The role of pattern recognition receptors in innate immunity.

Sheng Zhang*

Department of Biological Chemistry, Johns Hopkins University, Maryland, United States of America.

Abstract

Innate immunity is the body's first line of defence against invading pathogens, which include bacteria, viruses, fungi, and parasites. This type of immunity is present from birth and does not require prior exposure to a pathogen to be activated. Innate immunity provides a rapid response to pathogens and can help to prevent infection and disease.

Keywords: Innate Immune, Chemical barriers, Natural killer cells.

Introduction

The innate immune system is comprised of physical and chemical barriers, as well as cells and molecules that recognize and destroy invading pathogens. These barriers include the skin and mucous membranes, which provide a physical barrier to prevent pathogens from entering the body. Chemical barriers, such as stomach acid and enzymes in tears, saliva, and mucus, also help to destroy pathogens. The innate immune system also includes specialized cells such as macrophages, neutrophils, and natural killer cells, which are capable of recognizing and destroying invading pathogens. Macrophages are large cells that engulf and digest pathogens, while neutrophils are smaller cells that are typically the first cells to arrive at an infection site [1].

Natural killer cells are specialized cells that can recognize and destroy infected cells and cancer cells. The innate immune system also produces a variety of molecules called cytokines, which play a key role in coordinating the immune response. Cytokines are produced by cells such as macrophages and dendritic cells, and they can activate other immune cells and promote inflammation, which is a key part of the immune response [2].

One of the key features of the innate immune system is its ability to recognize and respond to a wide variety of pathogens. This is achieved through the use of pattern recognition receptors (PRRs), which are specialized molecules that can recognize specific patterns found on pathogens. These patterns, called pathogen-associated molecular patterns (PAMPs), are found on a wide range of pathogens, and include molecules such as lipopolysaccharides (LPS), which are found on the outer membrane of gram-negative bacteria. PRRs are found on a variety of cells, including macrophages, dendritic cells, and epithelial cells, and they play a key role in activating the immune response. When a PRR recognizes a PAMP, it can trigger the production of cytokines and chemokine's, which attract immune cells to the site of infection. PRRs can also trigger the activation of other immune cells, such as natural killer cells and T cells, which can help to destroy infected cells [3].

The innate immune system is also capable of adapting to specific pathogens over time, through a process called trained immunity. Trained immunity is a form of memory in the innate immune system, which allows it to respond more effectively to a pathogen if it is encountered again in the future. This is achieved through epigenetic changes in immune cells, which can alter their gene expression and enhance their ability to respond to a specific pathogen. While the innate immune system provides an important first line of defense against pathogens, it is not always sufficient to prevent infection and disease. In some cases, pathogens can evade or suppress the innate immune response, allowing them to establish infection and cause disease [4].

This is particularly true for chronic infections, such as tuberculosis and HIV, which are able to persist in the body despite the presence of a strong innate immune response. In addition, the innate immune response can sometimes become overactive, leading to inflammation and tissue damage. This is the case in autoimmune diseases such as lupus and rheumatoid arthritis, where the immune system mistakenly attacks the body's own tissues. Despite these limitations, the innate immune system plays a crucial role in protecting the body from pathogens. By providing a rapid response to invading pathogens, it can help to prevent infection and limit the spread of disease. And by adapting to specific pathogens over time, it can provide a more effective response to future infections [5].

Conclusion

Innate immune system is an essential component of the body's defence against pathogens. It provides a rapid and non-specific response to a wide range of pathogens, through the use of physical and chemical barriers, specialized cells, and cytokines. The innate immune system also has the ability to adapt to specific pathogens over time, through a process

***Correspondence to:** Sheng Zhang, Department of Biological Chemistry, Johns Hopkins University, Maryland, United States of America, E-mail: Shengzhang@yahoo.com

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called trained immunity. While the innate immune system has its limitations, such as the ability of pathogens to evade or suppress the immune response, it plays a critical role in preventing infection and limiting the spread of disease. Overall, a better understanding of the innate immune system is essential for the development of new therapies and strategies to combat infectious diseases and other immune-related disorders.

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