Compounds based on cerium are highly promising objects in biotechnology regarding their high biological activities such as antiviral, antibacterial, antifungal, neuro- and radioprotective action, antioxidant activity, as well these compounds can also increase the lifespan of micro- and macroorganisms (Shcherbakov, 2020).

On their basis it is possible to develop compositions capable of activating the systems of cellular and humoral immune defense and used for the prevention and therapy of viral diseases, which makes it achievable to use them for the development of potential antiherpetic agents (Thakur, 2019).

Thus, cerium-based compounds have a range of unique properties, but despite the success of their application in biotechnological fields, the mechanism of their action on biological objects requires detailed research. Therefore, the aim of the work was to verify in vitro antiherpetic activity of trivalent and tetravalent cerium salts.

In this research we used the salts CeCl$_3$·7H$_2$O and (NH$_4$)$_2$Ce(NO$_3$)$_6$ (Sigma, USA), where cerium has valency (III) and (IV) respectively, and also an African green monkey kidney cell culture MA-104, herpes simplex virus (HSV-1/2), isolate "GMM".

To determine antiviral activity of cerium salts preventive and therapeutic regimens were used. According to the preventive regimen, cerium salt samples were added to the MA-104 cell culture 24 h before the infection with HSV-1/2. The antiviral effect of the researched compounds was determined in the tenfold concentration range from 100 μM to 0.01 nM. According to the treatment regimen, salt samples were added to MA-104 cells 60 min after infection with HSV-1/2. In this regimen, the antiviral effect of cerium salts was determined in the tenfold concentration range an order of magnitude higher than in the preventive regimen from 1.0 mM to 0.1 nM. HSV-1/2 with the multiplicity of infection 1 × 10$^3$ TCD$_{50}$ in 100 μL of medium 199 (Sigma, USA) was used. Crystal violet staining was used to determine the total number of adherent viable cells.

We have shown that cerium salts are capable of providing the formation of a state of antiviral resistance against HSV-1/2, provided that they are present for 24 h in the culture medium. The therapeutic treatment regimen in the same salt concentrations as the preventive regimen (100 μM - 0.01 nM) has no antiviral effectiveness. Salt (NH$_4$)$_2$Ce(NO$_3$)$_6$ in vitro provides the formation of an effective state of antiviral resistance, while the salt CeCl$_3$·7H$_2$O forms a non-linear, sinusoidal-like concentration-dependent anti-HSV-1/2 response of cells.

An antiviral effect of CeCl$_3$·7H$_2$O and (NH$_4$)$_2$Ce(NO$_3$)$_6$ salts at various concentrations was studied in vitro in MA-104 cell culture at a high multiplicity of HSV-1/2 infection. Cerium salts were found to be capable of providing anti herpetic activity.