

OCCUPATIONAL DERMATITIS

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A Sub-Committee of Occupational Health and Safety Council of Ontario

Dermatitis in the Workplace – What You Should Know

Occupational dermatitis is inflammation of the skin caused by exposure to a substance in the workplace. Exposure usually occurs from direct contact but may, in rare circumstances, occur through the airborne route.

Dermatitis is a common and potentially serious problem that need not happen.

Legal Responsibilities

Under the Workplace Hazardous Materials Information System (WHMIS) Regulation, R.R.O.1990, Reg. 860, employers are required to ensure that suppliers' labels and material safety data sheets (MSDSs) are available for controlled products and that workers are educated and trained in their use.

The *Occupational Health and Safety Act*, section 25(2) (h), states that an employer must “take every precaution reasonable in the circumstances for the protection of a worker. These precautions include providing workers with education and hazard awareness training, safe handling procedures, and personal protective equipment. Additionally, Section 3 of Regulation 833/90 requires the employer to take all reasonable measures to protect workers from exposure (including skin absorption) to a chemical or biological substance because of the storage, handling, processing or use of these substances in the workplace. Furthermore, in Regulation 833/90 substances capable of being absorbed through the skin have been assigned with a "skin" notation. This means that if the substance is absorbed through the skin it may result in a significant systemic toxicity over that from inhalation exposure only.

Employers are required to assess dermatitis hazards in the workplace and develop policies and programs for preventing occupational dermatitis in the workplace. Supervisors must provide written instructions for the safe handling and use of hazardous agents and ensure that workers use follow instructions, work safely and use personal protective equipment, where required.

Sector-specific regulations made under the Act require that workers be appropriately protected when they risk injury from skin contact with an irritant or allergen. Appropriate protection may involve specific protective equipment, hygiene practices and specialized facilities such as an eyewash fountain and deluge shower.

What is Occupational Dermatitis?

Occupational dermatitis is a non-infectious disease caused by skin contact with substances used at work. Depending on the types of substances present, dermatitis may take two forms: a) allergic contact dermatitis, or b) irritant contact dermatitis.

Allergic contact dermatitis results when a person becomes sensitized to a substance (allergen). The person then develops an allergy to the substance and will react whenever in contact with that substance, no matter how minute the exposure. Reaction may range from minor to serious effects. Sensitization may occur within days of exposure, but usually takes months or years.

Irritant contact dermatitis occurs when the skin is exposed to a mild irritant (such as detergent or solvents) repeatedly over a long period of time or to a strong irritant (such as acids, alkalis, solvents, strong soaps, or cleansing compounds) that can cause immediate skin damage. Only the section of skin in contact with the substance will be affected.

Table 1 indicates a number of skin irritants and sensitizers, their sources, and the occupations that may be affected. The list is by no means inclusive. Other irritants from the same or different sources may cause dermatitis among occupations not listed here.

Table 1: Occupations at Risk and Irritants Involved

Irritant	Source	Occupation
Nickel	Metals, soldering, tools, coins	Plating, electronics, metalwork, hairdressers, cashiers, smelter and refinery workers
Chromium	Cement, leather gloves, metals	Construction, metal industry, leather, tanning
Epoxy resins	Paints and varnishes	Painting, electronics, manufacturing, construction
Isocyanates	Insulation foams, paints, and varnishes	Construction, painting, manufacturing
Formaldehyde	Cosmetics, plastics, resins	Adhesives, health care, embalming fluid fiberboard manufacturer and textiles
P-paraophenylenediamine	Oxidative hair colorants	Hairdressers
Textile dyes and pigments	Textile dyes and pigments	Textile manufacturing
Rubber chemicals, thiuram accelerators, phenylenediamine derivatives	Cosmetics, wood preservatives, water-based paints, glues	Hairdressers, wood workers, manufacturing
Detergents	Detergents	Food, health care, homemakers
Industrial enzymes	Amylases in flour, proteases in detergents	Food and detergents industry, cleaners
Natural rubber latex proteins	Protective gloves, medical instruments	Health care workers, hairdressers
Cutting oils	Cutting metal	Manufacturing, dry cleaning, metalwork, health care, rubber, printing, plastics, painting
Wood dust	Western red cedar, Birch, beech, mahogany, oak, teak, walnut	Construction projects, furniture mfg., sawmill workers, particle board mfg.
Cycloaliphatic epoxy resin, 1,2cyclohexanedicarboxylic acid, bis(oxiranylmethyl) ester, added to the oil as a stabilizer	Metalworking fluids	Metal workers, Machinists
Gluteraldehyde , Ethylene oxide	Sterilizing Agent	Health care workers
Methyl methacrylate	Manufacture of resins and plastics	Orthodontic labs
Ethyl methacrylate	Artificial fingernail industry	Cosmetologists working with artificial fingernails

