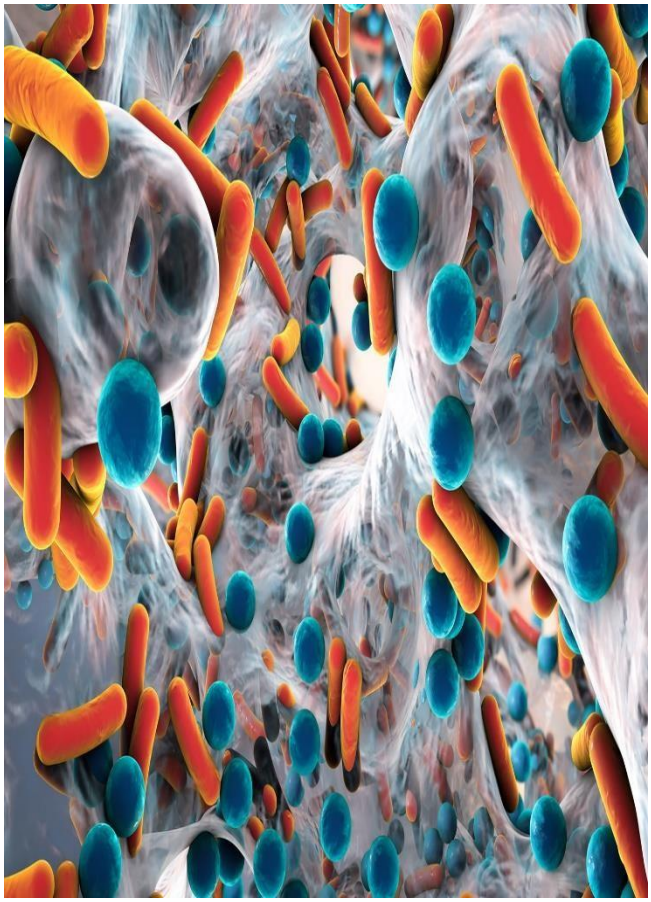
PASSION BATCH

SECOND YEAR



Microbiology

LECTURE 7

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Microbial Diversity
Eukaryotic Microbes

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Introduction

Eukaryotic microbes include some species of algae and fungi, and all protozoa, lichens, and slime moulds.

Prokaryotes are more important medically than ekaryotes
although eukaryotic microbes can cause a deadly disease

The most important species in eukaryotic
are the fungi and the protozoa
human medical microbiology من ناحية ال

Algae

Characteristics and Classification

Algae looks like a plant but its not a plant thus we call it plant like organism

Algae are photosynthetic, eukaryotic organisms

Algae and protozoa are referred to as protists because they are in the kingdom Protista.

Although they are not plants, algae are more plantlike than protozoa

A few species use organic nutrients, and others survive with very little sunlight.

Most algal cell walls contain cellulose

Depending on pigments they possess algae are classified as green, golden (or golden brown), brown, or red.

Diatoms algae live in both freshwater and seawater

Photosynthetic protists = algae

nonphotosynthetic protists = protozoa.

