Normal flora

-Important -Extra -Notes

-In boy's slides -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.

The editing file for the final's lectures

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MICROBIOLOGY TEAM 438

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 eg.:
  - ○ A. Source of opportunistic infection.
  - ○ B. Immunostimulation.
  - ○ C. Nutrition: Vitamins production.
  - ○ D. Production of Carcinogens.
  - ○ E. 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.

Doctor's notes

- ★ Normal flora are the microorganism in our body that usually do not harm us, unless in special situations.
  - And it's mainly Bacteria
  - Normally found in human body without causing any diseases (commensal & Mutually), (متعايشة ومتبادلة المنافع).
  - And they divided into four types:
    - Transients: there are for some time (days-weeks) and then disappear " it's the major one".
    - Residents: there are there all the time.
    - Carrier state: some of the normal flora are pathogenic, cause infection and after that they disappear, but people who around you they carry the organism.
    - Commensals.
- ★ Newborn are sterile in utero,but after birth they exposed mainly to the mother's normal flora, and even if they growth of age the mainly of normal flora in their bodies is the same of flora of their mothers.
- ★ The major normal flora are (commensal & Mutually) , (متعايشة ومتبادلة المنافع).
- ★ One of the benefits of normal flora is immune stimulated.
- ★ Areas:
  - The skin is full of normal flora
  - The GIT is good enviroment for anaerobic bacteria than the skin. (العدد الأكثر من النورمال فلورا موجود في الGIT) , and it's full of N.F.
  - In the skin you will found aerobic bacteria, in the mouth you will found both anaerobic & aerobic.
  - We have more normal flora in the urogenital tract than in the skin.
  - Urogenital tract have similar but less quantity of the GIT.
  - The normal flora in the GIT are the highest, The normal flora in the oral cavity is the worst.

Normal flora

are population of microorganisms that are frequently found in the skin , mucous membrane and other particular sites in normal healthy individual.

- Some are found in association with humans and animals. The Majority are bacteria.
- Symbolic relationship (symbiosis): close association with the host.
- Subject to constant changes.
- Altered by antimicrobial agents.

types

Commensals

Microorganisms that have natural relationship with the host.

Number ;; low
Function ;; no benefit no harm
Location ;; mainly associated with GIT

Residents

Consist of;; relatively fixed types of microorganisms
Location ;; given area at invariable period

If disturbed promptly re-establish itself

Transients

Establish itself briefly

Discussed in the next slide

Carrier state

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

This slide only found in girl's slides.

Transients cont.

Why it is temporarily ?

- They are washed by hand wash or bathing
- Competition by resident flora
- Killed by substances produced by resident flora
- May not survive in acidic or alkaline PH of the body site
- May be flushed away by bodily secretions like tears, sweat, oil urine,feces,..etc

Consist of :

nonpathogenic

potential pathogenic

microorganisms that inhabit the skin or mucous membrane for hours or days

Excluded by :

1- host defense
2- competition from resident flora

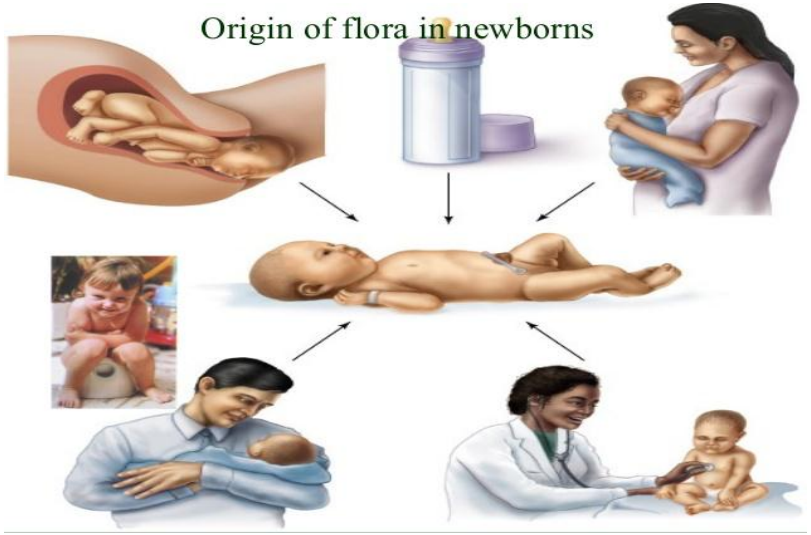
The **transient organisms** living in the external environment are attracted to;

- moist
- warm body sites.

