A Novel Approach to the Comparative Analysis of Natural Polymer-based Biomimetic Neural Scaffolds: Using the Taxic Response of Fungal Mycelium to Model Cell Response and Repair in Peripheral Nerve Gap Injuries such as the Medulla spinalis in Paraplegics

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The comparative analysis of natural polymer-based biomimetic neural scaffolds using the taxic response of fungal mycelium was designed to investigate functional deficits following Spinal cord injuries (SCI). SCI results in damage or severance of axons and loss of neurons. To reduce the secondary effects of these injuries and to better direct cell growth following SCI two types of scaffolds were used: fabrication and lumen filler implants. It was hypothesized that the fabrication of neural scaffolds will be the most functional followed by the lumen fillers. Furthermore, all scaffolds will be able to direct growth. The use of fungal mycelium's taxic response was used to determine if cell growth could be influenced by these implants. These implants were set in agar gel and sheets of mycelium were placed on top. Throughout three weeks measurements were recorded from the growth of the mycelium. An ANOVA analysis determined the statistical variation between the experimental groups and the control group. The p-value shows there's a significant difference between the experimental groups and the control group. A t-test showed a significant difference in the two implants with the p-value being below the alpha value. The hypothesis was partially supported with all neural scaffolds being able to facilitate growth but the lumen fillers were more effective than the fabrication implant. The null hypothesis was rejected and the data supports the hypothesis. In further research, the implants will be tested using stem cells and later in animal models to further determine their effectiveness.

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