Helikobacter Pylori Bacteria - Nomads Or Sediment Microorganisms In The Stomach Mucosa?

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ABSTRACT

In the article, the authors express their personal opinion about the properties of the bacterium Helikobacter pylori. As a result of studying the interaction of the urease enzyme with gastric juice, was revealed a sharp decrease in the concentration of the free hydrochloric acid fraction in the studied objects. Based on this, contrary to the accumulated facts in the world literature about the cause-and-effect relationship between Helikobacter pylori bacteria and peptic ulcer disease, they claim the opposite - about the usefulness of the mentioned bacteria. The facts they presented about the physical and biological properties of ammonia are of some interest. Their philosophical reflections on the nature of the processes that provide the human body with nutrition are worthy of attention.

Keywords: Peptic ulcer, gastric juice, urease, acidity, Helikobacter pylori.

Introduction

The human body is such a perfect mechanism and natural processes in it occur only in the name of life - according to the law of nature "THE PURPOSE IS LIFE". If a human lives in compliance with the laws of nature, sanitary and hygienic rules (does not starve, does not overeat, bears physical and mental stress in accordance with the capabilities of his body, determined by innate and acquired natural resources, knows how to adapt during changing conditions of the social environment and natural disasters) the indicators of his body will be within the framework of the "norm" recognized by medical science, and his life will end through natural aging.

Diseases that lead to premature death occur under the influence of external factors and as a result of an unhealthy lifestyle (infections, injuries, stress, bad habits, poor diet, physical and mental overwork, etc.). When creating living beings, including the human body, nature followed the law of "Purpose - Life." Nothing superfluous and nothing that contradicted the purpose of life. Even such laws as the law of universal gravitation, the law of conservation of energy, and the law of water circulation follow the spirit of this law. Everything is thought out to the smallest detail. Life is the basic law of nature. In living nature, no process is directed against life.

There are settled peoples and nomads, domestic and wild animals. Even bacteria are divided into those that constantly live in the human body in symbiosis with him are also antagonists coming from outside. The cells of the human body exist according to a slightly

different principle. They are all sedentary and have a permanent place of residence. Migrants entering from outside (transplanted tissues and organs, bacteria, viruses) are met with hostility by the immune system).

The basis for the existence of a living organism is the process of its energy supply. This function is performed by the digestive organs. The chemical processes occurring in the human body at all stages of food intake and its processing are simply brilliantly invented. Food in the mouth is processed after softening by the teeth with saliva, which has an alkaline environment, while in the stomach it is exposed to hydrochloric acid and pepsin, which in the absence of food become a threat to the stomach itself. To protect against them, nature invented mucus. To produce these chemicals, the glands of the gastric mucosa contain parietal, chief and accessory cells. These cells are permanent residents of the stomach wall.

Gastric mucus is a viscous substance, the most important function of which is to protect the stomach wall from the powerful peptic action of proteolytic enzymes and hydrochloric acid, exists in two forms: in the form of a gel (insoluble mucus) and soluble in gastric juice (soluble mucus) and the chemical structure is mucopolysaccharides. The polysaccharide part of the mucus molecule consists of 50% amino sugars, the protein part consists of 50% threonine, serine, alanine and proline.The peptide bonds formed by these amino acids give gastric mucus an important physical property - the ability to gelation and cause its significant resistance to the action of hydrochloric acid and pepsin. This chemical process occurs with the participation of urea [5]. Resistance to insoluble mucus to the action of hydrochloric acid and pepsin is mistakenly implied as its protective property. Meanwhile, everyone should know that the protective property of mucus is most likely due not to a mechanical barrier to hydrochloric acid and pepsin, but to a chemical process that is more characteristic of highly organized living beings.

Hydrochloric acid and pepsin of gastric juice are consumed, that is, neutralized by a substance susceptible to their action. This is the soluble part of gastric mucus, which is formed by the breakdown of polymer mucus (gels) after the decomposition of the urea molecule under the action of the enzyme urease. And the enzyme urease is the main product of the vital activity of Helicobacter pylori bacteria, discovered in 1983 by Australian scientists B. Marshall and K. Warren. As a result of B. Marshall's experiment on himself, gastric ulcer and duodenum were given an infectious status. An incredible scientific boom began around these bacteria. It especially intensified after these scientists were awarded the Nobel Prize in 2007. Microbiologists, pathomorphologists, some pharmaceutical companies and their advertising agencies were especially zealous. Many reports appeared in scientific and popular publications. If we summarize them, we get approximately the following picture: Helicobacter pylori is a gram-negative, flagellated, spirally twisted bacterium. The habitat is exclusively the stomach. Produces the enzyme urease, which breaks down urea into ammonia and carbon dioxide. It is the only cause of stomach ulcers and duodenum.

