

A close-up shot of Iron Man in his red and gold armor, looking forward with a serious expression. The chest arc reactor is glowing. The background is a dark, industrial-looking interior with some blue light sources.

# **Chapter 11: Protecting Yourself from disease**

# PATHOGENIC DEFENCES

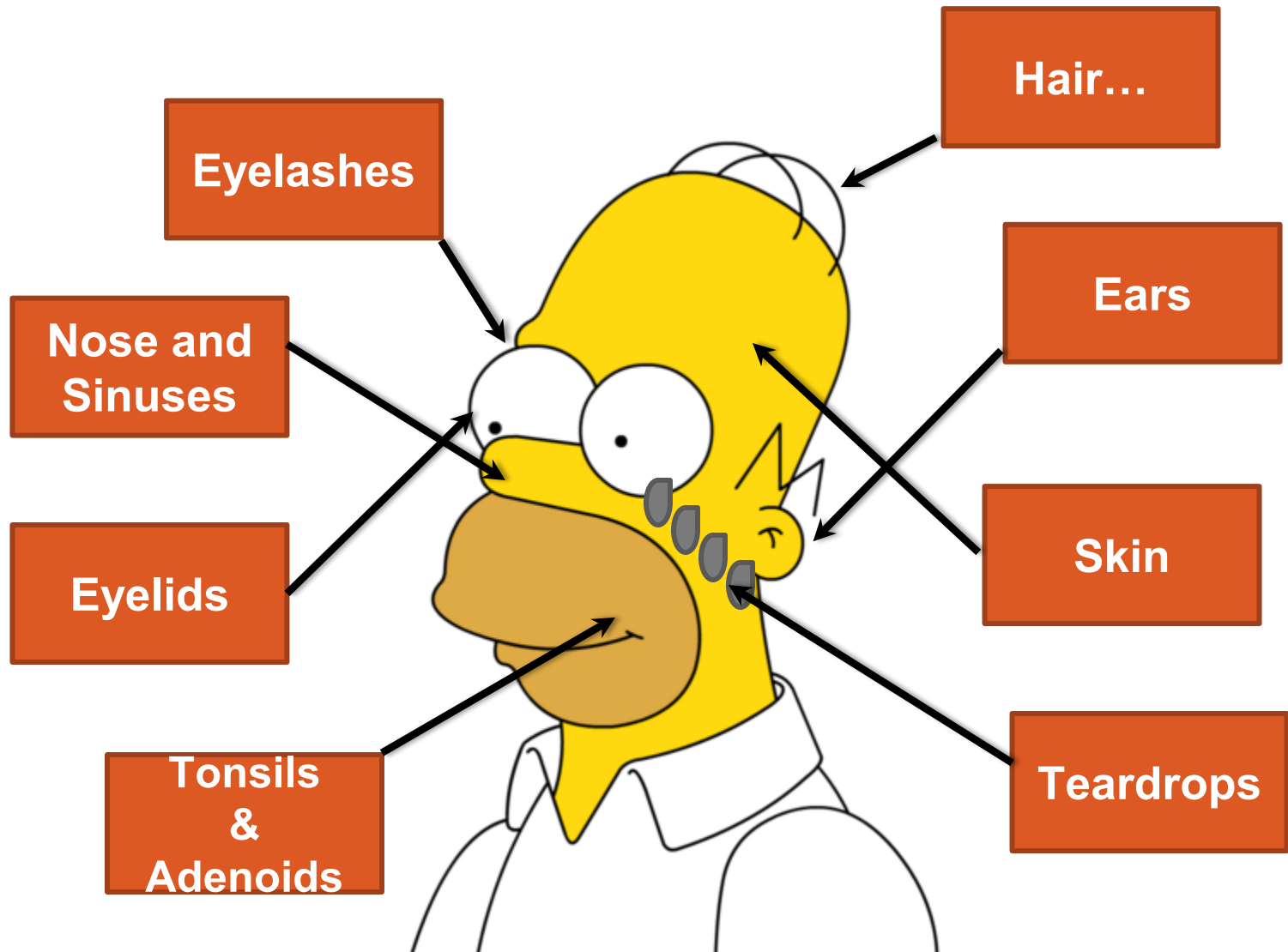
Millions of pathogens surround you everyday. They live on your body and most surfaces they touch

