



# Microbiology

Subject : اخر محاضرة بالميد

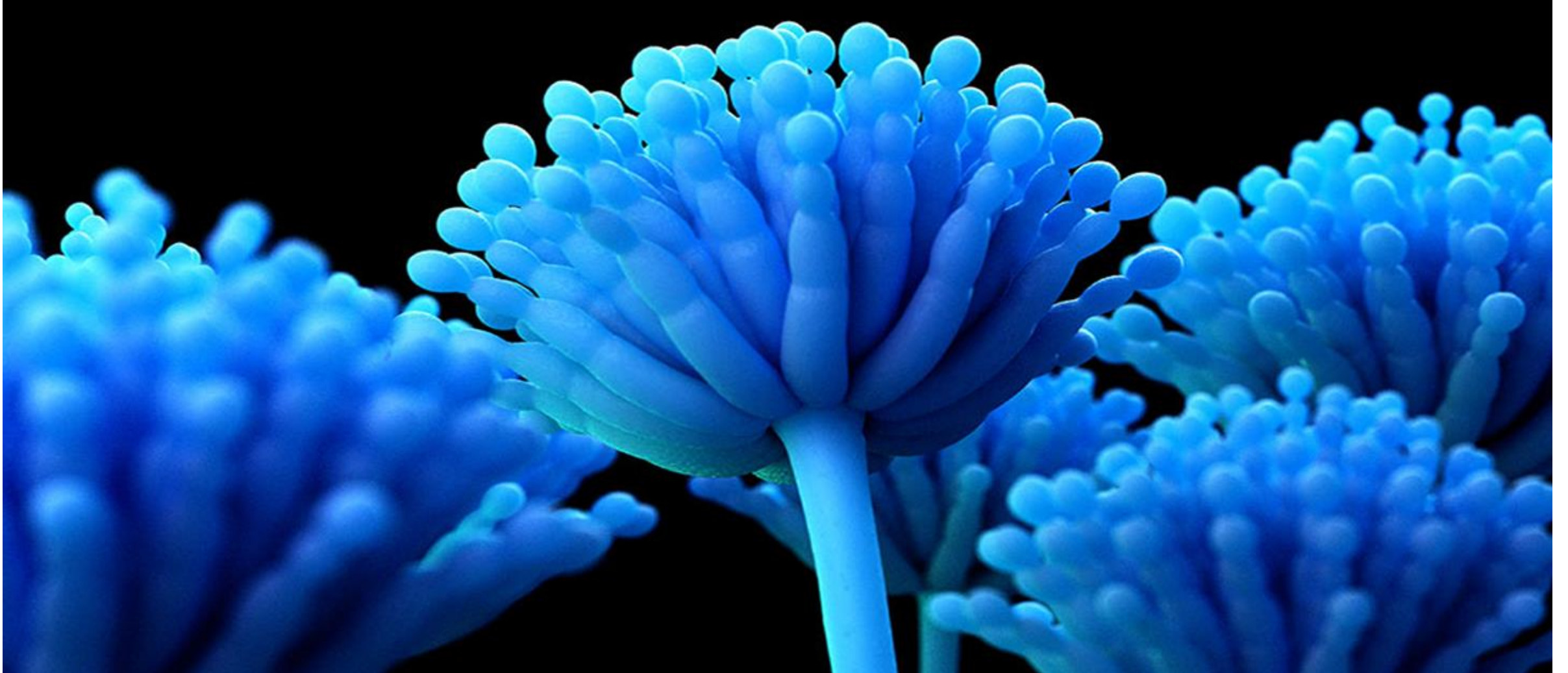
Lec no : 18

Done By : Tabark Aldaboubi

وَقُلْ رَبِّ زِدْنِي عِلْمًا

# Subcutaneous & Deep Mycoses

By Prof. Hala Tabl



# Subcutaneous mycoses

مجموعة من ال fungi تنمو بالتربة وع النباتات توصل لل subcutaneous عن طريق trauma

These are caused by fungi that grow **in soil and on vegetation** and acquired only when the fungus is **implanted** into subcutaneous tissues by **trauma**.

اراضى زراعية

The important Subcutaneous mycoses include:

**(1) Sporotrichosis**

**(2) Mycetoma (Madura foot)**

تنمو ع الورد وشوك الورد بستنتج انه ال infection  
يكون truma

# Sporotrichosis

الاسماء الثانية  
بتكون جذا مهمة

اكتر فئة معرضة لها لاشي الي بتعاملوا مع الورد  
وتقليم الاشجار

## “Rose gardener's disease”

اسم الفطريات الي تسببها

مهمة

- Caused by **Sporothrix schenckii**, a **dimorphic fungus**.
- Spores of the mold found on rose thorns, hay, sphagnum moss, twigs, and soil, and introduced into the skin, typically by a **thorn**, cuts or abrasions, so, occurs most often in **gardeners** or farmers because they may be stuck by a **rose thorn**.
- It occurs in the form of a local nodule (which may ulcerate) with nodules along the draining lymphatics.

