JOURNAL OF COMPLEMENTARY MEDICINE RESEARCH

RESEARCH ARTICLE

Intestinal Microbioma and Malignant Diseases of the Body in the Background of Invasion Blastocystis Spp.

BUGERO N.V.[1], ILYINA N.A.[2], ALEXANDROVA S.M.[3]

[1]*Doctor of Biological Sciences, Professor of the Department of Fundamental Medicine and Biochemistry, Pskov State University*

[2]*Doctor of Biological Sciences, Professor, Department of Zoology and Animal Ecology, Pskov State University*

[3]*PhD in Chemistry, Associate Professor of the Department of Chemistry, Pskov State University*

ABSTRACT

The paper presents data on the intestinal microbiota of cancer patients against the background of invasion by unicellular protozoa Blastocystis spp. A high level of infection (more than 64%) with blastocysts in persons with oncological diseases of the digestive system was revealed. It is known that the intestinal microbiota was formed during the evolution of human society and is individual for each organism. Analysis of the data obtained during the experiment showed an imbalance of the intestines in the examined individuals, expressed in a sharp decrease in the obligate (indigenous) flora and a significant increase in the colonization resistance of the number of opportunistic groups of microorganisms, which can cause chronic inflammation of the intestine, with characteristic clinical manifestations. The dependence of the severity of the degree of dysbiotic disorders and blastocyst invasion was established. In persons with blastocyst invasion, the most pronounced imbalance in the structure of the established intestinal microbiome, which in the future can serve as a platform for the development of various intestinal diseases. For a long stay in the host organism and participation in the formation of a special parasitocenosis Blastocystis spp. morphophysiological properties are required that allow the protozoa to participate in the creation of an individual intestinal community of the examined individuals. These properties include persistence factors that allow organisms to create their own microbiocenosis in cohabitation with other microorganisms in the studied biotope. In this work, using the example of anti-interferon activity, the persistence of blastocysts was studied, which allows them not only to participate in the formation of a special intestinal parasitocenosis, but also to carry out symbiotic relationships among microbes in the intestines of cancer patients.

KEYWORDS:
blastocystosis, opportunistic microorganisms, cancer patients, intestinal dysbiosis, indigenous flora, morphophysiological properties.

ARTICLE HISTORY:
Received Aug 11, 2021
Accepted Sep 16, 2021
Published Oct 02, 2021

DOI:
10.5455/jcmr.2021.12.03.16

VOLUME: 12
ISSUE: 3
ISSN: 2146-8397

INTRODUCTION

Throughout the entire historical development of the organic world, the human microbiota was constantly formed and changed as a result of the action on it of numerous factors of the external and internal environment, among which the priority role was given both in the past and now to the nutrition process. As a result of the evolutionary process, there was a significant change in human food products, which was expressed by the transition from the intake of animal food to plant food. In turn, this had a significant role in the formation of special ecological niches of the human intestine, inhabited by a diverse species composition of microorganisms. The intestinal microbiota of modern humans is a huge mass of prokaryotes - bacteria, archaea, among eukaryotes, there are protozoa, fungi, to a separate group viruses should be attributed [1].

The microbiome, formed in the process of evolution, is of great importance for the human body. Among the main functions of the intestinal microflora include: the formation of a protective barrier of the intestinal mucosa, suppression of the growth of pathogenic microflora, an immunogenic role, expressed in the stimulation of local immunity due to the production of immunoglobulins, detoxification of exogenous and endogenous toxic substances, antimutagenic activity, participation in

water-salt metabolism , maintenance of ionic homeostasis of the body, the formation of immunological tolerance to microbial antigens, participation in colonization resistance, etc.

It should also not be forgotten that as modern civilization is being formed, the intestinal flora is negatively influenced by a group of factors, both exogenous and endogenous. A fairly wide range of literary sources makes it possible to assess the impact of these factors both on the organism itself and on its evolutionary microflora. For example, in the works of V.A. Chereshnev, V.M. Poznyakovsky, much attention is paid to changes in the human diet, which entailed a change in the types of relationships both between bacteria and between bacteria and host cells in the ecosystem of the large intestine (commensalism, mutualism, parasitism).

