



Occupational Skin Diseases

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Occupational skin diseases



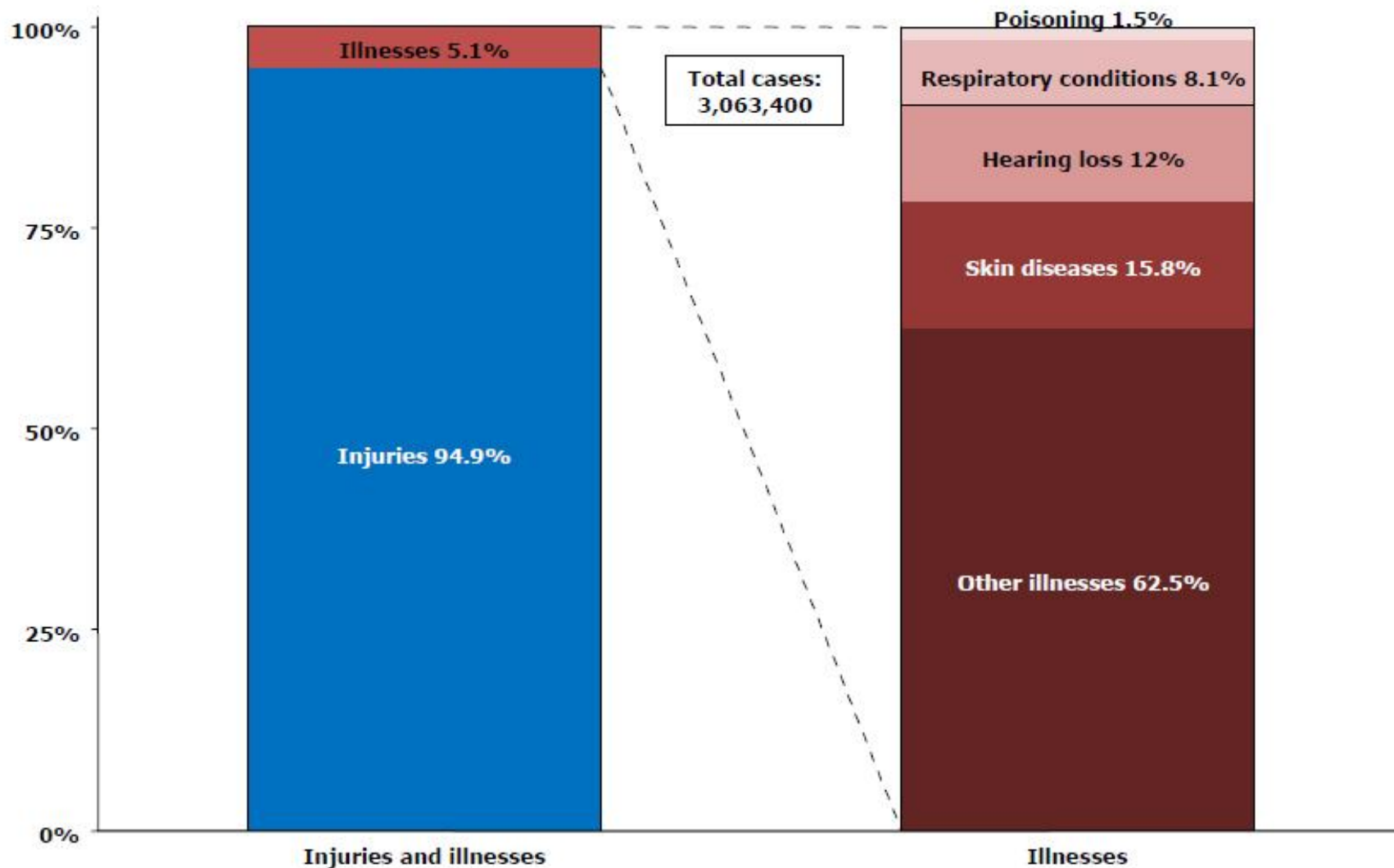
- .. also known as occupational dermatoses.
- .. One of the top three occupational diseases.
- .. caused by exposures to hazards at work .
- .. The majority is caused by wet work, workplace exposure to chemicals and high ultraviolet radiation from the sun.
- .. Contact dermatitis are the most prevalent.

