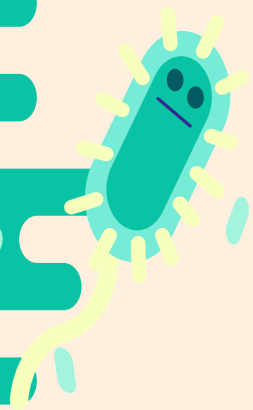
# BLACK FUNGUS IN COVID-19 PATIENTS



**COMMON ACADEMIC PROGRAMME**

BY

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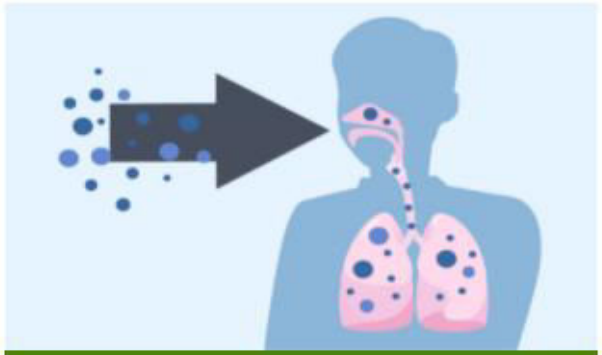

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Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

## MUCORMYCOSIS

Mucormycosis (previously called zygomycosis) is a serious but rare fungal infection caused by a group of molds called mucormycetes. These molds live throughout the environment. Mucormycosis mainly affects people who have health problems or take medicines that lower the body's ability to fight germs and sickness. It most commonly affects the sinuses or the lungs after inhaling fungal spores from the air. It can also occur on the skin after a cut, burn, or other type of skin injury.

# Fungi

- People experience fungi most often in their kitchens, when fruits rot or the bread turns moldy.

- While fungal diseases are common among plants, only a very small fraction of them assail humans. One reason is that animals, including humans, have evolved intricate immune systems.

- However, when the immune system has been breached by another illness, fungi that are otherwise harmless take advantage and invade human tissues. These are called opportunistic infections. Even so, unlike their pathogenic bacterial counterparts, fungi rarely cause life-threatening diseases.

# Fungi

- A few fungi, like the Candida yeast, can sometimes kick off a serious infection. Candida lives on the skin and inside the mouth, throat and vagina of healthy persons without causing any problems. But if the host's body has been weakened by another disease or drugs, it can cause oral thrush, diaper rash and vaginal infections.

- The Mucoralean fungi are even less problematic. They include the genuses of Mucor and Rhizopus. These are ubiquitous molds occurring in the soil, compost, animal dung, rotting wood and plant material. You may have seen them as the black growth on old fruits and bread.

# Fungi

- Mucoralean fungi are generally the first colonisers of dead or decaying plant material. They rapidly utilise the limited amount of simple carbohydrates available before other fungi show up for the more complex carbohydrates, such as cellulose.

- Like most fungi, Mucor produces millions of microscopic spherical, dark-hued structures called spores, which are dispersed in air. When the spores land on moist surfaces, like soil or plant material, they begin to germinate and produce thread like structures called mycelia. The mycelia branch out and feed on sugars in their surroundings and grow.

# Mucor Spores

- When a patient whose immune system has been compromised inhales Mucor spores, they may develop mucormycosis. This is a rare, non-contagious disease – but it can be debilitating or fatal if not treated quickly.

- The frequency of mucormycosis infections has increased in the last decade, principally because of the greater number of organ transplants.

- People who have received transplanted organs depend on immunosuppressant drugs to keep their bodies from rejecting the new organs, but in this state they are also predisposed to infection.

- People suffering from COVID-19, HIV/AIDS and other viral diseases, congenital bone marrow disease, severe burns, cancers and untreated or irregularly treated diabetes have reduced immunity and are prone to developing mucormycosis.

# Mucor Spores

- COVID-19 patients who have received steroids are particularly at risk because steroids suppress the immune system.
- This is why steroids should not be used unless absolutely necessary.
- Experiments with rats and rabbits have found that the inhaled spores in healthy animals are quickly killed by white blood cells.
- But if the host's immune response has been suppressed, the body produces fewer white blood cells. In this condition, the spores germinate and grow rapidly as thin, wire-like tubes that branch out and enter the blood vessels and kill them.

# WHAT IS BLACK FUNGUS

A life-threatening infection known as mucormycosis (colloquially as black fungus) which, if untreated, **results in blindness followed by death**

