Microbial Pathology

Identifying the Features of Pathogenic Bacteria

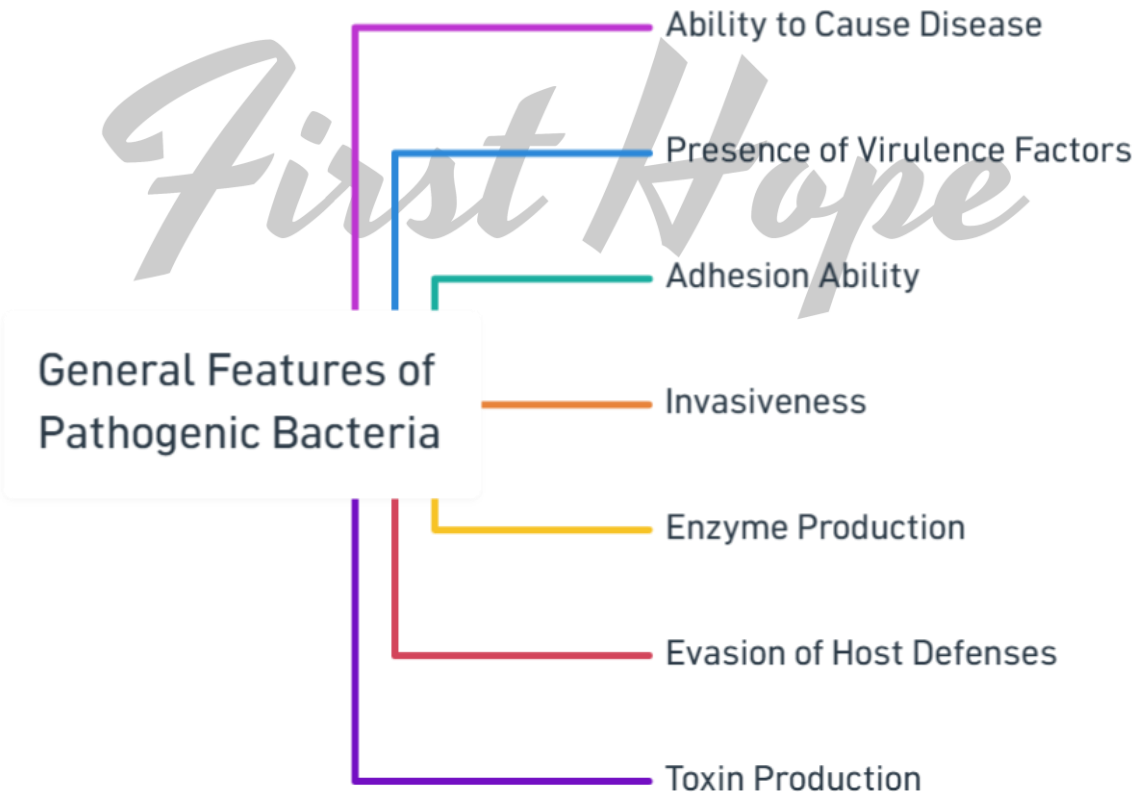
Introduction

- Pathogenic bacteria are bacteria that cause disease in humans, animals, or plants.
- They have special characteristics that help them invade the host, survive, multiply, and cause damage.
- Not all bacteria cause disease.
- Some bacteria are harmless or beneficial.
- Pathogenic bacteria possess special disease-causing properties called virulence factors.

Definition

- Pathogenic bacteria are bacteria capable of causing infection and disease.

General Features of Pathogenic Bacteria



1. **Ability to Cause Disease**
   - Pathogenic bacteria can invade tissues and produce harmful effects.
2. **Presence of Virulence Factors**
   - Virulence factors are structures or substances that help bacteria cause disease.
   - **Major Virulence Factors**
     A. **Capsule**

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- Some bacteria have an outer capsule.
- **Examples:** Streptococcus pneumoniae, Klebsiella.

Functions

- It protects bacteria from immune cells.
- It helps avoid phagocytosis.
- It helps in attachment.

