436
MEDICINE
KING SAUD UNIVERSITY

MICROBIOLOGY

Lecture :

NORMAL FLORA

IMPORTANT.

DOCTORS NOTES.

NOT IMPORTANT **(but it's in the slides)**

NAMES OF BACTERIAS

OBJECTIVES

1. Define the terms: *Normal Flora, Resident flora, Transient flora* and carrier state (3)
2. Know the origin of normal flora. (3)
3. Know the importance of normal flora with examples, including importance as: (4)
   A. Source of opportunistic infection.
   B. Immunostimulation.
   C. Nutrition: Vitamins production.
   D. Production of Carcinogens.
   E. Protection against external invaders.
4. Know areas of the body with normal flora (GIT, urogenital tract, and skin) and most common types of organism and relation to pathogenicity.
5. Know sites of the body with no normal flora e.g. sterile body sites and the importance of this fact in relation to interpretation of culture results.

Introduction, Origin & types of normal flora

- **Normal flora:** are a population of microorganisms that are frequently found in the skin, mucous and other particular sites in normal healthy individual.
- Some are found in association with humans and animals. The Majority are bacteria.
- Has symbolic relationship with the host. (تعايش سلمي)
- Subject to constant changes.
- Altered by antimicrobial agents.

Mothers flora stay with us and it's very similar to ours

* **Origin of normal flora:**

Newborn is sterile in uterus.

After birth, newborn is exposed to flora of mother's genital tract, skin, respiratory tract **flora of those handling him**, and the organisms in the environment.

types of normal flora

Types of normal flora

Commensals

Microorganisms that have natural relationship with the host.

Residents (مقيمة)

- Consist of relatively fixed types of microorganisms. Regularly found in a given area at invariable period. If disturbed promptly re-establish it self. (لها فترة معينة ليست مقيمة دائمة)

Transients

(nonpathogenic or potential pathogenic)

Moves from site to another. (inhabit the skin or mucous for hours or days)

Establish itself briefly, excluded by host defense or competition from residents.

Can get degenerated because of unfavorable environment it moves to.

4.Carrier state

potentially pathogenic, eg. Streptococcus pneumoniae, Neisseria meningetidis in throat of healthy individual. (تكون ممرضة إذا انتقلت عن طريق العدوى لإنسان بمناعة ضعيفة)

NOTE
carrier flora potentially pathogenic and are present without any symptoms.

Beneficial Effects About Normal Flora:

1- Immuno-stimulation (antibody production & development)

2- Exclusionary effect (vacuum effect) and protection from external invaders by either producing toxins or compete for nutrients and oxygen with pathogens.

3- Antagonize other bacteria through the production of substances that inhibit or kill non-indigenous bacteria.(تهاجم الباكتيريا الدخيلة)

4- Production of essential nutrients (Vit. K & B) by some normal intestinal flora eg. *E.coli.*

- **Remember:**

Normal flora سلاح ذو حدين، تحمي الشخص صاحب المناعة القوية لكنها تنتهز ضعف المناعة وتمرض صاحبها.

Facts About Normal Flora:

- May be a source of opportunistic infections (عدوى انتهازية)in patients with impaired defense mechanisms. eg. Staphylococcus epidermidis & 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.