Our body has 3 lines of defense to prevent these pathogens from attacking us

1. Physical Defences
2. Inflammatory Responses
3. The action of antibodies



# 1. PHYSICAL DEFENSES



# PHYSICAL DEFENSES

## 1. Block or trap incoming pathogens

- a. Hair (eyelashes)
- b. Eyelids
- c. Skin
- d. Tonsils and adenoids\*

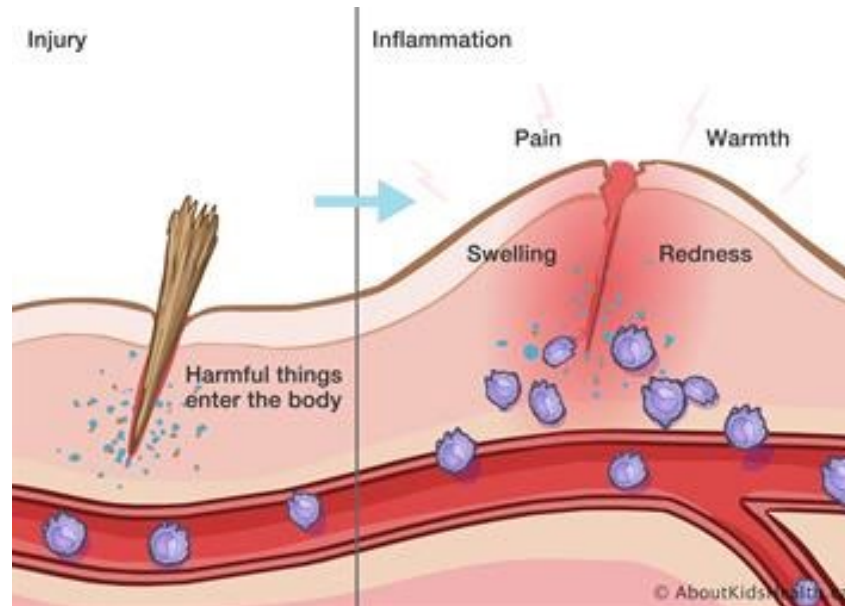
## 2. Flush away trapped pathogens

- a. Nose and sinuses (mucus)
- b. Ears (earwax)
- c. Teardrops

## 2. INFLAMMATORY RESPONSE

After an injury, the surrounding blood vessels and the area become warm as more blood arrives.

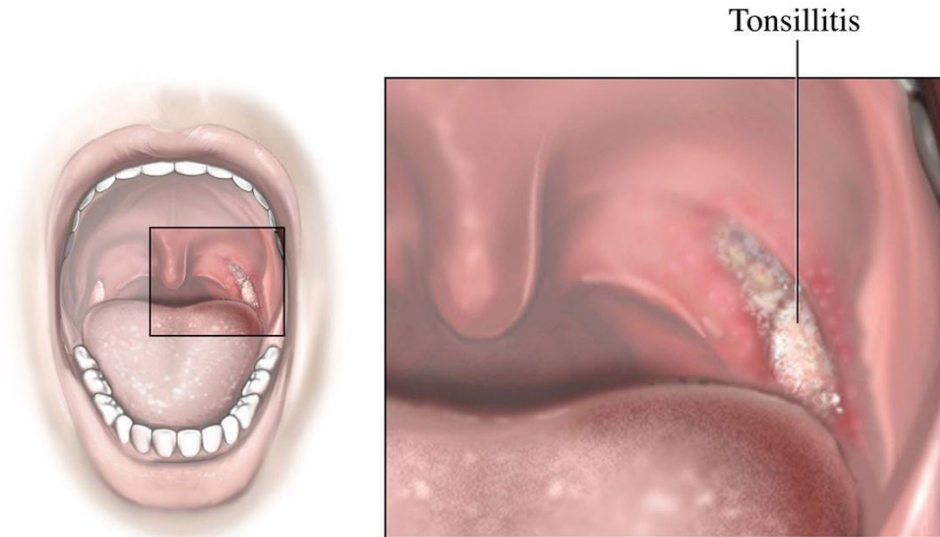
If the pathogens get past the physical barriers the body sends white blood cells, which are part of the immune system, to repel the invaders.



# INFLAMMATORY RESPONSE

Any kind of infection will trigger an inflammatory response.

Example: tonsillitis or appendicitis – the ending “itis” means “inflammation of”



# INFLAMMATORY RESPONSE

Can also occur when the skin is hit, such as when you fall and hit the ground.

Blood oozes from the ruptured blood vessels into surrounding tissue.

