The Immune System

How does the top layer of our skin form scales?

* The skin cells destroy itself
* The skin cells harden over time
* The skin cells stack on top of each other and harden
* There are no scales on our bodies

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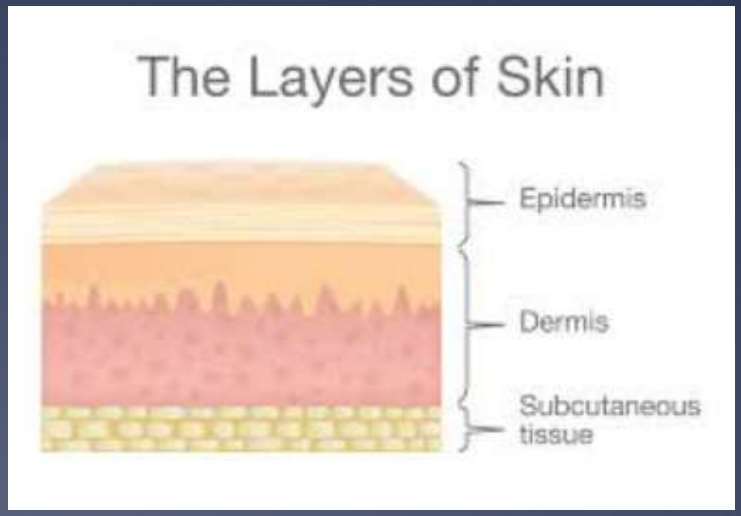
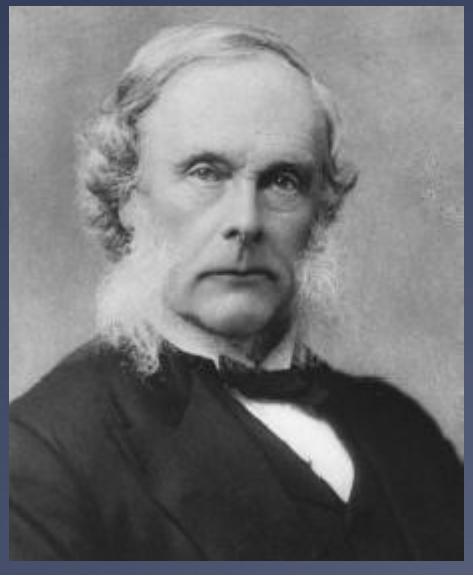


https://www.youtube.com/watch?v=r8AYLGJuyvw&ab_channel=MinuteEarth

The Immune System

In the year 1850, a patient had a 50% chance of survival after an operation.

The surgeons used non-sterilized instruments and rarely washed their hands before performing an operation.



Foreign Substances

Foreign substances: The things that invade your body

1. Antigen:
   * A substance that your body does not recognize
   * *Could* cause a disease
   * Example: splinter, metals, pathogens

2. Pathogen:
   * A substance that causes a disease
   * Can be living or non-living
   * Example: bacteria, viruses, cancerous cells, germs

Transmitting A Disease

In infectious diseases, pathogens are transmitted in 4 different ways.

Transmitting Infections Diseases

Transmission Method	Example
1. Direct Contact	
2. Indirect Contact	
3. Water and food	
4. Animal bites	

Transmitting Infections Diseases

Transmission Method	Example
1. Direct Contact	• Shaking hands • Sharing food or drinks
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4. Animal bites	• Being bitten by an animal carrying the virus

Video

https://www.youtube.com/watch?v=PSRJfaAYkW4

The Immune System

* The Immune System: The system in an organism that fights infections and pathogens.

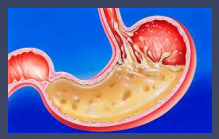
* The immune system offers 3 lines of defense.

The Immune System

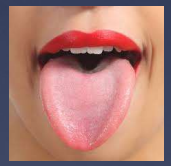
* The **First** Line of Defense
  * Works to keep pathogens **out** of the body.
  * Specific parts of the body are designed to protect it:

Skin

Eyelashes & tears



Stomach acid



Saliva

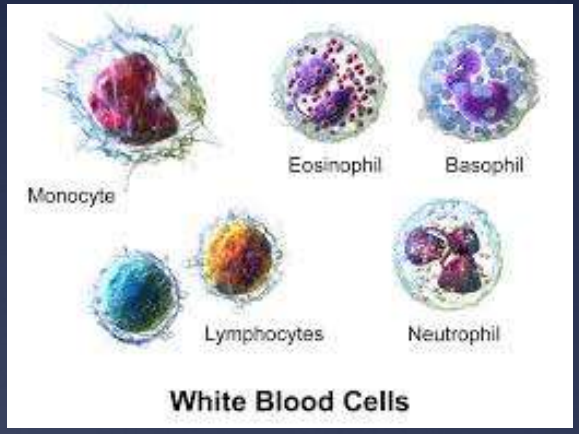
Nose hairs

Video

https://www.youtube.com/watch?v=GIJK3dwCWCw

The Immune System

- The **Second** Line of Defense
  - Attacks pathogens and antigens that **enter** the body.
  - Uses white blood cells that are transported in the blood that help fight an infection.



