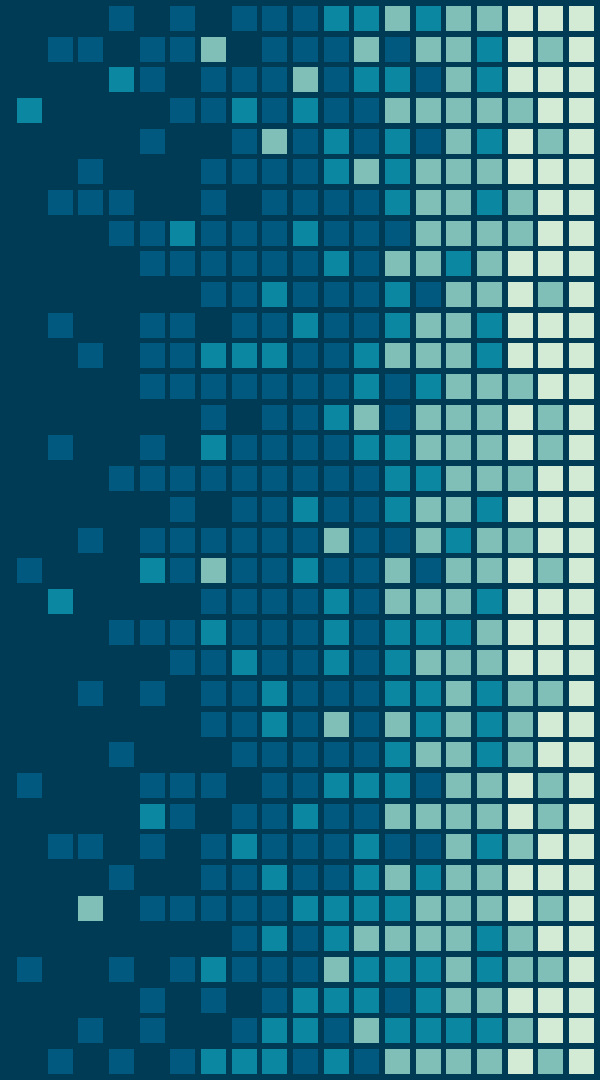
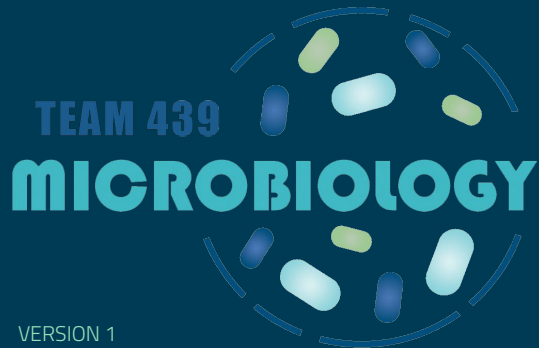


Normal Flora



Objectives

- ❖ Define the terms: Normal Flora, Resident flora, Transient flora and carrier state.
- ❖ Know the origin of normal flora.
- ❖ Know the effects and importance of normal flora such as:
 - Source of opportunistic infection.
 - Immunostimulation.
 - Nutrition: Vitamins production.
 - Production of Carcinogens.
 - Protection against external invaders.
- ❖ Know areas of the body with normal flora (gastrointestinal tract, urogenital tract, and skin) , most common types of organisms and its relation to pathogenicity.
- ❖ Know the sites of the body with no normal flora eg. sterile body sites and the importance of this fact in relation to interpretation of culture results.

Colour index:

- **Red: Important**
- **Grey: Extra info & explanation.**
- **Purple: only in girl's slides.**
- **Green: Only in boy's slides.**
-

Any future corrections
will be in the editing
file, so please check it
frequently.

Scan the code
Or click [here](#)



Normal Flora

A population of microorganisms (mostly bacteria) in a normal healthy individual (humans & animals).

- It is a **symbiotic** (تعایش) relationship between the body & the normal flora (close association with no harm).
- It is **subject to constant change**, and it **can be altered by antimicrobial agents**.
- They are frequently found in the: skin, mucous membrane, and other sites.

Note: you must understand the difference between residents and transients (slide 18)

Types of normal Flora

Commensals

Microorganisms that have a natural relationship with the host. Have **no benefit or harm** and are found in **low numbers**. Mainly associated with **GIT**.

Residents

Relatively **fixed types** of microorganisms regularly found in a given area at **invariable period** (months, years). If disturbed, it **re-establish itself** promptly (immediately).

Transients

*Discussed in details (the next slide).

Carrier state

Potentially pathogenic bacteria that are carried by the individual **without causing disease**. It is the source of infection to other susceptible (non-immune) individuals. Examples in the throat of healthy individual: **Neisseria meningitidis** and **Streptococcus pneumoniae**.

