AGROSH+

"OSH+ for the European Agriculture sector - Stimulating growth in rural areas through capacity building for providers (and beneficiaries) of occupational medicine and OSH services"

Module 6: Skin diseases for employees working in Agriculture

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Main risk factors for development of skin diseases among the agricultural workers (1)

1. **In Agriculture.**

- Outdoor work – UV light exposition, sun burning risk and risk for malignant transformation (skin cancer).
- Outdoor work with pesticides, insecticides, plant foods are potential risk factors for development of atopic dermatitis and anaphylactic reactions.
- Greenhouse work with pesticides, insecticides, plant foods as a potential risk factors for development of skin allergic disorders.

Main risk factors for development of skin diseases among the agricultural workers (2)

- Working with oil products (petroleum, oils, cleaning liquids) in the maintenance of the machinery as risk factor for developing of skin allergic disorders.
- Possible infections with skin form of anthrax in manipulation work and dry soils.
- **2. Livestock**
- Workers in pig farms, ruminant animal (cows and sheep) farms and poultry are exposed to development of skin forms of a number of zoonotic diseases, like brucellosis, tuberculosis, tularemia.

Diseases of the skin for employees working in agriculture

Most occupational skin disease results from contact with a chemical substance, of which there are more than 90,000 in the environment today.

Under certain conditions, all of them can irritate the skin, and approximately 2000 substances are now recognized as contact allergens.

In addition, workers bring to their work preexisting diseases, which can be aggravated by their work.

Contact dermatitis (CD)

CD can be subdivided into:

- irritant contact dermatitis (ICD) and
- allergic contact dermatitis (ACD)

Contact dermatitis (CD) of the hands is the most common occupational skin disease and atrophy is often an important cofactor.

Occupational contact dermatitis accounts for 90% of all cases of work-related cutaneous disorders (Sasseville D, 2008)

CONTACT DERMATITIS (CD) - Etiologic factors Allergens

- Chromate
- Epoxy resins
- Biocides
- Formaldehyde
- Fragrances
- Rubber chemicals
- Methacrylate
- Plants

