

# DISTURBANCE OF THE FUNCTIONAL MOBILITY OF THE TASTE RECEPTORS OF THE TONGUE IN SOME BLOOD DISEASES

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The various changes taking place in the mouth, and especially in the tongue, in patients with diseases of the internal organs have received inadequate study. Stimulation of the receptor zones in the mouth is known to lead to changes in the secretory and motor activity of the lower levels of the alimentary tract. So far, however, the influence of many pathological processes taking place in the organism on the oral cavity remains uncertain.

It has been found [2, 3] that in healthy persons the number of active taste receptors is smaller after eating than in a fasting condition. This phenomenon of mobilization of the taste papillae of the tongue before eating and their demobilization after eating has been interpreted as evidence of the close connection existing between the different parts of the digestive system, as a manifestation of reflex influences from the interoceptors of the stomach on the taste receptors of the tongue.

The results obtained during an investigation of the taste reception of the tongue in patients with anemias and other blood diseases accompanied by a marked anemic syndrome are described in this paper.

TABLE 1. Mean Indices of the Functional Mobility of the Taste Receptors of the Tongue in Patients without Anemia (Control Group)

No.	Subject's surname	Indices of mobility		Degree of of level of mobiliza- tion	P
		before eating	after eating		
1	R-v . . . . .	+45-3	+36-12	-9±0,70	<0,01
2	F-v . . . . .	+45-3	+33-15	-12±1,16	<0,001
3	R-n . . . . .	+35-13	+18-30	-17±1,89	<0,02
4	Sh-v . . . . .	+38-10	+26-23	-13±1,70	<0,01
5	D-v . . . . .	+40-8	+25-23	-15±1,89	<0,01
6	P-v . . . . .	+39-9	+27-21	-12±0,95	<0,01
7	Sh-ev . . . . .	+40-8	+28-20	-12±0,87	<0,001
8	M-a . . . . .	+42-6	+26-22	-16±2,12	<0,01
9	K-v . . . . .	+42-6	+29-19	-13±0,76	<0,001
10	B-a . . . . .	+41-7	+31-17	-10±1,39	<0,01
11	I-a . . . . .	+38-10	+25-23	-13±1,47	<0,01
12	G-a . . . . .	+43-5	+29-19	-14±1,97	>0,01
For the whole group . . . . .				-13±0,70	<0,001

Note: + papilla in an active state; - in an inactive state.

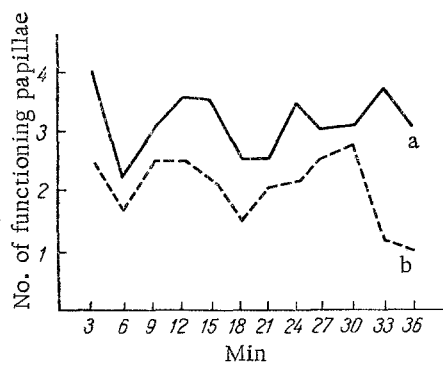


Fig. 1. Mean level of functional mobility of the taste receptors before and after taking food in normal persons. a) Investigation before, and b) after eating.

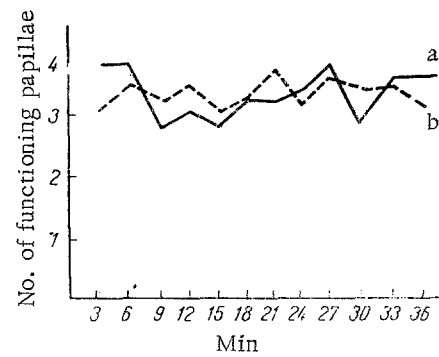


Fig. 2. Mean level of functional mobility of the taste receptors before and after taking food in a patient with aplastic anemia. a) Investigation before, and b) after eating.

#### EXPERIMENTAL METHOD

Because of the disadvantages of various methods [1, 5, 6], the taste sensation of the tongue was studied by the method of determination of the functional mobility of the taste receptors, first suggested by P. G. Snyakin [9], and later developed by N. S. Zaiko [3].

Observations were made on 34 patients (with leukemias and associated anemia, and with hypoplastic, hemolytic, and posthemorrhagic anemias). For control purposes the functional mobility of the taste receptors of the tongue was studied in 12 persons with diseases of the internal organs not accompanied by anemia (rheumatic fever in the active phase, heart defects, pneumonia, pneumosclerosis, chronic nephritis without anemia, and so on).

#### EXPERIMENTAL RESULTS

The mean results of the investigation of 12 patients in the control group are given in Table 1.

It is clear from Table 1 that in all the patients of the control group a certain proportion of receptor units were "demobilized" after eating, in agreement with the findings obtained when healthy persons were investigated [2, 3], demonstrating a reflex link between the tongue and the lower levels of the alimentary tract.

The mean level of mobilization of the taste receptors of the tongue before and after eating, determined in patient No. 7 (Table 1) with pneumonia of the right lower lobe, is given in Fig. 1.

This figure shows that the mobilization of the taste receptors of the tongue before eating was at a higher level than after a standard test meal. In other words, after eating, a partial demobilization of the taste elements took place, corresponding to the normal adaptation reaction of the taste receptors of the tongue.

