

WHAT THREATENS LIFE?

- Pollution
- Natural disaster
- Droughts
- Human deeds
- Nuclear weapons
- Viruses
- Global warming
- Oil leak
- Cutting trees
- Famine

DISEASES

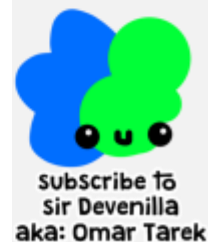
What is a disease?

It's an illness to living creatures caused by either organisms (likely microscopic) like viruses and bacteria, or by failures in one's own body like organ failure, it may be natural or artificial

EXAMPLES

- Shortage/abundance of a substance in the body
- Getting infected by viruses like covid-19
- Fungi infections
- Bacterial infection

We classify diseases as



INFECTIOUS

It's a disease that is transmitted from a person to another by a certain mean

- Plague
- Flu
- Ebola
- Aids
- Hepatitis
- Rabies
- Monkeypox
- **Malaria**
- leprosy

NON-INFECTIOUS

- diabetes
- GH diseases
- Anemia
- Osteoporosis
- exophthalmic goiter
- dementia
- **Sickle Anemia**



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What transmits infection?

- *Skin*
- *Insects*
- *Foods*
- Air and water
- blood

What causes illness (infectious factors)?

- viruses
- bacteria
- fungi
- parasites



VECTORS

It's an organism takes the disease from an infected creature to an uninfected creature



Like malaria with mosquitoes Leishmaniasis with sandfly

Schistosomiasis with freshwater snails

What causes a non-infectious disease

- genetics
- malnutrition
- environment
- lifestyle
- physical inactivity
- alcohol



The relation between diseases and economic development

Effect on Countries

When an infection spreads, its impact on the developed countries economy is less destructive than its impact on the developing countries

developed countries have multiple ways of income that do not require hand-to-hand interactions like AI, server processing, etc.

That's not the same with developing countries as they depend more hand-to-hand industries like farming.

Effect on industries

When an infection spreads, some companies will get damaged heavily like fast food companies

On the other hand, medical companies that makes serums, masks, and other medical equipment will get a big boost in economy



Sustainability Factors

Commented [SD1]: Something that affects and gets affected by

1- GENETICS

they can either transmit disease like sickle cell diseases

or they can mutate to create new diseases like how mutations solved malaria

2- POLLUTION

they can make mutations in the dna which will lead to new diseases, and also it's a habitable area for disease

3- SOCIAL LIFE

Bad social habits will lead to spreading of diseases

4- ECONOMY

Countries with weaker economies have lower medical care and that won't help with sickness

THE CELL THEORY



It states that all living things are composed of one or more cells, which means that **The Cell** is the basic unit of life as it can do complex stuff like reproduction and energy gathering, and when cells are combined into a multi-cell organism, the limits of its abilities is near endless

- cells reproduce using cellular division
- cells carry genetic materials that they pass to their off-spring during cell division
- these genetic materials help the off-spring to not adventure far off from the original species
- cells have the ability to gather energy by metabolism and biochemistry

HOW DISEASES DESTROY THE CELLS

1. viruses will infect cells and use them to produce more viruses of the same type, which after a while will cause the cell to die of explosion
2. diseases can disrupt the cell's function like sickle cell disease, they make the red blood cells sickle shaped causing them to get stuck, this will lead to the death of your body cells because there is no oxygen

there are a lot of diseases like



Malaria

it's an infectious disease caused by a single-cell organism called the plasmodium

- **what does it do to the body**

it travels to the liver and reproduces there, sometimes it stays in the liver without causing problems, but some times it bursts out causing the infection to become active

- **Transmitting**

It's carried by female mosquitos, when an infected mosquito bites a person, it injects the person with plasmodium

- **symptoms**

you will have a fever, your body and head will ache, your skin and eyes will get yellowish, you will be extremely fatigued

- **How to detect**

The plasmodium will appear as an irregular purple spot containing dark dots when a sample is stained and viewed under a microscope



• Previous Treatments

They used DDT which is an insecticide to kill and effectively wipe out malaria by killing mosquitos, but some developed an immunity to it

Then they began using insecticides on nets and they used them to effectively control mosquitos, they were helpful because they are low costs

Another way to attack plasmodium itself was drugs that was injected into the blood stream or the liver

