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INFLUENCE OF RICIN ON THE BIOSYNTHESIS OF PROTEIN IN NUCLEI OF RABBIT BRAIN NEURONAL CELLS IN *in vitro* EXPERIMENTS

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Ricin – a plant protein toxin isolated from the castor-oil plant – suppresses the synthesis of protein in a cell-free ribosomal system and is an inhibitor of the ribosomal synthesis of protein [1]. The mechanism of its action on the nuclear protein-synthesizing system is unknown. It appeared of interest to study its action on the nuclear synthesis of protein.

For the experiments we used ricins 1 and 2 isolated from castor beans and purified by affinity chromatography [2]: they differ from one another by their affinity for Sepharose 4B. We used animals from one litter, 3-4 individuals, in each case. Nuclei were isolated from the cells of brain neurons as we have described previously [3]. Protein synthesis was monitored from the inclusion of [^{14}C]lysine [4] in the protein synthesized by the nuclei. The radioactivity of the product [was determined] in 10 ml of ZhS-8 scintillation fluid on a Beckman LS-230 counter (USA), and the amount of protein by Lowry's method.

The results are given below:

TABLE 1

Variant	Inhibitor concentration, M	Radioactivity, pulses/min·mg of nuclear protein	Suppression, %
Control	–	34247	–
Ricin 1	10^{-4}	27054	23
Ricin 2	10^{-4}	33066	4
	10^{-5}	31016	10
	10^{-6}	26451	23

Ricin 1 in a concentration of 10^{-4} M suppressed the nuclear synthesis of protein by 23%. The same dose of ricin 2 suppressed protein synthesis by only 4%. Ricin 2 gave the same effect as ricin 1 in a concentration of 10^{-6} M. Consequently, ricins 1 and 2 weakly inhibit the processes of glycoprotein synthesis according to the inclusion of [^{14}C]lysine by neuronal nuclei, which shows the absence of the corresponding substrates participating in the elongation of the polypeptide chains.

Ricin 2 in concentrations of 10^{-4}, 10^{-5}, and 10^{-6} M suppressed the nuclear synthesis of protein in isolated nuclei by 4, 10, and 23%, respectively.

Ricin acts feebly on the synthesis of neuronal nuclear glycoproteins as compared with its action on the ribosomal synthesis of proteins in cell-free systems of eukaryotes, where, as shown in the literature [1], even very low concentrations of ricin (1 ng) suppress the level of ribosomal protein synthesis by 70-80%.

These facts confirm the hypothesis that in the cells of eukaryotes the nuclear synthesis of protein differs from the ribosomal synthesis [5]. The results obtained confirm the existence of substantial differences in the pathways for the biosynthesis of proteins in the nuclei of brain neurons as compared with ribosomal synthesis in the cytoplasm.

Thus, a study of the influence of ricin 2 in a cell-free system of nuclei will enable us, on the one hand, to study the mechanism of the nuclear biosynthesis of proteins as distinct from the ribosomal synthesis, and, on the other hand, to reveal pathways for the regulation of the biosynthesis of proteins in cell nuclei.

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