Airborne Contact Dermatitis

Jean-Marie Lachapelle

Contents

1 Core Messages ................................................................. 2
2 Introduction ........................................................................... 2
3 Airborne Offending Agents .................................................. 3
4 Classification of Occupational Airborne Skin Diseases .......... 4
5 Occupational Airborne Irritant (Frictional and/or Chemical) Contact Dermatitis .... 5
  5.1 Airborne Irritant Contact Dermatitis Due to Fibers .................. 5
  5.2 Airborne Irritant Contact Dermatitis Due to Dust Particles .......... 7
  5.3 Airborne Irritant Contact Dermatitis Due to Sprays, Vapors, and Gasses .... 8
6 Occupational Airborne Allergic Contact Dermatitis ................. 9
  6.1 Clinical Symptoms .......................................................... 10
  6.2 Differential Diagnosis ...................................................... 11
  6.3 Main Allergens ............................................................... 11
7 Occupational Airborne Phototoxic and Photoallergic Contact Dermatitis .......... 13
8 Occupational Airborne (Immunological and/or Nonimmunological) Contact Urticaria .. 13
9 Exacerbation of “Extrinsic” Atopic Dermatitis by Aeroallergens ............ 14
10 Diagnostic Procedures ......................................................... 15
11 Prevention and Treatment ................................................... 16
References ............................................................................. 16

Abstract

Occupational airborne irritant (frictional and/or chemical) contact dermatitis is due to fibers, dust particles, vapors, and/or gasses.

Occupational airborne allergic contact dermatitis is a common problem, provoked by a large variety of allergens.

Occupational airborne phototoxic and/or photoallergic contact dermatitis is a rare but well-documented event.

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Occupational airborne immunological contact urticaria can be caused by several chemicals and/or proteins. Allergy to latex proteins was the main problem, but it is declining at the present time.

There is a vast range of procedures available to reach a proper etiological diagnosis of airborne contact dermatitis.

Prevention and treatment of airborne contact dermatitis deserve special attention and must be adapted to each individual situation.

“Extrinsic” atopic dermatitis (face and neck dermatitis) is related to the penetration into the skin of aeroallergens, particularly dust mite.

**Keywords**

Airborne irritant contact dermatitis · Airborne allergic contact dermatitis · Airborne phototoxic contact dermatitis · Airborne photoallergic contact dermatitis · Airborne immunological contact urticaria · Dust particles · “Extrinsic” atopic dermatitis · Fibers · Gasses · Latex proteins · Vapors

### 1 Core Messages

- Occupational airborne irritant (frictional and/or chemical) contact dermatitis is due to fibers, dust particles, vapors, and/or gasses.
- Occupational airborne allergic contact dermatitis is a common problem, provoked by a large variety of allergens.
- Occupational airborne phototoxic and/or photoallergic contact dermatitis is a rare but well-documented event.
- Occupational airborne immunological contact urticaria can be caused by several chemicals and/or proteins. Allergy to latex proteins was the main problem, but it is declining at the present time.
- There is a vast range of procedures available to reach a proper etiological diagnosis of airborne contact dermatitis.
- Prevention and treatment of airborne contact dermatitis deserve special attention and must be adapted to each individual situation.
- “Extrinsic” atopic dermatitis (face and neck dermatitis) is related to the penetration into the skin of aeroallergens, particularly dust mite.

### 2 Introduction

Most patients consulting in occupational dermatology are referred to as contact dermatitis cases; conceptually, the term “contact dermatitis” implies a direct contact of the skin with the offending (liquid and/or solid) agents. It is not surprising that in this respect, hand dermatitis is the major complaint; this is due to a direct manipulation – at work – of thousands of different products. It is clear that other skin sites
can also be affected, either directly or indirectly (transfer of chemicals by hands; so-called by proxy contact dermatitis).

Apart from this “familiar landscape” the occurrence of occupational airborne dermatoses, that is, due to agents carried by or through the air, has been underestimated in the past. Pirilä (1950) was the first to promote the concept of airborne dermatoses on clinical and experimental grounds. In his extensive paper, the author called attention – almost exclusively – to allergic conditions, referring for instance to the cases of thiokol dermatitis he had observed in Finland after World War II. Later on, examples of occupational dermatoses closely related to airborne skin offenders were occasionally reported throughout the relevant literature (Pirilä et al. 1963).

