

ABSTRACT&REFERENCES

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DETERMINATION OF *LUMBRICUS TERESTRIS* POPULATION DENSITY IN SOIL LAYERS FROM THE ABOYOTIC FACTORS COMPLETE EFFECT UNDER CONDITIONS OF NORTH-EASTERN UKRAINE

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Aim. The aim of the research is to establish the dependence of *Lumbricus terrestris* population density in different soil layers on the complex (complete) effect of abiotic factors under conditions of the Northern East of Ukraine.

Methods. The methods of the research are field (method of excavations for determining the population density, selection of soil samples) and laboratory ones (determination of humidity, pH, electrical conduction (EC) of the soil).

Results. The example of three abiotic factors (temperature, humidity and pH of the soil) demonstrates their complex (complete influence) on the *Lumbricus terrestris* population density in soil layers 0–20 and 20–40 cm. Partial and plural coefficients of correlation of signs of temperature, humidity, pH of the soil and number of individuals, pair coefficients of correlation of signs of concentration of organic and non-organic substances (TDS) in the soil solution and population density of the variety testified to the different character of connections and dependencies.

Conclusions. The importance of the influence of one or another abiotic factor at the constant value of another one on the population density from the least to the biggest one grows in the succession: temperature, humidity, pH. The importance of the influence of the complete effect of two factors grows in the succession: temperature and humidity, humidity and pH, temperature and pH. The correlative-regressive model gives a possibility to prognosticate the soil fertility (in the wide understanding) depending on this variety population

Keywords: *Lumbricus terrestris*, variety, population density, soil, abiotic factors, correlation, regression

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THE LYSOZYME ACTIVITY IN LIVER AND COLON DYSBIOZIS AFTER EXPERIMENTAL ANTIBIOTIC THERAPY

p. 7–11

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As far as antibiotics cause dysbiotic and hepatotoxic side effects, there appeared the interest to the experimental study of the influence of antibiotics on the antimicrobial function of the liver and colon microbiota, especially lysozyme activity in tissues of rats.

Aim – is to study the influence of several antibiotics on lysozyme activity in the liver, blood serum and colon.

Methods. The studies were realized on rats of Wistar line, that were administered with soluble forms of antibiotics with drinking water: cefixime (20 mg/kg), or sumamed (25 mg/kg), or amoxiclav (40 mg/kg), or lincomycin (60 mg/kg) during 5 days, or antihelicobacter complex (omeprasole 1,33 mg/kg, amoxil-K 50 mg/kg and clarithromycin 7,5 mg/kg) for 8 days. Doses corresponded to developers' recommendations. Euthanasia of animals was realized under thiopental anesthesia (40 mg/kg) in 5 days after the last intake of antibiotics. Lysozyme and urease activity was determined the blood serum, homogenates of the liver and colon mucosa, and the dysbiosis degree was calculated by their level according to Levitsky by the enzymatic method. The results were processed using Student t-criterion.

Results. Antibiotics cause the decrease of lysozyme activity in the colon mucosa, blood serum and liver of rats. This factor decreases most after using lincomycin and antihelicobacter complex, insignificantly – after amoxiclav. Synchronously, urease activity in the colon mucosa, blood serum and liver and also the dysbiosis degree in the colon increase. Lincomycin and antihelicobacter complex essentially raised these indices. The course of amoxiclav, in opposite, caused the minimal effect on urease activity and dysbiosis degree. The obtained results allow to presuppose that reproduction of pathogenic and conventionally pathogenic microflora in the mucosa of the large intestine, established by the increase of

urease activity, may be a result of weakening of activity of the antimicrobial factor of lysozyme of the liver and colon after the realized antibiotic therapy. It must be taken into account at elaborating the prophylaxis of side effects of antibiotics

Keywords: antibiotics, lysozyme, urease, dysbiosis, blood serum, liver, large intestine, rats