B. Cell Wall Components

- Certain bacterial cell wall components contribute to pathogenicity.
- **Example:** Lipopolysaccharide in Gram-negative bacteria.

C. Endotoxins

- Endotoxins are toxins that are part of the bacterial cell wall.

Effects

- They may cause fever.
- They may cause inflammation.
- They may cause shock.

D. Exotoxins

- Exotoxins are toxic proteins secreted by bacteria.
- **Examples:** Tetanus toxin, Botulinum toxin.

3. Adhesion Ability

- Pathogenic bacteria attach to host tissues.
- **Structures Involved**
  - Pili
  - Fimbriae
  - Adhesins

4. Invasiveness

- Invasiveness is the ability of bacteria to enter and spread in tissues.

5. Enzyme Production

- Some bacteria produce enzymes that help spread infection.

A. Hyaluronidase

- It breaks tissue barriers.

B. Coagulase

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- It helps bacteria avoid host defenses.

C. Streptokinase

- It helps bacterial spread.

6. Evasion of Host Defenses

- Pathogens can avoid immune destruction.

Methods

- Capsule protection
- Antigen variation
- Intracellular survival

7. Toxin Production

- Many pathogens cause disease through toxins.

Morphological Features Used in Identification

Shape

1. Cocci
   - Cocci are spherical bacteria.
   - **Example:** Staphylococcus.
2. Bacilli
   - Bacilli are rod-shaped bacteria.
   - **Example:** Escherichia coli.
3. Spiral Forms
   - Spiral forms are spiral-shaped bacteria.
   - **Example:** Treponema.

Gram Reaction

1. Gram Positive Bacteria

- Gram positive bacteria have a thick peptidoglycan wall.
- **Example:** Staphylococcus.

2. Gram Negative Bacteria

- Gram negative bacteria have a thin peptidoglycan layer and an outer membrane.
- **Example:** Salmonella.

Growth Characteristics

- Identification may involve observing growth characteristics.

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- **Examples:** Colony shape, Pigment, Hemolysis patterns.

Biochemical Features

- Biochemical tests are used for identification.
- **Examples:** Catalase test, Oxidase test, Fermentation tests.

Examples of Pathogenic Bacteria

- **Examples:** Staphylococcus aureus, Mycobacterium tuberculosis, Vibrio cholerae.

Importance of Identification

- It helps in diagnosis.
- It helps in treatment selection.
- It helps in infection control.

Identifying the Features of Pathogenic Fungi

Introduction

- Pathogenic fungi are fungi capable of causing disease in humans or animals.
- They have specific structural and biological features that help in identification.
- Many fungi are harmless.
- Some fungi cause superficial or serious systemic infections.
- Identification depends on morphology, growth, and pathogenic features.

Definition

- Pathogenic fungi are fungi capable of causing infection.

General Characteristics of Fungi

- Fungi are eukaryotic organisms.
- They have a nucleus.
- Their cell wall contains chitin.
- They reproduce by spores.

Types of Pathogenic Fungi

1. Yeasts

- Yeasts are unicellular fungi.
- **Examples:** Candida.
- **Features**

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- Yeasts have round or oval cells.
- They reproduce by budding.

2. Molds

- Molds are multicellular fungi.
- **Structure**
  - Molds contain hyphae.
  - Hyphae form a mycelium.
  - Examples: Aspergillus.

3. Dimorphic Fungi

- Dimorphic fungi exist in two forms.
- **Mold Form**
  - They grow as molds at lower temperature.
- **Yeast Form**
  - They grow as yeasts at body temperature.
- Examples: Histoplasma.

Features Used in Identification

Morphology

- **Hyphae:** Hyphae are thread-like filaments.

Types of Hyphae

A. Septate Hyphae

- Septate hyphae have cross walls.

B. Non-septate Hyphae

- Non-septate hyphae do not have cross walls.

Spores

- Spores are important for fungal identification.
- **Examples:** Conidia, Sporangiospores.

Colony Characteristics

Colony characteristics are observed on culture media.

Features

- Texture

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