Transient Flora consist of 2 types:

Non-Pathogenic

Potential Pathogenic

Are microorganisms that **establish themselves briefly** (hours or days) **in the skin or mucous membranes.**

Transient organisms that live in the external environment are attracted to **moist and warm body sites.**

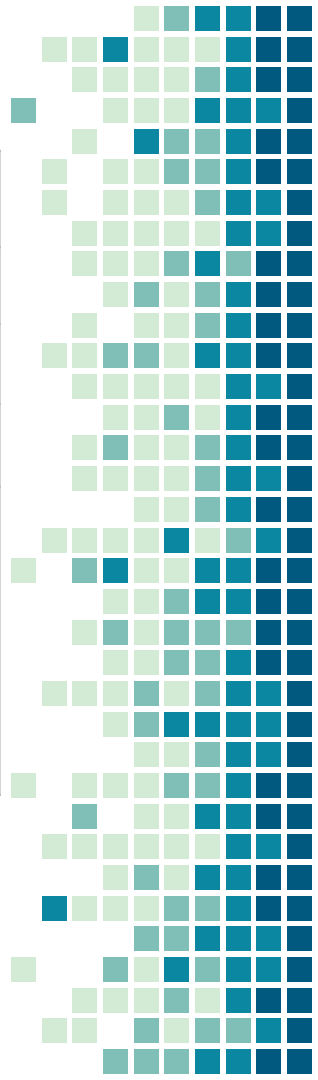
Excluded by: host defense or competition from resident flora.

It is Temporary Because:

- 1- Are washed by hand wash or bathing
- 2- May not survive in acidic or alkaline PH of body sites.
- 3- May be flushed away by body secretions like tears, sweat, oil, urine, and feces.
- 4- Competition by resident Flora.
- 5- Killed by substances produced by resident Flora.

Origin of Normal Flora

- **Before birth**, in the uterus, newborn is **sterile.**
- **After birth**, newborn is **exposed** to the flora of the mother's genital tract, skin, respiratory tract, flora of the person who is holding the newborn, and the organisms in the environment



Beneficial Effects of Normal Flora

01	Immunostimulation	Antibody production (يحفز جهاز المناعة يكون أجسام مضادة للبكتيريا)
02	Exclusionary effect (vacuum effect)	Protection from external invaders (يعمل على الحماية من المُمْرِضات عن طريق طردها)
03	Antagonize	Inhibit or kill (antagonize) non-indigenous bacteria through the production of substances (toxin)
04	Production of essential nutrients (Vitamin K&B)	By some intestinal normal flora eg. E.coli



Symbiosis

Team438: Most of normal flora are either in Commensalism or Mutualism, which get benefit without harming the host, or get and give benefits.



Symbiosis	First symbiont	Second symbiont
Neutralism	No effect	No effect
Commensalism	No effect	Benefit
Mutualism	Benefit	Benefit
Parasitism	Harm	Benefit

Facts About Normal Flora

1

Opportunistic Infections

May be a source of **opportunistic infections** in patients with impaired defense mechanisms. For example: **Staphylococcus epidermidis & E.coli.**

ممکن تكون مصدر عدوى وتتنهز الفرصة لما تكون مناعة الجسم ضعيفة

2

Cross Reacting

Some may **cross react with normal tissue** components ,eg. **antibodies to various ABO group** arise because of cross reaction between intestinal flora and the antigens of A & B blood substances.

3

Production of Carcinogens

Some normal flora may modify through their enzymes chemicals in our diets into **carcinogens**. (مواد مسرطنة)

Eg. **artificial sweeteners** may be enzymatically modified into bladder carcinogens.

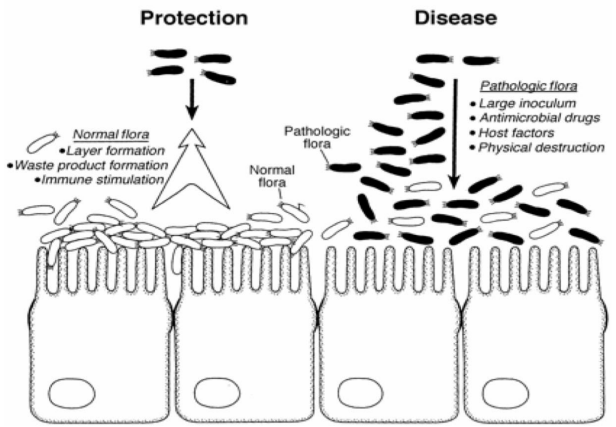
4

Effects on Normal Flora

Normal flora is affected by: consuming antibiotics, tissue damage, mechanical procedures, and diet change.



