

Multipotent Stem Cells from Trabecular Meshwork Become Phagocytic TM cells

Du Y, Roh DS, Mann MM, Funderburgh ML, Funderburgh JL, Schuman JS.

UPMC Eye Center, Ophthalmology and Visual Science Research Center, Department of Ophthalmology, University of Pittsburgh School of Medicine, Pittsburgh, PA.

PURPOSE: To isolate and characterize stem cells from human trabecular meshwork (TM) and to investigate the potential of these stem cells to differentiate into TM cells.

METHODS: Human trabecular meshwork stem cells (TMSC) were isolated as side population cells by fluorescence-activated cell sorting or isolated by clonal cultures. Passaged TMSC were compared with primary TM cells by immunostaining and quantitative RT-PCR. TMSC purity was assessed by flow cytometry and TMSC multipotency was examined by induction of neural cells, adipocytes, keratocytes or TM cells. Differential gene expression was detected by quantitative RT-PCR, immunostaining and immunoblotting. TM cell function was evaluated by phagocytic assay using inactivated *S. aureus* bioparticles.

RESULTS: Side population and clonal isolated cells expressed stem cell markers ABCG2, Notch1, OCT4, AnkG and MUC1 but not TM markers AQP1, MGP, CHI3L1 or TIMP3. Passaged TMSC are a homogeneous population with more than 95% cells positive to CD73, CD90, CD166 or Bmi1. TMSC exhibited multipotent ability of differentiation into a variety of cell types with expression of neural markers neurofilament, β -tubulin III, GFAP; or keratocyte specific markers keratan sulfate and keratocan; or adipocyte markers ap2 and Leptin. TMSC readily differentiated into TM cells with phagocytic function and expression of TM markers AQP1, CHI3L1 and TIMP3.

CONCLUSIONS: TMSC isolated as side population or as clones express specific stem cell markers, are homogeneous and multipotent with the ability to differentiate into phagocytic TM cells. These cells offer a potential for development of a novel stem cell-based therapy for glaucoma.

PMID: 22297497 <http://www.ncbi.nlm.nih.gov/pubmed/22297497>