

Bacterial toxins

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Bacterial Cells Damage Host Cells

Three mechanisms:

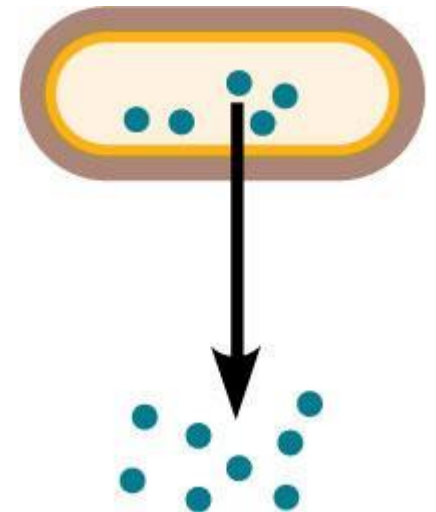
- Direct Damage
- Toxins
- Hypersensitivity Reactions
- Most bacterial damage is carried out by toxins.

Intoxications

- **Intoxications** are diseases that result from the entrance of a specific preformed toxin (e.g., botulinum toxin) into the body of a host
- **A toxin** [Latin toxicum, poison] is a substance, such as a metabolic product of the organism, that alters the normal metabolism of host cells with deleterious effects on the host
- The term **toxemia** refers to the condition caused by toxins that have entered the blood of the host. Toxins produced by bacteria can be divided into two main categories: exotoxins and endotoxins

Exotoxins

- soluble, heat-labile, proteins (a few are enzymes) that usually are released into the surroundings as the bacterial pathogen grows.
- May travel from the site of infection to other body tissues or target cells



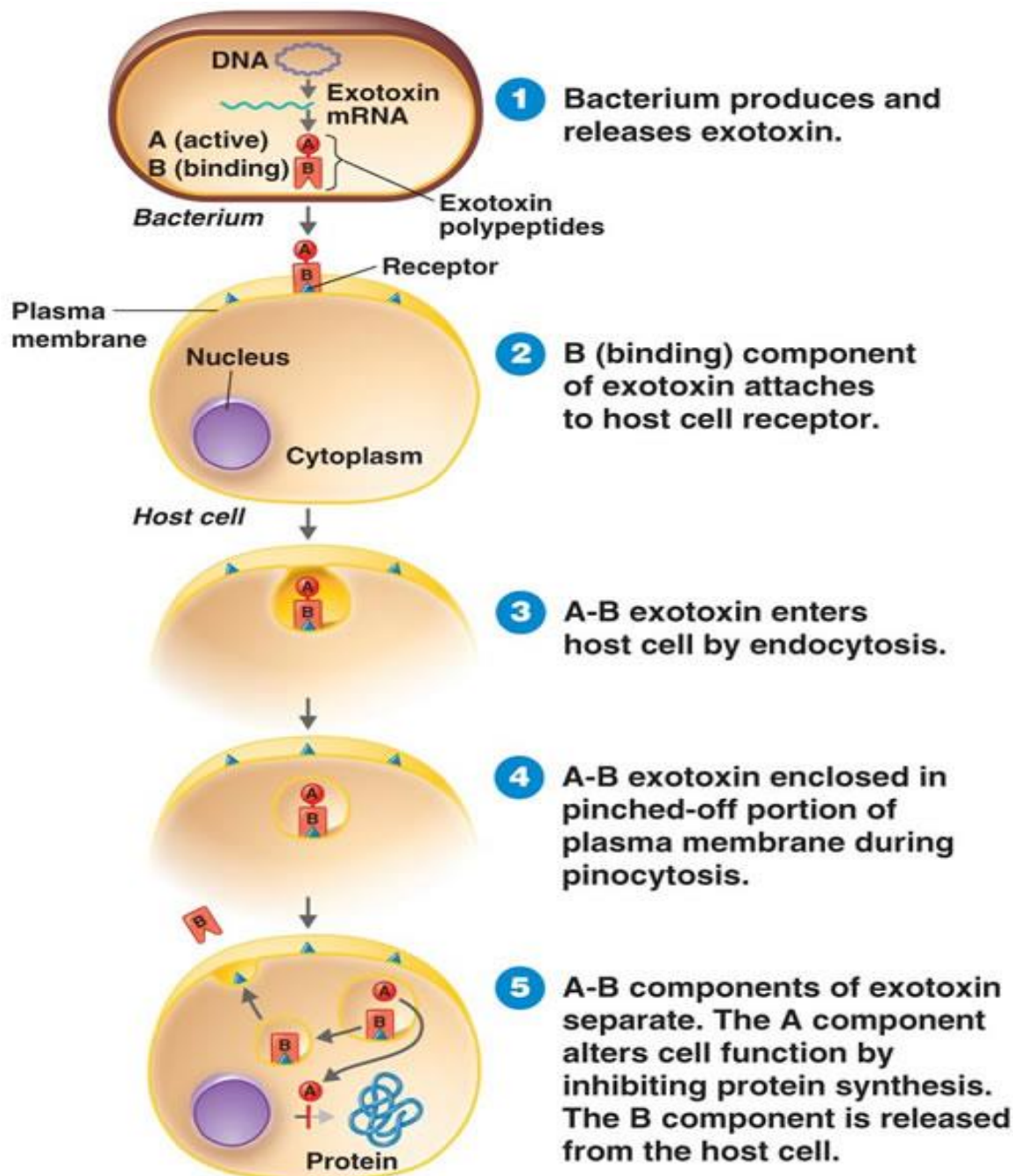
Properties

1. Genes on plasmids or prophages
2. Heat-labile proteins inactivated at 60 to 80°C
3. Lethal/ toxic in very small doses [microgram per kilogram amounts]; e.g., the botulinum toxin
4. Highly immunogenic and stimulate the production of neutralizing antibodies called antitoxins (antibodies)
5. Easily inactivated by formaldehyde, iodine, and other chemicals to form immunogenic toxoids
6. Unable to produce a fever in the host directly

