

# Infectious Diseases: Pathogens, Transmission, and Treatments



تم تحميل هذا الملف من موقع المناهج الإماراتية

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ملفات اكتب للمعلم اكتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل  
منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي للمدرس

المزيد من مادة  
أحياء:

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التواصل الاجتماعي بحسب الصف الثاني عشر العام



صفحة المناهج  
الإماراتية على  
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الرياضيات

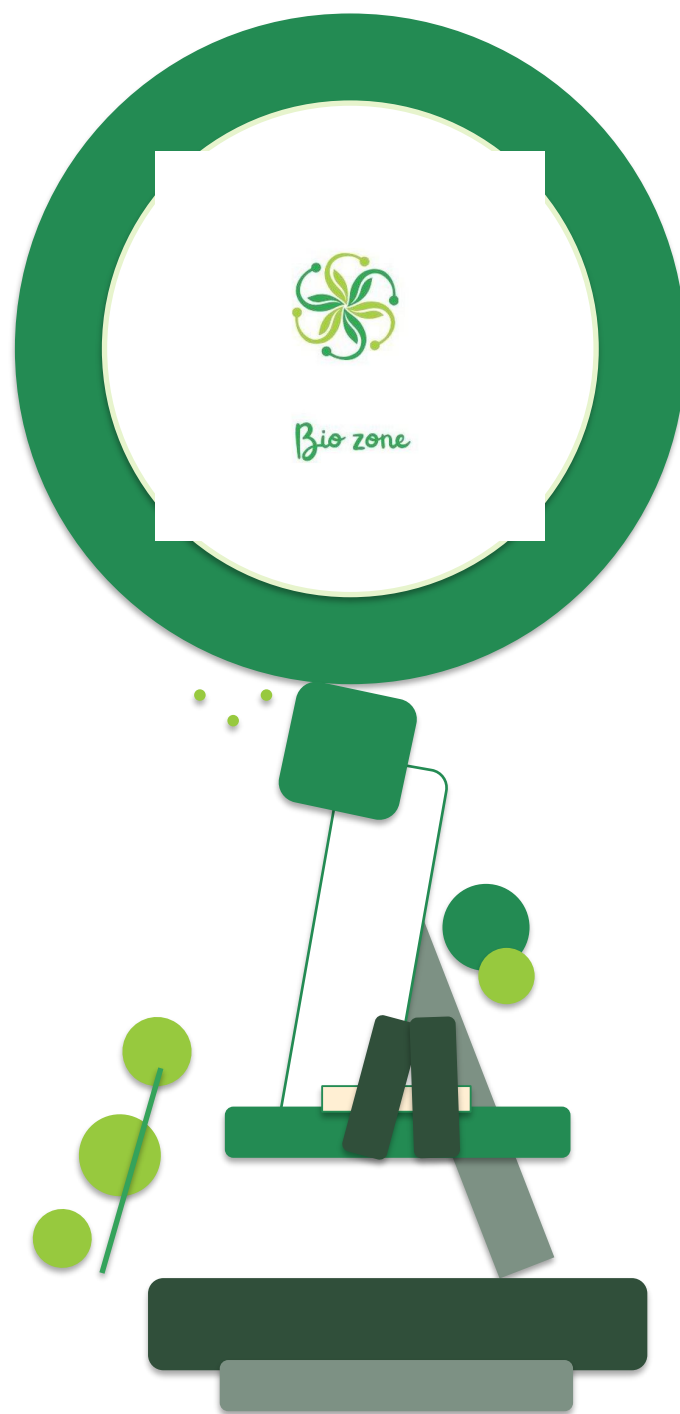
اللغة الانجليزية

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التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف الثاني عشر العام والمادة أحياء في الفصل الأول



