

BIOS255 – Week 5 Case Study

Cellular immunity involves the action of T lymphocytes that will directly attack and destroy abnormal host cells. During these immune responses, the body will get rid of pathogens that reside inside human cells as they are inaccessible to antibodies.

Like all other formed elements, T cells are produced in red bone marrow by the hematopoietic stem cells. Once produced, these new cells will enter the bloodstream and travel to the thymus. Here, these lymphocytes will mature into fully functional T cells. T lymphocytes must pass two tests before they are permitted to leave the thymus: positive selection and negative selection. These tests ensure self-tolerance or restraint from attacking one's own tissues. Failure of self-tolerance can result in autoimmune reactions or disorders, where the immune system will produce antibodies that will attack the body's own tissues.

Systemic lupus erythematosus (SLE), commonly referred to as lupus, is a chronic autoimmune disease characterized by inflammation and tissue damage in multiple organs and tissues throughout the body. SLE can affect various systems, including the skin, joints, kidneys, heart, lungs, and central nervous system. The exact cause of lupus is not fully understood, but it is believed to involve a combination of genetic predisposition, environmental triggers, hormonal influences, and dysregulation of the immune system.

Client Background:

Jenny, a 28-year-old graphic designer, arrives at the immunology clinic with a weariness that belies her age. Once a vibrant and energetic woman, Jenny now feels overwhelmed by a myriad of symptoms that have plagued her for months. Her days are filled with unrelenting fatigue, joint pain that makes even simple tasks a challenge, and a persistent rash that mars her once-clear complexion. The rash across Jenny's cheeks and nose has become a source of embarrassment and discomfort. No amount of makeup can conceal the angry red patches that seem to flare up unpredictably.

Jenny's journey into the world of autoimmune disorders began gradually, with symptoms that initially seemed insignificant. She brushed off her fatigue as the consequence of long work hours and dismissed her joint pain as the natural result of stress and overexertion. However, as time passed, Jenny's symptoms intensified, gradually eroding her quality of life, and leaving her feeling helpless and defeated.

Desired Outcomes:

1. Identify the underlying cause of Jenny's recurrent infections and immune dysfunction.
2. Develop a comprehensive treatment plan to boost Jenny's immune function and reduce her susceptibility to infections.
3. Educate Jenny about lifestyle modifications and preventive measures to support her immune health and overall well-being.

Findings:

Upon examination, Jenny exhibits signs of inflammation, including swollen and tender joints, along with a rash that appears to be consistent with a photosensitive skin reaction. Laboratory tests reveal elevated levels of antinuclear antibodies (ANA) and anti-dsDNA antibodies, suggestive of systemic lupus erythematosus (SLE), an autoimmune disorder characterized by widespread inflammation and organ involvement.

1. Describe the processes of positive and negative selection, and how they contribute to self-tolerance.
 - **Positive Selection** occurs in the **thymus**, where developing T cells are tested for their ability to bind with the body's major histocompatibility complex (MHC)