decarboxylase activity is high during the G1 phase of the normal cell cycle.

The factor in serum that is responsible for the induction of ornithine decarboxylase activity is not diffusible on dialysis and is recovered in the void volume of a Sephadex G-25 column. Growth hormone (100 µg/ml), dexamethasone (9α-fluoro-11β,17α,21-trihydroxy-16α-methylpregna-1,4-diene-3,20-dione) (10 µM), ornithine (9–900 µg/ml) and arginine (9–900 µg/ml) alone are not capable of raising the activity of serum-depleted cells, although tryptose–phosphate broth (10%, v/v) (a Difco ox heart digest) has a small effect, perhaps through a type of pleiotypic response (Hershko *et al.*, 1971).

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The Induction of Ornithine Decarboxylase during Lymphocyte Stimulation by Phytohaemagglutinin

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The initiation of DNA synthesis that follows the stimulation of cultured human lymphocytes by phytohaemagglutinin is preceded by a marked rise in the activity of ornithine decarboxylase, the first enzyme of the pathway for polyamine synthesis. Ornithine decarboxylase activity is very low in unstimulated lymphocytes, but it begins to rise 6h after the addition of phytohaemagglutinin. Maximum enzyme activity is reached after 24h and maintained for a further 24h, through the initiation of DNA synthesis. This increase is probably associated with the increased synthesis of ribosomes that is a prominent feature of the lymphocyte response to phytohaemagglutinin (Kay & Cooke, 1971).

Addition of high concentrations of amino acids to lymphocyte cultures preincubated with phytohaemagglutinin for 24h does not affect their rates of RNA or protein synthesis, but ornithine decarboxylase activity is increased fourfold within 3h. This enzyme has an unusually short half-life (Russell & Snyder, 1969), and the amino acid-dependent increase in lymphocyte ornithine decarboxylase activity is largely mediated through an increase in the half-life from 15min to about 45min (Kay *et al.*, 1972).

As lymphocyte stimulation by phytohaemaggluti-

nin results in an increase in the uptake of some amino acids (Mendelsohn *et al.*, 1971), the phytohaemagglutinin-dependent increase in ornithine decarboxylase activity could also be due to a decrease in the rate of degradation of the enzyme rather than an increase in its rate of synthesis. The activity in unstimulated lymphocytes is too low for reliable determination of its half-life. Addition of high concentrations of amino acids increases this activity, but not to more than 20% of the activity found after phytohaemagglutinin stimulation. In the presence of such amino acid concentrations the half-life of ornithine decarboxylase is the same in stimulated and unstimulated lymphocytes. The greater activity of phytohaemagglutinin-stimulated lymphocytes under these conditions must therefore be due to increased synthesis or activation of the enzyme.

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The Induction of Ornithine Decarboxylase in Cultured Hepatoma Cells

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When suspension cultures of rat hepatoma (HTC) cells reach the high-density stationary phase of the growth cycle the activity in cell extracts of ornithine decarboxylase, the first enzyme on the pathway of polyamine synthesis, is very low. On dilution of the cells into fresh growth medium there is a rapid increase in the activity of the enzyme, reaching a maximum of up to several hundred times the initial value at about 4h after dilution. More than 60% of this increase in enzyme activity is still obtained when RNA synthesis is inhibited by actinomycin D (Hogan, 1971). Ornithine decarboxylase in rat liver has been reported to have a very short half-life (approx. 10min) in the presence of inhibitors of protein synthesis (Russell & Snyder, 1969). The apparent half-life of the enzyme in stationary-phase HTC cells is also very short, with values between 5 and 15min. After dilution the half-life increases to between 30 and 60min. We conclude that at least some of the increase in ornithine decarboxylase activity after dilution of stationary-phase cells may be due to an increased

stability of the enzyme. Experiments are in progress to elucidate the factors controlling ornithine decarboxylase turnover in these cells.

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Creatine Kinase Activity in Cultures of Differentiating Myoblasts

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Differentiation of myoblasts *in vitro* results in the fusion of single cells to form multinucleate syncytia and an increase in the activity of creatine kinase (Hauschka, 1968). The analogous increase in creatine kinase activity associated with muscle development *in vivo* is accompanied by a change in isoenzyme pattern (Eppenberger *et al.*, 1964), and preliminary findings suggest a similar change *in vitro* (G. Morris, A. Cooke & R. J. Cole, personal communication).

This abstract is concerned with the appearance of creatine kinase in primary cultures of chick myoblasts and the relationship between changes in the enzyme and cell fusion.

A burst of fusion (measured as the percentage of nuclei in multinucleate syncytia) began after 45h in culture, giving rise to 50% multinucleate syncytia at 69h. In contrast there was relatively little increase in creatine kinase activity/mg of DNA until 69h in culture, but by 96h the creatine kinase activity/ μ g of DNA was 20-fold higher than its initial value at 33h. Creatine kinase activity was assayed by measuring fluorimetrically the creatine produced by the back-reaction of the enzyme (Koedam, 1969).

The isoenzyme compositions of creatine kinase in cell culture were obtained from the ratios of enzyme activity at high and at low concentrations of creatine phosphate and ADP (Eppenberger *et al.*, 1967). Two forms of the enzyme from chick heart and breast muscle gave values of 2.1 and 5.0 respectively. In cell culture a constant ratio of approx. 2.4 was obtained at 33–58h and this then increased to 3.3 at 69h and to 4.0 at 96h. Thus in newly fused myoblasts the 'heart'-type isoenzyme characteristic of embryonic muscle is predominant, and a change in isoenzyme composition occurs coincidental with the

marked increase in creatine kinase activity rather than fusion of the myoblasts.

Cells grown with 0.1mM-dibutylryl cyclic AMP (6-*N*,2'-*O*-dibutylryladenine 3':5'-cyclic monophosphate) fused 10h later than their controls, but the increase in creatine kinase activity was not delayed. This result contrasts with that obtained by Shainberg *et al.* (1971), who found that the inhibition of fusion caused by low Ca^{2+} concentrations also prevented the increase in creatine kinase activity.

It therefore seems that, although cell fusion is necessary for the observed increase in creatine kinase activity and appearance of the new isoenzyme, the two processes are not as tightly linked as previously suggested (Shainberg *et al.*, 1971).

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The Effect of Aflatoxin B₁ on Ribonucleic Acid Synthesis in Control and Cortisol-Stimulated Rat Liver

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The hepatocarcinogenic fungal toxin aflatoxin B₁ is a potent inhibitor of the induction by cortisol of tryptophan pyrrolase activity in rat liver (Clifford & Rees, 1967). The increased Mg^{2+} -stimulated RNA polymerase activity resulting from the administration of cortisol has been found to be strongly inhibited by aflatoxin B₁ *in vivo*, as is the increased incorporation *in vivo* of labelled orotate. The increase in the incorporation of labelled leucine *in vivo*, which results from the administration of cortisol, like the induction of tryptophan pyrrolase, is also strongly inhibited by aflatoxin B₁. The control tryptophan pyrrolase activity and leucine incorporation are not inhibited by aflatoxin B₁, whereas the control rate of RNA synthesis is strongly inhibited. Mg^{2+} -stimulated RNA polymerase activity in hepatic nuclei is decreased by prior adrenalectomy of the rats, but if these rats are also treated with aflatoxin B₁ the enzyme activity observed is no lower than that in intact animals treated with the toxin.

These findings suggest a close connexion between the stimulatory action of cortisol and the inhibitory