CONDITION

# Meningitis - cryptococcal

Cryptococcal meningitis is a serious fungal infection of the lining around the brain and spinal cord.

**WHAT IT IS**
Fungal infection of membranes surrounding the brain and spinal cord

**BODY SYSTEM**
Brain and nervous system

**MAIN SYMPTOMS**
Headache, fever, nausea, confusion

**WHAT CAUSES IT**
Infection with Cryptococcus yeast from the environment

**HOW IT IS DIAGNOSED**
Lumbar puncture with cerebrospinal fluid antigen testing and culture

**MAIN TREATMENT**
Antifungal medicines and control of pressure around the brain

**CAN IT BE CURED?**
Sometimes - treatment clears infection, but lasting damage remains possible

**IS IT AN EMERGENCY?**
Yes - immediate hospital assessment and treatment needed

**LONG-TERM OUTLOOK**
Recovery possible; delayed treatment raises disability and death risk

## Overview

Cryptococcal meningitis is an infection of the meninges, the thin layers of tissue surrounding the brain and spinal cord. It is caused by a yeast called Cryptococcus . Another name is cryptococcic meningitis.

The infection often develops gradually over days or weeks. It can raise pressure inside the skull and affect the brain, eyesight, hearing, or other nerves. Without effective treatment, it can be life-threatening.

Cryptococcal meningitis most often affects people whose immune systems are weakened, particularly those with advanced HIV. It may also occur after an organ transplant, during treatment that suppresses the immune system, or with certain blood cancers. Some people have no known immune problem.

This condition needs hospital treatment. Prompt antifungal treatment and careful control of pressure around the brain improve the chance of recovery.

## Symptoms

Symptoms may begin slowly and can be less obvious than those of bacterial meningitis. A stiff neck is possible, but it may be mild or absent.

Common symptoms include:

Raised pressure around the brain can cause a severe headache, repeated vomiting, vision changes, or increasing sleepiness. It may also affect nerves that control eye movement, hearing, or facial movement.

Seizures, loss of consciousness, or new weakness can occur in severe cases. Symptoms may be harder to recognise in someone whose immune system cannot produce a strong inflammatory response.

Having these symptoms does not mean that you have cryptococcal meningitis. Many other conditions can cause similar problems. However, a persistent headache or neurological symptoms need urgent assessment if your immune system is weakened.

- A persistent or worsening headache
- Fever
- Nausea or vomiting
- Unusual tiredness or weakness
- Sensitivity to light
- Confusion, slowed thinking, or changes in behaviour
- Blurred or double vision
- Neck pain or stiffness

## Causes and risk factors

Cryptococcal meningitis is usually caused by Cryptococcus neoformans or Cryptococcus gattii . These yeasts live in the environment, including soil, decaying plant material, and material contaminated by bird droppings.

People usually become infected by breathing in tiny airborne particles. The infection may begin

in the lungs and then travel through the blood to the brain. It is not generally spread from one person to another.

Many people are exposed without becoming ill. The immune system usually controls the yeast before it causes meningitis.

Factors that increase the risk include:

C. gattii can sometimes cause meningitis in people without a recognised immune problem. The infection may also form a cryptococcoma, which is a localised mass of yeast cells and inflammation in the brain or lungs.

- Advanced HIV infection, especially with a very low CD4 count
- An organ transplant
- Medicines that suppress immune activity
- Blood cancers or other conditions that weaken immunity
- Some chronic liver, kidney, or lung conditions
- Treatment with high-dose or prolonged corticosteroids like prednisone or hydrocortisone

## Diagnosis

A lumbar puncture is the main test. During this procedure, a clinician places a needle into the lower back and collects cerebrospinal fluid, or CSF. This is the clear fluid surrounding the brain and spinal cord.

The opening pressure is measured because raised CSF pressure is common and needs treatment. The fluid is tested for cryptococcal antigen, a substance released by the yeast. A fungal culture is also performed to grow and identify the organism, although results take longer.

Blood tests may look for cryptococcal antigen and signs that the infection has spread. Blood cultures, HIV testing, immune-system tests, and checks of kidney and liver function may also be needed.

A CT or MRI scan can show swelling, blocked fluid flow, a cryptococcoma, or another cause of symptoms. Imaging may be done before a lumbar puncture when there are signs that make the procedure less safe, such as certain neurological changes. A scan alone cannot rule out cryptococcal meningitis.

Eye and neurological examinations help identify effects on vision, hearing, movement, memory, and thinking.

## Treatment and management

Treatment usually begins in hospital. It has several phases and often continues for many months.

The first phase uses strong antifungal medicines to reduce the amount of yeast quickly. This commonly involves an amphotericin B formulation together with flucytosine. The exact regimen depends on factors such as immune status, pregnancy, kidney function, medicine availability, and whether the infection is responding.

A longer course of fluconazole usually follows. This helps clear the remaining infection and prevent relapse. Some people with ongoing immune suppression need maintenance treatment until their immune function has improved enough.

Antifungal medicines can affect the kidneys, liver, blood cells, and levels of minerals such as potassium and magnesium. Regular blood tests and replacement of fluids or minerals may be needed. These checks are part of standard treatment rather than a sign that the infection is getting worse.

Managing raised pressure inside the skull is essential. Repeated lumbar punctures may be used to drain CSF and reduce pressure. If pressure remains difficult to control, a temporary drain or surgically placed shunt may be considered.

For people with HIV, antiretroviral therapy treats the underlying immune weakness. Its timing is planned carefully because starting it too soon during cryptococcal meningitis can trigger harmful inflammation around the brain. If you already take HIV treatment, the specialist team will assess adherence, resistance, and any interactions with antifungal medicines.