In the 1980s, more attention was paid to the problem, after the publication of two review articles (Lachapelle 1986; Dooms-Goossens et al. 1986). Santos and Goossens (2007) have updated in a review paper (2001–2006) a list of offending agents able to provoke airborne contact dermatitis. They consider that the figures were underestimated for two main reasons: (a) many original cases are never published, and (b) in some papers, the term “airborne” does not appear in the key words, and the publications are therefore omitted in general reviews.

Nowadays, each year brings a blossom of new observations, coming from various parts of the world. These publications reflect the diversity of problems encountered, in relation with new chemicals and/or modified technical procedures. A better knowledge of occupational airborne dermatoses has practical implications, in terms of diagnosis, treatment, and prevention. A new updated list of aeroallergens has been actualized (Swinnen and Goossens 2013). There is a clear distinction to be made between airborne dermatoses and the “sick building syndrome”; the latter refers to epidemics of subjective symptoms (itching or burning sensations) without any clinically visible signs, which occur in the work environment. This situation can be related, for instance, to a low relative humidity rate in the air but may also represent a mass psychogenic illness (Lachapelle 2014).

Two papers are of particular interest for initiating a differential diagnosis between both conditions. One is referring to the skin disorders among construction workers following Hurricane Katrina and Hurricane Rita (Noe et al. 2007); the other deals with airborne occupational dermatoses experienced by aircrew (Legatt and Smith 2006).

### 3 Airborne Offending Agents

Airborne offending agents are present under various forms:

**Fibers**

Different types of fibers can be implied (Stam-Westerveld et al. 1994). The most classical example is fiberglass. Other examples include rock wool, carbon fibers, plastic materials such as polypropylene fibers, etc. Fibers can be chemically inert and provoke only mechanical trauma to the skin. Carbon fibers’ dermatitis and
most cases of fiberglass dermatitis are good examples of this condition. On the other hand, some fibers can produce allergic reactions, such as epoxy-coated fiberglass.

Dust Particles
Dust is ubiquitous in the work environment. Dust particles are transported by air; they can accumulate on the surface of the skin, in a visible way or not. Like fibers, some dust particles are chemically inert but can provoke mechanical (frictional) injury to the skin, whereas others do contain chemicals which are dissolved by the sweat; according to their nature, these chemicals are responsible for several types of skin reactions (Lachapelle 1987).

Sprays
Water or other liquid-based products moving in a mass of dispersed droplets represent an important source of airborne offending agents. Any of numerous commercial products, including paints, cosmetics, and insecticides that are dispensed from containers in this manner, are good examples. Skin reactions are multifaceted: irritant, eczematous, urticarial, or combined.

Vapors and Gasses
Vapor is defined as barely visible or cloudy diffused matter, such as mist, fumes, or smoke, suspended in the air. Gas has a more restricted meaning. Vapors and gasses may be like sprays: irritant, allergenic, or both.

4 Classification of Occupational Airborne Skin Diseases

Two categories of occupational airborne skin diseases have to be considered.

(a) “Systemic” occupational airborne skin diseases
Some skin conditions are as a result of the toxic effects of chemicals that have been absorbed by the body tissues either by inhalation or by transdermal penetration. We have coined the term “systemic” occupational airborne skin disease, by analogy with the term “systemic contact dermatitis” (Lachapelle 2017).

The most classical example is chloracne that, although rare, may serve as an extremely important indicator of internal poisoning and should be recognized by physicians treating occupational skin disease. Chloracneigenic substances such as polyhalogenated naphthalenes are well known (Coenraads et al. 1994); tetrachloro-2,3,7,8 dibenzo-p-dioxin was the agent incriminated in the Seveso catastrophe, which occurred in northern Italy in 1976.

Another example of “systemic” occupational airborne skin disease is lepidopterism, a syndrome including all symptoms due to airborne contact with the barbed hairs of pine tree processionary caterpillars, that is, pruritic rash, conjunctival hyperemia, dyspnea, wheezing, and more exceptionally anaphylaxis. Foresters and agricultural workers are at risk. More generally, it is a growing public health problem: There is an increasing number of outbreaks. Children are also affected and often more severely than adults (Gottschling et al. 1987).
A little while ago, there has been an invasion of caterpillars in Northern Europe, due to a gradual warming of the atmosphere, whereas they are usually confined to Southern Europe.

