Medical Microbiology
Lec. 5
Normal Flora of the human body

By:

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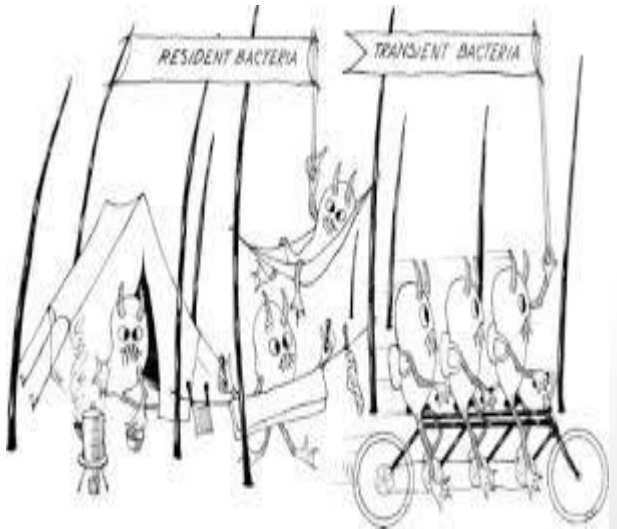
Normal flora

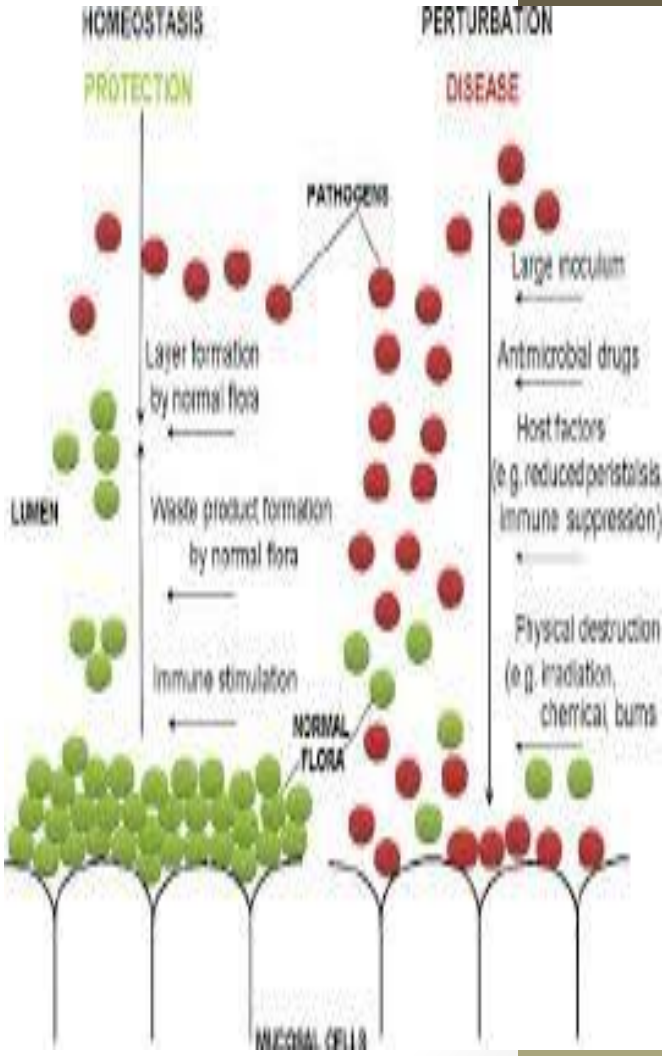
- Normal flora is the term used to describe the various bacteria and fungi that are **permanent residents** of certain body sites, especially the skin, oropharynx, colon, and vagina.
- Normal flora is usually develops in an orderly sequence, shortly after birth, leading to the stable populations of normal adult flora.
- Viruses and parasites are usually not considered members of normal flora.
- Normal flora *Vs* **carrier state**.
- Resident flora *Vs* **transient flora.**



Medically importance of normal flora:

Normal flora play a role in both maintenance of health and in causation of disease in many significant way:

1. Causing disease in immunocompromised patient.
2. Colonization resistance.
3. They may serve a nutritional function.
4. Some may cross react with normal tissue components ,eg, antibodies to various ABO group.



Distribution of normal flora:

❑ Normal flora of the skin:

- Skin has rich resident bacterial flora (10^3-$10^4/cm^2$).
- Most are located superficially in the **stratum corneum**, but some are found in deep hair follicles in the **dermis** and act as **reservoirs**.

Normal flora of skin

- **The predominant resident microorganism are:**

- Gram positive cooci: ***Staphylococcus epidermidis*** and other staphylococci but less common *S. aureus*.
- Aerobic and anaerobic bacilli (***Corynebacterium, Propionobacterium***).
- Streptococcus: *Peptostreptococcus*, enterococci, viridans streptococci
- Coliform.
- Non-pathogenic mycobacterium
- Fungi and yeast.