انصان طحلب

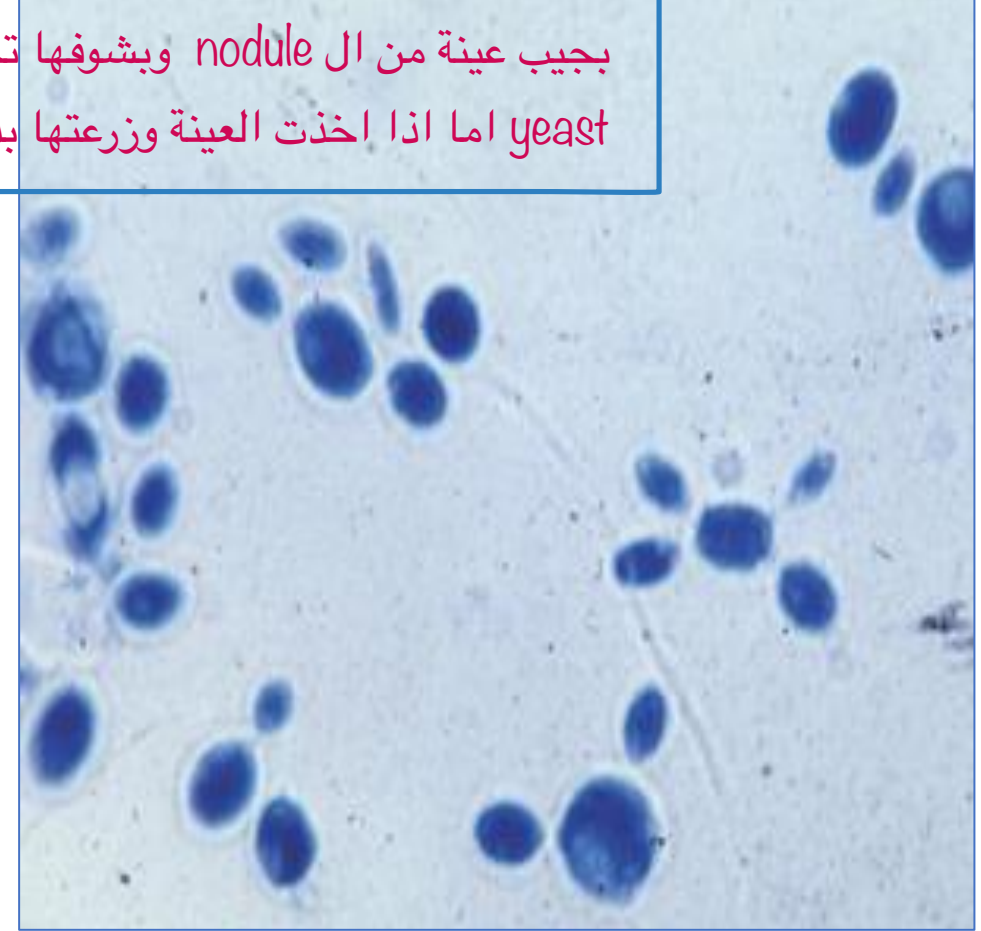
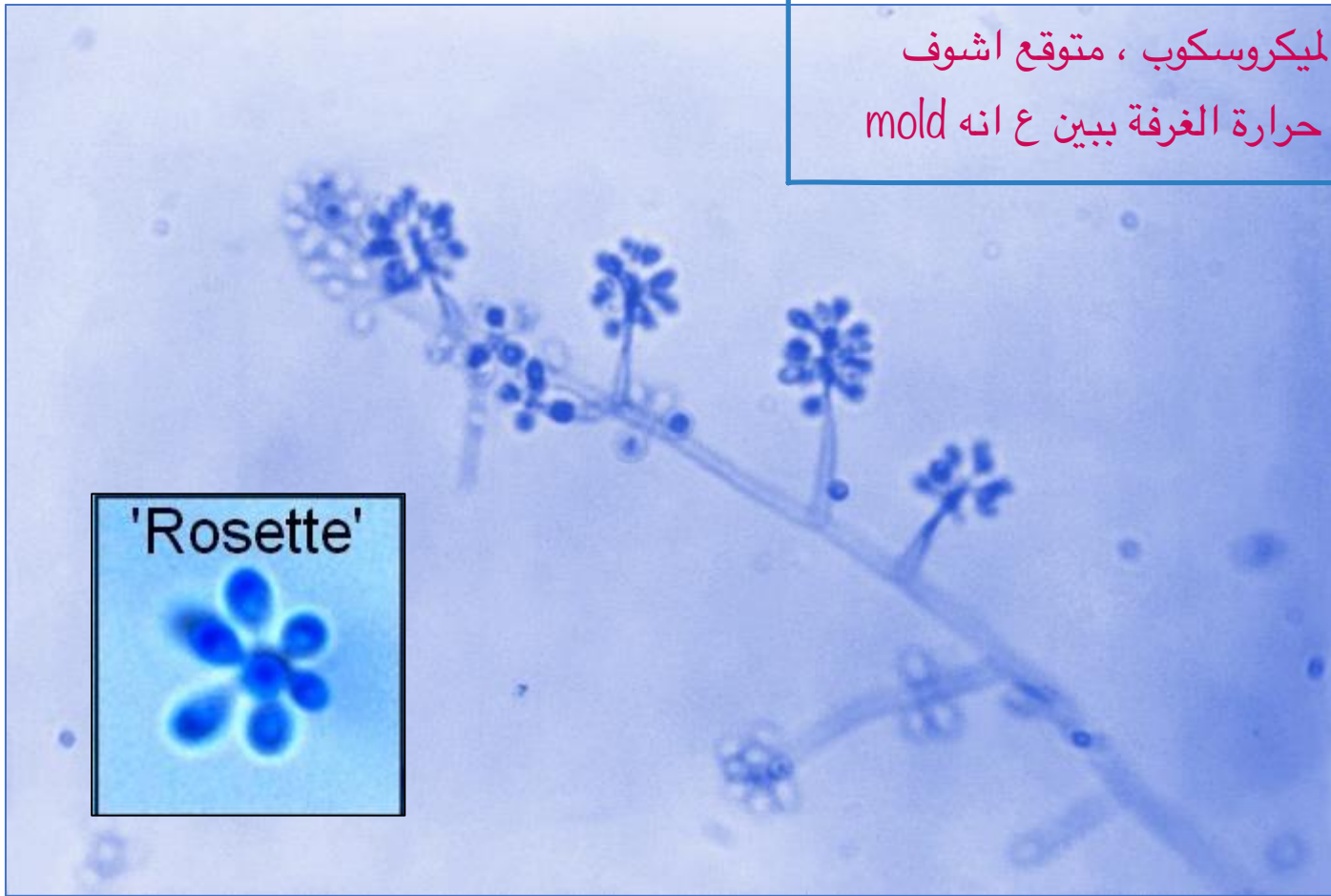
most common Affected hand and forearm.

بحدث بمكان ما غزت شوكة الوردة الجسم ويتبين انها nodule بعدها بصيرلها ulceration  
وببlish تبين ال nodule ع طول dreining lymphatics



لا يسبب خطراً إلا بحالات جداً جداً نادرة

بجيب عينة من ال nodule وبشوفها تحت الميكروسكوب ، متوقع اشوف yeast اما اذا اخذت العينة وزرعتها بدرجة حرارة الغرفة بين ع انه mold



