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AZOXIMERI BROMIDUM - PROTECTIVE ACTION OF IMMUNOSTIMULATOR DRUG IN EXPERIMENTAL TRICHINOSIS OF MICE

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ABSTRACT

Trichinosis is a parasitic disease caused by roundworms of the *Trichinella* type. Geographic distribution - worldwide. Nematodes of the genus *Trichinella* are one of the most widespread zoonotic pathogens on the world, and they can still cause major public health problems in many parts of the world. In our study we evaluated the protective effect of azoximeri bromidum in experimental trichinosis of mice. The azoximeri bromidum, is a polymer, a combined innovative product with immunomodulating, detoxifying, and antioxidative action, it is part of the Russian influenza vaccine. An assay was carried out on 20 white outbred mice weighting 16-18 g, divided into 2 groups of 10 animals in each. The first group was injected with azoximeri bromidum; the second group was injected with 0.9% NaCl. The drug was injected twice with an interval of 48 hours intramuscularly in a dose of 0,004 mg/mouse. After 48 hours the mice were infected by *Trichinella spiralis* larvae in a dose of 80 ± 5 larvae/mouse. Analysis of the data indicates that in the experiment the application of this drug had significant protective effect. The number of *T. spiralis* larvae detected in animals was 142.5 ± 11.1 larvae/mouse, respectively. This was 31.5 times less than in the mice of control group (4485 ± 430.6 larvae/mouse). Based on this, we consider it is expedient to continue the study of this immunostimulator drug in the complex immunoprophylaxis of trichinosis.

Keywords: *immunostimulator drugs, Trihinella spiralis, immunoprophylaxis, immunomodulators, mice.*

INTRODUCTION

Trichinosis is a parasitic disease caused by roundworms of the *Trichinella* type. Geographic distribution - worldwide. Most common in parts of Europe and the United States. Light infections may be asymptomatic. Intestinal invasion can be accompanied by gastrointestinal symptoms (diarrhea, abdominal pain, vomiting). Larval migration into muscle tissues (one week after infection) can cause

periorbital and facial edema, conjunctivitis, fever, myalgias, splinter hemorrhages, rashes, and peripheral eosinophilia. Occasional life-threatening manifestations include myocarditis, central nervous system involvement, and pneumonitis. Larval encystment in the muscles causes myalgia and weakness, followed by subsidence of symptoms (<https://www.cdc.gov>, 2017).

The therapy and immunoprophylaxis of this disease represents an important problem. Scientific research for effective means of protection against this deadly disease is conducted throughout the world.

The results of the study suggest that the parasite *Trichinella spiralis* made an effort to reduce the effectivity of the host immune response in order to ensure its own survival (Piekarska et al., 2010). Studies established that interleukin-25 (IL-25) promotes efficient protective immunity against *Trichinella spiralis* infection by enhancing the antigen-specific IL-9 response (Angkasekwina et al., 2013). In this way the using immunostimulators drugs in recent years are reasonably. There is a lot of references to research about strengthening the body's resistance to helminth infection by the application of non-specific immune stimulating (Berezhko. et al., 2004, Rudneva et al., 2014, Smolencev, 2011). Thus, in the model of experimental alveolar echinococcosis, the protective effect of the immunostimulating drug ribotan was established (Rudneva et al., 2016). Immunomodulator Roncoleukin has a protective effect (within 40%) with echinococcosis of dogs (Berezhko. et al., 2004). The protective effect of the immunostimulating antiparasitic agent on the basis of the seed *Artemisia vulgaris* was also revealed in experimental trichinosis (Rudneva et al., 2016). Combined use of antiparasitic drugs and immunomodulators, according to Ismagilov AM (2010), contributes to the faster recovery of the organism in the case of melophogosis. The use of immunomodulator Roncoleukin in experimental trichinosis provides protection against invasion by 80.6% (Napisanova et al., 2016).

Given these data, it is certain that the effectiveness of the protective action of a specific drug improves with the use of an immunostimulating agent. Its use makes it possible to increase the antiparasitic resistance of the organism.

In our study, we focused on the study of immunoprophylaxis activity of azoximeri bromidum – is an N-oxidized polyethylene-piperazine derivative, a water-soluble high-molecular synthetic immunomodulator. Polyoxidonium can be used as adjuvant in combined treatment of acute and chronic infections of any etiology, in the treatment of first and secondary immunodeficiencies simultaneously with basic drugs (Pinegin et al., 2003). It is part of the russian influenza vaccine (<https://www.drugs.com>, 2017). Also we evaluated the protective effect immunostimulant azoximeri bromidum in experimental trichinosis of albino outbred mice.

MATERIALS AND METHOD

We used in our study 20 albino mice weighing 16-18 g, divided into 2 groups of 10 animals in each. The first group was injected with azoximeri bromidum; the second group control group was injected with 0.9% NaCl. The azoximeri bromidum,

polymer, a combined innovative product with immunomodulating, detoxifying, and antioxidative action. The drug was injected twice with an interval of 48 hours intramuscularly in a dose of 0,004 mg/mouse in 0,2 ml 0.9% NaCl. After 48 hours the mice were infected by *T. spiralis* larvae in the dose of 80 ± 5 larvae/mouse. Study of the protective effect of immunostimulatory drug was carried out 45 days after invasion. The mice of each group include controls that are subjected to human euthanasia and digested in the artificial gastric juice separately (Figure 1).

