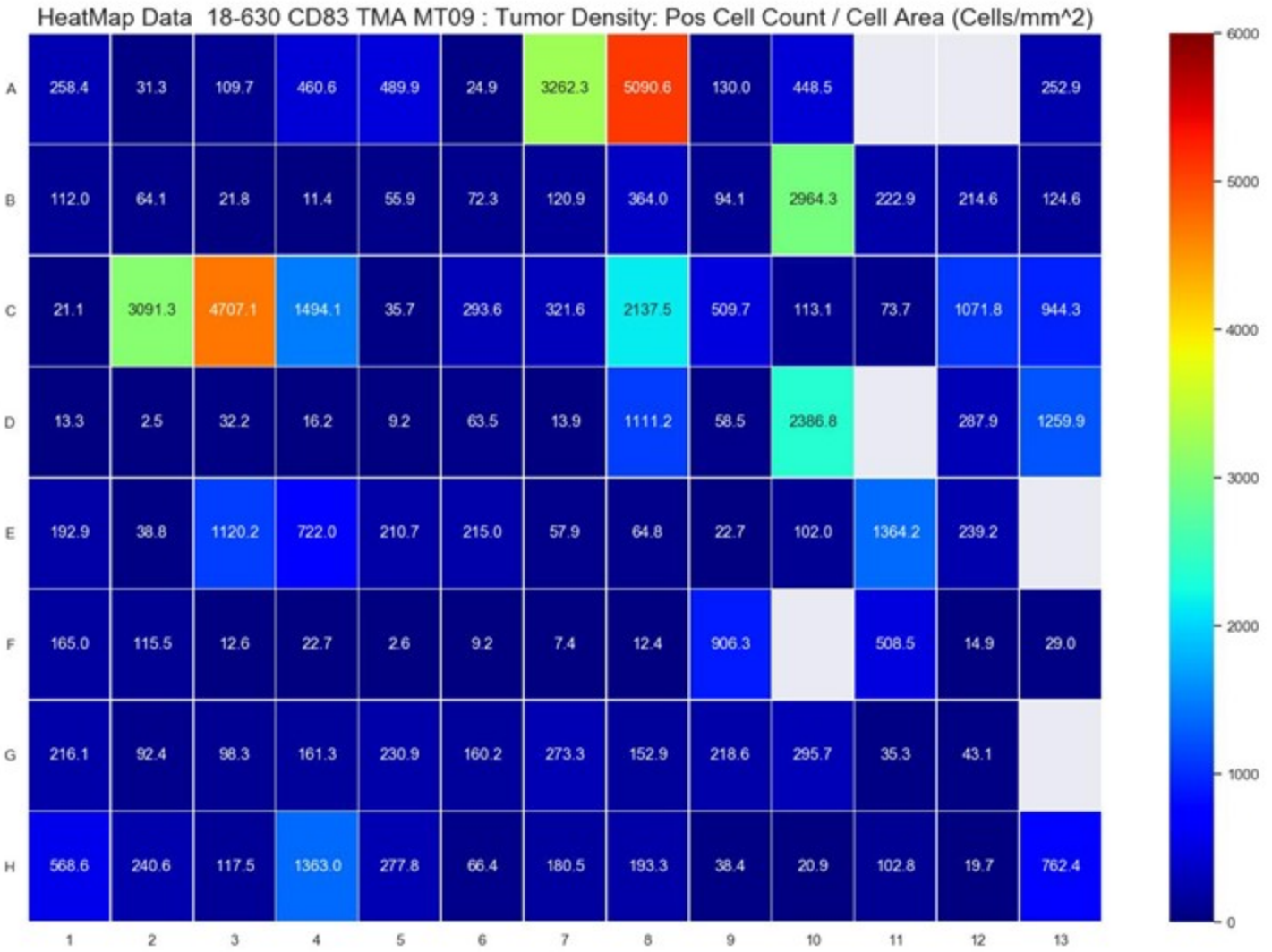


Supplemental Figure 8: Expression of CD83 on U937 and MOLM-13 cells. Histogram shows CD83 expression among proliferating A) U937 and B) MOLM-13 cells with MFI noted in the lower right-hand corner.



Supplemental Figure 9: Impact of human CD83 CAR T cells on hematopoietic stem cells in vitro. $CD34^+$ cells isolated from normal human bone marrow were co-incubated with either CAR T cells, mock T cells, or media alone at a 10:1 effector-to-target ratio for 4 hours. Cells were plated in Methocult medium in duplicates and cultured for 14 days, followed by colony counts. Graphs show the amount of A) total colonies, B) colony forming units (CFU)-granulocyte/macrophage (GM), C) CFU-granulocyte/erythrocyte/monocyte/ megakaryocyte (GEMM), and D) erythroid blast forming units (BFU). n=2 independent donors.

