The results found with promethazine provide further evidence that dimethylnitrosamine and carbon tetrachloride react with different sites in rat liver endoplasmic reticulum to produce a stimulation of lipid peroxidation.

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Orrenius, S. (1965). *J. Cell Biol.* **26**, 713.

Slater, T. F. (1968). *Biochem. J.* **106**, 155.

Slater, T. F. & Sawyer, B. C. (1969). *Biochem. J.* **111**, 317.

Effects of Aliphatic Aldehydes on Protein Synthesis in Cell-Free Systems

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Aliphatic aldehydes have been shown to depress protein synthesis in normal and neoplastic tissues *in vitro* (Guidotti, Fonnesu & Ciaranfi, 1964), possibly by a mechanism involving their condensation with the intracellular cysteine to form thiazolidine-4-carboxylic acids (Guidotti, Loreti & Ciaranfi, 1965). These effects have been confirmed by using bacteria (Együd & Szent-Györgyi, 1966) and cultured mammalian cells (Gregg, 1968). In experiments with cell-free systems we found that several aliphatic aldehydes unexpectedly inhibited the translation of synthetic mRNA coding for cysteine-devoid polypeptide chains. Here we report the results of experiments designed to investigate the effects of aliphatic aldehydes on the attachment of mRNA to ribosomes.

Rat liver polyribosomes were obtained by the procedure of Wettstein, Staehelin & Noll (1963). Ribosomes were derived by incubating the polyribosomes as reported by Williamson (1969) and the monomeric fraction was collected from a sucrose density gradient. Incubation conditions suitable for protein synthesis were similar to those described by Munro, Jackson & Korner (1964).

When 0.1 mM-DL-glyceraldehyde, 0.1 mM-methylglyoxal, 0.1 mM- $\alpha\beta$ -dihydroxybutyraldehyde or 0.5 mM-propionaldehyde was added simultaneously with poly U to a ribosome cell-free system, a definite inhibition of the polyphenylalanine biosynthesis occurred; this inhibition disappeared when one of the aldehydes was added 5 min after the poly U-directed phenylalanine incorporation had started. Comparable concentrations of aldehyde did not affect the endogenous messenger-directed incorporation of labelled phenylalanine, leucine and

lysine into protein by the polyribosome fraction. When U-¹⁴C-labelled $\alpha\beta$ -dihydroxybutyraldehyde was incubated (20 min to 4 h) with equal amounts of polyribosomes and ribosomes, the radioactivity recovered bound to the monomeric fraction was higher than that bound to the polyribosome fraction at all the time-intervals studied. A 20 min preincubation of monomeric ribosomes with unlabelled $\alpha\beta$ -dihydroxybutyraldehyde decreased the extent of attachment of ³H-labelled poly U to ribosomes adsorbed on nitrocellulose filters, as measured by a flow system (Moore, 1966).

These results indicate that aliphatic aldehydes impair the attachment of mRNA to ribosomes and suggest that this effect may be involved in the inhibition of protein biosynthesis by these compounds.

Együd, L. G. & Szent-Györgyi, A. (1966). *Proc. natn. Acad. Sci. U.S.A.* **56**, 203.

Gregg, Ch. T. (1968). *Expl Cell Res.* **50**, 65.

Guidotti, G. G., Fonnesu, A. & Ciaranfi, E. (1964). *Cancer Res.* **24**, 900.

Guidotti, G. G., Loreti, L. & Ciaranfi, E. (1965). *Eur. J. Cancer*, **1**, 23.

Moore, P. B. (1966). *J. molec. Biol.* **18**, 8.

Munro, A. J., Jackson, R. J. & Korner, A. (1964). *Biochem. J.* **92**, 289.

Wettstein, F. O., Staehelin, T. & Noll, H. (1963). *Nature, Lond.*, **197**, 430.

Williamson, A. R. (1969). *Biochem. J.* **111**, 515.

Protein Synthesis in Mammalian Epidermis: Are Polyribosomes Involved in Fibrous-Protein Biosynthesis?

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During the growth of fibrous protein tissue, fibrous protein molecules must be synthesized and assembled into specific protein aggregates. The processes of biosynthesis and assembly may be concurrent or consecutive.

Epidermis has been separated from the dermis of slivers of sheep skin by treatment with trypsin. It has been incubated in a tissue culture medium containing radioactively labelled algal-protein hydrolysate or leucine, washed and then disrupted in a Dounce tissue grinder. On sucrose density gradients the cell-free and nuclei-free tissue homogenates show (i) a radioactive supernatant layer, (ii) a 74S peak, which is attributed to single ribosomes and is not radioactively labelled, (iii) no evidence of polyribosomes containing, say, one to ten ribosomes, and (iv) a radioactive pellet from which ultrasonic irradiation releases single ribosomes (Priestley &