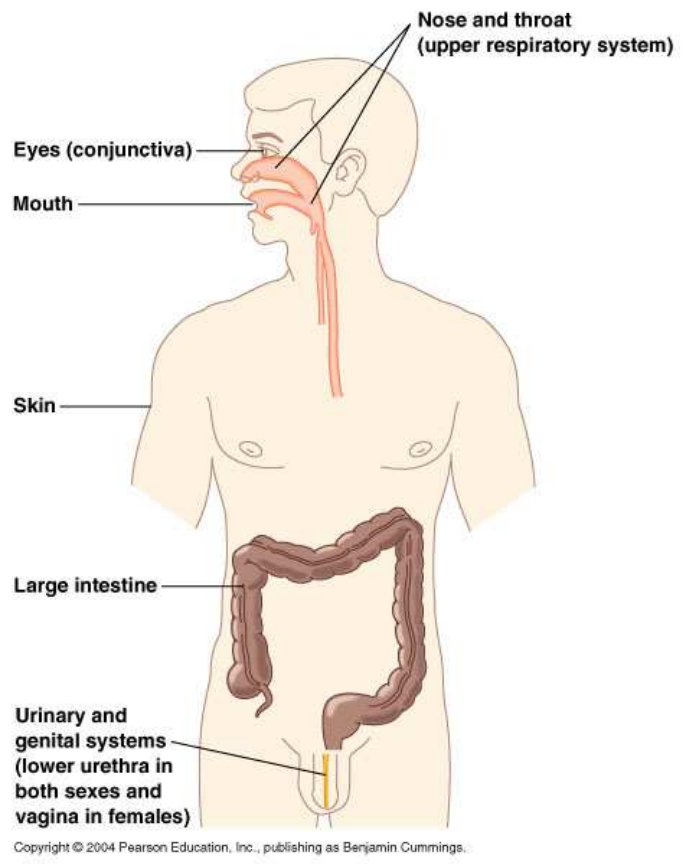
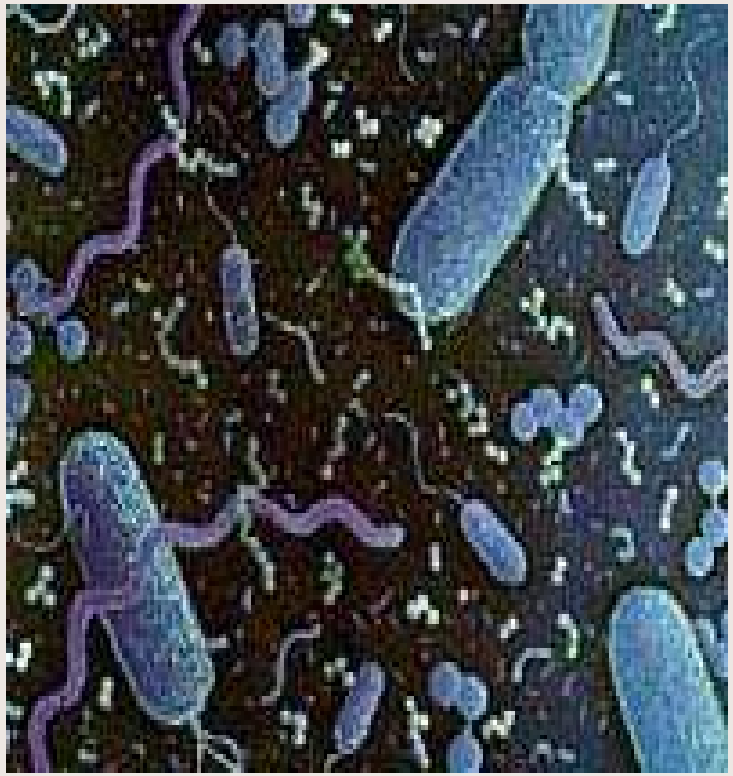
Normal Flora of the body and their sites



Normal Flora

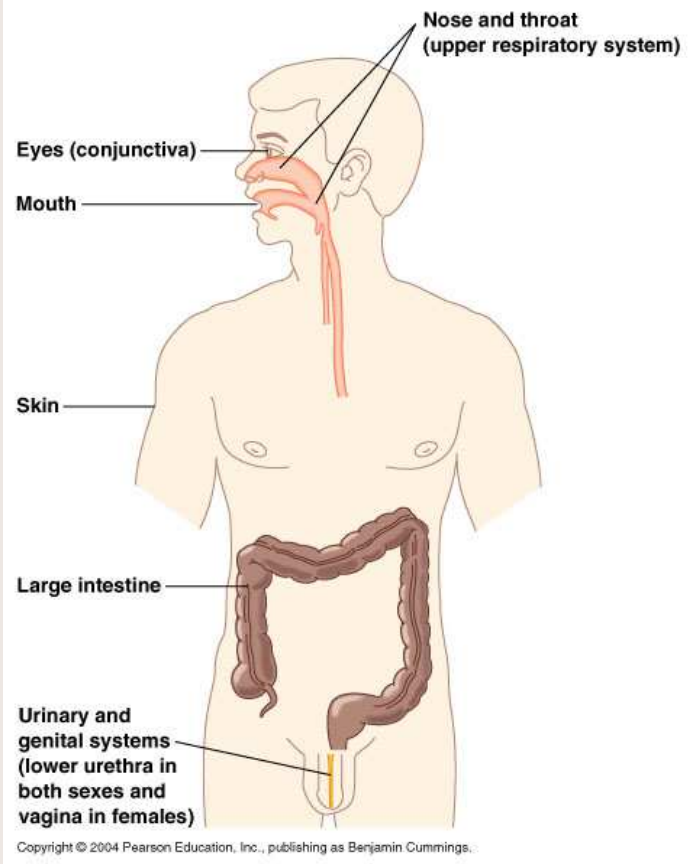
- **Definition**

  Normal flora is the mixture of microorganisms (bacteria and fungi) that are regularly found at any anatomical site of human body like:



