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Mechanotopography and biological properties of new histoequivalent-bioplastic material based on hyaluronic acid hydrocolloid

I.A. Almazov, E.V. Zinoviev and R.R. Rakhmatullin
Russian Federation Orenburg State University, Russian Federation

Relief of the type pathological processes, early activation of regenerative mechanisms – the conditions for successful wound healing. Reparative potential of epithelial tissues is realized at balanced migration and proliferation of their cellular elements, synthesis of fibrous proteins and extracellular matrix components, epithelisation. An in-depth assessment of the structure of the developed histoequivalent-bioplastic material based on hyaluronic acid hydrocolloid (G-Derm) and of its properties, positive in terms of optimizing the reparative mechanisms was made. Scanning probe microscopy and ultrastructure evaluation of bioplastic material were performed. For investigating the visualized globular structures, homogeneous samples of the material 101.5 ± 11.2 nm long, 110.3 ± 10.7 nm wide, 23.4 ± 3.4 nm high were taken. The space between globular formations was 127.2 ± 21.3 nm. It has been ascertained that the roughness coefficient of the surface relief (Rq) was 8.7 ± 0.5 nm. The method of fixing the contact angle of water was used to evaluate hydrophilic/hydrophobic properties of biomaterial. Value of the angle was 83° ; adhesion coefficient, 99.88 mN/m², which characterizes the surface of biomaterial as moderately hydrophilic. Mesenchymal stromal stem cells were cultured on a substrate of histoequivalent-bioplastic material based on hyaluronic acid hydrocolloid. In the course of ultrastructural study cell migration into the material was recorded, presence between the interwoven fibrillar fibres of cell layers of an oblong shape 3.7 ± 0.5 μ m wide, which reflects their cooperation with the surface of the developed polymer suitable for use as a growth substrate in case of biotechnological replacement of tissue defects.

Biography

Almazov, Ilya Alekseevich, corresponding author – successfully graduated Orenburg State Medical Academy in 2013 and entered the residency in plastic surgery Northwest Medical University in St. Petersburg. Simultaneously is doing scientific work under the direction of E.V. Zinoviev.

dr.almazov@gmail.com