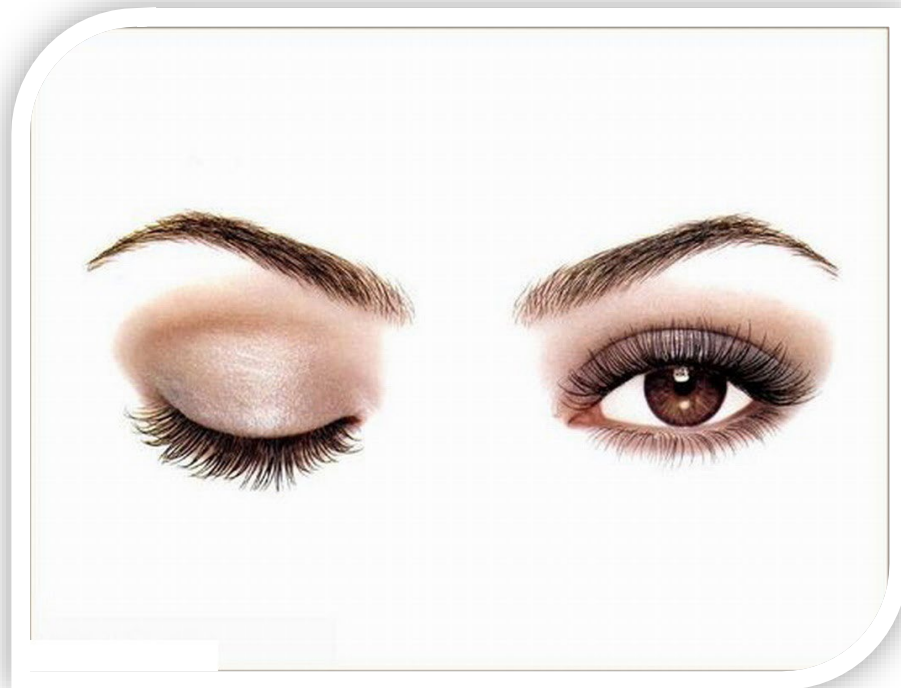
White blood cells engulf damaged cells and aid in the clean up and healing of the injury.



# GENERAL DEFENCE

Physical defence and inflammatory responses are called **general** defences because the body reacts the same way regardless of what pathogen is invading

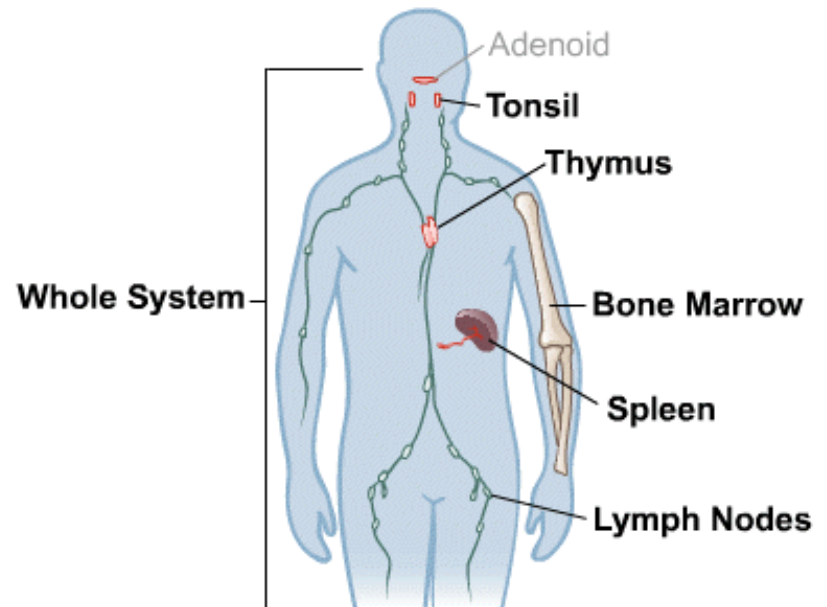
Example: Eye will blink when contacted





# 3. IMMUNE SYSTEM

The third line of defence. This system targets specific pathogens through the formation of **antibodies**.



# IMMUNITY

Built up as you are exposed to pathogens.

Your body recognizes **antigens** that are not part of itself.

