Dermatitis, Allergic Contact



What is occupational contact dermatitis?

Occupational contact dermatitis is a local inflammation of the skin. Symptoms of inflammation include itching, pain, redness, swelling, and the formation of small blisters or wheals (itchy, red circles with a white centre) on the skin. The inflammation is caused by an allergy or irritation as a result of substances found in the workplace that come into direct contact with the skin. Approximately 3,000 substances are recognized as contact allergens yet only 25 of these substances are responsible for almost half the cases of allergic contact dermatitis (ACD).

HOW DOES ALLERGIC CONTACT DERMATITIS DEVELOP?

Allergic contact dermatitis associated with the workplace develops in stages. There is a period during which an individual may be continually in contact with allergenic substances without developing any skin reaction. This period can last a lifetime or only a few days. The allergenic action of a substance depends on its ability to change some properties of the outer layer of the skin. This layer acts as a protective barrier against toxic substances. Some substances can remove fats, oils and water from the outer layer of the skin. These substances diminish the protective action of the skin and make it easier for substances to penetrate the skin.

The skin allergy begins with a process called sensitization. It starts with the penetration of allergenic substances into the outer layer of the skin. The process lasts from four days to three weeks. During this period there are no signs of skin damage.

Once penetrated, the allergenic substance combines with natural skin proteins. The combination formed by the allergenic substance and skin proteins is then carried throughout the body by white blood cells called lymphocytes.

Lymphocytes are part of the immune system which guards the body against germs or alien substances. The immune system has a “memory” to recognize and neutralize germs or substances encountered more than once.

When sensitized workers are re-exposed, lymphocytes recognize the allergen and react with it. But they also release tissue-damaging chemicals called lymphokines. These cause itching, pain, redness, swelling, and the formation of small wheals or blisters on the skin.

This inflammation is usually confined to the site of contact with the allergen, but

in severe cases it may spread to cover large areas of the body. It usually starts within twelve hours from exposure and is at its worst after three or four days. It slowly improves in about seven days. The allergic sensitization may remain with the individual through life. If there is no further contact with the allergen, the level of sensitivity may gradually decline, or it may not change.

WHAT ARE THE CONTRIBUTING FACTORS?

The most common factors contributing to the development of allergic contact dermatitis are pre-existing skin conditions such as irritant contact dermatitis. Cuts or scratches into which allergenic substances can enter also contribute to the development of allergic contact dermatitis. The chemical nature of the substance is important (for example, whether it is an acid, an alkali, or a salt), as are the amount and concentration that comes into contact with the skin, and the length and frequency of the exposure.

Important individual factors include the resistance of the skin, which increases with age. Hereditary factors influence the variety of reactions in different persons exposed to the same allergen.

Environmental factors play a significant role. For example, hot workplaces cause sweating, which can dissolve some types of industrial chemical powders, increasing their toxicity for the skin. But sweating may also provide a protective function because it may dilute or “wash out” substances. Dry air can cause chapping of the skin, increasing the possibility of allergies.

Friction against the skin (for example, from operating grinding machines and other equipment), can abrade or scrape away the skin. This action can reduce the protective action of skin against allergens.

WHAT OCCUPATIONS ARE AT RISK?

Some of the occupations where allergic contact dermatitis has been seen are listed in the following tables. Some substances which can cause allergic contact dermatitis may not be listed. New materials and new processes introduce new exposures and create new risks.

List of Allergens Encountered in Various Occupations

Occupations	Allergens
Agriculture workers	**Rubber, oats, barley, animal feed, veterinary medications, cement, plants, pesticides, wood preservatives**
Artists	**Turpentine, pigments, dyes, colophony, epoxy resin**
Automobile and aircraft industry workers	**Chromates, nickel, cobalt, rubber, epoxy and dimethacrylate resins**

