

# **Dimorphic Fungi**

## **Week 12**

- Dimorphic fungi have two different reproduction types:
  - **Fungus:** In nature as a saprophyte or at 25-30C on agar cultures while incubation
  - **Yeast or yeast like:** In animal tissues or at 37C on specific enrichment agar cultures
- Fungal or micelial form is the stabil form in comparison to these forms
  - Mantar ya da miselyal form bu iki form arasındaki daha stabil formdur.
- These fungi can cause deep or systemic mycoses in human and animals
  - Bu mantarlar insan ve hayvanlarda **derin** ya da **sistemik mikozişlere** neden olurlar.

## Diseases that are caused by dimorphic fungi

<b>Dimorphic Fungus</b>	<b>Hosts</b>	<b>Disease</b>	<b>Lesion Site</b>	<b>Geographical distribution</b>
<i>Sporothrix schenckii</i>	Horse, Dog, Cat, Human	Sporotriciosis	Subcutaneous nodules, Rarely systemic	All over the world
<i>Blastomyces dermatitidis</i>	Dog, human	North American Blastomycoses	Primarily dog Lung, skin and other organ metastases	USA, Africa, Asia and Europe
<i>Histoplasma capsulatum</i>	Dog, Cat, Human	Histoplasmosis	Primarily lungs Secondary intestines	Sporadic in the world
<i>Histoplasma farciminosum</i>	Equide	Epizootic Lenfangitis	Lymphatic system, lymph nodules and systemic	Africa, Asia, France, Italy, Rusia, Egypt
<i>Coccidioides immitis</i>	Dog, Human	Coccidiomycosis	Primarily lungs sekondarly bones and other organs	USA, Mexica, South America

# Sporotrichosis

*Sporotrichosis*, The chronic-granulomatous inflammation and ulceration of leg skin and lymph vessel

- Caused by *Sporotrichum schenckii* (*Dimorphic*)
- In the pathological material and slides prepared from the tissues it can be seen as long, spherical, cigar shaped and yeast like cells like bud
- The parasitic form of *S.schenckii*, in in-vitro environment, tiamine, biotine and aminoasides must be added, also incubated at 37C
- At 25°C colonies formed in 3-5 days and look like first white-cream then dark-skin like shaped
- At 37°C the yeast like, S typed, soft and cream colour colonies will occure