Normal Flora vs Pathogenic Flora



The picture is for further clarification

True vs Opportunistic pathogen

True Pathogen (Primary)	Opportunistic Pathogen (Secondary)
Full-time bad guys	Part-time bad guys
Causes disease in a healthy person.	Causes disease to people with low or weak immunity (immunocompromised host).
- Associated with a specific & recognizable disease.	- Gain access (injury) to sterile regions

Note: Normal flora can act as a pathogen when someone's immunity becomes weak or they increase in number.



Distribution of Normal Flora

- Normal flora is found on **external body** sites (كل المناطق المكشوفة بالجسم).
- **Internal organs are sterile** (خالية من البكتيريا) at health (except the **Gastrointestinal/alimentary tract**).

Sterility of internal organs maintained by :

Chemical substances in serum (Plasma without fibrinogens) & tissues eg. complement and antibodies.

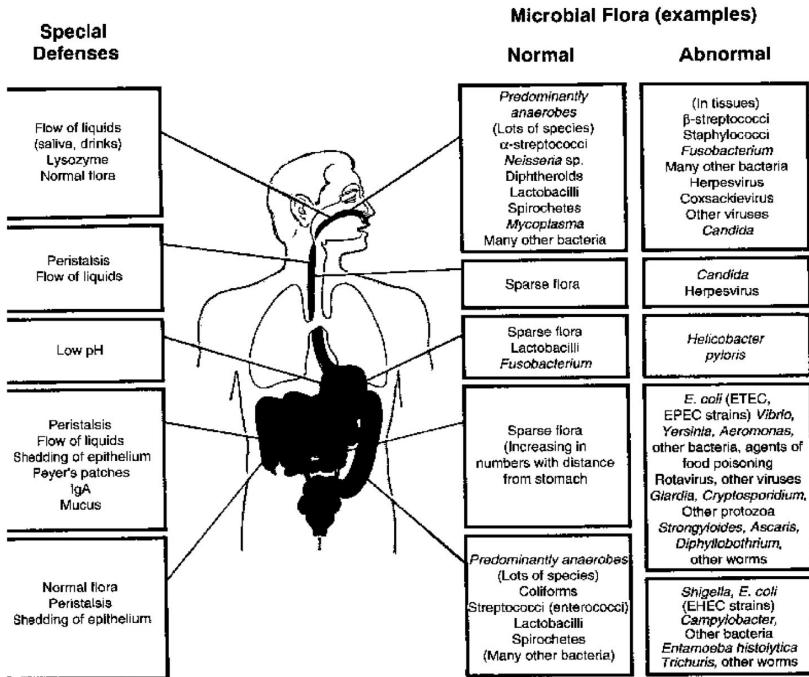
Local defense mechanisms
Eg. pH of stomach

Phagocytic activity of Polymorphonuclear monocytes



Contd, Distribution of Normal Flora

موجودة في الـ
upper GIT & the nose
وكل ما نزلنا تحت تزيد أعدادها



Body sites with normal flora

All external body sites contain normal flora:

Gastrointestinal tract:
mouth & large colon (colon has the most normal flora).

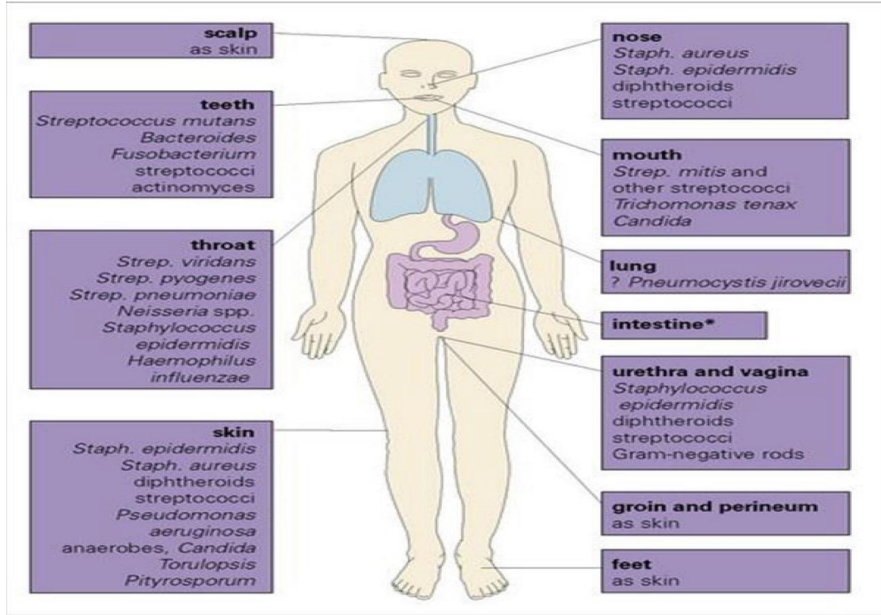
Urogenital tract: vagina & distal one third of the urethra.

