

# THE CONCEPT AND PREVALENCE OF HELICOBACTER PYLORI INFECTION

**Khudaiberganova N.H. Alikulov I.T. Khatimbetov J.Sh.Narziev N.M.**

Tashkent Medical Academy

**Resume.** Helicobacter pylori bacterium (HP), a etiopathogenetic agent of a number of “gastric”, including stomach cancer, and “extra -yielding” diseases, affects more than 50% of the planet’s population. The duration of the evolution of this microorganism in the human population is more than 100 thousand years. The modern epidemic process of the HR infection is characterized by three patterns: 1) the nature of the infection of the population dependent on the age; 2) the slow process of spontaneous release of the population from infection; 3) re -infection of part of the recovered population. The equal these processes leads to a gradual decrease in the infection of the population in developed countries. In the countries of the developing world, there is a stable high infection and high incidence of diseases associated with HP. It is concluded that medical science and medical measures make an important contribution to the liberation of mankind from HP infection, but at the present stage the leading role in this case is played by the standard of living and public hygiene and the culture of the content of houses, nutrition and consumption of alcohol, service, and physical contacts between people.

**Key words:** Helicobacter pylori, peptic ulcer, stomach cancer, risk factors for infection.

Introduction. HP, a small bacterium responsible for large negative consequences for the health and lifestyle of a person from the very occurrence of Homo sapiens to the present day, was opened twice - in 1875 and 1982. The first discovery [14], made by German researchers with the help of microscopy, remained unnoticed by the broad medical community, since no one was able to cultivate the bacterium. Its role in pathology was unclear, moreover, many researchers mistakenly considered the bacteria a harmless commensal. The second discovery of this forgotten microorganism was also not without scientific curiosity. B. Marshall and R. Warren [27], for the first time that prolonged the microophilic bent bacterium from the patient with a pantry of the stomach ulcer for the first time, identified it as Campylobacter pyloridis, and only in 1989 the correct taxonomic decision was made - the bacteria was defined as the first famous well -known A representative of a new kind of microorganisms - Helicobacter [3].

Since then, as of April 2, 2015, 37,838 publications about Helicobacter, including 36167, have been registered on the PubMed website. The overall result of this huge mass of scientific research is the proof of the unconditional pathogenicity of HP, the recognition of the etiopathogenetic role of this microorganism in acute and chronic forms of gastritis, peptic ulcer of the stomach and duodenum, stomach carcinoma, malt lymphoma of the stomach, as well as in “extra -expert” diseases: unclear iron deficiency anemia, vitamin B12 deficiency, idiopathic thrombocytopenic purple [5]. At least two pathological conditions associated with HR can be added to this list - a growth retardation in children [17] and a disorder of cognitive functions in elderly patients [13]. The discovery of HR as a pathogen and the successful implementation of the antibacterial therapy of diseases associated with this pathogen in clinical practice are attributed to the highest achievements of medicine of the second half of the twentieth century, and the authors of the opening were awarded the Nobel Prize 2005.

The scale of the problems due to HR were comprehended very quickly due to the global and massive defeat of the population with this pathogen. Filhenetic and Philodynamic studies presented clear evidence of the antiquity of the HP invasion in the human population. This happened at least 100,000 years ago as a result of the transmission of bacteria to people from the unidentified ancestral species to the predecessors of the African tribes San [6]. The further history of HR is the history of the evolutionary success of the bacteria, as evidenced by the expansion of its area to global proportions as humanity settles, an increase in the effective size of the population and the growth of genetic diversity. Currently, the type of HP includes 7 high-variable populations: HPEU-ROPE, HPSAHUL, HPEASTASIA, HPASIA2, HPNEAFRICA, HPA-Frical and HPafrica [21, 29]. The association of these populations with human evolution turned out to be so strong and continuous that the genetic variants of HP are brilliantly used as biological markers to study the migration of mankind, including to prove the two waves of the migration of a modern anthropological type [4]. In turn, in the epidemiological aspect, an ordinary, existing 100,000 years of infection, which affects more than 50% of the planet's population [8] With severe medical and social consequences: at least 50% of infected individuals suffer from chronic gastritis, 10-15% - ulcerative disease, about 1% - carcinoma or Malt lymphoma of the stomach [7]. Significant changes in the relationship between man and HP began only at the end of the twentieth century.

Epidemiological and environmental aspects of infection HP. HP is one of the most massive pathogens of a person. At the end of the twentieth - beginning of the XXI century. Its prevalence among the population reached 20% in Australia, 30 in North America and Western Europe, 50 in southern Europe, 70% in other countries of Eurasia, 80-90% -in Africa and South America.

The macro -epidemiological process of the HR infection has three most general patterns that form a picture of its spread in each population.

The first pattern is the nature of infection dependent on age.

The defeat increases from almost zero in the first months of life to mass, reaching in developed countries 20-40%, and in developing countries-80-90% of the adult population [24].