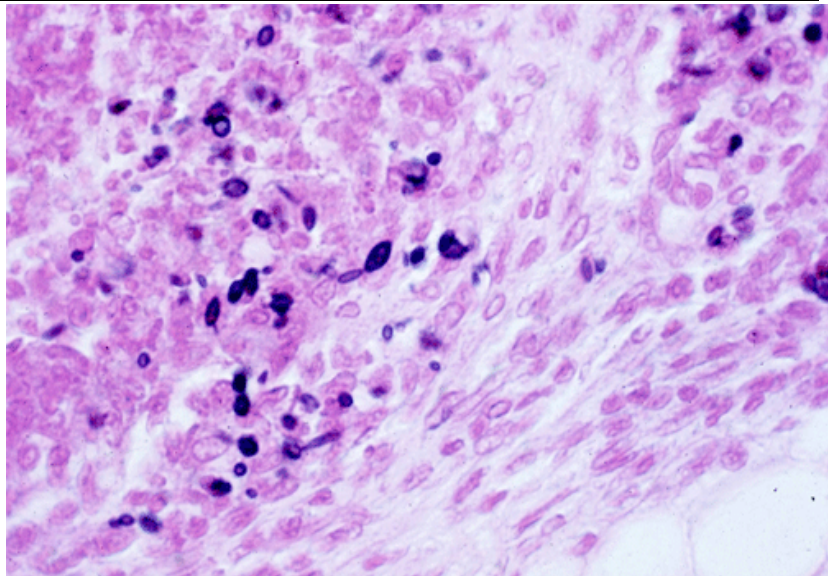
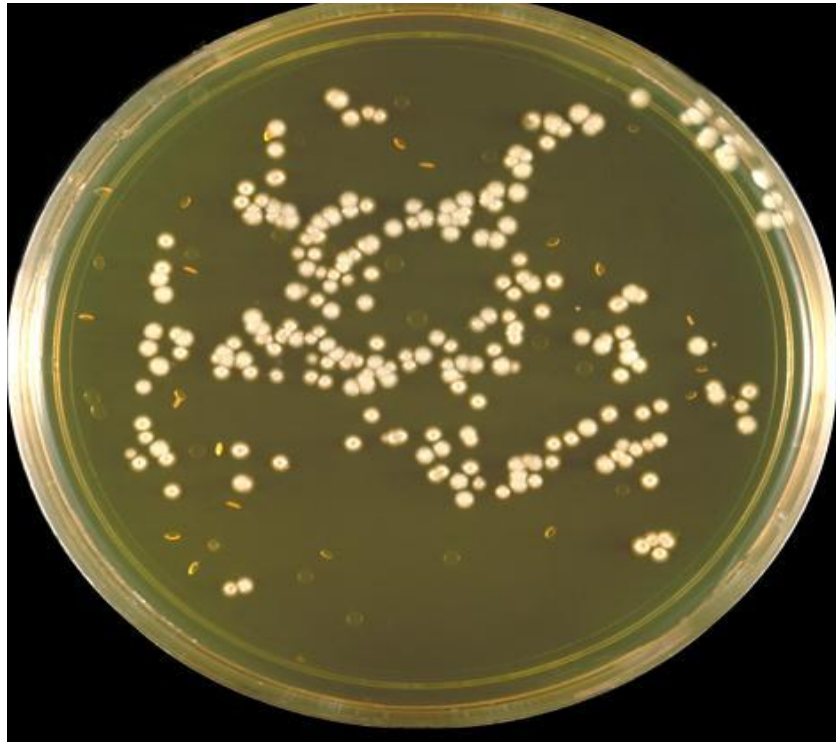
## Epidemiology