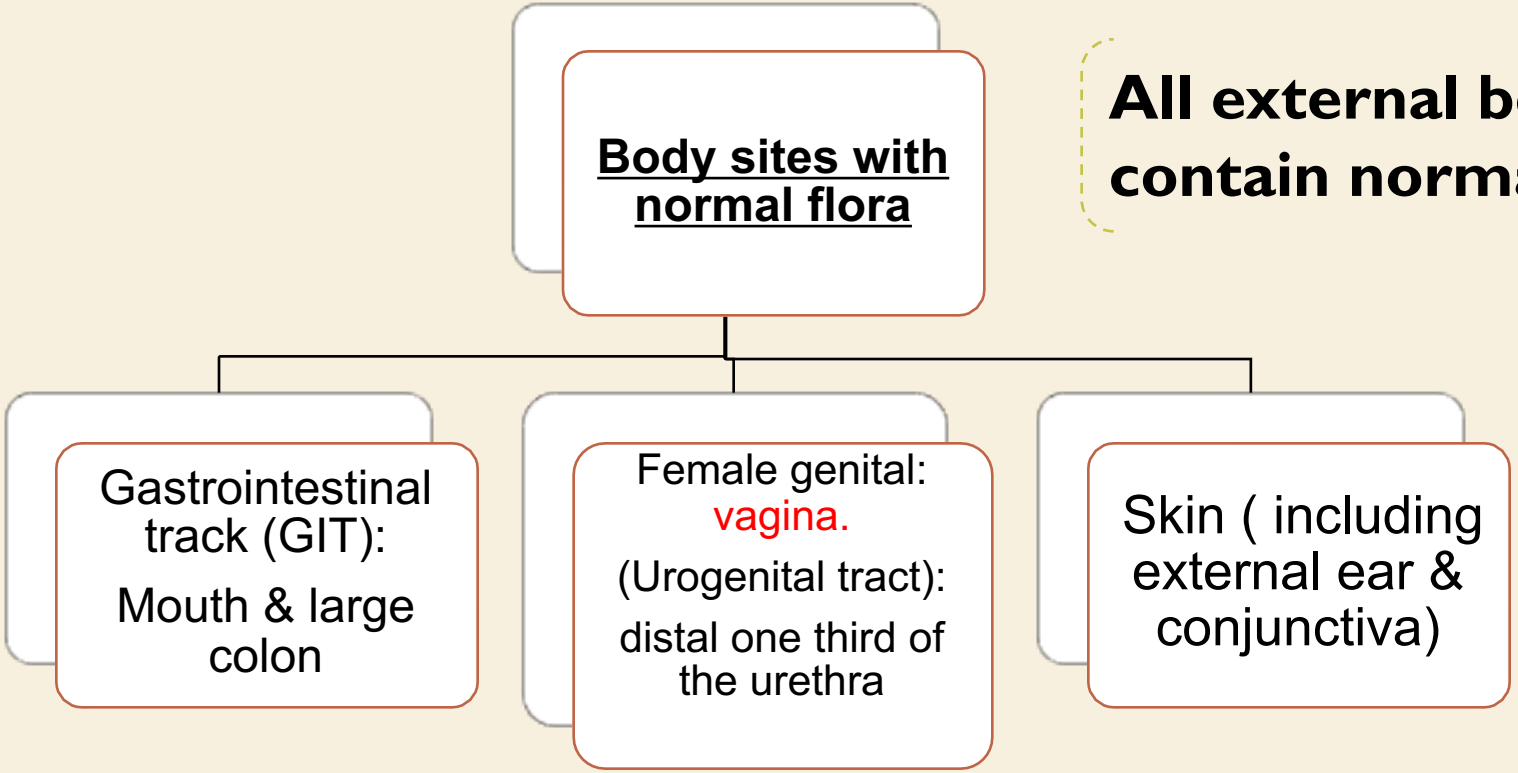
(مثال : تقتل الباكتيريا اللي تصنع بعض الفيتامينات في الأمعاء فيسبب نقص فيتامينات)

Distribution of Normal Flora:

- Normal flora found on external body sites.
- Internal organs are sterile at health (except the Gastrointestinal tract).

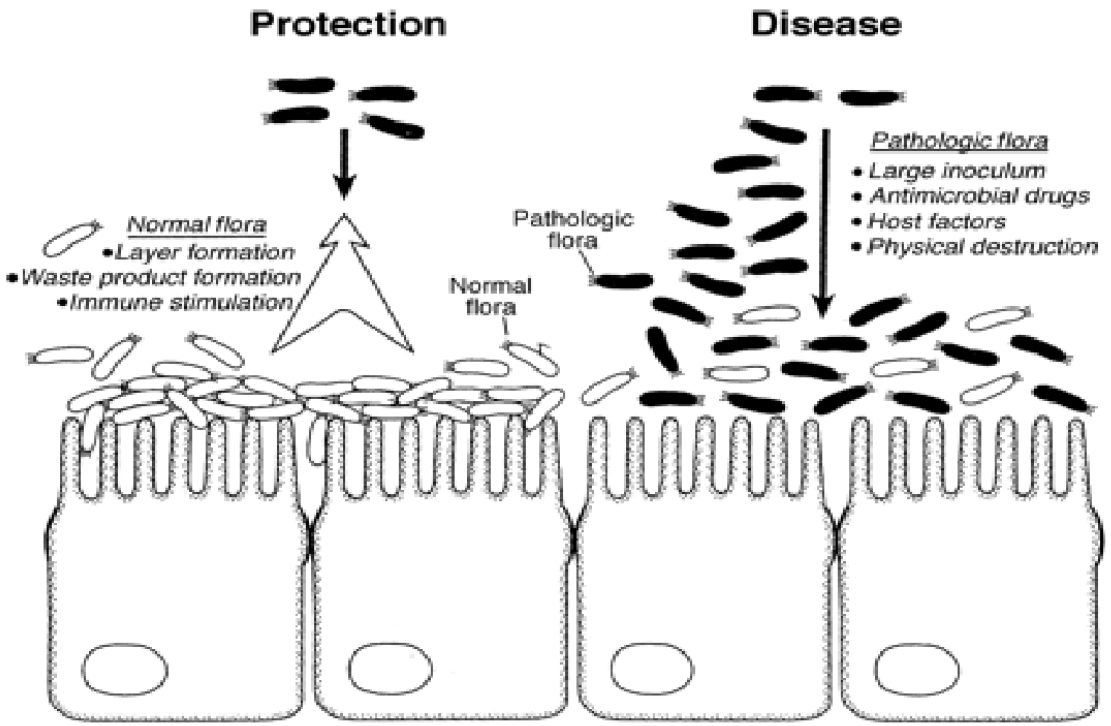
Sterility of internal organs maintained by :

