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CELLULAR COMPOSITION OF NEURAL TRANSPLANTS IN THE TREATMENT OF PARKINSON'S DISEASE

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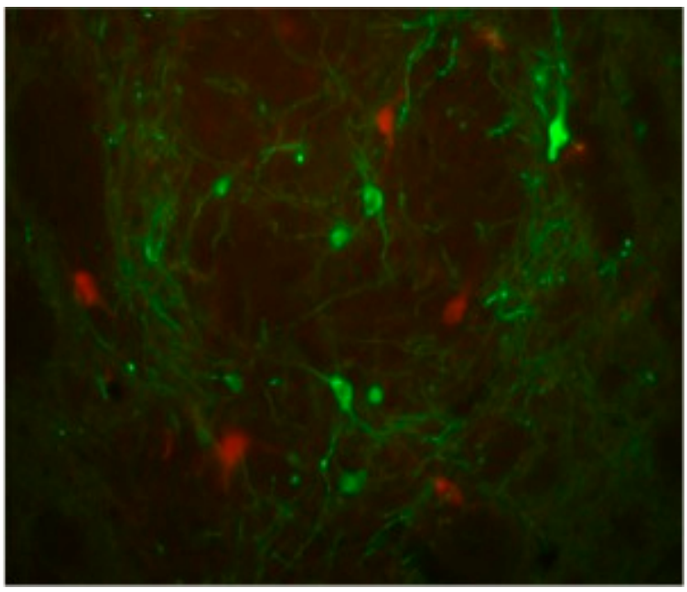

Parkinson's disease affects a specific subset of cells, the dopamine (DA)-producing neurons of the substantia nigra, making these cells a good candidate for neural transplantation. However, clinical trials have revealed that a number of patients develop dyskinesias following transplantation. Serotonin-producing neurons in the transplants are believed to play a major role in the development of dyskinesias. The goals of this study were to create a three-dimensional model of the fetal rat brain from which to base and standardize dissections for harvesting cells and to examine how the ratio of serotonin-producing cells to DA-producing cells in a neural transplant can affect dyskinesias. Fetal rat brains were traced and labeled for DA and serotonin precursors and then stacked to create a three-dimensional reconstruction of the fetal rat brain. This model was used to determine dissection coordinates for the second part of the experiment. Dyskinesias were induced in 6-hydroxydopamine-lesioned rats through daily treatment with the drug L-DOPA. Animals were grafted with transplants rich in DA-producing cells, rich in serotonin-producing cells, or containing a mixture of DA- and serotonin-producing cells. Animals that received grafts rich in DA-producing cells showed nearly complete recovery from parkinsonian behaviours and significant reduction in dyskinesias compared to controls. Animals that received grafts rich in serotonin-producing cells or mixed grafts showed significant reduction in dyskinesias from pre-transplantation scores, but not compared to controls. The results suggest that although a cell ratio of 4:1 DA-producing to serotonin-producing cells is sufficient to effect recovery from dyskinesias, the richer the transplant in DA-producing cells, the greater recovery will be.

Gillian MacMullin graduated from Riverview Rural High School in Sydney, Nova Scotia in 2006. Gillian is currently completing her honours thesis in her fourth year of biology at Acadia. For the past three years, she has acted as the competitive team representative of the Acadia Equestrian Team. She has also been involved in Relay for Life and S.M.I.L.E. Gillian hopes to start medical school or a Master's degree next year.