HOST DEFENSE MECHANISMS

1. **NON-SPECIFIC DEFENSES** (General defenses)

   * part of the structure and function of the animal
   * protect against microorganisms in **general** (any and all microorganisms that enters the body!)
   * first line of defense

.....if the non-specific defenses are breached.....

2. **SPECIFIC DEFENSES** (Immune response)

   * mediated by lymphocytes and antibodies
   * an immune response is mounted against a **specific** microorganism
   * second line of defense

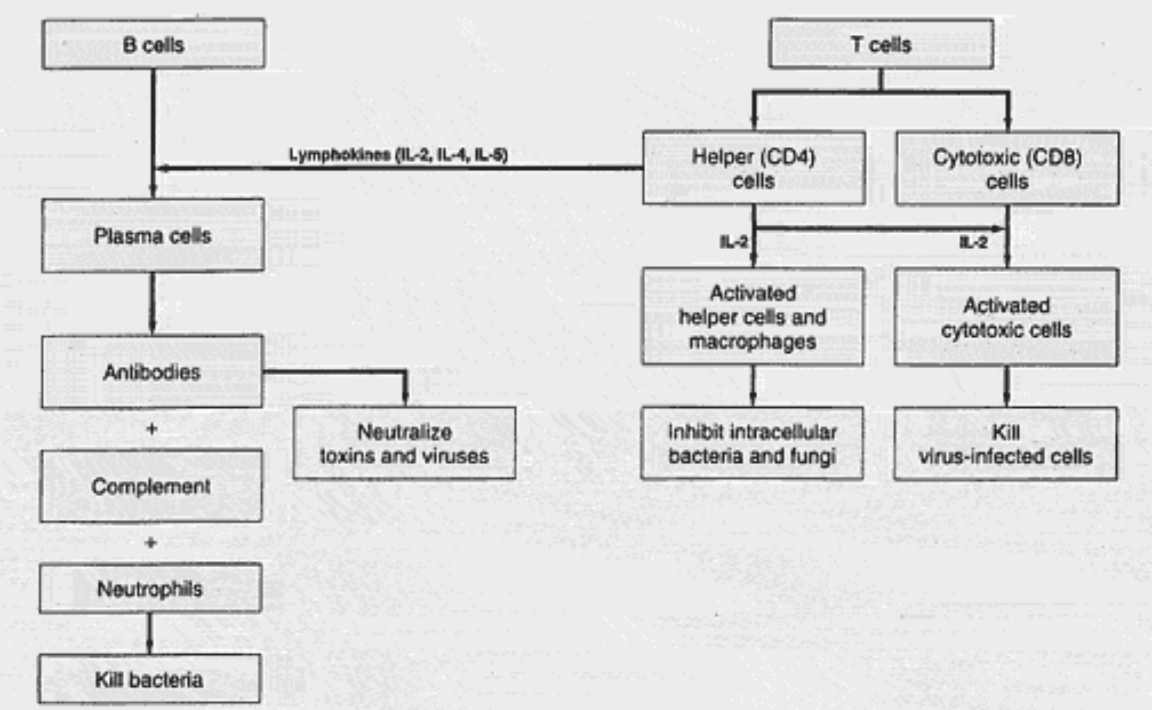

Figure 57–1. Introduction to the interactions and functions of the major components of the immune system. ***Left:*** Antibody-mediated (humoral) immunity. This is our main defense against extracellular, encapsulated, pyogenic bacteria such as staphylococci and streptococci. Antibodies also neutralize toxins, such as tetanus toxin, as well as viruses, such as hepatitis B virus. ***Right:*** Cell-mediated immunity. There are two distinct components. (1) Helper T cells and macrophages are our main defense against intracellular bacteria, such as *Mycobacterium tuberculosis*, and fungi, such as *Histoplasma capsulatum*. (2) Cytotoxic T cells are an important defense against viruses and act by destroying virus-infected cells.

