UDC 577.3 615

# AFLATOXIN B1 EFFECT AND THERAPEUTIC ACTION OF ENTEROSORBENTS ON NITRIC OXIDE SYSTEM IN ANIMAL CELLS

*Ch.M. Olijnyk*[1] junior research fellow, *H.L. Antonyak*[2] professor, Dr. Sci. Biol.
golovchak.kris@gmail.com

[1]Institute of Animal Biology, NAAS
[2]Lviv Ivan Franko National University

Aflatoxins are among the most dangerous pollutants of the agricultural crops and forages. Their producers, such as microscopic fungi of the genus Aspergillus, are widespread in warm and humid climate and can grow on cereals with non-compliance of storage norms. Produced by these fungi, toxins are entering the body of animals and humans and affect its metabolism, growth and development. However, influence of aflatoxin B1 on the system of synthesis of nitric oxide (NO) — an endogenous factor that is involved in the mechanisms of cellular functions regulation is not studied sufficiently.

As has been found in our previous studies, under conditions of oxidative stress caused by the action of aflatoxin B1 (AFB1) the expression level of total NO-synthase (NOS) in rat leukocytes was significantly reduced. NOS is capable to produce large quantities of nitric oxide (NO). NO — biologically active molecule and neurotransmitter that regulates the immune system, vascular tone and smooth muscles of internal organs, shows antithrombotic effect, affects the synthesis of protein. Nitric oxide is formed in the body from L-arginine (L-Arg) by different isoforms of NO-synthase, enzymes that are found in blood cells and many organs and tissues of human and animals.

Reduction of the negative impact of aflatoxin on animals is achieved by using the endogenous substances, such as sorbents. In most cases, they are added to the feed contaminated by fungi or mycotoxins. The effect of adsorption of mycotoxins in the digestive canal is carried out by the molecular interaction between the sorbents and mycotoxins through changing circulation of the bile acids in the liver. It is known that sorbents exhibit the highest activity against polar mycotoxins, such as aflatoxins.

The aim of our study was to investigate the functional state of nitric oxide in rat cells under the influence of aflatoxin B1 and to determine the effectiveness of sorbents in the regulation of disorders caused by aflatoxin. In our experiment for correction of chronic aflatoxicosis were used two sorbents, which differ in composition.

The animals were divided into 12 groups. The animals of the first group (K) were used as control. Rats of the group D1 were administered by aflatoxin B1 («Sigma», USA) at concentration of 15 mg/kg daily for 14 days intragastrically through a tube. Animals of the group D2 were administered the same amount of toxin along with the drug "Vitakorm-REO" (PE SPC "Himtehservis", Ukraine). Rats of the D3 group were injected with the toxin and drug "Vitakorm-Acidus". Drugs were added to the feed in amount of 1.5 g of sorbent per 1 kg of feed (input method — oral). Rats of D4 and D5 groups were consumed only sorbents with food. Decapitation was performed on the 7th and 14th day of the experiment under light ether anesthesia, using the rules of handling with animals.

Established that aflatoxin B1 in a daily dose of 15 mg/kg leads to decrease of the total NOS activity in lung cells studied animals during 14 day experiment. The general NOS activity in lung cells of rats, which were administered only by aflatoxin (the D1 group) on the 7th day of the experiment was lower at 22 % compared with the control group, and on the 14th — at 25 % ($P < 0.05$), respectively. In animals, which were administered with aflatoxin and drug «Vitakorm-REO» enzyme activity on the 7th day decreased only at 18 %, and on 14th — at 5 %. In the lung cells of rats from D3, D4, D5 research groups the enzyme activity was similar with the control values. In animals of the D1 group on the 7th day of experiment nitrites concentration was decreased at 18 %, and on the 14th — was increased at 25 %. Also, was found that aflatoxin B1 have significant action on general activity of NO-synthase in hepatocytes. In particular, on the 7th day of experiment in the group of animals, injected by toxin, enzyme activity was lower at 44 % ($P < 0.01$), and on the 14th — at 38 % ($P < 0.05$) compared with the control group. In animals, which were administered by toxin and drug «Vitakorm-REO» on the 7th day was observed decrease of NOS-activity at 36 % ($P < 0.01$), and on the 14th — only at 13 %, compared with control. Enzyme activity of other groups (D3, D4, D5) were close to the control. The nitrites concentration in hepatocytes under the influence of AFB1 was only 92 % of the values in the control group on the 7th day of the experiment and was higher at 16 % on the 14th compared with control.

These results suggest that aflatoxin B1 did not significantly affect on the total activity of NO-synthase in the lung cells, but has a greater impact on this value in liver cells.