

Review Article

An update on airborne contact dermatitis

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This review is an update of 2 previously published articles on airborne contact dermatoses. Because reports in the literature often omit the term 'airborne', 18 volumes of *Contact Dermatitis* (April 1991–June 2000), 8 volumes of the *American Journal of Contact Dermatitis* (1992–1999) and 4 volumes of *La Lettre du Gerda* (1996–1999) were screened, and the cases cited were classified as to history, lesion locations, sensitization sources, and other factors. Reports on airborne dermatitis are increasingly being published, sometimes in relation to specific occupational areas.

Key words: airborne; contact dermatitis; allergic; irritant; occupational; photocontact; urticaria.
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Reports on airborne dermatitis are increasingly being published sometimes in relation to specific occupational areas (1–7).

In 1986 and 1991, respectively, we published extensive reviews of contact dermatitis caused by airborne agents (1,8). For the present update, we screened not only the additional 18 volumes of *Contact Dermatitis* published to date (April 1991–June 2000), but also 8 volumes of the *American Journal of Contact Dermatitis* (1992–1999) and 4 volumes of *La Lettre du Gerda* (1996–1999). We also included relevant articles from other journals. An allergen was judged to be airborne on the basis of the author's use of terms such as dust or volatile and of the distribution pattern of the dermatitis, the nature of the lesions, the history, the follow-up of the patients, and the results of epicutaneous testing.

Clinical Symptoms and Causal Agents

• Allergic contact dermatitis

Almost all airborne allergens identified were occupationally related. The causal agents described are: plants, particularly Compositae (Asteraceae), in which monoterpenes, rather than the sesquiterpene lactones, seem to be the airborne allergens (9), natural resins, woods, plastics (synthetic resins), rubbers, glues, metals, industrial and pharmaceutical chemicals, insecticides, pesticides, ani-

mal feed additives, herbicides, fungicides and miscellaneous allergens.

The following lists give the airborne allergens that we found in our survey of the journals. The lists do not pretend to be exhaustive.

1. Plants, natural resins, and wood allergens

Acacia melanoxylon (Australian blackwood) (10)
Alstroemeria (tulipalin A) (11)
anethole (12)
Apuleia leiocarpa wood (Brazilian wood) (13)
atranorin (metabolite of oak moss)* (14)
Bowdichia nitida (sucupira, South-American wood) (15)
champignon mushroom (16)
citrus fruits (lemon essential oils) (17)
Coleus plant* (18, 19)
colophonium (20–22, 23*) and pine dust (24)
Compositae (Asteraceae) (9, 25–27)
Dalbergia latifolia Roxb. (East-Indian rosewood) (28)
Dendranthema morifolium (29)
Entandophragma cylindricum (10)
essential oils* (30, 31)
Fraxinus americanus (a domestic wood) (32)
Frullania (liverwort) (33–35)
garlic (36)
Helianthus annuus (sunflower) (37)

iroko (*Chlorophora excelsa*, West-African hardwood) (38)
 lichens (14, 35)
Machaerium acutifolium (Bolivian rosewood, a tropical wood) (32)
Machaerium scleroxylon (Santos rosewood, pao ferro) (39)
Parthenium hysterophorus (40, 41)
Primula obconica (42)
 soybean (36)
 tea tree oil* (31)
 tropical woods (e.g. framire) (32, 43–46)
 wild plants (*Anthemis nobilis*, *Sisymbrium officinale*) (29, 47)

2. *Plastics, rubbers, glues*

acrylates (48, 49)
 aziridine derivatives (50)
 benzoyl peroxide (51, 52)
 diaminodiphenylmethane (53)
 dibutylthiourea (54)
 epoxy acrylates (55)
 epoxy resin (and amines) (56–67, 68*)
 formaldehyde (69) and formaldehyde resins (70)
 isocyanates (diphenylmethane-4,4'-diisocyanate) (66)
 isophoronediamine (71)
 triglycidyl isocyanurate (72, 73)
 unsaturated polyester resin (74)

3. *Metals*

arsenic salts (75)
 chromate (potassium dichromate) (76)
 cobalt (77)
 gold (78)
 mercury (79,80)
 nickel (81–83)

