

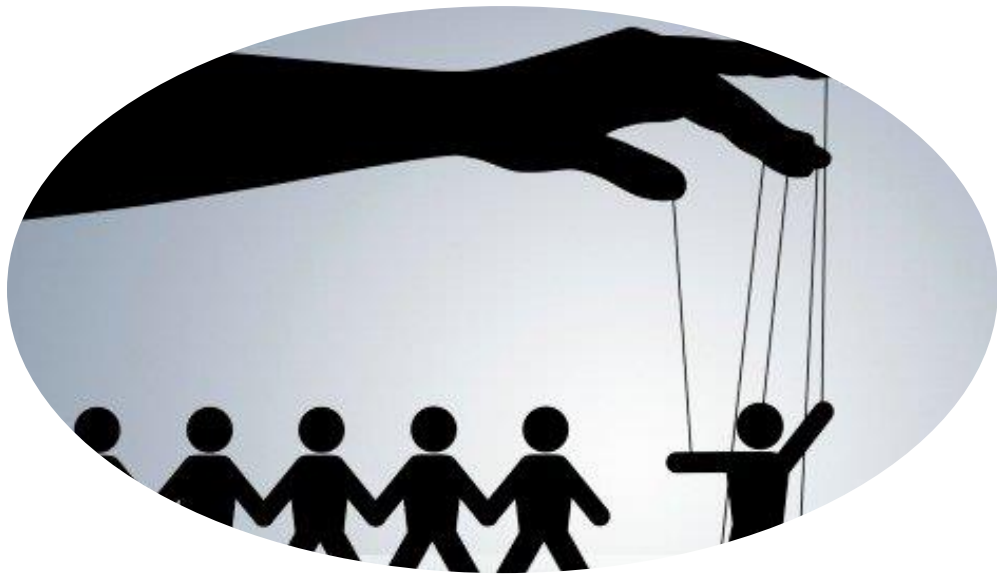
# U5: PROTECTION --- & CONTROL

The FINAL unit!!!



# PROTECT

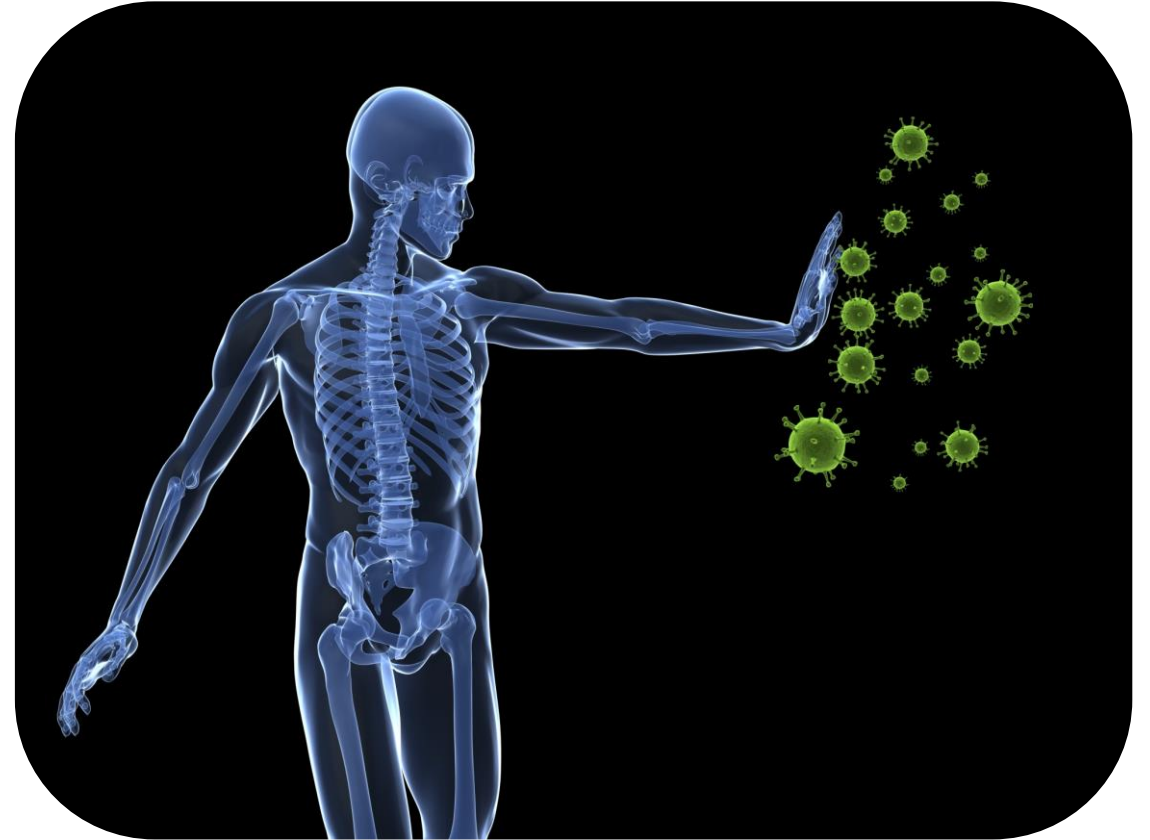
...A PERSON  
OR THING  
THAT  
PREVENTS  
SOMEONE  
OR  
SOMETHING  
FROM  
SUFFERING  
HARM OR  
INJURY.



