



## Respiratory sensitisers

### Introduction

For the European Week for Safety and Health at Work 2003, the Agency is producing a series of factsheets focusing on the communication of occupational safety and health-related information on dangerous substances. Respiratory sensitisers are biological and chemical agents that can induce allergic respiratory diseases in humans. This factsheet discusses important characteristics of the exposure to these agents and appropriate prevention measures.

### What causes occupational respiratory problems?

Reactions in the airways and lungs of workers breathing in substances and particles at work fall into three main categories:

1. Many known diseases, such as asbestosis or silicosis, are caused by fibres and particles being deposited in the respiratory tract.
2. Several types of natural and synthetic agents used in workplaces may also cause allergic respiratory diseases, occupational asthma, rhinitis or alveolitis, which have increased constantly over the last years (1).
3. Respiratory irritants, such as environmental tobacco smoke, chlorine, general dust and even cold air, may provoke attacks in those with pre-existing asthma. In this case, the individual does not become sensitised to that specific agent, but the attack is still work-related.

### What are allergic respiratory diseases?

The response of the human immune system against external threats posed by chemical and biological agents may be an allergic reaction in the airways. Symptoms include coughing, tightness of breathing, wheezing and breathlessness, sneezing, runny and blocked nose, itchy and inflamed red eyes, and also fever, muscle and joint aches.

All these diseases have certain common features:

- repeated exposures, either long term low-level or short term peaks, are needed before the disease develops. During this period, no symptoms exist
- only some of those exposed are affected
- when a person has been sensitised, even tiny amounts of the substance and each contact can trigger the symptoms at much lower levels than those that initially caused the hypersensitive state.

Symptoms can develop either immediately after exposure, or several hours later, possibly at night, so that a link with workplace activities is not obvious. They often improve when the worker is away from work, during weekends and holidays.

### What are respiratory sensitisers?

EU Directives (2) list sensitising substances. The respiratory sensitisers have to be labelled with the R-phrases R42 "May cause sensitisation by inhalation" or R 42/43 "May cause sensitisation by inhalation and skin contact".

Nevertheless, the most common respiratory sensitisers found in the workplace are not classified and labelled as such. Many are of natural origin, mostly proteins and biological agents commonly occurring in our living environment, but also typical to certain working processes.

Some respiratory sensitisers and related occupations are listed in the following tables.

### Respiratory sensitisers from natural origin

| Sensitiser                                                                                                                                                 | Occupation/sector                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Animal epithelia and urine proteins                                                                                                                        | Farmers, cattle tenders, veterinarians, laboratory workers                                |
| Colophony (pine resin)                                                                                                                                     | Soft solderers, electronics industry, metal or electrical processors, makers or repairers |
| Decorative plants                                                                                                                                          | Florists, gardeners, and botanists                                                        |
| Some foodstuff, plants and vegetables (e.g. coffee bean dust, egg proteins, flour and grain dust, fruits, vegetables, fish, seafood, soybean dust, spices) | Farmers, food processing, cooks, kitchen workers, dock handling, bakers, millers, brewers |
| Natural rubber latex proteins                                                                                                                              | Health care, laboratory workers, food processing                                          |
| Moulds                                                                                                                                                     | Farmers, bakers, greenhouse and sawmill workers                                           |
| Storage mites                                                                                                                                              | Bakers, millers, farmers, food processing and stock room workers                          |
| Textile fibres (3)                                                                                                                                         | Textile industry, sericulture                                                             |
| Some wood dusts incl. composite boards                                                                                                                     | Carpenters, woodworkers, sawmill workers                                                  |

### Chemicals

| Source                                                                                                                                                                                        | Occupation/sector                                                                                                                                                                                                              | Sensitiser                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Resins, glues and paints<br>Dental material, paints and varnishes<br>Epoxy resins and hardeners, moulding and adhesive bonding<br>Hardeners in paints, glues and resins<br>Polyurethane foams | Dental workers, mechanics, (spray) painters, moulding laminators, foundry, chemical and plastics workers, construction, insulators, metal or electronic/electrical processors, makers and repairers, resin and wood processing | Acid anhydrides<br>Aliphatic, cycloaliphatic or aromatic amines<br>Isocyanates<br>Formaldehyde |
| Preservatives                                                                                                                                                                                 | Metal workers, cleaners, chemical, laboratory, plastics and textile workers                                                                                                                                                    | Diethanolamines<br>Formaldehyde and formaldehyde releasers                                     |
| Drugs                                                                                                                                                                                         | Pharmaceutical industry, laboratories, chemists, health care                                                                                                                                                                   | Antibiotics                                                                                    |
| Food additives, detergents                                                                                                                                                                    | Bakers, food processing, pharmaceutical and laboratory workers, textile and detergent industry                                                                                                                                 | Enzymes (papain, alpha amylases, proteases)                                                    |
| Welding fumes, metals, electroplating chemicals                                                                                                                                               | Welders, metal workers, platers, refiners, grinders, glass industry                                                                                                                                                            | Metal fumes and salts, metal carbides                                                          |
| Hair dyes                                                                                                                                                                                     | Hairdressers, beauticians                                                                                                                                                                                                      | Paraphenylenediamine, henna                                                                    |
| Bleaching agents                                                                                                                                                                              | Hairdressers, laundry workers, chemical, food and paper industry,                                                                                                                                                              | Persulphates, sulphites and bisulphites                                                        |
| Textile chemicals and fibres, incl. finishing                                                                                                                                                 | Textile workers                                                                                                                                                                                                                | Reactive dyes, synthetic fibres, (4) formaldehyde                                              |

### Managing respiratory sensitisers

EU regulations (5) define the order of prevention measures as follows:

(1) French research has estimated that 5-10% of all asthma cases are work-related. In the UK, there are about 3,000 new occupational asthma cases each year. This rises to 7,000 if cases of asthma aggravated by work are included.