Information taken from the European Agency for Safety and Health at Work <http://agency.osha.eu.int>

Symptoms

Employees will differ in their reactions to exposure. Some people may react severely to a substance while others may not react at all. The main differences between irritant and allergic contact dermatitis are listed in Table 2.

The hands are the body parts most often affected by both types of dermatitis. The face is also a common site for dermatitis through exposure to airborne allergens such as volatile chemicals, sprays, aerosols, and dusts.

Table 2: Symptoms of Allergic Contact Dermatitis and Irritant Contact Dermatitis

Allergic Contact Dermatitis	Irritant Contact Dermatitis
Reddening of skin	Mild swelling of skin
Dry, scaly patches	Stiff, tight feeling in skin
Blisters that ooze	Dry cracking skin
Burning or itching	Blisters
Swelling in eyes	Localized reactions (area where contact was made)
Hives	
Darkened/cracked skin	
Reactions can spread beyond the area where contact was made	

Information taken from the Cleveland Health Clinic Information Centre

Skin Defenses

Our skin is made of multiple layers that act as a protective barrier. Some substances change or remove skin oils, cause the skin to become more vulnerable, and allow chemicals to penetrate deeper into layers. Once this damage has occurred, the substance or chemicals can then interact with bodily cells and tissues. At this point the skin may show signs of chapping, scaling, and blistering. These reactions can take place within a few hours of exposure or up to 24 hours after exposure.

Risk Factors

Various risk factors may facilitate the onset of dermatitis. The three main factors are

- 1) properties of the substance
- 2) environmental conditions
- 3) pre-existing medical condition or health of the person affected.

Table 3 indicates some of the factors that can contribute to the onset of dermatitis.

Table 3: Risk Factors for Dermatitis

Properties of Substance		Environmental Conditions		Health of Employee	
Solubility	The more soluble the substance the more likely it is to penetrate the skin	Temperature, humidity, moisture	Hot humid workplaces can cause sweating. Sweat can dissolve certain types of chemical powers thus making them more toxic or irritating	Skin region (hands, arms, face)	Certain chemical penetrate the face and back quicker than the arms.
Form: gas, liquid, solid	Agents that affect the skin can come in all forms, however liquids are the most common skin irritants and sensitizers.			Skin condition (cuts, rashes, abrasions)	Cuts and skin abrasion permits irritant or sensitizers to penetrate the skin more easily.
Concentration	Generally the higher the concentration the greater the skin hazard.	Contamination in the air	As the concentration of the chemical in the air increases the potential for dermatitis increases.	Dry skin	Dry kin can become cracked and thus allowing irritant or sensitizers to penetrate the skin more easily
Duration of exposure	The greater the exposure duration the grater the skin hazard.			Sweating	Sweat can dissolve certain types of chemical powers thus making them more toxic or irritating. Alternatively, sweating may protect the skin by washing away or diluting substances
Properties of the substance	Acid and alkali are more likely to cause irritation affect the skin than a neutral product such as water			Age and genetic background	Certain persons will react differently when exposed to the same substance.

Information taken from the Canadian Centre for Occupational Health and Safety

Prevention

Workers should:

- Read and understand the nature of Material Safety Data Sheets (MSDS) to be informed of any health hazards and know the precautions to take. Phrases such as “may cause skin sensitization” or “skin irritant” indicate that the substance can cause dermatitis.
- Check whether there is a safer alternative, if using a chemical that can cause dermatitis. A good example is water-based paints, cleaner or inks instead of solvent-based products.
- Use barrier creams and personal protective clothing such as gloves, aprons and chemical suits as a last resort to prevent skin contact and / or absorption. Ensure that the correct cream is used for protection, as there are different barrier creams for water soluble agents and for solvent-based agents.
- Remove any contaminated clothing quickly. *Immediately* wash skin that has been in contact with skin irritants or sensitizers with large amounts of warm clean water and a mild moisturizing soap.
- Never wash hands with solvents such as Varsol or gasoline. Instead, use mild soaps and ensure that skin is frequently moisturized with hand creams.
- Seek medical attention as soon as possible, if any changes in skin are noticed while at work or after using substances. Early diagnosis and advice is essential in preventing occupational dermatitis.

