CONDITION

Refrigerant poisoning

Refrigerant poisoning is harmful exposure to cooling chemicals through breathing, swallowing, or direct contact.

WHAT IT IS
Harmful exposure to chemicals used in cooling systems

BODY SYSTEM
Lungs, heart and circulation, brain, skin, and eyes

MAIN SYMPTOMS
Dizziness, headache, cough, shortness of breath

WHAT CAUSES IT
Breathing, swallowing, or touching refrigerant chemicals

HOW IT IS DIAGNOSED
Exposure history, examination, heart tracing, and targeted tests

MAIN TREATMENT
Fresh air, decontamination, oxygen, and supportive hospital care

CAN IT BE CURED?
Sometimes - severe organ damage may persist

IS IT AN EMERGENCY?
Sometimes - breathing trouble, collapse, confusion, or abnormal heartbeat

LONG-TERM OUTLOOK
Most recover; severe exposures can cause lasting injury

Overview

Refrigerants are chemicals that move heat out of refrigerators, freezers, air conditioners, heat pumps, and industrial cooling systems. "Freon" is a brand name often used informally for several refrigerants, but these products do not all contain the same chemical.

Refrigerant poisoning happens when exposure harms the body. It most often follows breathing a concentrated gas or vapor. Liquid refrigerant can also injure the skin or eyes because it becomes extremely cold as it evaporates. Swallowing a liquid product is less common but can damage tissue or enter the lungs during vomiting.

Different refrigerants cause different problems. Many household systems contain fluorinated hydrocarbons, which can affect the brain, lungs, and heart at high concentrations. Industrial systems may use ammonia, a strongly irritating chemical that can burn the eyes, skin, and

airways. Carbon dioxide and some other refrigerants can push oxygen out of an enclosed space.

Small leaks in a well-ventilated area do not always cause poisoning. Risk rises with a large leak, poor ventilation, prolonged exposure, direct contact with liquid, or intentional inhalation. Because serious heart or breathing problems can begin quickly, significant exposure needs prompt advice.

Symptoms

Symptoms depend on the chemical, its concentration, how long you were exposed, and how it entered your body.

Breathing refrigerant vapor may cause:

Very high vapor levels can reduce the oxygen available to the brain and other organs. Some fluorinated refrigerants can also make the heart unusually sensitive to adrenaline, increasing the risk of a dangerous abnormal heart rhythm.

Liquid refrigerant on the body can cause a cold injury similar to frostbite. The skin may become painful, numb, pale, hard, blistered, or swollen. Eye contact may cause pain, watering, redness, blurred vision, or damage to the eye's surface.

Ammonia refrigerant has a sharp smell and is strongly irritating. Exposure may cause burning pain, heavy tearing, hoarseness, wheezing, or severe breathing difficulty. Smell is not a safe way to judge exposure because some refrigerants have little odor, and a person may become less able to notice an odor over time.

Symptoms do not always show how serious the exposure was. Lung irritation can worsen over several hours, and an abnormal heart rhythm may occur without much warning.

- Headache, dizziness, or feeling light-headed
- Nausea, drowsiness, confusion, or poor coordination
- Cough, throat irritation, chest tightness, or shortness of breath
- A racing, pounding, or irregular heartbeat
- Fainting, seizures, or loss of consciousness after severe exposure

Causes and risk factors

Poisoning can happen when a cooling system, hose, cylinder, or storage tank leaks or ruptures.

It may also occur while equipment is being installed, serviced, drained, or dismantled.

Risk is higher when exposure happens:

Intentional inhalation is especially dangerous. A single episode can cause loss of consciousness, suffocation, injury from a fall, or a fatal heart rhythm. Repeated use can also affect memory, mood, coordination, and organs such as the liver or kidneys.

Children may be exposed through damaged appliances or unsecured containers. People who repair cooling systems or work in refrigeration, food storage, manufacturing, or transport may face greater occupational exposure.