Types of hazards



- .. chemical hazards are irritants, sensitising, photosensitising and acnegenic agents.
- .. Biological hazards range from bacteria, fungi, viruses, to skin parasites.
- .. Physical hazards include rubbing, mechanical pressure, radiations and temperature.

**Distribution of nonfatal occupational injury and illness cases
by category of illness, private industry, 2010**




Nonfatal occupational injuries accounted for the overwhelming majority of cases reported for the SOII in 2010—94.9 percent—with illnesses accounting for the remaining 5.1 percent of cases. Most illness cases fall into the “All other illnesses” category, which includes such things as repetitive motion cases and systemic diseases and disorders.


Contact Dermatitis

- Occupational dermatitis is an inflammation of the skin causing itching, pain, redness, swelling and small blisters.
- Contact dermatitis is an eczematous eruption caused by external agents, which can be broadly divided into:
 - ✧ Irritant substances that have a direct toxic effect on the skin (irritant contact dermatitis, ICD)
 - ✧ Allergic chemicals where immune delayed hypersensitivity reactions occur (allergic contact dermatitis, ACD).
- The symptoms and presentation of ICD and ACD are so similar, it is extremely difficult to distinguish between them without clinical testing (e.g. patch testing).

Irritant contact dermatitis (ICD)


- .. is a non-immunologic reaction that manifests as an inflammation of the skin caused by direct damage to the skin following exposure to a hazardous agent.
- .. ICD represents approximately 80% of all cases of occupational contact dermatitis.
- .. The reaction is typically localized to the site of contact.
- .. Patch tests are negative in ICD that has no allergic component
- .. Common chemical agents include acids, alkalies, organic solvents and detergents.

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- .. ICD may be caused by
 - ü phototoxic responses (e.g., tar),
 - ü acute exposures to highly irritating substances (e.g., acids, bases, oxidizing/reducing agents),
 - ü or chronic cumulative exposures to mild irritants (e.g., water, detergents, weak cleaning agents).

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- Symptoms of ICD range from dryness, burning red rashes (erythema) and swelling (oedema) to the development of bullas (blistering), necrosis and peeling (desquamation) in more severe cases
 - Chronic, repeated exposures trigger the development of fully-fledged eczema: itching, cracking, crusting and flaking, oozing or even bleeding that may be present alongside the signs mentioned earlier

Allergic contact dermatitis (ACD)

- ✧ Caused by an immunologic reaction triggered by dermal contact to a skin allergen sensitizing agents producing a response after a single or multiple exposure and only in some individuals
- ∴ Clinical signs of ACD are very similar to that of ICD, although itching is predominant over burning,
- ∴ The reaction is not confined to the site of contact and may result in systemic responses.
- ✧ Systemic responses (difficulty breathing, inflammation of airways, pulmonary edema)

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- .. ACD may be caused by industrial compounds (i.e. metals- chromium, nickel, cobalt, mercury,
 - .. epoxy and natural and artificial resins.
 - .. rubber additives
 - .. preservatives
 - .. animal feeds
 - .. plants
 - .. pharmaceuticals

photoallergic contact dermatitis



- .. A special form of ACD is photoallergic contact dermatitis.
- .. Here the chemical compound transforms into a complete sensitising agent only when exposed to ultraviolet light (mainly from the A-band spectrum).
- .. Fragrances (e.g., in cleaning, chemical industry), optical brighteners (e.g., in laundries, washing powder manufacturing), dyes (e.g., in textile industry), and pharmaceuticals are the most common chemicals involved in photoallergic contact dermatitis

Table 2. Photoactive Antimicrobials*

Drug	Action Spectrum
Topical antimicrobials†	
Clioquinol	Unknown
Halogenated salicylanilides‡	UV-A
Sulfonamides	UV-B
Olaquinox	UV-A, UV-B
Topical antifungals	
Jadit	UV-A
Multifungin	UV-A
Fentichlor	UV-A
Antibiotics†	
Tetracyclines	UV-A
Fluoroquinolones	UV-A
Nalidixic acid	UV-A
Ceftazidime	Unknown
Griseofulvin	UV-A
Ketoconazole	Unknown
Trimethoprim	Unknown
Sulfonamides	UV-B

** Data in this table from Gould et al.²⁶*

† Topical antimicrobials are photoallergens, and antibiotics are phototoxins.