BIO

## The immune system

### The infectious diseases



DATE

11 / 09 / 2026



TEACHER

Rania  
Adel



GRADE

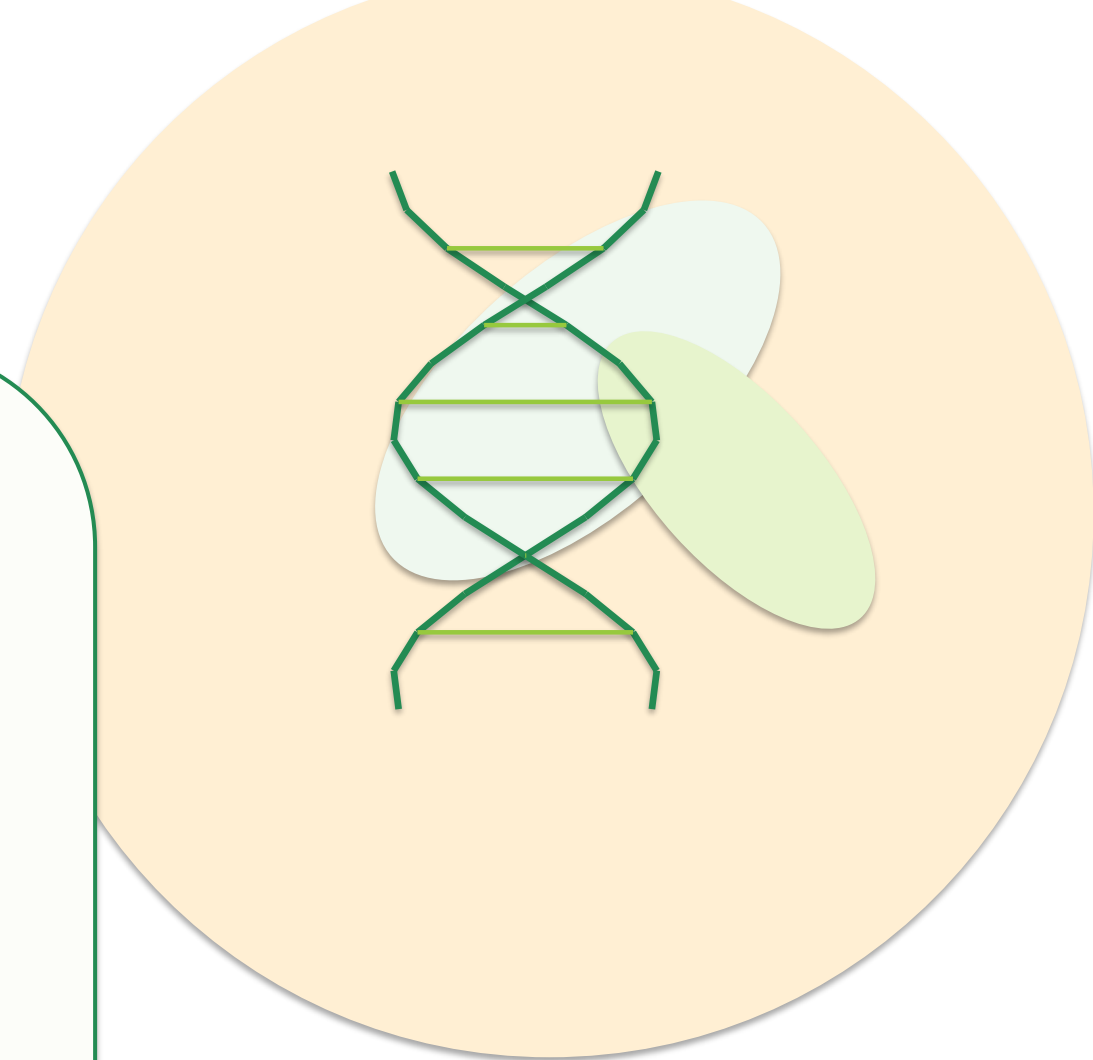
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SUBJECT