**Mold phase:** Septate hyphae with oval conidia in clusters with characteristic flowery shape.

**Yeast phase:** Round or cigar-shaped budding yeasts

المرض الي بتسببه بس نشرفوا بكون عباره عن شكل ورد (بتحس انك قاعد في جنينة) 🌻🌺🌸😄

موجود بالترربة وبالاراضي الزراعية اكثر  
اشخاص معرضين للاصابة هما المزارعين

# Mycetoma

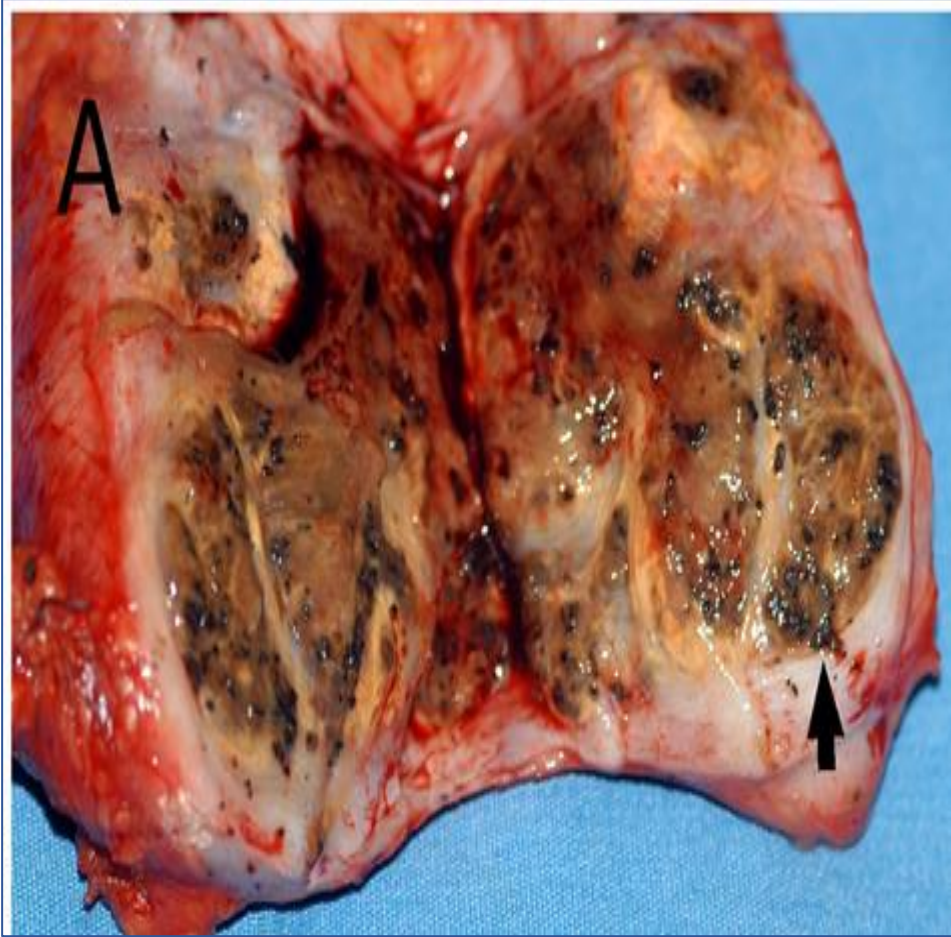
اسم ال Fungus الـ بسببه

- Caused by **mold *Madurella mycetomatis***.
- Foot is the common site affected and usually called "**Madura foot**".
- A localized chronic granuloma with progressive destruction of deeper tissues.
- Mycetoma swelling is <sup>1</sup>nodular and contains <sup>2</sup>sinuses which usually open on the surface of the skin, discharging **mucopus** containing **small black granules** which are compact colonies of the causative organism.



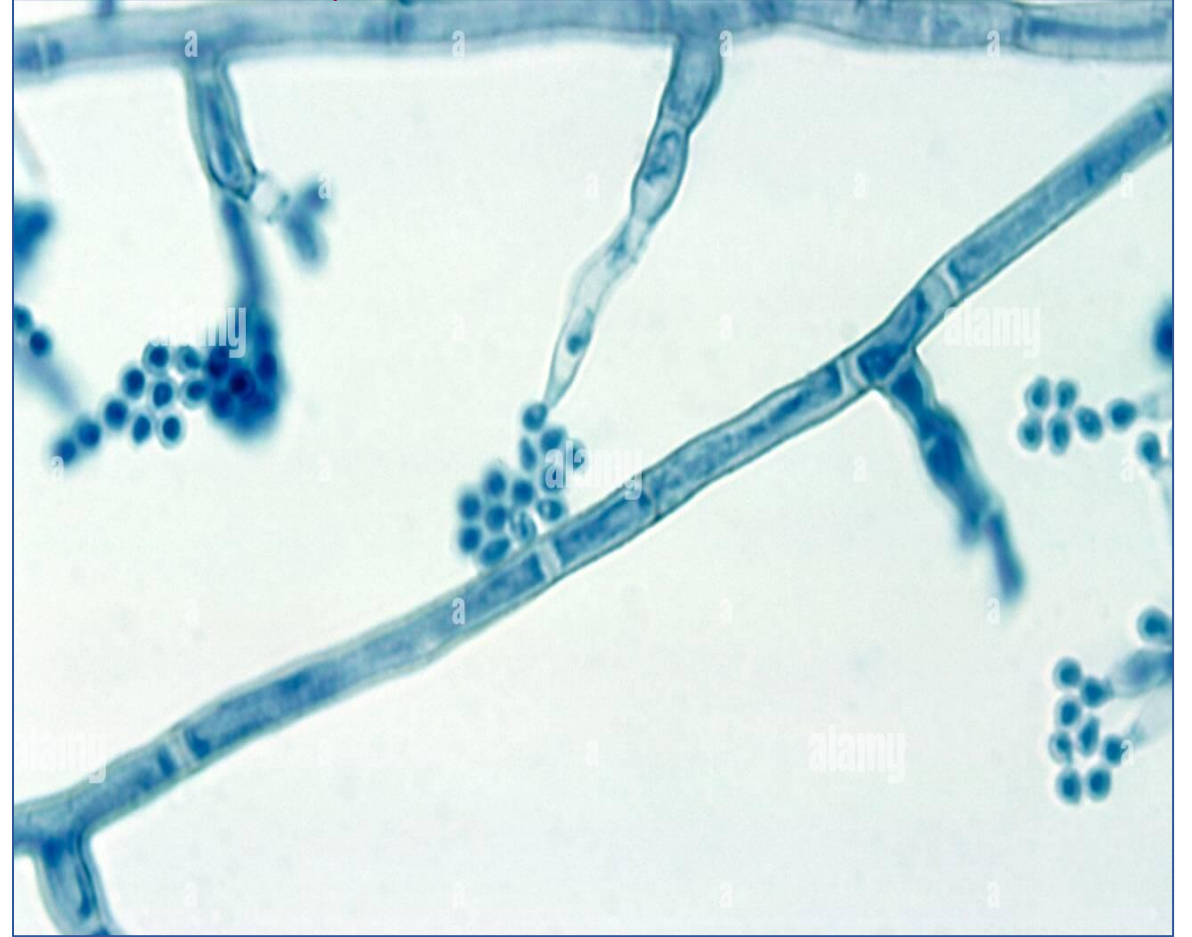
بالبداية بتكون nodule ومع الوقت ببلش يصير necrosis وبتبلش تعمل من جوا cavity فيها mucopus جوا هاي mucopus بتكون الفطريات ع شكل تجمعات لونها اسود بتبين ك small black granule مع الوقت بتبلش تفتح هاي ال cavity وتوصل ال mucopus عن طريق sinuses للجلد برا

بوخذ عينة من ال mucopus يكون فيها الفطريات بوخذها ويطحنا وبحطها ع شريحة  
وبصبغها ب lactophenol cotton blue وبشوفها تحت المجهر ك mold



**Black granules =**  
**in infected tissue**

البرصبي  
الفطريات



**Septate hyphae and  
chlamydospores**

# Deep Mycoses (Systemic Mycoses)

Important examples of systemic (deep ) mycoses are:

- **Candidiasis.**
- **Histoplasmosis.**
- **Cryptococcosis.**
- **Aspergillosis.**



# Opportunistic mycoses

ما يتسبب امراض الا بالناس الي عندها مناعة قليلة

Fungi that fail to induce disease in most immunocompetent persons but can do so in those with impaired immunity.

