

Industrial Hygiene

Specific agents responsible for industrial skin diseases can be classified according to how they act upon the skin. The relative importance of these causative factors varies from one industry to another, depending upon the materials and processes used. The determination of specific causative factors in cases of industrial skin disease is, of course, a problem for the dermatologist.

Causative factors are listed as follows:

- Detergents and keratin solvents remove the natural oils from the skin or react with the oils of the skin to increase susceptibility to reactions from chemicals which ordinarily do not affect the skin. Materials which remove the natural oils include alkalies, soaps, and turpentine. Typical materials which increase susceptibility are cottonseed and olive oils, alcohol, phenylene bases, and several of the aromatic hydrocarbons.
- Dessicators, hygroscopic agents, and anhydrides take water out of the skin and generate heat. Examples are sulfur dioxide and trioxide, phosphorus pentoxide, strong acids such as sulfuric, and strong alkalis such as potash.
- Protein precipitants tend to coagulate or callous the outer layers of the skin. They include all the heavy metallic salts and those which form alkaline albuminates on combining with the skin, such as mercuric and ferric chloride. Alcohol, tannic acid, formaldehyde, picric acid, phenol, and intense ultraviolet rays are other examples.
- Hydrolytic materials unite with water of the skin and thus form irritating compounds or dissociate into irritating elements when in contact with water. Heat is liberated on the skin during the reaction. Examples of such substances are mustard gas, ammonium nitrate, and hexamethylenetetramine.
- Oxidizers unite with hydrogen and liberate nascent oxygen on the skin. Such materials include nitrates, chlorine, iodine, bromine, hypochlorites, ferric chloride, hydrogen peroxide, chromic acid, permanganates, and ozone.
- Solvents extract essential skin constituents. Examples are ketones, aliphatic and aromatic hydrocarbons, halogenated hydro-

carbons, ethers, esters, and certain nitro compounds.

- Keratogenic and neoplastic agents act by stimulating abnormal growth in the outer layer of the skin and may cause either malignant or benign tumors. Examples are arsenic, coal tar products, petroleum and shale, and some coal tar bases such as 3, 4-Benzpyrene. (Aniline does not cause cancer.)
- Biotic agents are microorganisms and parasites (vegetable and animal) which act on the skin to produce dermatitis, such as athlete's foot.
- Allergic or anaphylactic proteins stimulate the production of antibodies which cause skin reactions in sensitive persons. The sources of these antigens are usually cereals, flour, and pollens, but may include feathers, scales, flesh, fur, and other emanations.
- Reducers react with water on the skin and, if the solution is strong, causes shedding of the horny layers. Examples are photographic developers, tar, phenols and naphthols, aromatic and aliphatic hydrocarbons, salts of titanium and hydroquinone, resorcinol, formalin, paraldehyde, and salicylic, formic, and oxalic acids.

Mechanical causes of skin irritation include friction, pressure, and trauma, which produce cuts, which may become infected with either bacteria or fungi, and callosities. If the horny layers of the skin become softened by high temperatures and excessive perspiration, the development of friction (for example, between the buttocks) then leads to dermatitis. Other examples of mechanical causes are abrasions.

Physical agents which lead to occupational dermatitis include heat, cold, water, sunlight, X rays, ionizing radiation, and electricity. Hot water softens the skin so that substances more readily attack it, as typified by dermatoses occurring among laundry workers and dish washers. X rays and other ionizing radiation may cause dermatitis, severe burns, and even cancer. Prolonged exposure to sunlight produces skin changes which may cause dangerous body alterations. Frostbite produces chilblains.