Upper Respiratory tract
(above the larynx)

Skin: (including external ear & conjunctiva)

The Sites of Normal Flora In The Body

It's only for your background



DISTRIBUTION AND FREQUENCY OF BACTERIA IN THE INTESTINE			
density	frequency of occurrence in population		
oesophagus			
stomach	lactobacilli		
small bowel			
duodenum	lactobacilli streptococci		
jejunum	Enterobacteria Bacteroides spp.		
ileum			
large bowel	<table border="1"> <tr> <td><i>Bacteroides</i> spp. <i>Fusobacterium</i> spp. <i>E. faecalis</i> <i>Escherichia coli</i></td> <td>Enterobacteria <i>Klebsiella</i> spp. Eubacteria Bifidobacteria</td> </tr> </table>	<i>Bacteroides</i> spp. <i>Fusobacterium</i> spp. <i>E. faecalis</i> <i>Escherichia coli</i>	Enterobacteria <i>Klebsiella</i> spp. Eubacteria Bifidobacteria
<i>Bacteroides</i> spp. <i>Fusobacterium</i> spp. <i>E. faecalis</i> <i>Escherichia coli</i>	Enterobacteria <i>Klebsiella</i> spp. Eubacteria Bifidobacteria		
faecal material	<table border="1"> <tr> <td>Lactobacillus <i>Staph. aureus</i> <i>Clostridium</i> spp.</td> <td>Streptococci <i>Pseudomonas</i> <i>Salmonella</i></td> </tr> </table>	Lactobacillus <i>Staph. aureus</i> <i>Clostridium</i> spp.	Streptococci <i>Pseudomonas</i> <i>Salmonella</i>
Lactobacillus <i>Staph. aureus</i> <i>Clostridium</i> spp.	Streptococci <i>Pseudomonas</i> <i>Salmonella</i>		



Normal Flora of The Respiratory Tract

- Upper respiratory tract **colonized** (full of bacteria) by normal flora as in the **mouth and nasopharynx**.
- Lower respiratory tract is sterile** eg. trachea, lung.



Common Nose Flora

Staphylococcus
epidermidis

**Staphylococcus
aureus** 30%

Corynebacterium
species

Coagulase (+)

It is the main flora in
**nose, axilla, and
groin.**

NOTE: Staphylococcus epidermidis is always related to the skin (It's all over the body).

Normal Flora Of The Oropharynx (Throat)

Normally found

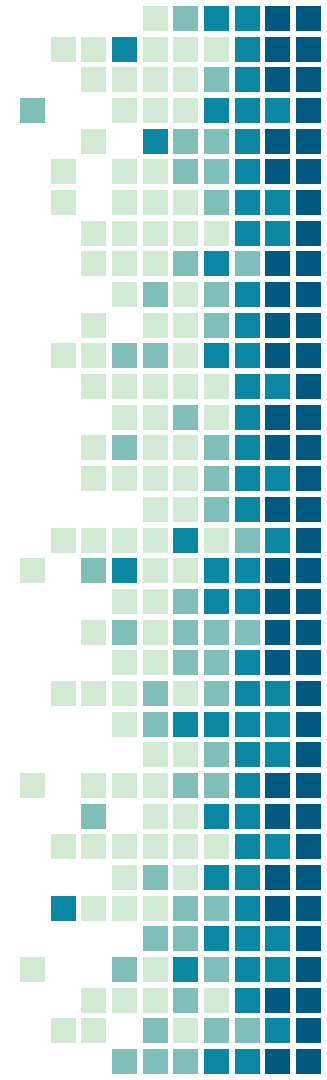
- **Viridans streptococci.** (the **most common** normal flora of oropharynx)
- **Commensal neisseria and moraxella*.**
- Corynebacteria.
- Bacteroides.
- Fusobacteria, Veillonella, Actinomyces, Spirochaetes.