Important examples of opportunistic fungi:

- **Candida spp.** *Species*
- **Cryptococcus spp.**
- **Aspergillus spp.**
- **Mucormycetes (Mucor, and Rhizopus)**

# CANDIDIASIS

هي yeast وتعتبر ك normal flora وهي opportunistic mycoses

- Systemic (invasive) candidiasis is a serious infection of the blood or other normally sterile sites. Affect mostly immunosuppressed and hospitalized individuals.
- Candida albicans (budding yeast) is the commonest cause of candidiasis, but C. tropicalis and C. parapsilosis are important pathogens also.
- Infection is mostly **blood borne** e.g. Central venous catheters, intravenous drug use, Major surgery,..)   
 كيف ممكن تدخل الدم: → ① ②
- **Systemic Candidiasis include:**
  - 1- Candida bloodstream infection (candidemia).
  - 2- Broncho-pulmonary infection.
  - 3- Endocarditis.
  - 4- Meningitis.
  - 5- Endophthalmitis (infection within the eye).

بتدخل عن طريق الدم موجودة ع skin  
كنورمال فلورا اذا لقت طريقة تدخل فيها للدم  
بتعمل candidiasis

# Laboratory Diagnosis

➤ **Specimen:** According to the lesion:

- In **superficial candidiasis:** Skin scraping, vaginal discharge, oral swab,..
- In **deep candidiasis:** Blood, Urine, Sputum,...

العينات

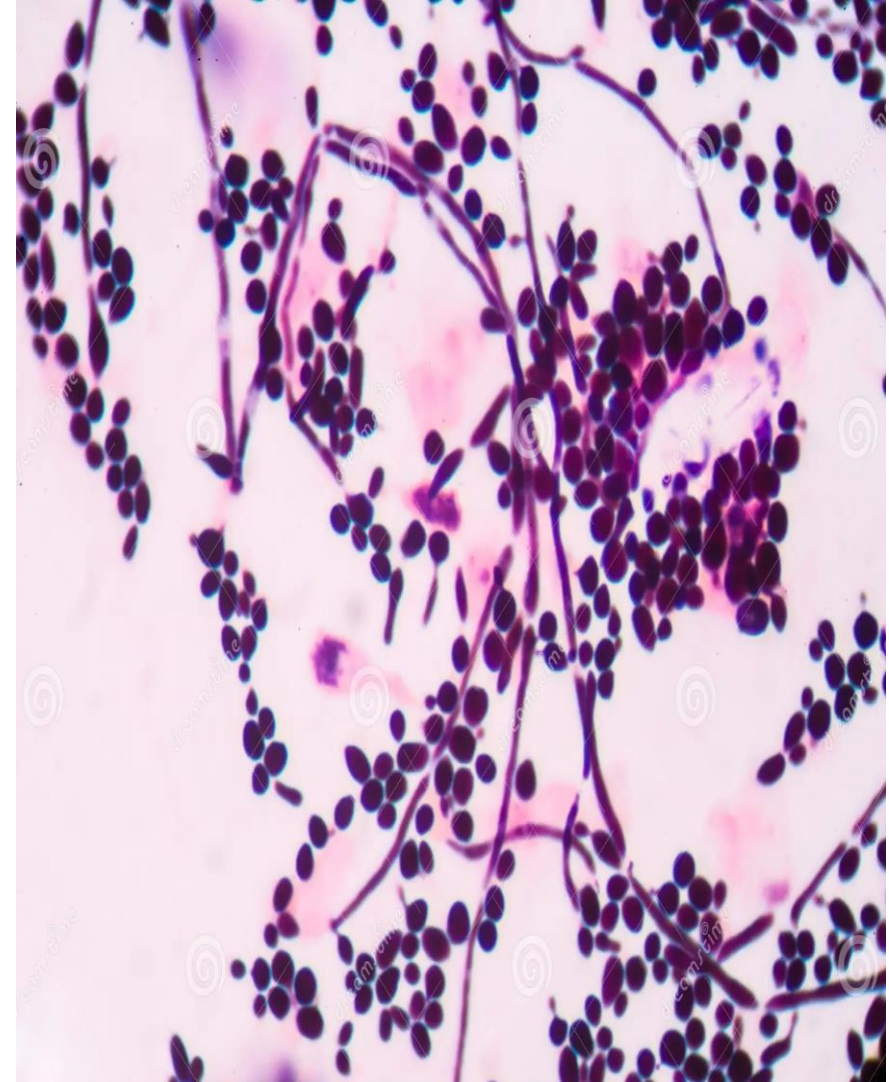
➤ **Direct microscopy:**

In **Gram stained film**, candida appear as Gram

①

+ ②

**+**ve, oval, budding cells with pseudohyphae.



## ➤ Culture:

On **sabouraud's** agar at 37°C for 1-2 days, colonies are cream colored, pasty, with distinctive yeast smell.

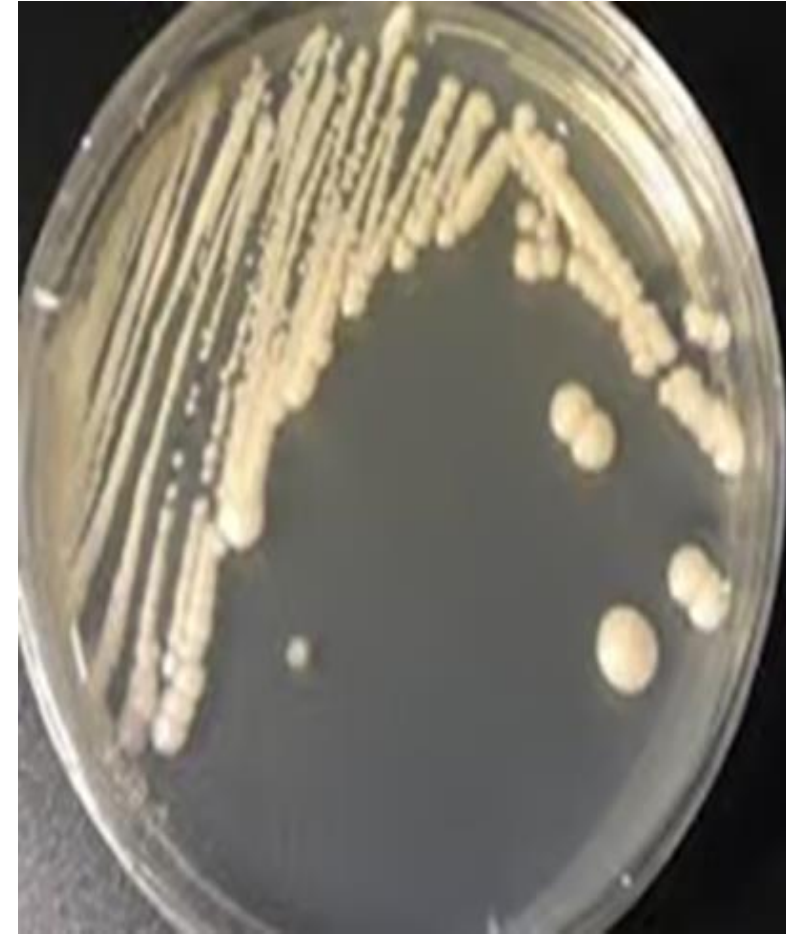
ریخت خمیرت

## ➤ Biochemical reactions:

*C. albicans* ferment Glucose & Maltose (acid&gas) and Sucrose (acid only).

