Beneficial Effects of Novel Inhibitors of Soluble Epoxide Hydrolase as Adjuvant Treatment for Cardiac Cell-Based Therapy

Tech ID: 24317 / UC Case 2014-956-0

ABSTRACT

Researchers at the University of California, Davis have identified several novel inhibitors of soluble epoxide hydrolase that may serve as adjuvant treatment for cardiac cell-based therapy. In addition to preventing the development of hypertrophy, fibrosis, and arrhythmias in models of cardiac hypertrophy and failure, soluble epoxide hydrolase inhibitors may be used as adjuvant treatment in cardiac cell-based therapy by increasing stem cell survival and integration within the host cardiac cells.

FULL DESCRIPTION

Cardiac hypertrophy is a type of heart disease which eventually results in cardiac failure. The disease is not reversible and aside from heart transplantation, current treatment is limited to therapy for amelioration of symptoms. As a result, alternative therapies are currently under investigation, and cardiac cell-based therapy may potentially replace cardiac transplantation in the future.

However, one barrier to cell-based regenerative therapy is promoting stem cell survival and integration within injured tissue that is undergoing remodeling, and exhibits robust inflammatory responses.

Researchers at the University of California, Davis have discovered novel inhibitors of soluble epoxide hydrolases (sEHIs) that suppress pro-inflammatory cytokines and chemokines at the injury site. Using a mouse model of myocardial infarction, human induced pluripotent stem cell derived cardiomyocytes (hiPSC-CMs) were transplanted into mouse myocardium treated with these novel sEHIs. Following treatment with sEHIs, animals experienced decreases in infarct size and prevention of cardiac dilatation post-MI. In addition, sEH treatment resulted in a decrease in apoptotic cardiomyocytes and non-myocytes, a decrease in reactive oxygen species production in tissue, and the suppression of cytokine-mediated inflammation in tissue. Furthermore, it has been shown that sEHIs can be easily administered and have few side effects. When combined, these data demonstrate improved cardiac function, prevention of adverse cardiac remodeling and enhanced engraftment of hiPSC-CMs in the injured myocardium with sEHI treatment. Thus, the suppression of inflammation and resolution of pre-existing fibrosis using sEHIs may become an adjuvant to cell-based therapy for cardiac hypertrophy and failure.

APPLICATIONS

› Adjuvant treatment in cardiac cell-based therapy.
› Reduce the development of cardiac fibrosis, hypertrophy, failure, and arrhythmias.

FEATURES/BENEFITS

› Promotes stem cell survival and integration with host cardiac cells.
› Suppresses pro-inflammatory cytokines and chemokines in tissue.
› Reduces cardiac fibroblast proliferation.

PATENT STATUS

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Additional Patent Pending

INVENTORS

› Chiamvimonvat, Nipavan
› Hammock, Bruce D.

OTHER INFORMATION

KEYWORDS

adjuvant, arrhythmia, cardiac, cell therapy, epoxide hydrolase, failure, fibrosis, hypertrophy, inhibitor

CATEGORIZED AS

› Biotechnology
› Health
› Materials & Chemicals
› Biological
› Medical
› Disease: Cardiovascular and Circulatory System
› New Chemical Entities, Drug Leads
› Therapeutics

RELATED CASES

2014-956-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

› Method of Preventing Bone Loss and Periodontal Disease
› Multi-Target Inhibitors for Pain Treatment
› Methods and Compositions of Treating Diabetic Nephropathy and Insulin Resistance
› Improved Dioxin Detection and Measurement
› Detection System for Small Molecules
› Soluble Epoxide Hydrolase-Conditioned Stem Cells for Cardiac Cell-Based Therapy
› Antibodies: Bacillus Delta Endotoxin PAbs
› Antibodies: Bromacil Herbicide PAbs
› Recombinant Neurotoxin: A More Effective Insecticide
› Novel Neuropathy Treatment Using Soluble Epoxide Inhibitors
› PTUPB Compound Potentiates Cisplatin-Based-First Line Therapies with No Additional Toxicity
› Novel and Specific Inhibitors of p21
› Antibodies for Pseudomonas (P.) aeruginosa
› Antibodies: Urea Herbicide Pabs
Bioavailable Dual sEH/PDE4 Inhibitor for Inflammatory Pain

Engineered Biomaterial to Prevent Endothelial Inflammation

Chemical Synthesis of Lipid Mediator 22-HDoHE and Structural Analogs

Antibodies: Triazine Herbicide Pabs