



MICROBIOLOGY

SAEF DAWWAS

Host-Microbe Relationships

Lecture# 5

Pharmaceutical Microbiology

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Normal (Indigenous) Microflora

- An adult human body harbors 10^{14} (100 trillion) prokaryotic and eukaryotic microorganisms on the skin surface, on mucous membranes, and in the passageways of the digestive, respiratory, and reproductive systems.
- Normal microflora: microorganisms that live in or on the body **without causing any harm, it is divided into:**
 - **Resident microflora: always present in or on the body.** Present in areas which are accessible & where conditions are suitable for growth (moist, warm, availability of nutrients).
 - **Transient microflora are microorganisms that can** be present under certain conditions in any of the locations where resident microflora are found.

عنا 10^{14} تقريبا من ال M.O بحسبها بين Prokarutic eukarutic

ال Microflora بتختار وسط warm, moist عشان تعيش فيها

فلا اما بكون **Residant** لما تلاقي مكان رطب ودافي عشان تنمو و
تتكاثر مثل الموجودة بالأمعاء او زي E.COLI في منها strain
مرضية

او بتكون **Transiant**

بتيجي بظروف معينة أحيانا هي الي تسبب أمراض
مش لازم تعملى مرض (زي normal floris) لكن بعض الأوقات
بسبب تغير الظروف التي يعيش فيها بتصير مرضة

Normal Microflora (Microbiota)

- resident and transient microflora are usually harmless but can cause disease under certain conditions. These organisms are called **opportunists**
- Conditions that create opportunities for such organisms include:
 1. *Failure of the Host's Normal Defenses*
 2. *Introduction of the Organisms into Unusual Body Sites*
 3. *Disturbances in the Normal Microflora.*

هسا حكيانا انه بتصحلها فرصة أحيانا انها تعمل مرض زي مثلا
المناعة تتغير تقل بسبب مرض (cancer, Diabetic) او بسبب
malnutrition انه موقعها يتغير مثلا ecoli الطبيعي انها
تكون موجودة بالأمعاء الغليظة وهناك بتفيد وبتسفيد
اذا تغير ال Site تاعاتها مثلا لقيناها بال uniray tract
هيك بتصير ممرضة مثلا Microflora موجودة بال intestine
ممکن تصير بينهم علاقة ضدية ممكن تصير فرز مواد عشان تؤدي
ال Micro flora فمثلا لما نوحذ دواء معين عشان تقتل ال M.O

فبتأثر على المايكرو فلورا وبتخريبها وهي أصلا كانت تحاول انها
تعمل Defence لل M.O فانت لما اخدت ال anti biotic
قللت ال M.O الي كانت تساعد

Classification of Diseases

مش شرط ال infection يكون معدي

- **Communicable infectious (contagious diseases):** infectious diseases can be spread from one host to another

E.g : Rubella(red measles) and rubella are highly communicable.

- **Noncommunicable infectious diseases are not spread** from one host to another

E.g:

- Ingestion of food poisoned by bacterial **toxin, e.g. enterotoxin (Staph.)**
- Infection by organisms in the **environment ,e.g. Tetanus**

اي infection اول اشي لازم يكون :

Contact ---> inmate ---> multibly

How Bacteria Cause Disease

- **Virulence factors:** are structures or physiologic characters of a pathogen that increase its ability to cause infection & disease; such as:
 - **Adhesions:** help the bacterium to adhere & colonize the host.
 - acid damage لعمل (الي بشتغل زي glu بربط الخلايا ببعض)
 - **Enzymes:**
 - 1. Hyaluronidase (*Streptococci*)
 - 2. Coagulase (*Staphylococcus aureus*): clots blood & protect bacteria from immune system
 - 3. Streptokinase (*Streptococci*): dissolves blood clot & aid bacterial spreading and invasion
 - **Toxins:**
 - 1. Exotoxins: mostly proteins or polypeptides secreted by the bacteria into host tissues
 - 2. Endotoxins: part of the cell wall of **G-ve bacteria (LPS)** which are released into the body when bacteria die

البكتيريا عشان تعمل

مرض

أول اشي اما بتفرزلي

toxins أو enzyme

بعمل acid damage

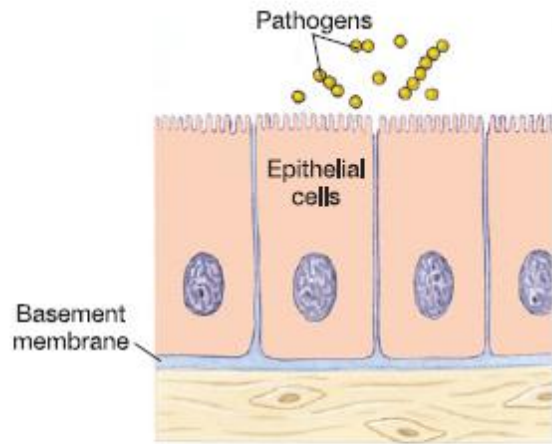
(الي بشتغل زي glu

بربط الخلايا ببعض)

