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INFLUENCE OF LONG-TERM CONSUMPTION OF STREPTOMYCETE BIOMASS ON CONDITIONAL-REFLEX LEARNING AND MEMORY IN WHITE RATS OF DIFFERENT AGES

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Rezumatul. În experimentele pe șobolani albi masculi, s-a constatat, că consumul pe termen lung al biomasei tulpinilor de streptomicete - *Streptomyces massasporeus* CNMN-36 și, într-o măsură mai mare, *Streptomyces fradiae* CNMN-Ac-11, izolate din solurile Moldovei, în mod semnificativ facilitează procesul de învățare a abilității de evitare activă și încetinește procesul de stingere a memoriei reflector-condiționate la animalele tinere și, în special, senile.

Cuvinte cheie: reflex condiționat, învățare, memorie, streptomicete, biomasă.

INTRODUCTION

Among microorganisms, one of the most productive and promising groups in terms of the introduction of biologically active substances of various chemical nature and scope are streptomycetes [1, 2]. Natural bioactive metabolites of streptomycetes are widely used in medicine, pharmaceutical production, veterinary medicine as antibiotics, antioxidants, enzyme inhibitors, antitumor, anti-inflammatory, antiviral and antifungal agents [3-5]. The main problem with the introduction of drugs based on metabolites of streptomycetes

remains insufficient knowledge of the mechanisms of their action on the body.

In recent decades, it has been found that the metabolites of some strains of streptomycetes have a neuroprotective effect when using various models of neurodegeneration, have the ability to stimulate neuritogenesis, affecting the ultrastructural organization of various neuronal formations of the brain, and the differentiation of neural stem cells [6-10]. Despite an increasing number of reports on the effects of streptomycete waste products on neuronal processes, their effect on animal behavior has been very little studied.

The aim of this work is a comparative study of the effect of long-term consumption of biomass of strains *Streptomyces massasporeus* CNMN-Ac-36 and *Streptomyces fradiae* CNMN-Ac-11, isolated from the soils of the central part of Moldova, on the process of developing defensive conditioned reflexes and conditioned reflex memory in white rats of different ages (young and old).

MATERIAL AND METHODS

The studies were performed on male Wistar rats. Animals of the experimental subgroups for 90 days as a food supplement to the standard diet received daily at a dose of 250 mg/kg of live weight dried biomass of two local strains of streptomycetes - *Streptomyces massasporeus* CNMN-36 or *Streptomyces fradiae* CNMN-Ac-11, grown on a nutrient medium with previously determined amino acid and lipid composition. Ninety days after the animals began to consume the biomass of streptomycetes and when they reached the age of 4 months (young) and 15 months (old), they began to develop conditioned reflexes. During the experiment on the development of conditioned reflexes (14 days), and then, in the study of the extinction of avoidance reactions (42 days), the experimental animals continued to receive biomass with food. Rats kept on a standard diet served as controls. To study the process of associative learning, the method of developing a conditioned reaction of active avoidance of a painful stimulus was used. In order to study the processes of conditioned reflex memory, the dynamics of the latent period of the avoidance reaction was determined on the 5th, 10th, 15th, 20th, 30th, and 45th days after the experiment on the development of conditioned reflexes

of active avoidance.

RESULTS AND DISCUSSION

It was found that long-term consumption of biomass of local strains of streptomycetes - *Streptomyces massasporeus* CNMN-36 and, to a greater extent, *Streptomyces fradiae* CNMN-Ac-11 significantly stimulates the development of a conditioned response of active avoidance in young and, especially, old animals, thereby facilitating the process of conditioned avoidance - reflex learning. In addition, the consumption of *Streptomyces massasporeus* CNMN-36 biomass and, to a greater extent, *Streptomyces fradiae* CNMN-Ac-11 significantly reduces the latent period of the avoidance reaction at various times after the development of a conditioned active avoidance reaction in young and, especially, old animals, thereby contributing to slowing down the extinction of traces of conditioned reflex memory. It should be noted that a low level of development of conditioned reflexes was initially recorded in old animals compared to young animals, which is obviously associated with the development of neurodegeneration processes in them. The fact that the effectiveness of the use of streptomycetes biomass, especially *Streptomyces fradiae* CNMN-Ac-11 in old animals is significantly higher than in young animals, given the role of oxidative stress in the development of age-related neurodegenerative changes against the background of a decrease in the activity of the multilevel antioxidant system of nerve cells, testifies in favor of assumptions about the neuroprotective mechanism of the effects of streptomycete biomass metabolites on the processes of conditioned reflex activity and memory.

CONCLUSIONS

1. Long-term consumption of the biomass of local strains of *Streptomyces massasporeus* CNMN-36 and, especially, *Streptomyces fradiae* CNMN-Ac-11 leads to a noticeable facilitation of the process of learning the habit of active avoidance and improvement of the conditioned reflex memory of young and, especially, old animals.

2. The local strains of *Streptomyces fradiae* CNMN-Ac-11 (primarily) and *Streptomyces massasporeus* CNMN-36 (to a lesser extent) isolated from the soils of Moldova are promising for further

research in order to isolate and identify substances with neuroprotective and nootropic properties.

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