A Novel Investigation of the Effects of EphA4 on Axon Regeneration in the Spinal Cord

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Spinal Cord Injuries (SCI) are prevalent in society, EphA4 is a gene that inhibits axon regeneration following development and is known to decrease neural plasticity during rehabilitation. Rehabilitation efforts have been feudal following a SCI because of the lack of neuron regrowth and new signaling pathways replacing the dead neurons. To determine EphA4s role in neural plasticity images of pyramid sections and spinal cords were taken coronally, which allowed for the axons to be exposed under the electron microscope. Then the images are analyzed to calculate the axon count (axon index) for each image to show the difference between the three genotype groups. The fully inhibited fl/fl genotype showed an increase of axon regeneration following a SCI, the partially inhibited wt/fl genotype showed little neuron regeneration. Finally, the control group or the wild type wt/wt genotype was used in comparison without spinal cord injury. These results indicate that EphA4 prevents the development of new signaling pathways, and discontinues neural plasticity in the spinal cord. In terms of this investigation, the increased Axon index of the fl/fl genotype shows that EphA4 fully inhibited will allow for new axons to be developed, which will result in greater neural plasticity, and aid in the treatment of SCI patients. This investigation did not look into the effects of total inhibition of EphA4 on other areas of the body beyond the central nervous system, and research must be done on its effects on the peripheral nervous system. An investigation into EphA4s effect on the rest of the body would indicate whether it would be safe for use in humans and whether other systems would be negative, and even fatally harmed by the inhibition process.

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