• Challenges

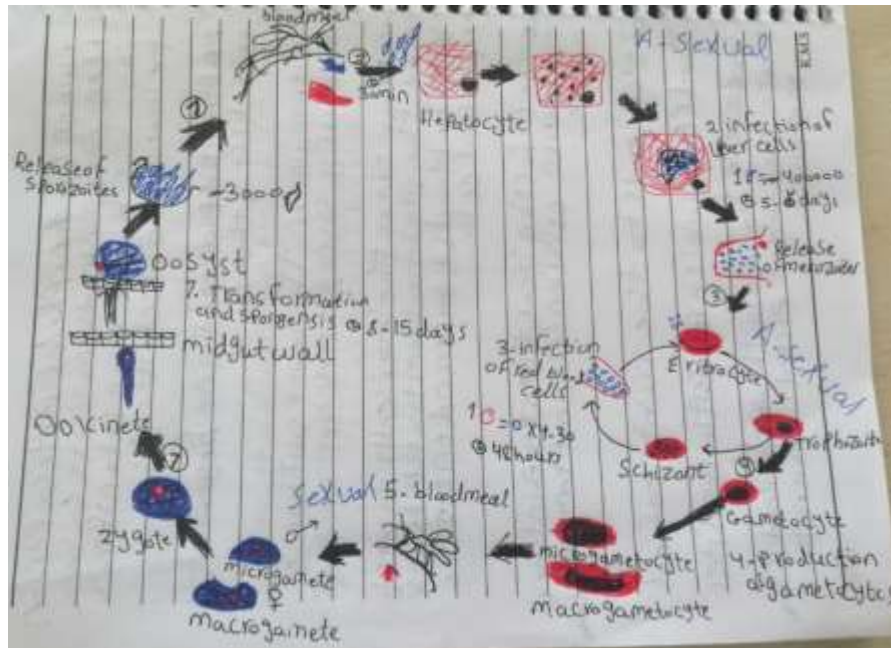
One type of Plasmodium has developed immunity to treatments

Climate change has led to cold area being vulnerable to mosquito/malaria infection

• Statistics

More than 3 pillion ppl are at risk of malaria and most deaths are from children





Stage	Description	Danger Level
Sporozoite Stage	Introduced by mosquito bite; travel to the liver	Low
Hepatic Stage	Development in liver cells	Low
Erythrocytic Stage	Invasion and multiplication in red blood cells	Variable
- Trophozoite Stage	Feeding and growth within red blood cells	Moderate
- Schizont Stage	Asexually multiplying stage within red blood cells	Variable
- Gametocyte Stage	Sexual form of the parasite; infects mosquitoes	Low

Plasmodium Species	Danger Level	Reason for Danger
Plasmodium falciparum	Most dangerous	- Severe Complications: Causes cerebral malaria, severe anemia, and multi-organ failure. Capable of rapid and severe disease progression.
Plasmodium vivax	Moderate	- Relapses: Can form hypnozoites in the liver, leading to recurrent infections (relapses) and potential complications. Generally less severe than P. falciparum.
Plasmodium ovale	Moderate	- Relapses: Similar to P. vivax, forms hypnozoites, causing relapses, though less frequent than P. vivax. Typically less severe than P. falciparum.
Plasmodium malariae	Relatively low	- Chronic Infections: Tends to cause chronic, low-grade infections but less frequently leads to severe illness compared to P. falciparum.
Plasmodium knowlesi	Variable	- Rapid Progression: Can cause severe disease rapidly, resembling P. falciparum infections. Capable of causing severe complications in some cases.

Tuberculosis (TB)

- It's an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. It mainly affects the lungs and is spread through tiny droplets released into the air via coughs and sneezes.

- **What It does to cells**



TB bacteria enter the lungs and are ingested by white blood cells called macrophages. The bacteria can remain inactive inside the body (latent infection) or become active, causing symptoms.

- **Transmitting**

TB is extremely infectious and can be passed through a cough, sneeze, or even talking with an infected person.

- **How to detect**

A positive skin or blood test for TB along with a normal chest X-ray indicates a latent infection. Active infection leads to symptoms like appetite and weight loss, coughing, night sweats, fever, fatigue, and chills.

Prevention and Treatment

- There is a vaccine available to prevent TB, but its effectiveness is limited. Antibiotics like isoniazid and rifampin are used to treat TB. They are usually prescribed in combinations of two to four different drugs.

Challenges



- Many strains of TB resist the drugs most used to treat the disease. Multidrug-resistant TB is particularly challenging to treat.
 - Co-infection with HIV/AIDS significantly increases the risk of developing active TB due to a weakened immune system.
- Ensuring patients complete their full course of treatment is crucial to prevent antibiotic resistance.