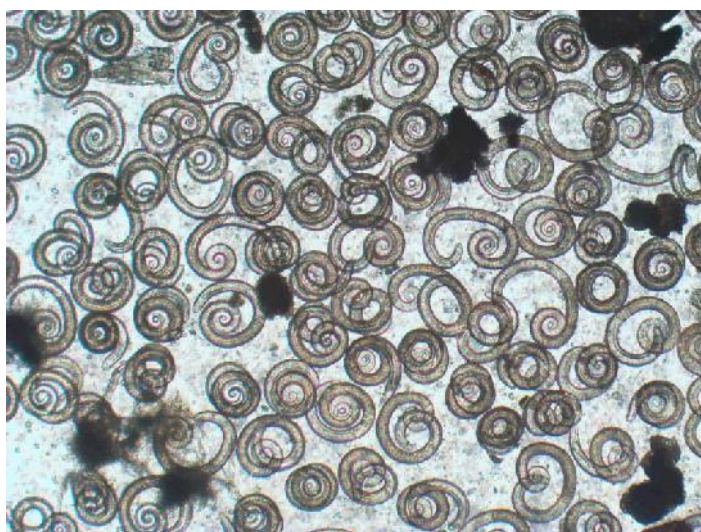


Figure 1. The larvae of *Trichinella spiralis* in the fluid after digested mice's in the artificial gastric juice (control group).

We then washed of *T. spiralis* larvae in the sedimentary fluid. The larvae were counted for each mouse separately by a binocular microscope. We have defined the arithmetic mean of the number of larvae in each group of experimental animals to evaluate. The average arithmetic number of larvae for each group of animals was determined.

RESULTS AND DISCUSSION

The number of *T. spiralis* larvae detected in animals was 142.5 ± 11.1 larvae/mouse respectively (figure 2). The degree of protection of mice injected with azoximeri bromidum. Even so, this was 31.5 times less than in the mice of control group (4485 ± 430.6 larvae/mouse).

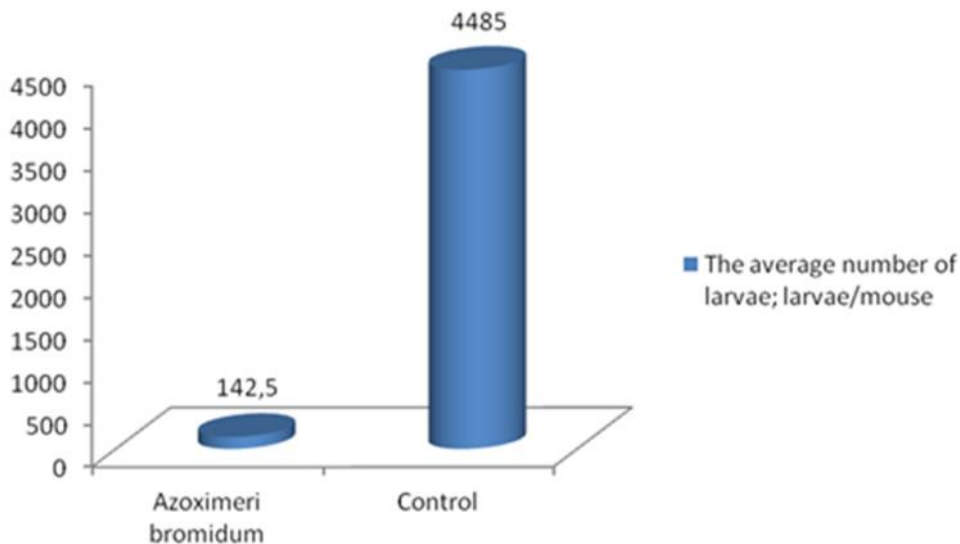


Figure 2. The number of detected *Trihinella spiralis* larvae in the experiment on the evaluation of the protective properties of the immunostimulator in experimental trichinosis

In this case, the use of this drug activates the immune response and the injection of this is immunomodulator significantly reduces subsequently infected of parasites animals. Thus, the smallest number of larvae was observed in the experimental group mice what evidenced about a high biological activity immunostimulatory azoximeri bromidum in experimental trichinosis.

Our data are comparable with the data of other researchers working in this field. So, according to Klenova, the protective action of the drug ribotan is in alveolar echinococcosis (Klenova, 1999). Cycloferon has a protective effect (within 95.75%) with experimental trichinosis (Rudneva, 2016). Podophyllum Theta, Cina 30 and Santoninum 30 reduced the larval population in the studied mice by 68.14%, 84.10% and 81.20%, respectively, as compared to the untreated control group (Sukul et al., 2005). Numerous studies on experimental models have shown that the combined use of specific and nonspecific drugs leads to successful immunization against helminthiases, especially in tissue invasion (Dalton et al., 2013, Rudneva, 2006).

In this way immunostimulating drugs significantly increase the protective reaction of the organism and are able to prevent subsequent infection by different helminths.

CONCLUSION

Thus, in the experiment it was clearly demonstrated high power effect azoximeri bromidum to achieve the best protective effect. Our data are actually not inconsistent with the results of other researchers which have used various

immunomodulating and adjuvant agents. That enhance the immunogenicity of antigens as a means of increase potentiation animal body defense mechanisms against helminthiasis.

Analysis of the data indicates that this substance in the experiment showed high protect effect and can be considered as a medicament for increasing the effect of specific antigens in parasitic diseases. We consider it necessary to continue research in this direction, but now in combination with specific antigenic drugs in the complex immunoprophylaxis against trichinosis.

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