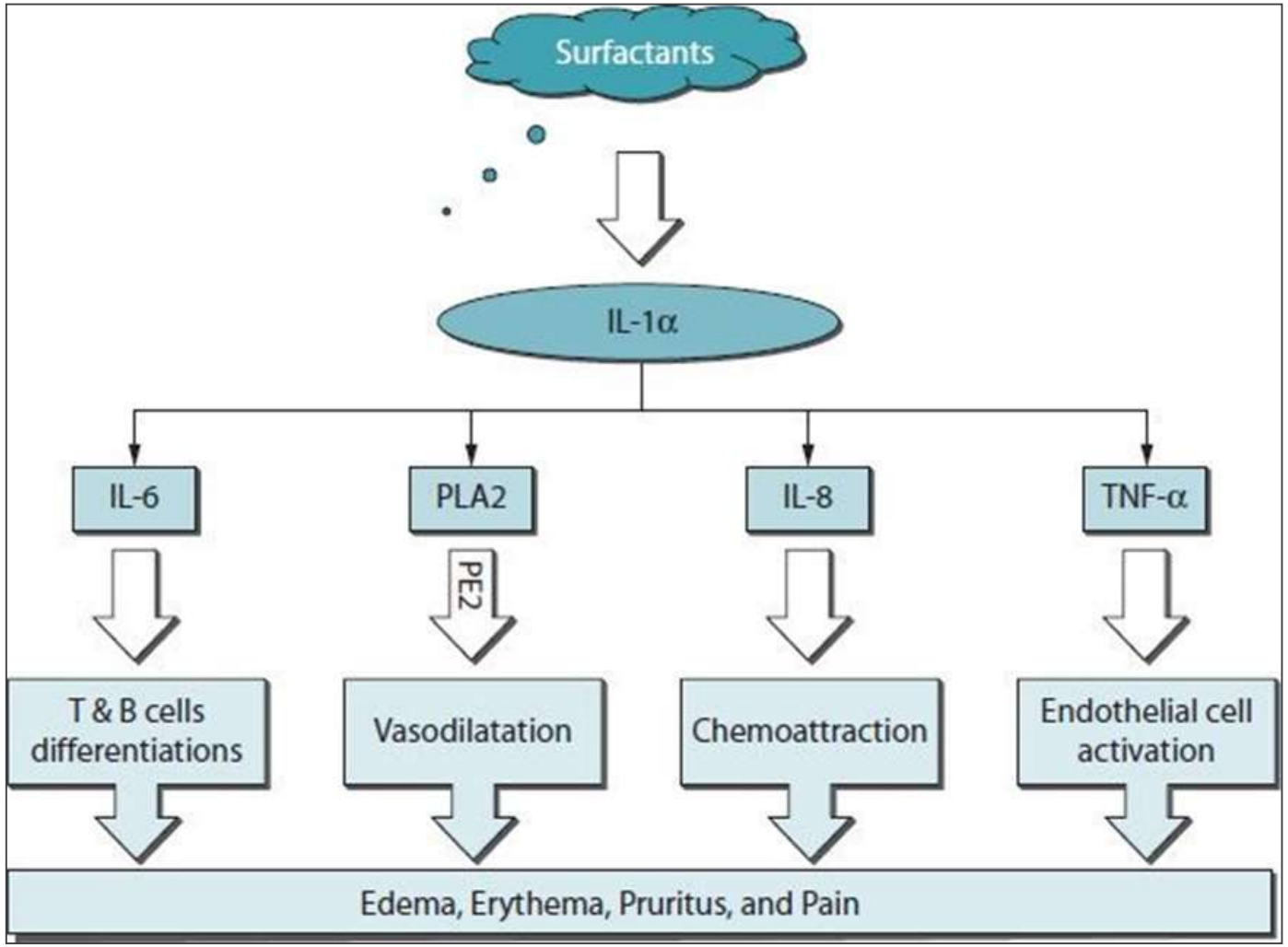
Occupational Dermal Irritants

- Acids and alkalis
- Plants (Bristles, thorns; Calcium oxalate: dieffenbachia, philodendron, daffodil, agave; Phototoxic psoralens: Apiaceae, Rutaceae;
- Particles (sand, fine wood dust, metals, etc.);
- Solvents (Aliphatic: gasoline, petroleum, kerosene; aromatic: toluene, xylene, benzene; halogenated; miscellaneous: water, turpentine, alcohols, etc.;
- Detergents, soaps, disinfectants;
- Metal salts (chromium, nickel, etc.);
- Plastics and resins

Irritant Contact Dermatitis (ICD)

- ICD is a non-immunogenic skin reaction to toxic substances either in low or high concentrations. Any substance (including water after long-term exposure) has a potential to cause skin irritation. Skin exposure to irritating toxic substances in low concentrations over a long period is a predisposing factor, as are atopic skin diathesis and hyperhidrosis.
- ICD results from direct cytotoxic effect, the denaturation and de-lipidation of the lipid-rich stratum corneum leading to altered barrier function and trans-epidermal water loss. This may result in the further penetration of and damage to the deeper epidermal layer containing living keratinocytes.

Pathophysiology of irritant contact dermatitis (ICD).



Irritant contact dermatitis (ICD) – symptoms and signs

Acute and subacute effects:

- Single exposure to a strong irritant / is sufficient
- Usually hands are involved
- Raw appearance and erythema of the affected body part
- Demarcated areas from the normal skin
- Cracking/chapping of the affected body part
- Fissure
- Bleeding
- Pustular skin changes
- Pain or burning sensation with or without visible skin changes
- Skin itching (less than in ACD)
- Immediate (in chemical burns)
- Chronic effects (repeated exposures required, to weak irritants)
- Skin dryness
- Hyperkeratosis
- Skin wrinkling
- Development of allergic contact dermatitis
- Everyone who is exposed can be affected

ICD – diagnosis

Special Test:

- The diagnosis of ICD is often confirmed by exclusion of allergic contact dermatitis.
- Patch testing is necessary to rule out allergic contact dermatitis, but it should be emphasized that testing should be avoided with irritants unless in nonirritant concentrations.

