Regenerative Medicine: Therapeutic Cell Technology IMPs/EPCs

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Technology description

The technology comprises small molecule-mediated, directed differentiation of human pluripotent cells to produce Isl1+ multipotent cardiovascular progenitors (IMPs). Cell therapies have the potential for broad therapeutic applications in a wide range of diseases. In the area of cardiovascular disease (CVD) alone, therapeutic cell technology could provide tremendous improvement over currently available therapies. The direct and indirect costs are likely to approach US$1 trillion annually with a projected treatment market of at least US$300B. While first generation stem cell therapeutics have shown some modest results in the treatment of CVD, there is a huge opportunity for therapeutics that demonstrate marked clinical impact on CVD.

University of Georgia researchers utilized small molecule-mediated, directed differentiation of human pluripotent cells to produce Isl1+ multipotent cardiovascular progenitors (IMPs). In vivo, transplanted IMP cells can incorporate into several types of vascular mesoderm, including endothelium. IMPs can be further differentiated into a uniform population of multi-potent epicardial progenitor cells (EPCs). EPCs are capable of differentiation into smooth muscle cells, endothelial cells and cardiac fibroblasts and consequently, components of the coronary vasculature. Since the EPC is a progenitor for cells that comprise the coronary vascular system, it provides utility as a cell therapeutic, as a drug screening tool and as a research tool. These findings have major implications for the utilization of hESC- or iPSC-derived IMPs and EPCs for cell therapeutic applications as well as drug discovery and research. The cells are produced as an essentially homogeneous population in a chemically-defined media and they can be derived from either hESCs or from human iPS cells. Substantial amplification of cells during production process allows for industrial scale up. These cells maintained as a stable population, are non-tumorigenic in SCID mouse, and have a normal karyotype. The invention provides for a potential therapeutic intervention in CVD, stroke, diabetes-related sequelae, autoimmune and inflammatory disease, graft versus host disease, wound healing, and bone repair.

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