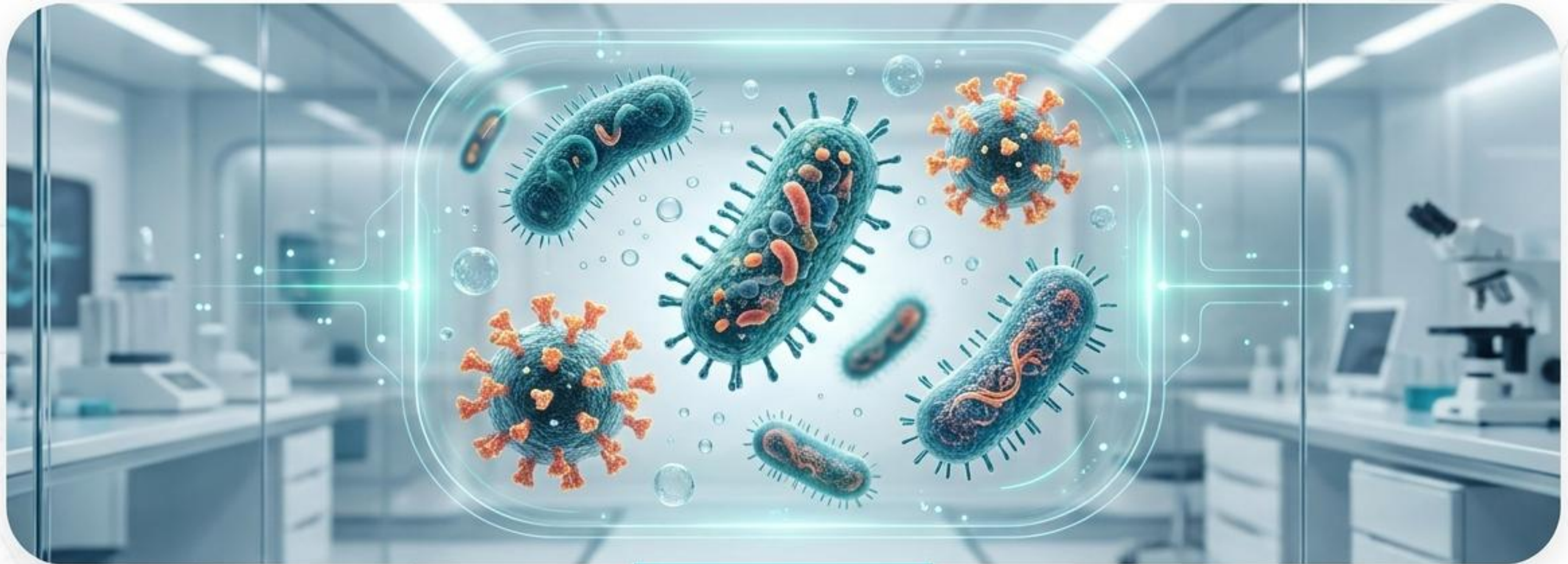
Biology

Learn • Understand • Apply



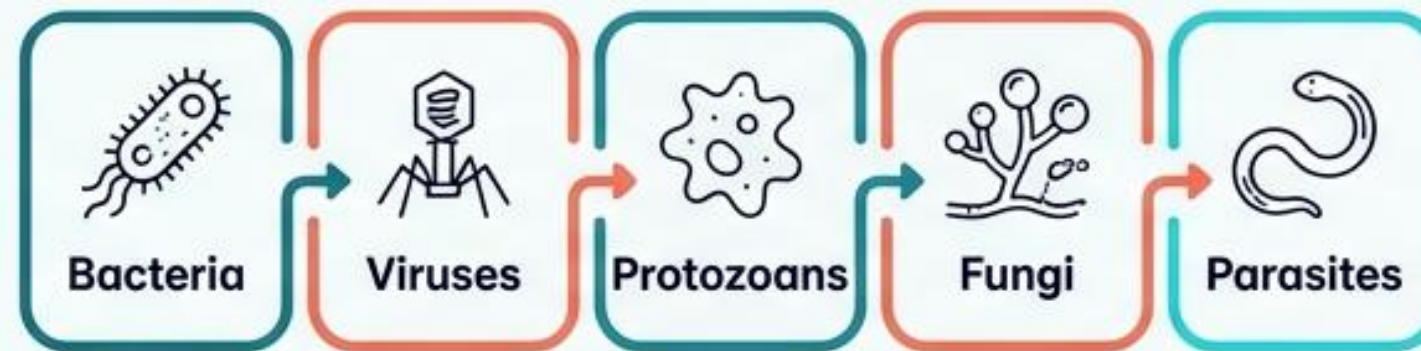
# Infectious Diseases: Pathogens, Transmission, and Treatments

A Complete Biology Module



# What do a cold and athlete's foot have in common?

An **infectious disease** is caused by a pathogen passed from one organism to another, disrupting the body's homeostasis.



**Pathogens** are the specific agents that cause these diseases.

## Real-Life Example

**Beneficial Microbes:** Not all microorganisms cause disease. Intestinal and skin bacteria form normal flora, keeping harmful pathogens from thriving.

## Quick Check:

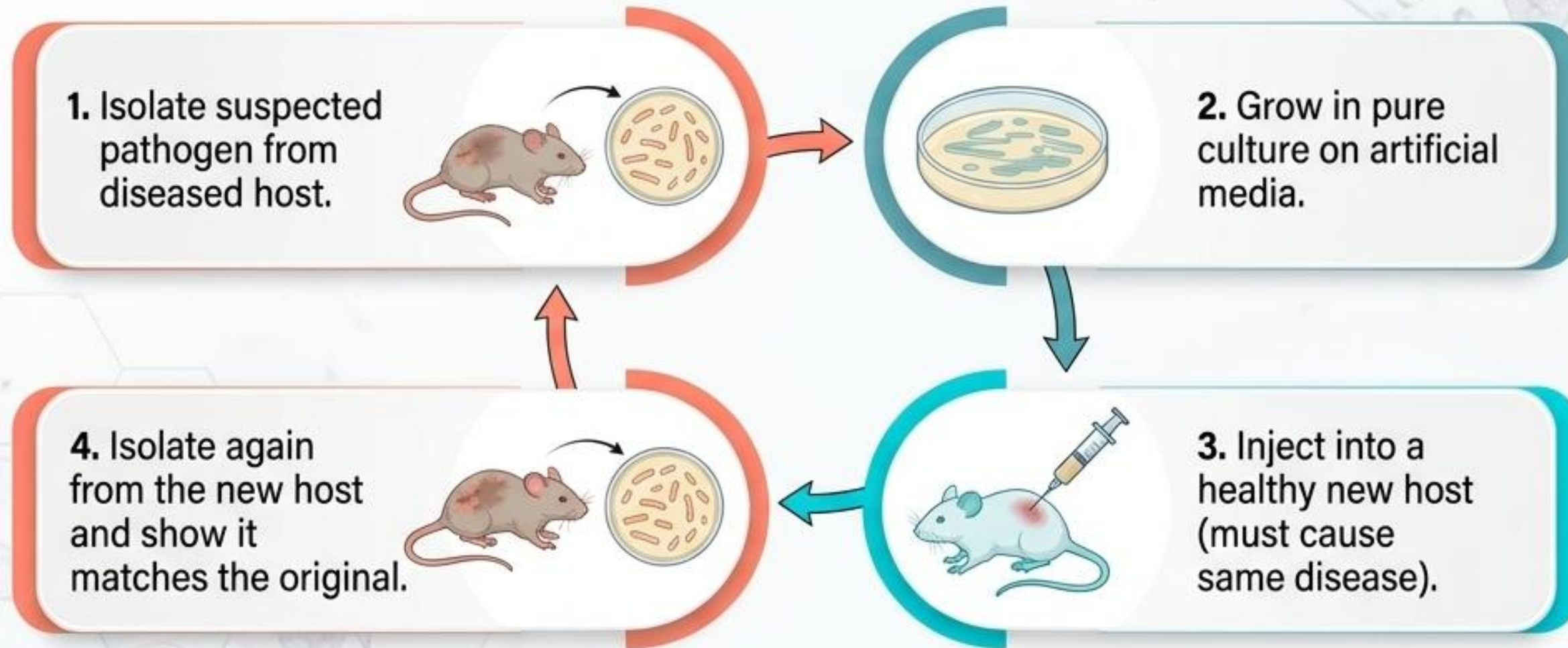
Do all microorganisms cause disease?