## WHAT MAKES YOU VULNERABLE

Exposure to mucor mould which is commonly found in soil, plants, manure etc

# Mucormycosis

**Order of Fungus: Mucorales**

# Diagnosis

## Multiple Ways

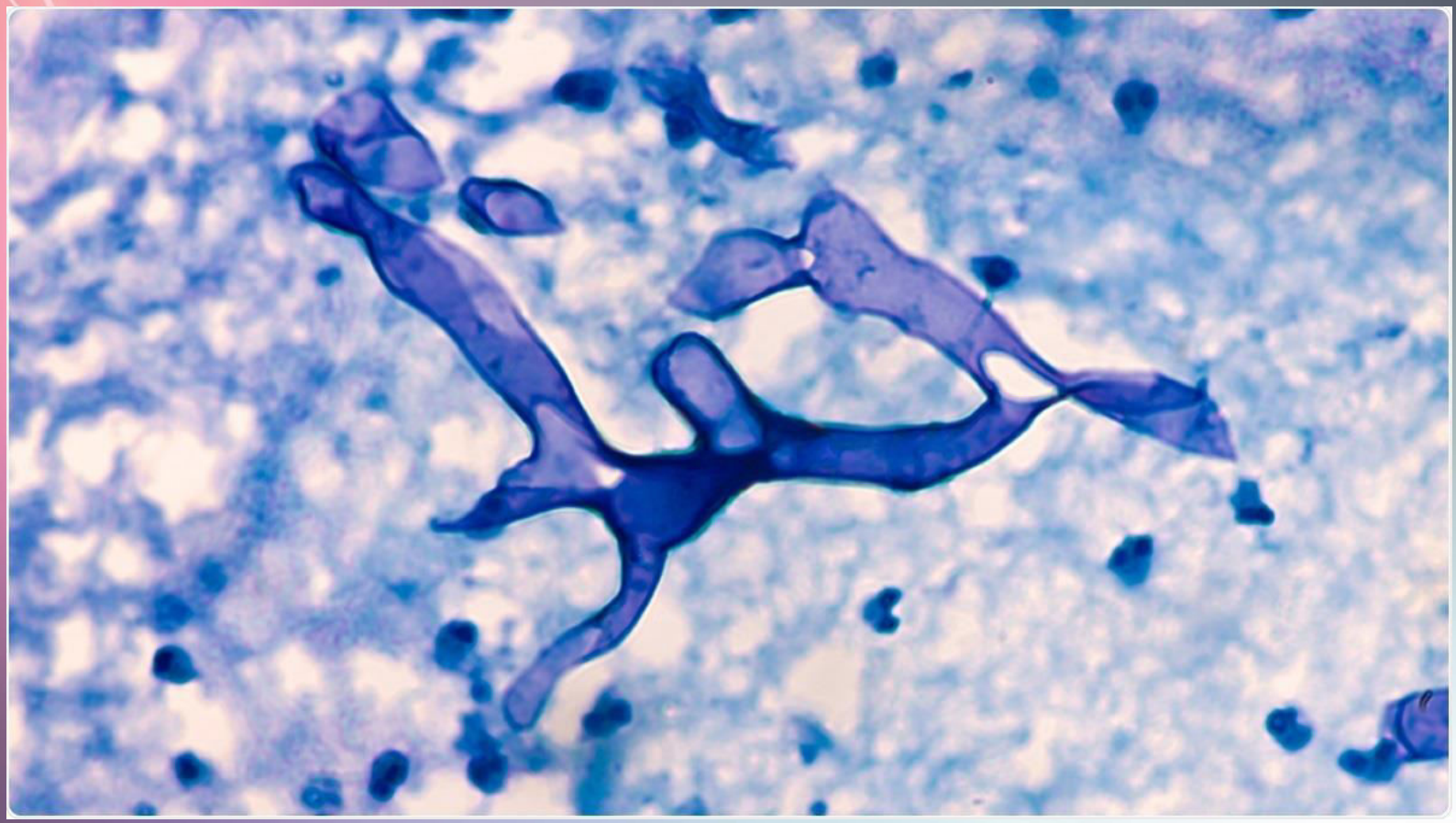
Definitive: Positive culture from sterile site

Visualized by acid-Schiff or methenamine sliver stain

Biopsy with histopathologic examination

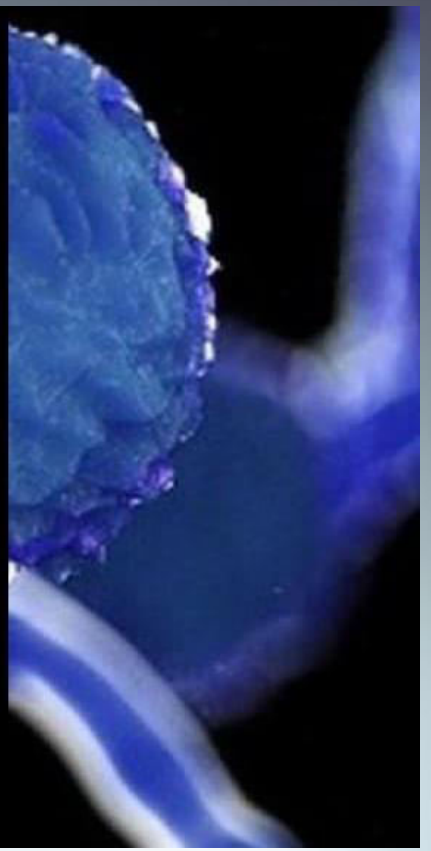
≥ 6 to 30 μm cells, thick walled, ribbon hyphae branching at right angles

**Mucormycosis: Broad, wide-angle non-septate hyphae of the fungus Mucor, from the paranasal sinus of a patient with diabetes mellitus**



*Mucor viewed through a microscope showing dark spherical spores*

# THREAT TO LIFE



BRAIN

SINUSES

LUNGS

**It affects the sinuses, the brain and the lungs** and can be life-threatening in diabetic or severely immunocompromised patients, such as those with cancer or HIV/AIDS

**WHO IS AT RISK**

People who are on medication for other health problems which reduces their ability to fight environmental pathogens

Some doctors believe it may be being triggered by steroids, a life-saving treatment for severe & critically ill Covid-19 patients

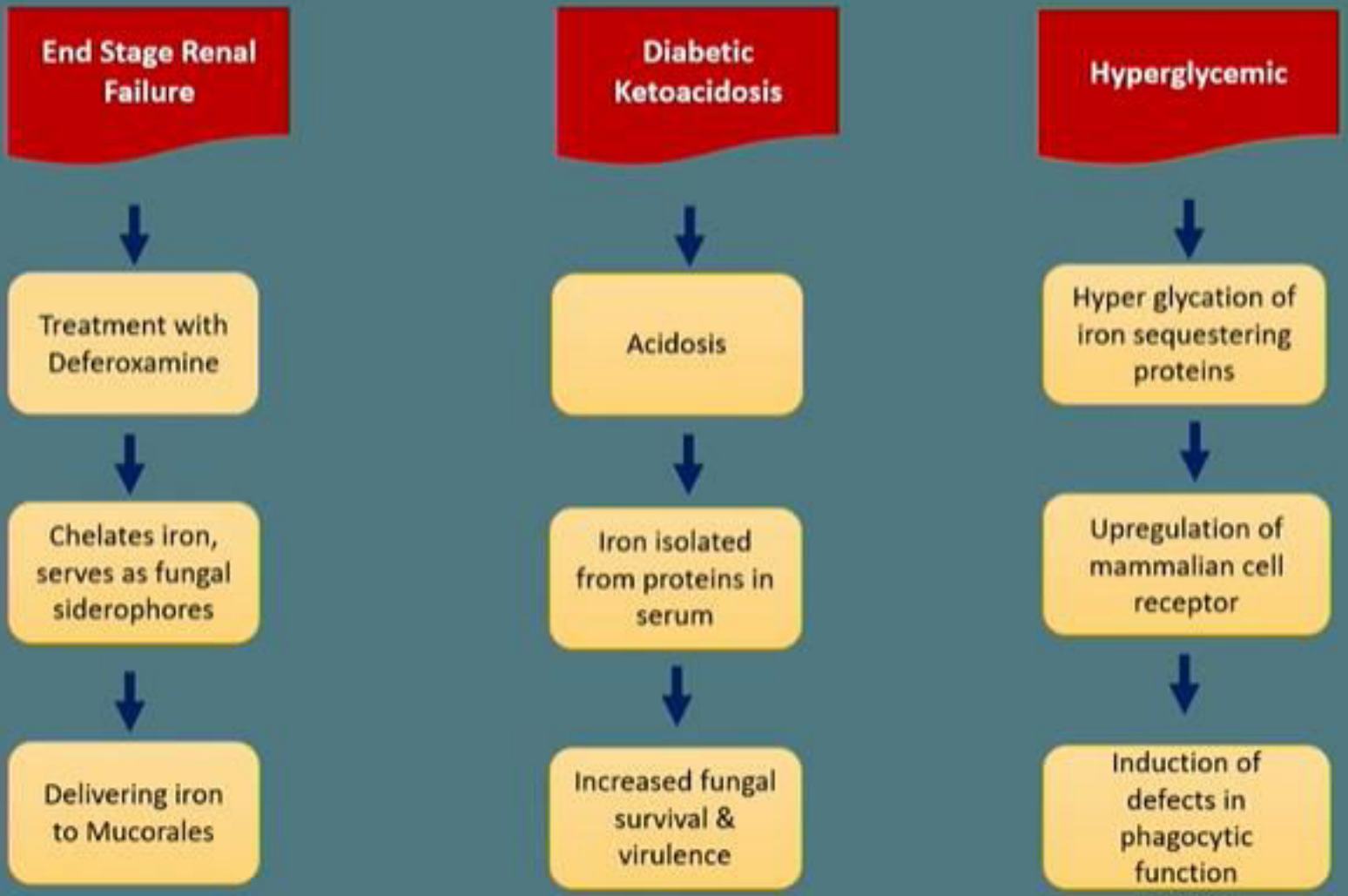
A drop in immunity could be triggering these cases