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INVESTIGATION OF THE NEUROPROTECTIVE EFFECT OF HALLOYSITE NANOCRYSTALS ON THE RESTORATIVE FUNCTION OF MICE BRAIN NEURONS

p. 12–17

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There were studied neuroprotective effects of halloysite nanocrystals on the decrease of protein synthesis – amyloid proteins and activation of neurogenesis in mice with genetic mutation of APP, PSN-1, PSN-2 genes. Halloysite inhibits B monoaminoxidase activity, at that A monoaminoxidase activity increases. All studied compounds inhibit Ca²⁺ glutamate-induced hold in synaptosomes. The study was realized on mice of C57BL/6 line with the preliminary reproduction of the defect of beta-amyloid proteins. Nanotubular halloysite was used as a neuroprotector. The analysis of the change of the quantity and localization of aggregates of beta-amyloid proteins before and after using nanotubular halloysite was realized by methods of fluorescent detecting of confocal microscopy. There is demonstrated the neuroprotective interaction and stimulation of neurons restoration. The results demonstrated the decrease of beta-amyloid proteins, neurogenesis activation, high antioxidant potential of halloysite nanocrystals that is a precondition of the neuroprotective potential of nanotubular halloysite

Keywords: neuroprotective, nanocrystals, halloysite, antioxidant, nanotubes, amyloid genesis

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RESEARCH OF INDICATORS OF THE ENDOGENOUS ANTIOXIDANT SYSTEM IN RATS AFFECTED WITH SODIUM NITRITE ON THE BACKGROUND OF TOBACCO INTOXICATION

p. 18–23

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Under conditions of progression of environmental pollution, the one of priority directions of toxicology and medicine is the study of features and mechanisms of the combined effect of xenobiotics – risk factors of many ecologically depending diseases. In last years there is widely studied the influence of tobacco smoking on the human organism. The numerous researches proved that the wide use of mineral fertilizers in agriculture resulted in environmental pollution, especially pollution of atmospheric air, drinking water and food and created the real threat for life of both human and other living beings. All these anthropogenic toxicants penetrate the human organism and lead to the oxidative stress and activation of free radical processes in the organism and imbalance in functioning of pro- and antioxidant systems.

The aim of the research is to establish the level of the oxidative stress and activity of indicators of the system of antioxidant defense in rats, injured with sodium nitrite on the background of 45 days tobacco intoxication for choosing adequate schemes of correction of detected disorders. Experiments were realized on non-linear white male rats of different age groups, who underwent the effect of tobacco smoke during 45 days. Two groups of animals, injured by smoke, received sodium nitrite in dose 45 mg/kg of body mass for 24 hours and 72 hours before the end of experiment. Euthanasia was realized under thiopental anesthesia. Blood, blood serum liver and kidneys were taken for the study.

For determining AOF, there was realized extraction of blood neutrophils by the method of gradient centrifugation. For measuring AOF level in neutrophils, dichlorofluorescein diacetate was used. The level of AOF production was analyzed by the intensity of dye stuff lighting on the current cytometer. Catalase activity in the reaction with ammonium molybdate, superoxide dismutase activity with nitroterazolium blue, the content of restored glutathione at interaction of Ellman reagent with free SH-groups were determined in blood serum and tissues. The content of ceruloplasmin in blood serum was determined by the reaction of para-phenylendiamine oxidation.

The studies were realized observing general principles of experiments on animals, coordinated with statements of the European convention about protection of vertebral animals, used for experimental and other scientific aims. Rats of all age groups, injured by tobacco smoke demonstrated the increase of AOF level in blood that resulted in the oxidative process development in the organism. The synchronous intoxication of rats with tobacco smoke and sodium nitrite deepened even more all detected disorders that testify to the reliable ($p \leq 0,05$) increase of AOF that acquired the maximal values in immature animals. The oxidative stress, observed in the organism of rats of all age groups, caused inhibition of antioxidant enzymes activity: superoxide dismutase, catalase and decrease of the non-enzyme component of the antioxidant system – restored glutathione. The synchronous injure of animals by sodium nitrite and tobacco smoke resulted in the decrease of catalase activity in lungs of mature rats in 2,4times compared with intact animals in the final term of the study.