- In a small or enclosed space, such as a vehicle, basement, cold-storage room, or equipment compartment
- During an industrial spill or failure of a pressurized system
- When liquid refrigerant sprays onto the skin or eyes
- When someone works without the ventilation or protective equipment listed for that chemical
- When a cylinder is heated, punctured, damaged, or connected incorrectly
- Through intentional inhalation, sometimes called "huffing"

Diagnosis

There is no single routine test that confirms every type of refrigerant poisoning. Diagnosis is usually based on what happened, the product involved, symptoms, and examination findings.

If it can be obtained safely, the product label or safety data sheet can help identify the chemical. Do not return to an unsafe area to collect it. A photo, appliance model, cylinder label, or information from an employer may be useful.

In an emergency department, testing may include an electrocardiogram, or ECG, which records the heart's electrical activity. Continuous heart monitoring may be needed because rhythm changes can occur after fluorinated refrigerant exposure.

Other tests may include blood oxygen measurement, blood tests, a chest X-ray, or tests of liver and kidney function. Blood gas testing can show how well the lungs are moving oxygen and carbon dioxide. Eye or skin injuries may need specialist examination.

Standard drug screens do not usually detect refrigerants. A normal early chest X-ray also does not always rule out developing lung irritation, so observation may be recommended after a significant exposure.

Treatment and management

The first step is to stop the exposure without putting anyone else at risk. Leave the contaminated area and move into fresh air if you can do so safely. Do not enter an enclosed or contaminated space to rescue someone unless you have the correct training and protective equipment.

Call emergency services for severe symptoms. A poison centre can advise you about less obvious exposures and whether medical observation is needed.

For liquid on the skin, remove contaminated clothing if it is not frozen to the skin. Rinse the area with lukewarm water. Do not rub the skin, apply direct heat, or pull away material that is stuck.

For eye exposure, begin rinsing with clean, lukewarm water and remove contact lenses if they come out easily. Continue rinsing while arranging urgent advice.

If refrigerant was swallowed, do not make yourself vomit. Vomiting can allow the chemical to enter the lungs. Rinse the mouth and contact a poison centre promptly.

Hospital treatment is supportive, meaning it protects breathing, circulation, and other body functions while the chemical leaves the body. It may include oxygen, breathing support, heart monitoring, intravenous fluids, and treatment for seizures or abnormal heart rhythms. There is no general antidote for fluorinated refrigerants.

Cold burns are rewarmed and treated according to their depth. Significant eye injuries may need assessment by an eye specialist. Ammonia exposure may require intensive airway and lung care because it can cause chemical burns and swelling.

Complications

Many people recover fully after a limited exposure. Complications are more likely after concentrated exposure, delayed rescue, loss of consciousness, or contact with corrosive refrigerants.

Possible complications include:

Swallowed refrigerant can enter the lungs, especially during vomiting. This may cause chemical pneumonitis, which is inflammation and injury of lung tissue.

Repeated intentional inhalation may lead to dependence and ongoing problems with concentration, coordination, mood, or organ function. Sudden death can also occur during a single episode, even in someone without known heart disease.

- Abnormal heart rhythms or cardiac arrest
- Lung inflammation, fluid in the lungs, or respiratory failure
- Brain injury caused by too little oxygen
- Frostbite, scarring, nerve damage, or tissue loss
- Eye surface damage or lasting changes in vision
- Liver or kidney injury after severe or repeated exposure
- Injury caused by falling or crashing while dizzy or unconscious

Prevention

Many accidental exposures can be prevented. Refrigeration systems should be installed and repaired by trained people using the procedures required for that product and workplace.

Do not puncture, heat, burn, or deliberately release a refrigerant cylinder. Never mix chemicals or transfer refrigerant into an unlabelled container. Store cylinders securely and away from children, heat, and physical damage.

If your work involves refrigerants, follow the safety data sheet and workplace controls for the specific chemical. These may include ventilation, leak monitoring, eye protection, cold-resistant gloves, or respiratory protection. Protective equipment is not interchangeable between chemicals or exposure levels.

Arrange professional service if an appliance or cooling system is leaking, damaged, or no longer cooling correctly. Ventilate the area if it is safe to do so, avoid flames or sparks, and follow emergency instructions for the product. Do not search for a major leak in an enclosed space.