For transplant recipients or others taking immune-suppressing medicines, treatment may need adjustment. Reducing immune suppression too quickly can also cause inflammation or threaten a transplanted organ, so changes are made cautiously.

## Complications

Cryptococcal meningitis can cause problems from the infection, raised pressure, inflammation, or treatment.

Possible complications include:

Immune reconstitution inflammatory syndrome, or IRIS, can occur when a recovering immune system produces a strong inflammatory response to remaining cryptococcal material. Symptoms can resemble a returning infection. Testing is needed because IRIS and relapse require different management.

- Loss of vision or hearing
- Memory, concentration, or balance problems
- Seizures
- Stroke caused by inflammation of small blood vessels
- Hydrocephalus, a buildup of CSF in the brain
- Cranial nerve damage affecting the eyes, face, or swallowing
- A return of infection after treatment
- Kidney, liver, blood-cell, or electrolyte problems from medicines

## Prevention

There is no vaccine against cryptococcal meningitis, and environmental exposure cannot be avoided completely. Everyday contact with birds or another person does not usually spread the infection.

For people with HIV, effective antiretroviral treatment helps restore immune function and greatly lowers the risk. In some settings, people with advanced HIV are offered a blood cryptococcal antigen test before symptoms develop. A positive result may lead to further testing and preventive antifungal treatment.

Take immune-suppressing medicines only as directed. Do not stop transplant medicines, corticosteroids, or other treatments without medical guidance.

Avoiding heavy exposure to dust from bird droppings, soil, or decaying wood may be sensible for someone with severe immune suppression, but this cannot guarantee prevention.

## Living with it and what to expect

Recovery usually takes time. Hospital care may be followed by months of oral antifungal treatment and regular appointments. Blood tests check for medicine side effects and help guide ongoing care.

Headache and pressure-related symptoms may improve as treatment begins, but thinking, balance, eyesight, hearing, and energy can recover more slowly. Some people return to their previous activities, while others have lasting neurological effects and need rehabilitation or practical support.

The risk of relapse is higher if treatment is interrupted, the yeast is not fully controlled, or

severe immune suppression continues. Taking antifungal and HIV medicines consistently is important. Tell your care team if side effects, cost, swallowing difficulties, or access problems make this hard.

Follow-up may include reviews with infectious-disease, HIV, transplant, neurology, eye, or rehabilitation services. Hearing tests, vision checks, physical therapy, or help with memory and daily activities may be appropriate.

A new or worsening symptom does not always mean that the infection has returned. Medicine effects, raised pressure, IRIS, and other infections can look similar, so further tests may be needed.

## When to get medical help

Cryptococcal meningitis is a medical emergency once it is suspected.

Seek emergency care now for:

Get urgent same-day medical assessment for a persistent headache, fever, new vision changes, or unusual behaviour if you have advanced HIV, an organ transplant, cancer treatment, or another cause of severe immune suppression.

During treatment, contact your care team urgently if symptoms return or worsen. Also report much less urine, severe weakness, yellowing of the skin or eyes, a new rash, or difficulty taking prescribed medicines.

Routine follow-up is used to monitor recovery, blood-test results, immune function, and medicine side effects. Keep these appointments even if you feel better, because treatment often needs to continue after symptoms improve.

- New confusion, severe drowsiness, or loss of consciousness
- A seizure
- A severe or rapidly worsening headache
- Repeated vomiting with headache
- Sudden vision loss, weakness, or difficulty speaking
- Trouble walking, breathing, or swallowing

## Common questions

Can cryptococcal meningitis be cured?

Antifungal treatment can clear the active infection. However, treatment is prolonged, relapse is possible, and some people have lasting effects from pressure or nerve damage. The chance of recovery is better when treatment starts promptly and the underlying immune problem can be controlled.

Is cryptococcal meningitis contagious?

It is not normally passed between people through coughing, touching, sex, or sharing household items. Infection usually follows exposure to Cryptococcus in the environment.

Can you get cryptococcal meningitis without HIV?

Yes. It can affect transplant recipients, people taking immune-suppressing medicines, and people with other immune problems. C. gattii may sometimes cause it in someone with no recognised immune condition.

Why are repeated lumbar punctures needed?

They can measure and reduce dangerously raised pressure around the brain. Antifungal medicines kill the yeast but do not always lower this pressure quickly enough. Repeated procedures may therefore be an important part of treatment.

Can cryptococcal meningitis come back?

Yes. Relapse can happen if treatment does not fully clear the infection, medicines are stopped early, the yeast becomes less responsive to treatment, or immune suppression continues. New symptoms need testing because relapse can resemble IRIS.

How long does recovery take?

Initial hospital treatment may last for weeks, followed by antifungal treatment for months. Energy, concentration, balance, vision, or hearing may improve gradually. Recovery time and lasting effects differ according to the severity of the infection and the person's immune health.

## Sources


- World Health Organization. Guidelines for diagnosing, preventing and managing cryptococcal disease among adults, adolescents and children living with HIV . 2022.
- US National Institutes of Health. Cryptococcosis: Adult and Adolescent Opportunistic Infections Guidelines .
- Centers for Disease Control and Prevention. Clinical Overview of Cryptococcosis .

- Chang CC, Harrison TS, Bicanic TA, et al. Global guideline for the diagnosis and management of cryptococcosis . The Lancet Infectious Diseases. 2024;24:e495-e512. 00731-4)
- Perfect JR, Dismukes WE, Dromer F, et al. Clinical practice guidelines for the management of cryptococcal disease: 2010 update by the Infectious Diseases Society of America . Clinical Infectious Diseases. 2010;50:291-322.