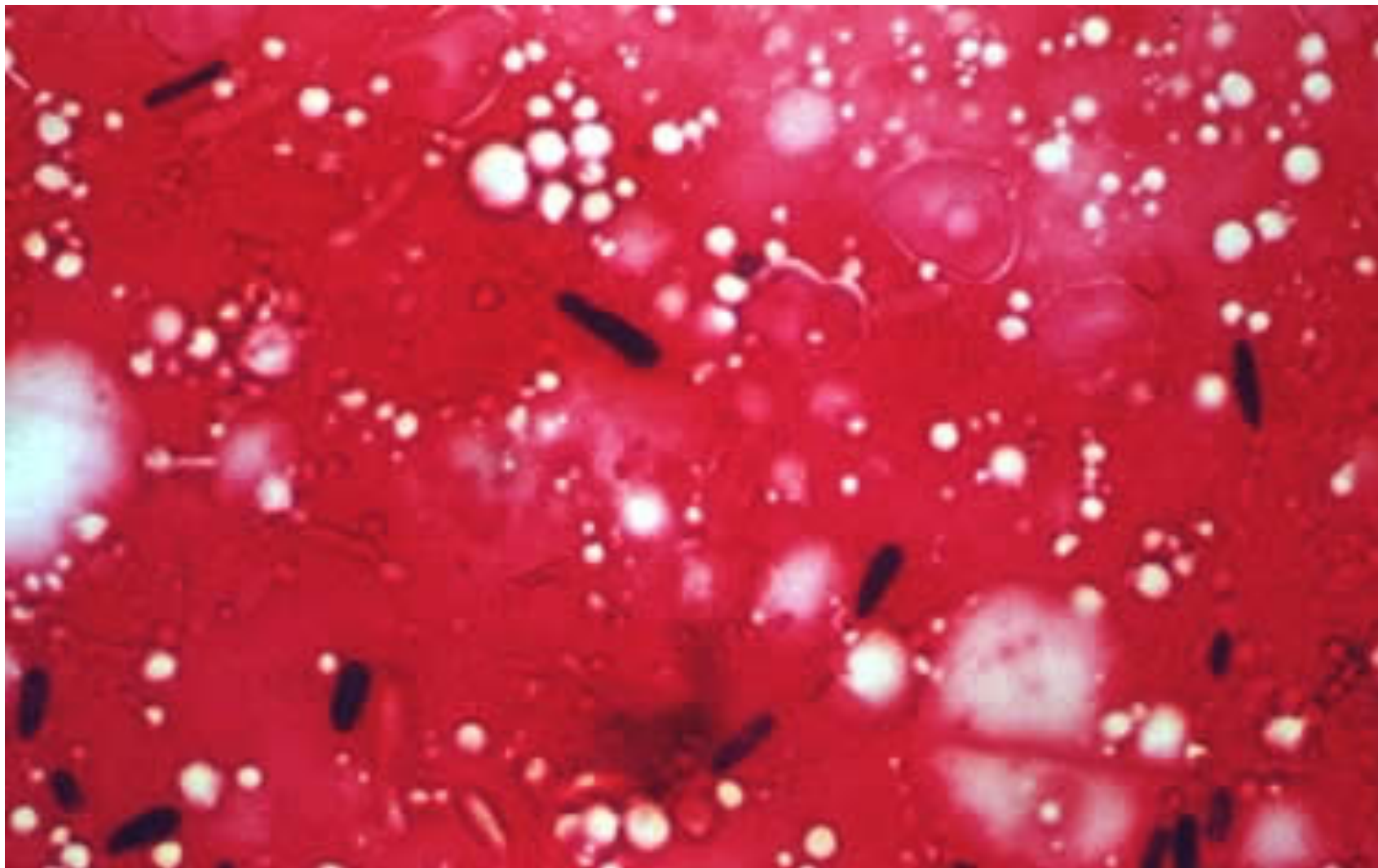
- *Sporotrichum schenckii*, can be found in nature
  - Soil, water, fertilizer (gübre), decayed plant and the oral and gastrointestinal mucosa of rats
  - Penetration to the body is from the portantres of skin
  - Moisture and heat is important in the initial of disease. At 30C and higher temperatures the rate of the occurence of the disease will be very less

## Clinical Findings

- In equide spores that penetrate from the microscopic portantres of the skin will form the lesions found in the skin and lymphoid tissue under the skin. Sometimes they can metastase to the inner organs
  - Mallein test can be performed for the differntiation from Malleus in equide
- Usually the nodulles under the chest skin will get bigger, hardened and became ulserative. The hair at that site will fall and pus will leak from the wounds

*Sporothrix schenckii*





*Sporothrix schenckii*,

Tissue Slide, Gram Stain

Long, Spherical, Cigar shaped, Yeast-like cells



## *Treatment and Control*

- Amphotericin-B, Griseofulvin and Sodium – Potassium Iodure
- Hygenic precautions must be ruled
- The legs of animals must be controlled routinely and prvented from the wound occurences



# **Blastomycosis**

***Blastomycosis***, The chronic-granulomatous and suppurative infection caused by dimorphic (diphasic) fungus *Blastomyces dermatitidis*

- *Blastomyces dermatitidis*, is in mycelial form when incubated at **22 - 25 °C** and yeast like form at **37 °C**
- In living organisms the body temperature is 36-37 °C so in the body and pathological material the fungus can be found as yeast-like form
- In skin, lungs, bones, neural system, urogenital system and other organs the lesions can be occurred