**Antigens** are specifically shaped structures that are attached to pathogens.

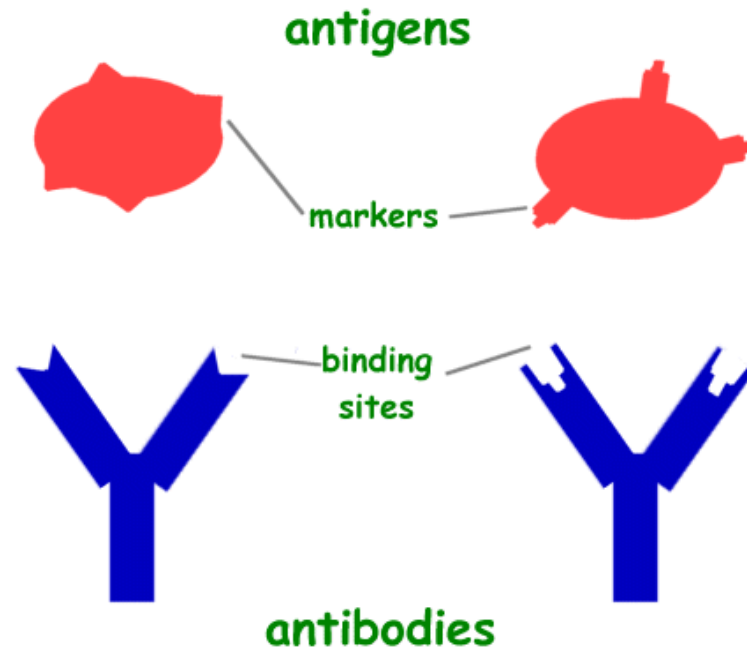
All living things such as viruses, bacteria, and fungi contain pathogens.



# IMMUNE RESPONSE

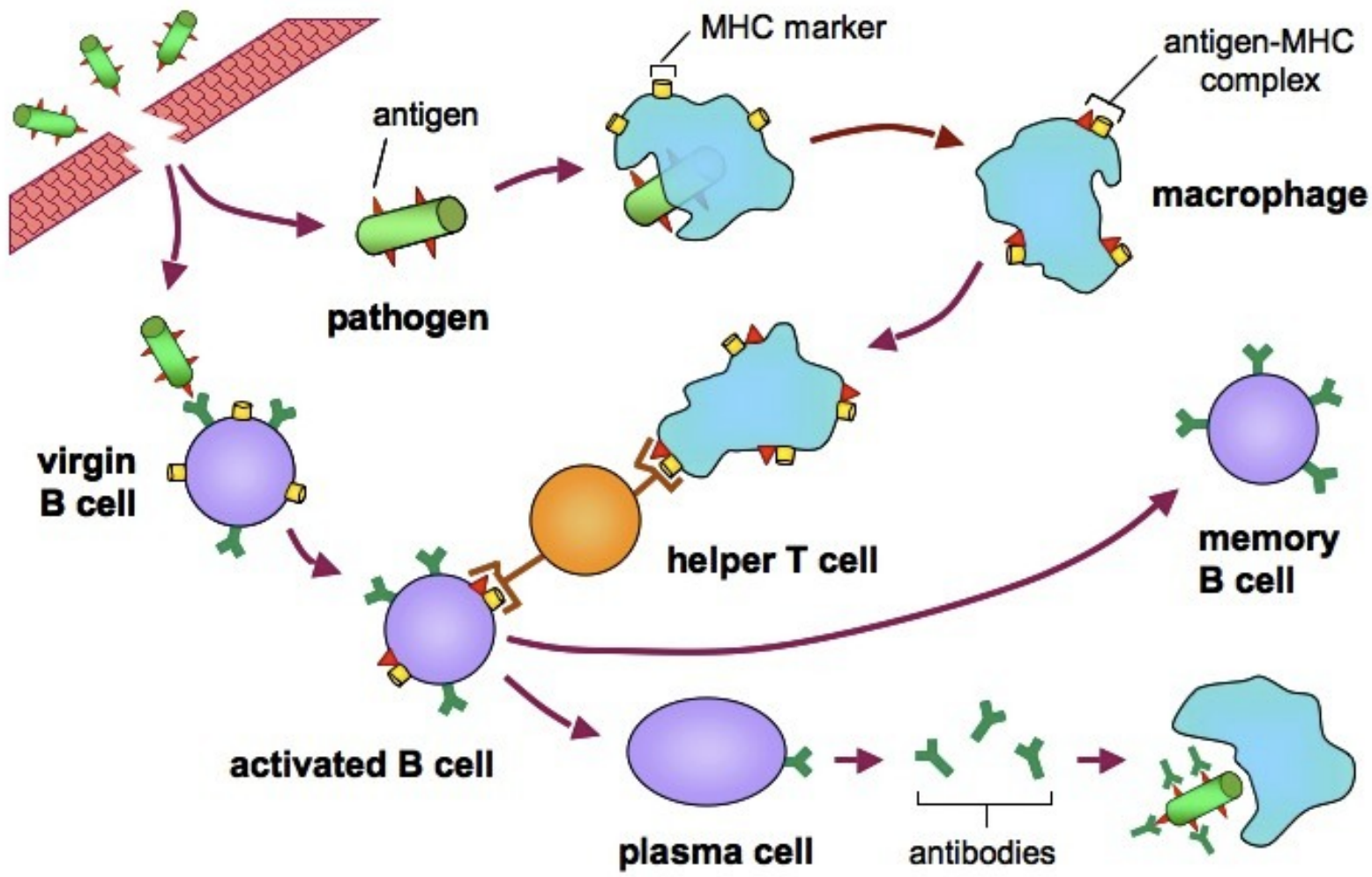
Most responsibility falls on the white blood cells. They created Y shaped protein compounds called **antibodies**.

