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**CORONAVIRUS IN PATIENTS WITH TUBERCULOSIS  
CHARACTERISTICS OF THE DISEASE**

**Abstract.**In the global tuberculosis epidemic, the COVID-19 pandemic threatens to negate the recent progress made in meeting the priorities in the fight against tuberculosis. The risk of development and the relationship between chronic tuberculosis infection and COVID-19 are analyzed on the basis of new world literature data. The frequency of detection of a chronic form of tuberculosis infection in patients suffering from COVID-19 and, conversely, the frequency of coronavirus infection against the background of CFT are reflected. Based on the data of the world literature, the issues of the mutual influence of combined infections with an emphasis on immunological changes, transformations and shifts of the body are summarized and analyzed. It is emphasized that at present there are a lot of unresolved issues and cases in the issues of mutual influences of the two infections that need further detailed research.

**Key words:** chronic tuberculosis, diagnosis, coronavirus infection, COVID-19, SARS-CoV-2, pandemic.

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## **КОРОНАВИРУС У БОЛЬНЫХ ТУБЕРКУЛЕЗОМ ХАРАКТЕРИСТИКИ БОЛЕЗНИ**

**Резюме.** В условиях глобальной эпидемии туберкулеза пандемия COVID-19 угрожает свести на нет прогресс, достигнутый в последнее время в решении приоритетных задач в борьбе с туберкулезом. Риск развития и взаимосвязь между хронической туберкулезной инфекцией и COVID-19 проанализированы на основе новых данных мировой литературы. Отражены частота выявления хронической формы туберкулезной инфекции у больных, страдающих COVID-19 и, наоборот, частота коронавирусной инфекции на фоне ЦФТ. На основании данных мировой литературы обобщены и проанализированы вопросы взаимовлияния сочетанных инфекций с акцентом на иммунологические изменения, трансформации и сдвиги организма. Подчеркнуто, что в настоящее время в вопросах взаимовлияния двух инфекций остается много нерешенных вопросов и случаев, которые нуждаются в дальнейшем детальном исследовании.

**Ключевые слова:** хронический туберкулез, диагностика, коронавирусная инфекция, COVID-19, SARS-CoV-2, пандемия.

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Latent tuberculosis infection (LT) is a state of persistent immune response caused by the presence of *Mycobacterium tuberculosis* antigens in the body, in the absence of clinical manifestations of active TB. There is no "gold standard" of diagnostics that allows a direct method to detect an infection caused by *Mycobacterium tuberculosis* in humans [1-5]. Latent TB has a 40% chance of progressing to active TB, 5% during the first two years of infection, and 5% during the rest of a person's life. From mathematical models, it has been reported that approximately 30% of the population worldwide are LT carriers [4]. Identification of individuals with RT and placing individuals at risk of developing active TB on prophylactic treatment is critical to eradicate the disease [3]. Since the end of 2019, the coronavirus disease 2019 (COVID-19) pandemic has had enormous health, social and economic impacts. Even after some of these are ironed out or leveled out, medium and long-term effects will still be felt. In the context of the global TB epidemic, the COVID-19 pandemic threatens to reverse recent progress towards global TB targets [1]. Globally, as of 16:50 CEST on 1 September 2021, there were 217,558,771 confirmed cases of COVID-19 reported to WHO, including 4,517,240 deaths. As of September 1, 2021, 5,272,630,490 doses of the vaccine have been administered. A 2020 study showed that if globally the COVID-19 pandemic results in a 25% drop in expected TB detection rates within 6 months, then a 26% increase in TB deaths can be expected, bringing us back to levels of mortality from tuberculosis among the world's population, which were observed in 2012 [3]. Official WHO data since the start of the pandemic show that in many high-burden TB countries, the number of TB notifications dropped significantly over several months in 2020. The negative impact of the pandemic on essential TB