# CONTROL

...the power to influence or direct the outcome or the course of events

- Our body's **immune system** works to protect us from foreign agents trying to enter our bodies.
- **Immunity** is the body's capability to repel foreign substances, pathogens and cancer cells.





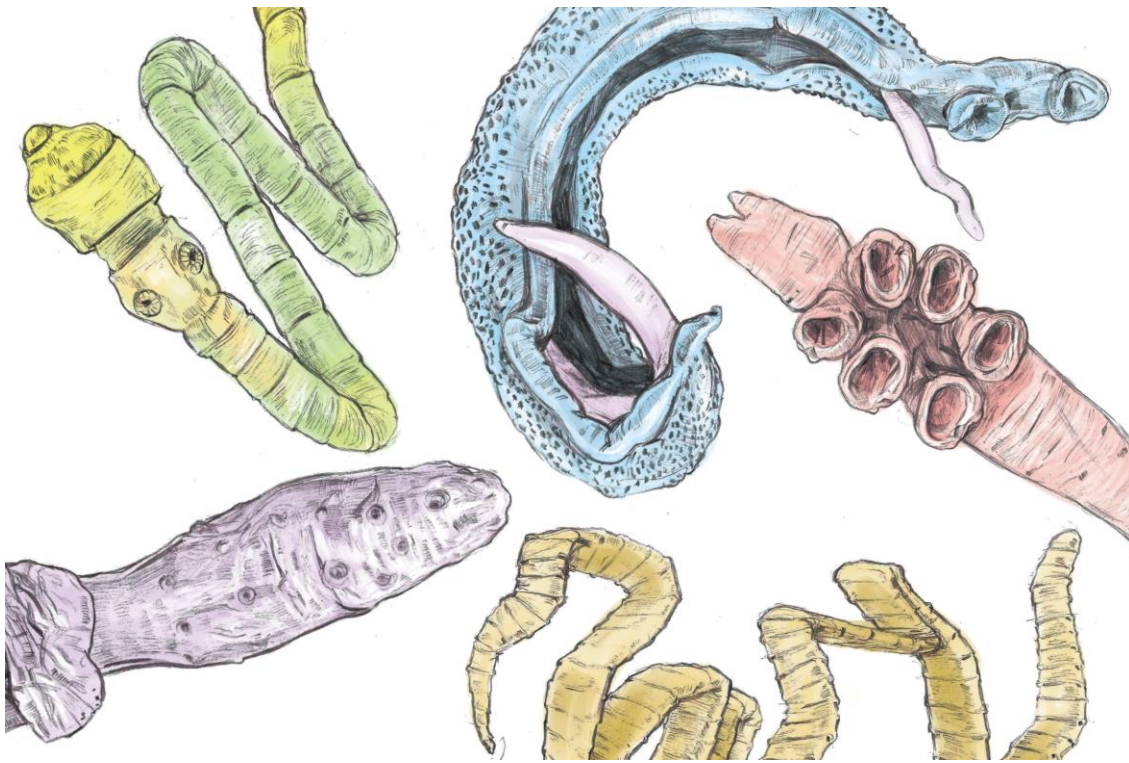
THE  
BAD  
GUYS

# CARCINOGENS



a substance  
capable of  
causing cancer  
in living  
tissue

# PARASITES



an organism that  
lives in or on  
another organism  
(its host) and  
benefits by  
deriving nutrients  
at the host's  
expense

# FUNGUS



any of a group of unicellular, multicellular spore-producing organisms feeding on organic matter, including molds, yeast, mushrooms, and toadstools