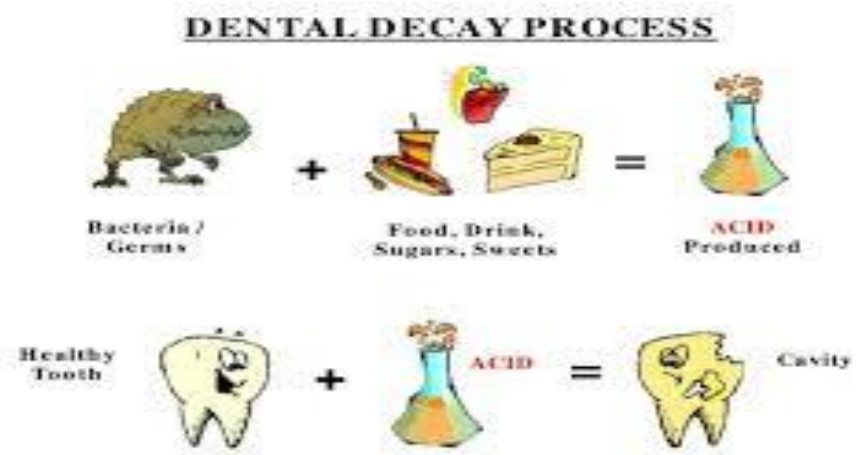
❑ Normal Flora of the respiratory tract

- A wide spectrum of organisms colonize the nose, throat, and mouth, but the lower bronchi and alveoli typically contain few, if any, organisms.
- **Nose:** colonized by staphylococci, streptococci, and corynebacteria.
- **Throat:** contains mixture of viridans streptococci, *S. epidermidis*, Commensal Neisseriae.

❑Normal Flora of the respiratory tract

- **Mouth:**

- viridans streptococci (***Streptococcus mutans)***- plaques, subacute bacterial endocarditis.
- **Eikenella corrodens**- clenched-fist injuries.
- Anaerobic bacteria (bacteroids, fusobacterium, clostridium, peptostreptococcus) are found in gingival crevices- cause lung abscesses
- Actinomyces israelii- causes abscesses of jaw, lungs, or abdomen.