Medical Significance

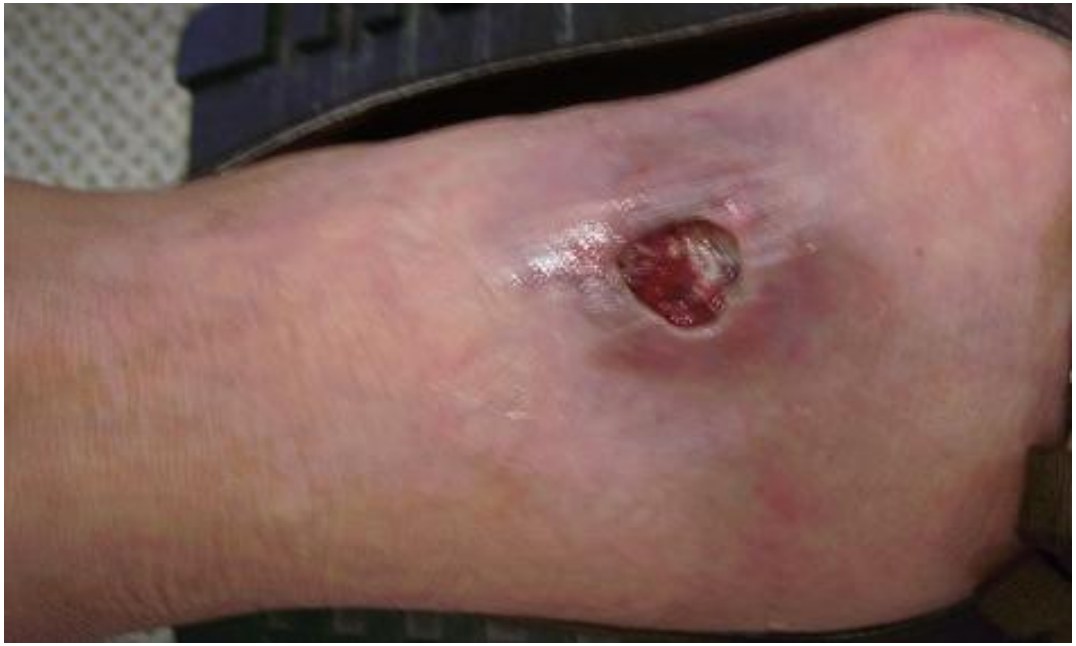
One genus of algae (*Prototheca)* is a very rare cause of human infections (causing a disease known as protothecosis).

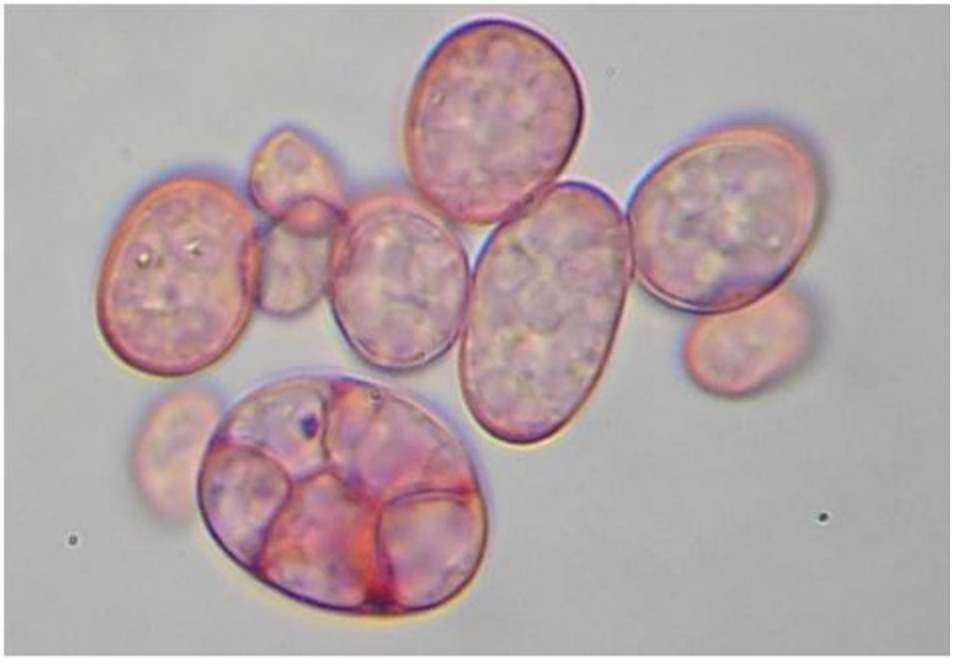
And this disease is manifested as skin ulcer and this skin ulcer could be fetal in case of immunesuppression

Prototheca lives in soil and can enter wounds, especially those located on the feet

It produces a small subcutaneous lesion that can progress to a crusty, warty-looking lesion.

Medically prototheca is the only algae specie which is medically impor





Prototheca cells in several stages of development

If the organism enters the lymphatic system, it may cause a debilitating, sometimes fatal infection, especially in immunosuppressed individuals.