A significant number of works are devoted to the influence of air on the state of the human body. It has been established that at present the composition of the air is very different from that which existed 100 years ago. This is due to the rapid development of plants and factories. Tons of substances are emitted into the air, which are either alien to the atmosphere, or violate the percentage of the components of the air mass, more than 2/3 of the pollution is accounted for by vehicle emissions. Combustion products of leaded gasoline, among which lead and other heavy metals are present, have a detrimental effect not only on human health, but also on the traditionally established intestinal microflora, expressed by a change in the structure among microorganisms of various groups (indigenous, resistant, transient), which entails various malfunctions of the body. Improper nutrition, psychoemotional stress, antibiotics, drug consumption also have a significant impact, as a result of which autoimmune diseases, diabetes, obesity, and other common pathologies can arise and develop, as evidenced by research results [2, 3, 4]. According to the WHO, about 95.0% of the world's population suffer from intestinal dysbiosis.

In recent decades, the use of modern research methods (PCR) and their use in the diagnosis of bacterial, parasitic infections have made it possible to identify new systematic groups of microorganisms that are not known to the world community.

Today, more than 5,000 species of microorganisms have been identified that inhabit various ecological niches of the human body (skin, oral cavity, vagina and gastrointestinal tract). More than 600 species live in the human intestine. From these positions, a person, together with the microorganisms living with him, is a special biocenosis with an organized work of enzymes encoded not only by the human genome, but also by the genomes of all symbiotic microorganisms, in which there are various mechanisms and types of relationships between neighbors.

Acute intestinal infections with unknown etiology are gaining in popularity. Recently, there has been a particular increase in the incidence of parasitic invasions. In 2014, according to the state report of Rospotrebnadzor of the population in the Russian Federation, acute intestinal infections of unknown etiology rank third place, second only to tuberculosis and acute respiratory infections.

Hence, in addition to the well-known and well-diagnosed pathogens, new or little-known microorganisms are getting more and more epidemic spread. Such a group includes an insufficiently well-studied pathogenic agent - a single-celled protozoan parasitizing in the large intestine Blastocystis spp. However, in recent years, there is a lot of information about this microbe and the establishment of its etiological significance in the development of infectious diseases of various spectrum.

For example, in the works of A.A. Nesterov [5], the role of blastocysts in the development of chronic dermatoses as a factor of the inflammatory process was established. The works of Yu.Yu. Krasnoperova [6] proved the role of protozoa Blastocystis spp. in the development of gastric ulcer. The research of A.S. Sigidaev et al., a survey of persons with chronic viral hepatitis was carried out, the prevalence rate was 28.8%, in persons with other diseases of the gastrointestinal tract - 5.5% [7]. There are works indicating that the risk group for the prevalence of this parasitic invasion includes people suffering from viral hepatitis B, HIV-infected people, and people with immunodeficiency.

However, there are no data in the literature on the composition of the human intestinal microbiome of cancer patients with blastocystosis. It should be assumed that individuals with various oncological diseases can also serve as a target for an attack by protozoan blastocysts, as well as the above groups of patients. It is known that cancer patients have a serious suppression of immunity, against the background of a decrease in which various side changes in the microflora of the intestinal tract are possible, which plays a colossal role in maintaining the general immune response of the body and performing essential functions for the normal functioning of the macroorganism as a whole. The relevance of the research is obvious, since at present there is no information on the invasion of persons with malignant tumors by blastocysts, as well as the official base of observations on the incidence of blastocystosis in the Russian Federation.

In this regard, the aim of this work was to study the intestinal microbiota of cancer patients against the background of invasion of protozoa Blastocystis spp.

Research tasks:
1. To study the features of the microbiocenosis of the large intestine of cancer patients.
2. Determine the frequency of occurrence in the intestines of patients with oncology Blastocystis spp. normal and dysbiosis.
3. To study the morphophysiological properties of blastocysts by the example of anti-interferon activity.

MATERIAL AND RESEARCH METHODS

In the period from 2019 to 2020, on the basis of the GBUZ Pskov Regional Clinical Oncological Dispensary, the INVITRO

laboratory and the "Diagnostics" research laboratory in Pskov, a series of studies was carried out to study the intestinal microbiocenosis of cancer patients.