**TREATMENT**

Doctors say most patients arrive late, when they are already losing vision, & doctors have to surgically remove the eye to stop the infection from reaching the brain

# Pathogenesis

## Disease Development



# Types of mucormycosis

- **Rhinocerebral (sinus and brain) mucormycosis** is an infection in the sinuses that can spread to the brain. This form of mucormycosis is most common in people with uncontrolled diabetes and in people who have had a kidney transplant.

- **Pulmonary (lung) mucormycosis** is the most common type of mucormycosis in people with cancer and in people who have had an organ transplant or a stem cell transplant.

- **Gastrointestinal mucormycosis** is more common among young children than adults, especially premature and low birth weight infants less than 1 month of age, who have had antibiotics, surgery, or medications that lower the body's ability to fight germs and sickness.

# Types of mucormycosis

- **Cutaneous (skin) mucormycosis**: occurs after the fungi enter the body through a break in the skin (for example, after surgery, a burn, or other type of skin trauma). This is the most common form of mucormycosis among people who do not have weakened immune systems.

- **Disseminated mucormycosis** occurs when the infection spreads through the bloodstream to affect another part of the body. The infection most commonly affects the brain, but also can affect other organs such as the spleen, heart, and skin.

# Symptoms of Mucormycosis

The symptoms of mucormycosis depend on where in the body the fungus is growing.

**rhinocerebral (sinus and brain) mucormycosis** include:

- One-sided facial swelling
- Headache
- Nasal or sinus congestion
- Black lesions on nasal bridge or upper inside of mouth that quickly become more severe
- Fever

Symptoms of **pulmonary (lung) mucormycosis** include:

- Fever
- Cough
- Chest pain
- Shortness of breath

# Symptoms of Mucormycosis

**Cutaneous (skin) mucormycosis**

blisters or ulcers, and the infected area may turn black. Other symptoms include pain, warmth, excessive redness, or swelling around a wound.

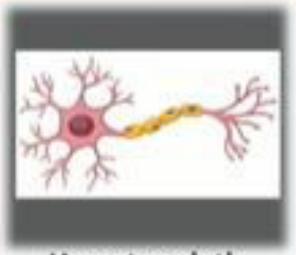
**Gastrointestinal mucormycosis** :

- Abdominal pain
- Nausea and vomiting
- Gastrointestinal bleeding

**Disseminated mucormycosis** typically occurs in people who are already sick from other medical conditions, so it can be difficult to know which symptoms are related to mucormycosis. Patients with disseminated infection in the brain can develop mental status changes or coma.

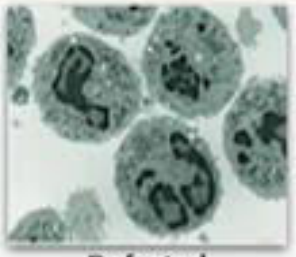
# Risk Factors

Diabetics with DKA



Hematopoietic Stem Cell Transplantation

Hyperglycemic

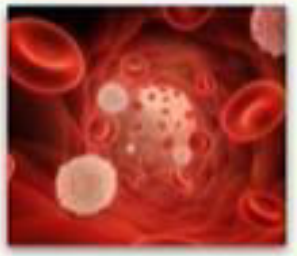


Defected Phagocytic function

Fe

Elevated levels of Iron


Solid Organ Transplantation



Prolonged Neutropenia

Malignancy

Trauma with implantation of soil & vegetation

Receiving antifungal prophylaxis

Catheters, SC injections, maceration of skin

Posaconazole

# People at Risk & Prevention

Who gets mucormycosis?

- Mucormycosis is rare, but it's more common among people who have health problems:
- Diabetes, especially with diabetic ketoacidosis
- Cancer
- Organ transplant
- Stem cell transplant
- Long-term corticosteroid use
- Injection drug use
- Too much iron in the body (iron overload or hemochromatosis)
- Skin injury due to surgery, burns, or wounds
- Prematurity and low birthweight (for neonatal gastrointestinal mucormycosis)

# People at Risk & Prevention

How does someone get mucormycosis?

- People get mucormycosis through contact with fungal spores in the environment. For example, the lung or sinus forms of the infection can occur after someone inhales the spores from the air. A skin infection can occur after the fungus enters the skin through a scrape, burn, or other type of skin injury.

Is mucormycosis contagious?

- No. Mucormycosis can’t spread between people or between people and animals.