1. - **Local defense mechanisms**
2. - **Chemical substances** in serum & tissues eg. Complement , antibodies.
3. -**Phagocytic activity** of Polymorphnuclear Monocytes.



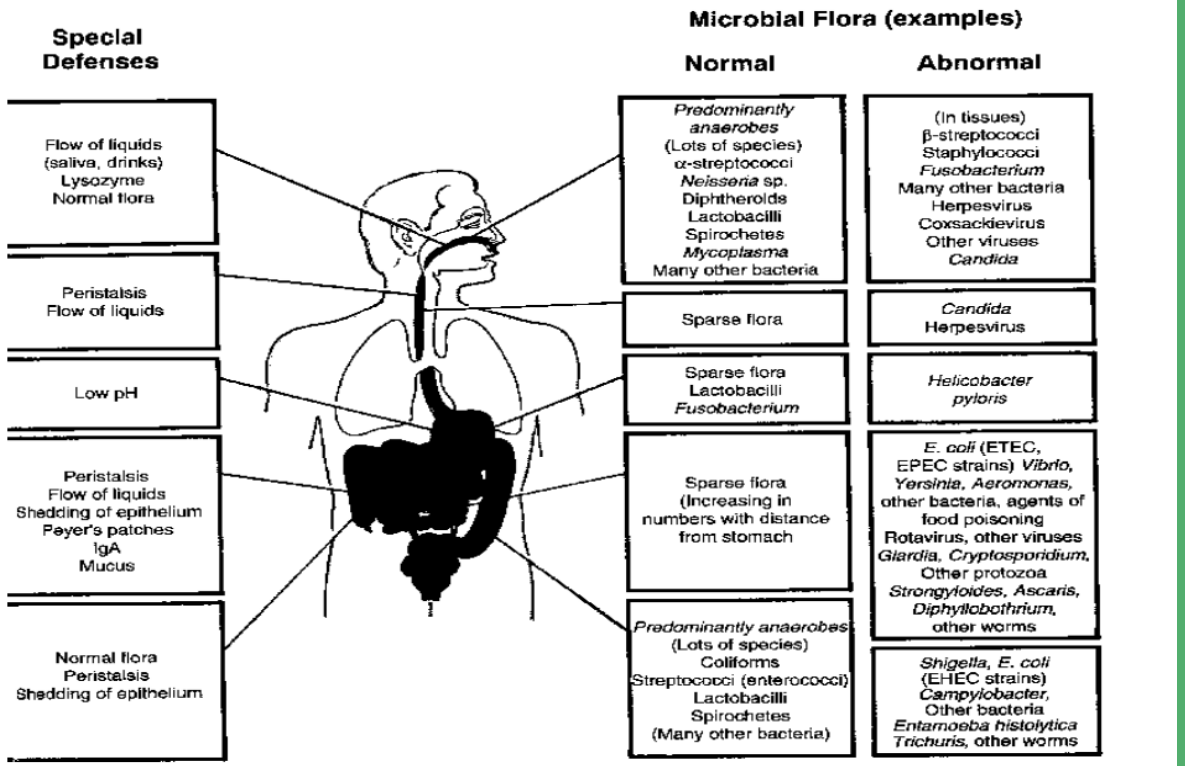
All external body sites contain normal flora

