Micro flora (Normal flora)

The term “normal microbial flora” refer to the population of microorganisms that inhabit the skin and mucous membranes of healthy normal persons. The microorganisms that live inside and on humans (now referred to as the **normal microbiota**)

Associations between hosts and their normal flora

1. **Commensals**: Microorganisms that have natural relationship with the host. Found in low number and has no benefit or harm . Mainly associated with the **GIT** (Gastro Intestinal Tract) .
2. **Residents** : Consist of relatively fixed types of microorganisms Regularly found in a given area at invariable period. If disturbed promptly reestablish itself .
3. **Transients:** Consist of nonpathogenic or potential pathogenic microorganisms that inhabit the skin or mucous membrane for hours or days. Establish itself briefly , excluded by host defense or competition from residents flora.
4. **Carrier state**: Potentially pathogenic that are carried by the individual without causing disease. However, it is the source of infection to other susceptible (nonimmune) individual. , eg. *Streptococcus pneumoniae*, *Neisseria meninetides* in throat of healthy individual.

DISTRIBUTION OF NORMAL FLORA IN THE BODY

The most common sites of the body inhabited by normal flora are, as might be expected, those in contact or communication with the outside world, namely, the skin, eye, and mouth as well as the respiratory, gastrointestinal, and urogenital tracts.

1. Skin

The skin can acquire any bacteria that happen to be in the immediate environment, but this transient flora either dies or is removable by washing. Nevertheless, the skin supports a permanent bacterial population (resident flora), residing in multiple layers of the skin. The resident flora regenerates even after vigorous scrubbing.

2. Eye

The conjunctiva of the eye is colonized primarily by *S. epidermidis*, followed by *S. aureus*, aerobic corynebacteria *(*diphtheroids), and *Streptococcus pneumoniae*. Other organisms that normally inhabit the skin are also present but at a lower frequency . Tears, which contain the antimicrobial enzyme lysozyme, help limit the bacterial population of the conjunctiva.

3. Mouth and nose

The mouth and nose harbor many microorganisms, both aerobic and anaerobic. Among the most common are diphtheroids (aerobic Corynebacterium species), *S. aureus*, and *S. epidermidis*. In addition, the teeth and surrounding gingival tissue are colonized by their own particular species, such as *Streptococcus mutans*.

4. Intestinal tract

In an adult, the density of microorganisms in the stomach is relatively low (10^3-10^5 per gram of contents) because of gastric enzymes and acidic pH. The density of organisms increases along the alimentary canal, reaching 10^8- 10^{10} bacteria per gram of contents in the ileum and 10^{11} per gram of contents in the large intestine. Some 20% of the fecal mass consists of many different species of bacteria, more than 99% of which are anaerobes. Bacteroides species constitute a significant percentage of bacteria in the large intestine. *Escherichia coli*,

a facultative organism, constitutes <0.1 % of the total population of bacteria in the intestinal tract.

5. Urogenital tract

The low pH of the adult vagina is maintained by the presence of *Lactobacillus* species, which are found in high numbers among the vaginal normal flora. If the Lactobacillus population in the vagina is decreased (eg, by antibiotic therapy), the pH rises, and potential pathogens can overgrow. A common example of such overgrowth is the yeast-like fungus, *Candida albicans* , which itself is a minor member of the normal flora of the vagina, mouth, and small intestine. The urine in the kidney and bladder is sterile but can become contaminated in the lower urethra by the same organisms that inhabit the outer layer of the skin and perineum.

BENEFICIAL FUNCTIONS OF NORMAL FLORA

Normal flora provides considerable benefits to the host.

1. the number of bacteria normally present in the lower bowel and mouth in a healthy person reduces the chances that invading pathogens can successfully compete for nutrients and attachment sites.
2. Some bacteria of the bowel produce antimicrobial substances to which the producers themselves are resistant, but invading bacteria are susceptible.
3. bacterial colonization of a newborn infant acts as a powerful stimulus for the development of the immune system. The microbiome plays an important role in "educating" the immune system.
4. bacteria of the gut provide important nutrients, such as vitamin K, and aid in digestion and absorption of nutrients.

HARMFUL EFFECTS OF NORMAL FLORA

Clinical problems caused by normal flora arise in the following ways:

1. The organisms are displaced from their normal site in the body to an abnormal site. e.g. *S. epidermidis*, into the blood stream where it can colonize catheters and artificial joints.
2. Potential pathogens gain a competitive advantage because of diminished populations of the microbiome. For example, normal bowel flora is depleted by antibiotic therapy leading to overgrowth by antibiotic resistant *Clostridium difficile*, which can cause severe colitis.
3. Harmless, commonly ingested food substances are converted into carcinogenic derivatives by bacteria in the colon. example is the conversion by bacterial sulfatases of the sweetener cyclamate into the bladder carcinogen cyclohexamine.
4. When individuals are immunocompromised, normal flora can overgrow and become pathogenic.