## Key Takeaway:

Pathogens cause infectious diseases by disrupting homeostasis, but many microorganisms are actually beneficial.

# Proving the Cause: Germ Theory & Koch's Postulates

How do scientists prove a specific pathogen causes a specific disease?



**Important Exceptions:** Pathogens like the one causing syphilis cannot grow on artificial media. Viruses require cultured living cells to grow.



**Quick Check:** Why must the pathogen be isolated a second time?



**Key Takeaway:** Koch established a strict experimental method to link a specific pathogen to a specific disease.

# Where Do Pathogens Hide? Disease Reservoirs

For a pathogen to spread, it needs a source in the environment to survive—a reservoir.



## Human Reservoirs

Individuals can be symptom-free but pass the disease (a carrier).  
Main reservoir for human diseases.

- HIV,
- Colds,
- Typhoid Mary.



## Animal Reservoirs

Diseases passed from animals to humans.

- Rabies (bats, dogs),
- Influenza (pigs).



## Inanimate Reservoirs

Non-living environments.

- Soil and contaminated water.



### Quick Check:

Can a person spread a disease without feeling sick?

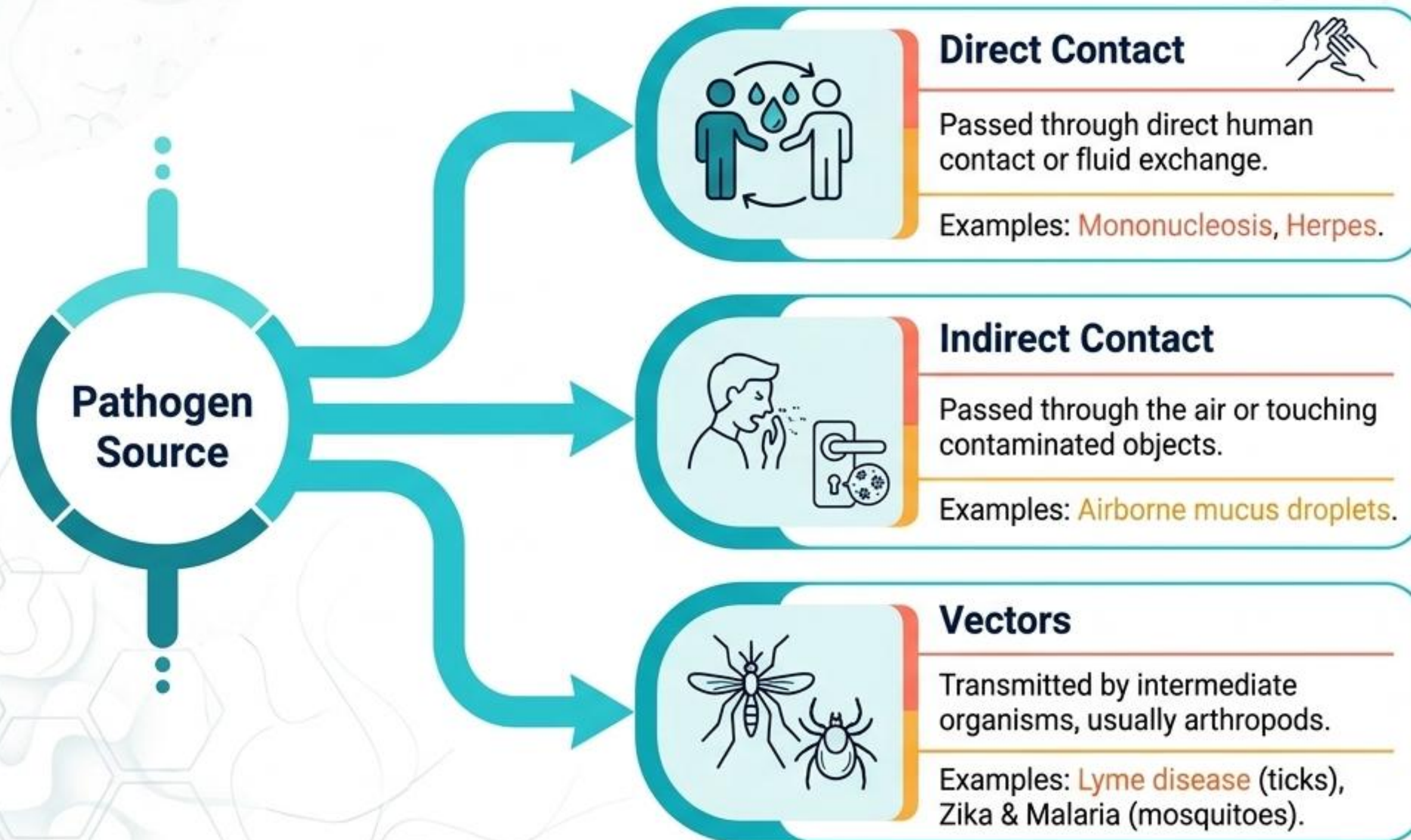


### Key Takeaway:

Reservoirs (human, animal, or inanimate) are the environmental sources where pathogens originate.

