Table S1. T Cell Product Release Criteria

Release Test	Test Methodology	Criteria for Passing
Plasmid vector copy number†	Southern w/ NeoR-specific probe	Single band
CAR expression	Western w/CD3ζ-specific antibody Flow cytometry w/Fc-specific antibody	Unique 66kDa band Unimodal expression
Surface phenotype	Flow cytometry	$\geq$ 90% TCR-αβ and CD8†; or CD3‡
Anti-lymphoma cytolytic activity	4-hr ^{51}Cr release assay	>50% specific lysis at E:T of 25:1
Viability	Trypan blue dye exclusion	>90% viability
Sensitivity to ganciclovir‡	14-day culture, trypan blue dye exclusion	$\leq$ 25% viability
Antigen/IL-2 dependent growth	^{3}H-TdR uptake assay	<10% of Jurkat c.p.m.†; or positive control cell number‡
Sterility	Bacterial and fungal growth media Gen-Probe mycoplasma detection Endotoxin ELISA	Negative cultures Negative mycoplasma < 5 EU/kg

†, IRB 98142 only
‡, IRB 01160 only

Table S2. Patient attributes

IRB#	UPN#	Diagnosis	Disease Burden (at time of enrollment)	Prior Rituximab	ALC† (cells/μL)	CD4/CD8$^+$ T cells‡	CD19/CD20$^+$ B cells	
							Pre‡	Post*
98142	**006**	Diffuse large cell lymphoma	Limited lymph node involvement	NO	1,096	CD4: 61.9% CD8: 16.0%	CD19: 0.43% CD20: 0.65%	21.32% 19.27%
	009	Diffuse large cell lymphoma	Limited lymph node involvement	YES	1,155	CD4: 53.3% CD8: 42.8%	CD19: 2.58% CD20: 8.24%	1.07% 1.37%
01160	**035**	Follicular lymphoma	Bulky disease	YES	1,663	CD4: 27.2% CD8: 30.1%	CD19: 0.03%	0.24%
	037	Follicular lymphoma	Limited lymph node involvement	YES	2,404	CD4: 35.1% CD8: 28.8%	CD19: 0.24%	0.08%

†, Absolute lymphocyte counts upon enrollment
‡, Percent of total peripheral blood mononuclear cells on day 0, prior to first infusion
*, Percent of total peripheral blood mononuclear cells 14 days after final infusion

Table S3. Absolute lymphocyte counts

IRB#	UPN#	ALC (cells/μL)*		
		Enrollment	**Day 0**	**Day 14**
98142†	**006**	1,096	763	1,044∞
	009	1,155	850	1,049
01160‡	**035**	1,663	1,505	1,188
	037	2,404	1,444	1,709

*, Normal range = 600 – 4,950 cells/μL
†, Myeloablation and hematopoietic stem cell transplantation occurred between enrollment and day 0
‡, Fludarabine administration occurred between days 0 and 14
∞, ALC for UPN006 acquired at day 28 due to re-scheduled second infusion

Supplemental Figure Legends

Figure S1. Product Manufacturing Strategy. (A) Plasmid vectors used to genetically redirect the patient's T cells to recognize CD20 (left) and CD19 (right). CD20- and CD19-specific CAR sequences (CD20R and CD19R) are indicated, as well as promoter (CMVp, EF-1p, SV40p), poly adenylation (BGHpolyA, SV40polyA), drug resistance (AmpR, NeoR, Hy), and origin of replication (ColE1ori, F1 ori) sequences. Note that the HyTK sequence is a fusion of the hygromycin resistance gene, and the HSV-1 thymidine kinase suicide gene. **(B)** Schematic of the CD20- and CD19-specific CAR molecules. Each has a murine single chain variable fragment (scFv) which makes it specific for either CD20 or CD19, a human IgG hinge-Fc (huγFc) domain, a human CD4 transmembrane (huCD4tm) domain, and a human CD3ζ cytoplasmic (huCD3ζcyt) domain. **(C)** Product manufacturing schema of genetically modified T cells that target CD20 (left) and CD19 (right). Patient peripheral blood mononuclear cells were activated with the CD3 agonist OKT3 and rhuIL-2 for three days and then electroporated with linearized CD20R_pcDNA3.1(-) (left) or CD19R_HyTK-pMG (right). Cells were placed in drug selection conditions 2-3 days later. Cloning (for CD20R expressing products only) and expansion were carried out in the presence of OKT3, rhuIL-2, irradiated LCL and irradiated PBMC feeders. T-25, T-75 and T-150 refer to flask sizes that permit 25, 50 and 100 mL of culture media respectively. At certain steps, the target number of selected CD20-specific T cell clones that were to be generated are indicated in the schema on the left. Performance of tests for viability, sterility, the presence of mycoplasma or endotoxin, transgene copy number (Southern and PCR), total and surface CAR expression (via Western and flow cytometry), IL-2 dependence, and cytolytic activity against CD20- (left) or CD19- (right) expressing targets (Micro-CRA, CRA) are indicated.

Figure S2. Protocol treatment schemas. (A) Treatment schema for recurrent/refractory $CD20^+$ lymphoma using $CD20R^+$ autologous T cells. Autologous stem cell transplants were to be administered after a myeloablative preparative regimen of high dose chemotherapy with or without fractionated total body irradiation; administration of escalating T cell dose infusions at two week intervals would then began as early as 28 days later. **(B)** Treatment schema for $CD19^+$ follicular lymphoma using $CD19R^+$ $HyTK^+$ autologous T cells. Lymphodepleting fludarabine was to be administered i.v. at $25mg/m^2$ x 5d; T cell supportive rhuIL-2 was to be administered s.c. at $5x10^5$ IU/ m^2 BID for up to 5 days after infusions #3 and #4.