potential pathogens

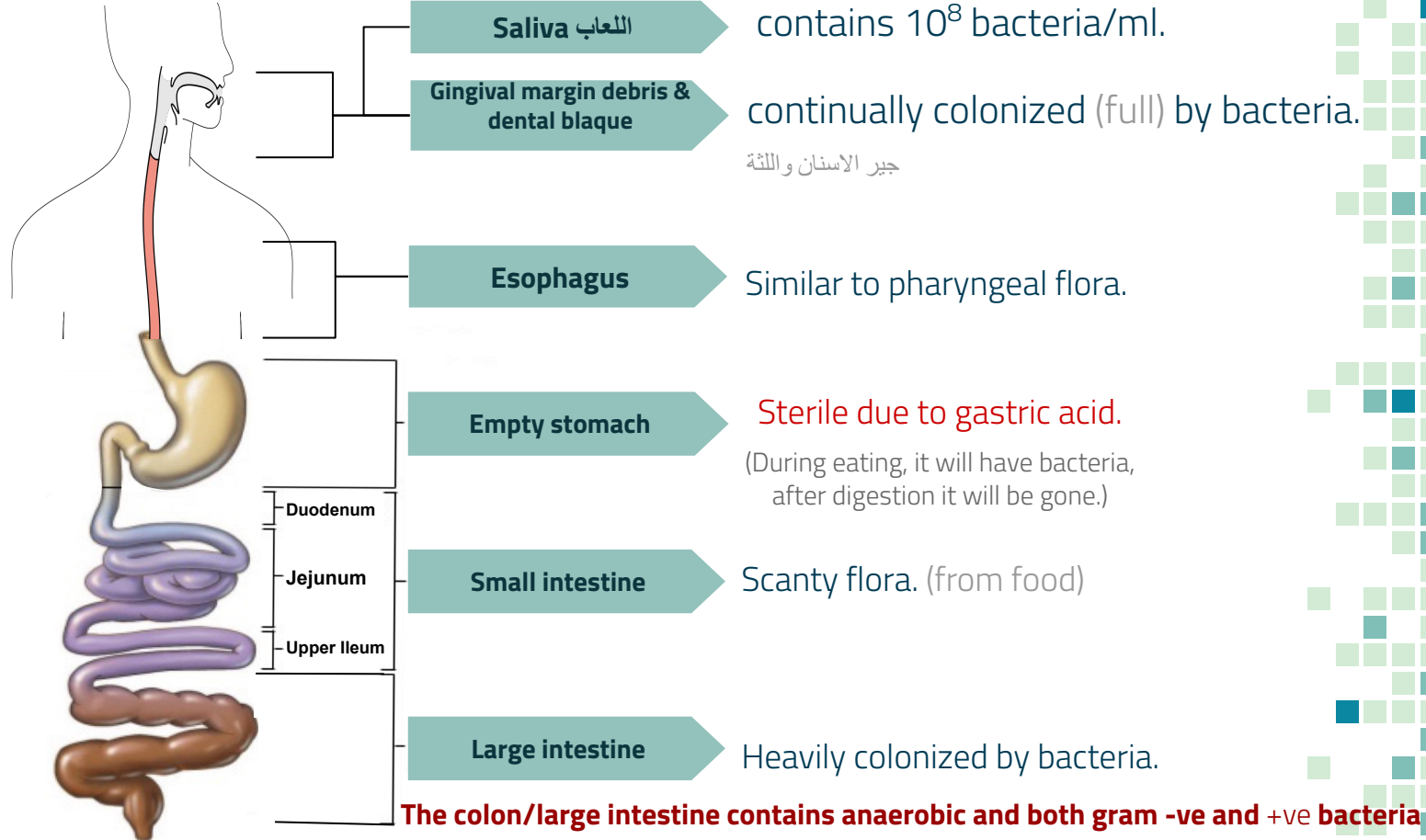
- **Haemophilus influenzae**
- **Pneumococcus (Streptococcus pneumoniae).**

Less common potential pathogens:

- Streptococcus pyogenes
- Neisseria meningitidis.



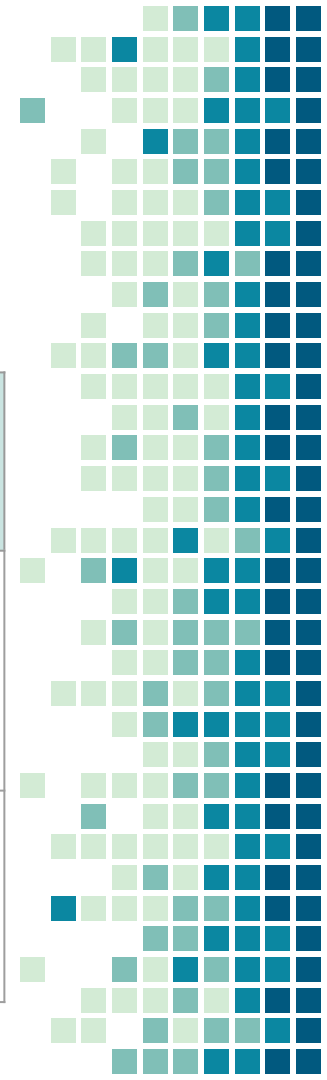
Normal Flora Of The GIT:



Feces (Stool):

- 1/3 of feces weight is bacteria, mainly dead bacteria.
- Living bacteria about 10^{10} /gm of stool.
- Mainly gram -ve

