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Development of a cell culture model for studying neuronal migration

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Motor neuron migration has been extensively studied in mouse and zebrafish, and is dependent upon the functions of a subset of proteins (Vangl2, Prickle1, and Celsr1) that act in the Wnt signaling pathway. However, other proteins (TAG-1, Laminin α ; 1, and Scribble1) that are not components of the Wnt pathway also play important roles in neuronal migration. Therefore, in order to better understand the molecular and cellular interactions that occur during motor neuron migration, an in vitro approach may be necessary to complement the in vivo experiments in mouse and zebrafish. The goal of these studies is to identify a cell culture model in which to further study several genes known to be involved in motor neuron migration. We initiated these studies by testing whether the human 1321N1 Astrocytoma cell line expresses the genes of interest under conditions that stimulate migration. Messenger RNA was isolated from control and migration induced cells, and a cDNA template was generated. Using custom designed primers for the various genes of interest, we tested whether they were expressed in the Astrocytoma cells using PCR. If these genes are expressed, then knockdown experiments using siRNA will be conducted to determine the roles these genes play in motor neuron migration in vitro. We will also continue to test additional cell lines with the goal of identifying an in vitro model of motor neuron migration potentially involving genes implicated in neural migration in vivo.