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## The Response of Schwann Cells to Weak DC Electric Fields

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### ABSTRACT

Schwann cells are glial cells that serve the vital role of supporting neurons in the peripheral nervous system. While their primary function is to provide insulation (myelin) for axons, they also help regenerate injured axons by digesting severed axons and providing scaffolding to guide the regeneration process. This specific role of Schwann cells makes them highly important cellular targets following nerve injury. Although some efforts have been made to encourage Schwann cell migration after nerve damage, the use of electric fields to control cell responses remain unexplored; therefore, this experiment serves to characterize the behavior of Schwann cells to weak direct current (DC) electric fields. Rat Schwann cells were seeded onto IBIDI culture slides and exposed to varying DC electric field strengths of 0 to 500 mV/mm for up to 6 hours. Preliminary responses to alternating DC electric fields were also observed. Pictures of the cells in their culture slides were taken after 0, 3, and 6 hours with images analyzed using ImageJ. Results showed that Schwann cells changed their orientation perpendicular to the electric field after they were exposed to field strengths of 75 mV/mm or greater. When exposed to alternating DC electric fields, the cells are also changed their orientation perpendicularly, but only at field strengths of 500 mV/mm. Although the mechanism behind this change needs further research, this shift in morphology may provide a framework for directed control/acceleration of axon regeneration using electric fields.

### KEYWORDS

Schwann cells, DC electric field, morphology