The outpatient records of the patients were previously studied, which allowed all the subjects to be divided into 3 groups. The first group consisted of persons with oncological diseases of the gastrointestinal tract - 67 people (40.60 ± 0.3%), the second - cervical cancer 42 people (25.47 ± 0.4%) and the third - lung cancer - 56 people (33.93 ± 0.6%).

To assess the microbiocenosis, we used the method of quantitative isolation of species and variants of microorganisms that are part of the microbiocenosis according to the order of the Ministry of Health of Russia dated 09.06.2003 No. 231 "On the approval of the industry standard "Protocol for the management of patients. Intestinal dysbiosis" (OST 91500.11.0004-2003).

To detect protozoa, including blastocysts, both the methods of traditional parasitological diagnostics (microscopy of fecal smears) and molecular biological methods (PCR) were used. Stool smear microscopy was carried out in compliance with all requirements for the preparation of the drug (MUK 4.2.735-99).

To obtain cultures of the simplest Blastocystis spp. used Pavlova's environment. The study of anti-interferon activity was carried out according to the method of O.V. Bukharin, Sokolova V.Yu. (author's invention SU 1564191 A1 Patent Office: USSR) 1990. The investigated culture of blastocysts is inoculated on a nutrient medium to which leukocyte human interferon is added at a dilution of 1/60-1/40. After incubation, the culture is inactivated and the nutrient medium is layered, in which the test culture of Corynebacterium xerosis GISK N181 is suspended. After re-incubation of the inoculations, the localization of the test culture colonies is studied. If the test culture has anti-interferon activity, then colonies of the test culture grow around the colonies [8].

RESEARCH RESULTS AND THEIR DISCUSSION

The study involved 165 people aged 35 to 65 years with various oncological diseases. The control group consisted of 50 apparently healthy individuals.

At the first stage of the work, an assessment was made of the intestinal microbiocenosis of patients at the oncological dispensary. Among parasites, the dominant position in frequency of occurrence was occupied by the protozoa Blastocystis spp. They were recorded with a frequency of 58.18 ± 5.2%. (76 people). The second place was taken by representatives of the genus Lamblia. Species identification, which made it possible to find Lamblia intestinalis in 26.52 ± 3.4%.

The study of the parasitocenosis in the selected groups of the examined made it possible to find the protozoa Blastocystis spp. in the following percentages. In the 1st group (persons with oncology of the gastrointestinal tract), 43 positive samples of Blastocystis spp. were detected, which amounted to 64.18 ± 1.6% (43 strains of blastocysts). In group 2, 21 (50.0 ± 1.9%) positive results were found in individuals with cervical cancer oncology. Among patients of group 3 with lung cancer, blastocysts were found in 21.43 ± 2.3% (12 surveyed).

In the control group, the prevalence of blastocysts was (11.60 ± 1.7%), which may serve as evidence of the participation of blastocysts in the formation of the intestinal microbiota of the studied biotope and assess their role in finding the causative agent of parasitic invasion in a practically healthy organism.

In the examined patients, two morphological forms of the protozoa Blastocystis spp. were identified: vacuolar and granular. The predominant form of blastocysts in the clinical material was vacuolar - 70.97 ± 4.3%.

The morphological feature of the vacuolar form of Blastocystis spp. was the presence of a central body (CT), which occupies most of the protozoan cell (Fig. 1).

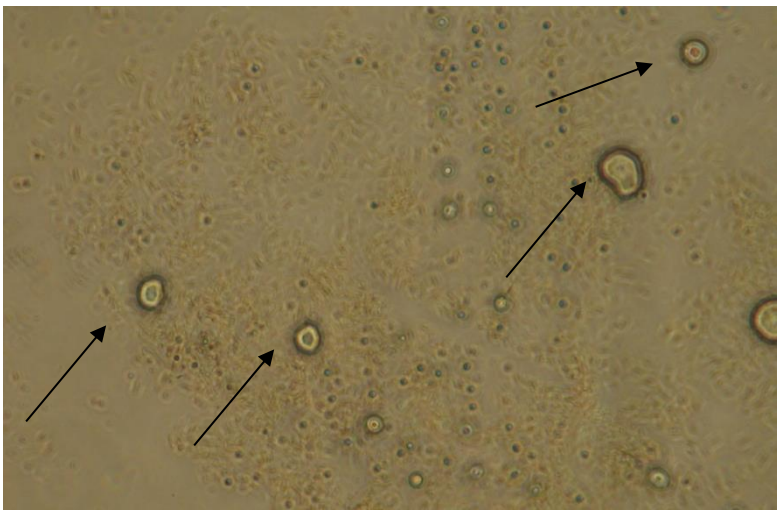

Fig. 1: Blastocystis spp. in faeces sample (staining × 1000)