# Where Mucormycosis Comes From

- The fungi that cause mucormycosis live in the environment
- Mucormycetes, the group of fungi that cause mucormycosis, are present throughout the environment, particularly in soil and in association with decaying organic matter, such as leaves, compost piles, and animal dung.
- They are more common in soil than in air, and in summer and fall than in winter or spring.
- Most people come in contact with microscopic fungal spores every day, so it's probably impossible to completely avoid coming in contact with mucormycetes.
- These fungi aren't harmful to most people. However, for people who have weakened immune systems, breathing in mucormycete spores can cause an infection in the lungs or sinuses which can spread to other parts of the body.

# Types of fungi that cause mucormycosis

- Several different types of fungi can cause mucormycosis. These fungi are called mucormycetes and belong to the scientific order Mucorales.

- The most common types that cause mucormycosis are *Rhizopus* species and *Mucor* species.

- Other examples include *Rhizomucor* species, *Syncephalastrum* species, *Cunninghamella bertholletiae*, *Apophysomyces, Lichtheimia* (formerly *Absidia*), *Saksenaea,* and *Rhizomucor*.

## Therapy or Treatment

## General Principles

**Early Diagnosis**

**Reversal of underlying predisposing risk factors**

**Surgical debridement**

**Antifungal therapy**

# Diagnosis and testing for Mucormycosis

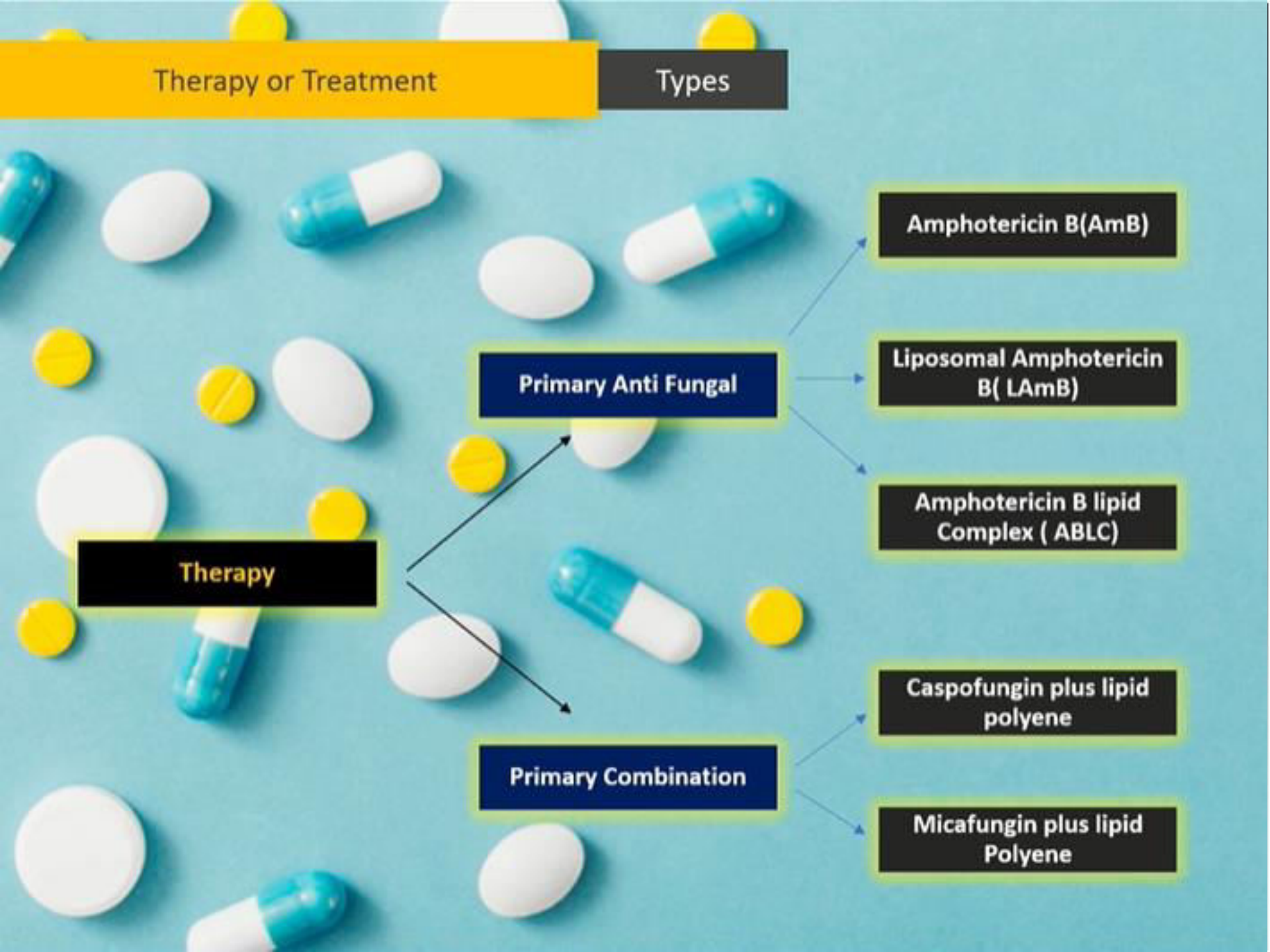
How is mucormycosis diagnosed?

- Healthcare providers consider your medical history, symptoms, physical examinations, and laboratory tests when diagnosing mucormycosis.

- Healthcare providers who suspect that you have mucormycosis in your lungs or sinuses might collect a sample of fluid from your respiratory system to send to a laboratory.

- Your healthcare provider may perform a tissue biopsy, in which a small sample of affected tissue is analyzed in a laboratory for evidence of mucormycosis under a microscope or in a fungal culture.

- You may also need imaging tests such as a CT scan of your lungs, sinuses, or other parts of your body, depending on the location of the suspected infection.


Therapy or Treatment
Types
Therapy
Primary Anti Fungal
Primary Combination
Amphotericin B(AmB)
Liposomal Amphotericin B( LAmB)
Amphotericin B lipid Complex ( ABLC)
Caspofungin plus lipid polyene
Micafungin plus lipid Polyene

# Treatment for Mucormycosis

How is mucormycosis treated?

- Mucormycosis is a serious infection and needs to be treated with prescription antifungal medicine, usually amphotericin B, posaconazole, or isavuconazole.

- These medicines are given through a vein (amphotericin B, posaconazole, isavuconazole) or by mouth (posaconazole, isavuconazole).

- Other medicines, including fluconazole, voriconazole, and echinocandins, do not work against fungi that cause mucormycosis.

- Often, mucormycosis requires surgery to cut away the infected tissue.

