Schwann Cell Differentiation from Stem Cells of Neurofibromatosis 1 Patients and Normal Controls

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One in every 4,000 newborns is diagnosed with Neurofibromatosis 1 (NF1), a common genetic disorder. Many NF1 patients develop painful tumors along their peripheral nervous system. NF1 patients exhibit tumorous Schwann cells called Schwannomas. This research was focused on the development of Schwann cells in NF1 patients. The goal of this project was to determine if NF1 Schwann cells undergo a different process of differentiation compared to non-NF1 Schwann cells. Induced-pluripotent stem (iPS) cells of non-NF1 and NF1 patients were successfully differentiated into Schwann cells and samples were collected on day 0 (iPS), day 19 (neural precursor), and day 30 (Schwann). These samples were analyzed using quantitative polymerase chain reaction to detect gene expression and to determine the rate of differentiation. The display of correct gene expression levels in this experiment demonstrated that Schwann cells can be successfully differentiated from iPS cells. The findings of this study disproved the experimental hypothesis and found that NF1 iPS cells differentiate into Schwann cells at an accelerated rate compared to non-NF1 iPS cells. In addition, these findings indicate that the genetic mechanism that brings forth the accelerated differentiation of Schwann cells occurs during the transition from the iPS cell stage to the neural precursor stage. By studying differences in development and gene expression between NF1 and non-NF1 Schwann cells, a model that depicts how Schwann cells form was created. This research offers insight into the NF1 disease by modeling Schwann cell development and gene activity of NF1 and non-NF1 patients.

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