Further, the work carried out the diagnosis of the qualitative and quantitative composition of the intestinal microbiocenosis of the examined persons. The analysis of forms for dysbiosis made it possible to divide the microorganisms isolated during the microbiological study into three groups: the first group consisted of lactic acid bacteria of normal microflora - mainly bifidobacteria and lactobacilli, the second group was occupied by pathogenic enterobacteria and the third group was occupied by opportunistic flora.

Severe disturbances in the obligate intestinal flora of cancer patients are shown, expressed by a decrease in the frequency of occurrence of bifidobacteria to 85.4 ± 3.4% ($p < 0.05$), lactobacilli to 77.4% ± 4.3 ($p < 0.03$), bacteroids up to 87.5 ± 3.9%, ($p < 0.05$), non-hemolytic Escherichia coli up to 68.3 ± 2.9%, ($p < 0.05$).

In people of the control group, these indicators were in the range of 98-100% ($p < 0.03$). The most pronounced these changes in the composition of microflora were observed in persons with oncology of the digestive system, which is generally not in doubt, since it is known that any diseases of the gastrointestinal sphere are aggravated by structural reorganization, which manifests itself in a decrease in the colonization resistance of the main symbionts of the intestinal flora against the background of a noticeable increase in the conditional - pathogenic groups of microbes, which was generally noted in the examined group of individuals.

People with oncology of the digestive system have malignant lesions of the digestive tube, as well as the glands involved in the process of digesting food. To date, no single cause has been identified that could provoke the growth of malignant oncological diseases of the gastrointestinal tract. For some types of cancer, for example, stomach cancer, the presence of acid-fast bacteria Nonlicobacter pyloru, damaging cells, is typical in the mucous membrane of the organ.

The qualitative and quantitative composition of the intestinal microbiocenosis of persons with oncological diseases of the digestive system (group 1), uterine cheek (group 2) and lung cancer (group 3) is presented in Table 1.

Table 1: Indicators of intestinal microbiota in persons with cancer

Types of microorganisms	Quantitative content of microorganisms (lg CFU/g)			
	oncology of the digestive system	cervical oncology	oncology lung cancer	Control
Lactobacillus spp.	7.5±0.1*	7.8±0.1*	8.2±0.3	8.6 ± 0.3
Bifidobacterium spp.	8.8±0.2*	9.6±0.3	9.6±0.4	10.1 ± 0.6
Escherichia coli	7.6±0.3*	7,2±0.6*	7.4±0.5*	8.9 ± 0.2
lactose-negative	1.6±0.3*	1.6±0.3*	1.4±0.4*	0.3±0.2
hemolytic	3.3±0.3	2.4±0.3	2.3±0.3	-
Bacteroides spp.	9.5±0.3	9.6±0.6	9.3±0.3	9.6 ± 0.4
Enterococcus spp.	8.4±0.3	6.8±0.3*	7.0±0.1*	2.5 ± 0.3
Proteus spp.	2.0±0.5*	1.4±0.3	1.3±0.3	0.9 ± 0.1
Klebsiella spp.	2.7±0.3*	2.2±0.4	2.1±0.3	1.2 ± 0.6
Enterobacter *spp.*	3.2±0.6	3.0±0.3*	2.9±0.4*	1.6 ± 0.3
Staphylococcus spp.	4.1±0.2*	2.9±0.2	3.4±0.2	2.3 ± 0.6
Candida spp.	3.6±0.2*	1.8±0.2*	2.9±0.2*	2.4 ± 0.1
Clostridium spp.	3.6±0.3*	2.9±0.3*	3.0±0.2*	2.1 ± 0.1

Notes. * - reliability of differences between indicators with the comparison group ($p < 0.05$).

Analysis of the table made it possible to note a significant decrease in the density of colonization of obligate flora in the studied groups, against the background of a sharp increase in opportunistic flora.