## ➤ Serology *ادورسای ال Antibody*

A rise in antibody titer is of diagnostic value in diagnosis of deep candida infections.



↓ = ued

## ➤ Differential tests:

To differentiate between *C. albicans* and *non-C. albicans* species e.g. *C. tropicalis* & *C. krusei*.

### 1- Germ tube test:

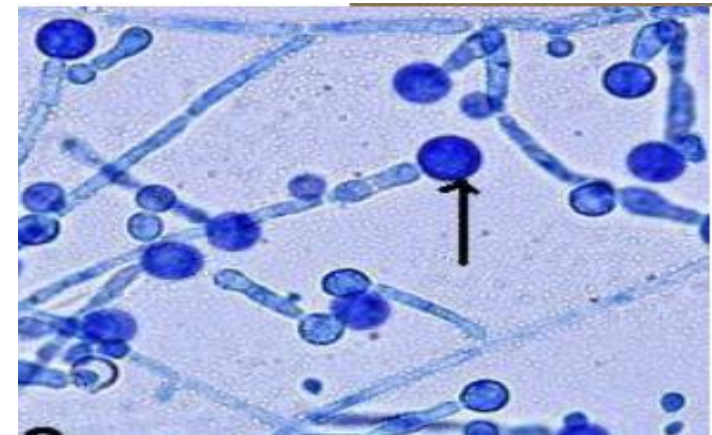
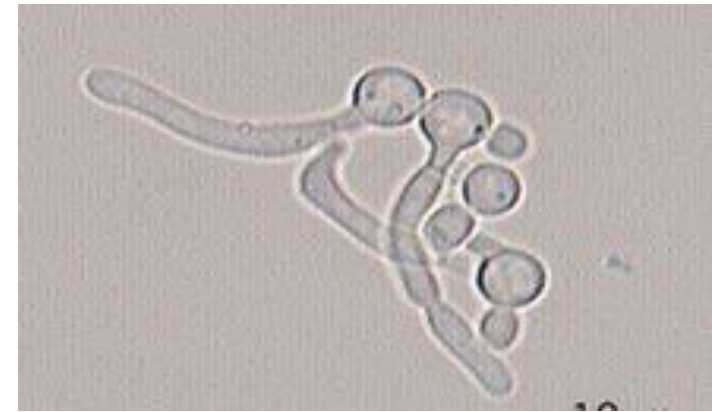
When Candida is grown in human serum at 37°C for 3 hours, they form germ tubes (tubal outgrowth extending from yeast cells). *C. albicans* gives + ve test.

### 2- Chlamyospore formation:

When candida is cultured on corn meal extract agar medium (deficient medium), it produces pseudohyphae and chlamyospores. *C. albicans* gives + ve test.

### 2- Chrom agar (Indicator media):

Different candidas give different colored colonies.



# ASPERGILLOSIS

- It is a group of **opportunistic** mycoses caused by Aspergillus Fungi which are common **saprophytic molds** frequently found on decaying vegetation.

بكون موجود بالبيئة بالملي بالارض بكل مكان حوالينا

- Medically important species are:

**1- Aspergillus Fumigatus.**

**2- Aspergillus Niger.**

**3- Aspergillus Flavus .**

# Aspergillus Fumigatus:-

عند طهريق ال inhalation

اسم المرض:

Causes pulmonary Aspergillosis, (in patients with a pre-existing lung disease).

## 1- Aspergilloma or " Fungus ball":

الشخص يكون عنده cavity كرة مفرغة من جوا

بتعرض الها الشخص المصاب مثلاً: بالسل

➤ Fungus grow in a pre- existing cavity e.g. T.B. cavity.

➤ X- ray shows fungus ball.

يكون الشخص عنده مرض ويس يستنشق هاي الفطريات بتدخل ع الرئة

وبالاحص ع هاي ال cavity

قبل ما تدخل الفطريات يكون هاي ال cavity فاضية وبتعطي لون اسود بال

Xray ويس تدخل الفطريات وينمو جواتها بتسكر وبتتحول الى اللون الابيض



## 2- Invasive Aspergillosis:

عند الناس الي مناعتهم كثير قليلة قتل مرضى (HIV) بتدخل بطول فاش منروي بيون cavity

➤ Mainly occurs in **immunocompromised** persons, and usually fatal.

➤ Fungus invades lung tissues giving rise <sup>1</sup> to <sup>2</sup> pneumonia and hemoptysis.

➤ Dissemination to other organs occur leading to **disseminated Aspergillosis**.

## 3- Allergic bronchopulmonary aspergillosis. → بعض الناس الي عندهم حساسية لما يشم ال

Aspergillus يكون عنده حساسية اتجاه ال cell wall تاغ هاي الفطريات

## Aspergillus Niger:

- التصاحب بقناة الاذن الخارجية  
➤ Causes **otomycosis**, chronic infection of the external auditory meatus. → قناة الاذن الخارجية
- Manifested by **pain, itching and ear discharge**.



## Aspergillus Flavus:

- ما يتسبب infection بسبب بتضرب toxin بعجل damage Liver  
➤ Produce **aflatoxins** which cause chronic damage & neoplasm in liver  
(Cancer liver)



