

# Review Article

## MECHANISM OF COMMON SYSTEMIC IMMUNODEFICIENCY DISORDERS

**Running Title:** A review on the mechanism of common systemic Immunodeficiency disorders

### Abstract

A heterogeneous group of disorders with defects in at least one segment of the immune system. Immunodeficiency disorders could experience the ill effects of an assortment of clinical signs, including intermittent, extreme, or irregular diseases, autoimmunity, and lymphoproliferative/malignancies. Immunodeficiency involves an enormous amount of sicknesses, influencing the advancement of the immune system, its function, or both. Although the number of patients determined to have immunodeficiency is developing. However, numerous patients are diagnosed late; numerous cases experience the ill effects of difficulties by chronic infections, end-organ damage, or even demise before the diagnosis is made. Ideal determination and suitable treatment stay the keys to the successful management of patients. This review is to overview the various systemic immunodeficiency disorders and their mechanism of occurrence of immunodeficiency.

**Keywords:** Immunodeficiency, systemic, HIV, Diabetes Mellitus, Anemia

### Introduction

An immune disorder characterized with the aid of recurrent infections and low antibody levels, mainly in immunoglobulins like IgG, IgM, and IgA (1). Immunodeficiency results from the absence of components of the immune system, including lymphocytes, phagocytes, and complement framework. These immunodeficiencies can be either primary, like Bruton illness, or secondary, as the one brought about by HIV infection (2)(3). Deletions in genes that encode cell surface proteins and cytokine receptors, such as CD19, CD20, CD21, and CD80, can be mostly a cause (4). Treatment choices are limited, and commonly involves lifelong immunoglobulin replacement therapy (5,6). The most common systemic immunodeficiency disorders are HIV, anemia, diabetes mellitus, chemotherapy-induced immunodeficiency disorders. Our team has extensive knowledge and research experience that has translated into high quality publications (7) (8)(9)(10)(11) (12)(13)(14)(15)(16)(17)(18)(19)(20)(21) [7-21]

### Etiology

Immunodeficiency disorders can result from Prolonged (constant) and in addition to serious disorders like diabetes or cancer, drugs. Rarely, radiation treatment. Immunodeficiency disorders may result from practically any prolonged serious disorder. For instance, diabetes can bring about an immunodeficiency issue since white platelets don't work well when the glucose level is high (22). Human immunodeficiency infection (HIV) contamination brings about (AIDS), the most well-known serious procured immunodeficiency disorder. Many kinds of diseases can cause an immunodeficiency problem. For instance, any malignancy that influences the bone marrow (like leukemia and lymphoma) can keep the bone marrow from creating ordinary white platelets (B cells and T cells), which are essential for the immune system (23).

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## Mechanism of immunodeficiency disorders

### Mechanism of HIV

HIV virion enters macrophages and CD4+ Lymphocytes by the adsorption of glycoproteins on its surface to receptors on the target cell followed by a combination of the viral envelope with the objective cell layer and the arrival of the HIV capsid into the cell (24)(25). HIV can likewise scatter by direct transmission starting with one cell then onto the next by a cycle of cell-to-cell spread, for which two pathways have been depicted. Right off the bat, a contaminated Lymphocyte can communicate infection straightforwardly to an Immune system microorganism utilizing a virological synapse (26)(27). Also, an antigen-presenting cell (APC), like a macrophage or dendritic cell, can send HIV to Lymphocytes by a cycle that either includes productive immunodeficiency disorders (on account of macrophages) or catch and move of virions in trans (on account of dendritic cells)

### Mechanism of Diabetes Mellitus

Diabetes mellitus is certifiably not a solitary issue, it addresses a progression of metabolic conditions related to hyperglycemia and brought about by absconds in insulin emission and additionally insulin activity. Openness to constant hyperglycemia may result in microvascular entanglements in the retina, kidney, or periphery (28–30). The blood conveys glucose to furnish the body with energy to play out the entirety of an individual's day-by-day exercises. The liver converts the food an individual eats into glucose. The glucose is then delivered into the circulatory system. In a solid individual, the blood glucose level is managed by a few chemicals, principally insulin. Insulin is delivered by the pancreas, a little organ between the stomach and liver (31). The pancreas additionally makes other significant catalysts delivered straightforwardly into the gut that helps digest food. Insulin permits glucose to move out of the blood into cells all through the body where it is utilized for fuel (32). Individuals enduring diabetes either **don't** create sufficient insulin (type 1 diabetes) or **can't** utilize insulin appropriately (type 2 diabetes) (33,34), or both (which happens with a few types of diabetes). In diabetes, glucose in the blood can't move proficiently into cells, so blood glucose levels stay high. This not just starves all the cells that require the glucose for fuel, yet additionally hurts certain organs and tissues presented to the high glucose levels (35).