Anaerobes (99%) لاهوائية	Aerobics هوائية
<ul style="list-style-type: none">● Bacteroides fragilis group (the dominant anaerobes)● Bifidobacteria● Lactobacilli.	Less common aerobics: <ul style="list-style-type: none">● E.coli● Proteus.
<p>Anaerobic environment is maintained by aerobic bacteria utilizing free O₂.</p> <p>باختصار البكتيريا الهوائية تمتص الاوكسجين وتخلي الوسط والبيئة مناسبين للبكتيريا اللاهوائية انها تعمل</p>	



Normal Flora Of The Genital Tract:

- Female genital tract heavily colonized because the female's external genital tract is shorter than male's.
- 10^8 /ml flora in normal vaginal secretion.
- In both sexes **Mycobacterium smegmatis** in secretions contaminates urine and leads to confusion /misdiagnosis of tuberculosis.*

Male & Female distal urethra (مجري البول):

- **Staphylococcus epidermidis**
- **Corynebacteria.**
- **Mycoplasma species**

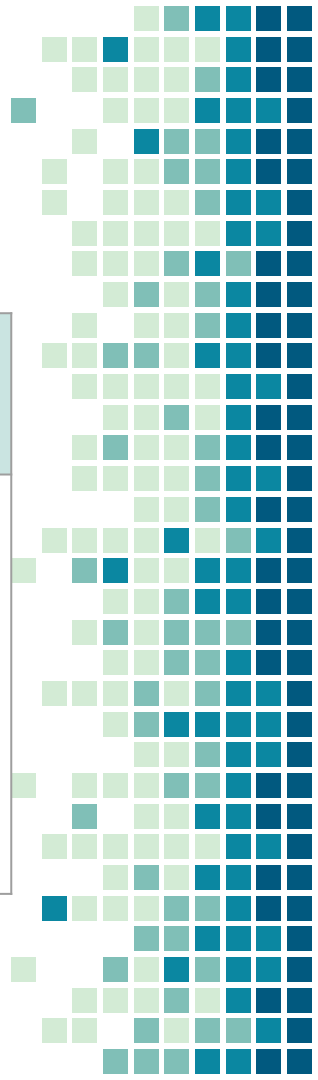
*** Note:**

تلوث أو تشوب urine وبالتالي يصير تشخيص خاطئ أحيانا، لأن شكلها تحت المجهر يشبه شكل بكتيريا الدرن (Mycobacterium tuberculosis)

Normal Flora Of The Female Genital Tract

Vulva (external part)	Vagina (Inside)
<ul style="list-style-type: none">● Staphylococcus epidermidis● Corynebacteria● E.coli.● other coliforms & Enterococcus faecalis.	<ul style="list-style-type: none">● Lactobacillus (Doderlein's bacilli) *● Bacteroides melaninogenicus.● Enterococcus faecalis.● Corynebacteria.● Mycoplasma.● Yeasts.

*Reason for acidity of the vagina, it provide protection for female.



Normal Flora of The Skin

- Skin has rich resident bacterial flora.
- Exist in microcolonies
- Anaerobic organisms are predominate in areas with sebaceous glands.
(Eg. hair scalp. mostly it will have anaerobic organisms).
- Moist skin, often colonized by coliforms
(Gram negative bacteria)

Extra: sebaceous glands are microscopic exocrine glands in the skin that secrete an oily or waxy matter.

★ Skin Flora

	Resident organisms	Transient organisms
Site	Deeper layers of skin	Superficial layers of skin
Duration	Permanent	Temporary
If distributed	Re-establish themselves	Do not Re-establish themselves
Effect of hand wash	Not removed	Easily removed
association with infection	Usually NOT associated	Usually associated



Main skin flora

Team 435: Any skin has staphylococcus epidermidis and corynebacterium

- **Staphylococcus aureus (potential pathogen)**

It is a normal flora, but it is especially dangerous

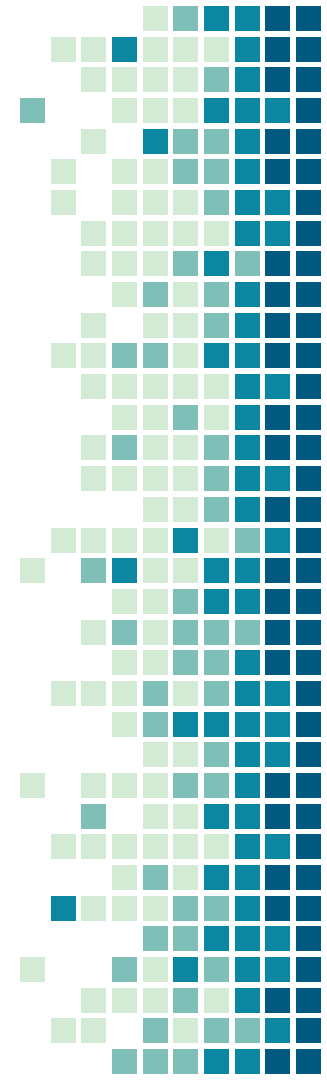
- **Staphylococcus epidermidis** Coagulase (-), main flora of skin