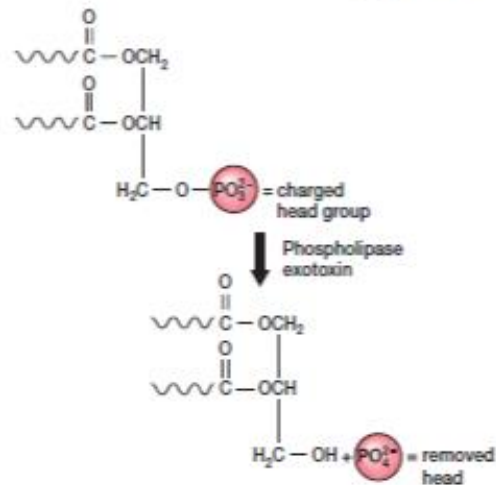
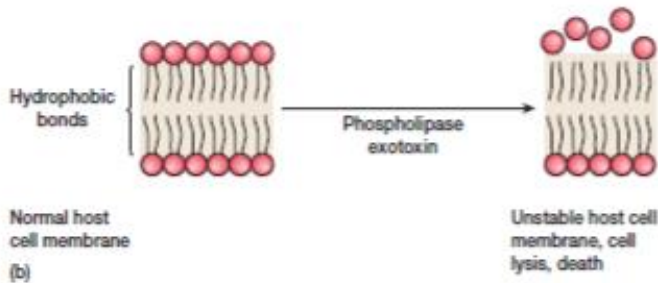
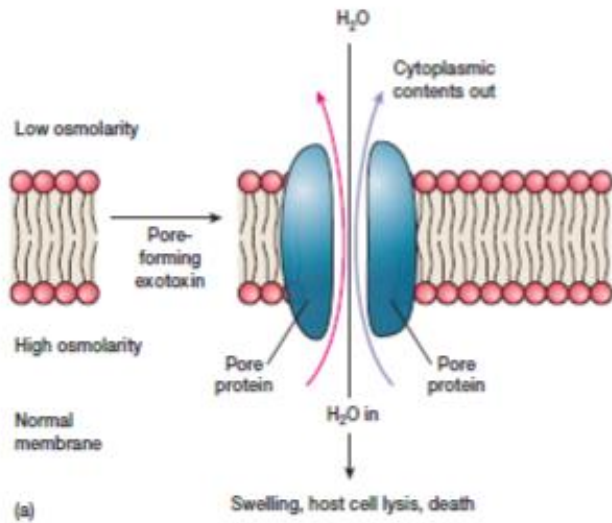
Types of toxins

1. Toxins that aid inspread: which act of extracellular matrix of connective tissues and aid in spread of infection agent e.g hyaluronidase by S.aureus, collagenases by C.perfringins
2. Toxin that damage membranes; plasma membrane of host tissues/cells by different means e.g. heolysins by S. pyogenes
3. Toxins that block protein synthesis: move inside the cell and inhibit synthesis of proteins e.g. exotoxin A by P.aeruginosa
4. Toxins that lock nerve function: interfere in the neurotransmission resulting in paralysis
5. Enterotoxin: effecting digestive system by different means causing diarrhea e.g. cholera toxin by Vibrio cholerae

Ab toxin

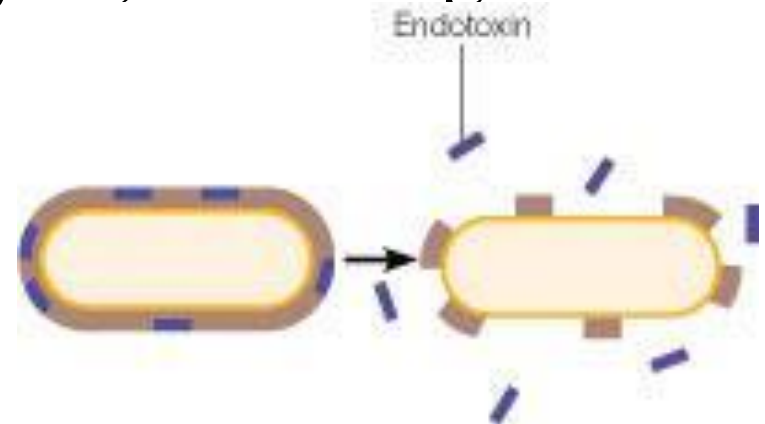


Membrane lysis



Endotoxin

- Part of outer membrane surrounding gram-negative bacteria.
- Endotoxin is lipid portion of lipopolysaccharides (LPS), called lipid A.
- Effect exerted when gram-negative cells die and cell walls undergo lysis, liberating endotoxin.



Properties

- Heat stable
- Toxic only at high doses (milligram per kilogram amounts)
- Weakly immunogenic
- Generally similar, despite source
- All produce the same signs and symptoms:
- Chills, fever, weakness, general aches, blood clotting and tissue death, shock, and even death. Can also induce miscarriage.
- Fever: Pyrogenic response is caused by endotoxins

Action

