

## Effect of Duodenides on Animals' Alimentary Behavior

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### ABSTRACT

The aim of this study was the evaluation of animal's alimentary behavior under the influence of biologically active substances, existing in duodenal extract. Have been carried out the experiments on white rats of Wister's rule, the mentioned rats previously were left in food deprivation of 48 hours' duration. They were injected intra-abdominally with 1,5-2,0 ml of mucous extract of duodenum, prepared before the experiment started and approximately in 10-15 minutes the rats were fed. Have been observed the targeting behavioral responses. The daily moving activity (in Richter-Yang apparatus) and also the amount of used food was defined. Essential inhibition of food-getting behavioral reaction (for 9-10 min) and their low activity expresses the inner state of animal but it still is not the index, indicating to suppression of alimentary motivation. However, the sharp decrease of used food (by 11,5%) and moving activity (by 45%) indicate to the presence of appetite-regulating biologically active substances in duodenal extract influencing on alimentary behavior.

**KEYWORDS:** *alimentary behavior, duodenum, duodenides*

**S**tudy of the regulation of starvation and satiation physiological mechanisms has not lost its topicality. Among the humoral factors of postgastric regulation of alimentary activity, appetite-regulating enterines attract our attention, the parienteral injection of which to rats evokes metabolic effect of true satiation - increase of essential metabolism [1,2].

The goal of our investigation was an estimation of alimentary behaviour of the organism by means of biologically active substrates in the extract of the duodenum.

### MATERIAL AND METHODS

Experiments were carried out on albino Wistar rats. The animals were divided into two groups. The extract of mucosal duodenum in the dose of 1,5-2 ml was intraabdominally injected to animals of group I. This extract was directly prepared before the experiment. In the animals of the control (II) group saline solution was injected in the same dose. The animals of both groups were deprived of food during 48 hours.

In the rats of both groups manifestation of food motivation has been observed, particularly, behavior directed to food search, motor activity, an amount of consumed food. Wheat grains were used as a food, which

were weighed in the beginning and completion of the experiment (24 h later). Motor activity was recorded on slowly rotating drum of Richter-Wang apparatus during 24 hours.

Results of our investigation were treated by variation statistics method according to Student's criterion and they were reliable ( $P < 0,1$ ;  $P < 0,01$ ).

### RESULTS

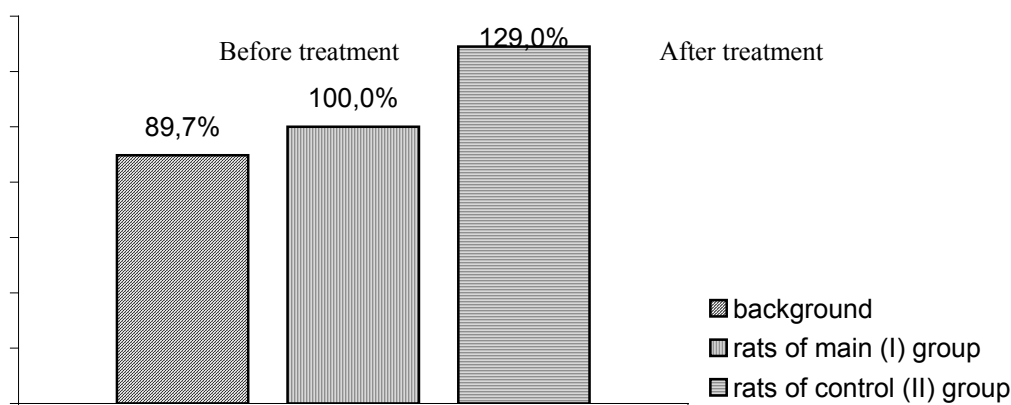
The analysis of our observations has shown that behavior of the animals is quite different. The animals of both groups were subsequently given food in 10-15 min after the injection of duodenal extract or saline solution. The animals of control (II) group immediately began to eat food actively, while duodenal extract-injected animals (group I) had quite different behavioral reactions. A significant decrease of food motivation was observed during absolutely all the experiments, however with different duration. Rats were extremely mobile, excited, used to rummage in bread grains, to smell it and only a few minutes later (9-10 min) began to eat the food. The process of eating itself was not active and in the beginning it had an interrupted character (Tab.1).

NN of experiments	After injection of duodenal extract to rats of the main (I) group	After injection of saline solution to rats of the control (II) group
1	18 min	2 sec
2	15 min	2 sec
3	5 min	0
4	5 min	0
5	5 min	0
6	3 min	0
7	7 min	0
8	5 min	0
9	12 min	2 sec
10	14 min	0
Average	9 min	0

**Tab.1** Duration of food deprivation in rats (food was given 10-15 min later after the injection).

No of experiment	Rats of the main (I) group			Rats of the control (II) group		
	Background	Day of injection	The following day	Background	Day of injection	The following day
1	8,5	8,2	7,7	12,0	15,5	15,0
2	12,0	12,2	12,0	10,3	13,0	13,0
3	12,0	9,3	10,2	12,5	16,5	15,5
4	12,0	12,5	13,0	12,5	16,0	15,0
5	8,5	1,6	6,0	10,0	13,5	14,5
6	12,0	10,7	11,0	12,5	15,5	16,0
7	12,0	12,7	12,5	11,5	16,0	14,5
8	8,5	7,0	7,7	11,0	15,8	15,0
9	12,0	11,2	11,5	11,5	12,2	13,0
10	11,5	9,5	11,0	12,4	15,0	15,0