These antibodies bind to specific antigens. This makes it easier for the antigens to be destroyed.



# IMMUNE RESPONSE

What happens when pathogens get past our first two defenses



# HOW IT WORKS



# TYPES OF IMMUNITY

**Immunity**  
Ability to resist disease

**Inherited Immunity**  
Born with it, stays with you your whole life.

**Acquired Immunity**  
Develops during lifetime

**Active Immunity**  
Body makes own antibodies – usually permanent

**Passive Immunity**  
Antibodies introduced to body – not as long lasting

**Naturally Acquired**

**Artificially Acquired**

**Naturally Acquired**

**Artificially Acquired**

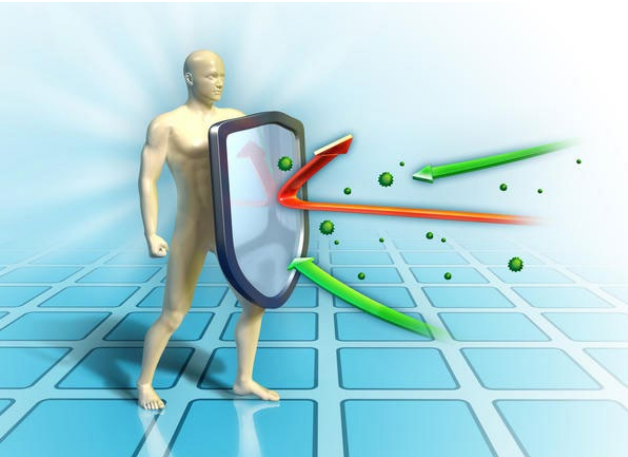
# ACTIVE IMMUNITY

## **NATURALLY ACQUIRED**

Occurs when the person is exposed to a live pathogen, develops the disease, and becomes immune as a result of the primary immune response

## **ARTIFICIALLY ACQUIRED**

Can be induced by a vaccine, (contains the antigen). This stimulates a primary response without causing symptoms of the disease



# PASSIVE IMMUNITY

## **NATURALLY ACQUIRED**

Occurs during pregnancy, in which certain antibodies are passed from the maternal into the fetal bloodstream.

## **ARTIFICIALLY ACQUIRED**

A short-term immunization by the injection of antitoxin or direct injection of antibodies





# IMMUNIZATION

Can be done by getting an injection of a **vaccine** or antitoxin

A vaccine consists of a dead or weakened pathogen

Once inside, your body begins to produce antibodies to fight the pathogen's antigens and will be prepared to fight the real disease if it invades your body

This is **active immunity**

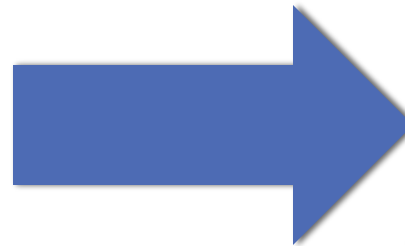


# ANTITOXINS

Provide **passive immunity**

Antitoxins neutralize the effect of toxins

Can be used against plants and animals as a reactive measure. Made from the blood of animals.