# How Do Diseases Spread? Transmission Modes

How does the pathogen get from the reservoir to you?



## Quick Check

Is a mosquito bite direct or vector transmission?



## Key Takeaway

Pathogens spread through diverse methods, making sanitation and vector-control vital.

# Clinical Overview of Common Human Infectious Diseases

| Disease             | Cause                                                                                         | Affected Organ System        | How Disease is Spread                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------|
| Tetanus             |  Bacterium   | Nervous system               | Soil in deep puncture wound                                                                             |
| Strep throat        |  Bacterium   | Respiratory system           | Droplets/direct contact                                                                                 |
| Lyme disease        |  Bacterium   | Skeletal and nervous systems |  Vector (tick)       |
| Chicken pox         |  Virus       | Skin                         | Droplets/direct contact                                                                                 |
| Rabies              |  Virus     | Nervous system               |  Animal bite       |
| Influenza (the flu) |  Virus     | Respiratory system           | Droplets/direct contact                                                                                 |
| Giardia             |  Protozoan | Digestive tract              | Contaminated water                                                                                      |
| Malaria             |  Protozoan | Blood and liver              |  Vector (mosquito) |
| Athlete's foot      |  Fungus    | Skin                         | Direct contact or contaminated objects                                                                  |



Quick Check:  
Which disease from the table is caused by a fungus?



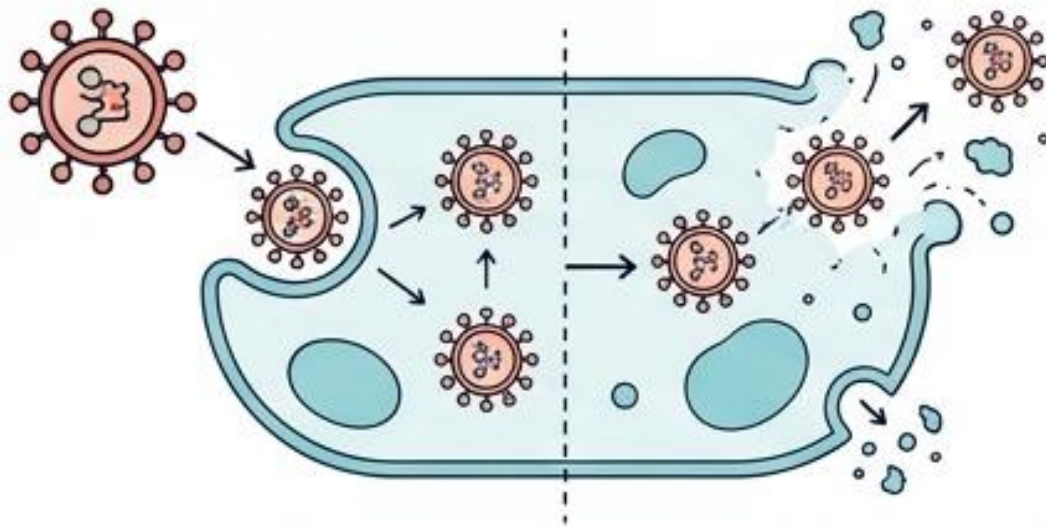
Key Takeaway:  
Diseases vary wildly in their root cause, target organs, and transmission methods.

# Why Do We Feel Sick? Symptoms & Toxins

Why do we cough, sneeze, or feel aches when infected?



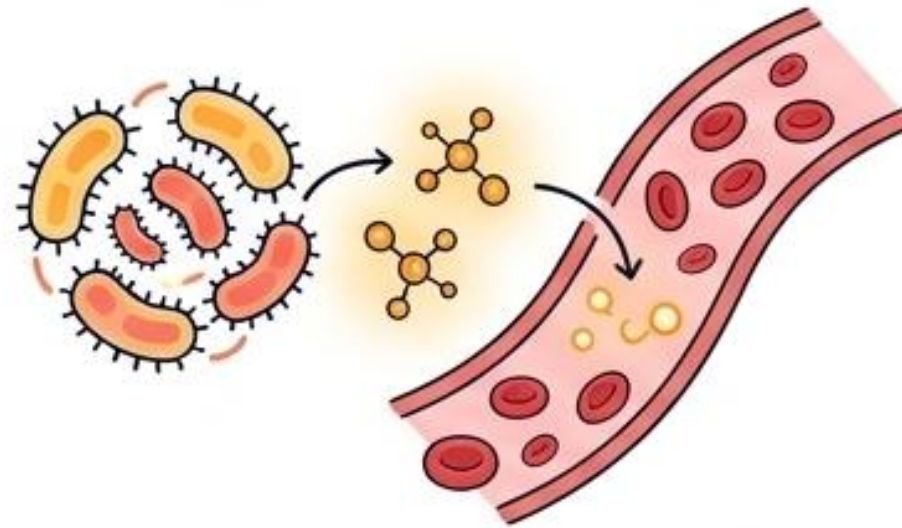
## Viral Cell Damage



Pathogen invades cells, multiplies, and leaves via exocytosis or bursts the cell, causing direct tissue damage.