After sodium nitrite intoxication of rats, toxicated by smoke, the content of restored glutathione was maximally decreased in the liver of mature rats (in 4,5 times). Most expressed changes of indicators of the antioxidant system were observed in blood serum and organs of mature rats

Keywords: injuries, white rats, oxidative stress, active forms of oxygen antioxidant system

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ANALYSIS OF SELENIUM- AND CHROMIUM-MADE COMPOUNDS AS A PROSPECTIVE CLASS OF BIOLOGICAL ACTIVE ADDITIVES

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*Selenium and chromium are essential microelements, which deficiency in food products conditions their decrease in the organism that results in the development of metabolic processes disorders. The use of biologically active additives of different generation allows to replenish the microelements reserve more or less. Properties of biologically active additives of organic nature have an advantage over their inorganic compounds and cause more therapeutic effect at disturbed metabolism. Biologically active additives of water plants are of a great interest. Preparations of *Chlorella vulgaris*, that is not only a source of biologically accessible chlorophyll, series of amino acids and so on, but also fatty acids that have antitoxic or antisclerotic effects recommended themselves rather well. There were elucidated the results of the studies that allow to note the positive influence of selenium-chromium-lipid complex of *Chlorella vulgaris* on metabolic processes in rats with experimental diabetes mellitus type 2. The skillful use of food additives for attaining the balance of food rations may cause regulation of prophylactic and treating measures, but any their use without scientific substantiation can cause negative results*

Keywords: *biologically active additives, selenium, chrome, water plants, compounds, diabetes mellitus, assimilation*

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CHANGING OF DYNAMIC RESPONSE OF THE ACTIVE MUSCLE SOLEUS IN CONDITIONS OF ITS ISCHEMIZATION IN ALCOHOLIC RATS WHEN C₆₀ FULLERENE IS ADMINISTERED

p. 27–32

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There were studied the effects of bio-compatible nanostructures C_{60} on mechanisms of muscle soleus contractions in alcoholized rats at their ischemic lesion for estimating the therapeutic effect of fullerene C_{60} on the time development of general pathogenesis in the ischemically injured muscular system.

The obtained data testify to the expressed protective effect of C_{60} FAS on the dynamics of muscle soleus contractions in alcoholized rats at their ischemic lesion. It indicates the fact that C_{60} FAS may be considered as promising medical means for prophylaxis and correction of the ischemically injured muscle.

The studies demonstrated that administration of C_{60} FAS causes different therapeutic effects on different zones of the contraction process. It was demonstrated, that the use of the water solution of fullerenes in dose 1 mg/kg as a protector on dynamic characteristics of skeletal muscles is effective at initial stages of lesions that is at ischemia during 1 hour. At increasing the ischemia duration, the protective influence of the solution decreases that may be connected with irreversible lesions in skeletal muscles, caused by the synergetic effect of two pathologies.

Keywords: fullerenes, ischemia, muscles, nanostructures, contractions, prophylaxis correction, radical, alcoholization, muscle soleus

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MORPHO-PHYSIOLOGICAL ADAPTATION OF BRYOPHYTES TO ENVIRONMENTAL FACTORS ON THE DEVASTATED TERRITORIES OF SULPHUR EXTRACTION

p. 33–38

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There was studied the morphological structure of mossy sods, content of carbohydrate metabolism components; activity of enzymes of antioxidant defense – peroxidase and superoxide dismutase in mosses with different tolerance to the moisture deficiency– Bryum argenteum Hedw., Bryum caespiticium Hedw. and Brachytecium salebrosum (Hoffm. ex F. Weber & D. Mohr) Schimp., and also the functional condition of DNA depending on the intensity of ecological factors at the territory of sulphur excavation dump of Novoyavorivsky state mining-chemical enterprise “Sirka” (Lviv region, Ukraine), where bryophytes are pioneers of overgrowth.

It was demonstrated, that under unfavorable hydrothermal regime, sods of mosses Bryum argenteum and Brachytecium salebrosum acquired signs of xeromorphism that is a manifestation of adaptation to the moisture deficiency. The mosses adaptation to the unfavorable water regime at the territory of the sulphur excavation dump is provided by the change of directionality of carbohydrate metabolism, manifested in the increase of the general content of carbohydrates and redistribution of carbohydrate metabolism to starch hydrolysis and soluble sugars accumulation.

There was established the increase of activity of enzymes-antioxidants – peroxidase and superoxide dismutase – in mosses shoots.

The moderate water deficiency influenced the intensity of luminescence of DNA ·AO of kernels, causing the increase of the level of polyploidization of kernels of the apical meristem of B. Caespiticium shoots

Keywords: structure of sods, general content of carbohydrates, starch, soluble sugars, peroxidase, superoxide dismutase, DNA luminescence, mosses

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