And most clinicians unconditionally accepted this postulate as an axiom, although the role of these bacteria in the pathogenesis of gastric ulcers, according to M. Woodley and A. Whelan, has not yet been fully clarified [2]. And there is not a single word in defense of these unfortunate bacteria, although we are sure that there are more beneficial microbes in the world than pathogenic ones, and they may be one of them. The following obvious facts indicate exactly this:

1. The presence of generally recognized etiopathogenetic factors of peptic ulcer disease (stress, nutritional disorders, gastric secretory dysfunction, hormonal changes in the body of a patient with peptic ulcer disease, etc.) [8].

2. Helicobacter pylori is found in healthy people and even in some animals, especially ruminants, which emphasizes their physiological necessity in the digestive process.

3. The duodenum is often affected by the ulcerative process, but these bacteria are not there.

4. Despite the colonization of the entire surface of the gastric mucosa by the mentioned

microbes, ulcers appear, as a rule, on the lesser curvature.

5. After surgical treatment, most patients do not have a relapse of peptic ulcer, although a large area of the gastric mucosa, populated by Helicobacter pylori bacteria, remains. This is clearly visible especially after vagotomy surgery.

In connection with these circumstances, it would be reasonable to conduct a study to prove our assumption about the possible role of Helicobacter pylori in the process of protecting the gastric mucosa. And the famous thesis of the doctor from Zagreb Schwarz "No acid - no ulcer" determined the direction of this research.

Purpose of the study. To study the effect of the enzyme urease on the acidity of gastric juice.

Materials and methods. Gastric juice was received in healthy people during preventive esophagogastrofibroscopy and in patients during their examination by aspiration of stomach contents with an electric suction in the morning on an empty stomach. The gastric juice was studied of three healthy and seven patients with catarrhal-erosive gastroduodenitis. The volume of gastric juice obtained was 18-20 ml in healthy people, and 50-70 ml in patients. The main active factor of Helicobacter pylori bacteria is the enzyme urease, which breaks down urea into ammonia and carbon dioxide, and it is found in watermelon seeds. An aqueous suspension of 10 watermelon seeds was prepared by grinding them after peeling them in a mortar and then adding 5 ml of distilled water [6].

The pH of gastric juice and an aqueous suspension of watermelon seeds (urease) was determined by the express method using a Combina 10M test strip. The acidity of gastric juice was determined by the Michaelis method: 1% phenolphthalein solution and 0.5% dimethylamidoazobenzene solution were added dropwise to 10 ml of gastric juice and titrated with 0.1% sodium hydroxide solution (NaOH). Initially, was determined the acidity of gastric juice. Then they took 5-10 ml of gastric juice into two test tubes. 5 ml of an aqueous suspension of 10 watermelon seeds was added to one, 5 ml of distilled water was added to the other, shaken and, after maintaining for 15-20 minutes at room temperature, subjected to titration [7].

Results and discussion. The results of laboratory studies of gastric juice are reflected in table No. 1 in absolute numbers. As can be seen from the table, in most patients the free hydrochloric acid (HCl) of gastric juice was 20-40 titer units (t.u.), total acidity – 35-62 t.u., the sum of free and bound HCl – 29-55 t.u., bound HCl – 12-30 t.u., and the acid residue was 5-10 t.u.

The results of gastric juice titration after adding 5 ml of an aqueous suspension of watermelon seeds differed significantly from the previous ones. Free HCl was detected in three cases within 1-4 t.u. In all other seven cases, titration showed its absence in the studied objects (0 t.u.). The total acidity of gastric juice, on the contrary, increased slightly and amounted to 40-76 t.u. The total indicator of free and bound HCl did not change significantly, but the specific gravity of bound HCl in it increased significantly and amounted to 20-76 t.u. The amount of acid residue in two cases increased noticeably (20-27 t.u.), and in the remaining 7 cases it remained almost unchanged.

In portions of gastric juice with the addition of 5 ml of distilled water, titration revealed a slight decrease in the titer of free hydrochloric acid in only three cases. In other cases, the indicators and free hydrochloric acid, and bound, and total acidity remained almost unchanged. In all cases, the pH of gastric juice ranged from 5-5.5; and the pH of the aqueous suspension of watermelon seeds was 6.0-6.25.

In order to determine the immediate buffering properties of an aqueous suspension of watermelon seeds, was titrated a standard 0.1% HCl solution. 5 ml of the test solution was taken into the flask, were added 1 drop of 1% phenolphthalein solution and 0.5% dimethylamidoazobenzene solution. The solution acquired a pale pink color, which, as the titration progressed, passed through the intermediate orange and lemon yellow levels into a crimson color. Titration of the same amount of standard solution with the addition

of 5 ml of an aqueous suspension of watermelon seeds gave the same result. Moreover, in both cases, was consumed an equal amount of NaOH - 100 titer. units.

