Contact Dermatitis & Poisonous Plants

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What is dermatitis?

Dermatitis is an inflammation of the skin. It describes a number of skin rashes caused by infections, allergies and irritating substances. Symptoms can include (depending on cause):

- Itchiness
- Painful ulcers
- Reddening
- Thickening
- Swelling
- Discoloration
- Marking
- Crusting
- Blisters
Allergic contact dermatitis occurs when the skin comes in contact with a substance that causes a delayed allergic reaction.

Skin can become allergic to a substance after many exposures or just one exposure. For example – poison ivy.

Common skin allergens include cosmetics, rubber derivatives, dyes, adhesives, nickel and other metals.

Some products only cause a reaction after the skin is also exposed to sunlight (photosensitivity).
Irritant Contact Dermatitis

Irritant contact dermatitis occurs when the skin comes in contact with a substance that irritates the skin such as detergents, soaps, waxes and solvents. These materials wear down the oily protective layer on the skin and lead to irritant contact dermatitis.

Diaper rash is an example of a common irritant contact dermatitis.

Sometimes it can be hard to differentiate between irritant contact and allergic dermatitis.

Irritant contact dermatitis caused by stone dust (lime and chalk)
# Allergic Contact vs. Irritant Contact Dermatitis

<table>
<thead>
<tr>
<th></th>
<th>Irritant contact dermatitis (ICD)</th>
<th>Allergic contact dermatitis (ACD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute lesions</td>
<td>erythema, vesicles, crust, scaling, and papules</td>
<td>erythema, vesicles, crust and scaling</td>
</tr>
<tr>
<td>Chronic lesions</td>
<td>papules, plaques, scaling, and crusts</td>
<td>papules, plaques, scaling, crusts, and fissures</td>
</tr>
<tr>
<td>Distribution</td>
<td>very sharp, strictly confined to site of exposure</td>
<td>usually confined to site of exposure, but may have some spreading in the periphery and become generalized</td>
</tr>
<tr>
<td>Evolution</td>
<td>quickly within a few hours of exposure</td>
<td>delayed, by 12 to 72 hours after exposure</td>
</tr>
<tr>
<td>Population</td>
<td>anyone</td>
<td>allergen-sensitized</td>
</tr>
</tbody>
</table>
Plant-Induced Contact Dermatitis

Divided into 5 categories:
- Allergic sensitization
- Mechanical irritation
- Chemical irritation
- Contact urticaria
- Photosensitization

The risk of acquiring plant-related dermatitis is influenced by host susceptibility and exposure.

Patch testing shows about 70% of Americans react to poison oak and ivy allergens but 50% has such reactions in nature.
Toxicondendron Species Plants

Most allergic reactions are due to Toxicondendron Plants

This species includes:

- Common poison ivy
- Western or northern poison ivy
- Eastern poison oak
- Western poison oak
- Poison sumac

These plants all contain urushiol, a toxic oleoresin which causes an allergic skin reaction in close to 70% of adults who come in contact with it
Urushiol

- Video: How Poison Ivy Works

- Urushiol can be found in the leaves, stems and roots of poison ivy, oak and sumac
Poison Ivy & Poison Oak grow throughout the US and prefer shaded areas with rich, wet soil.

Both have 3-5 leaflets per compound leaf – “Leaves of three, let them be”.

The leaves may change color in the fall or drop in the winter.
Poison sumac is a small tree that is usually found in wet areas such as bogs.

Its geographic range spans along the east coast from southern Ontario to eastern Texas.

Poison sumac has a number of leaves along the same stem vs a cluster of 3 to 5 leaves like poison ivy or oak.

The leaves are colorful in the fall and berries may be present.
Avoidance is the best strategy. Train employees on how to recognize and avoid contact with the plants. Emphasize that the leaves may change color and drop off during the winter. Contact with the leaves, stems and/or roots may cause dermatitis.

If contact may occur, consider PPE such as gloves or even coveralls in areas with significant plant growth.

