



## SKIN EXPOSURES & EFFECTS

It is estimated that **more than 13 million workers in the United States are potentially exposed to chemicals that can be absorbed through the skin.** Dermal exposure to hazardous agents can result in a variety of occupational diseases and disorders, including **occupational skin diseases (OSD) and systemic toxicity.** Historically, efforts to control workplace exposures to hazardous agents have focused on inhalation rather than skin exposures. As a result, assessment strategies and methods are well developed for evaluating inhalation exposures in the workplace; **standardized methods are currently lacking for measuring and assessing skin exposures.**



OSD are the second most common type of occupational disease and can occur in several different forms including:

- **Irritant contact dermatitis,**
- **Allergic contact dermatitis,**
- **Skin cancers,**
- **Skin infections,**
- **Skin injuries, and**
- **Other miscellaneous skin diseases.**

Contact dermatitis is one of the most common types of occupational illness, with estimated annual costs exceeding \$1 billion.



## OCCUPATIONS AT RISK



Any occupation that requires employees to handle hazardous chemicals, poisons, or potential allergens can be at risk or a harmful encounter that could damage the skin.

- **vitamin D synthesis,**
- **temperature control, and**
- **lubrication and waterproofing.**

## SKIN HAZARDS

**Causes of OSD include chemical agents, mechanical trauma, physical agents, and biological agents.**

**Chemical agents are the main cause of occupational skin diseases and disorders.**

These agents are divided into two types:

- **Primary irritants** or direct irritants act directly on the skin through chemical reactions.
- **Sensitizers.** Primary Sensitizers may not cause immediate skin reactions, but **repeated exposure can result in allergic reactions.**

**A worker's skin may be exposed to hazardous chemicals through:**

- **direct contact** with contaminated surfaces,
- **deposition of aerosols,**
- **immersion, or splashes.**
- **Physical agents** such as extreme temperatures (hot or cold) and radiation (UV/solar radiation).
- **Mechanical trauma** includes friction, pressure, abrasions, lacerations and contusions (scrapes, cuts and bruises).
- **Biological agents** include parasites, microorganisms, plants and other animal materials.

## DERMAL ABSORPTION

Dermal absorption is the transport **of a chemical from the outer surface of the skin both into the skin and into the body.** Absorption of chemicals through the skin



can occur without being noticed by the worker, and in some cases, may represent the **most significant exposure pathway**. Many commonly used chemicals in the workplace could **potentially result in systemic toxicity** if they penetrate through the skin (i.e. pesticides, organic solvents). These chemicals enter the blood stream and cause health problems away from the site of entry.

**The extent of absorption is dependent on the following factors:**

- **Skin integrity** (damaged vs. intact)
- **Location of exposure**
- **Physical and chemical properties of the hazardous substance**
- **Concentration and exposure duration of a chemical** on the skin surface
- **The surface area of skin exposed** to a hazardous substance

Data indicate that **contact dermatitis constitutes approximately 90-95% of all cases of OSD** in the United States. Common symptoms of dermatitis include:

- **Itching**
- **Pain**
- **Redness**
- **Swelling**
- **The formation of small blisters or wheals** (itchy, red circles with a white centre) on the skin
- **Dry, flaking, scaly skin that may develop cracks**

**Employers should follow the hierarchy of controls in order to prevent occupational skin disease in workers.** Employers should take the following step to protect workers from OSD:

- **Elimination:** In most cases, preventing skin contact with chemicals or other skin damaging agents will prevent disease. Eliminating exposure to the compound or product that causes the skin condition is the most effective method of control.
- **Substitution:** If possible, employers should attempt to substitute the hazardous agent a less hazardous compound.
- **Engineering controls:** If elimination or substitution is not possible, engineering controls such as local exhaust ventilation systems and isolation booths can prevent hazardous agents from contacting workers' skin.
- **Administrative controls:** Employers should provide training programs that educate workers about hazards that they may be exposed to and ways to protect themselves from the hazards.
- **Personal protective equipment:** Personal protective equipment such as **gloves, safety glasses or goggles, shop coats or coveralls, and boots**



should be provided by employers and worn by workers involved in the following activities:

- ❖ Wet or dry cleaning of work tools, equipment and work areas
- ❖ Disinfection of work tools, equipment, and work areas
- ❖ Contact with solvents
- ❖ Contact with monomers of epoxy resins and tacky surfaces or hardening agents (such as glue or epoxy resins)
- ❖ Use of preparations containing soaps, detergents, and disinfectants