NORMAL FLORA VS PATHOGENIC FLORA

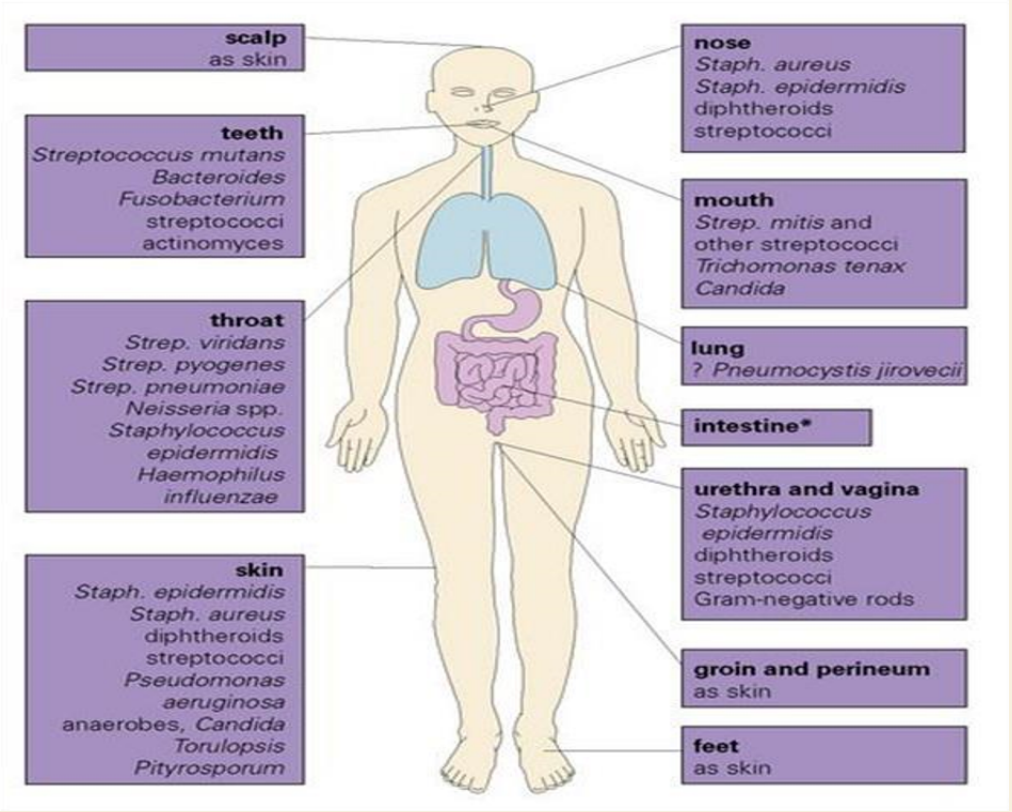


الصورة توضح كيفية عمل الفلورا في حالة قوة أو ضعف الجهاز المناعي، حيث أنها – كما ذكر سابقًا – سلاح ذو حدين.

DISTRIBUTION OF NORMAL FLORA



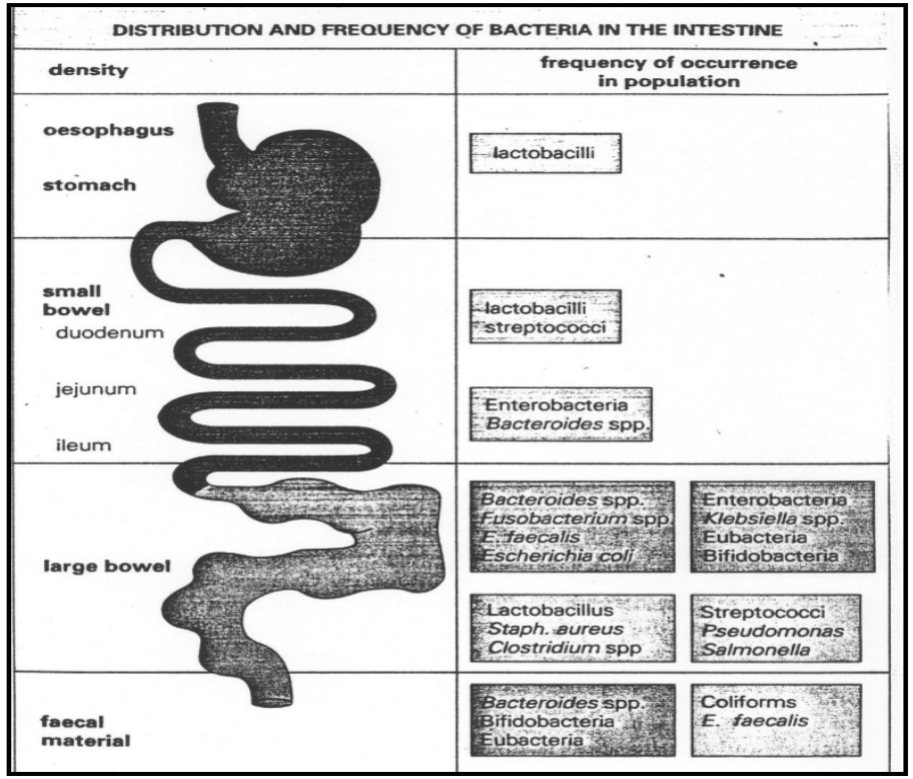
المهم في الصورة هو أن نعرف توزيع الفلورا في الجسم وكيف أنها تختلف كمية ونوعًا في كل منطقة، فمنطقة الفم والمرئ مليئة بالفلورا، بينما المعدة شبه معقمة، والأمعاء تتواجد فيها الفلورا لكن بشكل أقل من الجزء العلوى من الجهاز الهضمي.