# Clinical Manifestations

## Categories

**Categories**

- **Rhino-Orbital Cerebral Disease**
- **Pulmonary Disease**
- **Gastrointestinal disease**
- **Cutaneous Disease**
- **Disseminated**
- **Miscellaneous**






# Information for Healthcare Professionals about Mucormycosis

**Clinical features**

- There are five major clinical forms of mucormycosis; of these, rhinocerebral and pulmonary infections are the most common.
- A classic clinical sign of mucormycosis is the rapid onset of tissue necrosis with or without fever.
- Necrosis is the result of invasion of blood vessels and subsequent thrombosis.

- **Rhinocerebral mucormycosis** is the most common form in patients with diabetes and with renal transplants. It also occurs in neutropenic cancer patients and hematopoietic stem cell transplant or solid organ transplant recipients.

- Symptoms may include unilateral facial swelling, headaches, nasal or sinus congestion or pain, serosanguinous nasal discharge, and fever.

- As the infection spreads, ptosis, proptosis, loss of extraocular muscle function, and vision disturbance may occur. Necrotic black lesions on the hard palate or nasal turbinate and drainage of black pus from eyes are useful diagnostic signs.

# Information for Healthcare Professionals about Mucormycosis

- **Pulmonary mucormycosis** generally occurs in patients with hematologic malignancy or profound neutropenia.
- The symptoms are non-specific and include fever, cough, chest pain, and dyspnea. Angioinvasion results in tissue necrosis, which may ultimately lead to cavitation and/or hemoptysis.

- **Cutaneous mucormycosis** may be primary or secondary. Primary infection is usually caused by direct inoculation of the fungus into disrupted skin and is most often seen in patients with burns or other forms of local skin trauma, and can occur in patients who are not immunosuppressed.

- Primary infection produces an acute inflammatory response with pus, abscess formation, tissue swelling, and necrosis. The lesions may appear red and indurated and often progress to black eschars.

# Information for Healthcare Professionals about Mucormycosis

- **Gastrointestinal mucormycosis** is less common than the other clinical forms and is believed to result from ingestion of the organism. It typically occurs in malnourished patients or premature infants.
- The stomach, colon, and ileum are most commonly affected. Non-specific abdominal pain and distension, nausea, and vomiting are the most common symptoms, and gastrointestinal bleeding can occur.
- It is the most common form of mucormycosis among neonates and is challenging to diagnose partly because of its clinical resemblance to necrotizing enterocolitis, a far more common disease.

- **Disseminated mucormycosis** may follow any of the forms of mucormycosis described above but is usually seen in neutropenic patients with a pulmonary infection. The most common site of spread is the brain, but the spleen, heart, skin, and other organs can also be affected.

# Mucormycosis Statistics

- How common is mucormycosis?
- Mucormycosis is rare, but the exact number of cases is difficult to determine

# Deaths due to mucormycosis

- Mucormycosis is frequently a life-threatening infection. A review of published mucormycosis cases found an overall all-cause mortality rate of 54%. The mortality rate varied depending on underlying patient condition, type of fungus, and body site affected (for example, the mortality rate was 46% among people with sinus infections, 76% for pulmonary infections, and 96% for disseminated mucormycosis).

# Deaths due to mucormycosis

- Mucormycosis, a new cause for worry after the coronavirus disease (Covid-19) infection, has infected at least 7,250 people in India. Also known as black fungus, the infection is a Covid-19 complication which has killed at least 219 people in the country, according to the figures shared by officials in 13 states and Union territories

# DEDICATED CENTRES

The Central government said the states should declare the disease notifiable under the Epidemic Diseases Act, 1897. Delhi chief minister Arvind Kejriwal, meanwhile, has called for three government hospitals in the city - Lok Nayak, GTB and Rajeev Gandhi hospitals - to be set up dedicated centres for black fungus cases.

# List of states with highest number of black fungus

- **Maharashtra:** The state has 1,500 cases of mucormycosis and 90 deaths due it.
- **Gujarat:** As many as 1,163 cases of mucormycosis have been detected and 61 people have died due to it.
- **Madhya Pradesh:** The state has 575 cases of and 31 deaths due to mucormycosis.
- **Haryana:** As many as 268 cases, eight deaths due to mucormycosis have been reported in Haryana.
- **Delhi:** The national capital has registered 203 cases of mucormycosis and one death due to it.
- **Uttar Pradesh:** The state has registered 169 cases of mucormycosis and eight deaths due to it.
- **Bihar:** As many as 103 cases, 2 deaths due to mucormycosis have been registered in Bihar.
- **Chhattisgarh:** Mucormycosis has been detected in 101 people and one person has died in the state because of it.
- **Karnataka:** While 97 cases of mucormycosis have been reported in this southern state, the number of people who died due to it stand at zero, according to official data.
- **Telangana:** As many as 90 cases of mucormycosis have been detected here and 10 deaths have also been recorded.

# EVIDENCE BASED ADVISORY IN THE TIME OF COVID-19

## (Screening, Diagnosis & Management of Mucormycosis)

### Mucormycosis - if uncared for - may turn fatal

Mucormycosis is a fungal infection that mainly affects people who are on medication for other health problems that reduces their ability to fight environmental pathogens.

Sinuses or lungs of such individuals get affected after fungal spores are inhaled from the air.

This can lead to serious disease with warning sign and symptoms as follows:

- Pain and redness around eyes and/or nose
- Fever
- Headache
- Coughing
- Shortness of breath
- Bloody vomits
- Altered mental status

### What predisposes

- Uncontrolled diabetes mellitus
- Immunosuppression by steroids
- Prolonged ICU stay
- Co-morbidities - post transplant/malignancy
- Voriconazole therapy

### How to prevent

- Use masks if you are visiting dusty construction sites
- Wear shoes, long trousers, long sleeve shirts and gloves while handling soil (gardening), moss or manure
- Maintain personal hygiene including thorough scrub bath

### When to Suspect

(In COVID-19 patients, diabetics or immunosuppressed indiviuals )

- Sinusitis - nasal blockade or congestion, nasal discharge (blackish/bloody), local pain on the cheek bone
- One sided facial pain, numbness or swelling
- Blackish discoloration over bridge of nose/palate
- Toothache, loosening of teeth, jaw involvement
- Blurred or double vision with pain; fever, skin lesion; thrombosis & necrosis (eschar)
- Chest pain, pleural effusion, haemoptysis, worsening of respiratory symptoms