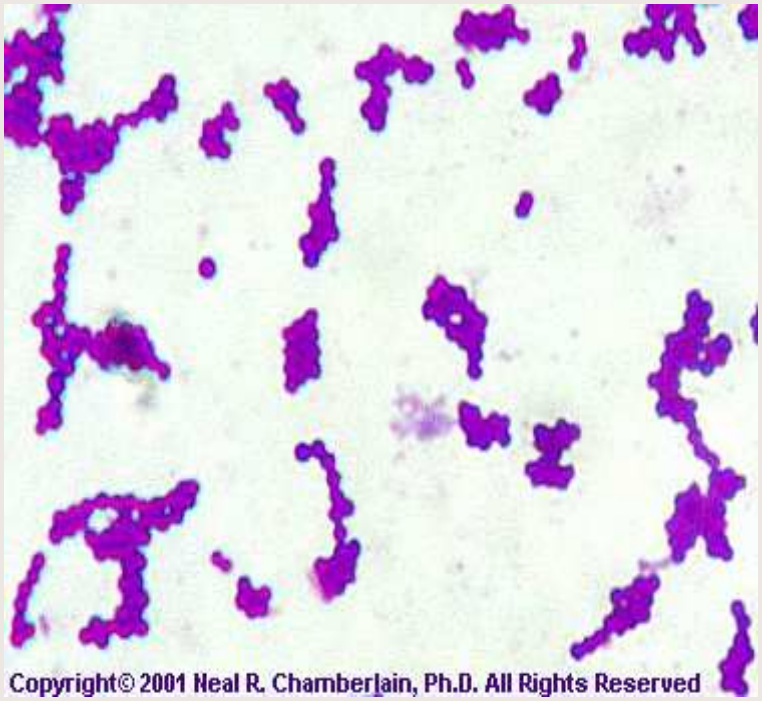
Normal Flora

- Skin
- Eyes (i.e.Cunjunctiva)
- Nose (i.e. Respiratory tract)
- Mouth (i.e Human Oral Cavity)
- Ears
- Urogenetal tract
- Elementry tract



Normal Flora

- Resident flora
  - 90% is *S. epidermidis*; *S. aureus*, may be in moist areas



Normal Flora

Sterile tissues

In a healthy human, the internal tissues such as:

- blood
- brain
- muscle
- cerbrospinal fluid (csf.)

are normally free of microorganisms.

Estimation of the Normal flora

It has been calculated that the normal flora human body about 10^{12} bacteria on the skin, 10^{10} in the mouth, and 10^{14} in the gastrointestinal tract.

-

Normal Flora of the Skin

- The most important sites are:

1. Axilla
2. Groin
3. Areas between the toes

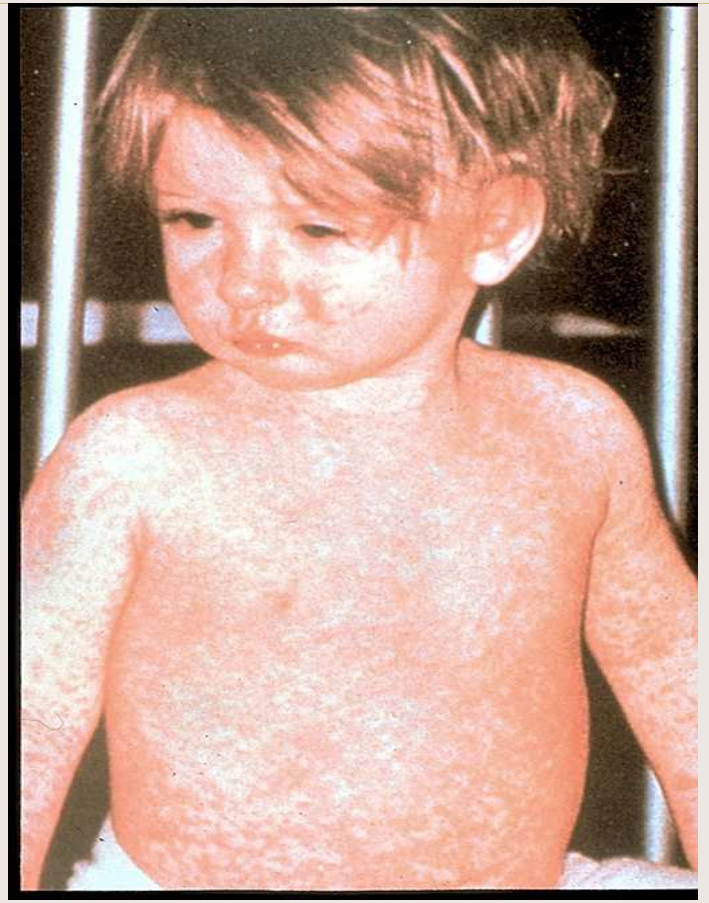
Normal Flora of the Skin

- The majority of skin microorganisms are found in the most superficial layers of the epidermis and the upper parts of the hair follicles.