BODY SITES WITH NORMAL FLORA

As we've mentioned in the previous slide, the GIT full of normal flora.

The pictures are only to understand the previous point.



Upper digestive track (more flora)

Stomach (sterile)

Lower digestive track (less flora)

- GIT flora **similar** with the oral cavity with **2** types of bacteria
- Oral cavity **differ** then GIT with **one** type bacteria
- GIT **differ** with Oral cavity by **4** different types

GIT = most contaminated with 6 types of bacteria

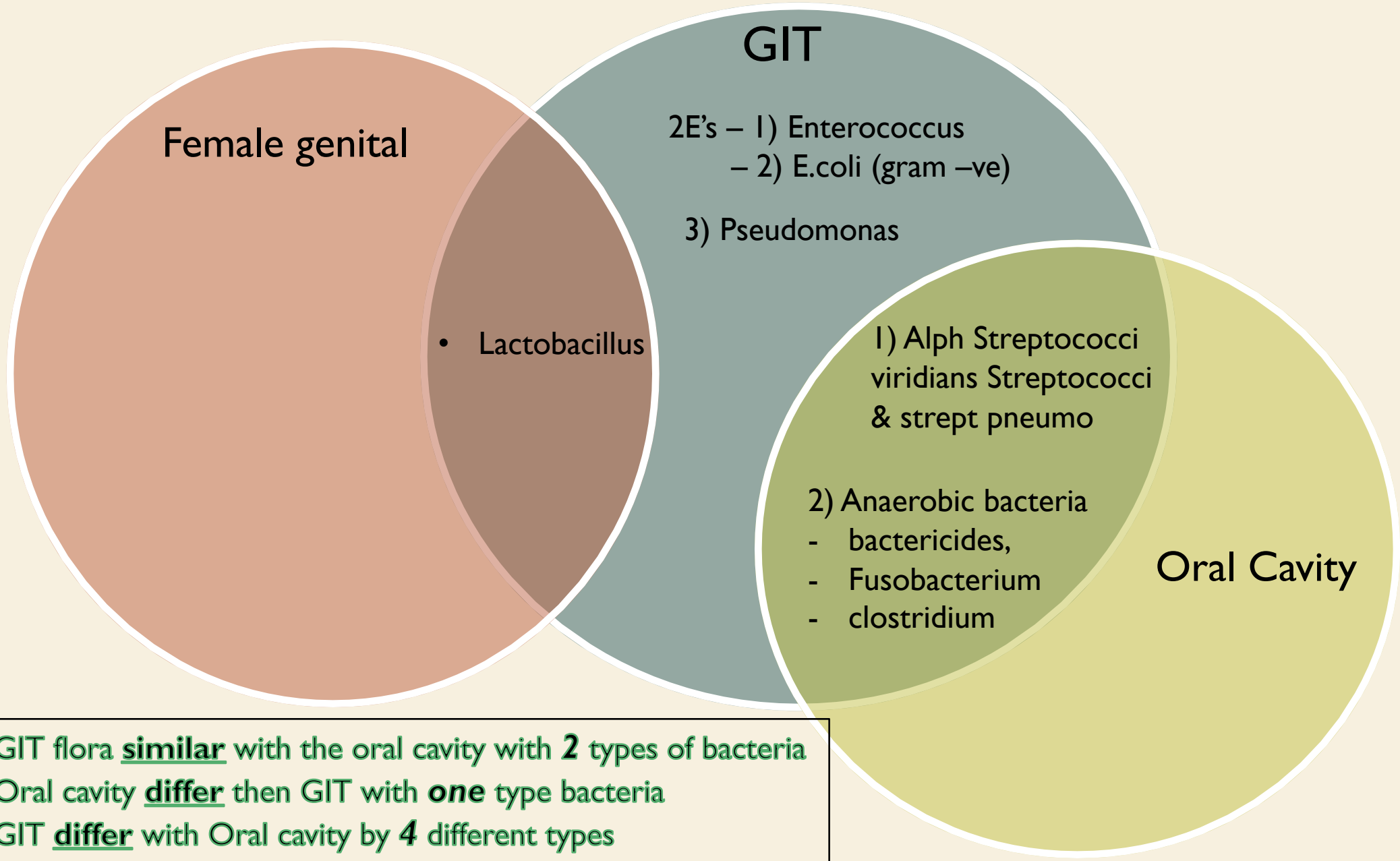
Female genital = least contaminated (only one type)

