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Electroactive PCL nanofibers coated by polypyrrole for nerve tissue engineering

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Electrically excitable tissues like nerve and muscle have shown promising results in regeneration on conductive scaffolds. In this study, a solution of 14% PCL electrospun was used on a rotating collector forming nanofibers with the average diameter of 430 nm. The fiber mats are dip coated by the conducting polymer PPy (polypyrrole) to form a substrate capable of stimulation of nerve cells. Ninety percent porosity of the conductive scaffold with more than double the Young's modulus compared to non-coated PCL met the required properties of nerve scaffolds. PC12 cells along with nerve growth factor, cultured on the aligned nanofibers and stimulated by a constant voltage of 0.01 V/cm for 1 h/day for three days. Formation of neurites in the direction of fibers suggests that the electroactive PCL-PPy scaffold can support the differentiation of PC12 cells into nerve cells. The flexible and stable fibrous scaffold with conductivities ranging up to 1.9 S/cm showed the potential applications of these membranes in neural tissue engineering.

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Generation of avian monoclonal antibody fragments for membrane protein crystallization

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Membrane proteins are challenging targets for crystallization and structure determination by X-ray crystallography. Antibody mediated crystallization has a major impact on the advancing structural and functional characterization of difficult membrane proteins 1, 2 and 3. More than 26 unique structures of membrane protein- antibody complexes have already been determined. An update of methods for generation of recombinant antibodies from hybridomas and their production in *E. coli* was recently published. The limited availability of suitable hybridoma cell lines due to low immunogenicity of therapeutically important human membrane proteins in mice has impeded the high-throughput application of this approach. Here, we show an efficient method to obtain high affinity binders against difficult targets by phage display exploiting the avian immune system. The recombinant chicken antibodies were generated against Na+/H+ transporter and used for its structural characterization. The strategy of avian immune phage display libraries provides fast access to versatile tools for structural and functional studies and in general paves the way to generate versatile tools for research, diagnostics and therapeutics targeting membrane proteins and is of special interest for antigens highly conserved in mammals.

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