- *Blastomyces dermatitidis* infections can be observed in dogs lived in Canada and USA. Agent can reproduce in the nature and the spores can be inhaled by air
- There is no spread between living organisms. All living organism will take the agent individually from outside and infection will occur
- There are two clinical forms: *Skin Blastomycosis* and *Systemic Blastomycosis*
- *Systemic Blastomycosis*, occurs when the agent invade into primer tissue sites. Lung, liver, kidney, splen and related organs are the tissue that the lesions are observed
- *Skin Blastomycosis*, rarely from skin wound but mostly by hematogen ways are the main routes that the disease agent causes skin lesions. Skin and under skin the lymph nodes are effected and the abscess, furuncules will occur

## **Identification**

**Clinical identification,** *B.dermatitis* lesions can be confused with other ileri gelen lezyonlar birçok bakteriyel ve viral etkenlerin oluşturduğu lezyonlara benzemektedir.

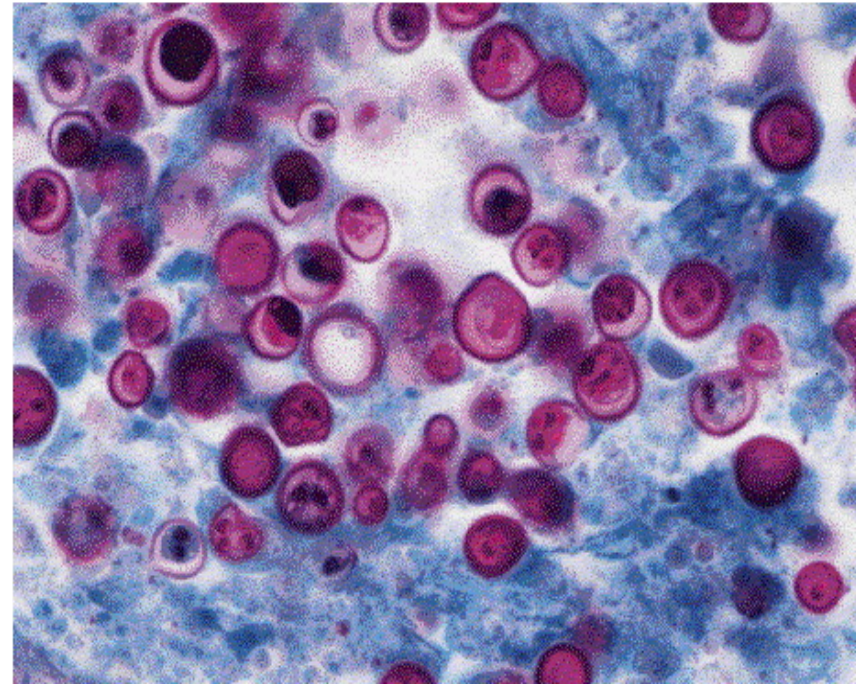
**A large number of nodules are found in necropsied animals, skin and subcutaneous tissues, lungs and other internal organs.**

**For laboratory diagnosis, lesions of lung, liver, spleen, kidney, lymph nodes, skin lesions are sent to the relevant laboratory.**

**Culture: Sowing is done on antibiotic SDA or brain-heart infusion agar from lesional tissues, organs and other materials and left for 10 - 15 days incubation at both 25 °C and 37 C. Macro and micro morphologies of reproducing fungal colonies are examined.**

**Microscopy: Lesioned materials are first treated with 10% KOH or Lactophenol Cotton Blue and examinations are performed between slide and coverslip. Under the microscope, large, round, thick-walled, granular and some of them budded cells are seen.**





- Treatment and Protection: There is no known effective therapeutic agent in the treatment of the disease. Generally, Amphotericin-B is administered to animals while attempting to heal wounds with surgical interventions.
- General hygienic conditions should be observed in order to prevent the disease and sick animals and healthy animals should be housed away from each other.