‡ Halogenated salicylanilides may have UV-B as an action spectrum.

The severity of contact dermatitis is highly variable and depends on many factors including:

- .. Characteristics of the hazardous agent (irritant and/or allergen)
- .. Concentration of the hazardous agent (irritant and/or allergen)
- .. Duration and frequency of exposure to the hazardous agent (irritant and/or allergen)
- .. Environmental factors (e.g., temperature, humidity)
- .. Condition of the skin (e.g., healthy vs. damaged skin, dry vs. wet)

Contact urticaria (CU)

- .. In immunologic CU the reaction is an immunoglobulin E mediated early immune response against the sensitizing chemical substance.
- .. Symptoms are itching and hives (urticaria) at the place of contact usually within an hour.
- .. This can be accompanied by (allergic) rhinitis, conjunctivitis, asthma and rarely anaphylaxis
- .. A well-known form of allergic CU is latex-allergy among healthcare and cleaning workers who are wearing latex gloves.

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- .. There is also a non-allergic route (non-immunologic CU), where the chemical directly triggers histamine release in the skin causing urticaria
 - .. Direct CU can be caused by stinging-nettle, preservatives, additives, dyes, fruits, vegetables, cobalt.
 - .. Tackling CU is more difficult, because it requires a total elimination of the allergen due to the risk of the more serious complications; thus change of job is more frequently recommended to avoid/ prevent exposure

MOST COMMON FOOD ALLERGENS



TREE NUTS



SOY



FISH



PEANUTS



SHELLFISH



EGGS



WHEAT



DAIRY

Occupational Skin Cancers

- .. The second m/c form of occupational skin diseases
- .. About 17% of all cases of occupational skin diseases
- .. Risky exposures include:
 - ✓ Ultraviolet light
 - ✓ Ionizing radiation
 - ✓ Poly cyclic aromatic hydrocarbones
 - ✓ Arsenic



Other occupational skin ailments:

Occupational acne



- .. These are comedos (pinheads), papules and pustules caused mostly by industrial oils and greases .
- .. Unlike common acne, these eruptions manifest at the site of skin contact.
- .. Tar derivatives and halogen-containing compounds (polychlorinated naphthalenes), iodides and bromides) may cause acne, just like certain pharmaceuticals.
- .. Car mechanics, maintenance workers are most at risk.



Hyper pigmentation

- ⌘ Darkening of the skin from chronic physical irritation (e.g., itching)
- ⌘ Some chemicals may stimulate the production of melanin (thus darkening)
 - n Tars, arsenic compounds, plant sensitizers.

Skin diseases of physical origin

- .. Physical exposures range from direct stimuli and thermal conditions to radiation.
- .. Mechanical trauma

Recurring rubbing or increased pressure can thicken the inflamed skin with “crazy-paving pattern” (lichenification) and callosity (ref).

Called occupational stigmas are frequent at body parts exposed: shoulders of sack carriers, fingertips of guitarist.







Temperature

Heat ..

Sweat stagnation can cause miliaria . 🗑

Overlapping skin surfaces can become sodden, ending up in intertrigo. 🗑

Cold temperature ..

Reynaud-like symptoms (blanching attacks of fingers) 🗑
frostbites. 🗑



6) Miliaria or prickly heat (sweat rash)
is a skin disease marked by small and itchy rashes.
Miliaria is a common ailment in hot and humid
conditions

Skin Diseases of Biological Origin



Bacterial infections

- .. Occupational pyodermas (folliculitis, furuncle, carbuncle, impetigo, ecthyma, paronychia, etc.)
- .. Skin tuberculosis

Fungal infections (mycoses)

- .. Yeast infections
- .. Candida albicans,
- .. onychomycosis (nail),
- .. paronychia (around the nail bed),
- .. interdigital mycosis (between the fingers or toes).



Viral skin diseases

- .. Milker's nodules

Parasitic skin lesions

- .. Arthropod bites from animal parasites
- .. Bee and wasp
- .. Scabies is caused by *Sarcoptes scabiei*.

