

LIFE FORM OF TUBERCULOSIS PATHOGEN AND ITS TOXIC EFFECTS ON THE ORGANISM

Sayfitdinov Zavqiddin Najmiddin o'g'li

2nd-year student, Kimyo International University in Tashkent (KIUT)

Email: zavqiddin620@gmail.com

Axatova Guljahon Xakimovna

Assistant at the Department of "Medical-Biological Sciences", (KIUT)

Email: g.ahatova@kiut.uz

Botirova Baxoroy Zoxid qizi

2nd-year student, Kimyo International University in Tashkent (KIUT)

Email: botirovab20@gmail.com

Relevance:

Tuberculosis (TB) remains a global health problem due to its high infectivity, high mortality rates, and the complexity of its treatment. It spreads through airborne droplets and affects not only the lungs but also other organs. The disease causes more than 1.6 million deaths annually and requires a specialized drug course lasting several months for treatment. According to the World Health Organization (WHO), millions of new cases of tuberculosis are recorded worldwide every year.

Objective:

The objective of this scientific work is to analyze the life form of the tuberculosis pathogen and its toxic effects on the organism.

Materials and Methods:

During the analysis, articles and statistical data (2020–2025) from leading scientific databases such as WHO, CDC (USA), UpToDate, PubMed, Elsevier, and Scopus were studied.

Results:

The results of our research show that Mycobacterium tuberculosis is acid-fast due to the presence of mycolic and other fatty acids, as well as phosphatides, and because its composition is rich in oily lipids and waxy substances. It grows well in aerobic conditions on special nutrient media. At an optimal growth temperature of 37°C, it can grow within 20-30 days.

The tuberculosis bacterium manifests its pathogenicity through toxic enzymes such as lecithinase, catalase, urease, and peroxidase. The enzyme **lecithinase** breaks down cell membranes and helps the bacteria escape from macrophages. If macrophages engulf

the tuberculosis bacterium into a phagosome, it dissolves the phagosome membrane and escapes into the cytoplasm.

Through the **urease** enzyme, it protects itself from acidic environments. Specifically, when macrophages swallow the bacterium and create an acidic environment to dissolve it, urease breaks down urea into ammonia (NH_3) and carbon dioxide (CO_2). The ammonia neutralizes the acidic environment created by the macrophage, allowing the bacterium to survive.

Together with **catalase** and **peroxidase** enzymes, it breaks down "free radicals" and hydrogen peroxide (H_2O_2) released by the immune system into oxygen (O_2) and water (H_2O).

Conclusion:

The results obtained show that the tuberculosis pathogen attempts to maintain its viability and reproductive functions by bypassing the immune system and demonstrating strong resistance.