Allergic Contact Dermatitis (ACD)

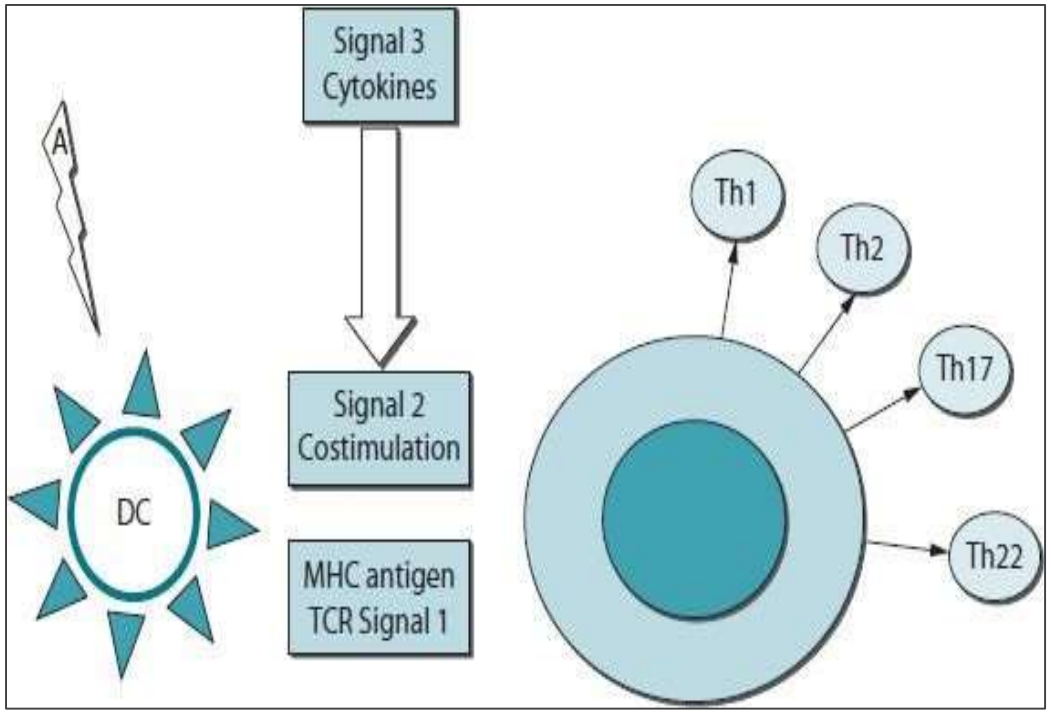
ACD is an **immunologic reaction** classified as a delayed type IV or T cell-mediated hypersensitivity. This distinguishes it from type I reactions, which are immediate and antibody mediated.

Risk factors:

- Development of ACD results from a very complex interplay of inherited risk factors such as polymorphism (genetic variations) and acquired risk factors like include atopic dermatitis, ICD, and venous stasis.

Pathophysiologic mechanisms of action

- Langerhans cells (LCs), epidermal and dermal dendritic cells (DCs) play vital roles in the sensitization and elicitation of ACD.
- Lymphocyte-mediated immune mechanisms in contact allergy in sensitization phase. The contact allergen interacts with dendritic cells in the skin via “pattern recognition receptors” such as TLRs (Toll-like receptors).
- Subsequently native T helper (Th) cells are polarized upon specific recognition of the haptenate allergen by the major histocompatibility complex (MHC), costimulatory signals and cytokines such as IL-12, IL-4, IL-1b, and IL-6.
- This process is followed by the elicitation phase where haptene-specific cytotoxic CD8 T lymphocytes (CTLs) release inflammatory cytokines and induce disease-specific local skin lesions following re-exposure of the skin to the same contact allergen.