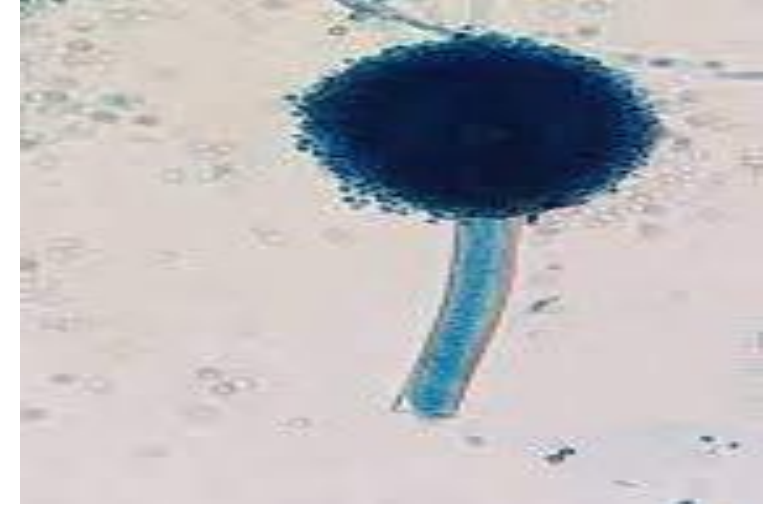
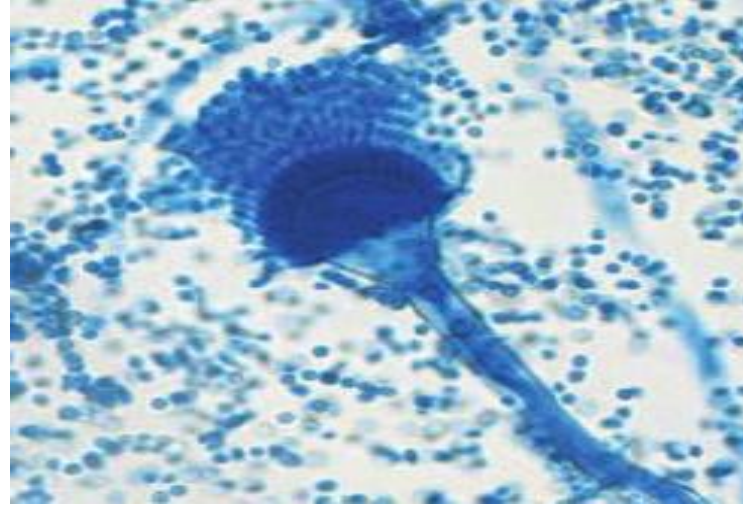
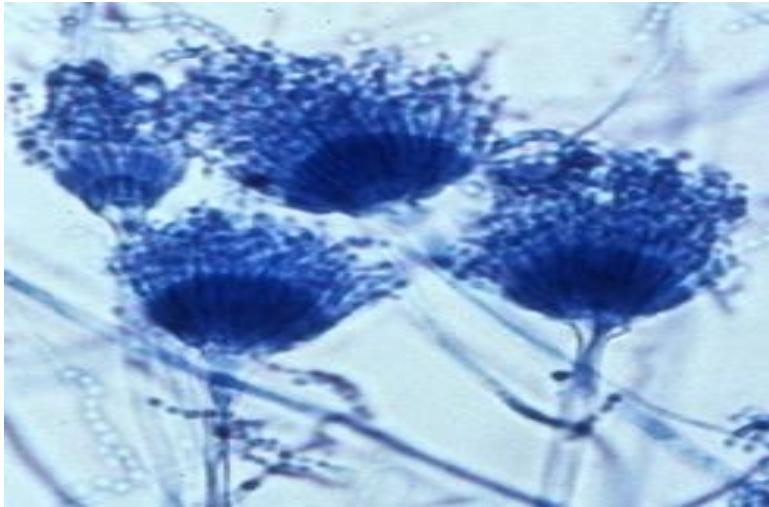
# Laboratory Diagnosis

العينة :

**Specimen:** According to the site of lesion (Sputum, Ear discharge,...).

**Direct Microscopy:-** lactophenol  
Cotton blue صبوغة بـ

Shows **filamentous septate hyphae** with characteristic **aspergillus head** in lactophenol cotton blue preparations.  
الستركسز الي طالع عليه لا spors



**A. Fumigatus**

Flask shaped head

**A. Flavus**

Hemi-spherical head

**A. Niger**

Rounded head

شکل ال Head  
يمكن تجيب انه نوع فطر ال Head فيه شكلها rounded؟ (بعض فوس ضروري تجيب الرسمة)

## Culture:-

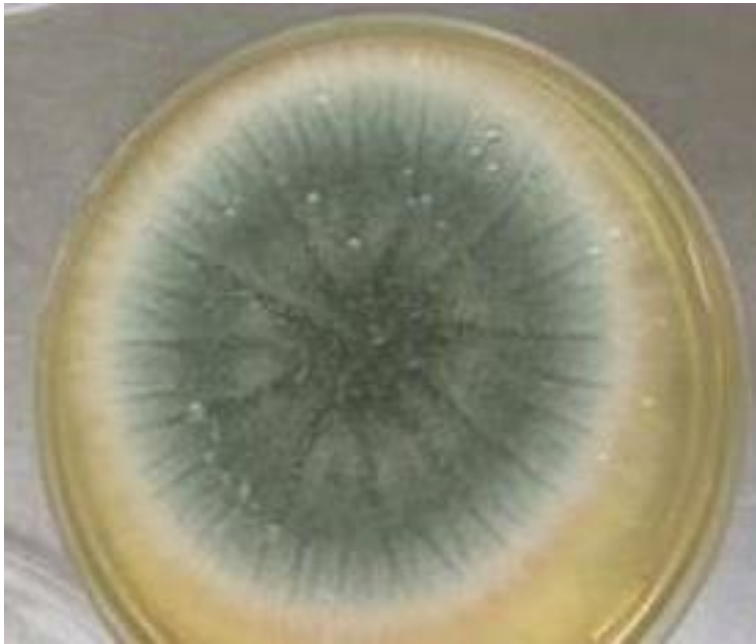
On Sabouraud's agar. Pigmentation of **aerial growth** can identify the Aspergillus species.

· بختلفوا باللون ناع ال growth

*A. Fumigatus* → White filaments with **smoky green** spores.

*A. Flavus* → White filaments with **yellowish green** spores.

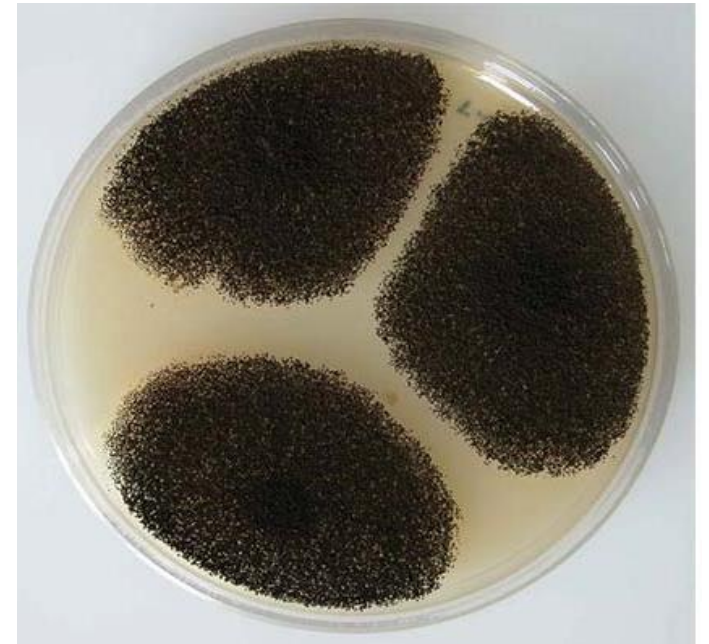
*A. Niger* → White filaments with **black** spores.