THIS SLIDE IS VERY IMPORTANT This is all normal flora's name that you have to **memorize**	*Staphylococcus aurous (Coagulase +)*	*Other Staph(Coagulase -)*	*Alph Hemolytic Streptococci (viridians Streptococci and strept pneumo*	*Enterococcus*	*Neisseria ,Moraxella and Heaomophilus*	*Corynebacteria (diphtheroid) Popionibacterium acnes*	*Lactobacillus*	*Gram Negative Bacteria (coliform ie E.coli) Pseudomonas*		*Anaerobic bacteria (Bactericides, fusobacterium and clostridium)*
Oral Cavity			+++		+++					+++
Skin		+++				+++				
Eye and eye		+++				+++				
Axilla, Groin and nose	+++	+++				+++				
GIT			+++	+++			+++	+++	+++	+++
female Genital							+++			

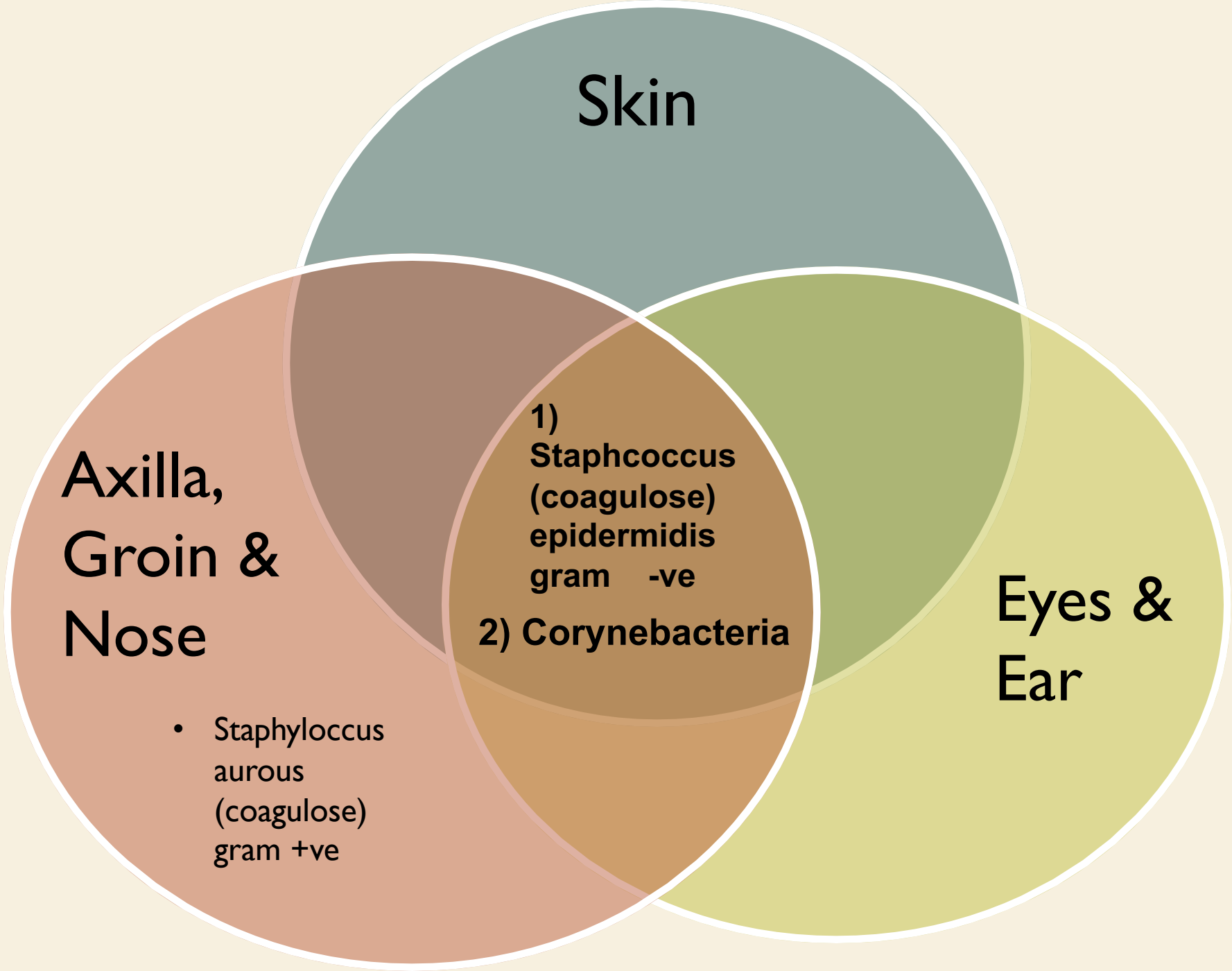
Warm & wet

Found in Sextually active i.e. 15-45yrs

(This table is simplified in the next slides)



- GIT flora **similar** with the oral cavity with ***2*** types of bacteria
- Oral cavity **differ** then GIT with ***one*** type bacteria
- GIT **differ** with Oral cavity by ***4*** different types


Skin
Axilla, Groin & Nose
• Staphyloccus aurous (coagulose) gram +ve
1) Staphcoccus (coagulose) epidermidis gram -ve
2) Corynebacteria
Eyes & Ear

Normal FLORA of …

What 's In grey is for reading

(GIT) The Gastrointestinal Tract

Mouth
- ***Saliva*** *contains 10^8 bacteria/ml*
- ***Gingival*** *margin debris & dental Plaque continually colonized by bacteria.*

Oesophagus
- *oesophagus (المرئ)has normal flora similar to pharyngeal(بلعوم) flora.*

Stomach
- ***Empty stomach sterile due to gastric acid.***

Small intestine
- **Duodenum, jejunum& upper ielium have scanty flora (few)**

Large intestine
- ***heavily colonized by bacteria.***

***Important*: GIT contain mainly Anaerobic, gram –ve and enterococcus bacteria. (but it has 6 types we need to know)**

***Note*: GIT has Mostly Anaerobic bacteria (highest) because No oxygen in GIT**

The Oropharynx(البلع وم)

Non Pathogens
- ***Viridance streptococci***
- ***Commensal neisseriae & Moraxella***
