DISPUTANDUM

Effect of Glucagon on Lipid Metabolism

Although the availability of glucagon in purified form has permitted extensive studies of this substance, very little is known of its role in lipid metabolism.

CAREN and CORBO[1] demonstrated a fall in the serum cholesterol values of dogs after glucagon administration. PALOYAN and HARPER[2] found marked hyperlipaemia in dogs after removal of portions of the pancreas containing α-cells; the hyperlipaemia could be abolished by glucagon. ALBRINK et al.[3], on the other hand, observed in normal persons no significant change in the cholesterol level after applying 0.03 mg/kg bodyweight glucagon intravenously; OLIVER and BOYD[4] observed a rise in serum cholesterol and β-lipoprotein cholesterol values after intravenous glucagon infusion.

The purpose of our present study was to reproduce the results obtained by CAREN and CORBO. It seemed worth while, however, to investigate the behaviour of the serum total lipid values and lipoprotein fractions simultaneously.

We performed our investigations in 16 adult mongrel dogs weighing 8–15 kg. The dogs were narcotized with urethane after 12 h fasting, and 1 mg glucagon (LILLY) was injected intravenously in isotonic saline. Blood was drawn 10 min and also immediately before, and 20, 40, 60, 120 and 180 min after injection for blood sugar, serum cholesterol, total lipid and lipoprotein determinations.

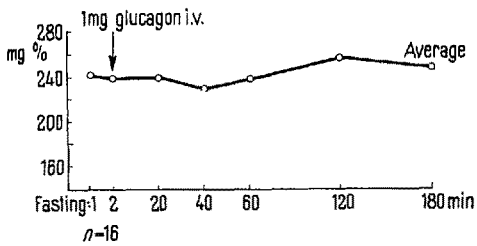

Fig. 1. Effect of glucagon on serum cholesterol values

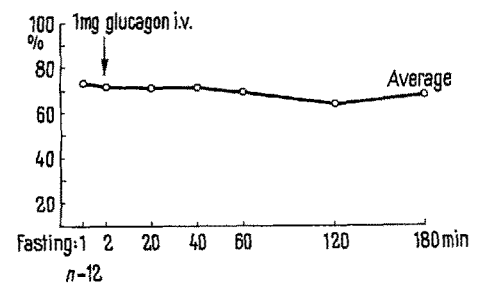

Fig. 2. Effect of glucagon on α-lipoprotein values

Figure 1 illustrates the effect of glucagon on the serum cholesterol values. 1 mg glucagon caused no significant change in the cholesterol level.

The total lipid values remained also practically unaltered after glucagon administration.

Figure 2 demonstrates the changes observed in the α-lipoprotein values. Although a slight decrease can be seen – with a simultaneous increase in the β-lipoproteins – these differences did not prove to be statistically significant.

The blood sugar levels showed a 50–100% rise in all experiments. In our investigations we could not demonstrate a significant change in the serum cholesterol level after glucagon administration. There was no considerable change in the total lipid values and lipoprotein fractions either, although the blood glucose response was satisfactory. As our studies were carried out in normal dogs, the counter-regulatory mechanisms provoked by glucagon administration (i.e. the stimulation of insulin or cortisol secretion, etc.) may have abolished the effect of the drug upon lipid metabolism. The different and often contradictory results published lately are possibly due to the fact that mostly various normal animals were used, frequently under different experimental conditions. The further investigation of the effect of glucagon on lipid metabolism seems warranted only with animals in which the disturbing influence of the insulin-producing and the adrenocortical systems can be eliminated[5].

Zusammenfassung. Die Wirkung von Glukagon auf den Fettstoffwechsel gesunder Hunde wird untersucht. Intravenöse Verabreichung von 1 mg kristallinem Glukagon bewirkt weder im Serum-Cholesterin- noch im -Gesamtlipidgehalt wesentliche Abweichungen und auch die Veränderung der Lipoproteinfraktionen ist nicht signifikant. Die Blutzuckerwerte sind bei sämtlichen Tieren stark erhöht.

G. CSAPO

1st Department of Medicine, University Medical School, Szeged (Hungary), February 10, 1964.

[1] R. CAREN and L. CORBO, Metabolism *9*, 938 (1960).
[2] E. PALOYAN and P. V. HARPER JR, Metabolism *10*, 315 (1961).
[3] M. J. ALBRINK, J. R. FITZGERALD, and E. B. MANN, Proc. Soc. exp. Biol. Med. N.Y. *95*, 778 (1957).
[4] M. F. OLIVER and G. S. BOYD, Lancet *1956ii*, 1273.
[5] We wish to express our thanks to the Lilly Research Laboratories, Indianapolis, Ind., for donating the glucagon used in this study. The skillful technical assistance of Mrs. I. LÁSZLÓ and Mr. I. BACH is gratefully acknowledged.