

Host-Parasite Relationship

— -Important
-In boy's slides

-Extra

-Notes
-In girl's slides

In this link, you will find any correction or notes unmentioned in the team's work. Please check the link below Frequently.

<https://docs.google.com/document/d/1WvdeC1atp7J-ZKWOUkSLsEcosjZ0AqV4z2VcH2TA0/edit?usp=sharing>



Objectives:

- ★ Define core terms important in understanding Host-Parasite Relationship: parasite, pathogen, pathogenicity, disease, infection.
- ★ Know host response to parasite invasion that include; Nonspecific and Specific defense mechanisms.
- ★ Name the important example of primary pathogens and opportunistic pathogens.
- ★ Recognize the transmissibility of pathogens.
- ★ Describe the attributes of pathogenicity and recalls examples, including:
 - a- Adherence.
 - b- Survival of host natural defence mechanisms.
 - C-Invasion (capsulated and non capsulated organisms).
 - d- Multiplication.
 - e- Tissue destruction by toxins (the differences between endotoxins and exotoxins).
- ★ States Koch's postulates.

Doctor's Notes:

- ★ You have a tremendous n.o. Bacteria in your body.
 - But your body is controlling them by many mechanisms.
 - Some of them are general (non-specific), and some of them are specific.
 - Sometimes they can cause diseases to you.
- ★ The majority of those diseases are coming **from outside** of the body **unless you have a problem in your immune system**.
 - If you have an abnormal immune system, you might have an infection **with the normal flora in your body**.
- ★ **Pathogenicity**: is a mechanism by which microorganisms can cause a disease, or the process of which bacteria can cause infection and attack tissue.
- ★ **Pathogen**: is the infectious agent.
 - Which is: bacteria, viruses, parasite, and fungus.
- ★ **Diseases**: is the **result** of the pathogenicity and pathogen, which the patient presented as symptoms.
- ★ So non-specific and specific resistance you have it in your body all the time to help you.
 - And because of that, the pathogen can not cause an infection with the host resistance. (لكن ممكن يصير انفيكشن من الخارج. فمثلاً لما يكون فيه جرح أو لما تلمس فمك .. إلخ)
- ★ The ciliated epithelium of the respiratory tract causes the sneeze to prevent us from organisms.
- ★ The acidity in the stomach prevents us from pathogens in our food, (and because of the acidity, we have less normal flora in the stomach).
- ★ All of the WBCs are non-specific resistance besides the Neutrophils
- ★ Non-specific resistance: normal flora and it's part of the first line of defense..
- ★ Specific resistance: is when the organisms pass the non-specific resistant (first line of defense) to the blood then you have the immune system response antigen presenting cells (APC),
 - you will have lymphoid, T cell, B cell, and protection of antibodies, those are specific.
- ★ **Primary pathogens**: is the pathogen that outside the body.
 - So there are not normal flora, they came from outside (either another person or لما تشرب ماء غير نقي or etc.).
- ★ **Secondary (opportunistic = إنتهازية) pathogens**: is the bacteria that we carry it in our bodies, they might cause an infection to us, " If there is a problem " .

Doctor's Notes:

- ★ Infection: the organism has inter the body, " doesn't mean that there a disease. " ---> (ممكن يحصل مرض ولكن مو بالضرورة يحصل برضو، باختصار لما) (يصير انفيكشن لا يعني ان صار فيه مرض).
- ★ **Virulence** (الخبث أو العدوانية): it's a feature of behavior that allows the organisms (pathogens) to destroy the human tissue.
 - Either they have toxins, enzymes, or capsules.
 - Measured the virulence according to the ability to kill certain n.o. mice (فئران).
 - The dose that can kill 50%, called (LD50).
 - LD50 و الـ Virulence العلاقة عكسية بين الـ
 - فكل ما قل حجم الجرعة ف راح تكون العداوة عالية، بمعنى آخر عندنا بكتيريا عدائية، لما نقلل الجرعة راح تكون أكثر عدائية
 - e.g. from the doctor:
 - 1 k of botulinum (bacteria), can kill all the people in the world, so it's highly virulent
- ★ Disease:
 - Resistance (يقاوم المرض): it's the ability of the host to prevent infection because they (pathogens) using different mechanisms (different PH etc.).
 - Susceptibility: can have the disease so easy.
- ★ **Transmissibility**: It's the control of pathogen's genetic material, to be adapted in the host.