The maximum decrease in quantitative indicators for these diseases was noted in relation to bifidobacteria and lactobacilli. In oncology of diseases of the gastrointestinal tract, cancer of the cervix and lungs, the colonization activity was 8.8 ± 0.2; 7.5 ± 0.1 lg CFU/g, 9.6 ± 0.3; 7.8 ± 0.1 lg CFU/g, 9.6 ± 0.4; 8.2 ± 0.3 lg CFU/g, respectively; in the comparison group - 10.1 0.6 and 8.6 0.3 lg CFU/g, $p<0.05$. A decrease in the frequency of occurrence of other representatives of normal microflora, such as E. coli with normal enzymatic activity and bacteroids, was also statistically significant ($p<0.05$).

The studies carried out revealed significant changes in intestinal colonization by opportunistic representatives of the genera: Enterococcus spp., Staphylococcus spp., Clostridium spp. and Klebsiella spp. So, the contamination of microorganisms in the group of persons with oncology of the gastrointestinal tract for the birth of Enterococcus spp. was 8.4 ± 0.3 lg CFU/g, which is 3.4 times higher than the number of these microorganisms in the comparison group. The index of colonization resistance of bacteria of the genera Klebsiella spp., Enterobacter spp. and Staphylococcus spp. exceeds 2.2 and 1.5 times, respectively, compared with the control (Table 1).

In cancer patients with cancer of the cervix and lungs, there was also a decrease in the quantitative indices of contamination for representatives of the obligate flora, which amounted to a group of bacteria of the genera *Bifidobacterium* spp. and *Lactobacillus* spp. from 10.1 0.6 and 8.6 0.3 lg CFU/g

in the control group to 9.6 ± 0.3, 7.8 ± 0.1 and 9.6 ± 0.4, 8.2 ± 0.3 lg CFU/g, respectively, in individuals of the surveyed groups (p <0.05).

It should also be noted that people with oncological diseases have E. coli with hemolytic activity, which rightly proves the course of the pathological process in the large intestine and can serve as an indicator of the state of human health. On the contrary, it is absent in the control group.

The next stage of the work was to study the parameters of the intestinal microbiota of individuals invaded by protozoa *Blastocystis* spp. against the background of oncological diseases of the digestive system, cancer of the cervix and lungs. The analysis of the microbiota of the studied groups demonstrates profound changes in the qualitative and quantitative composition of bacteria in the large intestine in the studied individuals. It was found that the contamination with bacteria of the obligate group (bifidobacteria and lactobacilli) is sharply reduced in cancer patients and the maximum values of the decrease in colonization resistance were established in relation to the group of people with oncology of the digestive system, as was noted in the same group, but without invasion by protozoan blastocysts, which clearly presented in Table 1. Analyzing these indicators in the group of persons with cervical oncology and lung cancer, one can also see a significant decrease in the quantitative indicators of bacteria of the genus *Bifidobacterium* spp. and *Lactobacillus* spp. from 8.6 ± 0.3 lg CFU/g in control to 7.4 ± 0.3 and 7.6 ± 0.6 lg CFU/g in subjects, respectively (p <0.05).

The analysis of the microbial number of the opportunistic flora showed an excess of the level of bacteria of the genus Enterococci, Staphylococci, Clostridia and Klebsiella in the studied groups of patients compared with the control group. So the level of enterococci exceeded the same indicator in the comparison group by 4, 3 and 3 times, respectively, in patients with oncology of the gastrointestinal tract, cervix and lungs. Microbial count values for bacteria of the genus Staphylococcus spp. the seeding rate in individuals with oncology of the digestive system was 2 times higher than in the control group and amounted to 4.7 ± 0.3 lg CFU/g and 2.3 ± 0.6 lg CFU/g, respectively, p <0.05. In the group of persons with diseases of the female genital organs and lung cancer, this indicator did not differ significantly from the control (Table 2).

The studies carried out also revealed an excess of the content of bacteria of the genus Clostridium spp. for all cancers compared with the comparison group. They were 2 times higher in oncology of the digestive system, 1.8 times in cancer of the cervix, 1.5 times in lung cancer, compared with the indicators of the control group (2.1 0.1 lg CFU/g, p < 0.05).

