Incorporation of Amino Acids into Protein in a System Containing Rat Liver Ribonucleoprotein Particles and Chick Liver Cell Sap

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It has been shown ^{1, 2} that isolated ribonucleoprotein particles from rat liver incorporate amino acids into protein when incubated with labelled amino acids, cell sap, adenosine triphosphate (ATP), and a system to regenerate ATP. The possible synthesis of a specific protein, rat serum albumin, by these particles has been studied in some detail ³. It has been found, that a protein similar to rat serum albumin becomes radioactive during incubation. This albuminlike protein has the immunological properties of rat serum albumin but differs slightly from rat serum albumin in its electrophoretic mobility on cellulose acetate ⁴.

When the ribonucleoprotein particles are incubated under the above conditions but with cell sap from chick liver, the rat albumin-like protein becomes radioactive as well as a chick albumin-like protein. The proteins can be precipitated by antiserum to rat serum albumin or antiserum to chick serum albumin, respectively. The labelled chick protein can be separated from the incubation mixture by column chromatography on DEAE-cellulose followed by electrophoresis on cellulose acetate. If the labelled chick protein is then allowed to react with antichick serum albumin in Ouchterlony plates, a radioactive precipitate forms.

The possibility remains, however, that the radioactivity obtained in the chick albumin-like protein is due to non-specific but energy dependent addition of amino acids to a protein moiety which behaves immunologically and on DEAE-cellulose columns as chick serum albumin.

Early Effects of Glucocorticoids on Nucleic Acid Metabolism of Rat Liver

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One important aspect of the action of adrenal glucocorticoids in mammalian tissue is their effects on several hepatic enzyme activities. It has become increasingly evident that the response of these enzymes to either cortisone or hydrocortisone *in vivo* actually represents rapid synthesis of new enzyme protein. In spite of this, investigations concerning the possible role of the nucleic acids in early steroid mediated enzyme induction in the mammalian liver are rather scarce ¹⁻³.

By a procedure based on the recovery of RNA-uridine and DNA-thymine, it can be seen that cortisone or hydrocortisone administered to fasted, adrenalectomized rats induce a rapid accumulation of liver RNA, which occasionally can be observed as early as 6 h after the hormone injection. The DNA content remained constant. The increase in RNA can be located in the cytoplasm as well as in the nuclear fraction.

The underlying changes in RNA metabolism are presumably revealed by the increased relative specific activities attained in mixed nucleic acid purines of liver tissue exposed to radioactive bicarbonate *in vitro*, and in RNA-uridine after incorporation of orotic acid-6-¹⁴C *in vitro* and *in vivo*.

The stimulatory effect of cortisone on RNA metabolism, reported by Feigelson *et al.* ^{2, 3} was demonstrated as increased incorporation rates of inorganic ³²P and glycine-¹⁴C, preceding an early rise in the levels of RNA.

In this laboratory, by short time labeling *in vivo* with orotic acid, a response has been observed within an hour after cortisone injection.

The changes described take place concomitant with the synthesis of tryptophan pyrrolase, which is among the earliest enzymes so far recognized to be induced by the glucocorticoids. Puromycin prevents the induction of tryptophan pyrrolase, and inhibits in part the responses observed within the RNA metabolism. Pretreatment with Actinomycin D also eliminates the induction of tryptophan pyrrolase.

The results obtained support the idea that adrenal glucocorticoids affect enzyme activities

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