MEDICINE
KING SAUD UNIVERSITY

microbiology

LECTURE:

FUNGI AND THEIR PATHOGENESIS

IMPORTANT.
DOCTORS NOTES.
EXTRA INFORMATION.

Lecture Objectives..

1. To describe the general characteristics of fungi and recognize a fungus from all other living organisms (slide 3)

2. To establish familiarity with the terminology needed by medical students (slide 3-6)

3. To know certain fundamental facts about classification reproduction and identification of fungi (5-9)

What is Mycology?

Mycology: Study of fungi

Kingdom myceteae = Kingdom fungi

Medical mycology : Study of medically important fungi and the mycotic diseases.

Mycoses: A disease caused by a fungus

Characteristics of fungi:

Or (distinguishing features):

Saprobic Recycling

feed on dead tissues or organic waste (decomposers)

Symbiotic

mutually beneficial relationship between a fungus and another organism

Parasitic

feeding on living tissue of a host. (disease) it can cause a Fungal infection

What is a Fungus ?

→ Are bigger than bacteria

Characteristics of fungi:

1. All Eukaryotic organisms (a true nucleus)
2. Heterotrophic (does not make their own food) (Saprobic, symbiotic, parasitic)
3. Do not have chlorophyll (Achlorophyllous)
4. The cell is surrounded by rigid cell wall (It gives it's shape) made of chitin and complex carbohydrates (Mannan, glucan)
5. Cell membrane: (sterol, ergosterol)

Mannan and Glucan are targets for the diagnosis of fungal infections

What is a fungus?
https://www.youtube.com/watch?v=b5rluxtABGA

What are Fungi ? Types and Characteristics
https://www.youtube.com/watch?v=rB1JUT3nzmM

MORPHOLGY

1. Yeasts : are unicellular organisms

Round oval

2. Filamentous fungi (mold) (Hyphae, mycelium):

Basic structure unit is hyphae

Hyhpae are multicellular filamentous structures, constituted by tubular cells with cell walls.

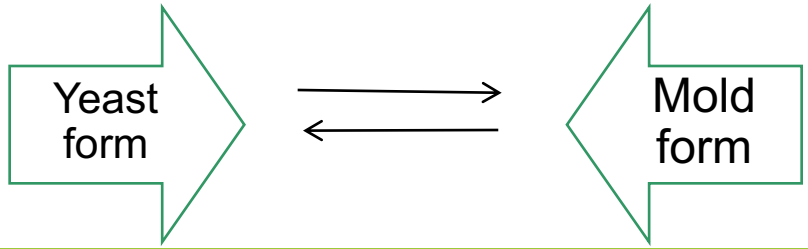
1. Dimorphic (between yeast and filamentous)

Yeast : Parasitic form, Tissue form, Cultured at 37° C

Filamentous : Saprophytic form, Cultured at 25 C

Depends on the temperature

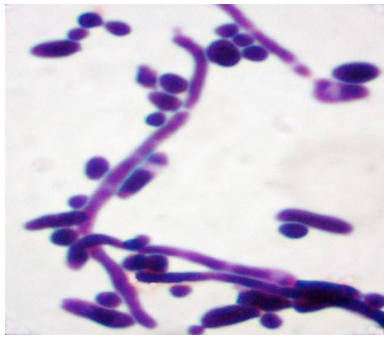
Dimorphic : Have two forms depending on change in the environmental factors :



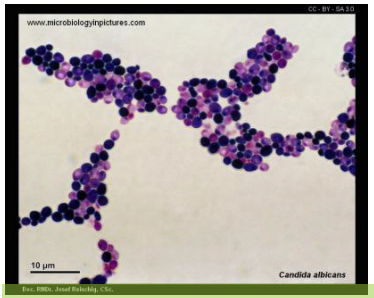
Yeast:

Morphology:	**Reproduction:**:	**Examples:**
Colony (culture)	Budding(Asexually)	**Candida albicans** (found as normal flora) / **Saccharomyces cerevisiae** (found in Baking Powder)

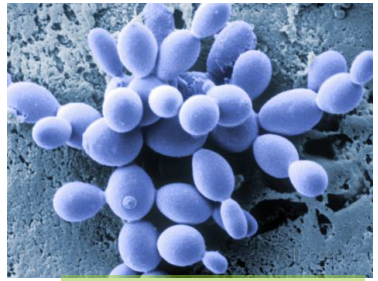
Cell culture:
Small – creamy



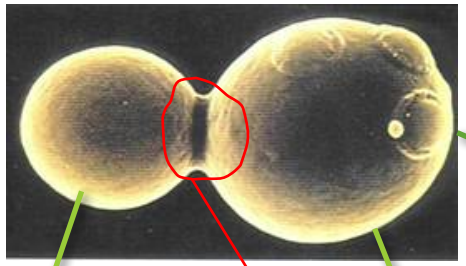
In Clinical samples
Budding yeast cells
+/- Pseudohyphae



