UDC 577.1: 599.232.4

NANOPOLYMER BASED ON PSEUDOPOLYAMINO ACIDS CAN BIND PROTEINS AND SPREAD TO RATS ORGANS AND TISSUES

B. O. Chekh[1], PhD Student, *M. V. Ferens*[2], PhD Student, *Y. V. Martyn*[1], Junior Research Fellow, *D. D. Ostapiv*[1], Head of the Laboratory, *V. V. Vlizlo*[1], Director of the Institute
bogdanchekh@gmail.com

[1]Institute of Animal Biology NAAS, Lviv, Ukraine
[2]National University "Lviv Polytechnic", Lviv, Ukraine

Today, the main purpose for science and medicine is to make drugs more effective against diseases and safer for human and animals. Accordingly to this, scientists develop new classes of polymers that are non toxic, stable and biodegradable which could be effective transporters for drugs. Perspective polymers that meet these requirements are polymers based on pseudopolyamino acids. The main difference between polymers based on pseudopolyamino acids and natural polyamino acids is that polymers based on pseudopolyamino acids doesn't have peptide bonds in their structure, that can be changed to urethane, ester, anhydrite and other chemical bonds. The main purpose of our work is to study the ability of GluLa-DPG-PEG600 to bind bovine serum albumin (BSA) and detect localization of complex GluLa-DPG-PEG600 with BSA in organs and tissues of experimental rats.

For our research we created nanopolymer GluLa-DPG-PEG600 that consist of glutamic and lauryl acids (GluLa), dipropylene glycol (DPF), polyethylene glycol (PEG600) To study nanopolymer localization in rats body, fluorescein (F) was covalently attached to main macromolecule of GluLa-DPG-PEG600 and resulting nanopolymer was GluLa-DPG-PEG600-F. For study the ability of nanopolymer to bind blood proteins we tested 2 % water dispersion of GluLa-DPG-PEG600 and GluLa-DPG-PEG600 with BSA by using electrophoresis in 5 % polyacrylamide gel. To study the ability of nanopolymer to spread in rats organs and tissues, we made complex which consist of 2 % water dispersion of GluLa-DPG-PEG600-F and BSA conjugated with *Alexa Fluor 555* fluorescent dye in ratio of 2.5:1 and maintained it at a temperature of 18 °C for 1 hour. We created 2 experimental and 1 control groups consists of three mature rats *Rattus norvegicus* var. Alba, line Wistar, weighing 250–300 g in each group. Rats from first experimental group were intramuscularly injected by complex of GluLa-DPG-PEG600-F + BSA *Alexa Fluor 555* and euthanized in 16 hours after injections. Rats from second experimental group were intravenously injected by complex of GluLa-DPG-PEG600-F + BSA *Alexa Fluor 555* and euthanized in 5 hours after injections. Rats from control group were intact. After we made histological samples of spleen, liver, brain and kidneys using cryostat. Localization of complex GluLa-DPG-PEG600-F + BSA *Alexa Fluor 555* in rats organs and tissues determined by fluorescent microscopy using *Leica DM2500* microscope and *Leica Application Suite* software.

In this study we detect that nanopolymer GluLa-DPG-PEG600 can bind bovine serum albumin which is an important quality and indicates GluLa-DPG-PEG600 as potential transporter of proteins and their complexes. Results of histological analysis prepared using luminescence microscopy shows nanopolymer localization in rats liver and brain on 16 hour after intramuscular injection and in spleen and kidneys on 5 hour after intravenous injection. This detect the ability of nanopolymer to be engaged in xenobiotic metabolism, penetrate blood-brain barrier and potentially provide quick and effective immune as potential drug transporter and adjuvant.