Microbiology
team 436

436
MEDICINE
KING SAUD UNIVERSITY

MICROBIOLOGY

Lecture :

HOST PARASITE RELATIONSHIP

IMPORTANT.
DOCTORS NOTES.
EXTRA INFORMATION.

Objectives

Define the terms:

- -Host-parasite Relationship 3
- -Pathogenicity 5
- -Pathogen 4
- -Disease 5
- -Resistance 6
- -Susceptibility 6
- -Infection 7
- -Virulence 7
- -Transmissibility 8

1) Know the division of host resistance to parasite. 6
2) Know the division of Pathogens and examples. 3-4
3) Know the determinants of pathogenicity. 5-6-9
4) Differentiate between Exotoxin and Endotoxin 11
5) Recognize the differences between virulence and pathogenicity and know how virulence is measured. 5-7
6) Recognize the transmissibility of pathogens. 8
7) Describe the attributes of pathogenicity and recall examples. 9-12
8) Know about Koch's Postulates 13

HOST PARASITE RELATIONSHIP

Only in this slide :
Males slides
Females slides

Human host is in contact with many microorganisms called normal flora or commensals but only a small number of these microorganism **can *cause disease*** and they called opportunistic pathogens and primary pathogens).

Host parasite relationship can be discussed under:

1= Primary pathogens : strict pathogens or virulent Bacteria (خطيرة وممرضة)
2-Non-Pathogenic bacteria:, they will never cause Disease (غير ممرضة)

1-pathogenicity.
2- normal flora.

يعني العلاقة بيننا وبينهم (المايكرواورقانزم) إما تكون..

- علاقة هجوم ودفاع (حرب)

أو

- علاقة سلمية وتعايش (معاهدة)

- **Host-parasite relationships:** is characterized by fighting the organism to invade the body and the body defending itself by protective measures.

Pathogen

Pathogen : a microorganism having the capacity to cause disease in a particular host.
Can be divided according to the degree of Pathogenecity into:

a) Primary pathogens:
-When the organism is able to produce disease even in an apparently healthy host

-Cause disease in non-immune host to that organism.
e.g. - **Bordetella species**
- Mycobacterium tuberculosis

b) Opportunistic (secondary) pathogens:
-When the organism causes disease only when the host's defenses are *impaired*

-Having low pathogenicity and infect people with low immunity.
e.g. -Pseudomonas

فيه فرق بينها وبين potential pathogens **بحيث كلهم تكون ممرضة أحيانا وكلهم بجسم الشخص لكن الأولى تضر الشخص نفسه بمعنى إن ضعفت مناعته تهاجمه هو ، بينما الثانية ما تضر الشخص نفسه بحيث ممكن تكون بجسمه وهو طبيعي جدا وما عليه أعراض لكن ممكن ينقلها لغيره وتمرضه**

Definitions

a)Pathogenicity

Ability of Microorganism to cause a disease

b)Pathogen

A **Microorganism having capacity** to cause disease in a particular host

c)Infectious Disease:

End product of an infectious process.

فيه فرق بين العدوى والمرض .. فالعدوى مجرد
دخولهم لجسمنا وممكن تروح بعد فترة.. بس إذا طلع
لي أعراض وبدأت تدمر الأنسجة تصير مرض

➢ A Pathogenicity

Host Resistance to Parasite Invasion is Divided into:

a)Non specific resistance: part of natural constitution of the host. e.g.

1. Competition by normal flora: compete over space and nutrients for example. GIT is relatively rich with normal flora compared to other parts of the body.
2. Skin mechanical barrier
3. Lysozymes
4. Ciliated epithelium of respiratory tract
5. Cough
6. Low pH in the stomach
7. peristalsis(movement of intestines):
8. Neutrophils

b)Specific / Acquired resistance to certain organism:
e.g. formation of antibodies

Disease in the host (just some terminology)

Resistance: The ability of the host to prevent establishment of infection by using its defense mechanisms

Susceptibility: Lack of this resistance and establishment of disease.

مثل إن كانت العدوى قد جتنا من قبل فخلاص جسمنا كون لها أجسام مضادة أو عن طريق التطعيمات نفس الفكرة

NOTES

a)Infection

Is simply **invasion** of cells and multiplication by microorganisms **without** tissue destruction.

b)Virulence is an ability to **Invade** and **destroy** tissue *to* ***produce disease***
(the degree of pathogenicity)

Virulence is **measured** by the *Lethal Dose 50 (LD50)*

LD50: Which is the *number of organisms* or *milligrams of toxins* that will kill 50% of susceptible lab animal – usually mice – when injected into such animal. When the LD50 is small, the microorganism is considered highly virulent and when it is high the organism is said to be of low virulence.

TRANSMISSIBILITY

the ability to spread from one host to another. This enables microorganism to maintain continuity of its species in the event of death of original host.