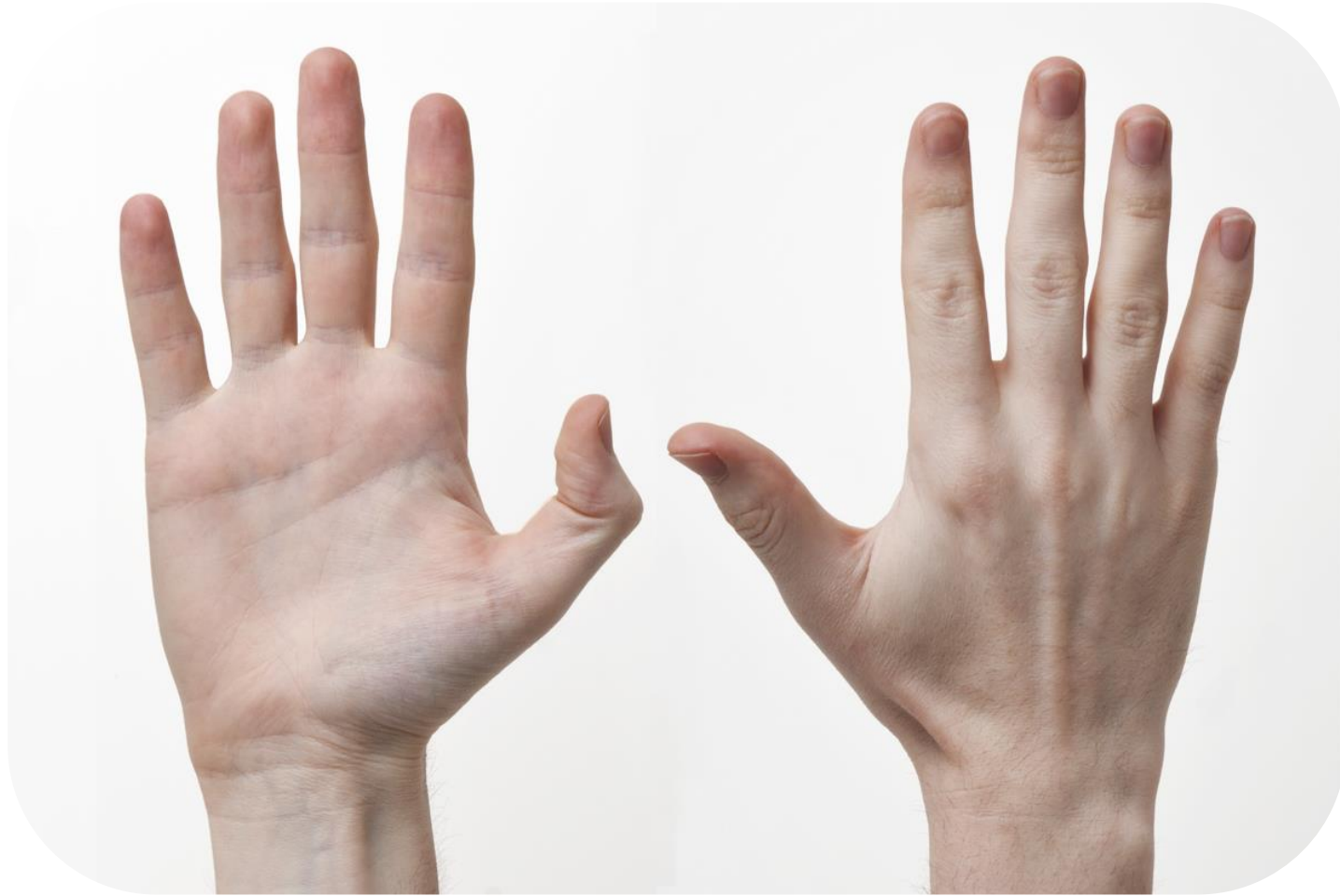




an antigenic poison or venom of plant or animal origin, especially one produced by or derived from microorganisms and causing disease when present at low concentration in the body

# GERMS SPREADING

- Viruses can be transferred from dry smooth surfaces up to 20 minutes after being contaminated.
- Some viruses can travel on droplets through the air (airborne)
- Bacteria doubles every 20 minutes
- 5 bacteria at 12 noon = 10 million bacteria by 7pm
- 3 days with no bacteria dying = enough to cover the Earth!



Human skin is a  
virtual zoo,  
according to  
U.S.

researchers  
who found ~200  
species of  
bacteria on the  
forearms of  
test subjects



3 LINES OF DEFENCE

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# 1<sup>ST</sup> LINE OF DEFENCE:

This line of defense is referred to as **NONSPECIFIC IMMUNITY**. This means that it will put up a battle to protect us from any pathogen (invader).

- The first line of defense includes:
  - skin - provides a physical barrier preventing pathogens from entering
  - mucous membranes - line the respiratory, urinary, reproductive and gastrointestinal tracts. Trap invaders in sticky mucous and expel it from the body by the wave-like motion of the cilia as well as coughing and sneezing.
  - tears, mucous and saliva wash bacteria away.

# INNATE / NATURAL IMMUNITY

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# 4 MAIN CHARACTERISTICS:

- Non-specific
- Born with it
- First line of defence
- Functions without previous exposure to a disease

