COLLAGEN EXTRACTION FROM THE MICE TAIL AND ITS SUCCESSIVE ELECTROSPINNING

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Introduction

Collagen is one of the main constituents of the extracellular matrix of mammalian tissues, serving as a natural scaffold that maintains the proper shape and mechanical properties of various tissues types [1-3].
As such, its applicability in various fields of medicine is of high importance, especially when tissue engineering is regarded. While this material is abundant in various tissue types, its proper extraction, being able to maintain its bioactivity and biofunctionality can be challenging. Then, its further processing into the proper shape and morphology can also become cumbersome.
Among different shapes that are regarded for its biomedical applications, the fibrous morphology is certainly one of the most popular, as it guarantees the highest biomimetism, high-surface-to volume ratio and enhanced mechanical properties [4].
The aim of this study was to conduct isolation of the collagen fibres from the mice tails in such a manner, that the material's native conformation is maintained. Another goal was to optimize the electrospinning conditions of the collagen so that the materials of fibrous morphology, insoluble in water can be obtained.

Materials and Methods

Mice tails were harvested from the post-experimental animals, in accordance with the 3R rule, through the courtesy of the UJ Department of Medical Biotechnology, Faculty of Biochemistry, Biophysics and Biotechnology, Krakow, Poland. The tails were processed in accordance with the protocol established by Rajan et.al. [5] – with exception that the process was conducted only until lyophilized sponges at step 25 were obtained. By this means, we obtained a mixture of different collagen types, which is suitable for the successive electrospinning. The materials were characterized via Keyence digital microscope (VHX-900F) and FTIR-ATR spectroscopy (Tensor 27, Bruker).
The as-obtained collagen was then dissolved using various solvents, including PBS, ethanol, and acetic acid in order to optimize the solvent composition for the electrospinning (SKE EF3000). The as-obtained fibres were tested for their chemical and morphological properties, with an aim to analyse the impact the process had on the materials' initial properties.

Results and Conclusions

We found that it is possible to extract the collagen fibres from the mice tail, with similar efficiency as the one reported for the rat tails. The materials maintained their native conformation and were soluble in some of the tested solvent compositions.
While the ES process was found to be challenging, we were still able to produce the fibrous products with satisfactory properties.

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