Origin of normal flora

before birth
newborn is **sterile**

After birth newborn is exposed to flora of ..



mother's genital tract + Breast milk

Skin and respiratory tract flora of individuals holding him\her

organisms in the environment.

Beneficial Effects of Normal Flora

Antagonize other bacteria

through

production of substances (toxin) that inhibit or kill non-indigenous bacteria.

Exclusionary effect

(vacuum effect)

protection from external invaders

protection from external invaders

Immunostimulation

(antibody production)

Production of essential nutrients

(Vitamin K & B)

by

some normal intestinal flora eg. Escherichia coli (E.coli).

Symbiosis

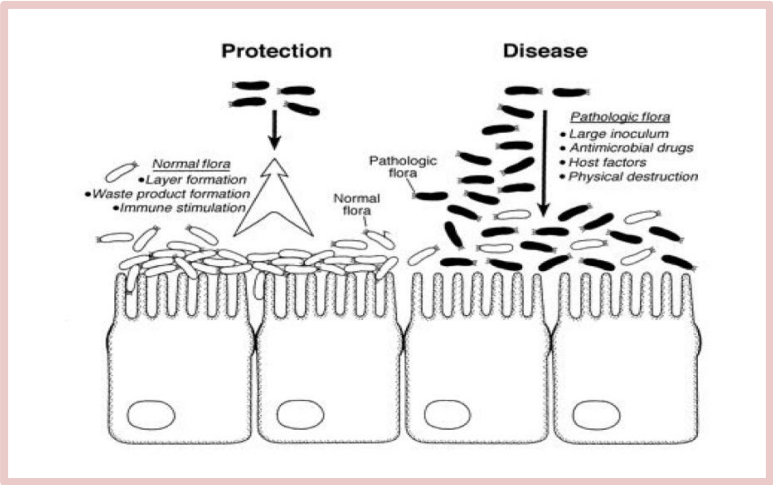
Most of Normal flora are either in Commensalism or Mutualism, which get benefit without harming the host, or get and give benefits.

Symbiosis	First symbiont	Second symbiont
Neutralism	No effect	No effect
Commensalism	No effect	Benefit
Commensalism	**Benefit**	**No effect**
Mutualism	**Benefit**	**Benefit**
Parasitism	Benefit	Harmed

Facts about normal flora

- May be a source of **opportunistic infections** in patients with impaired defense mechanisms. eg. Staphylococcus epidermidis and E.coli.
- 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.
- **Production of Carcinogens**: Some normal flora may modify through their enzymes chemicals in our diets into carcinogens. eg. artificial sweeteners may be enzymatically modified into bladder carcinogens.
- **Affected by : antibiotics, tissue damage, mechanical procedures and diet change**

