

# THE EFFECT OF SODIUM TARTRONATE ON THE BODY WEIGHT AND ON THE FAT AND GLYCOGEN CONTENT OF MOUSE AND RAT LIVERS

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It is well known that one of the most important factors in the development of obesity is the acceleration of carbohydrate transformation into fat (S. M. Leites [2]). It was therefore of interest to attempt the discovery of such biological factors, that would be capable of inhibiting this process and could thus be utilized in the treatment of obesity. There are indications in the literature (Weston [4]) that the introduction of tartronic acid (or of its sodium salt) caused a depression of the respiratory quotient in rats which had been placed on a fat-free diet and which, consequently, actively converted carbohydrate into fat. The observation was interpreted by Wesson as an indication of the suppression by tartronate of carbohydrate to fat conversion.

The liver is the main organ in which the conversion of carbohydrate to fat takes place. In order to investigate the extent of tartronic acid effect on the above mentioned process, it was of interest to study the effect of tartronic acid administration on the glycogen to fat ratio in animals receiving excess carbohydrate.

## EXPERIMENTAL METHODS

Rats and mice were placed on a standard mixed diet, supplemented with glucose in the milk over a period of 10 days; 2 g of glucose was given to each rat, and 0.5 g to each mouse, daily. During the same 10-day period a daily dose of sodium tartronate ranging from 0.025 to 0.09 g was administered as a 5% aqueous solution, orally to one group of animals, subcutaneously to others.

For the estimation of fat, liver powders dried to constant weight were extracted with dichloroethane (S. M. Leites and G. T. Pavlov [3]); glycogen was estimated by the micro-Pfluger technique, as modified by V. I. Goncharova [1]. Thirty-three treated and 29 control rats, and 12 each treated and control mice, were employed in the experiment.

## EXPERIMENTAL RESULTS

As will be seen from the data presented in the Table, supplementation of the diet with sodium tartronate (NaT) over the 10-day period had no effect on the body weight or on the fat and glycogen content of the livers (1st series). Subcutaneous introduction of NaT, while having no effect on the fat and glycogen content of the livers, inhibited body weight increase in the group of experimental animals (2nd series). When the NaT dose was increased to 0.09, subcutaneously, there was a tendency in adult rats, apart from the inhibition of body weight increase, toward an increase in liver glycogen content, and a lower fat content (3rd series). It should be underlined that this effect was observed only with adult animals (weight range - 254 to 364 g); in growing rats (96-110 g) fat and glycogen content did not alter, even though the inhibition of increase in body weight was observed (4th series). A similar decrease in fat content and increase in glycogen content of the liver was observed in adult (body weight 31-33 g) mice on administration of 0.025 g of NaT subcutaneously (5th series).

The Effect of Sodium Tartronate Treatment on the Animal Weight and on Fat and Glycogen Content of the Livers (mean values)

Animal species and experimental series	Expt.					Control							
	num-ber of ani-mals	daily NaT dose	intro-duction route	weight (in g)		num-ber of ani-mals	liver		weight (in g) at the end of the 10-day period	liver			
				before the ex-periment	at the end of the 10-day period		fat (g %)	glycogen (g %)		fat (g %)	glycogen (g %)		
Rats													
1st series	11	0.025	Per os	161	166	+5	16.2 (13.5-20.5) <sup>2</sup>	12	160	165	+5	15.0 (11.5-18.0)	2.38
2nd series	10	0.025	Subcut.	171	192	+21	14.0	6	172	209	+37	14.0	4.1
3rd series	9	0.09	"	307 (254-364)	294 (207-381)	-13	14.6 (12.0-15.5)	7	319 (256-367)	335 (244-396)	+16	16.3 (13.5-19.5)	2.4
4th series	3	0.075	"	102	112	+10	16.3	4	105	136	+31	15.8	3.7
Mice													
5th series	12	0.025	"	33	31	-2	16.9 (14.5-20.5)	12	31	20	-1	19.6 (17.0-23.0)	0.64 (0.28-1.2)

<sup>1</sup> Fat expressed on dry weight basis.

<sup>2</sup> Limits of variation shown in brackets.

Thus, the subcutaneous introduction of tartronic acid to adult rats and mice was followed by an increase in liver glycogen content and a parallel decrease in fat content; in the case of rats, there was also a decrease in body weight. These results may be interpreted as an indication that in adult animals tartronic acid effect may have been to inhibit the process of carbohydrate transformation into fat.

## SUMMARY

The effect of sodium tartronate was studied in experiments on mice and rats on the basis of data on the inhibition of the transfer of carbohydrates into fats by tartronic acid presented by Wesson. Sodium tartronate was administered in doses of 0.025 to 0.09 g and its effect on body weight, fat and liver glycogen was studied. If 0.09 g of sodium tartronate is introduced subcutaneously to adult rats weighing from 254 to 364 g for 10 days, reduction of weight, increase of glycogen content and a certain decrease of fat content is noted in the liver. If 0.025 g of this substance is introduced subcutaneously to adult mice weighing 31 to 33 g, there is an increase of glycogen and decrease of fat in the liver. However, with mice there is no reduction of weight.

## LITERATURE CITED

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\* In Russian.