Cell-Penetrating SOCS Proteins For Intracellular Therapy of Acute Inflammation

VANDERBILT UNIVERSITY
CTTC Center for Technology Transfer & Commercialization

Technology Summary:

Scientists at Vanderbilt have developed a unique intracellular protein therapy as a facile alternative to gene therapy. By engineering cell-penetrating recombinant SOCS proteins (CP-SOCSs) designed to inhibit cytokine signaling inside the cell they prevented or treated acute inflammation in the liver and other major organs in preclinical models. They extended this strategy to the long-acting form of these novel cell-penetrating physiologic suppressors of inflammation and cell death.

Commercial Applications:

This recombinant cell-penetrating protein can potentially be applied to treatment of inflammation, including:

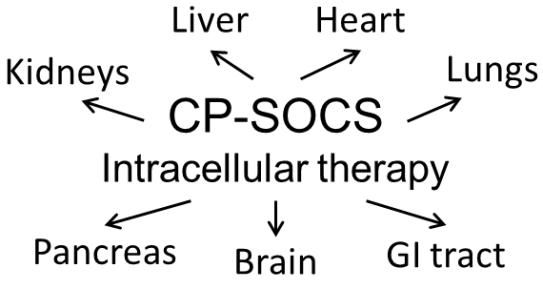
- Acute and chronic liver inflammation
- Acute and chronic lung inflammation
- Autoimmune inflammation in inflammatory bowel diseases, multiple sclerosis, and pancreas
- Myeloproliferative dysplastic syndromes

Problems addressed:

Inflammation is a main mechanism of metabolic, microbial, and autoimmune diseases. It can be exacerbated by alcohol and other toxic insults. It is mediated by messenger molecules on the outside (cytokines and chemokines) and within the cells (signaling intermediates). These proinflammatory messengers are controlled by physiologic proteins known as Suppressors of Cytokine Signaling (SOCSs) that can limit the magnitude and/or duration of an inflammatory response. Physiologic SOCSs are short-lived hence insufficient to extinguish inflammation, Intracellular delivery of cell-penetrating recombinant forms of SOCSs (e.g.CP-SOCS3 engineered as long-acting extinguisher that last 29 times longer) can replenish rapidly destroyed physiologic form. Although originally thought of as a treatment for acute inflammation of the liver and lungs, they can be suitable for other diseases, in particular, inflammatory bowel disease, rheumatoid arthritis, multiple sclerosis, and other autoimmune diseases.

Unique features:

- Provides a novel strategy for treating inflammation or preventing inflammation from recurring. Time course and dosage are controlled as contrasted to gene tx
- Provides a cell-penetrating recombinant form of natural protein comprising a SOCS3 (or SOCS1) with extended lifespan within inflamed cells that can be easily delivered into any cell as a biologically active anti-inflammatory and cytoprotective molecule



- Provides compositions that can be administered in various ways: intravenously, subcutaneously, and by inhalation
- Provides compositions that can be made by well-established protein expression systems

Intellectual Property Status: **U.S. Patent 8,420,296**

CTTC Contact:
Janis Elsner
Phone: (615)322-7056
Fax: (615)343-4419
Email: Janis.elsner@vanderbilt.edu

Vanderbilt Lead Inventor:
Jack J. Hawiger, M.D., Ph.D.
Professor of Molecular Physiology and Biophysics
jack.hawiger@vanderbilt.edu

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