# WHY GET IMMUNIZED?

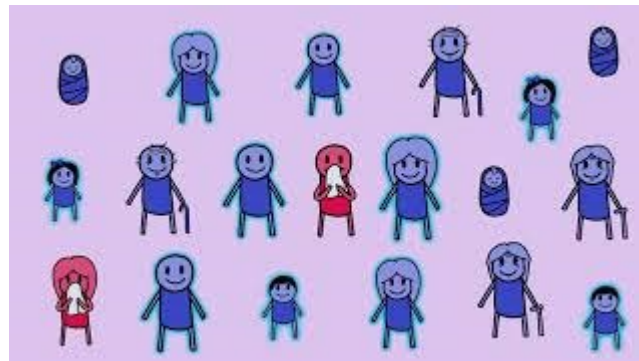
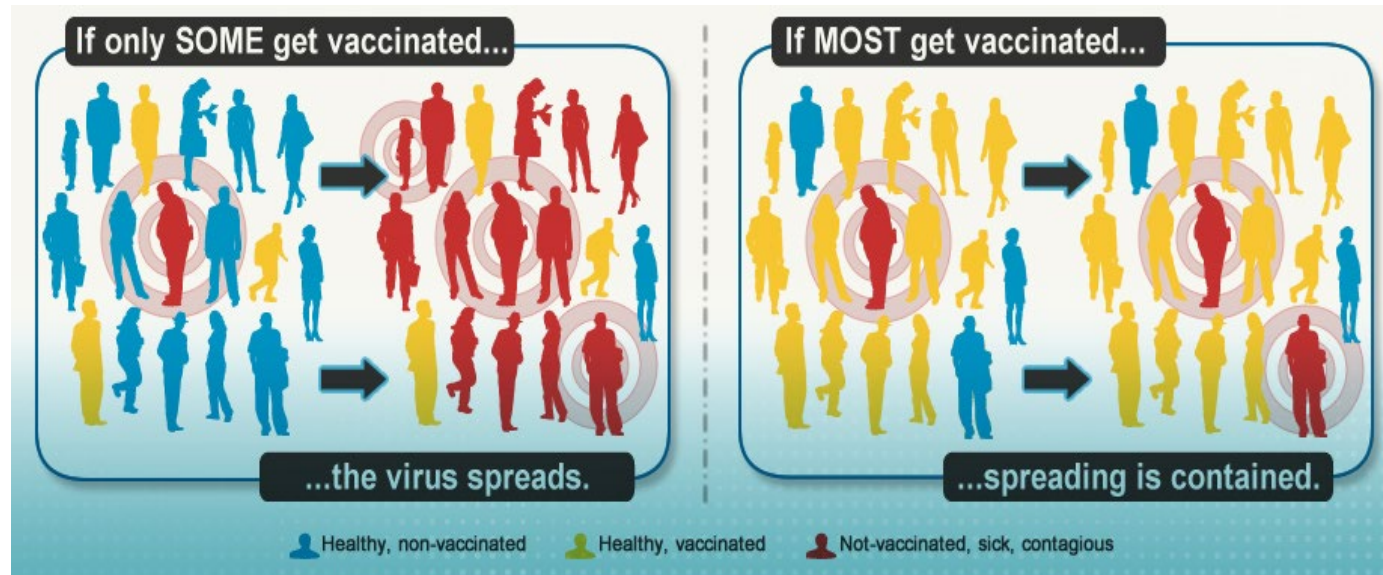


Most people get immunized but some chose not to for personal or medical reasons. Some people may react to immunizations.

Immunizations prevent more problems than they cause. They have reduced the cases and deaths of **communicable** diseases like COVID and **non-communicable** diseases like tetanus.



