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Protein release from electrospun produced 3D matrixes

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Production of fibers by electro-spinning from the solutions of polymers as well as their mixtures with low molecular substances or biopolymers provides a wide range of 3D matrixes that mimic natural tissues and provide long term delivery of various compounds included in these 3D matrixes. Obviously the ability to release of the compound from basic polymer enriched fibers depend from solubility of both basic synthetic polymers and biopolymers as long until the fibers will be formed during polymer drying up. In this work we have investigated release/distribution of human serum albumin (HSA) from/in electrospun produced 3D matrixes (ESM). The ESM were produced by electro-spinning from the solutions of PCL with different concentration of HSA (in a range 0.4-30%) in hexafluoroisopropanol (fiber diameter ~1 mkm, thickness ~150 mkm). The concentration of the exempt protein was measured by ELISA; other methods like Bradford or NanoOrange kit were not suitable. Protein was modified with N-(2-hydroxyethyl) phenazine to evaluate the protein location at the fiber surface. The data obtained by ELISA demonstrate that the main part of protein remains in ESM (for example, ESM containing 10% HSA releases no more than 1-3% of protein), while no less than 20% of the protein is exposed at the surface of the fibers according to the data received from modification of free amino groups by N-(2-hydroxyethyl) phenazine. Treatment of the ESM by proteinase K releases only half of the protein exposed out of the fibers. It was shown that predominant location of the protein is surface/sub-surface area of fibers.

Biography

V S Chernonosova has a Master's degree in Biochemistry from the Novosibirsk State University, Russia (2003). Currently, she is a PhD student in the laboratory of Dr. P.P. Laktionov at Institute of Chemical Biology and Fundamental Medicine, Siberian Branch of the Russian Academy of Sciences. Her research interests cover the following subjects: electrospinning, biomaterials for regeneration, tissue implants, interactions of cells with nanomaterials.

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