Immunity

Pathogen - an organism (or virus) that causes disease

Pathogens are transmitted by air, water, food, insects, physical and sexual contact.

Our immune system is our defence mechanism against disease causing micro-organisms (viruses, bacteria and protists). We can become immune in two ways:

1. **Active Immunity**: Immunity due to your body producing antibodies after being stimulated by the invasion of a pathogen. This means that people who have had a disease like chicken pox or measles won’t usually get it again (as you have made memory cells). Usually permanent.

2. **Passive Immunity**: Immunity acquired by the transfer of antibodies from another. This can be natural such as mom via placenta/colostrums (milk) or artificial such as vaccine. Gives protection immediately but is usually temporary.

Vaccination - immunisation involves a deliberate exposure to the pathogen in order to produce memory cells. Thus, if your body is later exposed to the pathogen, it is able to respond much more quickly and effectively. To avoid becoming ill as a result of the vaccine, the pathogen is killed, weakened, or a related strain (ex. Small pox for cow pox) is used.

**Lines of Defence:**

The body’s defences may be separated into three stages:

**The 1st line of defence:**

Is non-specific and guards against all pathogens.

A pathogen meets our skin, nose or mouth. The skin acts as a barrier, the nose has cilia and mucus to sweep out pathogens and pathogens ingested into our mouth end up in the stomach with digestive enzymes and acid. There is also an enzyme found in sweat, saliva, tears and mucus that breaks down bacterial cell walls.
The 2nd line of defence: This is also a non-specific response to the presence of any pathogen (regardless of which species it is).

Involves a few different types of white blood cells.

The pathogen is attacked by phagocytes (WBC's that engulf and destroy)
If this is unsuccessful, other WBC's initiate fever and inflammation. The spiked temperature instigates the production of more white blood cells and slows down or stopped bacterial reproduction (due to their heat-sensitive nature).
A protein known as interferon is produced which inhibits the synthesis of viral proteins, slowing the infection.

The 3rd line of defence: A specific response to an identified pathogen.

Involves white blood cells known as lymphocytes
Lymphocytes coordinate a range of specific responses to the pathogen (including antibody production)

Types of White Blood Cells (leukocytes)
Your body's immune response is coordinated by a series a white blood cells. There are five key types of cells.

1. Phagocytes: (Macrophages & Neutrophils)
   - most abundant
   - Kills invaders & engulfs them via phagocytosis
   - constantly at work.

2. Lymphocytes:
   B cells
   - make antibodies
   - some become memory cells
   T cells
   - Killer T cells
   - helper T cells
   - Suppressor T cells