

Lec. 1 micro summary , By Ghada Alzoubi

1-**Diarrhea** is the **most common** symptom of GI infections and remains a leading cause of morbidity and mortality worldwide, especially in children. it's **treatable and preventable**.

2-**Natural defense**→**Anatomical & Physiological barrier**: skin, oral mucosa and intestinal epithelium

3-**Natural defense**→**Chemical barriers**, such as the acidity of the stomach , complement and antimicrobial proteins ,enzymes ,peptides ,saliva , Antibodies “ **mainly IgA** in mucosal wall”

4-**Protection against pathogens relies on several levels of defense**:

Start from the first line **Anatomical barriers** → **complement+ antimicrobial proteins** → **innate immune cells** →when the pathogen overcome all of these barriers we will need help of the last line of defense which is **Adaptive immunity**

5-**Cell-mediated immunity proceeds in a series of steps**:

a-. Inflammatory inducers: **PAMPS**→invading microbe , **DAMPS**→ damage tissue

b-Sensor cells: **PRRs** “pattern recognition receptors” detect the inflammation

c- Mediators: like **cytokines** which act on Epithelial and lymphoid cells

6- **Epithelial surfaces**: Most of the **enzymatic breakdown** of food occurs in the small intestine.

7-**Between villi are the crypts of Lieberkuhn that contain** : **stem cells** , **Mucus-producing goblet cells** and **Paneth cells** located in the base of the small intestinal crypts where they secrete antimicrobial molecules

8-**M cells increase vulnerability to infection** “ point of entry for pathogens “ Salmonella, Shigella, Yersinia”

9-Abundant intraepithelial lymphocytes (IELs) **present in the intestines**

10- **In Peyer's patches** the antigen is collected by microfolds or M cells

11-**Epithelial cells** → help in **digestion and absorption**.

12-**Goblet cells** secrete heavily **glycosylated mucins** (type2)

13-, **Intestinal cells** have their own way of uptake and antigen presentation→ by M cells

14-the IgA is of two types: “**Transcytosis of secretory IgA**” بطلع الباتوجين من جوا لبرا

a. **Monomer**: found in the **blood** b. **Dimer**: linked by J-chain, found in **mucous** membranes

15-**microbiota/ microbiome / normal flora**→Cute little microbial communities that constantly colonize the skin and mucosal membranes of healthy individuals, **but not found** inside the blood or deep sterile tissues .

16-**The mucous layer** plays a key role in buffering the microbiota not to reach the epithelium

17-**colon** contains the **largest** number of bacteria→ **Bacteroides** (anaerobes common in colon)

18-The body contains 4 phyla of bacteria:

a. Firmicutes. b. Bacteroides c. Actinobacteria (bifidobacteria; in newborns). d. Proteobacteria

19- Two main phyla in the intestines: Firmicutes and Bacteroides

20- breast-fed babies are thought to have bifidobacteria as a predominant commensal.

21- Bifidobacterium spp. are the primary feces inhabitants shortly after birth + As the child shifts from mother's milk to solid food, the microbiota shifts to other anaerobic bacteria: C.difficile

22-Microbiota function → protection "directly by producing inhibitory substances that affect pH and oxygen, and antimicrobials"

Microbiota and disease:

1. **Obesity:** related to a lower diversity of microbiota with increased enzymes
2. Inflammatory Bowel Diseases IBD: Microbial community imbalances Increased Proteobacteria and depleted Firmicutes and Bacteroides
3. **Type I Diabetes:** Decreased gut microbiota diversity. Interaction of intestinal microbes with the innate immune system
4. **GI Cancers:** H. pylori
5. Association of various species with colorectal cancer
6. **Oral diseases:** Cavities and gingivitis disease Most common infectious disease worldwide
7. **Allergy-like (atopic) diseases:** Eczema, allergies, asthma, Hygiene hypothesis, Induction of tolerance (early exposure), Antibiotic treatment, C section increase rates of asthma.
8. **Pseudomembranous colitis:** caused by C.difficile. → Fecal transplants were shown to improve outcomes.