بكل بساطة هي قابلية انتشار الكائنات الدقيقه من مضيف لاخر (سواء كان انسان او غيره)
وهالشي يساعدها في البقاء والتكاثر في حالة موت المضيف

DETERMINANTS OF PATHOGENICITY

Before causing disease a microorganism should have the ability to:

↓

Adherence (Adhesion, Colonization, Growth)

↓

Surviving (escape) the host natural defense mechanisms

↓

Multiply to large numbers

↓

Invasion *Or* Toxicity

↓

Tissue destruction: It is the ability to overcome host defense invade the tissues and cause destruction to Produce clinical disease = Infectious disease

- Adherence:

It is the ability to attach firmly to host epithelial surface by the help of pili or other protein surface structures.

- Structures on host cells include:
  - Fibronectin
  - Proteins and glycopeptide parts

- Tissue destruction is produced by:

➢ Toxin production:

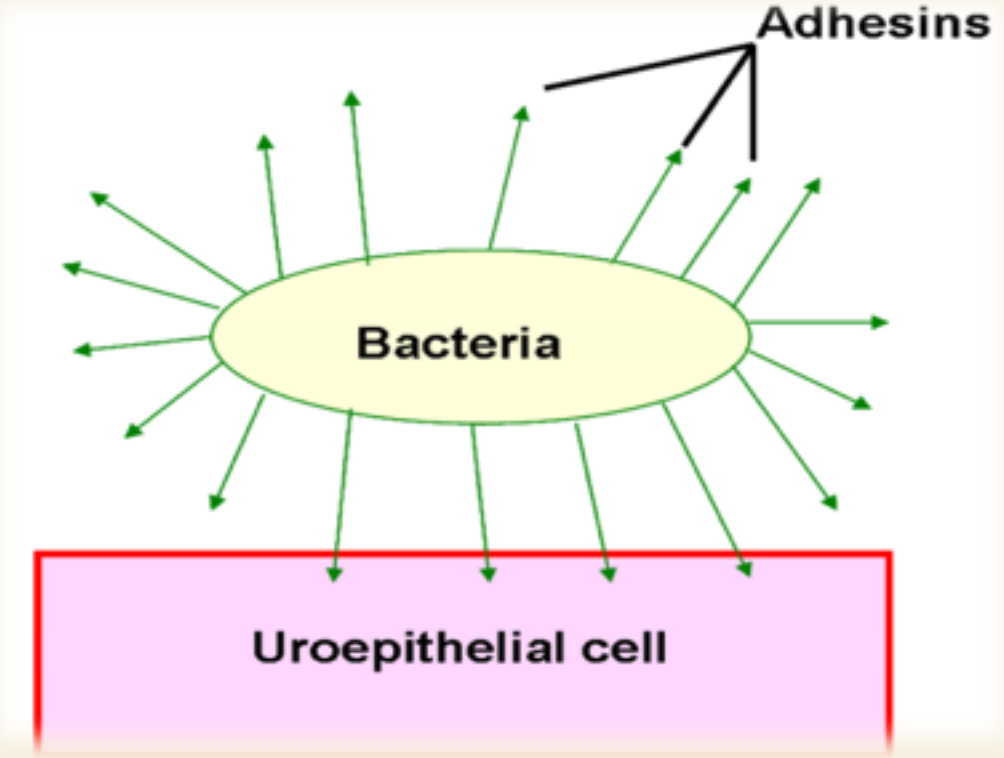
✓ Exotoxin

✓ Endotoxin (only in –tive gram)

➢ Invasion by organisms:

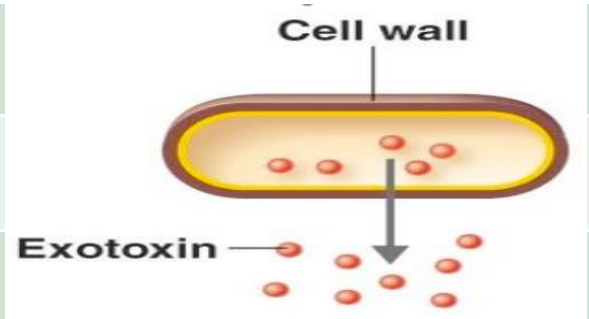
✓ Capsulated

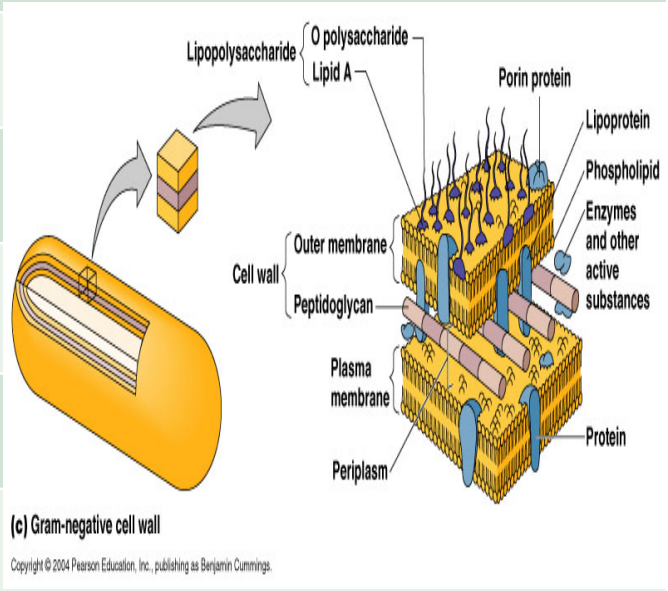
✓ Non-capsulated



What is the different between exotoxin and endotoxin?

Exotoxin gram (+)	Endotoxin gram (-)
protein	Lipopolysaccharide
Soluble	Part of cell wall
Heat Labile	Heat stable
Pharmacologically specific action يعني تهاجم منطقة معينة أو خلايا معينة مثل جهاز عصبي أو هضمي	Non-Specific أخطر
High Immunogenicity	Low Immunogenicity
Inactivated by chemicals to toxoids تصغير سم وهو نفسه اللي يستخدمونه بالتطعيمات	Do not form toxoids
No Fever	Induce Fever





CAPSULATED/NON CAPSULATED ORGANISMS

- **Capsulated organisms**: bacterial capsules are all made of polysaccharide **except** of **Bacillus anthracis** (**made of polypeptide**).

- **Capsule prevent phagocytosis :** some organisms are readily (easily) killed once they are phagocytized, these organisms called (**extracellular organisms**) **e.g (** **pneumococcus** **)**

يعني تعيش برا الخلية

- **Non-capsulated organisms**:

- resist intracellular killing (Phagocytosis) so called (**intracellular organisms**).

يعني تعيش جوا الخلية

- E.g Mycobacterium tuberculosis, Salmonella typhi, Brucella species,

The organisms which don't have capsules, have virulence factors to stop phagocytosis ,which is:

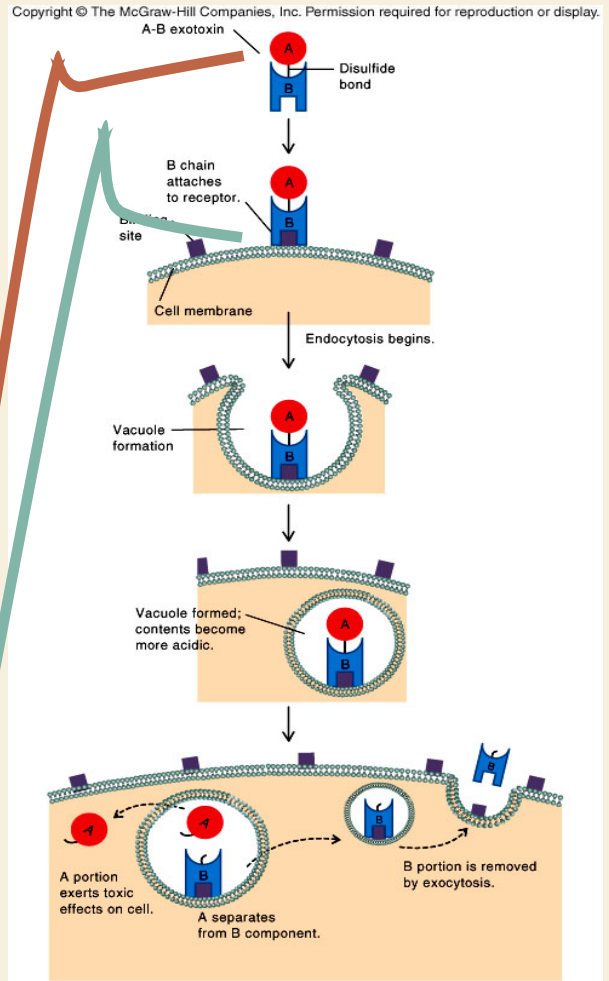
- Exotoxin (toxins):

