Lecture Title: NORMAL FLORA

(Foundation Block, Microbiology)

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Lecture Objectives..



By the end of this lecture the student is expected to be able to:

- 1. Define the terms: *Normal Flora, Resident flora, Transient flora* and carrier state
- 2. Know the origin of normal flora.
- 3. Know the importance of normal flora with examples, including importance as:
 - 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 in these areas and relation to pathogenicity of these organism.
- 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.

Definition



- Normal flora are microorganisms that are frequently found in a particular site in normal healthy individual.
- Some are found in association with humans / animals only. The Majority are bacteria.
- Symbolic relationship with the host.
- Subject to constant changes.
- Altered by antimicrobial agents.



Types of Normal Flora

- *Commensals*: natural relationship with host.
- Residents : present for invariable period .
- *Transients* : establish itself briefly , excluded by host defence or competition from residents.
- *Carrier state*: potentially pathogenic, eg.
 S.pneumoniae, N. meningetidis in throat of healthy individual.

Origin of Normal Flora

- Newborn sterile in utero
- After birth ,exposed to flora of mother's genital tract,skin, respiratory tract flora of those handling him ,and organisms in the environment.





Beneficial effects of normal flora

- 1 ~ Immunostimulation (antibody development)
- 2- Exclusionary effect (vacuum effect) and protection from external invaders..
- 3-Production of essential nutrients (vit. K & B) by some normal intestinal flora eg. *E.coli*.

Other facts regarding normal flora

- May be a source of opportunistic infections. eg . In patients with impaired defense mechanisms. eg *S.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.

Continue:



- 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.

Distribution of normal flora

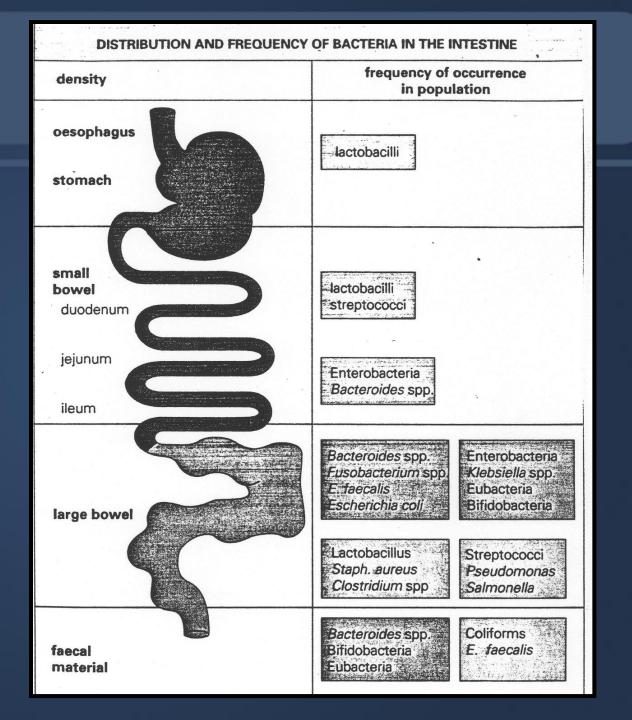


- Internal organs (except alimentary tract) are sterile at health.
- Sterility maintained by :
 - ~ local defence mechanisms
- chemical substances in serum & tissues eg.
 Complement , antibodies.
- ~phagocytic activity of PMN

