

Week 4: Immune System

Systemic Lupus Erythematosus (SLE) is a chronic autoimmune disease in which the body's immune system mistakenly attacks its own tissues, leading to widespread inflammation and potential organ damage. In SLE, the immune system becomes hyperactive, producing autoantibodies, particularly antinuclear antibodies (ANA), which target normal cellular components, such as nuclear proteins and DNA. These autoantibodies form immune complexes that can deposit in tissues, triggering an inflammatory cascade that activates the complement system, further exacerbating tissue damage. T cell dysregulation also plays a role, with overactive T helper cells and a lack of regulatory T cells contributing to the autoimmune process (Ying et al., 2022). The immune system's dysfunction in SLE often leads to a vicious cycle of chronic inflammation, which can affect multiple organs, including the skin, kidneys, joints, and cardiovascular system.

The clinical manifestations of SLE in the immune system are diverse. One of the hallmark symptoms is fatigue, which is often described as severe and debilitating. This fatigue is thought to stem from chronic inflammation and immune system activation (Goswami et al., 2021). Another common manifestation is fever, typically low-grade, resulting from systemic inflammation. SLE can also cause lymphadenopathy and splenomegaly, as the body increases the production of immune cells in response to ongoing immune activity. Cytopenias (anemia, leukopenia, and thrombocytopenia) are also prevalent in SLE, due to the immune system's attack on blood cells or suppression of bone marrow function (Goswami et al., 2021). Photosensitivity, resulting in characteristic skin rashes that worsen with sun exposure, is another hallmark feature of SLE, especially the butterfly-shaped rash that appears across the cheeks and nose (Moro et al., 2023). These symptoms can have a profound impact on a patient's quality of life, limiting daily activities and contributing to emotional distress, especially in visible manifestations such as skin rashes and hair loss. Frequent infections, due to both the disease itself and immunosuppressive treatments, further exacerbate the challenges patients face, increasing the risk of serious complications (Burt et al., 2022).

SLE's effects extend beyond the immune system, impacting other organ systems as well. For instance, immune complex deposition in the kidneys leads to lupus nephritis, a condition that causes glomerulonephritis and can result in kidney failure if not properly managed (Jiang et al., 2020). Chronic inflammation also increases the risk of cardiovascular disease, as persistent immune activation can lead to accelerated atherosclerosis (Zhou et al., 2022). Musculoskeletal involvement, such as joint pain and inflammation, commonly known as lupus arthritis, can impair mobility and daily functioning, while neurological complications, including seizures and