مادة بتفرزها هاي البكتيريا

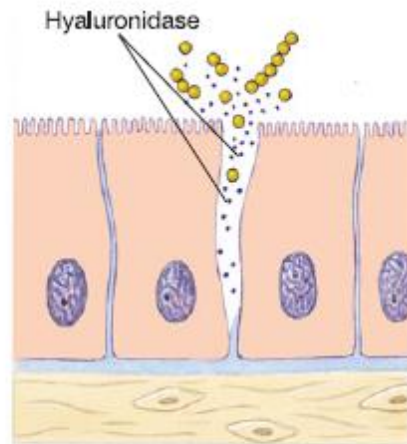
بتسرع عملية تخثر الدم عشان تعمل clout تتخبي فيها من immune system

الأنزيم الي بتفرزوا بحلل الخثرة تاعت الدم وهيك بطلع منها وبروح للأنسجة الثانية

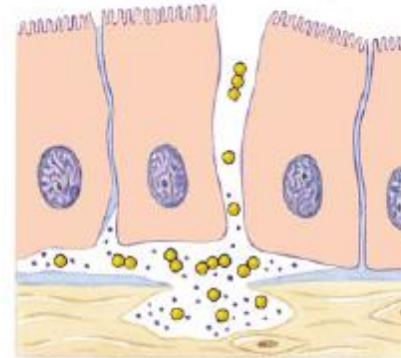


(a)

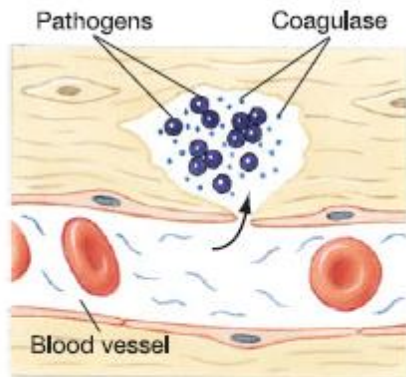
1. Invasive pathogens reach epithelial surface.



2. Pathogens produce hyaluronidase.

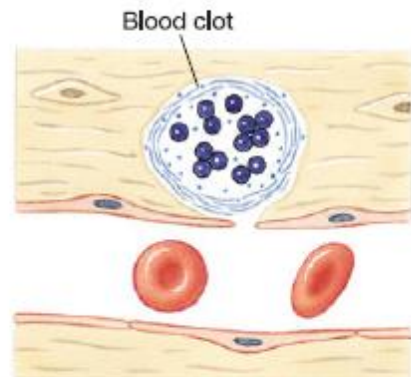


3. Pathogens invade deeper tissues.

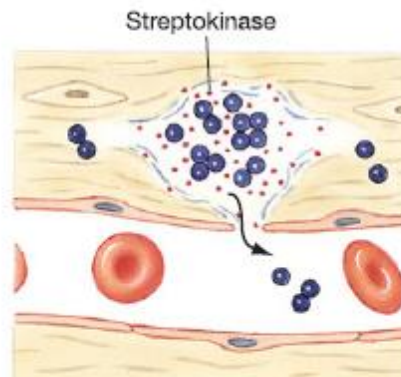


(b)

1. Pathogens produce coagulase.



2. Blood clot forms around pathogens.



3. Pathogens produce streptokinase, dissolving clot and releasing bacteria.

Enzymatic virulence factors help bacteria invade tissues and evade host defenses. (a) Hyaluronidase dissolves the

“cement” that holds together the cells that line the intestinal tract. Bacteria that produce hyaluronidase can then invade deeper cells within the intestinal tissues. **(b)**

Coagulase triggers blood plasma clotting, allowing bacteria protection from immune defenses. Streptokinase

dissolves blood clots. Bacteria trapped within a clot can free themselves and spread the infection by producing streptokinase.

Stages of an Infectious Disease

- **The Incubation Period** is the time between infection and the appearance of signs and symptoms.

It ranges from few days (cholera) to months (hepatitis) or years (AIDS)! Patient is contagious in this stage.

- **The Prodromal Phase** is a short period during which nonspecific, often mild, symptoms such as malaise and headache sometimes appear. Infected individuals are contagious.

- **The Invasive Phase** is the period during which the individual experiences the typical signs and symptoms of the disease. During this phase, the time when the signs and symptoms reach their greatest intensity is known as the **acme**. During the acme, pathogens invade and damage tissues.

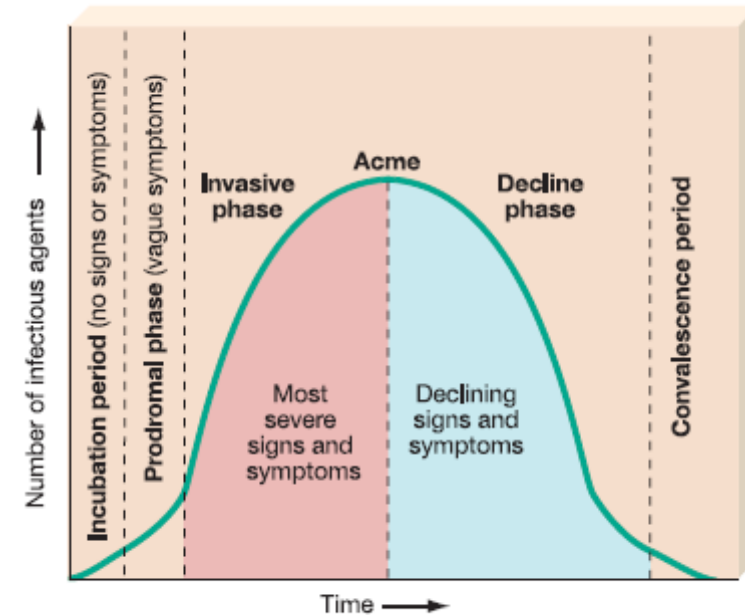


FIGURE 14.9 Stages in the course of an infectious disease.