A



B

	1	2	3	4	5	6	7	8	9	10	11	12	13
A	Adrenal Gland	Adrenal Gland	Adrenal Gland	Bladder Urinary	Bladder urinary	Bladder Urinary	Bone marrow	Bone marrow	Head and neck, salivary	Head and neck , Salivary	Eye	Eye	Breast
B	Breast	Breast	Cerebellum	Cerebellum	Cerebellum	Cerebral cortex	Cerebral cortex	Cerebral cortex	Fallopian tube	Fallopian tube	Fallopian tube	Esophagus	Esophagus
C	Esophagus	Stomach	Stomach	Stomach	Small Intestine	Small Intestine	Small Intestine	Colon	Colon	Colon	Rectum	Rectum	Rectum
D	Heart	Heart	Heart	Kidney cortex	Kidney cortex	Kidney cortex	Kidney medulla	Kidney medulla	Peripheral Nerve	Peripheral Nerve	Ureter	Ureter	Liver
E	Liver	Liver	Lung	Lung	Lung	Ovary	Ovary	Ovary	Pancreas	Pancreas	Pancreas	Parathyroid	Parathyroid
F	Pituitary gland	Pituitary gland	Pituitary gland	Placenta	Placenta	Placenta	Prostate	Prostate	Skin	Skin	Skin	Spinal Cord	Spinal Cord
G	Spleen	Spleen	Spleen	Skeletal muscle	Skeletal muscle	Skeletal muscle	Testis	Testis	Testis	Thymus	Thymus	Thymus	
H	Thyroid	Thyroid	Thyroid	Tonsil	Tonsil	Tonsil	Uterus, cervix	Uterus, cervix	Uterus, cervix	Uterus, endometrium	Uterus, endometrium	Uterus, endometrium	

Supplemental Figure 10: Human CD83 Tissue Microarray. CD83 protein expression was evaluated by quantitative immunohistochemistry on FFPE human TMA by Reveal Biosciences, Inc. CD83 was performed at 1:200 dilution. Heat-induced epitope retrieval was performed on a Leica Bond immunostainer with Leica Bond Epitope Retrieval buffer 1 (Citrate, pH 6.0) for 20 mins. Positive signal was visualized using DAB with a hematoxylin nuclear counterstain. A) Heat map of CD83 positive cells per mm^2 of tissue. B) Plate layout names of tissues in heatmap.

Supplemental Table 1: Key reagents				
Antibodies				
Antigen:	**Fluor:**	**Manufacturer:**	**Clone:**	**Catalog #**
CD127	**AF647**	**BD Biosciences**	**HIL-7R-M21**	**558598**
CD4	**FITC**	**ThermoFisher**	**OKT4**	**11-0048-42**
CD25	**PECy7**	**ThermoFisher**	**M-A251**	**557741**
Foxp3	**PE**	**BD Biosciences**	**259D/C7**	**560046**
Ki67	**PE**	**ThermoFisher**	**20Raj1**	**12-5699-42**
CD4	**PECy7**	**ThermoFisher**	**SK3**	**25-0047-42**
IL-4	**APC**	**ThermoFisher**	**8D4-8**	**17-7049-42**
IFN-γ	**FITC**	**BD Biosciences**	**B27**	**554700**
IL-17	**BV421**	**Biolegend**	**BL168**	**512322**
GATA3	**BV421**	**BD Horizon**	**L50-823**	**563349**
T-BET	**PECy7**	**Biolegend**	**4B10**	**644824**
RORγt	**BV650**	**BD Horizon**	**Q21-559**	**563424**
CD3	**FITC**	**ThermoFisher**	**OKT3**	**11-0037-42**
CD4	**PE**	**ThermoFisher**	**RPA-T4**	**12-0049-42**
CD83	**APC**	**Miltenyi Biotec**	**REA714**	**130-110-504**

CD83	**PE**	**BD Pharmingen**	**HB15e**	**556855**
Chemicals, Peptides, and Recombinant Proteins				
Live Dead Fixable Yellow Stain		**ThermoFisher**		**L34959**
Live Dead Fixable Aqua Stain		**ThermoFisher**		**L34965**
Human recombinant IL-2		**R&D**		**202-IL/CF**