Treatment of Autoimmune Diseases and Vasculitides with Immune Modulatory Peptides

Tech ID: 25131 / UC Case 2015-050-0

BACKGROUND

Regulatory T cells (Treg) are important to control immune homeostasis and control inflammation. In autoimmunity Tregs play a critical role in down-sizing autoreactive T cells and, via interleukin-10 (IL-10) secretion, they regulate not only inflammation but also the fibrotic process that often complicates systemic autoimmune diseases.

IVIG therapy is successfully used in many autoimmune conditions, such as immune-mediated thrombocytopenia, autoimmune hemolytic anemia, autoimmune vasculitides and in neurological conditions including Guillain-Barré syndrome, narcolepsy, Parkinson's, Alzheimer's. The expansion of Fc-specific Treg may account as the critical mechanism as the autoimmune pathogenesis in these diseases is now proven and the immunodominant Fc peptides bind HLA molecules strongly associated with these diseases. IVIG treatment is very expensive and is provided as an infusion that requires hospitalization, so alternative treatments are needed.

Immune regulation appears to be the most relevant therapeutic success in down-sizing endothelial inflammation and the vasculitis in Covid-19 infected patients. Suppressive lymphokines and in particular interleukin (IL)-10, the hallmark of regulatory T cells, regulates IL-1 and IL-6 secretion in the vascular compartment. Fc immune modulatory peptides are anticipated to stimulate Treg with potential effects not only on naïve T cell differentiation toward a pro-inflammatory phenotype, but also on innate cells representing a novel therapeutic approach with potential long lasting effects in maintaining the immune homeostasis.

TECHNOLOGY DESCRIPTION

Researchers at UC San Diego have identified a set of 16 immunodominant Fc peptides (that were narrowed down to a 6 peptide combination of immunodominant, conserved sequences), which induces the expansion of Treg that regulate naive T cell differentiation toward a pro-inflammatory phenotype. This Treg population has been found always detectable in the peripheral blood of healthy adult donors and in Kawasaki disease (KD) patients who responded well to the IVIG treatment; but not in KD patients that develop arterial complications despite IVIG therapy. In vitro studies suggest that these Fc immunodominant peptides can overcome this unresponsiveness, which is due to a defect of the antigen processing of the exogenous soluble Fc.

ADVANTAGES

The use of these immunomodulatory synthetic peptides provide significant advantages over other immune suppressive medications and IVIG. The manufacture is not expensive, the treatment does not require hospitalization; the product is stable and reproducible. As far as safety, short synthetic peptides are in the market approved by the FDA in cancer immunotherapy and have been shown to be safe and well-tolerated.

INTELLECTUAL PROPERTY INFO

A patent has been issued and there is a published application (see below)

STATE OF DEVELOPMENT

Human studies on an expanded group of Rheumatoid Arthritis patients with selected peptides is ongoing together with Kawasaki disease children after IVIG therapy.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,428,113	10/01/2019	2015-050
United States Of America	Issued Patent	10,035,823	07/31/2018	2015-050
United States Of America	Published Application	0109172-A1	04/09/2020	2015-050

RELATED MATERIALS

- Autoimmunity. 2015 May; 48(3): 181–188. Fine specificities of natural regulatory T cells after IVIG therapy in patients with Kawasaki disease. Jane C. Burns, Ranim Touma, Yali Song, Robert L. Padilla, Adriana H. Tremoulet, John Sidney, Alessandro Sette, and Alessandra Franco - 05/01/2015

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OTHER INFORMATION

KEYWORDS

Autoimmunity, atherosclerosis, Kawasaki disease, vasculitis, rheumatoid arthritis, Alzheimer's disease narcolepsy, nTreg, IVIG

CATEGORIZED AS

- **Medical**
  - Disease: Autoimmune and Inflammation
  - Disease: Cardiovascular and Circulatory System
  - Therapeutics

RELATED CASES

2015-050-0

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