(b) Occupational airborne contact dermatoses
This group refers to all skin symptoms directly related to airborne contact of the skin with the accountable agents. In fact, all varieties of contact dermatoses due to direct contactants can also be provoked by airborne contactants. Furthermore, in many cases, direct contact and airborne contact can occur simultaneously; contact urticaria to latex proteins (Lagier et al. 1990) or allergic contact dermatitis to epoxy resins (Le Coz et al. 1999) represents two good examples of such situations.

A classification of occupational airborne contact dermatoses has been proposed in Table 1. Although no specific criteria do exist to assess an airborne origin, some morphological and/or topographical aspects can help in the diagnostic procedure, as explained in the next paragraphs.

5 Occupational Airborne Irritant (Frictional and/or Chemical) Contact Dermatitis

5.1 Airborne Irritant Contact Dermatitis Due to Fibers
Subjective symptoms are always present. Itching, stinging, and burning sensations are the usual complaints of many patients, with or without objective signs. In particular, facial complaints are not often accompanied by detectable lesions; they correspond to the so-called subjective irritant dermatitis. The eyelids, cheeks, nasal folds, and neck are commonly involved.

Subjective symptoms may occur not only on covered parts of the body, mainly in the flexures (axillae, groins, cubital, and/or popliteal fossae) but also on the extensor aspects of the limbs or on the trunk.

Objective symptoms are usually present but vary in severity from case to case. Scratch marks, tiny papules, or a maculopapular rash is the usual lesion (Fig. 1). Severe cases could involve secondary infection (pustules) from scratching. The most typical example quoted in the literature is fiberglass dermatitis. Symptoms include

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Classification of occupational airborne contact dermatoses</th>
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<tbody>
<tr>
<td>1.</td>
<td>Occupational airborne irritant (frictional and/or chemical) contact dermatitis</td>
</tr>
<tr>
<td>2.</td>
<td>Occupational airborne allergic contact dermatitis</td>
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<td>3.</td>
<td>Occupational airborne phototoxic contact dermatitis</td>
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<td>4.</td>
<td>Occupational airborne photoallergic contact dermatitis</td>
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<tr>
<td>5.</td>
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</tr>
<tr>
<td>6.</td>
<td>Exacerbation of “extrinsic” atopic dermatitis by aeroallergens</td>
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itching and prickling in the skin areas coming into contact with fiberglass spicules present in the work environment. Scratch marks, papules, and pustules are sometimes present (Fisher 1982; Koh et al. 1992). To some extent, it may resemble scabies.

The presence of fibers encrusted in the horny layer of epidermis is clearly shown by the skin surface biopsy technique (Marks and Dawber 1971). The method consists of the following very simple steps: (a) a drop of cyanoacrylate glue is placed on the skin; (b) a clear glass slide is gently pressed on the drop for 30 s; and (c) the slide is then removed. A slight modification consists of using polyester tape instead of glass as holder (Lachapelle et al. 1977). Foreign material present at the surface of the skin or encrusted in horny cells is removed with the adhesive which remains attached to the glass slide or the plastic sheet; it can be visualized under the microscope.

Fiberglass dermatitis is still a very important problem in occupational dermatology, as mentioned in recent papers (Cusano and Mariano 2007; Bordel-Gomez and Miranda-Romero 2008; Lundgren et al. 2014). A very interesting contribution has been made about the size and configuration of glass fibers by scanning electron microscopy (Hsieh et al. 2001).
Other examples of fibers’ dermatitis include glass wool, rock wool, carbon fibers, ceramic fibers, polypropylene fibers, urea-formaldehyde insulating foam, etc. In all cases, the symptoms are similar to those observed in fiberglass dermatitis but are usually milder. It is obvious that clinical manifestations are due to a mechanical effect, either frictional or consecutive to encrustment of fibers into the skin. The diameter of fibers seems crucial to explain the severity of skin symptoms (Lachapelle 1986; Stam-Westerveld 1997).