Intentional inhalation cannot be made safe. Keeping cylinders and products secured can reduce access, but someone using inhalants may also need confidential substance-use and mental health support.

Living with it and what to expect

The course after refrigerant poisoning depends mainly on the chemical, concentration, exposure time, and whether the heart, lungs, brain, eyes, or skin were injured.

Mild headache, nausea, or throat irritation may improve within hours after fresh air and removal from exposure. Even so, symptoms that continue or return need medical advice. Cough and

breathing problems can sometimes worsen later as lung inflammation develops.

After a more significant exposure, observation may continue until breathing, heart rhythm, and alertness remain stable. Recovery can take days or weeks when there has been lung injury, a cold burn, or a period of low oxygen.

Frostbite may change in appearance over several days. Deeper damage is not always clear at first, and healing can take weeks or longer. Eye injuries may also require repeat checks.

Routine follow-up is important if you had an abnormal ECG, persistent cough, reduced exercise tolerance, confusion, skin injury, vision symptoms, or abnormal blood tests. Follow-up may include reassessment of the lungs, heart, skin, eyes, liver, or kidneys.

Most people with a mild, promptly treated exposure return to their usual activities. Severe poisoning can leave lasting breathing, neurological, skin, or vision problems. After intentional inhalation, support for substance use can lower the chance of another exposure and address cravings or underlying stress.

When to get medical help

Call emergency services immediately if refrigerant exposure is followed by:

Do not enter an unsafe area to reach someone. Tell emergency responders that refrigerant may be present so they can use suitable protective equipment.

Contact a poison centre promptly after swallowing refrigerant, direct eye exposure, a concentrated inhalation, or any exposure when the chemical is unknown. In the United States, Poison Control is available at 1-800-222-1222. Elsewhere, use your local poison information service.

Arrange routine medical follow-up if mild symptoms have resolved but a cough, headache, poor concentration, numb skin, vision change, or reduced exercise tolerance continues. Workplace exposures should also be reported through the appropriate occupational health or safety process.

- Trouble breathing, severe wheezing, or blue or grey lips
- Chest pain, a pounding or irregular heartbeat, or collapse
- Fainting, a seizure, severe confusion, or unusual drowsiness
- Inability to wake the person normally
- Severe eye pain, loss of vision, or extensive cold burns
- Symptoms after a major leak in an enclosed space

Common questions

Can a leaking refrigerator or air conditioner poison me?

It is possible, especially with a large leak in a small, poorly ventilated room. Many minor leaks do not produce severe poisoning, but odor alone cannot show whether an area is safe. Leave the area if you develop headache, dizziness, coughing, or breathing difficulty, and arrange professional repair.

Is Freon the same as refrigerant?

Not exactly. Freon is a brand name used for certain fluorinated chemicals. People often use the word for any refrigerant, but systems may contain different chemicals with different hazards. The label or safety data sheet gives the most useful identification.

How long do refrigerant poisoning symptoms last?

Mild symptoms may settle within several hours after exposure ends. Lung irritation, cold burns, or effects from low oxygen may last much longer. Symptoms that worsen, return, or continue should be medically assessed.

Can refrigerant poisoning cause permanent damage?

Yes, although this is more likely after severe exposure. Lasting problems can follow brain oxygen deprivation, deep frostbite, serious eye injury, lung damage, or cardiac arrest. Many people with limited exposures recover without permanent effects.

Can I test myself for refrigerant exposure at home?

No reliable home test confirms poisoning. Diagnosis is based mainly on the exposure details, symptoms, examination, and tests such as an ECG or oxygen measurement. Home refrigerant leak detectors may help identify some leaks, but they do not assess injury to your body.

What should I do if refrigerant gets on my skin?

Move away from the source, remove loose contaminated clothing, and rinse with lukewarm water. Do not rub the area or use direct heat. Blistering, numbness, hard or pale skin, severe pain, or a large affected area needs urgent medical assessment.

Sources

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