Candida Albican sstained



Saccharomyces cerevisiae



Budd or daughter cell

Yeasts budding

Mother

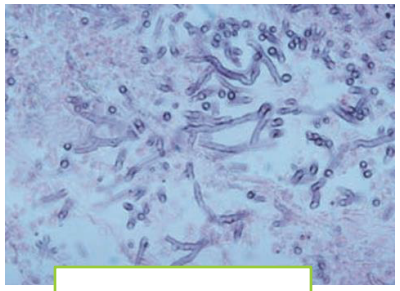
Weakness in this area in the cell wall = groth

In the end it well divided and became elongated , and again it's going to attach To another and called pseudohyphae

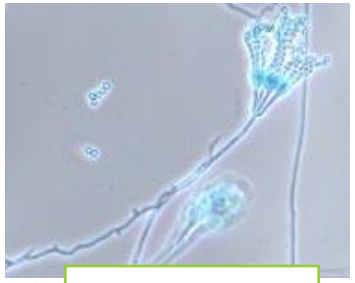
Pseudo = not true hyphae but it still a yeast

Filamentous (Mold=mould) fungi

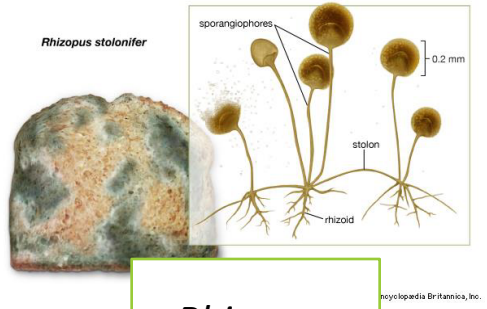
A hypha (plural hyphae)	Mycelium	**Conidia/ Spore (It is the origin of the filamentous fungi)**	**Examples:**
is a long, branching filamentous cell. hyphae are the main mode of vegetative growth.	The intertwined mass of hyphae that forms the fungal colony.	asexual spores borne externally on hyphae or on a conidiophore.	*Aspergillus* ***(very common pathogenic filamentous fungi)***
			Penicillium ***(synthesize penicillin)***
			Rhizopus ***(causes Black bread mold)***



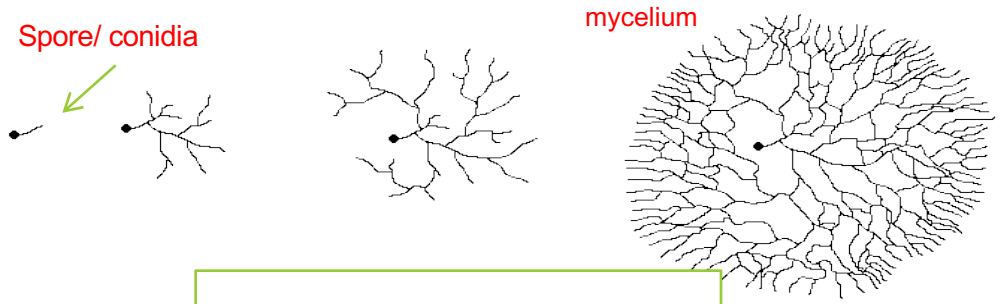
Aspergillus



Penicillium

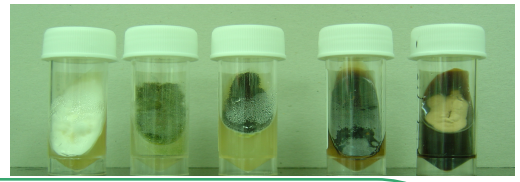


Rhizopus



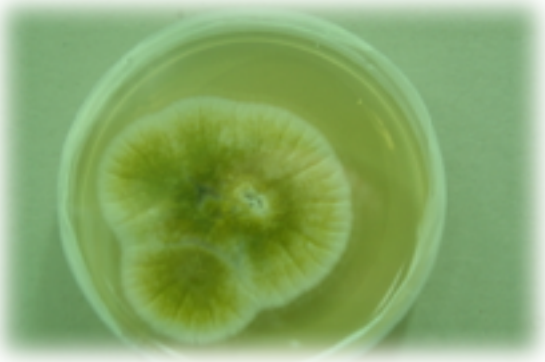
Filamentous fungi
Hyphal growth from spore