Bakers and confectioners	**Flavours and spices, orange, lemon, essential oils, dyes, ammonium persulphate and benzoyl peroxide.**
Bartenders	**Orange, lemon, lime, flavours**
Bookbinders	**Glues, resins, leathers**
Butchers	**Nickel, sawdust**
Cabinet makers and carpenters	**Stains, glues, woods, turpentine, varnishes, colophony**
Cleaners	**Rubber gloves**
Coal miners	**Rubber boots and masks**
Construction workers	**Chromates, cobalt, rubber and leather gloves, resins, woods**
Cooks and caterers	**Foods, onions, garlic, spices, flavours, rubber gloves, sodium metabisulphite, lauryl and octyl gallate, formaldehyde**
Dentists and dental technicians	**Local anesthetics, mercury, methacrylates, eugenol, disinfectants, rubber, dental impression material.**
Dry cleaners	**Rubber gloves**
Electricians	**Fluxes, resins, rubber**
Electroplaters	**Nickel, chromium, cobalt**
Embalmers	**Formaldehyde**
Floor-layers	**Cement, resins, woods, varnish**

Florists and gardeners	**Plants, pesticides, rubber gloves**
Foundry workers	**Phenol-and urea-formaldehyde resins, colophony**
Hairdressers	**Dyes, persulphates, nickel, perfumes, rubber gloves, formaldehyde, resorcinol, pyrogallol**
Homemakers	**Rubber gloves, foods, spices, flavours, nickel, chromates, polishes**
Jewellers	**Epoxy resin, metals, soldering fluxes**
Mechanics	**Rubber gloves, chromates, epoxy resin, antifreeze**
Medical personnel	**Rubber gloves, anesthetics, antibiotics, antiseptics, phenothiazines, formaldehyde, glutaraldehyde, liquid chloroxylenol, hand creams**
Metal workers	**Nickel, chromates, additives in some cutting oils**
Office workers	**Rubber, nickel, glue**
Painters	**Turpentine, thinners, cobalt, chromates, polyester resins, formaldehyde, epoxy resin, adhesives, paints**
Photography industry workers	**Rubber gloves, colour developers, para-aminophenol, hydroquinone, formaldehyde, sodium metabisulphite, chromates**
Plastic workers	**Hardeners, phenolic resins, polyurethanes, acrylics, plasticizers**
Printers	**Nickel, chromates, cobalt, colophony, formaldehyde, turpentine**
Rubber workers	**Rubber chemicals, dyes, colophony**

Shoemakers	**Glues, leather, rubber, turpentine**
Tannery workers	**Chromates, formaldehyde, tanning agents, fungicides, dyes**
Textile workers	**Formaldehyde resins, dyes, chromates, nickel**
Veterinarians	**Rubber gloves, medicaments**

HOW IS IT TREATED?

Sensitized workers should avoid further exposure to the allergen. This avoidance alone is an effective remedy. Allergic contact dermatitis may be treated with anti-inflammatory drugs, and with ointments and skin cleansers. In general, the affected skin should be protected from physical trauma, excessive sunlight, wind, and rapid temperature changes while the dermatitis is active.

HOW COMMON IS IT?

The present number of cases of allergic contact dermatitis in Canada is not known. According to some US statistics, skin disorders comprise more than thirty-five percent of all occupationally related diseases. Among all cases of occupational dermatitis, allergic contact dermatitis accounts for about twenty percent.

WHAT ARE THE PREVENTIVE MEASURES?

Establishing a good program to avoid exposure of the skin to allergens is of vital importance to eliminate allergic contact dermatitis.

As with all hazardous conditions in the workplace, the best control is at the source of the problem. The Regulations require workers to be informed about the nature of the products they are exposed to and how to work with them safety. SDSs should be reviewed to identify ingredients that may lead to sensitivities. Additional information may be needed from the manufacturer or through available texts or research articles.

Engineering control methods involve the enclosure of processes to separate workers from the harmful products they work with. Local exhaust systems should be used where toxic substances may escape into the workroom. Nonhazardous substances should be substituted for hazardous substances. Good housekeeping includes proper storage of products, frequent disposal of waste, prompt removal of spills, and maintenance of the equipment to keep it free of dust, dirt and drippings.

Occupational allergic contact dermatitis can be avoided by personal hygiene, engineering control methods, good housekeeping, and personal protection. Personal hygiene, including hand washing, is very important to prevent contact dermatitis, but workers should be aware that excessive hand washing with soap and detergents can also damage the skin.

Protective clothing such as aprons and gloves should be properly selected. Not all protective clothing resists all substances. Manufacturers’ specifications should be

followed. Barrier creams may be used where appropriate, especially when gloves or sleeves cannot be used safely, but they do not shield as well as protective clothing. Washrooms, toilets, and showers should be conveniently located and supplied with adequate hot water, disposable towels and soap.

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