prolonged to some extent by administration of atropine (Fig. 1 *C*–2). After atropinization, increase in the intensity of driving stimuli still brought about certain changes in shape of the action potential, namely, a prolongation of its duration, rather than a shortening, an increase in amplitude of the overshoot, a slowing of the terminal phase of depolarization and initial phase of repolarization (Fig. 1 *C*–3). Since similar effects were obtained both in atrial and ventricular fibres by administration of epinephrine or norepinephrine as well as by sympathetic nerve stimulation, it is conceivable that increase in the intensity of the driving stimuli results in liberation of a sympathomimetic substance. This liberation might result from stimulation of intramural nerve fibres by driving stimuli as in the case of liberation of acetylcholine. In preparations not atropinized, these effects were not observed, probably because they were masked by those of the acetylcholine which was simultaneously liberated.

It is obvious that in electrically driven hearts the duration and shape of the membrane action potential can be widely varied, depending on the intensity of the driving stimuli. The possible liberation of the autonomimetic substances should always be taken into account in interpreting the results of experiments which involve electric stimulation of cardiac tissue.

Our thanks are due to Dr. Chandler McC. Brooks for reading the manuscript and making valuable suggestions.

T. Azuma
H. Hayashi
T. Kanno
K. Matsuda

Department of Physiology,
Faculty of Medicine,
University of Tokyo,
Tokyo.

## Interrelationship between Fat and Sugar Metabolism in Infant Rats

Rat milk contains a large amount of fat and protein[1]. The amount of sugar in this food is just sufficient to cover the energy needs of the infant rat for about 2 hr., and it is thus obvious that the energy required for the remaining 22 hr. of the day must come either from fat or protein. This is underlined by the fact that liver and muscle glycogen content, although falling transiently shortly after birth, soon return to higher levels[2].

In order to gain further insight into the ways in which individual nutrients are utilized by the infant rat the following experiments were performed: Rats aged 5 (suckling period) and 30 days (end of weaning), and adult animals (body-weight 200 gm.) of both sexes were starved for 24 hr., the 5-day-old animals at 30° C., the older ones at room temperature. They were then given 1·1 ml. of olive oil/100 gm. body-weight via a stomach tube, and were killed at different intervals. Liver glycogen content[3] and blood glucose-levels[4] were determined. It is evident from Fig. 1 that administration of olive oil to animals aged 5 days resulted in a rapid increase in the level of liver glycogen, while no such rise was observed in animals aged 30 days, or in adult rats. Blood glucose-levels remained unchanged in all age-groups.

The administration of 1·1 ml. oleic acid/100 gm. body-weight to 5-day-old rats resulted in a much smaller, and variable, rise in liver glycogen content and the blood glucose-level was slightly raised.

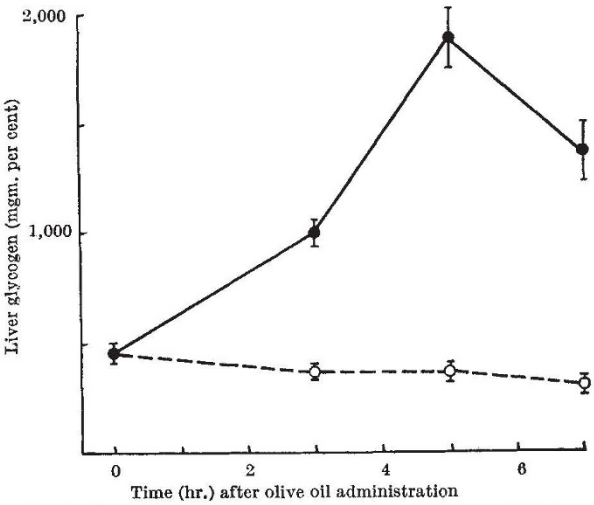


Fig. 1. Liver glycogen content in rats starved for 24 hr. and then given 1·1 ml. olive oil/100 gm. body-weight via stomach tube. Full line, rats aged 5 days; interrupted line, rats aged 30 days (the same type of curve was obtained for adult animals and for 5-day-old rats not given oil). Vertical lines indicate standard errors; each point is the average of at least 8 rats

It thus appeared that the glycerol contained in olive oil was responsible for the large rise in liver glycogen content found in 5-day-old rats. Administration of 2 ml. of a 2·5 per cent glycerol solution per 100 gm. body-weight, or administration of a mixture of oleic acid and glycerol corresponding to 1·1 ml. olive oil/100 gm., however, did not cause a rise in liver glycogen content, although hyperglycæmia was regularly found.

These results may be explained in several ways. Either fat gives rise to carbohydrate or fat spares sugars to a greater extent in the younger age-group. The first possibility can be rejected on theoretical grounds[5]; the second, however, may also be objected to since, following olive oil administration, glycogen accumulates in the liver and must be synthesized from some substance other than protein or amino-acids following the finding that gluconeogenesis from casein hydrolysate is much lower in sucking rats than in older animals[6]. Finally, there remains the possibility that triglycerides are transported differently in infant rats, as is also indicated by other results[7], and are transferred across the intestinal wall as such and broken down elsewhere, the glycerol being used for synthesis of liver glycogen.

P. Hahn
O. Koldovský

Institute of Physiology,
Czechoslovak Academy of Sciences,
Prague 6.

V. Melichar
M. Novák

Institute for the Care of
Mother and Child,
Prague.

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