### Dos

- Control hyperglycemia
- Monitor blood glucose level post COVID-19 discharge and also in diabetics
- Use steroid judiciously - correct timing, correct dose and duration
- Use clean, sterile water for humidifiers during oxygen therapy
- Use antibiotics/antifungals judiciously

### Don'ts

- Do not miss warning signs and symptoms
- Do not consider all the cases with blocked nose as cases of bacterial sinusitis, particularly in the context of immunosuppression and/or COVID-19 patients on immunomodulators
- Do not hesitate to seek aggressive investigations, as appropriate (KOH staining & microscopy, culture, MALDI-TOF), for detecting fungal etiology
- Do not lose crucial time to initiate treatment for mucormycosis

### How to manage

- Control diabetes and diabetic ketoacidosis
- Reduce steroids (if patient is still on) with aim to discontinue rapidly
- Discontinue immunomodulating drugs
- No antifungal prophylaxis needed
- Extensive Surgical Debridement - to remove all necrotic materials
- Medical treatment
  - Install peripherally inserted central catheter (PICC line)
  - Maintain adequate systemic hydration
  - Infuse Normal saline IV before Amphotericin B infusion
  - Antifungal Therapy, for at least 4-6 weeks (see the guidelines below )
- Monitor patients clinically and with radio-imaging for response and to detect disease progression

### Team Approach Works Best

- Microbiologist
- Internal Medicine Specialist
- Intensivist
- Neurologist
- ENT Specialist
- Ophthalmologist
- Dentist
- Surgeon (maxillofacial/plastic)
- Biochemist

### Detailed management guideline & information available on the following

Global guideline for the diagnosis and management of mucormycosis: an initiative of the European Confederation of Medical Mycology in cooperation with the Mycoses Study Group Education and Research Consortium. Lancet Infect Dis. 2019 Dec;19(12):e405-e421. doi: 10.1016/S1473-3099(19)30312-3.

https://www.ijmr.org.in/temp/IndianJMedRes1533311-3965147_110051.pdf

https://www.ijmr.org.in/temp/IndianJMedRes1392195-397834_110303.pdf

### Advisory developed by the following experts & National Task Force for COVID-19


- Dr. Arunaloke Chakrabarti, Professor & Head, Department of Medical Microbiology, PGIMER, Chandigarh
- Dr. Atul Patel, Infectious Disease Specialist, Ahmedabad
- Dr. Rajeev Soman, Consultant Infectious Disease Physician, Pune
- Dr. Prakash Shastri, Vice Chairman, Critical Care, Sir Ganga Ram Hospital, New Delhi
- Dr. J P Modi, Medical Superintendent, Dr. K J Upadhay, Head, Dept. of Internal Medicine and Multi-disciplinary Clinical Management Group, BJ Medical College & Civil Hospital, Ahmedabad
- Dr. Girish Parmar, Dean, Government Dental College & Hospital, Ahmedabad
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DEPARTMENT OF HEALTH RESEARCH
MINISTRY OF HEALTH AND FAMILY WELFARE
GOVERNMENT OF INDIA

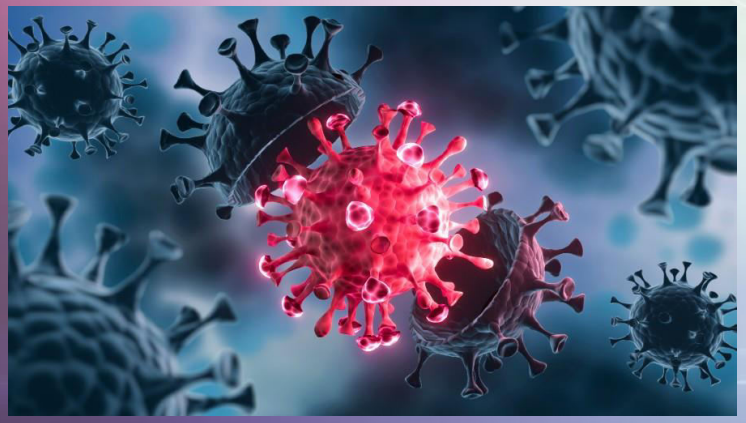
# DCGI

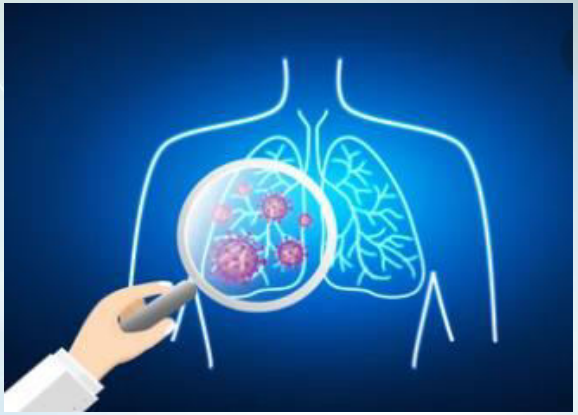
- The Drug Controller General of India, in March this year, gave approval to Mumbai-based bio-pharmaceutical firm Bharat Serums and Vaccines Limited to use anti-fungal medication -- Liposomal Amphotericin B or LAmB -- as a medical intervention in patients of Mucormycosis.

# Fungal Diseases and COVID-19

- Symptoms of some fungal diseases can be similar to those of COVID-19, including fever, cough, and shortness of breath. Laboratory testing is necessary to determine if a person has a fungal infection or COVID-19. Some patients can have COVID-19 and a fungal infection at the same time.

- People with severe COVID-19, such as those in an intensive care unit (ICU), are particularly vulnerable to bacterial and fungal infections. The most common fungal infections in patients with COVID-19 include aspergillosis or invasive candidiasis.





## Black fungus or Mucormycosis: Costly mistakes in COVID-19 treatment lead to new challenges

- The root cause of mucormycosis or black fungus is the completely unhygienic and dirty way of delivering oxygen to patients in many places in India combined with the indiscriminate use of steroids in the treatment of COVID-19

- A rare fungal infection called Mucormycosis (black fungus) has suddenly surged in India, in patients suffering or recovering from COVID-19 . Unfortunately, it is a highly dangerous infection, killing between 46-96 percent (one could say >50 percent) of patients, depending on its severity.