Prevention of Occupational Skin Damage


- .. Elimination
- .. substitution
- .. Engineering Controls
 - ✧ process re-design to eliminate or reduce contact, automation, closed systems
 - ✧ Make plans for spills and leaks
- .. Administrative Controls
 - ✧ Training, personal hygiene (remember lead and ingestion), barrier creams, rotation
 - ✧ Requires all workplaces contain a basin for washing, hot and cold running water, soap, clean towels or hot air dryers
- .. PPE: gloves, aprons, boots, full body suits, face shields, goggles
 - ✧ Provide a barrier; meet specifications for degradation and permeation




Ionizing Radiation

Ionising radiation

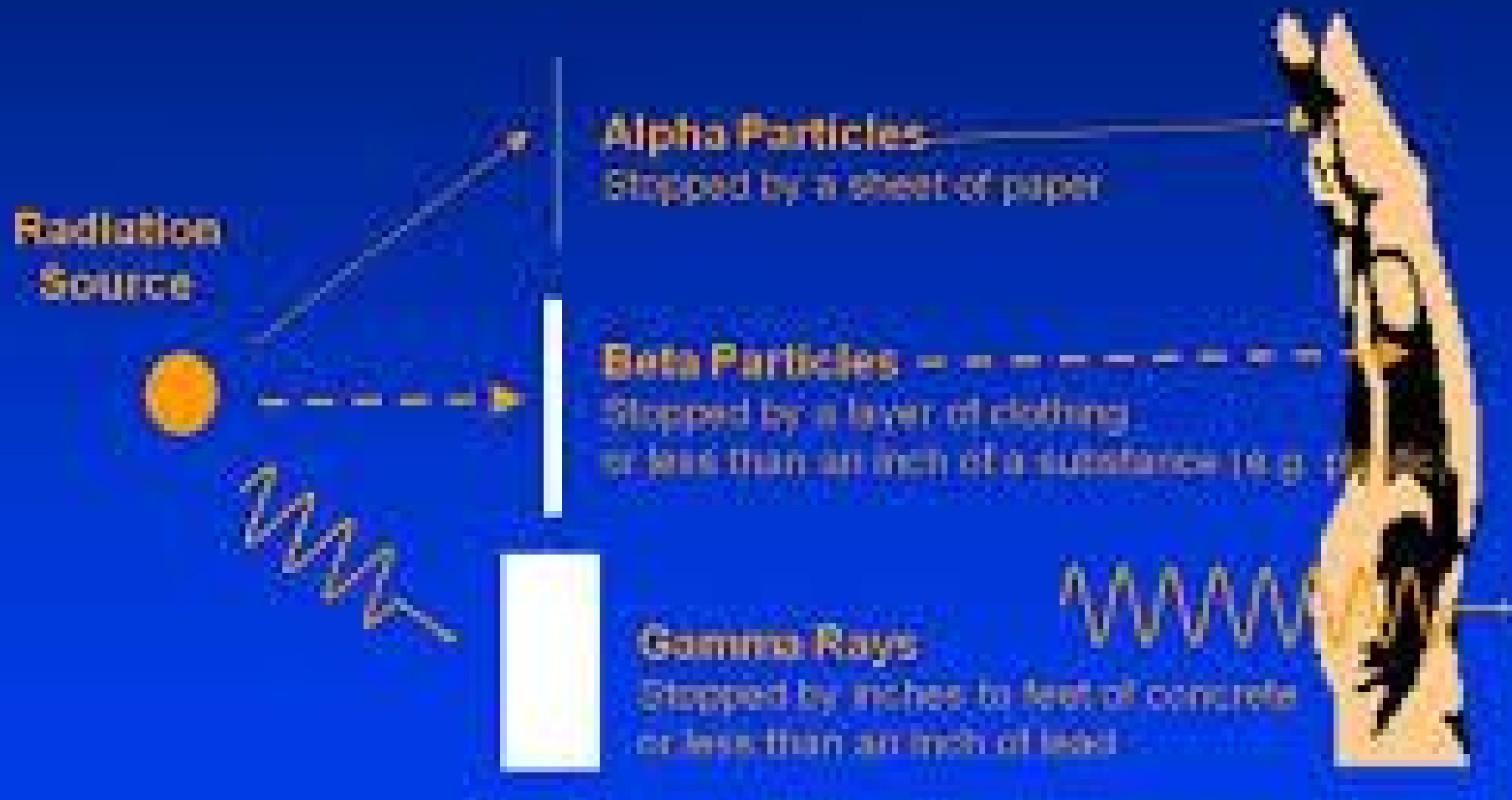
- .. Ionising radiation can be described as the transfer of energy in the form of particles (such as alpha and beta particles) or electromagnetic waves (such as X-rays and gamma rays) capable of producing ions directly or indirectly.
- .. Ionising radiation can occur naturally (e.g. from the radioactive decay of natural radioactive substances such as radon gas and its decay products) or it can be generated artificially (e.g. man-made radioactive substances or the operation of certain electrical equipment, such as X-ray sets, which emit ionising radiations).