Normal Flora of the Skin

- **Important bacteria:**

1. *Staphylococcus epidermidis*
2. *Micrococcus* sp.
3. *Corynebacteria* sp.
4. *Mycobacterium smegmatis*

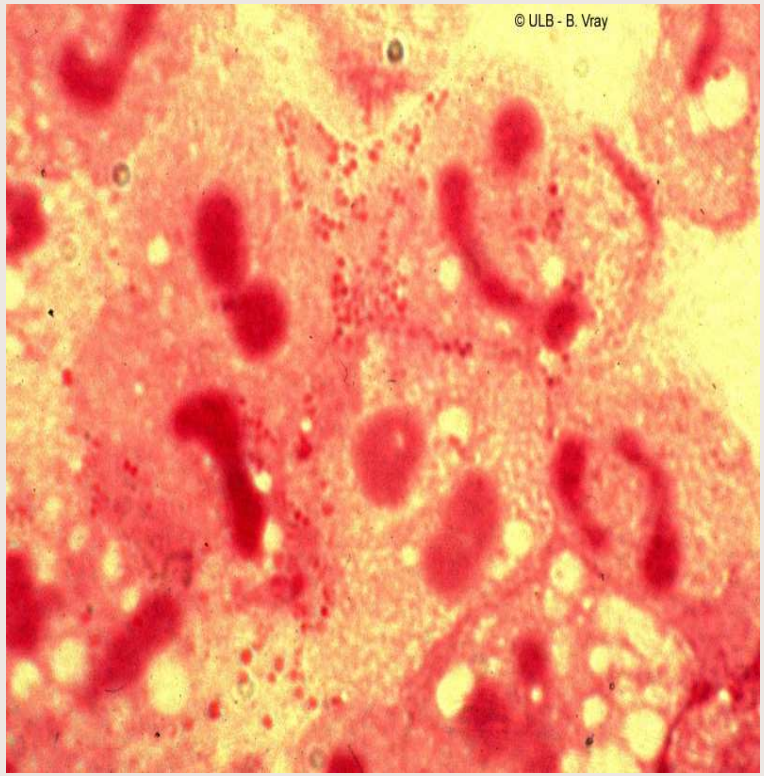


Normal Flora of the Conjunctiva

1. *Staphylococcus epidermidis*
2. *Corynebacterium sp.*
3. *Propoinibacteriumacnes*)
4. *Staphylococcus aureus*
5. Viridans streptococci
6. *Neisseria* sp.
7. *Haemophilus influenzae*

Pathogens which do infect the conjunctiva

- *Neisseria onorrhoeae*
- *Chlamydia trachomatis*



Normal Flora of the Respiratory Tract

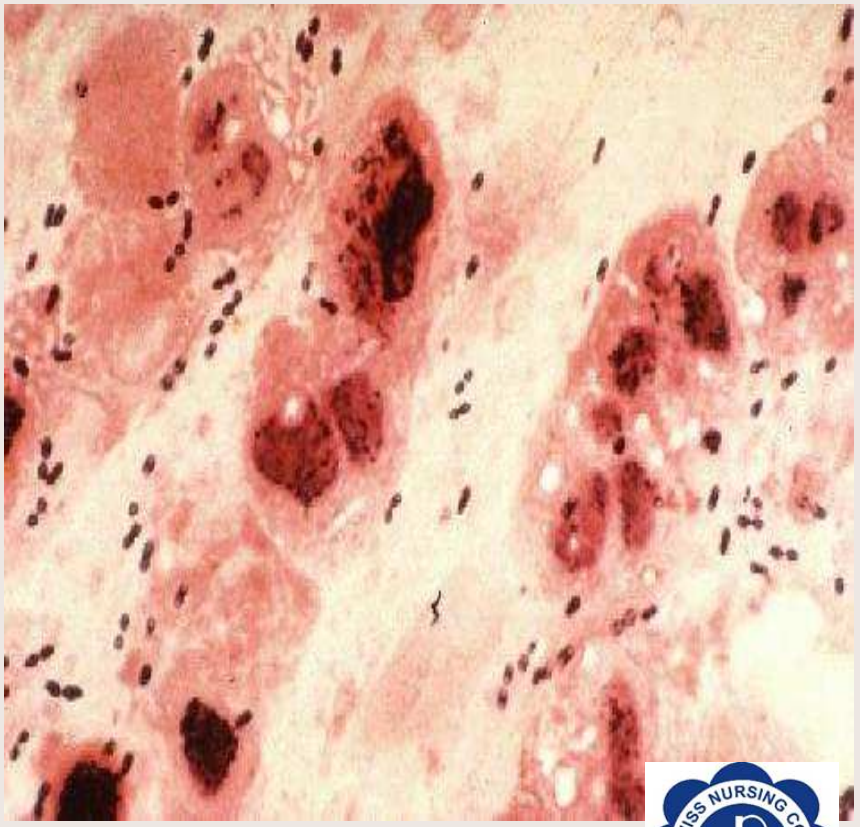
A) The nares (nostrils)

1. *Staphylococcus epidermidis*
2. Corynebacteria
3. *Staphylococcus aureus*
4. *Neisseria sp.*
5. *Haemophilus sp*
6. *Streptococcus pneumoniae*

Normal Flora of the Respiratory Tract

B) The upper respiratory tract (nasopharynx).