Normal flora vs pathogenic flora



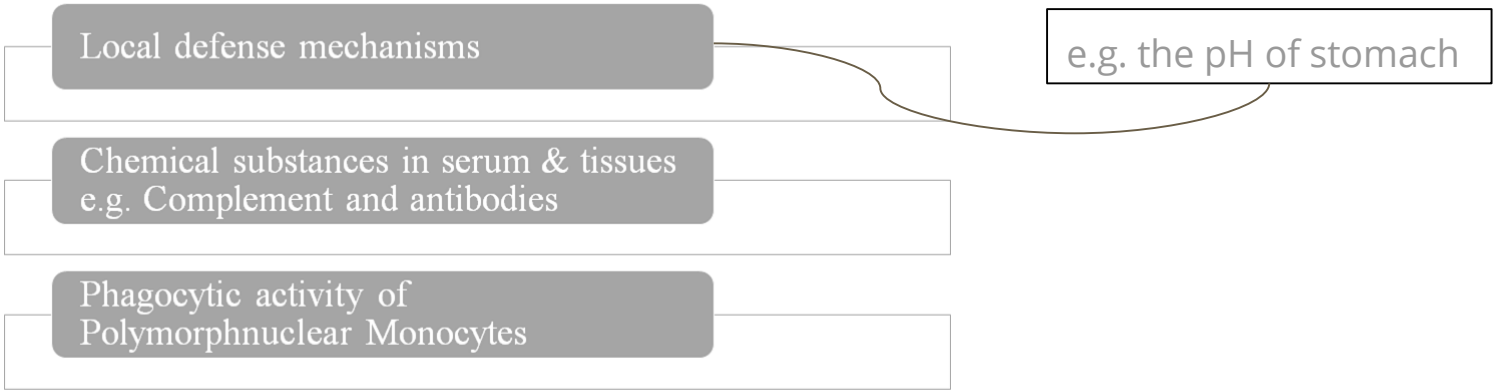
This slide only found in girl's slides.

True vs opportunistic pathogen

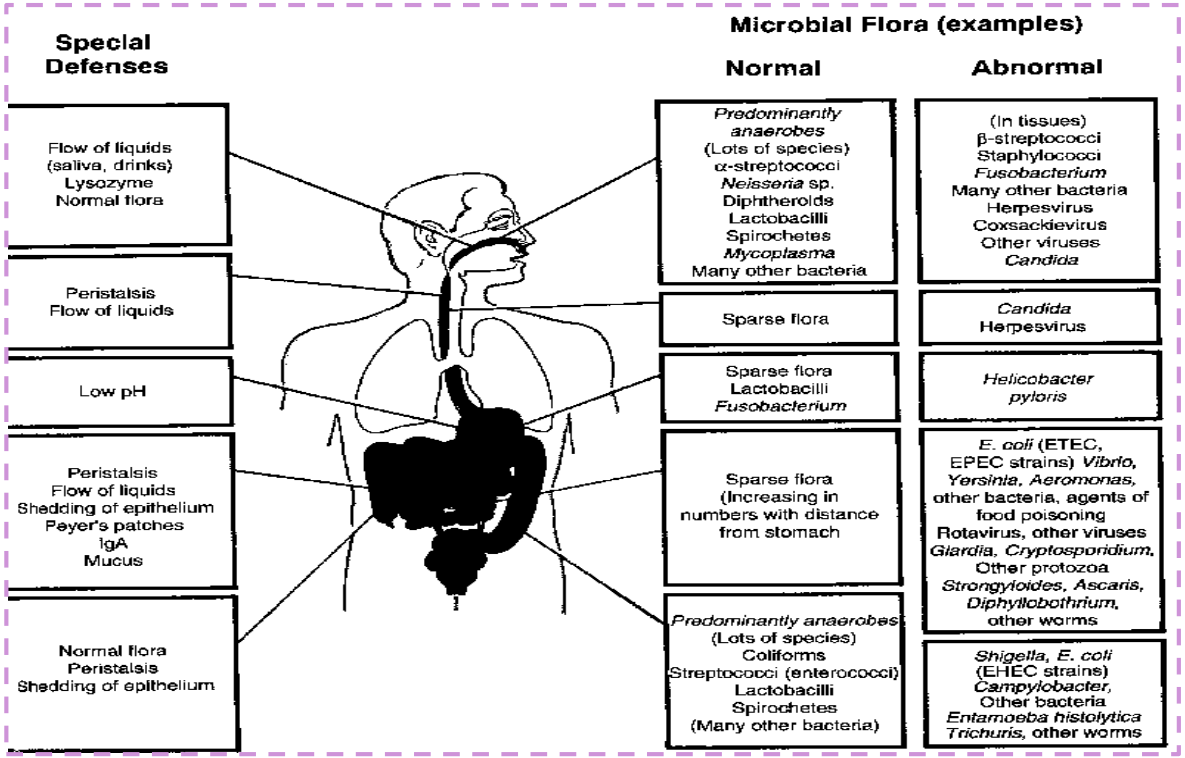
True pathogen	Opportunistic pathogen
Causes diseases in healthy individuals	Causes disease in immunocompro-mised host
Associated with a specific and recognizable disease	Gain access (injury) to sterile regions