*A. Fumigatus*



*A. Flavus*



*A. Niger*

# HISTOPLASMOSIS

لبفوجوا الضرايا

\* وصفه

- It is an **intracellular mycoses** of the **Reticuloendothelial system**. *تأثر على Macrophag cell الي موجوده بـ*
- Caused by **dimorphic Fungi** called ***Histoplasma capsulatum***. *اسم ال Fungus : →*
- Infection is acquired by **inhalation** of the spores. Inhaled spores are engulfed by alveolar **macrophages**, resist intracellular killing and develop into budding cells. Spores may spread from the lung to any part of the body. *كيف بده يعيش هذا النوع من الفطر جوا ال macrophage الي وظيفته يعمل phagocytosis لل organism وتلتهمه وتحطمه ؟ هذا الفطر عنده عامل من عوامل الشراسة بخليه resist to intracellular killing ويصير يعيش وينمو جواته ، بدخل اول مكان ع الرئة عن طريق الاستنشاق*
- Infection may be either:

**Asymptomatic** : *بغالب الاحيان يكون :*

**Acute:** Due to heavy exposure. Similar to pneumonia.

**Disseminated:** into reticuloendothelial system with lymphadenopathy, <sup>1</sup> enlarged liver & <sup>3</sup> spleen, <sup>4</sup> high fever and anemia.

# Laboratory diagnosis

## Specimen

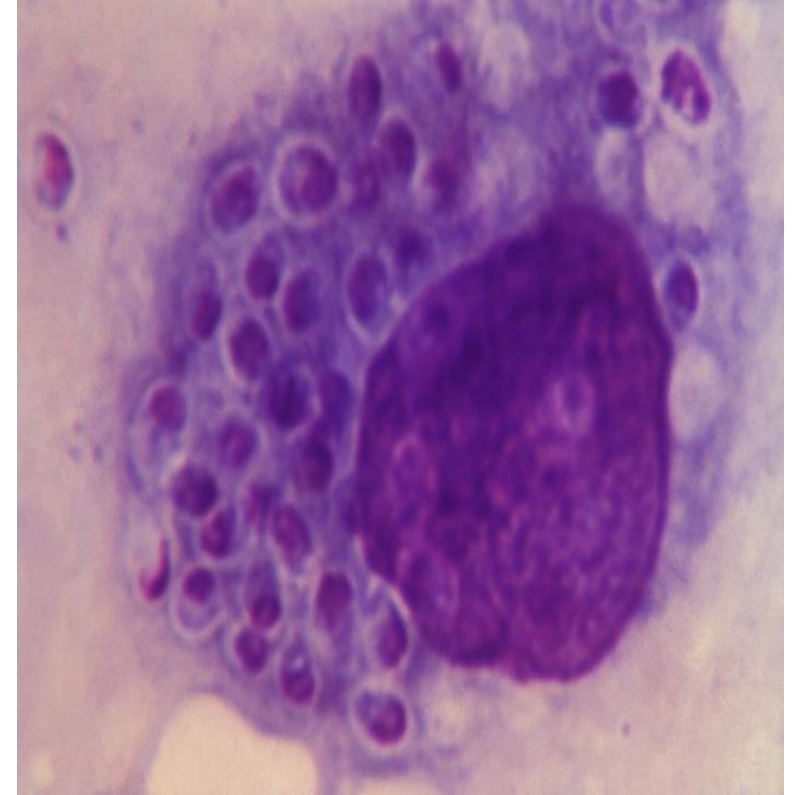
إذا كان بال *lung* العينة  
Sputum, Bone marrow aspirate or blood.

## Direct Microscopy

بصبغوا بصبغ

In Giemsa stained preparations,

**yeast form** can be seen **intracellular** as round or oval budding cells.

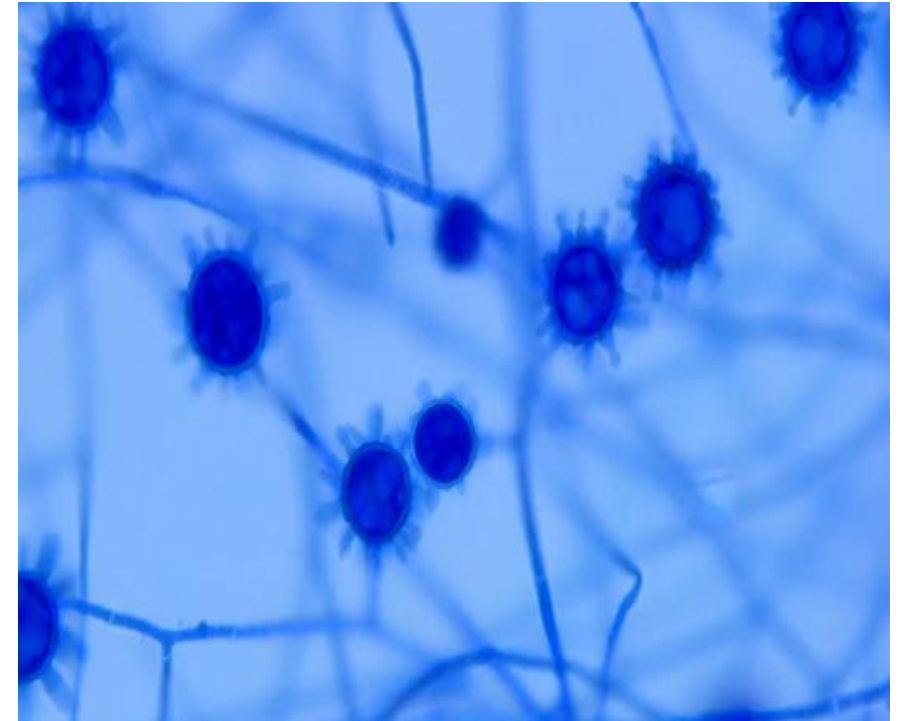


# Culture

➤ On sabouraud's agar at **room temperature** for up to 3 weeks produce **filamentous growth**.

\*A lactophenol cotton blue stained film show **septate hyphae** and round spores with finger like projections.

➤ **At 37°C** produce the **yeast form** (budding cells).



# CRYPTOCOCCOSIS

- **Opportunistic** mycoses usually **affecting** the lungs, brain and meninges.
- Caused by a **budding yeast** called *Cryptococcus neoformans*. : اسم ال Fungus  
\* عنده Capsule → الفصية العام
- Found in large amounts in dry **pigeon faeces** and this is the main source of human infection.  
الاکثر عرضة لهاي الفطريات الاشخاص الي بربوا حمام وكونه opportunistic معناها بس بأثر ع الاشخاص الي مناعتهم قليلة
- Human infection occur by **inhalation** of yeast cells or its spores.  
بدخل عن طريق ال inhalation واذا الشخص مناعته كويسة بكون Asymptomatic or mild pulmonary
- **In normal persons the infection may be:-** Asymptomatic or mild pulmonary symptoms.
- **In immunocompromised Persons:** A primary pulmonary infection occurs and then disseminates mainly to **Meninges**.  
البي مناعتهم قليلة ↓
- **Clinically** the commonest manifestation is chronic meningitis with a fluctuating course usually called:- "Cryptococcal meningitis".
- It is fatal unless treated. ←

# Laboratory Diagnosis

العينة:-

Specimen: C.S.F. or Sputum.