- Mucormycosis or black fungus is caused by a mold called Mucormycetes, which typically lives in soil, plants or decaying organic matter. If you're into gardening or outdoor activities, you could carry it from outdoors to indoors. However, it is found indoors as well, think of the black fungal outgrowth in spoiled bread or the fuzzy white mold that grows in fruits which later turns into deep grey. The black fungus also grows in the condensation lines and drip pans of air conditioners. In short, it has always been everywhere around us.

**Black fungus or Mucormycosis: Costly mistakes in COVID-19 treatment lead to new challenges**

- However, it is on extremely rare occasions that it should affect people whose immune system is compromised like uncontrolled diabetic patients or on steroid or cancer patients on chemotherapy. In the last 10 years, only a handful of patients have been reported in India.
- Last week, all of a sudden, thousands of cases of black fungus have been reported in patients suffering or recovering from COVID-19

Why is it so? To put things in context –

- Millions of patients in India suffering from diabetes or on steroid or cancer patients are admitted to hospital in India every year but no one gets this infection.
- Millions all over the world are getting infected with COVID, are diabetic, are put on steroids and their immune system is compromised but is not getting black fungus.

Then why is there a sudden surge of Mucormycosis among COVID patients in India only?

# The first mistake

- The root cause of this is the completely unhygienic and dirty way of delivering oxygen to patients in many places in India combined with the indiscriminate use of steroids in the treatment of COVID.

- Firstly, medical oxygen (as opposed to industrial oxygen) is a highly purified version that is more than 99.5 percengt pure by preparing its through repeated steps of compression, filtration and purification. The cylinders in which the liquid oxygen is stored, transported and used are rigorously cleaned and disinfected.

- Secondly, oxygen, especially when administered to patients at high flow, requires humidification. This is done by passing it through a container filled with sterile water. The water itself must be sterilized and changed frequently as per protocol. If the water is not sterile, it is potentially a source of black fungus infection! (Especially if high flow oxygen is given over a long period.)

- On the other hand, if oxygen is given without humidification, it will dry the mucous membrane and damage the inner lining of the lungs. It will also make the sputum or secretion very thick to clear out. Both of these have created havoc among patients.

# The second mistake

- The use of steroids in the treatment of COVID-19 has to happen at the right time. Steroids are only effective to fight the effects of COVID, not the virus directly. It is dangerous and harmful if given early when the virus is replicating. This will reduce body immunity and facilitate further replication of viruses. Giving steroids unnecessarily or early to a diabetic patient will raise their sugar level to a high level predisposing them to further risk of increase in severity of COVID as well as predisposing them to the ill effects of black fungus.

# The third mistake

- While it is a good initiative to ramp up the production of medicine (Amphotericin B ) to treat black fungus, we must understand that this disease kills between 46-96 percent of people, once infected. However, the bitter truth is that Amphoterin B is very toxic.

- The real solution is to enforce quality control and compliance for production, storage (in cylinder) and delivery (sterile water, clean system of oxygen) as well as stop indiscriminate use of steroids to minimise this new enemy.

- **The solution to bad body odor is a good shower, not expensive perfume.**

*The author is vice chairman and managing director, chief consultant for Cardiovascular Thoracic Surgery at the Asian Heart Institute in Mumbai.*

# Epidemic Diseases Act, 1897

- The Union Health Ministry urged states and union territories to make black fungus or mucormycosis a notifiable disease under the Epidemic Diseases Act, 1897, stating that the infection is leading to prolonged morbidity and mortality amongst COVID-19 patients.

- The ministry, in a letter, said that in the recent times a new challenge in the form of a fungal infection namely mucormycosis has emerged and is reported from many states among COVID-19 patients, especially those on steroid therapy and deranged sugar control.

# Centre asks states to declare black fungus as notified disease

- The Central government wrote to state governments over black fungus or mucormycosis disease and directed them to identify it as a notified disease.
- As many as 90 people have died of fungal infection in Maharashtra while Rajasthan and Telangana have declared black fungus as an epidemic amid surging cases.
- The Andhra Pradesh government has included black fungus in Aarogyasri scheme.
- In Maharashtra, 1,500 patients detected with black fungus and 500 have recovered while another 800 to 850 are still undergoing treatment and there is a shortage of a key medicine needed to treat it, said Public Health Minister Rajesh Tope on 19th May 2021.

## Black fungus: Andhra government to purchase 15,000 vials of Amphotericin B

- Andhra Pradesh government has placed orders for purchasing 15,000 vials of Amphotericin B injection to treat persons infected with black fungus or Mucormycosis, said state Medical and Health Principal Secretary Anil Kumar Singhal on 19.05.21

- The Centre has allocated 1650 vials for Andhra Pradesh and the state government has already given orders for 15,000 vials from three companies, and the supply is likely to start on May 22 or 23.

- Experts say that each patient may need 60 vials, thus each patient may need at least Rs 3 lakhs for the treatment. Keeping this in mind, the state government has included medical treatment for black fungus under Arogyasri Scheme.

**After Rajasthan, Telangana government declares Black Fungus infection as epidemic**

- Till now, cases of black fungus have been reported in various parts of the country including Karnataka, Uttarakhand, Telangana, Madhya Pradesh, Andhra Pradesh, Haryana and Bihar.

- Mucormycosis of black fungus, which is primarily affecting people recovering from the COVID-19, has been declared as an epidemic in Telangana on Thursday 20 May 2021

- “Fungal infection Mucormycosis is declared as notifiable disease under Epidemic Diseases Act 1897,” a statement issued by the Govt of Telangana said.

- On May 18, the Haryana government also formed regulations called, "The Haryana Epidemic Diseases (Mucormycosis) Regulations, 2021".

## Krishna district reports first black fungus death in Andhra Pradesh

- The first suspected black fungus death in the State was reported from Krishna district even as nine suspected fungal infection cases emerged from Prakasam.

- A 30-year-old Covid-19 patient reportedly died of black fungus in Krishna district a couple of days ago and it came to light on Tuesday after Collector A Md Imtiaz ordered an inquiry into the death.

- Nine suspected black fungus cases were reported from Ongole, Chirala-Perala, Kanigiri, Donakonda and Markapur in Prakasam district. Two of the cases are being treated in the critical care wing of Ongole GGH.

## Panel formed with experts from different specialities to tackle disease

- On the directions of the government, a Clinical Management Protocol Committee has been formed with experts from different specialities, under the aegis of P.V. Sudhakar, Principal, Andhra Medical College (AMC).
- Though this disease has been in existence for long, it assumed significance only after it started affecting COVID-19 patients.
- **A good thing is that mucormycosis does not spread from one person to another**.