Algae in several other genera secrete substances (*phycotoxins) that are poisonous to humans, fish, and other* animals

Protozoa Also called parasites

Most protozoa are single-celled free-living microorganisms found in soil and water

Protozoal cells are more animal-like than plantlike

All protozoal = eukaryotic

Structures and organelles = cell membranes, nuclei, endoplasmic reticulum, mitochondria, Golgi bodies, lysosomes, centrioles, and food vacuoles

Protozoa classified according to the locomotion which could be by :

1.cilia
2.flagella
3.pseudopodial
4.non motile

Protozoa do not have cell walls, but some, including some flagellates and some ciliates, possess a pellicle, which serves the same purpose as a cell wall—protection.

Some flagellates and some ciliates ingest food through a primitive mouth or opening, called a cytostome.

A typical protozoan life cycle consists of two stages:

1. motile trophozoite stage
2. nonmotile cyst stage.

Many parasitic protozoa are pathogens, causing malaria, giardiasis, African sleeping sickness, and amebic dysentery

Classification and Medical Significance

Protozoa are sometimes classified taxonomically by their mode of locomotion.

Some move by pseudopodia, others by flagella, others by cilia, and some are nonmotile.

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Amebae (amebas), such as *Acanthamoeba, Entamoeba,* and *Naegleria spp.* move by means of cytoplasmic extensions called pseudopodia (false feet).

Medically important ameba =Entamoeba histolytica, → amebic dysentery (amebiasis)

This is a GI disease leading to dysentery anc diarrhea

extraintestinal (meaning away from the intestine) → amebic abscesses.

If the Entamoeba histolytica reaches the liver it could lead to liver abscesse

Naegleria fowleri → primary amebic meningoencephalitis)

Acanthamoeba spp → eye infections).

conjunctivitis

Ciliates, such as *Balantidium, Paramecium, Stentor,* and *Vorticella spp.,* move about by means of large numbers of hairlike cilia on their surfaces

Balantidium coli → dysentery in underdeveloped countries

Flagellated protozoa (flagellates), such as Trypanosoma, Trichomonas, and *Giardia spp., move* by means of whiplike flagella.

We have 2 types of trypanosoma :

1.african

2.American which can cause a Chagas disease

Trypanosoma brucei subspecies gambiense ⟶ African sleeping sickness

Trypanosoma cruzi ⟶ (Chagas disease);

Trichomonas vaginalis ⟶ (trichomoniasis)

Sexually transmitted disease

Giardia lamblia ⟶ giardiasis

Is GI infection

اخطر انواع ال protozoa هي الانواع التي لا تتحرك
(nonmotile)

Babesia, Cryptosporidium, Cyclospora, Plasmodium, and Toxoplasma spp. are examples of sporozoan protozoa that cause human infections. Sporozoan protozoa are nonmotile.

Plasmodium spp. ⟶ *Malaria*

Cryptosporidium parvum ⟶ cryptosporidiosis

GI disease leasing to diarrhea and vomiting

Toxoplasma gondii ⟶ toxoplasmosis

Cat parasites

بتنتقل للناس عن طريق الclose contact مع القطط

And the toxoplasmosis can lead to fetal disease if it reaches the brian

Fungi

The study of fungi is called mycology.

Fungi are a diverse group of eukaryotic organisms that include yeasts, moulds, and mushrooms.

Mushroom is fungi but is not microorganism

Characteristics

Fungi differ from plants and algae = not photosynthetic

= no chlorophyll or other photosynthetic pigments.

=no cellulose (a polysaccharide) in fungal cell wall

= Fungal cell walls do contain a polysaccharide called chitin

chitin is used for surgical threads

Yeasts are unicellular, whereas moulds are multicellular.

