Adoptively transferred T lymphocytes engineered with chimeric antigen receptors are an emerging class of new immunotherapies that are providing meaningful clinical benefit to patients with hematological malignancies. CAR-T cells are in effect living drugs that expand, contract and actively home to distal tumor sites. To better understand the behavior and pharmacodynamics of CAR-T cells in vivo we have engineered in a PSMA-PET imaging tag to allow for direct detection of CAR-T cells in vivo. Proof of concept studies in murine xenogeneic tumor models demonstrate detection of CAR-T cells both in primary and metastatic tumor sites. No impact on CAR-T function or therapeutic efficacy was observed. This approach represents a promising and non-immunogenic platform for in vivo imaging in patients with hematological and solid tumors.