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

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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

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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
  - Disease: Infectious Diseases
  - Vaccines

RELATED CASES

2020-553-0

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