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### Mechanism of Anemia

Around 33% of the 5.5 billion individuals on the planet are anemic. **hemoglobin** under 11 g/dL for kids aged under 4 and pregnant ladies, hemoglobin under 12 g/dL for children 5 to 12 years and nonpregnant ladies, and hemoglobin under 13 g/dL for men are known to be anemic (36). The type of mechanism in which anemia is caused is due to the Dysregulation of the inflammatory response, Blunting of hypoxia/erythropoietin sensing mechanism, Sarcopenia, Quantitative/qualitative alterations in stem cell physiology, Decrease in sex steroids, Frequent co-morbid medical conditions, and polypharmacy (37).

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### Mechanism of chemotherapy-induced immunodeficiency

The utilization in the clinical medication of chemotherapeutic specialists with immunosuppressive action is aimed at mitigating immunologically interceded sickness, lymphoproliferative illnesses, and anticipation of uniting dismissals following organ transplantation(38).

A complex group of disorders that result from defects in immune system development or function. They are present in both children and adults, and although signs and symptoms are

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highly variable, most disorders involve increased susceptibility to infection, with many leading to significant disease-associated morbidity and mortality. Other important signs include excessive inflammatory responses and autoimmunity. The nature of these conditions requires referral to an immunologist for proper diagnosis and care. Severe diseases, such as HIV, necessitate long-term immune therapy. (e.g., BMT, HSCT, gene therapy) as soon as possible, which has led to the application of newborn screening to this population. B-cell or antibody-deficiency disorders are the most common types. The mainstay of treatment for patients with these disorders is immunoglobulin replacement therapy, and there are now several Ig products approved around the world for patients with immunodeficiency.

Our team has extensive knowledge and research experience that has translate into high quality publications (7),(8-19,39,40),(20,21,41-43)

**Conclusion:**

This review highlighted the pathogenic mechanism of immunodeficiency in various systemic immunodeficiency disorders like HIV, Anemia, Diabetes Mellitus, Chemotherapy related immunodeficiencies. This review emphasizes that all the common systemic immunodeficiency disorders must be taken into a consideration in treatment in clinical practice.

Table 1: Comparison of literature in relation to common systematic immunodeficiency disorders

LITERATURE COMPARISON	RELATION TO COMMON SYSTEMIC IMMUNODEFICIENCY DISORDERS	DEPENDENT VARIABLE
. Abbott, J K et al.,	+++	gene deletion
Chan et al.,	++	viral envelope, HIV capsid
CunninghamRundles, C.et al.,	+++	immune disorder
Ezekowitz, J.A.et al.,	+	dysregulation of inflammatory response
Freed, E.O.et al.,	++	contaminated lymphocyte, immune system microorganism
Gillespie, K.M. et al.,	+	insulin, pancreas
Jolly, C.et al.,	nil	direct transmission, cell to cell spread
Lehman, H.K. et al.,	+	B cells, T cells

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Mogensen, T.H et al.,	+++	platelets, glucose level
<i>Narendran, P. et al.,</i>	++	gut,glucose
Notarangelo, et al.,	++	secondary immunodeficiency
Ohmoto A et al.,	+++	immunosuppressive action
Pac M et al.,	+	primary immunodeficiency
<i>Rasmussen, L.et al.,</i>	++	hemoglobin
Resnick, E.S. et al.,	+++	immunoglobulin replacement therapy
Stumvoll,M. Et al.,	+	insufficient insulin
Thivolet, C.et al.,	++	metabolic conditions, insulin emission
Wellen, K.et al.,	+	high blood glucose level
Wyatt, R. et al.,	+++	target cell

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#### **Conflict of interest**

The author declares that there were no conflicts of interests in the present study.

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