In our experience, the diameter of most fibers incriminated in airborne contact dermatitis was comprised between 6 and 20 μm. Atopics are undoubtedly more prone to develop severe symptoms than nonatopics (Björnberg et al. 1979). This can be clearly demonstrated when epidemics of fiberglass dermatitis do occur in factories. Björnberg was a visionary at that time; his work has been underestimated, but nowadays, new developments in the comprehension of atopic dermatitis confirm his studies, based upon epidemiological investigations.

More recently, an outbreak of eight cases of occupational airborne irritant contact dermatitis has been reported in intensive care unit employees caused by synthetic (polypropylene and polyethylene) fibers from an air-conditioning filter (Patiwael et al. 2005). High filter pressure in the intensive care air-conditioning system, maintained to establish an outward airflow and prevent microorganisms from entering the ward, probably caused fibers from the filter to become airborne. Most patients recovered quickly after treatment with emollients and changing the filters.

And, finally, what about asbestos fibers? When asbestos was used extensively as an insulation procedure, very little was said about the potential irritant properties of asbestos. This is probably due to several factors: (a) asbestos is a mixture of dust and fibers; (b) most fibers have a diameter <1 mm; and (c) asbestos fibers can split longitudinally, which reduces even more the mean diameter of fibers.

An extensive program of removal of asbestos fibers is conducted in most industrialized countries, with their replacement by man-made vitreous fibers, such as glass or ceramic fibers. It occurs nowadays that some workers who remove asbestos fibers do complain of itching and prickling sensations, but this is certainly partly related to psychological factors, in relation with the propaganda fueled by the media on the toxicological properties of asbestos (Lachapelle 2006).

5.2 **Airborne Irritant Contact Dermatitis Due to Dust Particles**

Two different situations have to be taken into consideration:

(a) The dust particles are “chemically inert.” Skin symptoms are related to the mechanical (frictional) properties of particles. It is not clear whether the shape of the particles (e.g., particles with sharp edges) plays an important role or not (Fig. 2). Many other concomitant factors are most probably important, such as ambient heat, low humidity, sweating, and/or atopic state. The clinical symptoms are quite similar to those observed with fibers. Facial complaints are usually prominent: the eyelids, cheeks, nasal folds, retroauricular folds, and neck are
commonly involved. Workers wearing ill-fitted masks sometimes complain of itching of the face, due to the accumulation of dust under the mask, particularly in the nasal folds. Subjective and objective complaints can also occur on covered parts of the body, due to the accumulation of dust particles under the garments. Indeed, solid particles can pass easily under protective clothes, most often between sleeves and gloves; dust particles can also accumulate on the skin of the feet even when workers wear safety shoes.

(b) The dust particles are not chemically inert. They release irritant substances (acidic, alkaline, or neutral) that are responsible for true irritant (i.e., chemically-induced) contact dermatitis. When dust material is suspended in distilled water, the pH of the supernatant can be very alkaline, as mentioned in some reports (Lachapelle et al. 1984): anhydrite (pH, 11.2), sewage sludge (pH, 11), and trona (pH, 10.5). Dried industrial dyes show a wide range of pH. In these various situations, clinical symptoms are unequivocally typical of irritant contact dermatitis. Eyelids are preferentially involved, due not only to the accumulation of particles but also to the increased penetration of chemicals into the skin.

Periorbital dermatitis is a common problem encountered in occupational dermatology. Differential diagnosis of this entity is often difficult. Airborne irritant contact dermatitis to dust particles has to be taken into consideration as a potential etiological factor (Feser and Mahler 2009).

5.3 Airborne Irritant Contact Dermatitis Due to Sprays, Vapors, and Gasses

On the contrary of fibers’ and/or dust particles’ dermatitis, which may affect covered as well as uncovered parts of the body, occupational airborne irritant contact
dermatitis related to sprays, vapors, and/or gasses is almost exclusively limited to uncovered parts.

The face and neck are primarily involved. Clinical symptoms are typical of irritant contact dermatitis. Itching, stinging, and burning sensations are the usual complaints that precede the occurrence of a maculopapular rash (Fig. 3). The lesions may be limited to the eyelids (peri orbital dermatitis) or extend to the whole face and neck, sparing some partly protected areas, such as retroauricular folds or the margins of the scalp. Organic solvents, ammonia, and formaldehyde are often quoted as classical offending agents, but many others can be listed, such as acids and alkalis, domestic products (e.g., cleansing products), industrial solvents, carbonless copy paper, or phenol vapors (Dooms-Goossens et al. 1986).