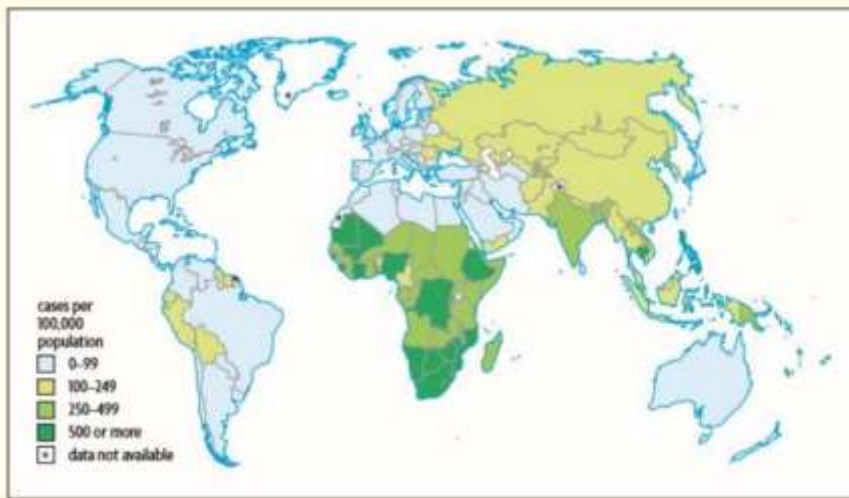
Cure Research

- Scientists are working on developing new treatments for TB, especially in areas where *Mycobacterium tuberculosis* has become resistant to available drugs.

Statistics

- At least one-fourth of the human population worldwide is estimated to be infected with TB bacteria.





Global distribution of tuberculosis cases

Rotavirus

- It's a virus that causes severe diarrhea, especially in infants.
- It infects cells in the small intestine, causing nutrients and water to leave the body rapidly, leading to dehydration.

Transmitting

- It's transmitted through contaminated water, food, airborne droplets, and contact with contaminated surfaces.



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What It Does to Cells

- The virus infects and kills cells that line the small intestine, the ones that absorb nutrients and water. When these cells die, unabsorbed nutrients and water leave the body rapidly in diarrhea and vomit, making the patient weak and dehydrated.

Symptoms

- Symptoms include severe vomiting, fever, abdominal pain, and watery diarrhea over several days. These symptoms are usually milder in adults.

Prevention and Treatment

- Prevention includes exclusive breastfeeding for infants up to six months old and vaccination. However, there's no drug treatment for rotavirus infection. Only oral or intravenous rehydration with electrolytes is prescribed.
- Challenges include the high cost of the vaccine and the need for refrigeration, which is difficult in remote areas.

Cure Research



- Research is ongoing for drug treatments for rotavirus infection.

Statistics

- Rotavirus causes approximately 40% of all cases of severe diarrhea in infants worldwide. More than 85% of rotavirus deaths occur in Asia and Africa.

Life of Disease

- The disease can be life-threatening if not treated properly. It usually causes symptoms for several days but can be prevented with proper hygiene practices and medical interventions.

HIV/AIDS

- It's a virus that attacks the body's immune system, specifically the CD4 cells, often called T cells. Over time, HIV can destroy so many of these cells that the body can't fight off infections and disease.
- HIV stands for human immunodeficiency virus. It is the virus that can lead to acquired



immunodeficiency syndrome, or AIDS, if not treated. Once you get HIV, you have it for life.

What It Does to Cells

- HIV attacks the body's immune system, specifically the CD4 cells (T cells), which help the immune system fight off infections. Untreated, HIV reduces the number of CD4 cells (T cells) in the body, making the person more likely to get other infections or infection-related cancers.

Symptoms

- The symptoms of HIV vary depending on the stage of infection. In the early stages, individuals may experience no symptoms or an influenza-like illness. As the infection progressively weakens the immune system, an individual can develop other signs and symptoms, such as swollen lymph nodes, weight loss, fever, diarrhea and cough.

Prevention and Treatment

- No effective cure currently exists for HIV. But with proper medical care, HIV can be controlled. Treatment for HIV is called antiretroviral therapy



or ART. If taken properly every day, ART can dramatically prolong the lives of many people infected with HIV, keep them healthy, and greatly lower their chance of infecting others.

Cure Research

- Research is ongoing for a cure for HIV/AIDS. The current treatment involves antiretroviral therapy or ART which helps control the virus.

