WATER-SOLUBLE FORM OF VITAMIN E IN THE PROCESS OF WARM-BLOODED ANIMALS METABOLISM

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It was established that the use of laboratory animals, α-tocopherol acetate in the block copolymer micelles with the addition of polyacrylic acid and polyethylene oxide possible to reduce its concentration to more than twenty four times, and on the effectiveness of the metabolism and increase in body weight compared to controlled increased by 10 %.

Key words: live weight, laboratory mice, α-tocopherol, an antioxidant, block copolymers.

Tocopherol combines several unsaturated alcohols, tocopherols, most active of which is alpha-tocopherol.

Tocopherols are transparent oily liquids, readily soluble in fats (oils, butter) and liposolubles, resistant to heat, but quickly destroyed by ultraviolet radiation [1, 5]. Tocopherols insolubility in water is difficult and limits their direct use. Therefore, in this paper we studied the effect of water-soluble forms of α-tocopherol acetate, obtained by micellar polymeric carriers, the clinical condition and body weight of the body of laboratory animals [6, 2].

Furthermore, vitamin E is a particularly valuable antioxidant in cell membranes where it prevents oxidation of unsaturated fatty acids by absorbing free radicals. This

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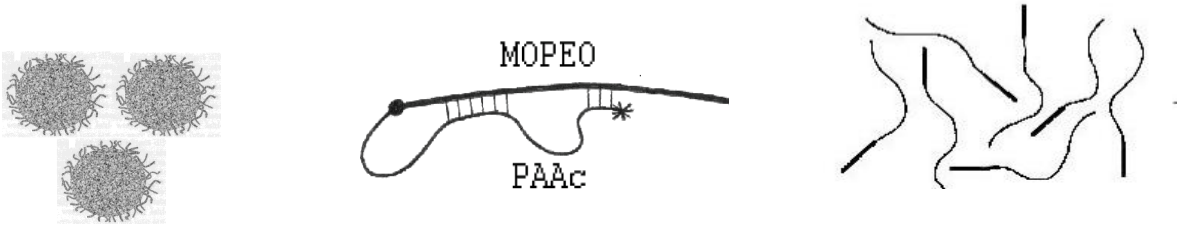
helps to stabilize and protect cell membranes of erythrocytes, etc., are sensitive to oxidation [1, 4, 3, 5].

The purpose of the study. Explore effect of vitamin E in water-soluble form in the organism of warm-blooded animals.

Material and methods research. The material for the study is based on nonlinear laboratory mice at the age of 45-days, the diblock copolymer (DSC) MOPEO-b-PAA (PANa) based on oxide of methoxy polyethylene (MOPEO) and polyacrylic acid (PAA).

DSC diagram of self-assembly into macromolecular micellar structures depending on the pH of the solution shown in Fig. 1.



Micelles DBK_{PAK} ($pH \leq 4$) Partially destroyed IntraPK ($4 < pH < 6$) Individual macromolecules DBK_{PANa} ($pH \geq 6$)

Fig. 1. DSC diagram of self-assembly molecules in micellar structures depending on pH.

For the second experiment two control and two experimental groups of 10 animals each. Groups formed the on the principle of analogies. Mice were first control group did not apply the drug, and the second – a fat-soluble vitamin E with higher concentration C_1 (0,25 mg/head) first test group diblock copolymer (DSC) MOPEO-b-PAA (PANa) based on oxide of methoxy polyethylene (MOPEO) and polyacrylic acid (PAA) (0,25 mg/head) and other test group the concentration difference was C_1/C_2 = 25 (0,01 mg/head). The drug posed by watering in the morning, after stopping the access of animals to water main watering. All laboratory animals were fed rodent chow. Conducted weighing animals.

RESULTS

During the experiment clinical trials of control and experimental groups of mice were conducted. In determining the habit of living animals had the temperament, the

average fatness and a natural body position in space. The appetite was, drinking was plenty and free. Just a month after the start of the experiment in the research groups of laboratory animals observed changes in coat, that is thick wool, which is well close to the body, shiny, well anchored in the skin. In the control groups of laboratory animals that were not fed or were fed without the pure preparation of the polymer shell coat was a few dim.

The effects of changes in body weight of mice alive for the use of the diblock copolymer (DSC) MOPEO-b-PAA (PANa) based MOPEO and PAC are shown in Table. 1.

1. The results of the changes in body weight of mice drinking water diblock copolymer (DSC) MOPEO-b-PAA (PANa) based MOPEO and PAC during the experiment, g, M±m, n=10.

Indicator	Group of mice			
	First control	Second control	First research	Second research
Live weight of the body in the beginning of the experiment	21,6±0,72	20,9±0,82	22,6±0,82 *▲	23,0±1,23*▲
weight after a month	26,5±0,92	26,4±1,36	28,7±0,62*▲	28,0±1,23*▲
weight after 2 monthes of experience	31,3±3,69	32,2±0,51	33,4±0,51*▲	33,7±1,02*▲
weight at the end of the experience (3 monthes)	33,5±0,92	33,9±0,51	34,6±0,82*▲	34,6±1,03*▲

* – $p < 0,05$ vs. group 1, ▲ – $p < 0,05$ compared with group 2

The data presented in table 1 indicate that the experience was elected with almost identical mice live weight. After one month of vitamin watering mouse first experimental group were 8,3 %, second – 5,7 % more weight compared to the first control group, as compared to the second control group, the mice of the first experimental group had higher body weight by 8,7 %, the second – 6,1 %, respectively.