## Bacterial Toxins



Pathogen produces harmful chemicals called toxins that are carried via the bloodstream to damage various body parts.



**Examples:** Tetanus (muscle spasms) & Botulism (nerve paralysis).



### Quick Check:

Do symptoms only come directly from the pathogen itself?



### Key Takeaway:

Symptoms are caused by cellular destruction, toxic chemicals, and the host's own immune system response.

**hallmark**

# Tracking Disease Patterns

How organizations like the CDC and WHO monitor outbreaks.



## Level 1: Endemic

Small numbers of incidents continually found within a population.

**Example:** The common cold.



## Level 2: Epidemic

A large outbreak spreading across a specific area or region.

**Example:** SARS outbreak in 2003.



## Level 3: Pandemic

Widespread throughout a large region, continent, or the entire globe.

**Example:** HIV, 1918 Spanish flu.



**Quick Check:** If a disease spreads across multiple continents, what is it called?



**Key Takeaway:**  
The geographic scale of a disease outbreak dictates its classification and the global medical response.

# Immunology Through Time

Centuries of struggle and scientific breakthroughs.

1796



Edward Jenner discovers cowpox vaccination for smallpox.

1908



Metchnikoff & Ehrlich observe phagocytosis and describe antibodies.

1981



First clinical description of AIDS.

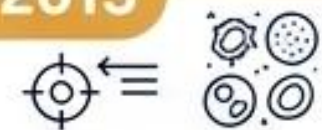
1984-1985



HIV discovered as the cause of AIDS, cloned, and testing enabled.



2009-2015



Targeted retroviral treatments destroy infected cells; 17 million people on therapy.



## Quick Check:

What major virus drove decades of research from 1981 to 2015?



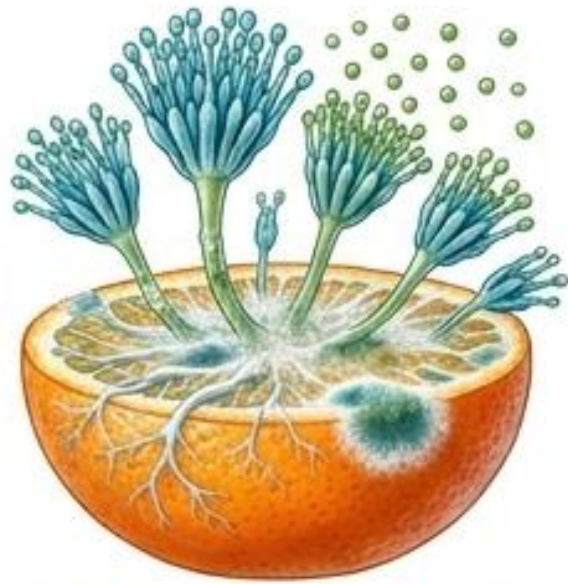
## Key Takeaway:

Scientific understanding of the immune system builds progressively, transforming deadly diseases into manageable conditions.

# Fighting Back: Medical Treatments

What interventions are used once you are infected?

## Antibiotics



Prescription drugs that **kill or inhibit the growth of bacteria**. Originally secreted by fungi like *Penicillium* (isolated in WWII).

Today, **synthetic antibiotics** are developed by pharmaceutical companies.

## Antivirals & Natural Immunity



Antibiotics do not work on **viruses**.

**Viral infections** rely on **antiviral drugs** (for Herpes, Flu, HIV) or the body's built-in immune defense system.



**Quick Check:** Can you use penicillin to cure the flu?



**Key Takeaway:** Antibiotics are highly effective against bacteria, but viral diseases rely on antiviral drugs or the body's immune system.

# The Threat of Antibiotic Resistance

What happens when the drugs stop working?

Resistance of Gonorrhea to Penicillin  
(1980-1990)