Host-Parasite Relationship

- ★ Human host is in contact with many microorganisms (normal flora) only a small number of these (primary and opportunistic pathogens) can cause disease.
- ★ Host: a human (or animal or others) that supports the growth and survival and protection of the parasite.
- ★ Parasite: bacteria, virus, fungi which live within the host. may cause disease or live mutually with the host
- ★ Host-parasite relationships:

Is characterized by fighting of the organism to invade the body and the body defending itself by protective measures.

It's the relationship between the host (Human) and the microorganism.

It can be discussed under:

Pathogenicity.

Normal flora

Pathogenicity :

Host Resistance To Parasite Invasion is divided into:

a) Non specific resistance:

is part of natural constitution of the host.
e.g.

- Skin mechanical barrier.
- ciliated epithelium of respiratory tract.
- Competition by normal flora.
- Low pH in the stomach.
- Cough.
- Peristalsis (movement of intestines).
- Lysozymes (abundant in the eye).
- Neutrophils (WBCs).

★ It is the ability of a microorganism to cause disease.



b) Specific / Acquired resistance:

is acquired resistance to certain organism
e.g.

- formation of Antibodies.

Pathogens & Disease in the host

★ Pathogens:

A microorganism having capacity to cause disease in a particular host.

Can be divided according to degree of Pathogenicity into:

a) Primary pathogens:

causing disease in non immune host to that diseases, it's from outside the body normally, and able to cause infection.

e.g. - *Bordetella species*
- *Mycobacterium tuberculosis*.

&

b) Opportunistic (انتهازية) pathogens:

having low pathogenicity and infect people with low immunity.

Can cause an infection in specific situation, usually coming from inside.

e.g. *Pseudomonas*

★ Disease in the host:

Resistance:

- ★ It is the ability of the host to prevent establishment of infection by using its defense mechanisms.

Susceptibility:

- ★ Lack of this resistance and establishment of disease.

Note:

★ a) Infection:	★ b) Virulence:	★ c) Primary pathogen & Secondary pathogen:
is simply invasion of cells and multiplication by microorganisms without tissue destruction.	is an ability to invade and destroy tissue to produce disease.	Primary pathogen: the organism is able to produce disease even in apparently healthy host.
	Virulence is measured by the Lethal dose 50 (LD50) which is the number of organisms or mg. of toxins that will kill 50% of susceptible lab. animal (usually mice) when injected into such animal. When the LD 50 is small, the microorganism is considered highly virulent and when it is high the organism is said to be of low virulence.	Secondary Pathogen (opportunistic pathogen): it causes disease only when the host's defenses are impaired

★ Transmissibility:

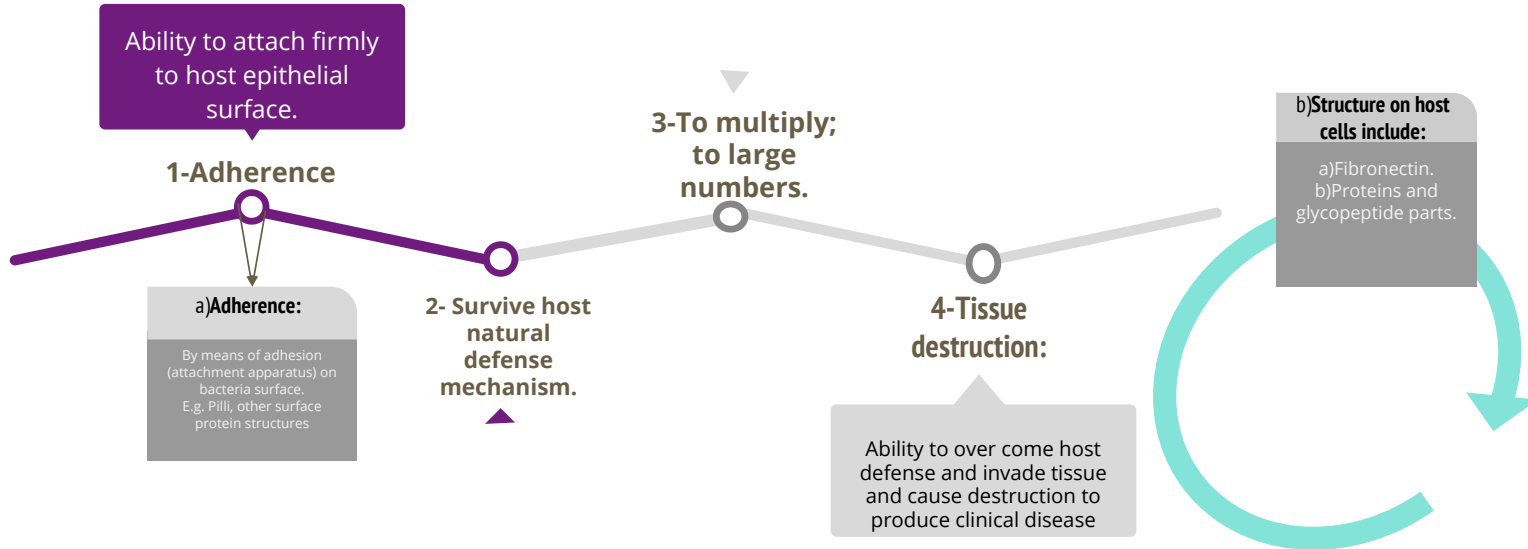
The ability to spread from one host to another, this enables microorganism to maintain continuity of its species in the event of death of original host.

It's one mechanism to survive and it's the ability to adapt.

(البكتيريا ما تقتل الهوست عشان ما تنهي أجيالها)

Determinants of Pathogenicity

Before causing disease a microorganism should have the ability to:



Determinants of Pathogenicity

C) Tissue destruction is produced by:

a) Toxin production either

★ Exotoxin

★ Endotoxin

a) A - B -exotoxins
e.g. Cholera toxins

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

b) Invasion by

Organisms

★ Capsulated
Hide them.

Capsulated organisms bacterial
are all made of **polysaccharide**
except that of B.anthraxis
(made of **polypeptide**)

Capsule prevent phagocytosis
(extracellular organisms).
e.g Pneumococcus

★ Non-capsulated
(intracellular
organism)

e.g. M. tuberculosis,
Salmonella typhi,
Brucella species

A-B subunit - exotoxin

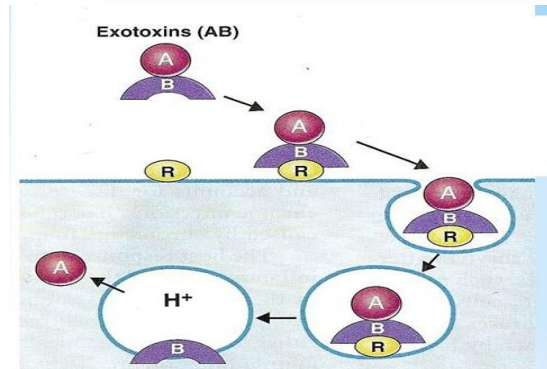
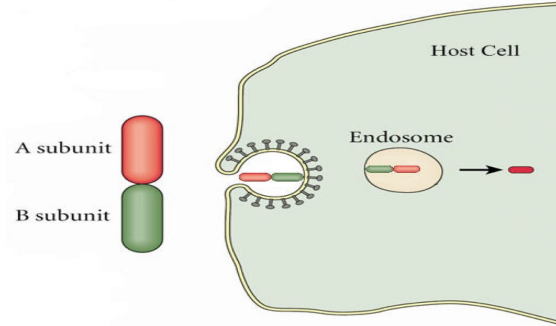
E.g. of exotoxin:
Cholera toxins