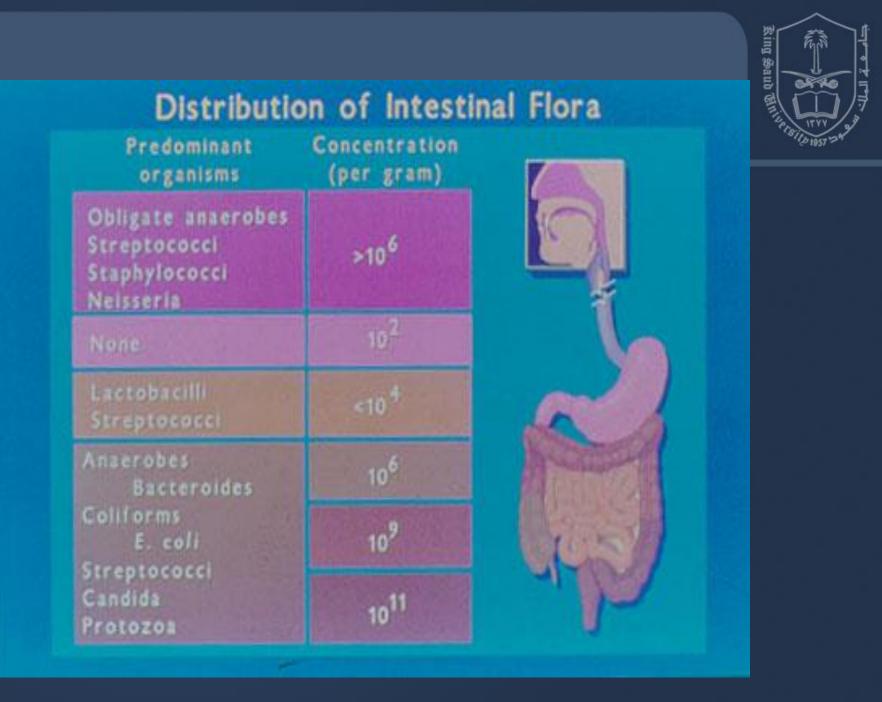
Areas of the body with normal flora

King Saud

- GIT: mouth & large colon
- Urogenital tract: vagina & distal 1/3 of the urethra
- Skin







Normal flora of the respiratory tract

- Upper resp.tract colonizes by flora as in mouth & nasopharynx
- Lower respiratory tract is sterile
- NOSE: ~ Staph. epidermidis
 - ~ Staph. aureus
 - ~Corynebacteria

Oropharynx flora

- Viridance streptococci
- Commensal neisseriae
- Corynebacteria
- Bacteroides
- Fusobacteria, Veillonella, actinomyces, spirochaetes.
- Heamophilus inflenzea & Pneumcoccus are potential pathogens.
- Less common: *S.pyogenes ,N.meningitidis*

Gastrointestinal tract flora

- Saliva contains 10⁸ bact/ml
- Gingival margin debris &dent. Plaque contiually colonized by bacteria.
- Oesophagus flora as pharyngeal flora.
- Empty stomach sterile due to gastric acid.
- Duodenum, jejunum&upper ielum have scanty flora
- Large intestine heavily colonized by bacteria.

Faeces



- 1/3 of faeces wt. is bacteria, mainly dead,
- Living bacteria ~ $10^{10}/\text{gm}$
- 99% anaerobes
- Anaerobic environment maintained by aerobic bacteria utilizing free O2.
- Bacteroides fragilis group the dominant anaerobes, bifidobact. Lactobacilli...etc.
- Less common: E.coli ,Proteus,....etc.

Genital tract flora

- Ring Saub Church
- Female genital tract heavily colonized, why?
- 10^8 /ml in normal vaginal secretion.
- In both sexes Mycob. Smegmatis (AFB) in secretions which contaminate urine-leads to confusion / misdiagnosis.
- M & F distal urethra: ~ S.epidermidis
 ~ corynebacteria
 ~Mycoplasma.

Female Vulva



- S. epidermidis , corynebacteria, E.coli and othe coliforms & St. faecalis.
- Vagina :
- ~lactobacilli (Doderlein's bacilli)
- ~ Bacteroides melaninogenicus
- ~S.faecalis
- ~ corynebacteria
- ~Mycoplasma
- ~ Yeasts.

Normal Skin Flora



- Skin has rich resident bacterial flora(10⁴/cm²).
- Exist as microcolonies.
- Ano2 organisms predomonate in aeras with sebaceous glands.
- Moist skin ,often colonized by coliforms.



Main Skin Flora

- Propionibacterium acnes
- Anaerobic cocci
- S. epidermidis
- Corynebacteria
- S. aureus (less common, potential pathogen)
- Coliforms



External auditory meatus

- S. epidermidis
- Corynebacteria
- AFB occasionally in wax.
 <u>CONJUNCTIVAL SAC FLORA</u>
- -Corynebacterium xerosis
- ~ S.epidrmidis

Reference book and the relevant page numbers.



- SHERRIS MEDICAL MICROBIOLOGY, AN INTRODUCTION TO INFECTIOUS DISEASES. KENNETH RYAN / GEORGE RAY. LATEST EDITION. PUBLISHER MC GRW HILL.
- CHAPTER 9, PAGE 141~148

I hank You ③

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