

Development of an alternative method for non-invasive delivery of biologically active substances into the organism

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To determine the feasibility of non-invasive, namely transdermal, delivery of a growth-inhibitory thermostable protein complex (TPC) isolated from adult rat liver, the effect of immobilized TPC in polyvinyl alcohol (PVA)-based films of various compositions on the proliferation of adolescent rat tissues was studied. It was found that exposure to the control film (N1), made of polyvinyl alcohol and vinyltriethoxysilane alone, did not alter mitotic activity in the liver and kidney of the test group compared to intact animals. The effect of TPC (N2), immobilized in a film made of polyvinyl alcohol and vinyltriethoxysilane (VTES), compared to the animals of the control group, significantly reduced the mitotic index in different tissues (liver and kidney) of the test group (by 43% and 29%, respectively). The control film made of polyvinyl alcohol alone (N3) did not affect the mitotic activity of the liver and kidney. In addition, the inhibitory effect of TPC immobilized in a film made of polyvinyl alcohol alone (N4) was not observed in any tissue. In parallel, the possibility of increasing the solubility and, accordingly, the permeability of proteins in the N1 and N4 films by using starch as a third component was investigated. It was revealed that the addition of starch to the N1 film did not lead to an increase in its solubility and, accordingly, a change in the inhibitory effect of the TPC immobilized in it. The use of starch in the N4 film (N6) also did not lead to an increase in its solubility.

Conclusions:

1. The feasibility of using a film based on polyvinyl alcohol and vinyltriethoxysilane for the non-invasive introduction of biologically active substances into the body is directly related to the content of vinyltriethoxysilane in the film.
2. The use of starch as an additional component in a film based on polyvinyl alcohol cannot ensure an increase in the rate of penetration of the thermostable protein complex through the film and, accordingly, the effectiveness of its inhibitory effect.