Analysis of intestinal contamination with bacteria of the genus Klebsiella in the examined individuals revealed a similar picture. The highest microbial count in comparison with the control group was observed in patients with oncology of the digestive tract.

Table 2: Indicators of intestinal microbiota in persons with cancer against the background of invasion by protozoa Blastocystis spp.

Types of microorganisms	Quantitative content of microorganisms (lg CFU/g)			
	oncology of the digestive system	cervical oncology	oncology lung cancer	Control
Lactobacillus spp.	6.3±0.3*	7.4±0.3*	7.6±0.6	8.6±0.3
Bifidobacterium spp.	7.4±0.2*	8.6±0.3*	9.2±0.2	10.1±0.6
Escherichia coli	6.4±0.4*	7.3±0.2*	7.3±0.2*	8.9±0.2
lactose-negative	2.7±0.3*	2.8±0.6*	2.6±0.4*	0.3±0.2
hemolytic	3.8±0.3	2.6±0.3	2.8±0.3	-
Bacteroides spp.	9.3±0.5	9.6±0.6	9.4±0.3	9.6±0.4
Enterococcus spp.	9.8±0.1*	7.0±0.2*	7.3±0.2*	2.5±0.3
Proteus spp.	2.3±0.3*	1.8±0.3*	1.6±0.3	0.9±0.1
Klebsiella spp.	2.9±0.2*	2.6±0.4*	2.3±0.3*	1.2±0.6
Enterobacter *spp.*	3.7±0.2*	3.4±0.2*	3.2±0.6*	1.6±0.3
Staphylococcus spp.	4.7±0.3*	2.7±0.2	3.2±0.2	2.3±0.6
Candida spp.	4.1±0.4*	2.0±0.2	2.7±0.4	2.4±0.1
Clostridium spp.	4.2±0.2*	3.7±0.3*	3.4±0.1	2.1±0.1

Notes. * - reliability of differences between indicators with the comparison group (p<0.05).

The problem of bacterial persistence, as a key link in infectious pathology, is a general biological phenomenon [9] and is of fundamental importance as one of the links in the complex process of self-regulation of parasitic systems.

The peculiar course of an infectious disease is determined not only by the variety of reactions of the macroorganism, but is also a reflection of the characteristics of the pathogenic agent, formed as a result of a long process of interaction between micro- and macroorganisms, their struggle and mutual adaptation.

To parasitize in the host organism, microbes require certain biological properties aimed at degradation of the host's resistance mechanisms. These mechanisms include persistence [9].

Further, in the work, the persistent activity of protozoan

blastocysts was studied, both the most common representatives of intestinal parasitocenosis of the examined, and microorganisms against the background of the invasion of which we see deeper dysbiotic changes in the large intestine of the examined. Anti-interferon trait (AIA) is an autonomous property of microorganisms designed for targeted, specific inactivation of the bactericidal fraction of human leukocyte interferon [8].

To study the persistent properties aimed at the degradation of the host resistance mechanisms, AIA of the protozoan strains Blastocystis spp., isolated from the examined patients, was identified.

Of the 76 blastocyst strains studied, 58 (76.31 ± 4.3%) had an anti-interferon trait. At the same time, AIA was considered high with inactivation of human leukocyte interferon at a concentration of more than 2 units, the average - from 1.1 - 2 units. and low - from 0 to 1 unit. To analyze the persistent characteristics of Blastocystis spp. 3 groups of protozoa were identified, which corresponded to the concentration of interferon in the experiment with protozoa (Table 3).

Table 3: Indicators of anti-interferon activity of Blastocystis spp.

Groups/units (AIA)	The number of strains with AIA (abs.)	Frequency of occurrence (%)
1st group (more than 2 units)	21	35.21±1.3
2nd group (1.1 - 2 units)	27	46.55±1.6
3rd group (0 - 1 unit)	10	17.20±1.1
Total	58	100

In the course of the study, an analysis of the frequency of occurrence of anti-interferon activity of blastocysts isolated from patients with various nosological forms of oncology was carried out.

Most often, anti-interferon activity was recorded in strains of protozoa isolated from feces of patients with the digestive organs, which is almost 90.67 ± 2.4% (Table 4). Slightly more than half of the blastocyst strains (14 out of 21 isolates) isolated from individuals with cervical cancer oncology showed their AIA, which amounted to 66.67 ± 4.7%. In individuals with oncology of the respiratory system, 5 out of 12 blastocyst strains had the studied property.

