

Stem Cell Therapies for Brain Regeneration

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Transplantation of neural stem cells into the brain is a novel approach to the treatment of chronic neurological disease. For clinical application, safety and efficacy of defined, stable and scalable, quality assured cell lines produced under GMP conditions are required. To this end, a human neural stem cell line, CTX0E03, was derived from human somatic stem cells following genetic modification with a conditional immortalising gene, c-mycER^{TAM}. This transgene generates a fusion protein that stimulates cell proliferation in the presence of a synthetic drug 4-hydroxy tamoxifen (4-OHT). The cell line is clonal, expands rapidly in culture (doubling time 50-60h) and has a normal human karyotype (46 XY). In the absence of growth factors and 4-OHT the cells undergo growth arrest and differentiate into neurons and astrocytes. Transplantation of CTX0E03 in a rat model of stroke (MCAo) caused statistically significant improvements in sensori-motor function and motor asymmetry tests at 6-12 weeks post grafting. In addition cell migration and long-term survival *in vivo* was not associated with significant cell proliferation. These data indicate that CTX0E03 has the appropriate biological and manufacturing characteristics necessary for development as a therapeutic cell line.