

Endemic:

- An infection which is constantly present at a low level in a specific population.

Epidemic:

- When an infection occurs much more frequently than usual.

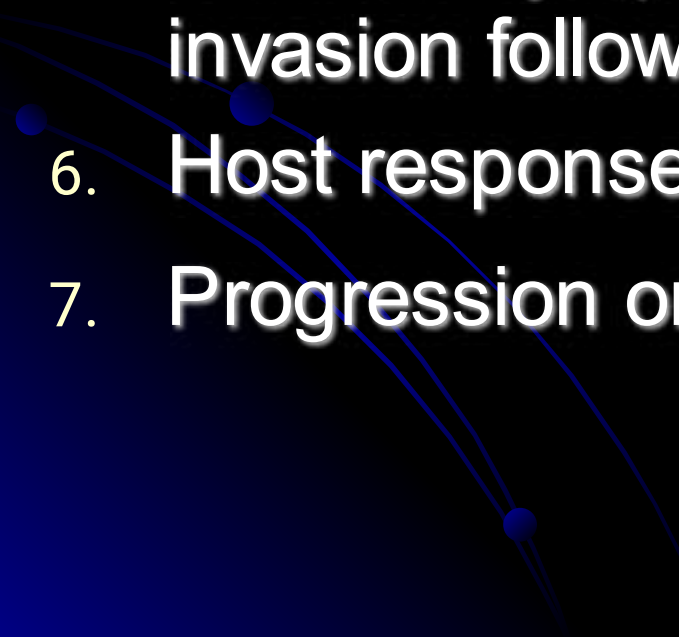
Pandemic:

- If the infection has a worldwide distribution.

Subclinical:

- An inapparent infection that can be detected only by demonstrating a rise in antibody titer or by isolating the organism.

STAGES OF BACTERIAL PATHOGENESIS

1. Transmission,
 2. Evasion of primary host defenses,
 3. Adherence to mucus membranes,
 4. Colonization by growth of bacteria, invasion, inflammation and intracellular survival
 5. Disease symptoms caused by toxin production or invasion followed by inflammation,
 6. Host responses – nonspecific & specific,
 7. Progression or resolution of the disease.
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Fomites – inanimate objects such as towels.

Common routes of transmission include...

- Respiratory tract,
- Gastrointestinal tract,
- Sexual contact,
- Urine,
- Skin contact,
- Blood transfusion,
- Contaminated needles &
- Insect bites.

INFLAMMATION

□ **Pyogenic:**

- Neutrophils are the predominant cells.
- Gram positive cocci
- Gram negative cocci

□ **Granulomatous:**

- Macrophages & T cells predominate.
- Bacterial antigens → cell-mediated immunity (T lymphocyte & macrophage activation)
- Mycobacterium tuberculosis

TOXIN PRODUCTION

Exotoxins:

- Produced by certain species of gram +ve & gram negative bacteria.

Endotoxins:

- It is an integral part of the cell wall of gram –ve bacteria.
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TABLE 7-9 Main Features of Exotoxins and Endotoxins

Comparison of Properties		
Property	Exotoxin	Endotoxin
Source	Certain species of gram-positive and gram-negative bacteria	Cell wall of gram-negative bacteria
Secreted from cell	Yes	No
Chemistry	Polypeptide	Lipopolysaccharide
Location of genes	Plasmid or bacteriophage	Bacterial chromosome
Toxicity	High (fatal dose on the order of 1 μg)	Low (fatal dose on the order of hundreds of micrograms)
Clinical effects	Various effects (see text)	Fever, shock
Mode of action	Various modes (see text)	Includes TNF and interleukin-1
Antigenicity	Induces high-titer antibodies called antitoxins	Poorly antigenic
Vaccines	Toxoids used as vaccines	No toxoids formed and no vaccine available
Heat stability	Destroyed rapidly at 60°C (except staphylococcal enterotoxin)	Stable at 100°C for 1 hour
Typical diseases	Tetanus, botulism, diphtheria	Meningococcemia, sepsis by gram-negative rods

IMMUNOPATHOGENESIS:

- In certain diseases it is not the organism itself that causes the symptoms of the disease but the immune response to the presence of organism e.g.,...
- Rheumatic fever
- Glomerulonephritis
- In rheumatic fever antibodies are formed against **M protein** of *Str. pyogenes* which cross-react with joint, heart & brain tissue → inflammation → arthritis, carditis & chorea.

Bacterial infections associated with cancer

- *H. pylori* → gastric carcinoma & gastric MALT lymphoma.
- *Campylobacter jejuni* → MALT lymphoma of small intestine (α chain disease).
- Antibiotics can cause regression of these cancers if treated during an early stage.

Typical stages of an infectious disease

- Four stages

1. **Incubation period:** time between the acquisition of the organism or toxin & the beginning of the symptoms,
2. **Prodrome period:** nonspecific symptoms such as fever, malaise & anorexia,
3. **Specific illness period:** characteristic signs & symptoms of disease,
4. **Recovery period:** convalescence period.

Approach to Lab. Diagnosis

- Two main approaches...

1. Bacteriological approach:

- Organism identified by staining & culturing.

2. Immunological (serological) approach:

- organism identified by detection of antibodies in the patient's serum.