6 Occupational Airborne Allergic Contact Dermatitis

Occupational airborne allergic contact dermatitis seems to be very frequent according to the recent literature.

Airborne “contact” allergens can be volatile (vapors and/or gasses) or transported under the form of sprays (mini-droplets) or present in dust particles: all physical forms are common in the work environment.
6.1 Clinical Symptoms

Clinical symptoms are typical of allergic contact dermatitis. There is no specific sign in relation with airborne contact. Eczematous lesions are symmetrical in most cases (Fig. 4); they are acute or chronic, depending on the environmental conditions: nature and/or concentration of the allergens, frequency of airborne contact, and so on. For instance, dermatitis from wood dust normally starts on the eyelids (Fig. 5) or the lower half of the face, often preceded by a period of itching. Swelling and redness spread to the neck, hands, and forearms. By the time the patient goes for treatment, a diffuse dermatitis might have developed, distinctly limited at the margins of the sleeves and collar. Because of the accumulation of dust and sweat, the elbow flexures and the skin under a tight collar are often lichenified. As already emphasized, airborne allergic contact dermatitis has no specific clinical features. Therefore,
there is no magic clue that leads to an unequivocal diagnosis. Anamnestic data, analysis of symptoms, and patch test results are needed to reach a correct conclusion.

In a recent observation, occupational conjunctivitis was the sole manifestation of airborne contact allergy to trimethylolpropane triacrylate (Mancuso and Berdondini 2008).

6.2 Differential Diagnosis

Differential diagnosis of facial airborne allergic contact dermatitis includes the following:

(a) “True” (or direct) contact allergic contact dermatitis. Asymmetry of facial lesions is a clinical sign in favor of “true” (or direct) allergic contact; this assertion has to be moderate, due to the fact that some airborne allergens can be sprayed on the face in an asymmetrical way at the workplace.

(b) Flare-up of the so-called id type, including eventually systemic contact dermatitis.

(c) Atopic dermatitis limited to the face. The distinction between both conditions is difficult to assess in many cases. The complexity of the problem has increased in recent years due to the current knowledge that facial signs of atopic dermatitis could be triggered, worsened, or even provoked by various allergens of high molecular weight (mainly proteins) present in house dust, pollens, molds, etc. This important current issue is discussed in detail in Sect. 9: “Exacerbation of ‘Extrinsic’ Atopic Dermatitis by Aeroallergens.”

(d) Photoallergic contact dermatitis, bearing in mind that some photoallergic reactions can be airborne related. In contrast to allergic airborne contact dermatitis, some parts of the face are partly or completely spared in non-airborne photo-allergic reactions: the eyelids, submental region, and retroauricular folds. In most cases, lesions of allergic airborne contact dermatitis are symmetrical.

(e) Seborrhoeic dermatitis, sometimes worsened by work conditions: irritant fumes or dusts, high temperature involving increased sweating, and so on.

(f) “Sebopsoriasis” is not uncommon and has also to be taken into account in the differential diagnosis. It can be triggered by work conditions, including contact with irritant fumes and dusts. Abundant sweating due to a high-temperature environment is a major cause of worsening of skin symptoms.

6.3 Main Allergens

The list of allergens responsible for occupational and/or environmental airborne allergic contact dermatitis is countless. The most important groups of allergens are listed in Table 2.
Some problems of current interest deserve special attention:

Occupational airborne allergic contact dermatitis to budesonide, even at very low concentrations, affecting nurses working in the hospital (Pontén 2006; Corazza et al. 2008; Baeck and Goossens 2009).

Plastic resin systems have an increasing diverse array of applications, which induce health hazards, in particular, occupational airborne allergic contact dermatitis. These resin systems include epoxies, (meth)acrylics, polyurethanes, phenol-formaldehydes, and polyesters, amino resins (melamine-formaldehydes, urea-formaldehydes, etc.). Some papers summarize the risks encountered (Cao et al. 2009; Geraut et al. 2009).

Parthenium dermatitis (Parthenium hysterophorus; parthenium weed) is a very common problem of occupational airborne allergic contact dermatitis in India and was extensively studied in recent years. Dermatitis occurs in farmers, with exacerbations during summer. It is sometimes photoaggravated, and rare cases of chronic actinic dermatitis have been recorded. Patch tests to *Parthenium* are positive (Sharma and Sethuraman 2007; Agarwal and D’Souza 2009). Parthenolide could also be an effective choice for patch testing (Mahajan et al. 2014).

