Use of bone marrow and circulating angiogenic progenitor cells in the repair of lung and other tissues after injury.

Published date: Feb. 1, 2012

Technology description

Summary

Background and Market Tissue damage and death are a major component of many diseases including ischemic heart disease, stroke, and chronic lung disease such as bronchopulmonary dysplasia (BPD). Repercussions of tissue damage from these diseases can be quite severe. For instance, IHD increases the risk of heart failure and heart attack, the number one cause of death for both men and women world wide. Second, tissue damage from ischemic stroke can damage the brain vasculature, causing breakdown of the blood brain barrier, making the patient more susceptible to secondary brain injury. In 2003 stroke accounted for 1 in 15 deaths in the US and is the third leading cause of all death. Lastly, structural lung abnormalities in infants with BPD result in a reduction of lung surface area, causing abnormal gas exchange, and negative impacts on quality of life such as exercise intolerance, and pulmonary hypertension (high blood pressure). High blood pressure in turn increases risk of heart attack. The cost of treating BPD in the United States alone is near $2.4 billion. Current treatment for IHD, BPD, and Stroke largely focus on management of symptoms and rehabilitation. First, treatment for patients with IHD includes medications to manage symptoms with surgical options available. For instance, revascularization has shown to have benefits and improve patient outcome. Second, BPD treatment comprises medications to support lung function and use of supplemental oxygen. In some serious cases supplemental oxygen may be necessary for the patients entire life. Stroke is different from IHD and BPD in that treatment mainly focuses on rehabilitation following permanent brain cell death. Use of anticoagulants is common for the prevention of recurrent stroke. The addition of a treatment option that addresses the underlying tissue damage and actually stimulates growth and repair of the damaged vascular tissue would address the cause of many of the resulting symptoms of IHD and BPD and could represent a major advancement in care. In the case of Stroke repair and re-growth of the damaged brain vasculature could make a patient less susceptible to secondary brain injury. Technology Drs. Balasubramaniam and Abman of the University of Colorado have developed a treatment using bone marrow derived angiogenic cells (BMDAC) to increase growth of vascular tissue following injury, showing promise as a treatment for ischemic heart disease, stroke, BPD, and other vascular injuries including those involving the heart or brain. To test their compounds and methods

Drs. Balasubramaniam and Abman used an experimental animal model that induces changes in lung structure, which mimics the histology observed in human infants with BPD. From these experiments they have in vitro evidence confirming that engraftment of BMDACs in the lung stimulate new alveolar and vascular growth and enhance restoration of normal lung structure following induced hyperoxic injury (see table 1, next page for statistical details). Method of administration of this compound can be by surgical engraftment, oral administration or by parenteral administration such as intravenous injection.

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