CONDITION

Nocardiosis

Nocardiosis is a bacterial infection that most often affects the lungs, skin, or brain.

WHAT IT IS
Infection caused by environmental Nocardia bacteria

BODY SYSTEM
Lungs, skin, brain, and other organs

MAIN SYMPTOMS
Cough, fever, breathlessness, skin sores

WHAT CAUSES IT
Bacterial infection from soil or water

HOW IT IS DIAGNOSED
Culture and testing of tissue or body fluids

MAIN TREATMENT
Prolonged antibiotics, sometimes with abscess drainage

CAN IT BE CURED?
Sometimes - prolonged antibiotics can clear infection

IS IT AN EMERGENCY?
Sometimes - severe breathlessness, confusion, or seizures

LONG-TERM OUTLOOK
Often good; worse with brain spread or weak immunity

Overview

Nocardiosis is an infection caused by bacteria from the Nocardia group. These bacteria live in soil, dust, decaying plant material, and water. Infection usually begins after a person breathes in contaminated dust or the bacteria enter through broken skin.

The lungs are the most common starting point. From there, the infection can sometimes spread through the bloodstream. The brain is an important possible site of spread, although the skin, bones, joints, kidneys, and other organs may also be affected.

Nocardiosis is uncommon. It mainly causes serious illness in people whose immune systems are weakened, but it can also occur in people without a known immune problem. A skin infection after an injury is particularly possible in otherwise healthy people.

The condition matters because its symptoms and scan findings can resemble pneumonia,

tuberculosis, a fungal infection, or cancer. It may develop slowly, and routine antibiotics like amoxicillin or doxycycline do not always treat it. Identifying the exact Nocardia species helps guide treatment.

Nocardiosis is not known to spread from person to person. Everyday contact with someone who has it does not usually put family members or caregivers at risk.

Symptoms

Symptoms depend on where the infection is located. They may begin gradually over several weeks, although some infections develop more quickly.

Lung nocardiosis may cause:

These symptoms are not specific to nocardiosis. Many more common lung conditions can cause the same problems.

A skin infection may appear after a cut, puncture, or other injury involving soil or contaminated material. It can cause redness, warmth, swelling, pain, ulcers, or pus-filled lumps. Some infections spread along the channels that carry lymph fluid, producing a line of lumps up an arm or leg. Long-lasting infection can form draining areas and damage deeper tissue.

If nocardiosis reaches the brain, it may form an abscess, which is a pocket of infection. Possible symptoms include a new or worsening headache, nausea, vomiting, confusion, weakness, balance problems, seizures, or changes in speech or vision.

Infection elsewhere may cause pain, swelling, fever, or reduced function in the affected area. Some people have symptoms from more than one part of the body.

- A persistent cough, sometimes producing mucus or blood
- Fever, night sweats, tiredness, or reduced appetite
- Shortness of breath or chest pain
- Unplanned weight loss

Causes and risk factors

Nocardiosis is caused by Nocardia bacteria entering the body. Breathing in contaminated dust can lead to a lung infection. Bacteria may also enter through damaged skin, including small cuts that are easy to overlook.

The infection is more likely to become severe or spread when the immune system cannot

control it effectively. Factors linked with greater risk include:

Nocardiosis can still occur without these factors. Having a risk factor also does not mean that an exposed person will develop the infection.

Different Nocardia species respond differently to antibiotics. This is one reason why laboratory identification and antibiotic susceptibility testing are important.

- Taking medicines that suppress the immune system, especially corticosteroids like prednisone or hydrocortisone
- Having an organ or stem cell transplant
- Cancer or cancer treatment
- Advanced HIV infection
- Certain inherited immune conditions, such as chronic granulomatous disease
- Long-term lung conditions, including chronic obstructive pulmonary disease or bronchiectasis

Diagnosis

Symptoms and imaging can suggest nocardiosis, but they cannot confirm it. Confirmation usually requires finding Nocardia in a sample from the affected area.

For lung symptoms, samples may include coughed-up mucus or fluid collected during bronchoscopy. Bronchoscopy uses a thin, flexible camera passed into the airways. A tissue biopsy may be needed if a lung abnormality cannot otherwise be identified.

For skin or deeper infections, a clinician may collect pus, fluid, or a small piece of tissue. Blood, spinal fluid, or material drained from an abscess may be tested when infection has spread.

In the laboratory, the sample is examined under a microscope and cultured, meaning it is placed under conditions that allow bacteria to grow. Nocardia can grow slowly, so results may take longer than results for many common bacteria. Molecular tests may help identify the species more quickly or accurately.

The laboratory can also test which antibiotics are likely to work. These results matter because resistance patterns differ among species.

Chest X-rays or CT scans can show the location and extent of lung disease, but their appearance is not unique to nocardiosis. Brain imaging with CT or MRI may be considered when there are neurological symptoms or concern that infection has spread. Imaging maps the infection; it does not replace culture or tissue testing.

Treatment and management

Nocardiosis is treated with antibiotics. Treatment is usually measured in months rather than days because the bacteria can be difficult to clear and the infection may return if treatment is too short.

Trimethoprim-sulfamethoxazole is commonly used, but it is not suitable or effective in every case. Other antibiotics may be chosen according to the Nocardia species, laboratory susceptibility results, the organs involved, and how severe the illness is.

