Immune System

The Immune System is not localized in any one place in your body. It is not controlled by any one organ, such as the brain. Instead, it is a team of individual cells, tissues, and organs that work together to keep you safe from invading pathogens.

Pathogens (a virus, bacteria, or other microorganism that causes disease) must get into your body to do you harm.

1. Your first line of defense is:
2. When pathogens try to enter your eyes, or mouth, they are destroyed by special enzymes
3. When pathogens try to enter your nose, they are washed down the back of your throat by mucus with carries them to your stomach where most are quickly digested
4. Your skin is many layers of flat cells with the outermost layers being dead cells. Many pathogens that land on your skin have difficulty finding a live cell to infect. As the dead cells flake off, they carry away the pathogens
5. Glands secrete oil onto your skin’s surface. The oil contains chemicals that kill many pathogens.
6. Failure of First Lines
7. When skin is cut or punctured, pathogens can enter. The body increases blood flow to the injured area and cell parts in blood, called platelets, help seal the wound so that no more pathogens can enter.
8. The increased blood flow also brings immune system cells that fight pathogens to the area.
9. Macrophages – an immune system cell that engulfs pathogens and other materials
10. T-cell – an immune system cell that coordinates the immune system and attacks many infected cells
11. B-cell – a white blood cell that makes antibodies
12. Antibodies are proteins made by B cells that bind to a specific antigen
13. Antigens are substances that stimulate an immune response
14. Responding to a virus
15. Two paths – When virus particles invade the body, some of the particles are engulfed by macrophages. Other virus particles infect body cells. Macrophages that have engulfed virus particles, infected body cellos, and virus particles all display viral antigens.
16. Two responses – Helper T-cells have receptor proteins that recognize the shape of the viral antigen on the macrophages. These helper T-cells begin two responses: a T-cell response and a B-cell response
17. T-Cell response – Helper T-cells activate killer T-cells
18. Destroying infected cells – Killer T-cells recognize the viral antigen on infected cells. The killer T-cells destroy the infected cells so that the virus particles inside the cell cannot replicate
19. B-Cell response – Meanwhile, helper T-cells also activate B-cells. Activated B-cells divide to make cells that can make antibodies. The antibodies recognize the shape of the viral antigen.
20. Destroying viruses – Antibodies bind to the viral antigen on the viruses. The antibodies bound to the viruses cause the viruses to clump together. Clumping marks the virus particles for destruction.
21. Fevers
22. When macrophages activate the helper T-cells, they send a chemical signal that tells the brain to heat up the body. A moderate fever of one or two degrees can slow the growth of some pathogens and it also helps B-cells and T-cells to multiply faster
23. Memory Cells
24. During the first encounter with a new pathogen, specialized B-cells make antibodies that are effective against that invader.
25. A few of the B-cells become memory B-cells that “remember” how to make an antibody for a particular pathogen. These antibodies are made in 3 or 4 days, thus protecting you from that pathogen.
26. Challenges to the Immune System
27. Allergies – the immune system overreacts to antigens that are not dangerous to the body
28. Autoimmune diseases – a disease in which the immune system attacks the body’s own cells by mistaking the body’s own cells for pathogens
29. Cancer – is the condition in which cells divide at an uncontrolled rate and the killer T-cells cannot control the growth of cells
30. AIDS – human immunodeficiency virus (HIV) causes acquired immune deficiency syndrome (AIDS). It uses the helper T-cells as factories to produce more viruses. The helper T-cells are destroyed in the process so nothing activates the B-cells and the killer t-cells, therefore the immune system cannot attack HIVF or any other pathogen. People with AIDS don’t usually die of AIDS itself, but they die of other diseases that they are unable to fight off.