



Position paper on ototoxic industrial chemicals
Issued by Working Group “Noise” and Working Group “Hazardous Substances”,
of the DGUV’s Committee for Occupational Medicine

The experts on the DGUV’s Occupational Medicine committee develop guidelines for occupational medical examinations with the aim of protecting the health of workers at work. If new health risks come to light or there is a suspicion of a link between established risks, they assess the current state of knowledge.

This approach was the catalyst for an event, entitled “Ototoxicity – a new challenge in the prevention of hearing damage?”, which was held in Hennef on 4 and 5 July 2006. The results of the discussions that took place there between experts from various scientific disciplines and workplace practitioners are published in this position paper, the aim being to inform those responsible for occupational safety and health (OSH) in enterprises about the current level of knowledge and thus to provide them with guidance.

Scientists and other experts have recently become increasingly concerned about the possibility of chemical-induced damage to the hearing (ototoxicity) at the workplace. Their concerns stem from the findings of animal experiments which showed that chemicals had caused relevant hearing damage, particularly in rodents. Numerous epidemiological studies on workers in various industries generally support these findings.

At the international level, the scientific debate has resulted in the problem of ototoxicity being taken into consideration in EU legislation. The EU Noise Directive, for instance, stipulates that employers must take into account the “interactions between noise and work-related ototoxic substances” when conducting risk assessments.

The term “work-related ototoxins” refers to a variety of chemicals with different properties, of which the toxicology and potential risk for the hearing are not always adequately known. In particular, there has not been much investigation of pathomechanisms, dose/response relationships or effect levels.

With regard to scientific findings relating to human beings, a point worthy of criticism is that a precise recording of exposure is problematic and there is hardly any knowledge about ototoxic effects in the exposure conditions prevalent at today's workplaces. There is also no reliable data on the possible combined effects of noise and ototoxic industrial chemicals.

The knowledge presently available is so incomplete that it is currently not possible to determine with the necessary accuracy whether the chemicals suspected of posing a risk do constitute substantial risks in the world of work and, if so, which chemicals cause the risks and under which working conditions risks might occur.

The following is an alphabetical list of the substances that are of most significance with regard to occupational exposure and whose ototoxic effect is currently being discussed (adapted from Morata & Little, 2002, NIOSH; EC Noise Guide; NoiseChem):

Benzene	Carbon disulphide	Carbon monoxide
Cyanide	Lead	Mercury
n-hexane	Solvents	Styrene
Toluene	Trichloroethylene	Xylene

So far, neither the German nor the EU specifications for the limit values relating to these substances take into account the ototoxic effect.

During the panel discussion at the event, the participants agreed the following conclusions regarding the current workplace situation:

- 1) If the current limit values for ototoxic industrial chemicals are adhered to, the probability of significant hearing loss is low.
- 2) There can be a higher risk in activities involving ototoxic industrial chemicals if the limit values are exceeded (e.g. when processing styrene).
- 3) Noise is the highest risk factor for hearing damage. Going by the knowledge currently available, effects of a similar proportion to those caused by other confounders (for example, cigarette smoke or a genetically determined heightened sensitivity to noise) cannot be ruled out if there is also a high exposure to ototoxic substances. Measures to combat noise-induced hearing loss continue to have top priority.

In keeping with the precautionary principle of the EU Commission, which calls for an adequate level of protection for employees even when the scientific data available is insufficient, ambiguous or unreliable, the following recommendations are hereby made:

- risk-management measures aimed at decreasing exposure to ototoxic industrial chemicals (substitution, reduction of emissions, changes in processing and production techniques, etc.) should be supported;
- public risk communication, including all points of contact (manufacturers, users, company physicians and safety specialists), should be promoted;
- the issue should be incorporated into occupational health-screening activities (education of and provision of advice to employers and employees; consideration when assessing the patient's history);
- scientific approaches (e.g. longitudinal studies) aimed at characterising the risk potential of ototoxic industrial chemicals and their effect when combined with noise should be supported for the purposes of hazard assessment;
- tools for early diagnosis should be developed;
- the ototoxicity endpoint should be taken into account when specifying occupational exposure limits; and
- a list of ototoxic industrial chemicals, like the list of neurotoxic solvents compiled for occupational disease BK 1317 "Polyneuropathy or encephalopathy caused by organic solvents or mixtures of the same", should be drawn up and agreed on.

Sankt Augustin, 17 July 2006

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