(2) Directives 67/548/EEC of 27 June 1967 and 1999/45/EC and amendments presenting requirements for testing, classification, packaging and labelling of dangerous substances and preparations, esp. Commission Directive 2001/59/EC of 6 August 2001 adapting to technical progress for the 28th time Council Directive 67/548/EEC.

(3) Cotton, flax, hemp, jute, kapok, silk, sisal, wool.

(4) Nylon, Orlon, Rayon.

(5) Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work and Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work.

Employers should

### 1. Assess the risks

Identify the hazards - which substances with the potential to cause asthma are used or generated by work activity. Remember that biological **and** chemical substances can lead to allergic respiratory diseases. Decide who might be harmed, and how.

### 2. Eliminate or substitute

The best option is to avoid use and exposure to these agents by substituting them with a less dangerous substance. Sensitising agents can cause allergic sensitisation in concentrations below the conventionally set occupational exposure limit values. Even very low exposure to sensitisers in the workplace levels may lead to allergic respiratory symptoms in workers already sensitised.

### 3. Prevent exposure

If substitution is not possible, minimise the exposure concentration, time, frequency and number of workers exposed. Decide whether existing precautions are adequate or if more should be done.

Draw up a respiratory protection plan:

- **Manage emissions at the source.** Include **systematic dust and aerosol prevention by:**
  - modifying the working process. Avoid work procedures producing dusts, aerosols or vapours
  - using substances in a less hazardous form e.g. as pellets or pastes instead of powders or liquids
  - using **closed systems for filling and transferring** e.g. powdery **substances** or fibres
  - controlling emission with effective encapsulations, ventilation, fume hoods and other workplace arrangements
  - drawing up a **maintenance and cleaning plan** including intervals, cleaning methods and devices. Use wet methods or vacuum cleaners instead of brooms.
- **Personal respiratory protective devices** should be used in addition to other practicable control measures if exposure cannot be otherwise prevented. It has to comply with EU regulations (\*).
  - Select the most suitable protective device for each work task or exposure. Refer to the producer's guidance for appropriate choice
  - Respirators should only be used by one worker and not be shared.
  - In regular use, the device should be kept in good condition, cleaned after use, filters changed as appropriate and the device checked for technical or other damage.
  - Lay down written procedures for regular cleaning, disinfecting, storing, inspection, repairing, discarding and maintaining respirators.

Further points to consider:

#### Inform and train workers about

- respiratory sensitisers they are exposed to
- safe work practices
- the proper use of respirators, including putting on and removing them, any limitations on their use and maintenance and to whom to report respiratory problems.

**Monitor exposure and health problems** regularly and re-assess, especially if the working methods are changed. In case of respiratory symptoms that could be related to work, medical examinations should be performed.

#### Record the findings.

#### Consult workers and/or their representatives:

- when assessing risks, exposures and respiratory problems occurring in workplaces
- when substituting dangerous substances
- on the choice of PPE
- on the results of monitoring, including health monitoring.

(\*). Directive 89/686/EC relating to personal protective equipment



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#### Latex allergy: a multifaceted risk

For some workers, exposures to latex may result in skin rashes, hives, flushing, itching, nasal, eye, or sinus symptoms, asthma, and (rarely) shock. Reports of such allergic reactions to latex have increased in recent years among health care workers, but also among others that use gloves or medical equipment made of natural latex. The main risk is from skin contact with latex proteins and breathing in dust from powdered gloves. These workers may also develop allergies to some foodstuff and other natural proteins as a consequence of the latex use, a major limitation in their lives. Some of them have to leave their workplace due to their acquired hypersensitivity.

Limiting the content in specific proteins for latex products, avoiding powdered gloves and substituting natural latex with other materials for regularly used gloves and equipment have helped reduce this risk considerably.



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#### Flour dust: a risk for bakers?

During the early 1980s, a rise in asthma diseases was seen in bakers. Enzymes increasingly used as food additives in flour and baking products have been identified as a main cause. But wheat, rye and soya flour and pollen also contribute. The occurrence of moulds is also common in these very warm and humid workplaces.

Measures should be targeted at high dust concentrations in bakeries. Enzyme products used in bakeries are increasingly offered as granulated, liquid or encapsulated products, which prevents them from being dispersed with dust. Other factors, such as hygiene and changes in well-established work procedures have contributed to a reduction in bakers' asthma cases.

#### Further information

Other factsheets available in this series on dangerous substances and further information are also available at <http://osha.eu.int/ew2003/>. This source is being continually updated and developed.