WHAT IS CLAIMED IS:

1. An isolated, modified human kynureninase enzyme having an amino acid sequence of SEQ ID NO: 3.

2. An isolated, modified human kynureninase enzyme, said modified enzyme having an amino acid sequence that is at least 95% identical to a human kynureninase enzyme of SEQ ID NO: 1 and comprising the substitutions L72N, H102W, A282P, F306W, I331S and N333T.

3. The enzyme of claim 2, wherein the enzyme has a catalytic activity for kynurenine (KYN) (kcat/kM) of at least $8000M^{-1}s^{-1}$.

4. The enzyme of claim 2, wherein the amino acid sequence is at least 95% identical to the amino acid sequence of SEQ ID NO: 2 or SEQ ID NO: 3.

5. The enzyme of any one of claims 1-4, further comprising a heterologous peptide segment.

6. The enzyme of any one of claims 1-4, wherein the enzyme is coupled to polyethylene glycol (PEG).

7. The enzyme of claim 6, wherein the enzyme is coupled to PEG at one or more Lys or Cys residues.

8. A nucleic acid comprising a nucleotide sequence encoding the enzyme of any one of claims 1-5.

9. The nucleic acid of claim 8, wherein the nucleic acid is codon-optimized for expression in bacteria, fungus, insects, or mammals.

10. An expression vector comprising the nucleic acid of claim 8 or 9.

11. A host cell comprising the nucleic acid of claim 8 or 9 or the expression vector of claim 10.

12. The host cell of claim 11, wherein the host cell is a bacterial cell, a fungal cell, an insect cell, or a mammalian cell.

13. The host cell of claim 12, wherein the mammalian cell is a mammalian immune effector cell.

14. The host cell of claim 13, wherein the mammalian immune effector cell is a NK-cell or a T-cell.

15. A pharmaceutical formulation comprising an enzyme in accordance with any one of claims 1-7 in a pharmaceutically acceptable carrier.

16. Use of a composition comprising an effective amount of the enzyme of any one of claims 1-7, in the manufacture of a medicament for the treatment of a subject having a tumor.

17. The use of claim 16, wherein the subject has been identified as having an IDO1, IDO2, or TDO expressing tumor.

18. The use of claim 16, wherein:

(a) the tumor is a solid tumor or a hematological tumor;

(b) the subject is a human patient;

(c) the composition is formulated to be administered intratumorally, intravenously, intradermally, intraarterially, intraperitoneally, intralesionally, intracranially, intraarticularly, intraprostaticaly, intrapleurally, intratracheally, intraocularly, intranasally, intravitreally, intravaginally, intrarectally, intramuscularly, subcutaneously, subconjunctival, intravesicularlly, mucosally, intrapericardially, intraumbilically, orally, by inhalation, by injection, by infusion, by continuous infusion, by localized perfusion bathing target cells directly, via a catheter, or via a lavage; and/or

(d) the composition is formulated to be administered with at least a second anti-cancer therapy.

19. The use of claim 18, wherein the second anticancer therapy is radiation therapy, surgical therapy, an immunotherapy or a second anticancer compound.

20. The use of claim 19, wherein:

(i) the second anticancer compound is an immune checkpoint inhibitor; and/or

(ii) the immunotherapy comprises immune effector cells or an immunogenic composition to be administered to the subject.

21. The use of claim 20, wherein the immune checkpoint inhibitor comprises an antibody or antibody-drug conjugate.

22. The use of claim 21, wherein the antibody is an anti-PD1, anti-CTLA-4, or anti-PD-L1 antibody.

23. The use of claim 20, wherein the immunogenic composition comprises cancer cell antigens and/or wherein the immune effector cells comprise NK-cells, T-cells, or CAR T-cells.

24. A transgenic T cell comprising an expressed kynureninase enzyme according to any one of claims 1-7.

25. The transgenic T cell of claim 24, wherein:

(a) the transgenic T cell further comprises an expressed chimeric antigen T-cell receptor (CAR) or an engineered T-cell receptor (TCR);

(b) the transgenic T cell is a human transgenic T cell;

(c) DNA encoding the CAR and the kynureninase is integrated into the genome of the cell; and/or

(d) wherein the CAR is targeted to a cancer-cell antigen.

26. The transgenic T cell of claim 25, wherein the cancer-cell antigen is HER2, CD19, CD20, or GD2.

27. A composition comprising an effective amount of transgenic cells in accordance with any one of claims 24-26, for use in the treatment a subject having a tumor.

28. The composition of claim 27, wherein:

(a) the transgenic cells are autologous; or

(b) the transgenic cells are heterologous.

29. Use of a kynureninase enzyme in accordance with any one of claims 1-7 or a nucleic acid in accordance with claim 8, in the manufacture of a medicament for the treatment of a tumor.

30. Use of a transgenic T cell in accordance with any one of claims 24-26, in the manufacture of a medicament for the treatment of a tumor.