IMMUNOTHERAPIES
DENDRITIC CELL-TARGETING VACCINES

The Baylor Institute for Immunology Research (BIIR) is a world-renowned leader in the field of dendritic cell (DC)-based immunotherapy, with a body of research that spans the continuum from basic through clinical research, much of which has been facilitated by development of novel enabling technologies and therapeutic compositions.

Dendritic Cell-Targeting Vaccines to Treat and Prevent Infectious Disease and Cancer

As major antigen presenting cells of the immune system, DCs play an important role in establishing immunity against microbial pathogens and cancers. DCs can be activated through various pattern recognition receptors, lectin and lectin-like receptors, and costimulatory molecules expressed on the DC surface. Activation of the DC triggers uptake and processing of the pathogens and presentation of associated antigens to circulating T cells. Antigen-specific T cell populations then expand and mount an immune response against the pathogen.

DC-targeting fusion protein vaccines are composed of an anti-DC antibody conjugated with antigens and potentially with adjuvants. BIIR's proprietary DC-targeting fusion protein technology is a modular approach that has the potential to induce the desired types of antigen-specific immune responses in a wide range of infectious diseases, cancers, and autoimmune diseases.

BIIR has leveraged this knowledge to develop a novel vaccine platform to produce a new generation of vaccines against currently intractable diseases such as HIV, hepatitis C, tuberculosis, influenza and cancers.
One such candidate is a therapeutic HIV vaccine. In collaboration with Dr. Yves Levy and his team at the Agence Nationale de Recherche sur le Sida (ANRS) and the Vaccine Research Institute (VRI) in France, BIIR has established compelling preclinical validation data for treating HIV patients. The HIV vaccine is based on a humanized anti-CD40 IgG4 antibody fused to five HIV peptide antigens selected from the HIV Gag, Nef and Pol viral proteins and has been validated in vitro in PBMC from HIV patients. This vaccine is currently being tested for antigenicity in non-human primates.

Another candidate vaccine is an H1N1 influenza vaccine. The influenza vaccine is based on an anti-CD40 or anti-Dectin-1 antibody fused to a flu antigen, such as hemagglutinin (HA) 1 or the influenza nuclear protein (NP). Antigenicity in non-human primates has been established and studies are currently underway to test this vaccine approach in a clinically relevant non-human primate influenza challenge model.

In addition to viral antigens, scientists at BIIR are using this technology to engineer DC-targeting cancer vaccines. For example, a candidate vaccine to treat HPV-related cancers, including head and neck, cervical, and other mucosal malignancies, has been identified and is being developed at BIIR. This molecule is based on a humanized anti-CD40 IgG4 antibody fused to proteins from HPV16, a strain highly relevant in tumorigenesis. BIIR is committed to producing clinical grade vaccine for critical proof of concept clinical trials in cervical or head and neck cancer patients.

BIIR’s proprietary DC-targeting fusion protein technology is also being used to generate immune tolerance to treat autoimmune disease. For example, scientists at BIIR have a candidate vaccine for multiple sclerosis, based on an anti-DC-ASGPR IgG4 antibody fused to a relevant MS antigen. This vaccine is being tested in a non-human primate model of MS and may represent a novel immune-modulatory approach to inducing tolerance in MS and other autoimmune diseases.

Opportunities

Patent applications have been filed for each of these innovations and are available for licensing. The patent applications encompass a wide range of compositions and indications, spanning cancer, infectious disease, auto-immune disease, allergy and inflammation.

In addition to licensing, opportunities exist for partnering and collaboration to further advance these technologies.

Selected Publications:


Flamar A. et al. (2013) Targeting concatenated HIV antigens to human CD40 expands a broad repertoire of multifunctional CD4+ and CD8+ T cells. Aids, v. 27, pp. 2041-2051