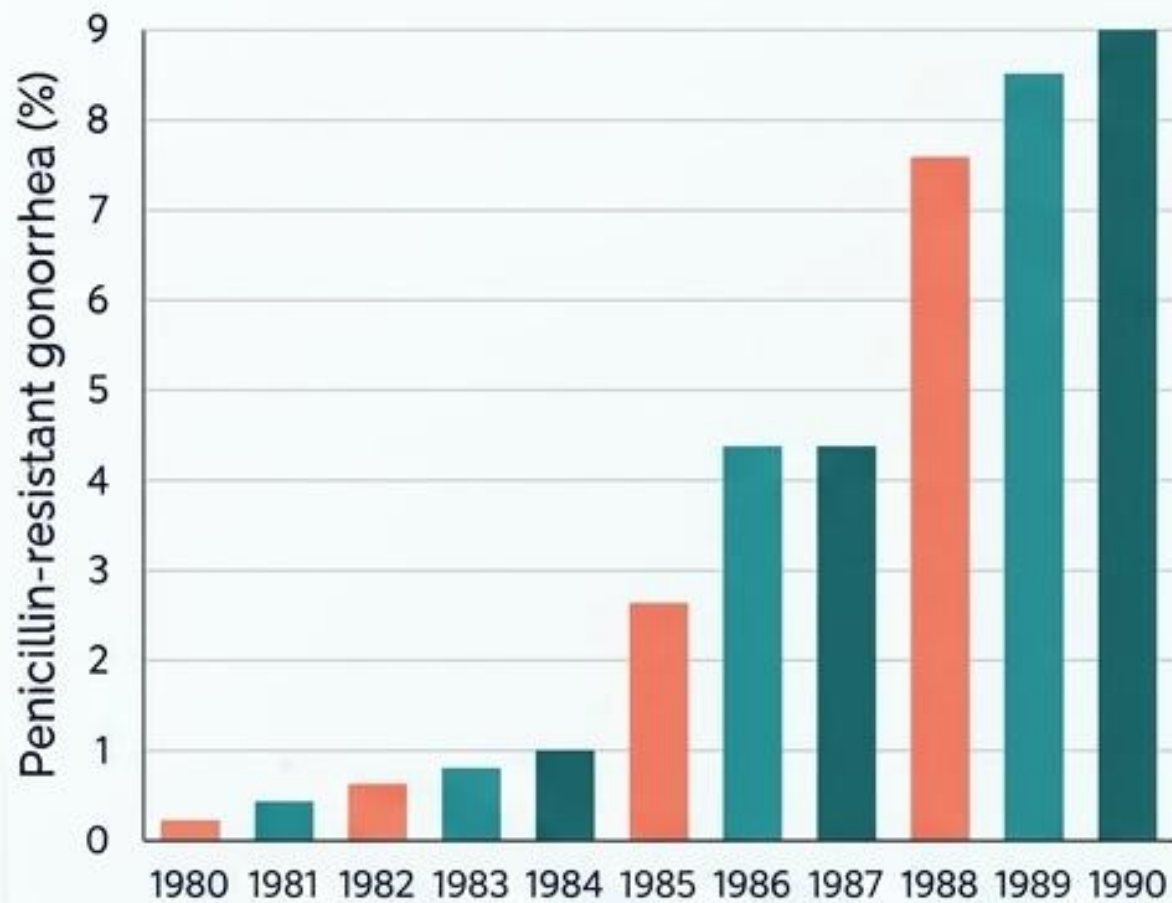
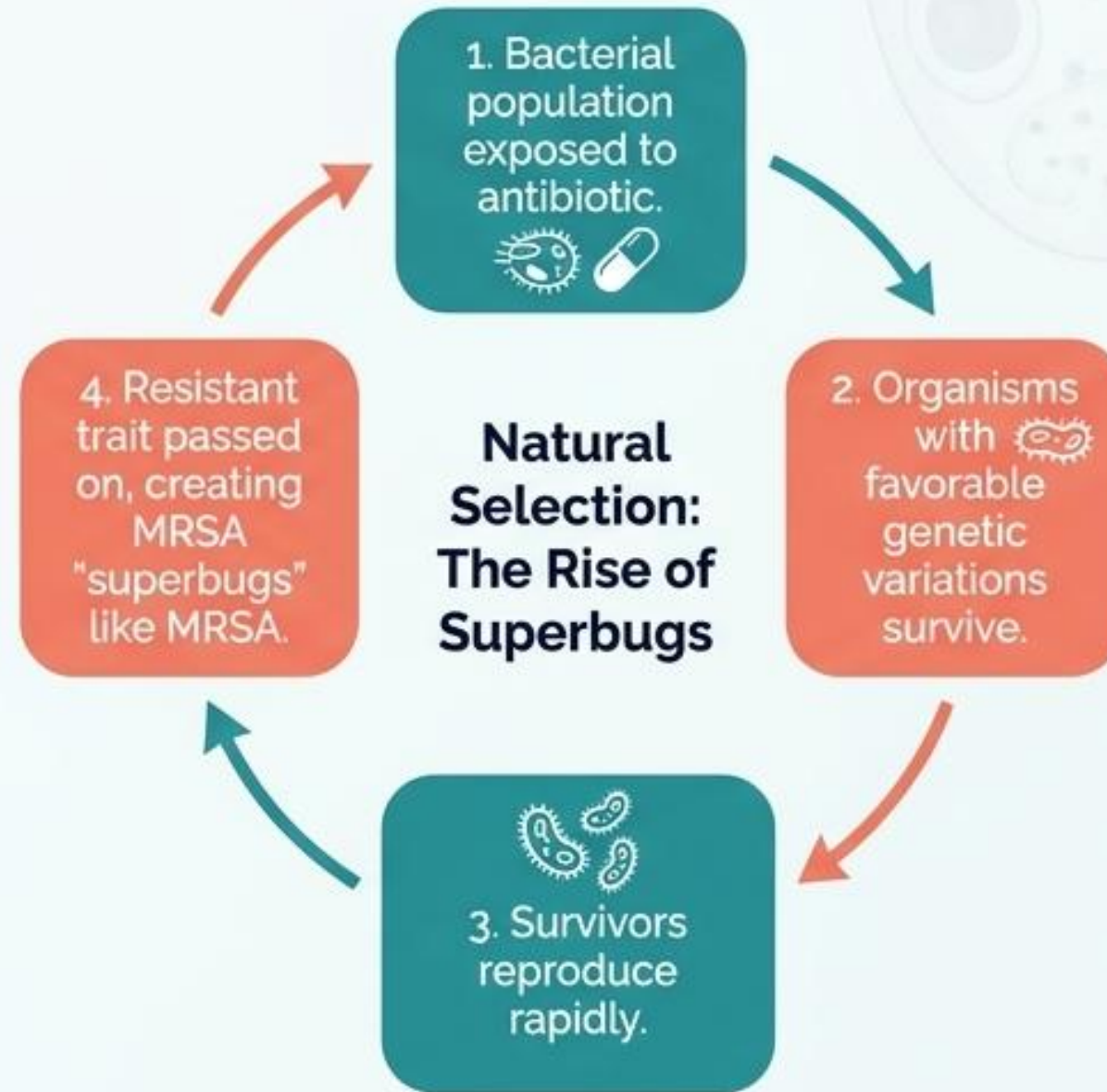


