**Immunity**

Immunity refers to protection against infections. The immune system is the collection of cells and molecules that are responsible for defending the body against the countless pathogens that individuals encounter. Defects in the immune system render individuals’ easy prey to infections and are the cause of immunodeficiency diseases. But the immune system is itself capable of causing tissue injury and disease, which are often referred to as hypersensitivity disorders.

Defense against pathogens consists of two types of reactions. Innate immunity (also called natural, or native, immunity) is mediated by cells and proteins that are always present (hence the term innate), poised to react against infectious pathogens. These mechanisms are called into action immediately in response to infection, and thus provide the first line of defense. Some of these mechanisms also are involved in clearing damaged cells and tissues. A major reaction of innate immunity is inflammation (Chapter 3). Many pathogens have evolved to resist innate immunity, and protection against these infections requires the more specialized and powerful mechanisms of adaptive immunity (also called acquired, or specific, immunity). Adaptive immunity is normally silent and responds (or adapts) to presence of infectious microbes by becoming active and generating potent mechanism for neutralizing and eliminating the microbes.

**Cells of immune system.**

Lymphocytes: T and B lymphocytes

Antigen presenting cells: Dendritic cells, Effector cells and lymphoid tissue.

**Autoimmune disease**.

Autoimmunity refers to immune reactions against self (“auto”) antigens. Autoimmune diseases are estimated to affect at least 1% to 2% of the U.S. population.

Autoimmune diseases may be organ-specific, in which the immune responses are directed against one particular organ or cell type and result in localized tissue damage, or systemic, characterized by lesions in many organs.

In systemic diseases that are caused by immune complexes and autoantibodies, the lesions principally affect the connective tissues and blood vessels of involved organs. Therefore, these diseases are often referred to as collagen vascular diseases or connective tissue diseases, even though the immunologic reactions are not specifically directed against constituents of connective tissue or blood vessels. Normal persons are unresponsive (tolerant) to their own (self) antigens, and autoimmunity results from a failure of self-tolerance. Therefore, understanding the pathogenesis of autoimmunity requires familiarity with the mechanisms of normal immunologic tolerance.

**Immunological tolerance.**

Immunologic tolerance is a state of unresponsiveness to an antigen that is induced by exposure of specific lymphocytes to that antigen. Self-tolerance refers to lack of immune responsiveness to one’s own tissue antigens. Billions of different antigen receptors are randomly generated in developing T lymphocytes and B lymphocytes, and it is not surprising that during this process, receptors are produced that can recognize self-antigens. Since these antigens cannot all be concealed from the immune system, there must be a means of eliminating or controlling self recognizing lymphocytes. Several mechanisms work in concert to select against self-reactivity and to thus prevent immune reactions against the body’s own antigens. Two broad mechanisms are recognized: central tolerance and peripheral tolerance

**Central Tolerance**

 The principal mechanism of central tolerance is the antigen-induced deletion (death) of self-reactive T lymphocytes and B lymphocytes during their maturation in central (generative) lymphoid organs (i.e., in the thymus for T cells and in the bone marrow for B cells)

**Peripheral Tolerance**

Several mechanisms silence potentially autoreactive T cells and B cells in peripheral tissues; these are best defined for T cells. These mechanisms include the following: • Anergy. This term refers to functional inactivation (rather than death) of lymphocytes that is induced by encounter with antigens under certain conditions