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- .. The effect on body tissues will depend on:
 1. the type of radiation,
 2. the dose and duration of exposure
 3. whether the source is internal or external to the body.

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- .. There are three types of nuclear radiation: alpha, beta and gamma.
 - .. Alpha is the least penetrating, while gamma is the most penetrating.
 - .. Nonetheless, all three are ionising radiation: they can knock electrons out of atoms and form charged particles.



Types of Ionizing Radiation



Types of Ionising Radiation

- .. Alpha radiation represents the nucleus of helium atoms that are often called alpha particles (α).
- .. They are positively charged particles
- .. These particles are big.
- .. If an alpha source is outside the body, the alpha radiation will not cause any harm to the human body since radiation will not reach the skin.

Types of Ionising Radiation: cont.

- .. Beta radiation consists of small, high-energy, and high-speed electrons emitted by certain types of radioactive nuclei.
- .. They are actually an ejected electron.
- .. If beta radiation reaches the human body, it can cause skin burn or blindness if the eyes are exposed.
- .. Internal organs will not be damaged (unless β -radiation emitters are deposited internally e.g. by ingestion) since beta radiation stops in 1 to 2 cm of tissue.

Types of Ionising Radiation: cont.

- .. Gamma particles have no mass and no electric charge called photons.
- .. They are the same particles as those that represent visible light but have much higher energy.
- .. Since they have no mass and no electric charge, it is difficult to stop.
- .. X-rays also ionise atoms. They behave the same as gamma rays, except that their energy is lower

Sources



- .. Ionising radiation sources are used in medicine (for diagnosis and treatment in oncology)
- .. Industry (for measurement and other purposes as well as for producing energy)
- .. Research and teaching.

Effects



- .. Ionising radiation ionises atoms in all matter including the human body.
- .. Cause cell damage death.
- .. OR radiation damages **cell DNA**
- .. If the damaged cell survives, it can mutate and reproduce and **cancer** can occur.

Dose Limit

- .. The most important dose limit is the annual dose limit of 20 mSv. It means that a worker can receive a dose of 20 mSv per year from ionising sources they are working with.
- .. Natural background radiation due to radioactivity in soil, water, air, food, on average the annual dose is around 2 mSv
- .. So a worker using ionising radiation sources can receive ten times the dose of the natural background at the workplace.

Pregnant and Nursing Mothers

- For women, there are special limitations during pregnancy or breast feeding.
- Pregnant woman can work in a radiation area but the dose to the foetus must be below 1 mSv during pregnancy.
- Breast feeding woman can work in a radiation area when only exposure to external radiation is possible (X-ray devices or encapsulated radioactivity sources). In that case, the limit of 20 mSv per year applies.
- A breastfeeding mother is not allowed to work in an area where contamination and intake of radioactivity is possible.

Protection



- .. To keep radiation doses low, three methods are used: time, distance and shielding.
- .. The dose is proportional to the time of exposure
The more time one is exposed to ionising radiation, the larger the dose that will be received and the more harmful the radiation will be.
- .. The radiation reduces with the distance from the source.

Protection: Cont.

- .. Shielding: There are activities that require workers to be close to the source and in a high radiation field.
- .. In that case, we minimise the doses by using shielding and protective clothing.
- .. When working with X-ray devices in medicine, the most common personal protective clothing is lead aprons. Lead aprons made of 0.25 mm thick lead attenuate X-rays more than 100 times.
- .. In some cases when eyes are exposed, spectacles made of lead glass are used as protection. Also, lead gloves can be used, however such gloves are quite thick and not appropriate for detailed work.



thank
you!