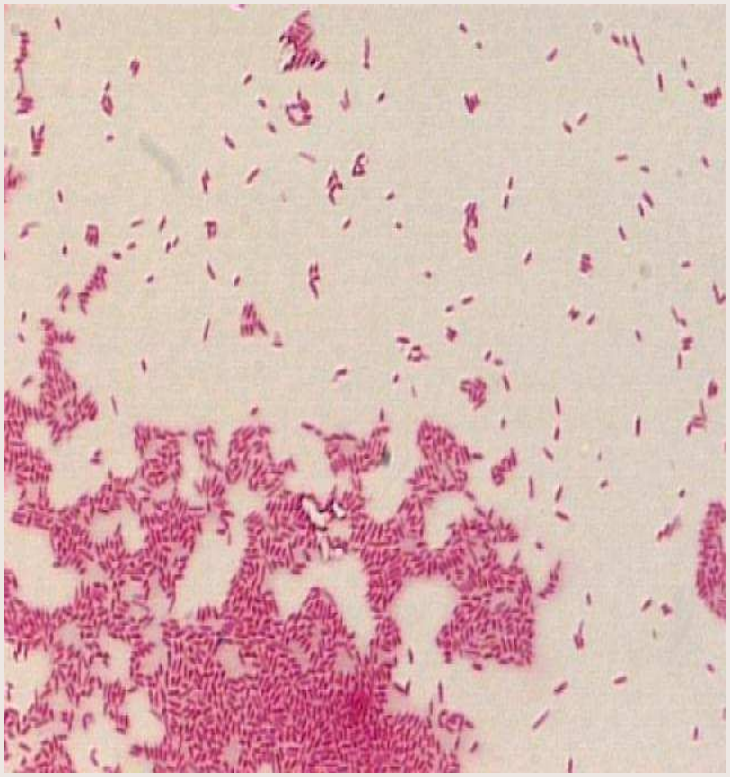
1. Non-hemolytic streptococci
2. Alpha-hemolytic streptococci
3. *Neisseria* sp.
4. *Streptococcus pneumoniae*
5. *Streptococcus pyogenes*
6. *Haemophilus influenzae*
7. *Neisseria meningitidis*



PAK-SWISS NURSING COLLEGE SWAT

Normal Flora of the Respiratory Tract

- **C) The lower respiratory** tract (trachea, bronchi, and pulmonary tissues):
- Usually sterile.
- The individual may become susceptible to infection by pathogens descending from the nasopharynx e.g.
- *H. influenzae*
- *S. pneumoniae*).



Normal Flora of the Human Oral Cavity

- Oral bacteria include:

1. Viridans streptococci
2. Lactobacilli
3. Staphylococci (*S. aureus* and *S. epidermidis*)
4. *Corynebacterium* sp.
5. *Bacteroides* sp.
6. *Streptococcus sanguis* (dental plaque)
7. *Streptococcus mutans* (dental plaque)
8. *Actinomyces* sp.

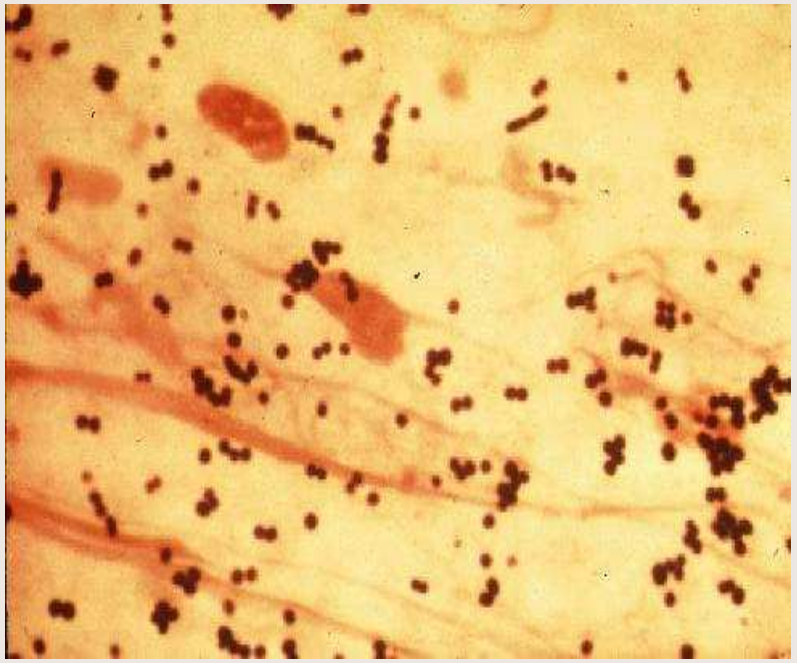
The Normal Flora of The Ears (i.e. external ear)

- The external ears contains avariety of microorganisms. These include:

1. *Staphylococcus epidermidis*

2. *Staphylococcus aureus*

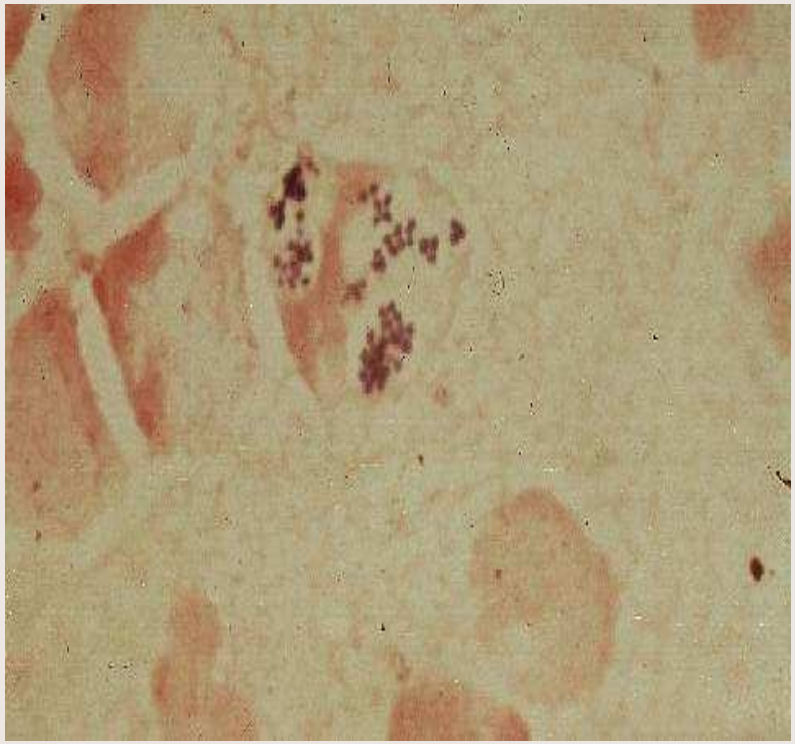
3. *Corynebacterium sp*



Normal flora of the Urogenital Tract

a) The anterior urethra

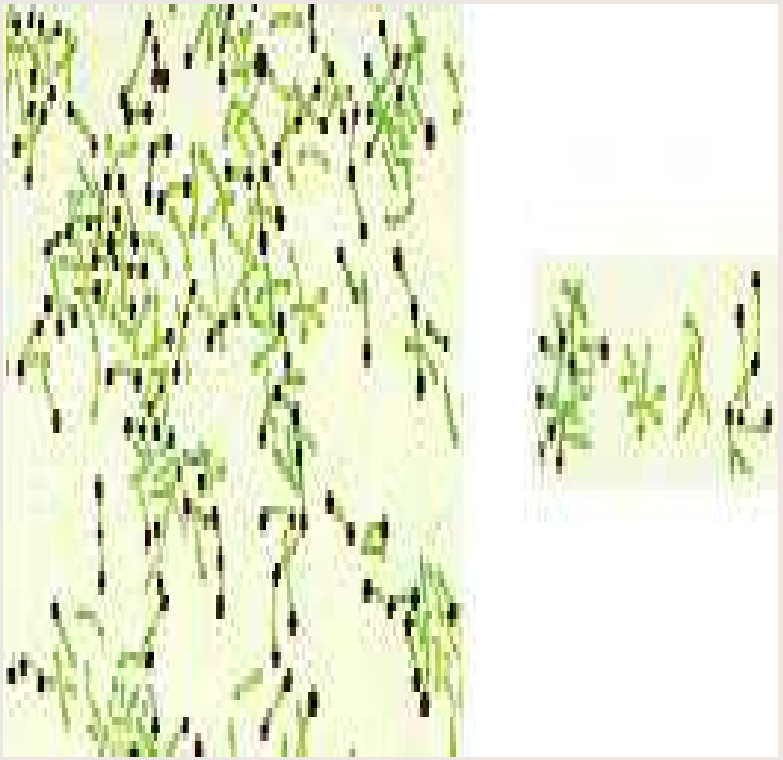
1. *Staphylococcus epidermidis*
2. *Enterococcus faecalis*
3. lpha-hemolytic streptococci.
4. Some enteric bacteria (e.g. *E. coli*, Proteus sp.)
5. Corynebacteria sp.
6. *Acinetobacter sp.*
7. *Mycoplasma sp.*
8. *Candida sp.*
9. *Mycobacterium smegmatis*



Normal flora of the Urogenital Tract

b) The vagina

1. *Corynebacterium* sp.
2. Staphylococci
3. Nonpyogenic streptococci
4. *Escherichia coli*
5. *Lactobacillus acidophilus*
6. *Flavobacterium sp.*
7. *Clostridium sp.*
8. *Viridans streptococci*
9. Other *Enterobacteria*



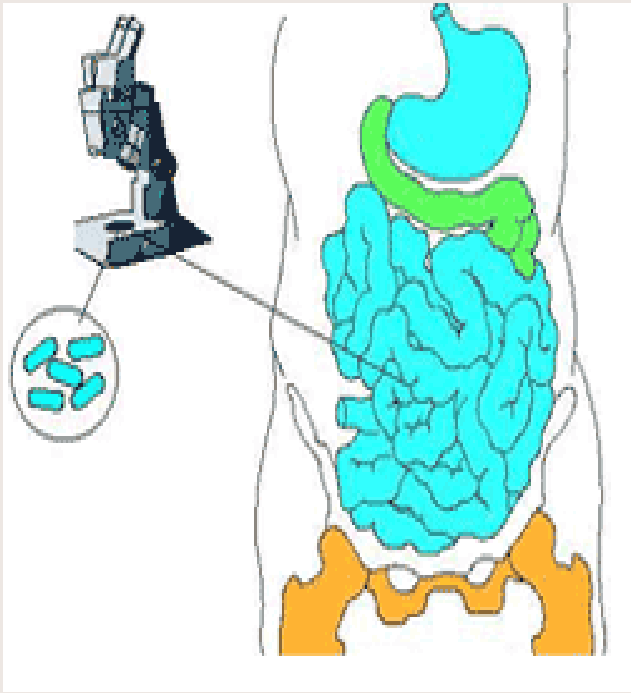
Normal Flora of the Gastrointestinal Tract (GIT)