- **Corynebacteria** main flora of skin

- Anaerobic cocci

- **Propionibacterium acnes** (تسبيب acne) it is semi-anaerobic

- Coliforms



Normal flora of the external auditory meatus

*Both have the same flora as skin but less amount

External ear has normal flora eg.

Staphylococcus epidermidis

Corynebacteria

Acid fast bacilli (AFB)

*occasionally in the wax of the ear

Middle & Inner ear > **Sterile**

Normal flora of the conjunctival sac

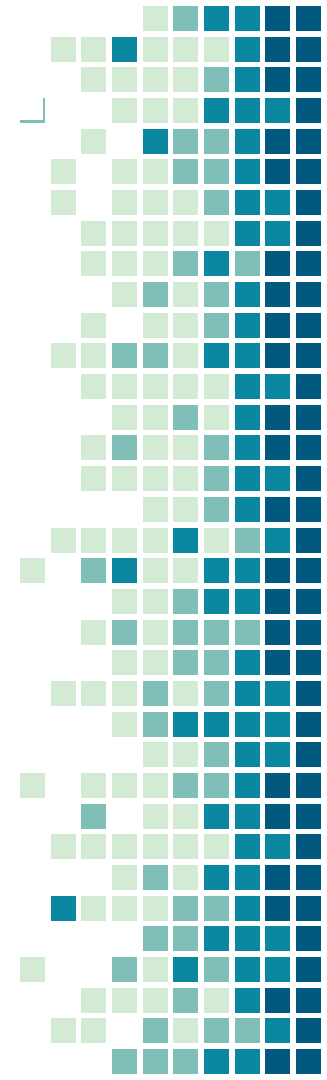
Conjunctiva has normal flora eg.

Corynebacterium xerosis

Staphylococcus epidermidis

Internal eye > **Sterile**

Note: Most of the normal flora is in the colon



Notes, Team 438

-scenario questions examples (Case based) :

Q: A patient came to the hospital with a fever, they took a blood sample from him, and did a blood culture and found staphylococcus epidermidis, interpret the result.

The blood normally is sterile. The interpretation here is that the blood has been contaminated, and this could happen for example if the person who took the blood sample didn't clean the site of the injection which caused the contamination of blood. Also, you are not going to give the patient any antibiotics depending on this result because staphylococcus in a normal flora and it's not pathogenic.

Q: Another scenario: a patient who has a sore throat came to the hospital, they took a throat swab from him and they found staphylococcus aureus, interpret the result.

This is a pathogenic bacteria that may be caused by an infection and in this case the patient needs to be investigated.