9b

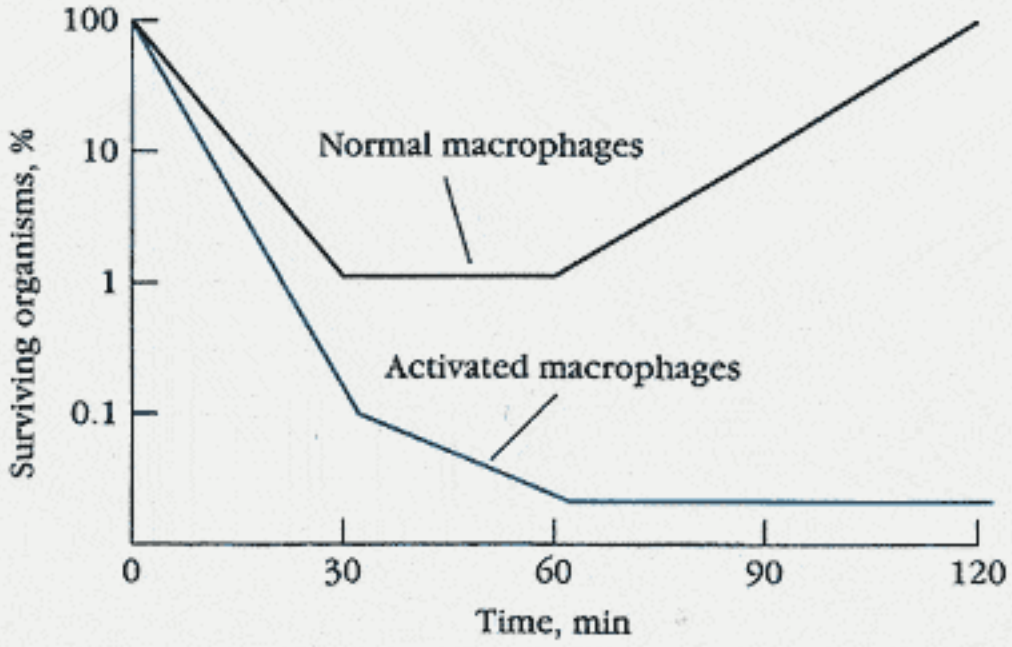

FIGURE 16-18

Survival of the intracellular pathogen *Listeria monocytogenes* when mixed with normal macrophages (not activated by IFN-γ) or activated macrophages in vitro. Note the logarithmic scale. The much greater ability of activated macrophages to destroy intracellular pathogens is evident.

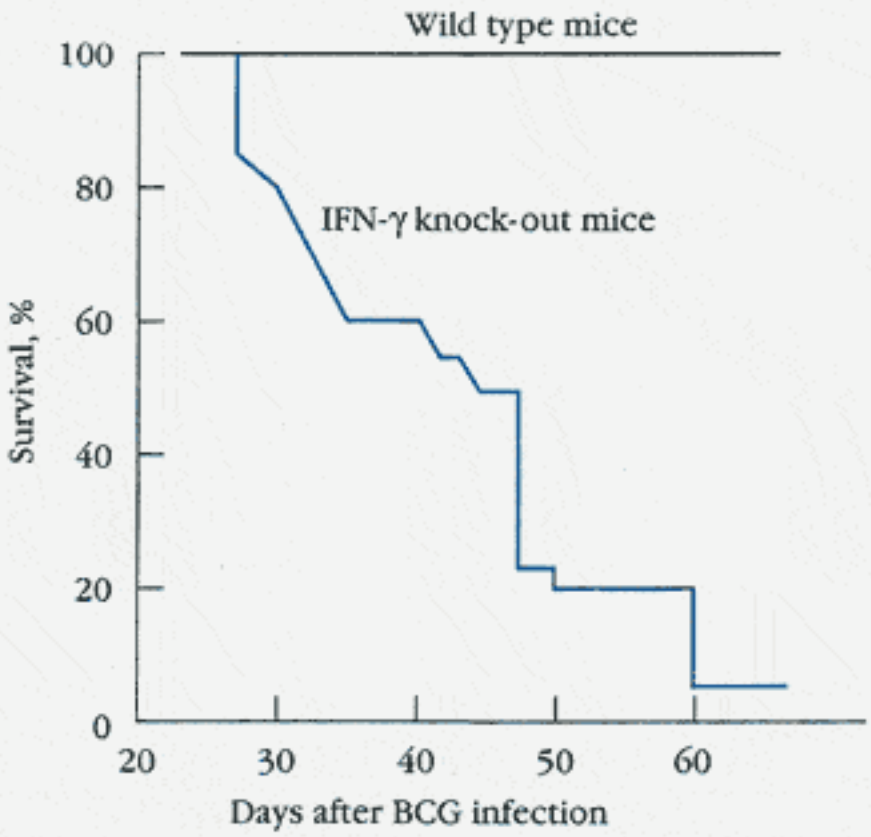

FIGURE 16-17

Experimental demonstration of role of IFN-γ in host defense against intracellular pathogens. Knockout mice were produced by introducing a targeted mutation in the gene encoding IFN-γ. The mice were then infected with 10^7 colony-forming units of attenuated *Mycobacterium bovis* (BCG) and their survival monitored. [Adapted from D. K. Dalton et al., 1993, *Science* **259**:1739.]