a) Membrane active exotoxin
e.g. Haemolysin of group A Streptococci

b) A – B exotoxins e.g. ***Cholera toxins***

A : Active unit

B : Binding unit for attachment



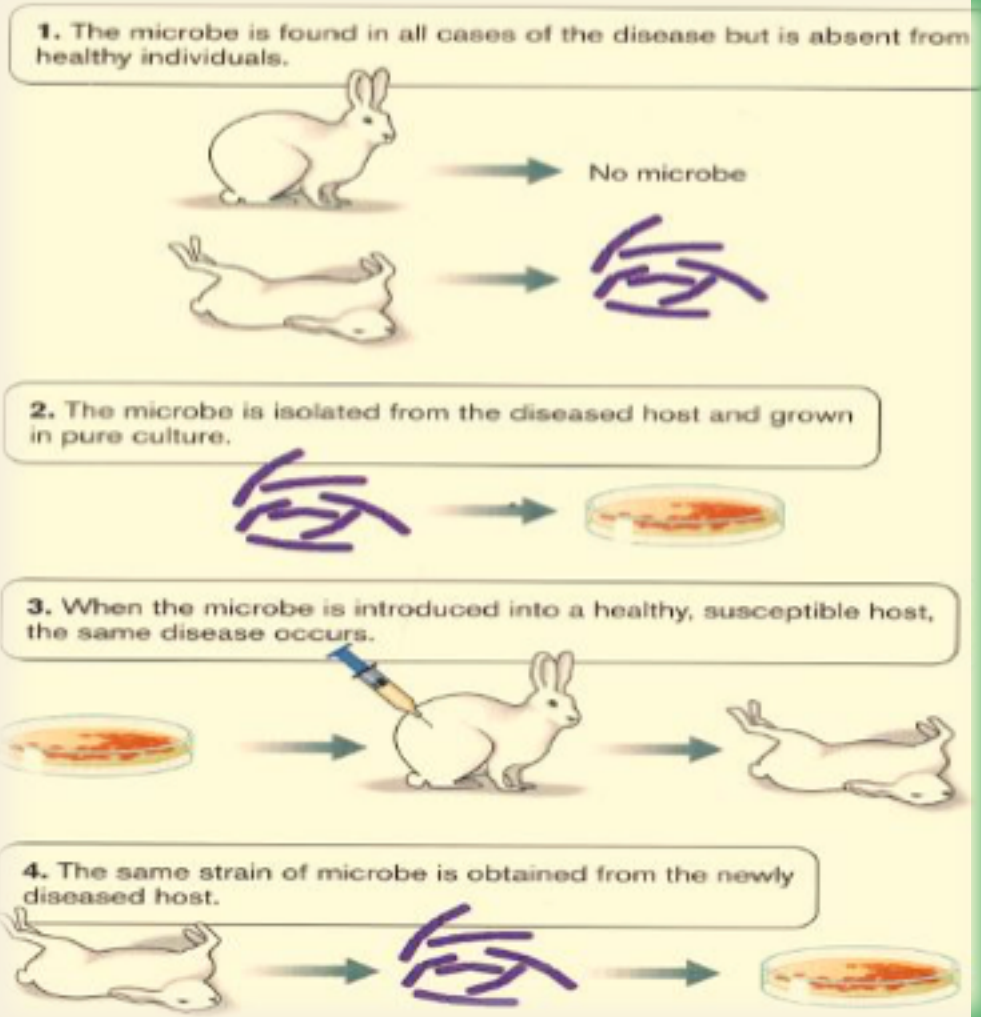
KOCH'S POSTULATES

for a microorganism to be accepted as the cause of an infectious disease it must satisfy all or most of koch's criteria

- If a microorganism is the causative (etiologic agent of and infectious disease) then it must be

- Present in every case of the disease, but absent from the healthy host(non infected)
- Isolated and grown in pure culture
- Able to cause the disease when a pure culture is inoculated into a healthy host
- Re-isolated from the host that was inoculated with the pure culture

مو مهمة ، الدكتور قال ماراح اسأل فيها.



quiz

- **A -Which of the following is a secondary pathogen?**

1. Bordetella species
2. Pseudomonas
3. Mycrobacterium tuberculosis

- **B-The ability of a microorganism to cause a disease is known as :**

1. Pathogen
2. Pathogenicity
3. Infectious disease

C-Which of the following is not a part of Non-specific resisitance:

1. Lysozymes
2. High PH in the stomach
3. Peristalsis
4. ciliated epithelium of respiratory tract

D-What helps in adhesion on bacterial cells?

1. Mesosomes
2. Flagella
3. pili

E-What is a character of endotoxin:

1. Heat liable
2. High immunogenicity
3. Part of cell wall
4. No fever

F-What is a character of exotoxin:

1. Soluble and diffusible
2. Do not form toxids
3. Lipopolysaccharide
4. Induce fever

G-Lack of resistance and establishment of disease is known as:

1. Susceptibility
2. Resistance
3. Virulence
4. infection

H- Which is the correct statement?

1. When the LD50 is high , the micro organism is considered highly virulent and when it is low The organism is said to be of low virulence
2. When the LD50 is small , the micro organism is considered highly virulent and when it is high The organism is said to be of low virulence
3. When the LD50 is small , the micro organism is considered low virulent and when it is high The organism is said to be of high virulence

I -What is the name of the bacteria the will never cause harm ?

answers

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