CONDITION

Chemical burn or reaction

Learn how chemical burns and skin reactions happen, what symptoms to watch for, how to rinse an exposure safely, and when to seek emergency care.

WHAT IT IS
Tissue damage or skin inflammation from chemical contact

BODY SYSTEM
Skin, eyes, digestive and breathing systems

MAIN SYMPTOMS
Burning pain, redness or swelling, blisters or peeling, itching

WHAT CAUSES IT
Chemical contact or immune reaction

HOW IT IS DIAGNOSED
Clinical examination, fluorescein eye testing, patch testing

MAIN TREATMENT
Immediate decontamination, irrigation and wound care

CAN IT BE CURED?
Sometimes - healing varies with injury depth

IS IT AN EMERGENCY?
Sometimes - eye exposure or breathing or swallowing difficulty

LONG-TERM OUTLOOK
Ranges from full healing to permanent scarring, disability, or vision loss

Overview

A chemical burn is tissue damage caused by contact with a corrosive or irritating substance. Chemicals can injure the skin, eyes, mouth, digestive tract, or airways. Some exposures cause damage within seconds, while others continue harming tissue until the chemical is removed.

Not every chemical reaction is a true burn. Irritant contact dermatitis is inflammation caused by direct damage to the skin barrier. It may develop after one strong exposure or repeated contact with milder products. Allergic contact dermatitis is an immune reaction to a substance, such as a fragrance, preservative, metal, or hair dye. It often causes an itchy rash rather than deep tissue injury.

Early decontamination-removing the chemical and rinsing the exposed area-is often the most important first step. However, some chemicals require special handling. Contact emergency

services or a poison center for instructions when the substance is unknown, highly corrosive, or known to react with water.

Chemical injuries matter because the damage may be deeper than it first appears. Eye, airway, and swallowing exposures need especially prompt assessment. Certain chemicals can also affect the heart, nerves, or mineral levels in the blood.

Symptoms

Symptoms depend on the chemical, its strength, the amount involved, how long it remained in contact, and the body area exposed.

A chemical burn of the skin may cause:

Pain does not always show how serious an injury is. A deep burn may become less painful if nerve endings are damaged. Some chemicals also produce delayed symptoms, so the area may worsen over several hours.

Irritant contact dermatitis usually causes dry, rough, cracked, burning, or tender skin. It commonly affects the hands after repeated exposure to water, soap, detergent, solvents, or cleaning products.

Allergic contact dermatitis more often causes itching, redness, swelling, small bumps, or weeping blisters. The rash may appear hours to days after contact and can spread beyond the exact area touched.

An eye exposure can cause intense pain, tearing, redness, eyelid swelling, light sensitivity, blurred vision, or difficulty keeping the eye open. Even when symptoms seem mild, chemical eye injuries require immediate rinsing and urgent medical guidance.

Inhaled chemicals may cause coughing, wheezing, chest tightness, hoarseness, headache, dizziness, or shortness of breath. Swallowed chemicals may cause burns around the lips, drooling, vomiting, chest or abdominal pain, or trouble swallowing.

- Burning, stinging, or severe pain
- Redness or swelling
- Blisters or peeling
- Wet, raw, white, gray, brown, or black skin
- Numbness, which can occur when deeper nerves are damaged
- A sharply outlined injury matching a spill, splash, glove, or soaked item of clothing

Causes and risk factors

Chemical injuries can happen at home, at work, during hobbies, or after an accident involving industrial products. Common sources include drain or oven cleaners, bleach, pool chemicals, cement, fertilizers, battery contents, solvents, disinfectants, and laboratory chemicals.

Acids and alkalis can both burn tissue. Alkalis, which are found in products such as some drain cleaners and wet cement, may penetrate deeply. The appearance of the skin alone cannot reliably identify the chemical or the depth of damage.

Risk is higher when a concentrated chemical remains on the body, becomes trapped under clothing or jewelry, or contaminates a large area. Powders can remain in skin folds or clothing. Liquid chemicals can soak through shoes or gloves and prolong exposure.

Work that involves cleaning agents, construction materials, manufacturing chemicals, agriculture, laboratory products, or hair and nail products can increase exposure. Risk may also rise when products are transferred out of their original containers, labels are missing, or incompatible cleaners are mixed.

Skin that is already cracked or inflamed is more easily irritated. Frequent handwashing, sweating inside gloves, and repeated "wet work" can weaken the skin barrier and contribute to irritant dermatitis.

Allergic reactions require prior sensitization, meaning the immune system has learned to react to a substance. Once sensitized, a small exposure may trigger another rash. Common triggers include nickel, fragrances, preservatives, rubber ingredients, adhesives, and some plants or personal-care products.

Hydrofluoric acid deserves special attention. It can cause deceptively small or delayed skin findings while affecting calcium and magnesium in the body, potentially disturbing heart rhythm. Suspected exposure requires immediate poison-center or emergency guidance.

Diagnosis

Diagnosis begins with identifying the substance and understanding the exposure. A clinician may ask for the product name, concentration, amount, route of contact, exposure time, and first aid already performed. If it is safe, bring the original container, label, safety data sheet, or a clear photograph of the label. Do not bring a leaking or contaminated container into a healthcare setting.