Distribution of Normal Flora

- **Normal flora found on external body sites**
- **Internal organs are sterile** (خالية من البكتيريا/معقمَّة) **at health (*except the Gastrointestinal tract*)**
- **Sterility of internal organs maintained by :**



Distribution of Normal Flora



- Notice the amount of the bacteria in the upper & lower GIT
- You don't have to memorize any of these it's just for your background :)

ملاحظة :الصورة هذي واللي بالسلايد اللي بعده د .حنان قالت أنها للتوضيح فقط !

Body Sites With Normal Flora

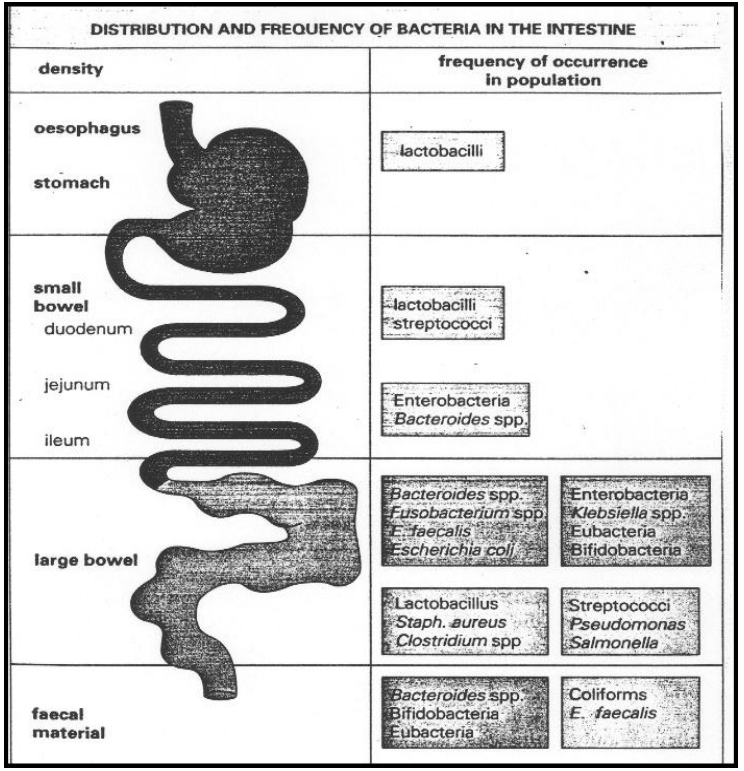
All external body sites contain normal flora:

★ Upper Respiratory Tract

Gastrointestinal tract (GIT): mouth & large colon

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

Skin (including external ear & conjunctiva)