Allergic Contact Dermatitis (ACD) – symptoms and sign

Once allergic sensitization has occurred, the dermatitis begins within 24–48 hours after contact

- Pruritus—very prominent feature
- Erythema—usually rapid
- Papule formation
- Vesicles
- Blistering
- Acute to subacute eczema with vesiculation

Allergic Contact Dermatitis (ACD) – diagnostic methods

Patch Testing - the key to diagnosis of allergic contact dermatitis is diagnostic patch testing.

Two methods is used:

- Finn chamber
- T.R.U.E. test – Thin-layer Rapid Use Epicutaneous patch test.

Contact Urticaria (CU)

Develops within minutes to an hour following contact with a substance

Types of Contact Urticaria

- Non-immunologic (Non-allergic) Contact Urticaria - with sufficient provocation, nearly all exposed individuals will develop a reaction. Previous sensitization is not necessary. Gardeners may develop reactions from contact with nettles and other plants, caterpillar hair, moths, and other insects; cooks from cinnamic acid and aldehyde, sodium benzoate, sorbic acid, fruits, vegetables, fish, and meat; and medical personnel from alcohols, balsam of Peru, and dimethyl sulfoxide.

- Immunologic (Allergic) Contact Urticaria - caused most commonly by latex for workers who must wear gloves throughout the workday.

They are Ig E mediated type I immediate hypersensitivity reactions.

Occupational etiology of a contact dermatosis

- Occupational exposure to cutaneous irritants or allergens;
- Removal from exposure can cure or diminish the symptoms;
- Contact dermatitis aspect;
- Local distribution of the lesions (contact zone, initial);
- Differential diagnosis with non-occupational exposures
- Specific tests at workplace noxious.

Treatment of ICD and ACD

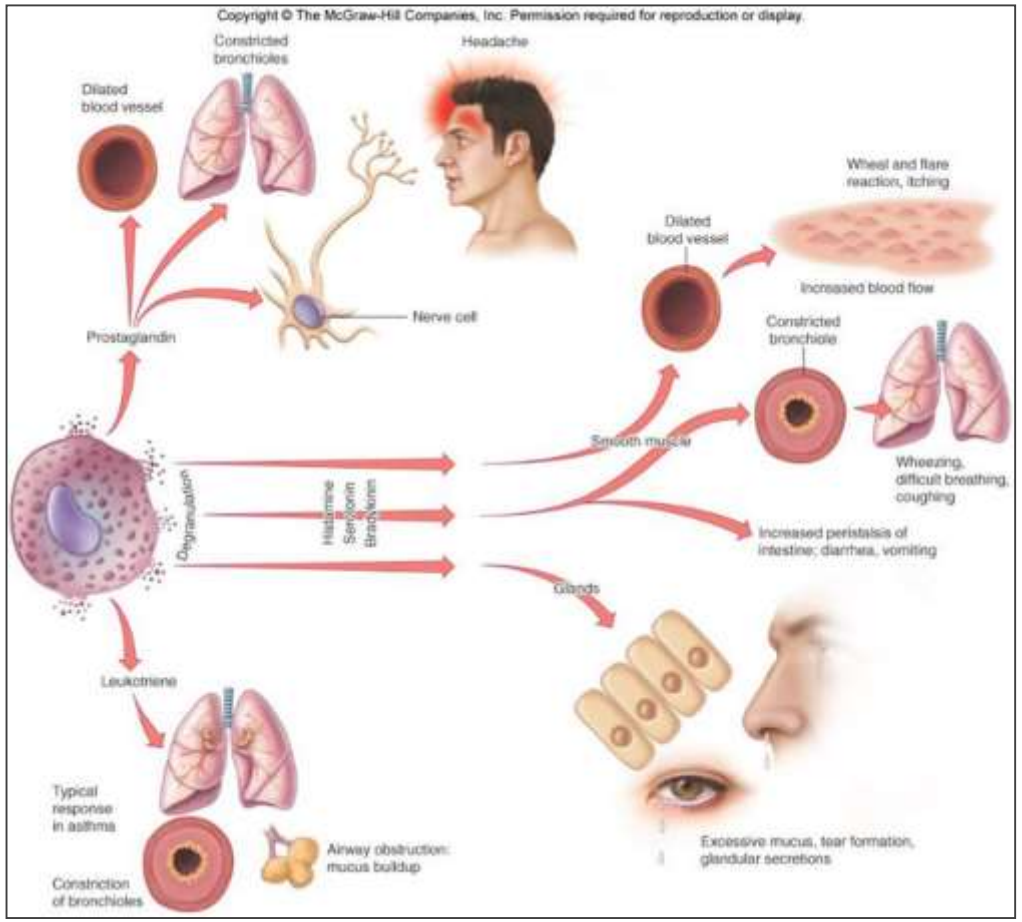
- Skin Cleaners
- Antibiotics
- Barrier creams
- Emollients
- Corticosteroids

