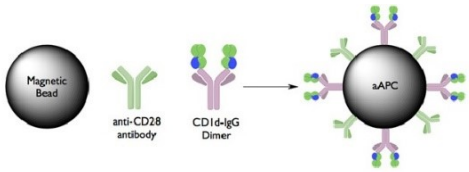
TECHNOLOGY

Nanoparticle-Based Artificial Antigen Presenting Cell for the Modulation of Natural Killer T (NKT) Cells

OVERVIEW

Natural killer T (NKT) cells constitute an important subset of T cells that can both, directly and indirectly, mediate antitumor immunity. It has been reported that the number of NKT cells in cancer patients can be 47% lower than those found in healthy patients. An effective mean of generating populations of NKT cells would be therapeutically useful for the treatment of cancer. However, the nonselective activation of all NKT cells or activation of the wrong subset could result in unwanted immunological outcomes. This technology refers to the generation of artificial antigen-presenting cells (aAPCs) that activate and generate NKT cells, *in vivo* or *ex vivo*, from samples comprising of NKT cells or precursor cells. These aAPCs have been used for the targeted modulation of *specific* T cell populations.

The technology describes a method for preparing artificial antigen presenting cells (aAPC) that can be used to modulate NKT activity. CD1d-Ig-based aAPC are made by covalently coupling CD1d-Ig and co-stimulatory molecules to magnetic beads. aAPC can be designed in such a way to standarize and optimize NKT cell proliferation. aAPCs were first generated by coupling CD1d-Ig and anti-CD28 antibodies to magnetic beads. They can also be generated to contain other microparticles or nanoparticles, such as quantum dots or polymeric particles. aAPCs comprise a population of surface ligands that can activate NKT cells, including but not limited to, CD1d antigen presenting complex. These aAPCs can be used for the targeted modulation of *specific* T cell populations as they can be loaded with monomeric antibodies and dimeric fusion proteins and used to activate both NKT cells hybridomas and primary NKT cells. CD1d-Ig based aAPCs have been found to propagate NKT cells from healthy controls effectively in patients with either melanoma, diffuse large B-cell lymphoma, or mantle cell lymphoma. In the case of the use of quantum dots (Qdots), these inherently fluorescent nanoparticles (10-20 nm in size) are commercially available as a method of staining and labeling cells. This technology describes the functional modification of these Qdots to be incorporated into aAPC (Qdot-aAPC), and be used stimulate specific NKT cells.



APPLICATIONS

The global cancer immunotherapy market reached $61.9 billion in 2016 and is expected to reach $119.4 billion by 2021 at a compound annual growth rate of 14%. To date, nine immunotherapy drugs have been approved across the US and Europe for more more than 25 cancer indications.

Immunotherapy based on NKT cells has been limited because there currently lacks an effective means of generating a therapeutically useful population of NKT cells. Immunotherapy based on NKT cells may provide an effective treatment for solid and hematological malignancies, including orphan diseases such as mantle cell, follicular, Hodgkin and diffuse large B-cell lymphoma, and acute myeloid and chronic myelogenous leukemia.

ADVANTAGES

Novel method for stimulating NKT cells in vitro

STAGE OF DEVELOPMENT

This technology has been tested *in vivo* in transgenic animal models and *ex vivo* in samples from cancer patients and healthy controls.

(As of 2/23/2017)- MEW

LICENSING POTENTIAL

Available for licensing

Available for sponsored Research

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PATENT STATUS

PCT/US2014/059038, US 15/027,148

LICENSE STATUS

Available for licensing

CATEGORIES

- Nanotechnology + Nanoparticles + Nanomaterials

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ATTACHMENTS

- Download TW-2012-105 Marketing FINAL.pdf

EXTERNAL RESOURCES

- Connecting the dots: artificial antigen presenting cell-mediated modulation of natural killer T cells

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