intervals of 5–40 min and growth hormone was given 2½ h before death. There was a 100% stimulation of peak incorporation into 45S RNA, which was reached in 10 min, but little evidence of an alteration in the rate of processing or first appearance of intermediate RNA species.

The stimulation of ribosomal precursor RNA synthesis in the nucleolus within 1 h and the smaller more transient stimulation of extranucleolar (heterodisperse) RNA synthesis are among the earliest observed actions of growth hormone *in vivo*, and may be important in the subsequent changes in cytoplasmic RNA and protein metabolism.

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Effects of Hormones on Glycerol Metabolism in the Isolated Perfused Liver

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Female rats weighing 180–220 g were starved for 18–20 h and their livers were perfused through the portal vein with haemoglobin-free Krebs–Ringer bicarbonate solution to study the metabolism of exogenous glycerol. The glycerol concentration in the perfusate was maintained at 10 mM by constant infusion. Just before the experiment was commenced 10 μ Ci of [2-¹⁴C]glycerol was added to the perfusate.

At the end of 60 min 30% of the label remained in glycerol and up to 90% of the rest of the label was found in glucose, lipid and CO₂. Glucose accounted for up to 70% of this label. A significant fraction was in CO₂, up to 10%, which indicated that some glycerol was completely oxidized. In livers that were perfused with insulin in the medium the proportion of radioactivity found in lipids was significantly increased, but there was no radioactivity in the CO₂ of the system. When growth hormone was added the radioactivity in lipids was not significantly different from that in control rats, but no labelled CO₂ could be detected.

About 2% of the glycerol that disappeared accumulated as lactate and this was not affected

by the hormones. The accumulation of acetoacetate was enhanced when livers were perfused with either insulin or growth hormone.

Thus gluconeogenesis from exogenous glycerol appears not to be affected by either insulin or growth hormone in the isolated perfused liver. Insulin stimulates lipogenesis, but growth hormone does not affect this process when compared with the control rat. Both these hormones prevent the complete oxidation of glycerol to CO₂.

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Control of Protein Synthesis during Lymphocyte Stimulation

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Human lymphocytes maintained *in vitro* do not grow, but can be induced to do so by the bean protein phytohaemagglutinin. DNA synthesis begins 30 h and cell division 2 days after the addition of phytohaemagglutinin (Nowell, 1960).

Incorporation of ¹⁴C-labelled amino acids into protein represents accurately the rate of protein synthesis in this system. The rate of incorporation first increases 2–3 h after the addition of phytohaemagglutinin, and continues to rise to 5–15 times the initial rate after 24 h and to 10–40 times the initial rate after 48 h. Determination of the amount of RNA in lymphocyte cultures showed that it increased only slightly by 24 h and to 1.5–2.5 times the initial value after 48 h. The rate of protein synthesis per ribosome thus increases an average of sevenfold in the first 24 h and tenfold by 48 h after the addition of phytohaemagglutinin.

Analysis on sucrose density gradients containing 0.5 M-sodium chloride (Zylber & Penman, 1970) showed that the percentage of ribosomes active in protein synthesis is increased from 22–34% in unstimulated lymphocytes to 55–85% after 24 h and 44–78% after 48 h. Part of the increase in the rate of protein synthesis could thus be attributed to an increase in the numbers of ribosomes involved, indicating an increase in the rate of initiation of polypeptide-chain synthesis relative to the rate of translation. However, the rate of protein synthesis per active ribosome also increased, showing that there must also be an increase in the rate at which ribosomes translate mRNA.

The abilities of ribosomes from resting and from stimulated lymphocytes to translate the synthetic mRNA poly(U) in a cell-free system were therefore compared. Incorporation of [¹⁴C]phenylalanine