4. *Industrial and pharmaceutical chemicals*

albendazole (antihelminthic agent) (84)
 2-aminophenyldisulfide (85)
 2-aminothiophenol (85)
 apomorphine* (86)
 benzalkonium chloride (87, 88)
 bis-(aminopropyl)-laurylamine (89)
 budesonide* (90)
 cacodylic acid (91, 92)
 cefazolin (93)
 chloroacetamide (94)
 chlorprothixene (95)
 colour developers (96–98)
 dicyclohexyl carbodiimide (99, 100)
 didecyldimethylammonium chloride (89)
 difencyprone (101)

di-isopropyl carbodi-imide (99)
 DOPPI (102)
 ethylenediamine (103, 104)
 FADCP (105)
 famotidine and intermediates (106)
 hydroxylammonium chloride (96)
 isoflurane (107, 108)
 isothiazolinones (94, 109–112)
 metaproterenol (113)
 methyl red (dye) (114)
 nicergoline (115)
 ortho-chlorobenzylidenemalonitrile (116)
 paracetamol (117)
 phosphorus sesquisulfide (118)
 phthalocyanine pigments (119)
 propacetamol (120, 121)
 pyritinol (and pyritinol hydrochloride) (122)

5. *Pesticides and animal feed additives*

carbamates (fungicides) (123)
 cobalt (animal feed additive) (77)
 dyrene (124)
 ethoxyquin (antioxidant in animal feed) (125)
 olaquinox (126)
 oxytetracycline hydrochloride (animal feed antibiotic) (127)
 penicillin (animal feed antibiotic) (127)
 pyrethrum (128)
 spiramycin (animal feed antibiotic) (127)
 tetrachloroacetophenone (insecticide) (129)
 tylosin (animal feed antibiotic) (127, 130, 131)

6. *Miscellaneous*

cigarettes and matches (132)
Tyrophagus putrescentiae (133)
 pig epithelia (134)
 penicillium* (135)
 cladosporium* (135)

* Non-occupational

In addition to allergic contact dermatitis, other skin reactions induced by airborne allergens have also been reported.

- *Irritant contact dermatitis* due to CS gas (ortho-chlorobenzylidenemalonitrile) (116), mustard gas (yperite) (136), metal dust (137), carbon fibre (138), benzalkonium chloride (139), epoxy resin (61) and ethylene oxide (140).

- *Photoallergic reactions* (sometimes followed by transient or persistent light reactions) due to olaquinox (126), and the pesticides maneb and fenitrothion (141).

- *Contact urticaria* due to latex (4, 142), xylene

(143), buckwheat powder (144), isothiazolinones (109) and epoxy resin (145, 146).

- *Contact urticaria syndrome* (also extracutaneous effects such as conjunctivitis, rhinitis, and respiratory symptoms) due to latex (142), *Ficus benjamina* (147), *Morus alba* (mulberry) pollen (148), tropical woods (28), potato (149), chironomids (150), the chemicals methylhexahydrophthalic and methyltetrahydro-phthalic anhydrides (151, 152), 2-(2-butoxyethoxy)-ethanol (153), and ethylenediamine (154).

- *Erythema-multiforme-like eruption* with systemic symptoms caused by mercury (79), tropical woods (43,44), and pyrethrum (128).

- *Pigmented contact dermatitis* as manifestation of a *phototoxic reaction* in a carpenter caused by *Plathymenia foliosa* dust (155).

- *Other*: acne-like lesions, paresthesia, purpura, subcorneal pustular eruptions, photocontact urticaria, fixed drug eruptions, lichenoid eruptions, exfoliative eruptions, teleangiectases, pellagra-like dermatitis, hyper- and depigmentation, and lymphomatoid contact dermatitis (1, 8).

A particular product can cause several different reactions.

Conclusion

Dermatologists have become increasingly aware of the airborne nature of certain contact dermatitis problems. By screening journals on contact dermatitis published since 1991, we have found even more references in comparison to our past 2 review publications. Occupationally-induced reactions are still by far the most common. The sources of the reactions may be multiple and we could detect several new agents causing airborne dermatoses, reminding us of the fact that we should always perform an extended anamnesis when lesions are located on air-exposed areas.

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