services includes a reallocation of human, financial and other services to fight COVID-19. India, Indonesia, the Philippines and South Africa – four countries that account for 44% of the global TB burden – experienced a sharp drop in notification of new TB cases from January to June 2020. Compared to the same six-month period in 2019, in India, Indonesia and the Philippines, this indicator decreased by 25-30%. Modeling suggests that between 2020 and 2025, TB incidence could increase by more than 1 million new cases per year and an additional 1.4 million people will die from TB as a direct consequence of the COVID-19 pandemic. In addition, the deterioration of the financial situation of people due to loss of income or work can lead to an increase in the proportion of TB patients and their families facing catastrophic expenses [4]. Approximately 1.4 million people received treatment for TB in 2020, 21% less than in 2019 [2]. The International Working Group on COVID/TB Modeling and others (2021) in their data review reflected various results of mathematical modeling of the impact of the COVID-19 pandemic on the burden of tuberculosis, and they summarized epidemiological, clinical, organizational materials in comorbidity, and also identified common mechanisms through which COVID-19 can change the burden of TB and mitigation efforts. The panel has identified data on the impact of COVID-19 on both availability and resource requirements for TB control, and highlighted gaps in the world's health systems that should be prioritized.

**Purpose of the study.** To analyze the mutual influence of coronavirus infection and latent and pre-local tuberculosis infection.

**Materials and research methods.** The study included 68 children and adolescents who had contact with close relatives with coronavirus infection.

**Research results.** 68 children and adolescents in the presence of contact with close relatives with coronavirus infection, during their examination, most children and adolescents did not reveal obvious signs of this disease, and therefore they were recommended to undergo a study including PCR diagnostics for coronavirus COVID-19, determination of immunoglobulins in the blood 51 were found to have Ig G, which was regarded as asymptomatic COVID-19; in 17 adolescents, some

elevated levels of Ig M were detected. Observation is recommended for these patients. A few weeks later, these 68 children and adolescents developed weakness, malaise, decreased appetite, sore throats, sweating, coughing, and headaches. After consultation with an infectious disease specialist, computed tomography of the chest organs was recommended, and in 37 cases, strengthening and deformation of the root, some enlargement of the intrathoracic lymph nodes were revealed. There has been an increase in cases of tuberculosis among patients who have had a coronavirus infection. In this regard, these patients were referred for pre-examination to TB centers. After a thorough history taking, complaints, an objective study (assessment of the BCG scar, the physical development of the child, the presence of paraspecific reactions, the state of the peripheral lymph nodes), these patients underwent the following studies:

1. Complete blood count;
2. Mantoux test with 2 TU, Diaskintest;
3. In children and adolescents in the presence of a cough with sputum, bacterioscopic examination for mycobacteria and PCR (GeneXpertRif) were carried out;
4. Plain radiograph, if necessary, and computed tomography of the chest organs.

In 12 patients, a positive Mantoux and Diaskintest test was detected, without changes in organs and peripheral lymph nodes, a diagnosis was made - "turn" of tuberculin tests, or as latent tuberculosis is currently called, these children and adolescents were prescribed outpatient treatment.

An objective study of 53 patients revealed:

- 42 had an increase in submandibular, cervical and axillary lymph nodes;
- 2 had paraspecific reactions - bleforitis - 1, erythema nodosum - 1; 23 children lagged behind in physical development; in all children, the Mantoux test and the Diaskin test gave a positive or hyperergic result. The medical commission of the phthysiology center verified tuberculosis intoxication for this group of

children and, accordingly, an adequate standard treatment regimen with anti-tuberculosis drugs was prescribed.

**Conclusions:** Children and adolescents who have been in contact with people with coronavirus infection need to be isolated and monitored. Computed tomography makes it possible to detect local forms of tuberculosis in children and adolescents. It must be remembered that most children and adolescents are currently infected with *Mycobacterium tuberculosis* and often coronavirus infection can contribute to the activation of mycobacteria and the development of tuberculosis. general pediatricians, infectious disease specialists and phthisiatricians during the COVID-19 pandemic should work together to prevent the development of severe forms of tuberculosis.

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