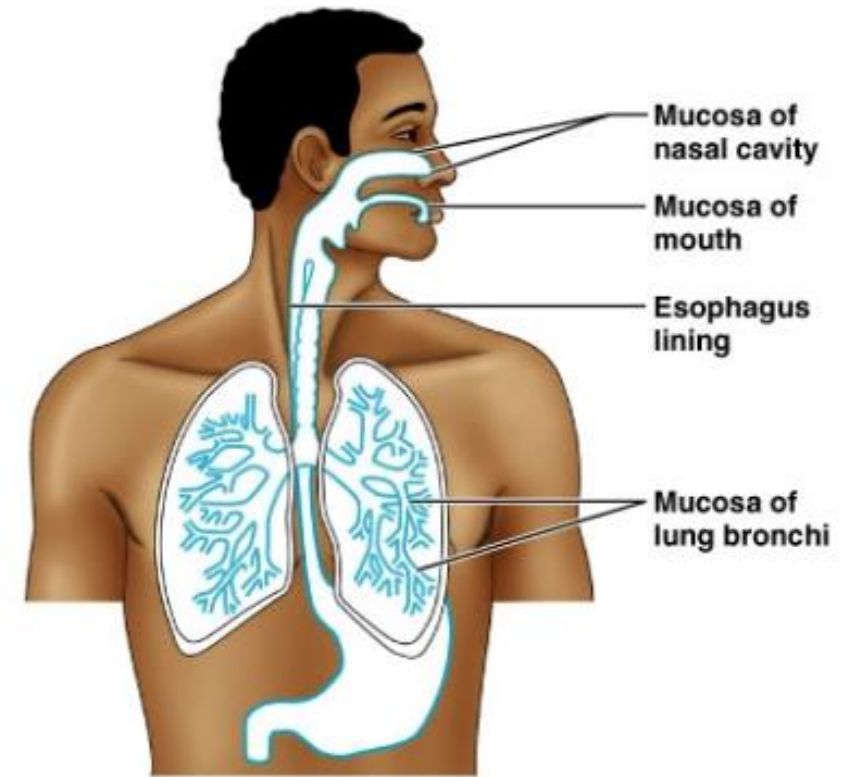






# PHYSICAL EXAMPLES:

- Skin and mucous membranes act as mechanical barriers
- Cilia sweep mucous and trapped particles to the throat to be expelled



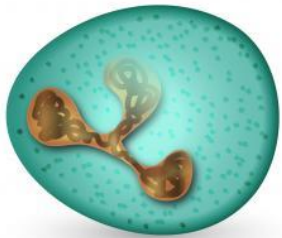
## 2<sup>ND</sup> LINE OF DEFENCE:

If pathogens make it through the first line of defense, they must combat the second line.

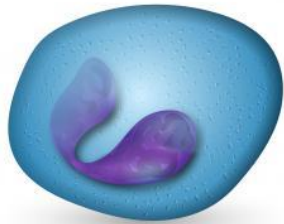
This response is also NONSPECIFIC so it will react to any invader.

- The second line of defense includes:
  - The Inflammatory Response - results in pain, redness, heat and swelling.
  - Macrophages - These cells engulf and destroy foreign material through phagocytosis.

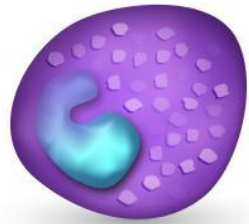
# PHAGOCYTES



**Neutrophil**



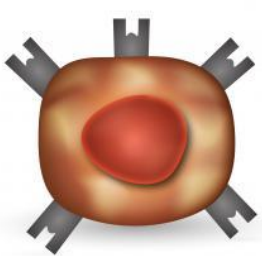
**Eosinophil**



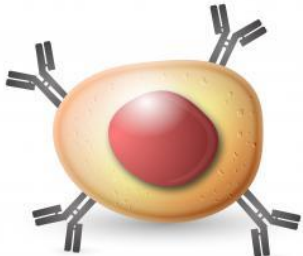
**Basophil**



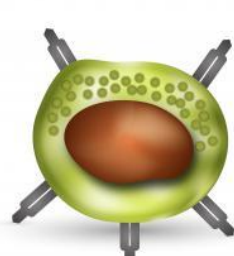
**Monocyte**



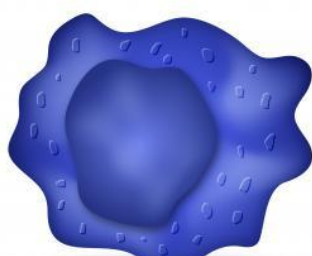
**T Cell**



**B Cell**



**Natural killer**



**Macrophage**

Phagocytes are cells that **protect the body by ingesting** (phagocytosing) harmful foreign particles, bacteria, and dead or dying cells.

