CLAIMS

1. A composition comprising T cells enriched in γδ T cells and depleted in αβ T cells wherein the composition comprises greater than 60% γδ T cells, less than about 5% αβ T cells and less than about 25% natural killer (NK) cells.

2. The composition of claim 1 wherein at least about 70% of the cells in the composition are viable.

3. The composition of claim 1 or claim 2 for use in an allogeneic hematopoietic stem cell transplantation (HSCT) treatment regimen in a patient, wherein the composition is used as a cell graft infusion, and wherein the composition comprises about 5 x 10^8 γδ T cells/kg or less of the patient's weight, about 1 x 10^7 γδ T cells/kg or less of the patient's weight, or about 5 x 10^6 γδ T cells/kg or less of the patient's weight.

4. The composition of claim 3 wherein the patient has been infused with allogeneic hematopoietic stem cells (HSC) comprising peripheral blood stem cells (PBSC) prior to infusion with the composition.

5. The composition of claim 4 wherein the patient has been infused with an agent which provides *in vivo* T cell depletion in the patient prior to infusion with the composition.

6. The composition of claim 5 wherein the patient is infused with allogeneic hematopoietic stem cells comprising peripheral blood stem cells (PBSC) on day 0.

7. The composition of claim 6 wherein the patient is infused with an agent which provides *in vivo* T cell depletion on about day +1 to day +10 relative to day 0.

8. The composition of claim 7 wherein the patient is infused with the composition on about day +7 to about day +25 relative to day 0; or on about day +7 to about day +9 relative to day 0.

9. The composition of claim 6 wherein the patient is to be administered a Graft vs. Host Disease (GvHD) prophylactic treatment regimen, wherein the patient is to be administered CY, mycophenolate mofetil (MMF), tacrolimus, or any combination thereof on one or more days starting at about day +5 relative to day 0 and continuing until about day +50 or more relative to day 0.

10. The composition of any one of claims 5 or 7 wherein the agent which provides *in vivo* T cell depletion is cyclophosphamide (CY).

11. The composition of claim 1 or claim 2 for use in the treatment of acute lymphoblastic leukemia (ALL); relapsed ALL; Hodgkin lymphoma (HL); Non-Hodgkin lymphoma (NHL); relapsed HL or NHL; acute myeloid leukemia (AML); relapsed AML; chronic myeloid leukemia (CML); myelodysplastic syndrome (MDS); refractory MDS; astrocytoma; Atypical Teratoid Rhaboid Tumor; brain stem glioma; choroid plexus tumors, carcinoma and papilloma; craniopharyngioma; desmoplastic infantile astrocytoma; germ cell tumor; medulloblastoma; neurofibromatosis; oligodendroglioma; optic glioma; neuroblastoma; Ewing's Sarcoma; infection; or Primitive Neuroectodermal Tumor, wherein the treatment comprises HSCT treatment regimen and wherein the composition is used as a cell graft infusion.

12. The composition of claim 11 wherein the composition comprises about 5 x 10^8 γδ T cells/kg or less of the patient's weight; about 1 x 10^7 γδ T cells/kg or less of the patient's weight; or about 5 x 10^6 γδ T cells/kg or less of the patient's weight.

13. The composition of any one of claims 3, 4, or 6 wherein the allogeneic HSCs are haploidentical HSCs.