Haval Shirwan, J Cell Sci Ther 2012, 3:8
http://dx.doi.org/10.4172/2157-7013.S1.019

OMICS Group Conferences
Accelerating Scientific Discovery

2nd World Congress on
Cell Science & Stem Cell Research

November 12-14, 2012 Hilton San Antonio Airport, USA

The direct display of immunological ligands on allogeneic hematopoietic stem cells and tissues as an effective means of inducing tolerance

Haval Shirwan
University of Louisville, USA

Transplantation of allogeneic hematopoietic stem cells (HSCs) and tissues serve as an effective means of treating various genetically inherited and acquired diseases. However, rejection of allogeneic HSCs and tissues is a major setback for the therapeutic utility of this approach. Therefore, the development of novel immunomodulatory approaches that overcome rejection is an important goal of the field of HSC transplantation. To achieve this, we have recently pioneered a practical, effective, and safe approach to generate novel immunological ligands and display them at the protein level on the surface of cells and tissues for immunomodulation to overcome allograft rejection. This concept involves i) generation of recombinant proteins consisting of functional domains of immunological ligands fused to a modified form of streptavidin (SA), ii) biotinylation of cell surface, iii) and the transient display of SA-chimeric proteins on the biotinylated surfaces taking the advantage of high affinity (10^{-15} M) interaction between biotin and SA. There are several advantages to this technology as compared with DNA-based gene therapy for immunomodulation. First, chimeric immunological ligands exist as minimum of tetramers and oligomers due to the structural features of SA, and as such avidly cross-link their counter receptors for potent signal transduction. Second, the transient display of immunological ligands on the cell membrane overcomes potential adverse effects of continued expression of such molecules via gene therapy. Third, the efficacy of displaying the chimeric proteins at desired levels on all targeted surfaces is almost 100%. Using this approach, we have shown that the display of a chimeric FasL molecule (SA-FasL) on bone marrow cells or pancreatic islets was effective in preventing their rejection following transplantation into allogeneic hosts with the establishment of sustained long-term durable tolerance. Therefore, the direct display of immunological ligands on the cell surface serves as a rapid, efficient, and clinically applicable approach for immunomodulation with implications in the transplantation of allogeneic stem cells for therapeutic purposes

Biography

Dr. Shirwan is Dr. Michael and Joan Hamilton Endowed Chair in Autoimmune Disease, Professor of Microbiology and Immunology, Director of Molecular Immunomodulation Program at the Institute for Cellular Therapeutics. He conducted his graduate studies at the University of California in Santa Barbara, CA, and postdoctoral studies at California Institute of Technology in Pasadena, CA. He joined the University of Louisville in 1998 after holding academic appointments at various institutions in the United States. Dr. Shirwan's research focuses on the modulation of immune system for the treatment of immune-based diseases with particular focus on type 1 diabetes, transplantation, and vaccines. Dr. Shirwan is widely published, lectured at numerous national/international conferences, served on study sections for various federal and non-profit funding agencies, and is on the editorial boards of 12 scientific journals. He is member of several national and international societies and recipient of various awards

haval.shirwan@louisville.edu