# HERD IMMUNITY

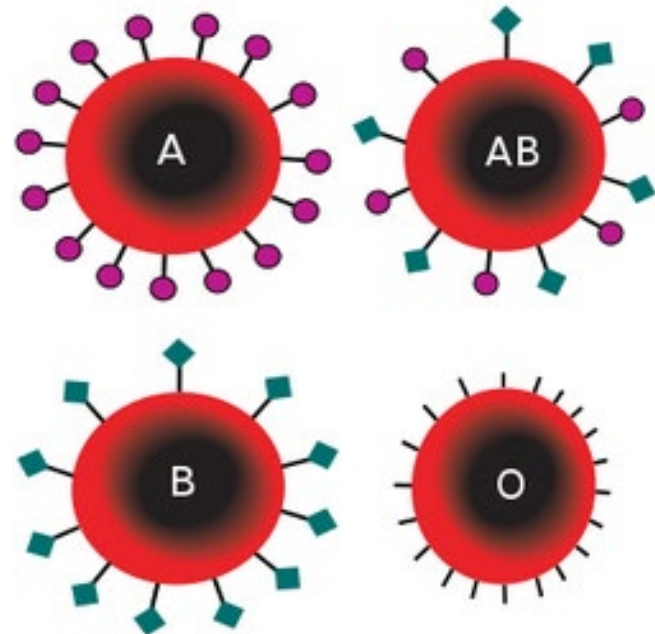
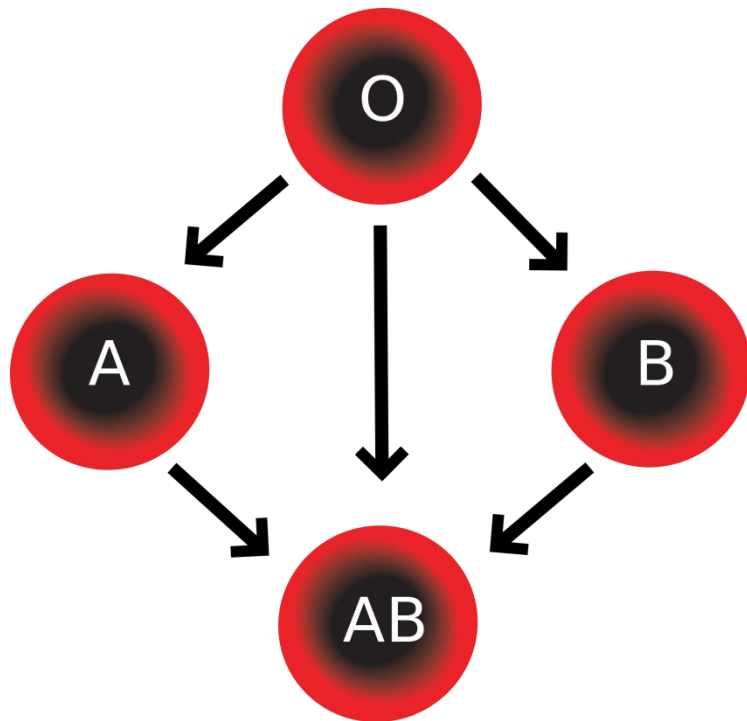


Disease	Effects of Disease
Diphtheria	Infection in throat and nose to make breathing difficult skin infections, rapid pulse, heart failure, paralysis, death
Measles	Red rash, high fever, cough, sore throat, Often ear infections and pneumonia
Mumps	Painful, swollen salivary glands: fever, headache
Polio	Fever, headache, stiff neck and back, muscle weakness Often permanent paralysis or death
Rubella	Mild fever, rash, swelling of the neck Dangerous during early pregnancy – miscarriages and mishaps
Tetanus	Muscle spasms, difficult breathing Death
Whooping Cough	Severe coughing, difficulties breathing -Often pneumonia Possible brain damage or death

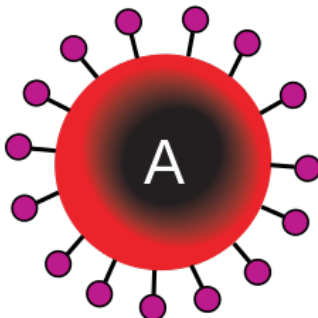
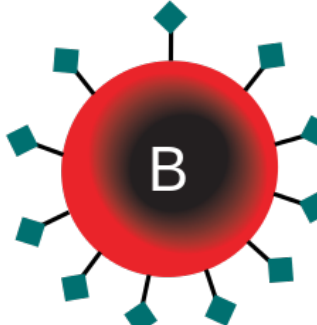
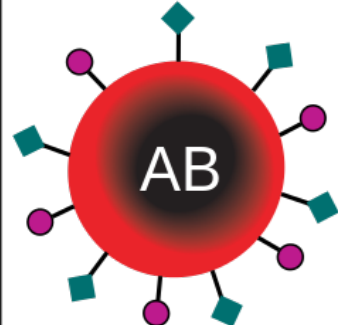
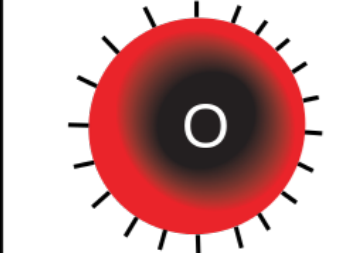
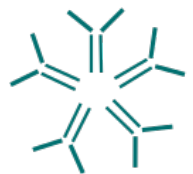

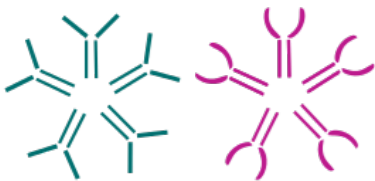



# BLOOD TYPING

With our new knowledge of antigens and antibodies, we can explain blood types!