Filamentous fungi



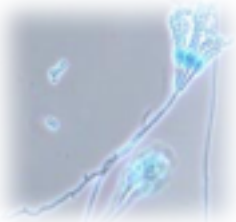
- **Morphology:**

a) Cell cultre:

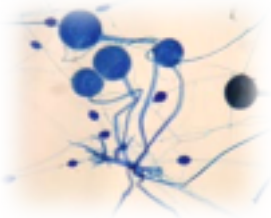


(big, colored, velvety, powdery) the powder here are the spores.

b) Light microscope:

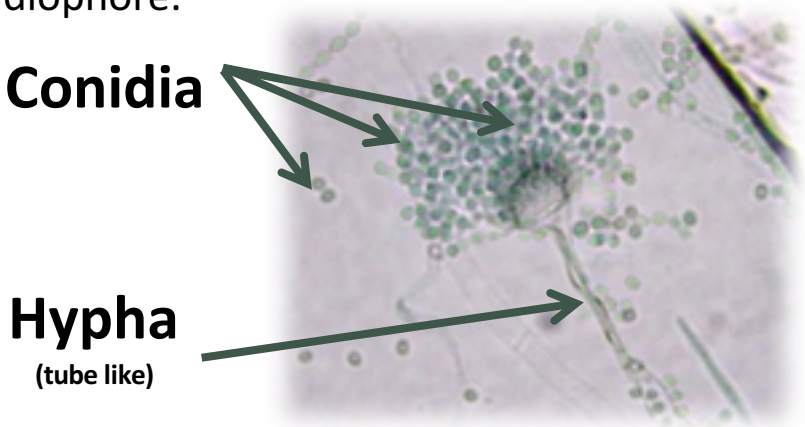


Penicillium



Rhiaopus

Conidia / spore (singular = conidium): : asexual spores borne externally on hyphae or on a conidiophore.



- **Septa: (2 types of Hypha)**

a) Septated-hypha: Cross-walls (septa) that divide hyphae into segments.

b) Non-septate: If there are no cross-walls.

a)

b)

- **Molds**

a) Moniliaceous molds

hyaline or lightly pigmented conidia or hyphae, colorless

b) Dematiaceous Molds

Are pigmented.

Because of the pigment, the colonies appear dark, brown, or black

Reproduction in fungi

I) **Asexual**: Only mitotic cell division

1) Somatic (production of daughter cell, genetically the same)

a) Yeasts by budding.

b) Molds by hyphal fragmentation

(each haypha will give me a new colony)

2) Spore formation:

a) Sporangiospores in sporangia

b) Chlamydospores in or on hyphae

c) Conidia (conidium) on hypha or on conidiophores

II) Sexual: Fusion, mitosis, meiosis (+ mates with -, no male or female here)

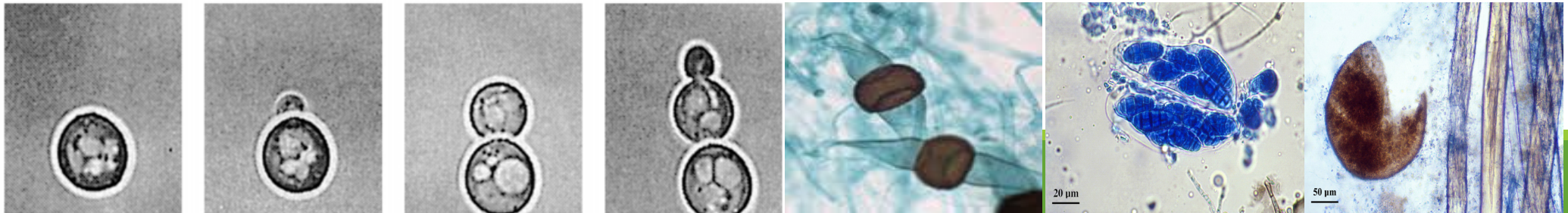
- **Spores**

-These are the small airborne particles by which fungi reproduce.

-They are produced by mitosis and readily disseminate in the air.

