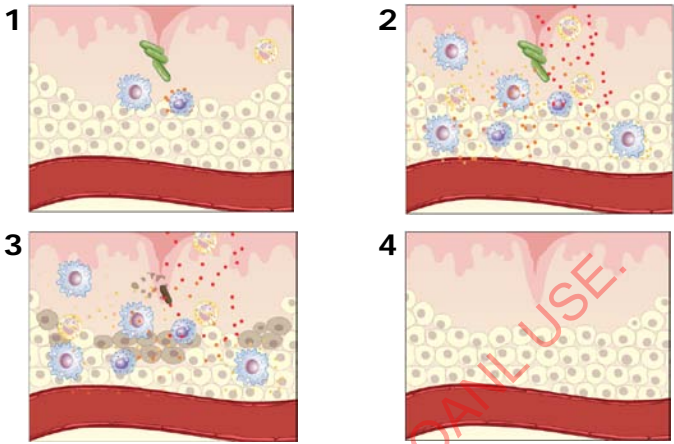




**Describe the inflammatory process**

Inflammation is one of the body's responses to infection. The process includes:

- Increased leukocyte migration to the damaged area (1)
- Leukocyte migration controlled by cytokines (2)
- Pathogens eliminated (3)
- Leukocytes disappear from tissue (not shown)
- Tissue returns to normal function (4)



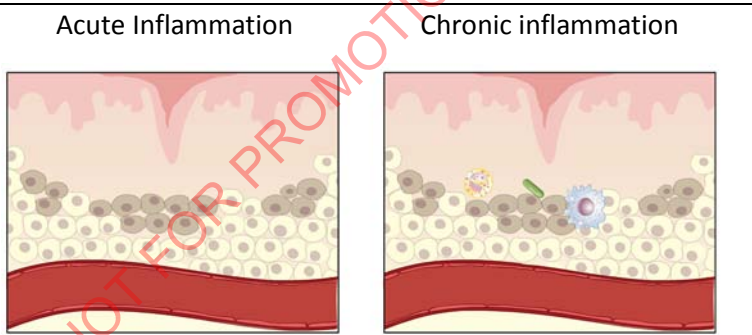
**Differentiate acute and chronic inflammation**

**Acute inflammation:**

- Infection completely eliminated (on left)

**Chronic inflammation:**

- Infection not completely eliminated (on right)
- Caused by continued antigenic stimulus to the immune system and cytotoxic effects of pathogen
- Chronic inflammation is a key aspect of many autoimmune diseases



**Describe relevant cytokines**

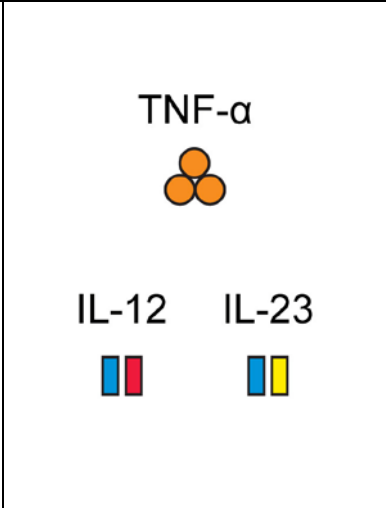
Relationships between cytokines comprise a complex feedback network. Among the most important cytokines are:

**TNF- $\alpha$**

- Pro-inflammatory with many functions, including the activation of other leukocytes and inducing apoptosis

**IL-12/23**

- Heterodimeric: comprised of 2 subunits each; they share a common subunit
- Involved in inflammatory and immune responses, such as natural killer cell activation and T-cell differentiation and activation
- IL-12 induces differentiation towards a T helper 1 (Th1) response; IL-23 induces differentiation towards a T helper 17 (Th17) response



**Explain the concept of hypersensitivity**

- Hypersensitivity is an inappropriate or excessive immune response
- Hypersensitivity has multiple causes and types
- Classified as types I, II, III, and IV

**List the types of hypersensitivity**

**Type I**

- Immediate response to antigens such as pollen and dust mites, causing conditions such as hayfever and asthma
- Subsequent exposure to the same antigen will lead to rapid histamine release
- Involves production of IgE antibodies which bind to mast cells and basophils, which are cells that contain histamine



**Type II**

- Involves IgG or IgM antibodies produced against surface antigens on the cells of the body
- These antibodies can induce cytotoxic reactions by activating complement or by facilitating the binding of natural killer cells, as in autoimmune hemolytic anemia and the incompatible transfusion of red blood cells



**Type III**

- Immune complex disease occurs when excess antigen-antibody complexes are formed which cannot be cleared by macrophages or other cells
- Local accumulation of these complexes can induce complement or a cell-mediated local reaction, causing conditions including systemic lupus erythmatosus (SLE) and serum sickness



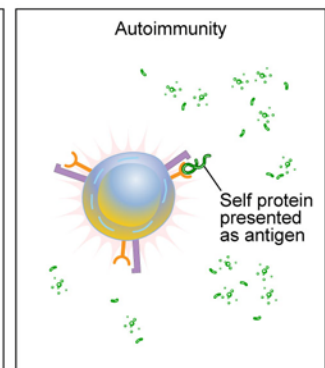
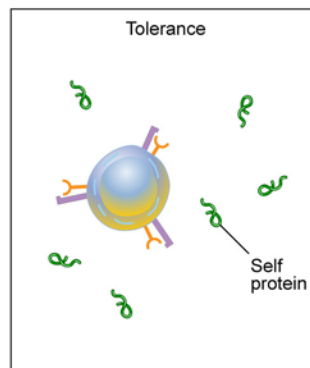
**Type IV**

- Delayed-type hypersensitivity or cell-mediated reactions that are mediated by T-cells rather than antibodies
- Examples include contact sensitivity such as poison ivy and graft rejection



**Describe autoimmunity**

- Tolerance prevents inflammatory responses to harmless antigens such as those in the lungs and gut.
- Self tolerance is tolerance to the body's own tissues.
- Autoimmunity occurs when self tolerance breaks down and the body mounts immune response against itself.



**Differentiate between organ-specific and non-organ specific autoimmune diseases**

- Organ-specific autoimmune disease is directed primarily against antigens localized to particular organs.
- Non-organ specific or systemic autoimmune disease is directed against antigens that are widespread throughout the body.
- The division is a continuum: many autoimmune diseases are most accurately described as being "more organ-specific" or "more systemic."