Neuroactive Peptide Nanofibers

The highly complex nature of spinal cord injuryes (SCIs) requires the design of novel biomaterials that can stimulate cellular regeneration and functional recovery. Promising SCI treatments use biomaterial scaffolds, which provide bioactive cues to the cells in order to trigger neural regeneration in the spinal cord. In a study Sever-Bahcekapili et al. use of peptide nanofibers is demonstrated, presenting protein binding and cell adhesion epitopes in a rat model of SCI. The self-assembling peptide molecules are designed to form nanofibers, which display heparan sulfate mimetic and laminin mimetic epitopes to the cells in the spinal cord. These neuroactive nanofibers are found to support adhesion and viability of dorsal root ganglion neurons as well as neurite outgrowth in vitro and enhance tissue integrity after 6 weeks of injury in vivo. Treatment with the peptide nanofiber scaffolds also shows significant behavioral improvement. These results demonstrate that it is possible to facilitate regeneration especially in the white matter of the spinal cord, which is usually damaged during the accidents using bioactive 3D nanostructures displaying high densities of laminin and heparan sulfate-mimetic epitopes on their surfaces [1)]

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Sever-Bahcekapili M, Yilmaz C, Demirel A, Kilinc MC, Dogan I, Caglar YS, Guler MO, Tekinay AB. Neuroactive Peptide Nanofibers for Regeneration of Spinal Cord after Injury. Macromol Biosci. 2020 Oct 11:e2000234. doi: 10.1002/mabi.202000234. Epub ahead of print. PMID: 33043585.