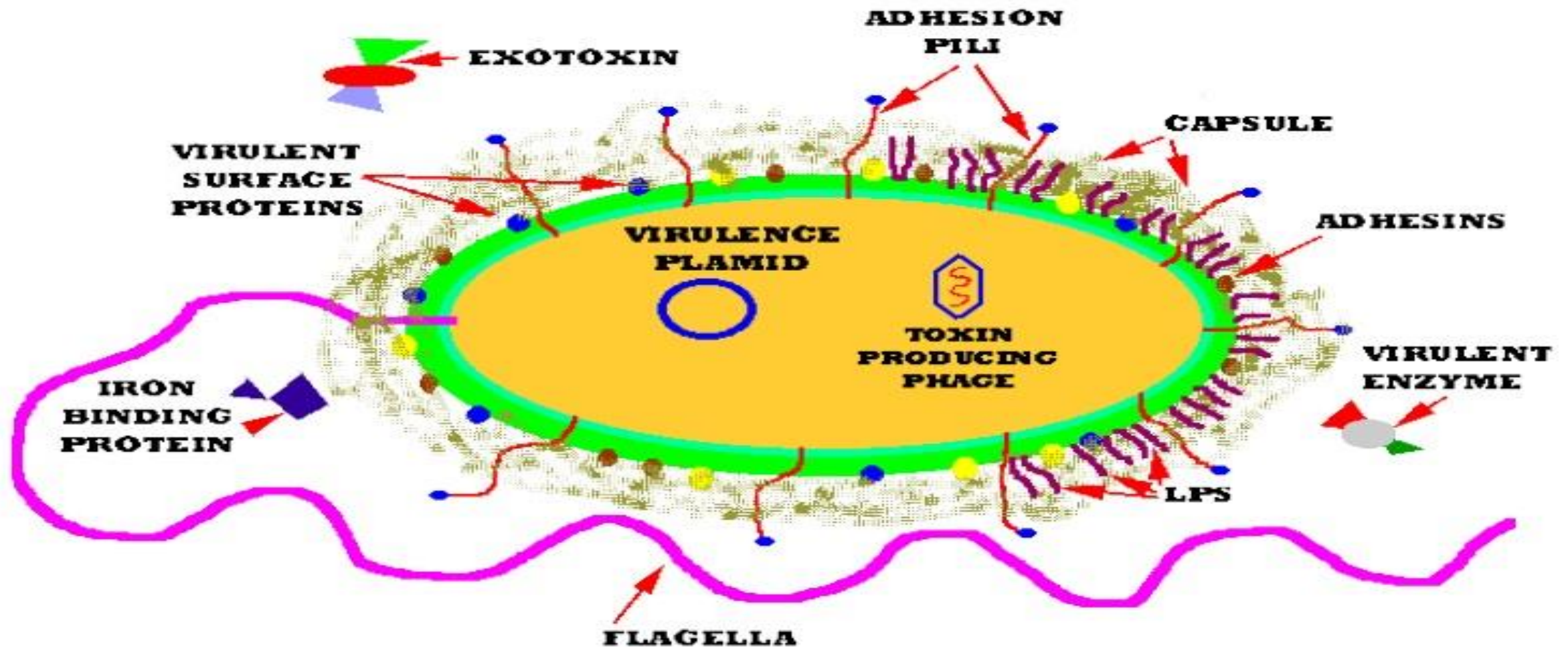


# Pathogenicity Mechanism of Bacteria

# General terms used in Pathogenesis

- **Infection:** growth and multiplication of a microbe in or on the body with or without the production of disease.
- The capacity of a bacterium to cause disease reflects its relative **“Pathogenicity.”**
- **Virulence** is the measure of the pathogenicity of a microorganism.
- **Pathogenesis** refers both to the mechanism of infection and to the mechanism by which disease develops.

# Bacterial Virulence Factors



# Function of virulence factors

1. Colonization of a niche in the host (this includes adhesion to cells)
2. Immuno evasion, evasion of the host's immune response.
3. Immunosuppression, inhibition of the host's immune response.
4. Entry into and exit out of cells (if the pathogen is an intracellular one).
5. Obtain nutrition from the host.

# Characteristics of Pathogenic Bacteria

1. Transmissibility.
2. Adherence to host cells.
3. Invasion of host cells and tissue.
4. Evasion of the host immune system.
5. Toxigenicity

# Mechanism of Bacterial Pathogenesis

1. Destroying tissue (invasiveness).
2. Producing toxins (toxigenicity).
3. Stimulating overwhelming host immune responses.

- **Invasiveness:**

- ❖ It is the ability to invade tissues.

- ❖ encompasses mechanisms for colonization (adherence and initial multiplication).

- ❖ production of extracellular substances which facilitate invasion (invasins).

# Toxigenesis

- It is the ability to produce toxins.
- Bacteria may produce two types of toxins called **exotoxins** and **endotoxins**.
- **Exotoxins:**
  - ✓ These are released during bacterial cells growth and may act at tissue sites.
- **Endotoxins:**
  - ✓ These are cell-associated substance.
  - ✓ released after bacterial cells death / cells that are lysed as a result of effective host defense (e.g. lysozyme).



# Differentiation of Exotoxins and Endotoxins

## Exotoxins

1. Excreted by living cells.
2. Relatively unstable.
3. Highly antigenic
4. Converted into antigenic, nontoxic toxoids.
5. Highly toxic.
6. Example- *Staphylococcus aureus*

## Endotoxins

1. Released after death of bacteria.
2. Relatively stable.
3. Less antigenic
4. Not converted into toxoids
5. Weakly toxic.
6. Example- *Aeromonas hydrophila*

# How do we know that a given pathogen causes a specific disease?

- **Koch's postulates:**

- In 1884, Robert Koch proposed a series of postulates.
- These postulates have been applied more broadly to link many specific bacterial species with particular diseases.
- 1. The pathogen must be present in every case of the disease.
- 2. The pathogen must be isolated from the diseased host & grown in pure culture.
- 3. The specific disease must be reproduced when a pure culture of the pathogen is inoculated into a healthy susceptible host.
- 4. The pathogen must be recoverable from the experimentally infected host.

