state of the pineal gland. One of them is the state of antioxidant defense systems, the activity of which can be determined by the level of total antioxidant activity of blood serum (TAAS).

The goal of the study was to research the chronorhythmological features of TAAS in the serum of rats under conditions of different functional activity of the pineal gland.

Experimental studies were performed on white nonlinear adult male rats weighing 170 ± 10 g. For 14 days they were kept under different lighting conditions (simulation of different functional activity of the pineal gland): group A - normofunction - (12 hours of light: 12 hours of darkness); group B - hypofunction - (24 hours of light: 0 hours of darkness); group C - hyperfunction - (0 h of light: 24 h of darkness). The experiment used fluorescent lamps with an intensity of 1500 lux. Euthanasia, by decapitation under light ether anesthesia, was performed at 8.00, 12.00, 16.00 and 20.00. Serum TAAS was expressed as the percentage inhibition of spontaneous peroxidation of endogenous brain lipids (according to the content of malonic dialdehyde). Statistical processing of the obtained results was performed using the parametric Student's t-test. The difference in results at $p < 0.05$ was considered statistically significant.

It was investigated that in group A at 12.00 TAAS serum was the highest and amounted to 78.1%. The lowest rates were at 8.00. In animals of group B there were phenomena of desynchronosis with a shift of the peak of TAAS at 16.00 against the background of a decrease in absolute values by 13%; 27.3%; 11.4% and 15.75% at 8.00, 12.00, 16.00 and 20.00, respectively, compared to animals of group A. With hyperfunction of the pineal gland (group C), the chronorhythm of TAAS coincided with the rhythm in animals of group A. An increase in the level of TAAS have revealed in all hours of the experiment, especially at 16.00 (by 8.1%) and 20.00 (by 14.5%) compared with animals of group A.

The phenomena of desynchronosis against the background of hypofunction of the pineal gland are probably caused by suppression and disruption of the rhythm of melatonin synthesis. Normochronosis and an increase in serum TAAS when stimulating the pineal gland around the clock are probably caused by an increase in the production of melatonin, which is also a powerful antioxidant in the body.

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INFLUENCE OF THE PHENOMENON OF POLYMORPHISM ON THE PROPERTIES OF DRUGS

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The ability of solids to exist in two or more forms with different crystal structures, properties, and the same chemical composition describes the phenomenon of polymorphism. This turned out to be an extremely important factor that determines the therapeutic effect of pharmaceuticals (significantly affects the parameters of their biological activity).

Especially important for chemists-technologists and pharmacists were the detection and study of differences in chemical stability, solubility, hygroscopicity, phase transition temperature. Change of the modification of active pharmaceutical ingredients (API) can occur both during synthesis (when replacing the solvent, the introduction of additional substances), and during isolation, purification, drying, storage.

A large number of modern drugs are polymorphic in their physical structure with the same chemical composition, and in the process of transition from one form to another, significant changes in medicinal properties are possible.

Obtaining polymorphic forms of the same drug often occurs when changing the conditions of crystallization of substances. For this reason, medicinal substances obtained at different factories, and sometimes even within the same series at the same factory, may differ in physicochemical properties, which is determined by the peculiarity of its technology, in particular at the stage of crystallization, as well as the possibility of polymorphic transitions during transportation and storage. This can also occur during the production and storage of ready-made drugs with appropriate changes in the properties of drugs.

For example, lincomycin and roxithromycin exist in at least 3 modifications - 2 crystalline and 1 amorphous, which differ in density values and the nature of the data of differential scanning calorimetry (DSC). The amorphous form of lincomycin during storage in the air turns into a crystalline modification, remaining stable in low humidity (storage in a desiccator).

Most substances, including antibiotics, are characterized by endothermic effects - processes with heat absorption that characterize the structural and phase transformations of substances, so the next stage of research was to study the nature of thermal transformations of lincomycin and roxithromycin.

According to the series of samples of roxithromycin for the original sample we also register one pronounced endothermic effect at 122° C. The DSC curve for an amorphous antibiotic sample and a sample isolated from the ether is of the same type, with structural transformations occurring in two stages and are accompanied by endothermic effects. For the amorphous sample of roxithromycin, the values of the maxima at 94.2° C are 113.4° C, and for the sample obtained from the ether, the values of the maxima are observed at 95° C and 11.7° C.

Despite the similarity of the thermal effects of samples of roxithromycin obtained from the ether (crystalline form) and *dimethylformamide* (DMFA) (amorphous form), the shift of the maximum effect relative to the high-temperature region indicates more stable structure of the sample of roxithromycin isolated from the ether.

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MECHANISM OF NANOPARTICLE INCORPORATION INTO THE SALT CRYSTAL

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The mechanism of incapsulation of aqueous CdTe/CdS quantum dots (QDs) in salt crystals of KBr is discussed. CdTe/CdS QDs in water as dopant of KBr monocrystals were used. The synthesis of CdTe/CdS QDs was based on the interaction of cadmium thioglycolate and hydrogen telluride (H_2Te) in alkaline medium followed by heat treatment of the formed clusters. For incorporation into the matrix, colloidal solutions of negatively charged CdTe/CdS QDs have been synthesized. Crystals of KBr:CdTe/CdS composite were grown by slowly evaporating the solvent from a mixture of a saturated aqueous solution of salt and colloid of nanoparticles under ambient conditions. To avoid energy transfer between neighboring QDs their concentration in the parental solution was kept relatively low. Parental solutions were stored for few days at the room condition. The crystals of salt: QDs composite were isolated from the parental solution, rinsed with acetone and dried.

Embedding of the nanocrystals in the bulk ionic crystals produces materials with density lower than that for matrix itself. This fact is usually omitted in the works of other authors. To evaluate density difference between composite and host materials we grew both of them in similar conditions and determined the density as mass to volume ratio. For cubic samples volume was determined by two approaches – calculation from the linear dimensions of the crystals and/or by fluid displacement method. For the samples of irregular shape only second method was used. According to the data from our experiments the densities of composites are almost 10% less than the density of a pure salt crystal. These results hint, that incorporation of the nanoparticles occurs alongside with the formation of pores (voids) in the composite crystal.

Previous works report that QDs can serve as crystallization centers for the composite. According to this mechanism, a number of crystallization centers should be equal to the number of QDs in the parental solution, and growth of large monocrystal is unlikely. Actually, only up to 4-8 crystals form in the growth solution under typical conditions of synthesis via slow solvent evaporation. This allows us to assume that crystallization centers are still spontaneously formed by the pure salt. Additionally, high ionic strength of the parental solution makes formation of floccules of nanocrystals more favorable. These floccules are attracted to the positively charged surface, cling to it and then captured inside the crystalline volume.