After 2 months watering vitamin mouse of the first experimental group were 6,7 %, the second – 7,7 % higher body weight than the first control group as compared with the second control group, mice of the first experimental group were 3,7%, second – 4,7 % higher weight.

After 3 months of study mice of the first and second test groups increased weight by 3,3 % compared to the first control group as compared with the second control group mice first and second experimental groups had higher live weight of 2,1 %.

So, as a result of the drinking water laboratory animal studies of vitamin E in the form of a concentrated water-soluble and reduced 24-fold concentration obtained almost identical results on the metabolism and weight gain.

On completion of the experiment we have carried out the sampling of blood for serum and clinical chemistry results are shown in Table 2.

2. Biochemical parameters of the blood serum of mice after 90 days of the trial? M±m, n=10.

Indicators	Groups			
	First control	Second control	First research	Second research
ALT, U/l	119±0,21	110,3±3,29	89±2,88*▲	104,7±3,08*▲
AST, U/l	159±4,01	146,7±5,04	118,4±3,49*▲	139,5±9,56*▲
Alkaline phosphatase, U/l	113±8,12	107±6,99	76,33±0,72*▲	97±1,23*▲
Total bilirubin, mmol/l	16±0,72	12±0,51	11,67±0,51*▲	10,67±0,31*▲
Total protein, g/l	60,9±0,99	59,37±0,68	62,67±0,64*▲	62,67±0,03*▲
Glucose, mmol/l	7,1±0,05	8,9±0,12	8,9±0,15*▲	8,97±0,17*▲
Amylase, U/l	4506±36,17	2698±9,66	2986±23,84*▲	3299±116,4*▲
Creatinine, mmol/l	40±1,03	17,33±0,72	21,67±2,36*▲	25±3,39*▲
Urea, mmol/l	19±0,69	7,83±0,28	9,6±0,65*▲	10,47±1,09*▲

* – $p < 0,05$ vs. group 1 ▲ – $p < 0,05$ compared with group 2

According to the research presented in Table 2, it is found that the ratio of AST:ALT is 1,33, which corresponds to a normal control and in experimental groups. Indicator alkaline phosphatase in serum decreased in mice first test group of 32,5 %, 2 minutes – 14 % compared with the first control group as compared with the second control group – 28,7 % and 9,3 %, respectively, indicating improvement in the functioning of the liver and the bone tissue. The content of total bilirubin decreased in mice first test group of 27,1 %, second – 33,3 % compared with the first control

group as compared with the second control group – 27,5 % and 11,1 %, respectively, it shows improvement in biliary function. The total protein content decreased in mice first and second groups experienced by 2,1 % compared to the first control group as compared with the second control group – 5,6 %, respectively, indicating that the increasing the filter capacity of the liver and kidneys. Amylase decreased in mice first test group of 33,7 %, second – 26,8 % compared to the first control group as compared with the second control group – 10,7 % and 22,5 %, respectively, for improving kidney function in mice experimental groups demonstrates destruction amylase. Glucose increased in mice first test group of 25,4 %, second – 26,3 % compared to the first control group. However, mice first experimental group had the same rate of glucose from the second control, and the second test – 0,07 % higher, indicating that before decapitation was kept on a starvation diet. Several discussion on the findings of creatinine and urea but they are in all the groups, despite the significant differences have begun within the physiological range.

Thus, the results indicate that under the conditions of application a water soluble form of vitamin E in blood serum found that creatinine decreased in mice first experimental group were 45,8 %, second – 37,5 % compared to the second control group, and compared with the second test in mice first experimental group creatinine increased – by 25 %, second at – 44,3 %, indicating a slight impairment of renal filtration. Urea content decreased in mice first test group of 49,3 %, second – 44,9 % compared to the first control group as compared with the 2-nd control group of mice grew urea first st research group – by 22,6 %, the second at – 2,64 indicates a slight decrease in renal excretory function.

CONCLUSIONS

Desoldering laboratory animals diblock copolymer (DSC) MOPEO-b-PAA (PANa) based on oxide of methoxy polyethylene (MOPEO) and polyacrylic acid (PAA) has reduced its concentration in more than twenty-four times, and the body weight of the mice at 3 months of vitamin E drinking in water-soluble form even increased significantly compared with controls.

The results of serum biochemical indicators of mice which vipoyuvaly diblock copolymer (DSC) MOPEO-b-PAA (PANa) through (MOPEO) and (PAA) show the functioning of the organism of the experimental animals within the physiological range.

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ВОДОРОЗЧИННА ФОРМА ВІТАМІНУ Е В ПРОЦЕСАХ МЕТАБОЛІЗМУ ТЕПЛОКРОВНИХ ТВАРИН

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Встановлено, що застосування лабораторним тваринам α-токоферолацетату в блок-кополімерних міцелах з додаванням поліакрилової кислоти і поліетиленоксиду дало змогу знизити його концентрацію більше, ніж у двадцять чотири рази, а ефективність дії щодо обміну речовин та приріст живої маси тіла порівняно з контролем підвищились на 10 %.

Ключові слова: *жива маса тіла, лабораторні миші, α-токоферолацетат, антиоксидант, блок-кополімери*

Водорастворимые формы витамина Е в процессе метаболизма теплокровных животных

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Установлено, что применение лабораторным животным α-токоферолацетат в блок-сополимерных мицеллах с добавлением полиакриловой кислоты и полиэтиленоксида позволило снизить его концентрацию более чем в двадцать четыре раза, а эффективность действия по обмену веществ и прироста живой массы тела по сравнению с контролем повысилась на 10 %.

Ключевые слова: *живая масса тела, лабораторные мыши, α-токоферолацетат, антиоксидант, блок-сополимеры*