Understanding the Equine Immune System

The equine immune system is far more complex than the brief description provided here, and a response that allows for sufficient biological defenses to ward off infection and protect the body to functions. "Thus, optimal care of the immune system is critical for a properly functioning immune system," said Adams.

The innate immune response is turned on, the infection can be eliminated if there are sufficient levels of activation. More importantly, activation of the adaptive immune response allows for generation of immunological memory to allow the immune system to respond more efficiently to future infections. The adaptive immune response is learned, is pathogen specific, and has memory.

The Adaptive Immune Response

The adaptive immune response relies on the innate immune system to communicate information about pathogens in the body. The adaptive immune response uses lymphocytes (white blood cells) to combat pathogens. These lymphocytes act both as a cell-mediated and a humoral immune response. Nonspecific phagocytes include the neutrophil, macrophage, and dendritic cells.

1. Neutrophils
   - The first to respond to infection
   - The speediest
   - Have a short lifespan
   - Use enzymes to destroy microbes

2. Macrophages
   - The professional phagocytes (macrophage and dendritic cells)
   - Process the antigen and leave the site of an infection
   - Dendritic cells travel to the lymph nodes or other secondary lymphatic tissue sites where they present the pathogen as an antigen to the adaptive immune system

3. Dendritic cells
   - Snag pathogens and present them as antigenic pieces and put the pieces on their cell surface receptors, which allows these cells to show the antigen to the adaptive immune system
   - "Not only are phagocytes important for killing pathogens, but they also process the pathogens into antigenic pieces and put the pieces on their cell surface receptors, which allows these cells to show the antigen to the adaptive immune system," Adams explained.

4. T cells
   - There are two types of T cells
   - T cells can be divided into helper T cells (Th) and cytotoxic T cells (Tc)
   - T cells travel back to the infection and kill the pathogen, while B cells produce antibodies that bind to the pathogen

5. B cells
   - Memory T and B cells wait in the lymph nodes for the next infection
   - Memory T cells and B cells can remember the same antigenic stimulus
   - B cells can produce antibodies that bind to the pathogen

The Innate Immune Response

The innate immune system is activated as the first line of defense. This is the body's built-in, ongoing biological defense system that is present from birth, not specific for any particular microbial substance (it doesn't matter if the invader is a virus, parasite, or bacteria, the innate immune system is activated) and has no memory.

When a pathogen, or disease-causing organism, breaks through the body's natural protective barriers, the innate immune system will kick in), and has no memory.

The activation of the innate immune response can happen in seconds and continue for minutes to days, she said. This entire innate immune response can happen in seconds and continue for minutes to days, she said. When cytokines are produced, they also trigger the inflammatory process characterized by heat, redness, swelling, and pain.

Cytokines and chemokines cause inflammation and vasodilation, which attract the phagocytes; these are the messengers between the innate and adaptive immune systems. Unlike the innate response, the adaptive immune response is specific to a particular pathogen. As the professional phagocytes (macrophage and dendritic cells) process the antigen and leave the site of an infection. "They're on high alert for pathogens in the body," said Adams. After engulfing and killing microbes, the neutrophil will die; an accumulation of dead neutrophils eventually leads to what we know as pus — the fluid that accumulates at the site of infection.

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Immunity is a state of having sufficient biological defenses to avoid infection, disease, or other unwanted biological invasion," Adams began. "To resist infection, the innate immune system is activated (causing organism, breaks through the body's natural protective barriers, and enter the body. Naturally, this important system is extremely complex. However, it is divided into two types of immunity: Natural acquired immunity, artificial acquired immunity (induced immunity), and active immunity (induced immunity). The adaptive immune response is specific to a particular pathogen and has memory.

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The Adaptive Immune Response

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