Exercise XIV

Flora of the Skin

Our bodies represent a myriad of microenvironments, each with its own normal flora. In general, intact skin serves as a natural protective barrier against invasion by most infectious disease growth. It is the body’s first line of defense. Hair follicles and the openings of secreting glands are potential invasive avenues for pathogens. The skin is generally an inhospitable environment for most microorganisms. The slightly cooler temperature of the skin, salt from sweat and the normal inhabitants of the skin assist in creating hostile environmental conditions by splitting lipid secretions of sebaceous glands, resulting in the creation of fatty acids.

The dry layers of keratin-containing cells that make up the epidermis is not easily colonized by most microbes. Sebum, secreted by oil glands, inhibits bacterial growth, and salts in perspiration create a hypertonic environment. Perspiration and sebum are nutritive for certain microorganisms, however, which establish them as part of the normal microbiota of the skin. Normal human skin is colonized by large numbers of microorganisms that are harmless as commensals on its surface.

Passing through both the dermis and epidermis are sweat glands and hair follicles. Along the sides of the hair follicles are sebaceous glands, which produce an oily secretion (sebum) that flows up through the follicles and out onto the skin. Both hair follicles and sweat glands provide passages for microorganisms to reach deep body tissue. The secretions that reach the surface of the skin through hair follicles and sweat glands serve as nutrients for the microorganisms on the surface of the skin.

Normal microbiota of the skin tends to be resistant to drying and to relatively high salt concentrations. More bacteria are found in moist areas, such as the axilla (arm pit), and the sides of the nose, than on the dry surfaces of the arms or legs. Transient microbiota are present on the hands and arms that are in contact with the environment.

Only a few species are found repeatedly on the skin of groups of individuals and are referred to as resident flora or microbiota of the skin. The conditions of the skin favor the growth of Streptococcus, Micrococcus, Staphylococcus, fungi, diptheroid bacilli, and yeast. The normal flora of the skin consists of two groups of microorganisms, yeast and bacteria. The majority of yeast belongs to the genus Pityrosporum, and the bacteria are mainly Staphylococcus, Micrococcus, and Propionibacterium (Corynebacterium). Both Pityrosporum and Propionibacterium are associated with skin defects and disease (dandruff and acne), whereas Staphylococcus and Micrococcus are associated with preventing the colonization of the skin by pathogens and controlling the other microorganisms on the skin. About a third of the population carries Staphylococcus aureus on their skin and it has become a potentially dangerous pathogen in nosocomial infections.
Materials Needed

nutrient agar plate
tube of sterile water
sterile swab
wax pencil
test tube rack
spray bottle of disinfectant
paper towels

Procedure

1. Obtain a nutrient agar plate.
2. Dip a sterile cotton swab into a tube of sterile water.
3. Press the swab against the side of the tube to remove any excess water.
4. Swab an area of the skin, preferably behind the ear, forehead, or under the fingernails.
5. Using the swab, inoculate the nutrient agar plate streaking in all directions to obtain isolated colonies.
6. Using a wax pencil, label the plate with the initials of someone in the group and place upside down in the incubator.
7. Dispose of the swab in a biohazard bag.

Clean-up Procedure

Spray and wipe the table top with disinfectant.

Procedure: Second Lab Period

1. Obtain the plate inoculated with a skin culture from the incubator.
2. Note the different types of colonies representing different bacteria.
3. Using aseptic technique and an inoculating loop, obtain a sample of one of the colonies and prepare a Gram stain.
4. Observe the slide under oil immersion.
5. Dispose of the slide in a beaker of bleach.