# Persistent Memory T-Cell Responses to Cancer and Infectious-disease Antigens by Manipulation of Amino Acid-catabolism Pathways

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**CONTACT**

Amir J. Kallas

ajkallas@ucdavis.edu

tel: .



## INVENTORS

- Hartigan-O'Connor, Dennis

## OTHER INFORMATION

### KEYWORDS

amino acid catabolism, cd4+ memory t cells, immune modulation, vaccines, viral vectors, tumor-associated antigens, tryptophan metabolism, immunotherapy, infectious diseases, indoleamine 2,3-dioxygenase

### CATEGORIZED AS

- **Biotechnology**
  - Health
- **Medical**
  - Disease: Cancer

## ABSTRACT

Researchers at the University of California, Davis, have created a technology that uses engineered polynucleotides to deliver both an antigen and an enzyme that breaks down amino acids. This approach is designed to boost long-lasting memory T-cell responses, providing stronger protection against infectious diseases and cancer.

## FULL DESCRIPTION

The invention provides compositions and methods leveraging co-expression of infectious disease or tumor-associated antigens alongside enzymes involved in amino acid catabolism pathways—such as indoleamine 2,3-dioxygenase 1 (IDO1) or arginase 1—to rebalance immune responses. This approach enhances long-lived memory CD4+ T-cell responses while modulating effector T-cell activity, leading to improved vaccine efficacy and immunotherapy outcomes against diseases including viral infections (e.g., SARS-CoV-2, HIV) and cancers.

## APPLICATIONS

- Advanced vaccines for viral infectious diseases, including SARS-CoV-2, HIV, influenza, and hepatitis C.
- Immunotherapies targeting cancers via tumor-associated antigens and neoantigens.
- Combination vaccine platforms incorporating immunoregulatory enzymes for improved efficacy.
- Therapeutic interventions for bacterial, fungal, protozoan, and helminthic infections.
- Development of diagnostic biomarker profiles and monitoring tools to accurately track vaccination or treatment success.

## FEATURES/BENEFITS

- Induces robust and durable memory CD4+ T cell responses, shifting the immune profile toward lasting protection rather than transient effector function.
- Rebalances immune responses by enhancing amino acid catabolism, promoting protective memory T cells over short-lived effector T cells.
- Reduces production of detrimental inflammatory cytokines such as IFN-γ, potentially minimizing immunopathology and systemic adverse effects.
- Encodes multiple antigens and catabolic enzymes, expanding versatility for targeting various infectious diseases and cancers.
- Addresses short-lived and suboptimal immune memory generated by conventional vaccines.

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---|---|---|---|---|
| United States Of America | Issued Patent | 12,582,709 | 03/24/2026 | 2020-553 |

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Vaccines Using Macrophage Suppression
- Affinity Targeted Immunogens

- Disease:

Infectious Diseases

- Vaccines

### RELATED CASES

2020-553-0

**University of California, Davis**

**Technology Transfer Office**

1 Shields Avenue, Mrak Hall 4th Floor,

Davis,CA 95616

Tel:

530.754.8649

techtransfer@ucdavis.edu

https://research.ucdavis.edu/technology-transfer/

Fax:

530.754.7620