Prevention of Contact Dermatitis

- Identification of potential irritants and allergens in the workplace
- Chemical substitution or removal to prevent recurrence
- Protective Clothing and Gloves
- Personal protective measures
- Personal and environmental hygiene
- Education to promote awareness of potential irritants and allergens both at work and at home
- Pre-employment and periodic health screening and
- Engineering controls with automated, closed systems

Anaphylactic shock

The most severe condition happening after second meeting with the allergen previously sensitized host immune response. Histamine liberation causes vascular increase permeability, bronchial constriction, peripheral vasodilation, hypotension and shock.



Pathophysiologic principles for anti-allergic treatment

- Anti-histamine drugs
- Corticosteroids
- Adrenaline (epinephrine) – EpiPen therapy

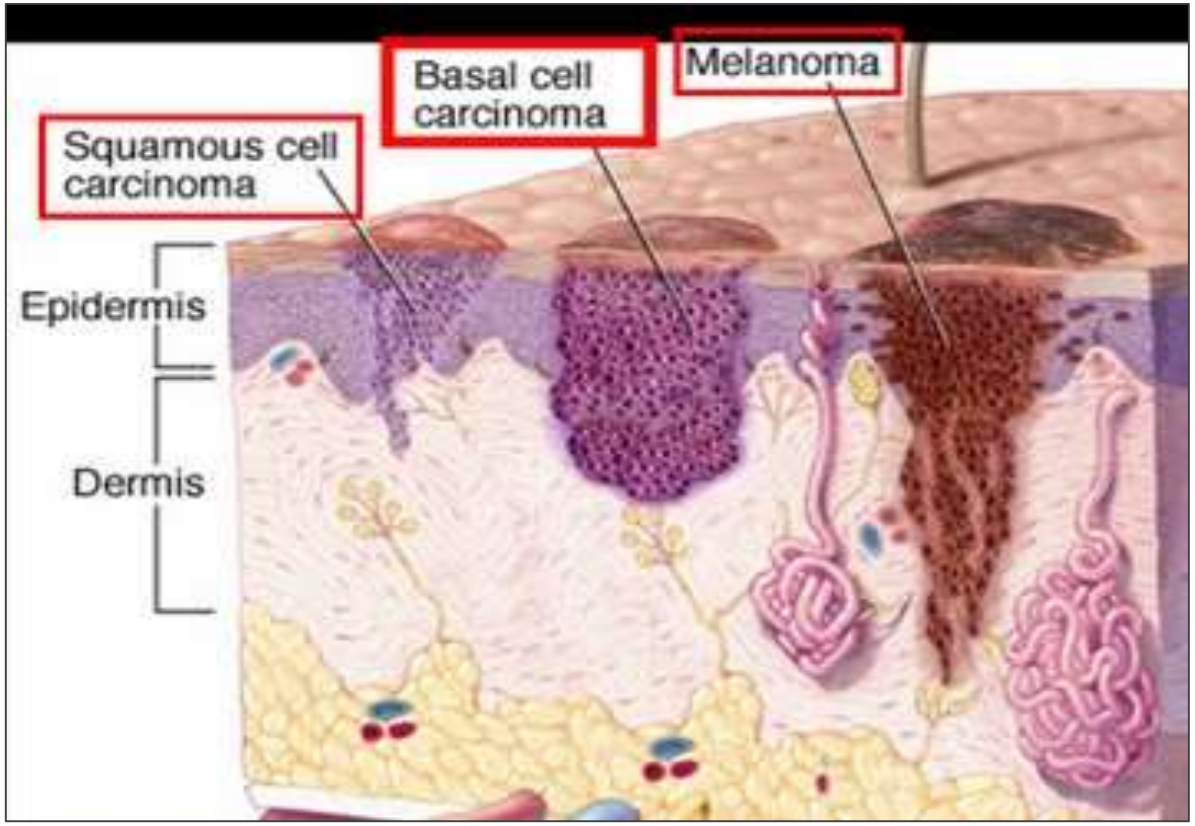
Skin diseases related with sunlight exposure