Serious lung disease, brain infection, or infection in several organs may initially require more than one antibiotic. Treatment may begin through a vein in hospital and later change to tablets once the infection is controlled. A localized, less severe infection may be managed differently.

A brain, lung, or soft-tissue abscess sometimes needs drainage or surgery as well as antibiotics. Surgery may also be needed to obtain a sample when less invasive testing has not provided a diagnosis.

Antibiotics used for nocardiosis can affect blood cell counts, the kidneys, the liver, or other medicines. Follow-up commonly includes blood tests, symptom reviews, and repeat imaging. Tell the prescribing team about new rashes, severe diarrhoea, unusual bruising, persistent vomiting, or difficulty taking the medicine.

If immune-suppressing treatment contributed to the infection, the specialists involved may review it. Such medicines should not be stopped or reduced without medical guidance because abrupt changes can be harmful.

Complications

Nocardiosis can spread from the lungs through the bloodstream. An abscess in the brain is one of the most serious complications and may occur even when neurological symptoms are mild at first.

Lung infection can produce cavities, areas of damaged tissue, fluid around the lung, or long-term breathing problems. Skin infection can spread into deeper tissue or, less commonly, bone.

Other possible complications include bloodstream infection, infection in several organs, and a return of the infection after treatment. Risk is greater when immunity remains weakened or treatment cannot be completed.

Treatment itself may cause side effects, including changes in blood counts or kidney and liver function. Regular monitoring helps identify these problems before they become severe.

Prevention

Nocardiosis cannot always be prevented because Nocardia bacteria are widespread in the environment. There is no vaccine, and avoiding all contact with soil or dust is not realistic.

If your immune system is significantly weakened, practical steps may reduce exposure. Wear gloves, closed footwear, and protective clothing when handling soil or doing yard work. Consider avoiding very dusty gardening or construction activities, or use an appropriate protective mask. Wash cuts promptly and keep them covered while they heal.

These measures cannot guarantee prevention. Antibiotics should not be started solely to prevent nocardiosis unless they have been prescribed for a specific medical reason.

Because nocardiosis does not normally pass between people, isolation from family, friends, school, or work is not usually required.

Living with it and what to expect

Recovery often takes time. Fever and severe symptoms may improve before tiredness, cough, or exercise tolerance returns to normal. Changes on lung or brain scans can also take longer to improve than symptoms.

You may need appointments over several months for blood tests and repeat imaging. These checks show whether treatment is working and look for medicine-related problems. Taking antibiotics for the full planned course is important, even if you feel better.

Some people recover without lasting effects. Others are left with lung scarring, reduced breathing capacity, or neurological problems after a brain abscess. The outcome is influenced by how far the infection spread, how quickly effective treatment began, and whether the immune system remains weakened.

A return to work, exercise, or other activities may need to be gradual. Persistent fatigue does not necessarily mean the antibiotic has failed, but new or worsening symptoms should be reviewed.

Nocardiosis can return after treatment. Follow-up is especially important after infection involving the brain or several organs, and for people continuing immune-suppressing treatment. Most people do not need to avoid close contact with others while recovering.

When to get medical help

Call emergency services for:

These symptoms may have causes other than nocardiosis, but they need immediate assessment.

Seek urgent medical advice if you have a weakened immune system and develop a persistent fever, worsening cough, shortness of breath, or a new painful skin swelling. A severe or worsening headache, repeated vomiting, balance problems, or changes in vision also need prompt assessment.

If you are already receiving treatment, contact your medical team promptly if symptoms are getting worse, you cannot keep the antibiotics down, or you develop a widespread rash, unusual bruising, severe diarrhoea, or reduced urination.

Routine follow-up is used to review gradual recovery, blood-test results, medication side effects, and repeat scans. Bring up ongoing fatigue, cough, pain, or difficulty returning to normal activities at these appointments.

- Severe difficulty breathing, blue or grey lips, or collapse
- A seizure
- Sudden confusion or difficulty staying awake
- New one-sided weakness, facial drooping, or trouble speaking

Common questions

Is nocardiosis contagious?

It is not normally passed from one person to another. Infection usually comes from breathing in bacteria from the environment or getting them into broken skin.

Can nocardiosis be cured?

Many localized infections can be cleared with the right antibiotics. Cure is less certain when infection has spread widely, reached the brain, or occurs alongside severe immune suppression. Relapse is possible, so treatment and follow-up may be lengthy.

How long does treatment take?

Treatment usually lasts for months. The length is influenced by the infected organs, the species and antibiotic results, the response to treatment, and the strength of the immune system.

Can a healthy person get nocardiosis?

Yes. Skin infection after an injury can occur in someone without an immune disorder. Serious

lung or widespread infection is more strongly associated with weakened immunity or long-term lung disease.

Is nocardiosis a type of cancer?

No. It is a bacterial infection. Lung nodules, cavities, or brain lesions caused by nocardiosis can resemble cancer on a scan, which is why testing a sample is often necessary.

Can nocardiosis come back?

Yes. Recurrence is more likely if treatment is stopped too early, the bacteria are resistant, or the immune system remains weakened. New symptoms after treatment should be assessed rather than assumed to be a relapse.

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