Conductive electrospun polycaprolactone- aniline membranes for peripheral nervous system use

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Peripheral nerves are highly susceptible to injuries. Severe nerve injuries with complete disruption in the nerve continuity need surgical intervention; injuries with nerve substance loss need a nerve substitute to fill the gap. Tissue enginering and regenerative medicine techniques have developed several artificial nerve substitutes of natural or synthetic origins to face this issue. In the present study, electrospun nanofibrous membranes composed of polycaprolactone (PCL) and polyaniline (PANI) blend, further doped with camphor-10-sulfonic acid (CSA), were prepared in random (Ran) and aligned (Alig) orientations and tested for their compatibility with peripheral nervous system cellular components. Primary cultures of Schwann cells (SC) and of dorsal root ganglia (DRG) derived sensitive neurons, and cultures of human induced pluripotent stem cell (hiPSC) derived motor neuron progenitors (MNP), were seeded on the membranes.

These preliminary tests confirmed that atmospheric plasma treated aligned electrospun PCL-PANI mats are a suitable substrate for culturing peripheral nervous system cells (rat primary Schwann cells, rat primary dorsal root ganglion derived sensory neurons and human derived motor neurons) thus suggesting that this mat could be a promising substrate for in-vitro experimental models and for in-vivo applications.

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