Exposure to sunlight can cause different skin disorders as trauma and different stages of burning with their complications. Workers in agriculture are the group with highest risk for prolonged sunlight exposure.

The primary carcinogenic action spectrum of sunlight is in the UVB range (290–320 nm), but UVA (320–400 nm) rays also are photo-carcinogenic. UVA rays accelerate UVB-induced malignancy.

Professionals who are at risk of developing skin cancers as a result of chronic sun exposure include farmers, horticulturists, especially with fair skin and light or ginger hair.

Skin cancer



- Melanoma

- Spinocellular carcinoma

- Basal cell carcinoma

Biological causes for skin diseases

Bacterial diseases

- Staphylococcal and Streptococcal infections - these infections are common in certain occupations, especially agricultural and construction workers, butchers, meat packers, and slaughterhouse workers. To put correct diagnosis needs skin samples investigated microbiologically.

- Treatment is local and systemic with specific antibiotics.

Cutaneous tuberculosis – Mycobacterium infection

Mycobacterium tuberculosis hominis is skin acquired infection through inoculation.

The typical skin lesions are slowly progressive, warty, hyperkeratotic plaques, which, if left untreated, eventually regress after many months or years, leaving disfiguring scars;

Sometimes diagnosis is difficult;

Treatment takes long time and workers loose many workdays for specific tuberculostatic cure.

TUBERCULOSIS OF SKIN

Cutaneous Leishmaniasis

The disease is transmitted by sandflies via blood sucking

The incubation period is two to eight weeks, although longer periods have been noted.

Typical manifestation of Leishmania tropica infection includes persistent cutaneous ulcers healing with scar tissue

Treatment - pentavalent antimonials.

Physical causes - Mechanical trauma

Agricultural workers are permanent exposed to the different risk factors – one group from environmental changes and the other group from their equipment and machinery.

Results will be corns and calluses; painful; fissures and profound wounds which may become infected.

Mechanical trauma could lead to disability to work or early retirement even to death.

Recommended dermatologic examinations for occupational physicians

History	Diagnosis
Job description	Support for diagnosis
Current treatment	Discussion
Present complaints	Disability status
Medical history	Factors of disability Subjective Objective
Family history	
Social history	Apportionment
Personal data	Future medical care
Medical record review	Vocational rehabilitation
Physical examination	Work restrictions

CONCLUSION

- Skin disorders related with agriculture work are from one hand easy to be diagnosed after appearances of first symptoms, but from other hand for occupational physician is difficult to make decision whether there occupational diseases in fact has began or problem has appeared earlier and out-side of the working place.
- Job description and Exposure assessment of the risk factors will help for right decision.
- The occupational physician will better manage the risk of exposure to risk factors for skin diseases towards the medical and physical condition of each employee. In this respect, collaboration with family physician will be of great importance.

RECOMENDATION

- The occupational physician will better manage the risk of exposure to risk factors for skin diseases towards the medical and physical condition of each employee. In this respect, collaboration with family physician will be of great importance.
- The occupational physician is recommended to give specialized support to workers and employers to learn and implement procedures and prevention programs to better working conditions.
- The occupational physician will take into account that weather conditions of concern may significantly influence other occupational risk factors. Irritated and undid skin help, absorption of toxic substances. In this respect, a holistic approach is recommended in risk assessment and risk management.