The immune system

The immune system encompasses a group of specialized cells and organs that develop to shield the body against invasion and attacks by unfamiliar invaders. In addition to fighting off infections brought about by bacteria, viruses, parasites, and fungi, the immune system also plays a crucial role in destroying pathogens that cause diseases (Cooley & Stewart 2009, p. 10). Another vital role of the immune system is to free the body from its own damaged or abnormal cells (Sompayrac 2012, p. 70). This defense against microbes has two fundamental types of reactions – reaction of innate immunity and reaction of adaptive immunity.

Innate Immune System

Innate immunity consists of cells and proteins that are present and prepared to mobilize and fight microorganisms at the point of infection at all times. It is non-specific on the types of organisms it fights. Unlike adaptive immune system, it reacts on the foreign bodies that invade the body immediately (Sompayrac 2012, p. 13). Although less specific, innate immune system is remarkable in its potential in discriminating good antigens from bad antigens and its ability in generating a strong first-line defense against infection. Innate immune system includes five main components, namely physical epithelial barrier, dendritic cells, phagocytic leukocytes, special types of lymphocyte cells termed as natural killer (NK) cells, and circulating fluid, plasma proteins.

Physical Epithelial Barriers

The first line of protection of the body is the skin and other physical epithelial barriers. These anatomical barriers include tears, mucus, cilia in the

respiratory and intestinal passages. The skin prevents foreign particles entering the body by providing a coating layer whereas the cilia movements keep air passages and the intestinal tract free frommicrobes. The trapping result of the mucus lining the respiratory and the gastro-vascular linings help guard the digestive system and the lungs from infection.

Humoral Obstructions

Some infectious agents do manage to penetrate the physical barriers leading to acute inflammation. Inflammation provides a protective wall around an area of damaged tissue that attracts white blood cells; these cells produce pus to ingest the toxins, hence leading to the healing of the damaged tissue (Cooley & Stewart 2009, p. 48).

Dendritic Cells

Dendritic cells are immune cells that are part of the human immune system. Their key function is to produce antigen substance and present it on the surface for accessibility to other cells of the immune system, thus acting as antigen-presenting cells (DeFranco & Roberson 2007, p. 8).

Phagocytic Leukocytes

Phagocytic leukocytes are white blood cells accountable for finding, overwhelming and digesting microbes, foreign substances, unusual cells, cellular debris, and waste products. They are fundamentally the body’s trash collectors. There are two types of phagocytic leukocytes, namely neutrophils and macrophages. Neutrophils contain digestive enzymes that engulf and digest foreign bodies in the human organism. In addition to macrophages

engulfing bulk bodies within an individual’s body, they alert the rest of the immune system of the foreign intrusions (Lambris 2007, p. 68).

Natural Killer (NK) Cells

Natural killer (NK) cells are cells within the innate immune system which specialize in killing certain types of cells within a body (Lambris 2007, p. 7). Unlike other cells, NK cells have both activating receptors that activate NNK cells when they bind to target cells, and inhibitory receptors that convey inhibitory signals if they come across Class I MHC molecules on the surfaces of the cells (DeFranco & Roberson 2007, p. 104).

Circulating Fluid Plasma Pproteins

Circulating fluid plasma proteins play a crucial role in enhancing not only blood coagulation; they also significantly contribute towards transportation of lipids and fat-soluble vitamins essential for the healing process.

Adaptive Immune System

Adaptive immune system is an antigen-specific defense mechanism. It takes a number of days to become protective and protects the body by reacting with and getting rid of a specific antigen. It is responsible for the annihilation of foreign particles once they have invaded the body. However, unlike innate immune system, acquired immune system not only requires the assistance of other cells, but also reacts only against the foreign particles it has previously encountered. This makes acquired immune system be less effective than the innate immune system in defending the body against new foreign invaders. An individual develops the innate immunity throughout life.

The cells of the acquired immune system are chiefly the B cells and the T cells (Pillai 2000, p. 373). Additionally, there also exist other crucial elements of the acquired immune system, such as the production of antibodies and the accompaniment cascade. The acquired immune system plays a vital function in the rejection of implanted organs during surgery. It is due to adaptive immunity that transport of antigens to lymphoid organs occurs, where naive B-lymphocytes and T-lymphocytes distinguish them (DeFranco & Roberson 2007, p. 96). Adaptive immunity constantly improves upon repeated disclosure to a given infection (Pillai 2000, p. 265).