The second common pattern is the spontaneous release of part of the population from infection. The initial assumptions about her "lifelong" character were not confirmed. However, it should be noted that the pace of spontaneous release does not exceed several percent per year [1].

The third pattern is a reification, which is subject to both spontaneously recovered and cured (past eradication therapy) population. Its speed in developed countries is at 1% per year [28], in developing countries, 13% per year.

The main source of HR infection is an infected person [20]. The totality of infected persons is the main tank of HP in nature. As an additional reservoir, the world of animals can be considered.

The main, but not the only niche of HP in the human body is the mucous membrane of the stomach. Non -yielding localization of HP, albeit more rare, is diverse: the duodenum [9], the ileum (diverticulum of Meckel), the lower esophagus [1], the mucous membrane of the tongue [6] and the tooth [5, 9]. In this regard, the removal of bacteria from the body is possible with many discharge and secrets: feces, vomiting, gastric juice, "regurgitation" material, saliva. This is followed by modern ideas, according to which there are two main mechanisms of infection of HP, -"fecal-oral" [14] and "oral-oral" [16].



They can be implemented by contact [18, 19], water [25] or food [2]. In addition, the ideas of two more transmission mechanisms are justified-“gastrointestinal” (through the material of regurgitation and vomiting [10]) and “gastrointestinal” (through endoscopes and other medical instruments [12]).HP in the environment. According to modern ideas, HP is deprived of sapronous properties (not capable of breed in abiotic conditions), however, up to several days can remain vitality in environmental objects. The huge size of the infection tank and the continuous abundant discharge of the pathogen with the above materials ensure its constant presence in the ecosystems of urban and rural settlements.So, American, Spanish and Japanese authors showed the presence of HP in the soil of public places, on the playgrounds of parks, in the soil of fields, feces of flies and cows [3, 7]. Numerous works in various regions of the world proven the presence of bacteria in the water of open sources (wells, lakes, rivers) and wastewater and even in the drinking water of settlements [11, 15]. Japanese researchers have established a clear pattern: river water in the upper reaches of the rivers is free of HP, signs of its presence appear in the middle and lower reaches as the growing fecal and domestic pollution (as the authors literally write - “where the human biosphere is common”) [26]. In some developing countries, the presence of viable HP bacteria in purified tap water was revealed [19, 21].In developed countries in drinking water, the HR DNA [23] was repeatedly determined, but these bacteria were never found in a viable form. Our studies of drinking water from the distribution system of St. Petersburg also did not reveal the presence of HP. These data indicate that modern technologies for cleaning and disinfecting water protect the population from infection of HP, which does not exclude the risk of infection in emergency situations associated with a breakthrough of wastewater into a water supply network.

Along with the contamination of water and soil, perhaps pollution of food products HP. Visible bacteria have been repeatedly detected in cheese cow's milk [26], although they were never found in pasteurized milk and dairy products.Risk factors for infection. In the structure of external factors in the risk of infection, the conditions of the social environment predominate. The intra -family transmission of HR is the main in developed countries. An infected mother is the main risk factor for infection. In most countries, the influence of the educational level of the mother is clearly shown - the lower it is, the higher the infection of children [29].Significant risk factors of infection are poor sanitary conditions in the dwelling - the absence of a water supply, hot water and sewage, neglect of the rule to wash your hands after the toilet, lack of soap [16, 20]; crowding, common beds of children with parents or with other children, large families [24, 28]. These factors are more significant in developing countries, like some ethnic characteristics of children's feeding.

Concomitant diseases. Significant risk factors include vitamin deficiency states caused by a deficiency of fresh vegetables and fruits [22]. Frequent feverish diseases in childhood are considered an important risk factor in the acquisition and further adverse course of HR infection [11, 17]. Helminthias as a vector for transmitting HP and a provocateur of diarrhea are considered in a number of works as a acquired risk factor for chronic helicobacter infection [1, 8].Lifestyle and HP. Elements of lifestyle, as it turned out, can greatly affect both the probability of infection of HP and the clinical consequences of infection. There are factors that contribute to infection and pathogenic effects (synergists HP), and factors that prevent infections (HP antagonists).

Non -steroidal anti -inflammatory drugs (NSAIDs), including aspirin, were studied on the effect of HP infection due to their mass constant use by senior groups of the population for various therapeutic and preventive purposes. Research data convincingly proved that NSAIDs



and HR: a) are independent risk factors for the development of peptic ulcer and its complications; b) both factors enhance each other's action in the development of ulcers. Based on these observations, a strict medical recommendation was formulated to test HR infections in all patients to be treated with aspirin and other NSAIDs, and if the infection is detected, antibacterial therapy [15].

Antagonists Hr. Provitamin A and carotenoids. The study of the high propagation of the HR infection in the region showed the reliable usefulness of fruits and vegetables rich in provitamin A, vitamins C and E, for the prevention of atrophic gastritis in the population [18]. The protective role of vitamin A is confirmed by an extensive prospective study. Not only vegetables, but any products, including additives and vitamin (multivitamin) drugs, gave more than a two-time preventive effect. Nevertheless, the consumption of fruits and vegetables is preferably due to the fact that, in addition to vitamins, they contain dietary fiber - another important preventive component.

