PROGRESS IN NEUROSCIENCE PINS

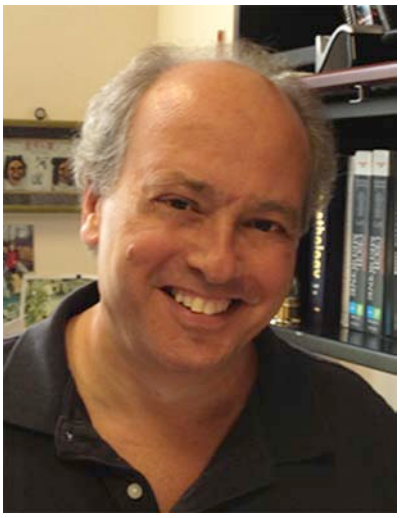
Seminar Series of the
Brain & Mind Research Institute
Weill Cornell Medical College (WCMC)
&
The Graduate Program in Neuroscience of
WCMC and Sloan Kettering Institute

Thursday, 12/5/13, 4 PM, coffee at 3:45 PM
Weill Auditorium

Human Glial Progenitor-cell Based Treatment and Modeling of Neurological Disease

Steve Goldman, M.D./Ph.D.
Distinguished Professor of Neuroscience
Co-Director, Center for Translational Neuromedicine, URMC

Abstract:



Neural precursor cell populations of the adult brain include not only neural stem cells and their derived neuronal progenitors, but also glial progenitor cells fated to give rise to both astrocytes and myelin-producing oligodendrocytes. As a result, diseases of glial cells may provide readily accessible targets for cell-based therapies. The myelin diseases, which involve the loss or dysfunction of oligodendrocytes in the brain and spinal cord, are among the most prevalent and disabling conditions in neurology, and may be particularly appropriate targets for progenitor cell-based therapy. This talk will focus on the potential utility of human oligodendrocyte progenitor cell transplantation as a means of treating both congenital and acquired diseases of myelin. It will cover potential sources of both tissue and stem cell-derived oligodendrocyte progenitor cells, as well as the use of iPSC-derived glial progenitors in myelin repair, and the potential limitations on the clinical use of each. In addition, we will consider the molecular control of human glial progenitor cells, from the standpoint of establishing strategies for their mobilization and induced myelination in vivo. The talk will also include a description of the glial chimeric mice that result from the neonatal implantation of human glial progenitors into the mouse brain. In these mice, the human glial progenitors outcompete their murine counterparts to eventually dominate the glial population of the recipient brains. By generating these animals using human iPSC-derived glial progenitors, we may now produce patient-derived and disease-specific human glial chimeras. These mice provide us a new model system within which to study only the myelin disorders, but the entire range of human neurological disease in which glia may causally participate.

Recent relevant publications:

Goldman, S.A., Nedergaard, M., Windrem, M. Glial progenitor cell-based treatment and modeling of neurological disease. Science 338:491-494, 2012.

Han, X., Chen, M., Wang, F., Windrem, M., Wang, S., Shanz, S., Xu, Q., Oberheim, N., Bekar, L., Betstadt, S., Silva, A., Takano, T., Goldman, S.A., Nedergaard, M. Human glia potentiate synaptic plasticity in adult mice. Cell Stem Cell 12:342-53, 2013.

Wang, S., Bates, J., Li, X., Schanz, S., Chandler-Militello, D., Levine, C., Maherali, N., Studer, L., Hochedlinger, K., Windrem, M.S., Goldman, S.A. Human iPS cell-derived oligodendrocyte progenitor cells can myelinate and rescue a mouse model of congenital hypomyelination, Cell Stem Cell 12:252-264, 2013.

Weill Cornell Medical College