The clinician examines the affected area for color, sensation, circulation, blistering, and depth. Chemical burns can evolve, so the full depth may not be clear during the first assessment.

Eye evaluation may include checking vision and eye pressure, measuring surface acidity or alkalinity, and using fluorescein dye to reveal corneal damage. A slit-lamp examination provides a magnified view of the eye. An ophthalmologist, a doctor who specializes in eye care, may need to assess the injury.

After inhalation or ingestion, evaluation may include monitoring oxygen levels, examining the mouth and airway, and obtaining chest imaging or a camera examination of the airway or digestive tract. Blood tests and an electrocardiogram may be used when a chemical can cause whole-body toxicity.

Contact dermatitis is usually diagnosed from the rash pattern and exposure history. If allergic contact dermatitis is suspected, a dermatologist may arrange patch testing after the active rash settles. Patch testing places small amounts of possible allergens on the back for several days. It is different from a skin-prick test used for immediate allergies.

Treatment and management

If exposure has just occurred, protect yourself before helping someone else. Avoid touching the chemical with bare hands and move away from fumes only when it is safe to do so.

Remove contaminated clothing, shoes, watches, and jewelry. Brush dry powder from the skin before rinsing, taking care not to spread it. Do not scrub the skin.

For most liquid chemical exposures, begin flushing the area immediately with plenty of room-temperature or lukewarm running water. Continue rinsing while obtaining advice from emergency services or a poison center. Do not delay rinsing to search for a specific neutralizing product. Trying to neutralize an acid with an alkali, or the reverse, can create heat and worsen injury.

A known water-reactive chemical may require different handling. Follow the product safety instructions and contact a poison center or emergency service immediately. In the United States, Poison Control can be reached at 1-800-222-1222.

For an eye exposure, start gentle irrigation at once. Hold the eyelids open and direct clean water across the eye without force. Remove contact lenses if they come out easily, but do not interrupt rinsing to struggle with them. Urgent medical assessment should follow.

If fumes were inhaled, move to fresh air if this can be done without entering a hazardous area. Do not enter a contaminated space without proper protective equipment. If a chemical was swallowed, do not induce vomiting or give a neutralizing substance. Rinse the mouth if the person is awake and follow poison-center or emergency instructions.

Emergency care is appropriate for eye exposure; breathing or swallowing difficulty; fainting,

confusion, or seizures; severe or increasing pain; a deep or large burn; or injury involving the face, hands, feet, genitals, or a major joint. Call emergency services if symptoms are severe or the person cannot be moved safely.

Medical treatment may include continued irrigation, pain relief, cleaning away dead tissue, and a dressing that protects the wound while maintaining moisture. Clinicians may review tetanus vaccination status. Antibiotics like amoxicillin or doxycycline are not automatically needed for every burn, but they may be used if infection develops.

Deep injuries sometimes require surgery, including removal of damaged tissue or a skin graft. Eye injuries may need specialized drops, close pressure checks, and ophthalmology follow-up. Hydrofluoric acid exposure may require calcium-based treatment and heart monitoring under professional supervision.

For contact dermatitis, avoiding the trigger is central. Fragrance-free moisturizers can help repair the skin barrier. A clinician may recommend a topical corticosteroid or another anti-inflammatory medicine based on the rash location and severity. Protective gloves may help with workplace or household exposure, but the glove material must be suitable for the specific chemical.

Complications

Chemical burns can deepen after the exposure has ended, particularly when the chemical was not fully removed. Possible complications include infection, delayed wound healing, permanent changes in skin color, raised scars, and loss of sensation.

Scarring across a joint can tighten as it heals. This is called a contracture and may limit movement. Physical or occupational therapy, splinting, compression garments, or reconstructive treatment may be needed for significant injuries.

Eye burns can damage the cornea, the clear front surface of the eye. Complications may include chronic dryness, infection, glaucoma, scarring, or vision loss. Prompt irrigation and specialist care reduce the risk but cannot always prevent lasting damage.

Inhaled chemicals can irritate or swell the airways and may injure the lungs. Some symptoms develop after a delay. Swallowed corrosives can scar the esophagus, the tube that carries food to the stomach, and later cause swallowing problems.

Certain chemicals can be absorbed and affect organs beyond the contact area. Depending on the substance, complications may involve heart rhythm, blood chemistry, kidneys, liver, or nervous system.

Repeated irritant exposure can lead to chronic hand dermatitis. Allergic contact dermatitis

may recur whenever the person encounters the allergen again, including in products with unfamiliar names.

Follow up

Follow the wound-care plan provided by the treating team. Keep dressings clean and attend planned reassessments because burn depth and healing can change. Do not pop blisters or apply household remedies, butter, oils, or unapproved chemicals.

Routine follow-up may include checking wound closure, movement, sensation, scarring, and return to work. Eye injuries usually need specialist review. Persistent or recurring dermatitis may require dermatology assessment, patch testing, or workplace changes.

Seek prompt medical review if pain, redness, warmth, swelling, drainage, or odor is increasing; a fever develops; the wound is not healing; or movement becomes restricted.

Call emergency services for new trouble breathing, throat swelling, severe chest pain, fainting, confusion, seizures, sudden vision loss, or rapidly worsening symptoms. These are different from routine wound concerns and should not wait for a scheduled visit.

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