

The membrane composite scaffolds with antithrombotic features for adherent cells function sustention

Magdalena Antosiak-Iwańska, Ewa Godlewska, Beata Kazimierczak,
Joanna Kinasiewicz, Ludomira Granicka*

Nalecz Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences, Trojdena 4 st., 02-109 Warsaw, Poland, Tel. +48 22 592 59 00; emails: lgranicka@ibib.waw.pl (L. Granicka), mantosiak@ibib.waw.pl (M. Antosiak-Iwanska), egodlewska@ibib.waw.pl (E. Godlewska), bkazimierczak@ibib.waw.pl (B. Kazimierczak), jkinasiewicz@ibib.waw.pl (J. Kinasiewicz)

Received 28 March 2018; Accepted 19 April 2018

ABSTRACT

The aim of the study was to design the scaffold encompassing bacteriostatic and antithrombotic properties as the elements of the dressing systems which could find biomedical applications. In this paper, we present the scaffolds produced of polysaccharide and/or protein involving the constituents allowing to obtain desired features. We have assessed physicochemical properties of designed membranes using Fourier transform infrared spectroscopy and water contact angle measurements. The mean contact angle value for the scaffolds with the antithrombotic constituent was equal to 18.0 ± 7.2 , whereas the scaffolds without this component showed meanly 68.7 ± 0.6 . Moreover, we evaluated the interaction of scaffolds with fibroblastic cell line evaluating the cell functions. The differences in percentage of viable cells cultured in the presence of designed scaffolds did not exceed 20%. All the designed membrane scaffolds based on alginate composite with properties that favored adhesion or weakened it without impairing the function of the cells would possibly find a biomedical application. However, the microscopic assessment showed the increased proliferation of cells immobilized within membrane scaffold, which was built of bilayer constructed of alginate with incorporated silver nanoparticles and heparin. This membrane encompassing bacteriostatic and antithrombotic features could be recommended as an element of dressing systems.

Keywords: Bacteriostatic and antithrombotic features; Alginate; Silver nanoparticles; Membrane scaffold

* Corresponding author.

Presented at the XII Scientific Conference "Membranes and Membrane Processes in Environmental Protection" – MEMPEP 2018 13–16 June 2018, Zakopane, Poland.