The urushiol oil can stick to clothing, tools, vehicles and equipment and contact with it even weeks later can cause rashes.
Barrier creams and lotions applied to the skin before contact with the plants can prevent the urushiol oil from causing a reaction. Follow the application directions and reapply as necessary.

Post-contact cleaners can be used to wipe down skin and equipment to remove urushiol before a rash occurs. This may need to be done within several hours of the contact.

It's important to clean the exposed skin well and wipe it off well as the urushiol oil is very sticky and can stay on the skin.
Prevention of Poison Ivy, Oak and Sumac

Since urushiol can stick to vehicles, tools, equipment, gloves, boots, etc. it’s important to clean them at the end of the day and before they are handled with bare hands.

Clothing that may have come in contact with urushiol should be washed daily and separate from other clothing.

Consider replacing lace-up boots with one-piece rubber boots if possible, as they are easier to clean.
Treatment of Poison Ivy, Oak and Sumac

The severity and size of the rash will depend on the amount of contact, personal sensitivity and body location of the contact with the urushiol oil.

Small cases can be treated with over-the-counter drugs such as calamine, zanfell and Benadryl to relieve itching symptoms.

If the symptoms include difficulty breathing, rashes on the face, eyelids and / or genitals, medical attention should be sought. The medical provider may give a steroid shot as part of the treatment.
Giant Hogweed (Heracleum Mantegazzianum) is another plant that can cause severe dermatological reactions.

Skin contact with the sap and then exposure to sunlight can cause severe burns within 24 to 48 hours.

Giant Hogweed is found in several areas of the US including the northeast, WI, IL, NC, VA, AK, WA and OR.
Hogweed Skin Burns

How Does Giant Hogweed Cause Skin Burns?

Giant Hogweed
Heracleum mantegazzianum
Height: Up to 5.5 metres

Giant Hogweed is a plant that is originally native to central Asia. In the 19th century it was introduced to the UK as an ornamental plant. Subsequently, it has spread to parts of the USA, Canada, and Europe.

Furanocoumarins

Psoralen

Bergapten

Methoxsalen

Giant Hogweed's sap contains phototoxic compounds called furanocoumarins (also known as furocoumarins). They are found in all parts of the plant, but the highest levels are found in the leaves. When in contact with the skin, and exposed to UV radiation from sunlight with a wavelength of 320-380 nanometres, they can cause phytophotodermatitis (skin inflammation and burns).

The phototoxic effects of furanocoumarins occur due to their ability to react with bases in DNA to form adducts in the presence of UV-A radiation. These adducts can then react further with other bases to form crosslinks between DNA strands. These crosslinks lead to the characteristic blisters seen on exposure to Giant Hogweed sap.
Hogweed Identification

- Giant Hogweed plants can grow to heights of 14 feet or more.

- It has hollow, ridged stems which grow 2-4 inches in diameter and dark reddish-purple blotches and the large compound leaves can grow up 5 feet wide.

- The white flower heads can grow up to 2 ½ feet in diameter.
Ragweed pollen is one of the most common causes of seasonal allergies. The pollen contains two allergens: an oleorosin that can cause airborne contact dermatitis and aqueous proteins that cause ragweed asthma and hay fever.

Chrysanthemums are the most common plants of the *Astraceae* family that cause occupational contact dermatitis. This can occur in florists who handle the plants or manipulate them to promote larger blooms.
Poodle-Dog Bush

Poodle-dog Bush (*Eriodictyon parryi*) is a shrub found in southern and Baja California that secretes a severe skin irritant.

The hairs of plant exude chemicals which can cause allergic chemical dermatitis with symptoms similar to that of poison oak (rash, blisters, itching or pain).

Gloves, long-sleeve shirts and other clothing will protect from contact. Wash clothing and tools after contact.
An occupational allergic contact dermatitis is often found in individuals who harvest sunflowers (*Helianthus annus*). Trichomes, or small hairs, on the surfaces of the leaves secrete the allergens. Windblown trichomes from dry plants can cause airborne contact dermatitis.