- In humans, the GIT flora are influenced by:

1. Age
2. Diet
3. Cultural conditions
4. The use of antibiotics

Normal Flora of the Gastrointestinal Tract (GIT)

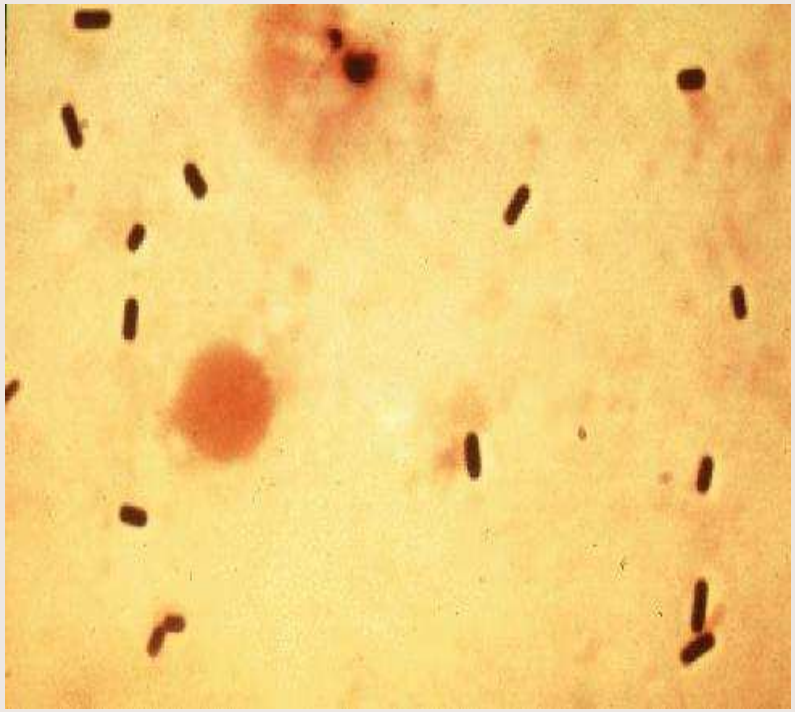
- **At birth**
- The entire intestinal tract is sterile, but bacteria enter with the first feed. The initial colonizing bacteria vary with the food source of the infant.



Normal Flora of the Gastrointestinal Tract (GIT)

- **In breast-fed**

1. Bifidobacteria account for more than 90% of the total intestinal bacteria **Bifidobacteria** are one of the major genera of bacteria that make up the gastrointestinal tract microbiota in mammals. Some **bifidobacteria** are used as probiotics. .
2. Enterobacteriaceae
3. Enterococci
4. Bacteroides. The bacteroides are able to benefit the host by preventing infection by potential pathogens that may colonize and infect the gut as well
5. Staphylococci
6. Lactobacilli ,They are a major part of the lactic acid bacteria group (i.e., they convert sugars to lactic acid).
7. Clostridia



Normal Flora of the Gastrointestinal Tract (GIT)

- **In bottle-fed infants**
- Bifidobacteria are not predominant. When breast-fed infants are switched to a diet of cow's milk or solid food, bifidobacteria are progressively joined by:

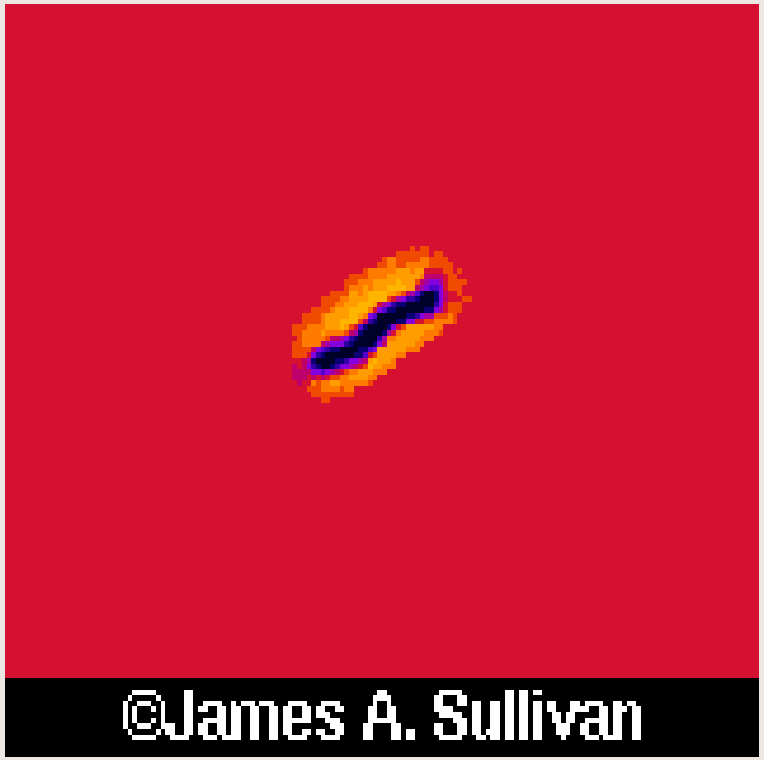
1. Enterics
2. Bacteroides
3. Enterococci
4. Lactobacilli They are a major part of the lactic acid bacteria group (i.e., they convert sugars to lactic acid
5. Clostridia