Click [here](#) to find the summary that was done by **our team**

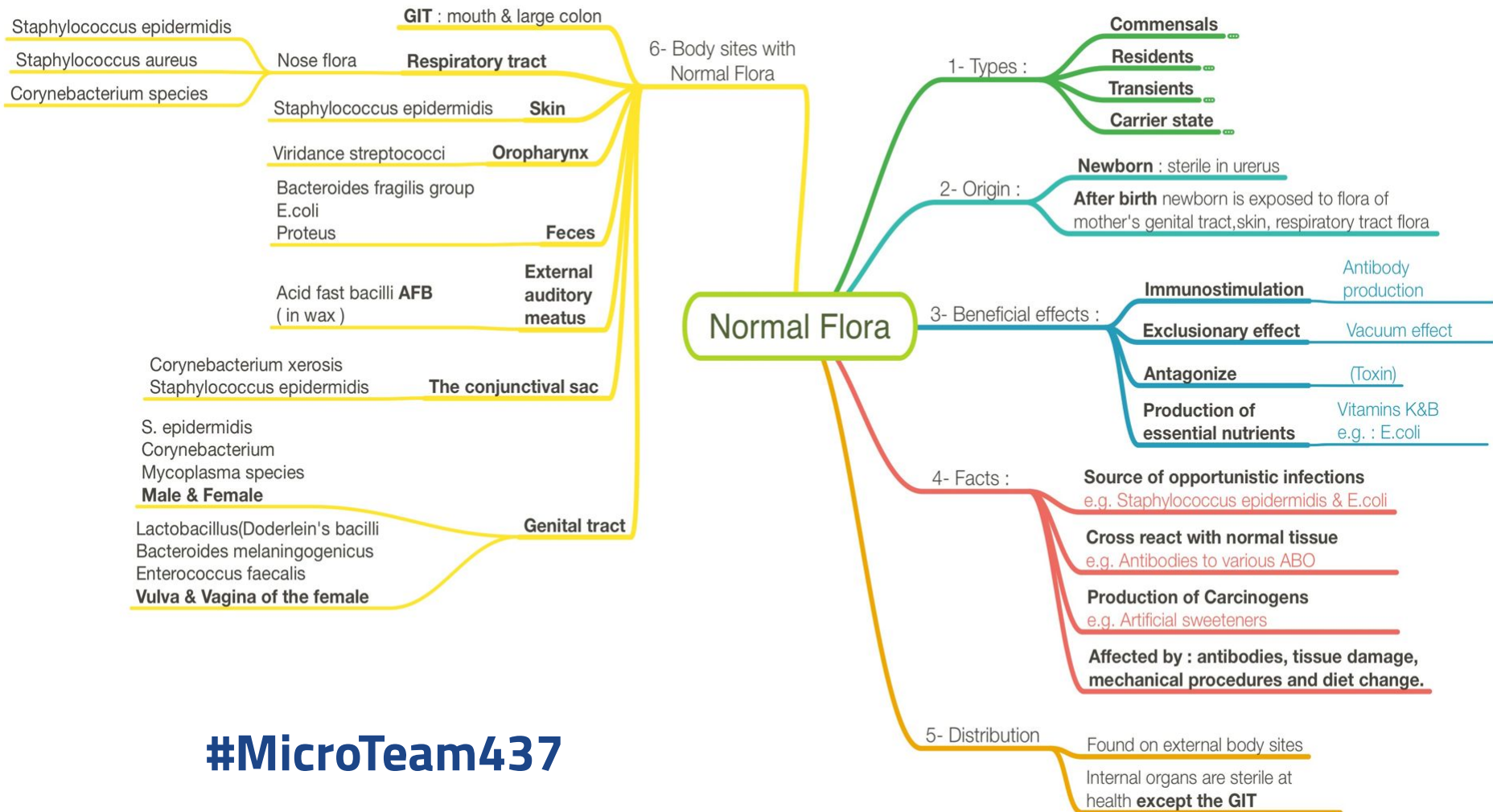
Batch's Contributions

If you click [here](#), you will find a great summary that was made by the amazing **Nada Babelli**.



Scan or Click

And if you scan or click on the code, you will find a quiz that was done by the awesome **Hessah Alalyan**



#MicroTeam437

MCQs

1- Transient flora is excluded by:

- A- host defence.
- B- competition with resident flora.
- C- severe PH conditions.
- D- All.

2- What is correct for true pathogen:

- A- Causes diseases to people with weak immunity.
- B- It gains access to sterile region.
- C- Example of it is staphylococcus epidermidis.
- D- Associated with a specific disease.

3- Viridans streptococci is a common flora of:

- A- Skin
- B- Genital tract
- C- Oropharynx
- D- GI tract

4- An example of Carrier state (potential pathogen)

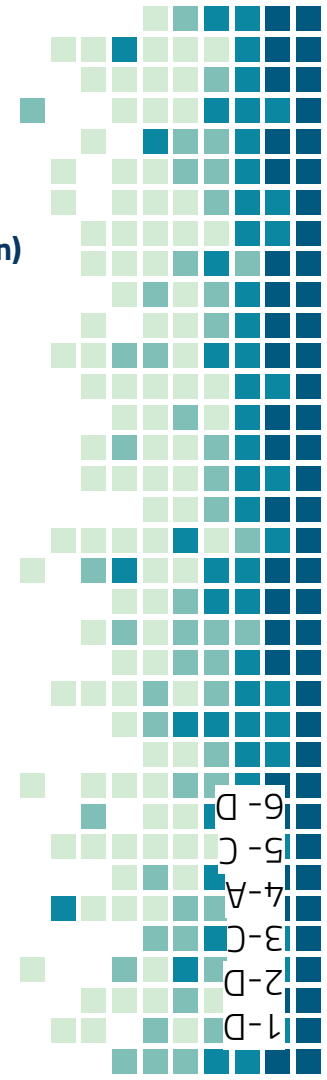
- A- neisseria meningitidis
- B- corynebacterium
- C- viridans streptococci
- D- coliform

5- An example of a normal flora that can produce essential nutrients?

- A- Maxella
- B- S. epidermidis
- C- E.coli
- D- Staphylococcus aureus

6- An example of a potential pathogenic normal flora?

- A- Commensal neisseria
- B- Corneybacteria
- C- Bacteroides
- D- Haemophilus influenzae



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