Neurotrophin

A growing number of pre-clinical studies have suggested that transplantation of neural stem cells (NSCs) could offer a promising new therapeutic approach for neurodegeneration. While much of the initial excitement about this strategy focused on the use of NSCs to replace degenerating neurons, more recent studies have implicated NSC-mediated changes in neurotrophins as a major mechanism of therapeutic efficacy [1].

Chiang et al. developed a hierarchical hybrid gelatin methacrylate-microcapsule hydrogel (HGMH) with Neurotrophin-3(NT-3)-loaded PLGA microcapsules to fabricate anisotropic structure with patterned NT-3 distribution (demonstrated as striped and triangular patterns) by dielectrophoresis (DEP). The HGMH provides a dynamic biomimetic sinuate-microwrinkles change with NT-3 spatial gradient and 2-stage time-dependent distribution, which was further simulated using a 3D finite element model. As demonstrated, in comparison with striped-patterned hydrogel, the triangular-patterned HGMH with highly anisotropic array of microcapsules exhibits remarkably spatial NT-3 gradient distributions that can not only guide neural stem cells (NSCs) migration but also facilitate spinal cord injury regeneration. This approach to construct hierarchical 4D hydrogel system via an electromicrofluidic platform demonstrates the potential for building various biomimetic soft scaffolds in vitro tailed to real soft tissues [2]

1)
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2)
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