Normal Flora of the Gastrointestinal Tract (GIT)

In the upper GIT of adult humans

- mainly acid-tolerant lactobacilli

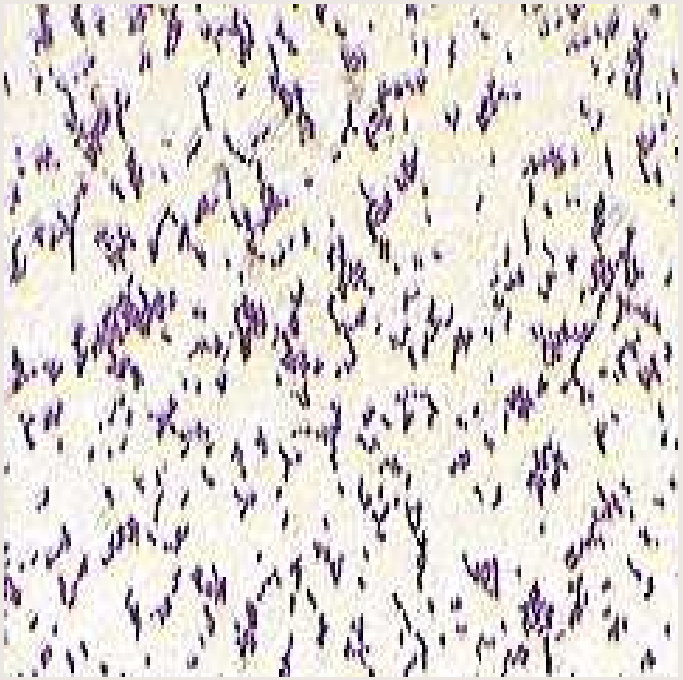
e.g. Helicobacter pylori



Normal Flora of the Gastrointestinal Tract (GIT)

- **The proximal small intestine**

1. **Lactobacilli**
2. ***Enterococcus faecalis*** urinary tract infections, endocarditis (an infection in the inner lining of the heart) and wound infections.
3. **Coliforms.** which can ferment lactose with the production of acid and gas when incubated at 35–37°C. They are a commonly used indicator of sanitary quality of foods and water
4. **Bacteroides**



Bacterial-human relationships

Normal flora –

Opportunistic – infections

Pathogenic infections –

Normal flora - Risks

- Dental plaque
- Dental caries: destruction of enamel, dentin or cementum of teeth
- Periodontal disease
- Inflammatory bowel disease
- Obesity

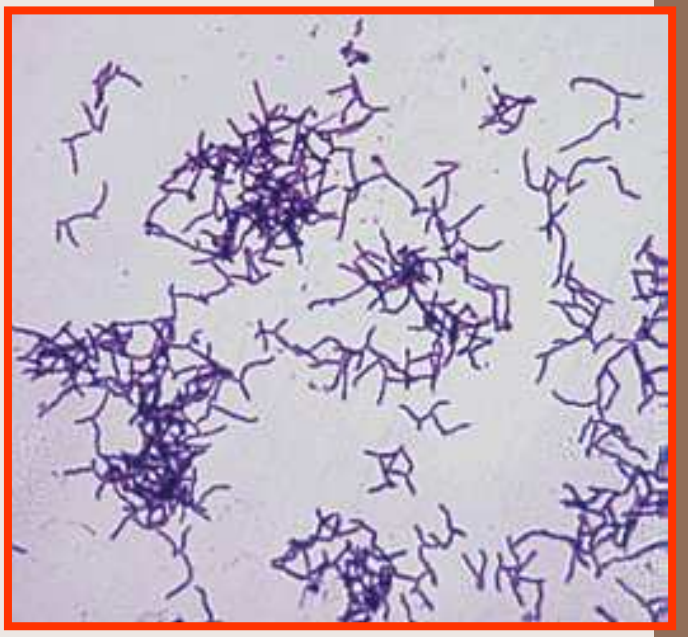
Opportunistic flora

- Some normal flora become opportunistic pathogens

(*Staphylococcus aureus, Streptococcus mutans, Enterococcus faecalis, Streptococcus pneumoniae, Pseudomonas aeruginosa,CAUSES SKIN AND UTI* etc.)