Stages of an Infectious Disease

- The **Decline Phase** is the period of illness during **which host defenses** and the effects of treatment finally overcome the pathogen.
- **Convalescence period:** recovery phase. Symptoms disappear, body heals & regain strength. persons recovering from the disease can **still transmit pathogens to others**

However, Effects remaining after the disease has ended are called **sequelae** e.g: **Permanent heart or kidney damage can be due to streptococcal infections**

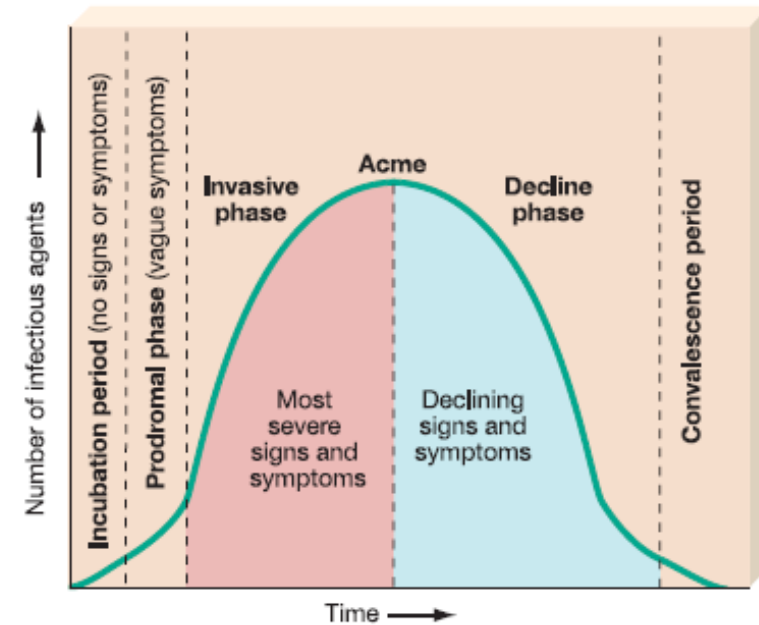


FIGURE 14.9 Stages in the course of an infectious disease.

stage of infection :

عبارة عن graph يمثل مراحل ال Disease

incubation :

مثلا الكورونا بتبين اعراضها من ٣ الى ٥ أيام من لما تاخذ الفيروس
بهاي المرحلة ممكن تعدي غيرك

Prodormal :

بتبلش الأعراض بس بتكون طفيفة وعامة مثلا بال كورونا الضعف
العام والتعب العام

invasive :

بتبلش أعراض المرض الصبح تطلع ووصلت ال peak و بيلش يعمل
Damage للأنسجة وبرضو معدي ، بنحاول نعطي ال treatment

Dealline phase :

ال intensity بتبلش تتراجع للعدوى

Convalescence Period :

تصير أعراض المرض تختفي بس برضو لسه معدي بس هون
بسبب ال infection يمكن يصير في عندك مشكلة دائمة زي العمى
مثلا

Important Terms

ما يعرف حفظ ولا لاء ، بسأل الدكتور
وبتأكد

Table 14.8 Terms Used to Describe Infections

Term	Characteristic of Infection
Acute disease	Disease in which symptoms develop rapidly and that runs its course quickly
Chronic disease	Disease in which symptoms develop slowly and disease is slow to disappear
Subacute disease	Disease with symptoms intermediate between acute and chronic
Latent disease	Disease in which symptoms appear and/or reappear long after infection
Local infection	Infection confined to a small region of the body, such as a boil or bladder infection
Focal infection	Infection in a confined region from which pathogens travel to other regions of the body, such as an abscessed tooth or infected sinuses
Systemic infection	Infection in which the pathogen is spread throughout the body, often by traveling through blood or lymph
Septicemia	Presence and multiplication of pathogens in blood
Bacteremia	Presence but not multiplication of bacteria in blood
Viremia	Presence but not multiplication of viruses in blood
Toxemia	Presence of toxins in blood
Sapremia	Presence of metabolic products of saprophytes in blood
Primary infection	Infection in a previously healthy person
Secondary infection	Infection that immediately follows a primary infection
Superinfection	Secondary infection that is usually caused by an agent resistant to the treatment for the primary infection
Mixed infection	Infection caused by two or more pathogens
Inapparent infection	Infection that fails to produce full set of signs and symptoms

آخر سلايد بالمحاضرة

بالتوفيق للجميع



Artery Academy