Normal Flora Of The Respiratory Tract

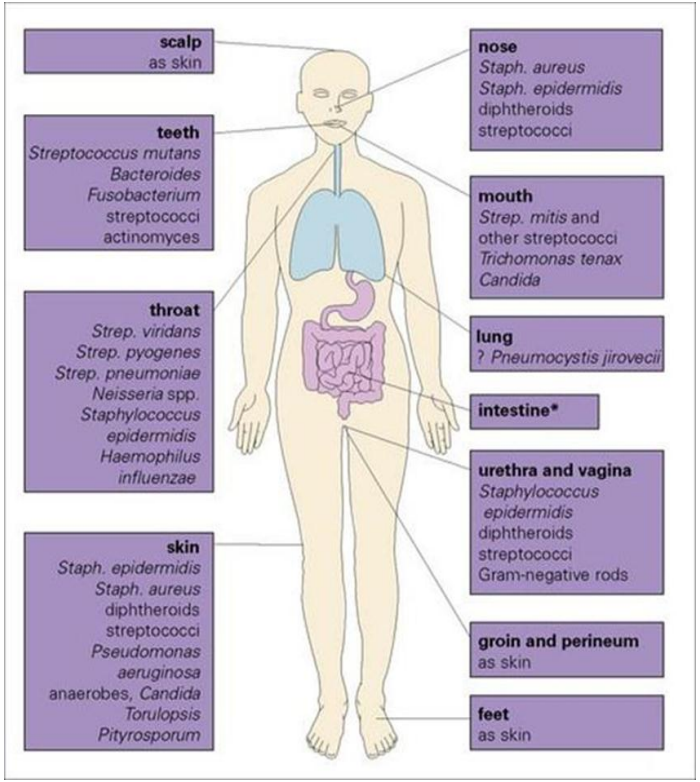
- **Upper respiratory tract colonized by normal flora as in mouth & nasopharynx.**

- **Lower respiratory tract is sterile**
- **Nose Flora :** - Staphylococcus epidermidis

  - Staphylococcus aureus 30%

  -Corynebacterium species

Note: Skin أي شيء فيه على طول خلوا في بالكم
Staphylococcus epidermidis
(it's all over the body).



Normal Flora Of The Oropharynx

- It's the important ones.
- Remember : it's Anaerobic bacteria.

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

pathogens:

- ***Heamophilus inflenzea & Pneumcoccus* are potential pathogens.**
- **Less common potential pathogens :**
- ***Streptococcus pyogenes***
- ***Niesseria meningitidis***

Normal Flora Of The GIT

Normal Flora Of The GIT

- Saliva contains 10^8 bacteria/ml
- Gingival margin debris & dental Plaque continually colonized by bacteria.
- Oesophagus has normal flora similar to pharyngeal flora.
- Empty stomach sterile due to gastric acid.
- Duodenum, jejunum & upper ileum have scanty flora
- Large intestine heavily colonized by bacteria.

Feces (Stool)

- 1/3 of feces weight is bacteria , mainly dead.
- Living bacteria about 1010/gm
- **99% anaerobes.**
- Anaerobic environment maintained by aerobic bacteria utilizing free O2.
- ***Bacteroides fragilis*** group is the dominant anaerobes, Bifidobacterium, Lactobacilli.
- Less common aerobics: ***E.coli***, Proteus.

Normal Flora Of The Genital Tract

- Kidney, bladder and fallopian tube are **Sterile**.
- Female genital tract heavily colonized, why ?

Because the female genital tract is short compared the male genital tract.

- 10^8/ml flora in normal vaginal secretion.
- **In both sexes *Mycobacterium smegmatis* in secretions which contaminate urine and leads to confusion /misdiagnosis** (لأن شكلها تحت المايكروسكوب يشبه بكتيريا الدرن)**.**
- Male & Female distal urethra:

  - S.epidermidis

  -Corynebacteria

  -Mycoplasma species

Normal Flora Of The Skin

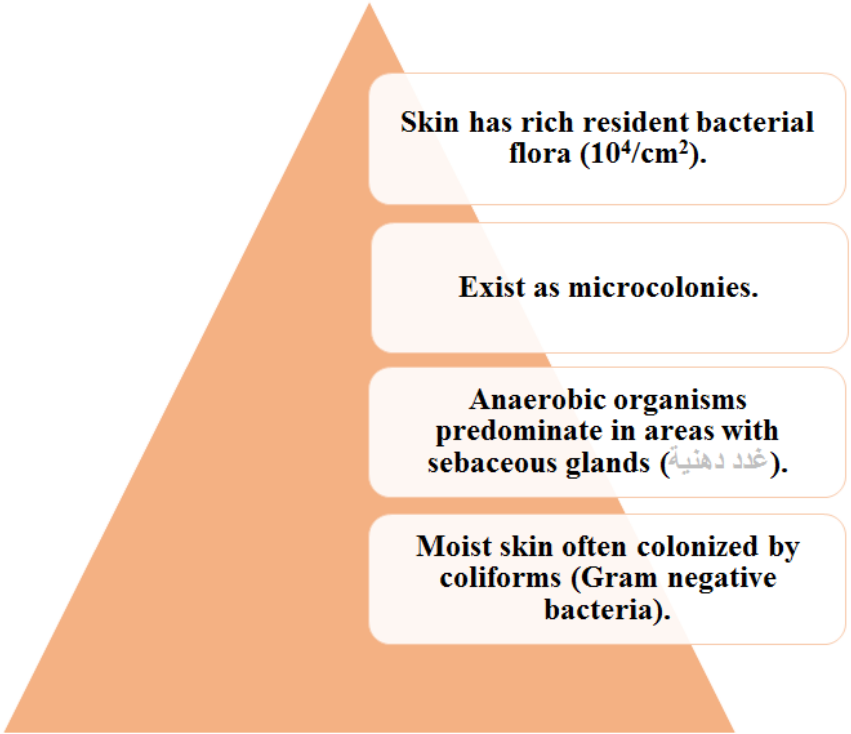
Normal Flora Of The Female Genital Tract

Vulva

- *S. epidermidis*
- *Corynebacteria*
- *E.coli*
- coliforms
- *Enterococcus faecalis*

Vagina

- *Lactobacillus (Doderlein's bacilli)*
- *Bacteroides melaninogenicus*
- *Enterococcus faecalis*
- Corynebacteria
- *Mycoplasma*
- Yeasts



Normal Flora Of The Skin

Skin Flora

Resident organisms	Transient organisms
• In deeper layers of skin	• In superficial layers of skin
• Permanent flora	• Temporary flora
• If disturbed reestablish themselves	• Usually do not reestablish themselves
• Not removed by routine hand wash	• Easily removed by routine hand wash
• Usually not associated with transmission of infection	• Usually associated with transmission of infection

Main skin flora:

- ***Staphylococcus epidermidis***
- ***Propionibacterium acnes***
- **Anaerobic cocci**
- ***Corynebacteria***
- ***Staphylococcus aureus*** **(potential pathogen)**
- **Coliforms**

Normal Flora Of The External Auditory Meatus

External ear has the following normal flora:

- ***S. epidermidis***
- **Corynebacteria**
- **Acid fast bacilli (AFB)(occasionally in wax).**

Middle and inner ear are sterile.

Normal Flora Of The Conjunctival Sac

Conjunctiva has normal flora eg.

- *Corynebacterium xerosis*
- *Staphylococcus epidermidis*

Internal eye is sterile.

Sites (+) represent the quantity, But don't bother yourself about it.	Load /gm	Staphylococcus aurous (Coagulase +)	Other Staph(Coagulase -)	Alph Hemolytic Streptococci (viridians Streptococci and strept pneumo	Enterococcus Entro = intestines.	Neisseria ,Moraxella and Heaomophilus The N.F for oral cavity	Corynebacteria (diphtheroid)	Popionibacterium acnes Lactobacillus	Gram Negative Bacteria (coliform ie E.coli)	Pseudomonas	Anaerobic bacteria (Bactericides, fusobacterium and clostridium)	Candida
Oral Cavity/ Upper Respiratory	10^8	+		+++		+++					+++	
Skin			+++				+++	++				
Eye and eye			+++				+++					
Axilla, Groin and nose		+++	+++				+++					
Stomach	10^2							+				
Small intestines	10^6			++				++	++		++	
Colon	10^{11}			+++	+++			++	+++	+++	+++	++
female Genital	10^8							+++				

