

# MICROBIOLOGY

## Unit # VI



HUMAN AND MICROBIAL INTERACTION

MUHAMMAD ALAM

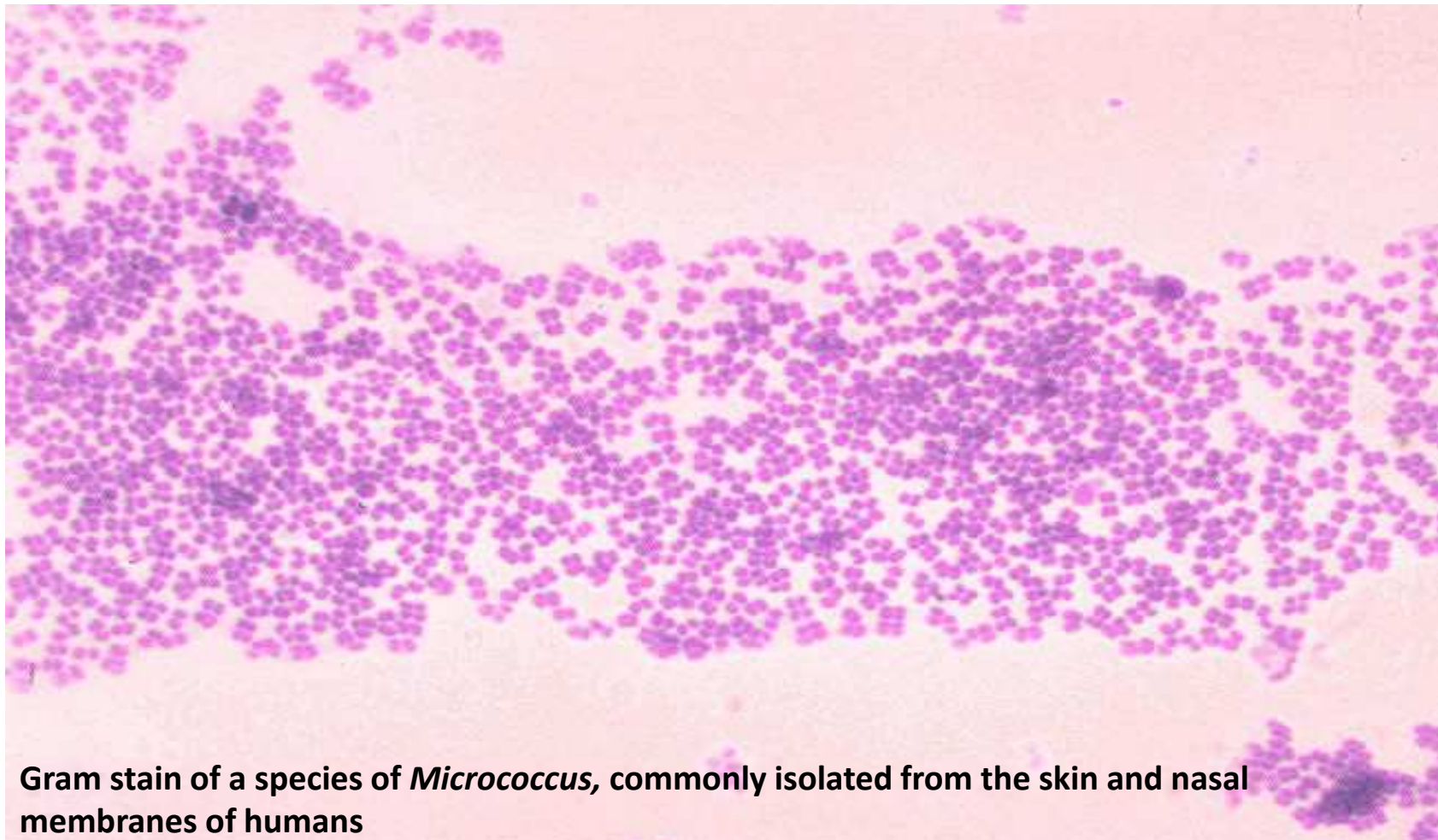
LECTURER PSNC SWAT.