**Tab.2** Amount of consumed food (gr/daily).

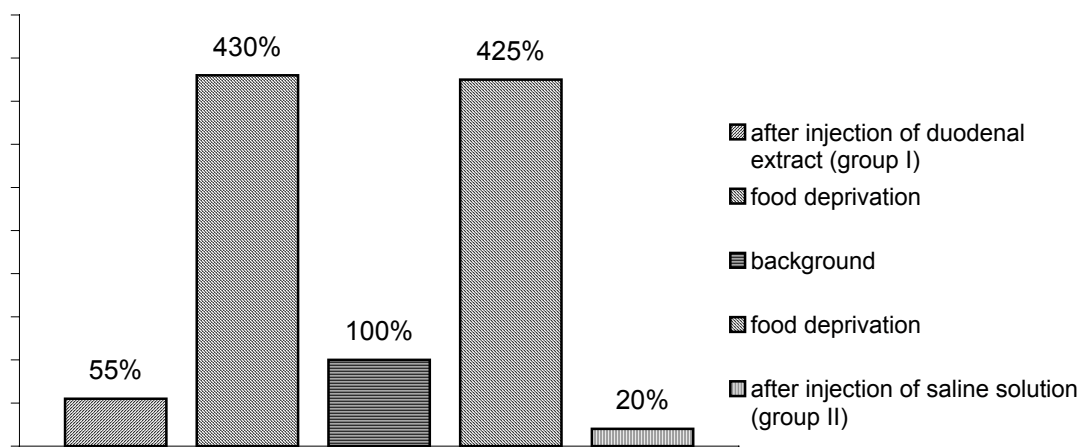


**Fig.1** Amount of daily-consumed food.

The degree of food motivation was also estimated by the amount of consumed food. Preliminarily, daily portion of food (average background amount in grams) for each rat and the amount of delivered food were determined 10-15 min after the injection. As mentioned above, before the experiment rats were deprived of food during 48 hours. After the injection of duodenal extract the amount of consumed food of group I animals decreased, as compared to the 24 h ration. Sometimes this effect was also observed on the second day of injection. In the animals of control (II) group a strongly reliable increase of consumed food amount, as compared to the background was noted during the injection as well as on the following day (Tab.2, Fig.1).

For the estimation of food motivation stimulation, motor activity of the animals was determined. Naturally, during food deprivation the rate of 24 h runs sharply increased, pointing to the intensity of food motivation stimulation. After food intake motor activity regularly decreased in the rats of both groups. In our experiments it is even less than the rate of the background of 24 h runs (under conditions of natural feeding) (Fig.2). Motor activity

varies in 10-15 min intervals from the injection to food intake. In particular, in this period rats of control (II) group maintain a high motor activity as distinct from those of main (I) group, which in the period of food delivery were mainly less active. Such a sharp decrease of motor activity in the animals of control (II) group may be considered as a result of significant increase (by 29%) of consumed food amount after the transition from the deprivation to natural regimen of feeding. Decrease of motor activity in duodenal extract-injected rats of main (I) group is noteworthy; the more so, as after 48 h food deprivation the amount of consumed food did not increase, but it was less than background amount (by 11,3%). It was supposed that hypoactivity of group I rats developed after food intake was reinforced by duodenal mucous extract [4]. This was corroborated by the fact that injection of duodenal extract to the rats of main (I) group inhibited behavioral reaction directed to food search, the process of nutrition itself became less active and interrupted, on the one hand, and reliably decreased amount of daily consumed food ration, on the other hand.



**Fig.2** Daily changes in motor activity

It is true that expedient behavioral reactions in principle express inner state of the animal, but they fail to estimate any motivation and its degree. Proceeding from this, it is natural that for the estimation of the effect of duodenal extract on food motivation, the parameters used by us are not a real index of food motivation suppression [3].

But inhibition of striving for the food accompanied by the decrease of daily-consumed food ration and decrease of motor activity corroborate the existence of biologically active substances in duodenal mucous extract regulating the appetite.

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## Влияние дуоденинов на пищевое поведение животных

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### РЕЗЮМЕ

Целью работы состояла в оценке пищевого поведения животных под влиянием биологически активных веществ, находящихся в дуоденальном экстракте. Опыты проводились на белых крысах породы Вистера, которые предварительно находились в 48-часовой пищевой депривации. Крысам интраабдоминально вводили 1,5-2,0 мл экстракта слизистой 12-перстной кишки, приготовленного непосредственно перед началом эксперимента, а через 10-15 минут подавалась пища. Наблюдались целенаправленные пищедобывательные поведенческие реакции. Определяли суточную двигательную активность (в аппарате Рихтера-Уанга), а также, количество потребленной пищи. Существенное торможение пищедобывательных поведенческих реакций (на 9-10 минут), их малая активность отражает внутреннее состояние животного, но все еще не является показателем подавления пищевой мотивации. Однако, резкое уменьшение потребленной пищи (на 11,5%) и двигательной активности (на 45%) указывает на существование аппетит-регулирующих биологически активных веществ в дуоденальном экстракте, влияющих на пищевое поведение.

**КЛЮЧЕВЫЕ СЛОВА:** пищевое поведение, 12-перстная кишка, дуоденин