# COVID Associated Mucormycosis

- “COVID Associated Mucormycosis (CAM) is an opportunistic infection caused by a group of fungi. It could be amongst many opportunistic infections of post COVID phase. Mucor fungal spores are ubiquitous in nature and found in soil and decaying vegetation,” says Veluri Gayathri, Professor of Microbiology, NRI Institute of Medical Sciences.

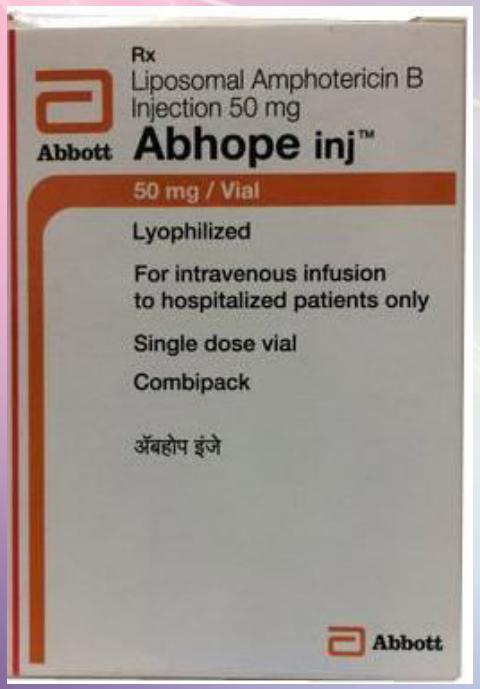
- “Mucor is a vasoinvasive fungus, which invades blood vessels, and spreads fast to adjacent areas, especially the eye and brain. The mortality rate can be reduced with early diagnosis and treatment. Regular and proper oral and dental hygiene all through COVID and post-COVID phases, regular betadine/chlorhexidine gargles and good blood glucose control,” adds Dr. Gayathri.

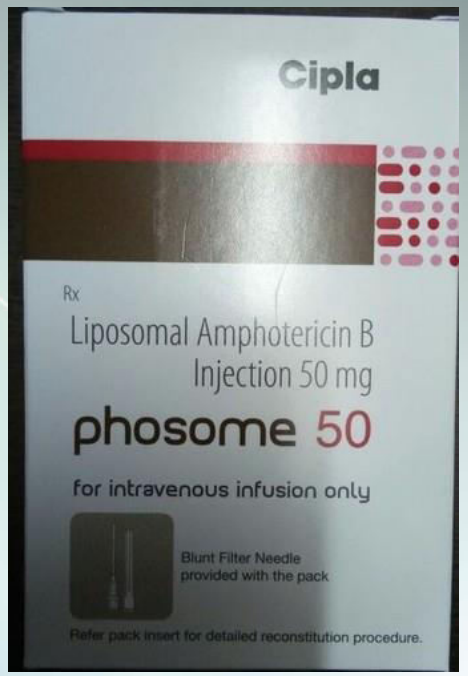
# Amphotericin B 50mg Brands in India

| | | |
|---|---|---|
| • Ambisome Injection | Mylan Pharma Ltd | ₹7814.0/Injection |
| • Ambilon 50mg Injection | Celon Laboratories Ltd | ₹3695/Injection |
| • Sporotar 50mg Injection | Emcure Pharmaceuticals Ltd | ₹4336.3/Injection |
| • Abhope 50mg Injection | Abbott | ₹4501/Injection |
| • Amphogard 50mg Injection | Zydus Cadila | ₹4572.05/Injection |
| • Lambin Injection | Sun Pharma Ltd | ₹4782.53/Injection |

# HOW AMPHOTERICIN B INJECTION WORKS

- **AMPHOTERICIN B** Injection is an antifungal medication. It kills fungi by destroying the fungal cell membrane.



**Black Fungus: 5 pharma cos get DCGI's nod to produce Amphotericin B**

- The Drug Controller General of India (DCGI) has granted approval to five pharma companies to start manufacturing antifungal anti-fungal drug Amphotericin B liposomal injection, whose demand has increased in the wake of a surge in black fungus infections.

- The five companies that got DCGI's nod are Alembic Pharmaceuticals, Emcure Pharmaceuticals, Gufic Biosciences, Lyca Pharmaceuticals, and Natco Pharma. Presently six firms - BDR Pharma, Bharat Serums and Vaccines, Mylan, Sun Pharma, Cipla, and Life Care - are producing the drug.

- "The existing pharma companies have already started ramping up the production. Indian Companies has also placed orders for importing 6 lakh vials of AmphotericinB," Minister of State for Chemicals and Fertilisers Mansukh Mandaviya said.

# **WHITE FUNGUS: What is it, is it more dangerous than black fungus and what are the symptoms?**

- Amid the on-going second wave of the deadly COVID-19 disease, the country recently reported a spike in rare fungal infection called black fungus (Mucormycosis) cases. And now, adding to the trouble, the capital of Bihar, Patna recently reported four cases of white fungus.

How were the white fungus cases detected?

- According to a report in Zee News, Dr SN Singh, head of the Microbiology, Department of PMCH who confirmed white fungus cases, said that all four patients showed all the symptoms of the COVID-19 virus, but tested negative in every test. The doctor said that during a detailed investigation, it turned out that they were infected with white fungus.

- However, all the patients as of now are completely fine after being administered the anti-fungal medicines.

## WHITE FUNGUS: What is it, is it more dangerous than black fungus and what are the symptoms?

Is White Fungus deadlier than black fungus?

- According to health experts, White Fungus infection is more dangerous than black fungus infection as it not only affects the lungs but other parts of the body such as nails, skin, stomach, kidney, brain, private parts and mouth.

What are the symptoms of White Fungus?

- According to doctors, the symptoms of this rare fungal disease are similar to coronavirus infection. As this attacks the lungs, the disease can be detected by performing HRCT test on an infected patient.

Who is at risk?

- As with the black fungus infection those with low immunity are at a greater risk. People with pre-existing medical issues like diabetes or those on steroids for a long time are most likely to get infected with White Fungus.

# Conclusion

- Early diagnosis means early treatment and leading to less mortality rates
- Reversal of underlying factors, Surgery and Liposomal amphotericin B increases cure rates
- Duration of treatment is highly individualized
- Posaconazole, Isuvaconazole can also be tried
- Adjunctive therapies need to proved in large trials and standardized


thank you