There is a dramatic increase in the number of cases of allergic (non-airborne) and airborne allergic contact dermatitis to isothiazolinones (mainly but not exclusively methylisothiazolinone). Some of them are undoubtedly of occupational origin, due to the presence of various isothiazolinones used as preservatives in water-based paints and more recently in leather. The most complete review on the subject is the thesis of Olivier Aerts (2017) at the University of Antwerp (Belgium).

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**Table 2** Selected allergens responsible for occupational airborne allergic contact dermatitis

<table>
<thead>
<tr>
<th>Allergen Type</th>
<th>Specific Allergens</th>
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<tbody>
<tr>
<td>Animal feeds</td>
<td>Dogger Bank itch</td>
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<tr>
<td>Budesonide</td>
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</tr>
<tr>
<td>Chromate, i.e., from cement dust or from welding fumes</td>
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</tr>
<tr>
<td>Cinnamon</td>
<td></td>
</tr>
<tr>
<td>Cobalt, i.e., from cement dust</td>
<td></td>
</tr>
<tr>
<td>Colophony (in woodcutting and soldering)</td>
<td></td>
</tr>
<tr>
<td>Drugs (and/or chemicals used in the synthesis of drugs in the pharmaceutical industry)</td>
<td></td>
</tr>
<tr>
<td>Epoxy resin when heated, epoxy hardeners, and epoxy reaction diluents</td>
<td></td>
</tr>
<tr>
<td>Formaldehyde</td>
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</tr>
<tr>
<td>Isothiazolinones</td>
<td></td>
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<tr>
<td><em>Parthenium</em></td>
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<tr>
<td>Pesticides</td>
<td></td>
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<tr>
<td>Plastics such as acrylates, phenol-formaldehyde resins, etc.</td>
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</tr>
<tr>
<td>Sesquiterpene lactones, such as in Compositae or <em>Frullania</em></td>
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<tr>
<td>Woods (wood dust from exotic or indigenous woods)</td>
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7 Occupational Airborne Phototoxic and Photoallergic Contact Dermatitis

Phototoxic and/or photoallergic chemicals can be airborne. Practically, there is no clinical sign that allows a clear-cut distinction between direct contact and airborne contact.

Both produce a similar type of eruption. On theoretical grounds, phototoxic reactions are more sharply demarcated, whereas photoallergic reactions display ill-defined margins, but there are many exceptions to the general rule. On the other hand, it can be claimed that in non-airborne phototoxic or photoallergic reactions, some parts of the face are relatively or completely spared, whereas in airborne ones, no part is spared. Once again, the rule has many exceptions. Diagnosis is therefore based on carefully completed anamnestic data, analysis of symptoms and signs, and patch test and photopatch test results (Lachapelle et al. 1992).

Occupational airborne phototoxic agents are rarely involved: coal tar and derivatives, for example, anthracene, acridine, phenanthrene, pyrene, dyes, and furocoumarins are quoted in most textbooks. Photoallergenic molecules include fragrance ingredients (in the cosmetic industry), coal tar derivatives, olaquindox, and several drugs (in the pharmaceutical industry).

Combined airborne and photoaggravated contact allergy, as seen with Compositae and lichens, presents difficulties in diagnosis (Thune 1977).

Parthenium dermatitis (mentioned above) is a good example of such difficult problems.

8 Occupational Airborne (Immunological and/or Nonimmunological) Contact Urticaria

Occupational airborne contact urticaria has been underestimated in the past. In most cases, it is the clinical expression of an immunological reaction, of the immediate type, mediated by IgE. Allergy to natural rubber latex has now become a major health-care issue. Direct contact urticaria due to latex gloves affects both hands, but natural rubber latex proteins are absorbed onto the maize starch powder of gloves; these are released into the air when the packets are opened or gloves are pulled out of multipack boxes. The particles contaminate the air, and in operating theaters with recirculated air systems, the allergens can be spread to the whole theater suite and cause different clinical problems: urticarial plaques on the face (Fig. 6), conjunctivitis, rhinitis, and even asthma (Handfield-Jones 1998). The problem is more or less under control nowadays, due to the conjunction of three preventive measures: (a) the use of non-powdered latex gloves; (b) the improvement in the quality of latex gloves, in terms of allergenicity (removal of immunogenic proteins); and (c) the increasing use of non-latex surgical gloves (Kean and McNally 2009). Other offending agents responsible for occupational airborne immunological contact urticaria are cosmetics, fruit, vegetables, animals’ hair, ammonium persulfate, or anhydrides.
Nonimmunological airborne urticarial reactions are less frequent in occupational life.

