CONDITION

Naphthalene poisoning

Naphthalene poisoning is toxic illness caused by swallowing, breathing, or absorbing naphthalene, often from mothballs.

WHAT IT IS
Toxic illness from swallowing, breathing, or touching naphthalene

BODY SYSTEM
Blood, brain, kidneys, liver, and lungs

MAIN SYMPTOMS
Nausea, headache, dark urine, yellow or blue-grey skin

WHAT CAUSES IT
Exposure to naphthalene, often from mothballs

HOW IT IS DIAGNOSED
Exposure history, blood tests, and co-oximetry

MAIN TREATMENT
Exposure removal, oxygen, monitoring, and supportive hospital care

CAN IT BE CURED?
Yes - most recover after exposure ends

IS IT AN EMERGENCY?
Sometimes - ingestion, breathlessness, or blue-grey skin

LONG-TERM OUTLOOK
Usually full recovery; severe organ injury can persist

Overview

Naphthalene poisoning happens when enough naphthalene enters the body to cause harm. Naphthalene is a white, strong-smelling chemical used in some mothballs and other moth-control products. It may also be present in industrial materials, smoke, and fuel-related fumes.

Exposure can happen by swallowing a product, breathing concentrated vapour, or through prolonged skin contact. Swallowing a mothball is especially concerning. Vapour can build up when mothballs are used in open rooms, cupboards, bedding, or other places not allowed by the product label.

Naphthalene mainly harms red blood cells. It can make them break apart faster than the body can replace them. This is called haemolysis , and it can lead to haemolytic anaemia, meaning

there are too few healthy red blood cells to carry oxygen.

It can also change haemoglobin, the oxygen-carrying part of red blood cells, into a form that does not work properly. This is called methaemoglobinaemia . Severe poisoning may affect the brain, kidneys, liver, and other organs.

Symptoms do not always begin straight away. Blood-cell damage may appear or become worse over the next several hours or days. Suspected ingestion should therefore be assessed promptly, even if the person initially seems well.

Symptoms

Early symptoms may include nausea, vomiting, stomach pain, headache, dizziness, tiredness, or confusion. Irritation of the eyes, nose, throat, or skin can occur after direct contact or concentrated vapour exposure.

As red blood cells break down, symptoms may include:

Methaemoglobinaemia can cause the lips, tongue, nail beds, or skin to look blue-grey. It may also cause headache, breathlessness, light-headedness, confusion, or chest discomfort. A standard fingertip oxygen monitor may give a low or unusual reading, but it cannot confirm the diagnosis.

Severe poisoning can cause marked drowsiness, seizures, collapse, very low oxygen levels, or coma. Kidney problems may reduce urine production.

Children may show less specific signs, such as poor feeding, unusual sleepiness, vomiting, irritability, or dark urine. A young child who may have swallowed a mothball needs urgent poison-centre or medical advice, even without symptoms.

- Unusual tiredness, weakness, or pale skin
- Shortness of breath or a fast heartbeat
- Dark brown, red, or tea-coloured urine
- Yellow skin or eyes, known as jaundice
- Back or abdominal pain

Causes and risk factors

The most common cause is exposure to a naphthalene-containing moth-control product. Not every mothball contains naphthalene; some contain other chemicals. The packaging or

product label can help identify the ingredient.

Poisoning can result from:

Babies and young children are at greater risk from a small amount because of their body size. Mothballs may also look like sweets or toys.

People with glucose-6-phosphate dehydrogenase deficiency , usually called G6PD deficiency, are especially vulnerable to red blood cell damage. G6PD deficiency is an inherited condition that reduces a red blood cell's protection against certain chemical stresses. A person may not know they have it until an exposure, illness, food, or medicine triggers haemolysis.

Risk also rises when exposure is concentrated or continues over time. The smell alone does not show whether an exposure is safe or dangerous.

- Accidentally or intentionally swallowing mothballs
- Using mothballs outside sealed storage containers
- Sleeping in bedding or wearing clothing stored with mothballs before airing it
- Repeatedly breathing concentrated vapour
- Prolonged contact with contaminated clothing or skin
- Workplace exposure without suitable controls

Diagnosis

Diagnosis begins with what happened: the product involved, how the exposure occurred, when it happened, and whether symptoms have developed. Bringing the container or a clear photograph of its label can help identify the chemical. Do not bring a leaking or contaminated item into a healthcare setting unless instructed.

Blood tests can check for anaemia and red blood cell breakdown. These may include a full blood count, bilirubin, lactate dehydrogenase, and haptoglobin. A blood film may show damaged red blood cells, although these changes are not unique to naphthalene.

A co-oximetry blood test measures abnormal forms of haemoglobin and can confirm methaemoglobinaemia. This is different from a standard pulse oximeter placed on a finger.

Urine and blood tests can also assess kidney and liver function. An electrocardiogram may be used to check the heart if there is breathlessness, chest discomfort, or significant oxygen problems.

Specialised laboratories can test for naphthalene breakdown products, but these tests are not usually needed to guide immediate care. Treatment should not be delayed while waiting for

them.

Testing for G6PD deficiency may be considered. A result taken during or soon after severe haemolysis can sometimes be misleading, so repeat testing may be needed later.

Treatment and management

The first step is to stop the exposure. After inhalation, move into fresh air without putting anyone else at risk. Remove contaminated clothing and wash exposed skin with soap and water. Eyes exposed to the chemical should be rinsed with clean lukewarm water.

Do not make someone vomit after swallowing a mothball. Do not give food, milk, oil, medicine, or activated charcoal unless a poison specialist or healthcare professional recommends it.