Employers should:

- Ensure the workplace is in compliance with all WHMIS legislation. MSDS's must be readily available on site for all controlled products being used.
- Change the way processes are done if possible to effectively reduce skin contact with dermatitic agents. For example, automated mixing instead of hand mixing substantially reduces the chance of skin contact.
- Provide appropriate barrier creams or personal protective equipment as a last resort.
- In the case of an emergency have an eyewash station and deluge shower for cleansing the eyes, face and skin after contact with skin irritants or sensitizers.
- Provide adequate hygiene facilities on site for workers to wash hands and face at the end of the job, before eating, drinking or smoking and after using the toilet.
- Ensure that personal protective equipment or clothing is made of a material appropriate for the chemical(s) being handled. Table 4 below identifies material to be worn for protection against chemicals that may injure the skin. This information can be used when the MSDS does not specify the type of material to be worn. Additionally the product supplier or manufacturer can be contacted for their advice if the MSDS does not provide adequate precautionary or preventative information.

Table 4: Selected Dermatitic Agents and Protective Materials

This table identifies materials to be worn for protection against chemicals that may injure the skin. This information can be used when the MSDS does not specify the type of material to be worn.

Caution: Recommendations are NOT valid for very thin gloves (0.3mm or less) made of natural rubber, neoprene, nitrile or PVC.

Chemical Name	Protective Material	Chemical Name	Protective Material
Acetone	Butyl Rubber, Neoprene	Methyl Chloroform	PVA, Viton
Cellosolve	Neoprene, Butyl Rubber	Methyl Ethyl Ketone	Butyl Rubber
Cement	Nitrile, Neoprene	Mineral Spirits	Neoprene
Cutting fluid	Nitrile	Naphtha	Nitrile, PVA
Cyclohexane	Nitrile, Viton®	Stoddard Solvent	PVA, Nitrile, Viton
Epoxy Resin	Butyl Rubber	Turpentine	PVA, Viton
Hexane	Nitrile, PVA	1, 1, 1 Trichloroethane 1, 1, 2 Trichloroethane Methylene Chloride Perchloroethylene	PVA, Viton
Methyl Alcohol	Butyl rubber, Viton	Xylene / Gasoline / Toluene	PVA, Viton
PVA – Polyvinyl Alcohol PVA – Polyvinyl Alcohol Viton® – Dupont trade name product			

Information taken from Quick Selection Guide to Chemical Protective Clothing, Krister Forsberg, S.Z. Mansdorf

Warning: Table 4 is not inclusive. It does not list all dermatitic agents or all protective materials. For each controlled product you use, refer to the Material Safety Data Sheet for the protective measures and precautions to follow with that specific product.

References

- Albert Einstein College of Medicine of Yeshiva University. Department of Environmental Health and Safety. http://www.aecom.yu.edu/ehs/industrial%20Hygiene/FS_Dermatis.htm
- Canadian Centre for Occupational Health and Safety. Dermatitis, Irritant Contact. <http://www.ccohs.ca/oshanswers/disease/dermatitis.html>
- Dermatology Products: Stiefel Canada. Contact Dermatitis. http://www.stiefel.ca/en/about_skin/texte.html
- European Agency for Safety and Health at Work. <http://agency.osha.eu.int>.
- Quick Selection Guide to Chemical Protective Clothing, Krister Forsberg, S.Z. Mansdorf
- Streit, M. Braathen, L.R.2001.Contact Dermatitis: Clinics and Pathology. Acta Odontol Scand. 2001: 59:309-314.
- The Cleveland Clinic Health Information Centre. Contact Dermatitis. <http://www.clevelandclinic.org/health/health-info/docs.0700>
- The Workers Health Centre. Dermatitis. <http://www.workershealth.com.au/facts010.html>
- The Workplace Safety and Insurance Board Workplace Contact Dermatitis. <http://www.wsib.on.ca/wsib/wsibsite.nsf/public/workerscontactdermatitis>

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