# The Normal Flora

- In a healthy animal, the internal tissues, e.g. blood, brain, muscle, etc., are normally free of microorganisms. However, the surface tissues, i.e., skin and mucous membranes, are constantly in contact with environmental organisms and become readily colonized by various microbial species. The mixture of organisms regularly found at any anatomical site is referred to as the **normal flora**, by researchers in the field who prefer the term "**indigenous microbiota**". The normal flora of humans consists of a few eucaryotic fungi and protists, but bacteria are the most numerous and obvious microbial components of the normal flora.

# Figure



Gram stain of a species of *Micrococcus*, commonly isolated from the skin and nasal membranes of humans

# Types of flora

- **Transient flora**

- Transient means they are not always present in the body- like those that cause illness.
- Transient bacteria live on the surface of skin and can be easily killed with proper hand washing. Soap and water or an antiseptic often kills transient bacteria.

- **Resident flora**

- Resident means they are a natural part of the body makeup- like normal intestinal flora.
- Resident bacteria can be found in deeper layers of the skin and are harder to remove. Washing your hands with soap and water or an antiseptic may kill some resident bacteria but not all.



# Beneficial roles of normal flora

- **Normal flora is defined as a mixture of organisms regularly found at any anatomical site.**
- **The human body contains more than 400 species of bacteria.**
- **Normal flora have beneficial effects on the host that include preventing growth and colonization of harmful pathogens and anti-inflammatory effects.**



- **1. The normal flora synthesize and excrete vitamins** in excess of their own needs, which can be absorbed as nutrients by their host. For example, in humans, enteric bacteria secrete Vitamin K and Vitamin B12, and lactic acid bacteria produce certain B-vitamins. Germ-free animals may be deficient in Vitamin K to the extent that it is necessary to supplement their diets.

**2. The normal flora prevent colonization by pathogens** by competing for attachment sites or for essential nutrients. This is thought to be their most important beneficial effect, which has been demonstrated in the oral cavity, the intestine, the skin, and the vaginal epithelium. In some experiments, germ-free animals can be infected by *Salmonella* bacteria, while these infections for conventional animals are very rare.



- **3. The normal flora may antagonize other bacteria** through the production of substances which inhibit or kill non indigenous species. The intestinal bacteria produce a variety of substances ranging from relatively nonspecific fatty acids and peroxides to highly specific bacteriocins, which inhibit or kill other bacteria.

**4. The normal flora stimulate the development of certain tissues**, i.e., the caecum and certain lymphatic tissues in the GI tract. The caecum of germ-free animals is thin-walled, compared to that organ in conventional animals. Also, based on the ability to undergo immunological stimulation, the intestinal lymphatic tissues of germ-free animals are poorly-developed compared to conventional animals.



- **5. The normal flora stimulate the production of natural antibodies.**
- Since the normal flora behave as antigens in an animal, they induce an immunological response, in particular, an antibody-mediated immune (AMI) response. Low levels of antibodies produced against components of the normal flora are known to cross react with certain related pathogens, and thereby prevent infection or invasion. Antibodies produced against antigenic components of the normal flora are sometimes referred to as "natural" antibodies, and such antibodies are lacking in germ-free animals.





# Nosocomial infections

Infection acquired during stay at hospital are known as Nosocomial infections.

They are also known as HAI.

The HAI or nosocomial infections can be avoided by carrying out various preventive or safety measures.

# Prevention of nosocomial infection



Reducing person-to-person transmission

- Hand decontamination
- Personal hygiene
- Clothing
- Masks
- Gloves
- Safe injection practices
- Preventing transmission from the environment
- Cleaning of the hospital environment
- Use of hot/superheated water
- Disinfection of patient equipment
- Sterilization