11.4: Early Induced Innate Immunity

Early induced innate immunity begins 4 - 96 hours after exposure to an infectious agent and involves the recruitment of defense cells as a result of pathogen-associated molecular patterns or PAMPs binding to pattern-recognition receptors or PRRs. These recruited defense cells include phagocytic cells (leukocytes such as neutrophils, eosinophils, and monocytes; tissue phagocytic cells in the tissue such as macrophages), cells that release inflammatory mediators (e.g., inflammatory cells in the tissue such as macrophages and mast cells; leukocytes such as basophils and eosinophils) and natural killer cells (NK cells).

Unlike adaptive immunity, innate immunity does not recognize every possible antigen. Instead, it is designed to recognize molecules shared by groups of related microbes that are essential for the survival of those organisms and are not found associated with mammalian cells. These unique microbial molecules are called pathogen-associated molecular patterns or PAMPs and include LPS from the Gram-negative cell wall, peptidoglycan and lipotechoic acids from the Gram-positive cell wall, the sugar mannose (a terminal sugar common in microbial glycolipids and glycoproteins but rare in those of humans), bacterial and viral unmethylated CpG DNA, bacterial flagellin, the amino acid N-formylmethionine found in bacterial proteins, double-stranded and single-stranded RNA from viruses, and glucans from fungal cell walls. In addition, unique molecules displayed on stressed, injured, infected, or transformed human cells also be recognized as a part of innate immunity. These are often referred to as danger-associated molecular patterns or DAMPs.
Glycoprotein molecules known as pattern-recognition receptors are found on the surface of a variety of body defense cells. They are so named because they recognize and bind to pathogen-associated molecular patterns - molecular components associated with microorganisms but not found as a part of eukaryotic cells. These include bacterial molecules such as peptidoglycan, teichoic acids, lipopolysaccharide, mannans, flagellin, pilin, and bacterial DNA. There are also pattern-recognition molecules for viral double-stranded RNA (dsRNA) and fungal cell walls components such as lipoteichoic acids, glycolipids, mannans, and zymosan. Many of these pattern recognition receptors are known as toll-like receptors.

Most body defense cells have pattern-recognition receptors or PRRs for these common PAMPs enabling an immediate response against the invading microorganism. Pathogen-associated molecular patterns can also be recognized by a series of soluble pattern-recognition receptors in the blood that function as opsonins and initiate the complement pathways. In all, the innate immune system is thought to recognize approximately 10^3 of these microbial molecular patterns.

- [Topic hierarchy](#)

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