The Second Line of Defense

Innate Immune Response:

* Response is quick, general and non-specific.
* The response is the same for all intruders.
* The body sends fluids, cells and other substances to the site of infection.
* Results in inflammation and a fever.

The Third Line of Defense

Acquired Immune Response:

* A direct and specific attack against a pathogen or an antigen.
* Takes up to 1 week for effects to be seen.
* Uses two types of blood cells:
  1. B cells
  2. T cells (Helper T Cells & Killer T Cells)

The Third Line of Defense

Type of White Blood Cell

* Helper T Cells

How it Fights Infection

* Send signals to B Cells to come and produce antibodies.

The Third Line of Defense

Type of White Blood Cell	How it Fights Infection
* B Cells	* B Cells recognize antigens in the body and produces antibodies. * Antibodies: particles that can attach to antigens and mark it for destruction.

The Third Line of Defense

Type of White Blood Cell

* Killer T Cells

How it Fights Infection

* Directly attack and destroy antigens or pathogens that have been marked by antibodies.

Video

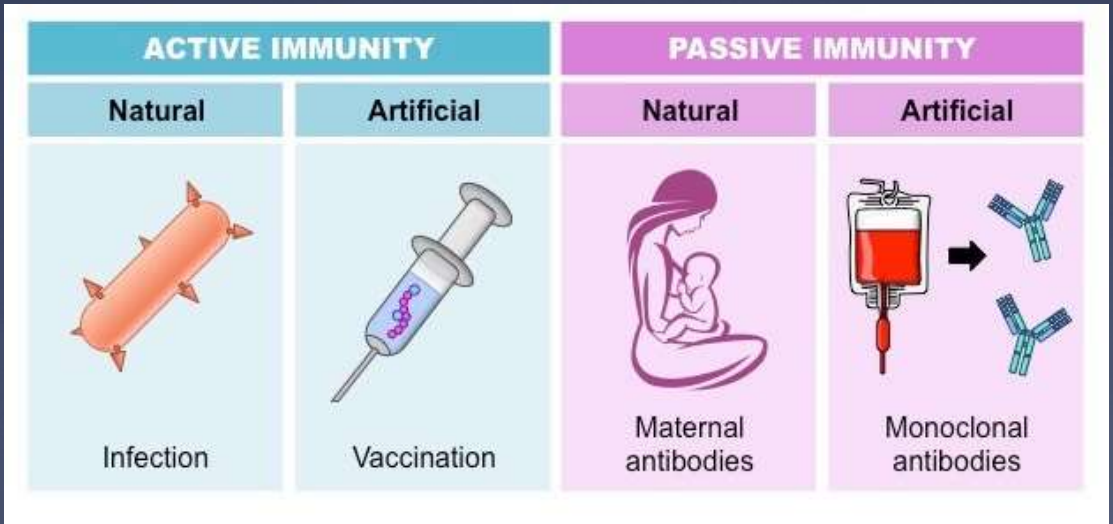
https://www.youtube.com/watch?v=2DFN4IBZ3rI

Active Immunity

* Active immunity: your body remembers which antibodies should be used to attack a pathogen that has infected it before.
* All acquired immune responses help you give you an active immunity.
* After an infection, the body stores some antibodies on B Cells which are called memory B cells.
* Memory B cells can be reactivated if the antigen or pathogen reappears.
* Example: chicken pox

Passive Immunity

- Passive immunity: results from the introduction of antibodies from another person or animal.
- Antibodies can be transferred:
  - From mother to baby
  - By injection



Vaccines

- Vaccine:
  - A special version of an antigen that gives you immunity against a disease.
  - A weakened form of a disease.
  - Stimulates your immune system to create antibodies against the disease and can be reactivated in the future.
  - Booster – an additional dose of a vaccine needed to boost the immune system.
    - Example: tetanus

Video

https://www.youtube.com/watch?v=uVUf_pt7Sh0