Location	Common normal flora	Potential pathogen
Upper respiratory tract (mouth & nasopharynx)	-Staphylococcus epidermidis -Staphylococcus aureus -Corynebacterium species	
Oropharynx	Viridansstreptococci	Heamophilus inflenzea & Pneumcoccus
Duodenum, jejunum upper ilium	scanty flora	
Feces (Stool)	Bacteroides fragilis group	
Male & Female distal urethra	-S.epidermidis -Corynebacteria -Mycoplasma species	
Male & female genital tract secretion	Mycobacterium Smegmatis	
Female genital tract (vulva)	-S. epidermidis - Corynebacteria, -E.coli and other coliforms & Enterococcus faecalis.	
Female genital tract (vagina)	- Lactobacillus (Doderlein's bacilli) - Bacteroides melaninogenicus - Enterococcus faecalis - Corynebacteria -Mycoplasma - Yeasts.	
Skin	- **Staphylococcus epidermidis** - Propionibacterium acnes - Anaerobic cocci - Corynebacteria - Coliforms	Staphylococcus aureus
External Auditory Meatus	-S. epidermidis -Corynebacteria -Acid fast bacilli (AFB) (occasionally in wax).	
Conjunctival Sac	-Corynebacterium xerosis -Staphylococcus epidrmidis	

Non-sterile organs	Sterile organs
Upper respiratory tract (mouth & nasopharynx)	Lower respiratory tract (lungs)
Oropharynx	
Duodenum, jejunum upper ilium	
Female genital tract (vulva & vagina)	
External Auditory Meatus	Middle and inner ear are sterile
Conjunctival Sac	Internal eye
GIT (mouth & large colon & saliva & Gingival margin debris & dental Plaque. & Oesophagus & pharynx & large intestine)	Empty stomach

New born is sterile

Abbreviations ;;
S = staphylococcus
E = Escherichia

notes:

★ Remember:

- The normal flora in the colon is the highest, follow of oral cavity, less quantity in the eye and stomach (because of the lysozym in the eye and acidity in the stomach).
- In the age of 15 to 40 in female the major normal flora in female genital tract is the **Lactobacillus**.
- **Propionibacterium acnes** is most hard to clean , (موجودة الجلد في حويصلات الشعر) .
- The normal flora in the oral cavity is the worst, (في الملاكمات اليد يصير لها انفيكشن من النورمال فلورا الأسوء الي بالفم).
- Neisseria, Moraxella and heamophilus are the normal flora of the oral cavity, and they are pathogenic (they can cause infection in the lung and ear).

★ Areas:

- Corynebacteria is similar to Coagualse (-) in the areas and quantity.
- Anaerobic bacteria is similar to alpha hemolytic in the areas and quantity.

notes:

- ★ You need to memorize the most common normal flora in each site (at least one or two).
- ★ The questions might be a scenario questions for ex: a patient came to the hospital with a fever, they took a blood sample from him and did a blood culture and they 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.

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.

- ★ You need to know if it's a genuine infection or just a contamination i.e. normal flora.

MCQs

1-Normal flora produces :
A- antigen
B- vit K &B
C- matrix of ECF
D- infections

2-An example of Carrier state (potential pathogene)
A- neisseria meningitidis
B- corynebacterium
C- viridans streptococci
D- coliform

3-The most common normal flora in the oropharynx is:
A- staphylococcus epidermidis
B- viridans streptococci
C- corynebacteria
D- staphylococcus aureus

4-Which of the following is sterile:
A- external ear
B- nose
C- internal eye
D- skin

5- Newborn do not expose to normal flora during delivery
1-T
2-F

saq : give an example of one main normal skin flora ?

SAQ
Staphylococcus epidermidis

1	2	3	4	5
B	A	B	C	F

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- دينا عورتاني
- ريناد المطوع
- سارة الهلال
- طيبة الزيد
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- عبدالله الداود
- عبدالرحمن البديوي
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