Different types: A, B, AB, O



# BLOOD TYPING

	Group A	Group B	Group AB	Group O
Red blood cell type	 <p>A</p>	 <p>B</p>	 <p>AB</p>	 <p>O</p>
Antibodies in Plasma	 <p>Anti-B</p>	 <p>Anti-A</p>	<p>Universal Recipient</p> <p>None</p>	 <p>Anti-A and Anti-B</p>
Antigens in Red Blood Cell	 <p>A antigen</p>	 <p>B antigen</p>	 <p>A and B antigens</p>	<p>Universal Donor</p> <p>None</p>



# ALLERGIES

Allergies develop when the immune system overreacts and becomes sensitive to substances such as pollen, dust, or mold

The immune system then treats these substances as pathogens and builds defenses against them

These antibodies result in a variety of symptoms – runny nose, watery eyes, and even breathing difficulties or death





# ALLERGIES

Scratch tests identify allergens. Where drops of antigens are absorbed under scratched skin.

Reactions produce redness, swelling, and itching along the scratch.

Identified allergens can be treated using immunotherapy, where gradual exposure reduces the immune system's response to an allergen.



Skin Allergy Test

# TREATING DISEASES

There is still no sure way to prevent colds

This is because the virus continues to mutate, so by the time the new vaccine is made the virus has changed

Usually when fighting colds, we take **over the counter drugs** which are sold **without** a doctor's prescription.

Can relieve the symptoms but not kill the virus.



# OVER THE COUNTER DRUGS

Usually considered safe to use

Avoid self diagnosis as many diseases may have similar symptoms and you may be fighting the wrong battle

When you have a choice among several medications, read the label carefully. It will tell you:

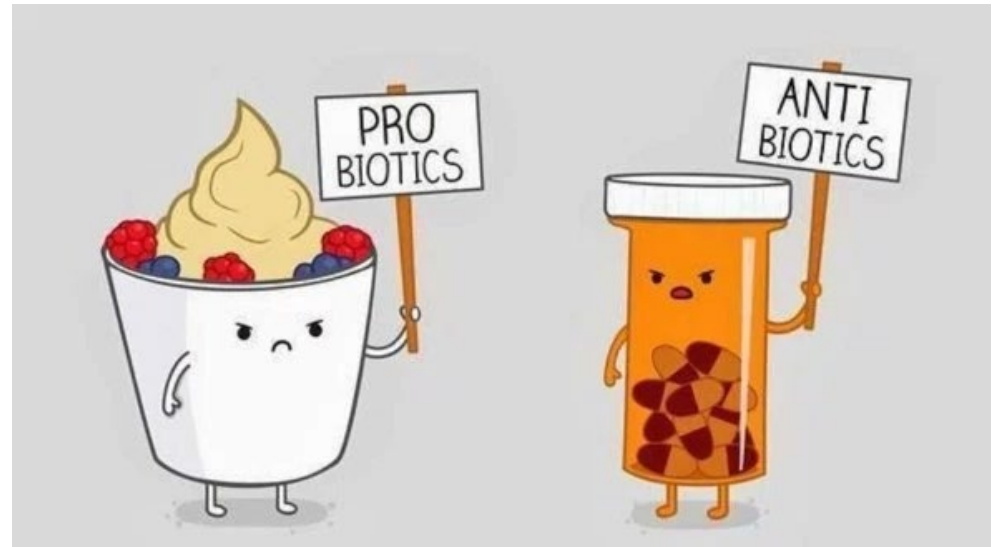
1. What the medicine treats (*e.g. headaches, upset stomach, coughing*)
2. Warnings and list of side effects (*e.g. drowsiness*)
3. The recommended amount for each time interval

# ANTIBIOTICS

If symptoms continue your doctor may prescribe an **antibiotic**. These are found naturally in fungi, moulds, and even bacteria.

They either kill **bacteria**, or prevent them from reproducing

Each antibiotic is effective against a specific type of **bacteria**, they have **no effect on viruses**



# PROBLEMS WITH ANTIBIOTICS

Some people think they need antibiotics for everyday colds or sore bacteria, but this is not always a good idea:

- 1.They kill harmful **and** helpful cells – your body has many useful bacteria, but the antibiotics can't really tell them apart
- 2.They can cause side effects – some people develop allergies to antibiotics
- 3.Overuse can help the development of **resistant** bacteria – bacteria can build resistance to antibiotics after repeated exposure
- 4. Cold and flus are often caused by viruses, and **antibiotics have no effect on viruses**

# ANTIBIOTIC RESISTANCE



# USE ANTIBIOTICS SAFELY

## Ask Questions

- Ask your doctor or pharmacist about side effects and recommended amounts

## Read Label

- Provides recommended daily amounts and when you should/shouldn't take them

## Take Properly

- Follow the directions on the label or set by your doctor. Not doing so could not provide the intended result



# END OF CHAPTER 11