- ***Corynebacteria***
- *Bacteroides*
- *Fusobacteria*
- *Veillonella*
- *Actinomyces*
- *Spirochaetes.*

Potential Pathogens

More common :
- ***Heamophilus inflenzea***
- ***Pneumcoccus***

less common :
- *Streotococcus pyogenes*
- *Niesseria meningitidis*

The Respiratory Tract

Upper respiratory tract

Is colonized by normal flora as in
- *Mouth*
- *Nasopharynx*

Lower respiratory tract

مثل الرئتان is sterile

Nose Flora :
- ***Staphylococcus epidermidis***
- ***Staphylococcus aureus***
- ***Corynebacteria***

Normal FLORA of …

The skin

- *Skin has rich **resident** bacterial flora.* 10^4 / cm^2
- *Exist as microcolonies.*
- ***Anaerobic** organisms predominate in areas with **sebaceous (دهنية) glands** (فروة الرأس)*
- *Moist skin often colonized by **coliforms** gram negative .*

Main skin flora :

- ***Staphylococcus epidermidis***
- ***Corynebacteria****

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

Saph. Epidermidis and corynebacteria are the main skin flora and important because they can present +ve in blood culture because of contaminated blood due to wrong skin cleaning when blood sample is taking .

Meddle and inner ear
Eye
Empty Stomach
Lungs
ARE STERILE

Note:
Grey: not important

Green : what the doctor say

Normal FLORA of …

إعادة تنبيه:
الأحمر مهم
الرمادي غير مهم

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***

The Conjunctival Sac

- ***Conjunctiva*** — *has normal flora:*
  - ***Corynebacterium xerosis***
  - ***Staphylococcus epidrmidis***
- ***Internal eye*** — ***is sterile***

أي شيء يكتب بالأخضر
هو كلام الدكاترة

Normal FLORA of …

This slide is NOT important but you may look at it for general Knowledge!!!!

(GIT) The Gastrointestinal Tract

Feces (stool)

- **Aerobes**
- **Anaerobes**

Less common aerobics:

- ***E.coli***
- *Proteus*

….etc.

- **99% anaerobes**
- ***Bacteroides fragilis*** group is the dominant anaerobes
- Other example : bifidobacteria , Lactobacilli…etc.