Physical activity is of undoubted importance as one of the factors that reduce the risk of ulcerative disease in modern Europeans infected with Helicobacteria [13]. The indicator of relative risk for persons involved in physical labor and practicing moderate, but not heavy physical exertion, was 14 times lower than in general the population with HP infection [12].

The HR infection can be asymptomatic for decades, which, unfortunately, does not protect infected individuals from its severe remote consequences - ulcers and cancer. However, in many cases, the problems created by the bacterium begin with childhood. In addition to the early formation of gastric pathology and the increase in diarrhea diseases, many infected children have adverse changes in anthropometric data - a decrease in body weight and growth of children. Helicobacter gastritis and even peptic ulcer often also begin in childhood.

Combined therapy, including antibiotics and antisecretory agents, according to messages from different countries of the world, has a noticeable superiority over the former therapeutic and surgical methods of treatment based on the results of the healing of the ulcer [2]. Eradication therapy was successfully used to treat patients with complicated ulcerative disease - recurrent bleeding [27] and Pi -lorodudenal stenosis. Another greater and other unexpected success is the development of antibiotic therapy of malignant lymphoma of the stomach of MaT-type, associated with the infection of HP.

In addition to direct therapeutic effect, antibacterial therapy of peptic ulcer, chronic gastritis and Malt lymphoma of the stomach leads to another valuable result. It has the effect of the so-called secondary prevention, since the cured patients cease to be a source of infection for their own family, the labor collective and the whole circle of communication of this person. Thus, it makes a tangible contribution to the cohort effect of a decrease in the prevalence of HP infection.

Ways to combat the spread of infection HP. The best solution to the problem could be the creation of a vaccine against HP and mass vaccine -prevention as a more practical and economical method of preventing peptic ulcer and stomach cancer than antibacterial therapy. Many experts consider vaccine prophylaxis the most promising for countries with the high prevalence of HP infection [23].

Studies in this area have been underway since the 1980s, but there is still no tangible progress.

Like the hepatitis C virus (HCC) and HIV, HR is continuously mutating, and this bacteria is highly characterized by a phenomenon, called "elimination of the immune system." Therefore, the prospects for creating a vaccine against HP, as well as against Higher School of



Economics and Higher Attestation Commission, are not yet clear today [10]. Due to these circumstances, antibiotic therapy remains a non -alternative specific agent.

The question of broad preventive programs of diagnosis and treatment of not only clinical patients, but also all asymptomatic persons with HR infection has long been discussed in the literature [4]. In a number of countries, large-scale regional programs have been developed and put into effect, during which 1-2-week-long courses of treatment with antibiotics (in combination with drugs that reduce the acidity and secretion of gastric juice) received hundreds of thousands of asymptomatic HP asymptomatic media. They established many years of observation with the registration of such consequences of infection as atrophic gastritis, peptic ulcer, and cancer of the stomach. In groups of persons undergoing a course of treatment, there are reliably fewer cases of peptic ulcer, atrophic gastritis, and 34% less often arise in stomach cancer than in the control groups of the population. At the same time, as a result of programs, side consequences of a different plan are possible - allergic conditions, inflammatory and tumor diseases of the esophagus, the potential increase in bacterial resistance to antibiotics [14].

Experts believe that the prevention of stomach cancer outweighs the possible undesirable effects of mass eradication HP, but recognize the need to further study the problem of the problem [16].

Thus, in anticipation of the creation of an effective vaccine against HP and the final verdict regarding mass drug programs, secondary vaccine-prevention, which is mentioned above, and the measures of the social and sanitary-hygienic plan, remains at the disposal of modern society. The effectiveness of such measures does not need evidence, however, their implementation, along with the undoubted importance of financial costs, requires a genuine culture to attitude to their own health and the health of others: cultures of the content of dwellings, the culture of nutrition and the consumption of alcohol, the culture of service, and the culture of physical contact between people, Cultures of the content of the territory, rivers, lakes and places of rest. Everyone - parents, the administration of children's institutions, owners and personnel of food facilities, representatives of public health and utilities, the administration of settlement, representatives of the media, representatives of the mass media should go.

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**Conclusion.** Before the eyes of the modern generation, the historical process of retreating mass infection that pursues humanity from the moment of its occurrence and creating a severe burden for health care and society as a whole, the HP infection. An outstanding contribution to this process is made by medical science and practical medicine, although at the present stage a more significant role, in all likelihood, is played by a high standard of living and public and personal hygiene. Medical science and practice will continue to continue intensive research and development on the problem of combating this infection. The creation of a vaccine against HP,

as well as a solution to the issue of indications for mass drug preventive programs, remains a genuine challenge to modern science.

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