Table 4: Prevalence of AIA strains of blastocysts with various oncological diseases

Diseases	Number of blastocyst strains (n=76)	The number of blastocyst strains with AIA (n=58)	Frequency of occurrence of AIA blastocyst strains (%)
Oncology of the digestive system	43	39	90.67±2.4
Oncology of cervical cancer	21	14	66.67±4.7
Lung cancer oncology	12	5	66.67±2.4

Based on the above, it can be argued that the protozoa Blastocystis spp. have anti-interferon activity. Strains of blastocysts have different indicators of AIA, which can contribute to the displacement of dominant symbionts of the intestinal flora by blastocysts and the appearance of conditionally pathogenic, as well as lead to the formation of a special parasitocenosis with well-coordinated mechanisms that make it possible to create a niche inside the large intestine with a certain qualitative and quantitative set of microorganisms, determining the structure of the symbiocenosis of the human intestine and affecting the existence of the macroorganism as a whole.

CONCLUSION

1. The work was the first to assess the microbiocenosis of the large intestine of cancer patients. It was found that the symbiocenosis included both representatives of the bacterial flora and protozoa. The most common unicellular protozoan, Blastocystis spp. (58.18±5.2%. –76 people) was found in the feces of the examined persons. The maximum number of blastocysts was found in patients with oncology of the digestive system, which amounted to 64.18 ± 1.6% (43 strains).
2. The change in the qualitative and quantitative composition of the intestinal normocenosis of the examined was established. The most profound changes were observed in individuals with gastrointestinal oncology infested with blastocysts. A sharp decrease in the obligate flora (bifidobacteria, lactobacilli) was noted against the background of a significant increase in the representatives of opportunistic groups (enterococci, staphylococci, Clostridia and Klebsiella), which indicates a significant restructuring of the bacterial structure of the intestines of patients and contributes to the formation of changes in the general immune status of cancer patients against the background of a decrease in the general immune status of cancer patients. the

functioning of the macroorganism as a whole.

3. The study of the morphophysiological properties of blastocysts was carried out using the example of anti-interferon activity. Blastocyst strains have a pronounced AIA, more than 90.67% of protozoan isolates isolated from the feces of individuals with oncology of the digestive system have the studied trait, which is manifested by high, medium and low AIA values, which, in general, allows us to conclude that blastocysts are involved in the formation of special parasitocenosis of the intestines of the examined.

REFERENCES

1. Qin J, et al. A metagenome-wide association study of gut microbiota in type 2 diabetes. Nature 2012; 490: 55-60
2. Tilg H, Moschen AR. Microbiota and diabetes: an evolving relationship. Gut 2014; 63: 1513-1521
3. Abrahamsson TR, et al. Low diversity of the gut microbiota in infants with atopic eczema. J Allergy Clin Immunol 2012; 129: 434-440, 440.e1-e2
4. Abrahamsson TR, et al. Low gut microbiota diversity in early infancy precedes asthma at school age. Clin Exp Allergy 2014; 44: 842-850
5. Osobennosti patogeneza i terapii khronicheskikh dermatozov pri blastotsistnoy invazii : dis. … d.i.n. : 14.00.11 /Nesterov A.S. – Spb., 2009 – 234 p. – 76 p.
6. Krasnoperova YU.YU., Il'ina N.A., Kasatkina N.M., Bugero N.V., 2011 Mikrobtologiya. Uchebnoye posobiye – M.: «Flinta»: Nauka, 2011. – 144 p.
7. de Goffau MC, et al. Aberrant gut microbiota composition at the onset of type 1 diabetes in young children. Diabetologia 2014; 57: 1569-1577
8. Bukharin O.V., Sokolov V.YU. Sposob opredeleniya antiinterferonovoy aktivnosti mikroorganizmov: A.s. 1564191 USSR № 18. – 1990.
9. Bukharin O.V. Persistence of bacterial pathogens as a physiological phenomenon // Vestnik moskovskogo universiteta. Ser. 16. Biologiya. - 2008. – № 1. – pp. 6-13.