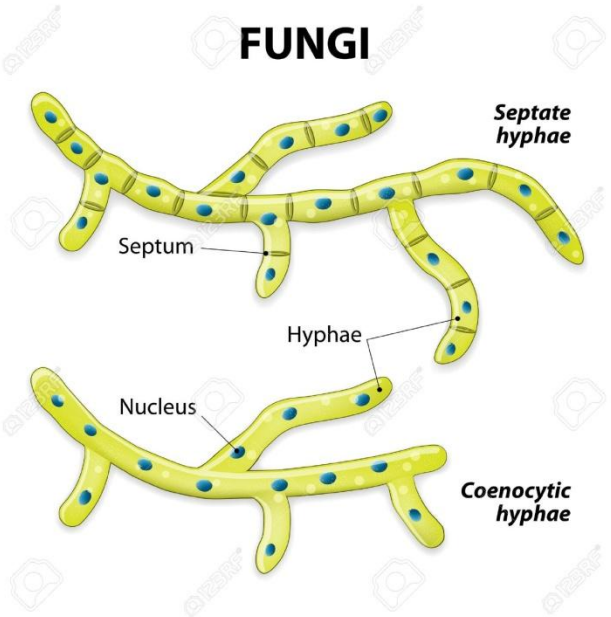
The most common and important moulds are those that we can fined in the surface of the food حتى بالمخللات يمكن ان نجد الmolds ولكنها لا تكون سامة

Filaments fungi called hyphae which intertwine to form a mass called a mycelium

Septate hyphae = aseptate hyphae

Septate or aseptate hyphae is an important “clue” when attempting to identify a fungus that has been isolated from a clinical specimen

Septate and aseptate is used to identify different types of fungi (a tool of diagnosis)



Coenocytic hyphae means there is no septum

لا يوجد حدود

Reproduction

Fungi reproduce by spore production.

Sexual and asexual spores.

Sexual spores are produced by the fusion of two gametes (thus, by the fusion of two nuclei).

Fungi are classified by the sexual spore that they produce or the type of structure on which the spores are produced

Asexual spores = fusion of gametes

Asexual fungal spores are known as conidia.

Fungal spores are very resistant to heat, cold, acids, bases, and other chemicals.

Many people are allergic to fungal spores

Yeasts

Yeasts are microscopic, single-celled organisms that usually reproduce by budding.

Yeasts are found in soil and water and on the skins of many fruits and vegetables.

Pasteur discovered that naturally occurring yeasts on the skin of grapes and other fruits and grains were responsible for these fermentation processes.

Yeasts are very similar to bacteria because the culture characteristics and the morphology looks very similar to bacteria

Pasteur was the first to discover the yeast and he discover Candida albicans which is a yeast and he found the fermentation process through the study of yeast.

If we do wet mount we will fined bacteria doing Brownian motion but yeast we will see what is called the germ tube

We can culture the yeasts in vitro like the bacteria

Saccharomyces cerevisiae ("baker's yeast") ferments sugar to alcohol under anaerobic conditions.

Yeast breaks down simple sugars to carbon dioxide and water aerobically, it has long been used as a leavening agent in bread production

Yeasts are also a good source of nutrients for humans because they produce many vitamins and proteins

Through fermentation pasteur was able to produce alcohols
And he found a type of yeast called saccharomyces cerevisiae
وهذا النوع المتسخدم لانتاج الكحول

Medically important Yeast

C. albicans and C. neoformans are examples of yeasts that cause human infections.

C. Albicans is the yeast most frequently isolated from human clinical specimens

C. Albicans is found everywhere on the skin, the surface of vegetables and fruits

ولكن الC. Albicans ممكن تعمل امراض وخاصة الناس التي تكون immune suppressed
مثل : الحامل ، المصابين بمرض السكري، وحتى الناس التي تتعالج بواسطة chemotherapy

And the C. Albicans can cause Oral thrush
وعادة تكون واضحة على الاطفال حديثين الولادة

اهم عامل لمقاومة الC. Albicans هو وجود ال normal flora

ونستطيع تقوية ال normal flora عن طريق اخذ probiotics

In the laboratory, yeasts colonies = quite similar in appearance to bacterial colonies

A wet mount can distinguish between a yeast colony and a bacterial colony

Yeasts are usually larger than bacteria, usually oval shaped; may be observed in the process of budding

C. Albicans can cause a disease in females called vaginitis

وسببها الحمل او اذا كان غياب للnormal flora في الvagina

lactobacillus presence is healthy

C. Neoformans is related with individuals that have AIDS