A method to reduce inflammation and promote tissue regeneration using novel stem cell renewal factor PDNF and PDNF derived 20mer peptide PL4-2

Published date: Jan. 22, 2014

Technology description

JR-100 as a Novel Therapeutic Strategy for Tissue Repair in Chronic Neurodegenerative and Inflammatory Diseases

Business Opportunity

Mercio (Pereira) Perrin, MD PhD, of Tufts University, has discovered JR-100, a novel compound that prevents brain degeneration in a mouse model of Huntington's disease and that sustains (more than 56-days after systemic administration) a reversion of disease progression in a mouse model of chronic inflammatory and fibrotic cardiomyopathy. JR-100 acts by functionally mimicking the neurotrophins nerve growth factor (NGF) and neurotrophin-3 (NT-3). It triggers tissue repair events through autocrine (direct activation of cell survival receptors TrkA and TrkC) and paracrine (stimulation of NGF secretion). Cardiac anti-inflammatory and anti-fibrotic tissue repair events triggered by JR-100 result from JR's power to strongly expand cardiac stem/progenitor cells (CPCs) (~100-fold after 12 passagesex vivo) and stimulate CPC differentiation into an anti-inflammatory phenotype. Intravenous JR-100 upregulates stem cell markers in the liver, heart, kidney, and brain. Hence, JR-100 is a biological in the making for chronic inflammatory diseases such as infectious myocarditis, heart hypertrophy and postmyocardial infarction, amyotrophic lateral sclerosis (ALS), and inflammatory bowel disease (IBD), all under investigation in collaboration with relevant experts with the Perrin lab.

Overview:

Chronic degenerative diseases are characterized by progressive loss of healthy tissue and concomitant replacement by fibrosis, leading organ dysfunction and failure, and death. Hence current efforts to advance regenerative medicine approaches to prevent or revert structural and functional alterations of tissues through stem cell regenerative therapy. Most existing stem cell clinical trials are based on injection of bone marrow stem cells or autologous stem cells grownex vivo. These trials have had limited success, in part because of the short time (few days) transplanted cells remain in the organ of interest. A better approach would be to administer agent able to expand, migrate, and differentiate stem/progenitor cells. But these agents do not exist. The ones studied have a short life (for example, the half-live of neurotrophinsin vivois less than 1 min), have many side effects (for example, NGF is nociceptive), and can cause autoimmunity. Identifying an exogenous agent that can expand act on resident progenitor cells and trigger their expansion, migration and tissue repair events in disease

states is a great need in state-of-the art therapeutic approaches. JR-100 fills this void. The therapeutic benefit of JR-100 intravenous administration in a mouse model of chronic infectious cardiomyopathy is evident at least two months after administration, most likely by boosting growth, migration and differentiation in reparative resident cardiac progenitor cells. In addition, short-term cell survival is caused by direct activation of survival signaling in parenchyma cells via TrkA and TrkC kinase receptors.

Application area

JR-100 is a potential biological therapeutic agent in regenerative medicine in diseases such as postmyocardial inflammatory cardiac remodeling, Chagas disease, IBD, ALS, rheumatoid arthritis, and other diseases.

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