The results of the main group of investigations showed that in 33 of the 34 patients with anemia the functional mobility was pathological in character, as shown by the absence of demobilization of the taste receptors after the test meal. The mean level of mobilization of the taste receptors of the tongue in a patient with aplastic anemia is indicated in Fig. 2. Unlike in normal conditions, when a proportion of the taste receptors become inactive after a test meal and the level of mobility after eating is lower than in a fasting state, in this case the degree of mobilization of the taste papillae remained the same.

The mean indices of the functional mobility of the taste receptors of the tongue in patients with anemia are given in Table 2.

In some patients (Nos. 18, 23, and 24, Table 2) the mean indices of mobility demonstrate a tendency towards demobilization after taking food (on account of the results of the first experiments). Subsequently, as the degree of anemia increased in these patients the functional mobility was strictly pathological in character.

Hence, in most cases the level of mobilization of the receptors of the tongue either remained completely unchanged or it was modified very slightly (either raised or lowered). The large number of sensitive papillae of the

TABLE 2. Mean Indices of Functional Mobility of Taste Receptors of the Tongue in Patients with Anemia.

No.	Subject's surname	Indices of mobility		Degree of change in level of mobilization	P
		before eating	after eating		
1	D-n	+42-6	+42-6	0±0,97	>0,5
2	T-a	+45-3	+45-3	0±0,70	>0,5
3	M-v	+47-1	+47-1	0±0,59	>0,5
4	P-a	+45-3	+44-4	-1±0,59	>0,5
5	Ya-ya	+46-2	+46-2	0±0,44	>0,5
6	K-v	+46-2	+42-6	-4±0,54	<0,01
7	Kh-a	+46-2	+46-2	0±0,54	>0,2
8	K-v	+44-4	+44-4	0±0,77	>0,5
9	P-k	+46-2	+46-2	0±0,92	>0,5
10	L-k	+46-2	+46-2	0±0,38	>0,5
11	P-va	+44-4	+44-4	0±1,08	>0,5
12	D-kh	+44-4	+45-3	+1±0,70	>0,2
13	D-a	+46-2	+46-2	0±0,86	>0,5
14	S-ya	+38-10	+37-11	-1±0,57	>0,1
15	M-s	+41-7	+42-6	+1±1,22	>0,5
16	Yu-v	+40-8	+40-8	0±0,91	>0,5
17	I-a	+43-5	+44-4	+1±0,74	>0,5
18	B-n	+42-6	+38-10	-4±2,31	>0,1
19	M-ov	+45-3	+45-3	0±0,70	>0,5
20	I-na	+45-3	+45-3	0±1,36	>0,5
21	K-a	+46-2	+45-3	-1±0,70	>0,1
22	Sh-v	+47-1	+45-3	-2±0,80	>0,1
23	R-n	+45-3	+42-6	-3±1,31	>0,1
24	T-na	+40-8	+29-19	-11±2,13	<0,01
25	Zh-a	+38-10	+39-9	+1±1,07	>0,2
26	B-a	+43-5	+44-4	+1±0,91	>0,5
27	V-v	+44-4	+43-5	-1±0,31	>0,2
28	M-a	+44-4	+46-2	+2±0,91	>0,1
29	S-o	+44-4	+43-5	-1±0,44	>0,1
30	N-v	+45-3	+45-3	0±1,22	>0,5
31	E-v	+45-3	+44-4	-1±1,08	>0,2
32	K-na	+46-2	+46-2	0±0,97	>0,5
33	G-a	+45-3	+45-3	0±0,59	>0,2
34	G-in	+47-1	+46-2	-1±0,89	>0,5
For the whole group .....				0±0,15	>0,1

Notes as in Table 1.

#### SUMMARY

A study of the gustatory reception of the tongue in anemic states of variable origin by determining the functional mobility revealed a blocking of the gastrolingual reflex—an absence of response of the gustatory receptors to changes in the functional state of the gastrointestinal tract.

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tongue (on the average more than 40 of 48) is a measure of the high receptive activity of the taste analyzer. Demobilization of the receptors is a manifestation of another process, in which the receptors of the tongue behave as effectors, and the receptor zone is the mucous membrane of the stomach [8, 9]. The results obtained show that anemia creates the conditions in the body in which the reflex "tuning" of the taste receptors of the tongue is upset.

Among the 34 patients in whom the functional mobility of the taste receptors of the tongue was studied, the character of the disease and the pathogenesis of the anemia differed very considerably. The only connecting link in practice was the fact that they all had severe anemia. In some cases a transition from a normal character of the functional mobility to a pathological was observed as the degree of anemia became progressively worse. A fluctuation in the activity of demobilization depending on the changes in the red blood indices was also observed. An increase in the hemoglobin concentration and in the red cell count led to the resumption of the normal adaptation reaction—the appearance of active demobilization of the taste receptors of the tongue after eating.

The disturbance of the receptor tuning of the tongue, which in normal conditions is determined by signals from the interoceptors of the stomach, while the sensitivity of the taste receptors remains unimpaired, may indicate the onset of pathological changes in the stomach. Clinical and experimental investigations have confirmed the development of secondary secretory and morphological changes in the stomach in certain blood diseases, and especially in anemia [4, 7]. In some cases, absence of the gastrolingual reflex has been observed even before pathological changes could be detected in the stomach by the ordinary clinical and roentgenological methods of investigation of the gastrointestinal tract. This fact may be utilized for the early diagnosis of pathological changes in the stomach.

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.

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