الأبواغ تساعدنا في معرفة الفطريات وتمييزها تحت المجهر

- الأبواغ قادرة على العيش في البيئات الصعبة



Pathogenicity of fungi

- Fungi are all around us
- widely distributed in nature (air, water, soil, decaying organic debris)
- However, fungi can cause diseases to human:
  - ➢ Cause superficial infections,
  - ➢ some can cause allergic reactions
  - ➢ Few cause invasive infections

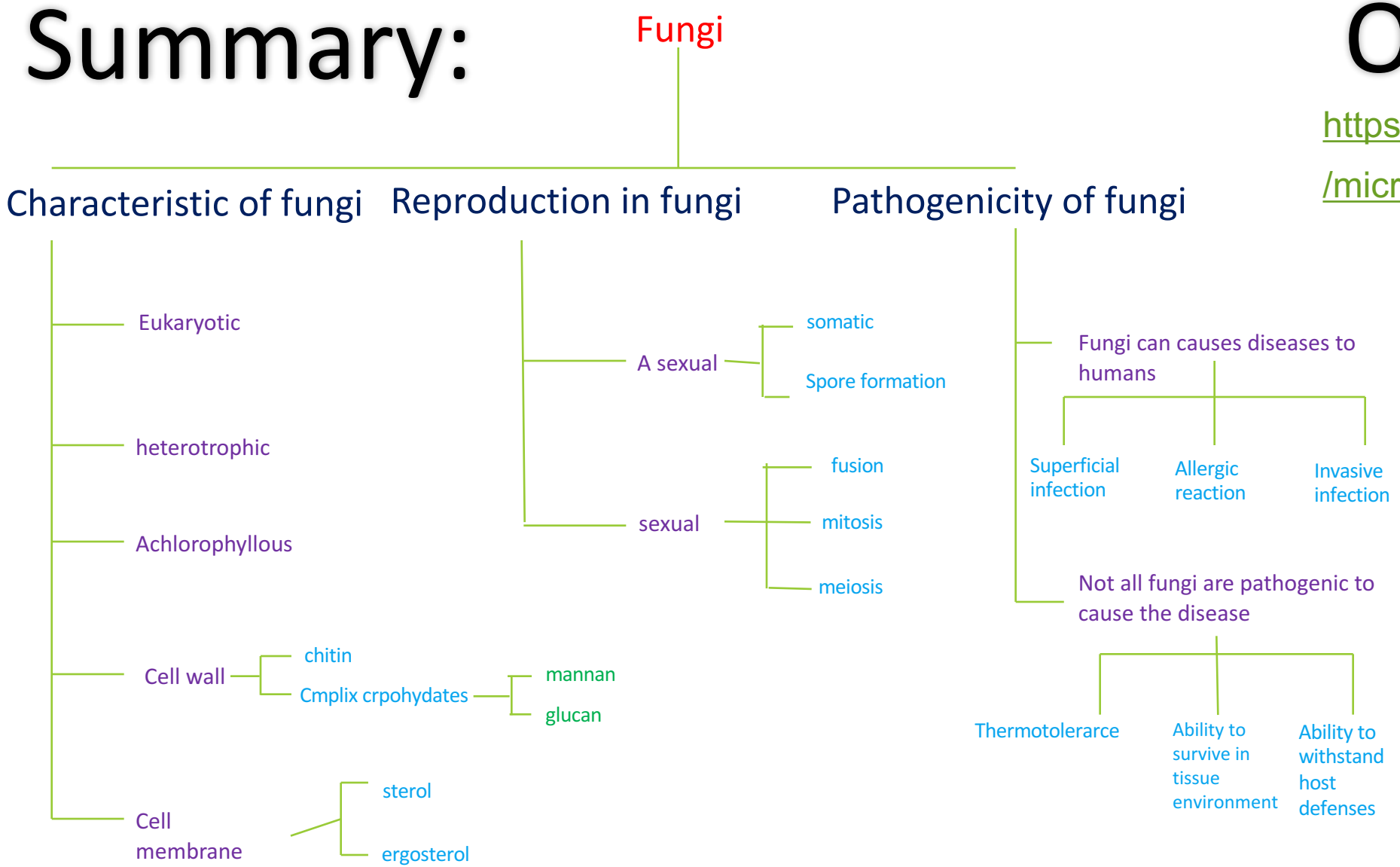
1- fungi clean the environment
2- used in antibiotic
3- food:
a) Baking Browder
b) mushrooms

- Not all fungi are pathogenic

To cause the disease:

1. Thermotolerance
2. Ability to survive in tissue environment
3. Ability to withstand host defenses

Summary:



Online quiz:

https://www.onlineexambuilder.com/microbiology-l5/exam-106234

Contact us :

436microbiologyteam@gmail.com

Twitter :

@microbio436

THE TEAM :

- Waleed Aljamal
- Ibrahim Fetyani
- Meshal Eiaidi
- Khalid Alhusainan
- Hussam Alkhathlan
- Faisal Alqumaizi

THE TEAM :

- Shrooq Alsomali
- Hanin Bashaikh
- Jawaher Alkhayyal
- Reem Alshathri
- Rawan Alqahtani
- Ohoud Abdullah
- Ghadah Almazrou
- Lama Al-musallam