Cerebrospinal Fluid

Direct microscopy:

Yeast cells of *cryptococcus neoformans* can be detected

اسم الصبغة:

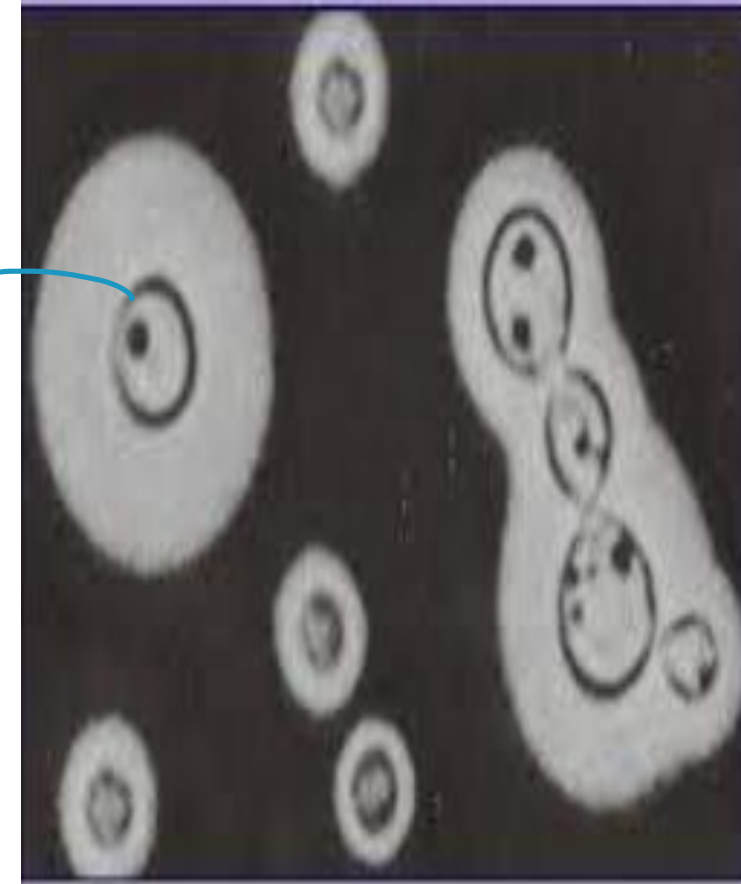
best in an India ink preparation from C.S.F.

-Cells appear rounded surrounded by a **wide capsule (white unstained halo)**

against a **black background.**

ما بتصبغ بصبغة ال India ink ال capsule

رهابي الدوائر السوداء  
هي ال cell  
Fungus تاعمة ال wall



## Culture:-

Yeast

On **sabouraud's** agar at 37°C for 2-3 days,

colonies are cream colored, **mucoïd** & Shiny.

لزوج ولامع  
↓  
لزوج بسبب ال capsule

## Serology:

فحص سريع جدًا

Detection of **capsular Ag** by latex agglutination

in C.S.F of patients is of **diagnostic value**.



بجيب شريحة وبحط عليها CSF وبحط antibody يكون  
ضد ال capsule لو موجود فيه ال fungus معناها رح  
يتفاعلوا سوا وتعمل agglutination



# MYCOTOXINS

Mycotoxins are toxins produced by fungi.

## General criteria of mycotoxicosis:

\*Not transmissible between persons. **ال toxin ما ينتقل بين الاشخاص.**

\*Associated with foods ingestion, inhalation or contact.

\*No effect of antifungals in treatment. **ال antifungal بتشتغل ويتقضي ع الفطر نفسه  
مش ع السم الي افرزه**

\*They are resistant to heat. **تقاوم الحرارة**

**ينتقل اذا تناول الشخص اكل  
بحتوي ع هذا السم او  
استنشقه او لمسه لمس مباشر**

(حفظ)

## Examples:

(1) **Poisonous mushrooms** (e.g. *Amanita mushroom*) is potent hepatotoxin.

(2) **Aflatoxin**, produced by *Aspergillus flavus*, causes neoplasm in liver (Cancer Liver).

(3) **Ergotism**, is caused by the mold *Claviceps purpurea*, which infects grains and produces alkaloids (e.g., ergotamine) that cause vascular and neurologic effects.

حكينا بالمحاورة الماضية انه ممكن استخرج من هالفطر دوا  
بفيدني انه بعمل uterin coneraction اذا اخذتوا بكميات محددة  
اما اذا اخذتوا بطريقة عشوائية وبكميات كبيرة بتحول ل toxin

*Amanita phalloides*  
"Death angel mushroom"



# The Quiz Time



**A girl who pricked her finger while pruning some rose bushes, develops a local pustule that progresses to an ulcer. Several nodules then develop along her forearm. The most likely agent is:**

- A) *Aspergillus fumigatus*.
- B) *Sporothrix schenckii*.
- C) *Madurella mycetomatis*.
- D) *Candida albicans*.
- E) *Histoplasma capsulatum*.

**A 50-year-old woman receiving chemotherapy via a subclavian catheter for acute leukemia. She presented with fever and stiffness in the neck with clinical suspicion of meningitis. CSF culture grew budding yeasts that formed germ tubes. The organism most likely causing this infection is:**

- A) *Cryptococcus neoformans*.
- B) *Candida albicans*.
- C) *Candida krusei*.
- D) *Histoplasma capsulatum*.
- E) *Candida tropicalis*.

**Aspergillus fumigatus can be involved in a variety of clinical conditions.**

**Which one of the following is LEAST likely to occur?**

- A) Tissue invasion in immunocompromised host.
- B) Allergy following inhalation of airborne particles of the fungus.
- C) Colonization of tuberculous cavities in the lung.
- D) Thrush.
- E) Pneumonia and hemoptysis.

**A 30-year-old woman has a painless ulcer on her tongue. She is HIV patient. Biopsy of the lesion revealed yeasts within macrophages.**

**What is the most likely diagnosis?**

- A) Candidiasis.
- B) Cryptococcosis.
- C) Sporotrichosis.
- D) Histoplasmosis.
- E) Aspergillosis.

**Mycotoxins are toxins produced by fungi.**

**Which of the following statements best describes aflatoxin?**

- A) It is readily treated with antifungal drugs.
- B) It is transmissible between persons.
- C) It causes chronic damage and neoplasm in liver.
- D) It is produced by poisonous mushrooms.
- E) It is produced by *Aspergillus fumigatus*.



"يقولون: "من سار على الدرب وصل".  
لكن لا أحد يخبرك بالقصة كاملة!  
من سار على الدرب تعثر وسقط ،  
تألم ونهض ، خذل ووقف ، أنته لحظات يأس  
فحاربه ثم مشى بعزيمة ، وركض ،  
وبعون الله وصل!"

نهاية مادة الميد 🙋

لا تمل اكمل طريقك إن الله يحب العبد اللحوح 🙏❤

بالتوفيق حياة ولا تنسوني من دعواتكم 🙏