Their name comes from the Greek phagein, "**to eat**" and "-cyte", the suffix in biology denoting "**cell**"

# INFLAMMATION



Occurs when tissue is damaged by physical/chemical agents or by pathogens

- Causes redness, heat, swelling and pain
- Goal is to expose the intruder to the immune system

# INFLAMMATION

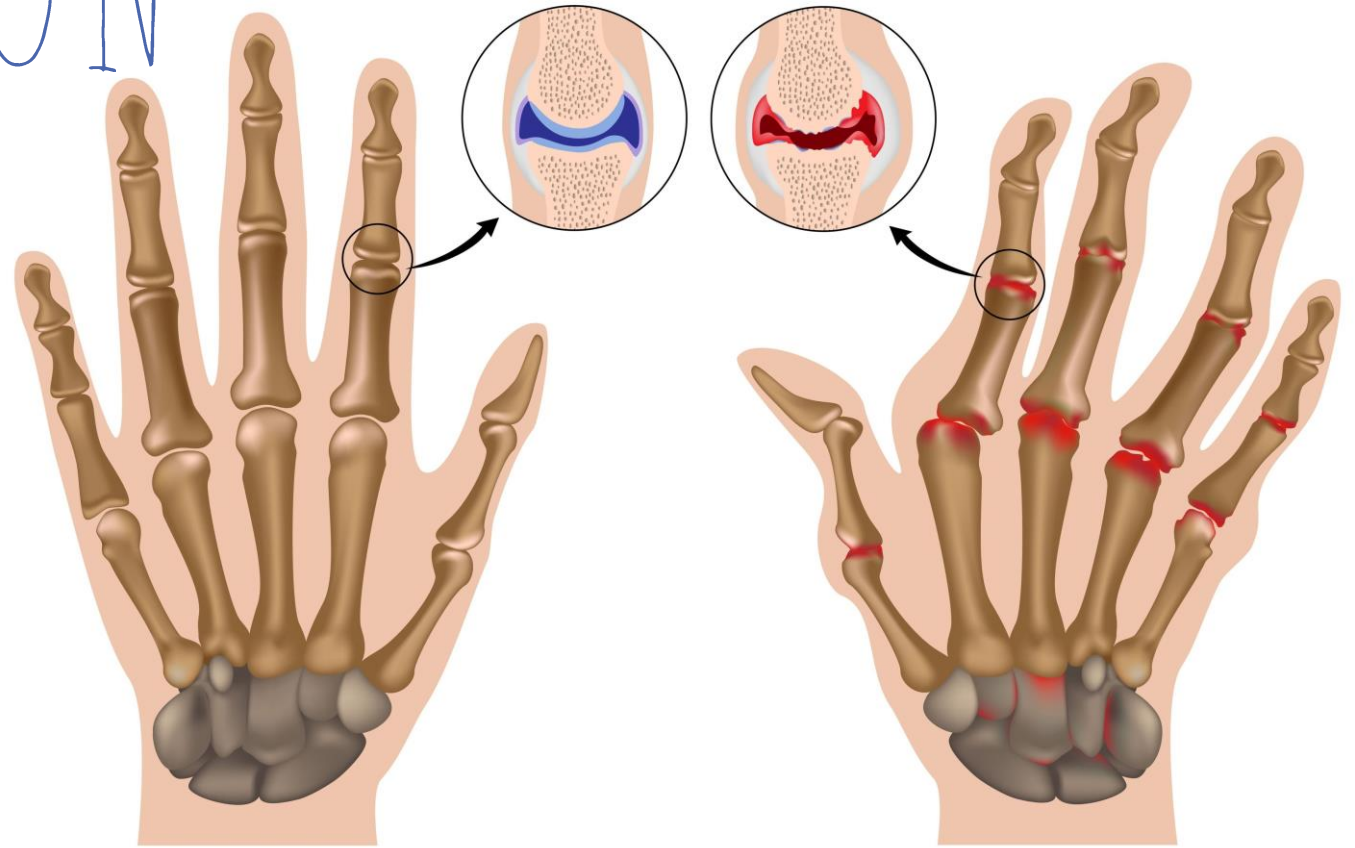
EXAMPLES...

\*Ingrown  
Toenail

\*Acne

\*Arthritis

\*Injured Muscle



Normal

Rheumatoid Arthritis