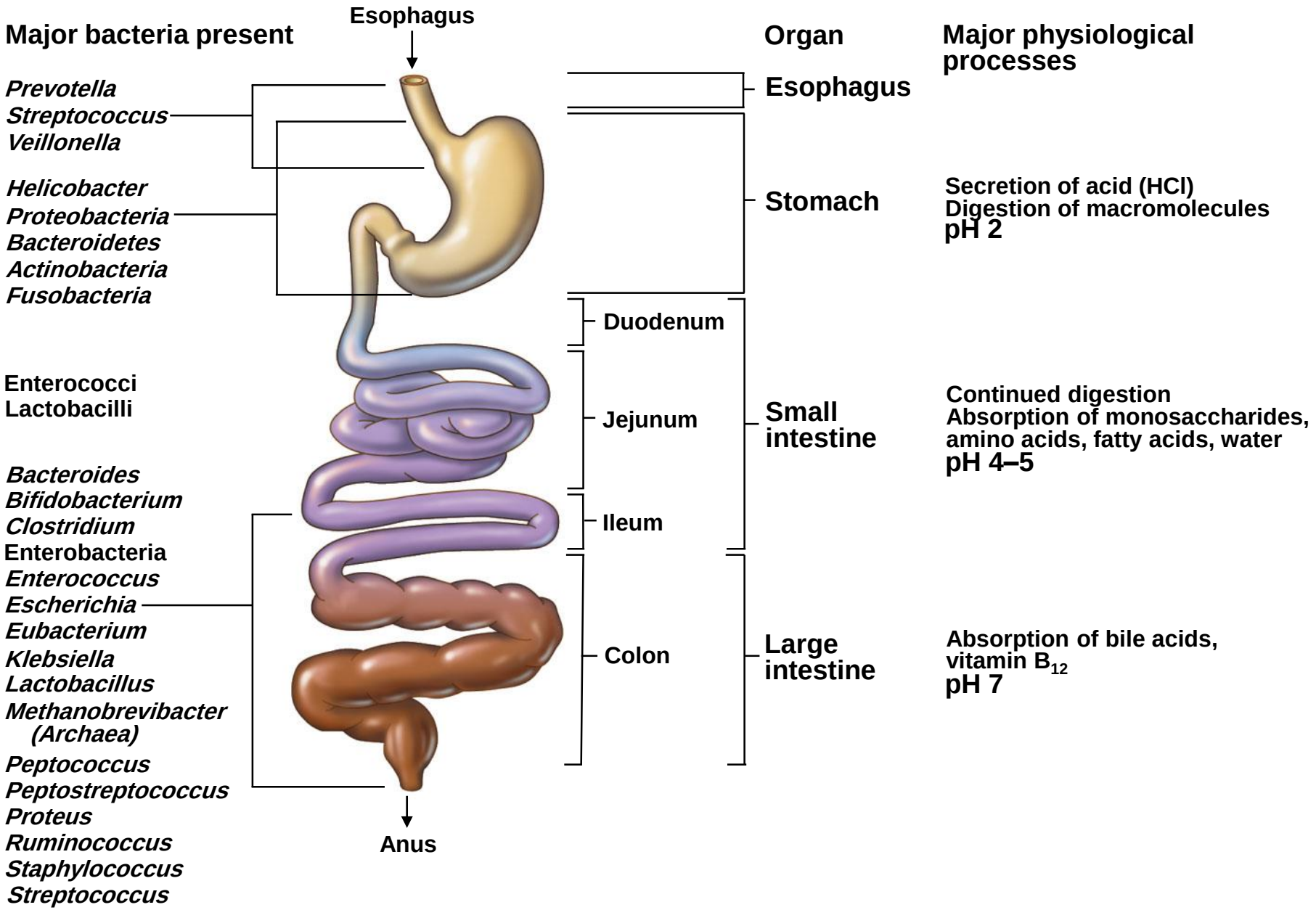


❑ Normal Flora of the intestinal tract

- **Stomach:** few organisms due to its low pH and enzymes.
- **Small intestine:** lactobacilli, enterococci and yeast
- **Large intestine:** the major location of normal flora, 20% of feces consist of bacteria,

-**Anaerobic bacteria:** 96-99% of resident flora, bacteroids especially B. fragilis, Clostridium especially C. perfringens

- **Facultative anaerobes:** 1-4% , coliform, enterococci, Pseudomonas, Lactobacilli, candida.



❑ Normal Flora of the genitourinary tract

- **Urethra:** **urine in bladder is sterile but during passage through urethra** contaminated with small number of organisms found on the skin and perineum. Theses organisms appear in normal voided urine in numbers of 10^2 -10^4 /mL
- **Vagina:**

- **lactobacilli:** low pH.
- **Group B streptococci:** 15-25% of women in childbearing age.
- **Others:** *Gardnerella vaginalis*, *Ureaplasma urealyticum*, clostridia, anaerobic streptococci, and candida.

Medically important normal flora

Table 6–2. Medically important members of the normal flora.

Location	Important Organisms[1]	Less Important Organisms[2]
Skin	*Staphylococcus epidermidis*	*Staphylococcus aureus, Corynebacterium* (diphtheroids), various streptococci, *Pseudomonas aeruginosa,* anaerobes (eg, *Propionibacterium*), yeasts (eg, *Candida albicans*)
Nose	*Staphylococcus aureus*[3]	*S epidermidis, Corynebacterium* (diphtheroids), various streptococci
Mouth	Viridans streptococci	Various streptococci, *Eikenella corrodens*
Dental plaque	*Streptococcus mutans*	*Prevotella intermedia, Porphyromonas gingivalis*
Gingival crevices	Various anaerobes, eg, *Bacteroides, Fusobacterium,* streptococci, *Actinomyces*	
Throat	Viridans streptococci	Various streptococci (including *Streptococcus pyogenes* and *S pneumoniae*), *Neisseria* species, *Haemophilus influenzae, S epidermidis*
Colon	*Bacteroides fragilis, Escherichia coli*	*Bifidobacterium, Eubacterium, Fusobacterium, Lactobacillus,* various aerobic gram-negative rods, *Enterococcus faecalis* and other streptococci, *Clostridium*
Vagina	*Lactobacillus,* E coli,[3] group B streptococci[3]	Various streptococci, various gram-negative rods, *B fragilis, Corynebacterium* (diphtheroids), *C albicans*
Urethra		*S epidermidis, Corynebacterium* (diphtheroids), various streptococci, various gram-negative rods, eg, *E coli*[3]

Medically important bacteria According to Gram's stain

Gram's positive Bacteria

G+ Cocci

1. **Staphylococci**
   - *S. aureus*
   - *S. epidermidis*
2. **Streptococci**
   - *St. pyogenes*
   - *St. pneumonia*
   - *St. fecalis*
   - *St. agalactiae*

G+ Bacilli

NSF Bacilli

1. Corynebacterium
   - *C. diphtheria*
2. Listeria
   - *L. monocytogenes*
3. Actinomyces
   - *A. israeli*

SF Bacilli

Aerobic

1. Bacillus
   - *B. anthracis*
   - *B. cereus*

Non-aerobic

1. Clostridium
   - *C. tetani*
   - *C. botulinum*
   - *C. perfringens*

Gram's negative bacteria

G- cocci

1. Neisseria
   - *N. gonorrhea*
   - *N. meningitidis*

G- bacilli

1. Enterobacteriace
   - *E. coli*
   - *Klebsiella*
   - *Proteus*
2. *Pseudomonas*
3. *Salmonella*
4. *Shigella*
5. *Brucellae*
6. *Compylobacter*
7. *Helicobacter*
8. *Vibrio*
9. *Hemophillus*
10. *Bordetella*
11. *Yersinia*

Special Bacteria

1. Mycobacterium
- *M. tuberculosis*
- *M. bovis*
- *M. leprae*

2. Spirochetes
- *Treponema pallidum*

Mycoplasma
- *M. pneumoniae*

Chlamydia
- *C. trachomatis*

Reikettsia


thank you