

unit 1 virulence factors of bacteria causing human infection.

Bacterial virulence factors:

virulence factors:-

* These are the molecules expressed and secreted by the bacteria.

* may be encoded on chromosomal plasmid, transposon or temperate bacteriophage DNA

* virulence factor genes - integrate into the bacterial chromosome.

Types of virulence factors:-

* adherence factors

* invasion factor

* capsule

* Toxins

* Iron acquisition.

ADHERENCE OR COLONIZATION FACTORS

* Pathogens and potentially pathogenic commensals adhere to the mucous membrane surface with considerable selectivity.

* fimbriae

* Slime layer

* Glyco-calyx

* membrane protein

* cell bound protein

* Bacterial biofilms.

BIO-FILMS

* Bio-films are communities of microorganisms in a matrix that joins them together and to living or inert substrates.

* They are surface-attached communities of bacteria, encased in an extracellular matrix of secreted proteins, carbohydrates, and/or DNA that assume phenotypes distinct from those of planktonic cells.

INVASION:-

* cell invasion refers to describe the entry of bacteria into host cells, ability to avoid humoral host defense mechanisms and potentially provides a niche rich in nutrients and devoid of competition from another host.

* invasion of tissue is enhanced by following factors:-

* invasin

* enzymes

* Antiphagocytic factor

* Intra-cellular survival

invasin:-

* It is the bacterial surface protein that affect physical proportion of tissue matrices, intracellular spaces, thereby promoting the spread of pathogens.

INTRACELLULAR SURVIVAL

✦ A few mechanisms that are suggested or the intra-cellular survival of bacteria include - inhibition of phago-lysosome fusion, resistance to action of lysosomal, adaptation to cytoplasmic replication.

✦ Mycobacterium tuberculosis interfere with the formation of phagolysome in a phagocyte.

✦ They are able to grow intracellularly in alveolar macrophages.

TOXINS - derived from Greek (toxicon) - Bow Poison

✦ components or products of microorganisms which when extracted and introduced into host animals, reproduces disease symptoms normally associated with infection.

✦ Roux and Yersin - diphtheria

✦ Endotoxin

✦ Exotoxin

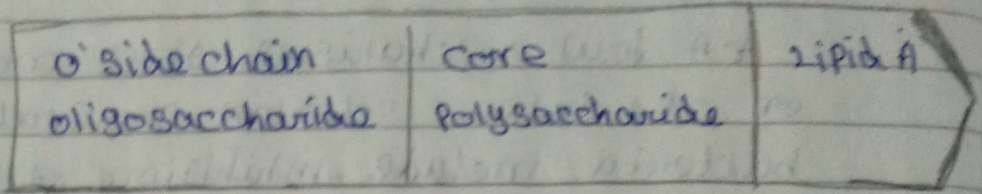
Endotoxin (PFEIFFER - 1893)

✦ Toxic lipopolysaccharide components - gram negative bacteria.

✦ Exhibit profound biologic effects on the host.

✦ Released mainly during the cell lysis and also during multiplication

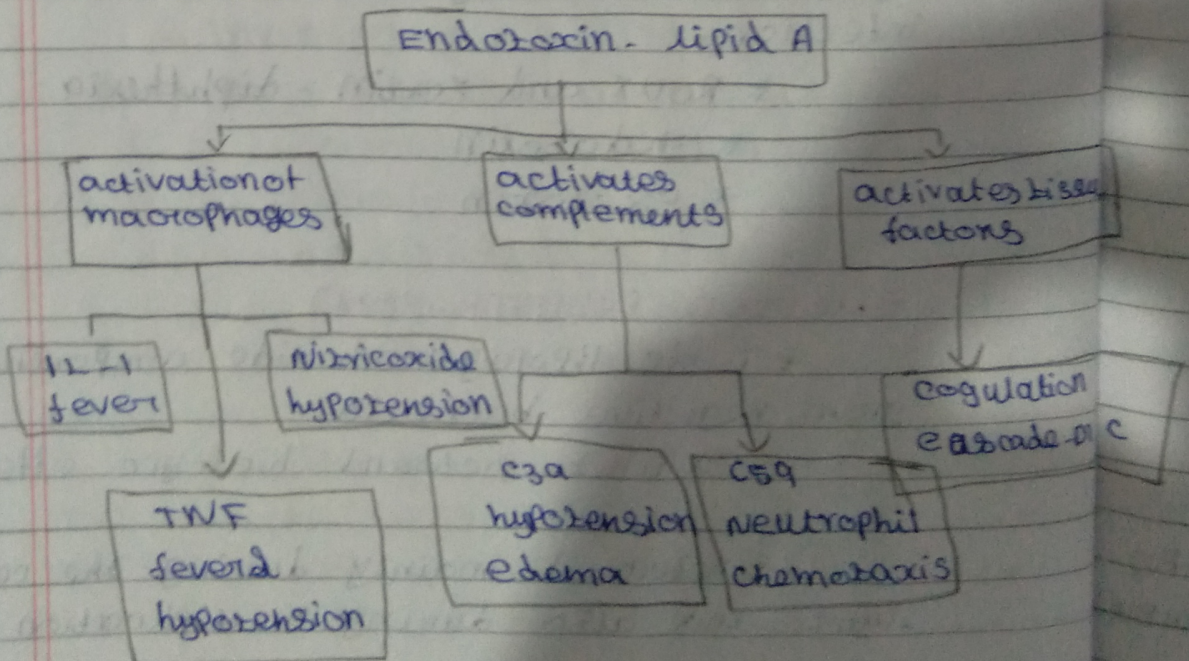
Basic Structure:



Genus or serotypes antigens Genus specific antigens Toxic moiety

Biologic activities of lipid A component of endotoxin:-

- + mitogenic effects on B lymphocytes
- + induction of gamma interferon production by T lymphocytes.
- + Activation of the complement cascade with the formation of C3a and C5a.
- + induction of the formation of Interleukin 1, Interleukin 2 and other mediators.



Exotoxin

Neurotoxin

Cytotoxin

Enterotoxin

Gram positive and gram negative species
soluble protein toxin released from
viable bacteria during exponential
growth phase.

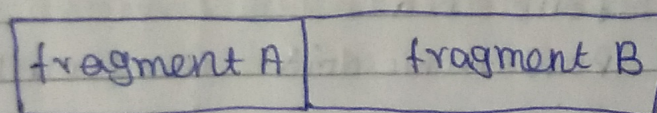
* are excellent antigens that
elicit specific antibodies called
antitoxins.

* Enter eukaryotic cells primarily
through receptor mediated endocytosis.

* Bacterial exotoxin - AB Structure - function
properties.

A domain - catalytic domain

B domain - receptor binding domain.



Ex: diphtheria toxin.

Regulation of virulence factor:-

* This signal

* common signal include temperature
iron availability, osmolarity, growth
phase, pH, static ions (Ca²⁺) or other
nutrient factors and quorum sensing.