- ***1/3*** *of feces weight is* ***bacteria.***
- *mainly* ***dead****.*
- *Living bacteria about* 10^{10}*/gm*
- ***Anaerobic environment maintained by aerobic bacteria utilizing free O2****.*

The Genital Tract

- ***In female Genital Tract***
- ***In both sexes (male & female)***

Female genital tract heavily colonized , why ?

Because it is short compared to the male genital tract. Also the bacteria from the colon will come to colonize it. This is why we find that the flora in the genital tract is the same as in the colon.

Vagina

- *10^8/ml flora in normal vaginal secretion.*
- *Example :*

-Lactobacillus (Doderlein's bacilli)
- Bacteroides melaninogenicus
-E.faecalis
- Corynebacteria
-Mycoplasma
- Yeasts.

Vulva

- S.epidermidis
- Corynebacteria
- E.coli
- coliforms
- entercoccus faecalis.

- **In both sexes *Mycobacterium smegmatis* in secretions which contaminate urine and leads to confusion /misdiagnosis.**
- **Male & Female distal urethra:**
  - **S.epidermidis**
  - **Corynebacteria**
  - **Mycoplasma species**

For help

بعض التشبيهات

NF of oropharynx (potential pathogens):

heamophilus inflenzea = انفلزنزا (Feels)فيلز هيمو (اسم دلع)

بعض الربط للأسماء ☺

- *(Viridance streptococci in Oropharynx)*

نقدر نغني ونطلع الصوت بالبلعوم ***Oropharynx*** والبكتيريا

بجسمنا تتراص ***streptococci*** وتتراقص ***viridance***

- *(Mycobacterium smegmatis in urine)*

أبشرك ماكو ***myco***بكتريا ***bacterium***تحاليل ***urine***

- *(Bacteroides fragilis in feces)*

هذي الجرثومه ***bacteroid*** شخصيتها ضعيفة وهشه ***fragilis***

عشان كذا انطردت من ***intetine***- ***feces***

- *((Doderlein's bacilli) Lactobacillus)*

دودي ***Doderlein's***بوصي لي ***bacili***لك ***Lac***تو٢ ***to***طاص ***bacillius***

Some notes ..

- *In GIT : the full stomach with food maybe is not sterile and there is some bacteria.*
- Sebaceous glands. = a small gland in the skin which secretes a lubricating oily matter (sebum) into the hair follicles to lubricate the skin and hair.
- Any skin has Staph epidrmidis & Corynebacteria

Team435

Name	Location	Information
S. Epidermidis (Staphylococcus Epidermidis)	• Oropharynx • The External Auditory Meatus (External ear) • Genital tract • The female genital tract (vulva) • The Conjunctival Sac • The Respiratory Tract (Nose flora) • Skin	• May be a source of **opportunistic infections** in patients with **impaired defense mechanisms.** • **Potential pathogens.**
E .coli (Escherichia coli)	• Feces (stool) • The female genital tract (vulva)	• **Production** of essential nutrients (Vitamin **K** & **B**) by some normal **intestinal flora** • May be a source of **opportunistic infections** in patients with **impaired defense mechanisms.**
• ***N.Meningitidis*** (Neisseria meningitidis) • ***Heamophilus inflenzea*** • ***Pneumcoccus***	Oropharynx	**potential pathogens.**
Proteus	Feces (stool)	**Aerobics**
Corynebacteria	• The Respiratory Tract (nose flora), • The External Auditory Meatus (External ear) • The female genital tract (vagina) • The female genital tract (vulva) • Skin	
Staph. Aureus (Staphylococcus aureus)	• The Respiratory Tract (nose flora) • Skin	**potential** pathogens.
Corynebacterium xerosis	The Conjunctival Sac	
Acid fast bacilli (AFB)	The External Auditory Meatus (External_ear).	
E.Faecalis (Enterococcus faecalis)	• The female genital tract (vagina) • The female genital tract (vulva)	
• **Yeasts** • **Mycoplasma** • **Lactobacillus (Doderlein's bacilli)** • **Bacteroides melaninogenicus**	The female genital tract(vagina).	
• **Propionibacterium acnes** • **Anaerobic acnes** • **Corynebacteria** • **Coliforms**	Skin	

Location	Group	Information
Oropharynx	•Viridance streptococci •Commensal neisseriae •Corynebacteria •Bacteroides •Fusobacteria , Veillonella, Actinomyces, Spirochaetes.	
Feces (Stool)	•Bacteroides fragilis •Anaerobes, bifidobacteria •Lactobacilli	
Genital Tract	Mycobacterium	In both sexes Smegmatis (Mycobacterium smegmatis) in secretions which contaminate urine and leads to confusion /misdiagnosis.

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