- Breach of skin/mucosal barrier: trauma, surgery, burns
- Bacterium at one site may be commensal, but might be pathogenic at another site

Mouth flora



Opportunistic flora

- Growth of commensals may put patient at risk

Broad-spectrum antibiotic therapy decreases total – number of bacterial in gut

During repopulation, faster-growing aerobic • Enterobacteriaceae over slower-replicating anaerobes increases probability of gram-negative bacteremia

Cross-reactive responses to host tissue: Superantigen –

Chronic, low-grade inflammation –

Perturbation of cytokine network •

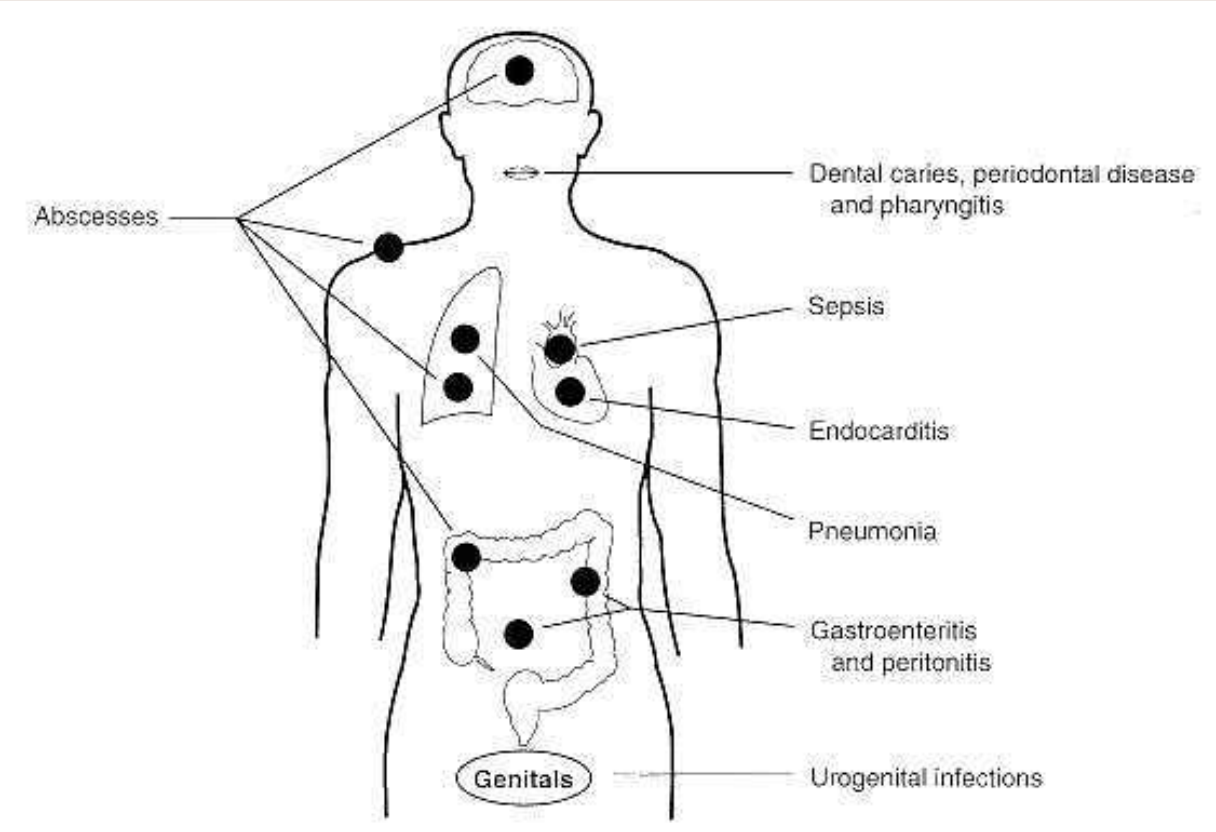
Gastrointestinal flora

- Antibiotics overuse
- Antibiotic associated diarrhae
- C. dfficile -associated diarrhea (CDAD)
- Pseudomembranous colitis
- toxic megacolon –

The flora of the large intestine (colon)

1. Enterococci
2. Clostridia
3. lactobacilli
4. Bacteroides
5. Bifidobacterium (*Bifidobacterium bifidum*)
6. *Escherichia coli*
7. Methanogenic bacteria FRMATIN OF METHAN
8. *Viridans streptococci*
9. *Staphylococcus sp.*
10. *Proteus sp.*
11. *Candida albicans* (Yeast). he main cause of C. albicans infection is the over use of antibiotics.
12. *Mycoplama sp.* primary atypical pneumonia

Normal flora - Risks and Opportunistic



Clinical conditions that may be caused by members of the normal flora

Probiotics/Prebiotics

- **Probiotic**
  - Oral administration of living organisms to promote health
  - Mechanism speculative: competition with other bacteria; stimulation of nonspecific immunity
  - Species specific: adherence and growth (tropism)

- Prebiotic
  - Non-digestible food that stimulates growth or activity of GI microbiota, especially bifidobacteria and lactobacillus bacteria (both of which are noninflammatory)
  - Typically a carbohydrate: soluble fiber

Gnotobiology

- Gnotobiotic animals: “germfree” (axenic) **Gnotobiology** is the science of study of animals or other organisms elevated to a higher position or level in environments free of germs or those which contain only specifically known germs. Scientists compare gnotobiotic animals with ordinary animals whose bodies carry many germs, like bacteria, viruses and parasites.
- Fetus is sterile –
- Cesarean sections to obtain fetus •
- Fetus growing in sterile isolator •
- Not anatomically or physiologically normal •
- Poorly developed lymphoid system, thin intestinal wall, – enlarged cecum, low antibody titers
- Die of intestinal atonia (motility problem) –
- Require vitamin K and B complexes –
- No dental caries or plaque –
- More susceptible to pathogens •

THE END

THANK YOU STUDENTS