Medical treatment depends on the amount and route of exposure, symptoms, blood-test results, and whether G6PD deficiency is present. Care may include observation, oxygen, intravenous fluids, and repeated blood and urine tests. Some people need hospital monitoring because haemolysis can be delayed.

A blood transfusion may be needed for severe anaemia. Kidney injury may require specialist treatment and, rarely, temporary dialysis.

Methylene blue is a hospital medicine that can treat significant methaemoglobinaemia in selected patients. It may work poorly or worsen haemolysis in people with G6PD deficiency, so clinicians must weigh this risk carefully. Other supportive treatments may be considered when methylene blue is unsuitable.

There is no single antidote that reverses every effect of naphthalene. Treatment focuses on restoring oxygen delivery, managing blood-cell damage, and supporting affected organs while the body clears the chemical.

Complications

The main complication is haemolytic anaemia. If severe, it reduces oxygen delivery to the body and can strain the heart and other organs.

Broken red blood cells release haemoglobin into the bloodstream and urine. This can contribute to acute kidney injury, particularly when haemolysis is extensive or the person is dehydrated.

Other possible complications include:

Eye lens changes, including cataracts, have been associated with substantial or prolonged

exposure, although the human evidence is less clear than the evidence for blood toxicity.

Complications are more likely after a large ingestion, repeated exposure, delayed treatment, or exposure in someone with G6PD deficiency. They are not expected after every contact with a naphthalene product.

- Significant methaemoglobinaemia and low tissue oxygen
- Liver inflammation or jaundice
- Heart rhythm problems
- Seizures or reduced consciousness
- Persistent kidney impairment after severe injury

Prevention

Naphthalene poisoning is preventable by avoiding unsafe exposure. If you use a registered moth-control product, follow its label exactly. Naphthalene mothballs are generally intended to work inside tightly sealed containers where their vapour is contained, not loose in living spaces.

Store mothballs in their original, labelled packaging, locked away from children and pets. Do not move them into food jars, cups, bags, or unmarked containers.

Do not place mothballs in beds, under furniture, in heating or ventilation systems, or around a room as an air freshener or general pest repellent. Never use them on a person or as a home treatment for illness.

Before wearing clothing or using bedding stored with mothballs, remove the product and air or wash the items according to the label. If the smell remains strong, continue airing them away from occupied areas.

At work, use the ventilation, protective equipment, and handling procedures required for the product. Report spills or repeated symptoms through the workplace safety process.

Living with it and what to expect

Naphthalene poisoning is usually a short-term toxic exposure rather than an ongoing condition. Many people recover after the exposure stops and the effects on their blood resolve. Recovery may take days to weeks, depending on the severity of haemolysis and whether an organ was injured.

Blood tests may need to be repeated after discharge because anaemia or red blood cell

breakdown can continue for a time. Routine follow-up may include checking the blood count, kidney function, urine, and jaundice until they return toward normal.

Tiredness and reduced exercise tolerance can continue while the body replaces damaged red blood cells. Activity may need to be increased gradually according to the advice given after assessment.

Severe kidney, brain, or heart complications can lengthen recovery and may leave lasting problems, although this is not the usual course. Follow-up is more involved when organ injury has occurred.

If testing identifies G6PD deficiency, that inherited trait remains for life. It does not mean naphthalene is still in the body. It means future exposure to naphthalene and other recognised triggers could cause another episode of haemolysis.

When to get medical help

Contact a poison centre promptly after any suspected swallowing of a naphthalene mothball or other naphthalene product. Do not wait for symptoms. In the United States, Poison Help is available at 1-800-222-1222 . Elsewhere, use your local poison-information service or emergency medical service.

Seek urgent medical assessment after exposure if there is vomiting, worsening headache, unusual tiredness, pale or yellow skin, dark urine, shortness of breath, or reduced urine output.

Call emergency services now for:

After treatment, keep routine follow-up appointments and complete recommended blood or urine tests. However, new blue-grey colouring, breathing difficulty, fainting, rapidly worsening weakness, or very little urine should not wait for a routine appointment.

- Blue-grey lips, tongue, or skin
- Severe trouble breathing
- A seizure, collapse, or loss of consciousness
- Marked confusion or difficulty waking
- Severe chest discomfort

Common questions

What should I do if my child swallowed a mothball?

Remove any remaining material from the mouth without making the child vomit. Contact a poison centre or emergency medical service immediately and keep the product packaging. A child can initially look well even though blood-cell damage develops later.

Can smelling mothballs make you sick?

Yes. Concentrated or repeated exposure to naphthalene vapour can cause symptoms and may damage red blood cells. A brief smell does not automatically mean poisoning, but headache, nausea, breathlessness, dark urine, or blue-grey skin after exposure needs prompt advice.

How long does naphthalene stay in the body?

The body breaks naphthalene down and removes it, but the harm to red blood cells can continue after the exposure has ended. Symptoms and abnormal blood tests may therefore last longer than the chemical itself. The recovery time reflects the exposure and any complications.

Are all mothballs made from naphthalene?

No. Some contain naphthalene, while others contain chemicals such as paradichlorobenzene. Both can be harmful if misused. Check the ingredient label, and tell the poison centre or healthcare team exactly what the package says.

Can naphthalene poisoning be treated at home?

Suspected ingestion should not be managed only at home. Poison specialists can decide whether observation, testing, or emergency care is needed. Skin or eye contact should be rinsed promptly, but symptoms or significant exposure still require professional advice.

Will I recover completely?

Many people recover fully with prompt removal from exposure and supportive care. Recovery may take longer after severe anaemia, methaemoglobinaemia, or kidney injury. Follow-up blood tests help show whether red blood cells and organs are recovering.

Sources

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