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Derek van der Kooy received a Master's Degree in Psychology at the University of British Columbia, and a Ph.D in Anatomy, first at Erasmus University in 1978, and finishing in the Department of Anatomy at the University of Toronto in 1980. Dr. van der Kooy gained postdoctoral research experience at Cambridge University in England and at the Salk Institute in California. In 1981, he became an Assistant Professor, was promoted to Associate Professor in 1986, and has served as Professor in the Department of Anatomy and Cell Biology at the U of T from 1991 until 2002, when he became a Professor in the Department of Molecular Genetics.

Professor van der Kooy's lab carries out various neuroscience and developmental biology research projects. Of note, Derek's lab produced the first report of stem cells in the adult mammalian eye, published in 2000 in Science. Derek's lab has also isolated a rare cell from the adult mouse pancreas (.01%) that can show extensive proliferation under completely defined conditions in vitro. Theses findings were published in Nature Biotechnology in 2004. Derek's lab continues to investigate the nature of stem cells, embryonic and adult, the concept of immortal cells, and the differentiation of embryonic stem cells, which are capable of forming any tissue in the body, to neural stem cells.

The Developmental Origin of Neural Stem Cells

The earliest mammalian neural stem cells can differentiate from pluripotent embryonic stem (ES) cells. These primitive neural stem cells emerge in response to LIF in minimal serum free media, express Oct4 and retain some pluripotency in blastocyst chimera assays. These primitive neural stem cells also may be isolated from the mouse embryonic day (E) 5.5 to E8.0 epiblast. Between E7.5 and E8.5, true FGF2 dependent, definitive neural stem cells emerge from the primitive neural stem cells and by embryonic day 14 they have given rise to copies of themselves and to EGF dependent neural stem cells. The separate FGF2 and EGF dependent, definitive neural stem cells increase greatly in numbers later in neurogenesis, but by E14 appear identical to the definitive adult neural stem cells. The adult mammalian definitive neural stem cells are mostly quiescent, dividing asymmetrically only once every few weeks. Recently, we have found that some LIF dependent primitive neural stem cells persist in the adult brain. After the removal of all definitive neural stem cells, then the LIF dependent primitive neural stem cells will regenerate the adult pool of definitive neural stem cells.

What is the central hypothesis of my presentation?
The developmental lineage creating neural stem cells now is known at a clonal level

What is the most important observation I will discus?
The earliest embryonic neural stem cell may persist in the adult brain

What is the translational significance?
There may be several neural stem cell substrates for endogenous functional recovery in the adult brain