# **Histoplasmozis**



- Histoplasmosis is a disease of localized (lung) or systemic character, caused by a dimorphic fungus *Histoplasma capsulatum* in humans and animals.
- Dogs and cats are the most sensitive animals.
- *Histoplasma capsulatum* is in mycelial form when incubated at 22 - 25 °C; When it is incubated at 37 °C, it shows growth in a yeast-like form.
- Colonies produced in Sabouraud dextrose agar at 25C are first white-pink, then brown, and aerial micelles like cotton are formed on them.
  
- In stained preparations made from pathological materials and especially blood, the agent is found in small, oval, yeast-shaped, mononuclear and sometimes polymorphnuclear cells.
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- In transplantations made from pathological materials, one white and aerial hyphae (Type-A) and the other brown (Type-B) colonies are formed.

## Epidemiology

*H. capsulatum* is abundant in the soil in saproptic form. The agent finds a good development environment in places and roosts contaminated with the feces of poultry.

No animal-to-animal or human transmission is seen. It is infected as a result of taking the spores belonging to the agent individually.

It has been reported that the agent was isolated from the feathers of chickens.

Environments where bats are present form reservoirs for humans and animals.

This disease is more common in dogs that have been specially trained to track in hunting (sniffing the soil, scraping). Apart from this, similar rates of disease have been found in cats, pigs and sheep.