Figure shows the dramatic spike in reported cases.



**? Quick Check:**  
Why does resistance spread so quickly in bacteria?

**💡 Key Takeaway:**  
Overuse of antibiotics drives bacterial evolution, creating dangerous, hard-to-treat infections.

# Module Assessment: Part 1

**Q1. What is the primary cause of an infectious disease?**



- ☐ A) High blood pressure
- ☐ B) Disruption of homeostasis by a pathogen
- ☐ C) Lack of vitamins
- ☐ D) Genetic mutation

**Q2. Which of the following is an exception to Koch's postulates because it cannot be grown on artificial media?**



- ☐ A) Tetanus
- ☐ B) Syphilis
- ☐ C) Giardia
- ☐ D) Lyme disease

**Q3. The Zika virus is transmitted to humans by mosquitoes. This is an example of what type of transmission?**



- ☐ A) Direct contact
- ☐ B) Indirect contact
- ☐ C) Vector
- ☐ D) Inanimate reservoir

**Q4. The first widely used antibiotic, isolated during World War II, was:**



- ☐ A) Erythromycin
- ☐ B) Neomycin
- ☐ C) Penicillin
- ☐ D) Gentamicin

**Q5. True/False: All types of bacteria found in the human body cause infectious diseases.**



- ☐ True
- ☐ False

**Q6. True/False: A pandemic affects a much larger geographic area than an epidemic.**



- ☐ True
- ☐ False

# Module Assessment: Part 2

**Q7. Matching: Match the disease to its pathogen type based on your clinical table.**

- |                       |              |
|-----------------------|--------------|
| 1. Malaria ___        | A. Bacterium |
| 2. Athlete's foot ___ | B. Virus     |
| 3. Strep throat ___   | C. Protozoan |
| 4. Rabies ___         | D. Fungus    |

**Q8. Short Answer: What are the four experimental steps established by Robert Koch to identify a specific pathogen?**

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_

**Q9. Short Answer: In epidemiological terms, define what a 'carrier' is.**

\_\_\_\_\_

**Q10. Cause & Effect: Describe how pathogenic bacteria like tetanus can cause severe muscle spasms in distant parts of the body even if the bacteria remain at the infection site.**

\_\_\_\_\_

**Q11. Cause & Effect: Explain the biological mechanism that causes bacterial populations to become resistant to antibiotics over time.**

\_\_\_\_\_

# Module Assessment: Part 3

## Q12. Application Scenario:



Two days after visiting a pet shop and observing green parrots in a display cage and fish in an aquarium, a student developed a fever and was diagnosed with parrot fever. Identify the likely disease reservoir and the possible transmission method.

## Q13. Critical Thinking:



The CDC frequently refers to thorough hand-washing as a “do-it-yourself” vaccine. Analyze why they use this terminology based on what you know about indirect transmission.

## Q14. Analysis:



Koch's second postulate states that a suspected pathogen must be grown in pure culture on artificial media. Analyze why viruses are a major exception to this rule.

## Q15. Compare/Contrast:



Compare the primary mode of transmission of the common cold with that of malaria.

# ANSWER KEY: Teacher & Grading Use Only

**1:** B (Disruption of homeostasis)

**2:** B (Syphilis)

**3:** C (Vector)

**4:** C (Penicillin)

**5:** False (Many are beneficial normal flora)

**6:** True

**7:** 1-C, 2-D, 3-A, 4-B

**8:** 1. Isolate from diseased host.  
2. Grow in pure culture.  
3. Inject into healthy host.  
4. Isolate again and match.

**9:** An individual that is symptom-free but capable of passing the pathogen to others.

**10:** The bacteria produce potent toxins that travel via the bloodstream.

**11:** Natural selection. Favorable genetic variations survive antibiotic exposure, reproduce, and pass on resistance.

**12:** Reservoir: Animal (parrots).  
Transmission: Indirect contact (air droplets) or direct contact.

**13:** Hand-washing mechanically removes pathogens before transfer to mouth/eyes, preventing infection just like a vaccine.

**14:** Viruses require living host cells to multiply; they cannot survive on artificial media.

**15:** Common cold: indirect/direct contact. Malaria: vector (mosquito).



Bio zone

*Teacher Rania Adel*