A comparison of the results of laboratory studies shows a significant decrease in the concentration of free hydrochloric acid in gastric juice until it disappears after adding an aqueous suspension of watermelon seeds and, conversely, an increase in the concentration of its bound fraction. As for general acidity, it does not have unidirectional changes: its indicators in four cases decreased slightly, and in five even increased, which is a sign of their independence from the action of the urease enzyme.

The absence of a significant decrease in the acidity of gastric juice after adding distilled water shows the presence of a neutralizing property of an aqueous suspension of watermelon seeds containing the enzyme urease on free hydrochloric acid, which in itself is proof that it has a protective function of the gastric mucosa from acid aggression. But what is the mechanism of this action? An aqueous suspension of watermelon seeds is not an alkaline medium - it has a pH in the range of 6.0 - 6.25, which excludes its direct buffering effect on the acidity of gastric juice.

Studies with a standard solution of hydrochloric acid suggest that the problem lies in the interactions of the urease enzyme with elements of gastric juice. Urease belongs to the class of hydrolytic enzymes of the amidase group. In its presence, urea decomposes into carbon dioxide and ammonia. And urea is an important component of gastric mucus. The reaction catalyzed by urease proceeds as follows [4]: $H_2N - CO - NH_2 + H_2O = 2NH_3 + CO_2$.

Table No. 1. Indicators of gastric juice acidity when titrated using the Michaelis method (in titration units)

Patients number in order	Initial indicators of gastric acidity					Indicators of acidity of gastric juice + water suspension of watermelon seeds					Indicators of acidity of gastric juice + distilled water				
	free HCl	total acidity	sum of free and bound HCl	bound HCl	acid residue	free HCl	total acidity	sum of free and bound HCl	bound HCl	acid residue	free HCl	total acidity	sum of free and bound HCl	bound HCl	acid residue
1	**40**	60	55	15	5	**4**	50	47	43	3	**38**	60	55	17	5
2	**40**	80	70	30	10	**0**	55	50	50	5	**28**	75	68	40	7
3	**20**	54	44	24	10	**2**	42	37	35	5	**18**	50	44	26	6
4	**25**	56	48	23	8	**0**	54	46	46	8	**20**	56	46	26	10
5	**32**	62	52	20	10	**0**	76	76	76	0	**26**	60	52	26	8
6	**20**	40	32	12	8	**0**	43	37	37	6	**16**	38	32	16	6
7	**17**	35	29	12	6	**0**	40	20	20	20	**15**	35	28	13	7
8	**20**	47	38	18	9	**0**	51	46	46	5	**20**	47	41	21	6
9	**27**	53	44	17	9	**1**	53	26	25	27	**23**	51	44	21	7
10	**24**	50	40	16	10	**0**	60	54	54	6	**22**	48	38	16	10

Thus, summing up the results of laboratory studies, we can come to the following conclusions:

1. In the presence of the urease enzyme, the concentration of free hydrochloric acid in gastric juice decreases sharply (down to zero). The amount of bound hydrochloric acid increases, but the total acidity does not change.

2. The process of neutralization of free hydrochloric acid of gastric juice is not carried out by its direct effect on the free fraction of hydrochloric acid, but occurs with the participation of gastric mucus.

3. Helicobacter pylori bacteria, which produce urease, most likely protect the gastric mucosa from the peptic effect of hydrochloric acid.

4. Watermelon seeds containing the enzyme urease can serve as a basis for the preparation of antiulcer drugs.

It seems that the Helicobacter pylori bacteria have been sorted out, and we hope that we have a little dispelled the myth existing in the literature about their harmfulness. But what to do with the gases that are formed during their life in the stomach? Carbon dioxide is known to be contained in small quantities in the atmospheric air, and its harmlessness has been proven.

What about ammonia? Ammonia, a toxic gas with a strong irritant effect, gives an unpleasant smell to the breath when belching. Its physiological threshold concentration in gastric air – 0.4 mg/m^3. Gastric juice contains ammonia
within 20-80 mmol/liter. (Smirnova G.P. Northern State Medical University). The role of "residual" ammonia in patients with peptic ulcer disease has been studied in sufficient detail by A.I. Gozhenko, A.A. Avramenko [3].

According to their data, the concentration of ammonia in gastric juice is directly proportional to the increase in the severity of the inflammatory process in the area of the ulcer and, as they subside, tends to decrease. According to the authors, ammonia promotes the formation of ulcers and maintains its activity, although at the same time they recognize the role of ammonia in neutralizing the hydrochloric acid of gastric juice. In this regard, arises the question: how, in this case, a drug that reduces the acidity of gastric juice can be an ulcerogenic factor, and why are we still treating ulcers with drugs that reduce the acidity of gastric juice?