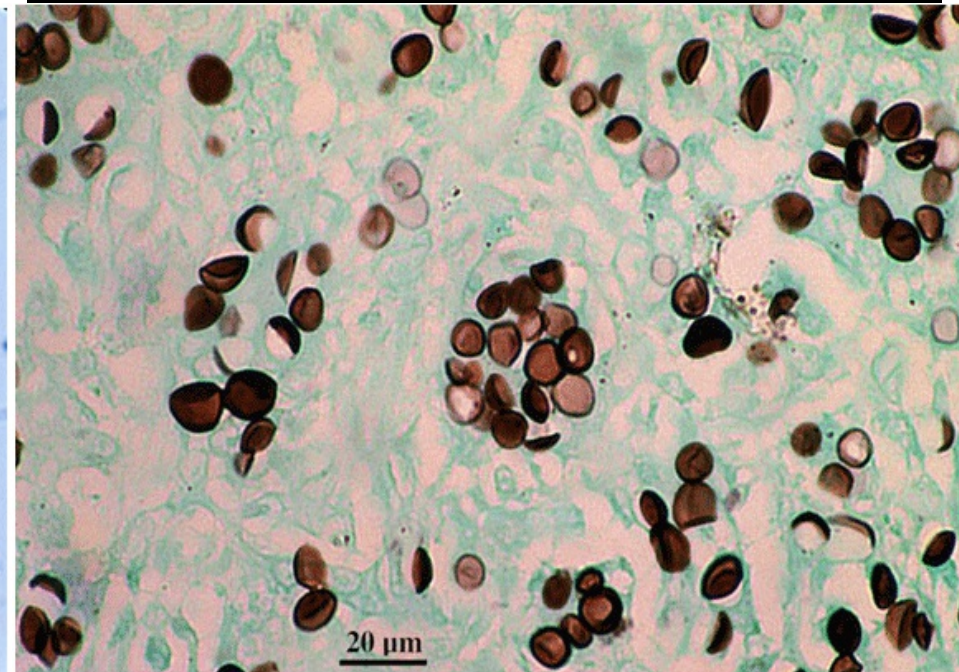
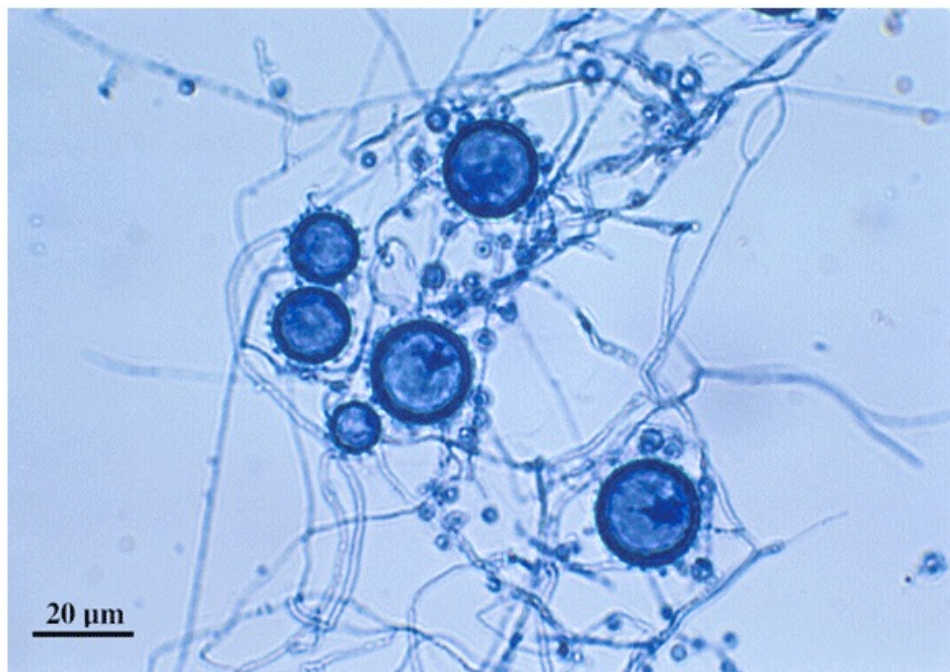
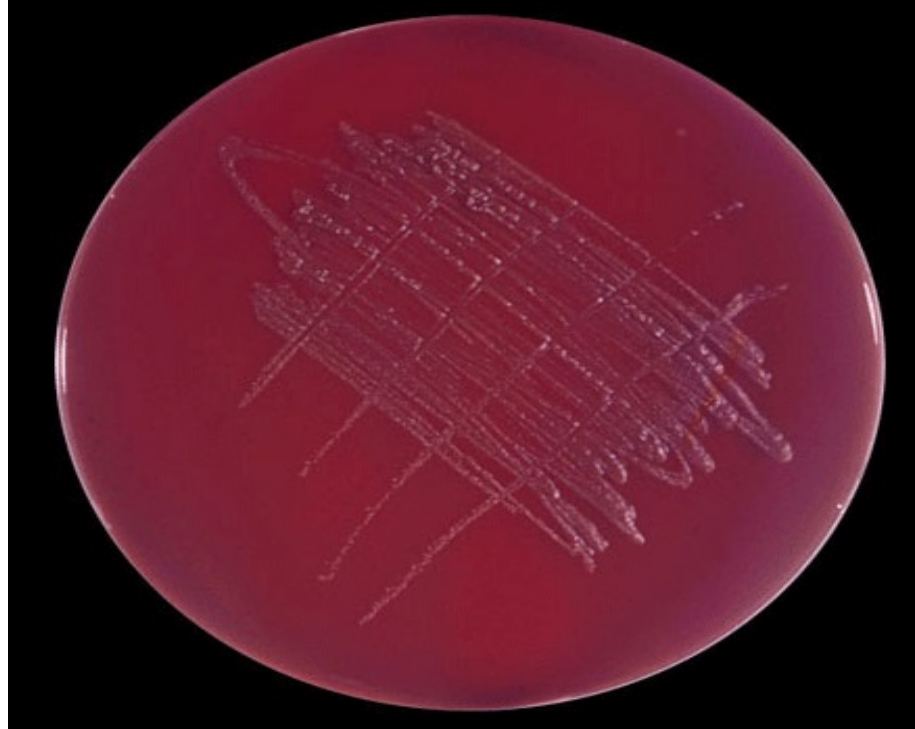
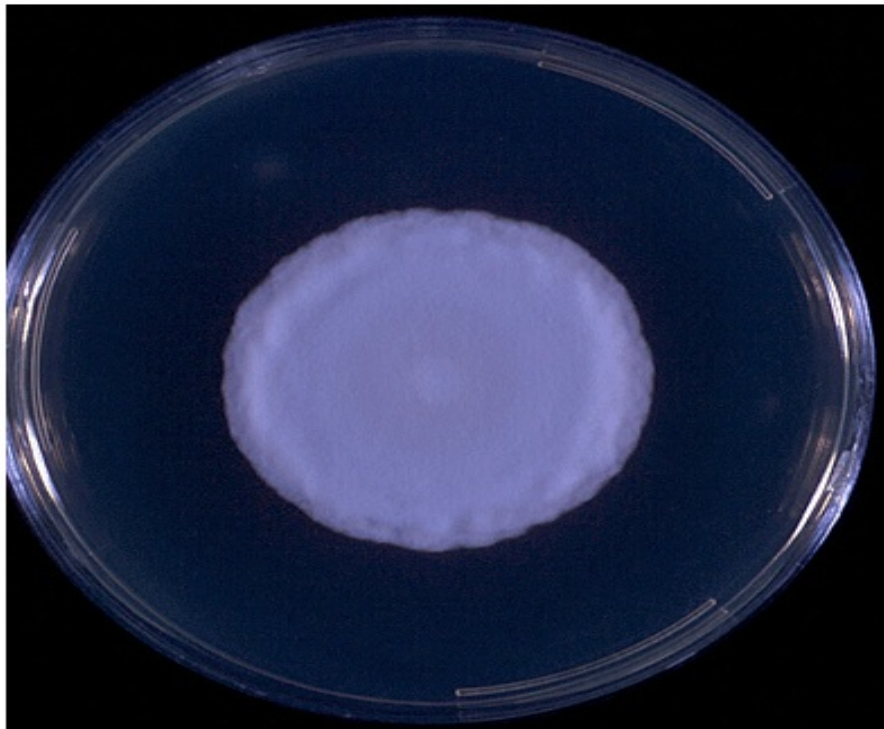
## Clinical Findings

