CYTO-BIOCHEMICAL REACTIONS OF ANIMAL LIVER NUCLEI TO THE ACTION OF GROWTH FACTOR T-86

O. Kh. Saitmuratova, É. A. Tursunov, and Z. Sh. Khidoyatova

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It has been shown previously that poisonous chemicals acting on the nuclear membrane change the enzymatic activity of nuclei [1-3]. It is not excluded that they may exert an influence on processes taking place within the nucleus. An interaction of pesticides with the lipid phase of the cell membrane has been shown and it has been established that this leads to a disturbance of the integrity of the cell and its permeability [3].

Our aim was to elucidate the mechanism of the action of growth factor T-86. We have investigated the cytotoxic and functional features of the reaction of liver cell nuclei after a single introduction of growth factor T-86 into the animal organism.

Random-bred male white rats weighing 150-200 g were given 1/2 LD of the preparation perorally (the LD_{50} of T-86 for rats is 7.5 g/kg). The animals were decapitated 2 h after the administration of the preparation. Cytological examinations of the liver nuclei were made under the microscope after the staining of smears of the hepatocyte nuclei.

The statistical treatment of the results was performed by using the analysis of variance [5]. Protein was determined by Lowry's method [6]. To prepare the smears, a suspension of liver nuclei was deposited in a thin layer on a microscope slide and was fixed in alcohol–ether (1:1) at room temperature for 20 min. The resulting smears were stained for 10 min (composition of the stain: 2 ml of the dye Azure-Eosin, 5.0 ml of 0.1 M NaH_2PO_4, 5.0 ml of 0.1 M Na_2HPO_4, 90 ml of distilled water) and the stained nuclei were gently rinsed with water and were dried at room temperature.

Electron-microscope examination showed that the nuclei isolated were fairly pure and their integrity had not been disturbed. A slight increase in the volume of the nuclei and also in the number of nucleoli and informosomes located under the karyolemma and euchromatization of the nucleus were observed, which showed an increase in the functional activity of the nuclear structures.

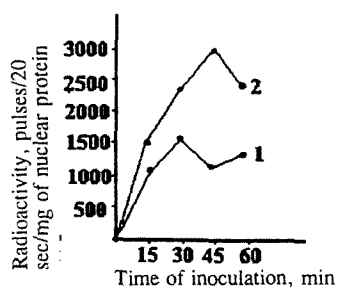

Fig. 1. Kinetics of the biosynthesis of nuclear glycoproteins of rat liver in control and experimental animals 2 h after the administration of the preparations: 1) control; 2) T-86, 1/2 LD_{50}.

A. S. Sadykov Institute of Bioorganic Chemistry, Academy of Sciences of the Republic of Uzbekistan, Tashkent, fax (3712) 62 70 71, and Tashkent Medical Institute. Translated from Khimiya Prirodnykh Soedinenii, No. 2, pp. 330-332, March-April, 1995. Original article submitted November 7, 1994.

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The rate of specific nuclear synthesis of glycoproteins was determined by biochemical investigations. The results showed that for an hour the kinetics of the synthesis of nuclear glycoproteins has a nonlinear nature. The nonuniform inclusion of labeled (^{35}S) methionine in the nuclear glycoproteins of the liver gives grounds for the assumption that the formation of proteins in animals takes place between the 15th and the 45th minutes from the beginning of the reaction (Fig. 1). The rate and kinetics of the nuclear synthesis of glycoproteins almost doubled in the presence of T-86 as compared with the control, which is probably due to an increased activity of certain enzymes. The synthetic activity of the nuclei correlates with the increase in the number of nucleoli and the euchromatization in the nuclei.

Thus, growth factor T-86, penetrating through the cell membranes and the nucler membrane of hepatocytes, increases the rate of nuclear protein synthesis, euchromatization in the nucleus, and the number of nucleoli. The results of this investigation may serve as a basis for the creation of a definite test for establishing the degree of its toxicity and physiological activity.

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