Most likely, on the contrary, ammonia is a physiologically necessary agent. In addition, ammonia is lighter than air and is part of the "gas bubble" of the stomach and, therefore, ulcers should affect its bottom. An increase in its concentration according to the degree of development of destructive lesions of the gastroduodenal zone is explained by an increase in mucus formation in the stage of acute ulcers. Gastric mucus, which contains urea, is a supplier of ammonia. If we recognize the beneficial role of Helicobacter pylori bacteria for the human body, then we must recognize the physiological nature of the presence of an acceptable concentration of their products - ammonia in the gastric juice and gas bubble of the stomach. How can ammonia be useful? The search for answers to this question led to the following thoughts:

First. In medicine, a 10% aqueous solution of ammonia, known as ammonia, is used to stimulate breathing and bring patients out of fainting. Perhaps it is precisely this property that nature uses to activate the breathing center in patients suffering from "night apnea" syndrome. Considering that this syndrome, which is sometimes a cause of death, often affects older people, in whom, as a result of age-related atrophy of the gastric mucosa, often occur functional failure of the cardia and gastroesophageal reflux, all that remains is to recognize the wisdom of the nature that created us.

Second. Ammonia is used to treat the bites of bees, wasps, and mosquitoes. And its 0.5% aqueous solution, which means 0.05% ammonia solution, was used to prepare the surgeon's hands for surgery (the Spasokukotsky-Kochergin method). This means that the presence of ammonia in the stomach is a necessary condition, intended to a certain extent for the disinfection of food entering the stomach.

Third. Ammonia is used in the food industry to process expired meat to make it marketable. Therefore, it cannot be ruled out that ammonia acts as a preservative during prolonged retention of food in the stomach.

Fourth. Ammonia is used in the refrigeration industry for cooling (refrigerant R 717). It is possible that this property is necessary to reduce the temperature inside the stomach when eating hot food, tea, coffee.

Fifth. Ammonia is lighter than air and therefore participates in the formation of a gas bubble of the stomach at its bottom and, probably, plays the role of a balloon or parachute, supporting the stomach in a suspended vertical state.

Conclusions:

Thus, the ammonia content in gastric juice and gastric air is normally in concentrations of 4.99 - 9.99 mmol/l and is one of the necessary natural conditions that ensure the normal course of important life processes in the human body. The listed positive properties of ammonia once again confirm that the presence of Helicobacter pylori bacteria in the gastric mucosa is a necessary form of joint life, a kind of symbiosis of macro- and microorganism to ensure natural harmony of coexistence of living beings with multi-purpose goal.

Therefore, it can be assumed that Helicobacter pylori bacteria are designed by nature to protect the gastric mucosa from the aggressive effects of hydrochloric acid and pepsin during fasting. In fact, when assessing the properties of these bacteria, first of all, one must proceed from the principle of the presumption of innocence. Nature hardly lays it down in advance in the design of his best creation, any inaccuracy that does not correspond to the purpose of life. Most likely, on the contrary, the bacteria Helicobacter pylori provide the process of protecting the gastric mucosa during the period between meals. From this follows the natural necessity of these bacteria to comply with safety rules in the process of life support for the human body. This means that we must admit that in the mucous membrane of the human stomach there are not 3, but 4 types of cells that live permanently, and according to the law of Nature "THE PURPOSE IS LIFE", the bacteria Helicobacter pylori have every right to receive at least a "residence permit".

References

1. Vasilenko V.Kh., Grebnev A.L., Sheptulin A.A. Peptic ulcer. M.: Medicine; 1987; 286 p.
2. Woodley M., Whelan A. Washington University Therapeutic Handbook. M.: Practice; 1995: 412 p.
3. Gozhenko A.I., Avramenko A.A. The role of "residual" ammonia levels in patients with chronic helicobacteriosis in the formation of destructive lesions of the gastroduodenal zone. Clinical medicine. Journal of the Academy of Medical Sciences of Ukraine. 2009; 15(4): p. 789–801.
4. Guseva K.E., Proskurina I.K. Development of a chemical experiment with environmental content. Chemistry at school, 2002; 10: p. 72–74.
5. Mouse V.G. Pathophysiological aspects of peptic ulcer surgery. – Novosibirsk. The science. 1983. p. 3–20.
6. Tsyganov A.R., Suchkova I.V., Kovaleva I.V. Biochemistry. Workshop: textbook. Minsk: Information Computing Center of the Ministry of Finance. 2007: 19 p.
7. Shekhovtseva T.N. Enzymes: their use in chemical analysis. Soros educational magazine. 2000; 6 (1): p. 38-40.
8. Eshbekov M. Conversations about peptic ulcer disease. Tashkent-Jizzakh, Sangzar, 2009: 175 p.