9 Exacerbation of “Extrinsic” Atopic Dermatitis by Aeroallergens

It is convincingly proven that patients suffering from atopic dermatitis of exposed sites (the so-called face and neck dermatitis) are worsened by airborne contact with aeroallergens, especially house dust mite (Samochocki 2007). A recent study (Hallai and Gawkrodger 2009) has shown that 77% of patients presented with a positive atopy patch test reaction to human dust mite (20% in pet; Chemotechnique®) at day 4, as well as an elevated allergen-specific IgE level. This emphasizes the new concept of “extrinsic” atopic dermatitis, related to filagrin haploinsufficiency in the stratum corneum; this allows an increased penetration of high-molecular weight allergens into the skin. The impact of these studies has to be further evaluated in occupational dermatology. (Diepgen 2014).
10 Diagnostic Procedures

The diagnosis of occupational airborne contact dermatitis may be extremely difficult. The approach of each individual case requires various steps that can be discussed in an algorithmic way. The major issue is to determine whether the clinical symptoms evocate or not such a diagnosis. The classical tools available for diagnosing occupational contact dermatitis in general can be applied to occupational airborne contact dermatitis. These include anamnestic data, clinical symptoms, exacerbation (or not) of symptoms during work activities, determination of the occurrence of all offending agents at the workplace, knowledge of the chemical nature of these agents, etc.

When an airborne contact is reasonably suspected, the following strategy is recommended:

(a) Patch testing and/or photopatch testing

Patch tests and/or photopatch tests are performed in the usual way. There are no specific techniques that are recommended for airborne dermatitis. The methodology also includes additional procedures, such as open tests, semi-open tests, ROAT’s, and eventually use tests.

(b) Prick testing

Prick tests are needed when airborne contact urticaria or protein contact dermatitis (i.e., to latex or pollen proteins) is suspected.

(c) Procedures useful in the diagnosis of occupational irritant airborne contact dermatitis

Some procedures are available that permit to evaluate the potential accountability of some offending agents for provoking airborne irritancy of the skin. This approach cannot be achieved without the collaboration of occupational physicians and/or safety officers. It also requires laboratory equipment and dermatological expertise in the field.

The following steps are usually recommended:

Visit of the dermatologist at the workplace and analysis of the technical aspects of the work procedure.
Collection of samples (i.e., suspected fibers, dusts, or liquids sprayed in the air).
Analysis of samples, including pH, physical and chemical properties of chemicals, etc.
Determination of the presence of particles (and eventually of chemicals) in the skin (i.e., using skin surface biopsy).
Evaluation of the irritant potential of collected materials on the skin of workers or volunteers, by means of noninvasive techniques (such as transepidermal water loss, erythrometry, laser Doppler flowmetry, and others).
Evaluation of the relative rate of humidity in the air.
Use of an exposure chamber designed for experiments with controlled exposure to airborne particles, mainly skin and respiratory allergens and irritants. The aims
are to study skin effects and to develop methods for the measurement of deposition of particles on the skin (Lidén et al. 1998). Review of the relevant literature. Using such techniques does not lead – in many instances – to a final conclusion, but it allows recommendations in terms of preventive measures that will be applied and evaluated by occupational physicians.

11 Prevention and Treatment

Preventive measures are of course of prime importance to eradicate occupational airborne irritant and allergic contact dermatitis. They have been explained in detail in this chapter.

When dermatitis does occur, treatment strategies are multifaceted: topical treatments on the first line, that is, emollients, corticosteroids, and calcineurin inhibitors. Tacrolimus ointment is the treatment of choice for periorbital dermatitis.

Systemic treatments are sometimes required; for example, in severe cases of parthenium dermatitis, azathioprine is very useful and superior to betamethasone (Verma et al. 2008).

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