The infection is difficult to diagnose because of its latent and chronic course in animals. Some of the symptoms that occur are not capable of defining the disease specifically.

## Laboratory Findings

**Microscopy:** The yeast form of the agent is found in dyed and unpainted preparations prepared from materials taken from animals. Mononuclear and sometimes polymorphnuclear structures are found in preparations prepared from blood, bone marrow and lymph nodes.

**Culture:** From the materials taken, it is planted in antibiotic SDA medium and left for incubation up to 2 weeks at both 25C and 37C. Micro and macro morphologies of breeding colonies are examined. When necessary, the yeast form is re-seeded and left for incubation to transform it into a micellar form.



# **Koksidiodomikozis**

*Coccidioidomycosis is a chronic non-infectious disease that is generally localized to the respiratory system in humans and animals.*

*The agent is Coccidioides immitis, which has dimorphic properties.*

*C.immitis is very resistant to drying. It can maintain its viability for a long time in environmental conditions.*

*Antibiotic SDA grows easily in the medium and at 25C within 3-5 days.*

## Epidemiology

*C. immitis* and spores belonging to the agent are abundant in the soil.

In dry and windy weather, spores that enter the air are taken with breathing air and localized to the lungs.

No animal-to-animal or human transmission is seen.

The possibility of getting an infection from portarants in the skin is very rare, and there is no gastrointestinal system infection.