Dandelions are another very common source of allergens. Allergic contact dermatitis can occur when the plant’s parachute-shaped seeds contacts the skin. This often occurs during stretches of hot and dry weather after someone has mowed their lawn.
Garlic is a common cause of fingertip dermatitis in food preparation workers. Fresh garlic can contain the irritants and allergens diallyl sulfide, allylpropyl disulfide and allicin. If these substances contact injured skin second and third degree burns can result.

Tulip contact can lead to “tulip fingers”, a combined allergic and irritant contact dermatitis.
Mangoes & Allergic Contact Dermatitis

**THE CHEMISTRY OF MANGOES**

### Mango Flavour & Aroma Compounds

A large number of compounds contribute to the flavour and the aroma of mangoes. The cultivar, maturity, and geographical origin of the mango all influence the compounds present.

![Mango Flavour & Aroma Compounds](Image)

270+ **Volatile Compounds Detected in Mangoes**

- **HDMF**
- **γ-Octalactone**
- **Ethyl Butanoate**

**Mangoes & Contact Dermatitis**

Esters such as ethyl butanoate account for fruity notes in mango aroma. A major contributor to sweet notes is HDMF (4-hydroxy-2,5-dimethyl-3(2H)-furanone). Lactones such as γ-octalactone can lend a coconut-like aroma, while terpenes are also found in significant quantities and make minor contributions.

Mangoes belong to the same family of plants as poison ivy. Urushiol, a mix of similar organic compounds which are found in poison ivy and can cause a rash to develop on contact with the skin, can also be found in mango skin. This means that some people who are sensitive to urushiol get contact dermatitis when chopping or eating mangoes.
Urticaria, also known as hives, is an outbreak of swollen, pale, red bumps or plaques (wheals) on the skin that appear suddenly – either as a result of the body’s reaction to certain allergens or for unknown reasons. They usually itch but may also have a stinging or burning sensation.

Urticaria reactions to plants are divided into:

- immunologic reactions
- nonimmunologic reaction
- toxin-mediated categories
Immunologic contact urticaria typically affects individuals who have a long history of handling plants and/or atopy (allergies).

Toxin-mediated contact urticaria
- Plants in the *urticaceae* family, such as stinging nettles, cause most plant-induced contact urticaria
- These plants have trichomes, or sharp hairs on their leaves and stems
- These hair are like hypodermic needles and can release irritant chemicals such as acetylcholine and histamine
- The reaction occurs within a few minutes of contact and may last for several hours
Large spines and thorns can become imbedded in the skin and cause secondary infections.

Some plants have spines or hairs that can imbed in the skin like fish hooks and are hard to remove.

Microbes, such as bacteria, growing on the spines or thorns may introduce pathogenic microorganisms into the wounds.
Several plant families possess chemicals that irritate human skin, such as calcium oxalate which can enhance the irritancy of other chemicals. For example calcium oxalate-induced microabrasions in pineapple workers can lead to skin injuries.

Other plants such as dumb cane and daffodils can release calcium oxalate that leads to scales, fissure and erythema on the skin.
Phytophotodermatitis is a dermatitis caused after the skin is exposed to photosensitizing compounds in plants and then exposed to sunlight.

Common plants such as citrus fruits (limes, lemons) celery, and wild parsnip contain these photosensitizing chemicals.

Some of the chemicals may not cause any effect until they are exposed to UV(A) radiation. The resulting effects can include burns, edema and severe blistering hours or days after exposure.
Generalized Treatment for Dermatitis

Wash exposed areas with copious amounts of water. Gentle soaps should be only used after flushing the skin with water.

Remove and launder clothing and clean PPE that was exposed to the plants.

Monitor the impacted areas. If the individual has difficulty breathing or swallowing, swollen eyelids, a very large rash or a rash on the face, seek medical help.

Attempt to identify the plant/s involved. If they can’t be easily identified, take pictures and consult with agricultural or botany subject matter experts.

The diagnosis and treatment of dermatological problems may require treatment by a dermatologist rather than a general practitioner.
Questions?
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