Statistics

- HIV/AIDS is a global pandemic affecting millions of people worldwide. The disease is most prevalent in Africa and Asia.

Life of Disease

- The disease progresses in stages from acute HIV infection to clinical latency and finally to AIDS. With treatment, people with HIV can live nearly as long as someone who does not have HIV.

Sickle Cell Anemia



- It's an inherited genetic mutation that makes the hemoglobin proteins stack to one another, changing something in the protein hemoglobin called beta-globin. This leads to hemoglobin changing to hemoglobin S which forms chains within the red blood cells, making them sickle-shaped.

What It Does to Cells

- The disease causes red blood cells to become misshapen and break down. These irregularly shaped cells can get stuck in small blood vessels, which can slow or block blood flow and oxygen to parts of the body.

Transmitting

- It's carried by genetics. If you carry the sickle cell trait, seeing a genetic counselor before trying to conceive can help you understand your risk of having a child with sickle cell anemia.

How to Detect

- The infected red blood cell will appear sickle-shaped and flattened under a microscope.

Symptoms



- Symptoms vary from person to person and include episodes of pain, painful swelling of hands and feet, frequent infections, delayed growth, and vision problems. It will make your joints and muscles hurt, your abdominals will ache and your eyes and skin will turn yellow.

Prevention and Treatment

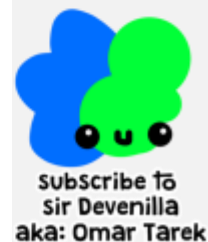
- There's no cure for most people with sickle cell anemia. But treatments can relieve pain and help prevent problems associated with the disease. Treatment involves managing symptoms and preventing complications.

Cure Research

- Research is ongoing for a cure for Sickle Cell Anemia. The current treatment involves managing symptoms and preventing complications.

Statistics

- Sickle Cell Anemia is most common among people of African descent. About 1 in 13 African American babies is born with sickle cell trait.

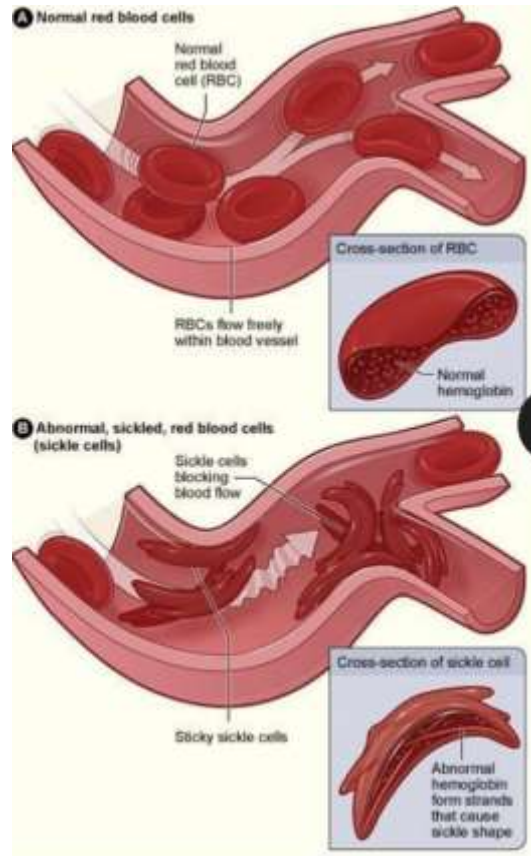


- About 1 in every 365 black children is born with sickle cell disease.

Life of Disease

- The disease progresses over time and can lead to complications such as stroke, acute chest syndrome, pulmonary hypertension, organ damage, blindness, leg ulcers, gallstones, priapism. It can also increase vulnerability to infections.





- The reason this mutation persists in certain populations, despite the severe health consequences of sickle cell disease, is because inheriting one copy of the mutated gene (having sickle cell trait) can provide a degree of protection against malaria. Individuals with sickle cell trait are less susceptible to severe forms of malaria caused by Plasmodium

falciparum. In areas where malaria is prevalent, the presence of the sickle cell trait offers a survival advantage against malaria, contributing to the persistence of the mutation in those populations. This phenomenon is an example of natural selection acting on genetic variation in response to environmental pressures like malaria.

RED BLOOD CELLS

They carry oxygen using the hemoglobin which is iron mixed with protein, iron is important because it mixes with oxygen and carbon dioxide and carries it to the lungs and body

Cells then take the oxygen and the glucose and by burning the glucose we get ATP and carbondioxide





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