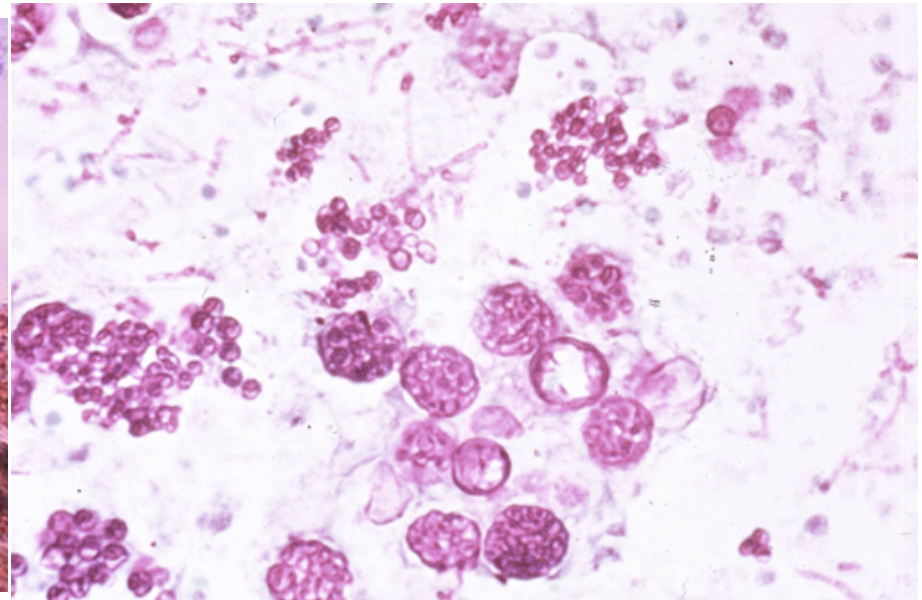
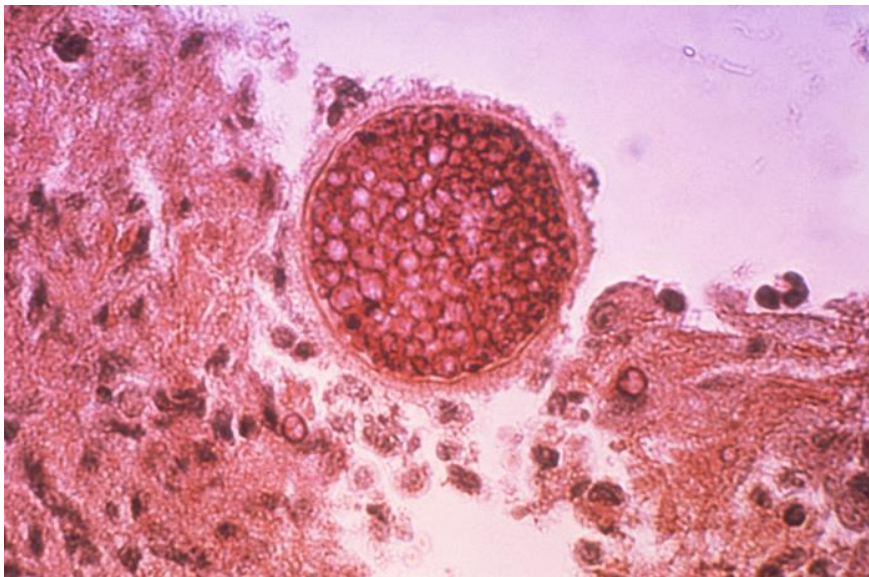
The infection is mostly found in dogs, cattle, horses, cats, pigs and sheep.

## Clinical Findings

Most of the infections caused by *C. immitis* are always overlooked since they progress in latent or subclinical forms.

It is almost impossible to make a definitive diagnosis without laboratory analysis in cases that have reached clinical level.

Cough, the most prominent symptom, is similar to tuberculosis and other lung infections.





## Laboratory Findings

**Microscopy:** From the lesional materials, firstly, 10% KOH or Lactophenol is treated with Cotton Blue and examinations are performed between slide and coverslip. It is examined under the microscope in terms of a thick-walled and refractile spherula.

**Culture:** From clinical materials, sowing is done instead of antibiotic and antibiotic-free SDA medium and left for incubation at 25C and 37C. Colonies grown within 3-5 days are examined in terms of *C.immitis* culture formation, but care is taken not to scatter the spores around and take them with breath air.