A = Active Unit.
(stop protein synthesis)

B = Binding Unit for attachment
(for attachment)

AB exotoxin enters cells via:

1. Receptor mediated endocytosis.
2. Fusion of vesicle with lysosome.
3. Acid environment of lysosome reduces disulfide bonds and releases a into cell.
4. A has various cellular activities.



★ Memorise them

Exotoxin Vs. Endotoxin

Exotoxin (mainly Gram +)	Endotoxin (mainly Gram -)
Protein (fragile)	Lipopolysaccharide (or oligosaccharides)
Soluble & Diffusible	Part of cell wall
Heat labile	Heat stable
Pharmacologically specific action ← (producing specific action)	Non-specific (most serious one). ← <small>كلهم خطيرين</small>
High Immunogenicity	Low Immunogenicity
Inactivated by Chemicals to toxoids	Do not form toxoids
No fever	Induce Fever

Koch's Postulates

- ★ For a microorganism to be accepted as the cause of an infectious disease it must satisfy all or most of these criteria :



Notes:

- ★ it is important to know the determinants of pathogenicity and the difference between endotoxin exotoxin And between primary & secondary pathogen.
- ★ All examples in toxin production bacteria and invasion by capsulated are **imp.**

MCOs

1) 2) 3) 4) 5)

Q1) which of the following is an opportunistic pathogen?

A) borderella B) HIV C) mycobacterium TB D) pseudomonas

Q2) most gram negative bacteria are

A) endotoxins B) exotoxin C) spore forming D) b+c

Q3) exotoxin bacteria has

A) lipopolysaccharide B) high immunogenicity C) low immunogenicity

Q4) LD50 is small in :

A) High virulent bacteria B) low virulent bacteria C) both D) neither

Q5) which of the following is a characteristic of endotoxin bacteria

A) no fever B) heat labile. C) don't form toxoids. D) protein

SAQ

Q1: the ability of a microorganism to cause a disease is known as ?

ANS: pathogenicity

Q2: Host resistance to parasite invasion is divided into :

ANS: 1- non specific resistance
2- specific/acquired resistance

Q3: The ability to spread from one host to another enables bacteria to :

ANS: maintain continuity of its species
in the event of death of the host

Q4: why do we call non capsulated organism an intracellular organism ?

ANS: because it resists
intracellular killing

Team Leaders:

Members:

بدر القرني ★

- فيصل ع. الزهراني ★
- الوليد العازمي ★
- عبدالله الحوامدة ★
- عبدالله الداود ★
- عبدالرحمن البديوي ★
- فيصل القبلان ★
- عبدالله العثمان ★
- بدر المهنا ★
- عبدالرحمن الحواس ★
- محمد الشويعر ★
- فارس المبارك ★
- عبدالله النويبت ★

حنين الصميلي ★

- سارة يوسف الفليج ★
- أميرة الزهراني ★
- غادة السدحان ★
- نجود العلي ★
- جود الخليفة ★
- دينا عورتاني ★
- ريناد المطوع ★
- سارة الهلال ★
- طيبة الزيد ★
- لينا النصر ★
- ميسون آل تميم ★
- نورة المزروع ★
- سارة الخيفي ★
- رغد الخشان ★
- لينا العصيمي ★

★ **Contact us:**

MicrobiologyTeam438@gmail.com

[@Microbiology438](https://www.instagram.com/Microbiology438)