Mycobacterial Diseases
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Commentary

Causes of Immunodeficiency and its Impact on Progression of Tuberculosis

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DESCRIPTION

Tuberculosis (TB) is a serious infectious disease caused by the bacterium *Mycobacterium tuberculosis*. The disease can affect different parts of the body, but most commonly affects the lungs. TB is a major public health concern worldwide, with an estimated 10 million people falling ill with the disease and 1.5 million deaths in 2020 alone, according to the World Health Organization (WHO). One of the key factors in the development of TB is a weakened immune system. People with immune deficiencies, such as HIV/AIDS or malnutrition, are at a higher risk of developing TB and have a greater chance of developing more severe forms of the disease. In this article, we will discuss the immune deficiency of tuberculosis and its impact on the body.

Immune deficiency

Immune deficiency refers to a weakened immune system, where the body's natural defenses against infection and disease are compromised. The immune system is made up of various organs, cells, and proteins that work together to defend the body against harmful invaders like bacteria, viruses, and parasites. When the immune system is functioning properly, it can quickly identify and destroy these invaders before they can cause harm. However, if the immune system is weakened, it may not be able to effectively fight off these invaders, leading to infections and diseases.

Types of immune deficiency diseases

Primary and secondary. Primary immune deficiency is caused by genetic defects that affect the development or function of the immune system. Secondary immune deficiency, on the other hand, is caused by external factors such as infections, medications, or other medical conditions that weaken the immune system.

Immune deficiency and tuberculosis

Tuberculosis is caused by *Mycobacterium tuberculosis*, a bacteria that primarily infects the lungs. When a person inhales droplets containing the bacteria, the immune system is triggered to respond to the infection. In a healthy individual with a fully functioning immune system, the body's defenses are able to contain the infection and prevent the development of active TB disease. However, when the immune system is weakened, the bacteria can multiply and spread throughout the body, leading to the development of active TB disease. Immune deficiency can be caused by a number of factors, including HIV/AIDS, malnutrition, diabetes, cancer, and certain medications. HIV/AIDS is one of the most significant risk factors for developing TB. HIV attacks the immune system, specifically targeting the $CD4^+$ T cells, which play a critical role in the body's immune response. As a result, people living with HIV/AIDS have a significantly higher risk of developing active TB disease. In fact, according to the WHO, approximately one-third of all HIV-related deaths are caused by TB. Additionally, people living with HIV/AIDS are more likely to develop more severe forms of TB, such as disseminated or extrapulmonary TB, which can affect other parts of the body outside of the lungs. Malnutrition is another risk factor for developing TB. A lack of proper nutrition can weaken the immune system, making it more difficult for the body to fight off infections. This is particularly true for deficiencies in certain nutrients, such as vitamin D, which plays a key role in immune function.

Diabetes is also a risk factor for developing TB, as high blood sugar levels can weaken the immune system and make it more difficult to fight off infections. Additionally, people with diabetes are more likely to have other underlying health conditions that can further weaken their immune system. Certain medications, such as immunosuppressants, can also weaken the immune system and increase the risk of developing TB. These medications are often used to treat autoimmune disorders or prevent rejection of transplanted organs, but they can also make it more difficult for the body to fight off infections.

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